

DUMBO – 200 WATER STREET
BROOKLYN, NEW YORK

Remedial Action Work Plan

NYC VCP Number: 14CVCP181K
E-Designation Site Number: 14EHAN030K

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REMEDIAL ACTION WORK PLAN

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LIST OF ACRONYMS

Acronym	Definition
AOC	Area of Concern
AS/SVE	Air Sparging/Soil Vapor Extraction
BOA	Brownfield Opportunity Area
CAMP	Community Air Monitoring Plan
C/D	Construction/Demolition
COC	Certificate of Completion
CQAP	Construction Quality Assurance Plan
CSOP	Contractors Site Operation Plan
DCR	Declaration of Covenants and Restrictions
ECs/ICs	Engineering and Institutional Controls
HASP	Health and Safety Plan
IRM	Interim Remedial Measure
BCA	Brownfield Cleanup Agreement
MNA	Monitored Natural Attenuation
NOC	Notice of Completion
NYC 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	New York State Department of Environmental Conservation Division of Environmental Remediation
NYS DOH	New York State Department of Health
NYS DOT	New York State Department of Transportation
ORC	Oxygen-Release Compound
OSHA	United States Occupational Health and Safety Administration
PE	Professional Engineer

PID	Photo Ionization Detector
QEP	Qualified Environmental Professional
QHHEA	Qualitative Human Health Exposure Assessment
RAOs	Remedial Action Objectives
RAR	Remedial Action Report
RAWP	Remedial Action Work Plan or Plan
RCA	Recycled Concrete Aggregate
RD	Remedial Design
RI	Remedial Investigation
RMZ	Residual Management Zone
SCOs	Soil Cleanup Objectives
SCG	Standards, Criteria and Guidance
SMP	Site Management Plan
SPDES	State Pollutant Discharge Elimination System
SVOC	Semi-Volatile Organic Compound
USGS	United States Geological Survey
UST	Underground Storage Tank
VOC	Volatile Organic Compound

CERTIFICATION

I, _____, am a Professional Engineer licensed in the State of New York. I have primary direct responsibility for implementation of the remedial action for the 200 Water Street Site 14CVCP181K and OER project number 14EHAN030K.

I, _____ am a Qualified Environmental Professional as defined in §43-140. I have primary direct responsibility for implementation of the remedial action for the 200 Water Street Site 14CVCP181K and OER project number 14EHAN030K.

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



QEP Name

QEP Signature

Date

EXECUTIVE SUMMARY

Dumbo Assemblage LLC has enrolled in the New York City Voluntary Brownfield Cleanup Program (NYC VCP) to investigate and remediate a 10,500-square foot site located at 200 Water Street in Brooklyn, New York. A remedial investigation (RI) was performed to compile and evaluate data and information necessary to develop this Remedial Action Work Plan (RAWP). The remedial action described in this document provides for the protection of public health and the environment consistent with the intended property use, complies with applicable environmental standards, criteria and guidance and conforms with applicable laws and regulations.

Site Location and Current Usage

The Site is located at 200 Water Street in the Dumbo section in Brooklyn, New York and is identified as Block 41 and the northern portion of Lot 13 on the New York City Tax Map. Figure 1 shows the Site location. The Site is 10,500-square feet and is bounded by the 200 Water Street to the north, the 185 Front Street property to the south, a five-story residence to the east, and a three-story commercial building to the west. A map of the site boundary is shown in Figure 2. A vacant, 4-story warehouse building occupies the entire Site.

Summary of Proposed Redevelopment Plan

The project consists of a proposed conversion of the existing 4-story warehouse building to a 6-story residential building with cellar. Approximately 30-feet will be demolished from the southern portion of the existing building resulting in an approximate 60-foot open area between the proposed development and the building proposed for development at 177 Front Street. The new building will occupy the remaining portion of the lot with a gross floor area of 43,905 ft² and 15 residential apartment units. The maximum height of the building from Water Street will be approximately 80 feet above grade. The cellar will include utility rooms, refuse room, bicycle storage, and telecom room. No subsurface excavation is planned, except for that required to install an elevator and lower an approximately 320 square-foot area of the existing basement to match the grade of the current sub-basement. A 30-foot patio and landscape area

will be present along the southern portion of the site. Layout of the proposed site development is presented in Appendix 4.

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:

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 (CPP);
2. Performance of a Community Air Monitoring Program for particulates and volatile organic carbon compounds;
3. Establishment of Track 4 Soil Cleanup Objectives (SCOs);
4. Installation of two Soil Vapor sampling points across Water Street;
5. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking & staking excavation areas;
6. Excavation and removal of soil/fill exceeding SCOs;
7. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID. Appropriate segregation of excavated media on-Site;
8. Removal of any underground storage tanks and closure of petroleum spills in compliance with applicable local, State and Federal laws and regulations. If practical, efforts will be made to remove previously abandoned USTs, and the surrounding soils.

9. Transportation and off-Site disposal of all soil/fill material at permitted facilities in accordance with applicable laws and regulations for handling, transport, and disposal, and this plan. Sampling and analysis of excavated media as required by disposal facilities. Appropriate segregation of excavated media onsite;
10. Demarcation of residual soil/fill in landscaped areas;
11. Import of materials to be used for backfill and cover in compliance with this plan and in accordance with applicable laws and regulations;
12. Installation of a vapor barrier system beneath the basement area that will be excavated to install a new elevator and lower the floor to match the existing sub-basement grade. The vapor barrier will be constructed on-Site and consist of the Stego Wrap Vapor Barrier manufactured by Stego Industries LLC or approved equal;
13. Installation and operation of an active sub-slab depressurization system in conjunction with Soil Vapor Extraction System;
14. Construction and maintenance of an engineered composite cover consisting the 4” concrete basement slab and foundation and a 2-foot open space cover to prevent human exposure to residual soil/fill remaining under the Site;
15. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations;
16. Performance of all activities required for the remedial action, including permitting requirements and pretreatment requirements, in compliance with applicable laws and regulations;
17. Submission of a RAR that describes the remedial activities, certifies that the remedial requirements have been achieved, defines the Site boundaries, lists any changes from this RAWP, and describes all Engineering and Institutional Controls to be implemented at the Site.
18. Submission of an approved Site Management Plan (SMP) in the RAR for long-term management of residual contamination, including plans for, maintenance, inspection and

certification of Engineering and Institutional Controls and reporting at a specified frequency;

19. Continued registration with an E-Designation; 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; and Institutional Controls will include prohibition of the following: (1) vegetable gardening and farming; (2) use of groundwater without treatment rendering it safe for the intended use; (3) disturbance of residual contaminated material unless it is conducted in accordance with the SMP; and (4) higher level of land usage without OER-approval.

COMMUNITY PROTECTION STATEMENT

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

This cleanup plan provides a very high level of protection for neighboring communities 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 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 safety coordinator maintains an emergency contact sheet and protocol for management of emergencies. The Site safety coordinator is designated by general contractor, TRM Contracting LLC, and can be reached at 914-265-7354.

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

Community Air Monitoring Plan. Community air monitoring will be performed during this cleanup project to ensure that the community is properly protected from contaminants, dust and odors. Air samples will be tested in accordance with a detailed plan called the Community Air Monitoring Plan (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 onsite Project Manager Joseph Armocida, with TRM Contracting LLC, and can be reached at 914-265-7354; or NYC Office of Environmental Remediation Project Manager Rebecca Bub at 212-341-2073.

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

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

Hours of Operation. The hours for operation of cleanup will comply with the NYC Department of Buildings construction code requirements or according to specific variances issued by that agency. For this cleanup project, the hours of operation are 7:00 a.m. to 4:00 p.m. 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 which is designated as Joseph Armocida, with TRM Contracting LLC, and can be reached at 914-265-7354 or NYC Office of Environmental Remediation Project Manager Rebecca Bub at 212-341-2073, 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 in trucking; and (f) minimize off-Site line-ups (queuing) of trucks entering the

property. Operators of loaded trucks leaving the Site will be instructed not to stop or idle in the local neighborhood.

Final Report. The results of all cleanup work will be fully documented in a final report (called a Remedial Action Report) that will be available for you to review in the public document repositories located at Brooklyn Heights Library.

Long-Term Site Management. To provide long-term protection after the cleanup is complete, the property owner will be required to comply with an ongoing Site Management Plan that calls for continued inspection of protective controls, such as Site covers. The Site Management Plan is evaluated and approved by the NYC Office of Environmental Remediation. Requirements that the property owner must comply with are defined in the property's deed or established through a city environmental designation. A certification of continued protectiveness of the cleanup will be required from time to time to show that the approved cleanup is still effective.

REMEDIAL ACTION WORK PLAN

1.0 SITE BACKGROUND

Dumbo Assemblage LLC has applied to enroll in the New York City Voluntary Cleanup Program (NYC VCP) to investigate and remediate a property located at 200 Water Street in the Dumbo section of Brooklyn, New York (the “Site”). A Remedial Investigation (RI) was performed to compile and evaluate data and information necessary to develop this Remedial Action Work Plan (RAWP) in a manner that will render the Site protective of public health and the environment consistent with the contemplated end use. This RAWP establishes remedial action objectives, provides a remedial alternatives analysis that includes consideration of a permanent cleanup, and provides a description of the selected remedial action. The remedial action described in this document provides for the protection of public health and the environment, complies with applicable environmental standards, criteria and guidance and applicable laws and regulations.

1.1 SITE LOCATION AND CURRENT USAGE

The Site is located at 200 Water Street in the Dumbo section in Brooklyn, New York and is identified as Block 41 and the northern portion of Lot 13 on the New York City Tax Map. Figure 1 shows the Site location. The Site is 10,500-square feet and is bounded by the 200 Water Street to the north, the 185 Front Street property to the south, a five-story residence to the east, and a three-story commercial building to the west. A map of the site boundary is shown in Figure 2. A vacant, 4-story warehouse building occupies the entire Site.

1.2 PROPOSED REDEVELOPMENT PLAN

The project consists of a proposed conversion of the existing 4-story warehouse building to a 6-story residential building with cellar. Approximately 30-feet will be demolished from the southern portion of the existing building resulting in an approximate 60-foot open area between the proposed development and the building proposed for development at 177 Front Street. The new building will occupy the remaining portion of the lot with a gross floor area of 43,905 ft² and 15 residential apartment units. The maximum height of the building from Water Street will

be approximately 80 feet above grade. The cellar will include utility rooms, refuse room, bicycle storage, and telecom room. No subsurface excavation is planned, except for that required to install an elevator and to lower an approximately 320 square-foot area of the existing basement to match the grade of the current sub-basement. A 30-foot patio and landscape area will be present along the southern portion of the site. Layout of the proposed site development is presented in Appendix 4.

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

1.3 DESCRIPTION OF SURROUNDING PROPERTY

The surrounding properties are predominately residential and commercial with some manufacturing. Adjacent properties include:

Direction From Site	Address	Occupant(s) Name or Type	Current Use
North	188 Plymouth Street / 205 Water Street	Newly constructed five-story building	Residential
North-Northeast	50 Bridge Street	Six-story residential / commercial building	Mixed Use
East	220 Water Street	Five-story residential building	Residential
South	185 Front Street	Parking lot for Site building	Parking
West	192 Water Street	Four-story commercial building	Commercial

Figure 3 shows the surrounding land usage.

1.4 REMEDIAL INVESTIGATION

A remedial investigation was performed and the results are documented in a companion document called “*Remedial Investigation Report, Dumbo – 200 Water Street*”, dated February 2012 (RIR).

The review of Sanborn maps depicted the Site with an Iron Wheel Barrow factory and two dwellings 1887; and vacant land where the former Iron Wheel Barrow factory was located, and barrel storage in 1904; In 1915, the was depicted as barrel storage. In 1938, the Site is depicted as vacant land and labeled Kirkman and Son Inc. storage of coal and glycerine drums. The Site was depicted with the existing three-story building identified as Brillo manufacturing and constructed in 1950 and vacant land on the remainder of that lot. The 1977 Sanborn map identified the three-story Site building as manufacturing and labeled Len Art Co. The reference to Len Art Co. was not present in 1979 and all subsequent years through 2007 identified the Site use as the three-story manufacturing building with parking at 185 Front Street. The review of the Sanborn maps identified the surrounding property use as manufacturing including foundry, lead works, and shoe factory; warehouses; brewing company; electric company, smelting; tin plate decorating; residential; stores; and commercial.

The AOCs identified for this site include:

1. Historical manufacturing, and coal and glycerine drum storage;
2. Historic fill in shallow soils; and
3. Reported groundwater volatile organic compound (VOC) contamination at the east adjoining property (220 Water Street).

Summary of the Work Performed under the Remedial Investigation

Dumbo Assemblage LLC performed the following scope of work:

1. Conducted a Site inspection to identify AOCs and physical obstructions (i.e. structures, buildings, etc.);
2. Installed four soil borings across the entire project Site, and collected 12 soil samples for chemical analysis from the soil borings to evaluate soil quality;

3. Installed two temporary groundwater monitoring wells throughout the Site and collected two groundwater samples for chemical analysis to evaluate groundwater quality;
4. Installed three soil vapor probes around Site perimeter and collected three samples for chemical analysis.
5. Collected one ambient air sample for chemical analysis.

Summary of Environmental Findings

- Elevation of the Site ranges from 25 to 36 feet.
- Depth to groundwater ranges from 26 to 35 feet at the Site.
- Groundwater flow is generally from southeast to northwest beneath the Site.
- Depth to bedrock is greater than 40 feet at the Site.
- The stratigraphy of the site, from the surface down, consists of fill material to a depth of 8 to 13 feet below ground surface (bgs) underlain by varying gradations of brown and light brown and reddish brown sands and silts, with a little gravel, to a termination depth of 20 feet bgs.
- Soil/fill samples collected during the RI detected no pesticides or PCBs. VOCs were detected in trace levels in two of the three shallow soil samples. TCE was detected in one shallow soil sample at 0.054 mg/Kg, below Unrestricted Use SCOs. No other VOC were detected in any of six soil samples. Four SVOCs including; benzo(a)anthracene (1.1 mg/Kg), benzo(a)pyrene (max of 1.3 mg/Kg), chrysene (1.4 mg/Kg), and indeno(1,2,3-cd)pyrene (5.2 mg/Kg) were detected in two of the three shallow soil samples at concentrations above Unrestricted Use SCOs. Except for chrysene, these SVOCs also exceeded Restricted Residential SCOs. The SVOCs detected were all polyaromatic hydrocarbon compounds (PAHs) typically associated with historic fill material. Metals including, lead was detected in two shallow soil samples at a maximum concentration of 535 mg/Kg. Magnesium was detected in all six soil samples and ranged from 2,410 to 4740 mg/Kg. Mercury (at 0.37 mg/Kg) and zinc (at 217 mg/Kg) were detected in one

shallow soil sample each at concentrations above Unrestricted Use SCOs. Of these metals, lead and magnesium also exceeded Restricted Residential SCOs. Overall the soil testing results were consistent with the observation of historic fill at the shallow depths throughout the site. The RI did not reveal any contaminant source areas on the site. Groundwater samples collected during the RI detected no PCBs or pesticides. Trichloroethene (TCE) was detected in both water samples at concentrations ranging from 7.1 ug/L to 13 ug/L, above 6 NYCRR Part 703.5 Groundwater Quality standards (GQS). PCE was detected at trace concentrations in both wells. No other VOCs were detected. The SVOC, bis(2-Ethyhexyl)Phthalate was detected in one well above GQS at a concentration of 6.3 ug/L. Metals including antimony, iron, manganese, selenium, and sodium were detected above GQS in both wells.

- Soil vapor samples collected during the RI showed moderate to high levels of several petroleum and chlorinated VOCs. Overall the highest reported concentrations were for acetone (all samples at max of 1247 $\mu\text{g}/\text{m}^3$), toluene (max of 188 $\mu\text{g}/\text{m}^3$), and xylene (max. of 279 $\mu\text{g}/\text{m}^3$). Chlorinated VOCs including 1,1,1-Trichloroethane was detected in all three vapor samples at a maximum concentration of 38.7 $\mu\text{g}/\text{m}^3$. Carbon tetrachloride was detected in one sample at 0.69 $\mu\text{g}/\text{m}^3$. Trichloroethene (TCE) was detected in all three soil vapor samples at concentrations ranging from 105 $\mu\text{g}/\text{m}^3$ to 6072 $\mu\text{g}/\text{m}^3$. Tetrachloroethene (PCE) was measured at two of the three soil vapor samples at concentration ranging from 33 $\mu\text{g}/\text{m}^3$ to 539 $\mu\text{g}/\text{m}^3$. PCE and TCE were detected in all three soil vapor samples above the mitigation/monitoring level ranges established within the New York State Department of Health (NYSDOH) Final Guidance on Soil Vapor Intrusion (October 2006) values (AGVs).

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

2.0 REMEDIAL ACTION OBJECTIVES

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

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.

Soil Vapor

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

3.0 REMEDIAL ALTERNATIVES ANALYSIS

The goal of the remedy selection process 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 exceedence of applicable standards, criteria and guidance values (SCGs). A remedy is then developed based on the following ten criteria:

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

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

Alternative 1 involves:

- Establishment of Unrestricted Use (Track 1) Soil Cleanup Objectives (SCOs).
- Removal of all soil/fill exceeding Unrestricted Use SCOs throughout the Site and confirmation that Track 1 Unrestricted Use SCOs has been achieved with post-excavation endpoint sampling. This alternative would require removing the existing basement floor; provide shoring as necessary to support the building, and excavating all soils across the entire Site. Based on the results of the RI, this would likely require an excavation depth

of 3 to 10 feet below the current basement floor. Subsequent to soil removal, the area would be backfilled with certified clean fill.

- No Engineering or Institutional Controls are required for a Track 1 cleanup, but a vapor barrier would be installed beneath the foundation and behind foundation sidewalls of the new building as a part of development to prevent any potential future exposures from off-Site soil vapor.
- Installation of a Sub Slab Depressurization system as part of new construction.
- Placement of a final cover over the entire Site as part of new development.

Alternative 2 involves

- Establishment of Track 4 Site-Specific SCOs.
- The basement floor of the existing building will remain in-place. A new floor deck is to be installed above the existing basement floor so that the first floor is level with Water Street. The trench drain located in the southern portion of the basement, a steel grate in the northeastern portion of the building and various smaller drains located within the basement will be cleaned out, backfilled with suitable material, and sealed. In addition, an approximately 320 square area of the existing basement floor will be removed and excavated for the installation of an elevator and lower the existing basement floor to match that of the sub-basement area. The previously abandoned USTs will be removed, if practical, and the surrounding soil transported off-Site for disposal. A vapor barrier will be installed above the sub-base material prior to pouring the new basement foundation and slab. The remaining basement floor will remain in place to prevent the migration of soil vapors into the proposed building. An approximately 30-foot by 105-foot area where a portion of the existing building is to be demolished will be backfilled with clean material (compliant with Restricted Residential SCOs) from the adjoining property at 177 Front Street. The surface 2-feet of the area will be backfilled with certified clean fill or topsoil and the area will be either landscaped or hardscaped.
- Placement of a final cover over the entire Site to prevent exposure to remaining soil/fill;

- Placement of a soil vapor barrier system beneath the basement area that will be excavated to install a new elevator and lower the floor to match the existing sub-basement and along new foundation side walls to prevent any potential future exposures from off-Site soil vapor;
- Installation of an active Sub Slab Depressurization system.
- 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 contaminants leaching into groundwater.

Alternative 2 would achieve comparable protections of human health and the environment by managing soil/fill in-place and 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 vapor barrier, active SSDS system and composite cover system. The composite cover system would prevent direct contact with any remaining on-Site soil/fill. Implementing Institutional Controls including a Site Management Plan would ensure that the composite cover system remains intact and protective. Establishment of Track 4 Site-Specific SCOs would minimize the risk of contamination leaching into groundwater.

For both Alternatives, potential exposure to the contaminated soils or groundwater during construction would be minimized by implementing a Construction Health and Safety Plan (CHASP), a Soil and Materials Management Plan, and Community Air Monitoring Plan (CAMP). Groundwater is 35 feet deep and is not expected to be encountered during development, and potential contact with contaminated groundwater would be prevented as City laws and regulations prohibit its use. Potential future migration of off-Site soil vapors into the new building would be prevented by installing a vapor barrier system below the new building's basement slab and continuing the vapor barrier around the foundation walls, and by installing an active SSDS system

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 an active SSDS and a vapor barrier system below the new building's slab and continuing the vapor barrier 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. Except for that required as part of the alteration of the existing building, no excavation of impacted soil is planned. Various drains and trenches within the existing building will be clean out, backfilled

and sealed. Placement of a final cover over the Site consisting of the existing concrete basement slab, 2-foot clean fill cap, and the new sub-basement area with vapor barrier would eliminate exposures to remaining contaminated soils. Soil vapor impacts would be prevented by the remaining existing basement slab and crawl space and through installation of an active SSDS system and vapor barrier under the new sub-basement slab.

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 would protect on-site workers and the surrounding community from exposure to Site-related contaminants.

Short-term effectiveness and impacts

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

Alternative 1 would result in significantly greater short-term impacts due to the quantity of excavation and transport required to remove all unconsolidated material necessary to achieve SCOs throughout the Site. These impacts could include higher air quality impacts caused by greater soil excavation, handling and load out, and associated truck traffic. Focused attention to means and methods employed during the remedial action, including community air monitoring and appropriate truck routing, would minimize or negate the overall impact of this additional activity.

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 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 by removing all soils affected by Site contaminants or historic fill materials above Track 1 SCOs. Groundwater and soil vapor impact should diminish with time. Since the proposed building will cover the entire Site, exposures to residual groundwater contamination would be eliminated. Impact to residual soil vapor will be address through the installation of a vapor barrier.

Alternative 2 would achieve long term effectiveness and permanence by removing selective on-Site contaminated soils and attaining Track 4 Site-Specific SCOs, by establishing Engineering Controls including a vapor barrier and composite cover system across the Site; by establishing Institutional Controls to ensure long-term management including use restrictions, a Site Management Plan and continued registration as E-designated property to memorialize these controls for the long term. The SMP would ensure long-term effectiveness of all ECs and ICs by requiring periodic inspection and certification that these controls and restrictions continue to be in place and are functioning as they were intended assuring that protections designed into the remedy will provide continued high level of protection in perpetuity.

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 will eliminate any migration to groundwater.

Since the proposed building and clean cap would cover the entire Site, exposures to residual groundwater contamination will be eliminated. Soil vapor impacts would be prevented by the remaining existing basement slab and crawl space and through installation of a vapor barrier under the new sub-basement slab.

Reduction of toxicity, mobility, or volume of contaminated material

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

Alternative 1 would provide maximum reduction of toxicity, mobility and volume of contaminated material on-Site by excavation and removal of all soils that exceed the Track 1 unrestricted use SCOs.

Alternative 2 would remove some of the historic fill/soil at the Site, and any remaining on-Site soil beneath the new building would meet Track 4 - Site-Specific SCOs. Alternative 2 would provide engineering and institutional controls to ensure that there are no pathways for exposure to remaining materials. Alternative 1 would eliminate a greater total mass of contaminants on Site.

Implementability

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

Both alternatives are feasible and implementable. They use identical standard materials and services and well established technology. The reliability of the remedy is high. There are no special difficulties associated with any of the activities proposed in Alternate 2. However, Alternative 1 will likely require additional shoring and building support, and potentially jeopardizes the structural integrity of the existing building.

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.

The capital costs and risks associated with Alternative 1 are likely to be considerably greater than Alternative 2 for little added value. Both alternatives satisfy the threshold balancing criterion and other criterion listed here, and are fully protective of public health and the environment, will control migration of contaminants, are effective for both the short-term and long-term.

Community Acceptance

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

Based on the overall goals of the remedial program and initial observations by the project team, both alternatives will be acceptable to the community. This RAWP will be subject to and undergo public review under the NYC VCP and will provide the opportunity for detailed public input on the remedial alternative and the selected remedial action. This public comment will be considered by OER prior to approval of this plan.

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.

Both alternatives for remedial action at the site are comparable with respect to the proposed use and to land uses in the vicinity of the Site. The proposed use is consistent with the existing zoning designation for the property and is consistent with recent development patterns. The Site is surrounded by residential and commercial properties and the proposed alternative provides comprehensive protection of public health and the environment for these uses. Improvements in the current brownfield condition of the property achieved by the alternatives is also consistent with the City's goals for cleanup of contaminated land and bringing such properties into productive reuse. The alternatives are equally protective of natural resources and cultural resources. This RAWP will be subject to public review under the NYC VCP and will provide the opportunity for detailed public input on the land use factors described in this section. This public comment will be considered by OER prior to approval of this plan.

Sustainability of the Remedial Action

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

Both alternatives have the potential to utilize sustainable means to achieve the cleanup goals. This program contemplates the utilization of several green remediation methods that are

compatible with the alternative. The full list of green remediation activities considered in this program is included in the Sustainability Statement.

4.0 REMEDIAL ACTION

4.1 SUMMARY OF PREFERRED REMEDIAL ACTION

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

The proposed remedial action will consist of:

1. Preparation of a Community Protection Statement and performance of all required NYC VCP citizen participation activities according to an approved Citizen Participation Plan (CPP);
2. Performance of a Community Air Monitoring Program for particulates and volatile organic carbon compounds;
3. Establishment of Track 4 Soil Cleanup Objectives (SCOs);
4. Installation of two Soil Vapor sampling points across Water Street;
5. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking & staking excavation areas;
6. Excavation and removal of soil/fill exceeding SCOs;
7. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID. Appropriate segregation of excavated media on-Site;

8. Removal of any underground storage tanks and closure of petroleum spills in compliance with applicable local, State and Federal laws and regulations. Efforts will be made to remove previously abandoned USTs, and the surrounding soils.
9. Transportation and off-Site disposal of all soil/fill material at permitted facilities in accordance with applicable laws and regulations for handling, transport, and disposal, and this plan. Sampling and analysis of excavated media as required by disposal facilities. Appropriate segregation of excavated media onsite;
10. Demarcation of residual soil/fill in landscaped areas;
11. Import of materials to be used for backfill and cover in compliance with this plan and in accordance with applicable laws and regulations;
12. Installation of a vapor barrier system beneath the basement area that will be excavated to install a new elevator and lower the floor to match the existing sub-basement grade. The vapor barrier will be constructed on-Site and consist of the Stego Wrap Vapor Barrier manufactured by Stego Industries LLC or approved equal;
13. Installation and operation of an active sub-slab depressurization system in conjunction with Soil Vapor Extraction System;
14. Construction and maintenance of an engineered composite cover consisting the 4” concrete basement slab and foundation and a 2-foot open space cover to prevent human exposure to residual soil/fill remaining under the Site;
15. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations;
16. Performance of all activities required for the remedial action, including permitting requirements and pretreatment requirements, in compliance with applicable laws and regulations;
17. Submission of a RAR that describes the remedial activities, certifies that the remedial requirements have been achieved, defines the Site boundaries, lists any changes from this RAWP, and describes all Engineering and Institutional Controls to be implemented at the Site.

18. Submission of an approved Site Management Plan (SMP) in the RAR for long-term management of residual contamination, including plans for, maintenance, inspection and certification of Engineering and Institutional Controls and reporting at a specified frequency;
19. Continued registration with an E-Designation; 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; and 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 Soil Cleanup Objectives are proposed for this project. The SCOs for this Site are the Restricted Residential SCOs (Track 2) except for the modifications listed in Table 1. Soil and materials management on Site and off-Site, including excavation, handling and disposal, will be conducted in accordance with the Soil/Materials Management Plan in Appendix 3,

TABLE 1 – TRACK 4 SOIL CLEANUP OBJECTIVES	
Total SVOCs	250 mg/kg
Lead	600 mg/kg
Mercury	1.5 mg/kg

The location of planned excavations is shown in Figure 4.

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

Estimated Soil/Fill Removal Quantities

The total quantity of soil/fill expected to be excavated and disposed off-Site is 100 tons.

Disposal facilities will be reported to OER when they are identified and prior to the start of remedial action.

End-Point Sampling

Contaminant concentrations have been delineated during the RI and the limits of the excavation have been established. If additional hotspots are identified or if gross contaminated soils are observed and must be removed, removal actions under this plan will be performed in conjunction with confirmation soil sampling. If confirmation samples are collected from the base of an excavation, the locations will be determined by OER. For comparison to Track 1 SCOs, analytes will include VOCs, SVOC, pesticides, PCBs and metals according to analytical methods described below. For comparison to Track 4 SCOs, analytes will only include trigger compounds and elements established on the Track 4 SCO list.

Hot-spot removal actions, whether established under this RAWP or identified during the remedial program, will be performed in conjunction with post remedial end-point samples to ensure that hot-spots are fully removed. Analytes for end-point sampling will be those parameters that are driving the hot-spot removal action and will be approved by OER. Frequency for hot-spot end-point sample collection is as follows:

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

3. For sampling of volatile organics, bottom samples should be taken within 24 hours of excavation, and should be taken from the zero to six-inch interval at the excavation floor. Samples taken after 24 hours should be taken at six to twelve inches.

4. For contaminated soil removal, post remediation soil samples for laboratory analysis should be taken immediately after contaminated soil removal. If the excavation is enlarged horizontally, additional soil samples will be taken pursuant to bullets 1-3 above.

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

New York State ELAP certified labs will be used for all confirmation and end-point sample analyses. Labs performing confirmation and end-point sample analyses will be reported in the RAR. The RAR will provide a tabular and map summary of all confirmation and end-point sample results and will include all data including non-detects and applicable standards and/or guidance values. End-point samples will be Confirmation samples will be analyzed for compounds and elements as described above 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 “finger print analysis” and required regulatory reporting (i.e. spills hotline) will be performed.

Quality Assurance/Quality Control

Samples will be collected into the appropriate containers provided by the laboratory, placed in a cooler, and shipped via overnight courier to the laboratory under proper chain-of-custody procedures. Samples will be preserved through the use of ice or “cold-paks” to maintain a temperature of 4°C.

Disposable sampling equipment will be used for the collection of end-point samples; therefore, no field (rinsate) blanks will be generated. However, if non-disposal sampling equipment is used, field rinsate blanks will be prepared at a rate of one for every 10 samples collected. Sampling equipment will be properly decontaminated prior to reuse. Trip blanks will be used if VOC samples are collected for analysis. Trip blanks will not be required for samples analyzed for SVOCs, metals, PCBs or pesticides. One blind duplicate sample will be collected and submitted for analysis every 20 samples.

Import and Reuse of Soils

Import of soils onto the property and reuse of soils already onsite will be performed in conformance with the Soil/Materials Management Plan in Appendix 3. The estimated quantity of soil to be imported into the Site for backfill and cover soil is 350 tons. The estimated quantity of onsite soil/fill expected to be reused/relocated on Site from the adjoining property at 177 Front Street is 1,750 tons.

4.3 ENGINEERING CONTROLS

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

- composite cover system consisting of the concrete basement slabs and 2-foot clean fill cap;
- Installation of a vapor barrier system beneath the basement area that will be excavated to install a new elevator and lower the floor to match the existing sub-basement grade; and

- sub-slab depressurization system.

Composite Cover System

Exposure to residual soil/fill will be prevented by an engineered, composite cover system to be built on the Site. This composite cover system is comprised of:

- The cover system will be comprised of a minimum 4-inch thick concrete foundation and basement slab beneath the existing building, and
- A 2-foot thick clean soil cover in the proposed open space area in the southern portion of the Site.

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

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

Vapor Barrier

The migration of soil vapors will be prevented with the combined installation of the concrete cellar foundation slab and vapor barrier. A portion of the existing cellar floor will be excavated for the installation of an elevator and to lower the floor to match the existing sub-basement grade. A vapor barrier will be installed beneath the entire area where the existing basement floor is to be lowered. The new sub-basement area will be used for utility rooms and storage. A vapor barrier will be installed over the sub-base material prior to pouring the building foundation slab. The vapor barrier will be constructed on-Site and consist of the Stego Wrap Vapor Barrier manufactured by Stego Industries LLC or approved equal. Installation specifications will be provided to the construction management company and the installer of the geomembrane. All vapor barrier seams, penetrations, and repairs will be sealed either by the tape method or weld method, in accordance with the manufactures recommendations and

instructions.

The project's Professional Engineer licensed by the State of New York will have primary direct responsibility for overseeing the implementation of the vapor barrier. The Remedial Action Report will include photographs (maximum of two photos per page) of the installation process, PE/RA certified letter (on company letterhead) from primary contractor responsible for installation oversight and field inspections, and a copy of the manufacturer's certificate of warranty.

Figure 6 illustrates the extent of the proposed vapor barrier membrane. Installation details with respect to the proposed building foundation, footings, exterior foundation wall, etc. are provided in Figure 7. Product Manufacturer specifications are provided in Appendix 5.

Sub-Slab Depressurization System

An active sub-slab depressurization system will be installed beneath the footprint of the new building slab to address residual soil vapors.

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 multiple vertical extraction points. The layout plan and details of the SSDS system will be provided in Stip letter.

4.4 INSTITUTIONAL CONTROLS

Institutional Controls (IC) have been incorporated in this remedial action to manage residual soil/fill and other media and render the Site protective of public health and the environment. Institutional Controls are listed below. Long-term employment of EC/ICs will be implemented under a site-specific Site Management Plan (SMP) that will be included in the RAR. The property will continue to be registered with an E-Designation at the NYC Buildings Department.

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, monitoring, inspection, reporting and certification of ECs. SMP will require that the property owner and property owner's successors and assigns will submit to OER a periodic written statement that certifies that: (1) controls employed at the Site are unchanged from the previous certification or that any changes to the controls were approved by OER; and, (2) nothing has occurred that impairs the ability of the controls to protect public health and environment or that constitute a violation or failure to comply with the SMP. OER retains the right to enter the Site in order to evaluate the continued maintenance of any controls. This certification shall be submitted at a frequency to be determine by OER in the SMP and will comply with RCNY §43-1407(1)(3).
- Vegetable gardens and farming on the Site are prohibited in contact with residual soil materials;
- Use of groundwater underlying the Site is prohibited without treatment rendering it safe for its intended use;
- All future activities on the Site that will disturb residual material must be conducted pursuant to the soil management provisions in an approved SMP;
- The Site will be used for residential use and will not be used for a higher level of use without prior approval by OER.

4.5 SITE MANAGEMENT PLAN

Site Management is the last phase of remediation and begins with the approval of the Remedial Action Report and issuance of the Notice of Completion (NOC) for the Remedial Action. The Site Management Plan (SMP) describes appropriate methods and procedures to ensure implementation of all ECs and ICs that are required by the DCR and 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 Brownfield Cleanup Agreement with OER. This includes a plan for: (1) implementation of EC's and ICs; (2) implementation of monitoring programs; (3) operation and maintenance of EC's; (4) inspection and certification of EC's; and (5) reporting.

Site management activities, reporting, and EC/IC certification will be scheduled by OER on a periodic basis to be established in the SMP and will be subject to review and modification by OER. The Site Management Plan will be based on a calendar year and certification reports will be due for submission to OER by 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 and pathways for human exposure to the contaminants of concern (COC) that are present at, or migrating from, the Site. The identification of exposure pathways describes the route that the COC takes to travel from the source to the receptor. An identified pathway indicates that the potential for exposure exists; it does not imply that exposures actually occur.

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

Known and Potential Sources

Historic fill is present at the Site to a depth of 8 to 13 feet below grade. Based on results of the Remedial Investigation Report the contaminants of concern are:

Soil

- SVOCs, all PAH compounds included benzo(a)anthracene, benzo(a)pyrene, and indeno(1,2,3-cd)pyrene were detected above Restricted Residential SCOs.
- Metals including, lead and magnesium exceeded Restricted Residential SCOs

Groundwater

- One VOC, Trichloroethene (TCE) was detected above GQS.
- One SVOC, bis(2-Ethyhexyl)Phthalate was above GQS
- Five metals: antimony, iron, manganese, selenium, and sodium were detected above GQS

Soil Vapor

- Chlorinated VOCs including TCE and PCE were detected above NYSDOH monitoring thresholds.

Nature, Extent, Fate and Transport of Contaminants

SVOCs and metals are present throughout the Site in the Shallow soils associated with the historic fill material. Low concentrations of trichloroethene and metals appeared to be present in the shallow groundwater throughout the Site. TCE and PCE soil vapor concentrations above the NYSDOH AGVs are present throughout the Site. PCE was not found in any of the on-site soil or groundwater samples collected.

Potential Routes of Exposure

The five elements of an exposure pathway are: (1) a contaminant source; (2) contaminant release and transport mechanisms; (3) a point of exposure; (4) a route of exposure; and (5) a receptor population. An exposure pathway is considered complete when all five elements of an exposure pathway are documented. A potential exposure pathway exists when any one or more of the five elements comprising an exposure pathway cannot be documented. An exposure pathway may be eliminated from further evaluation when any one of the five elements comprising an exposure

pathway has not existed in the past, does not exist in the present, and will never exist in the future. Three potential primary routes exist by which chemicals can enter the body:

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

Existence of Human Health Exposure

Current Conditions: The potential for exposure to historic fill is limited due to an concrete/asphalt cap constructed over the entire lot. 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, there is no potential exposure. Under current conditions, accumulation of soil vapor within the currently on-Site structures can accumulate.

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.

Proposed Future Conditions: Under future remediated conditions, all soils in excess of Track 4 Site Specific SCOs will be removed. The Site will be fully capped, limiting potential direct exposure to soil and groundwater remaining in place. Potential post-remediation exposures to on-Site residents from soil vapors migrating on-Site from an off-Site source remain a concern after the remedial action. A waterproofing membrane/vapor barrier system and active SSSS system will prevent any exposure to existing and potential soil vapors in the future. The Site is served by a public water supply, and groundwater is not used at the Site for potable supply. There are no plausible off-Site pathways for ingestion, inhalation, or dermal exposure to contaminants derived from the Site under future conditions.

Receptor Populations

Potential on-site receptors include adult and child residences, construction workers, trespassers and commercial workers. The potential off-site receptors are adult and child pedestrians and residents.

Overall Human Health Exposure Assessment

There are potential complete exposure pathways for the current site condition. There is a potential complete, exposure pathway that requires mitigation during implementation of the remedy. 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, a subsurface vapor barrier system for the building and a active SSDS system. Potential post-construction use of groundwater is not considered an option because groundwater in this area of New York City is not used as a potable water source. There are no surface waters in close proximity to the Site that could be impacted or threatened.

Based upon this analysis, complete on-Site exposure pathways appear to be present only during the current un-remediated phase and the remedial action phase. Under current conditions, on-Site exposure pathways exist for those given access to the Site or trespassers. During remedial construction, on-Site and off-Site exposures to contaminated dust from historic fill material will be addressed through dust controls, and through the implementation of the Community Air Monitoring Program, the Soil/Materials Management Plan, and a Construction Health and Safety Plan. After the remedial action is complete, there will be no remaining exposure pathways to on-Site soil/fill, as all soil above Unrestricted Use SCOs would have been removed and a vapor barrier system and active SSDS system would have been installed as part of development.

5.0 REMEDIAL ACTION MANAGEMENT

5.1 PROJECT ORGANIZATION AND OVERSIGHT

Principal personnel who will participate in the remedial action include Jed A. Myers, Ph.D., Senior Project Manager of Cardno ATC, and John Mascioli, M.S., Project Manager of Cardno ATC. The aforementioned personnel will provide oversight and consultation regarding the remedial action. Messrs. Robert Harrington, CIH, Senior Project Manager of Cardno ATC and Michael Donovan, CIH, Senior Project Manager of Cardno ATC will provide consultation regarding the CAMP. There may be additional personnel to perform air monitoring and particulate monitoring during the construction phase. The Professional Engineer (PE) for this project is Mr. Gilbert Gedeon, P.E., Division Manager of Cardno ATC.

5.2 SITE SECURITY

Site access will be controlled by gated entrances to the fenced property.

5.3 WORK HOURS

The hours for operation of remedial construction will be from 7:00 to 4:00. 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 identified by the general contractor, TRM Contracting LLC. Remedial work performed under this RAWP will be in full compliance with applicable health and safety laws and regulations, including Site and OSHA worker safety requirements and HAZWOPER requirements. Confined space entry, if any, will comply with OSHA requirements and industry standards and will address potential risks. The parties performing the remedial construction work will ensure that performance of work is in compliance with the HASP and applicable laws and regulations. The HASP pertains to remedial and invasive work performed at the Site until the issuance of the Notice of Completion.

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

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

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

5.5 COMMUNITY AIR MONITORING PLAN

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

Periodic monitoring for VOCs will be performed during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. Periodic monitoring during sample collection, for instance, will consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. Depending upon the proximity of potentially exposed individuals, continuous monitoring may be performed during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park,

or adjacent to a school or residence. Exceedences of action levels observed during performance of the Community Air Monitoring Plan (CAMP) will be reported to the OER Project Manager and included in the Daily Report.

VOC Monitoring, Response Levels, and Actions

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

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

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

Particulate Monitoring, Response Levels, and Actions

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

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques will be employed. Work will continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed $150 \text{ mcg}/\text{m}^3$ 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.

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

No dewatering is anticipated during the construction of the proposed building.

Equipment and Material Staging

Equipment and materials will be stored and staged in a manner that complies with applicable laws and regulations.

Stabilized Construction Entrance

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

Truck Inspection Station

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

Extreme Storm Preparedness and Response Contingency Plan

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

Storm Preparedness

Preparations in advance of an extreme storm event will include the following: containerized hazardous materials and fuels will be removed from the property; 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, hay bales; clean storm sewer filters and traps; and secure and protect pumps and hosing.

Storm Response

At the conclusion of an extreme storm event, as soon as it is safe to access the property, a complete inspection of the property will be performed. A site inspection report will be submitted to OER at the completion of site inspection and after the site security is assessed. Site conditions will be compared to the inventory of site conditions and material performed prior to the storm event and significant differences will be noted. Damage from storm conditions that result in acute public safety threats, such as downed power lines or imminent collapse of buildings, structures or equipment will be reported to public safety authorities via appropriate means such as calling 911. Petroleum spills will be reported to NYS DEC within 2 hours of identification and consistent with State regulations. Emergency and spill conditions will also be reported to OER. Public safety structures, such as construction security fences will be repaired promptly to eliminate public safety threats. Debris will be collected and removed. Dewatering will be performed in compliance with existing laws and regulations and consistent with emergency notifications, if any, from proper authorities. Eroded areas of soil including unsafe slopes will be stabilized and fortified. Dislocated materials will be collected and appropriately managed. Support of excavation structure will be inspected and fortified as necessary. Impacted stockpiles will be contained and damaged stockpile covers will be replaced. Storm-water control systems and structures will be inspected and maintained as necessary. If soil or fill materials are discharged off site to adjacent properties, property owners and OER will be notified and

corrective measure plan designed to remove and clean dislocated material will be submitted to OER and implemented following approval by OER and granting of site access by the property owner. Impacted offsite areas may require characterization based on site conditions, at the discretion of OER. If onsite petroleum spills are identified, a qualified environmental professional will determine the nature and extent of the spill and report to NYS DEC's spill hotline at DEC 800-457-7362. If the source of the spill is ongoing and can be identified, it should be stopped if this can be done safely. Potential hazards will be addressed immediately, consistent with guidance issued by NYS DEC.

Storm Response Reporting

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

5.8 TRAFFIC CONTROL

Drivers of trucks leaving the 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 will be determined once the final disposal site is identified.

5.9 DEMOBILIZATION

Demobilization will include:

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

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

5.10 REPORTING AND RECORD KEEPING

Daily Reports

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

- Project number and statement of the activities and an update of progress made and locations of work performed;
- Quantities of material imported and exported from the Site;

- Status of on-Site soil/fill stockpiles;
- A summary of all citizen complaints, with relevant details (basis of complaint; actions taken; etc.);
- A summary of CAMP excursions, if any;
- Photograph of notable Site conditions and activities.

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

Record Keeping and Photo-Documentation

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

5.11 COMPLAINT MANAGEMENT

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

5.12 DEVIATIONS FROM THE REMEDIAL ACTION WORK PLAN

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

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

5.13 DATA USABILITY SUMMARY REPORT

The primary objective of a Data Usability Summary Report (DUSR) is to determine whether or not data meets the site specific criteria for data quality and data use. The DUSR provides an evaluation of analytical data without third party data validation. The DUSR for post-remedial samples collected during implementation of this RAWP will be included in the Remedial Action Report (RAR).

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 (if Track 1 is not achieved);
- Description of any changes in the remedial action from the elements provided in this RAWP and associated design documents;
- Tabular summary of all end point sampling results 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 at the NYC Department of Buildings.

- Reports and supporting material will be submitted in digital form.

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, Gilbert Gedeon, 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 Dumbo 200 Water Street Site 14CVCP181K.

I, Jed A. Myers, Ph.D. am a qualified Environmental Professional. I had primary direct responsibility for implementation remedial program for the Dumbo 200 Water Street Site 14CVCP181K.

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 15 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	8
Remedial Excavation	9	6
Demobilization	48	4
Submit Remedial Action Report	52	4

FIGURES

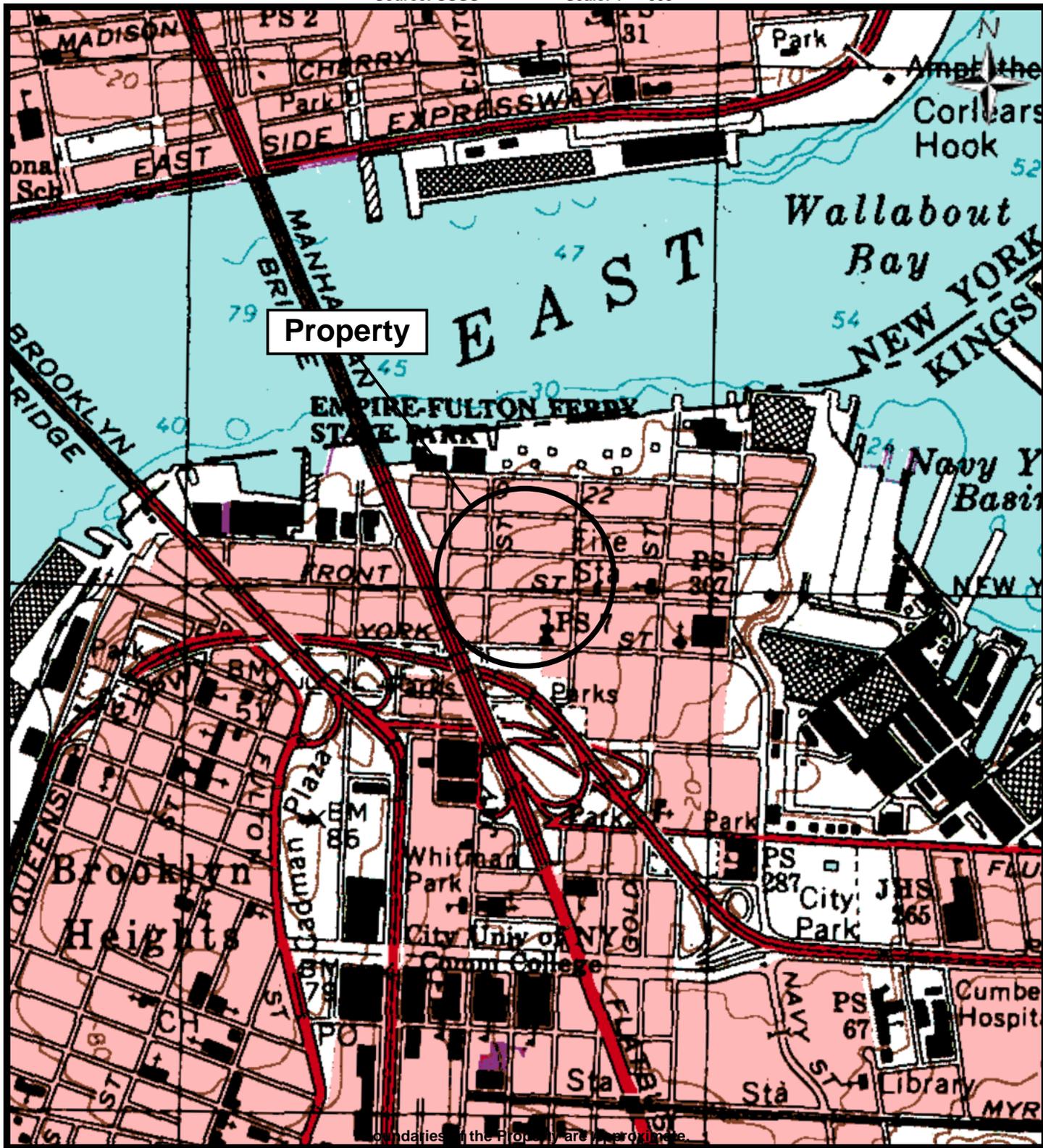


FIGURE 1 - SITE LOCATION MAP

DUMBO ASSEMBLAGE

200 Water Street

Brooklyn, NY 11201



Shaping the Future

PREPARED FOR: Dumbo Assemblage LLC

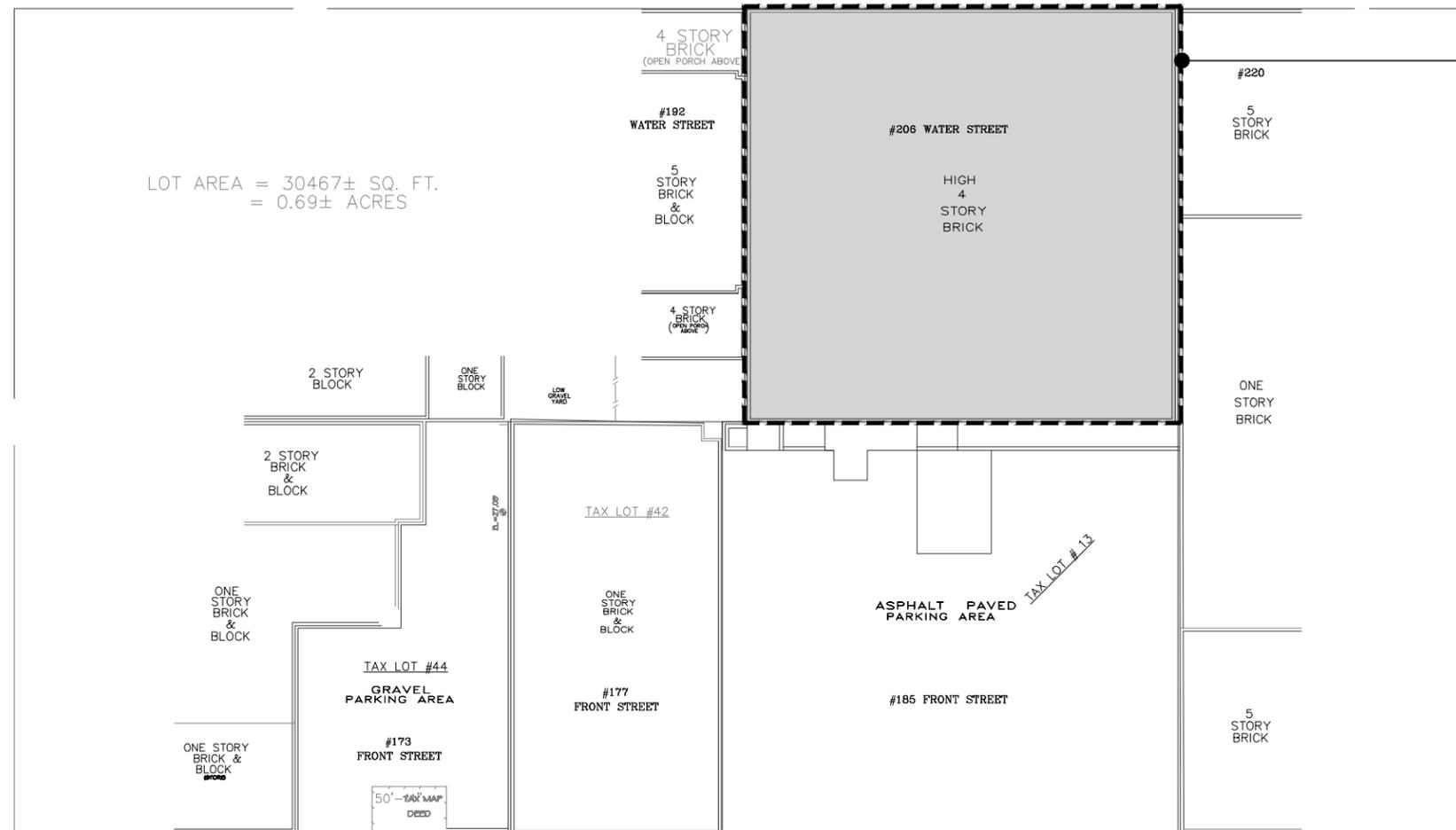
PROJ. MGR: Jed Myers

DRAWN BY: Jed Myers

DATE: 8/20/2013

PROJ. #: 15.44291.0004

WATER STREET



PROPERTY BOUNDARY LINE

JAY STREET

BRIDGE STREET

FRONT STREET



CLIENT:
DUMBO ASSEMBLAGE LLC
ADDRESS:
22 CORTLAND STREET
16TH FLOOR
NEW YORK, NY 10007

SITE ADDRESS:

200 WATER STREET
BROOKLYN, NY 11201



DRAWING BY: M. SVERDEL
INSPECTED BY: J. MYERS
DESIGNED BY: J. MYERS
CHECKED BY:

DRAWING TITLE:
SITE PLAN

SCALE
SEE SCALE BAR
ATC PROJECT: # 15.44291.0004

DRAWING NO.
FIG-2
SHT. OF
DATE: 09.03.13
REVISION No. 0



Source: <http://gis.nyc.gov/doitt/nycitymap/>



104 East 25th Street, 8th Floor
 New York, NY 10010-2917
 Phone (212) 353-8280 * Fax (212) 979-8447

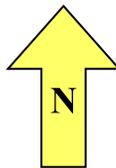


FIGURE 3 – Site Plan and Surrounding Land Use

Name: Dumbo Assemblage
Address: 200 Water Street
 Brooklyn, New York 11211
Project No. 015.44291.0004

LEGEND:

- - - - - Property Boundary (approx.)
- - - - - Lot Lines (approx.)

Approximate Scale:

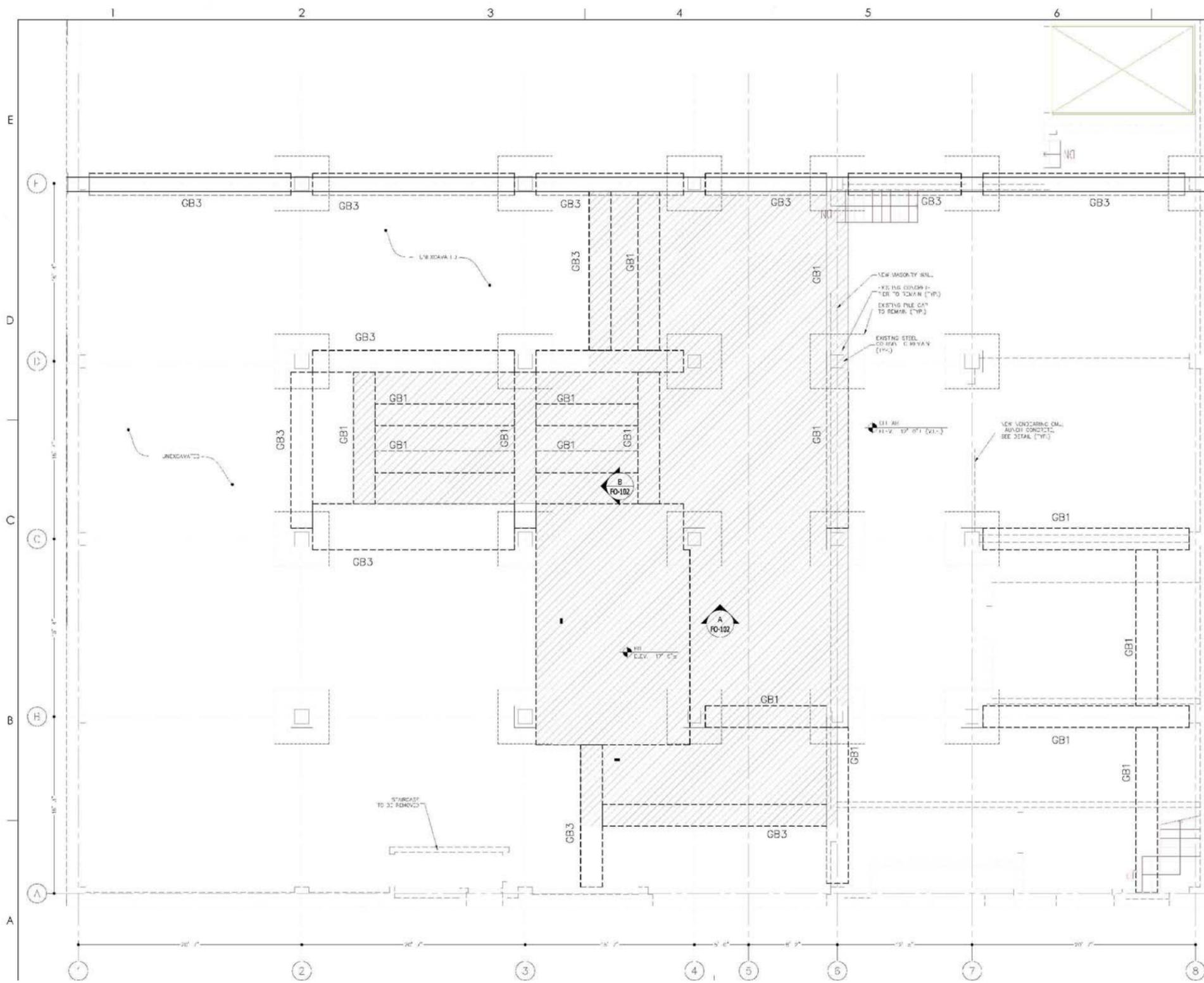




LEGEND	
	NEW WALL
	NEW GRADE BEAM OR SUPPORT BEARING WALL
	EXISTING WALL TO BE REMOVED
	AREA TO BE EXCAVATED TO EXTEND CELLAR AREA (SEE NOTE #1)

NOTES:

1. FINISHED FIRST FLOOR ELEVATION 0'-0" IS EQUAL TO ELEVATION 4'-7.0' N.G.M.D. SEE ARCHITECT'S DRAWINGS.
2. BOTTOM OF FOOTING AND TOP OF THE WALL ELEVATION SHOWN ARE APPROXIMATE. CONTRACTOR TO VERIFY CONDITION IN THE FIELD AND MAKE NECESSARY ADJUSTMENTS.
3. SEE ARCHITECTURAL AND/OR MECHANICAL PLANS FOR DRAIN LOCATIONS.
4. HATCH AREA MAY NEED TO BE LOWERED DOWN TO PROPOSED CELLAR ELEVATION. GENERAL CONTRACTOR TO PERFORM TEST PIT TO ENSURE FILL CAP DOES NOT INTERFERE WITH GRADE BEAM LOCATION.
5. SIGN OF GRADE BEAM CONNECTION AND EXCAVATION OF HATCHED AREA IS TO BE MADE ON EXISTING FILL CAP LOCATION. THIS DRAWING MAY BE ADJUSTED AS THE LR REVIEW SIGNATURE.



FOUNDATION PLAN
 0 6 12
 SCALE IN FEET

CLIENT:
DUMBO ASSEMBLAGE LLC
 ADDRESS:
 22 CORTLAND STREET
 16TH FLOOR
 NEW YORK, NY 10007

SITE ADDRESS:
 200 WATER STREET
 BROOKLYN, NY 11201

Cardno ATC
 Shaping the Future
 104 EAST 25th STREET, 10th FLOOR NEW YORK, NY 10010
 TEL: (212) 353-8280 FAX: (212) 353-8306

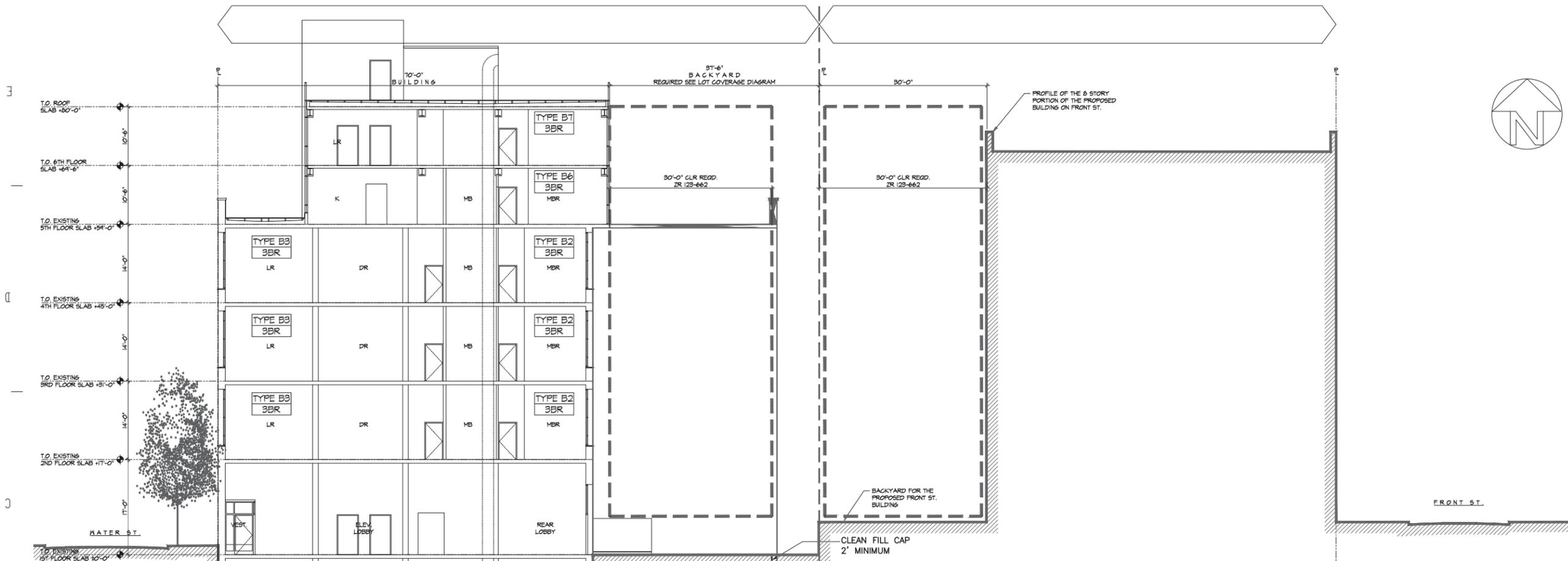
DRAWING BY: M. SVERDEL
 INSPECTED BY: J. MYERS
 DESIGNED BY: J. MYERS
 CHECKED BY:

DRAWING TITLE:
PROPOSED EXTENT OF SOIL EXCAVATION

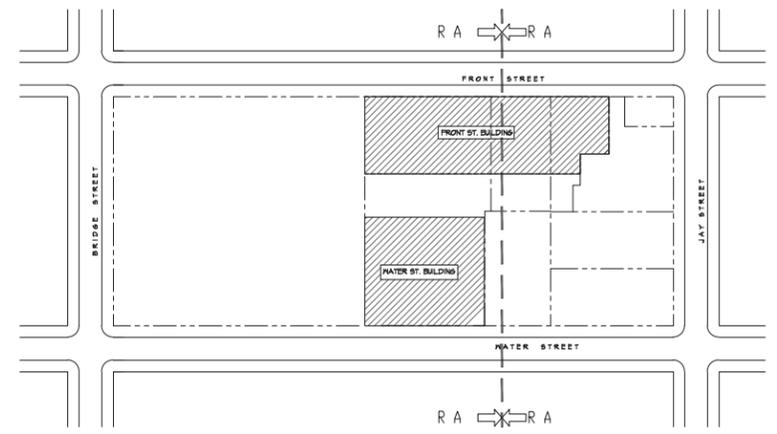
SCALE:
 SEE SCALE BAR

ATC PROJECT: # 15.44291.0004

DRAWING NO. **FIG-4**
 SHEET OF
 DATE: 09.03.13
 REVISION No. 0

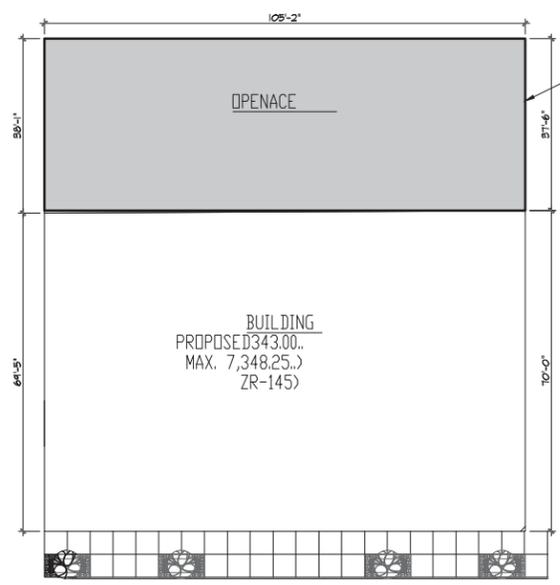


SECTION
SCALE IN FEET
0 10 20



KEYPLAN
NOT TO SCALE

AREA OF IMPORTED BACKFILL MEETING THE TRACK 4 RESTRICTED RESIDENTIAL SCO'S FROM THE ADJOINING SITE AT 177 FRONT STREET



LOT COVERAGE DIAGRAM
NOT TO SCALE

CLIENT:
DUMBO ASSEMBLAGE LLC
ADDRESS:
22 CORTLAND STREET
16TH FLOOR
NEW YORK, NY 10007

SITE ADDRESS:
200 WATER STREET
BROOKLYN, NY 11201

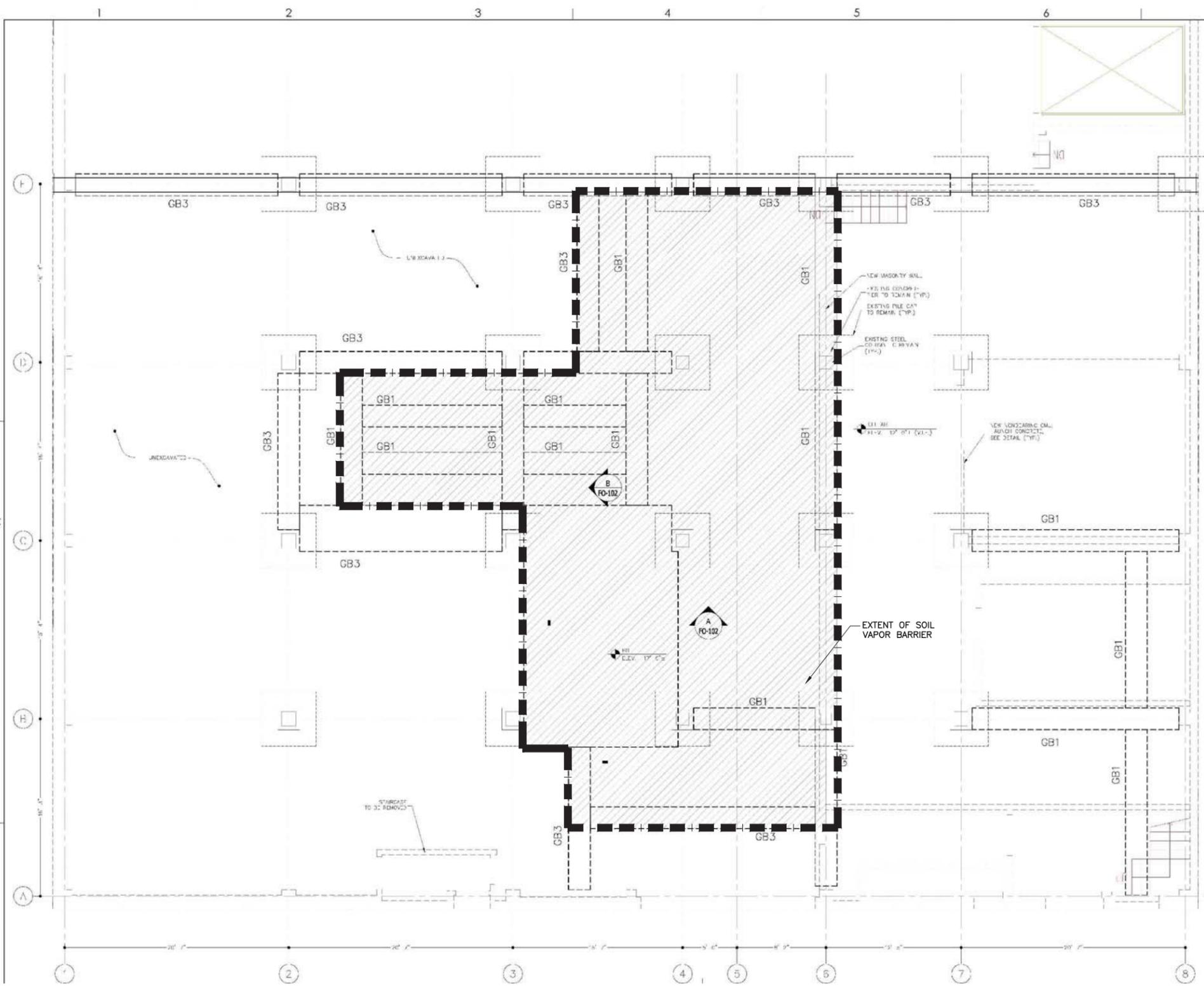
Cardno ATC
Shaping the Future
104 EAST 25th STREET, 10th FLOOR NEW YORK, NY 10010
TEL: (212) 353-8280 FAX: (212) 353-8306

DRAWING BY: M. SVERDEL
INSPECTED BY: J. MYERS
DESIGNED BY: J. MYERS
CHECKED BY:

DRAWING TITLE:
TYPICAL DESIGN FOR THE
REMEDIAL COVER SYSTEM

DRAWING NO. **FIG-5**
SHT. OF
DATE: 09.03.13
REVISION No. 0

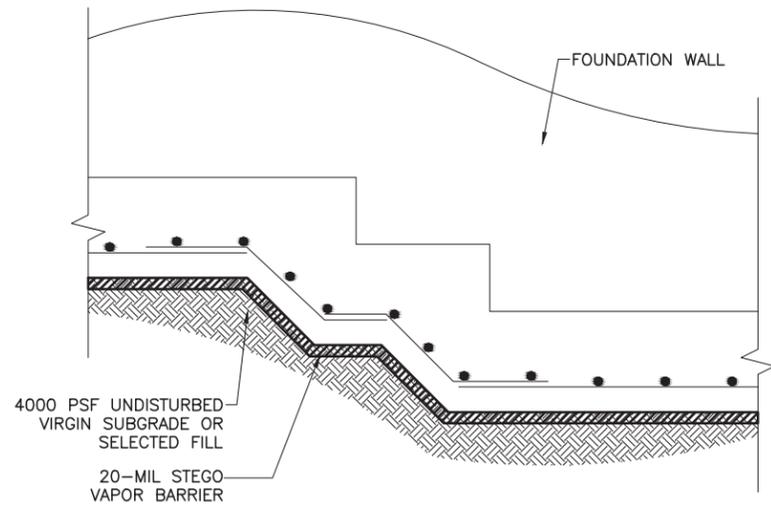
SCALE SEE SCALE BAR
ATC PROJECT: # 15.44291.0004



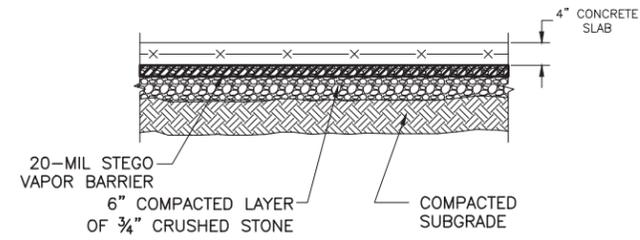
EXTENT OF PROPOSED VAPOR BARRIER



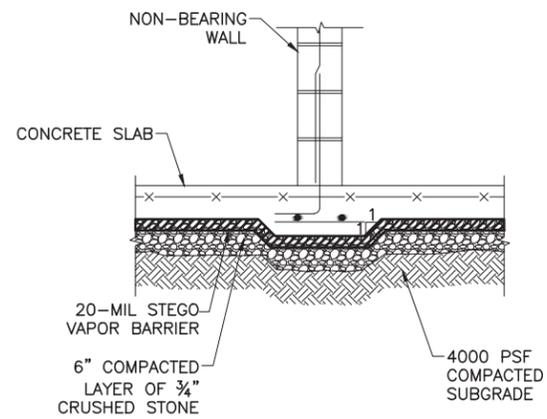
CLIENT: DUMBO ASSEMBLAGE LLC ADDRESS: 22 CORTLAND STREET 16TH FLOOR NEW YORK, NY 10007	SITE ADDRESS: 200 WATER STREET BROOKLYN, NY 11201	 Cardno ATC Shaping the Future 104 EAST 25th STREET, 10th FLOOR NEW YORK, NY 10010 TEL: (212) 353-8280 FAX: (212) 353-8306	DRAWING BY: M. SVERDEL	DRAWING TITLE: EXTENT OF PROPOSED VAPOR BARRIER	DRAWING NO. FIG-6
			INSPECTED BY: J. MYERS		SHEET OF DATE: 09.03.13
			DESIGNED BY: J. MYERS	SCALE SEE SCALE BAR	REVISION No. 0
			CHECKED BY:	ATC PROJECT: # 15.44291.0004	



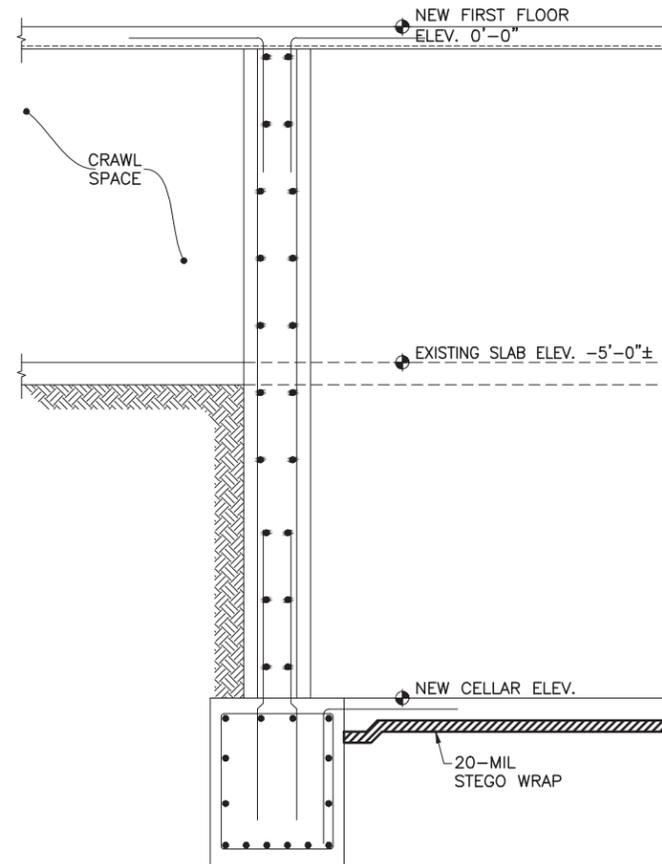
TYPICAL STEP FOOTING DETAIL



TYPICAL 4" CONCRETE SLAB ON GRADE



TYPICAL HAUNCH SLAB UNDER NON-BEARING WALL



TYPICAL GRADE BEAM

CLIENT:
DUMBO ASSEMBLAGE LLC
 ADDRESS:
 22 CORTLAND STREET
 16TH FLOOR
 NEW YORK, NY 10007

SITE ADDRESS:
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DRAWING BY: M. SVERDEL
 INSPECTED BY: J. MYERS
 DESIGNED BY: J. MYERS
 CHECKED BY:

DRAWING TITLE:
 VAPOR BARRIER DETAIL DRAWINGS
 SCALE:
 N.T.S.
 ATC PROJECT: # 15.44291.0004

DRAWING NO.
FIG-7
 SHEET OF
 DATE: 09.03.13
 REVISION No.
 0

TABLES

**TABLE 2
IMPORTED BACKFILL AND CLEAN SOIL LIMITS**

Contaminant	CAS NUMBER	Protection of Public Health			
		Residential	Restricted Residential	Commercial	Industrial
METALS					
Arsenic	7440-38-2	16 ^f	16 ^f	16 ^f	16 ^f
Barium	7440-39-3	350 ^f	400	400	10,000 ^d
Beryllium	7440-41-7	14	72	590	2,700
Cadmium	7440-43-9	2.5 ^f	4.3	9.3	60
Chromium, hexavalent ^h	18540-29-9	22	110	400	800
Chromium, trivalent ^h	16065-83-1	36	180	1,500	6,800
Copper	7440-50-8	270	270	270	10,000 ^d
Total Cyanide ^h		27	27	27	10,000 ^d
Lead	7439-92-1	400	400	1,000	3,900
Manganese	7439-96-5	2,000 ^f	2,000 ^f	10,000 ^d	10,000 ^d
Total Mercury		0.81 ⁱ	0.81 ⁱ	2.8 ^j	5.7 ^j
Nickel	7440-02-0	140	310	310	10,000 ^d
Selenium	7782-49-2	36	180	1,500	6,800
Silver	7440-22-4	36	180	1,500	6,800
Zinc	7440-66-6	2200	10,000 ^d	10,000 ^d	10,000 ^d
PCBs/PESTICIDES					
2,4,5-TP Acid (Silvex)	93-72-1	58	100 ^a	500 ^b	1,000 ^c
4,4'-DDE	72-55-9	1.8	8.9	62	120
4,4'-DDT	50-29-3	1.7	7.9	47	94
4,4'-DDD	72-54-8	2.6	13	92	180
Aldrin	309-00-2	0.019	0.097	0.68	1.4
alpha-BHC	319-84-6	0.097	0.48	3.4	6.8
beta-BHC	319-85-7	0.072	0.36	3	14
Chlordane (alpha)	5103-71-9	0.91	4.2	24	47
delta-BHC	319-86-8	100 ^a	100 ^a	500 ^b	1,000 ^c
Dibenzofuran	132-64-9	14	59	350	1,000 ^c
Dieldrin	60-57-1	0.039	0.2	1.4	2.8
Endosulfan I	959-98-8	4.8 ⁱ	24 ⁱ	200 ⁱ	920 ⁱ
Endosulfan II	33213-65-9	4.8 ⁱ	24 ⁱ	200 ⁱ	920 ⁱ
Endosulfan sulfate	1031-07-8	4.8 ⁱ	24 ⁱ	200 ⁱ	920 ⁱ
Endrin	72-20-8	2.2	11	89	410
Heptachlor	76-44-8	0.42	2.1	15	29
Lindane	58-89-9	0.28	1.3	9.2	23
Polychlorinated biphenyls	1336-36-3	1	1	1	25
SEMIVOLATILES					
Acenaphthene	83-32-9	100 ^a	100 ^a	500 ^b	1,000 ^c
Acenaphthylene	208-96-8	100 ^a	100 ^a	500 ^b	1,000 ^c
Anthracene	120-12-7	100 ^a	100 ^a	500 ^b	1,000 ^c
Benz(a)anthracene	56-55-3	1 ^f	1 ^f	5.6	11
Benzo(a)pyrene	50-32-8	1 ^f	1 ^f	1 ^f	1.1
Benzo(b)fluoranthene	205-99-2	1 ^f	1 ^f	5.6	11
Benzo(g,h,i)perylene	191-24-2	100 ^a	100 ^a	500 ^b	1,000 ^c

TABLE 2
IMPORTED BACKFILL AND CLEAN SOIL LIMITS

Contaminant	CAS NUMBER	Protection of Public Health			
		Residential	Restricted Residential	Commercial	Industrial
Benzo(k)fluoranthene	207-08-9	1	3.9	56	110
Chrysene	218-01-9	1 ^f	3.9	56	110
Dibenz(a,h)anthracene	53-70-3	0.33 ^e	0.33 ^e	0.56	1.1
Fluoranthene	206-44-0	100 ^a	100 ^a	500 ^b	1,000 ^c
Fluorene	86-73-7	100 ^a	100 ^a	500 ^b	1,000 ^c
Indeno(1,2,3-cd)pyrene	193-39-5	0.5 ^f	0.5 ^f	5.6	11
m-Cresol	108-39-4	100 ^a	100 ^a	500 ^b	1,000 ^c
Naphthalene	91-20-3	100 ^a	100 ^a	500 ^b	1,000 ^c
o-Cresol	95-48-7	100 ^a	100 ^a	500 ^b	1,000 ^c
p-Cresol	106-44-5	34	100 ^a	500 ^b	1,000 ^c
Pentachlorophenol	87-86-5	2.4	6.7	6.7	55
Phenanthrene	85-01-8	100 ^a	100 ^a	500 ^b	1,000 ^c
Phenol	108-95-2	100 ^a	100 ^a	500 ^b	1,000 ^c
Pyrene	129-00-0	100 ^a	100 ^a	500 ^b	1,000 ^c
VOLATILES					
1,1,1-Trichloroethane	71-55-6	100 ^a	100 ^a	500 ^b	1,000 ^c
1,1-Dichloroethane	75-34-3	19	26	240	480
1,1-Dichloroethene	75-35-4	100 ^a	100 ^a	500 ^b	1,000 ^c
1,2-Dichlorobenzene	95-50-1	100 ^a	100 ^a	500 ^b	1,000 ^c
1,2-Dichloroethane	107-06-2	2.3	3.1	30	60
cis-1,2-Dichloroethene	156-59-2	59	100 ^a	500 ^b	1,000 ^c
trans-1,2-Dichloroethene	156-60-5	100 ^a	100 ^a	500 ^b	1,000 ^c
1,3-Dichlorobenzene	541-73-1	17	49	280	560
1,4-Dichlorobenzene	106-46-7	9.8	13	130	250
1,4-Dioxane	123-91-1	9.8	13	130	250
Acetone	67-64-1	100 ^a	100 ^b	500 ^b	1,000 ^c
Benzene	71-43-2	2.9	4.8	44	89
Butylbenzene	104-51-8	100 ^a	100 ^a	500 ^b	1,000 ^c
Carbon tetrachloride	56-23-5	1.4	2.4	22	44
Chlorobenzene	108-90-7	100 ^a	100 ^a	500 ^b	1,000 ^c
Chloroform	67-66-3	10	49	350	700
Ethylbenzene	100-41-4	30	41	390	780
Hexachlorobenzene	118-74-1	0.33 ^e	1.2	6	12
Methyl ethyl ketone	78-93-3	100 ^a	100 ^a	500 ^b	1,000 ^c
Methyl tert-butyl ether	1634-04-4	62	100 ^a	500 ^b	1,000 ^c
Methylene chloride	75-09-2	51	100 ^a	500 ^b	1,000 ^c
n-Propylbenzene	103-65-1	100 ^a	100 ^a	500 ^b	1,000 ^c
sec-Butylbenzene	135-98-8	100 ^a	100 ^a	500 ^b	1,000 ^c
tert-Butylbenzene	98-06-6	100 ^a	100 ^a	500 ^b	1,000 ^c
Tetrachloroethene	127-18-4	5.5	19	150	300
Toluene	108-88-3	100 ^a	100 ^a	500 ^b	1,000 ^c

**TABLE 2
IMPORTED BACKFILL AND CLEAN SOIL LIMITS**

Contaminant	CAS NUMBER	Protection of Public Health			
		Residential	Restricted Residential	Commercial	Industrial
Trichloroethene	79-01-6	10	21	200	400
1,2,4-Trimethylbenzene	95-63-6	47	52	190	380
1,3,5-Trimethylbenzene	108-67-8	47	52	190	380
Vinyl chloride	75-01-4	0.21	0.9	13	27
Xylene (mixed)	1330-20-7	100 ^a	100 ^a	500 ^b	1,000 ^c

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.

^f For constituents where the calculated SCO was lower than the rural soil background concentration as determined by the Department and Department of Health rural soil survey, the rural soil background concentration is used as the Track 2 SCO value for this use of the site.

^g This SCO is derived from data on mixed isomers of BHC.

^h The SCO for this specific compound (or family of compounds) is considered to be met if the analysis for the total species of this contaminant is below the specific SCO.

ⁱ This SCO is for the sum of endosulfan I, endosulfan II, and endosulfan sulfate.

^j This SCO is the lower of the values for mercury (elemental) or mercury (inorganic salts). See TSD Table 5.6-1.

APPENDIX 1

CITIZEN PARTICIPATION PLAN

The NYC Office of Environmental Remediation and Dumbo Assemblage 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, Dumbo Assemblage 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, Rebecca Bud, who can be contacted about these issues or any others questions, comments or concerns that arise during the remedial process at (212) 788-8841

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

Repositories. A document repository is maintained in the nearest public library that maintains evening and weekend hours. This document repository is intended to house, for community review, all principal documents generated during the cleanup program including Remedial Investigation plans and reports, Remedial Action work plans and reports, and all public notices and fact sheets produced during the lifetime of the remedial project. Dumbo Assemblage LLC will inspect the repositories to ensure that they are fully populated with project information. The repository for this project is:

Brooklyn Heights Library

280 Cadman Plaza, Brooklyn, NY 11201

718-623-7100

Hours of Operation: Monday – Friday 8:00 to 1:00; Saturday 9:00 to 1:00; Sunday 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. Enrollee is not aware of any issues of public concern at the present time.

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

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

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

Public notice in the form of a Fact Sheet is sent to all parties listed on the Site Contact List announcing the availability of the Remedial Investigation Report and Remedial Action Work Plan and the initiation of a 30-day public comment period on the Remedial Action Work Plan. The Fact Sheet summarizes the findings of the RIR and provides details of the RAWP. The public comment period will be extended an additional 15 days upon public request. A public meeting or informational session will be conducted by OER upon request.

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

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

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

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

APPENDIX 2

SUSTAINABILITY STATEMENT

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

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

An estimate of the quantity (in tons) of clean, non-virgin materials (reported by type of material) reused under this plan will be quantified and reported in the RAR.

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

An estimate of the quantity (in tons) of virgin and non-renewable resources, the use of which will be avoided under this plan, will be quantified and reported in the RAR.

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

The selection of Alternative 2 reduces energy consumption over Alternative 1 by reducing the amount of excavation and transportation and disposal of impacted soils.

Best efforts will be made to quantify energy efficiencies achieved during the remediation and will be reported in the Remedial Action Report (RAR). Where energy savings cannot be easily quantified, a gross indicator of the amount of energy saved or the means by which energy savings was achieved will be reported.

Conversion to Clean Fuels. Use of clean fuel improves NYC's air quality by reducing harmful emissions.

An estimate of the volume of clean fuels used during remedial activities will be quantified and reported in the RAR.

Recontamination Control. Recontamination after cleanup and redevelopment is completed undermines the value of work performed, may result in a property that is less protective of public health or the environment, and may necessitate additional cleanup work later or impede future redevelopment. Recontamination can arise from future releases that occur within the property or by influx of contamination from off-Site.

An estimate of the area of the Site that utilizes recontamination controls under this plan will be reported in the RAR in square feet.

Storm-water Retention. Storm-water retention improves water quality by lowering the rate of combined storm-water and sewer discharges to NYC's sewage treatment plants during periods of precipitation, and reduces the volume of untreated influent to local surface waters.

An estimate of the enhanced storm-water retention capability of the redevelopment project will be included in the RAR.

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

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

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

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

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

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

APPENDIX 3

SOIL/MATERIALS MANAGEMENT PLAN

1.1 SOIL SCREENING METHODS

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

1.2 STOCKPILE METHODS

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

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

1.3 CHARACTERIZATION OF EXCAVATED MATERIALS

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

1.4 MATERIALS EXCAVATION, LOAD-OUT AND DEPARTURE

The PE/QEP overseeing the remedial action will:

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

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

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

1.5 OFF-SITE MATERIALS TRANSPORT

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

Outbound truck transport routes will be determined once the final disposal facility is selected. This routing takes into account the following factors: (a) limiting transport through residential areas and past sensitive sites; (b) use of mapped truck routes; (c) minimizing off-Site queuing of trucks entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport. To the extent possible, all trucks loaded with Site materials will travel from the Site using these truck routes. Trucks will not stop or idle in the neighborhood after leaving the project Site.

1.6 MATERIALS DISPOSAL OFF-SITE

The following documentation will be established and reported by the PE/QEP for each disposal destination used in this project to document that the disposal of regulated material exported from the Site conforms with applicable laws and regulations: (1) a letter from the PE/QEP or Enrollee to each disposal facility describing the material to be disposed and requesting written acceptance of the material. This letter will state that material to be disposed is regulated material generated at an environmental remediation Site in Brooklyn, New York under a governmental remediation program. The letter will provide the project identity and the name and phone number of the PE/QEP or Enrollee. The letter will include as an attachment a summary of all chemical data for the material being transported; and (2) a letter from each disposal facility stating it is in receipt of the correspondence (1, above) and is approved to accept the material. These documents will be included in the RAR.

The Remedial Action Report will include an itemized account of the destination of all 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.

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. At the present time reuse of on-Site materials is not anticipated.

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 2.

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.
- Soil from the adjoining property at 177 Front Street that meets the Track Restricted Residential SCOs listed in Table 1.

All materials received for import to the Site will be approved by a PE/QEP and will be in compliance with provisions in this RAWP. The RAR will report the source of the fill, evidence

that an inspection was performed on the source, chemical sampling results, frequency of testing, and a Site map indicating the locations where backfill or soil cover was placed.

Source Screening and Testing

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

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

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

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

1.10 FLUIDS MANAGEMENT

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

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

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

1.11 STORM-WATER POLLUTION PREVENTION

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

1.12 CONTINGENCY PLAN

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

will be included in the daily report. If previously unidentified contaminant sources are found during on-Site remedial excavation or development-related excavation, sampling will be performed on contaminated source material and surrounding soils and reported to OER. Chemical analytical testing will be performed for TAL metals, TCL volatiles and semi-volatiles, TCL pesticides and PCBs, as appropriate.

1.13 ODOR, DUST AND NUISANCE CONTROL

Odor Control

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

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

Dust Control

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

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

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

Other Nuisances

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

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

APPENDIX 4

PROPOSED DEVELOPMENT PLANS

PROPOSED REAR YARD & ROOFTOP ADDITIONS 200 WATER STREET BROOKLYN, NY

DEVELOPER

DUMBO Associates LLC
22 Cortland St.
New York, NY 10007
tel.: 212.419.0567

ARCHITECT:

asap **Aufgang + Subotovsky**
Architecture and Planning
PLLC
49 North Airmont Road, Suffern, NY 10901
tel: 845.368.0004 www.asaparchitecture.com
fax: 800.772.8304

STRUCTURAL ENGINEER:

BROOKER ENGINEERING, PLLC
76 LAFAYETTE AVENUE, SUFFERN, NEW YORK 10901
TEL: 845-357-4411
FAX: 845-357-1896

MECHANICAL ENGINEER:

ETTINGER ENGINEERING ASSOCIATES CONSULTING
85 BUSH AVENUE, NEW YORK, NEW YORK 10001
TEL: 212-244-2410 FAX: 212-643-1606



FRONT ELEVATION
NOT TO SCALE



REAR ELEVATION
NOT TO SCALE

DRAWING SCHEDULE:

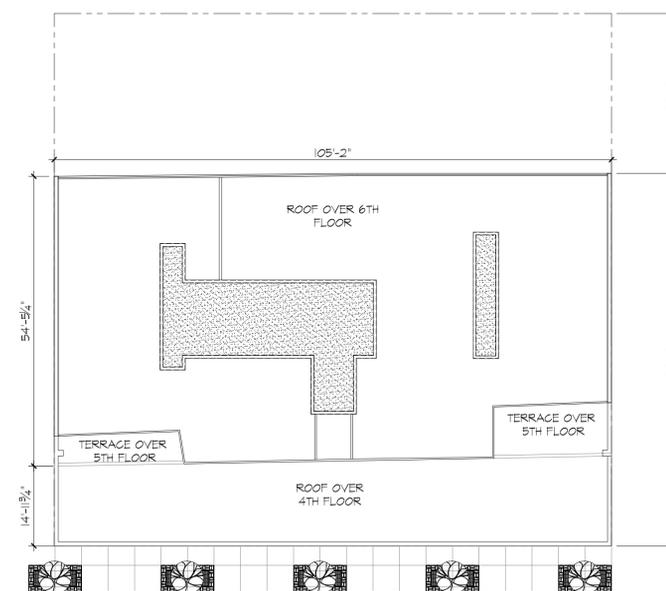
T-001	COVER SHEET
C-001	EXISTING WATER ST. BUILDING, BLOCK PLAN HEIGHTS, AERIAL & AXONOMETRIC VIEW
C-002	PROPOSED WATER ST. BUILDING, AERIAL & AXONOMETRIC VIEW
C-003	WATER STREET BUILDING PERSPECTIVE VIEW
C-004	OVERALL MAP
C-005	SITE MAPS
A-100	BASEMENT FLOOR PLAN
A-101	1ST FLOOR PLAN
A-102	2ND THROUGH 4TH FLOOR PLANS
A-103	5TH FLOOR PLAN
A-104	6TH FLOOR PLAN
A-105	ROOF PLANS
A-200	EXISTING FRONT ELEVATION & NEIGHBORING BUILDINGS
A-201	FRONT ELEVATION & NEIGHBORING BUILDINGS
A-202	REAR ELEVATION & NEIGHBORING BUILDINGS
A-210	SECTION A-A
A-211	SIGLINE SECTIONS

APARTMENT DISTRIBUTION			
	2 BR.	3 BR.	TOTAL
1ST FLOOR	1	1	2
2ND FLOOR	0	3	3
3RD FLOOR	0	3	3
4TH FLOOR	0	3	3
5TH FLOOR	0	2	2
6TH FLOOR	1	1	2
TOTAL	2	13	15
PERCENT	13.3%	86.7%	100%

IN PROGRESS LANDMARK SET 08-02-13



VICINITY MAP
NOT TO SCALE



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

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PLLC
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www.asaparchitecture.com

PROPOSED REAR YARD & ROOFTOP ADDITIONS:
DUMBO
200 WATER ST., BROOKLYN, NEW YORK 11201
WATER STREET BUILDING
COVER SHEET

DATE: 06-19-13
PROJECT NO: #1314
DRAWN BY: AFM
CHECKED BY: PC
DRAWING NO:

T-001.00

SCALE: AS NOTED SHEET NO: 1 of 17
NYC DOB NUMBER:

1 2 3 4 5 6 7 8

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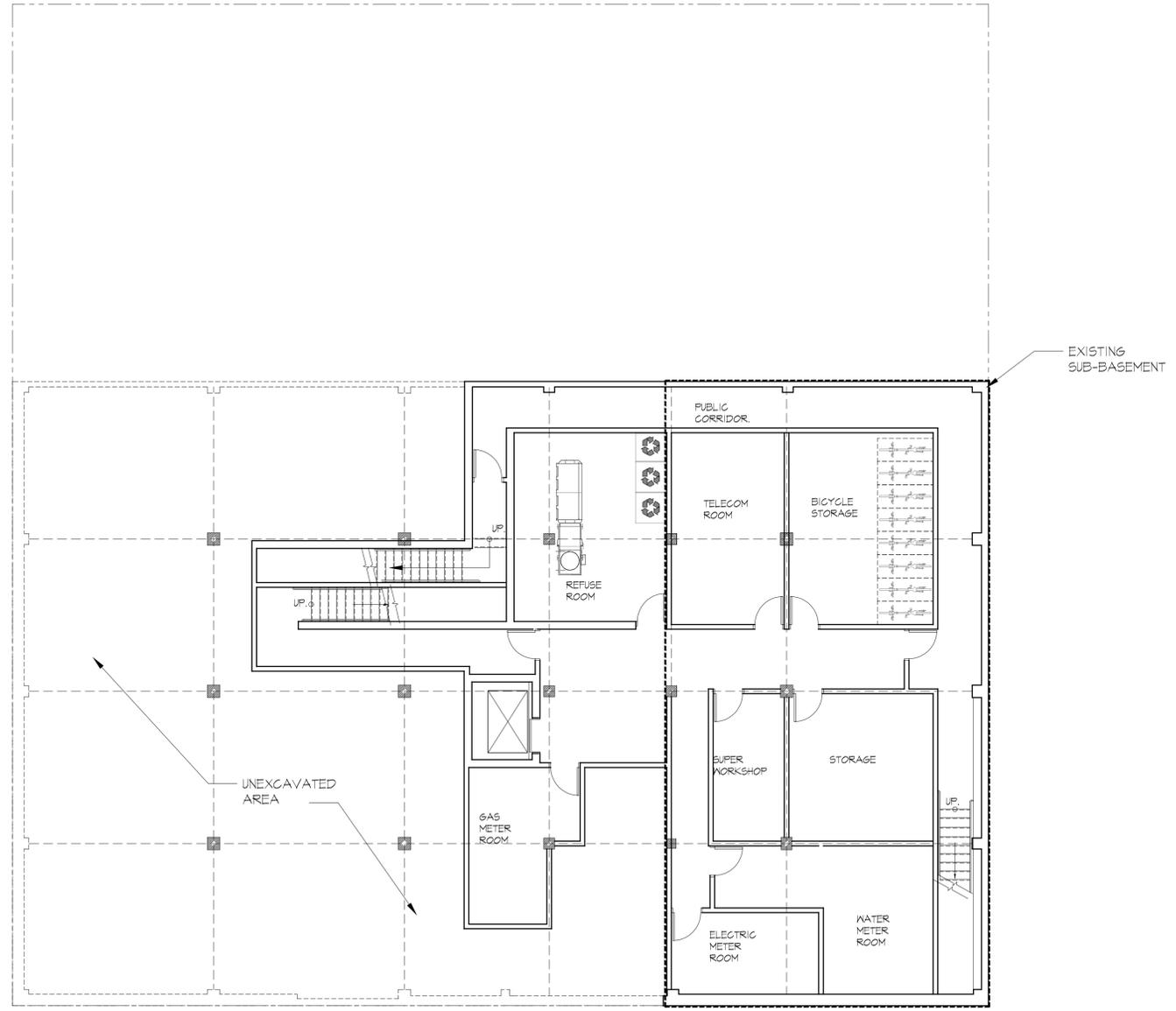
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IN PROGRESS LANDMARK SET 08-02-13

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



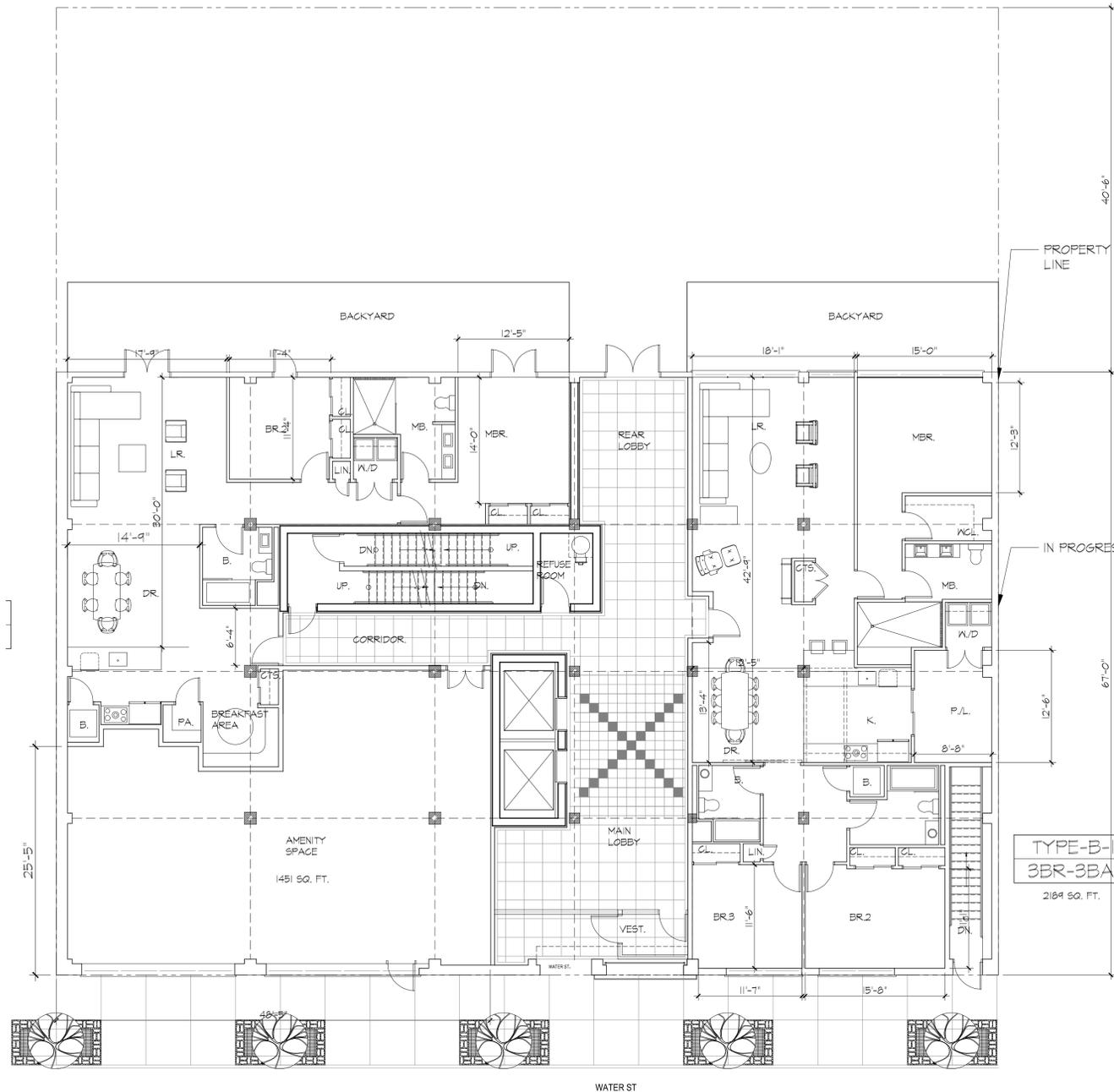
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PROPOSED REAR YARD & ROOFTOP ADDITIONS:	
DUMBO	
200 WATER ST., BROOKLYN, NEW YORK 11201	
WATER STREET BUILDING	
BASEMENT FLOOR PLAN	
DATE:	06-19-13
PROJECT NO:	#1314
DRAWN BY:	VF/AFM
CHECKED BY:	PC
DRAWING NO:	A-100.00
SCALE:	AS NOTED
SHEET NO:	7 of 17
NYC DOB NUMBER:	

1 2 3 4 5 6 7 8



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



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PROPOSED REAR YARD & ROOFTOP ADDITIONS:
DUMBO
200 WATER ST., BROOKLYN, NEW YORK 11201

WATER STREET BUILDING
1ST FLOOR PLAN

DATE:	06-19-13
PROJECT NO:	#1314
DRAWN BY:	VF/AFM
CHECKED BY:	PC
DRAWING NO:	A-101.00
SCALE:	AS NOTED
SHEET NO:	8 of 17
NYC DOB NUMBER:	

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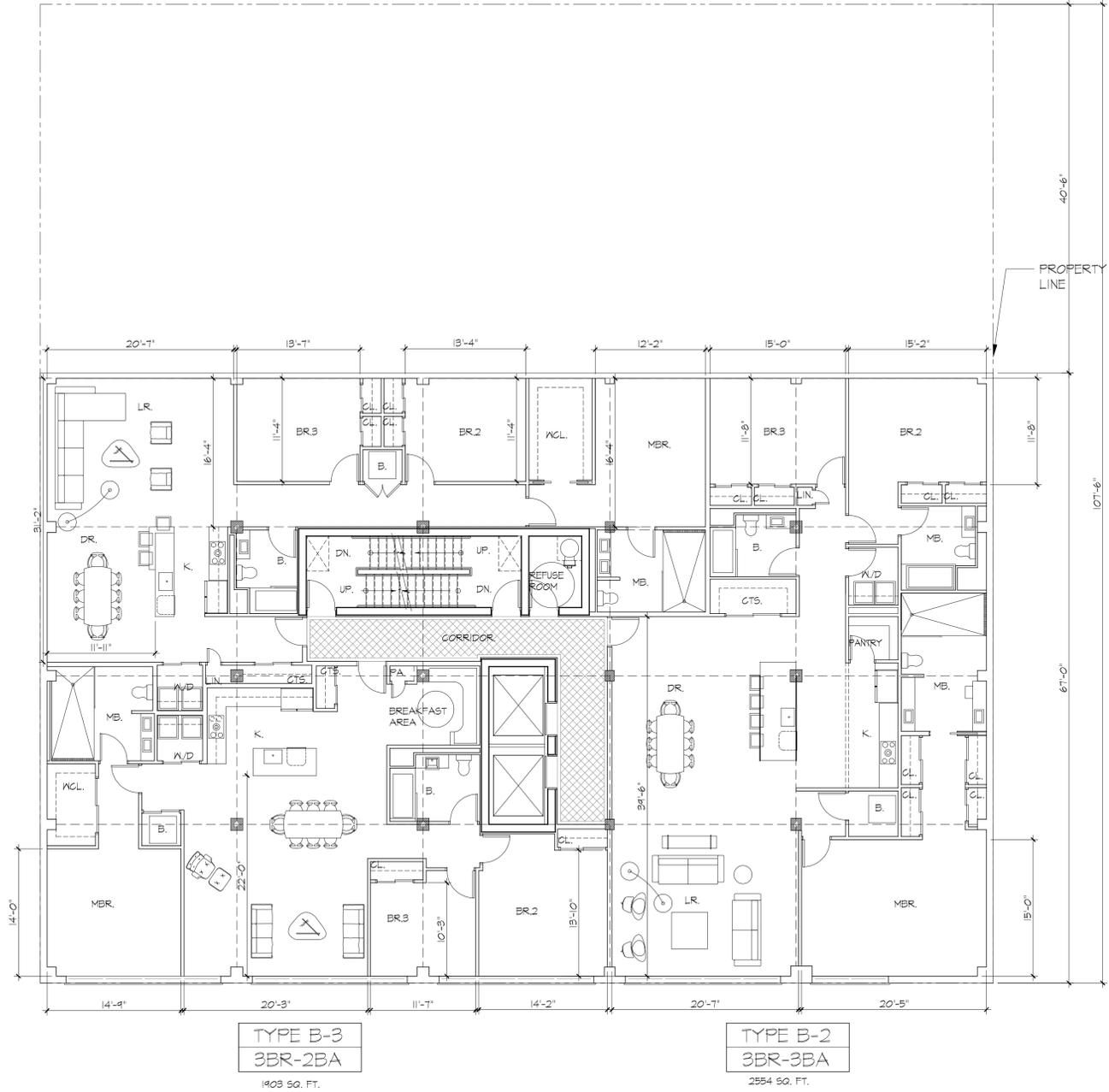
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TYPE B-4
3BR-2BA
1884 SQ. FT.

TYPE B-3
3BR-2BA
1403 SQ. FT.

TYPE B-2
3BR-3BA
2554 SQ. FT.

2ND THROUGH 4TH
FLOOR PLANS
SCALE : 1/8" = 1'-0"



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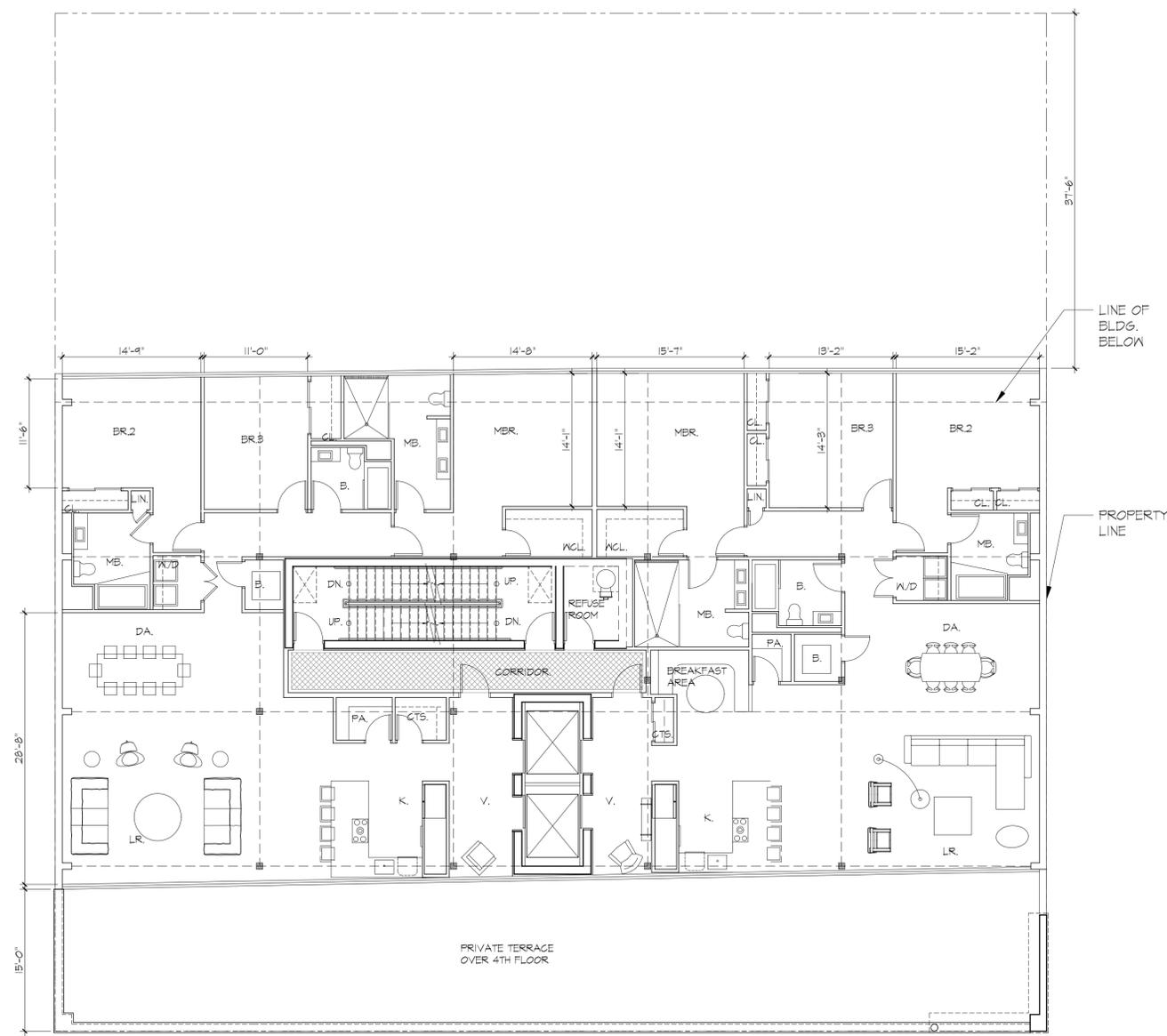
PROPOSED REAR YARD & ROOFTOP ADDITIONS:
DUMBO
200 WATER ST., BROOKLYN, NEW YORK 11201
WATER STREET BUILDING
2ND THROUGH 4TH FLOOR PLANS

DATE:	06-19-13
PROJECT NO:	#1314
DRAWN BY:	VF/AFM
CHECKED BY:	PC
DRAWING NO:	A-102.00
SCALE:	AS NOTED
SHEET NO:	9 of 17
NYC DOB NUMBER:	

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TYPE B-5
3BR-3BA
2490 SQ. FT.

TYPE B-6
3BR-3BA
2526 SQ. FT.

5TH FLOOR PLAN
SCALE: 1/8" = 1'-0"



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PROPOSED REAR YARD & ROOFTOP ADDITIONS:
DUMBO
200 WATER ST., BROOKLYN, NEW YORK 11201

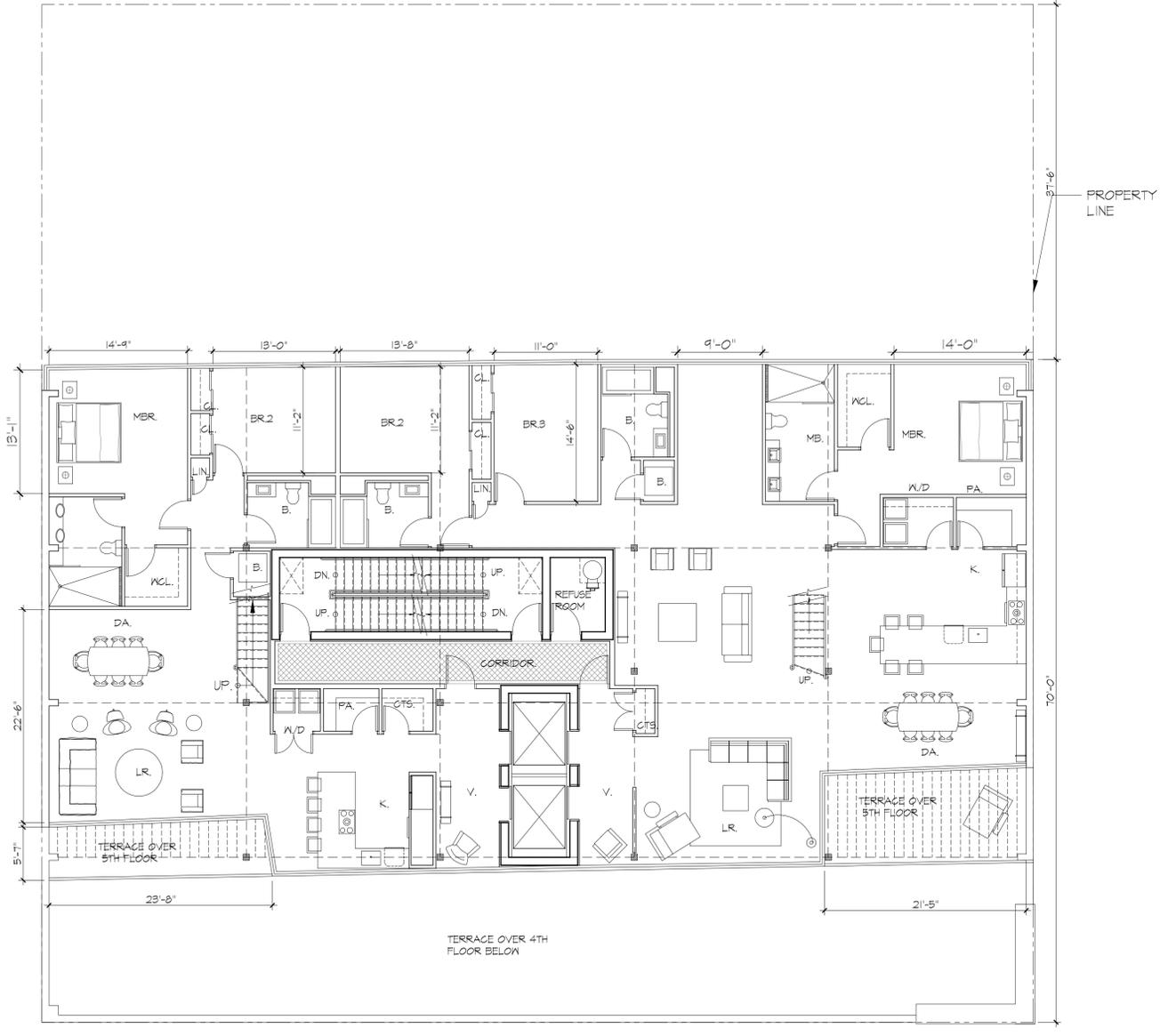
WATER STREET BUILDING
5TH FLOOR PLAN

DATE:	06-19-13
PROJECT NO:	#1314
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CHECKED BY:	PC
DRAWING NO:	A-103.00
SCALE:	AS NOTED
SHEET NO:	10 of 17
NYC DOB NUMBER:	

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TYPE A-2
2BR-2BA
1826 SQ. FT.

TYPE B-7
3BR-3BA
2850 SQ. FT.

6TH FLOOR PLAN
SCALE : 1/8" = 1'-0"



IN PROGRESS LANDMARK SET 08-02-13

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PROPOSED REAR YARD & ROOFTOP ADDITIONS:
DUMBO
200 WATER ST., BROOKLYN, NEW YORK 11201

WATER STREET BUILDING
6TH FLOOR PLAN

DATE:	06-19-13
PROJECT NO:	#1314
DRAWN BY:	VF/AFM
CHECKED BY:	PC
DRAWING NO:	A-104.00
SCALE:	AS NOTED
SHEET NO:	11 of 17
NYC DOB NUMBER:	

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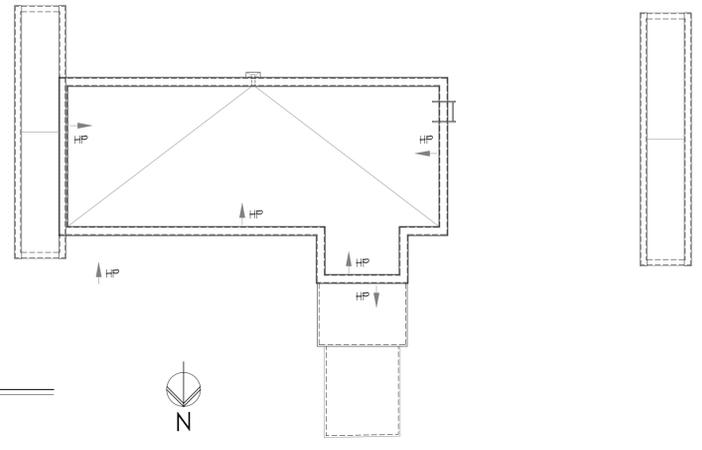
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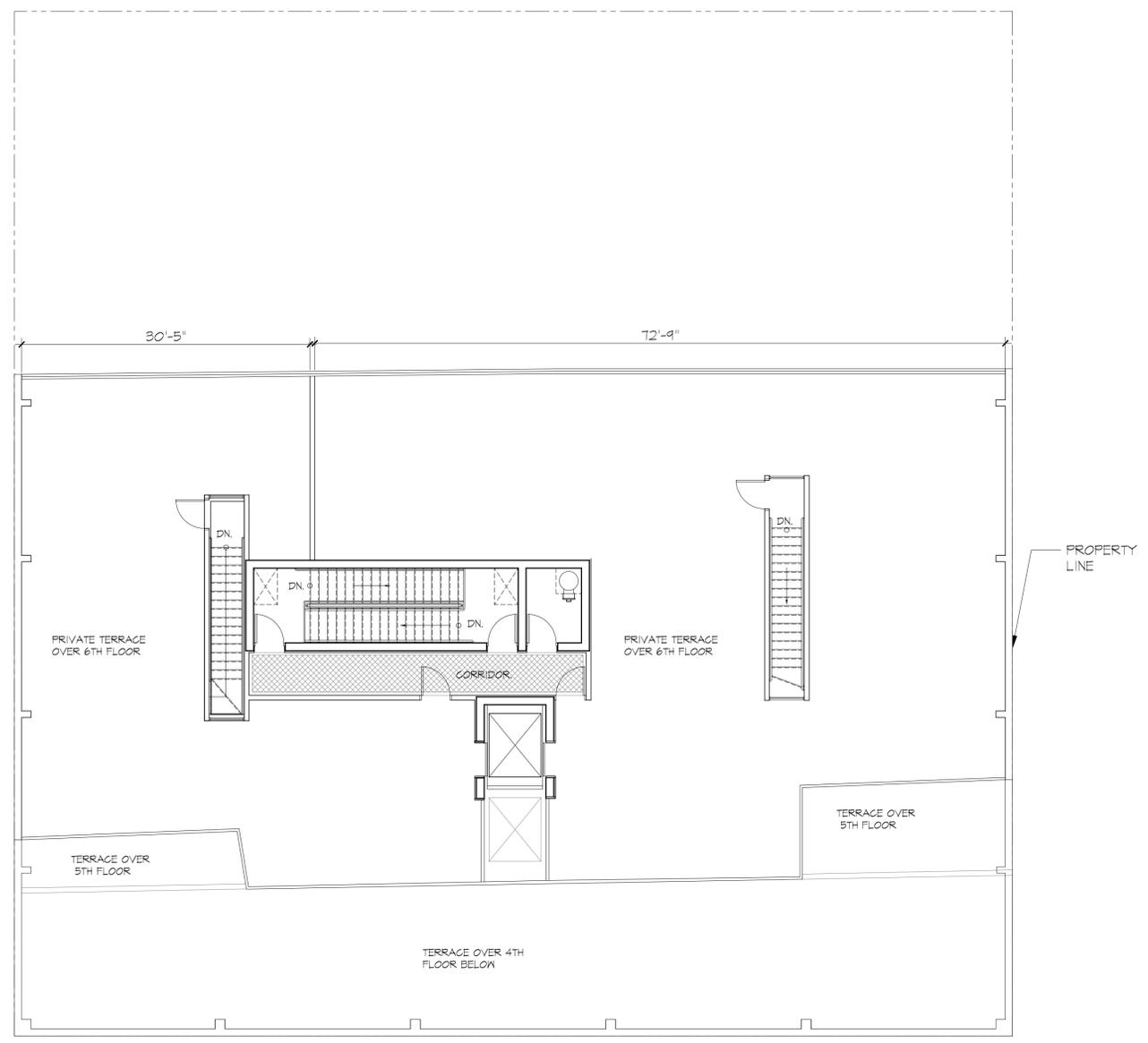
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ROOF OVER BULKHEADS
SCALE : 1/8" = 1'-0"



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

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200 WATER ST., BROOKLYN, NEW YORK 11201

WATER STREET BUILDING
ROOF PLANS

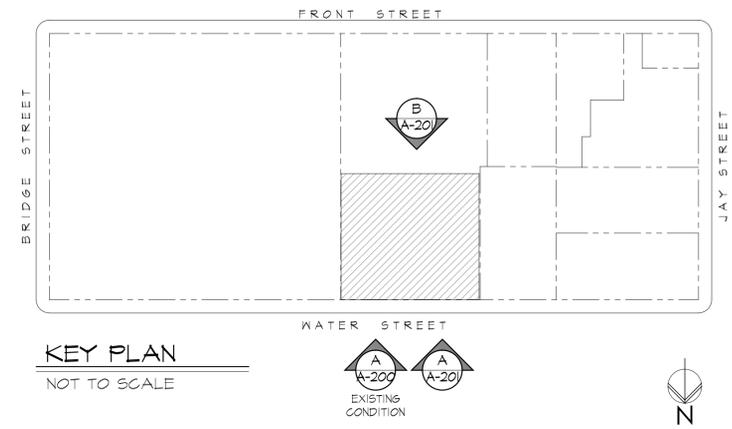
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NYC DOB NUMBER:	

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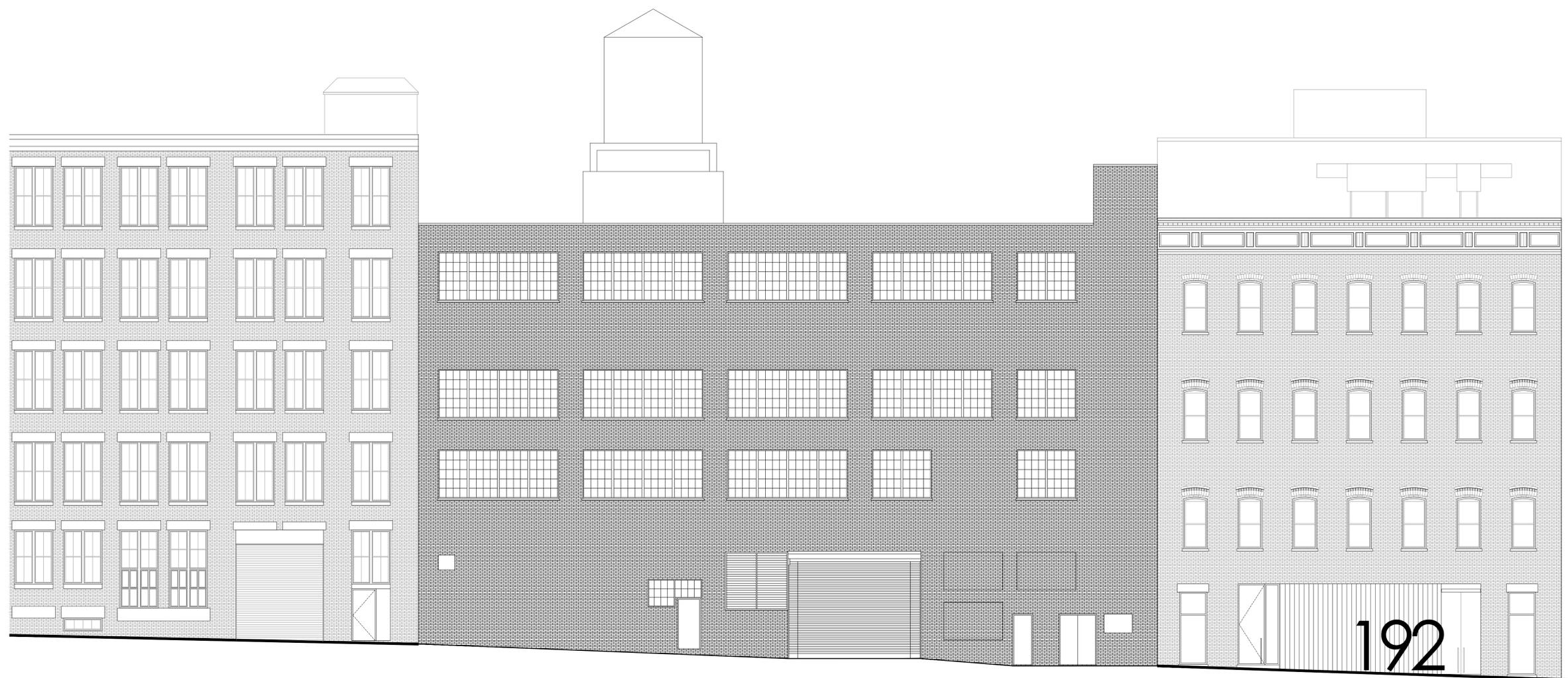
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IN PROGRESS LANDMARK SET 08-02-13

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www.asaparchitecture.com

PROPOSED REAR YARD & ROOFTOP ADDITIONS:
DUMBO
200 WATER ST., BROOKLYN, NEW YORK 11201

WATER STREET BUILDING EXISTING FRONT ELEVATION & NEIGHBORING BUILDINGS

DATE:	06-19-13
PROJECT NO:	#1314
DRAWN BY:	VF/AFM
CHECKED BY:	PC
DRAWING NO:	A-200.00
SCALE:	AS NOTED
SHEET NO:	13 of 17
NYC DOB NUMBER:	

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A-200
EXISTING CONDITION
FRONT ELEVATION
SCALE: 1/8" = 1'-0"

220 WATER STREET

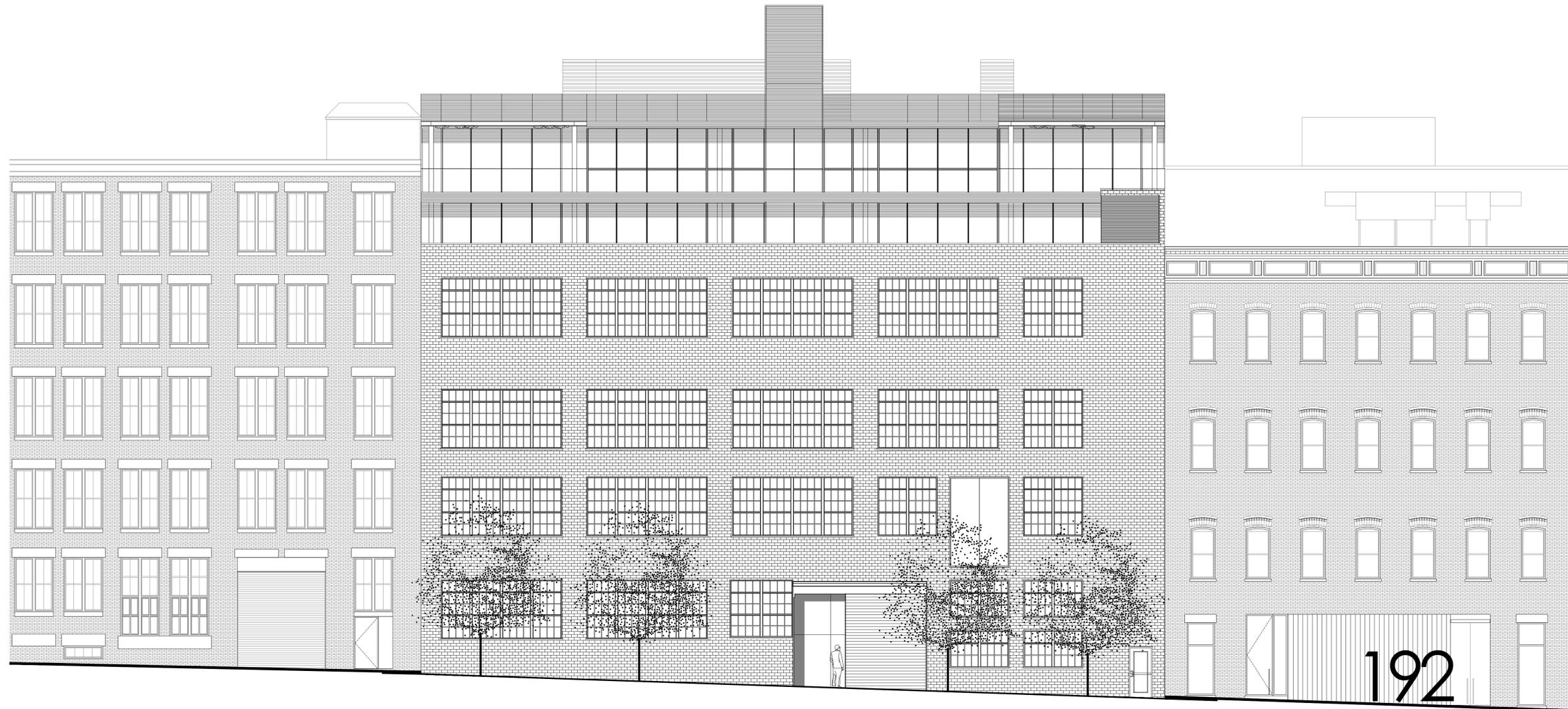
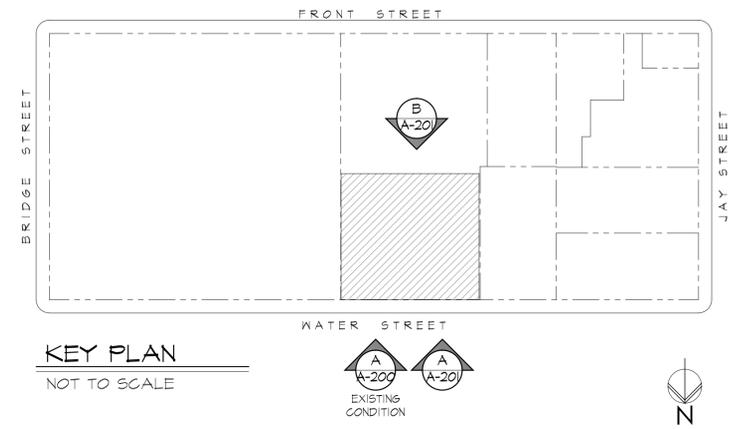
200 WATER STREET

192 WATER STREET

1 2 3 4 5 6 7 8

1 2 3 4 5 6 7 8

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IN PROGRESS LANDMARK SET 08-02-13

← 220 WATER STREET 200 WATER STREET 192 WATER STREET →

A FRONT ELEVATION
A-200 SCALE : 1/8" = 1'-0"

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DUMBO
200 WATER ST., BROOKLYN, NEW YORK 11201

WATER STREET BUILDING
FRONT ELEVATION & NEIGHBORING BUILDINGS

DATE:	06-19-13
PROJECT NO:	#1314
DRAWN BY:	VF/AFM
CHECKED BY:	PC
DRAWING NO:	A-201.00
SCALE:	AS NOTED
SHEET NO:	14 of 17
NYC DOB NUMBER:	

1 2 3 4 5 6 7 8

1 2 3 4 5 6 7 8

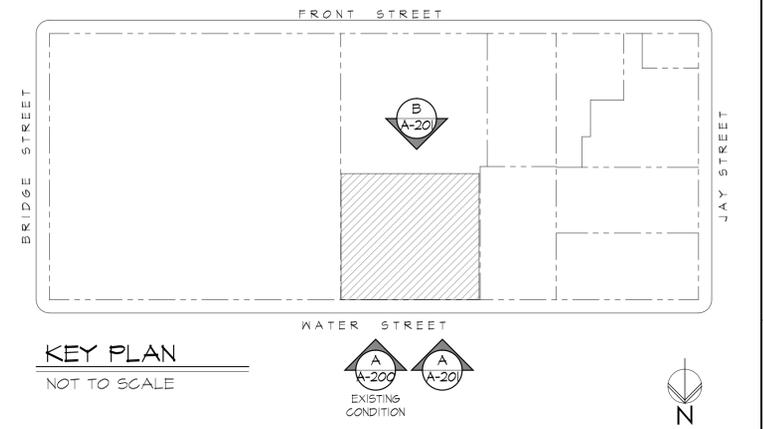
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IN PROGRESS LANDMARK SET 08-02-13

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asap **Aufgang + Subotovsky**
Architecture and Planning
PLLC

49 North Airmont Road, Suffern, NY 10901 tel: 845.368.0004 fax: 800.772.8304
www.asaparchitecture.com

PROPOSED REAR YARD & ROOFTOP ADDITIONS:
DUMBO
200 WATER ST., BROOKLYN, NEW YORK 11201

WATER STREET BUILDING
REAR ELEVATION & NEIGHBORING BUILDINGS

DATE:	06-19-13
PROJECT NO:	#1314
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← 192 WATER STREET X 200 WATER STREET X 220 WATER STREET →

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

1 2 3 4 5 6 7 8

APPENDIX 5
SOIL VAPOR BARRIER DESIGN SPECIFICATIONS

According to information provided by the Developer, an approximate area of 320 square feet of the current basement floor is to be removed and excavated for the installation of a new elevator and to lower the existing floor to match the grade of current the sub-basement. A 20-mil vapor barrier will be installed beneath the concrete slab of this new cellar area, and along the sub-surface walls of the cellar. The selected vapor barrier is the Stego® Wrap Vapor Barrier manufactured by Stego Industries, LLC. Installation will be performed according to the manufacturer's specifications. A Copy of the Stego® Wrap Vapor Barrier specifications and installation instructions is attached.

References and Standards for the Vapor Barrier

American Society for Testing and Materials (ASTM):

1. ASTM E 1745-09 Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.
2. ASTM E 1643-10 Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.

American Concrete Institute (ACI):

1. ACI 302.2R-06 Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.

Materials

The following vapor barrier materials are provided by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com.

1. Stego Wrap Vapor Barrier (15-mil)
2. Stego Tape
3. Stego Mastic
4. Stego CreteClaw Tape
5. Stego Tack Tape
6. Stego Term Bar

Material specifications and cut sheets are present in Appendix C.

Installation

1. The Stego Wrap can be installed directly over an aggregate, sand or tamped earth base. The base material should be level and compact per the geotechnical engineering specifications.

2. Install vapor barrier in accordance with manufacturer's instructions and ASTM E 1643.
3. Unroll vapor barrier with the longest dimension parallel with the direction of the concrete placement. The vapor barrier should completely cover the concrete placement area.
4. All joints/seams both lateral and butt should be overlapped 6 inches and seal with manufacturer's tape. The area of adhesion should be free of dust, dirt and moisture to ensure maximum adhesion of tape.
5. The vapor barrier shall be continuous to prevent vapor intrusion. The vapor barrier shall be placed completely beneath the concrete floor area and exterior sub-grade walls up to street level.
6. Extend vapor barrier over the top of grade beams to a distance acceptable to the structural engineer and terminate as recommended by the manufacturer.
7. Seal around all penetrations such as utility conduits and drainage pipes per manufacturer's instructions.
8. Care should be undertaken to prevent damage to the vapor barrier during construction, including installation of reinforcing steel, utilities and concrete.
9. Repair damaged areas by cutting patches of vapor barrier, overlapping damaged area 6 inches and taping all sides with tape per manufacturer's instructions.

Inspection

Subsequent to installation, prior to concrete placement, the contractor shall coordinate an inspection with the Engineer or its designated representative. The membrane shall not be covered until the contractor has received approval from the Engineer.



Stego® Wrap 20-Mil Vapor Barrier

STEGO INDUSTRIES, LLC



Vapor Retarders
07 26 00, 03 30 00

1. Product Name

Stego Wrap 20-Mil Vapor Barrier

2. Manufacturer

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

3. Product Description

USES: Stego Wrap 20-Mil Vapor Barrier is used as a below-slab vapor barrier, and as a protection course for below grade waterproofing applications.

COMPOSITION: Stego Wrap 20-Mil Vapor Barrier is a multi-layer plastic extrusion manufactured with only the highest grade of prime, virgin, polyolefin resins.

ENVIRONMENTAL FACTORS:

Stego Wrap 20-Mil Vapor Barrier can be used in systems for the control of soil gases (radon, methane), soil poisons (oil by-products) and sulfates.

5. Installation

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

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

6. Availability & Cost

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

7. Warranty

Stego Industries, LLC believes to the best of its knowledge, that specifications and recommendations herein are

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

8. Maintenance

None required.

9. Technical Services

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

4. Technical Data

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

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

Note: perm unit = grains/(ft² *hr* in.Hg)

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





Stego® Mastic

STEGO INDUSTRIES, LLC



Vapor Retarders
07 26 00, 03 30 00

1. Product Name

Stego Mastic

2. Manufacturer

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

3. Product Description

USES: Stego Mastic is designed to be used as a waterproofing and vapor retardant membrane for use in conjunction with Stego Wrap 10-mil and 15-mil Vapor Retarder/Barrier. Stego Mastic can be used as an alternate to boots for pipe penetrations in Stego Wrap Vapor Barrier.

COMPOSITION: Stego Mastic is a medium-viscosity, water-based, polymer-modified anionic bituminous/asphalt emulsion, which exhibits bonding, elongation and water-proofing characteristics.

SIZE: Stego Mastic comes in five-gallon buckets.

4. Technical Data

APPLICABLE STANDARDS:

American Society for Testing and Materials (ASTM)

- ASTM D 412 Standard Test Method for Vulcanized Rubber and Thermoplastic Elastomers - Tension
- ASTM E 154 Standard Test Methods for Water Vapor Retarders Used in Contact with Earth under Concrete Slabs, on Walls, or as Ground Cover
- ASTM G 23 Practice for Operating Light-Exposure Apparatus (Carbon-Arc Type) With and Without Water for Exposure of Nonmetallic Materials (Withdrawn 2000)
- ASTM E 96 Standard Test Methods for Water Vapor Transmission of Materials
- ASTM D 751 Standard Test Methods for Coated Fabrics
- ASTM D 1434 Standard Test Method for Determining Gas Permeability Characteristics of Plastic Film and Sheeting
- ASTM C 836 Standard Specification for High Solids Content, Cold Liquid-Applied Elastomeric Water-proofing

Membrane for Use with Separate Wearing Course.

- ASTM E 1643 Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill under Concrete Slabs.

5. Installation

PREPARATION:

- A test application simulating the project environment should always be done prior to final usage of Stego Mastic.
- All Surfaces should be dry and free of loose materials, oils and other contaminants. The surfaces should be cleaned in the same fashion as the test surface in order to ensure proper results.
- Store above 40°F

PENETRATIONS:

For small pipe and rebar penetrations in Stego Wrap Vapor Barrier cut Stego Wrap just big enough for the penetration. Liberally apply Stego Mastic around the penetration to keep the integrity of the membrane intact. Stego Mastic can be applied by brush, roller, or sprayer.

NOTES: 1) For larger penetrations or wide cut-outs of Stego Wrap, use Stego Wrap and Stego Tape to repair and seal. 2) Solvent-based products should not be applied over this product. 3) Clean all tools with kerosene and/or oil-based cleaners.

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

6. Availability & Cost

Stego Mastic is available nationally via building supply distributors. For current cost information, contact your local Stego distributor or Stego Industries' sales department.

7. Warranty

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

8. Maintenance

None required.

9. Technical Services

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

10. Filing Systems

- Stego Industries' website
- Buildsite

TABLE 1: PHYSICAL PROPERTIES OF STEGO MASTIC	
Property and Test	Stego Mastic
Tensile/Elongation, ASTM D 412	32 psi / 3860%
Resistance to Decay, ASTM E 154	9% perm loss
Accelerated Aging, ASTM G 23	No Effect
Permeance, ASTM E 96	0.17 Perms
Hydrostatic Water Pressure, ASTM D 751	28 psi
Methane Transmission Rate, ASTM D 1434	0
Adhesion to Concrete & Masonry, ASTM C 836	7 lbf./in.
Hardness, ASTM C 836	85
Crack Bridging, ASTM C 836	No Cracking
Low Temp Flexibility, ASTM C 836	No Cracking at -20°C
Resistance to Acids:	
Acetic	30%
Sulfuric and Hydrochloric	15%
Temperature Effect:	
Stable	248°F
Flexible	13°F

Note: perm unit = grains/(ft² *hr* in.Hg)





Stego® Tape
 STEGO INDUSTRIES, LLC



Vapor Retarders
07 26 00, 03 30 00

1. Product Name
 Stego Tape

2. Manufacturer

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

3. Product Description

USES: Stego Tape is a low permeance tape designed for protective sealing, hanging, seaming, splicing, and patching applications where a highly conformable material is required. It has been engineered to bond specifically to Stego Wrap, making it ideal for sealing Stego Wrap seams and penetrations.

COMPOSITION: Stego Tape is composed of polyethylene film and an acrylic, pressure-sensitive adhesive.

SIZE: Stego Tape is 3.75" wide and 180' long. Stego Tape ships 12 rolls in a case.

4. Technical Data

APPLICABLE STANDARDS:

Pressure Sensitive Tape Council (PSTC)

- PSTC 101 – International Standard for Peel Adhesion of Pressure Sensitive Tape

American Society for Testing & Materials (ASTM)

- ASTM E 1643 - Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill under Concrete Slabs

5. Installation

SEAMS:

Overlap Stego Wrap six inches and seal with Stego Tape. Make sure the area of adhesion is free from dust, dirt, moisture and frost to allow maximum adhesion of the pressure sensitive tape.

PIPE PENETRATION SEALING

- 1) Install Stego Wrap around pipe by slitting/cutting material
- 2) If void space around pipe is minimal, seal around base of pipe with Stego Tape (Stego Mastic can be used for additional coverage)

DETAIL PATCH FOR PIPE PENETRATION SEALING

- 1) Cut a piece of Stego Wrap that creates a six inch overlap around all edges of the void space
- 2) Cut an "X" in the center of the detail patch
- 3) Slide detail patch over pipe, secure tightly
- 4) Tape down all sides of detail patch with Stego Tape
- 5) Seal around base of pipe with Stego Tape (Stego Mastic can be used for additional coverage)

Stego Tape should be installed above 40°F. In temperatures below 40°F, take extra care to remove moisture or frost from the area of adhesion.

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



6. Availability & Cost

Stego Tape is available nationally via building supply distributors. For current cost information, contact your local Stego distributor or Stego Industries' sales department.

7. Warranty

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

8. Maintenance

None required.

9. Technical Services

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

10. Filing Systems

- Stego Industries' website
- Buildsite

TABLE 1: PHYSICAL PROPERTIES OF STEGO TAPE

PROPERTY	RESULTS
Total Thickness	6 mils
Permeance	0.03 perms
Tensile Strength	17 lbs./in. width
Elongation (at break) MD	1060%
Adhesion (20 min dwell ss, PSTC 101)	95-oz./in. width
Ultraviolet Resistance	Excellent





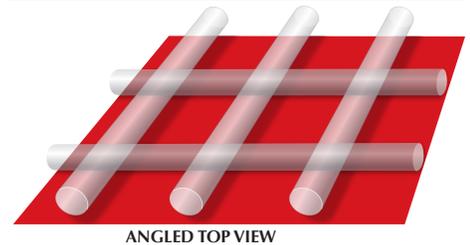
STEGO CRETE CLAW® TAPE

Stego Crete Claw® Tape provides an innovative and economical way to secure plastic film to concrete while the concrete is still wet.

Crete Claw is a multi-layered tape/detail strip that will mechanically lock Stego Wrap Vapor Barrier to concrete. The patent-pending design allows wet concrete to cast into the textured surface of Crete Claw. Just stick Crete Claw to Stego Wrap prior to concrete placement, then place the concrete directly over the system.

Stego Crete Claw can be used in place of Stego Tape to seal joints in Stego Wrap Vapor Barrier providing a dual purpose and helping to offset costs.

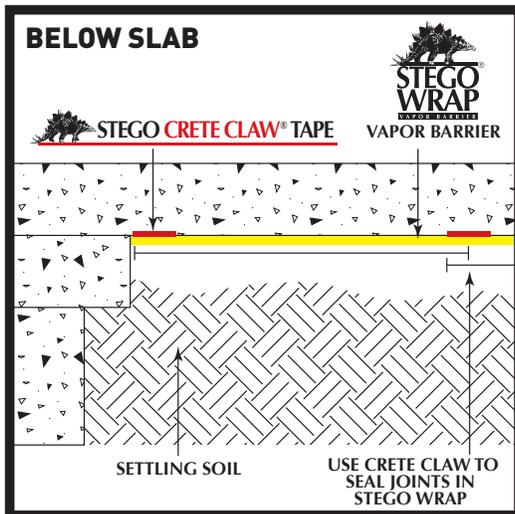
The patent-pending design allows wet concrete to cast into the textured surface of Crete Claw



MOST COMMON APPLICATIONS FOR CRETE CLAW® 6" Wide 3" Wide

ASTM E 1643 - Forming seal to the slab at perimeter	✓	✓
Securing Stego Wrap to bottom of slab for expansive/settling soils and carton/void form applications	Perimeter	✓
	Seams	✓

-  Quick and easy to install
-  Saves time and money
-  Innovative Solution to help meet ASTM E 1643



Other more expensive products rely on chemical reaction or geotextile to bond with concrete making it all but impossible to properly install the vapor barrier. Often in pursuit of the all-in-one product, the performance characteristics of the vapor barrier are compromised. Because Crete Claw Tape is applied as a separate accessory to the vapor barrier, it does not interfere with the ability to detail around penetrations or repair damaged areas.

TABLE 1: CRETE CLAW TAPE TEST RESULTS

PROPERTY	TEST	RESULTS
Total Thickness		26 mils
Permeance	ASTM F 1249	0.03 perms
180° Adhesion Peel Strength	ASTM D 903	17.6 lbf/in.
Shear Adhesion Strength	1 in. ² shear test using an Instron 3345 Machine	>49 lbf/in. ² *
Roll Sizes		6" x 180' and 3" x 180' **

* Specimens failed by stretching vapor barrier to failure before pulling Crete Claw from concrete.

** 3" wide is for perimeter seal application only.

Contact us to learn more about this innovative product.

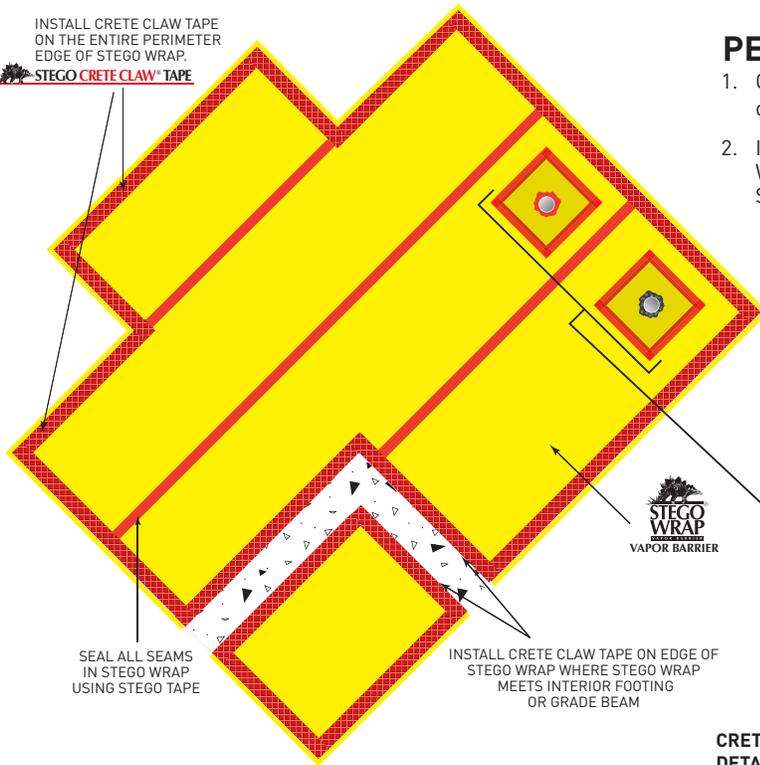
STEGO CRETE CLAW® TAPE

INSTALLATION INSTRUCTIONS

TOP-DOWN VIEWS OF A BUILDING FOOTPRINT



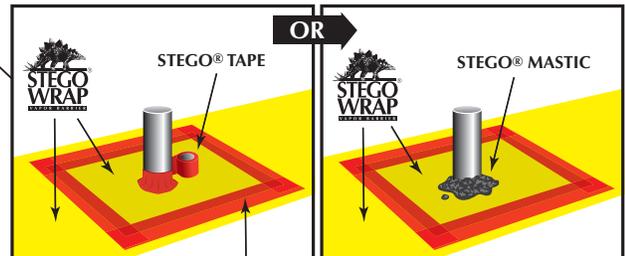
INSTALL CRETE CLAW TAPE ON THE ENTIRE PERIMETER EDGE OF STEGO WRAP.
STEGO CRETE CLAW® TAPE



PERIMETER SEAL TO SLAB

1. Clean surface of Stego Wrap to ensure that it is free of moisture and debris prior to the installation of Crete Claw Tape.
2. Install 3" or 6" Crete Claw Tape on the entire perimeter of the Stego Wrap Installation. Crete Claw Tape should be completely on Stego Wrap.

SEAL ALL PENETRATIONS WITH STEGO TAPE AND/OR STEGO MASTIC. CRETE CLAW TAPE IS NOT MEANT FOR REPAIRING PENETRATIONS.



CRETE CLAW CAN BE USED TO SEAL SEAM AROUND DETAIL PATCH FOR ADDED PROTECTION.

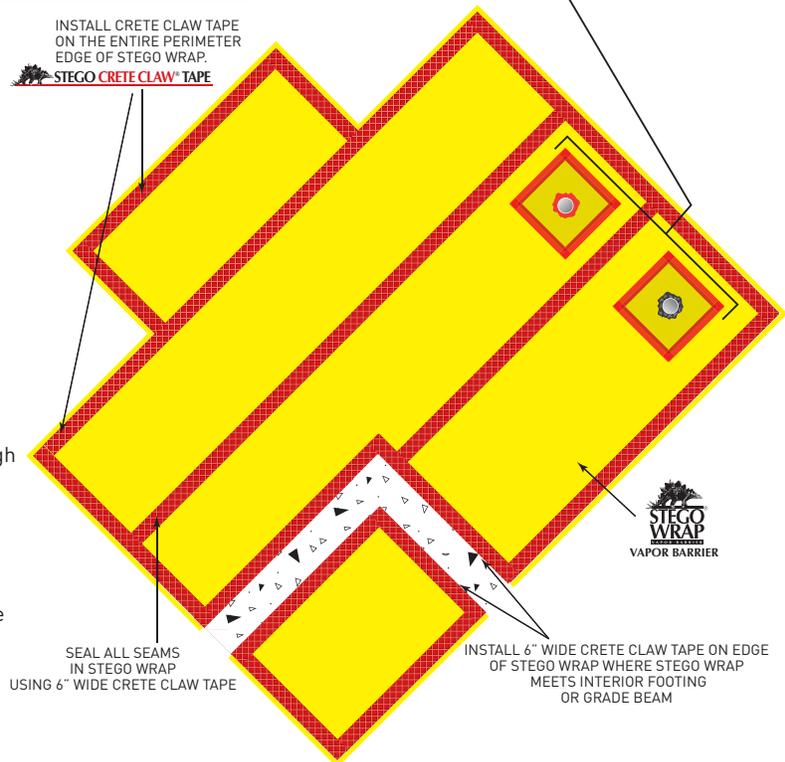
SECURING STEGO WRAP TO THE BOTTOM OF THE SLAB

1. Clean surface of Stego Wrap to ensure that it is free of moisture and debris prior to the installation of 6" wide Crete Claw Tape.
2. Overlap seams a minimum of 6 inches. Seal all seams in Stego Wrap using Crete Claw Tape.
3. Install 6" wide Crete Claw Tape on the entire perimeter of the Stego Wrap Installation. Crete Claw Tape should be completely on Stego Wrap.
4. Install additional Crete Claw Tape if required. Lab and simulated field tests have shown that if 6" wide Crete Claw is installed on all seams and around the perimeter, then it is more than strong enough to support Stego Wrap. If determined by the architect or engineer, additional Crete Claw may be specified.
5. Prior to the placement of concrete, ensure that Crete Claw is free of dirt or debris to ensure maximum bond to the concrete.

These are general instructions. Installation requirements may change on a project-by-project basis

IMPORTANT - For the application of securing Stego Wrap to the bottom of the slab, always use 6" wide Crete Claw Tape.

INSTALL CRETE CLAW TAPE ON THE ENTIRE PERIMETER EDGE OF STEGO WRAP.
STEGO CRETE CLAW® TAPE



NOTE: Stego Industries, LLC's ("Stego") installation instructions are based on ASTM E 1643 - *Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs*. These instructions are meant to be used as a guide, and do not take into account specific job site situations. Consult local building codes and regulations along with the building owner or owner's representative before proceeding. If you have any questions regarding the above mentioned installation instructions, Stego products, please call us at 877-464-7834 for technical assistance. While Stego employees and representatives may provide technical assistance regarding the utility of a specific installation practice or Stego product, they are not authorized to make final design decisions.



Stego® Crete Claw® Tape

STEGO INDUSTRIES, LLC



Vapor Retarders
07 26 00

1. Product Name

Stego® Crete Claw® Tape

2. Manufacturer

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

3. Product Description

USES: Stego Crete Claw Tape is a multi-layered tape that is used to seal Stego Wrap to concrete while the concrete is still wet. Crete Claw allows wet concrete to cast into the textured top surface to form a mechanical bond/seal. **COMPOSITION:** Stego Crete Claw is composed of polyethylene film, aperture film, and an acrylic, pressure sensitive adhesive. **SIZE:** Stego Crete Claw is 6" wide by 180' long. Stego Crete Claw ships 8 rolls in a case.

4. Technical Data

TABLE 1: PHYSICAL PROPERTIES OF STEGO CRETE CLAW

PROPERTY	RESULTS
Dimensions	6" x 180'
Total Thickness	26 mils
Permeance: ASTM F 1249	0.03 perms
180° Adhesion Peel Strength: ASTM D 903	17.6 lbf/in.
Shear Adhesion Strength: 1 in ² shear test using an Instron 3345 Machine	>49 lbf/in ² *

* Specimens failed by stretching vapor barrier to failure before pulling Crete Claw from concrete.

5. Installation

SECURING STEGO WRAP TO SLAB: Clean the surface of Stego Wrap to ensure that it is free of moisture, frost, dirt, and debris prior to the installation of Stego Crete Claw. When ready to apply Crete Claw, peel back the release liner and apply to Stego Wrap. Stego Crete Claw should be completely on Stego Wrap.

Install Crete Claw Tape on all seams and around the entire perimeter of the Stego Wrap installation.

To detail, cut Stego Crete Claw with a box knife or scissors. Crete Claw should be installed above 40°F for maximum adhesion. For additional information, please refer to Stego's complete installation instructions.

TIP: Wrap the release liner back over the entire roll while unrolling Crete Claw. This technique will allow the release liner to pull off easily and keep it out of the way.

6. Availability & Cost

Stego Crete Claw is available nationally through our network of building supply distributors. For current cost information, contact your local Stego Wrap distributor or Stego Industries' Sales Representative.

7. Warranty

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

8. Maintenance

Store Stego Crete Claw in a dry and temperate area.

9. Technical Services

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

10. Filing Systems

www.stegoindustries.com
Buildsite





Stego® Crete Claw® (3" Wide)

STEGO INDUSTRIES, LLC



Vapor Retarders
07 26 00

1. Product Name

Stego® Crete Claw® (3" Wide)

2. Manufacturer

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

3. Product Description

USES: Stego Crete Claw is a multi-layered tape that is used to seal Stego Wrap to the perimeter of the slab while the concrete is placed. Crete Claw allows wet concrete to cast into the textured top surface to form a mechanical bond/seal.
COMPOSITION: Stego Crete Claw is composed of polyethylene film, aperture film, and an acrylic, pressure sensitive adhesive.
SIZE: Stego Crete Claw (3" Wide) is 3" wide and 180' long. Stego Crete Claw (3" Wide) ships 16 rolls in a case.

4. Technical Data

TABLE 1: PHYSICAL PROPERTIES OF STEGO CRETE CLAW (3" Wide)

PROPERTY	RESULTS
Dimensions	3" x 180'
Total Thickness	26 mils
Permeance: ASTM F 1249	0.03 perms
180° Adhesion Peel Strength: ASTM D 903	17.6 lbf/in.
Shear Adhesion Strength: 1 in ² shear test using an Instron 3345 Machine	>49 lbf/in ² *

* Specimens failed by stretching vapor barrier to failure before pulling Crete Claw from concrete.

5. Installation

UNDER SLAB: Clean surface of Stego Wrap to ensure that it is free of moisture, frost, dirt, and debris prior to the installation of Stego Crete Claw. When ready to apply Crete Claw, peel back the release liner and apply to Stego Wrap. Stego Crete Claw should be completely on Stego Wrap.

To detail, cut Stego Crete Claw with a box knife or scissors. Crete Claw should be installed above 40°F for maximum adhesion. For additional information please refer to Stego's complete installation instructions.

TIP: Wrap the release liner back over the entire roll while unrolling Crete Claw. This technique will allow the release liner to pull off easily and keep it out of the way.

6. Availability & Cost

Stego Crete Claw (3" Wide) is available nationally through our network of building supply

distributors. For current cost information, contact your local Stego Wrap distributor or Stego Industries' Sales Representative.

7. Warranty

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

8. Maintenance

Store Stego Crete Claw in a dry and temperate area.

9. Technical Services

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

10. Filing Systems

www.stegoindustries.com
Buildsite





StegoTack® Tape

STEGO INDUSTRIES, LLC



Vapor Retarders
07 26 00, 03 30 00

1. Product Name

StegoTack® Tape

2. Manufacturer

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

3. Product Description

USES: StegoTack Tape is a double-sided adhesive strip used to bond and seal Stego Wrap to concrete, masonry, wood, metal, and other surfaces. StegoTack is a flexible and moldable material to allow for a variety of applications and installations.

COMPOSITION: StegoTack Tape is made from a blend of synthetic rubber and resins. **SIZE:** StegoTack Tape is 2 inches wide and 50 feet long. StegoTack Tape ships 12 rolls in a case.

5. Installation

TO WALLS: Make sure the area of

adhesion is free of dust, dirt, debris, moisture, and frost to allow maximum adhesion. Remove release liner on one side and stick to desired surface. When ready to apply Stego Wrap, remove the exposed release liner and press Stego Wrap firmly against StegoTack Tape to secure.

TO FOOTINGS: Make sure the area of adhesion is free of dust, dirt, debris, moisture, and frost to allow maximum adhesion. Remove release liner on one side and stick to desired surface. When ready to apply Stego Wrap, remove the exposed release liner and press Stego Wrap firmly against StegoTack Tape to secure.

Cut StegoTack Tape using a utility knife or scissors. Cut StegoTack Tape before removing the release liner for easier cutting. Install StegoTack Tape between 40°F and 110°F. For additional information please refer to Stego's complete installation instructions.

6. Availability & Cost

StegoTack Tape is available nationally through our network of building supply distributors. For current cost information, contact your local Stego

Wrap distributor or Stego Industries' Sales Representative.

7. Warranty

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

8. Maintenance

For longer adhesive life, store in dry, temperate area.

9. Technical Services

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

10. Filing Systems

www.stegoindustries.com
 Buildsite

4. Technical Data

TABLE 1: PHYSICAL PROPERTIES OF STEGOTACK TAPE

PROPERTY	RESULTS
Dimensions	50 feet long, 2 inches wide
Total Thickness	30 Mils
Permeance	0.03 perms (30 mils)
Color	Grey
Material	Synthetic rubber blend
Adhesion to Steel	10.3 lbs./in. width ASTM C 1000
Installation Temperature	40°F/110°F (4°C/43°C)
In Service Temperature Range	-20°F/+140°F (-29°C/60°C)
VOC Content	No VOC's, 100% solids





Stego® Term Bar

STEGO INDUSTRIES, LLC



Vapor Retarders
07 26 00, 03 30 00

1. Product Name
Stego Term Bar

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

3. Product Description
 USES: Stego Term Bar is a semi-flexible plastic termination bar used for mechanically securing Stego Wrap or other materials to concrete, masonry, or wood.
 COMPOSITION: Stego Term Bar is made from post-industrial recycled PVC.

5. Installation
 UNDER SLAB: Nail through Stego Term Bar and Stego Wrap to secure material as needed. If the beveled edge is facing the wall, a pocket/lip is created for mastic/sealant to be used if required.

Pre-drilled nail holes are provided every 6 inches for ease of installation.

To cut Stego Term Bar, score with a utility knife or wire snips. Stego Term Bar can be bent back and forth and then broken at desired locations as well. Stego Term Bar is flexible enough to bend around corners and contours in the wall for easy installation.

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

6. Availability & Cost
 Stego Term Bar is available nationally through our network of building supply distributors. For current cost information, contact your local Stego Wrap distributor or Stego Industries' Sales Representative.

7. Warranty
 Stego Industries, LLC believes to the best of its knowledge, that specifications and recommendations herein are

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

8. Maintenance
 Store above 60°F. Term Bar will become less flexible at lower temperatures.

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

10. Filing Systems
www.stegoindustries.com

4. Technical Data

TABLE 1: PHYSICAL PROPERTIES OF STEGO TERM BAR

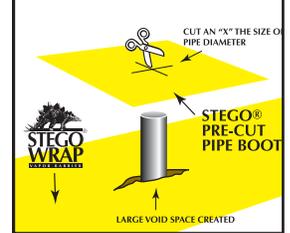
PROPERTY	RESULTS
Dimensions	4 feet long, 1 1/8 inches wide
Color	Red
Material	Recycled PVC
Weight	4.7 oz. (132 grams)





Stego® Pre-Cut Pipe Boots

STEGO INDUSTRIES, LLC



Vapor Retarders
07 26 00, 03 30 00

1. Product Name

Stego Pre-Cut Pipe Boots

2. Manufacturer

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

3. Product Description

USES: Stego Pre-Cut Pipe Boots are used to seal around permanent penetrations in Stego Wrap.

COMPOSITION: Stego Pre-Cut Pipe Boots are made from Stego Wrap Vapor Barrier (15-mil), and therefore are manufactured from only high grade prime, virgin, polyolefin resins.

SIZE: Stego Pre-Cut Pipe Boots are 18" by 18" and 15 mils thick. Stego Pre-Cut Pipe Boots ship 10 packs of 25 in a case (250 boots per case).

5. Installation

UNDER SLAB: Cut an "X" the size of the pipe diameter in the center of the Pre-Cut Pipe Boot and slide tightly over pipe. Tape all sides of the pipe boot with Stego Tape. Seal around the base of the pipe using Stego tape and/or Stego Mastic.

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

6. Availability & Cost

Stego Pre-Cut Pipe Boots are available nationally through our network of building supply distributors. For current cost information, contact your local Stego Wrap distributor or Stego Industries' Sales Representative.

7. Warranty

Stego Industries, LLC believes to the best of its knowledge, that specifications and recommendations herein are accurate and reliable. However, since

site conditions are not within its control, Stego Industries does not guarantee results from the use of the information provided and disclaims all liability from any loss or damage. No warranty, express or implied, is given as to the merchantability, fitness for a particular purpose, or otherwise with respect to the products referred to.

8. Maintenance

None required.

9. Technical Services

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

4. Technical Data

TABLE 1: PHYSICAL PROPERTIES OF STEGO PRE-CUT PIPE BOOTS

PROPERTY	TEST	RESULTS
Under Slab Vapor Retarders	ASTM E 1745 Class A, B & C - Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs	Exceeds Class A, B & C
Water Vapor Permeance	ASTM F 1249 - Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor	0.0086 perms *0.0036 WVTR
Puncture Resistance	ASTM D 1709 - Test Methods for Impact Resistance of Plastic Film by Free-Falling Dart Method	2266 grams
Tensile Strength	ASTM D 882 - Test Method for Tensile Properties of Thin Plastic Sheeting	70.60 lbf/in.
Permeance After Conditioning (ASTM E 1745 Sections 7.1.2 - 7.1.5)	ASTM E 154 Section 8, F 1249 - Permeance after wetting, drying, and soaking ASTM E 154 Section 11, F 1249 - Permeance after heat conditioning ASTM E 154 Section 12, F 1249 - Permeance after low temperature conditioning ASTM E 154 Section 13, F 1249 - Permeance after soil organism exposure	0.0098 perms 0.0091 perms 0.0097 perms 0.0095 perms
Thickness	ACI 302.1R-04 - Minimum Thickness (10 mils)	15 mils
Pipe Boot Dimensions		18" x 18"

Note: perm unit = grains/(ft² *hr* in.Hg) * WVTR = Water Vapor Transmission Rate



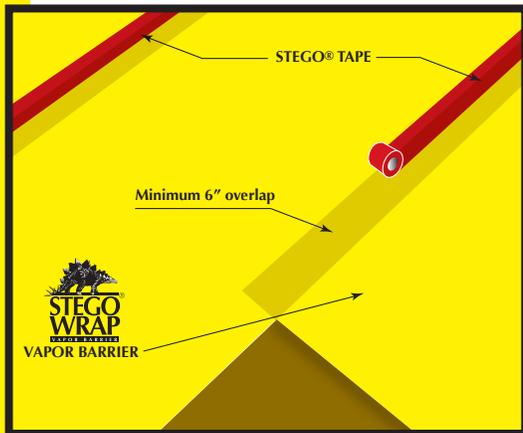
PART 1

STEGO WRAP VAPOR BARRIER/RETARDER INSTALLATION INSTRUCTIONS



IMPORTANT: Please read these installation instructions completely, prior to beginning any Stego Wrap installation. The following installation instructions are based on ASTM E 1643 - Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs. If project specifications call for compliance with ASTM E 1643, then be sure to review the specific installation sections outlined in the standard along with the techniques referenced in these instructions.

FIGURE 1: UNDER-SLAB INSTALLATION



UNDER-SLAB INSTRUCTIONS:

1. Stego Wrap can be installed over an aggregate, sand, or tamped earth base. It is not necessary to have a cushion layer or sand base, as Stego Wrap is tough enough to withstand rugged construction environments.
2. Unroll Stego Wrap over the area where the slab is to be placed. Stego Wrap should completely cover the concrete placement area. All joints/seams both lateral and butt should be overlapped a minimum of six inches and taped using Stego Tape.

NOTE: The area of adhesion should be free from dust, dirt, moisture, and frost to allow maximum adhesion of the pressure-sensitive tape.

3. ASTM E 1643 requires sealing the perimeter of the slab. *Extend vapor retarder over footings and seal to foundation wall, grade beam, or slab at an elevation consistent with the top of the slab or terminate at impediments such as waterstops or dowels.* Consult the structural engineer of record before proceeding.

SEAL TO SLAB AT PERIMETER:*

NOTE: Clean the surface of Stego Wrap to ensure that the area of adhesion is free from dust, dirt, moisture, and frost to allow maximum adhesion of the pressure-sensitive adhesive.

- a. Install Crete Claw® on the entire perimeter edge of Stego Wrap.
- b. Prior to the placement of concrete, ensure that the top of Crete Claw is free of dirt, debris, or mud to maximize the bond to the concrete.

STEGO LABOR SAVER!

This method not only complies with ASTM E 1643, but it also:

- reduces labor compared to other perimeter sealing techniques.
- can be used even without an existing wall or footing, unlike alternatives.

FIGURE 2a: SEAL TO SLAB AT PERIMETER

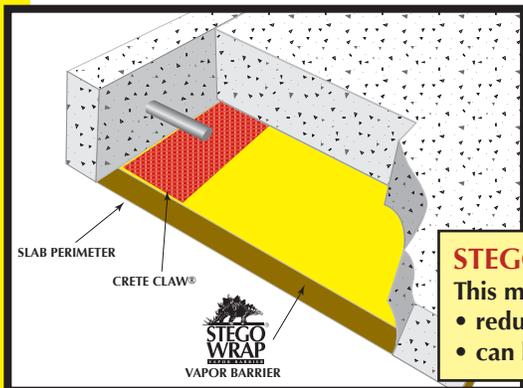


FIGURE 2b: SEAL TO PERIMETER WALL

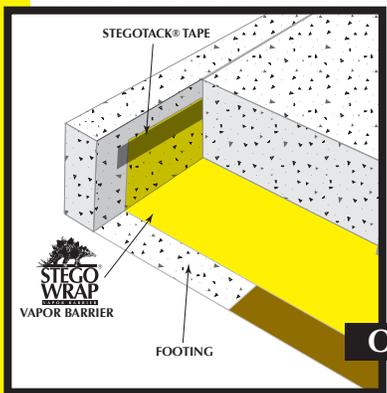
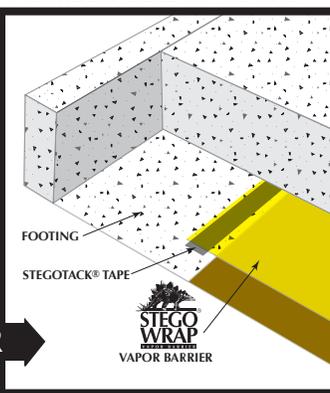


FIGURE 2c: SEAL TO FOOTING



OR SEAL TO PERIMETER WALL OR FOOTING WITH STEGOTACK® TAPE:*

- a. Make sure area of adhesion is free of dust, dirt, debris, moisture, and frost to allow maximum adhesion.
- b. Remove release liner on one side and stick to desired surface.
- c. When ready to apply Stego Wrap, remove the exposed release liner and press Stego Wrap firmly against StegoTack Tape to secure.

* If ASTM E 1643 is specified, consult with project architect and structural engineer to determine which perimeter seal technique should be employed for the project.

NOTE: Stego Industries, LLC's ("Stego") installation instructions are based on ASTM E 1643 - Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs. These instructions are meant to be used as a guide, and do not take into account specific job site situations. Consult local building codes and regulations along with the building owner or owner's representative before proceeding. If you have any questions regarding the above mentioned installation instructions or Stego products, please call us at 877-464-7834 for technical assistance. While Stego employees and representatives may provide technical assistance regarding the utility of a specific installation practice or Stego product, they are not authorized to make final design decisions.

- In the event that Stego Wrap is damaged during or after installation, repairs must be made. Stego Tape can be used to repair small holes in the material. For larger holes, cut a piece of Stego Wrap to a size and shape that covers any damage by a minimum overlap of six inches in all directions. Clean all adhesion areas of dust, dirt, moisture, and frost. Tape down all edges using Stego Tape (see figure 3, Sealing Damaged Areas).

FIGURE 3: SEALING DAMAGED AREAS



- IMPORTANT: ALL PENETRATIONS MUST BE SEALED.** All pipe, ducting, rebar, wire penetrations and block outs should be sealed using Stego Wrap, Stego Tape and/or Stego Mastic (see figure 4a, Pipe Penetration Sealing).

FIGURE 4a: PIPE PENETRATION SEALING



STEGO WRAP PIPE PENETRATION REPAIR DETAIL:

- 1: Install Stego Wrap around pipe penetrations by slitting/cutting material as needed. Try to minimize the void space created.
- 2: If Stego Wrap is close to pipe and void space is minimized then seal around pipe penetration with Stego Tape and/or Stego Mastic. **[See Figure 4a]**
- 3: If detail patch is needed to minimize void space around penetration, then cut a detail patch to a size and shape that creates a six inch overlap on all edges around the void space at the base of the pipe. Stego Pre-Cut Pipe Boots are also available to speed up the installation.
- 4: Cut an "X" the size of the pipe diameter in the center of the pipe boot and slide tightly over pipe.
- 5: Tape down all sides of the pipe boot with Stego Tape.
- 6: Seal around the base of the pipe using Stego Tape and/or Stego Mastic. **[See Figure 4b]**

FIGURE 4b: DETAIL PATCH FOR PIPE PENETRATION SEALING

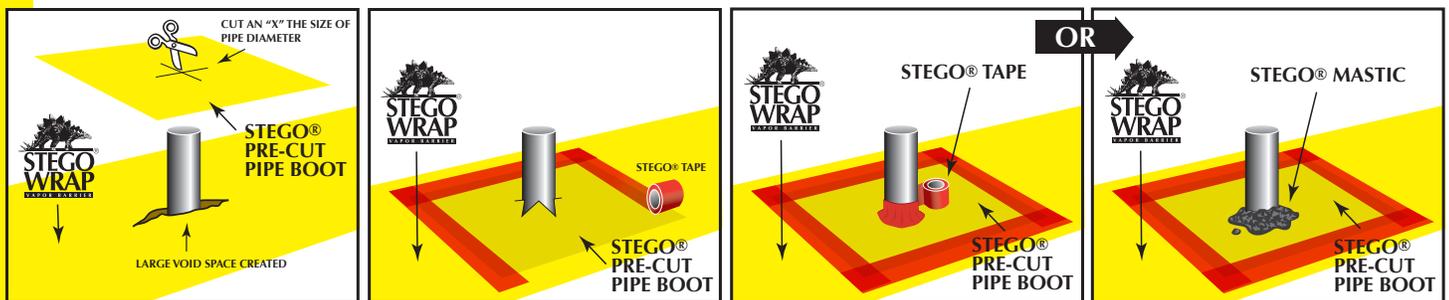


FIGURE 5: MULTIPLE PIPE PENETRATION SEALING



MULTIPLE PIPE PENETRATION SEALING:

Multiple pipe penetrations in close proximity and very small pipes may be sealed using Stego Wrap and Stego Mastic for ease of installation (see figure 5, Multiple Pipe Penetration Sealing).

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PART 2

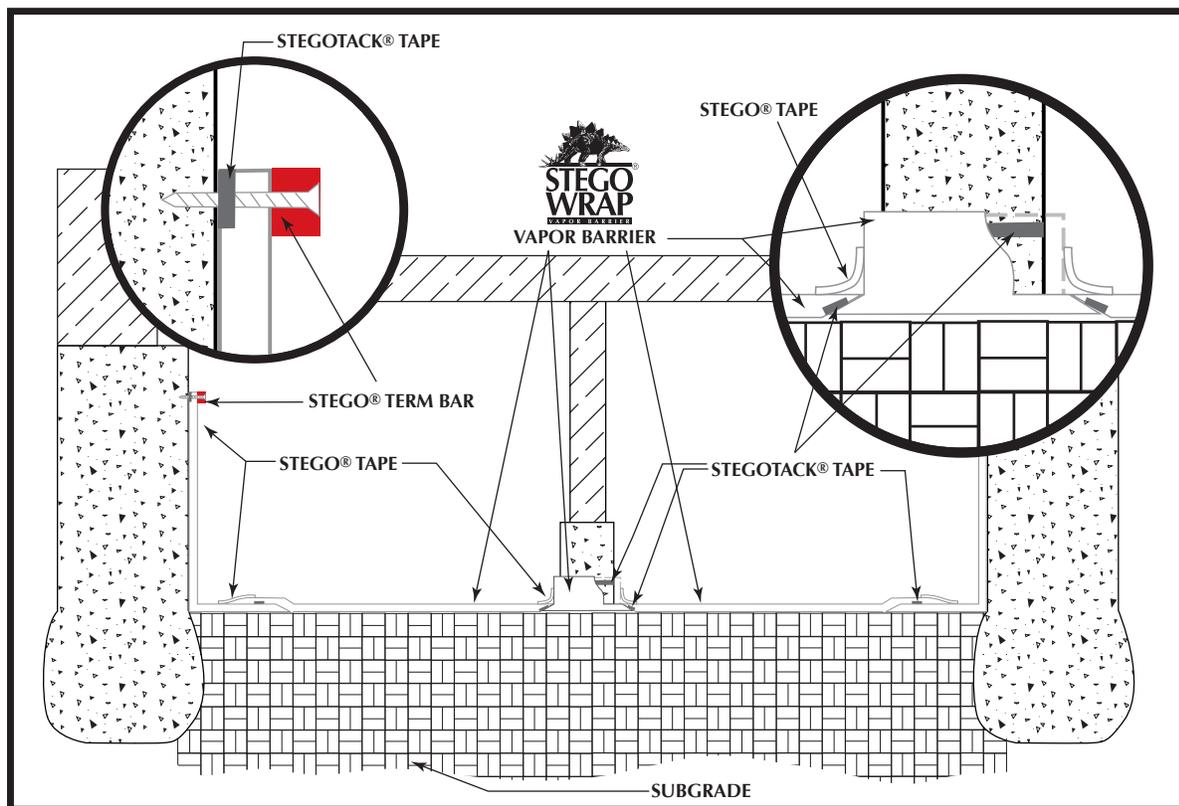
STEGO WRAP VAPOR BARRIER/RETARDER INSTALLATION INSTRUCTIONS



CRAWL SPACE INSTALLATION INSTRUCTIONS:

1. Turn Stego Wrap up the foundation wall to a minimum height of six inches above the outside/exterior grade or in compliance with local building codes and terminate with Stego Term Bar. To form a complete seal, apply StegoTack Tape or a layer of Stego Mastic to the foundation wall prior to installing Stego Term Bar. Allow one hour for Stego Mastic to cure prior to installing Stego Term Bar.
2. Seal Stego Wrap around all penetrations and columns using Stego Tape, StegoTack Tape, and/or Stego Mastic.
3. Place Stego Wrap directly over the crawl space floor. If rigid insulation is to be used, install Stego Wrap prior to insulation (under insulation and between the foundation wall and insulation).
4. Overlap seams a minimum of six inches and seal with Stego Tape. Some codes require a minimum of a twelve inch overlap. Check appropriate codes prior to installation.

FIGURE 6: CRAWL SPACE INSTALLATION



NOTE: Stego Wrap Vapor Barrier and Stego Tape are both available in white (as shown in illustration above).

INSTALLATION TIP:

1. For a cleaner look and to prevent against tenting of Stego Wrap at the foundation wall/foundation floor intersection, consider mechanically fastening Stego Wrap to base of foundation wall in addition to the above mentioned wall termination.

NOTE: Stego Industries, LLC's ("Stego") installation instructions are based on ASTM E 1643 - *Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs*. These instructions are meant to be used as a guide, and do not take into account specific job site situations. Consult local building codes and regulations along with the building owner or owner's representative before proceeding. If you have any questions regarding the above mentioned installation instructions or Stego products, please call us at 877-464-7834 for technical assistance. While Stego employees and representatives may provide technical assistance regarding the utility of a specific installation practice or Stego product, they are not authorized to make final design decisions.

APPENDIX 6
HEALTH AND SAFETY PLAN