

**DOMINO SUGAR SITE D**

**330-350 KENT AVENUE**

**BROOKLYN, NEW YORK**

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# **Remedial Action Work Plan**

**NYC VCP Number: 15CVCP004K**

**E-Designation Site Number: 14EHAN586K**

**Prepared for:**

Two Trees Management, LLC

45 Main Street, Suite 602

Brooklyn, NY 11201

**Prepared by:**

***EBC***

***ENVIRONMENTAL BUSINESS CONSULTANTS***

1808 Middle Country Road

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**AUGUST 2014**

# REMEDIAL ACTION WORK PLAN

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## LIST OF ACRONYMS

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

# CERTIFICATION

I, Ariel Czemerinski, am a Professional Engineer licensed in the State of New York. I have primary direct responsibility for implementation of the remedial action for the Domino Sugar Site B Redevelopment Project located at 332-350 Kent Avenue, Brooklyn, NY, NYC VCP Site number 15CVCP004K and OER Project No. 14EHAN586K.

I certify that 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

\_\_\_\_\_  
NYS PE License Number

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date



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## EXECUTIVE SUMMARY

Two Trees Management, LLC has applied to enroll in the New York City Voluntary Cleanup Program (NYC VCP) to investigate and remediate a 48,484 ft<sup>2</sup> Site located at 332-350 Kent Avenue in Brooklyn, New York. A remedial investigation (RI) was performed to compile and evaluate data and information necessary to develop this Remedial Action Work Plan (RAWP). The remedial action described in this document provides for the protection of public health and the environment consistent with the intended property use, complies with applicable environmental standards, criteria and guidance and conforms with applicable laws and regulations.

### Site Location and Current Usage

Domino Sugar Site D is located at 332 to 350 Kent Avenue in the Williamsburg-South Side section of Brooklyn, New York, and is currently identified as a portion of Block 2414 Lot 1 on the New York City Tax Map. Figure 1 shows the Site location. Lot 1 is a 717,000 ft<sup>2</sup> water front lot located on the west side of Kent Avenue between Grand Street to the north and South 5th Street to the south. Lot 1 has historically consisted of multiple industrial/commercial buildings utilized by the Domino Sugar Company and other sugar refinery companies. All of the buildings on Lot 1, with the exception of the Refinery Building, are currently being demolished. The portion of Lot 1 identified as Site D was developed with 4-story brick building identified as the Adant House, which was originally used for processing sugar into cubes, and a portion of the former Domino Sugar Packaging House, which also bordered the Site to the north and west.

Site D is currently bordered by Site C to the north (which includes the former Domino Sugar Packaging House building), South 5th Street to the south, Kent Avenue to the east and the southern portions of the former Domino Sugar Packaging House building to the west. Site D is approximately 48,474 ft<sup>2</sup>, and consists of 249.5 feet of street frontage on Kent Avenue and a length of approximately 224.875 ft along the northern property boundary.

Following redevelopment, Site D will be subdivided to create a new tax lot (Proposed Lot D), and newly mapped streets including South 4th Street and River Street. A new recreational and

shoreline walkway/park will be created on the opposite side of River Street, which will span along the west side of Sites A, B, C, D and F.

Following redevelopment, Proposed Lot D will be bordered by Kent Avenue to the east, newly mapped South 4th Street to the north, and newly mapped River Street to the west and south. Proposed Lot D will consist of approximately 204.5 feet of street frontage on Kent Avenue, and 179.875 feet of street frontage on South 4th Street, creating a 27,017 ft<sup>2</sup> lot. The portion of Site D which will be converted into Proposed Lot D currently consists of a portion of the recently demolished 4-story brick building identified as the Adant House, which was originally used for processing sugar into cubes, as well as a portion of the recently demolished Domino Sugar Packaging House.

Site D (Proposed Lot D and the areas of each of the newly mapped streets), was investigated as part of the Remedial Investigation and are discussed within this Remedial Investigation Report. A map of the current site boundary for both Site D (as shown in blue dash marks) and Proposed Lot D (as shown in red dash marks) is shown on Figure 2.

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

Redevelopment of the former Domino Sugar properties (Block 2414, Lot 1 and Block 2428, Lot 1) will include four new mixed-use buildings (Sites A, B, D, E), adaptively reuse the existing landmarked Refinery building (Site F), create a one acre inland green space to be called Domino Square (Site C) and develop a new waterfront park. The redevelopment project would encompass approximately 3 million ft<sup>2</sup>, consisting of approximately 2.2 million ft<sup>2</sup> of residential floor area (to consist of both market rate and affordable housing), 500,000 ft<sup>2</sup> of commercial space, and 150,000 ft<sup>2</sup> of community facility space, as well as approximately 1,050 parking spaces. Publicly accessible open space, totaling approximately 4.8 acres, would also be created along the waterfront and throughout the Development Site. Additionally, new public sidewalks and streets (extension of South 1st Street, South 2nd Street, South 3rd Street and South 4th Street, and creation of River Street between Sites A, B, C, D and F and the waterfront park) totaling approximately 2.0 acres are proposed, providing increased public access to the waterfront.

In mixed-use buildings, residential units would generally be located on the upper floors, while office, retail, and community facility uses, including a 375-seat school within the Site B building, would generally occupy the ground and lower floors, activating the streetscape and drawing people to the redevelopment project's open space.

The public access areas would be landscaped with large lawn areas and improved with planters and seating areas. This area would be programmed for passive uses, including seating areas and an artifact walk with historic elements from the Domino Sugar factory buildings on display, and active uses, such as playing fields and a dog run. The portion of the waterfront park to be constructed immediately west of Site D will consist of the active recreation area, which will include lawn areas, a dog run, and a bocce ball court. The waterfront park immediately west of Site D will be redeveloped under a separate Remedial Action Work Plan from Site D.

The proposed future use of Proposed Lot D will consist of a new mixed-use building that will consist of a 36 floor southern tower and a 30 floor northern tower. The 36 floor southern tower will be approximately 401 feet tall, and the 30 floor northern tower will be approximately 321 feet tall, and will contain a total of approximately 529,000 ft<sup>2</sup>, consisting of commercial health club use, commercial retail use and residential use.

The cellar level of the building to be constructed on Proposed Lot D will have a 10,864 ft<sup>2</sup> commercial storage area, a 12 car parking garage that will be accessible by car elevator from South 4th Street, a 2,750 ft<sup>2</sup> parking storage area, and space for the electrical, telecom, gas, water, sewer, mechanical and fire pump rooms. The ground level will consist of 6 separate retail spaces (Retail-SW 806 ft<sup>2</sup>, Retail-NW 1,013 ft<sup>2</sup>, Retail-NE 4,929 ft<sup>2</sup>, Retail-SE 1,706 ft<sup>2</sup>, Retail-N 1,952 ft<sup>2</sup>, and Retail-S 1,697 ft<sup>2</sup>), an office lobby, the residential lobbies for the two towers, the car elevator to the cellar level parking garage from South 4th Street, and a loading dock. The second, third and fourth floors will consist of residential apartments along Kent Avenue and South 4th Street, and there will be a 13,366 ft<sup>2</sup> commercial space along River Street on both the 2nd and 3rd floors. Floors 5 through 8 will consist of residential apartments along Kent Avenue and South 4th Street. The building will then divide into two separate towers. All of the upper floors will consist of residential apartments, and the roofs will house the generator, electrical rooms, boiler rooms, Cogen rooms, and elevator shafts.

The cellar level will occupy the majority Proposed Lot D, with the exception of a small area at the corner of Kent Avenue, South 5th Street and River Street. Excavation to a depth of approximately 4 to 5 feet below grade will be performed in this area. The cellar slab will be constructed at an elevation of approximately 4 feet, but the foundation will consist of a 5 ft thick pile-supported mat slab. Therefore, the eastern end of Site D will require excavation to a depth of approximately 22 feet below grade, the middle portion will require excavation to a depth of approximately 17 feet, and the western end of Site will require excavation to a depth of approximately 12 feet below grade. Assuming an average excavation depth of approximately 17 feet, an estimated 17,010 cubic yards (25,500 tons) of soil will require excavation for the building's cellar level. In addition, five elevator pits will be excavated to a depth of approximately 8 feet beyond the building slab. Layout of the proposed site development is presented in Figure 3. Excavation depths are shown in Figure 5. The current zoning designation is C6-2. The proposed use is consistent with existing zoning for the property.

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

### **Summary of the Remedy**

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

The proposed remedial action will consist of:

1. Preparation of a Community Protection Statement and performance of all required NYC VCP Citizen Participation activities according to an approved Citizen Participation Plan;
2. Performance of a Community Air Monitoring Program for particulates and volatile organic carbon compounds;
3. Establishment of Site-Specific (Track 4) Soil Cleanup Objectives (SCOs);
4. Site mobilization involving Site security setup, equipment mobilization, utility mark outs

- and marking & staking excavation areas;
5. Performance of geophysical/test pits/trenches prior to start of building construction in proposed roads area and areas of the building footprint where excavation will not occur;
  6. Completion of a Waste Characterization Study prior to excavation activities;
  7. Excavation and removal of soil/fill exceeding Track 4 Site-Specific SCOs. For development purposes, excavation for the building's cellar would take place to a depth of approximately 22 feet on the eastern end of Proposed Lot D, 17 feet in the middle portion of the lot, and 12 feet on the western end of Proposed Lot D. Excavation to a depth of approximately 4 to 5 feet below grade would be performed in the southern end of Proposed Lot D, within the area that will be slab-on grade. If soil/fill containing analytes at concentrations above Track 4 Site-Specific SCOs is still present at the base of the excavation after removal of all soil required for construction of the buildings is complete, additional excavation will be performed to meet Track 4 Site-Specific SCOs. Approximately 25,500 tons of soils will be excavated and removed from this Site;
  8. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID;
  9. Management of excavated materials including temporarily stockpiling and segregating to prevent co-mingling of contaminated material and non-contaminated materials.
  10. Removal of underground storage tanks (USTs) (if encountered) and closure of petroleum spills (if evidence of a spill/leak is encountered during Site excavation) in compliance with applicable local, State and Federal laws and regulations;
  11. Transportation and off-Site disposal of all soil/fill material at permitted facilities in accordance with applicable laws and regulations for handling, transport, and disposal, and this plan. Sampling and analysis of excavated media as required by disposal facilities. Appropriate segregation of excavated media on-Site;
  12. Collection and analysis of end-point samples to determine the performance of the remedy with respect to attainment of SCOs;
  13. Import of materials to be used for backfill and cover in compliance with this plan and in accordance with applicable laws and regulations;
  14. Installation of an active Sub-Slab Depressurization System (SSDS) below the entire portion of the building not utilized as a parking garage. The SSDS system will be

- installed in the gravel layer beneath the new building slab;
15. Installation of a waterproofing membrane system below the cellar slab and slab on-grade portion of the building, as well as behind subgrade portions of foundation walls of the proposed building. The waterproofing membrane system will consist of Preprufe 300R and Bituthene 4000 as manufacturing by Grace. Preprufe 300 is a 1.2 mm (0.046in) thick HDPE film with a pressure sensitive adhesive that bonds to the poured concrete. Preprufe 300 will be installed below the building's cellar slab and on grade portion of the building slab along River Street. Bituthene 4000 is a flexible preformed waterproof membrane combining a high performance cross laminated, HDPE carrier film with a unique super sticky self-adhesive rubber bitumen compound. Bituthene 4000 will be installed behind the building's foundation walls to grade;
  16. Construction and maintenance of an engineered composite cover consisting of the building's 2.5 ft (at-grade) and 5 ft (cellar) thick pile-supported mat building slab to prevent human exposure to residual soil/fill remaining under the Site. Sidewalks and roadways will consist of a geotextile layer installed above a prepared subgrade, a 6 inch thick layer of a compacted aggregate base, and a 4 inch or 7 thick layer of concrete (sidewalks/driveways) or a layer of asphaltic concrete binder course below a asphaltic concrete top course (street);
  17. Performance of all activities required for the remedial action, including permitting requirements and pretreatment requirements, in compliance with applicable laws and regulations;
  18. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations;
  19. Submission of a Remedial Action Report (RAR) that describes the remedial activities, certifies that the remedial requirements have been achieved, defines the Site boundaries, describes all Engineering and Institutional Controls to be implemented at the Site, and lists any changes from this RAWP;
  20. Submission of an approved Site Management Plan (SMP) in the RAR for long-term management of residual materials, including plans for operation, maintenance, inspection and certification of Engineering and Institutional Controls and reporting at a specified frequency; and

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

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## COMMUNITY PROTECTION STATEMENT

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

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

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

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

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

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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 plan are in compliance with safety requirements of the United States Occupational Safety and Health Administration (OSHA). This plan includes many protective elements including those discussed below.

**Site Safety Coordinator.** This project has a designated Site Safety Coordinator to implement the Health and Safety Plan. The Site Safety Coordinator maintains an emergency contact sheet and protocol for management of emergencies. The Site Safety Coordinator is Mr. Kevin Waters of Environmental Business Consultants. Mr. Waters can be reached at (631) 504-6000.

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

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

**Odor, Dust and Noise Control.** This cleanup plan includes actions for odor and dust control. These actions are designed to prevent off-Site odor and dust nuisances and includes steps to be taken if nuisances are detected. Generally, dust is managed by application of physical covers and by water sprays. Odors are controlled by limiting the area of open excavations, physical covers, spray foams and by a series of other actions (called operational measures). The project is also required to comply with NYC noise control standards. If you observe problems in these areas, please contact the on-Site Project Manager, Mr. Kevin Waters at (631) 504-6000 or NYC Office of Environmental Remediation Project Manager, Ms. Shana Holberton (212) 788-3220.

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

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

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

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

**Complaint Management.** The contractor performing this cleanup is required to address all complaints. If you have any complaints, you can call the facility Project Manager, Mr. Kevin Brussee (EBC) at (631) 504-6000, the NYC Office of Environmental Remediation Project Manager, Shana Holberton at (212) 788-3220, or call 311 and mention the Site is in the NYC Voluntary Cleanup Program.

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

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

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

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

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

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

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

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

**Truck Routing.** Truck routes have been selected to: (a) limit transport through residential areas and past sensitive nearby properties; (b) maximize use of city-mapped truck routes; (c) limit total distance to major highways; (d) promote safety in entry to highways; (e) promote overall safety

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in trucking; and (f) minimize off-Site line-ups (queuing) of trucks entering the property. Operators of loaded trucks leaving the Site will be instructed not to stop or idle in the local neighborhood.

**Final Report.** The results of all cleanup work will be fully documented in a final report (called a Remedial Action Report) that will be available for you to review online at OER's website.

**Long-Term Site Management.** To provide long-term protection after the cleanup is complete, the property owner will be required to comply with an ongoing Site Management Plan (if Track 1 is not achieved) that calls for continued inspection of protective controls, such as Site covers. The Site Management Plan is evaluated and approved by the NYC OER. Requirements that the property owner must comply with are established through a city environmental designation. A certification of continued protectiveness of the cleanup will be required from time to time to show that the approved cleanup is still effective.

# REMEDIAL ACTION WORK PLAN

## 1.0 SITE BACKGROUND

Two Trees Management, LLC has applied to enroll in the New York City Voluntary Cleanup Program (NYC VCP) to investigate and remediate a property located at 332 to 350 Kent Avenue in the Williamsburg section of Brooklyn, New York (the Site). A Remedial Investigation (RI) was performed to compile and evaluate data and information necessary to develop this Remedial Action Work Plan (RAWP) in a manner that will render the Site protective of public health and the environment consistent with the contemplated end use. This RAWP establishes remedial action objectives, provides remedial alternatives analysis that includes consideration of a permanent cleanup, and provides a description of the selected remedial action. The remedial action described in this document provides for the protection of public health and the environment, complies with applicable environmental standards, criteria and guidance and applicable laws and regulations.

### 1.1 Site Location and Current Usage

Domino Sugar Site D is located at 332 to 350 Kent Avenue in the Williamsburg-South Side section of Brooklyn, New York, and is currently identified as a portion of Block 2414 Lot 1 on the New York City Tax Map. Figure 1 shows the Site location. Lot 1 is a 717,000 ft<sup>2</sup> water front lot located on the west side of Kent Avenue between Grand Street to the north and South 5th Street to the south. Lot 1 has historically consisted of multiple industrial/commercial buildings utilized by the Domino Sugar Company and other sugar refinery companies. All of the buildings on Lot 1, with the exception of the Refinery Building, are currently being demolished. The portion of Lot 1 identified as Site D was developed with 4-story brick building identified as the Adant House, which was originally used for processing sugar into cubes, and a portion of the former Domino Sugar Packaging House, which also bordered the Site to the north and west.

Site D is currently bordered by Site C to the north (which includes the former Domino Sugar Packaging House building), South 5th Street to the south, Kent Avenue to the east and the southern portions of the former Domino Sugar Packaging House building to the west. Site D is approximately 48,474 ft<sup>2</sup>, and consists of 249.5 feet of street frontage on Kent Avenue and a length of approximately 224.875 ft along the northern property boundary.



Following redevelopment, Site D will be subdivided to create a new tax lot (Proposed Lot D), and newly mapped streets including South 4th Street and River Street. A new recreational and shoreline walkway/park will be created on the opposite side of River Street, which will span along the west side of Sites A, B, C, D and F.

Following redevelopment, Proposed Lot D will be bordered by Kent Avenue to the east, newly mapped South 4th Street to the north, and newly mapped River Street to the west and south. Proposed Lot D will consist of approximately 204.5 feet of street frontage on Kent Avenue, and 179.875 feet of street frontage on South 4th Street, creating a 27,017 ft<sup>2</sup> lot. The portion of Site D which will be converted into Proposed Lot D currently consists of a portion of the recently demolished 4-story brick building identified as the Adant House, which was originally used for processing sugar into cubes, as well as a portion of the recently demolished Domino Sugar Packaging House.

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## 1.2 Proposed Redevelopment Plan

Redevelopment of the former Domino Sugar properties (Block 2414, Lot 1 and Block 2428, Lot 1) will include four new mixed-use buildings (Sites A, B, D, E), adaptively reuse the existing landmarked Refinery building (Site F), create a one acre inland green space to be called Domino Square (Site C) and develop a new waterfront park. The redevelopment project would encompass approximately 3 million ft<sup>2</sup>, consisting of approximately 2.2 million ft<sup>2</sup> of residential floor area (to consist of both market rate and affordable housing), 500,000 ft<sup>2</sup> of commercial space, and 150,000 ft<sup>2</sup> of community facility space, as well as approximately 1,050 parking spaces. Publicly accessible open space, totaling approximately 4.8 acres, would also be created along the waterfront and throughout the Development Site. Additionally, new public sidewalks and streets (extension of South 1st Street, South 2nd Street, South 3rd Street and South 4th Street, and creation of River Street between Sites A, B, C, D and F and the waterfront park) totaling approximately 2.0 acres are proposed, providing increased public access to the waterfront.

In mixed-use buildings, residential units would generally be located on the upper floors, while office, retail, and community facility uses, including a 375-seat school within the Site B building, would generally occupy the ground and lower floors, activating the streetscape and drawing people to the redevelopment project's open space.

The public access areas would be landscaped with large lawn areas and improved with planters and seating areas. This area would be programmed for passive uses, including seating areas and an artifact walk with historic elements from the Domino Sugar factory buildings on display, and active uses, such as playing fields and a dog run. The portion of the waterfront park to be constructed immediately west of Site D will consist of the active recreation area, which will include lawn areas, a dog run, and a bocce ball court. The waterfront park immediately west of Site D will be redeveloped under a separate Remedial Action Work Plan from Site D.

The proposed future use of Proposed Lot D will consist of a new mixed-use building that will consist of a 36 floor southern tower and a 30 floor northern tower. The 36 floor southern tower will be approximately 401 feet tall, and the 30 floor northern tower will be approximately 321 feet tall, and will contain a total of approximately 529,000 ft<sup>2</sup>, consisting of commercial health club use, commercial retail use and residential use.

The cellar level of the building to be constructed on Proposed Lot D will have a 10,864 ft<sup>2</sup> commercial storage area, a 12 car parking garage that will be accessible by car elevator from South 4th Street, a 2,750 ft<sup>2</sup> parking storage area, and space for the electrical, telecom, gas, water, sewer, mechanical and fire pump rooms. The ground level will consist of 6 separate retail spaces (Retail-SW 806 ft<sup>2</sup>, Retail-NW 1,013 ft<sup>2</sup>, Retail-NE 4,929 ft<sup>2</sup>, Retail-SE 1,706 ft<sup>2</sup>, Retail-N 1,952 ft<sup>2</sup>, and Retail-S 1,697 ft<sup>2</sup>), an office lobby, the residential lobbies for the two towers, the car elevator to the cellar level parking garage from South 4th Street, and a loading dock. The second, third and fourth floors will consist of residential apartments along Kent Avenue and South 4th Street, and there will be a 13,366 ft<sup>2</sup> commercial space along River Street on both the 2nd and 3rd floors. Floors 5 through 8 will consist of residential apartments along Kent Avenue and South 4th Street. The building will then divide into two separate towers. All of the upper

floors will consist of residential apartments, and the roofs will house the generator, electrical rooms, boiler rooms, Cogen rooms, and elevator shafts.

The cellar level will occupy the majority Proposed Lot D, with the exception of a small area at the corner of Kent Avenue, South 5th Street and River Street. The cellar slab will be constructed at an elevation of approximately 4 feet, but the foundation will consist of a 5 ft thick pile-supported mat slab. Therefore, the eastern end of Site D will require excavation to a depth of approximately 22 feet below grade, the middle portion will require excavation to a depth of approximately 17 feet, and the western end of Site will require excavation to a depth of approximately 12 feet below grade. Assuming an average excavation depth of approximately 17 feet, an estimated 17,010 cubic yards (25,500 tons) of soil will require excavation for the building's cellar level. In addition, five elevator pits will be excavated to a depth of approximately 8 feet beyond the building slab. Layout of the proposed site development is presented in Figure 3. Excavation depths are shown in Figure 5. The current zoning designation is C6-2. The proposed use is consistent with existing zoning for the property.

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

**1.3 Description of Surrounding Property**

The area immediately surrounding Site consists of the former Domino Sugar facility buildings to the north, the Williamsburg Bridge and a New York City Transit Authority work shop and yard to south across South 5th Street, the East River to the west and both residential and former industrial/manufacturing buildings to the east across Kent Avenue. Figure 4 shows the surrounding land usage of the adjacent properties listed below as well as additional properties located up to 500 feet away from the Site. No hospitals, schools or daycare facilities are located within a 250 ft radius of the Site.

**Surrounding Property Usage**

Direction	Property Description
North – Adjacent Property	<u>Block 2414, Lot 1</u> (SITE C) - 316 to 330 Kent Avenue A one/two story industrial/warehouse building formerly utilized by Domino Sugar as the packaging house and Bin Room. The building is being demolished for construction of a park/recreation area called Domino Square. As part of redevelopment, South 4th Street will be expanded to divide Site D from Site C.

<p><b>South –</b> Opposite side of South 5th Street</p>	<p><u>Block 2453, Lot 1 - 390 Kent Avenue</u> New York City Department of Transportation property developed with several brick office buildings beneath the Williamsburg Bridge.</p>
<p><b>East –</b> Opposite side of Kent Avenue</p>	<p><u>Block 2441, Lot 8 - 331 Kent Avenue</u> Developed with a 2-story commercial/office building with 1 residential unit.</p> <p><u>Block 2441, Lot 107 - 337 Kent Avenue</u> Developed with a 5-story residential building.</p> <p><u>Block 2441, Lot 1 - 351 Kent Avenue</u> Developed with a small 1-story commercial building, and a small 2-story commercial building.</p>
<p><b>West –</b></p>	<p><u>East River</u> Following redevelopment, River Street will be constructed along the west side of Site D. A recreational/walking/park area will be constructed on the other side of River Street along East River.</p>

**1.4 Remedial Investigation**

A remedial investigation was performed and the results are documented in a companion document called “*Remedial Investigation Report, 332-350 Kent Avenue, Brooklyn, NY*”, dated July 2014 (RIR).

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

Two Phase I Environmental Site Assessment (ESA) Reports have been completed for Sites A, B, C, D, E and F.

A Phase I Environmental Site Assessment Report was completed by Environmental Health Investigations, Inc. in 2004 for Sites A, B, C, D, E and F. At the time the Phase I ESA was completed, the Site D portion of Lot 1 consisted a 4-story brick building known as the Adant House as well as a portion of the former Domino Sugar Packaging House. The Adant House was utilized for processing sugar into cubes.

The Phase I ESA indicated Lot 1 has been developed as a sugar refinery since the 1850's by companies such as the Brooklyn Sugar Refining Company (circa 1887), American Sugar Refining Company, Havemeyer and Elder Plant (from 1904 to 1970's), and the Amstar Corporation/Amstar Sugar Corporation, Domino Sugar Corporation, and Tate & Lyle North American Sugar, Inc. (1970's to 1990's). In June 1999 the facility ceased raw sugar refining, and

instead began receiving partially raw sugar liquor from an affiliate facility. The northern most portion of Lot 1 (Site A) was also utilized by the Scranton Coal Company as a coal yard in 1887. Tate & Lyle North American Sugar, Inc. operated until early 2004.

The Phase I ESA did not identify any Recognized Environmental Conditions in connection with the Site D.

A Phase I Environmental Site Assessment Report was completed by Emteque LLC in 2012, for Sites A, B, C, D, E, and F. Historic Sanborn maps provided within the report were reviewed by EBC and the following information was obtained:

Site D was developed prior to 1887 with multiple 2, 6 and 8 story industrial buildings for Havemeyer & Elder, a sugar refinery. The buildings contained a storage shed, 17 large boilers, steam drying rooms, hot air drying rooms, centrifugal machines, vacuum pans, and a fill house. Areas labeled “coal house”, “coal pockets”, and “engine” were located within the 2-story storage shed building partially located at Site D. By 1904, the sugar refining operation was owned by the American Sugar Refining Company. At that time, the building had only four large boilers, and they are listed as not in use, and to be removed. The coal house was no longer shown in the storage shed. The Site D buildings were converted into the Adant Block by 1918. By 1965, all of the older industrial buildings, with the exception of the Adant House, had been demolished and replaced with the large warehouse, packaging and carton storage building that recently stood on all of Site C and the western end of Site D. In the late 1970's the facility operated as part of the Amstar Corporation, and the Adant House was utilized as a warehouse. From 1993 on, the facility operated as Domino Sugar.

The Emteque LLC Phase I Environmental Site Assessment Report identified multiple recognized environmental conditions in connection with Lot 1. However, only two are believed to be associated with Site D; potential historic/urban fill at the Site, and the listing of neighboring properties on environmental databases.

The AOCs identified for Site D include:

1. Historic fill layer is present at the Site at depths varying from 7 to approximately 15 ft below the former Adant House building slab.

## Summary of the Work Performed under the Remedial Investigation

EBC performed the following scope of work within the footprint of Site D in April of 2014:

1. Conducted a Site inspection to identify AOCs and physical obstructions (i.e. structures, buildings, etc.);
2. Installed five soil borings within Site D, and collected ten soil samples for chemical analysis from the soil borings to evaluate soil quality; and
3. Installed two groundwater monitoring wells within Site D and collected two groundwater samples from the monitoring wells to evaluate groundwater quality; and
4. Installed three soil vapor probes within Site D and collected three soil vapor samples for chemical analysis.

## Summary of Environmental Findings

1. The elevation of Site D is approximately 8 feet on the western end, and approximately 16 feet along Kent Avenue.
2. Depth to groundwater varies across Site D from approximately 6 feet on the western end, to approximately 14 feet along Kent Avenue.
3. Depth to bedrock is at the Site is greater than 100 feet.
4. The stratigraphy of Site D, from the surface down, consists of a layer of historic fill material that varies from 7 to approximately 15 ft below the former building's cellar slab, underlain by a brown sand.
5. Soil sample results were compared to NYSDEC Part 375-6 Unrestricted Use (Track 1) and Restricted Residential Use (Track 2) Soil Cleanup Objectives (SCOs). Soil/fill samples collected during the 2014 EBC RI, and 2008 AKRF Phase II showed no pesticides at concentrations above Unrestricted Use SCOs. The following VOCs were detected at a concentration below Unrestricted Use SCOs; 1,2,4-trimethylbenzene (1.5 micrograms per kilogram [ $\mu\text{g}/\text{Kg}$ ]), 1,3,5-trimethylbenzene (0.96  $\mu\text{g}/\text{Kg}$ ), carbon disulfide (maximum [max] of 21  $\mu\text{g}/\text{Kg}$ ), methylene chloride (max of 2  $\mu\text{g}/\text{Kg}$ ), naphthalene (max 1,900  $\mu\text{g}/\text{Kg}$ ), p-isopropyltoluene (max of 230  $\mu\text{g}/\text{Kg}$ ), styrene (3.7  $\mu\text{g}/\text{Kg}$ ), toluene (max of 3.4  $\mu\text{g}/\text{Kg}$ ), and trichlorofluoromethane (12  $\mu\text{g}/\text{Kg}$ ). Acetone (max 140  $\mu\text{g}/\text{Kg}$ ) was detected within four soil samples at a concentration above Unrestricted Use SCOs, and methyl ethyl ketone (max 250 (max 140  $\mu\text{g}/\text{Kg}$ ) was

detected within one soil sample at a concentration above Unrestricted Use SCOs. Six SVOCs including benz(a)anthracene (max of 21,000 µg/Kg), benzo(a)pyrene (max of 17,000 µg/Kg), benzo(b)fluoranthene (max of 20,000 µg/Kg), benzo(k)fluoranthene (max of 6,000 µg/Kg), chrysene (max of 22,000 µg/Kg), and indeno(1,2,3-cd)pyrene (max of 8,600 µg/Kg) were detected above Restricted Residential Use SCOs within soil samples retained from the historic fill layer. Several metals including cadmium (max of 4.08 mg/Kg), chromium (max of 37.7 mg/Kg), copper (max of 252 mg/Kg), lead (max of 691 mg/Kg), mercury (max of 0.31 mg/Kg), nickel (max of 67.2 mg/Kg), and zinc (1,460 mg/Kg) were detected above Unrestricted Use SCOs. Of these metals, cadmium and lead also exceeded Restricted Residential Use SCOs within soil samples collected from the historic fill layer. PCB-1254 was detected within the shallow soil samples retained from SB1 (160 µg/Kg) and SB4 (120 µg/Kg) at a concentration above Unrestricted Use SCOs. No PCBs were detected within the deeper soil samples retained from the same soil borings. Overall, the findings were consistent with observations for historical fill sites in areas throughout NYC.

6. Groundwater samples results were compared to NYSDEC 6NYCRR Part 703.5 Groundwater Quality Standards (GQS). Groundwater samples collected during the 2014 EBC RI showed no detectable concentrations of pesticides or PCBs, and no SVOCs were detected above GQS. The VOC methyl ethyl ketone (maximum of 330 µg/L) was detected above GQS in both groundwater samples and the following VOCs were detected in one or more of the groundwater samples at concentrations below GQS: 4-methyl-2-pentanone (1.2 µg/L), acetone (maximum of 160 µg/L), naphthalene (2.5 µg/L), p-isopropyltoluene (0.68 µg/L) and toluene (2.9 µg/L). Dissolved metals present in groundwater at levels above GQS included antimony, cadmium, iron, magnesium, manganese, selenium, and sodium. The presence of some of these metals in groundwater, specifically those that are common salinity indicators, can be attributed to intrusion of road salting as well as proximity to the East River.
7. Soil vapor samples collected during the RI were compared to the compounds listed in Table 3.1 Air Guideline Values Derived by the NYSDOH located in the New York State Department of Health (NYSDOH) Final Guidance for Evaluating Soil Vapor Intrusion. Soil vapor samples indicated petroleum related VOCs and chlorinated VOCs were

present at low to moderate concentrations, with the exception of trichlorofluoromethane which as detected in all three soil vapor samples within the range of 651 to 10,600 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ). Petroleum-related VOCs (BTEX) were detected at a maximum concentration of  $307.4 \mu\text{g}/\text{m}^3$ . Overall the highest reported concentrations were for 1,1-dichloroethane (max of  $165 \mu\text{g}/\text{m}^3$ ) acetone (max of  $1,140 \mu\text{g}/\text{m}^3$ ), cyclohexane (max of  $378 \mu\text{g}/\text{m}^3$ , ethanol (max of  $557 \mu\text{g}/\text{m}^3$ ), ethyl acetate (max of  $107 \mu\text{g}/\text{m}^3$ ), methyl ethyl ketone (max of  $112 \mu\text{g}/\text{m}^3$ ), propylene (max of  $703 \mu\text{g}/\text{m}^3$ ), toluene (max of  $167 \mu\text{g}/\text{m}^3$ ) and trichlorofluoromethane (max of  $10,600 \mu\text{g}/\text{m}^3$ ). Trichloroethylene (TCE) was detected in all three soil vapor samples, and ranged in concentration from 0.43 to  $3.17 \mu\text{g}/\text{m}^3$ , and tetrachloroethylene (PCE) was detected in all three soil vapor samples, and ranged in concentration from 1.36 to  $16.2 \mu\text{g}/\text{m}^3$ . Carbon tetrachloride was detected within all three soil vapor samples at a maximum concentration of  $0.88 \mu\text{g}/\text{m}^3$  and 1,1,1-trichloroethylene (TCA) was detected in all three soil gas samples at a concentration ranging from 2.89 to  $61.1 \mu\text{g}/\text{m}^3$ . The TCE, PCE, carbon tetrachloride and TCA concentrations are below the monitoring level ranges established within the NYSDOH Final Guidance on Soil Vapor Intrusion.

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.

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## 2.0 REMEDIAL ACTION OBJECTIVES

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

### Groundwater

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

### Soil

- Prevent direct contact with contaminated soil.
- Prevent exposure to contaminants volatilizing from contaminated soil.
- Prevent migration of contaminants that would result in groundwater or surface water contamination.

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

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

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

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

- Selection of 6NYCRR Part 375 Table 6.8 (a) Unrestricted Use (Track 1) Soil Cleanup Objectives (SCOs).
- Removal of all soil/fill exceeding Track 1 Unrestricted Use SCOs throughout the Site and confirmation that Track 1 Unrestricted Use SCOs have been achieved with post-excavation endpoint sampling. Based on the results of the Remedial Investigation, it is expected that this alternative would require excavation across Site D to a depth 10 feet below grade for removal of historic fill, with some areas requiring additional excavation

to depths as great as 15 feet. Therefore, to remove all soil/fill containing analytes at concentrations above Unrestricted Use SCOs, additional excavation of historic fill material would be required within the streets and sidewalks surrounding Proposed Lot D, and the southern end of Lot D that will be finished as slab-on grade.

- No Engineering or Institutional Controls can be utilized in a Track 1 cleanup, but installation of a vapor barrier/waterproofing membrane system beneath the cellar's foundation and behind foundation sidewalls of the new building would be installed as part of development to prevent exposures from off-Site soil vapor.
- Placement of a final cover over the entire Site as part of new development.

### **Alternative 2 involves**

- Establishment of Track 4 Site-Specific SCOs.
- Removal of all soil/fill exceeding Track 4 Site-Specific SCOs and confirmation that Track 4 Site-Specific SCOs have been achieved with post-excavation endpoint sampling. Excavation for construction of the building's cellar would take place to a depth of approximately 22 feet on the eastern end of Proposed Lot D, 17 feet in the middle portion of the lot, and 12 feet on the western end of Proposed Lot D. Excavation to a depth of approximately 4 to 5 feet below grade would be performed in the southern end of Proposed Lot D, within the area that will be slab-on grade. If soil/fill containing analytes at concentrations above Track 4 Site-Specific SCOs is still present at the base of the excavation after removal of all soil required for construction of the buildings is complete, additional excavation will be performed to meet Track 4 Site-Specific SCOs.
- Placement of a final cover over the entire Site to prevent exposure to remaining soil/fill;
- Installation of a soil vapor barrier/waterproofing membrane system beneath the building's slab and along foundation side walls to prevent any potential future exposures from off-Site soil vapor;
- Establishment of use restrictions including prohibitions on the use of groundwater from the Site; prohibitions of sensitive Site uses, such as farming or vegetable gardening, to prevent future exposure pathways; and prohibition of a higher level of land use without OER approval;

- Establishment of an approved Site Management Plan (SMP) to ensure long-term management of these Engineering and Institutional Controls including the performance of periodic inspections and certification that the controls are performing as they were intended; and
- Continued registration as an E-designated property to memorialize the remedial action and the Engineering and Institutional Controls required by the RAWP.

### 3.1 Threshold Criteria

#### Protection of Public Health and the Environment

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

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

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

For both Alternatives, potential exposure to contaminated soils 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 buildings would be prevented by installing a vapor barrier/waterproofing membrane system below the new building's cellar slab and continuing the vapor barrier/waterproofing membrane around foundation walls.

### **3.2. Balancing Criteria**

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

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

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

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

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

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### Short-term effectiveness and impacts

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

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

An additional short-term adverse impact and risks to the community associated with both remedial alternatives is increased truck traffic. Approximately 500, 25-ton capacity truck trips would be necessary for Alternative 2 to transport fill and soil excavated during Site development. Truck traffic will be routed on the most direct course using major thoroughfares where possible and flaggers will be used to protect pedestrians at Site entrances and exits.

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

protected from on-Site contaminants (personal protective equipment would be worn consistent with the documented risks within the respective work zones).

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

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

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

Alternative 2 would provide long-term effectiveness by removing most on-Site contamination and attaining Track 4 Site-Specific SCOs; a composite cover system across the Site, maintaining use restrictions, establishing an SMP to ensure long-term management of Institutional Controls (ICs), Engineering Controls (ECs), and maintaining continued 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 would provide continued high level of protection in perpetuity.

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

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

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

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

Alternative 2 would remove a large quantity of the historic fill at the Site, and any remaining on-Site soil beneath the building and within the streets surrounding Proposed Lot D would meet Track 4 - Site-Specific SCOs. Alternative 1 would eliminate a greater total mass of contaminants on Site.

**Implementability**

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

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

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**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.

Costs associated with Alternative 1 would be significantly higher than Alternative 2 since historic fill with analytes above Unrestricted Use SCOs is present both below the excavation depth required for new building and in areas not required to be excavated for the both the new building and streets/sidewalks surrounding Proposed Lot D. Additional costs would include disposal of additional soil/fill, and import of clean soil for backfill. Additional long-term costs would be required for Alternative 2 based on implementation of a Site Management Plan as part of Alternative 2.

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

**Community Acceptance**

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

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**Land use**

This evaluation criterion addresses the proposed use of the property. This evaluation has considered reasonably anticipated future uses of the Site and takes into account: current use and historical and/or recent development patterns; applicable zoning laws and maps; NYS Department of State's Brownfield Opportunity Areas (BOA) pursuant to section 970-r of the general municipal law; applicable land use plans; proximity to real property currently used for residential use, and to commercial, industrial, agricultural, and/or recreational areas; environmental justice impacts, Federal or State land use designations; population growth patterns and projections; accessibility to existing infrastructure; proximity of the site to important cultural resources and natural resources, potential vulnerability of groundwater to contamination that might emanate from the site, proximity to flood plains, geography and geology; and current Institutional Controls applicable to the site.

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

**Sustainability of the Remedial Action**

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

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The remedial plan would take into consideration the shortest trucking routes during off-Site disposal of historic fill and other soils, which would reduce greenhouse gas emissions and conserve energy used to fuel trucks. New York City Clean Soil Bank program may be utilized for backfill clean soils. To the extent practicable, energy efficient building materials, appliances, and equipment will be utilized to complete the development. While Alternative 2 would potentially result in lower energy usage based on reducing the volume of material transported off-Site, both remedial alternatives are comparable with respect to the opportunity to achieve sustainable remedial action. A complete list of green remedial activities considered as part of the NYC VCP is included in the Sustainability Statement, included as Appendix C.

## 4.0 REMEDIAL ACTION

### 4.1 Summary of Preferred Remedial Action

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

The proposed remedial action will consist of:

1. Preparation of a Community Protection Statement and performance of all required NYC VCP Citizen Participation activities according to an approved Citizen Participation Plan;
2. Performance of a Community Air Monitoring Program for particulates and volatile organic carbon compounds;
3. Establishment of Site-Specific (Track 4) Soil Cleanup Objectives (SCOs);
4. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking & staking excavation areas;
5. Performance of geophysical/test pits/trenches prior to start of building construction in proposed roads area and areas of the building footprint where excavation will not occur;
6. Completion of a Waste Characterization Study prior to excavation activities;
7. Excavation and removal of soil/fill exceeding Track 4 Site-Specific SCOs. For development purposes, excavation for the building's cellar would take place to a depth of approximately 22 feet on the eastern end of Proposed Lot D, 17 feet in the middle portion of the lot, and 12 feet on the western end of Proposed Lot D. Excavation to a depth of approximately 4 to 5 feet below grade would be performed in the southern end of Proposed Lot D, within the area that will be slab-on grade. If soil/fill containing analytes at concentrations above Track 4 Site-Specific SCOs is still present at the base of the excavation after removal of all soil required for construction of the buildings is complete, additional excavation will be performed to meet Track 4 Site-Specific SCOs. Approximately 25,500 tons of soils will be excavated and removed from this Site;

8. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID;
9. Management of excavated materials including temporarily stockpiling and segregating to prevent co-mingling of contaminated material and non-contaminated materials;
10. Removal of underground storage tanks (USTs) (if encountered) and closure of petroleum spills (if evidence of a spill/leak is encountered during Site excavation) in compliance with applicable local, State and Federal laws and regulations;
11. Transportation and off-Site disposal of all soil/fill material at permitted facilities in accordance with applicable laws and regulations for handling, transport, and disposal, and this plan. Sampling and analysis of excavated media as required by disposal facilities. Appropriate segregation of excavated media on-Site;
12. Collection and analysis of end-point samples to determine the performance of the remedy with respect to attainment of SCOs;
13. Import of materials to be used for backfill and cover in compliance with this plan and in accordance with applicable laws and regulations;
14. Installation of an active Sub-Slab Depressurization System (SSDS) the entire portion of the building not utilized as a parking garage. The SSDS system will be installed in the gravel layer beneath the new building slab;
15. Installation of a waterproofing membrane system below the cellar slab and slab on-grade portion of the building, as well as behind subgrade portions of foundation walls of the proposed building. The waterproofing membrane system will consist of Preprufe 300R and Bituthene 4000 as manufacturing by Grace. Preprufe 300 is a 1.2 mm (0.046in) thick HDPE film with a pressure sensitive adhesive that bonds to the poured concrete. Preprufe 300 will be installed below the building's cellar slab and on grade portion of the building slab along River Street. Bituthene 4000 is a flexible preformed waterproof membrane combining a high performance cross laminated, HDPE carrier film with a unique super sticky self-adhesive rubber bitumen compound. Bituthene 4000 will be installed behind the building's foundation walls to grade;
16. Construction and maintenance of an engineered composite cover consisting of the building's 2.5 ft and 5 ft thick pile-supported mat building slab to prevent human exposure to residual soil/fill remaining under the Site. Sidewalks and roadways will

consist of a geotextile layer installed above a prepared subgrade, a 6 inch thick layer of a compacted aggregate base, and a 4 inch or 7 thick layer of concrete (sidewalks/driveways) or a layer of asphaltic concrete binder course below a asphaltic concrete top course (street);

17. Performance of all activities required for the remedial action, including permitting requirements and pretreatment requirements, in compliance with applicable laws and regulations;
18. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations;
19. Submission of a Remedial Action Report (RAR) that describes the remedial activities, certifies that the remedial requirements have been achieved, defines the Site boundaries, describes all Engineering and Institutional Controls to be implemented at the Site, and lists any changes from this RAWP;
20. Submission of an approved Site Management Plan (SMP) in the RAR for long-term management of residual materials, including plans for operation, maintenance,, inspection and certification of Engineering and Institutional Controls and reporting at a specified frequency;
21. The property will continue to be registered with an E-Designation at the NYC Buildings Department. Establishment of Engineering Controls and Institutional Controls in this RAWP and a requirement that management of these controls must be in compliance with an approved SMP. Institutional Controls will include prohibition of the following: (1) vegetable gardening and farming; (2) use of groundwater without treatment rendering it safe for the intended use; (3) disturbance of residual contaminated material unless it is conducted in accordance with the SMP; and (4) higher level of land usage without OER-approval.

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

Track 4 - Site-Specific Soil Cleanup Objectives (SCOs) are proposed for this project. The following Track 4 - Site-Specific SCOs will be used:

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<b><u>Contaminant</u></b>	<b><u>Track 4 SCOs</u></b>
Total SVOCs	250 ppm
Mercury	1.5 ppm
Lead	800 ppm

Soil and materials management on-Site and off-Site, including excavation, handling and disposal, will be conducted in accordance with the Soil/Materials Management Plan in Attachment D. The location of planned excavations is shown in Figure 5.

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

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

The total quantity of soil/fill expected to be excavated and disposed off-Site is 25,500 tons. Disposal location(s) will be reported promptly to the OER Project Manager prior to the start of the remedial action.

### **End-Point Sampling**

Removal actions under this plan will be performed in conjunction with remedial end-point sampling. Post-excavation end-point sampling and testing will be performed promptly following materials removal and completed prior to Site development activities. To evaluate attainment of Track 4 - Site-Specific SCOs, 8 endpoint soil samples will be collected and analyzed for SVOCs and selected metals. The approximate collection location of the endpoint soil samples is shown on Figure 8.

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

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

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- For subsurface removals, one sample from each sidewall for every 30 linear feet of sidewall and one sample from the excavation bottom for every 900 square feet of bottom area.
3. For sampling of volatile organics, bottom samples should be taken within 24 hours of excavation, and should be taken from the zero to six-inch interval at the excavation floor. Samples taken after 24 hours should be taken at six to twelve inches.
  4. For contaminated soil removal, post remediation soil samples for laboratory analysis should be taken immediately after contaminated soil removal. If the excavation is enlarged horizontally, additional soil samples will be taken pursuant to bullets 1-3 above.

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

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

Soil analytical methods will include:

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

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

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## Quality Assurance/Quality Control

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

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

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

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

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

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

## **Import and Reuse of Soils**

Import of soils onto the property and reuse of soils already on-Site will be performed in conformance with the Soil/Materials Management Plan in Attachment D. The estimated quantity of soil to be imported into the Site for backfill and cover soil is 0 tons. The estimated quantity of onsite soil/fill expected to be reused as backfill behind Site perimeter shoring is approximately 0 tons.

### **4.3 Engineering Controls**

The excavation required for the proposed Site development will achieve Track 4 - Site-Specific SCOs. Engineering Controls will be employed in the remedial action to address residual contamination remaining at the Site. The Site has three elements will constitute primary Engineering Controls.

#### **Composite Cover System**

All of Site D will be covered by an engineered composite cover system. This cover system will be comprised of the building's 2.5 ft thick (slab on grade portion of building) (See Figure 7 - S-101.00) and 5 ft thick (entire cellar slab) pile-supported mat building slab (See Figure 6 - FO-100.00) with a minimum 6-inch subbase beneath the area of the proposed building (cellar and slab-on grade portions). Sidewalks and roadways will consist of a geotextile layer installed above a prepared subgrade, a 6 inch thick layer of a compacted aggregate base, and a 4 inch or 7 thick layer of concrete (sidewalks/driveways) or a layer of asphaltic concrete binder course below a asphaltic concrete top course (street). Details of the composite cover systems are shown in Figure 14.

The composite cover system will be a permanent engineering control to address residual soils. The composite cover system will serve as a permanent engineering control for the Site. The system will be inspected and reported at specified intervals as required by this RAWP and the Site Management Plan. A Soil and Materials Management Plan (SMMP) will be included in the Site Management Plan and will outline the procedures to be followed in the event that the composite cover system and underlying residual soil/fill is disturbed after the remedial action is complete. Maintenance of this composite cover system will be described in the Site Management Plan in the RAR.

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## **Waterproofing Membrane/Vapor Barrier**

Migration of potential soil vapor from off-Site in the future will be achieved with a combination of building slab and vapor barrier waterproofing membrane system. The waterproofing membrane system will consist of Preprufe 300R system and Bituthen 4000 as manufactured by Grace. Preprufe 300 is a 1.2 mm (0.046in) thick HDPE film with a pressure sensitive adhesive that bonds to the poured concrete. Preprufe 300 will be installed below the building's cellar slab and southern on grade portion of the building slab along River Street. Bituthene 4000 is a flexible preformed waterproof membrane combining a high performance cross laminated, HDPE carrier film with a unique super sticky self-adhesive rubber bitumen compound. Bituthene 4000 will be installed behind the building's foundation walls to grade.

The Preprufe 300R system will extend throughout the area occupied by the footprint of the new building and Bituthen 4000 will extend up the subgrade portions of foundation sidewalls to grade in accordance with manufacturer specifications.

The project's Professional Engineer licensed by the State of New York will have primary direct responsibility for overseeing the implementation of the vapor barrier. The extent of the proposed waterproofing membrane system is provided in Figure 9. Installation details (penetrations, joints, etc.) with respect to the proposed buildings' foundations, footings, slab, and sidewalls are provided in Figure 14. Product specification sheets are provided in Attachment F. The Remedial Closure Report will include photographs (maximum of two photos per page) of the installation process, PE/RA certified letter (on company letterhead) from primary contractor responsible for installation oversight and field inspections, and a copy of the manufacturers certificate of warranty.

## **Active Sub-Slab Depressurization System**

An active sub-slab depressurization system will be installed beneath the concrete slab of both the slab-on grade portion of the building and the cellar to address residual soil vapors, with the exception of the portion of the cellar that will be utilized as a parking garage. Migration of soil vapor beneath the building will be mitigated with the construction of an active sub-slab depressurization system. The SSDS will consist of a six loops installed within porous granular material beneath the slab-on grade portion of the building. The six SSDS loops will provide the

correct coverage in accordance with USEPA sub-slab depressurization design specifications which recommend a separate vent loop for every 4,000 ft<sup>2</sup> of slab area. The SSDS loops will be outfitted with a riser that will extend to the roof of the building and finished with a blower/fan. The blower/fan exhaust will be placed at a minimum distance of 15ft from all air intakes. The layout plan for the SSDS system is provided as Figure 12. Details of the SSD system are provided in Figure 13.

#### Ventilated Garage

A portion of the basement will consist of a ventilated garage. The underground ventilated garage will prevent vapors entering new development. The garage will be built and operated per requirements of NYC Building Department's codes.

#### **4.4 Institutional Controls**

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

Institutional Controls for this remedial action are:

- The property will continue to be registered with an E-Designation at the NYC Buildings Department. This RAWP includes a description of all ECs and ICs and summarizes the requirements of the Site Management Plan which will note that the property owner and property owner's successors and assigns must comply with the approved SMP;
- Submittal of a Site Management Plan in the RAR for approval by OER that provides procedures for appropriate operation, maintenance, inspection, reporting and certification of ECs. SMP will require that the property owner and property owner's successors and assigns will submit to OER a periodic written statement that certifies that: (1) controls employed at the Site are unchanged from the previous certification or that any changes to the controls were approved by OER; and, (2) nothing has occurred that impairs the ability of the controls to protect public health and environment or that constitute a violation or failure to comply with the SMP. OER retains the right to enter the Site in order to evaluate the continued maintenance of any controls. This certification shall be submitted

annually and will comply with RCNY §43-1407(1)(3).

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

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

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

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

Site management activities, reporting, and EC/IC certification will be scheduled on a periodic basis to be established in the SMP and will be subject to review and modification by OER. The Site Management Plan will be based on a calendar year and certification reports will be due for submission to OER by July 31 of the year following the reporting period.

#### 4.6 Qualitative Human Health Exposure Assessment

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

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

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

#### Known and Potential Sources

Historic fill material is present at the Site from grade to depths as great as 15 feet below grade. Based on the results of the Remedial Investigation Report, the contaminants of concern found are:

##### Soil

- SVOCs, including benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, and indeno(1,2,3-cd)pyrene were detected at concentrations exceeding Restricted Residential Use SCOs; and
- Metals, including cadmium and lead were detected at concentrations exceeding Restricted Residential Use SCOs;

### Groundwater

- The VOC methyl ethyl ketone was detected above GQS;
- Metals, including antimony, cadmium, iron, magnesium, manganese, selenium and sodium were detected above GQS;

### Soil vapor

- Chlorinated VOCs detected at low concentrations including 1,1,1-trichloroethylene, carbon tetrachloride, trichloroethylene, and tetrachloroethylene. Chlorinated VOC's were all below monitoring values established by State DOH;
- Petroleum VOCs detected at low concentrations including benzene, toluene, ethylbenzene and xylenes; and
- Acetone and trichlorofluoromethane were detected at high concentrations.

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

SVOCs and metals are present in the historic fill materials throughout the Site. No SVOCs were detected in groundwater above GQS, but the dissolved concentrations of the metals antimony, cadmium, iron, magnesium, manganese, selenium and sodium were detected above GQS. The chlorinated VOCs in soil vapor were well below guidance issued by New York State DOH and were not found in any of the on-Site soil or groundwater samples collected. The VOC methyle ethyle ketone, detected in all three soil vapor samples, was also detected at a concentration above NYSDEC Unrestricted Use SCOs in one deep soil sample and above NYSDEC Groundwater Quality Standards in both groundwater samples.

### **Receptor Populations**

On-Site Receptors – The former Adant House building located on Site B has been demolished, and only the former concrete slab of the building remains. Due to the current demolition activities, On-Site receptors for all of Lot 1 are limited to the Site owner's and contractors. During redevelopment of the Site, the on-Site potential receptors will include construction workers, site representatives, and visitors. Once the Site is redeveloped, the on-Site potential sensitive receptors will include adult and child building residents, workers and visitors.

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

1. Commercial Businesses (up to 0.25 mile) – existing and future
2. Residential Buildings (up to 0.25 mile) – existing and future
3. Building Construction/Renovation (up to 0.25 mile) – existing and future
4. Pedestrians, Trespassers, Cyclists (up to .25 mile) – existing and future
5. Schools (up to .25 mile) – existing and future

### **Potential Routes of Exposure**

The five elements of an exposure pathway are: (1) a contaminant source; (2) contaminant release and transport mechanisms; (3) a point of exposure; (4) a route of exposure; and (5) a receptor population. An exposure pathway is considered complete when all five elements of an exposure pathway are documented. A potential exposure pathway exists when any one or more of the five elements comprising an exposure pathway cannot be documented. An exposure pathway may be eliminated from further evaluation when any one of the five elements comprising an exposure pathway has not existed in the past, does not exist in the present, and will never exist in the future. Three potential primary routes exist by which chemicals can enter the body on a remedial project include:

- Ingestion of water, fill, or soil;
- Inhalation of vapors and particulates; and
- Dermal contact with water, fill, soil, or building materials

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

Current Conditions: The majority of Site D remains capped with the former building slab of the Adant House and former packaging warehouse, therefore the potential for exposure to historic fill material below the slab is limited. Groundwater is marginally contaminated but is not exposed at the Site, and because the Site is served by the public water supply and groundwater use for potable supply is prohibited, groundwater is not used at the Site and there is no potential for exposure under current conditions. There are no buildings on Site D, therefore, accumulation of soil vapor does not pose an exposure threat.

Construction/ Remediation Activities: Once redevelopment activities begin, construction workers will come into direct contact with surface and subsurface soils, as a result of on-Site construction and excavation activities. On-Site construction workers potentially could ingest, inhale or have dermal contact with any exposed impacted soil and fill. Similarly, off-Site receptors could be exposed to dust and vapors from on-Site activities. During 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. Because groundwater is shallow, there may be a direct pathway for exposure during the remedial construction period. As there will be no building within the footprint of Site D during the remedial period and the construction phase is short term, on-Site, accumulation of soil vapor during the remedial period will not pose an exposure threat.

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

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

Potential complete exposure pathways (i.e., source, route to exposure, receptor population) exists only for the construction condition. There is no complete exposure pathway under future conditions after the Site is developed. This assessment takes into consideration the reasonably anticipated use of the Site, which includes a residential structure, site-wide impervious surface cover cap, and a subsurface vapor barrier/waterproofing membrane system for the building. Potential post-construction use of groundwater is not considered an option because groundwater in this area of New York City is not used as a potable water source. Surface waters in close proximity to the Site will not be impacted by future site conditions.

Based upon this analysis, complete on-Site exposure pathways appear to be present during the remedial action phase. 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. After the remedial action is complete, there will be no remaining exposure pathways to on-Site soil/fill, as all soil above Track 4 Site Specific SCOs will have been removed and a vapor barrier/waterproofing membrane system will have been installed as part of development. For the long term, a Site Management Plan will ensure that any residual materials are properly managed if future construction is required and that engineering controls will remain in place. Periodic inspections will be performed to ensure those controls remain effective. In addition, the Site will continue to be registered with an E-Designation, requiring involvement of OER before new construction that could alter the engineering controls can take place.

## 5.0 REMEDIAL ACTION MANAGEMENT

### 5.1 Project Organization and Oversight

Principal personnel who will participate in the remedial action include Kevin Brussee, Project Manager-EBC and Kevin Waters, Field Operations Officer-EBC. The Professional Engineer (PE) and Qualified Environmental Professionals (QEP) for this project are Ariel Czemerinski P.E., AMC Engineering and Charles Sosik P.G. EBC.

### 5.2 Site Security

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

### 5.3 Work Hours

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

### 5.4 Construction Health and Safety Plan

The Health and Safety Plan is included in Appendix 4. The Site Safety Coordinator will be Kevin Waters - EBC. Remedial work performed under this RAWP will be in full compliance with applicable health and safety laws and regulations, including Site and OSHA worker safety requirements and HAZWOPER requirements. Confined space entry, if any, will comply with OSHA requirements and industry standards and will address potential risks. The parties performing the remedial construction work will ensure that performance of work is in compliance with the HASP and applicable laws and regulations. The HASP pertains to remedial and invasive work performed at the Site until the issuance of the Notice of Completion.

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

Personnel entering any exclusion zone will be trained in the provisions of the HASP and be required to sign an HASP acknowledgment. Site-specific training will be provided to field personnel. Additional safety training may be added depending on the tasks performed.

Emergency telephone numbers will be posted at the site location before any remedial work begins. A safety meeting will be conducted before each shift begins. Topics to be discussed include task hazards and protective measures (physical, chemical, environmental); emergency procedures; PPE levels and other relevant safety topics. Meetings will be documented in a log book or specific form.

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

### **5.5 Community Air Monitoring Plan**

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

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

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

Volatile organic compounds (VOCs) will be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis during invasive work.

Upwind concentrations will be measured at the start of each workday and periodically thereafter to establish background conditions. The monitoring work will be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment will be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment will be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

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

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

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

Particulate concentrations will be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring will be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment will be equipped with an audible alarm to indicate exceedance of the action level. In

addition, fugitive dust migration should be visually assessed during all work activities.

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter ( $\text{mcg}/\text{m}^3$ ) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques will be employed. Work will continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed  $150 \text{ mcg}/\text{m}^3$  above the upwind level and provided that no visible dust is migrating from the work area.
- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than  $150 \text{ mcg}/\text{m}^3$  above the upwind level, work will be stopped and a re-evaluation of activities initiated. Work will resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within  $150 \text{ mcg}/\text{m}^3$  of the upwind level and in preventing visible dust migration.

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

## 5.6 Agency Approvals

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

## 5.7 Site Preparation

### Pre-Construction Meeting

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

### Mobilization

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

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### **Utility Marker Layouts, Easement Layouts**

The presence of utilities and easements on the Site will be fully investigated prior to the performance of invasive work such as excavation or drilling under this plan by using, at a minimum, the One-Call System (811). Underground utilities may pose an electrocution, explosion, or other hazard during excavation or drilling activities. All invasive activities will be performed in compliance with applicable laws and regulations to assure safety. Utility companies and other responsible authorities will be contacted to locate and mark the locations, and a copy of the Markout Ticket will be retained by the contractor prior to the start of drilling, excavation or other invasive subsurface operations. Overhead utilities may also be present within the anticipated work zones. Electrical hazards associated with drilling in the vicinity of overhead utilities will be prevented by maintaining a safe distance between overhead power lines and drill rig masts.

Proper safety and protective measures pertaining to utilities and easements, and compliance with all laws and regulations will be employed during invasive and other work contemplated under this RAWP. The integrity and safety of on-Site and off-Site structures will be maintained during all invasive, excavation or other remedial activity performed under the RAWP.

### **Dewatering**

In the event that dewatering of groundwater during construction will be necessary, the water will be disposed into the New York City combined sanitary/storm sewer system. A permit to discharge will be obtained from the New York City Department of Environmental Protection (NYCDEP). As part of the permit to discharge, the location of discharge will be based on the Site-Specific requirements of the DEP. The need for pretreatment will be determined by DEP's requirements for the discharge permit. If pretreatment is required by the DEP, it will be performed in accordance with the requirements of the DEP.

### **Equipment and Material Staging**

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

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### **Stabilized Construction Entrance**

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

### **Truck Inspection Station**

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

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

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

#### **Storm Preparedness**

Preparations in advance of an extreme storm event will include the following: containerized hazardous materials and fuels will be removed from the property; loose materials will be secured to prevent dislocation and blowing by wind or water; heavy equipment such as excavators and generators will be removed from holes, trenches and depressions on the property to high ground or removed from the property; an inventory of the property with photographs will be performed to establish conditions for the site and equipment prior to the event; stockpile covers for soil and fill will be secured by adding weights such as sandbags for added security and worn or ripped stockpile covers will be replaced with competent covers; stockpiled hazardous wastes will be

removed from the property; stormwater management systems will be inspected and fortified, including, as necessary: clean and reposition silt fences, haybales; clean storm sewer filters and traps; and secure and protect pumps and hosing.

### **Storm Response**

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

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## Storm Response Reporting

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

### 5.8 Traffic Control

Drivers of trucks leaving the NYC VCP Site with soil/fill will be instructed to proceed without stopping in the vicinity of the site to prevent neighborhood impacts. The planned route on local roads for trucks leaving the Site is shown on Figure 11.

### 5.9 Demobilization

Demobilization will include:

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

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

## 5.10 Reporting and Record Keeping

### Daily Reports

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

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

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

An alpha-numeric site map will be used to identify locations described in reports submitted to OER and is shown in Figure 10.

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

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

### **5.11 Complaint Management**

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

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

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

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

## 6.0 REMEDIAL ACTION REPORT

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

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

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## Remedial Action Report Certification

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

*I, \_\_\_\_\_, am currently a professional engineer licensed by the State of New York. I had primary direct responsibility for implementation of the remedial program for the Domino Sugar Site D Redevelopment Project located at 332-350 Kent Avenue, Brooklyn, NY, NYC VCP Site number 15CVCP004K.*

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

## 7.0 SCHEDULE

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

Schedule Milestone	Weeks from Remedial Action Start	Duration (weeks)
OER Approval of RAWP	0	-
Fact Sheet 2 announcing start of remedy	0	-
Mobilization	1	1
Remedial Excavation	2	104
Demobilization	105	1
Submit Remedial Action Report	140	-

# **TABLES**

**TABLE 1**  
**Soil Cleanup Objectives**

Contaminant	CAS Number	Protection of Public Health				Protection of Ecological Resources	Protection of Ground-water	Unrestricted Use
		Residential	Restricted-Residential	Commercial	Industrial			
<b>METALS</b>								
Arsenic	7440-38 -2	16f	16f	16f	16f	13f	16f	13 <sup>c</sup>
Barium	7440-39 -3	350f	400	400	10,000 d	433	820	350 <sup>c</sup>
Beryllium	7440-41 -7	14	72	590	2,700	10	47	7.2
Cadmium	7440-43 -9	2.5f	4.3	9.3	60	4	7.5	2.5 <sup>c</sup>
Chromium, hexavalent <sup>h</sup>	18540-29-9	22	110	400	800	1e	19	1 <sup>b</sup>
Chromium, trivalent <sup>h</sup>	16065-83-1	36	180	1,500	6,800	41	NS	30 <sup>c</sup>
Copper	7440-50 -8	270	270	270	10,000 d	50	1,720	50
Total Cyanide <sup>h</sup>		27	27	27	10,000 d	NS	40	27
Lead	7439-92 -1	400	400	1,000	3,900	63f	450	63 <sup>c</sup>
Manganese	7439-96 -5	2,000f	2,000f	10,000 d	10,000 d	1600f	2,000f	1600 <sup>c</sup>
Total Mercury		0.81j	0.81j	2.8j	5.7j	0.18f	0.73	0.18 <sup>c</sup>
Nickel	7440-02 -0	140	310	310	10,000 d	30	130	30
Selenium	7782-49 -2	36	180	1,500	6,800	3.9f	4f	3.9 <sup>c</sup>
Silver	7440-22 -4	36	180	1,500	6,800	2	8.3	2
Zinc	7440-66 -6	2200	10,000 d	10,000 d	10,000 d	109f	2,480	109 <sup>c</sup>
<b>PESTICIDES / PCBs</b>								
2,4,5-TP Acid (Silvex)	93-72-1	58	100a	500b	1,000c	NS	3.8	3.8
4,4'-DDE	72-55-9	1.8	8.9	62	120	0.0033 e	17	0.0033 <sup>b</sup>
4,4'-DDT	50-29-3	1.7	7.9	47	94	0.0033 e	136	0.0033 <sup>b</sup>
4,4'-DDD	72-54-8	2.6	13	92	180	0.0033 e	14	0.0033 <sup>b</sup>
Aldrin	309-00-2	0.019	0.097	0.68	1.4	0.14	0.19	0.005 <sup>c</sup>
alpha-BHC	319-84-6	0.097	0.48	3.4	6.8	0.04g	0.02	0.02
beta-BHC	319-85-7	0.072	0.36	3	14	0.6	0.09	0.036
Chlordane (alpha)	5103-71 -9	0.91	4.2	24	47	1.3	2.9	0.094
delta-BHC	319-86-8	100a	100a	500b	1,000c	0.04g	0.25	0.04
Dibenzofuran	132-64-9	14	59	350	1,000c	NS	210	7
Dieldrin	60-57-1	0.039	0.2	1.4	2.8	0.006	0.1	0.005 <sup>c</sup>
Endosulfan I	959-98-8	4.8i	24i	200i	920i	NS	102	2.4
Endosulfan II	33213-65-9	4.8i	24i	200i	920i	NS	102	2.4
Endosulfan sulfate	1031-07 -8	4.8i	24i	200i	920i	NS	1,000c	2.4
Endrin	72-20-8	2.2	11	89	410	0.014	0.06	0.014
Heptachlor	76-44-8	0.42	2.1	15	29	0.14	0.38	0.042
Lindane	58-89-9	0.28	1.3	9.2	23	6	0.1	0.1
Polychlorinated biphenyls	1336-36 -3	1	1	1	25	1	3.2	0.1
<b>SEMI-VOLATILES</b>								
Acenaphthene	83-32-9	100a	100a	500b	1,000c	20	98	20
Acenaphthylene	208-96-8	100a	100a	500b	1,000c	NS	107	100 <sup>a</sup>
Anthracene	120-12-7	100a	100a	500b	1,000c	NS	1,000c	100 <sup>a</sup>
Benzo(a)anthracene	56-55-3	1f	1f	5.6	11	NS	1f	1 <sup>c</sup>
Benzo(a)pyrene	50-32-8	1f	1f	1f	1.1	2.6	22	1 <sup>c</sup>
Benzo(b) fluoranthene	205-99-2	1f	1f	5.6	11	NS	1.7	1 <sup>c</sup>
Benzo(g,h,i) perylene	191-24-2	100a	100a	500b	1,000c	NS	1,000c	100
Benzo(k) fluoranthene	207-08-9	1	3.9	56	110	NS	1.7	0.8 <sup>c</sup>
Chrysene	218-01-9	1f	3.9	56	110	NS	1f	1 <sup>c</sup>
Dibenz(a,h) anthracene	53-70-3	0.33e	0.33e	0.56	1.1	NS	1,000c	0.33 <sup>b</sup>
Fluoranthene	206-44-0	100a	100a	500b	1,000c	NS	1,000c	100 <sup>a</sup>
Fluorene	86-73-7	100a	100a	500b	1,000c	30	386	30
Indeno(1,2,3-cd) pyrene	193-39-5	0.5f	0.5f	5.6	11	NS	8.2	0.5 <sup>c</sup>
m-Cresol	108-39-4	100a	100a	500b	1,000c	NS	0.33e	0.33 <sup>b</sup>
Naphthalene	91-20-3	100a	100a	500b	1,000c	NS	12	12
o-Cresol	95-48-7	100a	100a	500b	1,000c	NS	0.33e	0.33 <sup>b</sup>
p-Cresol	106-44-5	34	100a	500b	1,000c	NS	0.33e	0.33 <sup>b</sup>
Pentachlorophenol	87-86-5	2.4	6.7	6.7	55	0.8e	0.8e	0.8 <sup>b</sup>
Phenanthrene	85-01-8	100a	100a	500b	1,000c	NS	1,000c	100
Phenol	108-95-2	100a	100a	500b	1,000c	30	0.33e	0.33 <sup>b</sup>
Pyrene	129-00-0	100a	100a	500b	1,000c	NS	1,000c	100

**TABLE 1**  
**Soil Cleanup Objectives**

Contaminant	CAS Number	Protection of Public Health				Protection of Ecological Resources	Protection of Ground-water	Unrestricted Use
		Residential	Restricted-Residential	Commercial	Industrial			
<b>VOLATILES</b>								
1,1,1-Trichloroethane	71-55-6	100a	100a	500b	1,000c	NS	0.68	0.68
1,1-Dichloroethane	75-34-3	19	26	240	480	NS	0.27	0.27
1,1-Dichloroethene	75-35-4	100a	100a	500b	1,000c	NS	0.33	0.33
1,2-Dichlorobenzene	95-50-1	100a	100a	500b	1,000c	NS	1.1	1.1
1,2-Dichloroethane	107-06-2	2.3	3.1	30	60	10	0.02f	0.02 <sup>c</sup>
cis-1,2-Dichloroethene	156-59-2	59	100a	500b	1,000c	NS	0.25	0.25
trans-1,2-Dichloroethene	156-60-5	100a	100a	500b	1,000c	NS	0.19	0.19
1,3-Dichlorobenzene	541-73-1	17	49	280	560	NS	2.4	2.4
1,4-Dichlorobenzene	106-46-7	9.8	13	130	250	20	1.8	1.8
1,4-Dioxane	123-91-1	9.8	13	130	250	0.1e	0.1e	0.1 <sup>b</sup>
Acetone	67-64-1	100a	100b	500b	1,000c	2.2	0.05	0.05
Benzene	71-43-2	2.9	4.8	44	89	70	0.06	0.06
Butylbenzene	104-51-8	100a	100a	500b	1,000c	NS	12	12
Carbon tetrachloride	56-23-5	1.4	2.4	22	44	NS	0.76	0.76
Chlorobenzene	108-90-7	100a	100a	500b	1,000c	40	1.1	1.1
Chloroform	67-66-3	10	49	350	700	12	0.37	0.37
Ethylbenzene	100-41-4	30	41	390	780	NS	1	1
Hexachlorobenzene	118-74-1	0.33e	1.2	6	12	NS	3.2	0.33 <sup>b</sup>
Methyl ethyl ketone	78-93-3	100a	100a	500b	1,000c	100a	0.12	0.12
Methyl tert-butyl ether	1634-04 -4	62	100a	500b	1,000c	NS	0.93	0.93
Methylene chloride	75-09-2	51	100a	500b	1,000c	12	0.05	0.05
n-Propylbenzene	103-65-1	100a	100a	500b	1,000c	NS	3.9	3.9
sec-Butylbenzene	135-98-8	100a	100a	500b	1,000c	NS	11	11
tert-Butylbenzene	98-06-6	100a	100a	500b	1,000c	NS	5.9	5.9
Tetrachloroethene	127-18-4	5.5	19	150	300	2	1.3	1.3
Toluene	108-88-3	100a	100a	500b	1,000c	36	0.7	0.7
Trichloroethene	79-01-6	10	21	200	400	2	0.47	0.47
1,2,4-Trimethylbenzene	95-63-6	47	52	190	380	NS	3.6	3.6
1,3,5-Trimethylbenzene	108-67-8	47	52	190	380	NS	8.4	8.4
Vinyl chloride	75-01-4	0.21	0.9	13	27	NS	0.02	0.02
Xylene (mixed)	1330-20 -7	100a	100a	500b	1,000c	0.26	1.6	0.26

All soil cleanup objectives (SCOs) are in parts per million (ppm). NS=Not specified. See Technical Support Document (TSD). Footnotes

a The SCOs for residential, restricted-residential and ecological resources use were capped at a maximum value of 100 ppm. See TSD section 9.3.

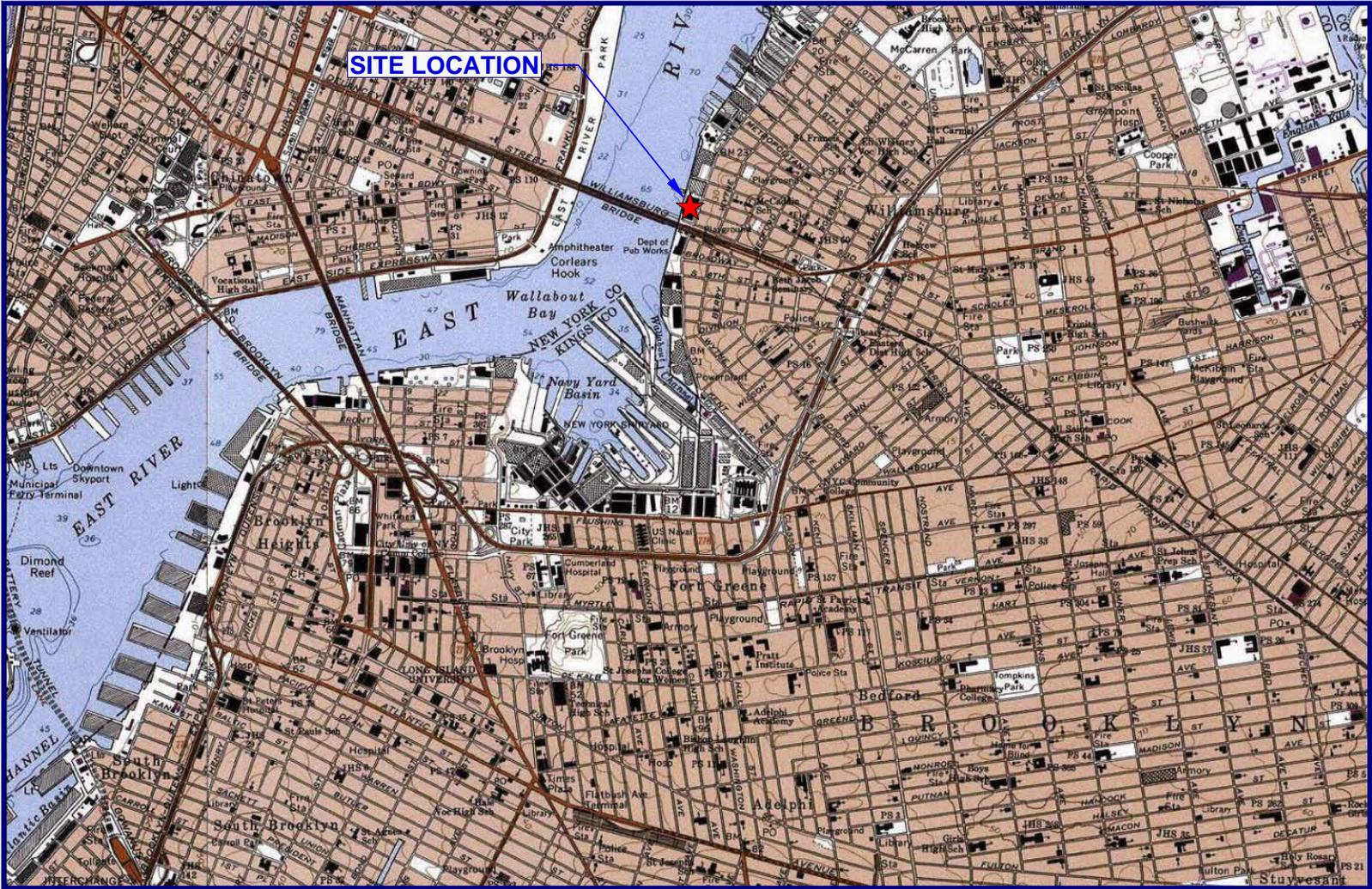
b The SCOs for commercial use were capped at a maximum value of 500 ppm. See TSD section 9.3.

c The SCOs for industrial use and the protection of groundwater were capped at a maximum value of 1000 ppm. See TSD section 9.3.

d The SCOs for metals were capped at a maximum value of 10,000 ppm. See TSD section 9.3.

e For constituents where the calculated SCO was lower than the contract required quantitation limit (CRQL), the CRQL is used as the SCO value.

# **FIGURES**



74°00.000' W

73°59.000' W

73°58.000' W

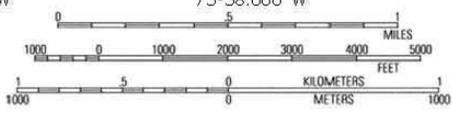
73°57.000' W

WGS84 73°56.000' W

40°43.000' N

40°42.000' N

40°41.000' N



USGS Brooklyn Quadrangle 1995, Contour Interval = 10 feet



**ENVIRONMENTAL BUSINESS CONSULTANTS**  
1808 MIDDLE COUNTRY ROAD, RIDGE, NY 11961

Phone 631.504.6000  
Fax 631.924.2780

**FORMER DOMINDO SUGAR SITE D**  
**332-350 KENT AVENUE, BROOKLYN, NY**

**FIGURE 1** SITE LOCATION MAP

D



EAST RIVER

Active  
Recreation Area  
(To Be Constructed)

EAST RIVER

RIVER STREET  
(To Be Constructed)

LOT D

SOUTH 4TH STREET  
(To Be Constructed)

SIDEWALK

204.5'

70'

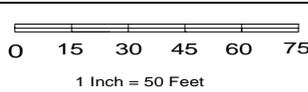
179.875'

KENT AVENUE

KEY:

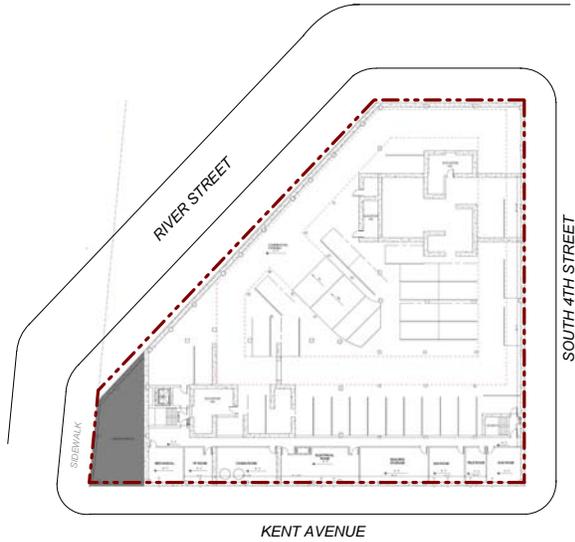
- Boundary of Proposed Lot D
- Boundary of Site D

SCALE:

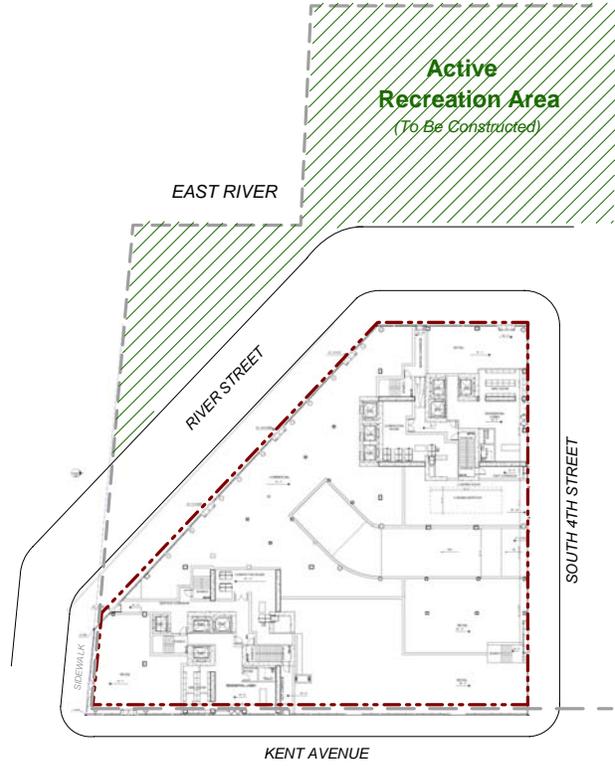


D

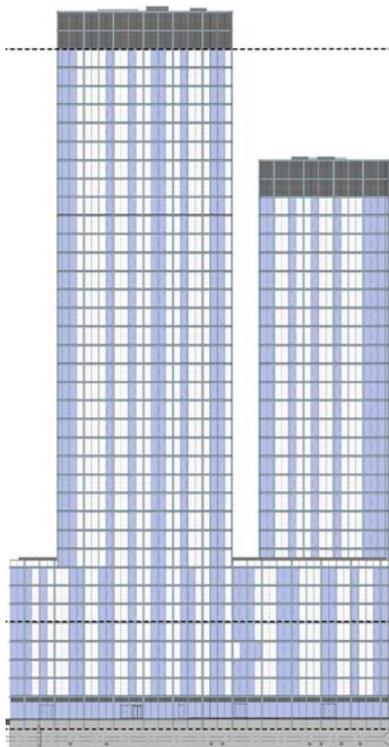
**CELLAR PLAN**



**FIRST FLOOR PLAN**



**ELEVATION DRAWING - West**



**ELEVATION DRAWING - East**

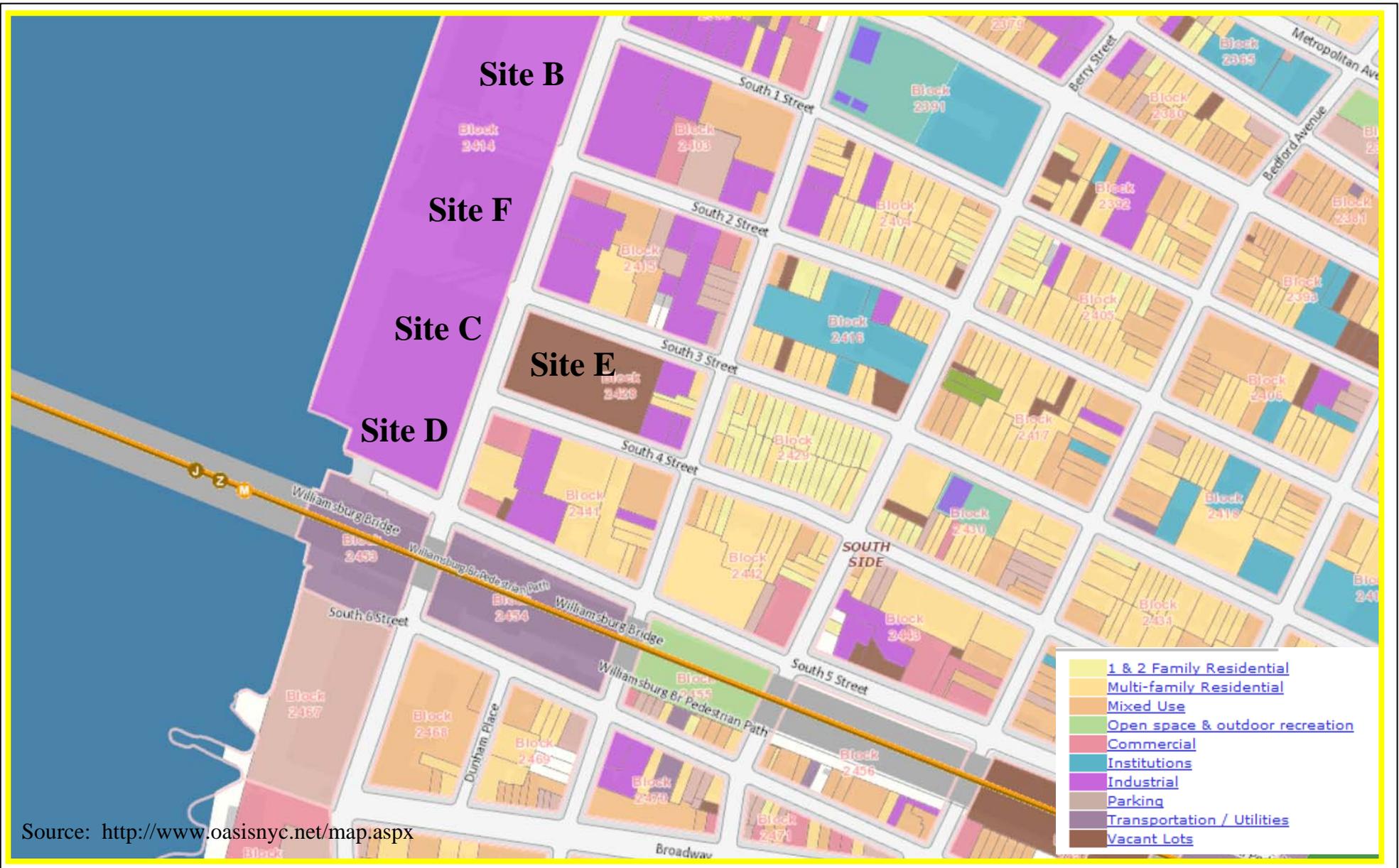


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Fax 631.924.2870

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Figure No.  
**3**

Site Name: Domino Sugar Site - Site D  
Site Address: 332 to 350 Kent Avenue, Brooklyn, NY  
Drawing Title: Redevelopment Plan



**FIGURE 4**  
**SURROUNDING LAND USE MAP**

**SITE D**  
 332-350 KENT AVENUE, BROOKLYN, NY



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 1808 MIDDLE COUNTRY ROAD, RIDGE, NEW YORK 11961  
 PHONE: (631) 504-6000 FAX: (631) 924-2870



- LEGEND**
- T OR B INDICATES ADDITIONAL TOP OR BOTTOM REINFORCING
  - PC-X INDICATES CONCRETE PILE CAP TYPE  
PC-X. SEE TYPICAL DETAILS
  - INDICATES 200-TON STEEL PIPE PILE, 18" O.D. WITH 1/2" SHELL THICKNESS
  - ⊗ INDICATES 500-TON STEEL CAISSONS TO BEDROCK, 13.50" O.D. WITH 0.48 STEEL CASING THICKNESS
  - ▭ INDICATES REINFORCED CONCRETE WALL
  - SW-X INDICATES REINFORCED CONCRETE SHEAR WALL TYPE X. SEE SHEAR WALL PLANS/DETAILS ON S-220
  - INDICATES REINFORCED CONCRETE COLUMN, SEE SCHEDULE ON S-210 SERIES AND TYPICAL DETAILS
  - INDICATES COLUMN NUMBER, SEE SCHEDULE ON S-210 FOR SIZE AND REINFORCING.

- NOTES**
1. T.O. CONCRETE SLAB EL = 3'-0" UNLESS NOTED THUS:  $\times \times \times$
  2. T.O. PILE CAP = T.O. MAT SLAB
  3. HORIZONTAL SPACING BETWEEN ADJACENT CAISSONS IN AREAS UNDER WALLS IS 4'-0" TYP.
  4. PILE CAP EXTENTS SHOWN IN MAT SLAB FOR REFERENCE OF PILE LAYOUTS. SEE TYPICAL PILE CAP DETAILS ON S-203 FOR LAYOUT DIMENSIONS. PILE CAP DEPTH EQUALS MAT DEPTH. DASHED LINES DO NOT INDICATE STEP IN SLAB AND ARE FOR DIMENSIONAL LOCATING PURPOSES ONLY.
  5. FOUNDATIONS SHALL BE SUPPORTED ON 200-TON STEEL PIPE PILES OR 500-TON STEEL CAISSONS AS PER INFORMATION FROM URS CORPORATION DATED MARCH 14, 2014.
  6. SEE ARCHITECTURAL DRAWINGS FOR ALL DIMENSIONS NOT SHOWN ON STRUCTURAL DRAWINGS.
  7. BUILDING IS IN AN AE ZONE AS PER THE 2013 ADVISORY NYC FEMA FLOOD MAPS. FOUNDATION IS DESIGNED FOR A DESIGN FLOOD ELEVATION OF 12 FEET (PROJECT ELEVATION + NAVD83).
  8. THIS JOB REQUIRES NO UNDERPINNING.

No	Date	Rev	Issue
1	05/30/14		DOB SUBMISSION

NOTES:

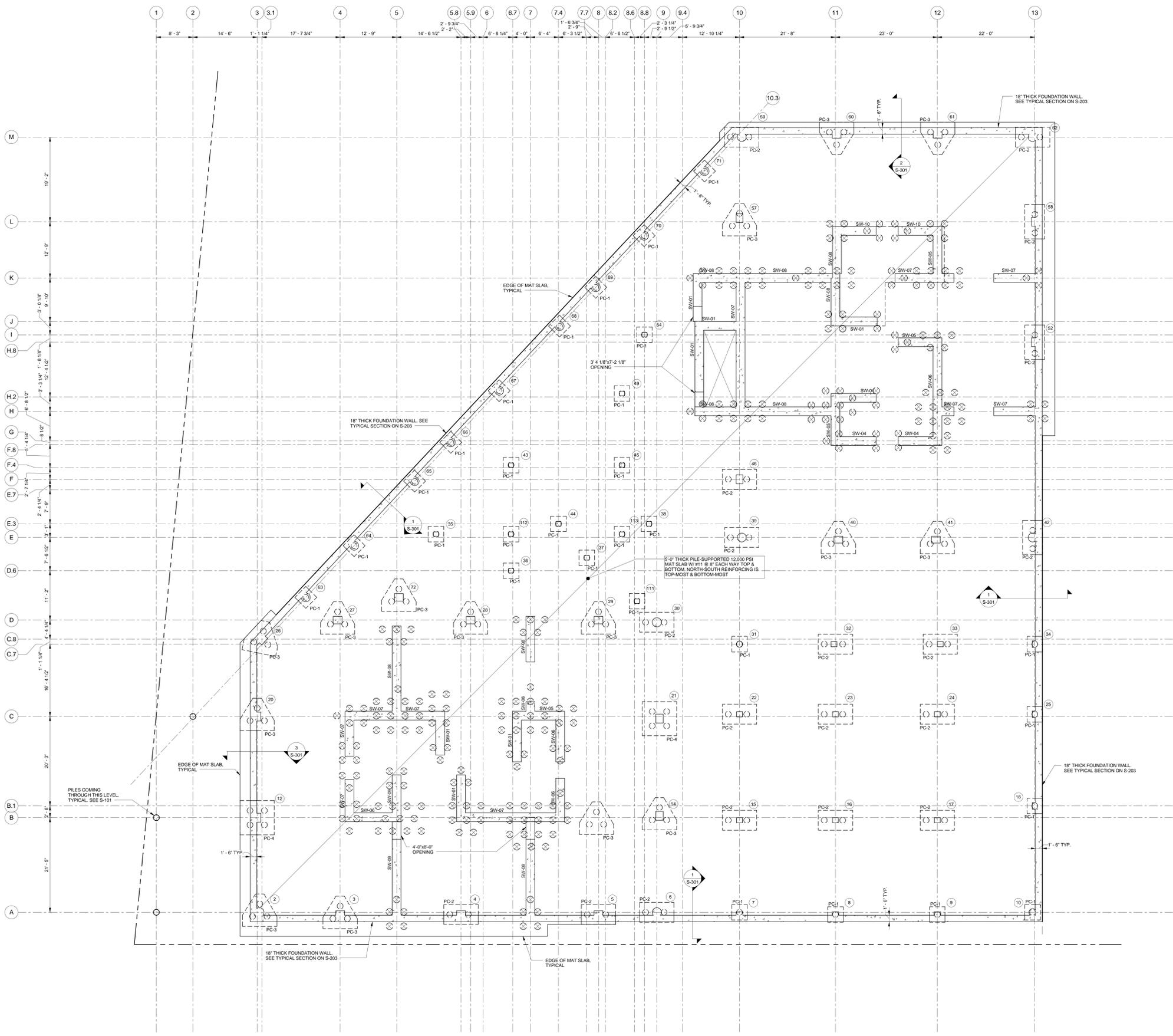
**CLIENT**  
Two Trees Management  
45 Main Street, Suite 602  
Brooklyn, NY 11201

**PROJECT**  
Domino - Site D  
350 Kent Avenue  
Brooklyn, NY

**TITLE**  
FOUNDATION PLAN/B1 LEVEL  
FRAMING PLAN

**SCALE:** 1/8" = 1'-0"  
**DATE:** 05/30/14  
**PROJECT No:** 15600

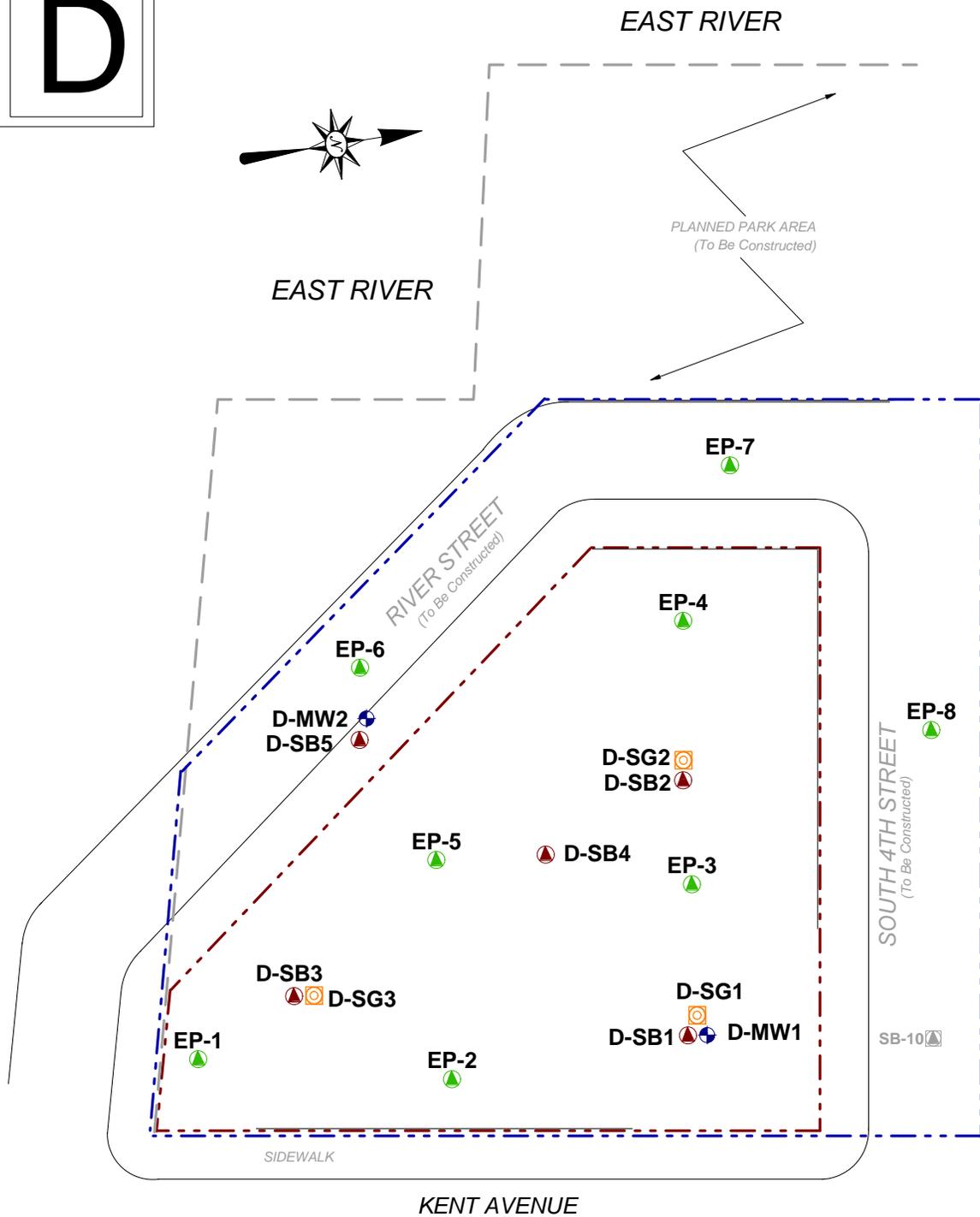
FO-100.00



**1 B1/FOUNDATION PLAN**  
FO-100.00 1/8" = 1'-0"



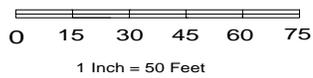
# D



**KEY:**

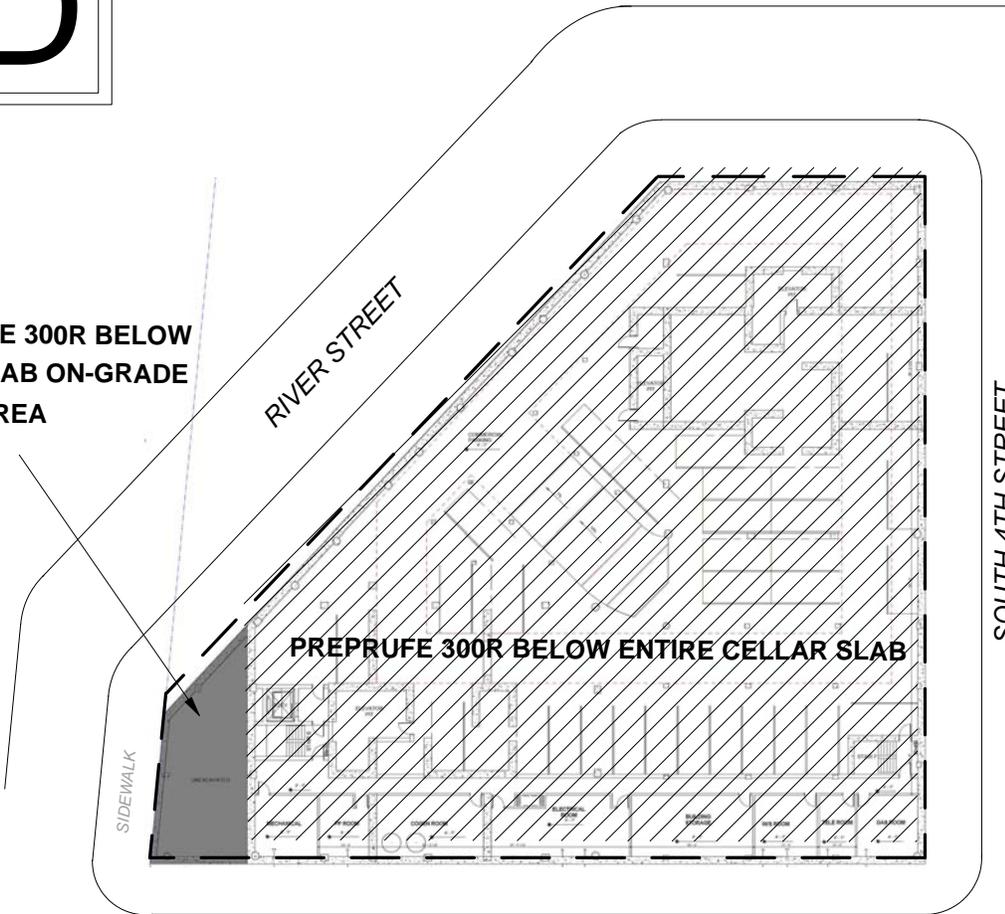
- - - Boundary of Proposed Lot A
- - - Boundary of Site A
- Soil Boring Location (AKRF Phase II 2008)
- 2014 EBC RI Soil Gas Sampling Location
- 2014 EBC RI GW Sampling Location
- 2014 EBC RI Soil Boring Location
- Excavation Endpoint Sample Location Analysis for SVOCs 8270 and TAL Metals

**SCALE:**



**D**

**PREPRUFE 300R BELOW  
ENTIRE SLAB ON-GRADE  
AREA**



**SCALE**



1 Inch = 50 Feet

**KEY:**

--- Bituthene 4000 Behind All Foundation Walls to grade



Phone 631.504.6000  
Fax 631.924.2870

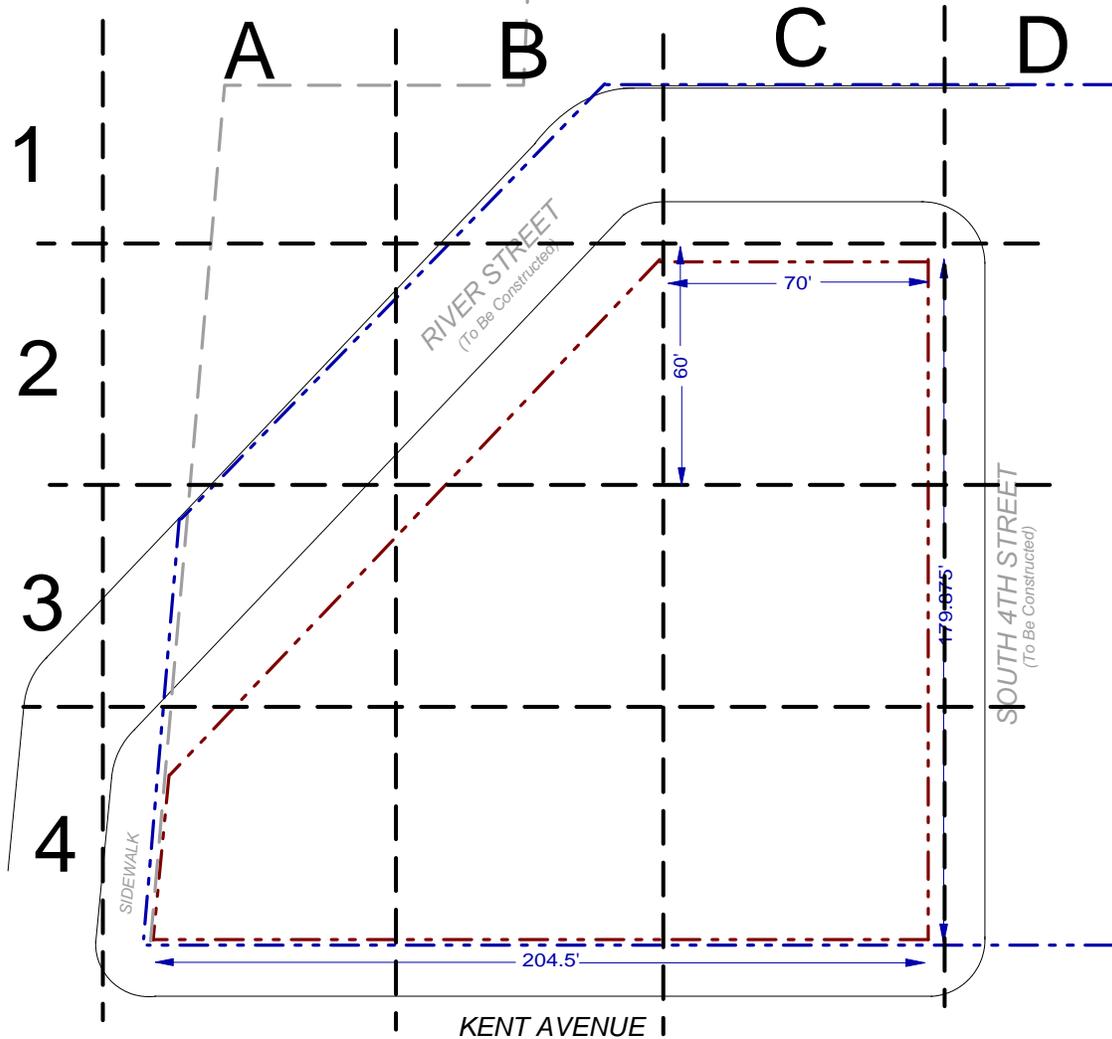
ENVIRONMENTAL BUSINESS CONSULTANTS

**Figure No.**  
**9**

Site Name: Domino Sugar Site - Site D  
Site Address: 332 to 350 Kent Avenue, Brooklyn, NY  
Drawing Title: Waterproofing Membrane Plan

**D**

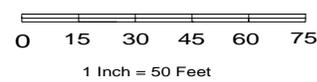
EAST RIVER

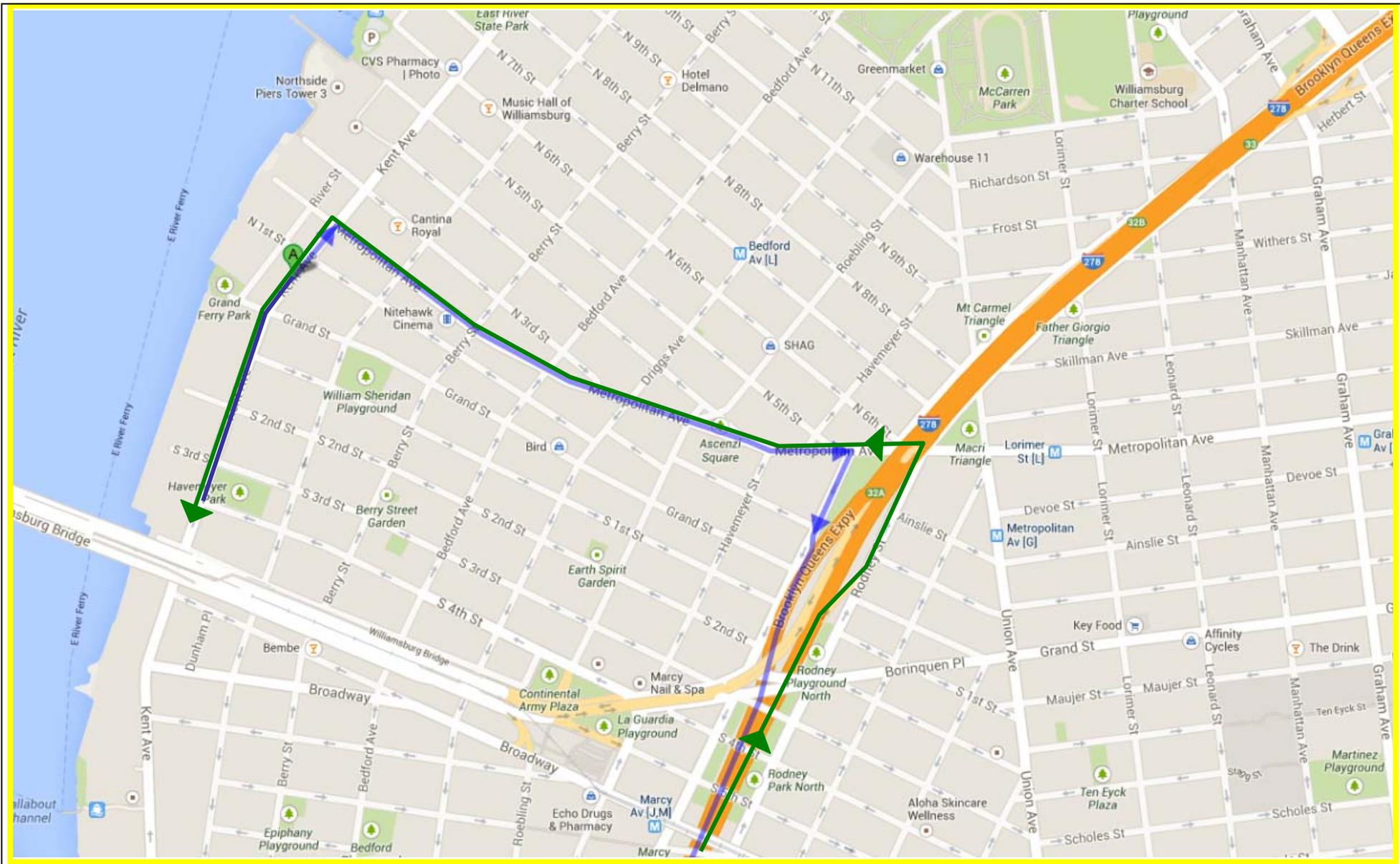


KEY:

- - - - - Boundary of Proposed Lot A
- - - - - Boundary of Site A

SCALE:





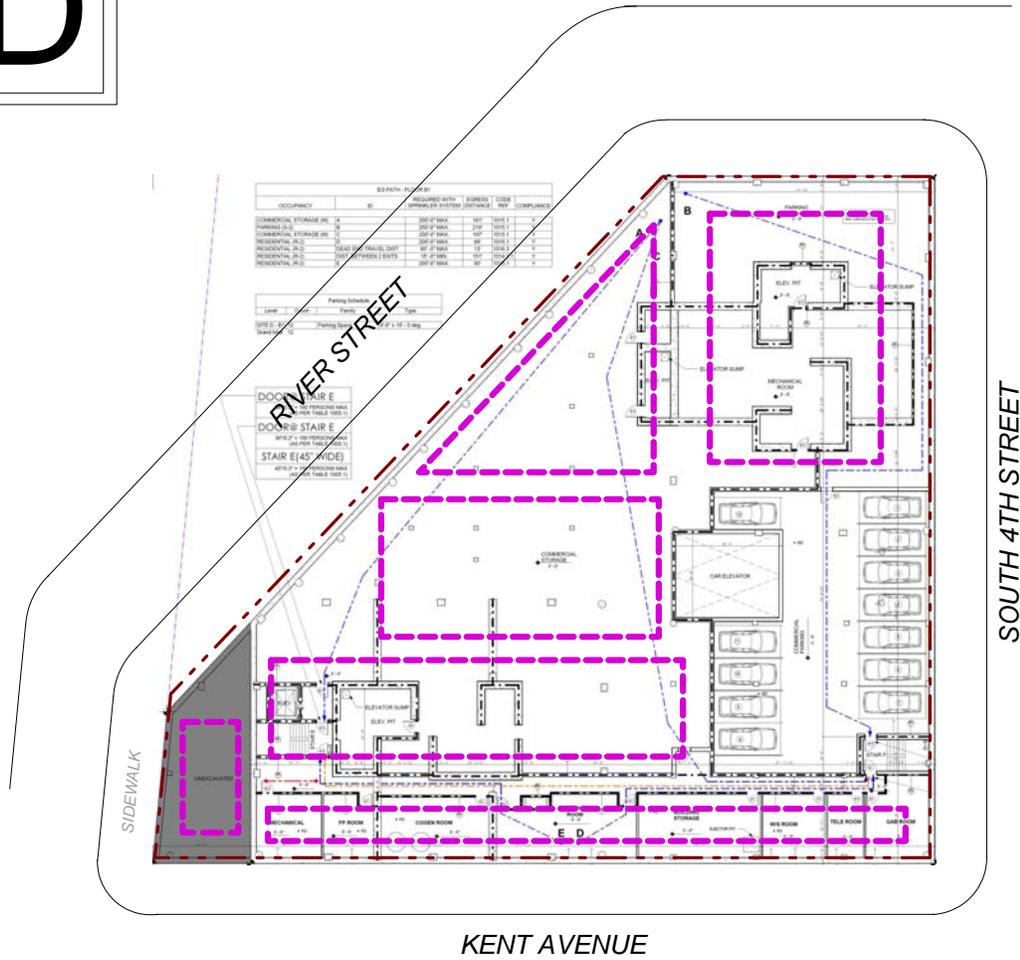
## FIGURE 11 – TRUCK ROUTE MAP

DOMINO SITE D - 332-350 KENT AVE, BROOKLYN, NY  
 REMEDIAL ACTION WORK PLAN



**ENVIRONMENTAL BUSINESS CONSULTANTS**  
 1808 MIDDLE COUNTRY ROAD, RIDGE, NEW YORK 11961  
 PHONE: (631) 504-6000 FAX: (631) 924-2870

D



DESCRIPTION	QUANTITY	UNIT	REMARKS
COMMERCIAL STORAGE	10	SQ. FT.	
COMMERCIAL STORAGE	10	SQ. FT.	
COMMERCIAL STORAGE	10	SQ. FT.	
COMMERCIAL STORAGE	10	SQ. FT.	
COMMERCIAL STORAGE	10	SQ. FT.	
COMMERCIAL STORAGE	10	SQ. FT.	
COMMERCIAL STORAGE	10	SQ. FT.	
COMMERCIAL STORAGE	10	SQ. FT.	
COMMERCIAL STORAGE	10	SQ. FT.	
COMMERCIAL STORAGE	10	SQ. FT.	

LEVEL	DESCRIPTION	AREA
1	COMMERCIAL STORAGE	1000
2	COMMERCIAL STORAGE	1000
3	COMMERCIAL STORAGE	1000
4	COMMERCIAL STORAGE	1000
5	COMMERCIAL STORAGE	1000
6	COMMERCIAL STORAGE	1000
7	COMMERCIAL STORAGE	1000
8	COMMERCIAL STORAGE	1000
9	COMMERCIAL STORAGE	1000
10	COMMERCIAL STORAGE	1000

DESCRIPTION	QUANTITY	UNIT	REMARKS
DOCK DOOR E	1		
DOCK DOOR E	1		
DOCK DOOR E	1		
DOCK DOOR E	1		
DOCK DOOR E	1		
DOCK DOOR E	1		
DOCK DOOR E	1		
DOCK DOOR E	1		
DOCK DOOR E	1		
DOCK DOOR E	1		

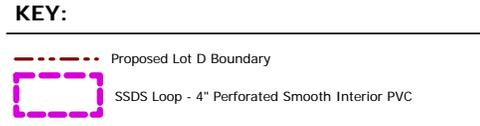
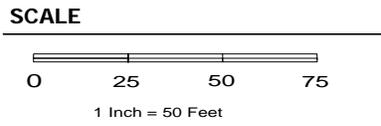
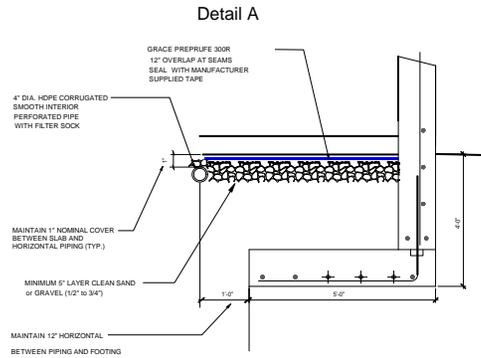


Figure No. 12

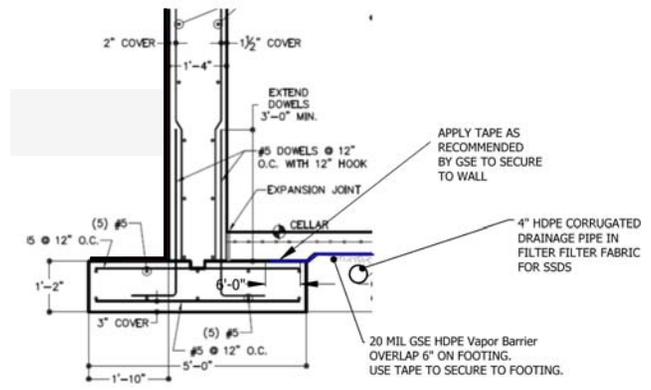
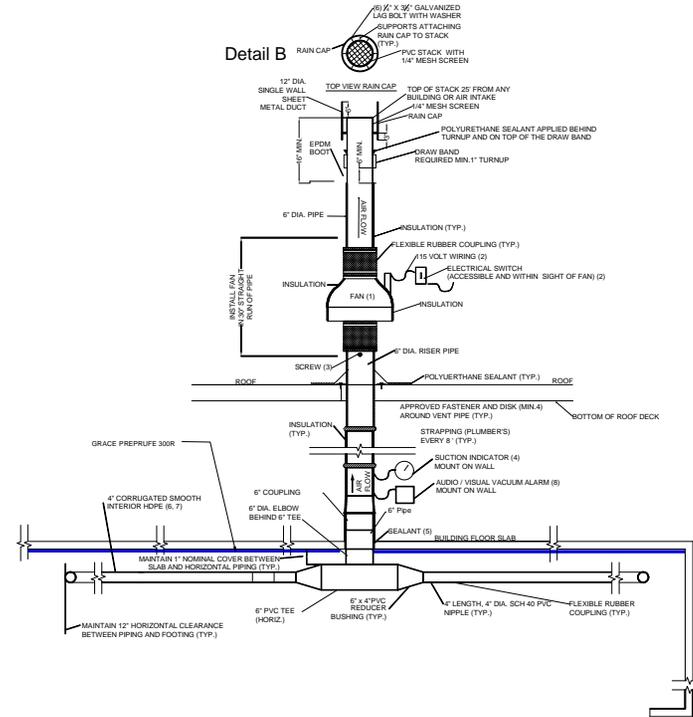
Site Name:	Domino Sugar Site - Site D
Site Address:	332 to 350 Kent Avenue, Brooklyn, NY
Drawing Title:	SSDS Layout

**NOTES:**

1. FAN TO BE RADONAWAY HIGH-FLOW IN-LINE FAN, MODEL RP 265, OR APPROVED EQUAL.
2. FAN AND ON/OFF SWITCH TO BE HARD-WIRED TOGETHER TO 115 VOLT CIRCUIT.
3. SECURE RUBBER COUPLING WITH SCREW TO PREVENT FAN ASSEMBLY FROM SLIPPING DOWN VERTICAL PIPE.
4. DRYER MAGNETIC DIAL TYPE VACUUM GAUGE MODEL 2002-M OR APPROVED EQUAL.
5. SEAL OPENING WITH ELASTOMERIC JOINT SEALANT AS DEFINED IN ASTM D630.
6. HIGH DENSITY POLYETHYLENE CORRUGATED PERFORATED PIPE WITH SMOOTH INTERIOR WATERWAY. ADS N-12 OR APPROVED EQUAL.
7. W/SPF 4 HDPE PIPE WITH GEOTEXTILE FABRIC, GSE NM4 OR APPROVED EQUAL.
8. EBC MUST PRE-APPROVE ALL FILLMATERIAL BEFORE DELIVERY TO SITE.



**Detail B**

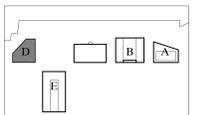


	Phone 631.504.6000 Fax 631.924.2870	<b>Figure No.</b> <b>13</b>	Site Name: <b>REDEVELOPMENT PROJECT</b>
			Site Address: <b>332 TO 350 KENT AVENUE, BROOKLYN, NY</b>
			Drawing Title: <b>REVISED SSDS LAYOUT</b>

FIGURE 14

No	Date	Rev	Issue
1	05/30/14		DOB SUBMISSION

NOTES:  
ALL ELEVATIONS ARE MEASURED RELATIVE TO NAVD (1988). BROOKLYN HIGHWAY DATUM (BHD) IS +1.46'



CLIENT

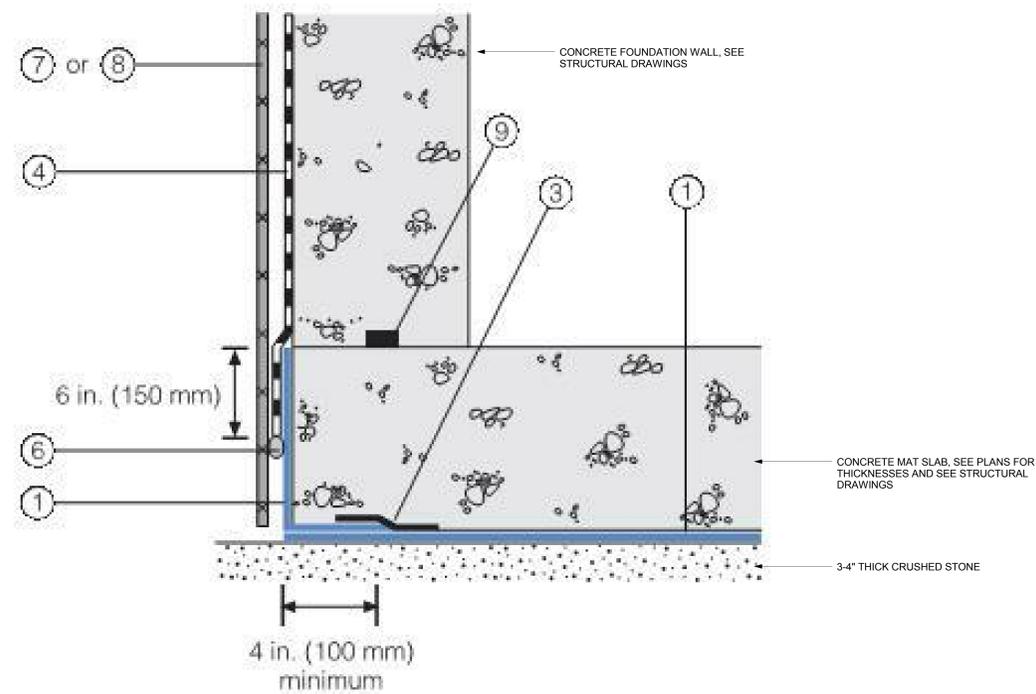
Two Trees Management  
45 Main Street, Suite 602  
Brooklyn, NY 11201

PROJECT  
Domino - Lot A  
Building D  
Brooklyn, NY

TITLE  
Foundation Details

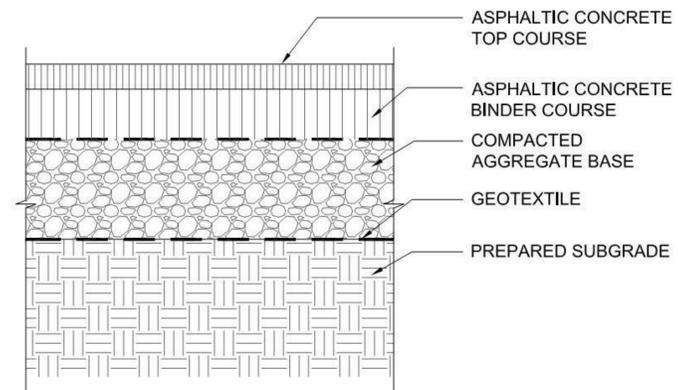
SCALE: 3" = 1'-0"  
DATE: 07/30/14  
PROJECT No: 13,143.01

RAP  
005

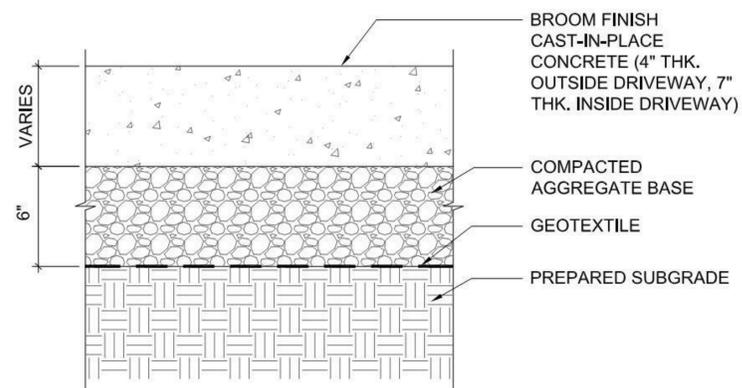


- 1 PREPRUFE 300R PLUS, OR EQUAL
- 2 PROCOR, OR EQUAL
- 3 PREPRUFE TAPE, OR EQUAL
- 4 BITUTHENE, OR EQUAL
- 5 BITUTHENE LIQUID MEMBRANE, OR EQUAL
- 6 PROTECTION
- 7 HYDRODUCT, OR EQUAL
- 8 ADCOR ES, OR EQUAL
- 9 PREPRUFE CJ TAPE, OR EQUAL
- 10

1 TYPICAL MAT SLAB DETAIL  
SCALE: 3" = 1'-0"



2 TYPICAL ASPHALT ROADWAY DETAIL  
SCALE: 3" = 1'-0"



3 TYPICAL CONCRETE WALKWAY DETAIL  
SCALE: 3" = 1'-0"

**ATTACHMENT A**  
**PROPOSED DEVELOPMENT PLANS**

PROJECT

**DOMINO SUGAR**  
**LOT A - BUILDING D**

CLIENT

**TWO TREES MANAGEMENT**

45 Main Street, Suite 602  
Brooklyn, NY 11201  
PH: (718) 222-2500



ARCHITECT

**ISMAEL LEYVA**  
ARCHITECTS, P.C.  
48 West 37th St, New York, NY 10018  
TEL: (212) 290 -1444 FAX: (212) 290 - 1425

**sh p**  
233 Broadway 11th Floor  
New York, NY 10027  
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FAX: (212) 888-3686

CONSULTANTS

Robert Silman Associates  
Structural Engineers  
88 University Place  
New York, NY 10003  
TEL: (212) 620-7970  
FAX: (212) 620-8157

Eitinger & Associates  
MEP/FS Engineers  
595 8th Ave, 24th Floor  
New York, NY 10018  
TEL: (212) 224-2410  
FAX: (212) 643-1686

URS  
Geotechnical Engineer  
1255 Broad Street, Suite 201  
Clifton, NJ 07011  
TEL: (973) 883-8500  
FAX: (973) 883-8501

Philip Habib & Associates  
Traffic Consultant  
102 Madison Avenue, 11th Floor  
New York, NY 10016  
TEL: (212) 926-9556  
FAX: (212) 926-9665

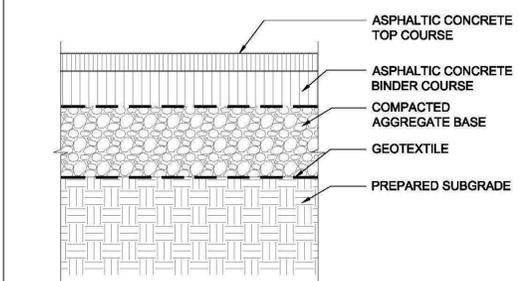
William Vitacco Associates  
Building & Zoning Law Consultant  
299 Broadway  
New York, NY 10007  
TEL: (212) 791-4575  
FAX: (212) 513-9687

YR&G  
Sustainability Consultant  
161 Bowery, 8th Floor  
New York, NY 10002  
TEL: (917) 677-8023  
FAX: (917) 677-8023

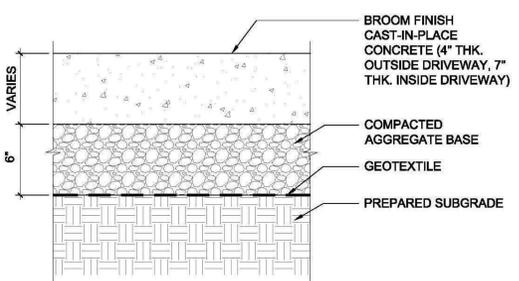
**DOB Submission**  
**May 30, 2014**

**ARCHITECTURAL**

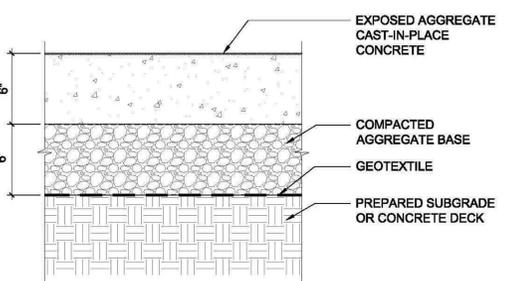
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02	08.13.13	ULURP	JCFO
03	09.24.13	ULURP	JCFO
04	10.15.13	ULURP	JCFO



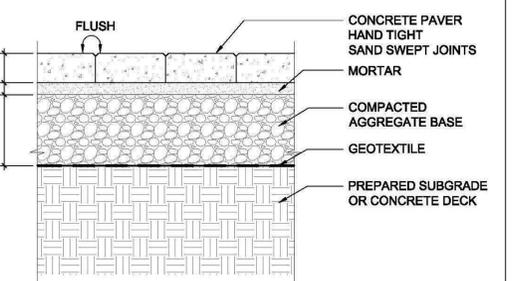
01 ASPHALT PAVING @ PRIVATE ROADS  
SCALE: 2"=1'-0"



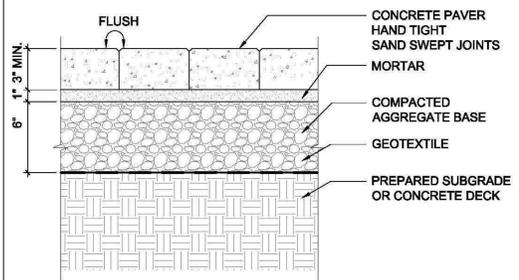
02 CIP CONC' - PAVING 1 (B) BROOM FINISH @ SIDEWALK  
SCALE: 2"=1'-0"



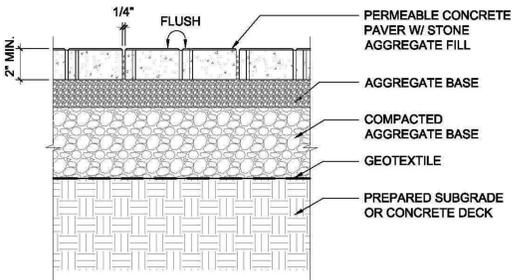
03 CIP CONC' - PAVING 2 (C) EXPOSED AGG. FINISH @ ARTIFACT WALK  
SCALE: 2"=1'-0"



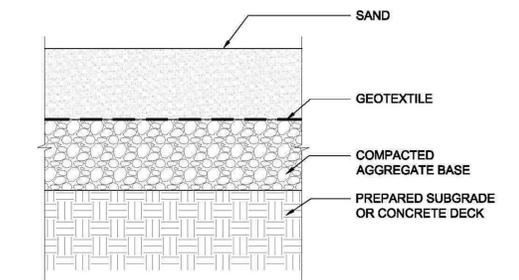
04 CONCRETE PAVER 1 - TYP. (D)  
SCALE: 2"=1'-0"



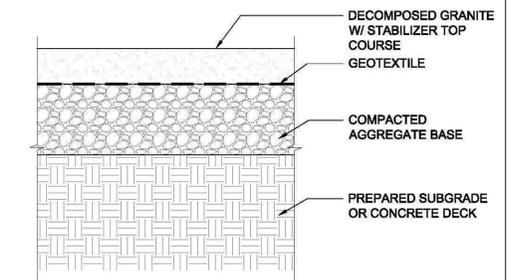
05 CONCRETE PAVER 2 (E) - VEHICULAR LOADING  
SCALE: 2"=1'-0"



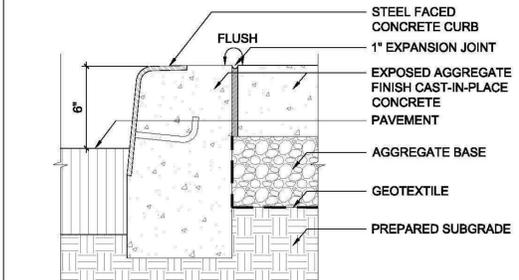
06 CONC' PAVER 3 (F) - PERMEABLE @ SIDEWALK TREE PIT AND UNDER SEATING @ LAWN  
SCALE: 2"=1'-0"



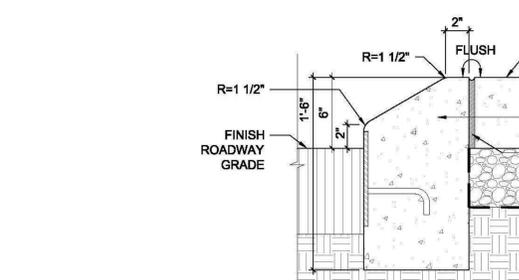
07 SAND @ BEACH VOLLEYBALL COURT  
SCALE: 2"=1'-0"



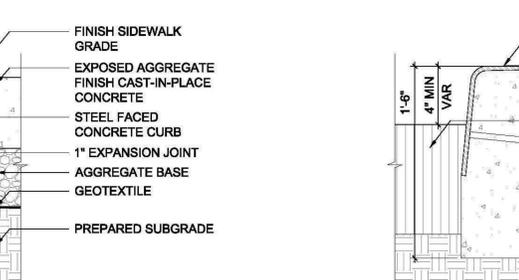
08 DECOMPOSED GRANITE  
SCALE: 2"=1'-0"



09 STANDARD STREET CURB  
SCALE: 2"=1'-0"



10 MOUNTABLE CURB FOR EMS ACCESS  
SCALE: 2"=1'-0"



11 LOW CURB FOR FDNY CURB REVEAL ZONE  
SCALE: 2"=1'-0"



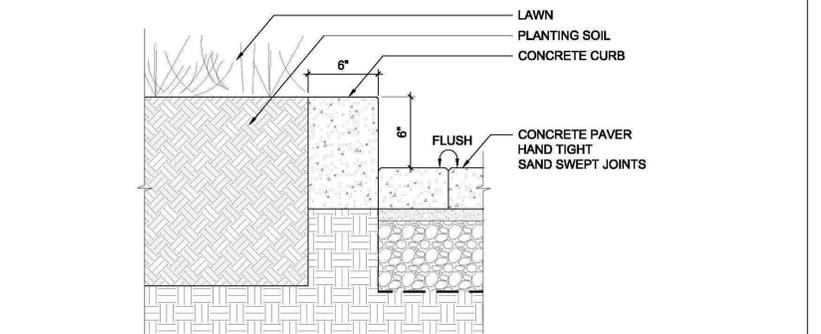
12 CIP CONCRETE - EXPOSED AGG.(C)  
NTS



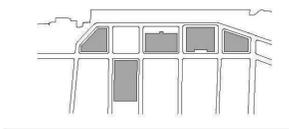
13 CONCRETE PAVER 1 & 2 (D+E)  
NTS



14 CONCRETE PAVER 3 (F)  
NTS



15 TYP. CONCRETE CURB EDGE @ LAWN  
SCALE: 2"=1'-0"



LANDSCAPE ARCHITECT:  
**James corner field operations**  
475 Tenth Ave, Tenth Floor, New York, NY 10018

CONSULTANT TEAM:  
**SHoP Architects P.C.**  
11 Park Place Penthouse, New York, NY 10007  
**Philip Habib & Associates, P.E., P.C.**  
102 Madison Ave, 11th Floor, New York, NY 10018

NOTES:  
ALL ELEVATIONS ARE MEASURED RELATIVE TO NAVD (1988). BROOKLYN HIGHWAY DATUM (BHD) IS +1.49'

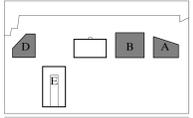
CLIENT:  
**Two Trees Management Co. LLC**  
45 Main Street, Suite 602, Brooklyn, New York 11201

PROJECT NAME:  
**TWO TREES DOMINO SUGAR**

DRAWING TITLE:  
**TYPICAL DETAILS 1**

SEAL AND SIGNATURE: [Signature]  
DATE: 09.24.2013  
DESCRIPTION: SK  
DRAWING BY: TB  
CHECKED BY: LS  
DWG No:  
**L-210.00**  
CADD FILE No: X OF X

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CLIENT:  
Two Trees Management  
45 Main Street, Suite 602  
Brooklyn, NY 11201

PROJECT:  
Domino - Lot A  
Buildings A, B & D  
Brooklyn, NY

TITLE:  
TYPICAL DETAILS 1

SCALE:  
DATE: 05/30/14  
PROJECT No: 13.143.02



L  
210  
.00

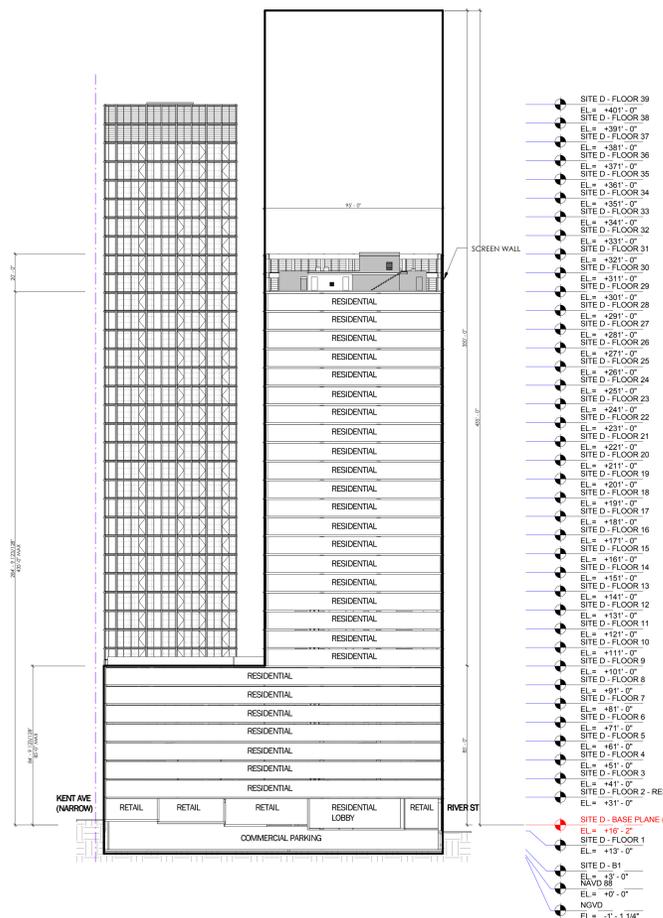
NOTES:  
BUILDING SECTIONS WITHIN THE LIMIT OF ZONING ENVELOPE ARE PROVIDED FOR ILLUSTRATIVE PURPOSES ONLY AND ARE SUBJECT TO CHANGE.  
ALL DISTANCES BETWEEN BUILDINGS AND WINDOWS COMPLY WITH REGULATIONS UNLESS SPECIFICALLY WAIVED.

HEIGHT MAY BE MEASURED FROM THE HIGHER OF (1) THE ADJUSTED BASE PLANE, PROVIDED THAT ANY SUCH BUILDING COMPLES WITH THE PROVISIONS OF APPENDIX G OF THE BUILDING CODE USING THIS ELEVATION AS THE DESIGN FLOOD ELEVATION OR (2) THE DESIGN FLOOD ELEVATION DETERMINED PURSUANT TO APPENDIX D OF THE BUILDING CODE FOR A BUILDING'S STRUCTURAL OCCUPANCY CATEGORY.

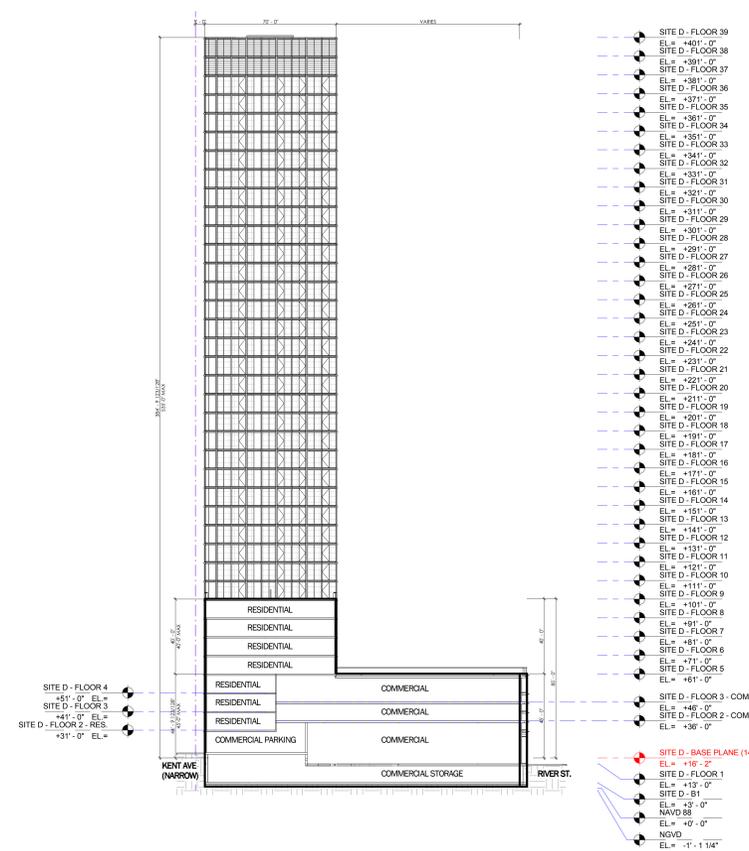
ALL ELEVATIONS SHOWN ON THESE PLANS ARE MEASURED RELATIVE TO NAVD(1988). FOR REFERENCE, BROOKLYN HIGHWAY DATUM (BHD) IS +1.46'

BHD  
EL: 1.46'  
NAVD 88  
EL: 0.00'

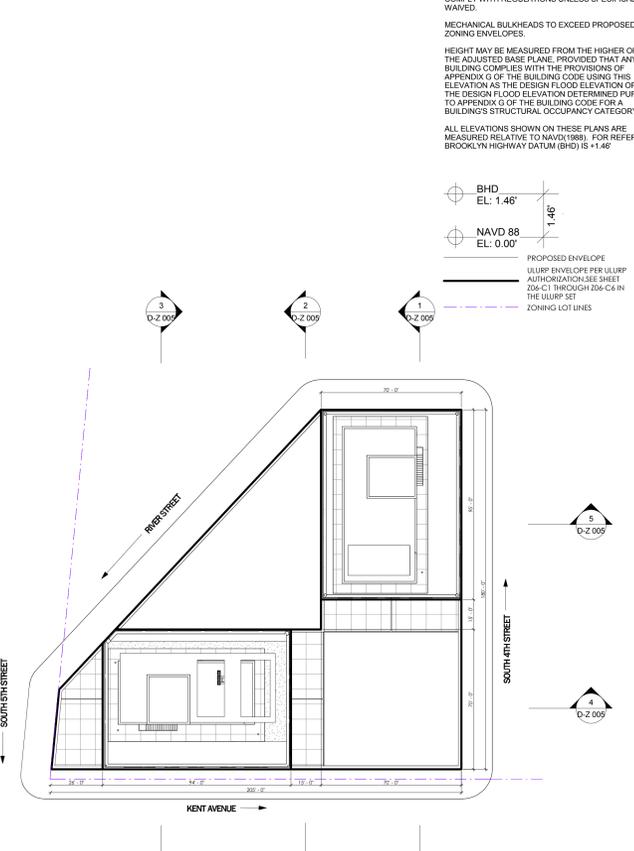
PROPOSED ENVELOPE  
ULURP ENVELOPE PER ULURP AUTHORIZATION SEE SHEET 204-C1 THROUGH 204-C4 IN THE ULURP SET  
ZONING LOT LINES



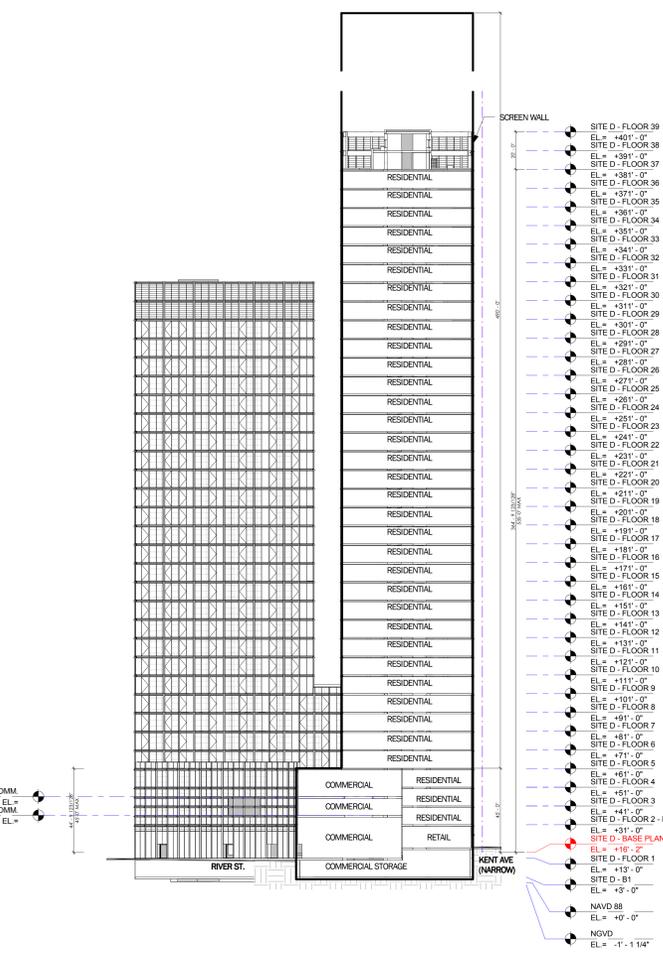
1 Site D - Encroachment Diagram - 1  
SCALE: 1/32" = 1'-0"



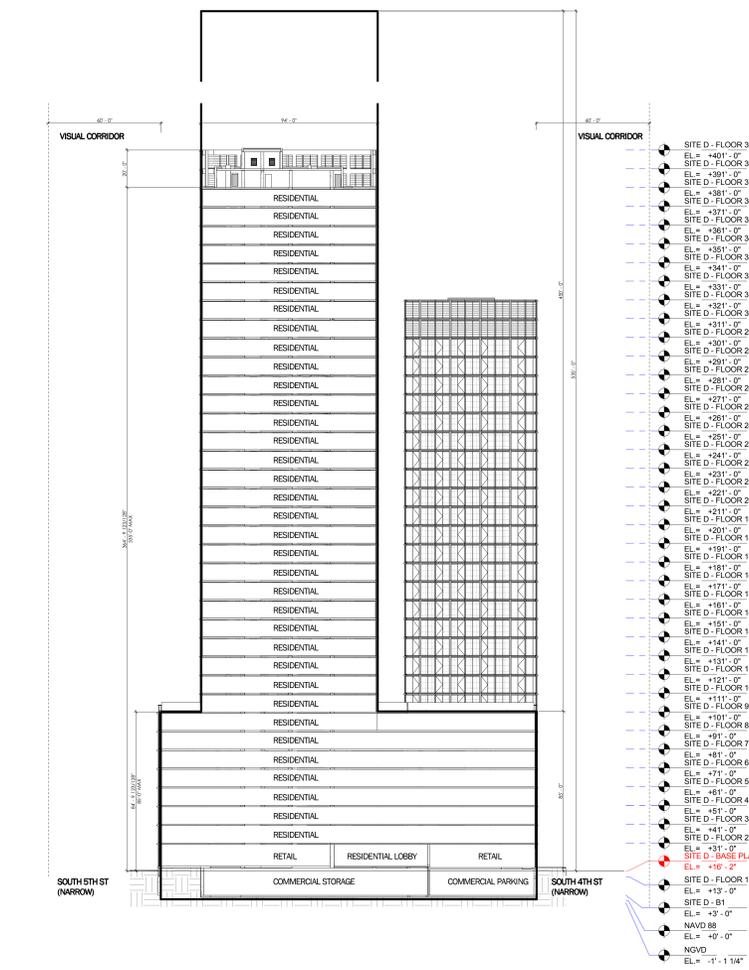
2 Site D - Encroachment Diagram - 2  
SCALE: 1/32" = 1'-0"



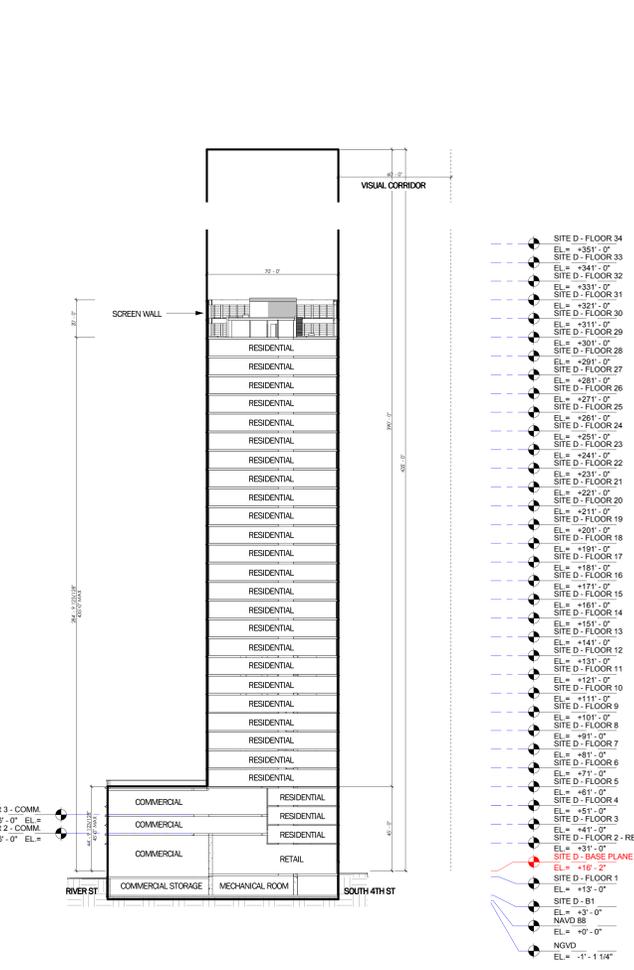
6 Site D - Encroachment Plan  
SCALE: 1" = 30'-0"



3 Site D - Encroachment Diagram - 3  
SCALE: 1/32" = 1'-0"



4 Site D - Encroachment Diagram - 4  
SCALE: 1/32" = 1'-0"

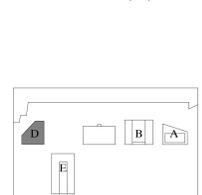


5 Site D - Encroachment Diagram - 5  
SCALE: 1/32" = 1'-0"



No	Date	Rev	Issue
1	05/30/14		DOB SUBMISSION

NOTES:  
ALL ELEVATIONS ARE MEASURED RELATIVE TO NAVD (1988), BROOKLYN HIGHWAY DATUM (BHD) IS +1.46'

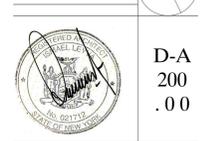


CLIENT  
**Two Trees Management**  
45 Main Street, Suite 602  
Brooklyn, NY 11201

PROJECT  
**Domino - Lot A Building D**  
Brooklyn, NY

TITLE  
Floor B1

SCALE: As indicated  
DATE: 05/30/14  
PROJECT No: 13.143.02



**OCCUPANT LOAD AND EGRESS ANALYSIS**

FLOOR B1  
SECTION BC 1004 - OCCUPANCY LOAD CALCULATION  
TABLE 1004.1.2

GROSS AREA = 25,809 S.F.

OCCUPANCY	AREA	CALCULATION	OCCUPANTS
COMMERCIAL (PARKING)	4,390 S.F.	4,390 S.F./200 GROSS	22
RESIDENTIAL (MECHANICAL)	7,538 S.F.	7,538 S.F./300 GROSS	26
COMMERCIAL (MECHANICAL)	267 S.F.	267 S.F./300 GROSS	1
PARKING STORAGE	2,750 S.F.	2,750 S.F./300 GROSS	10
COMMERCIAL STORAGE	10,864 S.F.	10,864 S.F./300 GROSS	36
<b>TOTAL OCCUPANT LOAD: 95 OCCUPANTS</b>			

SECTION BC 1004 - OCCUPANCY LOAD CALCULATION  
TABLE 1005.1

EGRESS DOOR	REQUIRED OCCUPANT LOAD X 0.2' 95 X 0.2' = 19'	PROVIDED STAIR F DOOR 1 = 36" STAIR F DOOR 2 = 36" STAIR E DOOR 1 = 36" STAIR E DOOR 2 = 36"	COMPLIANCE
TOTAL: 95 X 0.2' = 19'		TOTAL = 144"	YES

EGRESS STAIR	REQUIRED OCCUPANT LOAD X 0.3' 95 X 0.3' = 28.5'	PROVIDED STAIR F = 45" STAIR E = 45"	COMPLIANCE
TOTAL: 95 X 0.3' = 28.5'		TOTAL = 90"	YES

EGRESS NOTES:  
SECTION BC 302 CLASSIFICATION  
1. ASSEMBLY  
2. BUSINESS  
3. EDUCATIONAL  
4. RESIDENTIAL  
5. MERCANTILE  
6. STORAGE  
7. UTILITY

\$28.2.706.3.7 FIRE-RESISTANCE RATING REQUIREMENTS FOR FIRE BARRIER ASSEMBLIES BETWEEN FIRE AREAS  
OCCUPANCY GROUP FIRE-RESISTANCE RATING(HOURS)  
A,B,E,F,2-H,4-H,S,U,M,R,S-2 2

SECTION 28.2.1018.1 MINIMUM NUMBER OF EXITS  
OCCUPANT LOAD MINIMUM # OF EXITS  
1-500 2  
501-1000 3  
MORE THAN 1000 4

\$28.2.1014.1 EXIT OR EXIT ACCESS DOORWAYS REQUIRED. TWO EXITS OR EXIT ACCESS DOORWAYS FROM ANY SPACE SHALL BE PROVIDED WHERE ONE OF THE FOLLOWING CONDITIONS EXISTS:  
1. THE OCCUPANT LOAD OF THE SPACE EXCEEDS THE VALUES IN TABLE 1014.1.

OCCUPANCY R 20 PERSONS  
A, B, E, M, U 74 PERSONS  
S 30 PERSONS

\$28.2.1014.2.1 TWO EXITS OR EXIT ACCESS DOORWAYS. EXCEPTIONS:  
1. THE OCCUPANT LOAD OF THE SPACE EXCEEDS THE VALUES IN TABLE 1014.1.

3. R.2 OCCUPANCY: IN R-2 OCCUPANCY, WHERE STAIRS ARE ENCLOSED IN WALLS HAVING AT LEAST A 2-HOUR FIRE-RESISTANCE RATING AND CONSTRUCTED OF MASONRY EQUIVALENT IN ACCORDANCE WITH DEPARTMENT RULES:  
1. THE OCCUPANT LOAD OF THE SPACE EXCEEDS THE VALUES IN TABLE 1014.1.

OCCUPANCY R 20 PERSONS  
A, B, E, M, U 74 PERSONS  
S 30 PERSONS

\$28.2.1014.2.1 TWO EXITS OR EXIT ACCESS DOORWAYS. EXCEPTIONS:  
1. THE OCCUPANT LOAD OF THE SPACE EXCEEDS THE VALUES IN TABLE 1014.1.

3.1 THE EXIT DOORS TO SUCH STAIRS SHALL BE PLACED A DISTANCE APART EQUAL TO NO LESS THAN 15 FEET

**LEGEND:**

- [ ] NO ACCESS ZONE
- NON-SIMULTANEOUS OCCUPANCY (N.S.O.)
- EXIT TO GRADE
- TRAVEL DISTANCE
- SAFE AREA
- NON-RATED PARTITION
- CONCRETE WALL/COLUMN
- EXIT SIGN
- GARAGE DRAIN
- DEAD END TRAVEL DIST.
- DIST. BETWEEN 2 EXITS
- COMMON PATH OF TRAVEL
- 1 HR-RATED PARTITION
- 2 HR-RATED PARTITION
- 3 HR-RATED PARTITION

NOTE:  
ALL DOORS IN PUBLIC CORRIDORS ARE SELF-CLOSING AND HAVE A 1.5 HOUR FIRE PROTECTION RATING.

DOOR@ STAIR F  
36"0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)

DOOR@ STAIR F  
36"0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)

STAIR F (45" WIDE)  
45"0.3" = 150 PERSONS MAX  
(AS PER TABLE 1005.1)

EG PATH - FLOOR B1

OCCUPANCY	ID	REQUIRED WITH SPRINKLER SYSTEM	EGRESS DISTANCE	CODE REF	COMPLIANCE	
COMMERCIAL STORAGE (M)	A	200'-0" MAX.	161'	1015.1	Y	
PARKING (S-2)	B	250'-0" MAX.	219'	1015.1	Y	
COMMERCIAL STORAGE (M)	C	200'-0" MAX.	197'	1015.1	Y	
RESIDENTIAL (R-2)	D	200'-0" MAX.	89'	1015.1	Y	
RESIDENTIAL (R-2)		DEAD END TRAVEL DIST.	80'-0" MAX.	13'	1016.3	Y
RESIDENTIAL (R-2)		DIST. BETWEEN 2 EXITS	15'-0" MIN.	151'	1014.2.1	Y
RESIDENTIAL (R-2)	E	200'-0" MAX.	80'	1015.1	Y	

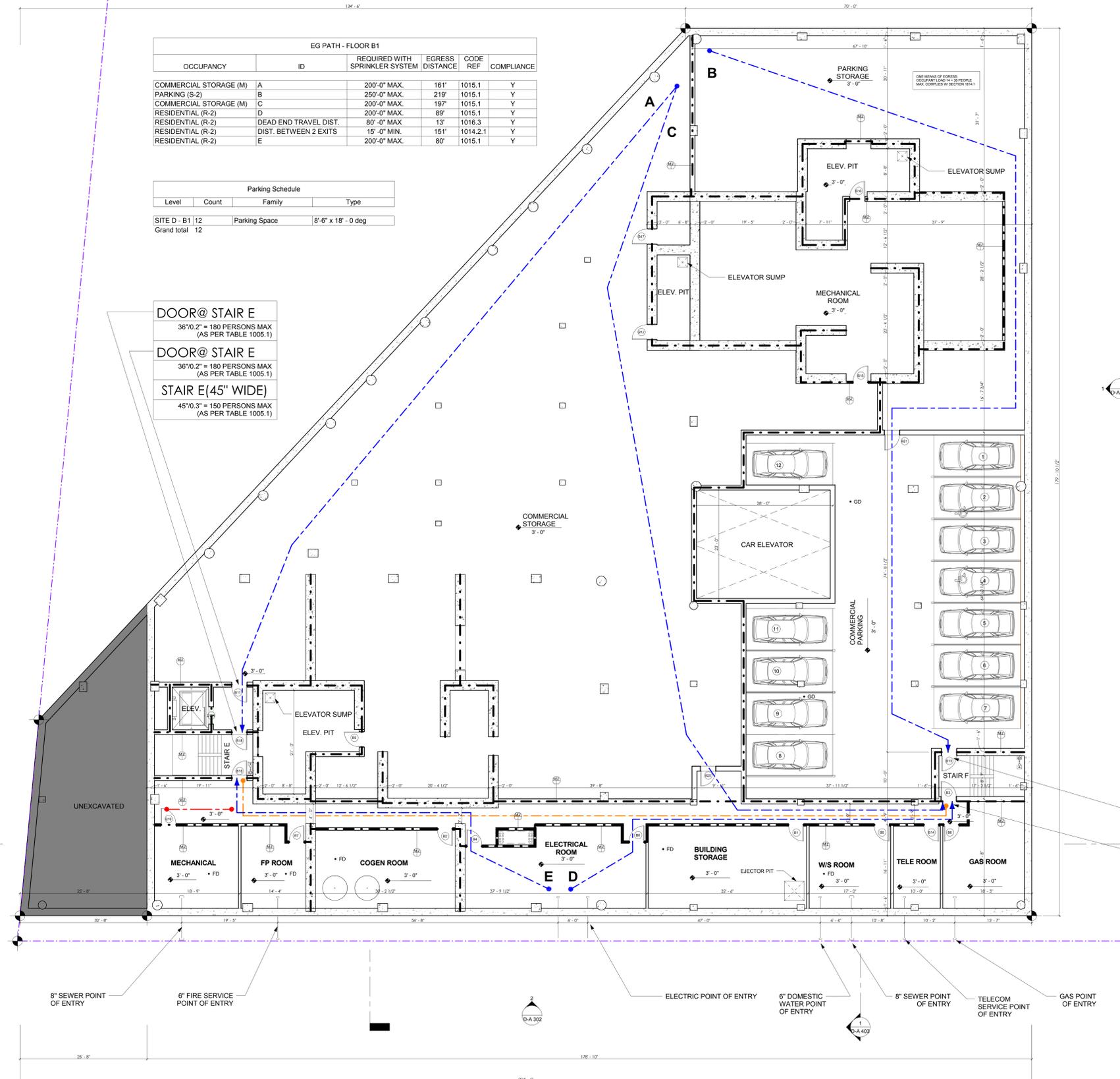
Parking Schedule

Level	Count	Family	Type
SITE D - B1   12	Parking Space	8'-6" x 18' - 0 deg	
Grand total	12		

DOOR@ STAIR E  
36"0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)

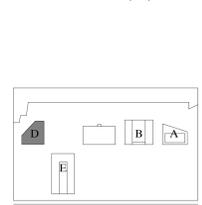
DOOR@ STAIR E  
36"0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)

STAIR E (45" WIDE)  
45"0.3" = 150 PERSONS MAX  
(AS PER TABLE 1005.1)



No.	Date	Rev	Issue
1	05/30/14	01	DOB SUBMISSION

NOTES:  
ALL ELEVATIONS ARE MEASURED RELATIVE TO NAVD (1988), BROOKLYN HIGHWAY DATUM (BHD) IS +1.46'



CLIENT  
Two Trees Management  
45 Main Street, Suite 602  
Brooklyn, NY 11201

PROJECT  
Domino - Lot A  
Building ID  
Brooklyn, NY

TITLE  
Floor 1

SCALE: As indicated  
DATE: 05/30/14  
PROJECT No: 13,143.02



**OCCUPANT LOAD AND EGRESS ANALYSIS**

FLOOR 1  
SECTION BC 1004 - OCCUPANCY LOAD CALCULATION  
TABLE 1004.1.2  
GROSS AREA = 27,017 S.F.

OCCUPANCY	AREA	CALCULATION	OCCUPANTS
COMMERCIAL (LOADING DOCK)	3,554 S.F.	3,554 S.F./200 GROSS	18
COMMERCIAL (OFFICE LOBBY)	2,188 S.F.	N.S.O.	N.S.O.
COMMERCIAL (PARKING)	1,564 S.F.	1,564 S.F./200 GROSS	8
COMMERCIAL (RETAIL-NW)	1,013 S.F.	1,013 S.F./30 GROSS	34
COMMERCIAL (RETAIL-NE)	4,929 S.F.	4,929 S.F./30 GROSS	164
COMMERCIAL (RETAIL-SE)	1,706 S.F.	1,706 S.F./30 GROSS	57
COMMERCIAL (RETAIL-N)	1,952 S.F.	1,952 S.F./30 GROSS	65
COMMERCIAL (RETAIL-S)	1,697 S.F.	1,697 S.F./30 GROSS	57
COMMERCIAL (RETAIL-SW)	806 S.F.	806 S.F./30 GROSS	27
RESIDENTIAL (NORTH LOBBY)	3,271 S.F.	N.S.O.	N.S.O.
RESIDENTIAL (SOUTH LOBBY)	3,318 S.F.	N.S.O.	N.S.O.

**TOTAL OCCUPANT LOAD: 430 OCCUPANTS**

SECTION BC 1004 - OCCUPANCY LOAD CALCULATION  
TABLE 1005.1  
EGRESS DOOR OCCUPANCY

OCCUPANCY	REQUIRED OCCUPANT LOAD X 0.2'	PROVIDED DOOR CALCULATION	COMPLIANCE OCCUPANTS
COMMERCIAL (LOADING DOCK)	18 X 0.2' = 3.6'	DOOR = 36"	YES
COMMERCIAL (PARKING)	8 X 0.2' = 1.6'	DOOR = 36"	YES
COMMERCIAL (RETAIL-NW)	34 X 0.2' = 6.8'	DOOR = 72"	YES
COMMERCIAL (RETAIL-NE)	164 X 0.2' = 32.8'	DOOR = 72"	YES
COMMERCIAL (RETAIL-SE)	57 X 0.2' = 11.4'	DOOR = 72"	YES
COMMERCIAL (RETAIL-N)	65 X 0.2' = 13.0'	DOOR = 72"	YES
COMMERCIAL (RETAIL-S)	57 X 0.2' = 11.4'	DOOR = 72"	YES
COMMERCIAL (RETAIL-SW)	27 X 0.2' = 5.4'	DOOR = 72"	YES

DOOR@ RES.-N  
72"0.2" = 360 PERSONS MAX  
(AS PER TABLE 1005.1)

DOOR@ STAIR B2  
36"0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)

DOOR@ L.DOCK  
36"0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)

DOOR@ PARKING  
36"0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)

DOOR@ STAIR B1  
36"0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)

DOOR@ STAIR A2  
36"0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)

DOOR@ STAIR A1  
36"0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)

DOOR@ STAIR F  
36"0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)

DOOR@ STAIR E  
36"0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)

DOOR@ STAIR D  
36"0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)

DOOR@ STAIR C  
36"0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)

DOOR@ STAIR B  
36"0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)

DOOR@ STAIR A  
36"0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)

DOOR@ STAIR G  
36"0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)

DOOR@ STAIR H  
36"0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)

DOOR@ STAIR I  
36"0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)

DOOR@ STAIR J  
36"0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)

DOOR@ STAIR K  
36"0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)

DOOR@ STAIR L  
36"0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)

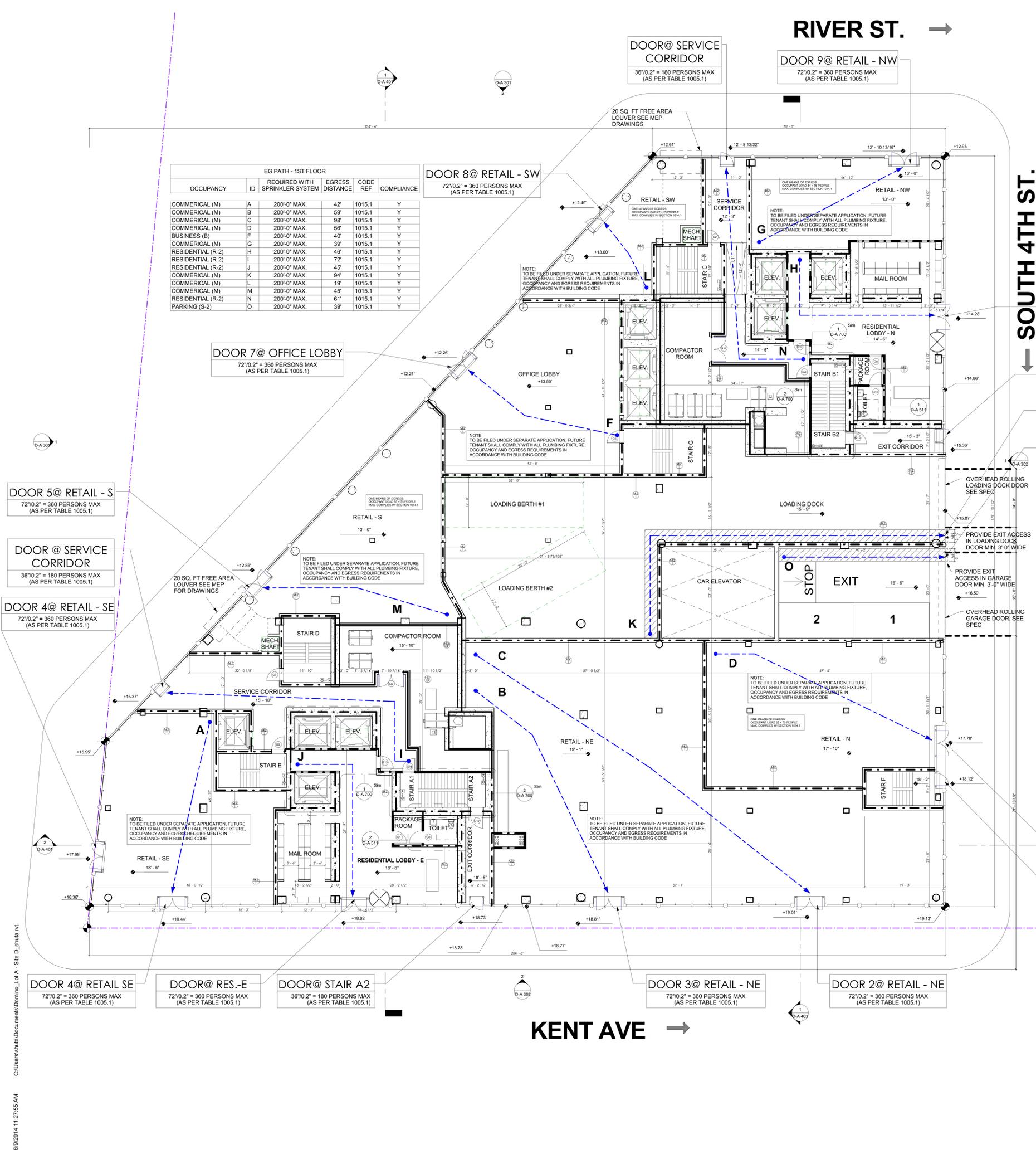
DOOR@ STAIR M  
36"0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)

DOOR@ STAIR N  
36"0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)

DOOR@ STAIR O  
36"0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)

DOOR@ STAIR P  
36"0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)

DOOR@ STAIR Q  
36"0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)



EG PATH - 1ST FLOOR

OCCUPANCY	ID	REQUIRED WITH SPRINKLER SYSTEM	EGRESS DISTANCE	CODE REF	COMPLIANCE
COMMERCIAL (M)	A	200'-0" MAX.	42'	1015.1	Y
COMMERCIAL (M)	B	200'-0" MAX.	59'	1015.1	Y
COMMERCIAL (M)	C	200'-0" MAX.	98'	1015.1	Y
COMMERCIAL (M)	D	200'-0" MAX.	56'	1015.1	Y
BUSINESS (B)	F	200'-0" MAX.	40'	1015.1	Y
COMMERCIAL (M)	G	200'-0" MAX.	39'	1015.1	Y
RESIDENTIAL (R-2)	H	200'-0" MAX.	46'	1015.1	Y
RESIDENTIAL (R-2)	I	200'-0" MAX.	72'	1015.1	Y
RESIDENTIAL (R-2)	J	200'-0" MAX.	45'	1015.1	Y
COMMERCIAL (M)	K	200'-0" MAX.	94'	1015.1	Y
COMMERCIAL (M)	L	200'-0" MAX.	19'	1015.1	Y
COMMERCIAL (M)	M	200'-0" MAX.	45'	1015.1	Y
RESIDENTIAL (R-2)	N	200'-0" MAX.	61'	1015.1	Y
PARKING (S-2)	O	200'-0" MAX.	39'	1015.1	Y

DOOR 5@ RETAIL - S  
72"0.2" = 360 PERSONS MAX  
(AS PER TABLE 1005.1)

DOOR @ SERVICE CORRIDOR  
36"0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)

DOOR 4@ RETAIL - SE  
72"0.2" = 360 PERSONS MAX  
(AS PER TABLE 1005.1)

DOOR 4@ RETAIL SE  
72"0.2" = 360 PERSONS MAX  
(AS PER TABLE 1005.1)

DOOR@ RES.-E  
72"0.2" = 360 PERSONS MAX  
(AS PER TABLE 1005.1)

DOOR@ STAIR A2  
36"0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)

DOOR 3@ RETAIL - NE  
72"0.2" = 360 PERSONS MAX  
(AS PER TABLE 1005.1)

DOOR 2@ RETAIL - NE  
72"0.2" = 360 PERSONS MAX  
(AS PER TABLE 1005.1)

**OCCUPANT LOAD AND EGRESS ANALYSIS**

FLOORS 2-4 (RESIDENTIAL)  
 SECTION BC 1004 - OCCUPANCY LOAD CALCULATION  
 TABLE 1004.1.2

OCCUPANCY	AREA	CALCULATION	OCCUPANTS
GROSS AREA	11,157 S.F.	11,157 S.F./200 GROSS	56
GROSS AREA WITHIN D.U.	2494 S.F.	N.S.O.	N.S.O.
<b>TOTAL OCCUPANT LOAD: 56 OCCUPANTS</b>			

SECTION BC 1004 - OCCUPANCY LOAD CALCULATION  
 TABLE 1005.1

EGRESS DOOR SPACE	REQUIRED	PROVIDED	COMPLIANCE
GROSS AREA WITHIN D.U.	OCCUPANT LOAD X 0.2" 56 X 0.2" = 11.2'	STAIR A1 DOOR = 36" STAIR A2 DOOR = 36" STAIR B1 DOOR = 36" STAIR B2 DOOR = 36" <b>TOTAL = 144"</b>	YES
EGRESS STAIR SPACE	REQUIRED	PROVIDED	COMPLIANCE
GROSS AREA WITHIN D.U.	OCCUPANT LOAD X 0.3" 56 X 0.3" = 16.8'	STAIR A1 = 45" STAIR A2 = 45" STAIR B1 = 45" STAIR B2 = 45" <b>TOTAL = 180"</b>	YES

EGRESS NOTES:  
 SECTION BC 302 CLASSIFICATION  
 1. ASSEMBLY A-1, A.2, A.3, A.4, A.5  
 2. BUSINESS B  
 3. EDUCATIONAL E  
 4. RESIDENTIAL R  
 5. MERCANTILE M  
 6. STORAGE S  
 7. UTILITY U

§28-2706.3.7 FIRE-RESISTANCE RATING REQUIREMENTS FOR FIRE BARRIER ASSEMBLIES BETWEEN FIRE AREAS  
 OCCUPANCY GROUP FIRE-RESISTANCE RATING(HOURS)  
 A,B,E,F,Z-H,I-H,S,I,M,R,S-2 2

SECTION 28-2-1018.1 MINIMUM NUMBER OF EXITS  
 OCCUPANT LOAD MINIMUM # OF EXITS  
 1-100 2  
 101-1000 3  
 MORE THAN 1000 4

§28-2-1014.1 EXIT OR EXIT ACCESS DOORWAYS REQUIRED. TWO EXITS OR EXIT ACCESS DOORWAYS FROM ANY SPACE SHALL BE PROVIDED WHERE ONE OF THE FOLLOWING CONDITIONS EXISTS:  
 1. THE OCCUPANT LOAD OF THE SPACE EXCEEDS THE VALUES IN TABLE 1014.1.

OCCUPANCY R 20 PERSONS  
 A, B, E, M, U 24 PERSONS  
 S 30 PERSONS

§28-2-1014.2 TWO EXITS OR EXIT ACCESS DOORWAYS.  
 EXCEPTIONS:  
 3. R-2 OCCUPANCY, IN R-2 OCCUPANCY, WHERE STAIRS ARE ENCLOSED IN WALLS HAVING AT LEAST A 2-HOUR FIRE-RESISTANCE RATING AND CONSTRUCTED OF MASONRY EQUIVALENT IN ACCORDANCE WITH DEPARTMENT RULES.  
 3.1 THE EXIT DOORS TO SUCH STAIRS SHALL BE PLACED A DISTANCE APART EQUAL TO NO LESS THAN 15 FEET

- LEGEND:**
- [ ] NO ACCESS ZONE
  - [ ] NON-SIMULTANEOUS OCCUPANCY (N.S.O.)
  - [ ] EXIT TO GRADE
  - [ ] TRAVEL DISTANCE
  - [ ] SAFE AREA
  - [ ] NON-RATED PARTITION
  - [ ] CONCRETE WALL/COLUMN
  - [ ] EXIT SIGN
  - [ ] GARAGE DRAIN
  - [ ] DEAD END TRAVEL DIST.
  - [ ] DIST. BETWEEN 2 EXITS
  - [ ] COMMON PATH OF TRAVEL
  - [ ] 1 HR-RATED PARTITION
  - [ ] 2 HR-RATED PARTITION
  - [ ] 3 HR-RATED PARTITION
- NOTE:  
 ALL DOORS IN PUBLIC CORRIDORS ARE SELF-CLOSING AND HAVE A 1.5 HOUR FIRE PROTECTION RATING.

EG PATH - 2ND - 4TH FLOOR RES.

OCCUPANCY	ID	REQUIRED WITH SPRINKLER SYSTEM	EGRESS DISTANCE	CODE REF	COMPLIANCE
RESIDENTIAL (R-2)	APARTMENT B	200'-0" MAX.	83'	1015.1	Y
RESIDENTIAL (R-2)	APARTMENT J	200'-0" MAX.	98'	1015.1	Y
RESIDENTIAL (R-2)	APARTMENT K	200'-0" MAX.	135'	1015.1	Y
RESIDENTIAL (R-2)	APARTMENT W	200'-0" MAX.	96'	1015.1	Y
RESIDENTIAL (R-2)	DEAD END TRAVEL DIST. 1	80'-0" MAX.	38'	1016.3	Y
RESIDENTIAL (R-2)	DEAD END TRAVEL DIST. 2	80'-0" MAX.	30'	1016.3	Y
RESIDENTIAL (R-2)	DIST. BETWEEN 2 EXITS, A	15'-0" MIN.	15'	1014.2.1	Y
RESIDENTIAL (R-2)	DIST. BETWEEN 2 EXITS, B	15'-0" MIN.	15'	1014.2.1	Y

DOOR@ STAIR B1  
 36"0.2" = 180 PERSONS MAX  
 (AS PER TABLE 1005.1)  
 STAIR B/1 (45" WIDE)  
 45"0.3" = 150 PERSONS MAX  
 (AS PER TABLE 1005.1)

DOOR@ STAIR B2  
 36"0.2" = 180 PERSONS MAX  
 (AS PER TABLE 1005.1)  
 STAIR B/2 (45" WIDE)  
 45"0.3" = 150 PERSONS MAX  
 (AS PER TABLE 1005.1)

DOOR@ STAIR A1  
 36"0.2" = 180 PERSONS MAX  
 (AS PER TABLE 1005.1)  
 STAIR A1 (45" WIDE)  
 45"0.3" = 150 PERSONS MAX  
 (AS PER TABLE 1005.1)

DOOR@ STAIR A2  
 36"0.2" = 180 PERSONS MAX  
 (AS PER TABLE 1005.1)  
 STAIR A/2 (45" WIDE)  
 45"0.3" = 150 PERSONS MAX  
 (AS PER TABLE 1005.1)

**OCCUPANT LOAD AND EGRESS ANALYSIS**

FLOORS 2-3 (COMMERCIAL)  
SECTION BC 1004 - OCCUPANCY LOAD CALCULATION  
TABLE 1004.1.2

GROSS AREA = 13,366 S.F.

OCCUPANCY	AREA	CALCULATION	OCCUPANTS
OFFICE	13,366 S.F.	13,366 S.F./100 GROSS	137
<b>TOTAL OCCUPANT LOAD: 137 OCCUPANTS</b>			

SECTION BC 1004 - OCCUPANCY LOAD CALCULATION  
TABLE 1005.1:

EGRESS DOOR SPACE	REQUIRED	PROVIDED	COMPLIANCE
OFFICE	OCCUPANT LOAD X 0.2' 137 X 0.2' = 27.4'	STAIR C DOOR = 36" STAIR D DOOR = 36" STAIR F DOOR = 36" TOTAL = 108"	YES
EGRESS STAIR SPACE	REQUIRED	PROVIDED	COMPLIANCE
OFFICE	OCCUPANT LOAD X 0.3' 137 X 0.3' = 41.1'	STAIR C = 64" STAIR D = 64" STAIR F = 60" TOTAL = 188"	YES

EGRESS NOTES:

SECTION BC 302 CLASSIFICATION  
1 ASSEMBLY  
2 BUSINESS  
3 EDUCATIONAL  
4 RESIDENTIAL  
5 MERCANTILE  
6 STORAGE  
7 UTILITY

SECTION 28-2-1011 MINIMUM NUMBER OF EXITS  
OCCUPANT LOAD  
1-500  
501-1000  
MORE THAN 1000

SECTION 28-2-1014 EXIT OR EXIT ACCESS DOORWAYS REQUIRED: TWO EXITS OR EXIT ACCESS DOORWAYS FROM ANY SPACE SHALL BE PROVIDED WHERE ONE OF THE FOLLOWING CONDITIONS EXISTS:  
1. THE OCCUPANT LOAD OF THE SPACE EXCEEDS THE VALUES IN TABLE 1014.1.

SECTION 28-2-1014.2 TWO EXITS OR EXIT ACCESS DOORWAYS:  
EXCEPTIONS:  
3. R2 OCCUPANCY, IN R-2 OCCUPANCY, WHERE STAIRS ARE ENCLOSED IN WALLS HAVING AT LEAST A 2-HOUR FIRE-RESISTANCE RATING AND CONSTRUCTED OF MASONRY EQUIVALENT IN ACCORDANCE WITH DEPARTMENT RULES.  
3.1 THE EXIT DOORS TO SUCH STAIRS SHALL BE PLACED A DISTANCE APART EQUAL TO NO LESS THAN 15 FEET

**LEGEND:**

- NO ACCESS ZONE
- NON-SIMULTANEOUS OCCUPANCY (N.S.O.)
- EXIT TO GRADE
- TRAVEL DISTANCE
- SAFE AREA
- NON-RATED PARTITION
- CONCRETE WALL/COLUMN
- EXIT SIGN
- GARAGE DRAIN
- DEAD END TRAVEL DIST.
- DIST. BETWEEN 2 EXITS
- COMMON PATH OF TRAVEL
- 1 HR-RATED PARTITION
- 2 HR-RATED PARTITION
- 3 HR-RATED PARTITION

NOTE:  
ALL DOORS IN PUBLIC CORRIDORS ARE SELF-CLOSING AND HAVE A 1.5 HOUR FIRE PROTECTION RATING.

EG PATH - 2ND - 3RD FLOOR COMM.

OCCUPANCY	ID	REQUIRED WITH SPRINKLER SYSTEM	EGRESS DISTANCE	CODE REF	COMPLIANCE
BUSINESS (B)	A	300'-0" MAX.	87'	1015.1	Y
BUSINESS (B)	B	300'-0" MAX.	143'	1015.1	Y
BUSINESS (B)	C	300'-0" MAX.	87'	1015.1	Y
BUSINESS (B)	D	300'-0" MAX.	159'	1015.1	Y
BUSINESS (B)	DIST. BETWEEN 2 EXITS	15'-0" MIN.	168'	1014.2.1	Y

**DOOR@ STAIR C**  
36"0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)

**STAIR C (64" WIDE)**  
64"0.3" = 213 PERSONS MAX  
(AS PER TABLE 1005.1)

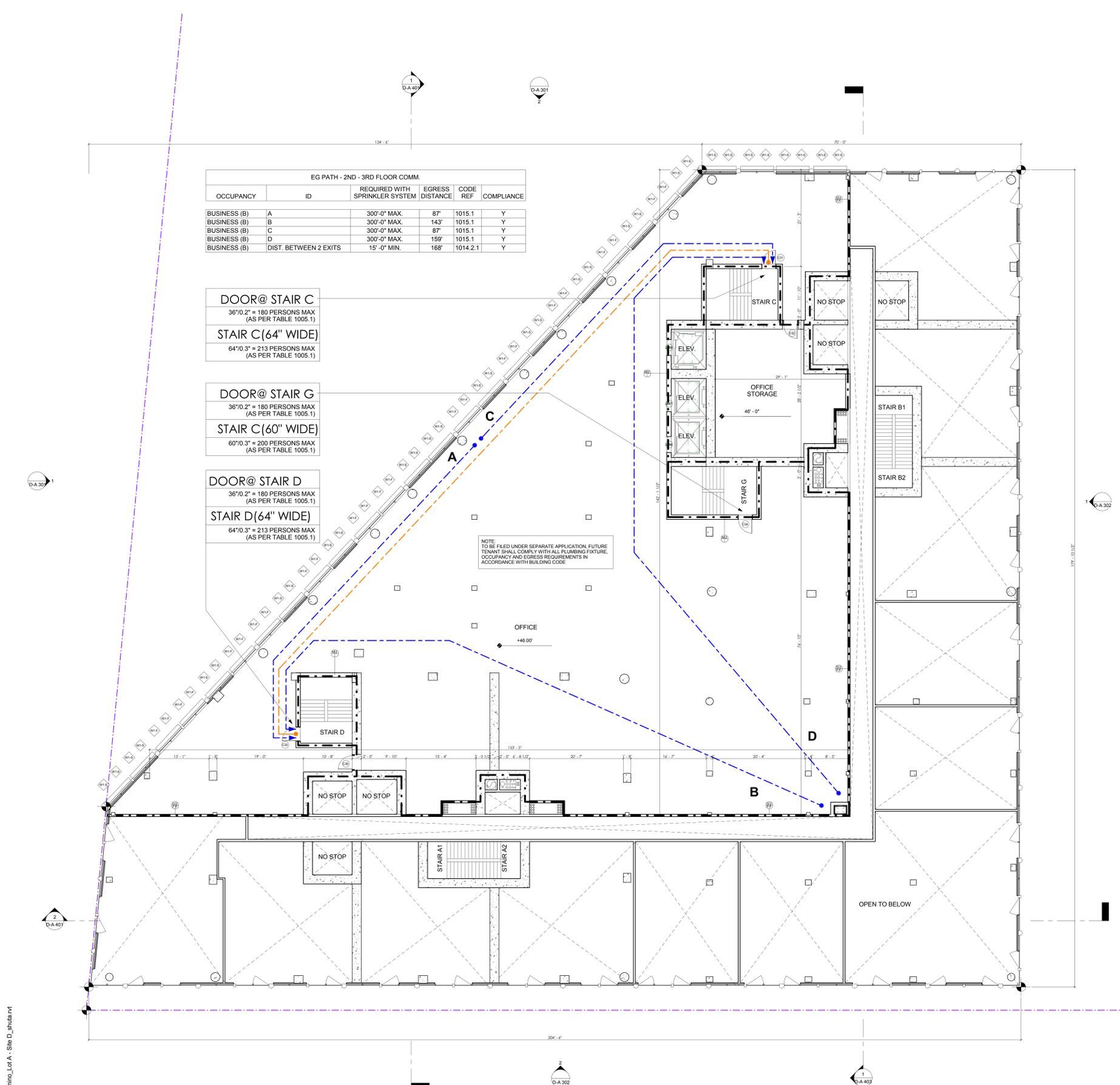
**DOOR@ STAIR G**  
36"0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)

**STAIR C (60" WIDE)**  
60"0.3" = 200 PERSONS MAX  
(AS PER TABLE 1005.1)

**DOOR@ STAIR D**  
36"0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)

**STAIR D (64" WIDE)**  
64"0.3" = 213 PERSONS MAX  
(AS PER TABLE 1005.1)

NOTE:  
TO BE FILED UNDER SEPARATE APPLICATION, FUTURE TENANT SHALL COMPLY WITH ALL PLUMBING FIXTURE, OCCUPANCY AND EGRESS REQUIREMENTS IN ACCORDANCE WITH BUILDING CODE



**OCCUPANT LOAD AND EGRESS ANALYSIS**

FLOOR 5  
SECTION BC 1004 - OCCUPANCY LOAD CALCULATION  
TABLE 1004.1.2

OCCUPANCY	AREA	CALCULATION	OCCUPANTS
GROSS AREA WITHIN D.U.	18,507 S.F.	18,507 S.F./200 GROSS	93
STORAGE CIRCULATION	593 S.F.	593 S.F./200 GROSS	2
	2,288 S.F.	N.S.O.	N.S.O.
<b>TOTAL OCCUPANT LOAD: 95 OCCUPANTS</b>			

SECTION BC 1004 - OCCUPANCY LOAD CALCULATION  
TABLE 1005.1

EGRESS DOOR SPACE	REQUIRED	PROVIDED	COMPLIANCE
GROSS AREA WITHIN D.U. STORAGE	OCCUPANT LOAD X 0.2' 93 X 0.2' = 18.6'	STAIR A1 DOOR = 36" STAIR B1 DOOR = 36" STAIR B2 DOOR = 36" TOTAL = 144"	YES
EGRESS STAIR SPACE	OCCUPANT LOAD X 0.3' 93 X 0.3' = 27.9'	STAIR A1 = 45" STAIR B1 = 45" STAIR B2 = 45" TOTAL = 180"	YES

EGRESS NOTES:  
SECTION BC 302 CLASSIFICATION  
1. ASSEMBLY  
2. BUSINESS  
3. EDUCATIONAL  
4. RESIDENTIAL  
5. MERCANTILE  
6. STORAGE  
7. UTILITY

A-1, A.2, A.3, A.4, A.5  
B  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M  
N  
O  
P  
Q  
R  
S  
U

SECTION 282-1014.1 MINIMUM NUMBER OF EXITS  
OCCUPANT LOAD  
1-100  
101-1000  
MORE THAN 1000

FIRE-RESISTANCE RATING(HOURS)  
2  
2

MINIMUM # OF EXITS  
2  
3  
4

SECTION 282-1014.2 TWO EXITS OR EXIT ACCESS DOORWAYS  
EXCEPTIONS:  
1. THE OCCUPANT LOAD OF THE SPACE EXCEEDS THE VALUES IN TABLE 1014.1

OCCUPANCY R  
A, B, E, M, U  
S

SECTION 282-1014.2.1 TWO EXITS OR EXIT ACCESS DOORWAYS  
EXCEPTIONS:  
1. THE OCCUPANT LOAD OF THE SPACE EXCEEDS THE VALUES IN TABLE 1014.1

OCCUPANCY R  
A, B, E, M, U  
S

SECTION 282-1014.2.2 TWO EXITS OR EXIT ACCESS DOORWAYS  
EXCEPTIONS:  
1. THE OCCUPANT LOAD OF THE SPACE EXCEEDS THE VALUES IN TABLE 1014.1

OCCUPANCY R  
A, B, E, M, U  
S

SECTION 282-1014.2.3 TWO EXITS OR EXIT ACCESS DOORWAYS  
EXCEPTIONS:  
1. THE OCCUPANT LOAD OF THE SPACE EXCEEDS THE VALUES IN TABLE 1014.1

OCCUPANCY R  
A, B, E, M, U  
S

SECTION 282-1014.2.4 TWO EXITS OR EXIT ACCESS DOORWAYS  
EXCEPTIONS:  
1. THE OCCUPANT LOAD OF THE SPACE EXCEEDS THE VALUES IN TABLE 1014.1

OCCUPANCY R  
A, B, E, M, U  
S

SECTION 282-1014.2.5 TWO EXITS OR EXIT ACCESS DOORWAYS  
EXCEPTIONS:  
1. THE OCCUPANT LOAD OF THE SPACE EXCEEDS THE VALUES IN TABLE 1014.1

OCCUPANCY R  
A, B, E, M, U  
S

SECTION 282-1014.2.6 TWO EXITS OR EXIT ACCESS DOORWAYS  
EXCEPTIONS:  
1. THE OCCUPANT LOAD OF THE SPACE EXCEEDS THE VALUES IN TABLE 1014.1

OCCUPANCY R  
A, B, E, M, U  
S

SECTION 282-1014.2.7 TWO EXITS OR EXIT ACCESS DOORWAYS  
EXCEPTIONS:  
1. THE OCCUPANT LOAD OF THE SPACE EXCEEDS THE VALUES IN TABLE 1014.1

OCCUPANCY R  
A, B, E, M, U  
S

SECTION 282-1014.2.8 TWO EXITS OR EXIT ACCESS DOORWAYS  
EXCEPTIONS:  
1. THE OCCUPANT LOAD OF THE SPACE EXCEEDS THE VALUES IN TABLE 1014.1

OCCUPANCY R  
A, B, E, M, U  
S

SECTION 282-1014.2.9 TWO EXITS OR EXIT ACCESS DOORWAYS  
EXCEPTIONS:  
1. THE OCCUPANT LOAD OF THE SPACE EXCEEDS THE VALUES IN TABLE 1014.1

OCCUPANCY R  
A, B, E, M, U  
S

SECTION 282-1014.2.10 TWO EXITS OR EXIT ACCESS DOORWAYS  
EXCEPTIONS:  
1. THE OCCUPANT LOAD OF THE SPACE EXCEEDS THE VALUES IN TABLE 1014.1

OCCUPANCY R  
A, B, E, M, U  
S

SECTION 282-1014.2.11 TWO EXITS OR EXIT ACCESS DOORWAYS  
EXCEPTIONS:  
1. THE OCCUPANT LOAD OF THE SPACE EXCEEDS THE VALUES IN TABLE 1014.1

OCCUPANCY R  
A, B, E, M, U  
S

EG PATH - 5TH FLOOR

OCCUPANCY	ID	REQUIRED WITH SPRINKLER SYSTEM	EGRESS DISTANCE	CODE REF	COMPLIANCE
RESIDENTIAL (R-2)	APARTMENT A	200'-0" MAX.	82'	1015.1	Y
RESIDENTIAL (R-2)	APARTMENT J	200'-0" MAX.	100'	1015.1	Y
RESIDENTIAL (R-2)	APARTMENT K	200'-0" MAX.	135'	1015.1	Y
RESIDENTIAL (R-2)	APARTMENT T	200'-0" MAX.	110'	1015.1	Y
RESIDENTIAL (R-2)	DEAD END TRAVEL DIST. 1	80'-0" MAX.	52'	1016.3	Y
RESIDENTIAL (R-2)	DEAD END TRAVEL DIST. 2	80'-0" MAX.	30'	1016.3	Y
RESIDENTIAL (R-2)	DIST. BETWEEN 2 EXITS_A	15'-0" MIN.	15'	1014.2.1	Y
RESIDENTIAL (R-2)	DIST. BETWEEN 2 EXITS_B	15'-0" MIN.	15'	1014.2.1	Y

DOOR@ STAIR B1  
36'7.0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)  
STAIR B1 (45" WIDE)  
45'7.0.3" = 150 PERSONS MAX  
(AS PER TABLE 1005.1)

DOOR@ STAIR B2  
36'7.0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)  
STAIR B2 (45" WIDE)  
45'7.0.3" = 150 PERSONS MAX  
(AS PER TABLE 1005.1)

DOOR@ STAIR A1  
36'7.0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)  
STAIR A1 (45" WIDE)  
45'7.0.3" = 150 PERSONS MAX  
(AS PER TABLE 1005.1)

DOOR@ STAIR A2  
36'7.0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)  
STAIR A2 (45" WIDE)  
45'7.0.3" = 150 PERSONS MAX  
(AS PER TABLE 1005.1)

**LEGEND:**

- [ ] NO ACCESS ZONE
- [ ] NON-SIMULTANEOUS OCCUPANCY (N.S.O.)
- [ ] EXIT TO GRADE
- [ ] TRAVEL DISTANCE
- [ ] SAFE AREA
- [ ] NON-RATED PARTITION
- [ ] CONCRETE WALL/COLUMN
- [ ] EXIT SIGN
- [ ] GARAGE DRAIN
- [ ] DEAD END TRAVEL DIST.
- [ ] DIST. BETWEEN 2 EXITS
- [ ] COMMON PATH OF TRAVEL
- [ ] 1 HR-RATED PARTITION
- [ ] 2 HR-RATED PARTITION
- [ ] 3 HR-RATED PARTITION

NOTE:  
ALL DOORS IN PUBLIC CORRIDORS ARE SELF-CLOSING AND HAVE A 1.5 HOUR FIRE PROTECTION RATINGS.

**OCCUPANT LOAD AND EGRESS ANALYSIS**

FLOORS 6-8  
SECTION BC 1004 - OCCUPANCY LOAD CALCULATION  
TABLE 1004.1.2

OCCUPANCY	AREA	CALCULATION	OCCUPANTS
GROSS AREA WITHIN D.U.	18,507 S.F.	18,507 S.F./200 GROSS	93
STORAGE CIRCULATION	593 S.F.	593 S.F./300 GROSS	2
	2,288 S.F.	N.S.O.	N.S.O.
<b>TOTAL OCCUPANT LOAD: 95 OCCUPANTS</b>			

SECTION BC 1004 - OCCUPANCY LOAD CALCULATION  
TABLE 1005.1

EGRESS DOOR SPACE	REQUIRED	PROVIDED	COMPLIANCE
GROSS AREA WITHIN D.U. STORAGE	OCCUPANT LOAD X 0.2' 93 X 0.2' = 18.6'	STAIR A1 DOOR = 36" STAIR A2 DOOR = 36" STAIR B1 DOOR = 36" STAIR B2 DOOR = 36" <b>TOTAL = 144"</b>	YES
EGRESS STAIR SPACE	OCCUPANT LOAD X 0.3' 93 X 0.3' = 27.9'	STAIR A1 = 45" STAIR A2 = 45" STAIR B1 = 45" STAIR B2 = 45" <b>TOTAL = 180"</b>	YES

EGRESS NOTES:  
SECTION BC 302 CLASSIFICATION  
1. ASSEMBLY A-1, A-2, A-3, A-4, A-5  
2. BUSINESS B  
3. EDUCATIONAL E  
4. RESIDENTIAL R  
5. MERCANTILE M  
6. STORAGE S  
7. UTILITY U

\$28-2-706.3.7 FIRE-RESISTANCE RATING REQUIREMENTS FOR FIRE BARRIER ASSEMBLIES BETWEEN FIRE AREAS  
OCCUPANCY GROUP FIRE-RESISTANCE RATING(HOURS)  
A,B,E,F-Z,H-I,M,R,S-2 2

SECTION 28.2-1018.1 MINIMUM NUMBER OF EXITS  
OCCUPANT LOAD MINIMUM # OF EXITS  
1-999 2  
1000-4999 3  
5000-9999 4  
10000 OR MORE 5

\$28-2-1014.1 EXIT OR EXIT ACCESS DOORWAYS REQUIRED. TWO EXITS OR EXIT ACCESS DOORWAYS FROM ANY SPACE SHALL BE PROVIDED WHERE ONE OF THE FOLLOWING CONDITIONS EXISTS:  
1. THE OCCUPANT LOAD OF THE SPACE EXCEEDS THE VALUES IN TABLE 1014.1.  
OCCUPANCY R 20 PERSONS  
A, B, E, M, U 24 PERSONS  
S 30 PERSONS

\$28-2-1014.2.1 TWO EXITS OR EXIT ACCESS DOORWAYS.  
EXCEPTIONS:  
3. R-2 OCCUPANCY, IN R-2 OCCUPANCY, WHERE STAIRS ARE ENCLOSED IN WALLS HAVING AT LEAST A 2-HOUR FIRE-RESISTANCE RATING AND CONSTRUCTED OF MASONRY EQUIVALENT IN ACCORDANCE WITH DEPARTMENT RULES.  
3.1 THE EXIT DOORS TO SUCH STAIRS SHALL BE PLACED A DISTANCE APART EQUAL TO NO LESS THAN 15 FEET

- LEGEND:**
- [ ] NO ACCESS ZONE
  - [ ] NON-SIMULTANEOUS OCCUPANCY (N.S.O.)
  - [ ] EXIT TO GRADE
  - [ ] TRAVEL DISTANCE
  - [ ] SAFE AREA
  - [ ] NON-RATED PARTITION
  - [ ] CONCRETE WALL/COLUMN
  - [ ] EXIT SIGN
  - [ ] GARAGE DRAIN
  - [ ] DEAD END TRAVEL DIST.
  - [ ] DIST. BETWEEN 2 EXITS
  - [ ] COMMON PATH OF TRAVEL
  - [ ] 1 HR-RATED PARTITION
  - [ ] 2 HR-RATED PARTITION
  - [ ] 3 HR-RATED PARTITION
- NOTE:  
ALL DOORS IN PUBLIC CORRIDORS ARE SELF-CLOSING AND HAVE A 1.5 HOUR FIRE PROTECTION RATING.

EG PATH - 6TH-8TH FLOOR

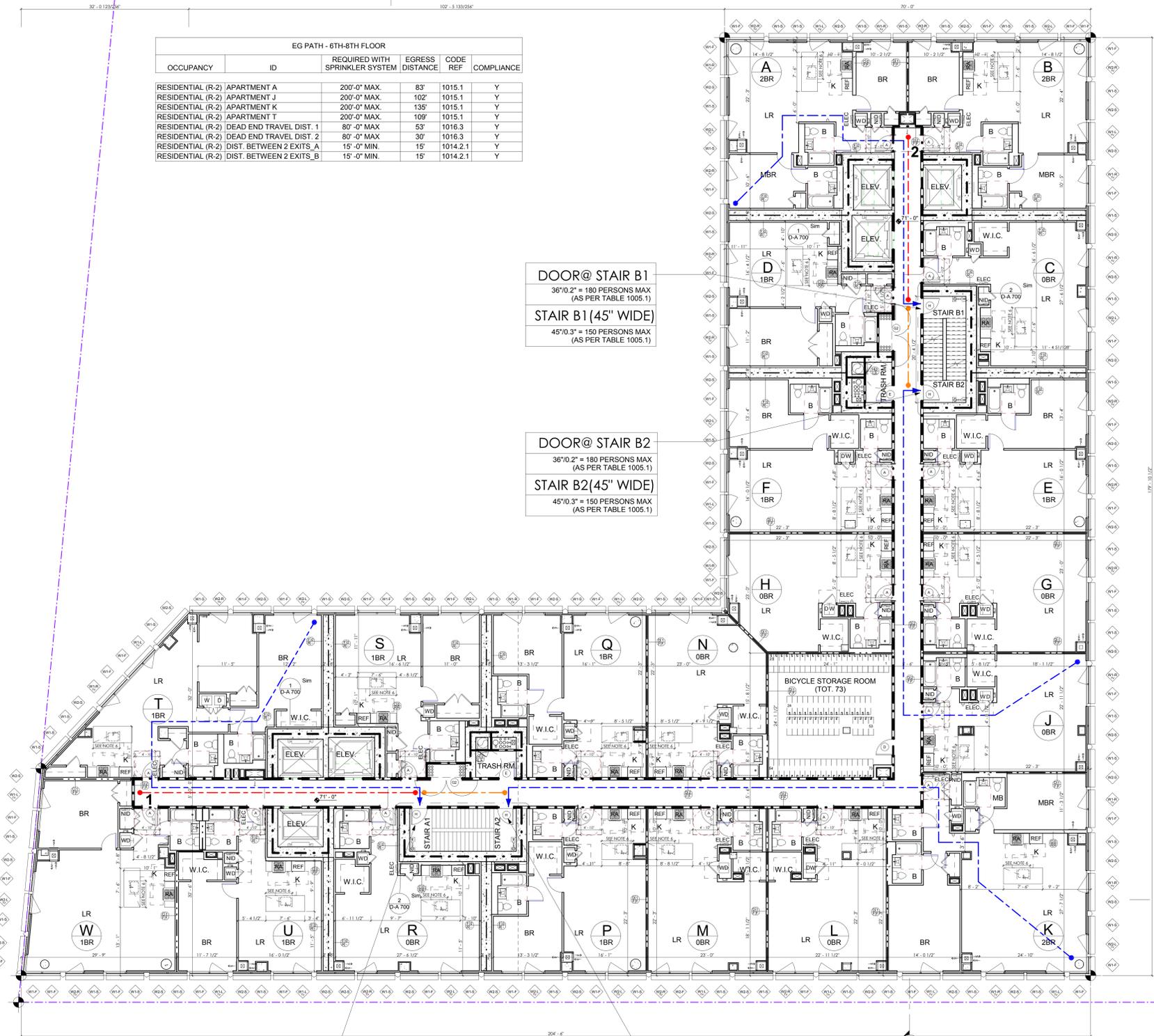
OCCUPANCY	ID	REQUIRED WITH SPRINKLER SYSTEM	EGRESS DISTANCE	CODE REF	COMPLIANCE
RESIDENTIAL (R-2)	APARTMENT A	200'-0" MAX.	83'	1015.1	Y
RESIDENTIAL (R-2)	APARTMENT J	200'-0" MAX.	102'	1015.1	Y
RESIDENTIAL (R-2)	APARTMENT K	200'-0" MAX.	135'	1015.1	Y
RESIDENTIAL (R-2)	APARTMENT T	200'-0" MAX.	109'	1015.1	Y
RESIDENTIAL (R-2)	DEAD END TRAVEL DIST. 1	80'-0" MAX.	53'	1016.3	Y
RESIDENTIAL (R-2)	DEAD END TRAVEL DIST. 2	80'-0" MAX.	30'	1016.3	Y
RESIDENTIAL (R-2)	DIST. BETWEEN 2 EXITS, A	15'-0" MIN.	15'	1014.2.1	Y
RESIDENTIAL (R-2)	DIST. BETWEEN 2 EXITS, B	15'-0" MIN.	15'	1014.2.1	Y

DOOR@ STAIR B1  
36'0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)  
STAIR B1 (45" WIDE)  
45'0.3" = 150 PERSONS MAX  
(AS PER TABLE 1005.1)

DOOR@ STAIR B2  
36'0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)  
STAIR B2 (45" WIDE)  
45'0.3" = 150 PERSONS MAX  
(AS PER TABLE 1005.1)

DOOR@ STAIR A1  
36'0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)  
STAIR A1 (45" WIDE)  
45'0.3" = 150 PERSONS MAX  
(AS PER TABLE 1005.1)

DOOR@ STAIR A2  
36'0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)  
STAIR A2 (45" WIDE)  
45'0.3" = 150 PERSONS MAX  
(AS PER TABLE 1005.1)



**OCCUPANT LOAD AND EGRESS ANALYSIS**

FLOOR 9 - TOWER D2  
SECTION BC 1004 - OCCUPANCY LOAD CALCULATION  
TABLE 1004.1.2

OCCUPANCY	AREA	CALCULATION	OCCUPANTS
GROSS AREA	5,870 S.F.	5,868 S.F./200 GROSS	29
GROSS AREA WITHIN D.U.		N.S.O.	N.S.O.
CIRCULATION	780 S.F.		
<b>TOTAL OCCUPANT LOAD: 29 OCCUPANTS</b>			

SECTION BC 1004 - OCCUPANCY LOAD CALCULATION  
TABLE 1005.1

EGRESS DOOR SPACE	REQUIRED	PROVIDED	COMPLIANCE
GROSS AREA WITHIN D.U.	OCCUPANT LOAD X 0.2' 29 X 0.2' = 5.8'	STAIR A1 DOOR = 36" STAIR A2 DOOR = 36" TOTAL = 72"	YES
EGRESS STAIR SPACE	REQUIRED	PROVIDED	COMPLIANCE
GROSS AREA WITHIN D.U.	OCCUPANT LOAD X 0.3' 29 X 0.3' = 8.7'	STAIR A1 = 45" STAIR A2 = 45" TOTAL = 90"	YES

EGRESS NOTES:  
SECTION BC 302 CLASSIFICATION  
1. ASSEMBLY A-1, A-2, A-3, A-4, A-5  
2. BUSINESS B  
3. EDUCATIONAL E  
4. RESIDENTIAL R  
5. MERCANTILE M  
6. STORAGE S  
7. UTILITY U

§28.2-706.3 FIRE-RESISTANCE RATING REQUIREMENTS FOR FIRE BARRIER ASSEMBLIES BETWEEN FIRE AREAS  
OCCUPANCY GROUP FIRE-RESISTANCE RATING(HOURS)  
A,B,E,F-2,H-4,H-5,I,M,R,S-2 2

SECTION 28.2-1018.1 MINIMUM NUMBER OF EXITS  
OCCUPANT LOAD MINIMUM # OF EXITS  
1-500 2  
501-1000 3  
MORE THAN 1000 4

§28.2-1014.1 EXIT OR EXIT ACCESS DOORWAYS REQUIRED. TWO EXITS OR EXIT ACCESS DOORWAYS FROM ANY SPACE SHALL BE PROVIDED WHERE ONE OF THE FOLLOWING CONDITIONS EXISTS:  
1. THE OCCUPANT LOAD OF THE SPACE EXCEEDS THE VALUES IN TABLE 1014.1.

OCCUPANCY R 20 PERSONS  
A, B, E, M, U 74 PERSONS  
S 30 PERSONS

§28.2-1014.2 TWO EXITS OR EXIT ACCESS DOORWAYS. EXCEPTIONS:  
1. R-2 OCCUPANCY, IN R-2 OCCUPANCY, WHERE STAIRS ARE ENCLOSED IN WALLS HAVING AT LEAST A 2-HOUR FIRE-RESISTANCE RATING AND CONSTRUCTED OF MASONRY EQUIVALENT IN ACCORDANCE WITH DEPARTMENT RULES.  
3.1 THE EXIT DOORS TO SUCH STAIRS SHALL BE PLACED A DISTANCE APART EQUAL TO NO LESS THAN 15 FEET

**LEGEND:**

- NO ACCESS ZONE
- NON-SIMULTANEOUS OCCUPANCY (N.S.O.)
- EXIT TO GRADE
- TRAVEL DISTANCE
- SAFE AREA
- NON-RATED PARTITION
- EXIT SIGN
- GARAGE DRAIN
- DEAD END TRAVEL DIST.
- DIST. BETWEEN 2 EXITS
- COMMON PATH OF TRAVEL
- 1 HR-RATED PARTITION
- 2 HR-RATED PARTITION
- 3 HR-RATED PARTITION

NOTE: ALL DOORS IN PUBLIC CORRIDORS ARE SELF-CLOSING AND HAVE A 1.5 HOUR FIRE PROTECTION RATING.

**OCCUPANT LOAD AND EGRESS ANALYSIS**

FLOOR 9 - TOWER D1  
SECTION BC 1004 - OCCUPANCY LOAD CALCULATION  
TABLE 1004.1.2

OCCUPANCY	AREA	CALCULATION	OCCUPANTS
GROSS AREA	5,774 S.F.	5,774 S.F./200 GROSS	29
GROSS AREA WITHIN D.U.		N.S.O.	N.S.O.
CIRCULATION	783 S.F.		
<b>TOTAL OCCUPANT LOAD: 29 OCCUPANTS</b>			

SECTION BC 1004 - OCCUPANCY LOAD CALCULATION  
TABLE 1005.1

EGRESS DOOR SPACE	REQUIRED	PROVIDED	COMPLIANCE
GROSS AREA WITHIN D.U.	OCCUPANT LOAD X 0.2' 29 X 0.2' = 5.8'	STAIR A1 DOOR = 36" STAIR A2 DOOR = 36" TOTAL = 72"	YES
EGRESS STAIR SPACE	REQUIRED	PROVIDED	COMPLIANCE
GROSS AREA WITHIN D.U.	OCCUPANT LOAD X 0.3' 29 X 0.3' = 8.7'	STAIR A1 = 45" STAIR A2 = 45" TOTAL = 90"	YES

EG PATH - 9TH FLOOR - Tower D2

OCCUPANCY	ID	REQUIRED WITH SPRINKLER SYSTEM	EGRESS DISTANCE	CODE REF	COMPLIANCE	Tower
RESIDENTIAL (R-2) APARTMENT A		200'-0" MAX.	73'	1015.1	Y	D2
RESIDENTIAL (R-2) APARTMENT E		200'-0" MAX.	47'	1015.1	Y	D2
RESIDENTIAL (R-2) DEAD END TRAVEL DIST. 1		80'-0" MAX	31'	1016.3	Y	D2
RESIDENTIAL (R-2) DEAD END TRAVEL DIST. 2		80'-0" MAX	6'	1016.3	Y	D2
RESIDENTIAL (R-2) DIST. BETWEEN 2 EXITS		15'-0" MIN.	15'	1014.2.1	Y	D2

DOOR@ STAIR B1  
36"/0.2' = 180 PERSONS MAX  
(AS PER TABLE 1005.1)  
STAIR B1 (45" WIDE)  
45"/0.3' = 150 PERSONS MAX  
(AS PER TABLE 1005.1)

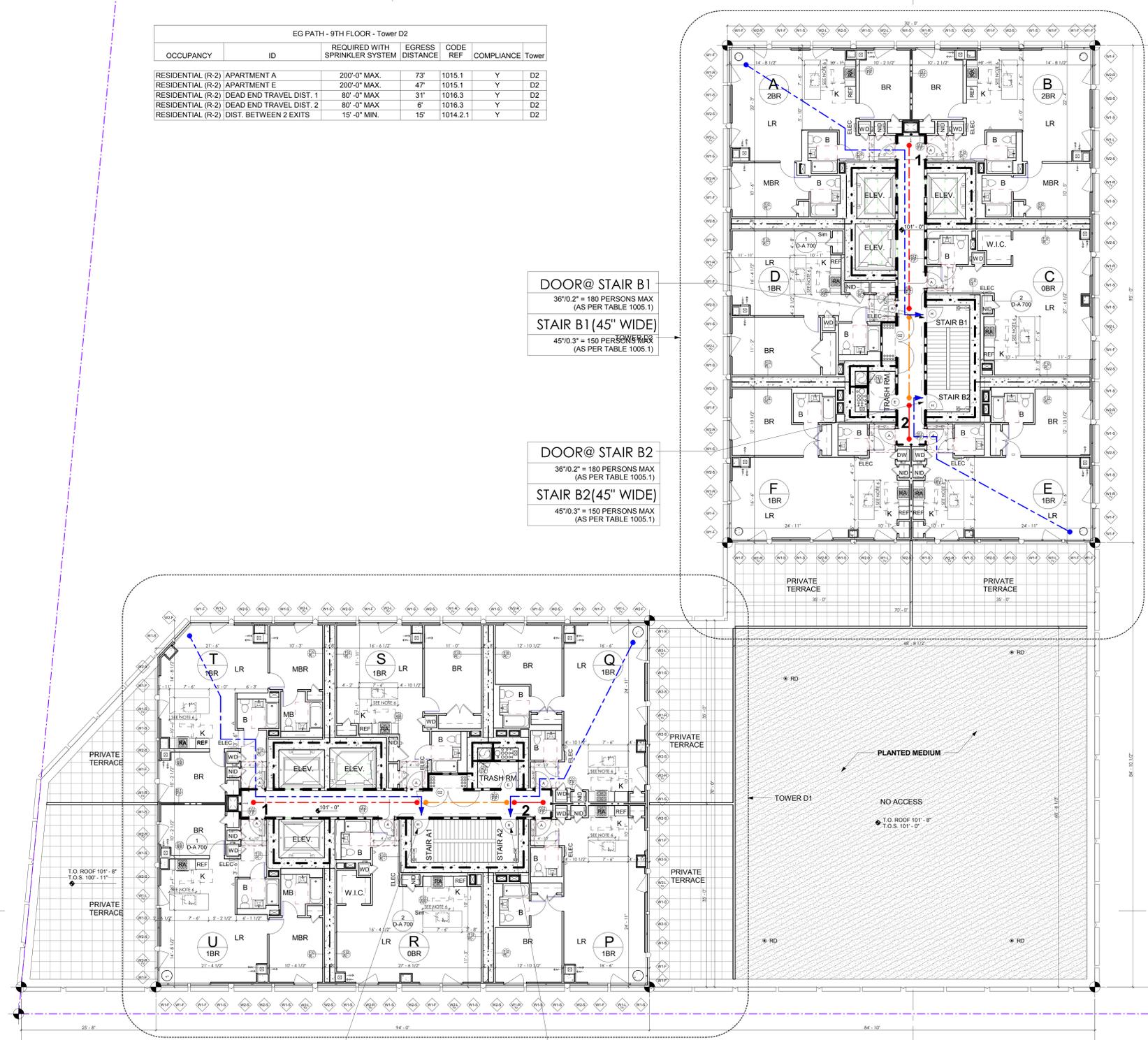
DOOR@ STAIR B2  
36"/0.2' = 180 PERSONS MAX  
(AS PER TABLE 1005.1)  
STAIR B2 (45" WIDE)  
45"/0.3' = 150 PERSONS MAX  
(AS PER TABLE 1005.1)

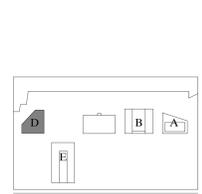
DOOR@ STAIR A1  
36"/0.2' = 180 PERSONS MAX  
(AS PER TABLE 1005.1)  
STAIR A1 (45" WIDE)  
45"/0.3' = 150 PERSONS MAX  
(AS PER TABLE 1005.1)

DOOR@ STAIR A2  
36"/0.2' = 180 PERSONS MAX  
(AS PER TABLE 1005.1)  
STAIR A2 (45" WIDE)  
45"/0.3' = 150 PERSONS MAX  
(AS PER TABLE 1005.1)

EG PATH - 9TH FLOOR - Tower D1

OCCUPANCY	ID	REQUIRED WITH SPRINKLER SYSTEM	EGRESS DISTANCE	CODE REF	COMPLIANCE	Tower
RESIDENTIAL (R-2) APARTMENT Q		200'-0" MAX.	47'	1015.1	Y	D1
RESIDENTIAL (R-2) APARTMENT T		200'-0" MAX.	74'	1015.1	Y	D1
RESIDENTIAL (R-2) DEAD END TRAVEL DIST. 1		80'-0" MAX	31'	1016.3	Y	D1
RESIDENTIAL (R-2) DEAD END TRAVEL DIST. 2		80'-0" MAX	6'	1016.3	Y	D1
RESIDENTIAL (R-2) DIST. BETWEEN 2 EXITS		15'-0" MIN.	15'	1014.2.1	Y	D1



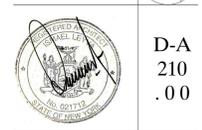


CLIENT  
**Two Trees Management**  
45 Main Street, Suite 602  
Brooklyn, NY 11201

PROJECT  
**Domino - Lot A Building D**  
Brooklyn, NY

TITLE  
Floors 10-28

SCALE: As indicated  
DATE: 05/30/14  
PROJECT No: 13.143.02



D-A  
210  
.00

**OCCUPANT LOAD AND EGRESS ANALYSIS**

FLOORS 10-28 - TOWER D2  
SECTION BC 1004 - OCCUPANCY LOAD CALCULATION  
TABLE 1004.1.2

OCCUPANCY	AREA	CALCULATION	OCCUPANTS
GROSS AREA	5,870 S.F.	5,868 S.F./200 GROSS	29
GROSS AREA WITHIN D.U.		N.S.O.	N.S.O.
CIRCULATION	780 S.F.	N.S.O.	N.S.O.
<b>TOTAL OCCUPANT LOAD: 29 OCCUPANTS</b>			

SECTION BC 1004 - OCCUPANCY LOAD CALCULATION  
TABLE 1005.1

EGRESS DOOR SPACE	REQUIRED	PROVIDED	COMPLIANCE
GROSS AREA WITHIN D.U.	OCCUPANT LOAD X 0.2' 29 X 0.2' = 5.8'	<b>STAIR A1 DOOR = 36"</b> <b>STAIR A2 DOOR = 36"</b> TOTAL = 72"	YES
EGRESS STAIR SPACE	REQUIRED	PROVIDED	COMPLIANCE
GROSS AREA WITHIN D.U.	OCCUPANT LOAD X 0.3' 29 X 0.3' = 8.7'	<b>STAIR A1 = 45"</b> <b>STAIR A2 = 45"</b> TOTAL = 90"	YES

EGRESS NOTES:  
SECTION BC 302 CLASSIFICATION  
A ASSEMBLY  
B BUSINESS  
C EDUCATIONAL  
D RESIDENTIAL  
E MERCANTILE  
F STORAGE  
G UTILITY

\$28.2.706.3.7 FIRE-RESISTANCE RATING REQUIREMENTS FOR FIRE BARRIER ASSEMBLIES BETWEEN FIRE AREAS  
A A-1, A-2, A-3, A-4, A-5  
B E  
C R  
D M  
E S  
F U

OCCUPANCY GROUP FIRE-RESISTANCE RATING(HOURS)  
A,B,E,F,H,I,J,K,S,M,R,S-2 2

SECTION 28.2.1018.1 MINIMUM NUMBER OF EXITS  
OCCUPANT LOAD MINIMUM # OF EXITS  
1-500 2  
501-1000 3  
MORE THAN 1000 4

\$28.2.1014.1 EXIT OR EXIT ACCESS DOORWAYS REQUIRED: TWO EXITS OR EXIT ACCESS DOORWAYS FROM ANY SPACE SHALL BE PROVIDED WHERE ONE OF THE FOLLOWING CONDITIONS EXISTS:  
1. THE OCCUPANT LOAD OF THE SPACE EXCEEDS THE VALUES IN TABLE 1014.1.

OCCUPANCY R 20 PERSONS  
A, B, E, M, U 74 PERSONS  
S 30 PERSONS

\$28.2.1014.2.1 TWO EXITS OR EXIT ACCESS DOORWAYS.  
EXCEPTIONS:  
3. R-2 OCCUPANCY: IN R-2 OCCUPANCY, WHERE STAIRS ARE ENCLOSED IN WALLS HAVING AT LEAST A 2-HOUR FIRE-RESISTANCE RATING AND CONSTRUCTED OF MASONRY EQUIVALENT IN ACCORDANCE WITH DEPARTMENT RULES:  
3.1 THE EXIT DOORS TO SUCH STAIRS SHALL BE PLACED A DISTANCE APART EQUAL TO NO LESS THAN 15 FEET

**LEGEND:**

- [ ] NO ACCESS ZONE
- NON-SIMULTANEOUS OCCUPANCY (N.S.O.)
- ▶ EXIT TO GRADE
- ← TRAVEL DISTANCE
- SAFE AREA
- NON-RATED PARTITION
- ▣ CONCRETE WALL/COLUMN
- ⊕ EXIT SIGN
- \* GARAGE DRAIN
- DEAD END TRAVEL DIST.
- DIST. BETWEEN 2 EXITS
- COMMON PATH OF TRAVEL
- 1 HR-RATED PARTITION
- - - 2 HR-RATED PARTITION
- 3 HR-RATED PARTITION

NOTE:  
ALL DOORS IN PUBLIC CORRIDORS ARE SELF-CLOSING AND HAVE A 1.5 HOUR FIRE PROTECTION RATING.

**OCCUPANT LOAD AND EGRESS ANALYSIS**

FLOORS 10-28 - TOWER D1  
SECTION BC 1004 - OCCUPANCY LOAD CALCULATION  
TABLE 1004.1.2

OCCUPANCY	AREA	CALCULATION	OCCUPANTS
GROSS AREA	5,774 S.F.	5,774 S.F./200 GROSS	29
GROSS AREA WITHIN D.U.		N.S.O.	N.S.O.
CIRCULATION	783 S.F.	N.S.O.	N.S.O.
<b>TOTAL OCCUPANT LOAD: 29 OCCUPANTS</b>			

SECTION BC 1004 - OCCUPANCY LOAD CALCULATION  
TABLE 1005.1

EGRESS DOOR SPACE	REQUIRED	PROVIDED	COMPLIANCE
GROSS AREA WITHIN D.U.	OCCUPANT LOAD X 0.2' 29 X 0.2' = 5.8'	<b>STAIR A1 DOOR = 36"</b> <b>STAIR A2 DOOR = 36"</b> TOTAL = 72"	YES
EGRESS STAIR SPACE	REQUIRED	PROVIDED	COMPLIANCE
GROSS AREA WITHIN D.U.	OCCUPANT LOAD X 0.3' 29 X 0.3' = 8.7'	<b>STAIR A1 = 45"</b> <b>STAIR A2 = 45"</b> TOTAL = 90"	YES

EG PATH - 10TH - 28TH FLOOR - Tower D2

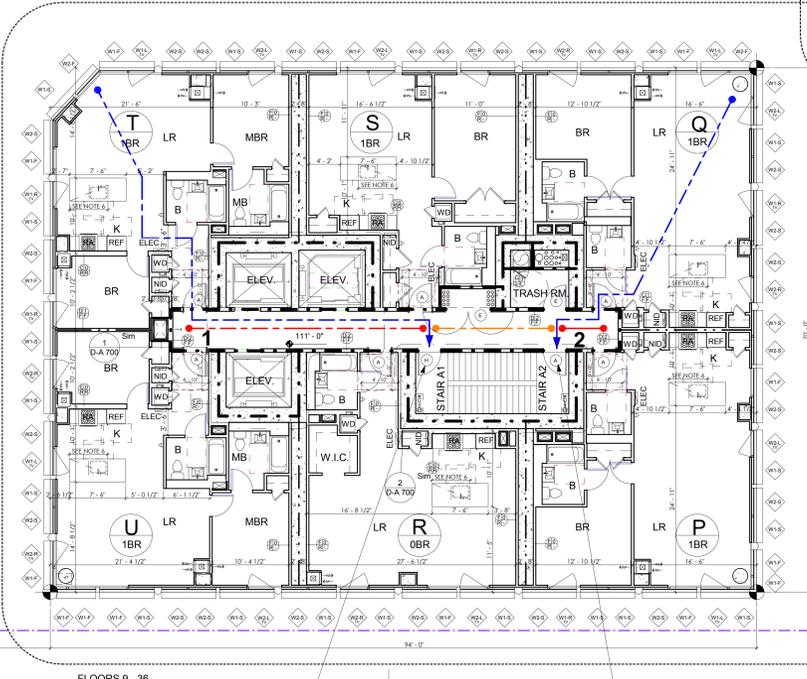
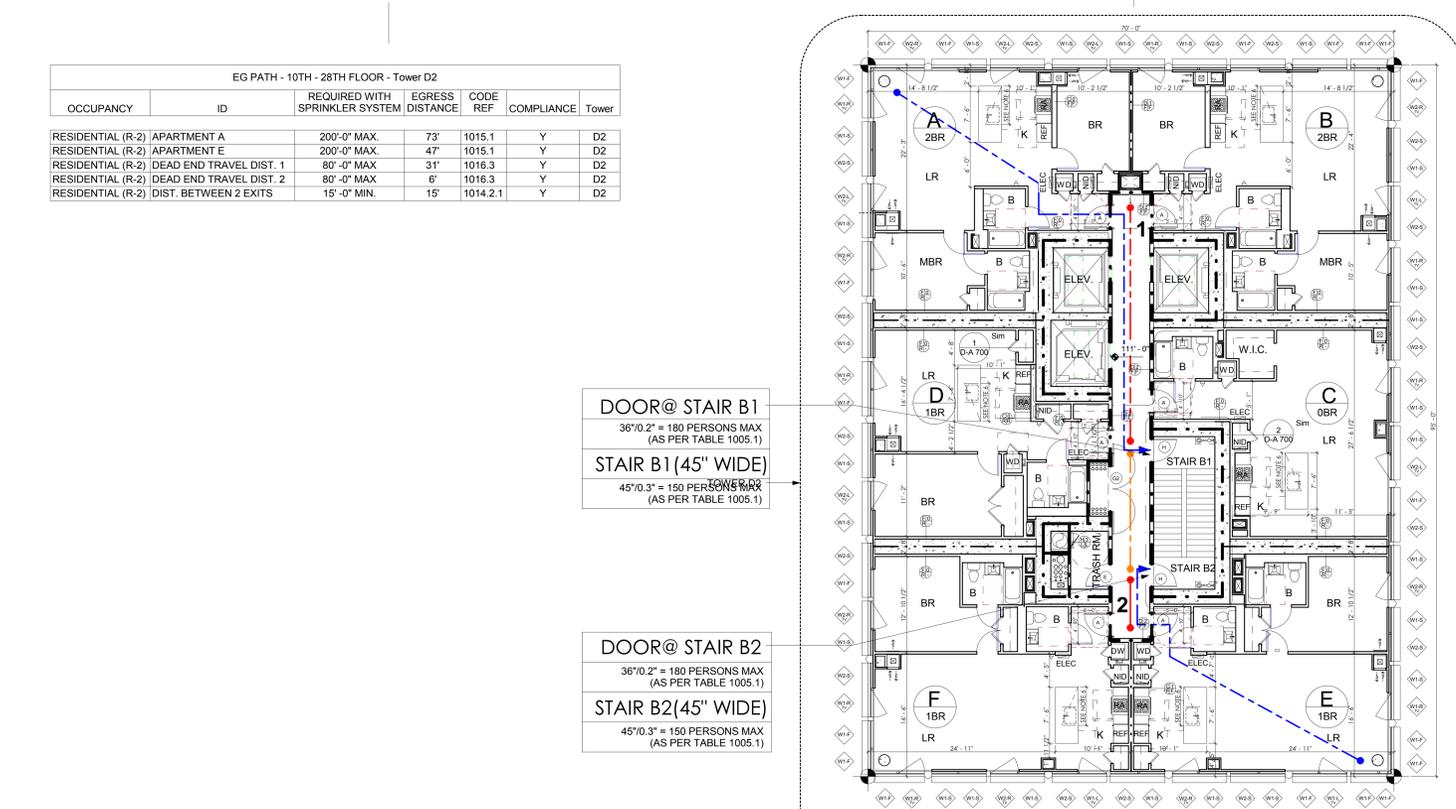
OCCUPANCY	ID	REQUIRED WITH SPRINKLER SYSTEM	EGRESS DISTANCE	CODE REF	COMPLIANCE	Tower
RESIDENTIAL (R-2) APARTMENT A		200'-0" MAX.	73'	1015.1	Y	D2
RESIDENTIAL (R-2) APARTMENT E		200'-0" MAX.	47'	1015.1	Y	D2
RESIDENTIAL (R-2) DEAD END TRAVEL DIST. 1		80'-0" MAX.	31'	1016.3	Y	D2
RESIDENTIAL (R-2) DEAD END TRAVEL DIST. 2		80'-0" MAX.	6'	1016.3	Y	D2
RESIDENTIAL (R-2) DIST. BETWEEN 2 EXITS		15'-0" MIN.	15'	1014.2.1	Y	D2

**DOOR@ STAIR B1**  
36"/0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)

**STAIR B1 (45" WIDE)**  
45"/0.3" = 150 PERSONS MAX  
(AS PER TABLE 1005.1)

**DOOR@ STAIR B2**  
36"/0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)

**STAIR B2 (45" WIDE)**  
45"/0.3" = 150 PERSONS MAX  
(AS PER TABLE 1005.1)



EG PATH - 10TH - 28TH FLOOR - Tower D1

OCCUPANCY	ID	REQUIRED WITH SPRINKLER SYSTEM	EGRESS DISTANCE	CODE REF	COMPLIANCE	Tower
RESIDENTIAL (R-2) APARTMENT Q		200'-0" MAX.	47'	1015.1	Y	D1
RESIDENTIAL (R-2) APARTMENT T		200'-0" MAX.	74'	1015.1	Y	D1
RESIDENTIAL (R-2) DEAD END TRAVEL DIST. 1		80'-0" MAX.	31'	1016.3	Y	D1
RESIDENTIAL (R-2) DEAD END TRAVEL DIST. 2		80'-0" MAX.	6'	1016.3	Y	D1
RESIDENTIAL (R-2) DIST. BETWEEN 2 EXITS		15'-0" MIN.	15'	1014.2.1	Y	D1

**DOOR@ STAIR A1**  
36"/0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)

**STAIR A1 (45" WIDE)**  
45"/0.3" = 150 PERSONS MAX  
(AS PER TABLE 1005.1)

**DOOR@ STAIR A2**  
36"/0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)

**STAIR A2 (45" WIDE)**  
45"/0.3" = 150 PERSONS MAX  
(AS PER TABLE 1005.1)

**OCCUPANT LOAD AND EGRESS ANALYSIS**

FLOOR 29 - TOWER D2  
SECTION BC 1004 - OCCUPANCY LOAD CALCULATION  
TABLE 1004.1.2

GROSS AREA = 2,927 S.F.

OCCUPANCY	AREA	CALCULATION	OCCUPANTS
RESIDENTIAL MECHANICAL	2,927 S.F.	2,927 S.F./300 GROSS	10
<b>TOTAL OCCUPANT LOAD: 10 OCCUPANTS</b>			

SECTION BC 1004 - OCCUPANCY LOAD CALCULATION  
TABLE 1005.1

EGRESS DOOR SPACE	REQUIRED	PROVIDED	COMPLIANCE
RESIDENTIAL MECHANICAL	OCCUPANT LOAD X 0.2' 10 X 0.2' = 2.0'	<b>DOOR @ STAIR B1 = 36"</b> <b>DOOR @ STAIR B2 = 36"</b> <b>TOTAL = 72"</b>	<b>YES</b>
EGRESS STAIR SPACE	REQUIRED	PROVIDED	COMPLIANCE
RESIDENTIAL MECHANICAL	OCCUPANT LOAD X 0.3' 10 X 0.3' = 3.0'	<b>STAIR B1 = 45"</b> <b>STAIR B2 = 45"</b> <b>TOTAL = 90"</b>	<b>YES</b>

EGRESS NOTES:  
SECTION BC 302 CLASSIFICATION  
1 ASSEMBLY  
2 BUSINESS  
3 EDUCATIONAL  
4 RESIDENTIAL  
5 MERCANTILE  
6 STORAGE  
7 UTILITY

SECTION BC 302 CLASSIFICATION  
A-1, A-2, A-3, A-4, A-5  
B  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M  
N  
O  
P  
Q  
R  
S  
T  
U

SECTION 28-2101.3.7 FIRE-RESISTANCE RATING REQUIREMENTS FOR FIRE BARRIER ASSEMBLIES BETWEEN FIRE AREAS

OCCUPANCY GROUP  
A, B, F, S, H, I, S, M, R, S-2

SECTION 28-2101.8 MINIMUM NUMBER OF EXITS

OCCUPANT LOAD  
1-500  
501-1000  
MORE THAN 1000

SECTION 28-2101.4 EXIT OR EXIT ACCESS DOORWAYS REQUIRED. TWO EXITS OR EXIT ACCESS DOORWAYS FROM ANY SPACE SHALL BE PROVIDED WHERE ONE OF THE FOLLOWING CONDITIONS EXISTS:

1. THE OCCUPANT LOAD OF THE SPACE EXCEEDS THE VALUES IN TABLE 1014.1.

OCCUPANCY R  
A, B, E, M, U  
S

SECTION 28-2101.2.1 TWO EXITS OR EXIT ACCESS DOORWAYS.

EXCEPTIONS:

3. R-2 OCCUPANCY, IN R-2 OCCUPANCY, WHERE STAIRS ARE ENCLOSED IN WALLS HAVING AT LEAST A 2-HOUR FIRE RESISTANCE RATING AND CONSTRUCTED OF MASONRY EQUIVALENT IN ACCORDANCE WITH DEPARTMENT RULES.

3.1 THE EXIT DOORS TO SUCH STAIRS SHALL BE PLACED A DISTANCE APART EQUAL TO NO LESS THAN 15 FEET

**LEGEND:**

- NO ACCESS ZONE
- NON-SIMULTANEOUS OCCUPANCY (N.S.O.)
- EXIT TO GRADE
- TRAVEL DISTANCE
- SAFE AREA
- NON-RATED PARTITION
- CONCRETE WALL/COLUMN
- EXIT SIGN
- GARAGE DRAIN
- DEAD END TRAVEL DIST.
- DIST. BETWEEN 2 EXITS
- COMMON PATH OF TRAVEL
- 1 HR-RATED PARTITION
- 2 HR-RATED PARTITION
- 3 HR-RATED PARTITION

NOTE:  
ALL DOORS IN PUBLIC CORRIDORS ARE SELF-CLOSING AND HAVE A 1.5 HOUR FIRE PROTECTION RATING.

**OCCUPANT LOAD AND EGRESS ANALYSIS**

FLOORS 10-28 - TOWER D1  
SECTION BC 1004 - OCCUPANCY LOAD CALCULATION  
TABLE 1004.1.2

GROSS AREA = 6,557 S.F.

OCCUPANCY	AREA	CALCULATION	OCCUPANTS
GROSS AREA WITHIN D.U.	5,776 S.F.	5,776 S.F./200 GROSS	29
CIRCULATION	781 S.F.	N.S.O.	N.S.O.
<b>TOTAL OCCUPANT LOAD: 29 OCCUPANTS</b>			

SECTION BC 1004 - OCCUPANCY LOAD CALCULATION  
TABLE 1005.1

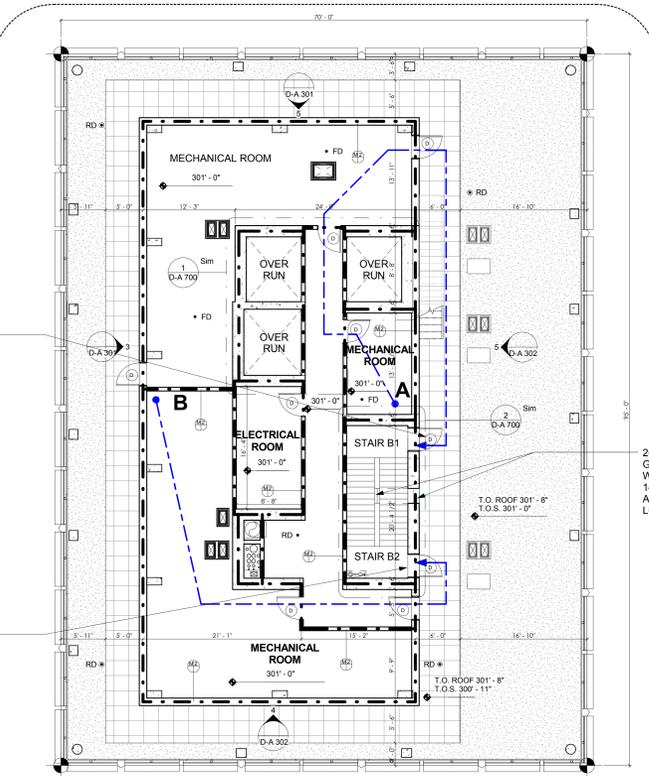
EGRESS DOOR SPACE	REQUIRED	PROVIDED	COMPLIANCE
GROSS AREA WITHIN D.U.	OCCUPANT LOAD X 0.2' 29 X 0.2' = 5.8'	<b>STAIR A1 DOOR = 36"</b> <b>STAIR A2 DOOR = 36"</b> <b>TOTAL = 72"</b>	<b>YES</b>
EGRESS STAIR SPACE	REQUIRED	PROVIDED	COMPLIANCE
GROSS AREA WITHIN D.U.	OCCUPANT LOAD X 0.3' 29 X 0.3' = 8.7'	<b>STAIR A1 = 45"</b> <b>STAIR A2 = 45"</b> <b>TOTAL = 90"</b>	<b>YES</b>

EG PATH - 29TH FLOOR - Tower D2

OCCUPANCY	ID	REQUIRED WITH SPRINKLER SYSTEM	EGRESS DISTANCE	CODE REF	COMPLIANCE	Tower
RESIDENTIAL (R-2)	A	200'-0" MAX.	94'	1015.1	Y	D2
RESIDENTIAL (R-2)	B	200'-0" MAX.	70'	1015.1	Y	D2

**DOOR@ STAIR B1**  
36"0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)  
**STAIR B1 (45" WIDE)**  
45"0.3" = 150 PERSONS MAX  
(AS PER TABLE 1005.1)

**DOOR@ STAIR B2**  
36"0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)  
**STAIR B2 (45" WIDE)**  
45"0.3" = 150 PERSONS MAX  
(AS PER TABLE 1005.1)

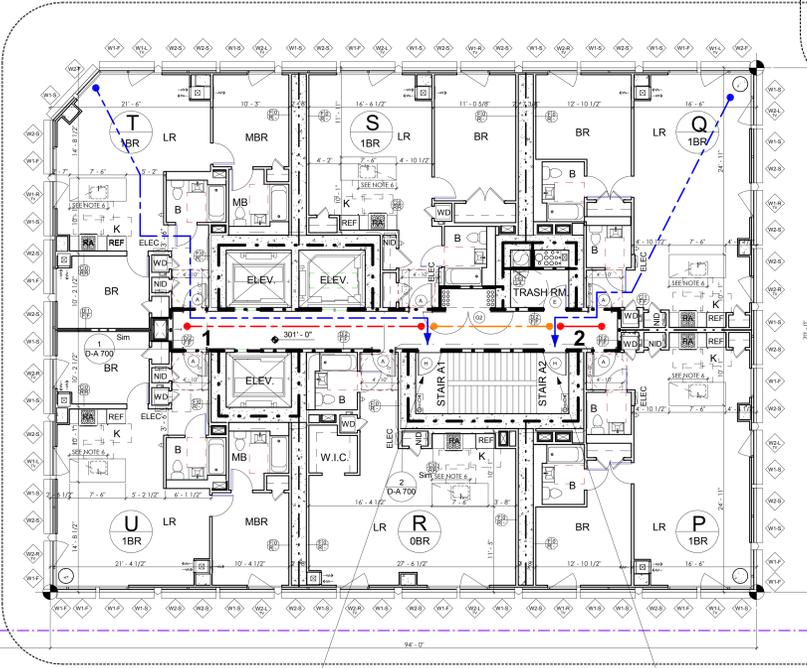


EG PATH - 29TH FLOOR - Tower D1

OCCUPANCY	ID	REQUIRED WITH SPRINKLER SYSTEM	EGRESS DISTANCE	CODE REF	COMPLIANCE	Tower
RESIDENTIAL (R-2)	APARTMENT Q	200'-0" MAX.	47'	1015.1	Y	D1
RESIDENTIAL (R-2)	APARTMENT T	200'-0" MAX.	74'	1015.1	Y	D1
RESIDENTIAL (R-2)	DEAD END TRAVEL DIST. 1	80'-0" MAX.	31'	1016.3	Y	D1
RESIDENTIAL (R-2)	DEAD END TRAVEL DIST. 2	80'-0" MAX.	6'	1016.3	Y	D1
RESIDENTIAL (R-2)	DIST. BETWEEN 2 EXITS	15'-0" MIN.	15'	1014.2.1	Y	D1

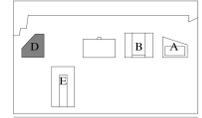
**DOOR@ STAIR A1**  
36"0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)  
**STAIR A1 (45" WIDE)**  
45"0.3" = 150 PERSONS MAX  
(AS PER TABLE 1005.1)

**DOOR@ STAIR A2**  
36"0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)  
**STAIR A2 (45" WIDE)**  
45"0.3" = 150 PERSONS MAX  
(AS PER TABLE 1005.1)



No	Date	Rev	Issue
1	05/30/14		DOB SUBMISSION

NOTES:  
ALL ELEVATIONS ARE MEASURED RELATIVE TO NAVD (1988). BROOKLYN HIGHWAY DATUM (BHD) IS +1.46'



CLIENT  
**Two Trees Management**  
45 Main Street, Suite 602  
Brooklyn, NY 11201

PROJECT  
**Domino - Lot A Building D**  
Brooklyn, NY

TITLE  
Floor 30

SCALE: As indicated  
DATE: 05/30/14  
PROJECT No: 13.143.02



D-A  
230  
.00

**OCCUPANT LOAD AND EGRESS ANALYSIS**

FLOOR 30 - TOWER D2  
SECTION BC 1004 - OCCUPANCY LOAD CALCULATION  
TABLE 1004.1.2

GROSS AREA = 530 S.F.			
OCCUPANCY	AREA	CALCULATION	OCCUPANTS
RESIDENTIAL MECHANICAL	530 S.F.	530 S.F./200 GROSS	3
<b>TOTAL OCCUPANT LOAD: 3 OCCUPANTS</b>			

SECTION BC 1004 - OCCUPANCY LOAD CALCULATION  
TABLE 1005.1

EGRESS DOOR SPACE	REQUIRED	PROVIDED	COMPLIANCE
RES. (MECHANICAL)	OCCUPANT LOAD X 0.2' 3 X 0.2' = 0.6'	DOOR = 36"	YES
	TOTAL = 0.6'	TOTAL = 36"	

SECTION BC 1004 - OCCUPANCY LOAD CALCULATION  
TABLE 1005.1

EGRESS STAIR SPACE	REQUIRED	PROVIDED	COMPLIANCE
RESIDENTIAL MECHANICAL	OCCUPANT LOAD X 0.3' 3 X 0.3' = 0.9'	STAIR B2 = 45"	YES
	TOTAL = 0.9'	TOTAL = 45"	

EGRESS NOTES:  
SECTION BC 302 CLASSIFICATION  
1. ASSEMBLY A-1, A-2, A-3, A-4, A-5  
2. BUSINESS B  
3. EDUCATIONAL E  
4. RESIDENTIAL R  
5. MERCANTILE M  
6. STORAGE S  
7. UTILITY U

§28.2-706.3.7 FIRE-RESISTANCE RATING REQUIREMENTS FOR FIRE BARRIER ASSEMBLIES BETWEEN FIRE AREAS  
OCCUPANCY GROUP FIRE-RESISTANCE RATING(HOURS)  
A,B,E,F,2,H,I,M,R,S,2 2

SECTION 28.2-1018.1 MINIMUM NUMBER OF EXITS  
OCCUPANCY LOAD MINIMUM # OF EXITS  
1-50 2  
501-1000 3  
MORE THAN 1000 4

§28.2-1014.1 EXIT OR EXIT ACCESS DOORWAYS REQUIRED. TWO EXITS OR EXIT ACCESS DOORWAYS FROM ANY SPACE SHALL BE PROVIDED WHERE ONE OF THE FOLLOWING CONDITIONS EXISTS:  
1. THE OCCUPANT LOAD OF THE SPACE EXCEEDS THE VALUES IN TABLE 1014.1.  
OCCUPANCY R 20 PERSONS  
A, B, E, M, U 74 PERSONS  
S 30 PERSONS

§28.2-1014.2.1 TWO EXITS OR EXIT ACCESS DOORWAYS. EXCEPTIONS:  
3. R2 OCCUPANCY, IN R-2 OCCUPANCY, WHERE STAIRS ARE ENCLOSED IN WALLS HAVING AT LEAST A 2-HOUR FIRE-RESISTANCE RATING AND CONSTRUCTED OF MASONRY EQUIVALENT IN ACCORDANCE WITH DEPARTMENT RULES.  
3.1 THE EXIT DOORS TO SUCH STAIRS SHALL BE PLACED A DISTANCE APART EQUAL TO NO LESS THAN 15 FEET

LEGEND:  
[ ] NO ACCESS ZONE  
[ ] NON-SIMULTANEOUS OCCUPANCY (N.S.O.)  
EXIT TO GRADE  
TRAVEL DISTANCE  
SAFE AREA  
NON-RATED PARTITION  
CONCRETE WALL/COLUMN  
EXIT SIGN  
GARAGE DRAIN

● DEAD END TRAVEL DIST.  
○ DIST. BETWEEN 2 EXITS  
○ COMMON PATH OF TRAVEL  
- - - 1 HR-RATED PARTITION  
- - - 2 HR-RATED PARTITION  
- - - 3 HR-RATED PARTITION

NOTE:  
ALL DOORS IN PUBLIC CORRIDORS ARE SELF-CLOSING AND HAVE A 1.5 HOUR FIRE PROTECTION RATING.

**OCCUPANT LOAD AND EGRESS ANALYSIS**

FLOOR 30 - TOWER D1  
SECTION BC 1004 - OCCUPANCY LOAD CALCULATION  
TABLE 1004.1.2

GROSS AREA = 6,558 S.F.			
OCCUPANCY	AREA	CALCULATION	OCCUPANTS
GROSS AREA WITHIN D.U.	5,777 S.F.	5,777 S.F./200 GROSS	29
CIRCULATION	781 S.F.	N.S.O	N.S.O
<b>TOTAL OCCUPANT LOAD: 29 OCCUPANTS</b>			

SECTION BC 1004 - OCCUPANCY LOAD CALCULATION  
TABLE 1005.1

EGRESS DOOR SPACE	REQUIRED	PROVIDED	COMPLIANCE
GROSS AREA WITHIN D.U.	OCCUPANT LOAD X 0.2' 29 X 0.2' = 5.8'	STAIR A1 DOOR = 36" STAIR A2 DOOR = 36"	YES
	TOTAL = 5.8'	TOTAL = 72"	

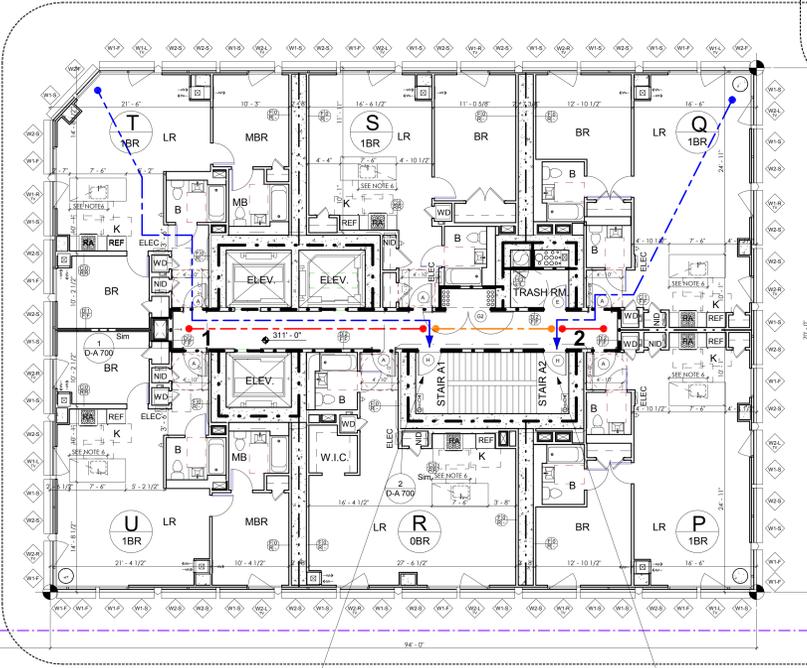
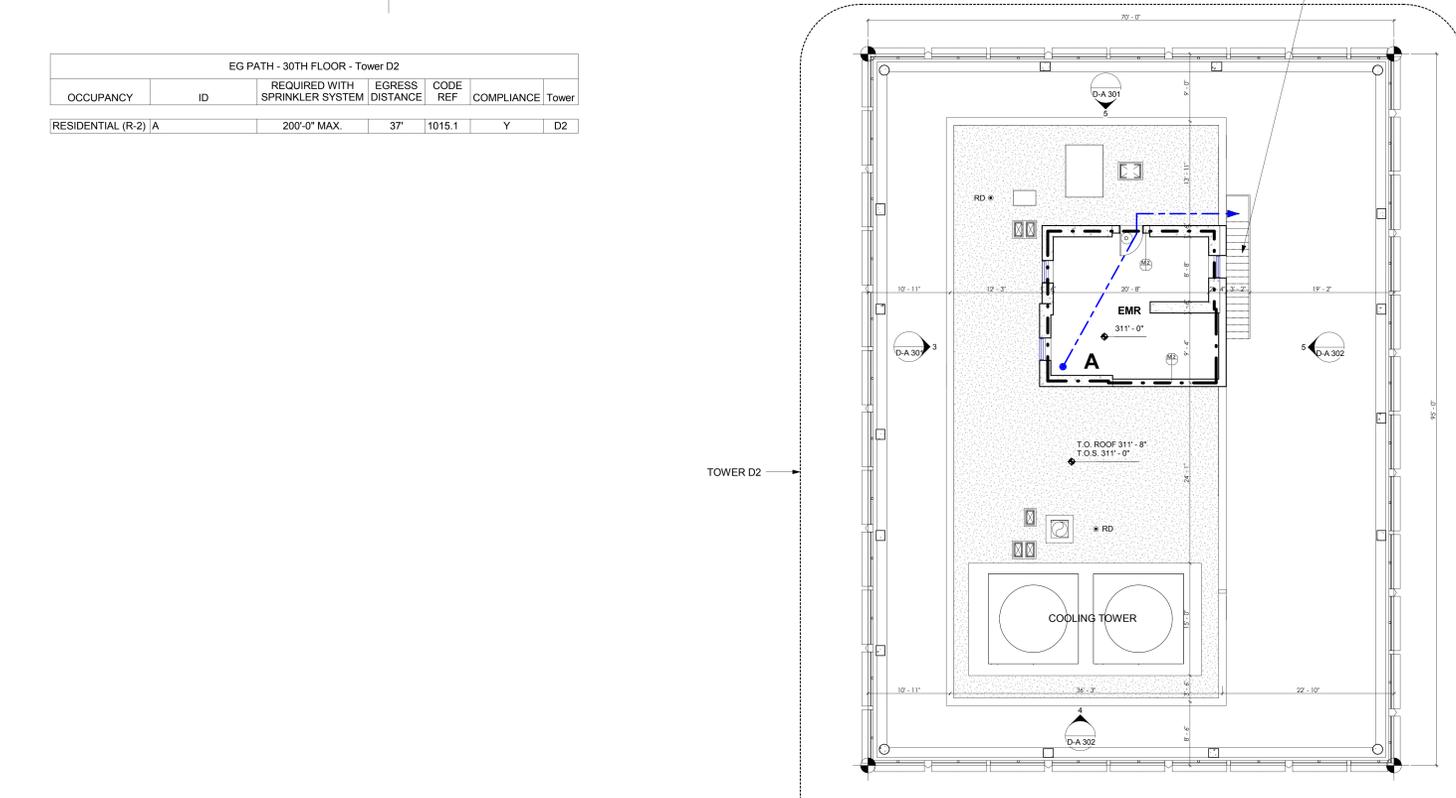
SECTION BC 1004 - OCCUPANCY LOAD CALCULATION  
TABLE 1005.1

EGRESS STAIR SPACE	REQUIRED	PROVIDED	COMPLIANCE
GROSS AREA WITHIN D.U.	OCCUPANT LOAD X 0.3' 29 X 0.3' = 8.7'	STAIR A1 = 45" STAIR A2 = 45"	YES
	TOTAL = 8.7'	TOTAL = 90"	

EG PATH - 30TH FLOOR - Tower D2

OCCUPANCY	ID	REQUIRED WITH SPRINKLER SYSTEM	EGRESS DISTANCE	CODE REF	COMPLIANCE	Tower
RESIDENTIAL (R-2)	A	200'-0" MAX.	37'	1015.1	Y	D2

STAIR B2 (36" WIDE)  
36"0.2" = 120 PERSONS MAX  
(AS PER TABLE 1005.1)



EG PATH - 30TH FLOOR - Tower D1

OCCUPANCY	ID	REQUIRED WITH SPRINKLER SYSTEM	EGRESS DISTANCE	CODE REF	COMPLIANCE	Tower
RESIDENTIAL (R-2)	APARTMENT Q	200'-0" MAX.	47'	1015.1	Y	D1
RESIDENTIAL (R-2)	APARTMENT T	200'-0" MAX.	74'	1015.1	Y	D1
RESIDENTIAL (R-2)	DEAD END TRAVEL DIST. 1	80'-0" MAX	31'	1016.3	Y	D1
RESIDENTIAL (R-2)	DEAD END TRAVEL DIST. 2	80'-0" MAX	6'	1016.3	Y	D1
RESIDENTIAL (R-2)	DIST. BETWEEN 2 EXITS	15'-0" MIN.	15'	1014.2.1	Y	D1

DOOR@ STAIR A1  
36"0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)  
STAIR A1 (45" WIDE)  
45"0.3" = 150 PERSONS MAX  
(AS PER TABLE 1005.1)

DOOR@ STAIR A2  
36"0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)  
STAIR A2 (45" WIDE)  
45"0.3" = 150 PERSONS MAX  
(AS PER TABLE 1005.1)

- FLOOR PLAN GENERAL NOTES  
(FLOORS 81-86)
- FOR DOOR TYPES AND DETAILS SEE DRAWING A 016 & A 017.
  - FOR INTERIOR PARTITION TYPES SEE DRAWING A 011 & 0.
  - ALL ELEVATIONS SHOWN ON THESE PLANS ARE MEASURED RELATIVE TO NAVD(1988). FOR REFERENCE, BROOKLYN HIGHWAY DATUM (BHD) IS +1.46'
  - U.O.N. INTERIOR DIMENSIONS ARE MEASURED TO THE CENTERLINE OF DRYWALL PARTITIONS & THE FACE OF THE OUTERMOST G.W.B AT FURRING, CHASE & SHAFT WALLS.
  - FOR STAIR DETAILS SEE VERTICAL CIRCULATION DRAWINGS A 700 SERIES.
  - IN ALL RESIDENTIAL STAIRS, DOORS OPENING INTO AN INTERIOR STAIR ENCLOSURE SHALL BE LOCATED FROM THE STAIR SIDE AND PROVIDED WITH AN AUTOMATIC FAIL SAFE SYSTEM FOR OPENING IN THE EVENT OF AN EMERGENCY. SIGNS SHALL BE PROVIDED THROUGHOUT THE STAIRWAY INDICATING THAT KEYENTRY IS PROVIDED ONLY DURING FIRE EMERGENCIES.
  - TELEPHONES OR OTHER TWO-WAY COMMUNICATION SYSTEMS, CONNECTED TO AN APPROVED CONSTANTLY ATTENDED STATION, SHALL BE PROVIDED AT NOT LESS THAN EVERY 5TH FLOOR IN ALL RESIDENTIAL STAIRS.
  - EXIT STAIR ENCLOSURES SHALL BE CONSTRUCTED OF IMPACT RESISTANT WALLS.
  - TYPICAL INTERIOR PARTITION NOTES:  
A. DRYWALL PARTITIONS WITHIN PARTMENTS TO BE TYPE D0 U.O.N.  
B. CHASE WALL PARTITIONS TO BE TYPE C0 U.O.N.  
C. DRYWALL PARTITIONS BETWEEN APARTMENTS TO BE MIN. 1 HR RATED TYPE D1 FF U.O.N.  
D. FURRING-AROUND COLUMNS TO BE TYPE FOR U.O.N.  
E. FURRING AT ELEVATOR HOISTWAY AGAINST HABITABLE ROOMS TO BE TYPE F0 U.O.N.  
F. NOT USED  
G. CHASE WALL PARTITIONS BETWEEN APARTMENTS TO BE MIN. 1 HR RATED TYPE C1 U.O.N.  
H. DRYWALL PARTITIONS BETWEEN APARTMENTS & CORRIDORS, STAIRS, ELECTRICAL CLOSETS, ETC. TO BE 2 HR. RATED TYPE D2 U.O.N.  
I. NOT USED  
J. CHASE WALL PARTITIONS BETWEEN APARTMENTS & CORRIDORS, STAIRWELLS, ELECTRICAL CLOSETS, ETC. TO BE 2 HR RATED TYPE C2 U.O.N.  
K. ALL EXHAUST AND SUPPLY DUCT RISERS TO BE ENCLOSED IN 2 HR. RATED SOLID SHAFT WALL ASSEMBLIES TYPE H2 BETWEEN CORRIDOR AND ELEVATOR HOISTWAY TO BE 2 HR RATED TYPE H2.  
M. TRASH CHUTE TO BE ENCLOSED IN CONTINUOUS 3 HR RATED WALL TYPE H3.  
N. PARTITIONS BETWEEN STAIRWELLS AND CORRIDORS TO BE 2 HR RATED ASSEMBLIES WITH IMPACT RESISTANT G.W.B TYPE D2.
  - PROVIDE 3/4" THICK FIRE RETARDANT PLYWOOD FASTENED TO FINISHED PARTITION FOR ATTACHMENT OF TELECOM PANELS AND EQUIPMENT. COORDINATE LOCATION WITH TELECOM DWGS.
  - FOR LOCATIONS OF SPRINKLERS, SMOKE/CO DETECTORS, LIGHT FIXTURES & OTHER CEILING FIXTURES, REFER TO RCP'S A 600 SERIES.
  - FINISH LEVEL AT ALL EXTERIOR TERRACES ADJOINING APARTMENTS TO BE 6" ABOVE TOP OF SLAB ELEVATION. TYPICAL OWNER OR BUILDING MANAGER SHALL PROVIDE HANDICAP ACCESS TO TERRACES FROM APARTMENT VIA RAMP INSTALLED IN COMPLIANCE WITH BUILDING CODE.
  - NOT USED
  - ALL MECHANICAL AND STORAGE ROOMS SHALL BE PROPERLY VENTILATED.
  - NOT USED
  - PROVIDE 1 1/2" X 1 1/2" CHAMFER AT ALL EXPOSED RECTANGULAR COLUMNS IN PARKING GARAGE. PROVIDE SURFACE PROTECTION AS REQUIRED BY SECTION 714.4
  - FLOOR STRIPING TO INDICATE AREA LEFT CLEAR AS EGRESS PATHWAY OR ACCESSIBLE ROUTE.
  - CROSSHATCH INDICATES LESS THAN 7'-0" HEADROOM
  - SOLID HATCH INDICATES CONCRETE EQUIPMENT PAD. 6" THICK U.O.N.
  - INDICATES OPERABLE VENTILATION WINDOW. SEE DETAIL XXXX FOR SCHEDULE ASSEMBLY AND ENERGY PERFORMANCE ANALYSIS AND SHEETS B-2 100 FOR NATURAL LIGHT AND VENTILATION CALCULATIONS

EGRESS NOTES:

SECTION BC 302 CLASSIFICATION  
1. ASSEMBLY  
2. BUSINESS  
3. EDUCATIONAL  
4. RESIDENTIAL  
5. MERCANTILE  
6. STORAGE  
7. UTILITY

A-1, A-2, A-3, A-4, A-5  
E  
R  
M  
S  
U

§28.2.706.3.7 FIRE-RESISTANCE RATING REQUIREMENTS FOR FIRE BARRIER ASSEMBLIES BETWEEN FIRE AREAS  
OCCUPANCY GROUP FIRE-RESISTANCE RATING(HOURS)  
A,B,E,F,2-H,4-H,5,U,M,R,S-2 2

SECTION 28.2-1018.1 MINIMUM NUMBER OF EXITS  
OCCUPANT LOAD MINIMUM # OF EXITS  
1-500 2  
501-1000 3  
MORE THAN 1000 4

§28.2.1014.1 EXIT OR EXIT ACCESS DOORWAYS REQUIRED. TWO EXITS OR EXIT ACCESS DOORWAYS FROM ANY SPACE SHALL BE PROVIDED WHERE ONE OF THE FOLLOWING CONDITIONS EXISTS:  
1. THE OCCUPANT LOAD OF THE SPACE EXCEEDS THE VALUES IN TABLE 1014.1.  
OCCUPANCY R 20 PERSONS  
A, B, E, M, U 74 PERSONS  
S 30 PERSONS

§28.2-1014.2.1 TWO EXITS OR EXIT ACCESS DOORWAYS.  
EXCEPTIONS:  
3. R.2 OCCUPANCY: IN R-2 OCCUPANCY, WHERE STAIRS ARE ENCLOSED IN WALLS HAVING AT LEAST A 2-HOUR FIRE-RESISTANCE RATING AND CONSTRUCTED OF MASONRY IN ACCORDANCE WITH DEPARTMENT RULES:  
3.1 THE EXIT DOORS TO SUCH STAIRS SHALL BE PLACED A DISTANCE APART EQUAL TO NO LESS THAN 15 FEET

- LEGEND:
- NO ACCESS ZONE
  - NON-SIMULTANEOUS OCCUPANCY (N.S.O.)
  - EXIT TO GRADE
  - TRAVEL DISTANCE
  - SAFE AREA
  - NON-RATED PARTITION
  - CONCRETE WALL/COLUMN
  - EXIT SIGN
  - GARAGE DRAIN
  - DEAD END TRAVEL DIST.
  - DIST. BETWEEN 2 EXITS
  - COMMON PATH OF TRAVEL
  - 1 HR-RATED PARTITION
  - 2 HR-RATED PARTITION
  - 3 HR-RATED PARTITION
- NOTE:  
ALL DOORS IN PUBLIC CORRIDORS ARE SELF-CLOSING AND HAVE A 1.5 HOUR FIRE PROTECTION RATING.

**OCCUPANT LOAD AND EGRESS ANALYSIS**

FLOOR 31 - TOWER D1  
SECTION BC 1004 - OCCUPANCY LOAD CALCULATION  
TABLE 1004.1.2

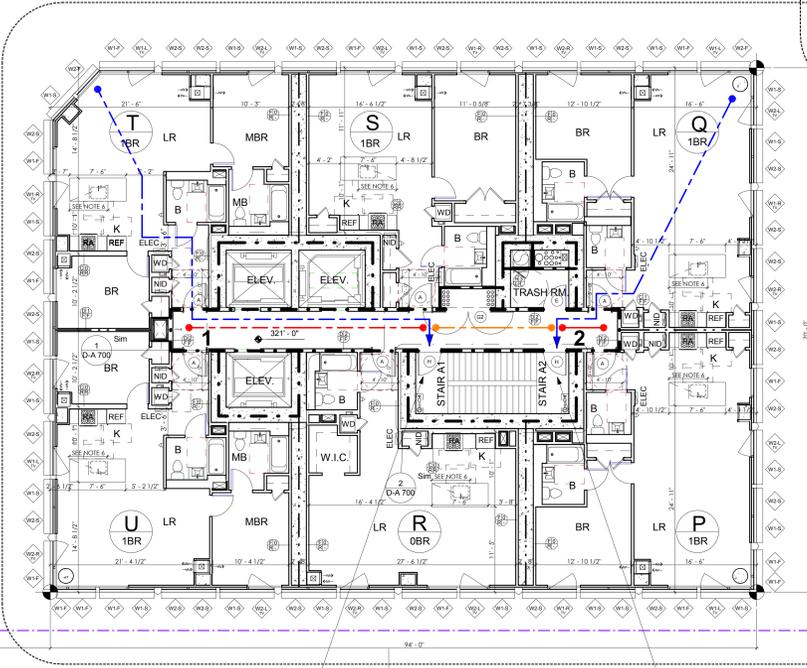
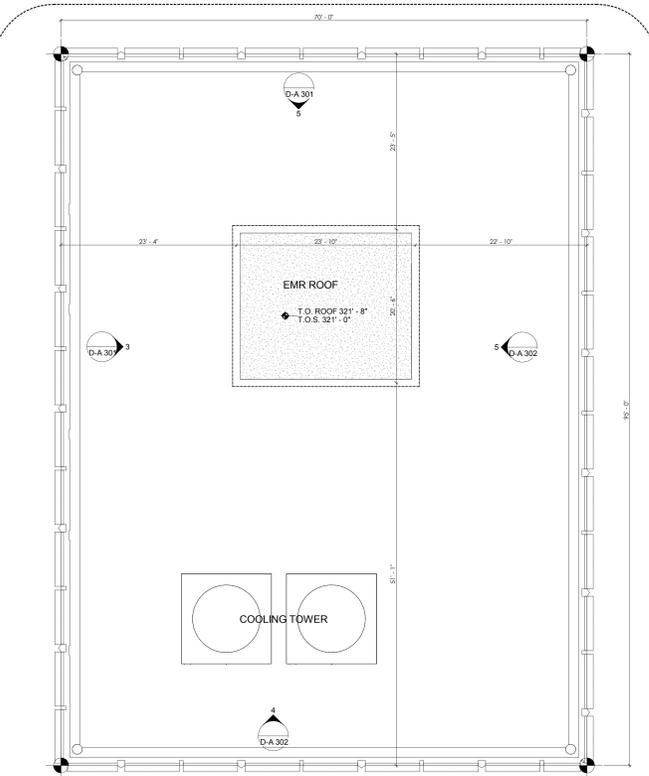
GROSS AREA = 6,558 S.F.

OCCUPANCY	AREA	CALCULATION	OCCUPANTS
GROSS AREA WITHIN D.U.	5,777 S.F.	5,777 S.F./200 GROSS	29
CIRCULATION	781 S.F.	N.S.O.	N.S.O.
<b>TOTAL OCCUPANT LOAD: 29 OCCUPANTS</b>			

SECTION BC 1004 - OCCUPANCY LOAD CALCULATION  
TABLE 1005.1

EGRESS DOOR SPACE	REQUIRED	PROVIDED	COMPLIANCE
OCCUPANT LOAD X 0.2'	29 X 0.2' = 5.8'	STAIR A1 DOOR = 36" STAIR A2 DOOR = 36"	
GROSS AREA WITHIN D.U.	TOTAL = 5.8'	TOTAL = 72"	YES

EGRESS STAIR SPACE	REQUIRED	PROVIDED	COMPLIANCE
OCCUPANT LOAD X 0.3'	29 X 0.3' = 8.7'	STAIR A1 = 45" STAIR A2 = 45"	
GROSS AREA WITHIN D.U.	TOTAL = 8.7'	TOTAL = 90"	YES

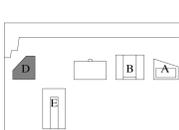


EG PATH - 31TH FLOOR - Tower D1

OCCUPANCY	ID	REQUIRED WITH SPRINKLER SYSTEM	EGRESS DISTANCE	CODE REF	COMPLIANCE	Tower
RESIDENTIAL (R-2)	APARTMENT Q	200'-0" MAX.	47'	1015.1	Y	D1
RESIDENTIAL (R-2)	APARTMENT T	200'-0" MAX.	74'	1015.1	Y	D1
RESIDENTIAL (R-2)	DEAD END TRAVEL DIST. 1	80'-0" MAX	31'	1016.3	Y	D1
RESIDENTIAL (R-2)	DEAD END TRAVEL DIST. 2	80'-0" MAX	6'	1016.3	Y	D1
RESIDENTIAL (R-2)	DIST. BETWEEN 2 EXITS	15'-0" MIN.	15'	1014.2.1	Y	D1

DOOR@ STAIR A1  
36"0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)  
STAIR A1 (45" WIDE)  
45"0.3" = 150 PERSONS MAX  
(AS PER TABLE 1005.1)

DOOR@ STAIR A2  
36"0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)  
STAIR A2 (45" WIDE)  
45"0.3" = 150 PERSONS MAX  
(AS PER TABLE 1005.1)



- FLOOR PLAN GENERAL NOTES (FLOORS 32-36)
- FOR DOOR TYPES AND DETAILS SEE DRAWING A 018 & A 017.
  - FOR INTERIOR PARTITION TYPES SEE DRAWING A 011 & 0.
  - ALL ELEVATIONS SHOWN ON THESE PLANS ARE MEASURED RELATIVE TO NAVD(1988). FOR REFERENCE, BROOKLYN HIGHWAY DATUM (BHD) IS +1.46'
  - U.O.N. INTERIOR DIMENSIONS ARE MEASURED TO THE CENTERLINE OF DRYWALL PARTITIONS & THE FACE OF THE OUTERMOST GWB AT FURRING, CHASE & SHAFT WALLS.
  - FOR STAIR DETAILS SEE VERTICAL CIRCULATION DRAWINGS A 700 SERIES.
  - IN ALL RESIDENTIAL STAIRS, DOORS OPENING INTO AN INTERIOR STAIR ENCLOSURE SHALL BE LOCKED FROM THE STAIR SIDE AND PROVIDED WITH AN AUTOMATIC FAIL SAFE SYSTEM FOR OPENING IN THE EVENT OF AN EMERGENCY. SIGNS SHALL BE PROVIDED THROUGHOUT THE STAIRWAY INDICATING THAT REENTRY IS PROVIDED ONLY DURING FIRE EMERGENCIES.
  - TELEPHONES OR OTHER TWO-WAY COMMUNICATION SYSTEMS, CONNECTED TO AN APPROVED CONSTANTLY ATTENDED STATION, SHALL BE PROVIDED AT NOT LESS THAN EVERY FIFTH FLOOR IN ALL RESIDENTIAL STAIRS.
  - EXIT STAIR ENCLOSURES SHALL BE CONSTRUCTED OF IMPACT RESISTANT WALLS.
  - TYPICAL INTERIOR PARTITION NOTES:  
A. DRYWALL PARTITIONS WITHIN APARTMENTS TO BE TYPE D0 U.O.N.  
B. CHASE WALL PARTITIONS TO BE TYPE C0 U.O.N.  
C. DRYWALL PARTITIONS BETWEEN APARTMENTS TO BE MIN. 1 HR RATED TYPE D1 FF U.O.N.  
D. FURRING AROUND COLUMNS TO BE TYPE FOR U.O.N.  
E. FURRING AT ELEVATOR HOISTWAY AGAINST HABITABLE ROOMS TO BE TYPE F0 U.O.N.  
F. NOT USED  
G. CHASE WALL PARTITIONS BETWEEN APARTMENTS TO BE MIN. 1 HR RATED TYPE C1 U.O.N.  
H. DRYWALL PARTITIONS BETWEEN APARTMENTS & CORRIDORS, STAIRS, ELECTRICAL CLOSETS, ETC. TO BE 2 HR. RATED TYPE D2 U.O.N.  
I. NOT USED  
J. CHASE WALL PARTITIONS BETWEEN APARTMENTS & CORRIDORS, STAIRWELLS, ELECTRICAL CLOSETS, ETC. TO BE 2 HR RATED TYPE C2  
K. ALL EXHAUST AND SUPPLY DUCT RISERS TO BE ENCLOSED IN 2 HR. RATED SOLID SHAFT WALL ASSEMBLIES TYPE H2.  
L. SHUTT WALL PARTITIONS BETWEEN CORRIDOR AND ELEVATOR HOISTWAY TO BE 2 HR RATED TYPE H2.  
M. TRASH CHUTE TO BE ENCLOSED IN CONTINUOUS 3 HR RATED WALL TYPE H3.  
N. PARTITIONS BETWEEN STAIRWELLS AND CORRIDORS TO BE 2 HR RATED ASSEMBLIES WITH IMPACT RESISTANT GWB TYPE D2.
  - PROVIDE 3/4" THICK FIRE RETARDANT PLYWOOD FASTENED TO FINISHED PARTITION FOR ATTACHMENT OF TELECOM PANELS AND EQUIPMENT. COORDINATE LOCATION WITH TELECOM DWGS.
  - FOR LOCATIONS OF SPRINKLERS, SMOKE/CO DETECTORS, LIGHT FIXTURES & OTHER CEILING FIXTURES, REFER TO RCP'S A 600 SERIES.
  - FINISH LEVEL AT ALL EXTERIOR TERRACES ADJOINING APARTMENTS TO BE 6" ABOVE TOP OF SLAB ELEVATION TYPICAL. OWNER OR BUILDING MANAGER SHALL PROVIDE HANDICAP ACCESS TO TERRACES FROM APARTMENT VIA RAMP INSTALLED IN COMPLIANCE WITH BUILDING CODE.
  - NOT USED
  - ALL MECHANICAL AND STORAGE ROOMS SHALL BE PROPERLY VENTILATED.
  - NOT USED
  - PROVIDE 1 1/2" X 1 1/2" CHAMFER AT ALL EXPOSED RECTANGULAR COLUMNS IN PARKING GARAGE. PROVIDE SURFACE PROTECTION AS REQUIRED BY SECTION 714.4
  - FLOOR STRING TO INDICATE AREA LEFT CLEAR AS EGRESS PATHWAY OR ACCESSIBLE ROUTE.
  - CROSSHATCH INDICATES LESS THAN 7'-0" HEADROOM
  - SOLID HATCH INDICATES CONCRETE EQUIPMENT PAD. 8" THICK U.O.N.
  - INDICATES OPERABLE VENTILATION WINDOW. SEE DETAIL XXXX FOR SCHEDULE ASSEMBLY AND ENERGY PERFORMANCE ANALYSIS AND SHEETS B-2 100 FOR NATURAL LIGHT AND VENTILATION CALCULATIONS

EGRESS NOTES:

SECTION BC 302 CLASSIFICATION	A-1, A-2, A-3, A-4, A-5
1. ASSEMBLY	B
2. BUSINESS	E
3. EDUCATIONAL	R
4. RESIDENTIAL	M
5. MERCANTILE	S
6. STORAGE	U
7. UTILITY	

SECTION 2-706.3.7 FIRE-RESISTANCE RATING REQUIREMENTS FOR FIRE BARRIER ASSEMBLIES BETWEEN FIRE AREAS	FIRE-RESISTANCE RATING(HOURS)
OCCUPANCY GROUP A,B,E,F-Z,H-J,H-S,M,R,S-2	2

SECTION 28.2-1018.1.1 MINIMUM NUMBER OF EXITS	MINIMUM # OF EXITS
OCCUPANT LOAD 1-999	2
501-1000	3
MORE THAN 1000	4

SECTION 2-1014.1.1 EXIT OR EXIT ACCESS DOORWAYS REQUIRED: TWO EXITS OR EXIT ACCESS DOORWAYS FROM ANY SPACE SHALL BE PROVIDED WHERE ONE OF THE FOLLOWING CONDITIONS EXISTS:  
1. THE OCCUPANT LOAD OF THE SPACE EXCEEDS THE VALUES IN TABLE 1014.1.

OCCUPANCY	R	20 PERSONS
A, E, M, U <td>S <td>34 PERSONS</td> </td>	S <td>34 PERSONS</td>	34 PERSONS
	S <td>36 PERSONS</td>	36 PERSONS

SECTION 2-1014.2.1 TWO EXITS OR EXIT ACCESS DOORWAYS. EXCEPTIONS:

- R-2 OCCUPANCY, IN R-2 OCCUPANCY, WHERE STAIRS ARE ENCLOSED IN WALLS HAVING AT LEAST A 2-HOUR FIRE-RESISTANCE RATING AND CONSTRUCTED OF MASONRY EQUIVALENT IN ACCORDANCE WITH DEPARTMENT RULES.
- THE EXIT DOORS TO SUCH STAIRS SHALL BE PLACED A DISTANCE APART EQUAL TO NO LESS THAN 15 FEET

LEGEND:

- NO ACCESS ZONE
  - NON-SIMULTANEOUS OCCUPANCY (N.S.O.)
  - EXIT TO GRADE
  - TRAVEL DISTANCE
  - SAFE AREA
  - NON-RATED PARTITION
  - CONCRETE WALL/COLUMN
  - EXIT SIGN
  - GARAGE DRAIN
  - DEAD END TRAVEL DIST.
  - DIST. BETWEEN 2 EXITS
  - COMMON PATH OF TRAVEL
  - 1 HR-RATED PARTITION
  - 2 HR-RATED PARTITION
  - 3 HR-RATED PARTITION
- NOTE: ALL DOORS IN PUBLIC CORRIDORS ARE SELF-CLOSING AND HAVE A 1.5 HOUR FIRE PROTECTION RATING.

OCCUPANT LOAD AND EGRESS ANALYSIS

FLOORS 32-36 - TOWER D1  
SECTION BC 1004 - OCCUPANCY LOAD CALCULATION  
TABLE 1004.1.2

OCCUPANCY	AREA	CALCULATION	OCCUPANTS
GROSS AREA WITHIN D.U.	5,777 S.F.	5,777 S.F./200 GROSS	29
CIRCULATION	781 S.F.	N.S.O.	N.S.O.
<b>TOTAL OCCUPANT LOAD: 29 OCCUPANTS</b>			

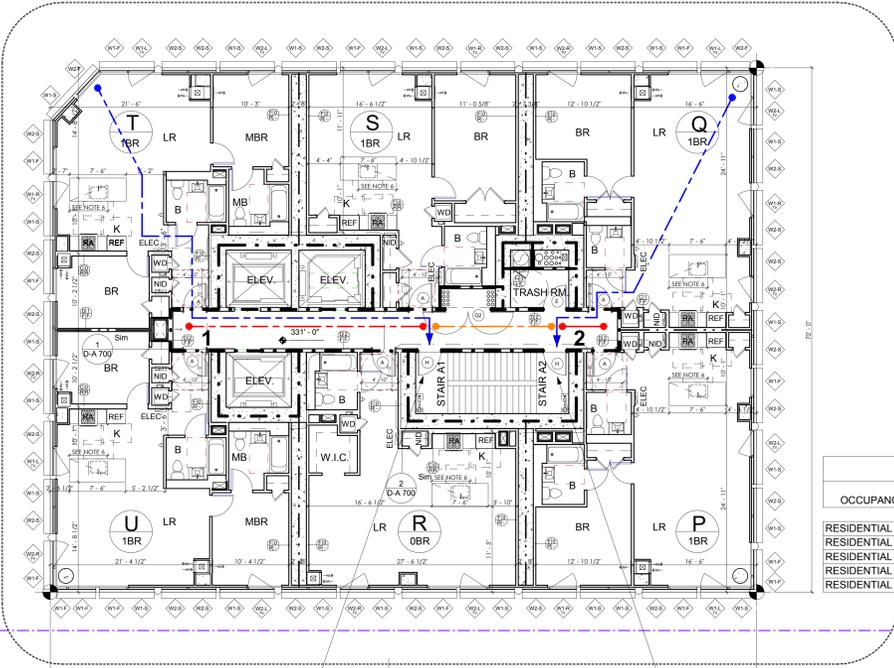
SECTION BC 1004 - OCCUPANCY LOAD CALCULATION  
TABLE 1005.1

EGRESS DOOR SPACE	REQUIRED	PROVIDED	COMPLIANCE
GROSS AREA WITHIN D.U.	OCCUPANT LOAD X 0.2' 29 X 0.2' = 5.8'	STAIR A1 DOOR = 36" STAIR A2 DOOR = 36" TOTAL = 72"	YES

EGRESS STAIR SPACE	REQUIRED	PROVIDED	COMPLIANCE
GROSS AREA WITHIN D.U.	OCCUPANT LOAD X 0.3' 29 X 0.3' = 8.7'	STAIR A1 = 45" STAIR A2 = 45" TOTAL = 90"	YES

EG PATH - 32ND - 36TH FLOOR - Tower D1

OCCUPANCY	ID	REQUIRED WITH SPRINKLER SYSTEM	EGRESS DISTANCE	CODE REF	COMPLIANCE	Tower
RESIDENTIAL (R-2)	APARTMENT Q	200'-0" MAX.	47'	1015.1	Y	D1
RESIDENTIAL (R-2)	APARTMENT T	200'-0" MAX.	74'	1015.1	Y	D1
RESIDENTIAL (R-2)	DEAD END TRAVEL DIST. 1	80'-0" MAX.	31'	1016.3	Y	D1
RESIDENTIAL (R-2)	DEAD END TRAVEL DIST. 2	80'-0" MAX.	6'	1016.3	Y	D1
RESIDENTIAL (R-2)	DIST. BETWEEN 2 EXITS	15'-0" MIN.	15'	1014.2.1	Y	D1

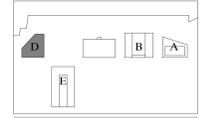


DOOR@ STAIR A1  
36"0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)  
STAIR A1 (45" WIDE)  
45"0.3" = 150 PERSONS MAX  
(AS PER TABLE 1005.1)

DOOR@ STAIR A2  
36"0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)  
STAIR A2 (45" WIDE)  
45"0.3" = 150 PERSONS MAX  
(AS PER TABLE 1005.1)

No. Date:	Rev. Issue:
1 05/30/14	DOB SUBMISSION

NOTES:  
ALL ELEVATIONS ARE MEASURED RELATIVE TO NAVD (1988), BROOKLYN HIGHWAY DATUM (BHD) IS +1.46'



CLIENT  
**Two Trees Management**  
45 Main Street, Suite 602  
Brooklyn, NY 11201

PROJECT  
**Domino - Lot A**  
Building D  
Brooklyn, NY

TITLE  
Main Roof

SCALE: As indicated  
DATE: 05/30/14  
PROJECT No: 13,143.02

- FLOOR PLAN GENERAL NOTES (FLOORS B1-36):
- FOR DOOR TYPES AND DETAILS SEE DRAWING A 018 & A 017.
  - FOR INTERIOR PARTITION TYPES SEE DRAWING A 011 & C.
  - ALL ELEVATIONS SHOWN ON THESE PLANS ARE MEASURED RELATIVE TO NAVD(1988). FOR REFERENCE, BROOKLYN HIGHWAY DATUM (BHD) IS +1.46'
  - U.O.N. INTERIOR DIMENSIONS ARE MEASURED TO THE CENTERLINE OF DRYWALL PARTITIONS & THE FACE OF THE OUTERMOST GWB AT FURRING, CHASE & SHAFT WALLS.
  - FOR STAIR DETAILS SEE VERTICAL CIRCULATION DRAWINGS A 700 SERIES.
  - IN ALL RESIDENTIAL STAIRS, DOORS OPENING INTO AN INTERIOR STAIR ENCLOSURE SHALL BE LOCKED FROM THE STAIR SIDE AND PROVIDED WITH AN AUTOMATIC FAIL SAFE SYSTEM FOR OPENING IN THE EVENT OF AN EMERGENCY. SIGNS SHALL BE PROVIDED THROUGHOUT THE STAIRWAY INDICATING THAT KEYWAY IS PROVIDED ONLY DURING FIRE EMERGENCIES.
  - TELEPHONES OR OTHER TWO-WAY COMMUNICATION SYSTEMS, CONNECTED TO AN APPROVED CONSTANTLY ATTENDED STATION, SHALL BE PROVIDED AT NOT LESS THAN EVERY FIFTH FLOOR IN ALL RESIDENTIAL STAIRS.
  - EXIT STAIR ENCLOSURES SHALL BE CONSTRUCTED OF IMPACT RESISTANT WALLS.
  - TYPICAL INTERIOR PARTITION NOTES:  
A. DRYWALL PARTITIONS WITHIN APARTMENTS TO BE TYPE D0 U.O.N.  
B. CHASE WALL PARTITIONS TO BE TYPE C0 U.O.N.  
C. DRYWALL PARTITIONS BETWEEN APARTMENTS TO BE MIN. 1 HR RATED TYPE D1 FF U.O.N.  
D. FURRING AROUND COLUMNS TO BE TYPE FOR U.O.N.  
E. FURRING AT ELEVATOR HOISTWAY AGAINST HABITABLE ROOMS TO BE TYPE F0 U.O.N.  
F. NOT USED  
G. CHASE WALL PARTITIONS BETWEEN APARTMENTS TO BE MIN. 1 HR RATED TYPE C1 U.O.N.  
H. DRYWALL PARTITIONS BETWEEN APARTMENTS & CORRIDORS, STAIRS, ELECTRICAL CLOSETS, ETC. TO BE 2 HR RATED TYPE D2 U.O.N.  
I. NOT USED  
J. CHASE WALL PARTITIONS BETWEEN APARTMENTS & CORRIDORS, STAIRWELLS, ELECTRICAL CLOSETS ETC. TO BE 2 HR RATED TYPE C2.  
K. ALL EXHAUST AND SUPPLY DUCT RISERS TO BE ENCLOSED IN 2 HR RATED SOLID SHAFT WALL ASSEMBLIES TYPE H2.  
L. SHUTT WALL PARTITIONS BETWEEN CORRIDOR AND ELEVATOR HOISTWAY TO BE 2 HR RATED TYPE H2.  
M. TRASH CHUTE TO BE ENCLOSED IN CONTINUOUS 3 HR RATED WALL TYPE H3.  
N. PARTITIONS BETWEEN STAIRWELLS AND CORRIDORS TO BE 2 HR RATED ASSEMBLIES WITH IMPACT RESISTANT GWB TYPE D2.

EGRESS NOTES:

SECTION BC 302 CLASSIFICATION	A-1, A-2, A-3, A-4, A-5
1 ASSEMBLY	B
2 BUSINESS	R
3 EDUCATIONAL	M
4 RESIDENTIAL	S
5 MERCANTILE	S
6 STORAGE	S
7 UTILITY	U

\$28.2.706.3 FIRE-RESISTANCE RATING REQUIREMENTS FOR FIRE BARRIER ASSEMBLIES BETWEEN FIRE AREAS	
OCCUPANCY GROUP	FIRE-RESISTANCE RATING(HOURS)
A,B,E,F,H-4,H-5,M,R,S-2	2

SECTION 28.2-1018.1 MINIMUM NUMBER OF EXITS	
OCCUPANT LOAD	MINIMUM # OF EXITS
1-500	2
501-1000	3
MORE THAN 1000	4

\$28.2-1014.1 EXIT OR EXIT ACCESS DOORWAYS REQUIRED: TWO EXITS OR EXIT ACCESS DOORWAYS FROM ANY SPACE SHALL BE PROVIDED WHERE ONE OF THE FOLLOWING CONDITIONS EXISTS:  
1. THE OCCUPANT LOAD OF THE SPACE EXCEEDS THE VALUES IN TABLE 1014.1.

OCCUPANCY	R	20 PERSONS
A, B, E, M, U		24 PERSONS
S		30 PERSONS

\$28.2-1014.2 1 TWO EXITS OR EXIT ACCESS DOORWAYS, EXCEPTIONS:  
3. R-2 OCCUPANCY, IN R-2 OCCUPANCY, WHERE STAIRS ARE ENCLOSED IN WALLS HAVING AT LEAST A 2-HOUR FIRE RESISTANCE RATING AND CONSTRUCTED OF MASONRY EQUIVALENT IN ACCORDANCE WITH DEPARTMENT RULES.  
3.1 THE EXIT DOORS TO SUCH STAIRS SHALL BE PLACED A DISTANCE APART EQUAL TO NO LESS THAN 15 FEET

**LEGEND:**

[ ] NO ACCESS ZONE	● DEAD END TRAVEL DIST.
[ ] NON-SIMULTANEOUS OCCUPANCY (N.S.O.)	○ DIST. BETWEEN 2 EXITS
▶ EXIT TO GRADE	— COMMON PATH OF TRAVEL
← TRAVEL DISTANCE	--- 1 HR-RATED PARTITION
■ SAFE AREA	- - - 2 HR-RATED PARTITION
□ NON-RATED PARTITION	— 3 HR-RATED PARTITION
▭ CONCRETE WALL/COLUMN	
⊕ EXIT SIGN	
* GARAGE DRAIN	

NOTE:  
ALL DOORS IN PUBLIC CORRIDORS ARE SELF-CLOSING AND HAVE A 1.5 HOUR FIRE PROTECTION RATING.

**OCCUPANT LOAD AND EGRESS ANALYSIS**

FLOOR 37 - TOWER D1  
SECTION BC 1004 - OCCUPANCY LOAD CALCULATION  
TABLE 1004.1.2

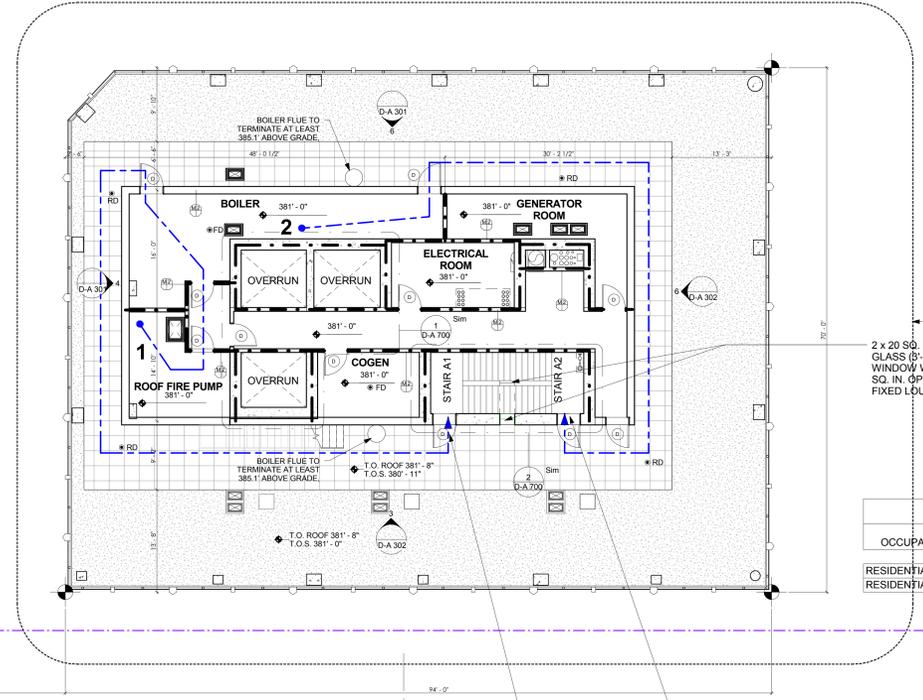
GROSS AREA = 2,173 S.F.			
OCCUPANCY	AREA	CALCULATION	OCCUPANTS
RESIDENTIAL MECHANICAL	2,173 S.F.	2,173 S.F./200 GROSS	11
<b>TOTAL OCCUPANT LOAD: 11 OCCUPANTS</b>			

SECTION BC 1004 - OCCUPANCY LOAD CALCULATION  
TABLE 1005.1

EGRESS DOOR COMPLIANCE SPACE	REQUIRED	PROVIDED	
RESIDENTIAL MECHANICAL	OCCUPANT LOAD X 0.2' = 2.2'	DOOR@STAIR B1 = 36" DOOR@STAIR B2 = 36" TOTAL = 72"	YES
EGRESS STAIR SPACE	REQUIRED	PROVIDED	COMPLIANCE
RESIDENTIAL MECHANICAL	OCCUPANT LOAD X 0.3' = 4.5'	STAIR B1 = 45" STAIR B2 = 45" TOTAL = 90"	YES

EG PATH - 37TH FLOOR - Tower D1

OCCUPANCY	ID	REQUIRED WITH SPRINKLER SYSTEM	EGRESS DISTANCE	CODE REF	COMPLIANCE	Tower
RESIDENTIAL (R-2)	1	200'-0" MAX.	136'	1015.1	Y	D1
RESIDENTIAL (R-2)	2	200'-0" MAX.	109'	1015.1	Y	D1



**DOOR@ STAIR A1**  
36"0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)  
**STAIR A1 (45" WIDE)**  
45"0.3" = 150 PERSONS MAX  
(AS PER TABLE 1005.1)

**DOOR@ STAIR A2**  
36"0.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)  
**STAIR A2 (45" WIDE)**  
45"0.3" = 150 PERSONS MAX  
(AS PER TABLE 1005.1)

**FLOOR PLAN GENERAL NOTES**  
(FLOORS B1-30)

- FOR DOOR TYPES AND DETAILS SEE DRAWING A 016 & A 017.
- FOR INTERIOR PARTITION TYPES SEE DRAWING A 011 & C.
- ALL ELEVATIONS SHOWN ON THESE PLANS ARE MEASURED RELATIVE TO NAVD(1988). FOR REFERENCE, BROOKLYN HIGHWAY DATUM (BHD) IS +1.46'
- U.O.N. INTERIOR DIMENSIONS ARE MEASURED TO THE CENTERLINE OF DRYWALL PARTITIONS & THE FACE OF THE OUTERMOST GWB AT FLOORING, CHASE & SHIRT WALLS.
- FOR STAIR DETAILS SEE VERTICAL CIRCULATION DRAWINGS A 700 SERIES.
- IN ALL RESIDENTIAL STAIRS, STAIR ENCLOSURES SHALL BE LOCKED FROM THE STAIR SIDE AND PROVIDED WITH AN AUTOMATIC FAIL SAFE SYSTEM FOR OPENING IN THE EVENT OF AN EMERGENCY. SIGNS SHALL BE PROVIDED THROUGHOUT THE STAIRWAY INDICATING THAT REENTRY IS PROVIDED ONLY DURING FIRE EMERGENCIES.
- TELEPHONES OR OTHER TWO-WAY COMMUNICATION SYSTEMS, CONNECTED TO AN APPROVED CONSTANTLY ATTENDED STATION, SHALL BE PROVIDED AT NOT LESS THAN EVERY FIFTH FLOOR IN ALL RESIDENTIAL STAIRS.
- EXIT STAIR ENCLOSURES SHALL BE CONSTRUCTED OF IMPACT RESISTANT WALLS.
- TYPICAL INTERIOR PARTITION NOTES:  
A. DRYWALL PARTITIONS WITHIN APARTMENTS TO BE TYPE D0 U.O.N.  
B. CHASE WALL PARTITIONS TO BE TYPE C0 U.O.N.  
C. DRYWALL PARTITIONS BETWEEN APARTMENTS TO BE MIN. 1 HR RATED TYPE D1 FF U.O.N.  
D. FLOORING AROUND COLUMNS TO BE TYPE FOR- U.O.N.  
E. FLOORING AT ELEVATOR HOISTWAY AGAINST HABITABLE ROOMS TO BE TYPE F0 U.O.N.  
F. NOT USED  
G. CHASE WALL PARTITIONS BETWEEN APARTMENTS TO BE MIN. 1 HR. RATED TYPE C1 U.O.N.  
H. DRYWALL PARTITIONS BETWEEN APARTMENTS & CORRIDORS, STAIRS, ELECTRICAL CLOSETS, ETC. TO BE 2 HR. RATED TYPE D2 U.O.N.  
I. NOT USED  
J. CHASE WALL PARTITIONS BETWEEN APARTMENTS & CORRIDORS, STAIRWELLS, ELECTRICAL CLOSETS ETC. TO BE 2 HR RATED TYPE C2.  
K. ALL EXHAUST AND SUPPLY DUCT RISERS TO BE ENCLOSED IN 2 HR. RATED SOLID SHAFT WALL ASSEMBLIES TYPE H2.  
L. SHIRT WALL PARTITIONS BETWEEN CORRIDOR AND ELEVATOR HOISTWAY TO BE 2 HR RATED TYPE H2.  
M. TRASH CHUTE TO BE ENCLOSED IN CONTINUOUS 3 HR RATED WALL TYPE H3.  
N. PARTITIONS BETWEEN STAIRWELLS AND CORRIDORS TO BE 2 HR RATED ASSEMBLIES WITH IMPACT RESISTANT GWB TYPE D2.  
O. PROVIDE 3/4" THICK FIRE RETARDANT PLYWOOD FASTENED TO FINISHED PARTITION FOR ATTACHMENT OF TELECOM PANELS AND EQUIPMENT. COORDINATE LOCATION WITH TELECOM DWGS.  
P. FOR LOCATIONS OF SPRINKLERS, SMOKE/CO DETECTORS, LIGHT FIXTURES & OTHER CEILING FIXTURES, REFER TO RCPS A 600 SERIES.  
Q. FINISH LEVEL AT ALL EXTERIOR TERRACES ADJOINING APARTMENTS TO BE 6" ABOVE TOP OF SLAB ELEVATION. TYPICAL OWNER OR BUILDING MANAGER SHALL PROVIDE HANDICAP ACCESS TO TERRACES FROM APARTMENT VIA RAMP INSTALLED IN COMPLIANCE WITH BUILDING CODE.  
R. NOT USED  
S. ALL MECHANICAL AND STORAGE ROOMS SHALL BE PROPERLY VENTILATED.  
T. NOT USED  
U. PROVIDE 1 1/2" X 1 1/2" CHAMFER AT ALL EXPOSED RECTANGULAR COLLUMS IN PARKING GARAGE. PROVIDE SURFACE PROTECTION AS REQUIRED BY SECTION 714.4  
V. FLOOR STRIPING TO INDICATE AREA LEFT CLEAR AS EGRESS PATHWAY OR ACCESSIBLE ROUTE.  
W. CROSSHATCH INDICATES LESS THAN 7'-0" HEADROOM  
X. SOLID HATCH INDICATES CONCRETE EQUIPMENT PAD. 6" THICK U.O.N.  
Y. INDICATES OPERABLE VENTILATION WINDOW. SEE DETAIL XXXXX FOR SCHEDULE, ASSEMBLY, AND ENERGY PERFORMANCE ANALYSIS AND SHEETS B.2-100 FOR NATURAL LIGHT AND VENTILATION CALCULATIONS

**EGRESS NOTES:**

SECTION BC 302 CLASSIFICATION  
1 ASSEMBLY A-1, A.2, A.3, A.4, A.5  
2 BUSINESS B  
3 EDUCATIONAL E  
4 RESIDENTIAL R  
5 MERCANTILE M  
6 STORAGE S  
7 UTILITY U

§28-2706.3.7 FIRE-RESISTANCE RATING REQUIREMENTS FOR FIRE BARRIER ASSEMBLIES BETWEEN FIRE AREAS  
A,B,E,F-2,H-4,I-5,M,R,S-2 2

OCCUPANT GROUP FIRE-RESISTANCE RATING(HOURS)  
1-500 2  
501-1000 3  
MORE THAN 1000 4

SECTION 28-2-1018.1 MINIMUM NUMBER OF EXITS  
OCCUPANT LOAD MINIMUM # OF EXITS  
1-500 2  
501-1000 3  
MORE THAN 1000 4

§28-2-1014.1 EXIT OR EXIT ACCESS DOORWAYS REQUIRED: TWO EXITS OR EXIT ACCESS DOORWAYS FROM ANY SPACE SHALL BE PROVIDED WHERE ONE OF THE FOLLOWING CONDITIONS EXISTS:  
1. THE OCCUPANT LOAD OF THE SPACE EXCEEDS THE VALUES IN TABLE 1014.1.

OCCUPANCY R 20 PERSONS  
A, B, E, M, U 74 PERSONS  
S 30 PERSONS

§28-2-1014.2.1 TWO EXITS OR EXIT ACCESS DOORWAYS.  
EXCEPTIONS:  
3. R-2 OCCUPANCY: IN R-2 OCCUPANCY, WHERE STAIRS ARE ENCLOSED IN WALLS HAVING AT LEAST A 2-HOUR FIRE-RESISTANCE RATING AND CONSTRUCTED OF MASONRY EQUIVALENT IN ACCORDANCE WITH DEPARTMENT RULES.  
3.1 THE EXIT DOORS TO SUCH STAIRS SHALL BE PLACED A DISTANCE APART EQUAL TO NO LESS THAN 15 FEET

**LEGEND:**

- NO ACCESS ZONE
- NON-SIMULTANEOUS OCCUPANCY (N.S.O.)
- EXIT TO GRADE
- TRAVEL DISTANCE
- SAFE AREA
- NON-RATED PARTITION
- CONCRETE WALL/COLUMN
- EXIT SIGN
- GARAGE DRAIN
- DEAD END TRAVEL DIST.
- DIST. BETWEEN 2 EXITS
- COMMON PATH OF TRAVEL
- 1 HR-RATED PARTITION
- 2 HR-RATED PARTITION
- 3 HR-RATED PARTITION

NOTE:  
ALL DOORS IN PUBLIC CORRIDORS ARE SELF-CLOSING AND HAVE A 1.5 HOUR FIRE PROTECTION RATING.

**OCCUPANT LOAD AND EGRESS ANALYSIS**

FLOOR 38 - TOWER D1  
SECTION BC 1004 - OCCUPANCY LOAD CALCULATION  
TABLE 1004.1.2:

OCCUPANCY	AREA	CALCULATION	OCCUPANTS
RESIDENTIAL MECHANICAL	534 S.F.	534 S.F./200 GROSS	3
<b>TOTAL OCCUPANT LOAD: 3 OCCUPANTS</b>			

SECTION BC 1004 - OCCUPANCY LOAD CALCULATION  
TABLE 1005.1:

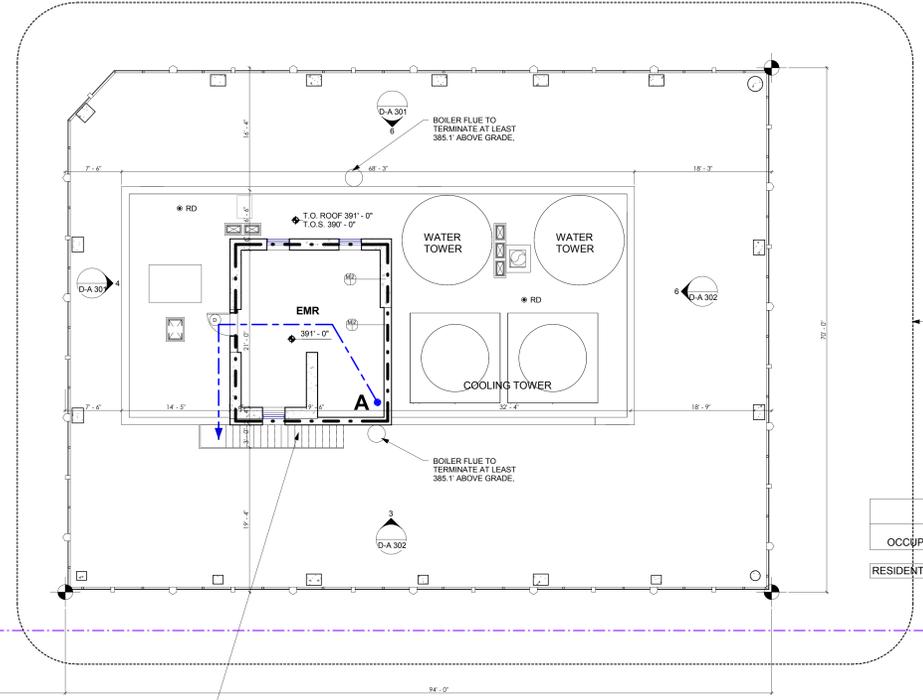
EGRESS DOOR SPACE	REQUIRED	PROVIDED	COMPLIANCE
RESIDENTIAL MECHANICAL	OCCUPANT LOAD X 0.2' 3 X 0.2' = 0.6'	DOOR = 36" TOTAL = 36"	YES

SECTION BC 1004 - OCCUPANCY LOAD CALCULATION  
TABLE 1005.1:

EGRESS STAIR SPACE	REQUIRED	PROVIDED	COMPLIANCE
RESIDENTIAL MECHANICAL	OCCUPANT LOAD X 0.3' 3 X 0.3' = 0.9'	STAIR B2 = 45" TOTAL = 45"	YES

EG-PATH - 38TH FLOOR - Tower D1

OCCUPANCY	ID	REQUIRED WITH SPRINKLER SYSTEM	EGRESS DISTANCE	CODE REF	COMPLIANCE	Tower	
RESIDENTIAL (R-2)	A		200'-0" MAX.	42'	1015.1	Y	D1

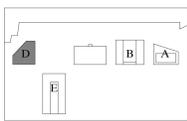


STAIR A2 (36" WIDE)  
3670.2" = 180 PERSONS MAX  
(AS PER TABLE 1005.1)



No	Date	Rev	Issue
1	05/30/14		DOB SUBMISSION

NOTES:  
ALL ELEVATIONS ARE MEASURED RELATIVE TO NAVD (1988). BROOKLYN HIGHWAY DATUM (BHD) IS +1.46'



CLIENT

Two Trees Management  
45 Main Street, Suite 602  
Brooklyn, NY 11201

PROJECT  
Domino - Lot A  
Building D  
Brooklyn, NY

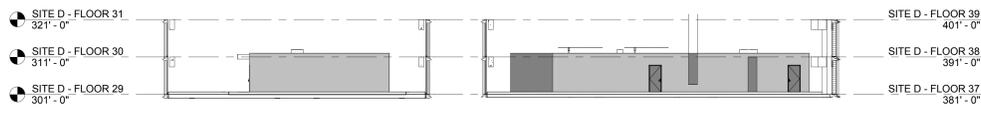
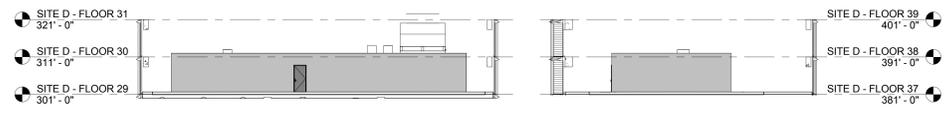
TITLE

Building Elevations

SCALE: As indicated  
DATE: 05/30/14  
PROJECT No: 13.143.02

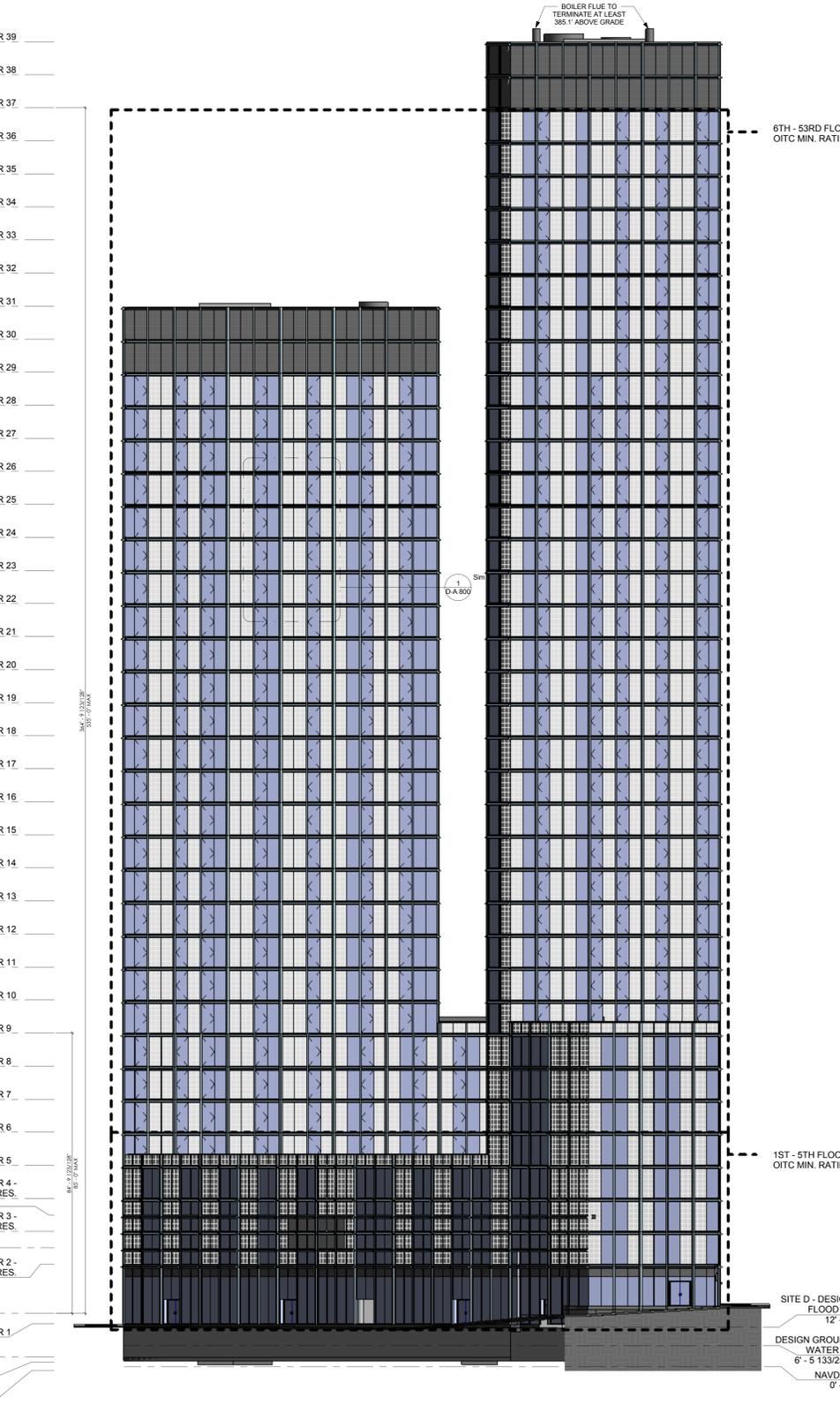


D-A  
301  
.00



3 Elevation - South Bulkhead - Tower D2  
1/16" = 1'-0"

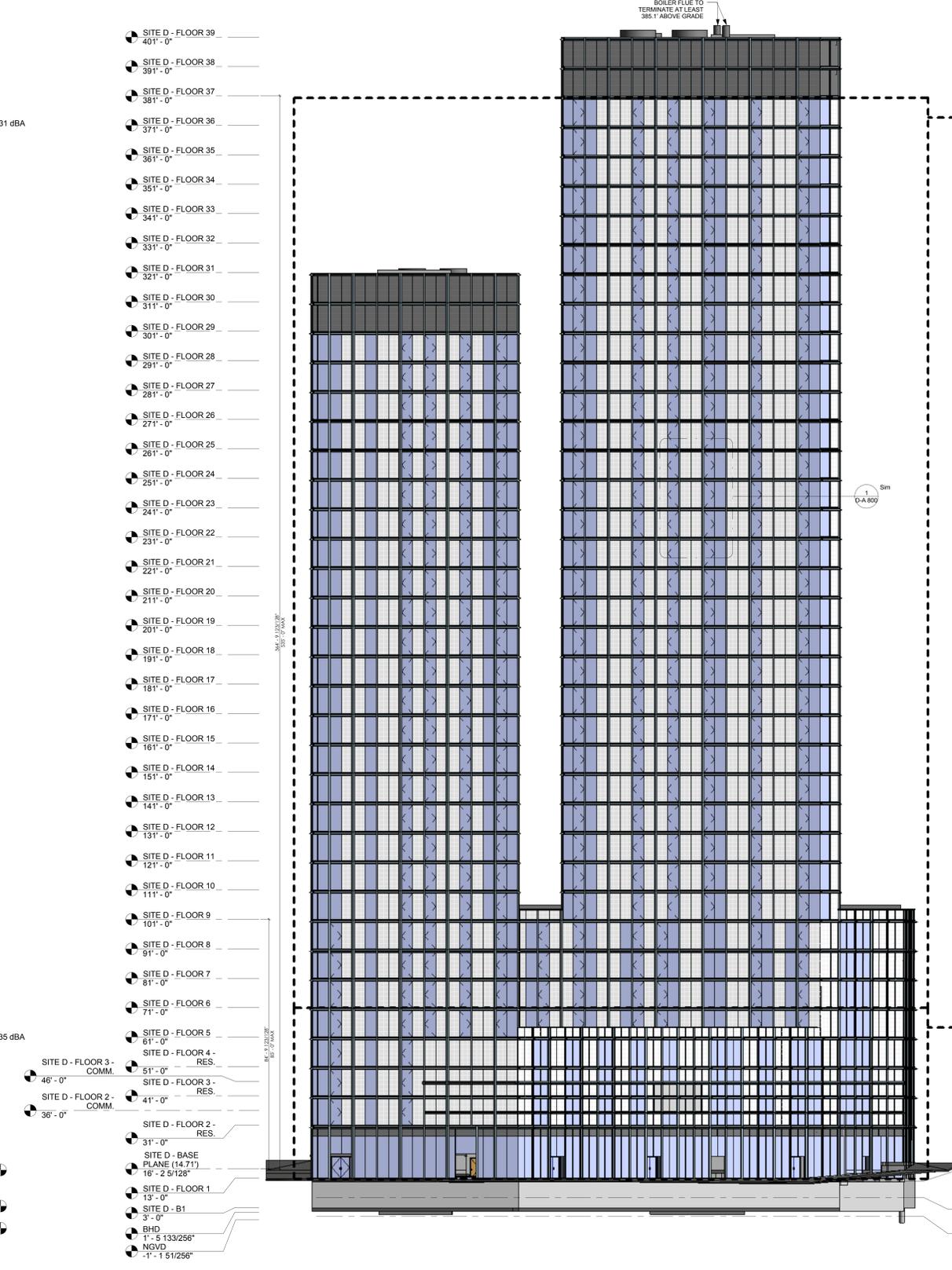
5 Elevation - West Bulkhead - Tower D2  
1/16" = 1'-0"



1 Elevation - South  
1/16" = 1'-0"

South Facade							
Panel Type	Area	U-Factor	OITC	SHGC	Type Mark	Manufacturer	Model
FIXED VISION GLASS	7987 SF	0.45	35	0.35		FA & PARTNERS	FA100
LOUVER	88 SF				GREENHECK	EDJ-430	
OPERABLE VISION PANEL	10279 SF	0.45	35	0.35		FA & PARTNERS	FA100
SPANDREL	17204 SF	0.45	35	0.35		FA & PARTNERS	FA100

SURFACE AREA: 44,425 SF  
GLAZING AREA (VISION GLASS): 7994+10279 = 18,273 SF  
SOUTH FACADE: 41.13% GLAZING



2 Elevation - West  
1/16" = 1'-0"

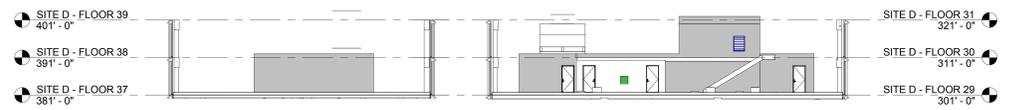
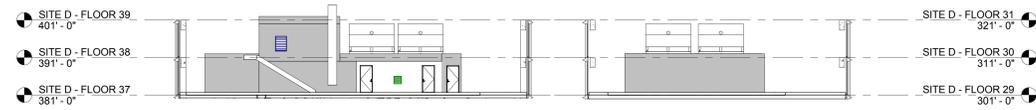
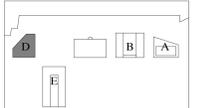
West Facade							
Panel Type	Area	U-Factor	OITC	SHGC	Type Mark	Manufacturer	Model
FIXED VISION GLASS	15439 SF	0.45	35	0.35		FA & PARTNERS	FA100
LOUVER	591 SF				GREENHECK	EDJ-430	
OPERABLE VISION PANEL	9761 SF	0.45	35	0.35		FA & PARTNERS	FA100
SPANDREL	23506 SF	0.45	35	0.35		FA & PARTNERS	FA100

SURFACE AREA: 62,037 SF  
GLAZING AREA (VISION GLASS): 15577+9761 = 25,338 SF  
SOUTH FACADE: 40.84% GLAZING

LEGEND

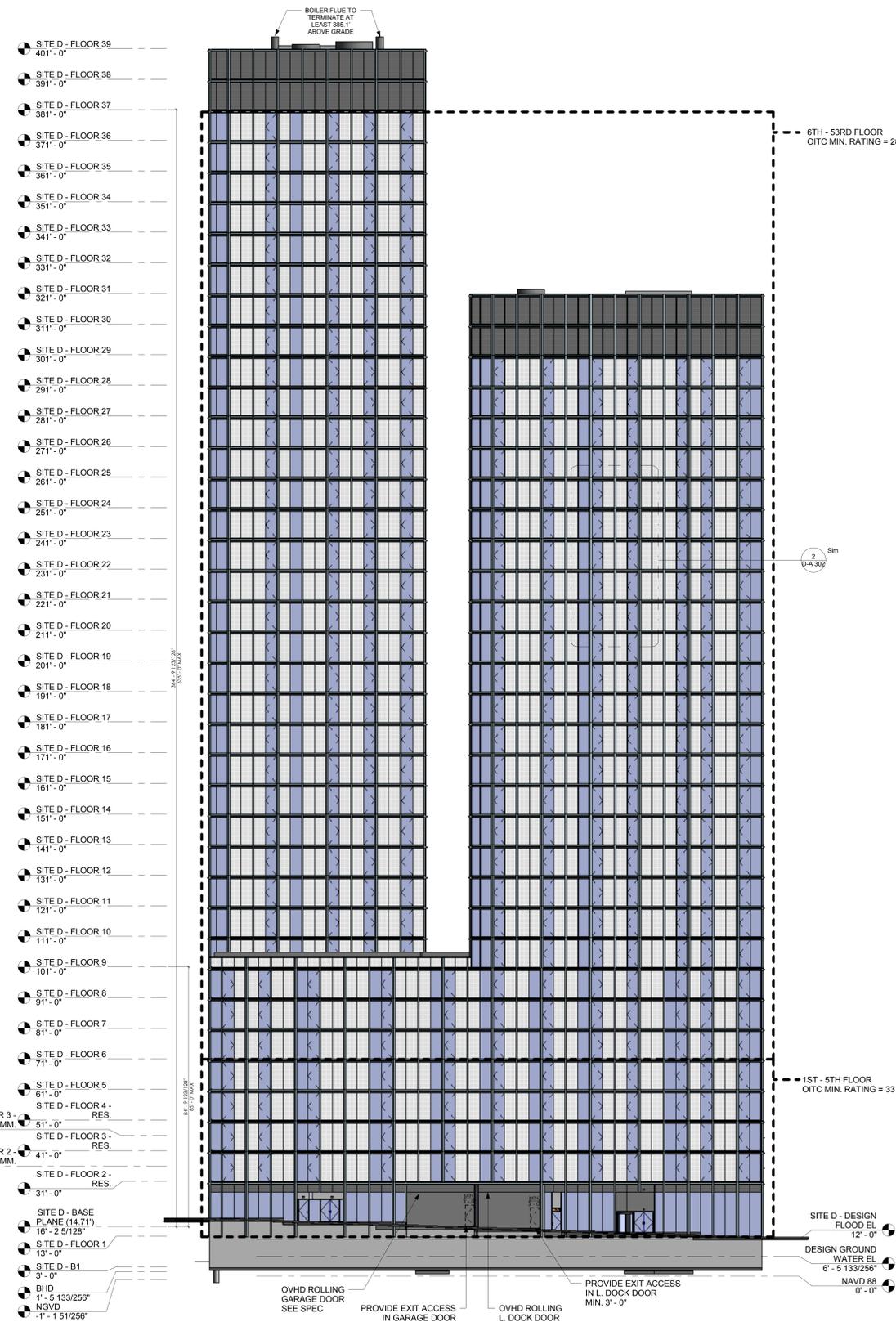
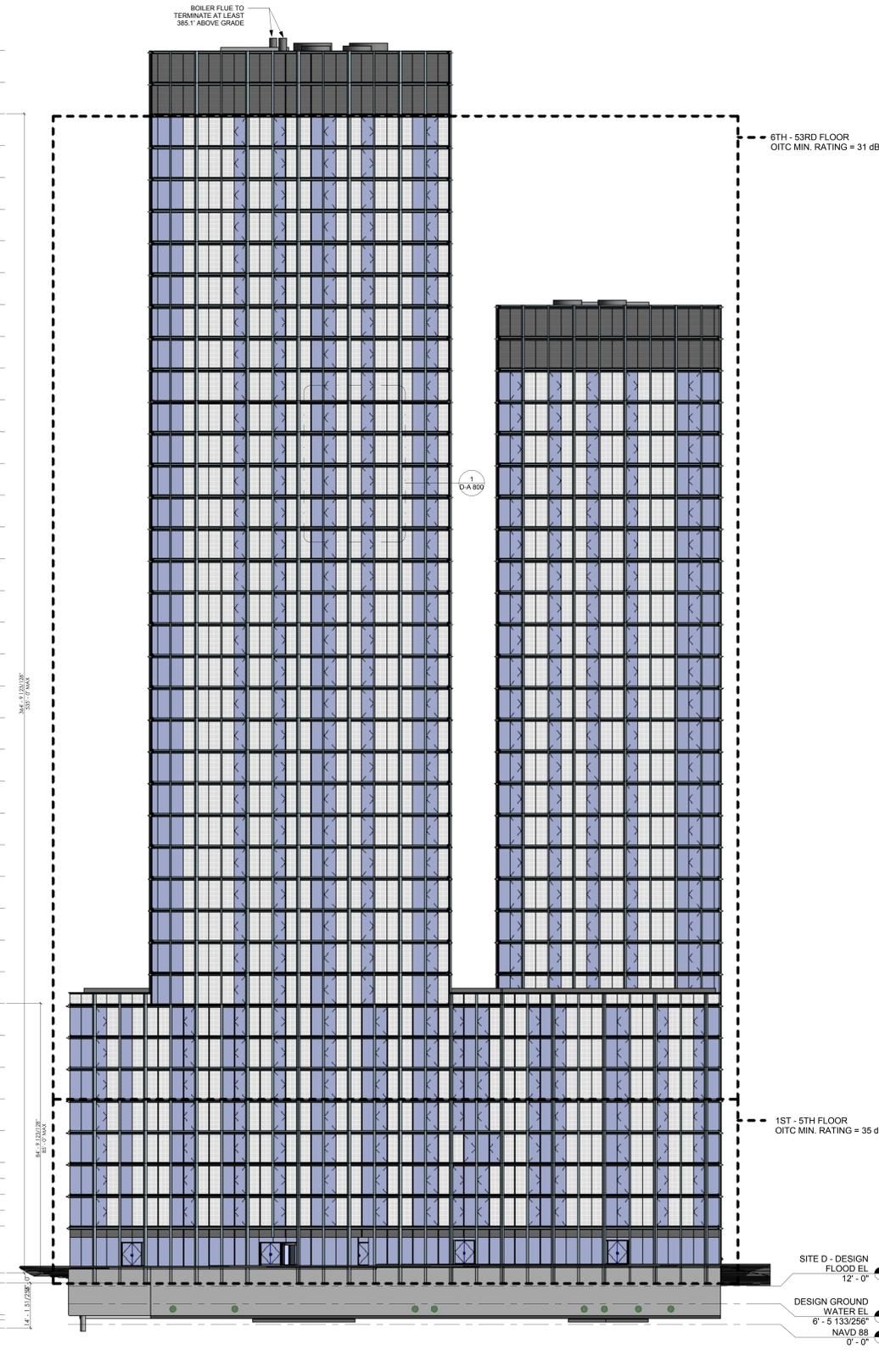
[Symbol]	SPANDREL GLASS
[Symbol]	FIXED VISION GLASS
[Symbol]	OPERABLE VISION GLASS
[Symbol]	GLASS DOOR
[Symbol]	LOUVER PANEL
[Symbol]	METAL SLAB COVER/RAILLION

NOTE: TV INDICATES TROUBLE VENT INTEGRATED PHOTO-CAMERATED WINDOW SIZE SPEC.



3 Elevation - East Bulkhead - Tower D1  
1/16" = 1'-0"

6 Elevation - North Bulkhead - Tower D1  
1/16" = 1'-0"



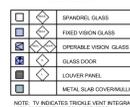
2 Elevation - East  
1/16" = 1'-0"

1 Elevation - North  
1/16" = 1'-0"

East Facade							
Panel Type	Area	U-Factor	OITC	SHGC	Type Mark	Manufacturer	Model
FIXED VISION GLASS	11353 SF	0.45	35	0.35		FA & PARTNERS	FA100
LOUVER	459 SF				L	GREENHECK	EDJ-430
OPERABLE VISION PANEL	10901 SF	0.45	35	0.35		FA & PARTNERS	FA100
SPANDREL	23537 SF	0.45	35	0.35		FA & PARTNERS	FA100

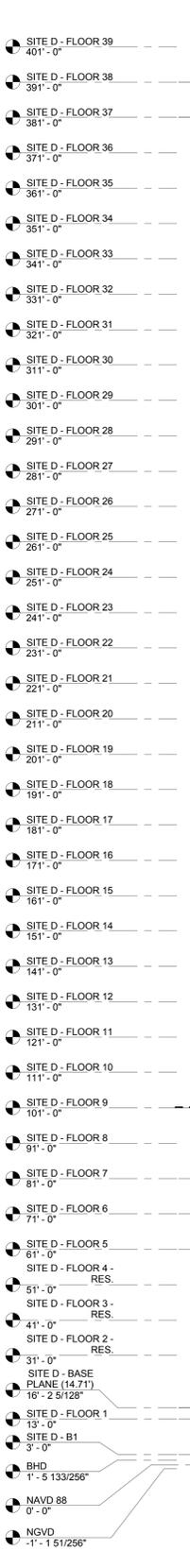
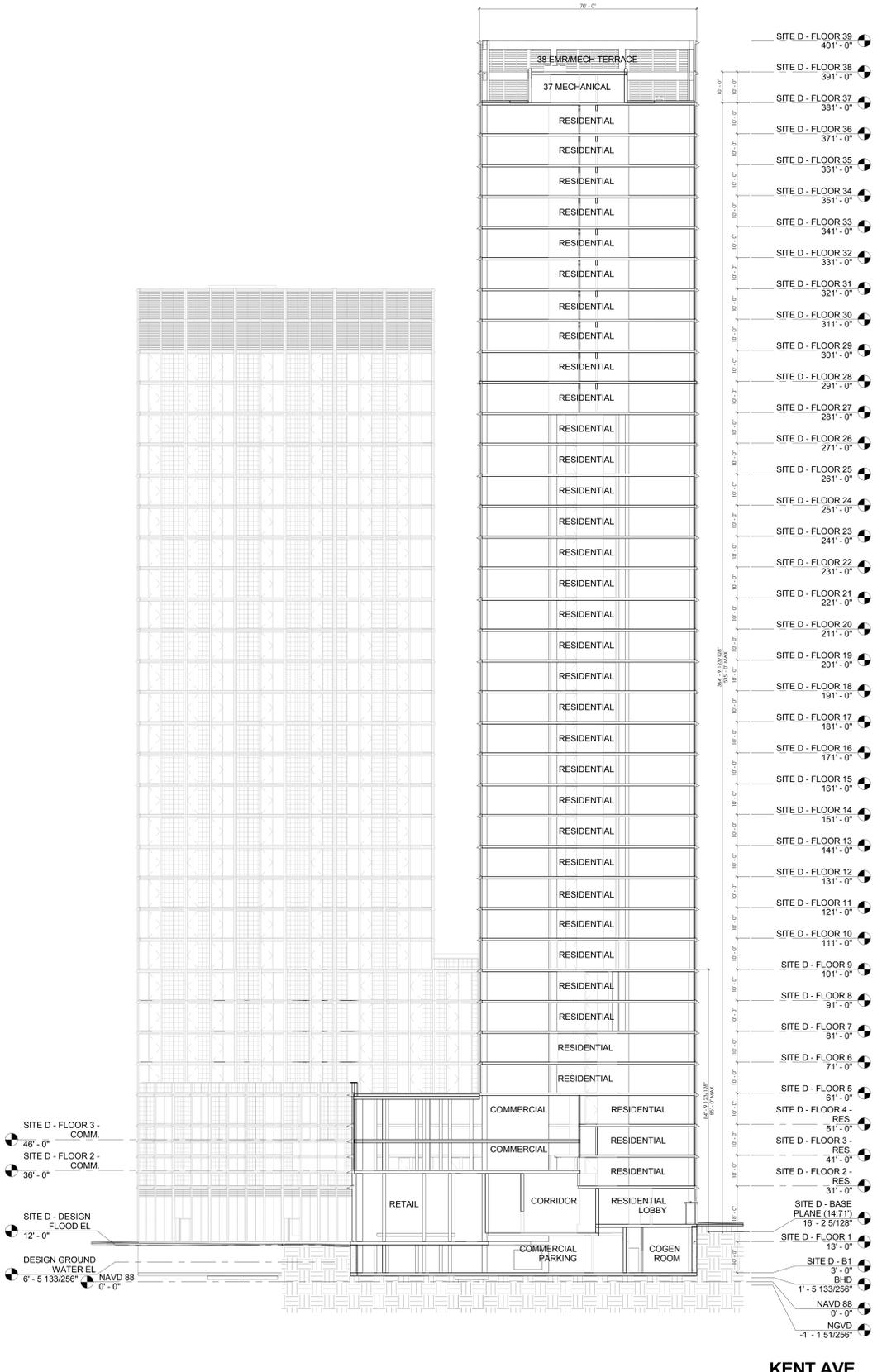
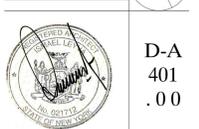
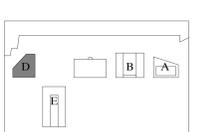
North Facade							
Panel Type	Area	U-Factor	OITC	SHGC	Type Mark	Manufacturer	Model
FIXED VISION GLASS	7949 SF	0.45	35	0.35		FA & PARTNERS	FA100
LOUVER	410 SF				L	GREENHECK	EDJ-430
OPERABLE VISION PANEL	10519 SF	0.45	35	0.35		FA & PARTNERS	FA100
SPANDREL	23685 SF	0.45	35	0.35		FA & PARTNERS	FA100

LEGEND



SURFACE AREA: 57,142 SF  
GLAZING AREA (VISION GLASS): 11,360+10,901 = 22,261 SF  
SOUTH FACADE: 38.96% GLAZING

SURFACE AREA: 53,882 SF  
GLAZING AREA (VISION GLASS): 7,962+10,519 = 18,481 SF  
SOUTH FACADE: 34.30% GLAZING



1 Section C-C  
1/16" = 1'-0"

2 Section A-A  
1/16" = 1'-0"

**ATTACHMENT B**  
**CITIZEN PARTICIPATION PLAN**

## **ATTACHMENT B**

### **CITIZEN PARTICIPATION PLAN**

The NYC Office of Environmental Remediation and Two Trees Management, 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, Two Trees Management, LLC will maintain a repository for project documents and provide public notice at specified times throughout the remedial program. This Plan also takes into account potential environmental justice concerns in the community that surrounds the project Site. Under this Citizen Participation Plan, project documents and work plans are made available to the public in a timely manner. Public comment on work plans is strongly encouraged during public comment periods. Work plans are not approved by the NYC Office of Environmental Remediation (OER) until public comment periods have expired and all comments are formally reviewed. An explanation of cleanup plans in the form of a public meeting or informational session is available upon request to OER's project manager assigned to this Site, Ms. Shana Holberton, who can be contacted about these issues or any others questions, comments or concerns that arise during the remedial process at (212) 788-3220.

**Project Contact List.** OER has established a Site Contact List for this project to provide public notices in the form of fact sheets to interested members of the Community. Communications will include updates on important information relating to the progress of the cleanup program at the Site as well as to request public comments on the cleanup plan. The Project Contact List includes owners and occupants of adjacent buildings and homes, principal administrators of nearby schools, hospitals and day care centers, the public water supplier that serves the area, established document repositories, the representative Community Board, City Council members, other elected representatives and any local Brownfield Opportunity Area (BOA) grantee organizations. Any member of the public or organization will be added to the Site Contact List on request. A copy of the Site Contact List is maintained by OER's project manager. If you would like to be added to the Project Contact List, contact NYC OER at (212) 788-8841 or by email at

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

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

The library nearest the Site is:

Brooklyn Library - Leonard Branch

81 Devoe Street, Brooklyn, NY 11215

Telephone Number: 718-486-3365

Hours of Operation:

Mon	10:00 AM - 6:00 PM
Tue	1:00 PM - 8:00 PM
Wed	10:00 AM - 6:00 PM
Thu	10:00 AM - 6:00 PM
Fri	10:00 AM - 6:00 PM
Sat	10:00 AM - 5:00 PM
Sun	Closed

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

**Identify Issues of Public Concern.** The major issues of concern to the public will be potential impacts of nuisance odors and dust during the disturbance of historic fill soils at the Site. This work will be performed in accordance with procedures which will be specified under a detailed Remedial Program which considers and takes preventive measures for exposures to future residents of the property and those on adjacent properties during construction. Detailed plans to

monitor the potential for exposure including a Construction Health and Safety Plan and a Community Air Monitoring Plan are required components of the remedial program. Implementation of these plans will be under the direct oversight of the NYC OER.

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

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

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

**Public Notice and Public Comment.** Public notice to all members of the Project Contact List is required at three major steps during the performance of the cleanup program (listed below) and at other points that may be required by OER. Notices will include Fact Sheets with descriptive project summaries, updates on recent and upcoming project activities, repository information, and important phone and email contact information. All notices will be prepared by Two Trees Management, LLC, reviewed and approved by OER prior to distribution and mailed by Two Trees Management, LLC. Public comment is solicited in public notices for all work plans developed under the NYC Voluntary Cleanup Program. Final review of all work plans by OER will consider all public comments. Approval will not be granted until the public comment period has been completed.

**Citizen Participation Milestones.** Public notice and public comment activities occur at several steps during a typical NYC VCP project. See flow chart on the following page, which identifies when during the NYC VCP public notices are issued: These steps include:

- **Public Notice of the availability of the Remedial Investigation Report and Remedial Action Work Plan and a 30-day public comment period on the Remedial Action Work Plan.**

Public notice in the form of a Fact Sheet is sent to all parties listed on the Site Contact List announcing the availability of the Remedial Investigation Report and Remedial

Action Work Plan and the initiation of a 30-day public comment period on the Remedial Action Work Plan. The Fact Sheet summarizes the findings of the RIR and provides details of the RAWP. The public comment period will be extended an additional 15 days upon public request. A public meeting or informational session will be conducted by OER upon request.

- **Public Notice announcing the approval of the RAWP and the start of remediation**

Public notice in the form of a Fact Sheet is sent to all parties listed on the Site Contact List announcing the approval of the RAWP and the start of remediation.

- **Public Notice announcing the completion of remediation, designation of Institutional and Engineering Controls and issuance of the Notice of Completion**

Public notice in the form of a Fact Sheet is sent to all parties listed on the Site Contact List announcing the completion of remediation, providing a list of all Institutional and Engineering Controls implemented for to the Site and announcing the issuance of the Notice of Completion

**ATTACHMENT C**  
**SUSTAINABILITY STATEMENT**

## ATTACHMENT C SUSTAINABILITY STATEMENT

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

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

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

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

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

**Storm-water Retention.** Storm-water retention improves water quality by lowering the rate of combined storm-water and sewer discharges to NYC's sewage treatment plants during periods of precipitation, and reduces the volume of untreated influent to local surface waters. An estimate of the enhanced storm-water retention capability of the redevelopment project will be included in the RAR.

**Linkage with Green Building.** Green buildings provide a multitude of benefits to the city across a broad range of areas, such as reduction of energy consumption, conservation of resources, and reduction in toxic materials use.

The number of Green Buildings that are associated with this brownfield redevelopment property



will be reported in the RAR. The total square footage of green building space created as a function of this brownfield redevelopment will be quantified for residential, commercial and industrial/manufacturing uses.

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

Recycled concrete materials and other backfill materials will be locally sourced reducing the energy consumption associated with transporting these materials to the Site. Best efforts will be made to quantify energy efficiencies achieved during the remediation and will be reported in the Remedial Action Report (RAR). Where energy savings cannot be easily quantified, a gross indicator of the amount of energy saved or the means by which energy savings was achieved will be reported.

**Paperless Voluntary Cleanup Program.** Two Trees Management, 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.** Two Trees Management, LLC is participating in OER's low-energy project management program. Under this program, whenever possible, meetings are held using remote communication technologies, such as videoconferencing and teleconferencing to reduce energy consumption and traffic congestion associated with personal transportation.

**ATTACHMENT D**  
**SOIL/MATERIALS MANAGEMENT PLAN**

## **ATTACHMENT D**

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

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

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

#### **1.2 STOCKPILE METHODS**

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

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

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

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

## 1.4 MATERIALS EXCAVATION, LOAD-OUT AND DEPARTURE

The PE/QEP overseeing the remedial action will:

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

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

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

## 1.5 OFF-SITE MATERIALS TRANSPORT

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

The planned route on local roads for trucks leaving the Site is shown on Figure 11.

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 Two Trees Management, 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 Brooklyn, New York under a governmental remediation program. The letter will provide the project identity and the name and phone number of the PE/QEP or Two Trees Management, 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 RAR.

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

All impacted soil/fill or other waste excavated and removed from the Site will be managed as regulated material and will be disposed in accordance with applicable laws and regulations. Historic fill and contaminated soils taken off-Site will be handled as solid waste and will not be disposed at a Part 360-16 Registration Facility (also known as a Soil Recycling Facility).

Waste characterization will be performed for off-Site disposal in a manner required by the receiving facility and in conformance with its applicable permits. Waste characterization

sampling and analytical methods, sampling frequency, analytical results and QA/QC will be reported in the RAR. A manifest system for off-Site transportation of exported materials will be employed. Manifest information will be reported in the RAR. Hazardous wastes derived from on-Site will be stored, transported, and disposed of in compliance with applicable laws and regulations.

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

### **1.7 MATERIALS REUSE ON-SITE**

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

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

### **1.8 DEMARCATION**

After completion of hotspot removal and any other invasive remedial activities, and prior to backfilling, the top of the residual soil/fill will be defined by one of three methods: (1) placement of a demarcation layer. The demarcation layer will consist of geosynthetic fencing or equivalent material to be placed on the surface of residual soil/fill to provide an observable reference layer.

A description or map of the approximate depth of the demarcation layer will be provided in the SMP; or (2) a land survey of the top elevation of residual soil/fill before the placement of cover soils, pavement and associated sub-soils, or other materials or structures or, (3) all materials beneath the approved cover will be considered impacted and subject to site management after the remedy is complete. Demarcation may be established by one or any combination of these three methods. As appropriate, a map showing the method of demarcation for the Site and all associated documentation will be presented in the RAR.

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

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

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

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

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

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

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

### **Source Screening and Testing**

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

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

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

Recycled concrete aggregate (RCA) will be imported from facilities permitted or registered by NYSDEC. Facilities will be identified in the RAR. A PE/QEP is responsible to ensure that the facility is compliant with 6NYCRR Part 360 registration and permitting requirements for the period of acquisition of RCA. RCA imported from compliant facilities will not require additional testing, unless required by NYSDEC under its terms for operation of the facility. RCA imported to the Site must be derived from recognizable and uncontaminated concrete. RCA material is not acceptable for, and will not be used as cover material.

### **1.10 FLUIDS MANAGEMENT**

All liquids to be removed from the Site, including dewatering fluids, will be handled, transported and disposed in accordance with applicable laws and regulations. Liquids discharged into the New York City sewer system will receive prior approval by New York City Department of

Environmental Protection (NYC DEP). The NYC DEP regulates discharges to the New York City sewers under Title 15, Rules of the City of New York Chapter 19. Discharge to the New York City sewer system will require an authorization and sampling data demonstrating that the groundwater meets the City's discharge criteria. The dewatering fluid will be pretreated as necessary to meet the NYC DEP discharge criteria. If discharge to the City sewer system is not appropriate, the dewatering fluids will be managed by transportation and disposal at an off-Site treatment facility.

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

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

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

### **1.12 CONTINGENCY PLAN**

This contingency plan is developed for the remedial construction to address the discovery of unknown structures or contaminated media during excavation. Identification of unknown contamination source areas during invasive Site work will be promptly communicated to OER's Project Manager. Petroleum spills will be reported to the NYS DEC Spill Hotline. These findings will be included in the daily report. If previously unidentified contaminant sources are found

during on-Site remedial excavation or development-related excavation, sampling will be performed on contaminated source material and surrounding soils and reported to OER. Chemical analytical testing will be performed for TAL metals, TCL volatiles and semi-volatiles, TCL pesticides and PCBs, as appropriate.

### 1.13 ODOR, DUST AND NUISANCE CONTROL

#### **Odor Control**

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

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

#### **Dust Control**

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

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

This dust control plan is capable of controlling emissions of dust. If nuisance dust emissions are identified, work will be halted and the source of dusts will be identified and corrected. Work will not resume until all nuisance dust emissions have been abated. OER will be notified of all dust complaint events. Implementation of all dust controls, including halt of work, will be the

responsibility of the PE/QEP's responsible for certifying the Remedial Action Report.

**Other Nuisances**

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

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

**ATTACHMENT E**  
**SITE SPECIFIC CONSTRUCTION**  
**HEALTH AND SAFETY PLAN**

# DOMINO SUGAR SITE B

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330-350 KENT AVENUE

BROOKLYN, NEW YORK

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## CONSTRUCTION HEALTH AND SAFETY PLAN

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SEPTEMBER 2014

*Prepared for:*

Two Trees Management, LLC

45 Main Street, Suite 602

Brooklyn, NY 11201

*Prepared By:*

**EBC**

**ENVIRONMENTAL BUSINESS CONSULTANTS**

1808 Middle Country Road

Ridge, NY 11961

## HEALTH AND SAFETY PLAN

Site: **Redevelopment Project - TRG**

Location: **330-350 Kent Avenue, Brooklyn, NY**

Prepared By: **ENVIRONMENTAL BUSINESS CONSULTANTS**

Date Prepared: **September - 2014**

Version: **1**

Revision: **0**

Project Description:

Waste types: Solid

Characteristics: Semi-Volatile Organic Compounds, and metals – in historic fill (Grade to 15 feet of soil)

Overall Hazard: Low

ENVIRONMENTAL BUSINESS CONSULTANTS (EBC) AND EBC'S SUBCONTRACTORS DO NOT GUARANTEE THE HEALTH OR SAFETY OF ANY PERSON ENTERING THIS SITE. DUE TO THE NATURE OF THIS SITE AND THE ACTIVITY OCCURRING THEREON, IT IS NOT POSSIBLE TO DISCOVER, EVALUATE, AND PROVIDE PROTECTION FOR ALL POSSIBLE HAZARDS WHICH MAY BE ENCOUNTERED. STRICT ADHERENCE TO THE HEALTH AND SAFETY GUIDELINES SET FORTH HEREIN WILL REDUCE, BUT NOT ELIMINATE, THE POTENTIAL FOR INJURY AT THIS SITE. THE HEALTH AND SAFETY GUIDELINES IN THIS PLAN WERE PREPARED SPECIFICALLY FOR THIS SITE AND SHOULD NOT BE USED ON ANY OTHER SITE WITHOUT PRIOR RESEARCH AND EVALUATION.

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APPENDIX C                      CHEMICAL HAZARDS  
APPENDIX D                      HOSPITAL INFORMATION, MAP AND FIELD ACCIDENT REPORT

## STATEMENT OF COMMITMENT

This Health and Safety Plan (HASP) has been prepared to ensure that workers are not exposed to risks from hazardous materials during the Remedial Activities planned for 330-350 Kent Avenue, Brooklyn, New York.

This HASP, which applies to persons present at the site actually or potentially exposed to hazardous materials, describes emergency response procedures for actual and potential chemical hazards. This HASP is also intended to inform and guide personnel entering the work area or exclusion zone. Persons are to acknowledge that they understand the potential hazards and the contents of this Health and Safety policy by signing off on receipt of their individual copy of the document. The General Contractor and their subcontractors and suppliers are retained as independent contractors and are responsible for ensuring the health and safety of their own employees. The General contractor has the option of adopting this HASP or providing its own for the planned scope of work under the Remedial Action Plan.



## 1.0 INTRODUCTION

This document describes the health and safety guidelines developed by Environmental Business Consultants (EBC) for implementation of a Remedial Action Plan at Redevelopment Project located at 330-350 Kent Avenue, Brooklyn, NY, to protect on-site personnel, visitors, and the public from physical harm and exposure to hazardous materials or wastes during the removal of underground storage tanks and the excavation and loading of contaminated soil. In accordance with the Occupational Safety and Health Administration (OSHA) 29 CFR Part 1910.120 Hazardous Waste Operations and Emergency Response Final rule, this CHASP, including the attachments, addresses safety and health hazards related to subsurface sample collection activities and is based on the best information available. The CHASP may be revised by EBC at the request of Two Trees Management LLC (“the Developer”) and/or the New York State Department of Environmental Conservation (NYSDEC) or New York City Office of Environmental Remediation (NYCOER) upon receipt of new information regarding site conditions. Changes will be documented by written amendments signed by EBC’s Project Manager, site safety officer and/or the EBC Health and Safety Consultant.

### 1.1 Scope

This CHASP addresses the potential hazards related to the site Remedial Action Plan (RAP). The RAP activities are as described below:

- 1) Site mobilization of General Contractor (GC) and Subcontractors to install the building foundation.
  - a) Excavate top 12 to 15 feet of historic fill from Site.
  - b) Excavate as necessary for installation of new building's foundation.

### 1.2 Application

The HASP applies to all personnel involved in the above tasks who wish to gain access to active work areas, including but not limited to:

- General Contractor
- EBC employees and subcontractors;
- Client representatives; and
- Federal, state or local representatives.

### 1.3 Site Safety Plan Acceptance, Acknowledgment and Amendments

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

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

## 1.4 Key Personnel - Roles and Responsibilities

Personnel responsible for implementing this Construction Health and Safety Plan are:

Name	Title	Address	Contact Numbers
Mr. Kevin Brussee	EBC Project Manager	1808 Middle Country Road Ridge, NY 11961	(631) 504-6000 Cell (631) 338-1749
Mr. Kevin Waters	EBC Site Safety Officer	1808 Middle Country Road Ridge, NY 11961	(631) 504-6000

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

The site safety officer is also responsible for coordinating health and safety activities related to hazardous material exposure on-site. The site safety officer is responsible for the following:

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

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

## 2.0 SITE BACKGROUND AND SCOPE OF WORK

Domino Sugar Site D is located at 332 to 350 Kent Avenue in the Williamsburg-South Side section of Brooklyn, New York, and is currently identified as a portion of Block 2414 Lot 1 on the New York City Tax Map. Lot 1 is a 717,000 ft<sup>2</sup> water front lot located on the west side of Kent Avenue between Grand Street to the north and South 5th Street to the south. Lot 1 has historically consisted of multiple industrial/commercial buildings utilized by the Domino Sugar Company and other sugar refinery companies. All of the buildings on Lot 1, with the exception of the Refinery Building, are currently being demolished. The portion of Lot 1 identified as Site D was developed with 4-story brick building identified as the Adant House, which was originally used for processing sugar into cubes, and a portion of the former Domino Sugar Packaging House, which also bordered the Site to the north and west.

Site D is currently bordered by Site C to the north (which includes the former Domino Sugar Packaging House building), South 5th Street to the south, Kent Avenue to the east and the southern portions of the former Domino Sugar Packaging House building to the west. Site D is approximately 48,474 ft<sup>2</sup>, and consists of 249.5 feet of street frontage on Kent Avenue and a length of approximately 224.875 ft along the northern property boundary.

Following redevelopment, Site D will be subdivided to create a new tax lot (Proposed Lot D), and newly mapped streets including South 4th Street and River Street. A new recreational and shoreline walkway/park will be created on the opposite side of River Street, which will span along the west side of Sites A, B, C, D and F.

Following redevelopment, Proposed Lot D will be bordered by Kent Avenue to the east, newly mapped South 4th Street to the north, and newly mapped River Street to the west and south. Proposed Lot D will consist of approximately 204.5 feet of street frontage on Kent Avenue, and 179.875 feet of street frontage on South 4th Street, creating a 27,017 ft<sup>2</sup> lot. The portion of Site D which will be converted into Proposed Lot D currently consists of a portion of the recently demolished 4-story brick building identified as the Adant House, which was originally used for processing sugar into cubes, as well as a portion of the recently demolished Domino Sugar Packaging House.

### 2.1 Prior Investigations

Two Phase I Environmental Site Assessment (ESA) Reports have been completed for Sites A, B, C, D, E and F.

A Phase I Environmental Site Assessment Report was completed by Environmental Health Investigations, Inc. in 2004 for Sites A, B, C, D, E and F. At the time the Phase I ESA was completed, the Site D portion of Lot 1 consisted a 4-story brick building known as the Adant House as well as a portion of the former Domino Sugar Packaging House. The Adant House was utilized for processing sugar into cubes.

The Phase I ESA indicated Lot 1 has been developed as a sugar refinery since the 1850's by companies such as the Brooklyn Sugar Refining Company (circa 1887), American Sugar Refining Company, Havemeyer and Elder Plant (from 1904 to 1970's), and the Amstar Corporation/Amstar Sugar Corporation, Domino Sugar Corporation, and Tate & Lyle North American Sugar, Inc. (1970's to 1990's). In June 1999 the facility ceased raw sugar refining, and

instead began receiving partially raw sugar liquor from an affiliate facility. The northern most portion of Lot 1 (Site A) was also utilized by the Scranton Coal Company as a coal yard in 1887. Tate & Lyle North American Sugar, Inc. operated until early 2004.

The Phase I ESA did not identify any Recognized Environmental Conditions in connection with the Site D.

A Phase I Environmental Site Assessment Report was completed by Emteque LLC in 2012, for Sites A, B, C, D, E, and F. Historic Sanborn maps provided within the report were reviewed by EBC and the following information was obtained:

Site D was developed prior to 1887 with multiple 2, 6 and 8 story industrial buildings for Havemeyer & Elder, a sugar refinery. The buildings contained a storage shed, 17 large boilers, steam drying rooms, hot air drying rooms, centrifugal machines, vacuum pans, and a fill house. Areas labeled “coal house”, “coal pockets”, and “engine” were located within the 2-story storage shed building partially located at Site D. By 1904, the sugar refining operation was owned by the American Sugar Refining Company. At that time, the building had only four large boilers, and they are listed as not in use, and to be removed. The coal house was no longer shown in the storage shed. The Site D buildings were converted into the Adant Block by 1918. By 1965, all of the older industrial buildings, with the exception of the Adant House, had been demolished and replaced with the large warehouse, packaging and carton storage building that recently stood on all of Site C and the western end of Site D. In the late 1970's the facility operated as part of the Amstar Corporation, and the Adant House was utilized as a warehouse. From 1993 on, the facility operated as Domino Sugar.

The Emteque LLC Phase I Environmental Site Assessment Report identified multiple recognized environmental conditions in connection with Lot 1. However, only two are believed to be associated with Site D; potential historic/urban fill at the Site, and the listing of neighboring properties on environmental databases.

The AOCs identified for Site B include:

1. Historic fill layer is present at the Site at depths varying from 7 to approximately 15 ft below the former Adant House building slab.

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

EBC performed the following scope of work within Site B in April of 2014:

1. Conducted a Site inspection to identify AOCs and physical obstructions (i.e. structures, buildings, etc.);
2. Installed five soil borings within Site D, and collected ten soil samples for chemical analysis from the soil borings to evaluate soil quality; and
3. Installed two groundwater monitoring wells within Site D and collected two groundwater samples from the monitoring wells to evaluate groundwater quality; and
4. Installed three soil vapor probes within Site D and collected three soil vapor samples for chemical analysis.

### **Summary of Environmental Findings**

1. The elevation of Site D is approximately 8 feet on the western end, and approximately 16 feet along Kent Avenue.

2. Depth to groundwater varies across Site D from approximately 6 feet on the western end, to approximately 14 feet along Kent Avenue.
3. Depth to bedrock is at the Site is greater than 100 feet.
4. The stratigraphy of Site D, from the surface down, consists of a layer of historic fill material that varies from 7 to approximately 15 ft below the former building's cellar slab, underlain by a brown sand.
5. Soil sample results were compared to NYSDEC Part 375-6 Unrestricted Use (Track 1) and Restricted Residential Use (Track 2) Soil Cleanup Objectives (SCOs). Soil/fill samples collected during the 2014 EBC RI, and 2008 AKRF Phase II showed no pesticides at concentrations above Unrestricted Use SCOs. The following VOCs were detected at a concentration below Unrestricted Use SCOs; 1,2,4-trimethylbenzene (1.5 micrograms per kilogram [ $\mu\text{g}/\text{Kg}$ ]), 1,3,5-trimethylbenzene (0.96  $\mu\text{g}/\text{Kg}$ ), carbon disulfide (maximum [max] of 21  $\mu\text{g}/\text{Kg}$ ), methylene chloride (max of 2  $\mu\text{g}/\text{Kg}$ ), naphthalene (max 1,900  $\mu\text{g}/\text{Kg}$ ), p-isopropyltoluene (max of 230  $\mu\text{g}/\text{Kg}$ ), styrene (3.7  $\mu\text{g}/\text{Kg}$ ), toluene (max of 3.4  $\mu\text{g}/\text{Kg}$ ), and trichlorofluoromethane (12  $\mu\text{g}/\text{Kg}$ ). Acetone (max 140  $\mu\text{g}/\text{Kg}$ ) was detected within four soil samples at a concentration above Unrestricted Use SCOs, and methyl ethyl ketone (max 250 (max 140  $\mu\text{g}/\text{Kg}$ ) was detected within one soil sample at a concentration above Unrestricted Use SCOs. Six SVOCs including benz(a)anthracene (max of 21,000  $\mu\text{g}/\text{Kg}$ ), benzo(a)pyrene (max of 17,000  $\mu\text{g}/\text{Kg}$ ), benzo(b)fluoranthene (max of 20,000  $\mu\text{g}/\text{Kg}$ ), benzo(k)fluoranthene (max of 6,000  $\mu\text{g}/\text{Kg}$ ), chrysene (max of 22,000  $\mu\text{g}/\text{Kg}$ ), and indeno(1,2,3-cd)pyrene (max of 8,600  $\mu\text{g}/\text{Kg}$ ) were detected above Restricted Residential Use SCOs within soil samples retained from the historic fill layer. Several metals including cadmium (max of 4.08 mg/Kg), chromium (max of 37.7 mg/Kg), copper (max of 252 mg/Kg), lead (max of 691 mg/Kg), mercury (max of 0.31 mg/Kg), nickel (max of 67.2 mg/Kg), and zinc (1,460 mg/Kg) were detected above Unrestricted Use SCOs. Of these metals, cadmium and lead also exceeded Restricted Residential Use SCOs within soil samples collected from the historic fill layer. PCB-1254 was detected within the shallow soil samples retained from SB1 (160  $\mu\text{g}/\text{Kg}$ ) and SB4 (120  $\mu\text{g}/\text{Kg}$ ) at a concentration above Unrestricted Use SCOs. No PCBs were detected within the deeper soil samples retained from the same soil borings. Overall, the findings were consistent with observations for historical fill sites in areas throughout NYC.
6. Groundwater samples results were compared to NYSDEC 6NYCRR Part 703.5 Groundwater Quality Standards (GQS). Groundwater samples collected during the 2014 EBC RI showed no detectable concentrations of pesticides or PCBs, and no SVOCs were detected above GQS. The VOC methyl ethyl ketone (maximum of 330  $\mu\text{g}/\text{L}$ ) was detected above GQS in both groundwater samples and the following VOCs were detected in one or more of the groundwater samples at concentrations below GQS: 4-methyl-2-pentanone (1.2  $\mu\text{g}/\text{L}$ ), acetone (maximum of 160  $\mu\text{g}/\text{L}$ ), naphthalene (2.5  $\mu\text{g}/\text{L}$ ), p-isopropyltoluene (0.68  $\mu\text{g}/\text{L}$ ) and toluene (2.9  $\mu\text{g}/\text{L}$ ). Dissolved metals present in groundwater at levels above GQS included antimony, cadmium, iron, magnesium, manganese, selenium, and sodium. The presence of some of these metals in groundwater, specifically those that are common salinity indicators, can be attributed to intrusion of road salting as well as proximity to the East River.
7. Soil vapor samples collected during the RI were compared to the compounds listed in Table 3.1 Air Guideline Values Derived by the NYSDOH located in the New York State Department of Health (NYSDOH) Final Guidance for Evaluating Soil Vapor Intrusion. Soil vapor samples indicated petroleum related VOCs and chlorinated VOCs were

present at low to moderate concentrations, with the exception of trichlorofluoromethane which as detected in all three soil vapor samples within the range of 651 to 10,600 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ). Petroleum-related VOCs (BTEX) were detected at a maximum concentration of  $307.4 \mu\text{g}/\text{m}^3$ . Overall the highest reported concentrations were for 1,1-dichloroethane (max of  $165 \mu\text{g}/\text{m}^3$ ) acetone (max of  $1,140 \mu\text{g}/\text{m}^3$ ), cyclohexane (max of  $378 \mu\text{g}/\text{m}^3$ , ethanol (max of  $557 \mu\text{g}/\text{m}^3$ ), ethyl acetate (max of  $107 \mu\text{g}/\text{m}^3$ ), methyl ethyl ketone (max of  $112 \mu\text{g}/\text{m}^3$ ), propylene (max of  $703 \mu\text{g}/\text{m}^3$ ), toluene (max of  $167 \mu\text{g}/\text{m}^3$ ) and trichlorofluoromethane (max of  $10,600 \mu\text{g}/\text{m}^3$ ). Trichloroethylene (TCE) was detected in all three soil vapor samples, and ranged in concentration from 0.43 to  $3.17 \mu\text{g}/\text{m}^3$ , and tetrachloroethylene (PCE) was detected in all three soil vapor samples, and ranged in concentration from 1.36 to  $16.2 \mu\text{g}/\text{m}^3$ . Carbon tetrachloride was detected within all three soil vapor samples at a maximum concentration of  $0.88 \mu\text{g}/\text{m}^3$  and 1,1,1-trichloroethylene (TCA) was detected in all three soil gas samples at a concentration ranging from 2.89 to  $61.1 \mu\text{g}/\text{m}^3$ . The TCE, PCE, carbon tetrachloride and TCA concentrations are below the monitoring level ranges established within the NYSDOH Final Guidance on Soil Vapor Intrusion.

### 2.3 Description of Remedial Action Plan

Site activities included within the Remedial Action Plan that are included within the scope of this HASP include the following:

The proposed remedial action will consist of:

1. Preparation of a Community Protection Statement and performance of all required NYC VCP Citizen Participation activities according to an approved Citizen Participation Plan;
2. Performance of a Community Air Monitoring Program for particulates and volatile organic carbon compounds;
3. Establishment of Site-Specific (Track 4) Soil Cleanup Objectives (SCOs);
4. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking & staking excavation areas;
5. Performance of geophysical/test pits/trenches prior to start of building construction in proposed roads area and areas of the building footprint where excavation will not occur;
6. Completion of a Waste Characterization Study prior to excavation activities;
7. Excavation and removal of soil/fill exceeding Track 4 Site-Specific SCOs. For development purposes, excavation for the building's cellar would take place to a depth of approximately 22 feet on the eastern end of Proposed Lot D, 17 feet in the middle portion of the lot, and 12 feet on the western end of Proposed Lot D. Excavation to a depth of approximately 4 to 5 feet below grade would be performed in the southern end of Proposed Lot D, within the area that will be slab-on grade. If soil/fill containing analytes at concentrations above Track 4 Site-Specific SCOs is still present at the base of the excavation after removal of all soil required for construction of the buildings is complete, additional excavation will be performed to meet Track 4 Site-Specific SCOs. Approximately 25,500 tons of soils will be excavated and removed from this Site;
8. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID;
9. Management of excavated materials including temporarily stockpiling and segregating to prevent co-mingling of contaminated material and non-contaminated materials.
10. Removal of underground storage tanks (USTs) (if encountered) and closure of petroleum spills (if evidence of a spill/leak is encountered during Site excavation) in compliance

- with applicable local, State and Federal laws and regulations;
11. Transportation and off-Site disposal of all soil/fill material at permitted facilities in accordance with applicable laws and regulations for handling, transport, and disposal, and this plan. Sampling and analysis of excavated media as required by disposal facilities. Appropriate segregation of excavated media on-Site;
  12. Collection and analysis of end-point samples to determine the performance of the remedy with respect to attainment of SCOs;
  13. Import of materials to be used for backfill and cover in compliance with this plan and in accordance with applicable laws and regulations;
  14. Installation of an active Sub-Slab Depressurization System (SSDS) below the entire portion of the building not utilized as a parking garage. The SSDS system will be installed in the gravel layer beneath the new building slab;
  15. Installation of a waterproofing membrane system below the cellar slab and slab on-grade portion of the building, as well as behind subgrade portions of foundation walls of the proposed building. The waterproofing membrane system will consist of Preprufe 300R and Bituthene 4000 as manufacturing by Grace. Preprufe 300 is a 1.2 mm (0.046in) thick HDPE film with a pressure sensitive adhesive that bonds to the poured concrete. Preprufe 300 will be installed below the building's cellar slab and on grade portion of the building slab along River Street. Bituthene 4000 is a flexible preformed waterproof membrane combining a high performance cross laminated, HDPE carrier film with a unique super sticky self-adhesive rubber bitumen compound. Bituthene 4000 will be installed behind the building's foundation walls to grade;
  16. Construction and maintenance of an engineered composite cover consisting of the building's 2.5 ft (at-grade) and 5 ft (cellar) thick pile-supported mat building slab to prevent human exposure to residual soil/fill remaining under the Site. Sidewalks and roadways will consist of a geotextile layer installed above a prepared subgrade, a 6 inch thick layer of a compacted aggregate base, and a 4 inch or 7 thick layer of concrete (sidewalks/driveways) or a layer of asphaltic concrete binder course below a asphaltic concrete top course (street);
  17. Performance of all activities required for the remedial action, including permitting requirements and pretreatment requirements, in compliance with applicable laws and regulations;
  18. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations;
  19. Submission of a Remedial Action Report (RAR) that describes the remedial activities, certifies that the remedial requirements have been achieved, defines the Site boundaries, describes all Engineering and Institutional Controls to be implemented at the Site, and lists any changes from this RAWP;
  20. Submission of an approved Site Management Plan (SMP) in the RAR for long-term management of residual materials, including plans for operation, maintenance, inspection and certification of Engineering and Institutional Controls and reporting at a specified frequency; and
  21. 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.

### **3.0 HAZARD ASSESSMENT**

This section identifies the hazards associated with the proposed scope of work, general physical hazards that can be expected at most sites; and presents a summary of documented or potential chemical hazards at the site. Every effort must be made to reduce or eliminate these hazards. Those that cannot be eliminated must be guarded against using engineering controls and/or personal protective equipment.

#### **3.1 Physical Hazards**

##### *3.1.1 Tripping Hazards*

An area of risk associated with on-site activities are presented by uneven ground, concrete, curbstones or equipment which may be present at the site thereby creating a potential tripping hazard. During intrusive work, care should be taken to mark or remove any obstacles within the exclusion zone.

##### *3.1.2 Climbing Hazards*

During site activities, workers may have to work on excavating equipment by climbing. The excavating contractor will conform with any applicable NIOSH and OSHA requirements or climbing activities.

##### *3.1.3 Cuts and Lacerations*

Field activities that involve excavating activities usually involve contact with various types of machinery. A first aid kit approved by the American Red Cross will be available during all intrusive activities.

##### *3.1.4 Lifting Hazards*

Improper lifting by workers is one of the leading causes of industrial injuries. Field workers in the excavation program may be required to lift heavy objects. Therefore, all members of the field crew should be trained in the proper methods of lifting heavy objects. All workers should be cautioned against lifting objects too heavy for one person.

##### *3.1.5 Utility Hazards*

Before conducting any excavation, the excavation contractor will be responsible for locating and verifying all existing utilities at each excavation.

##### *3.1.6 Traffic Hazards*

All traffic, vehicular and pedestrian, shall be maintained and protected at all times consistent with local, state and federal agency regulations regarding such traffic and in accordance with NYCDOT guidelines. The excavation contractor shall carry on his operations without undue interference or delays to traffic. The excavation contractor shall furnish all labor, materials, guards, barricades, signs, lights, and anything else necessary to maintain traffic and to protect his work and the public, during operations.

#### **3.2 Work in Extreme Temperatures**

Work under extremely hot or cold weather conditions requires special protocols to minimize the chance that employees will be affected by heat or cold stress.

### 3.2.1 Heat Stress

The combination of high ambient temperature, high humidity, physical exertion, and personal protective apparel, which limits the dissipation of body heat and moisture, can cause heat stress.

The following prevention, recognition and treatment strategies will be implemented to protect personnel from heat stress. Personnel will be trained to recognize the symptoms of heat stress and to apply the appropriate treatment.

#### 1. Prevention

- a. Provide plenty of fluids. Available in the support zone will be a 50% solution of fruit punch and water or plain water.
- b. Work in Pairs. Individuals should avoid undertaking any activity alone.
- c. Provide cooling devices. A spray hose and a source of water will be provided to reduce body temperature, cool protective clothing and/or act as a quick-drench shower in case of an exposure incident.
- d. Adjustment of the work schedule. As is practical, the most labor-intensive tasks should be carried out during the coolest part of the day.

#### 2. Recognition and Treatment

##### a. Heat Rash (or prickly heat):

Cause: Continuous exposure to hot and humid air, aggravated by chafing clothing.

Symptoms: Eruption of red pimples around sweat ducts accompanied by intense itching and tingling.

Treatment: Remove source or irritation and cool skin with water or wet cloths.

##### b. Heat Cramps (or heat prostration)

Cause: Profuse perspiration accompanied by inadequate replenishment of body water and electrolytes.

Symptoms: Muscular weakness, staggering gait, nausea, dizziness, shallow breathing, pale and clammy skin, approximately normal body temperature.

Treatment: Perform the following while making arrangement for transport to a medical facility. Remove the worker to a contamination reduction zone. Remove protective clothing. Lie worker down on back in a cool place and raise feet 6 to 12 inches. Keep warm, but loosen all clothing. If conscious, provide sips of salt-water solution, using one teaspoon of salt in 12 ounces of water. Transport to a medical facility.

##### c. Heat Stroke

Cause: Same as heat exhaustion. This is also an extremely serious condition.

Symptoms: Dry hot skin, dry mouth, dizziness, nausea, headache, rapid pulse.

Treatment: Cool worker immediately by immersing or spraying with cool water or sponge bare skin after removing protective clothing. Transport to hospital.

### 3.2.2 Cold Exposure

Exposure to cold weather, wet conditions and extreme wind-chill factors may result in excessive loss of body heat (hypothermia) and /or frostbite. To guard against cold exposure and to prevent cold injuries, appropriate warm clothing should be worn, warm shelter must be readily available, rest periods should be adjusted as needed, and the physical conditions of on-site field personnel should be closely monitored. Personnel and supervisors working on-site will be made aware of the signs and symptoms of frost bite and hypothermia such as shivering, reduced blood pressure, reduced coordination, drowsiness, impaired judgment, fatigue, pupils dilated but reactive to light and numbing of the toes and fingers.

### 3.3 Chemical Hazards

Soil collected from the site as part of several subsurface investigations performed at the site have revealed elevated levels of SVOCs, metals and pesticides in historic fill at the Site.

Semi-Volatile organic compounds reported to be present at elevated concentrations in historic fill materials at the Site include the following:

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

Metals reported to be present at elevated concentrations in historic fill materials at the Site include the following:

Arsenic	Copper	Mercury	Lead	Nickel	Zinc
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The primary routes of exposure to identified contaminants in soil to on-site construction workers are through inhalation, ingestion and absorption.

**Appendix C** includes information sheets for all detected chemicals that may be encountered at the site.

#### 3.3.1 Respirable Dust

Dust may be generated from vehicular traffic and/or excavation activities. If visible observation detects elevated levels of dust, a program of wetting will be employed by the site safety officer. If elevated dust levels persist, the site safety office will employ dust monitoring using a particulate monitor (Miniram or equivalent). If monitoring detects concentrations greater than 150 µg/m<sup>3</sup> over daily background, the site safety officer will take corrective actions as defined herein, including the use of water for dust suppression and if this is not effective, requiring workers to wear APRs with efficiency particulate air (HEPA) cartridges.

Absorption pathways for dust and direct contact with soils or groundwater will be mitigated with the implementation of latex gloves, hand washing and decontamination exercises when necessary.

#### 3.3.2 Dust Control and Monitoring During Earthwork

Dust generated during excavation activities or other earthwork may contain contaminants identified in soils at the site. Dust will be controlled by wetting the working surface with water. Calcium chloride may be used if the problem cannot be controlled with water. Air monitoring and dust control techniques are specified in a site specific Dust Control Plan (if applicable). Site

workers will not be required to wear APR's unless dust concentrations are consistently over 150  $\mu\text{g}/\text{m}^3$  over site-specific background in the breathing zone as measured by a dust monitor unless the site safety officer directs workers to wear APRs. The site safety officer will use visible dust as an indicator to implement the dust control plan.

### 3.3.3 *Organic Vapors*

Although no VOCs were detected within any of the soil samples collected at the Site, the site safety officer will periodically monitor organic vapors with a Photo-ionization Detector (PID) during excavation activities to determine whether organic vapor concentrations exceed action levels shown in Section 5 and/or the Community Air Monitoring Plan.

## 4.0 PERSONAL PROTECTIVE EQUIPMENT

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

### 4.1 Level D

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

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

### 4.2 Level C

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

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

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

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

### 4.3 Activity-Specific Levels of Personal Protection

The required level of PPE is activity-specific and is based on air monitoring results (Section 4.0) and properties of identified or expected contaminants. **It is expected that site work will be performed in Level D.** If air monitoring results indicate the necessity to upgrade the level of protection, engineering controls (i.e. Facing equipment away from the wind and placing site personnel upwind of excavations, active venting, etc.) will be implemented before requiring the use of respiratory protection.

## 5.0 AIR MONITORING AND ACTION LEVELS

29 CFR 1910.120(h) specifies that monitoring shall be performed where there may be a question of employee exposure to hazardous concentrations of hazardous substances in order to assure proper selection of engineering controls, work practices and personal protective equipment so that employees are not exposed to levels which exceed permissible exposure limits, or published exposure levels if there are no permissible exposure limits, for hazardous substances.

### 5.1 Air Monitoring Requirements

If excavation work is performed, air will be monitored for VOCs with a portable ION Science 3000EX photoionization detector, or the equivalent. If necessary, Lower Explosive Limit (LEL) and oxygen will be monitored with a Combustible Gas Indicator (CGI). If appropriate, fugitive dust will be monitored using a MiniRam Model PDM-3 aerosol monitor. Air will be monitored when any of the following conditions apply:

- initial site entry;
- during any work where a potential IDLH condition or flammable atmosphere could develop;
- excavation work begins on another portion of the site;
- contaminants, other than those previously identified, have been discovered;
- each time a different task or activity is initiated;
- during trenching and/or excavation work.

The designated site safety officer will record air monitoring data and ensure that air monitoring instruments are calibrated and maintained in accordance with manufacturer's specifications. Instruments will be zeroed daily and checked for accuracy. Monitoring results will be recorded in a field notebook and will be transferred to instrument reading logs.

### 5.2 Work Stoppage Responses

The following responses will be initiated whenever one or more of the action levels necessitating a work stoppage are exceeded:

- 1 The SSO will be consulted immediately
- 2 All personnel (except as necessary for continued monitoring and contaminant migration, if applicable) will be cleared from the work area (eg from the exclusion zone).
- 3 Monitoring will be continued until intrusive work resumes.

### 5.3 Action Levels During Excavation Activities

Instrument readings will be taken in the breathing zone above the excavation pit unless otherwise noted. Each action level is independent of all other action levels in determining responses.

Organic Vapors (PID)	LEL %	Responses
0-1 ppm above background	0%	<ul style="list-style-type: none"> <li>• Continue excavating</li> <li>• Level D protection</li> <li>• Continue monitoring every 10 minutes</li> </ul>
1-5 ppm Above Background, Sustained Reading	1-10%	<ul style="list-style-type: none"> <li>• Continue excavating</li> <li>• Go to Level C protection or employ</li> </ul>

		<p>engineering controls</p> <ul style="list-style-type: none"> <li>• Continue monitoring every 10 minutes</li> </ul>
5-25 ppm Above Background, Sustained Reading	10-20%	<ul style="list-style-type: none"> <li>• Discontinue excavating, unless PID is only action level exceeded.</li> <li>• Level C protection or employ engineering controls</li> <li>• Continue monitoring for organic vapors 200 ft downwind</li> <li>• Continuous monitoring for LEL at excavation pit</li> </ul>
>25 ppm Above Background, Sustained Reading	>20%	<ul style="list-style-type: none"> <li>• Discontinue excavating</li> <li>• Withdraw from area, shut off all engine ignition sources.</li> <li>• Allow pit to vent</li> <li>• Continuous monitoring for organic vapors 200 ft downwind.</li> </ul>

Notes: Air monitoring will occur in the breathing zone 30 inches above the excavation pit. Readings may also be taken in the excavation pit but will not be used for action levels.

If action levels for any one of the monitoring parameters are exceeded, the appropriate responses listed in the right hand column should be taken. If instrument readings do not return to acceptable levels after the excavation pit has been vented for a period of greater than one-half hour, a decision will then be made whether or not to seal the pit with suppressant foam.

If, during excavation activities, downwind monitoring PID readings are greater than 5 ppm above background for more than one-half hour, excavation will stop until sustained levels are less than 5 ppm (see Community Air Monitoring Plan).

## 6.0 SITE CONTROL

### 6.1 Work Zones

The primary purpose of site controls is to establish the perimeter of a hazardous area, to reduce the migration of contaminants into clean areas, and to prevent access or exposure to hazardous materials by unauthorized persons. When operations are to take place involving hazardous materials, the site safety officer will establish an exclusion zone, a decontamination zone, and a support zone. These zones "float" (move around the site) depending on the tasks being performed on any given day. The site safety officer will outline these locations before work begins and when zones change. The site safety officer records this information in the site log book.

**Due to the dimensions of the Site and the work area, it is expected that an exclusion zone will include the entire fenced area with the exception of the construction entrance area, which will serve as the decontamination zone. A support zone if needed will be located outside of the fenced area.** All onsite workers during excavation of historic fill materials must provide evidence of OSHA 24 or 40-hour Hazardous Waste Operations and Emergency Response Operations training to conduct work within the exclusion zone established by the site safety officer. The exclusion zone is defined by the site safety officer but will typically be a 50-foot area around work activities. Gross decontamination (as determined by the site Health and Safety Officer) is conducted in the exclusion zone; all other decontamination is performed in the decontamination zone or trailer, if provided.

Protective equipment is removed in the decontamination zone. Disposable protective equipment is stored in receptacles staged in the decontamination zone, and non-disposable equipment is decontaminated. All personnel and equipment exit the exclusion zone through the decontamination zone. If a decontamination trailer is provided the first aid equipment, an eye wash unit, and drinking water are kept in the decontamination trailer.

The support zone is used for vehicle parking, daily safety meetings, and supply storage. Eating, drinking, and smoking are permitted only in the support zone. When a decontamination trailer is not provided, the eye wash unit, first aid equipment, and drinking water are kept at a central location designated by the site safety officer.

## 7.0 CONTINGENCY PLAN/EMERGENCY RESPONSE PLAN

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

Emergency telephone numbers and a map to the hospital will be posted in the command post. Site personnel should be familiar with the emergency procedures, and the locations of site safety, first aid, and communication equipment.

### 7.1 Emergency Equipment On-site

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

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

### 7.2 Emergency Telephone Numbers

General Emergencies	911
Suffolk County Police	911
NYC Fire Department	911
Woodhull Medical Center	(718) 963-8000
NYSDEC Spills Hotline	1-800-457-7362
NYSDEC Project Manager	(718) 482-4010
NYC Department of Health	(212) 676-2400
National Response Center	1-800-424-8802
Poison Control	1-800-222-1222
Project Manager	1-631-504-6000
Site Safety Officer	1-631-504-6000

### 7.3 Personnel Responsibilities During an Emergency

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

- Take appropriate measures to protect personnel including: withdrawal from the exclusion zone, evacuate and secure the site, or upgrade/downgrade the level of protective clothing and respiratory protection;
- Ensure that appropriate federal, state, and local agencies are informed and emergency response plans are coordinated. In the event of fire or explosion, the local fire department should be summoned immediately. If toxic materials are released to the air, the local authorities should be informed in order to assess the need for evacuation;
- Ensure appropriate decontamination, treatment, or testing for exposed or injured



evacuated safely. The head count will be correlated to the site and/or exclusion zone entry/exit log.

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

### **7.7 Spill Control Procedures**

Spills associated with site activities may be attributed to project 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.

### **7.8 Vapor Release Plan**

If work zone organic vapor (excluding methane) exceeds 5 ppm, then a downwind reading will be made either 200 feet from the work zone or at the property line, whichever is closer. If readings at this location exceed 5 ppm over background, the work will be stopped.

If 5 ppm of VOCs are recorded over background on a PID at the property line, then an off-site reading will be taken within 20 feet of the nearest residential or commercial property, whichever is closer. If efforts to mitigate the emission source are unsuccessful for 30 minutes, then the designated site safety officer will:

- contact the local police;
- continue to monitor air every 30 minutes, 20 feet from the closest off-site property. If two successive readings are below 5 ppm (non-methane), off-site air monitoring will be halted.
- All property line and off site air monitoring locations and results associated with vapor releases will be recorded in the site safety log book.

***APPENDIX A***  
***SITE SAFETY ACKNOWLEDGEMENT FORM***

## DAILY BRIEFING SIGN-IN SHEET

Date: \_\_\_\_\_ Person Conducting Briefing: \_\_\_\_\_

Project Name and Location: \_\_\_\_\_

1. AWARENESS (topics discussed, special safety concerns, recent incidents, etc...):

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2. OTHER ISSUES (HASP changes, attendee comments, etc...):

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3. ATTENDEES (Print Name):

1.	11.
2.	12.
3.	13.
4.	14.
5.	15.
6.	16.
7.	17.
8.	18.
9.	19.
10.	20.

***APPENDIX B***  
***SITE SAFETY PLAN AMENDMENTS***

**SITE SAFETY PLAN AMENDMENT FORM**

**Site Safety Plan Amendment #:** \_\_\_\_\_

**Site Name:** \_\_\_\_\_

**Reason for Amendment:** \_\_\_\_\_

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

**Alternative Procedures:** \_\_\_\_\_

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

**Required Changes in PPE:** \_\_\_\_\_

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

\_\_\_\_\_  
**Project Superintendent (signature)**

\_\_\_\_\_  
**Date**

\_\_\_\_\_  
**Health and Safety Consultant (signature)**

\_\_\_\_\_  
**Date**

\_\_\_\_\_  
**Site Safety Officer (signature)**

\_\_\_\_\_  
**Date**

***APPENDIX C***  
***CHEMICAL HAZARDS***

**CHEMICAL HAZARDS**

The attached International Chemical Safety Cards are provided for contaminants of concern that have been identified in soils and/or groundwater at the site.

# International Chemical Safety Cards

## BENZ(a)ANTHRACENE

ICSC: 0385



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

ICSC # 0385  
CAS # 56-55-3  
RTECS # [CV9275000](#)  
EC # 601-033-00-9  
October 23, 1995 Validated



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

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Personal protection: complete protective clothing including self-contained breathing apparatus.	Well closed.	T symbol N symbol R: 45-50/53 S: 53-45-60-61

**SEE IMPORTANT INFORMATION ON BACK**

ICSC: 0385

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: 0385

# BENZ(a)ANTHRACENE

<p>I M P O R T A N T D A T A</p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS TO YELLOW BROWN FLUORESCENT FLAKES OR POWDER.</p> <p><b>PHYSICAL DANGERS:</b> Dust explosion possible if in powder or granular form, mixed with air.</p> <p><b>CHEMICAL DANGERS:</b></p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: A2 (suspected human carcinogen); (ACGIH 2004). MAK: Carcinogen category: 2 (as pyrolysis product of organic materials) (DFG 2005).</p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation, through the skin and by ingestion.</p> <p><b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b></p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> This substance is probably carcinogenic to humans.</p>
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<p><b>PHYSICAL PROPERTIES</b></p>	<p>Sublimation point: 435°C Melting point: 162°C Relative density (water = 1): 1.274 Solubility in water: none</p>	<p>Vapour pressure, Pa at 20°C: 292 Octanol/water partition coefficient as log Pow: 5.61</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	<p>Bioaccumulation of this chemical may occur in seafood.</p>	
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## NOTES

This substance is one of many polycyclic aromatic hydrocarbons - standards are usually established for them as mixtures, e.g., coal tar pitch volatiles. However, it may be encountered as a laboratory chemical in its pure form. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken. Do NOT take working clothes home. Tetraphene is a common name. Card has been partly updated in October 2005 and August 2006: see sections Occupational Exposure Limits, EU classification.

## ADDITIONAL INFORMATION

<p><b>ICSC: 0385</b></p>	<p><b>BENZ(a)ANTHRACENE</b></p>
<p>(C) IPCS, CEC, 1994</p>	

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# International Chemical Safety Cards

**BENZO(a)PYRENE**

ICSC: 0104



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 Peer reviewed



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Combustible.	NO open flames.	Water spray, foam, powder, carbon dioxide.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>	See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE.	AVOID ALL CONTACT! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
• <b>INHALATION</b>		Local exhaust or breathing protection.	Fresh air, rest.
• <b>SKIN</b>	MAY BE ABSORBED!	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• <b>EYES</b>		Safety goggles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>		Do not eat, drink, or smoke during work.	Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention.

SPILLAGE DISPOSAL	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, then remove to safe place.	Separated from strong oxidants.	T symbol N symbol R: 45-46-60-61-43-50/53 S: 53-45-60-61

**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

<p>I M P O R T A N T A D V I S I O N</p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> PALE-YELLOW CRYSTALS</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> Reacts with strong oxidants causing fire and explosion hazard.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> 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).</p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its aerosol, through the skin and by ingestion.</p> <p><b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b></p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> 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.</p>
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<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 496°C Melting point: 178.1°C Density: 1.4 g/cm<sup>3</sup></p>	<p>Solubility in water: none (&lt;0.1 g/100 ml) Vapour pressure : negligible Octanol/water partition coefficient as log Pow: 6.04</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	<p>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.</p>	
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### 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

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ICSC: 0104

BENZO(a)PYRENE

(C) IPCS, CEC, 1994

<p><b>IMPORTANT LEGAL NOTICE:</b></p>	<p>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.</p>
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# International Chemical Safety Cards

**BENZO(b)FLUORANTHENE**

ICSC: 0720



Benz(e)acephenanthrylene  
2,3-Benzofluoranthene  
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 Peer reviewed



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

SPILLAGE DISPOSAL	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

<b>I</b>	<b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS CRYSTALS	<b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation
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**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).

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/m<sup>3</sup>. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken.

**ADDITIONAL INFORMATION**

**ICSC: 0720**

**BENZO(b)FLUORANTHENE**

(C) IPCS, CEC, 1994

**IMPORTANT LEGAL NOTICE:**

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# International Chemical Safety Cards

**BENZO(g,h,i)FLUORANTHENE**

ICSC: 0527



2,13-Benzofluoranthene  
Benzo(mno)fluoranthene  
 $C_{18}H_{10}$   
Molecular mass: 226.3

ICSC # 0527  
CAS # 203-12-3  
RTECS # [DF6140000](#)  
March 25, 1998 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Combustible.	NO open flames.	Water spray, powder.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>		PREVENT DISPERSION OF DUST!	
• <b>INHALATION</b>		Local exhaust or breathing protection.	
• <b>SKIN</b>	MAY BE ABSORBED!	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention. Wear protective gloves when administering first aid.
• <b>EYES</b>		Safety goggles, face shield, or eye protection in combination with breathing protection if powder.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>		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.	Well closed.	R: S:

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0527**

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(g,h,i)FLUORANTHENE**

ICSC: 0527

<b>I</b>	<b>PHYSICAL STATE; APPEARANCE:</b> YELLOW CRYSTALS	<b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its aerosol and through the skin.
<b>M</b>		
<b>P</b>	<b>PHYSICAL DANGERS:</b>	

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**INHALATION RISK:**

**CHEMICAL DANGERS:**

The substance decomposes on heating producing toxic fumes.

**EFFECTS OF SHORT-TERM EXPOSURE:**

**OCCUPATIONAL EXPOSURE LIMITS:**

TLV not established.

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**

See Notes.

**PHYSICAL PROPERTIES**

Melting point: 149°C  
Solubility in water: none  
Vapour pressure, Pa at 20°C: <10

Relative vapour density (air = 1): 7.8  
Relative density of the vapour/air-mixture at 20°C (air = 1): 1.0  
Octanol/water partition coefficient as log Pow: 7.23

**ENVIRONMENTAL DATA**

This substance may be hazardous to the environment; special attention should be given to the total environment. In the food chain important to humans, bioaccumulation takes place, specifically in oils and fats.



**NOTES**

Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken. Also consult ICSC #0720 and 0721.

**ADDITIONAL INFORMATION**

**ICSC: 0527**

**BENZO(g,h,i)FLUORANTHENE**

(C) IPCS, CEC, 1994

**IMPORTANT LEGAL NOTICE:**

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# 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
<b>FIRE</b>	Combustible.	NO open flames.	Water spray. Dry powder. Foam. Carbon dioxide.
<b>EXPLOSION</b>	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
<b>EXPOSURE</b>	See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE.	AVOID ALL CONTACT!	
• <b>INHALATION</b>		Local exhaust or breathing protection.	Fresh air, rest.
• <b>SKIN</b>		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• <b>EYES</b>		Safety goggles	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>		Do not eat, drink, or smoke during work.	Rinse mouth.

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 Aqua-Cancer Suspected of causing cancer Very toxic to aquatic life with long lasting effects Very toxic to aquatic life

**SEE IMPORTANT INFORMATION ON BACK**

# International Chemical Safety Cards

## CHRYSENE

ICSC: 1672

<p><b>I M P O R T A N T  D A T A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS TO BEIGE CRYSTALS OR POWDER</p> <p><b>PHYSICAL DANGERS:</b> Dust explosion possible if in powder or granular form, mixed with air.</p> <p><b>CHEMICAL DANGERS:</b> The substance decomposes on burning producing toxic fumes Reacts violently with strong oxidants</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: A3 (confirmed animal carcinogen with unknown relevance to humans); (ACGIH 2006). MAK not established.</p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its aerosol, through the skin and by ingestion.</p> <p><b>INHALATION RISK:</b> A harmful concentration of airborne particles can be reached quickly when dispersed</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b></p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> This substance is possibly carcinogenic to humans.</p>
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<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 448°C Melting point: 254 - 256°C Density: 1.3 g/cm<sup>3</sup></p>	<p>Solubility in water: very poor Octanol/water partition coefficient as log Pow: 5.9</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	<p>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.</p>	
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**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

**ADDITIONAL INFORMATION**

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ICSC: 1672

CHRYSENE

(C) IPCS, CEC, 1994

<p><b>IMPORTANT LEGAL NOTICE:</b></p>	<p>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.</p>
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# International Chemical Safety Cards

**INDENO(1,2,3-cd)PYRENE**

ICSC: 0730



o-Phenylenepyrene  
2,3-Phenylenepyrene  
 $C_{22}H_{12}$   
Molecular mass: 276.3

ICSC # 0730  
CAS # 193-39-5  
RTECS # [NK9300000](#)  
March 25, 1999 Peer reviewed

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

SPILLAGE DISPOSAL	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.	R: S:

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0730

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

**INDENO(1,2,3-cd)PYRENE**

ICSC: 0730

<b>I</b>	<b>PHYSICAL STATE; APPEARANCE:</b> YELLOW CRYSTALS	<b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its aerosol and through the skin.
<b>M</b>	<b>PHYSICAL DANGERS:</b>	<b>INHALATION RISK:</b>
<b>P</b>		

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**CHEMICAL DANGERS:**  
Upon heating, toxic fumes are formed.

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

**OCCUPATIONAL EXPOSURE LIMITS:**  
TLV not established.  
MAK:  
Carcinogen category: 2;  
(DFG 2004).

**EFFECTS OF SHORT-TERM EXPOSURE:**

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**  
This substance is possibly carcinogenic to humans.

**PHYSICAL PROPERTIES**

Boiling point: 536°C  
Melting point: 164°C  
Solubility in water:  
none

Octanol/water partition coefficient as log Pow: 6.58

**ENVIRONMENTAL DATA**

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



**NOTES**

Indeno(1,2,3-cd)pyrene is present as a component of polycyclic aromatic hydrocarbons (PAH) content in the environment usually resulting from the incomplete combustion or pyrolysis of organic matters, especially fossil fuels and tobacco. ACGIH recommends environment containing Indeno(1,2,3-c,d)pyrene should be evaluated in terms of the TLV-TWA for coal tar pitch volatile, as benzene soluble 0.2 mg/m<sup>3</sup>. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken.

**ADDITIONAL INFORMATION**

**ICSC: 0730**

**INDENO(1,2,3-cd)PYRENE**

(C) IPCS, CEC, 1994

**IMPORTANT LEGAL NOTICE:**

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# International Chemical Safety Cards

ARSENIC

ICSC: 0013



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 Peer reviewed



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Combustible. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames. NO contact with strong oxidizers. NO contact with hot surfaces.	Powder, water spray, foam, carbon dioxide.
<b>EXPLOSION</b>	Risk of fire and explosion is slight when exposed to hot surfaces or flames in the form of fine powder or dust.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
<b>EXPOSURE</b>		PREVENT DISPERSION OF DUST! AVOID ALL CONTACT! AVOID EXPOSURE OF (PREGNANT) WOMEN!	IN ALL CASES CONSULT A DOCTOR!
<b>•INHALATION</b>	Cough. Sore throat. Shortness of breath. Weakness. See Ingestion.	Closed system and ventilation.	Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.
<b>•SKIN</b>	Redness.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
<b>•EYES</b>	Redness.	Face shield or eye protection in combination with breathing protection if powder.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
<b>•INGESTION</b>	Abdominal pain. Diarrhoea. Nausea. Vomiting. Burning sensation in the throat and chest. Shock or collapse. Unconsciousness.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention.

SPILLAGE DISPOSAL	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**

<p><b>I M P O R T A N T D A T A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> ODOURLESS, BRITTLE, GREY, METALLIC-LOOKING CRYSTALS.</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> Upon heating, toxic fumes are formed. Reacts violently with strong oxidants and halogens, causing fire and explosion hazard. Reacts with acids to produce</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 0.01 mg/m<sup>3</sup> as TWA A1 (confirmed human carcinogen); BEI issued (ACGIH 2004). MAK: Carcinogen category: 1; Germ cell mutagen group: 3A; (DFG 2004). OSHA PEL: 1910.1018 TWA 0.010 mg/m<sup>3</sup> NIOSH REL: Ca C 0.002 mg/m<sup>3</sup> 15-minute <a href="#">See Appendix A</a> NIOSH IDLH: Ca 5 mg/m<sup>3</sup> (as As) See: <a href="#">7440382</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its aerosol and by ingestion.</p> <p><b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly, when dispersed.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> 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.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> 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.</p>
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<p><b>PHYSICAL PROPERTIES</b></p>	<p>Sublimation point: 613°C Density: 5.7 g/cm<sup>3</sup></p>	<p>Solubility in water: none</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	<p>The substance is toxic to aquatic organisms. It is strongly advised that this substance does not enter the environment.</p>	
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**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**

(C) IPCS, CEC, 1994

<p><b>IMPORTANT LEGAL NOTICE:</b></p>	<p>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.</p>
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# International Chemical Safety Cards

**COPPER**

ICSC: 0240



Cu  
(powder)

ICSC # 0240

CAS # 7440-50-8

RTECS # [GL5325000](#)

September 24, 1993 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Combustible.	NO open flames.	Special powder, dry sand, NO other agents.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>		PREVENT DISPERSION OF DUST!	
• <b>INHALATION</b>	Cough. Headache. Shortness of breath. Sore throat.	Local exhaust or breathing protection.	Fresh air, rest. Refer for medical attention.
• <b>SKIN</b>	Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• <b>EYES</b>	Redness. Pain.	Safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>	Abdominal pain. Nausea. Vomiting.	Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers. Carefully collect remainder. Then remove to safe place. (Extra personal protection: P2 filter respirator for harmful particles).	Separated from - See Chemical Dangers.	R: S:

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0240**

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

**COPPER**

ICSC: 0240

I M P	<p><b>PHYSICAL STATE; APPEARANCE:</b> RED POWDER, TURNS GREEN ON EXPOSURE TO MOIST AIR.</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation and by ingestion.</p> <p><b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.</p>
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Shock-sensitive compounds are formed with acetylenic compounds, ethylene oxides and azides. Reacts with strong oxidants like chlorates, bromates and iodates, causing explosion hazard.

**EFFECTS OF SHORT-TERM EXPOSURE:**  
Inhalation of fumes may cause metal fume fever. See Notes.

**OCCUPATIONAL EXPOSURE LIMITS:**  
TLV: 0.2 mg/m<sup>3</sup> fume (ACGIH 1992-1993).  
TLV (as Cu, dusts & mists): 1 mg/m<sup>3</sup> (ACGIH 1992-1993).  
Intended change 0.1 mg/m<sup>3</sup>  
Inhal.,  
A4 (not classifiable as a human carcinogen);  
MAK: 0.1 mg/m<sup>3</sup> (Inhalable fraction)  
Peak limitation category: II(2) Pregnancy risk group: D (DFG 2005).  
OSHA PEL\*: TWA 1 mg/m<sup>3</sup> \*Note: The PEL also applies to other copper compounds (as Cu) except copper fume.  
NIOSH REL\*: TWA 1 mg/m<sup>3</sup> \*Note: The REL also applies to other copper compounds (as Cu) except Copper fume.  
NIOSH IDLH: 100 mg/m<sup>3</sup> (as Cu) See: [7440508](#)

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**  
Repeated or prolonged contact may cause skin sensitization.

<b>PHYSICAL PROPERTIES</b>	Boiling point: 2595°C Melting point: 1083°C Relative density (water = 1): 8.9	Solubility in water: none
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<b>ENVIRONMENTAL DATA</b>	
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**NOTES**

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

**ADDITIONAL INFORMATION**

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**ICSC: 0240**

**COPPER**

(C) IPCS, CEC, 1994

**IMPORTANT LEGAL NOTICE:**

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# International Chemical Safety Cards

**LEAD**

ICSC: 0052



Lead metal  
Plumbum  
Pb  
Atomic mass: 207.2  
(powder)

ICSC # 0052  
CAS # 7439-92-1  
RTECS # [OF7525000](#)  
October 08, 2002 Peer reviewed

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

SPILLAGE DISPOSAL	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.	R: S:

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0052**

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

<p><b>I M P O R T A N T T A D A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> BLUISH-WHITE OR SILVERY-GREY SOLID IN VARIOUS FORMS. TURNS TARNISHED ON EXPOSURE TO AIR.</p> <p><b>PHYSICAL DANGERS:</b> Dust explosion possible if in powder or granular form, mixed with air.</p> <p><b>CHEMICAL DANGERS:</b> 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.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 0.05 mg/m<sup>3</sup> A3 (confirmed animal carcinogen with unknown relevance to humans); BEI issued (ACGIH 2004). MAK: Carcinogen category: 3B; Germ cell mutagen group: 3A; (DFG 2004). EU OEL: as TWA 0.15 mg/m<sup>3</sup> (EU 2002). OSHA PEL*: 1910.1025 TWA 0.050 mg/m<sup>3</sup> <a href="#">See Appendix C</a> *Note: The PEL also applies to other lead compounds (as Pb) -- <a href="#">see Appendix C</a>. NIOSH REL*: TWA 0.050 mg/m<sup>3</sup> <a href="#">See Appendix C</a> *Note: The REL also applies to other lead compounds (as Pb) -- <a href="#">see Appendix C</a>. NIOSH IDLH: 100 mg/m<sup>3</sup> (as Pb) See: <a href="#">7439921</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation and by ingestion.</p> <p><b>INHALATION RISK:</b> A harmful concentration of airborne particles can be reached quickly when dispersed, especially if powdered.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b></p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> 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.</p>
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<b>PHYSICAL PROPERTIES</b>	<p>Boiling point: 1740°C Melting point: 327.5°C</p>	<p>Density: 11.34 g/cm<sup>3</sup> Solubility in water: none</p>
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<b>ENVIRONMENTAL DATA</b>	<p>Bioaccumulation of this chemical may occur in plants and in mammals. It is strongly advised that this substance does not enter the environment.</p>	
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**NOTES**

Depending on the degree of exposure, periodic medical examination is suggested. Do NOT take working clothes home.  
Transport Emergency Card: TEC (R)-51S1872

**ADDITIONAL INFORMATION**

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<b>ICSC: 0052</b>	<b>LEAD</b>
(C) IPCS, CEC, 1994	

<b>IMPORTANT LEGAL NOTICE:</b>	<p>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.</p>
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# International Chemical Safety Cards

**MERCURY**

ICSC: 0056



Quicksilver  
Liquid silver  
Hg  
Atomic mass: 200.6

ICSC # 0056  
CAS # 7439-97-6  
RTECS # [OV4550000](#)  
UN # 2809  
EC # 080-001-00-0  
April 22, 2004 Peer reviewed



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
<b>EXPLOSION</b>	Risk of fire and explosion.		In case of fire: keep drums, etc., cool by spraying with water.
<b>EXPOSURE</b>		STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN! AVOID EXPOSURE OF ADOLESCENTS AND CHILDREN!	IN ALL CASES CONSULT A DOCTOR!
<b>•INHALATION</b>	Abdominal pain. Cough. Diarrhoea. Shortness of breath. Vomiting. Fever or elevated body temperature.	Local exhaust or breathing protection.	Fresh air, rest. Artificial respiration if indicated. Refer for medical attention.
<b>•SKIN</b>	MAY BE ABSORBED! Redness.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.
<b>•EYES</b>		Face shield, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
<b>•INGESTION</b>		Do not eat, drink, or smoke during work. Wash hands before eating.	Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area in case of a large spill! Consult an expert! Ventilation. Collect leaking and spilled liquid in sealable non-metallic containers as far as possible. Do NOT wash away into sewer. Do NOT let this chemical enter the environment. Chemical protection suit including self-contained breathing apparatus.	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 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**

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

## MERCURY

ICSC: 0056

<p><b>I</b> <b>M</b> <b>P</b> <b>O</b> <b>R</b> <b>T</b> <b>A</b> <b>N</b> <b>T</b> <b>D</b> <b>A</b> <b>T</b> <b>A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> ODOURLESS, HEAVY AND MOBILE SILVERY LIQUID METAL.</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> 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.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 0.025 mg/m<sup>3</sup> as TWA (skin) A4 BEI issued (ACGIH 2004). MAK: 0.1 mg/m<sup>3</sup> Sh Peak limitation category: II(8) Carcinogen category: 3B (DFG 2003). OSHA PEL<sub>f</sub>: C 0.1 mg/m<sup>3</sup> NIOSH REL: Hg Vapor: TWA 0.05 mg/m<sup>3</sup> skin Other: C 0.1 mg/m<sup>3</sup> skin NIOSH IDLH: 10 mg/m<sup>3</sup> (as Hg) See: <a href="#">7439976</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its vapour and through the skin, also as a vapour!</p> <p><b>INHALATION RISK:</b> A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20°C.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> 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.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> 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.</p>
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<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 357°C Melting point: -39°C Relative density (water = 1): 13.5 Solubility in water: none</p>	<p>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</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	<p>The substance is very toxic to aquatic organisms. In the food chain important to humans, bioaccumulation takes place, specifically in fish.</p>	
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**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**

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<b>ICSC: 0056</b>	(C) IPCS, CEC, 1994	<b>MERCURY</b>
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# International Chemical Safety Cards

NICKEL

ICSC: 0062



Ni  
Atomic mass: 58.7  
(powder)

ICSC # 0062  
CAS # 7440-02-0  
RTECS # [QR5950000](#)  
EC # 028-002-00-7  
October 17, 2001 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Flammable as dust. Toxic fumes may be released in a fire.		Dry sand. NO carbon dioxide. NO water.
<b>EXPLOSION</b>	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
<b>EXPOSURE</b>		<b>PREVENT DISPERSION OF DUST! AVOID ALL CONTACT!</b>	
• <b>INHALATION</b>	Cough. Shortness of breath.	Local exhaust or breathing protection.	Fresh air, rest.
• <b>SKIN</b>		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• <b>EYES</b>		Safety spectacles, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>		Do not eat, drink, or smoke during work.	Rinse mouth.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Vacuum spilled material. Carefully collect remainder, then remove to safe place. Personal protection: P2 filter respirator for harmful particles.	Separated from strong acids.	Xn symbol R: 40-43 S: 2-22-36

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0062**

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

NICKEL

ICSC: 0062

<b>I</b>	<p><b>PHYSICAL STATE; APPEARANCE:</b> SILVERY METALLIC SOLID IN VARIOUS FORMS.</p> <p><b>PHYSICAL DANGERS:</b></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of the dust.</p>
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Dust explosion possible if in powder or granular form, mixed with air.

**CHEMICAL DANGERS:**

Reacts violently, in powder form, with titanium powder and potassium perchlorate, and oxidants such as ammonium nitrate, causing fire and explosion hazard. Reacts slowly with non-oxidizing acids and more rapidly with oxidizing acids. Toxic gases and vapours (such as nickel carbonyl) may be released in a fire involving nickel.

**OCCUPATIONAL EXPOSURE LIMITS:**

TLV:  
(Inhalable fraction)  
1.5 mg/m<sup>3</sup> as TWA A5 (not suspected as a human carcinogen); (ACGIH 2004).  
MAK: (Inhalable fraction) sensitization of respiratory tract and skin (Sah);  
Carcinogen category: 1;  
(DFG 2004).  
OSHA PEL\*†: TWA 1 mg/m<sup>3</sup> \*Note: The PEL does not apply to Nickel carbonyl.  
NIOSH REL\*: Ca TWA 0.015 mg/m<sup>3</sup> [See Appendix A](#)  
\*Note: The REL does not apply to Nickel carbonyl.  
NIOSH IDLH: Ca 10 mg/m<sup>3</sup> (as Ni) See: [7440020](#)

**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:**

May cause mechanical irritation. Inhalation of fumes may cause pneumonitis.

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**

Repeated or prolonged contact may cause skin sensitization. Repeated or prolonged inhalation exposure may cause asthma. Lungs may be affected by repeated or prolonged exposure. This substance is possibly carcinogenic to humans.

**PHYSICAL PROPERTIES**

Boiling point: 2730°C  
Melting point: 1455°C  
Density: 8.9 g/cm<sup>3</sup>

Solubility in water:  
none

**ENVIRONMENTAL DATA**

**NOTES**

At high temperatures, nickel oxide fumes will be formed. Depending on the degree of exposure, periodic medical examination is suggested. The symptoms of asthma 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. Anyone who has shown symptoms of asthma due to this substance should avoid all further contact with this substance.

**ADDITIONAL INFORMATION**

**ICSC: 0062**

**NICKEL**

(C) IPCS, CEC, 1994

**IMPORTANT LEGAL NOTICE:**

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# International Chemical Safety Cards

**ZINC POWDER**

ICSC: 1205



Blue powder  
Merrillite  
Zn  
Atomic mass: 65.4  
(powder)

ICSC # 1205  
CAS # 7440-66-6  
RTECS # [ZG8600000](#)  
UN # 1436 (zinc powder or dust)  
EC # 030-001-00-1  
October 24, 1994 Peer reviewed



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Highly flammable. Many reactions may cause fire or explosion. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames, NO sparks, and NO smoking. NO contact with acid(s), base (s) and incompatible substances (see Chemical Dangers).	Special powder, dry sand, NO other agents. NO water.
<b>EXPLOSION</b>	Risk of fire and explosion on contact with acid(s), base(s), water and incompatible substances.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Prevent build-up of electrostatic charges (e.g., by grounding). Prevent deposition of dust.	In case of fire: cool drums, etc., by spraying with water but avoid contact of the substance with water.
<b>EXPOSURE</b>		<b>PREVENT DISPERSION OF DUST! STRICT HYGIENE!</b>	
• <b>INHALATION</b>	Metallic taste and metal fume fever. Symptoms may be delayed (see Notes).	Local exhaust.	Fresh air, rest. Refer for medical attention.
• <b>SKIN</b>	Dry skin.	Protective gloves.	Rinse and then wash skin with water and soap.
• <b>EYES</b>		Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>	Abdominal pain. Nausea. Vomiting.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Refer for medical attention.

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

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 1205**

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

## ZINC POWDER

ICSC: 1205

<p><b>I</b> <b>M</b> <b>P</b> <b>O</b> <b>R</b> <b>T</b> <b>A</b> <b>N</b> <b>T</b> <b>D</b> <b>A</b> <b>T</b> <b>A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> ODOURLESS GREY TO BLUE POWDER.</p> <p><b>PHYSICAL DANGERS:</b> Dust explosion possible if in powder or granular form, mixed with air. If dry, it can be charged electrostatically by swirling, pneumatic transport, pouring, etc.</p> <p><b>CHEMICAL DANGERS:</b> Upon heating, toxic fumes are formed. The substance is a strong reducing agent and reacts violently with oxidants. Reacts with water and reacts violently with acids and bases forming flammable/explosive gas (hydrogen - see ICSC0001) Reacts violently with sulfur, halogenated hydrocarbons and many other substances causing fire and explosion hazard.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV not established.</p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation and by ingestion.</p> <p><b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> Inhalation of fumes may cause metal fume fever. The effects may be delayed.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> Repeated or prolonged contact with skin may cause dermatitis.</p>
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<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 907°C Melting point: 419°C Relative density (water = 1): 7.14</p>	<p>Solubility in water: reaction Vapour pressure, kPa at 487°C: 0.1 Auto-ignition temperature: 460°C</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	
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### NOTES

Zinc may contain trace amounts of arsenic, when forming hydrogen, may also form toxic gas arsine (see ICSC 0001 and ICSC 0222). Reacts violently with fire extinguishing agents such as water, halons, foam and carbon dioxide. The symptoms of metal fume fever do not become manifest until several hours later. Rinse contaminated clothes (fire hazard) with plenty of water.

Transport Emergency Card: TEC (R)-43GWS-II+III  
NFPA Code: H0; F1; R1;

### ADDITIONAL INFORMATION

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ICSC: 1205

ZINC POWDER

(C) IPCS, CEC, 1994

<p><b>IMPORTANT LEGAL NOTICE:</b></p>	<p>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.</p>
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***APPENDIX D***  
***HOSPITAL INFORMATION AND MAP***  
***FIELD ACCIDENT REPORT***

FIELD ACCIDENT REPORT

This report is to be filled out by the designated Site Safety Officer after EVERY accident.

PROJECT NAME \_\_\_\_\_ PROJECT. NO. \_\_\_\_\_

Date of Accident \_\_\_\_\_ Time \_\_\_\_\_ Report By \_\_\_\_\_

Type of Accident (Check One):

Vehicular             Personal             Property

Name of Injured \_\_\_\_\_ DOB or Age \_\_\_\_\_

How Long Employed \_\_\_\_\_

Names of Witnesses \_\_\_\_\_  
\_\_\_\_\_

Description of Accident \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Action Taken \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Did the Injured Lose Any Time? \_\_\_\_\_ How Much (Days/Hrs.)? \_\_\_\_\_

Was Safety Equipment in Use at the Time of the Accident (Hard Hat, Safety Glasses, Gloves, Safety Shoes, etc.)? \_\_\_\_\_  
\_\_\_\_\_

(If not, it is the EMPLOYEE'S sole responsibility to process his/her claim through his/her Health and Welfare Fund.)

INDICATE STREET NAMES, DESCRIPTION OF VEHICLES, AND NORTH ARROW

# HOSPITAL INFORMATION AND MAP

The hospital nearest the site is:

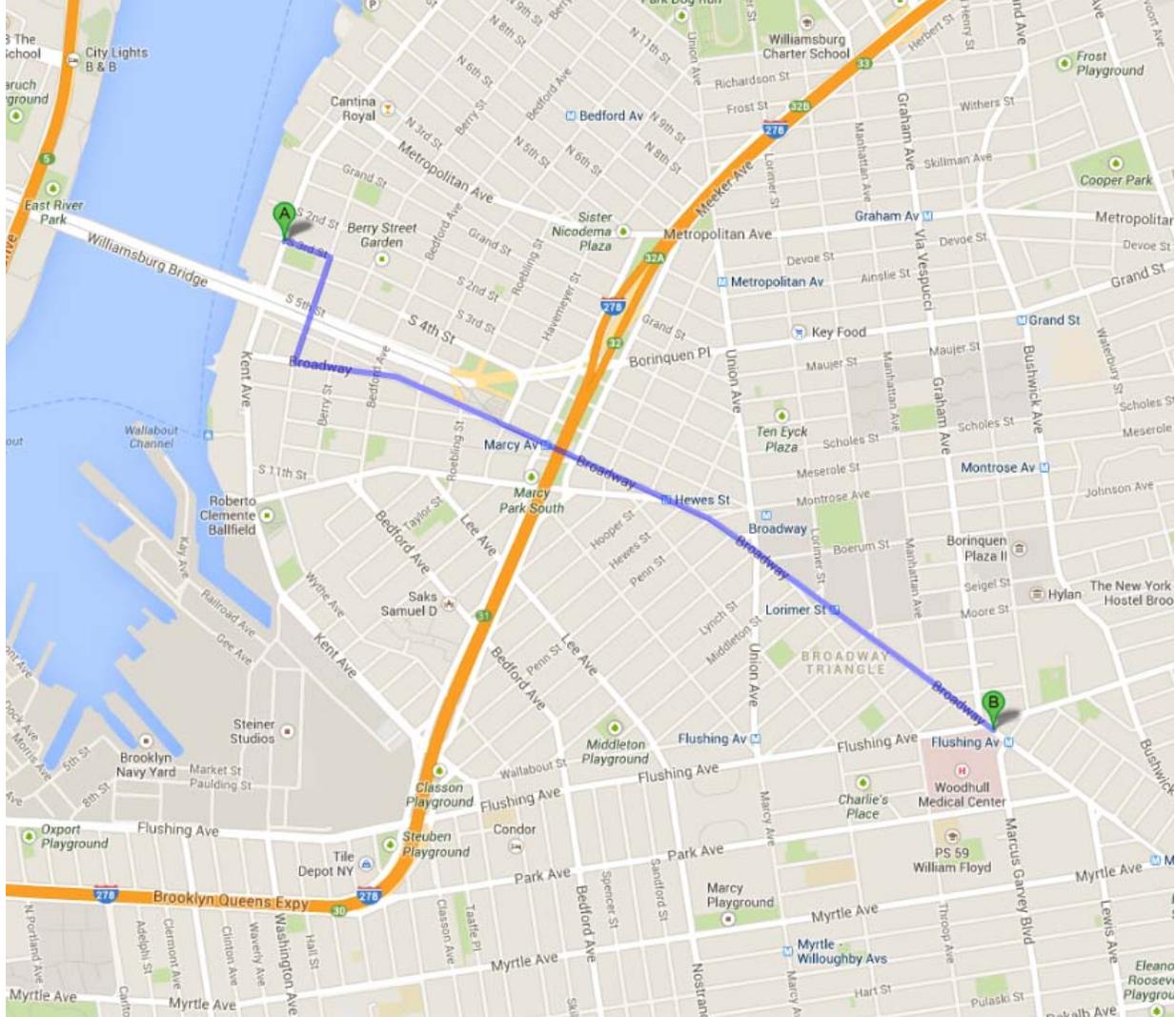
## The BROOKLYN HOSPITAL CENTER

### WOODHULL MEDICAL CENTER

760 Broadway Brooklyn, New York 11206

718-963-8000

2.0 Miles – About 10 Minutes



**A** 300 Kent Ave, Brooklyn, NY 11249

1. Head north on Kent Ave toward S 3rd St go 7 ft  
total 7 ft
2. Take the 1st right onto S 3rd St go 482 ft  
total 489 ft
3. Take the 1st right onto Wythe Ave go 0.2 mi  
total 0.3 mi
4. Turn left onto Broadway  
Destination will be on the right  
About 6 mins go 1.5 mi  
total 1.8 mi

**B** Woodhull Medical Center  
760 Broadway, Brooklyn, NY 11206

**ATTACHMENT F**  
**WATERPROOFING MEMBRANE**  
**SYSTEM SPECIFICATIONS**

# Grace Below Grade Waterproofing

## PREPRUFE® 300R Plus & 160R Plus

Pre-applied waterproofing membranes that bond integrally to poured concrete for use below slabs or behind basement walls on confined sites

### Description

Preprufe® 300R Plus & 160R Plus membranes are unique composite sheets comprising, a thick HDPE film, an aggressive pressure sensitive adhesive a weather resistant protective coating and an adhesive to adhesive seam overlap.

Unlike conventional non-adhering membranes, which are vulnerable to water ingress tracking between the unbonded membrane and structure, the unique Preprufe bond to concrete prevents ingress or migration of water around the structure.

The Preprufe R Plus System includes:

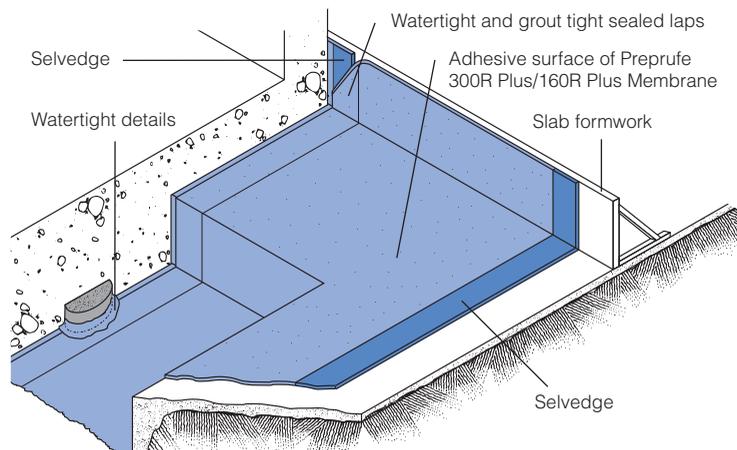
- **Preprufe 300R Plus**—heavy-duty grade for use below slabs and on rafts (i.e. mud slabs). Designed to accept the placing of heavy reinforcement using conventional concrete spacers.
- **Preprufe 160R Plus**—thinner grade for blindside, zero property line applications against soil retention systems.
- **Preprufe Tape LT**—for covering cut edges, roll ends, penetrations and detailing (temperatures between 25°F (-4°C) and 86°F (+30°C)).
- **Preprufe Tape HC**—as above for use in Hot Climates (minimum 50°F (10°C)).
- **Bituthene® Liquid Membrane**—for sealing around penetrations, etc.
- **Adcor™ ES**—waterstop for joints in concrete walls and floors
- **Preprufe Tieback Covers**—preformed cover for soil retention wall tieback heads
- **Preprufe Preformed Corners**—preformed inside and outside corners

Preprufe 300R Plus & 160R Plus membranes are applied either horizontally to smooth prepared concrete, carton forms or well rolled and compacted earth or crushed stone substrate; or vertically to permanent formwork or adjoining structures. Concrete is then cast directly against the adhesive side of the membranes. The specially developed Preprufe adhesive layers work together to form a continuous and integral seal to the structure.

Preprufe can be turned up the inside face of slab formwork but is not recommended for conventional twin-sided formwork on walls, etc. Use Bituthene® self-adhesive membrane or Procor® fluid applied membrane to walls after removal of formwork for a fully bonded system to all structural surfaces.

### Advantages

- **Forms a unique continuous adhesive bond to concrete poured against it**—prevents water migration and makes it unaffected by ground settlement beneath slabs
- **Fully-adhered adhesive to adhesive watertight laps and detailing**
- **Provides a barrier to water, moisture and gas**—physically isolates the structure from the surrounding ground
- **Easy roll/kick out installation**—reduces installation time and cost
- **Release Liner free**—expedites installation and reduces construction site waste
- **Solar reflective**—reduced temperature gain
- **Simple and quick to install**—requiring no priming or fillets
- **Can be applied to permanent formwork**—allows maximum use of confined sites
- **Self protecting**—can be trafficked immediately after application and ready for immediate placing of reinforcement
- **Unaffected by wet conditions**—cannot activate prematurely
- **Inherently waterproof, non-reactive system:**
  - not reliant on confining pressures or hydration
  - unaffected by freeze/thaw, wet/dry cycling
- **Chemical resistant**—effective in most types of soils and waters, protects structure from salt or sulphate attack



Drawings are for illustration purposes only.  
Please refer to [graceconstruction.com](http://graceconstruction.com) for specific application details.

## Installation

The most current application instructions, detail drawings and technical letters can be viewed at [graceconstruction.com](http://graceconstruction.com). For other technical information contact your local Grace representative.

Preprufe Plus has colored zip strips at the top and bottom of the seam area on the edge of the roll. Both zip strips cover an aggressive adhesive. Once the yellow zip strip on the top of the membrane and the blue zip strip on the bottom of the membrane are removed, a strong adhesive to adhesive bond is achieved in the overlap area.

### Substrate Preparation

**All surfaces**—It is essential to create a sound and solid substrate to eliminate movement during the concrete pour. Substrates must be regular and smooth with no gaps or voids greater than 0.5 in. (12 mm). Grout around all penetrations such as utility conduits, etc. for stability (see Figure 1).

**Horizontal**—The substrate must be free of loose aggregate and sharp protrusions. Avoid curved or rounded substrates. When installing over earth or crushed stone, ensure substrate is well compacted to avoid displacement of substrate due to traffic or concrete pour. The surface does not need to be dry, but standing water must be removed.

**Vertical**—Use concrete, plywood, insulation or other approved facing to sheet piling to provide support to the membrane. Board systems such as timber lagging must be close butted to provide support and not more than 0.5 in. (12 mm) out of alignment.

### Membrane Installation

Preprufe can be applied at temperatures of 25°F (-4°C) or above. When installing Preprufe in cold or marginal weather conditions <40°F (<4°C) the use of Preprufe Tape LT is recommended at all laps and detailing. Preprufe Tape LT should be applied to clean, dry surfaces and the release liner must be removed immediately after application. Alternatively, Preprufe Plus Low Temperature (LT) is available for low temperature condition applications. Refer to Preprufe Plus LT data sheet for more information.

**Horizontal substrates**—Kick out or roll out the membrane HDPE film side to the substrate with the yellow zip strip facing towards the concrete pour. End laps should be staggered to avoid a build up of layers. Leave yellow and blue zip strips on the membrane until overlap procedure is completed.

Accurately position succeeding sheets to overlap the previous sheet 3 in. (75 mm) along the marked selvedge with the blue zip strip on top of the yellow zip strip. Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap. Peel back and remove both the yellow and blue zip strips in the overlap area to achieve an adhesive to adhesive bond at the overlap. Ensure a continuous bond is achieved without creases and roll firmly with a heavy roller.

Refer to Grace Tech Letter 15 for information on suitable rebar chairs for Preprufe.

**Vertical substrates**—Mechanically fasten the membrane vertically using fasteners appropriate to the substrate with the yellow zip strip facing towards the concrete pour. The membrane may be installed in any convenient length. Fastening can be made through the selvedge using a small and low profile head fastener so that the membrane lays flat and allows firmly rolled overlaps. Accurately position succeeding sheets to overlap the previous sheet 3 in. (75 mm) along the marked selvedge with the blue zip strip on top of the yellow zip strip. Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap. Peel back and remove both the yellow and

blue zip strips in the overlap area to achieve an adhesive to adhesive bond at the overlap. Roll firmly to ensure a watertight seal.

**Roll ends and cut edges**—Overlap all roll ends and cut edges by a minimum 3 in. (75 mm) and ensure the area is clean and free from contamination, wiping with a damp cloth if necessary. Allow to dry and apply Preprufe Tape LT (or HC in hot climates) centered over the lap edges and roll firmly (see Figure 2). Immediately remove tinted plastic release liner from the tape.

### Details

Refer to Preprufe Field Application Manual, Section V Application Instructions or visit [graceconstruction.com](http://graceconstruction.com). This manual gives comprehensive guidance and standard details.

### Membrane Repair

Inspect the membrane before installation of reinforcement steel, formwork and final placement of concrete. The membrane can be easily cleaned by power washing if required. Repair damage by wiping the area with a damp cloth to ensure the area is clean and free from dust, and allow to dry. Repair small punctures (0.5 in. (12 mm) or less) and slices by applying Preprufe Tape centered over the damaged area and roll firmly. Remove the release liner from the tape. Repair holes and large punctures by applying a patch of Preprufe membrane, which extends 6 in. (150 mm) beyond the damaged area. Seal all edges of the patch with Preprufe Tape, remove the release liner from the tape and roll firmly. Any areas of damaged adhesive should be covered with Preprufe Tape. Remove tinted plastic release liner from tape. Where exposed selvedge has lost adhesion or laps have not been sealed, ensure the area is clean and dry and cover with fresh Preprufe Tape, rolling firmly. Alternatively, use a hot air gun or similar to activate adhesive and firmly roll lap to achieve continuity.

### Pouring of Concrete

Ensure the plastic release liner is removed from all areas of Preprufe Tape.

It is recommended that concrete be poured within 56 days (42 days in hot climates) of application of the membrane. Following proper ACI guidelines, concrete must be placed carefully and consolidated properly to avoid damage to the membrane. Never use a sharp object to consolidate the concrete. Provide temporary protection from concrete over splash for areas of the Preprufe membrane that are adjacent to a concrete pour.

### Removal of Formwork

Preprufe membranes can be applied to removable formwork, such as slab perimeters, elevator and lift pits, etc. Once the concrete is poured the formwork must remain in place until the concrete has gained sufficient compressive strength to develop the surface bond. Preprufe membranes are not recommended for conventional twin-sided wall forming systems.

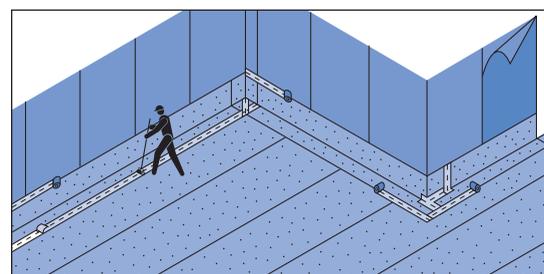
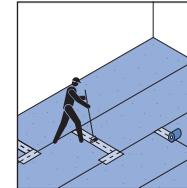
A minimum concrete compressive strength of 1500 psi (10 N/mm<sup>2</sup>) is recommended prior to stripping formwork supporting Preprufe membranes. Premature stripping may result in displacement of the membrane and/or spalling of the concrete.

Refer to Grace Tech Letter 17 for information on removal of formwork for Preprufe.

Figure 1



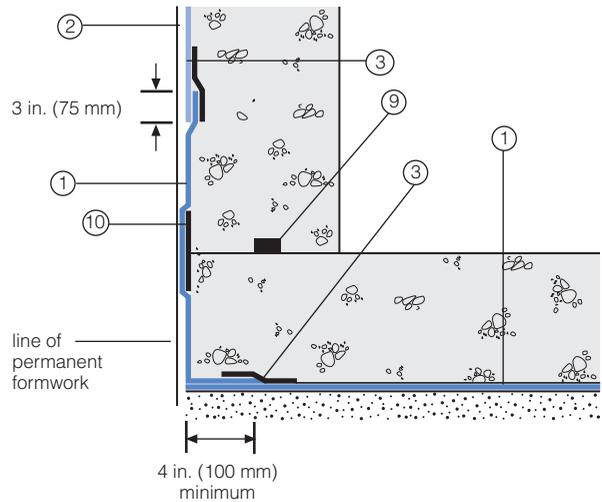
Figure 2



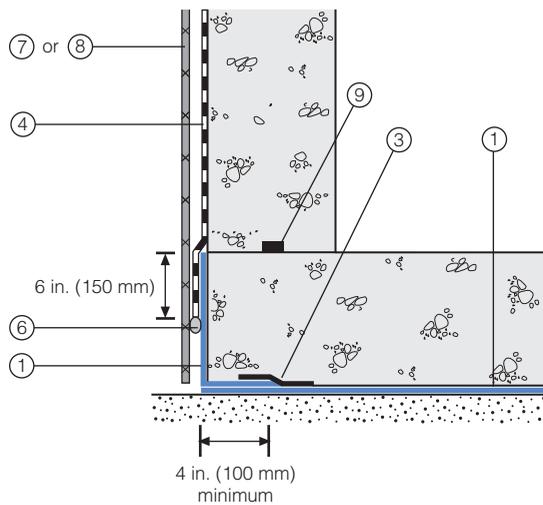
## Detail Drawings

Details shown are typical illustrations and not working details. For a list of the most current details, visit us at [graceconstruction.com](http://graceconstruction.com). For technical assistance with detailing and problem solving please call toll free at 866-333-3SBM (3726).

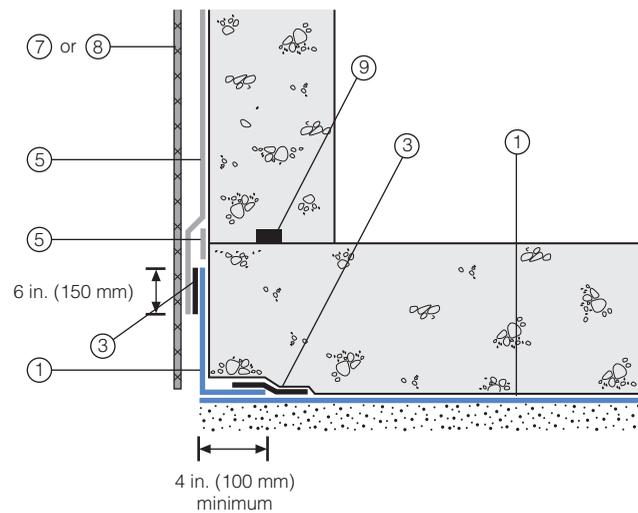
### Wall base detail against permanent shutter



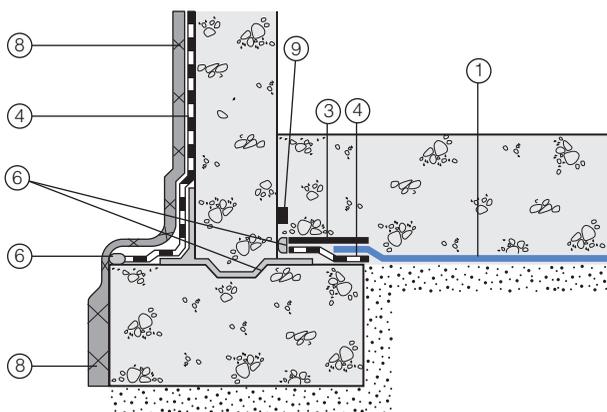
### Bituthene wall base detail (Option 1)



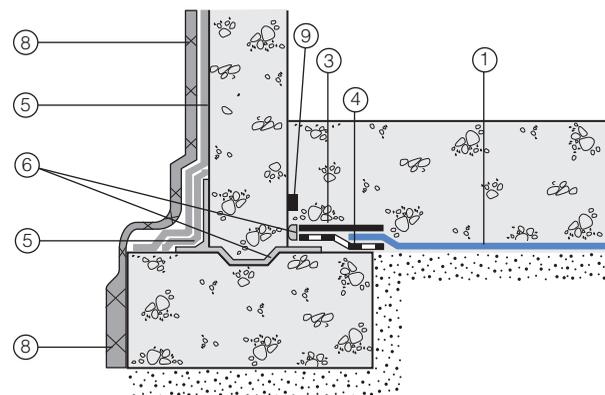
### Procor wall base detail (Option 1)



### Bituthene wall base detail (Option 2)



### Procor wall base detail (Option 2)



- 1 Preprufe 300R Plus
- 2 Preprufe 160R Plus
- 3 Preprufe Tape
- 4 Bituthene®

- 5 Procor
- 6 Bituthene Liquid Membrane
- 7 Protection

- 8 Hydroduct®
- 9 Adcor ES
- 10 Preprufe CJ Tape

## Supply

Dimensions (Nominal)	Preprufe 300R Plus Membrane	Preprufe 160R Plus Membrane	Preprufe Tape (LT or HC*)
Thickness	0.046 in. (1.2 mm)	0.032 in. (0.8 mm)	
Roll size	3 ft. 10 in. x 102 ft. (1.17m x 31.15m)	3 ft. 10 in. x 120 ft. (1.17m x 36.6m)	4 in. x 49 ft (100 mm x 15 m)
Roll area	392 ft <sup>2</sup> (36 m <sup>2</sup> )	460 ft <sup>2</sup> (42 m <sup>2</sup> )	
Roll weight	108 lbs (50 kg)	92 lbs (42 kg)	4.3 lbs (2 kg)
Minimum side/end laps	3 in. (75 mm)	3 in. (75 mm)	3 in. (75 mm)
* LT denotes Low Temperature (between 25°F (-4°C) and 86°F (+30°C)) HC denotes Hot Climate (50°F (>+10°C))			
<b>Ancillary Products</b>			
Bituthene Liquid Membrane—1.5 US gal (5.7 liter) or 4 US gal (15.1 liter)			

## Physical Properties

Property	Typical Value 300R Plus	Typical Value 160R Plus	Test Method
Color	white	white	
Thickness	0.046 in. (1.2 mm)	0.032 in. (0.8 mm)	ASTM D3767
Lateral Water Migration Resistance	Pass at 231 ft (71 m) of hydrostatic head pressure	Pass at 231 ft (71 m) of hydrostatic head pressure	ASTM D5385, modified <sup>1</sup>
Low temperature flexibility	Unaffected at -20°F (-29°C)	Unaffected at -20°F (-29°C)	ASTM D1970
Resistance to hydrostatic head	231 ft (71 m)	231 ft (71 m)	ASTM D5385, modified <sup>2</sup>
Elongation	500%	500%	ASTM D412, modified <sup>3</sup>
Tensile strength, film	4000 psi (27.6 MPa)	4000 psi (27.6 MPa)	ASTM D412
Crack cycling at -9.4°F (-23°C), 100 cycles	Unaffected, Pass	Unaffected, Pass	ASTM C836 <sup>4</sup>
Puncture resistance	221 lbs (990 N)	100 lbs (445 N)	ASTM E154
Peel adhesion to concrete	5 lbs/in. (880 N/m)	5 lbs/in. (880 N/m)	ASTM D903, modified <sup>5</sup>
Lap peel adhesion at 72°F (22°C)	8 lbs/in. (1408 N/m)	8 lbs/in. (1408 N/m)	ASTM D1876, modified <sup>6</sup>
Lap peel adhesion at 40°F (4°C)	8 lbs/in. (1408 N/m)	8 lbs/in. (1408 N/m)	ASTM D1876, modified <sup>6</sup>
Permeance to water vapor transmission	0.01 perms (0.6 ng/(Pa x s x m <sup>2</sup> ))	0.01 perms (0.6 ng/(Pa x s x m <sup>2</sup> ))	ASTM E96, method B

### Footnotes:

- Lateral water migration resistance is tested by casting concrete against membrane with a hole and subjecting the membrane to hydrostatic head pressure with water. The test measures the resistance of lateral water migration between the concrete and the membrane.
- Hydrostatic head tests of Preprufe Membranes are performed by casting concrete against the membrane with a lap. Before the concrete cures, a 0.125 in. (3 mm) spacer is inserted perpendicular to the membrane to create a gap. The cured block is placed in a chamber where water is introduced to the membrane surface up to the head indicated.
- Elongation of membrane is run at a rate of 2 in. (50 mm) per minute.
- Concrete is cast against the Preprufe membrane and allowed to cure (7 days minimum)
- Concrete is cast against the protective coating surface of the membrane and allowed to properly dry (7 days minimum). Peel adhesion of membrane to concrete is measured at a rate of 2 in. (50 mm) per minute at room temperature.
- The test is conducted 15 minutes after the lap is formed (per Grace published recommendations) and run at a rate of 2 in. (50 mm) per minute at 72°F (22°C).

## Specification Clauses

Preprufe 300R Plus or 160R Plus shall be applied with its adhesive face presented to receive fresh concrete to which it will integrally bond. Only Grace Construction Products approved membranes shall be bonded to Preprufe. All Preprufe system materials shall be supplied by Grace Construction Products, and applied strictly in accordance with their instructions. Specimen performance and formatted clauses are also available.

NOTE: Use Preprufe Tape to tie-in Procor with Preprufe.

## Health and Safety

Refer to relevant Material Safety data sheet. Complete rolls should be lifted and carried by a minimum of two persons.

[www.graceconstruction.com](http://www.graceconstruction.com)

**For technical assistance call toll free at 866-333-3SBM (3726)**

Aador is a trademark and Preprufe, Bituthene and Hydroduct are registered trademarks of W. R. Grace & Co.—Conn. Procor is a U.S. registered trademark of W. R. Grace & Co.—Conn., and is used in Canada under license from PROCOR LIMITED.

We hope the information here will be helpful. It is based on data and knowledge considered to be true and accurate and is offered for the users' consideration, investigation and verification, but we do not warrant the results to be obtained. Please read all statements, recommendations or suggestions in conjunction with our conditions of sale, which apply to all goods supplied by us. No statement, recommendation or suggestion is intended for any use which would infringe any patent or copyright. W. R. Grace & Co.—Conn., 62 Whittemore Avenue, Cambridge, MA 02140. In Canada, Grace Canada, Inc., 294 Clements Road, West, Ajax, Ontario, Canada L1S 3C6.

This product may be covered by patents or patents pending.  
PF-189 Printed in U.S.A. 02/13

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FA/PDF

**GRACE**

# Bituthene® 4000

Self-adhesive HDPE waterproofing membrane with enhanced bonding characteristics for use with B2 moisture tolerant primer.

## Advantages

- Cold applied - simple application to substrates especially at low temperatures.
- Suitable for application to "green" concrete - reduces programme schedules
- Moisture tolerant primer system - allows application in damp or marginal weather conditions.
- Wide application temperature range - excellent bond to self and substrate from -10°C to +35°C.
- Overlap security - enhanced-bond provides additional security.
- Cross laminated high density polyethylene carrier film - provides high tear strength, puncture and impact resistance.
- Flexible - accommodates concrete shrinkage cracks.
- Gas resistant - methane, carbon dioxide and radon gas protection in excess of the standard membrane requirements in BRE Reports 211 (radon) and 212 (methane and carbon dioxide).

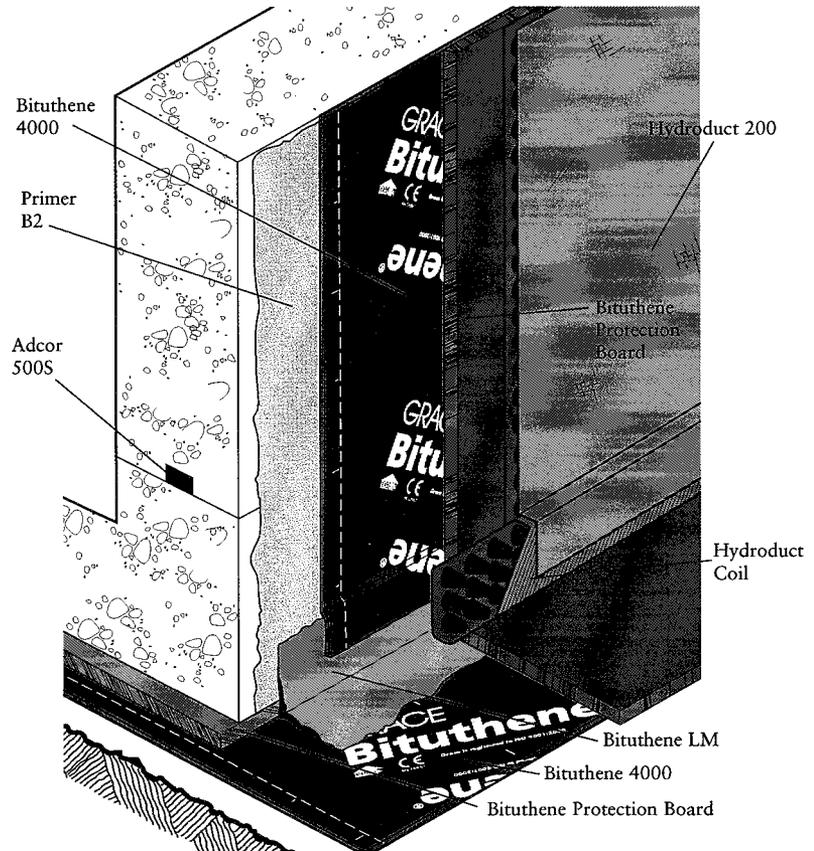
## Description

Bituthene® 4000 is a flexible preformed waterproof membrane combining a high performance cross laminated, HDPE carrier film with a unique super sticky self-adhesive rubber bitumen compound.

## Ancillary Products

### Primer B2

Primer B2 is used to prepare vertical and sloping surfaces and suspended slabs. It is moisture tolerant and can be used on "green" concrete or damp to touch substrates.



### Bituthene® LM

Waterproof continuity at angles and at penetrations is provided by Bituthene LM two component chemically curing liquid applied waterproof membrane.

### Bituthene® Protection Boards

Damage from following trades and backfill is prevented by Bituthene® Protection Boards. Located with Bitustik™ 4000 double sided tape.

*Details shown are typical illustrations only and not working drawings. For assistance with working drawings and additional technical advice please contact Grace Technical Services*



## Supply

<b>Bituthene® 4000</b>	1 m x 20 m roll (20 sq m) Weight 32 kg
<b>Palletisation</b>	15 rolls per pallet
<b>Storage</b>	Store upright in dry conditions below +30°C
<b>Primer B2</b>	5, 25 litre drums
<b>Coverage</b>	10 - 12 sq m per litre depending upon method of application, surface porosity and ambient temperature
<b>Ancillary Products</b>	
Bituthene® LM	5.7 litre packs
Bituthene®	3 mm x 1 m x 2 m
Protection Boards	
Adcor® 500S	6 x 5 m rolls
Hydroduct®	In lieu of drainage stone
Waterstops	See separate data sheet for details
Bitustik™ 4000	150 mm x 12 m roll
Lap Roller	Unit

## Installation

At air temperatures below +4°C measures should be taken to ensure that all surfaces are free from ice or frost. All surfaces except those below ground bearing slabs and Preprufe® R membranes should be primed with one coat of Primer B2 applied at a rate of approx. 10m<sup>2</sup> per litre.

Bituthene 4000 shall be laid by peeling back the protective release paper and applying the adhesive face onto the prepared surface, free from ice, frost, condensation or any contaminants which could adversely effect adhesion.

Bituthene LM to be applied at all internal and external corners, penetrations etc. prior to applying the overall membrane.

Bituthene 4000 should be brushed onto the surface to ensure good initial bond and exclude air. Adjacent rolls are aligned and overlapped 50mm minimum at side and ends and well rolled with a firm pressure, using a lap roller to ensure complete adhesion and continuity between the layers. On high walls it may be necessary to batten fix the membrane to prevent slippage.

### Repairs

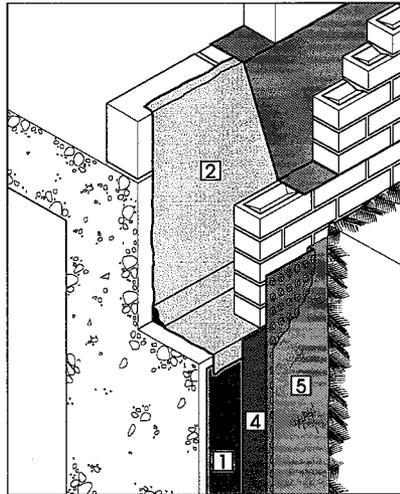
Damaged areas to be repaired by patching with an oversize patch applied to a clean dry surface and firmly rolled.

## Performance

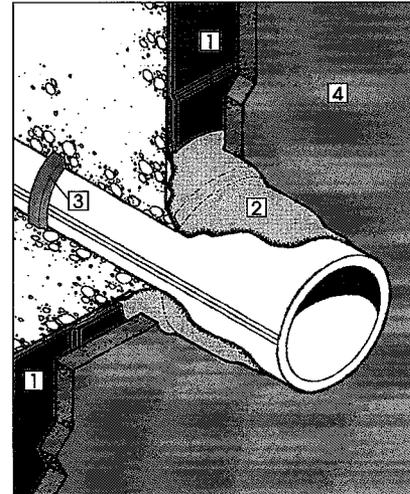
Bituthene 4000 complies with the relevant section of the following national standards: BS 8102:1990, Building Regulations (England and

## Physical Properties

Property	Typical Results	Test Method
Elongation at max load	Long 244% Trans 185%	BS 2782 320 A
Tear Resistance	Long 77N Trans 92N	MOAT 27:5.4.1
Peel Strength	76.5 N/mm <sup>2</sup>	MOAT 27:5.1.3
Tensile Strength of joints	117N	MOAT 27:5.2.2
Moisture Vapour Permeability	0.31 g/m <sup>2</sup> /24 hours	BS 3177: 1959 (75% RH/25°C)
Puncture Resistance	220 N 65mm	ASTM E154
Water Resistance (6m head)	No penetration	MOAT 27:5.1.4
Environmental Resistance	Conforms	ASTM D543



Typical ground level termination detail



Pipe through wall detail

### Key to diagrams:

- 1 Bituthene 4000 on Primer B2
- 2 Bituthene LM
- 3 Adcor 500S
- 4 Bituthene Protection Board
- 5 Hydroduct 220

Wales) 1991 (amended 1994) clause C4. Building Regulations (Northern Ireland) 1994 (amended 1995) clause B2. Building Standard (Scotland) Regulations 1990, Regulation B2.1, G2.6.

## Health and Safety

There is no legal requirement for a Material Safety Data Sheet for Bituthene 4000, Bituthene Protection Boards, Bitustik, Lap Roller, Hydroduct or waterstops. For health and safety questions on these products please contact Grace Construction Products Limited.

For Primer B2, and Bituthene LM read the product label and Material Safety Data Sheet (MSDS) before use. Users must comply with all risk and safety phrases. MSDS's can be obtained from Grace Construction Products or from our web site at [www.graceconstruction.com](http://www.graceconstruction.com).

## NBS Specification Clause

Refer to Clause 180 and 190.

**Web** Visit our web site at [www.graceconstruction.com](http://www.graceconstruction.com)

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