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January 7, 2015

New York City Office of Environmental Remediation  
City Voluntary Cleanup Program  
c/o Shaminder Chawla  
100 Gold Street, 2<sup>nd</sup> Floor  
New York, NY 10038

**Re: 13CVCP110K  
11EH-N358K  
504 Myrtle Avenue  
Remedial Action Work Plan (RAWP) Stipulation List**

Dear Mr. Chawla:

Hydro Tech Environmental Corp. hereby submits a Remedial Action Plan (RAWP) Stipulation List for the Site to the New York City Office of Environmental Remediation (OER) on behalf of 490 Myrtle Residential Owner, LLC & 504 Myrtle Residential Owner, LLC. This letter serves as an addendum to the RAWP to stipulate additional content, requirements, and procedures that will be followed during the site remediation. The contents of this list are added to the RAWP and will supersede the content in the RAWP where there is a conflict in purpose or intent. The additional requirements/procedures include the following Stipulation List below:

1. The criterion attached in **Appendix 1** will be utilized if additional any petroleum containing tank or vessel is identified during the remedial action or subsequent redevelopment excavation activities. All petroleum spills will be reported to the NYSDEC hotline as required by applicable laws and regulations. This contingency plan is designed for heating oil tanks and other small or moderately sized storage vessels. If larger tanks, such as gasoline storage tanks are identified, OER will be notified before this criterion is utilized.
2. A pre-construction meeting is required prior to start of remedial excavation work at the site. A pre-construction meeting will be held at the site and will be attended by OER, the developer or developer representative, the consultant, excavation/general contractor, and if applicable, the soil broker.

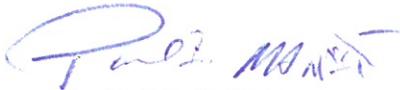
3. A pre-approval letter from all disposal facilities will be provided to OER prior to any soil/fill material removal from the site. Documentation specified in the RAWP - Appendix 3 - Section 1.6 "Materials Disposal Off-Site" will be provided to OER. If a different disposal facility for the soil/fill material is selected, OER will be notified immediately.
4. Signage for the project will include a sturdy placard mounted in a publically accessible right of way to building and other permits signage will consist of the NYC VCP Information Sheet (attached **Appendix 2**) announcing the remedial action. The Information sheet will be laminated and permanently affixed to the placard.
5. This NYC VCP project may involve the removal and transportation of hazardous waste, and if it does, it will be subject to the Special Assessment on hazardous waste (ECL 27-0923) which charges a fee of up to \$27 per ton of hazardous waste generated that is due to the State Department of Taxation and Finance 30 days after the end of the quarter in which the waste was generated. See DEC's website for more information: <http://www.dec.ny.gov/chemical/9099.html> .
6. Collection and analysis of end-point samples will be conducted to evaluate the performance of the remedy with respect to attainment of Track 1 SCOs. To evaluate attainment of Track 1 SCOs throughout the site, seven (7) base samples will be collected. Each sample will be analyzed for VOCs, SVOCs, TAL Metals, and PVCs/ Pesticides as per their appropriate method numbers. A map indicating post-remedial End Point Sampling Locations is attached as **Appendix 3**.
7. OER requires parties seeking City Brownfield Incentive Grants to carry insurance. For a cleanup grant, both the excavator and the trucking firm(s) that handle removal of soil must carry or be covered under a commercial general liability (CGL) policy that provides \$1 million per claim in coverage. OER recommends that excavators and truckers also carry contractors pollution liability (CPL) coverage, also providing \$1 million per claim in coverage. The CGL policy, and the CPL policy if obtained, must name the City of New York, the NYC Economic Development Corporation, and Brownfield Redevelopment Solutions as additional insured. For an investigation grant, an environmental consultant must be a qualified vendor in the BIG program and carry \$1 million of professional liability (PL) coverage. A fact sheet regarding insurance is attached as **Appendix 4**.
8. Daily reports will be provided during active excavation work. If no work is performed for extended time period, daily report frequency will be reduced to weekly basis. Daily report template is attached in **Appendix 5**.

9. An active Sub-Slab Depressurization System (SSDS) will be installed beneath areas of the building slab where ventilated sub-grade parking is not anticipated to be present. The system can be operated passively contingent upon post installation sampling and OER's discretion. Conceptual Design and technical specifications for the SSDS are also attached in **Appendix 6**.
10. A 46-mil thick Grace Preprufe® 300R membrane will be installed beneath the cellar structural slab and a 32-mil thick Grace Preprufe® 160R membrane and/or 62.5-mil thick Grace Bituthene 4000 membrane will be installed along the foundation sidewalls. **Appendix 7** provides manufactures specifications and PE certified plans showing the extent of the vapor barrier installation details (penetrations, joints, etc.) with respect to the proposed foundation, footings, etc.
11. An engineered composite site cover will be placed over the entire footprint of the Site. The composite cover system will be comprised of concrete foundation/slabs. Drawings of the composite site cover are provided as **Appendix 8**.
12. Truck route is included in **Appendix 9**.
13. Dewatering will be performed in full compliance with applicable laws, rules and regulations. Dewatering permit will be obtained from NYCDEP prior to construction activities.
14. Any hotspot areas identified during waste characterization sampling will be disposed of in accordance with applicable laws and regulations as well as disposal facility requirements. Waste characterization sampling results will be provided to OER.
15. A pre-approval letter from all disposal facilities will be provided to OER prior to any soil/fill material removal from the site. Documentation specified in the RAWP - Appendix 3 - Section 1.6 "Materials Disposal Off Site" would be provided to OER. If a different disposal facility for the soil/fill material is selected, OER will be notified immediately.
16. Approval for the import of material for backfilling purposes must be received from OER prior to the commencement of such activities. Documentation illustrating that the requisitioned import material has been properly segregated, stockpiled, and tested (when needed) prior to its release from the generating site, and by extension prior to its arrival to the import site, will be required. Blended recycled concrete aggregate (bRCA) is not an acceptable material for import.

17. Revised project description: A revised RA stamped project description / excavation depth letter is provide in **Appendix 10**.

18. Revised Architectural development plans are attached in **Appendix 11**.

Very Truly Yours,  
**Hydro Tech Environmental, Corp.**



Paul I. Matli, Ph.D.  
Senior Project Manager

cc: W. Wong, NYCOER  
Phil Schanzer, 504 Myrtle Residential Owner, LLC

# CERTIFICATION

I, Shaik A. Saad, am a Professional Engineer licensed in the State of New York. I have primary direct responsibility for implementation of the remedial action for the 490 Myrtle Avenue Site and 504 Myrtle Avenue Site (OER E-Designation # 11EH-N012K and VCP Site No. 13CVCP109K and 13CVCP110K).

I, Mark E. Robbins am a Qualified Environmental Professional as defined in §43-140. I have primary direct responsibility for implementation of the remedial action for the 490 Myrtle Avenue Site and 504 Myrtle Avenue Site (OER E-Designation # 11EH-N012K and VCP Site No. 13CVCP109K and 13CVCP110K).

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.

Shaik A. Saad

Name

071078

NYS PE License Number

Signature

Date

Mark E. Robbins

QEP Name

QEP Signature

Date



## **Appendix 1**

### Generic Procedures for Management of Underground Storage Tanks Identified under the NYC VCP

Prior to Tank removal, the following procedures should be followed:

- Remove all fluid to its lowest draw-off point.
- Drain and flush piping into the tank.
- Vacuum out the “tank bottom” consisting of water product and sludge.
- Dig down to the top of the tank and expose the upper half.
- Remove the fill tube and disconnect the fill, gauge, product, vent lines and pumps. Cap and plug open ends of lines.
- Temporarily plug all tank openings, complete the excavation, remove the tank and place it in a secure location.
- Render the tank safe and check the tank atmosphere to ensure that petroleum vapors have been satisfactorily purged from the tank.
- Clean tank or remove to storage yard for cleaning.
- If the tank is to be moved, it must be transported by licensed waste transporter. Plug and cap all holes prior to transport leaving a 1/8 inch vent hole located at the top of the tank during transport.
- After cleaning, the tank must be made acceptable for disposal at a scrap yard, cleaning the tanks interior with a high pressure rinse and cutting the tank in several pieces.

During the tank and pipe line removal, the following field observations should be made and recorded:

- A description and photographic documentation of the tank and pipe line condition (pitting, holes, staining, leak points, evidence of repairs, etc.).
- Examination of the excavation floor and sidewalls for physical evidence of contamination (odor, staining, sheen, etc.).
- Periodic field screening (through bucket return) of the floor and sidewalls of the excavation, with a calibrated photoionization detector (PID).

#### Impacted Soil Excavation Methods

The excavation of the impacted soil will be performed following the removal of the existing tanks. Soil excavation will be performed in accordance with the procedures described under Section 5.5 of Draft DER-10 as follows:

- A description and photographic documentation of the excavation.
- Examination of the excavation floor and sidewalls for physical evidence of contamination (odor, staining, sheen, etc.).
- Periodic field screening (through bucket return) of the floor and sidewalls of the excavation, with calibrated photoionization detector (PID).

Final excavation depth, length, and width will be determined in the field, and will depend on the horizontal and vertical extent of contaminated soils as indentified through physical examination (PID response, odor, staining, etc.). Collection of verification samples will be performed to evaluate the success of the removal action as specified in this document.

The following procedure will be used for the excavation of impacted soil (as necessary and appropriate):

- Wear appropriate health and safety equipment as outlined in the Health and Safety Plan.

- Prior to excavation, ensure that the area is clear of utility lines or other obstructions. Lay plastic sheeting on the ground next to the area to be excavated.
- Using a rubber-tired backhoe or track mounted excavator, remove overburden soils and stockpile, or dispose of, separate from the impacted soil.
- If additional UST's are discovered, the NYSDEC will be notified and the best course of action to remove the structure should be determined in the field. This may involve the continued trenching around the perimeter to minimize its disturbance.
- If physically contaminated soil is present (e.g., staining, odors, sheen, PID response, etc.) an attempt will be made to remove it, to the extent not limited by the site boundaries or the bedrock surface. If possible, physically impacted soil will be removed using the backhoe or excavator, segregated from clean soils and overburden, and staged on separated dedicated plastic sheeting or live loaded into trucks from the disposal facility. Removal of the impacted soils will continue until visibly clean material is encountered and monitoring instruments indicate that no contaminants are present.
- Excavated soils which are temporarily stockpiled on-site will be covered with tarp material while disposal options are determined. Tarp will be checked on a daily basis and replaced, repaired or adjusted as needed to provide full coverage. The sheeting will be shaped and secured in such a manner as to drain runoff and direct it toward the interior of the property.

Once the site representative and regulatory personnel are satisfied with the removal effort, verification of confirmatory samples will be collected from the excavation in accordance with DER-10.

**Appendix 2**  
NYC VCP Signage



## **NYC Voluntary Cleanup Program**

**504 Myrtle Avenue, Brooklyn, NY**  
**Site #: 13CVCP110K**

This property is enrolled in the New York City Voluntary Cleanup Program for environmental remediation. This is a voluntary program administered by the NYC Office of Environmental Remediation.

please contact:

For more information, log on to:

[www.nyc.gov/oer](http://www.nyc.gov/oer)

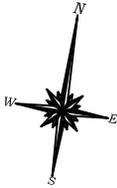


If you have questions or would like more information, please contact:

Shaminder Chawla at (212) 788-8841

or email us at [brownfields@cityhall.nyc.gov](mailto:brownfields@cityhall.nyc.gov)

**Appendix 3**  
End-Point Sampling Map



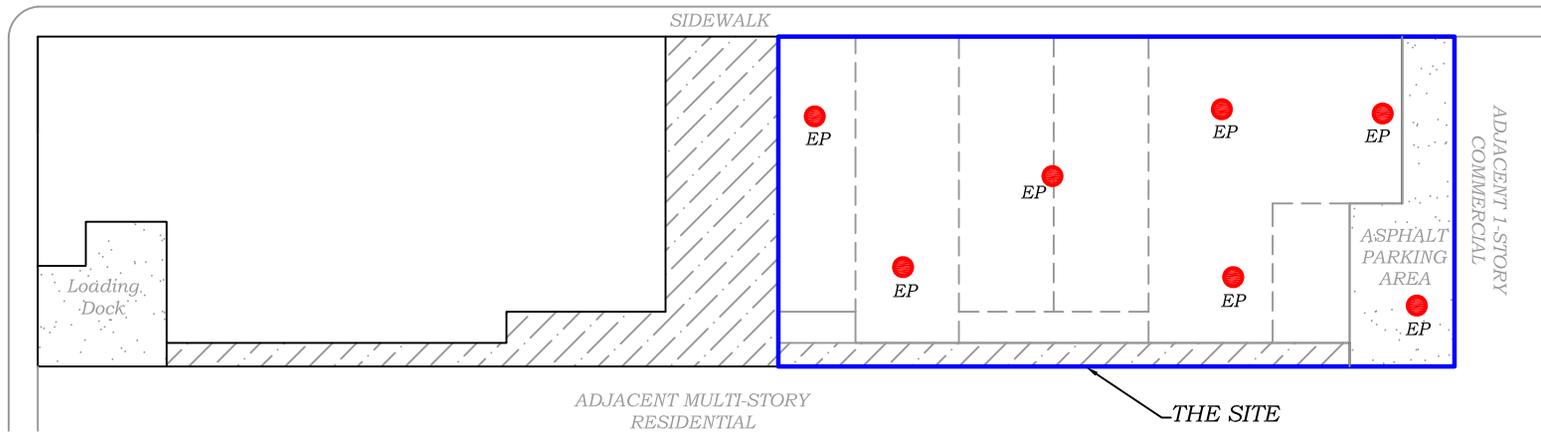
ADJACENT 1-STORY  
COMMERCIAL

ADJACENT 1-STORY  
COMMERCIAL

MYRTLE AVENUE

ADJACENT 2-STORY  
COMMERCIAL/RESIDENTIAL

HALL STREET



LEGEND:

● ENDPOINT SAMPLE LOCATIONS (EP)

0' 20' 40' 60'  
SCALE IN FEET (FT.)



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504 Myrtle Avenue  
Brooklyn, NY  
HTE Job# 120262

Drawn By: C.Q.  
Reviewed By: M.R.  
Approved By: M.R.  
Date: 12/02/14  
Scale: AS NOTED

TITLE:

END POINT SAMPLING PLAN

**Appendix 4**  
BIG Program Insurance Fact Sheet

## FACT SHEET – BIG PROGRAM INSURANCE REQUIREMENTS

**Investigation Grants** – for a developer or site owner to be eligible for a BIG investigation grant, its environmental consultant(s) must be:

- a Qualified Vendor in the BIG Program; and
- maintain Professional Liability (PL) insurance of \$1M per claim and annual aggregate.

**Cleanup Grants** – for a developer or site owner to be eligible for a BIG cleanup grant:

- Its general contractor or excavation/foundation contractor hired to perform remedial work must maintain Commercial General Liability (CGL) insurance of at least \$1M per occurrence and \$2M in the general aggregate. It is recommended that the general contractor or excavation/foundation contractor also maintain a Contractors Pollution Liability policy (CPL) of at least \$1M per occurrence.
- Its subcontractors who are hired by the general contractor etc. to perform remedial work at a site, including soil brokers and truckers, must also maintain a CGL policy in the amount and with the terms set forth above. It is recommended that subcontractors also maintain a CPL policy in the amount and with the terms set forth above.

The CGL policy, and the CPL policy if in force, must list the city, EDC and BRS as additional insureds, include completed operations coverage and be primary and non-contributory to any other insurance the additional insureds may have.

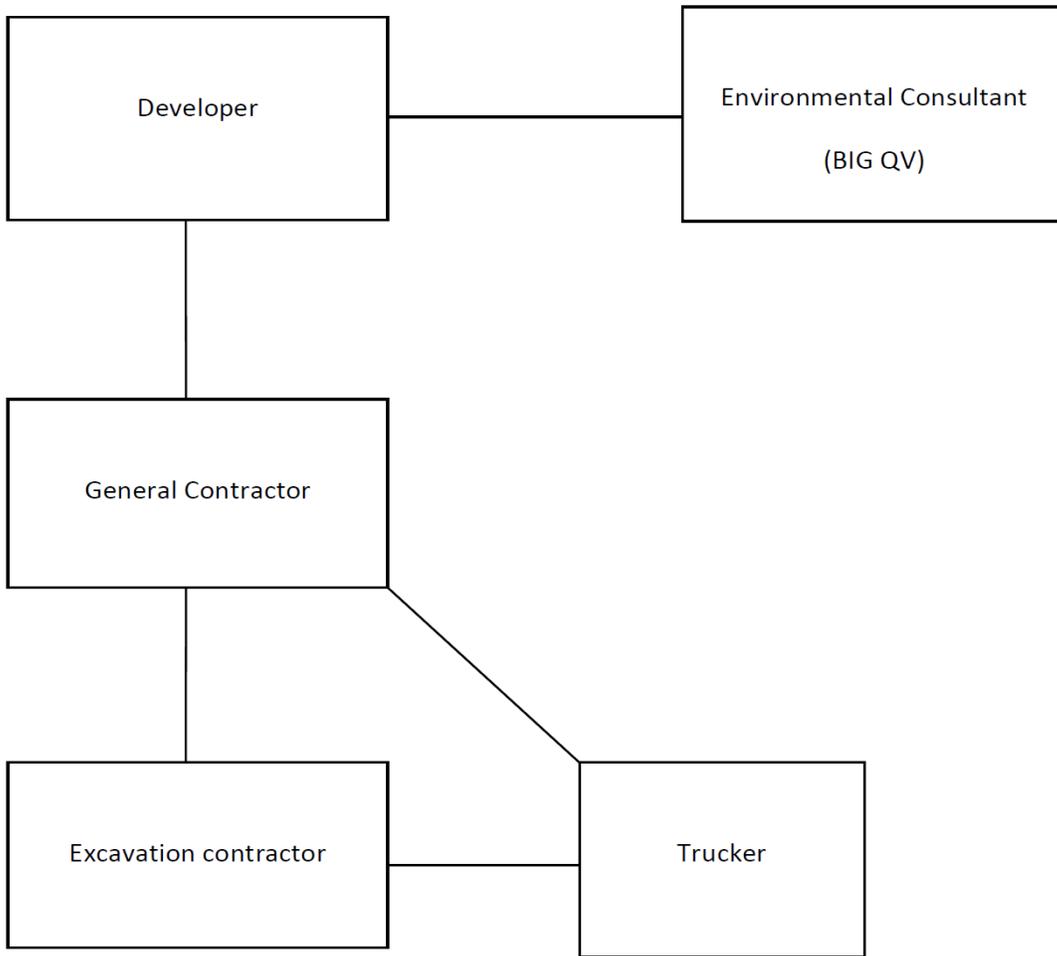
- Its environmental consultant(s) hired to oversee the cleanup must be:
  - a. a BIG Qualified Vendor; and
  - b. maintain Professional Liability (PL) insurance of \$1M per claim and annual aggregate.

If, in the alternative, the developer hires its environmental consultant to perform the cleanup, the environmental consultant must maintain CGL insurance in the amount and with the terms set forth above. It is recommended that the environmental consultant also maintain CPL coverage in the amount and with the terms set forth in the first two bulleted items listed above.

A schematic presenting the contractual relationships described above appears on page 2. Parties who must be named as Additional Insureds on Cleanup Grant insurance policies (CGL and CPL) are presented on page 3.

**Example of Contractual Relationships for Cleanup Work**

The Office of Environmental Remediation’s Voluntary Cleanup Plan program requires applicants to identify the parties who are engaged in active remediation of their sites including: the General Contractor hired to remediate and/or the excavation contractor hired to excavate soil from the site and the trucking firm(s) that remove soil from the site for disposal at approved facilit(ies).



The chart above shows contractual relationships that typically exist for projects that are enrolled in the Voluntary Cleanup Program.

**BIG Program Additional Insureds**

The full names and addresses of the additional insureds required under the Required CGL Policy and recommended CPL Policy are as follows:

**“City and its officials and employees”**

New York City Mayor’s Office of Environmental Remediation  
253 Broadway, 14th Floor  
New York, NY 10007

**“NYC EDC and its officials and employees”**

New York City Economic Development Corporation  
110 William Street  
New York, NY 10038

**“BIG Grant Administrator and its officials and employees”**

Brownfield Redevelopment Solutions, Inc.  
739 Stokes Road, Units A & B  
Medford, NJ 08055

**Appendix 5**  
Daily Report Template

## Generic Template for Daily Status Report

### Instructions

The Daily Status Report submitted to OER should adhere to the following conventions:

- Remove this cover sheet prior to editing.
- Remove all the **red text** and replace with site-specific information.
- Submit the final version as a Word or PDF file.

### Daily Status Reports

Daily status 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.

# DAILY STATUS REPORT

WEATHER	Snow		Rain		Overcast		Partly Cloudy	X	Bright Sun	
TEMP.	< 32		32-50		50-70	X	70-85		>85	

Prepared By: \_\_\_\_\_  
 Enter Your Name Here

VCP Project No.:	<b>13CVCP110K</b>	E-Number Project No.:	<b>11EH-N358K</b>	Date:	
Project Name:	<b>504 Myrtle Avenue, Brooklyn, NY</b>				

Consultant: Person(s) Name and Company Name	Safety Officer: Person(s) Name and Company Name
General Contractor: Person(s) Name and Company Name	Site Manager/ Supervisor: Person(s) Name and Company Name
Work Activities Performed (Since Last Report): Provide details about the work activities performed.  11EH-N358K	
Working In Grid #: <b>A1, B1, C1</b>	

Samples Collected (Since Last Report): No samples collected or provide details
Air Monitoring (Since Last Report): No air monitoring performed or provide details
Problems Encountered: No problems encountered or provide details
Planned Activities for the Next Day/ Week: Provide details about the work activities planned for the next day/ week.

									Example:	
Facility # Name/ Location Type of Waste Solid <u>Or</u> Liquid	Facility # Name Location Type of Waste Solid <u>Or</u> Liquid		##### Clean Earth Carteret, NJ petroleum soils Solid							
(Trucks, Cu.Yds. <u>Or</u> Gallons)	Trucks	Cu. Yds. <u>Or</u> Gallons	Trucks	Cu. Yds.						
Today									5	120
Total									25	600

NYC Clean Soil Bank		Receiving Facility: Name/ Address (Approved by OER)			
Tracking No.:	13CCSB000				
Today	Trucks 5	Cu. Yds. 25	Total	Trucks 120	Cu. Yds. 600

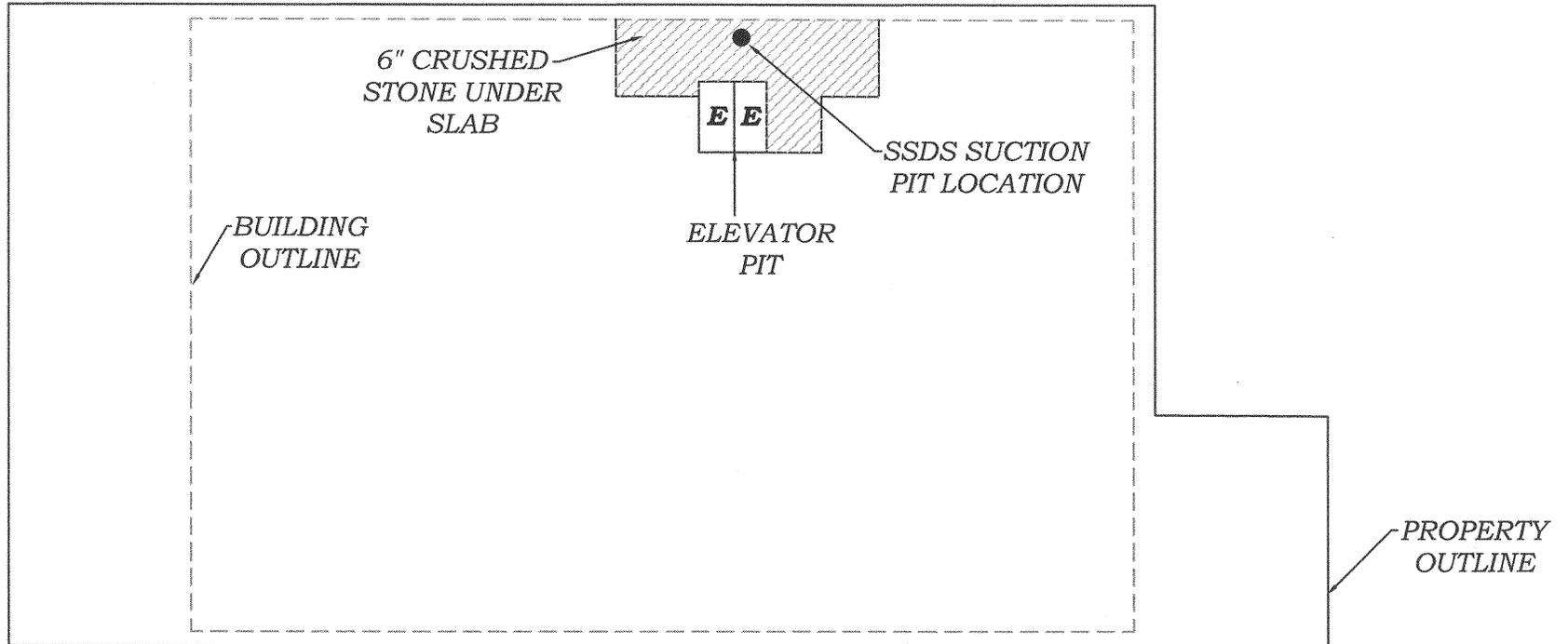
Site Grid Map  
 Insert the site grid map here

## Photo Log

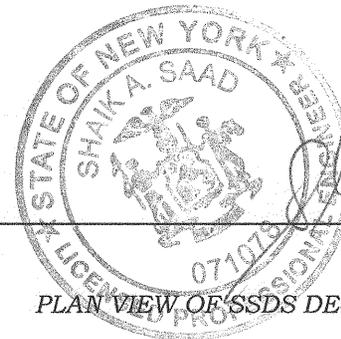
<p>Photo 1 – provide a caption</p>	<p>Insert Photo Here – Photo of the entire site</p>
<p>Photo 2 – provide a caption</p>	<p>Insert Photo Here – Photo of the work activities performed</p>
<p>Photo 3 – provide a caption</p>	<p>Insert Photo Here – Photo of the work activities performed</p>

**Appendix 6**  
Conceptual Design and Technical Specifications for the SSDS

MYRTLE AVENUE



**CELLAR**  
**PLAN VIEW**



PLAN VIEW OF SSDS DESIGN PLAN



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HTE Job# 130219

Drawn By: C.O.  
Reviewed By: M.R.  
Approved By: M.R.  
Date: 12/16/14  
Scale: AS NOTED

TITLE:

**Appendix 7**

Vapor Barrier Specifications and Certified Plans Showing Extent of Vapor Barrier  
Design Under Proposed Building Footprint

## PREPRUFE® 300R & 160R

Pre-applied waterproofing membranes that bond integrally to poured concrete for use below slabs or behind basement walls on confined sites

### Description

Preprufe® 300R & 160R membranes are unique composite sheets comprising a thick HDPE film, an aggressive pressure sensitive adhesive and a weather resistant protective coating.

Unlike conventional non-adhering membranes, which are vulnerable to water ingress tracking between the unbonded membrane and structure, the unique Preprufe bond to concrete prevents ingress or migration of water around the structure.

The Preprufe R System includes:

- **Preprufe 300R**—heavy-duty grade for use below slabs and on rafts (i.e. mud slabs). Designed to accept the placing of heavy reinforcement using conventional concrete spacers.
- **Preprufe 160R**—thinner grade for blindside, zero property line applications against soil retention systems.
- **Preprufe Tape LT**—for covering cut edges, roll ends, penetrations and detailing (temperatures between 25°F (-4°C) and 86°F (+30°C)).
- **Preprufe Tape HC**—as above for use in Hot Climates (minimum 50°F (10°C)).
- **Bituthene® Liquid Membrane**—for sealing around penetrations, etc.

Preprufe 300R & 160R membranes are applied either horizontally to smooth prepared concrete, carton forms or well rolled and compacted sand or crushed stone substrate; or vertically to permanent formwork or adjoining structures. Concrete is then cast directly against the adhesive side of the membranes. The specially developed Preprufe adhesive layers work together to form a continuous and integral seal to the structure.

Preprufe can be returned up the inside face of slab formwork but is not recommended for conventional twin-sided formwork on walls, etc. Use Bituthene self-adhesive membrane or Procor® fluid applied membrane to walls after removal of formwork for a fully bonded system to all structural surfaces.

### Advantages

- **Forms a unique continuous adhesive bond to concrete poured against it**—prevents water migration and makes it unaffected by ground settlement beneath slabs
- **Fully-adhered watertight laps** and detailing
- **Provides a barrier to water, moisture and gas**—physically isolates the structure from the surrounding ground
- **BBA Certified** for basement Grades 2, 3, & 4 to BS 8102:1990
- **Zero permeance** to moisture

- **Solar reflective**—reduced temperature gain
- **Simple and quick to install**—requiring no priming or fillets
- **Can be applied to permanent formwork**—allows maximum use of confined sites
- **Self protecting**—can be trafficked immediately after application and ready for immediate placing of reinforcement
- **Unaffected by wet conditions**—cannot activate prematurely
- **Inherently waterproof, non-reactive system:**
  - not reliant on confining pressures or hydration
  - unaffected by freeze/thaw, wet/dry cycling
- **Chemical resistant**—effective in most types of soils and waters, protects structure from salt or sulphate attack

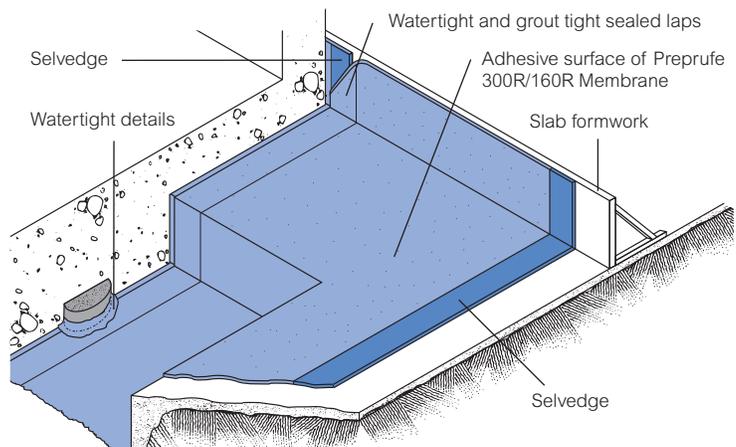
### Installation

The most current application instructions, detail drawings and technical letters can be viewed at [www.graceconstruction.com](http://www.graceconstruction.com). Technical letters are provided for the following subjects to assist in the installation of Preprufe:

- Chemical Resistance
- Minimizing Concrete Shrinkage and Curling
- Rebar Chairs on Preprufe 300R Membrane
- Removal of Formwork Placed Against Preprufe Membranes
- Winter Lap Sealing and the use of Preprufe Tape LT

For other technical information contact your local Grace representative.

Preprufe 300R & 160R membranes are supplied in rolls 4 ft (1.2 m) wide, with a selvedge on one side to provide self-adhered laps for continuity between rolls. The rolls of Preprufe Membrane and Preprufe Tape are interwound with a disposable plastic release liner which must be removed before placing reinforcement and concrete.



Drawings are for illustration purposes only. Please refer to [www.graceconstruction.com](http://www.graceconstruction.com) for specific application details.

## Substrate Preparation

**All surfaces**—It is essential to create a sound and solid substrate to eliminate movement during the concrete pour. Substrates must be regular and smooth with no gaps or voids greater than 0.5 in. (12 mm). Grout around all penetrations such as utility conduits, etc. for stability (see Figure 1).

**Horizontal**—The substrate must be free of loose aggregate and sharp protrusions. Avoid curved or rounded substrates. The surface does not need to be dry, but standing water must be removed.

**Vertical**—Use concrete, plywood, insulation or other approved facing to sheet piling to provide support to the membrane. Board systems such as timber lagging must be close butted to provide support and not more than 0.5 in. (12 mm) out of alignment.

## Membrane Installation

Preprufe can be applied at temperatures of 25°F (-4°C) or above. When installing Preprufe in cold or marginal weather conditions 55°F (<13°C) the use of Preprufe Tape LT is recommended at all laps and detailing. Preprufe Tape LT should be applied to clean, dry surfaces and the release liner must be removed immediately after application.

**Horizontal substrates**—Place the membrane HDPE film side to the substrate with the clear plastic release liner facing towards the concrete pour. End laps should be staggered to avoid a build up of layers. Leave plastic release liner in position until overlap procedure is completed (see Figure 2).

Accurately position succeeding sheets to overlap the previous sheet 3 in. (75 mm) along the marked selvedge. Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap. Peel back the plastic release liner from between the overlaps as the two layers are bonded together. Ensure a continuous bond is achieved without creases and roll firmly with a heavy roller. Completely remove the plastic liner to expose the protective coating. Any initial tack will quickly disappear.

Refer to Grace Tech Letters for information on suitable rebar chairs for Preprufe.

**Vertical substrates**—Mechanically fasten the membrane vertically using fasteners appropriate to the substrate with the clear plastic release liner facing towards the concrete pour. The membrane may be installed in any convenient length. Secure the top of the membrane using a batten such as a termination bar or similar 2 in. (50 mm) below the top edge (see Figure 3). Fastening can be made through the selvedge so that the membrane lays flat and allows firmly rolled overlaps. Immediately remove the plastic release liner. Any additional fasteners must be covered with a patch of Preprufe Tape (see Figure 4).

Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap. Roll firmly to ensure a watertight seal.

**Roll ends and cut edges**—Overlap all roll ends and cut edges by a minimum 3 in. (75 mm) and ensure the area is clean and free from contamination, wiping with a damp cloth if necessary. Allow to dry and apply Preprufe Tape LT (or HC in hot climates) centered over the lap and roll firmly. Immediately remove printed plastic release liner from the tape.

## Details

Refer to Preprufe Field Application Manual, Section V Application Instructions or visit [www.graceconstruction.com](http://www.graceconstruction.com). This Manual gives comprehensive guidance and standard details for:

- internal and external corners
- penetrations
- tiebacks
- columns
- grade beam pilecaps
- tie-ins
- terminations

## Membrane Repair

Inspect the membrane before installation of reinforcement steel, formwork and final placement of concrete. The membrane can be easily cleaned by jet washing if required. Repair damage by wiping the area with a damp cloth to ensure the area is clean and free from dust, and allow to dry. Repair small punctures (0.5 in. (12 mm) or less) and slices by applying Preprufe Tape centered over the damaged area and roll firmly. Remove the release liner from the tape. Repair holes and large punctures by applying a patch of Preprufe membrane, which extends 6 in. (150 mm) beyond the damaged area. Seal all edges of the patch with Preprufe Tape, remove the release liner from the tape and roll firmly. Any areas of damaged adhesive should be covered with Preprufe Tape. Remove printed plastic release liner from tape. Where exposed selvedge has lost adhesion or laps have not been sealed, ensure the area is clean and dry and cover with fresh Preprufe Tape, rolling firmly. Alternatively, use a hot air gun or similar to activate adhesive and firmly roll lap to achieve continuity.

## Pouring of Concrete

Ensure the plastic release liner is removed from all areas of Preprufe R Membrane and Tape.

It is recommended that concrete be poured within 56 days (42 days in hot climates) of application of the membrane. Concrete must be placed and compacted carefully to avoid damage to the membrane. Never use a sharp object to consolidate the concrete.

## Removal of Formwork

Preprufe membranes can be applied to removable formwork, such as slab perimeters, elevator and lift pits, etc. Once the concrete is poured the formwork must remain in place until the concrete has gained sufficient compressive strength to develop the surface bond. Preprufe membranes are not recommended for conventional twin-sided wall forming systems.

A minimum concrete compressive strength of 1500 psi (10 N/mm<sup>2</sup>) is recommended prior to stripping formwork supporting Preprufe membranes. Premature stripping may result in displacement of the membrane and/or spalling of the concrete.

As a guide, to reach the minimum compressive strength stated above, a structural concrete mix with an ultimate strength of 6000 psi (40 N/mm<sup>2</sup>) will typically require a cure time of approximately 6 days at an average ambient temperature of 25°F (-4°C), or 2 days at 70°F (21°C).

Figure 1

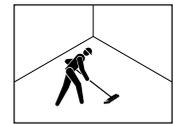


Figure 2

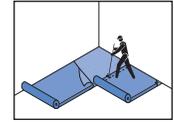
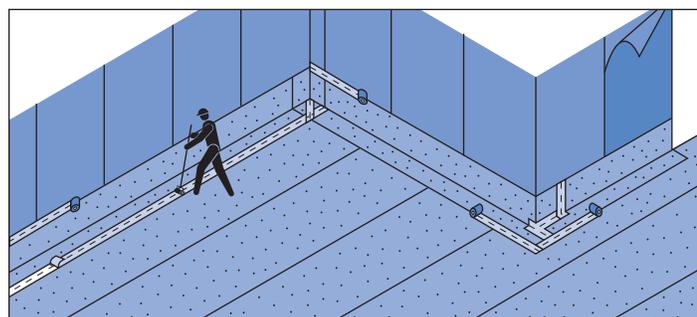
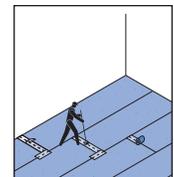


Figure 3



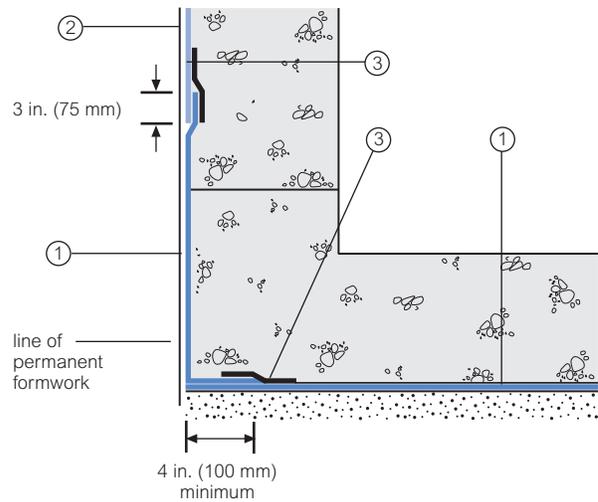
Figure 4



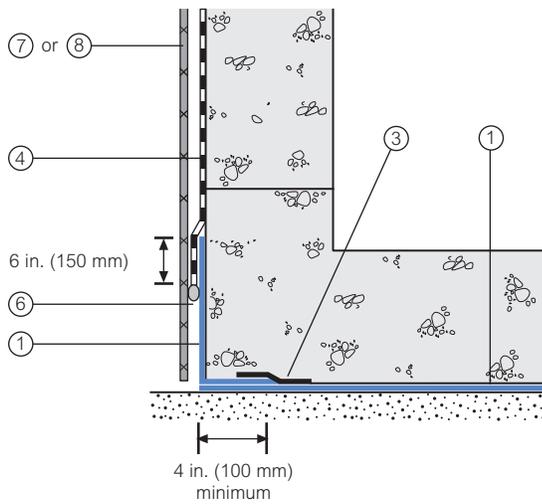
## Detail Drawings

Details shown are typical illustrations and not working details. For a list of the most current details, visit us at [www.graceconstruction.com](http://www.graceconstruction.com). For technical assistance with detailing and problem solving please call toll free at 866-333-3SBM (3726).

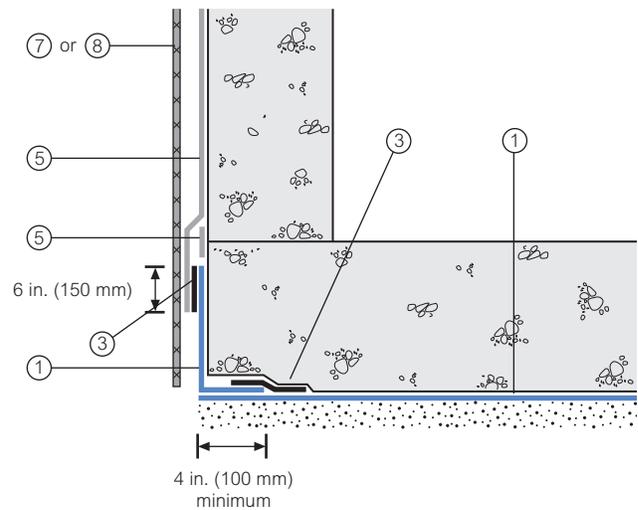
### Wall base detail against permanent shutter



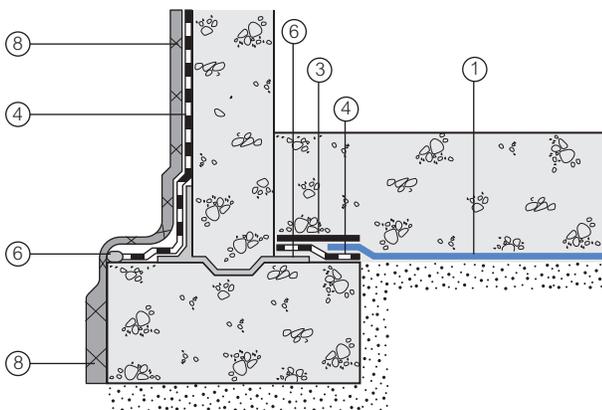
### Bituthene wall base detail (Option 1)



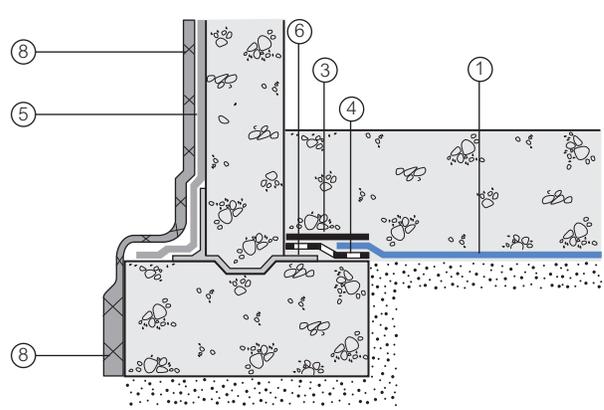
### Procor wall base detail (Option 1)



### Bituthene wall base detail (Option 2)



### Procor wall base detail (Option 2)



1 Preprufe 300R  
2 Preprufe 160R

3 Preprufe Tape  
4 Bituthene

5 Procor  
6 Bituthene Liquid Membrane

7 Protection  
8 Hydroduct®

## Supply

Dimensions (Nominal)	Preprufe 300R Membrane	Preprufe 160R Membrane	Preprufe Tape (LT or HC*)
Thickness	0.046 in. (1.2 mm)	0.032 in. (0.8 mm)	
Roll size	4 ft x 98 ft (1.2 m x 30 m)	4 ft x 115 ft (1.2 m x 35 m)	4 in. x 49 ft (100 mm x 15 m)
Roll area	392 ft <sup>2</sup> (36 m <sup>2</sup> )	460 ft <sup>2</sup> (42 m <sup>2</sup> )	
Roll weight	108 lbs (50 kg)	92 lbs (42 kg)	4.3 lbs (2 kg)
Minimum side/end laps	3 in. (75 mm)	3 in. (75 mm)	3 in. (75 mm)
* LT denotes Low Temperature (between 25°F (-4°C) and 86°F (+30°C)) HC denotes Hot Climate (50°F (>+10°C))			
<b>Ancillary Products</b>			
Bituthene Liquid Membrane—1.5 US gal (5.7 liter) or 4 US gal (15.1 liter)			

## Physical Properties

Property	Typical Value 300R	Typical Value 160R	Test Method
Color	white	white	
Thickness	0.046 in. (1.2 mm) nominal	0.032 in. (0.8 mm) nominal	ASTM D3767
Low temperature flexibility	Unaffected at -10°F (-23°C)	Unaffected at -10°F (-23°C)	ASTM D1970
Resistance to hydrostatic head, minimum	231 ft (70 m)	231 ft (70 m)	ASTM D5385, modified <sup>1</sup>
Elongation, minimum	300%	300%	ASTM D412, modified <sup>2</sup>
Tensile strength, film, minimum	4000 psi (27.6 MPa)	4000 psi (27.6 MPa)	ASTM D412
Crack cycling at -10°F (-23°C), 100 cycles	Unaffected	Unaffected	ASTM C836
Puncture resistance, minimum	221 lbs (990 N)	100 lbs (445 N)	ASTM E154
Peel adhesion to concrete, minimum	5.0 lbs/in. (880 N/m) width	5.0 lbs/in. (880 N/m) width	ASTM D903, modified <sup>3</sup>
Lap peel adhesion	2.5 lbs/in. (440 N/m) width	2.5 lbs/in. (440 N/m) width	ASTM D1876, modified <sup>4</sup>
Permeance to water vapor transmission, maximum	0.01 perms (0.6 ng/(Pa × s × m <sup>2</sup> ))	0.01 perms (0.6 ng/(Pa × s × m <sup>2</sup> ))	ASTM E96, method B
Water absorption, maximum	0.5%	0.5%	ASTM D570
Methane permeability	9.1 mls/m <sup>2</sup> /day	N/A	University of London, QMW College <sup>3</sup>
Permeability <sup>5</sup> (hydraulic conductivity)	$K < 1.4 \times 10^{-11} \text{cm} \cdot \text{s}^{-1}$	$K < 1.4 \times 10^{-11} \text{cm} \cdot \text{s}^{-1}$	ASTM D5084-90

### Footnotes:

- Hydrostatic head tests of Preprufe Membranes are performed by casting concrete against the membrane with a lap. Before the concrete cures, a 0.125 in. (3 mm) spacer is inserted perpendicular to the membrane to create a gap. The cured block is placed in a chamber where water is introduced to the membrane surface up to the head indicated.
- Elongation of membrane is run at a rate of 2 in. (50 mm) per minute.
- Concrete is cast against the protective coating surface of the membrane and allowed to properly dry (7 days minimum). Peel adhesion of membrane to concrete is measured at a rate of 2 in. (50 mm) per minute at room temperature.
- The test is conducted 15 minutes after the lap is formed (per Grace published recommendations) and run at a rate of 2 in. (50 mm) per minute at 25°F (-4°C).
- Result is lower limit of apparatus. Membrane therefore considered impermeable.

### Specification Clauses

Preprufe 300R or 160R shall be applied with its adhesive face presented to receive fresh concrete to which it will integrally bond. Only Grace Construction Products approved membranes shall be bonded to Preprufe 300R/160R. All Preprufe 300R/160R system materials shall be supplied by Grace Construction Products, and applied strictly in accordance with their instructions.

Specimen performance and formatted clauses are also available.

NOTE: Use Preprufe Tape to tie-in Procor with Preprufe.

### Health and Safety

Refer to relevant Material Safety data sheet. Complete rolls should be handled by a minimum of two persons.

[www.graceconstruction.com](http://www.graceconstruction.com)

For technical assistance call toll free at 866-333-3SBM (3726)

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**GRACE**

# GRACE

## Construction Products

### 1. Product Name

Preprufe® 300R and 160R Waterproofing Systems

### 2. Manufacturer

Grace Construction Products  
62 Whittemore Avenue  
Cambridge, MA 02140  
(866) 333-3SBM (3726)  
Fax: (617) 498-4311  
www.graceconstruction.com

### 3. Product Description

#### BASIC USE

Preprufe® 300R and Preprufe 160R membranes are used in blind side waterproofing applications where positive side waterproofing is desired but the positive side of the structure is not accessible once the concrete is poured.

Preprufe 300R Membrane is used primarily in under slab and below-grade split slab applications. Preprufe 300R Membrane is applied over properly prepared earth, stone or concrete. Concrete is cast against the adhesive side of the membrane. Preprufe 300R Membrane incorporates an exceptionally tough HDPE film and is designed to allow foot traffic directly on the membrane during construction.

Preprufe 160R Membrane is used in vertical applications. It is applied to properly prepared soil retention systems and concrete is cast against the membrane.

#### COMPOSITION & MATERIALS

Preprufe 300R and Preprufe 160R membranes are multilayered composite sheets consisting of an exceptionally tough HDPE film, a specially formulated synthetic pressure sensitive adhesive and a protective coating.

#### ACCESSORY COMPONENTS

- Preprufe Tape
- Preprufe Tieback Cover
- Bituthene® Liquid Membrane
- Preprufe CJ Tape

### 4. Technical Data

#### APPLICABLE STANDARDS

ASTM International

- ASTM C836 Standard Specification for High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course
- ASTM D412 Standard Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers-Tension
- ASTM D570 Standard Test Method for Water Absorption of Plastics
- ASTM D882 Standard Test Method for Tensile Properties of Thin Plastic Sheeting
- ASTM D903 Standard Test Method for Peel or Stripping Strength of Adhesive Bonds
- ASTM D1876 Standard Test Method for Peel Resistance of Adhesives (T-Peel Test)
- ASTM D1970 Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
- ASTM D3767 Standard Practice for Rubber-Measurement of Dimensions
- ASTM D5385 Standard Test Method for Hydrostatic Pressure Resistance of Waterproofing Membranes
- ASTM E96 Standard Test Methods for Water Vapor Transmission of Materials
- ASTM E154 Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover

#### PHYSICAL PROPERTIES

For detailed information on the physical properties of Preprufe 300R and Preprufe 160R Membranes, see Table 1.

### 5. Installation

Apply membranes when ambient temperatures are 25 degrees F (-4 degrees C) or above. Substrates must be smooth and sound with no gaps or voids in excess of 1/2" (13 mm).

#### FORMING SYSTEMS

It is very important to specify a forming system that is compatible with the Preprufe system. One-sided wall forming systems are clearly the best choice since there are no form ties used in this system. Therefore, there are no penetrations to the waterproofing layer. Other compatible systems include gang forms with load gathering form ties. These systems minimize the number of penetrations.

Hand set forming systems or, more specifically, use of form ties with ultimate load capabilities of less than 10,000 lb (44,500 N) per tie are not recommended. These systems have many form ties that penetrate the waterproofing.

#### Formwork

On vertical applications, use one-sided wall forming systems to minimize punctures in the membrane after the membrane is installed. Review Technical Letter "Forming Systems for use with Preprufe 160R Membrane."

#### APPLICATION

##### Vertical Applications

Apply the membrane with the thick white HDPE film side facing the prepared substrate and the protective coating side facing the concrete to be poured. The membrane may be installed in any convenient length vertically. For lengths of membrane greater than 8' (2.4 m), mechanically fasten the membrane at 2' (0.6 m) intervals centered in the self-adhesive selvedge prior to making the side lap, using small head nails or staples.

Using the lap line as a guide, apply subsequent sheets overlapping the in-place sheet 3" (75 mm) along the self-adhesive selvedge of the membrane. Avoid overlapping membrane beyond the guideline to prevent fishmouths. Should they occur, apply Preprufe Tape centered over the fishmouth, roll firmly to form a tight seal and remove release liner.

It is important that all nail heads be covered with the overlapping sheets of membrane. Side laps must be immediately rolled firmly to ensure a tight seal. A metal seam roller is recommended. To maximize adhesion in colder temperatures or in damp conditions, apply gentle heat to the lap area using a hot air gun (see Technical Letters). Overlap the ends of the membrane a minimum of 3" (75 mm). Remove and discard the release liner from both sheets. Apply Preprufe Tape centered over the end lap and edges of membrane not sealed by selvedge. Roll firmly to form a tight seal. Remove release liner from tape and discard.

For additional protection, Hydroduct® Tape may be applied between the sheets in the end lap area prior to application of the Preprufe Tape. Secure the top termination of the membrane with a termination bar and fasteners.

If the top termination is to be covered by the concrete pour, a strip of Preprufe CJ Tape must be placed over the termination bar and fasteners. Place the termination bar 2" (50 mm)

below the top edge of the membrane. If the membrane will tie into subsequent sheets of Preprufe, Bituthene Membrane or other waterproofing, leave an additional 12" (300 mm) length of Preprufe 160R membrane. Protect this length from damage and do not remove the release liner. This length of clean membrane will be used to complete the appropriate waterproofing details after the concrete or lift is poured.

**Horizontal Applications**

Roll out the membrane with the thick white HDPE film side facing the prepared substrate and the protective coating side facing the concrete to be poured. Remove the clear release liner at the time of installation. Using the lap line as a guide, align and roll out subsequent sheets overlapping the in-place sheet 3" (75 mm) along the self-adhesive selvage of the membrane. Side laps must be immediately rolled firmly to ensure a tight seal. A heavy metal seam roller is recommended.

Avoid overlapping membrane beyond the guideline to prevent fishmouths. Should this occur, apply Preprufe Tape centered over the fishmouth, roll firmly to form a tight seal and remove release liner. To maximize adhesion in

cooler temperatures or in damp conditions, apply gentle heat to the lap area using a hot air gun (see Technical Letters section of website). The membrane may be installed in any convenient length. Overlap the ends of the membrane 3" (75 mm) and remove and discard the release liner from both sheets. Apply Preprufe Tape centered over the end lap and edges of membrane not sealed by selvage. Roll firmly to form a tight seal. Remove release liner from tape and discard.

For additional protection, Hydroduct Tape may be applied between the sheets in the end lap area prior to application of the Preprufe Tape.

**Internal & External Corners**

Install the Preprufe Membrane according to standard application instructions detailed for vertical and horizontal applications above. Internal and external corners should be formed as shown in the Detail Drawings returning the membrane a minimum of 4" (100 mm).

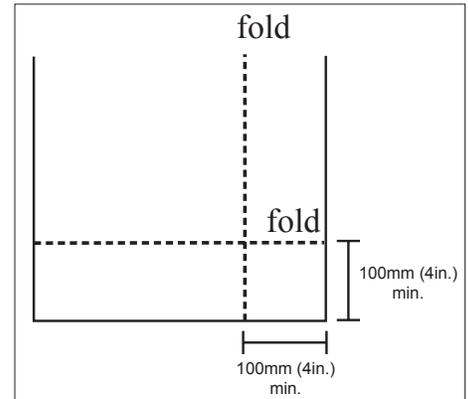


Figure 1

**Internal Corners**

Fold the membrane as indicated in Figure 1. Crease the fold with nominal hand pressure to ensure a close fit to the substrate profile and avoid hollows. With the white coating facing toward the concrete, ensure that the apex of the corner is covered and sealed with Preprufe Tape. Remove release liner and roll firmly.

**External Corners**

Fold the membrane as indicated in Figure 1. Crease the fold with nominal hand pressure to

TABLE 1 PHYSICAL PROPERTIES OF PREPRUFE 160R AND PREPRUFE 300R MEMBRANES

Property & test method	Typical values	
	Preprufe 160R Membrane	Preprufe 300R Membrane
Color	White	White
Thickness, ASTM D3767, Method A	0.032" (0.8 mm) nominal	0.046" (1.2 mm) nominal
Low temperature flexibility, ASTM D1970	Unaffected at -10°F (-23°C)	Unaffected at -10°F (-23°C)
Resistance to hydrostatic head, minimum, ASTM D5385, Modified <sup>1</sup>	231 (70 m)	231 (70 m)
Elongation, minimum, ASTM D412, Modified <sup>2</sup>	300%	300%
Tensile strength, film, minimum, ASTM D882	4000 psi (27.6 MPa)	4000 psi (27.6 MPa)
Crack cycling, at -10°F (-23°C), 100 cycles, ASTM C836	Unaffected	Unaffected
Puncture resistance, minimum, ASTM E154	100 lb (445 N)	221 lb (990 N)
Peel adhesion to concrete, minimum, ASTM D903, Modified <sup>3</sup>	5.0 lb/in width (880 N/m)	5.0 lb/in width (880 N/m)
Lap peel adhesion, ASTM D1876, Modified <sup>4</sup>	2.5 lb/in width (440 N/m)	2.5 lb/in width (440 N/m)
Permeance to water vapor transmission, maximum, ASTM D96, Method B	0.01 perms (0.6 ng/(Pa × s × m <sup>2</sup> ))	0.01 perms (0.6 ng/(Pa × s × m <sup>2</sup> ))
Water absorption, maximum, ASTM D570	0.5%	0.5%

<sup>1</sup> Hydrostatic head tests of Preprufe Membranes are performed by casting concrete against the membrane with a lap. Before the concrete cures, a 0.125" (3 mm) spacer is inserted perpendicular to the membrane to create a gap. The cured block is placed in a chamber where water is introduced to the membrane surface up to the head indicated.

<sup>2</sup> Elongation of membrane is run at a rate of 2" (51 mm) per minute.

<sup>3</sup> Concrete is cast against the protective coating surface of the membrane and allowed to properly dry (7 days minimum). Peel adhesion of membrane to concrete is measured at a rate of 2" (51 mm) per minute at room temperature.

<sup>4</sup> The test is conducted 15 minutes after the lap is formed (per Grace published recommendations) and run at a rate of 2" (51 mm) per minute at 25°F (-4°C).

ensure a close fit to the substrate profile and avoid hollows. Cut the Preprufe membrane in order to wrap around corner. With the white coating facing toward the concrete, ensure that the apex of the corner is covered and sealed with Preprufe Tape. Remove release liner and roll firmly.

**Round Penetrations**

For Service Pipes, Lighting Conduit, Piles, etc. - Follow these steps to seal around penetrations:

1. All penetrations must be firmly secured and stable. Grout around all penetrations that are not stable. Clean loose dust or dirt from the penetration surface using a clean, dry cloth or brush. Remove rust, if applicable, with a wire brush and wipe clean.
2. Cut the field membrane tight to the penetration and remove release liner. If membrane is not within 1/2" (12 mm) of penetration and not more than 2" (50 mm) from penetration, apply Preprufe Tape to cover the gap. Roll firmly into place and remove release liner. If the membrane is greater than 2" (51 mm) from penetration, install more Preprufe Membrane to cover the gap, repeating these instructions until Preprufe

Membrane/Tape is within 1/2" (12 mm).

3. Mix and apply Bituthene Liquid Membrane around the penetration. Liquid Membrane should be placed to form a minimum 1" (25.4 mm) continuous fillet between the Preprufe Membrane/Tape and the base of the penetration.
4. Cut a patch of Preprufe Membrane that is a minimum of 12" (300 mm) larger than the diameter or width of the penetration so that the patch extends 6" (150 mm) beyond the penetration in all directions. Remove the release liner and center the patch over penetration and trace/draw the penetration profile onto the patch. Using sheers or a utility knife, make relief cuts through the membrane. Triangles formed by making a

relief cut are not to exceed 2" (50 mm) in height when placed over penetration. In other words, penetration diameters greater than 4" (100 mm) need to be trimmed. Remove and discard release liner.

5. Slide the patch over penetration and press into the partially cured Liquid Membrane. Ensure that the patch is pressed firmly into the Liquid Membrane and is positioned directly onto the Preprufe Field Membrane/Tape below. Using a trowel, smooth out any Liquid Membrane that has flowed out of the relief cut.
6. Apply Preprufe Tape centered over the edges of the patch and roll firmly to form a tight seal. Remove release liner from tape and discard.
7. Wrap the penetration with Preprufe Tape, positioning the tape at the base of the patch. Remove enough release liner to overlap Tape onto itself and roll/press firmly into place. Remove remaining release liner and discard.

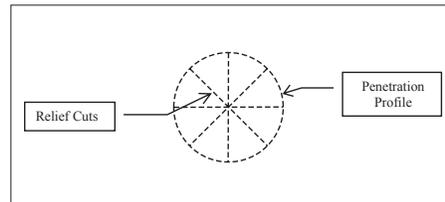


Figure 2

**Straight Edge Penetrations**

For square piles, steel columns, walers, rakers, etc. - Follow these steps to seal around

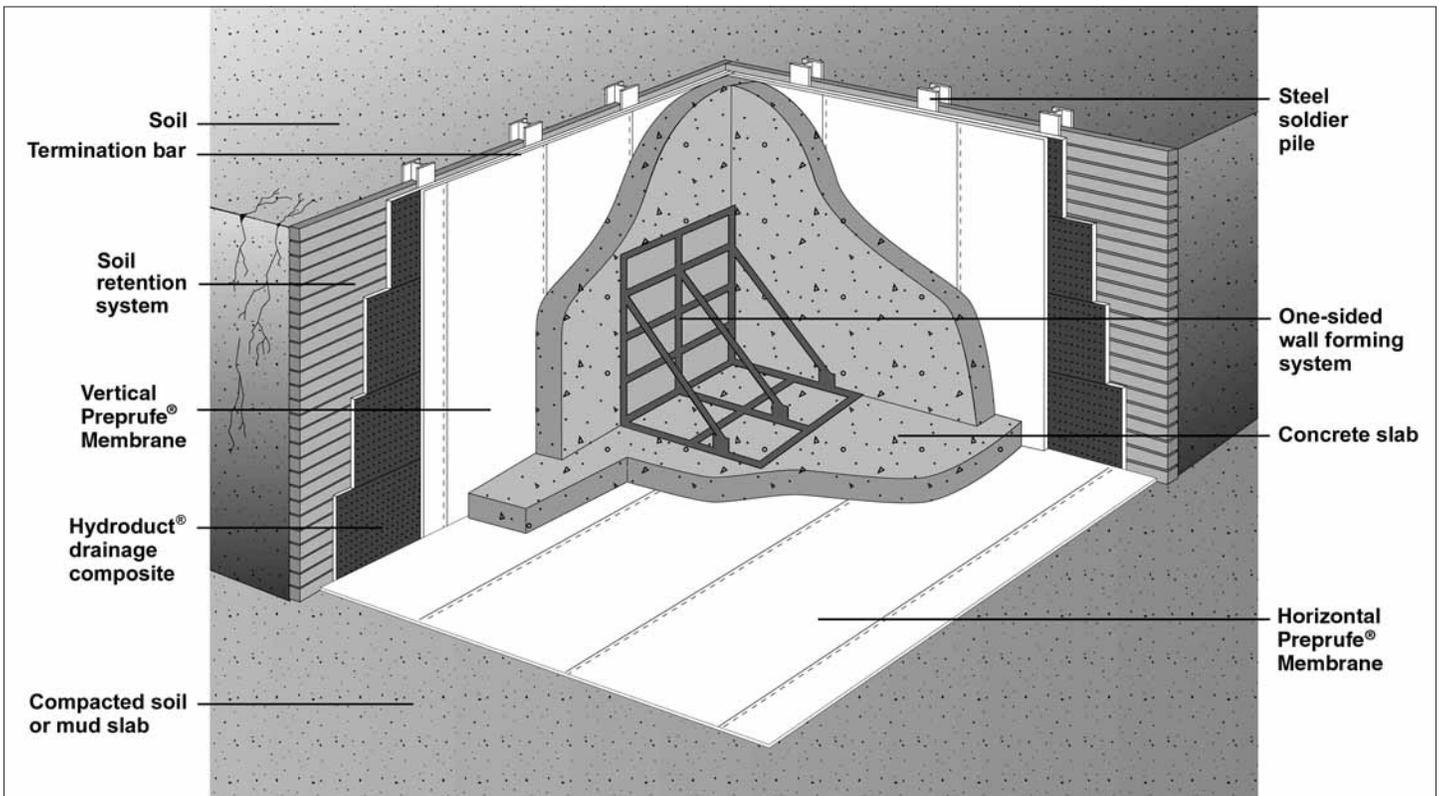


Figure 3 Preprufe® Waterproofing Systems

penetrations:

1. All penetrations must be firmly secured and stable. Grout around all penetrations that are not stable. Clean loose dust or dirt from the penetration surface using a clean, dry cloth or brush. Remove rust, if applicable, with a wire brush and wipe clean.
2. Cut the field membrane tight to the penetration and remove release liner. If membrane is not within 1/2" (12 mm) of penetration and not more than 2" (51 mm) from penetration, apply Preprufe Tape to cover the gap. Roll firmly into place and remove release liner. If the membrane is greater than 2" (51 mm) from penetration, install more Preprufe Membrane to cover the gap repeating these instructions until Preprufe Membrane/Tape is within 1/2" (12 mm).
3. Mix and apply Bituthene Liquid Membrane around the penetration. Liquid Membrane should be placed to form a minimum 1" (25.4 mm) continuous fillet between the Preprufe Membrane/Tape and the base of the penetration. Apply a 90 mil (2.2 mm) continuous coating overlapping a minimum of 3" (75 mm) onto the surface of the Preprufe Membrane and the penetration.
4. Install a minimum 12" (300 mm) strip of Bituthene Membrane centered over the Preprufe Membrane and the penetration intersection.
5. Install Preprufe Tape to cover the strip of Bituthene Membrane by overlapping a minimum of 1" (25.4 mm) until a minimum of 2" (51 mm) overlap onto the Preprufe Membrane is achieved.
6. Terminate the top edge of the strip of Bituthene Membrane and Preprufe Tape along the penetration with a bead of Bituthene Liquid Membrane.

#### Wall Penetrations

For Rebar, All-Thread, Metal Dowels, etc. - Follow these steps to seal around penetrations:

1. Clean loose dust or dirt from the penetration and the surrounding substrate surface using a clean, dry cloth or brush. Remove rust, if applicable, with a wire brush and wipe clean.
2. Mix and apply Bituthene Liquid Membrane around the penetration. Liquid Membrane should be placed to form a minimum 1" (25.4 mm) continuous fillet between the substrate and the base of the penetration.
3. Cut the field membrane tight to the penetration and remove release liner. If membrane is not within 1/2" (12 mm) of penetration and not more than 2" (51 mm) from

penetration, apply Preprufe Tape to cover the gap. Roll firmly into place and remove release. If the membrane is greater than 2" (51 mm) from penetration, install more Preprufe Membrane to cover the gap repeating these instructions until Preprufe Membrane/Tape is within 1/2" (12 mm).

4. Position the field membrane snug to the penetration so that it is a maximum of 1/2" (12 mm) from the base of the penetration and press firmly into the partially cured Liquid Membrane.
5. Apply Liquid Membrane to form a minimum 1" (25.4 mm) continuous fillet between the Preprufe Membrane and the base of the penetration. Extend a 90 mil (2.2 mm) continuous coating of Liquid Membrane overlapping a minimum of 3" (75 mm) onto the surface of the Preprufe Membrane and 6" (150 mm) onto the penetration.
6. Wrap the penetration with Preprufe Tape, positioning the tape at the base of the penetration. Remove enough release liner to overlap tape onto itself and roll/press firmly into place. Remove remaining release liner and discard.

#### Tiebacks

The Preprufe Tieback Cover is a specially designed, two-part cover used to maintain waterproofing integrity at soil retention tieback heads. The Preprufe Tieback Cover consists of a rigid ABS plastic base and pre-fabricated Preprufe membrane cover.

1. Install Preprufe Membrane within 2" of tieback as per standard installation instructions.
2. Center the base over tieback head and secure base to soil retention system using appropriate fasteners. Fasteners should have a low profile head.
3. Apply Preprufe Tape centered over the edge of the base flange and roll firmly to form a tight seal. Remove release liner and discard.
4. Position the membrane cover over the base taking care to ensure the cover flange sits flat onto the Preprufe Membrane.
5. Apply Preprufe Tape centered over the edge of the cover flange and roll firmly to form a tight seal. Remove release liner and discard.

Note: All Preprufe Tape should overlap onto surfaces of tape, membrane, base, cover, etc., a minimum of 50 mm (2").

#### Columns

There are 2 common methods to create a waterproof seal under columns.

- Column Option 1 - Preprufe Membrane is placed over the column footing and directly under the column. Tie-in penetrations such as rebar and threaded rod that penetrate the membrane should be sealed with Bituthene Liquid Membrane. Cut the membrane tight to the penetration. If membrane is not within 1/2" (12 mm) of penetration, apply Preprufe Tape to cover the gap. Mix and apply Bituthene Liquid Membrane around the penetration. Bituthene Liquid Membrane should be placed to form a minimum 1" (25.4 mm) continuous fillet around the penetration at the point of penetration. Bituthene Liquid Membrane should be applied as a 90 mil (2.2 mm) continuous coating overlapping a minimum of 3" (75 mm) onto the surface of the Preprufe membrane.
- Column Option 2 - Preprufe Membrane is placed below the column footing before it is poured. The membrane is installed following the vertical and horizontal application instructions described earlier in this section. When placing the membrane, it is important to leave sufficient length of Preprufe 300R beyond the footing to allow for tie-in to the Preprufe Membrane that will be laid to waterproof the general slab area. The release liner must not be removed from this extra length, and it should be protected from damage until the tie-in details are completed.

#### Grade Beam Pile Caps

The preferred methods to waterproof pile caps are to either "tank" or "cover" the pile cap.

- Pile Cap Option 1 (Tanking Option) - Install Preprufe Membrane over the prepared substrate as instructed in horizontal applications above. Preprufe Membrane is placed in the area formed for the pile cap before the concrete is poured. When placing the membrane, it is important to leave sufficient length of Preprufe beyond the pile cap area to allow for tie-in to the Preprufe Membrane that will be laid to waterproof the general slab area. Cut membrane tight to each pile and complete detail around each pile as instructed earlier in this section for a Penetration Detail.
- Pile Cap Option 2 (Covering Option) - For mud slabs, clean loose dust or dirt from the

pile cap and mud slab surface using a clean, dry cloth or brush. Apply a continuous 90 mil (2.2 mm) coating of Bituthene Liquid Membrane or Procor over the top of the pile cap. Place a 1" (25.4 mm) bead of Liquid Membrane or Procor around all penetrations at the point of penetration through the pile cap. Prime along the edge of the mud slab a minimum of 6" (150 mm) from the edge of pile cap with a Bituthene Primer and allow to dry. Align a 9" (225 mm) strip of Bituthene Membrane centered over the edge of the pile cap. Remove release liner and roll firmly onto the Liquid Membrane and primed mud slab. Install Preprufe Membrane over the prepared substrate and terminate it 2" (51 mm) onto the pile cap. Apply Preprufe Tape centered over the Preprufe Membrane termination. Remove the release liner and roll firmly. Seal Bituthene Membrane and Preprufe Tape edge with a termination bead of Liquid Membrane.

**Pile Cap Option 2 for Compacted Earth**

Apply a continuous 90 mil (2.2 mm) coating of Bituthene Liquid Membrane or Procor over the top of the pile cap. Place a 1" (25.4 mm) bead of Liquid Membrane or Procor around all penetrations at the point of penetration through the pile cap. Remove compacted earth away from the sides of pile cap. Clean loose dust or dirt from the pile cap surface using a clean, dry cloth or brush.

Prime the sides of the pile cap a minimum of 6" (150 mm) from the top of pile cap with a Bituthene Primer and allow to dry. Align a 9" (225 mm) strip of Bituthene Membrane centered over the outside edge (outside corner) of the pile cap. Remove release liner and roll firmly onto the Liquid Membrane and primed sides of pile cap. Align a 12" (300 mm) strip of Bituthene Membrane centered over the outside edge (outside corner) of the pile cap. Remove half of release liner by scoring release liner along the center of the strip.

Roll firmly onto the sides of pile cap with the 9" (225 mm) strip of Bituthene Membrane and the remaining primed pile cap. Leave the other half of the 12" (300 mm) strip with the release liner still intact in order to receive the Preprufe Membrane. Replace earth/fill and compact per standard back-filling instructions being careful not to damage the Bituthene strip including the non-bonded portion. Invert the Bituthene strip, and remove the remaining release liner to expose the adhesive portion

of the Bituthene.

Install Preprufe Membrane over the prepared substrate and terminate it 2" (51 mm) onto the pile cap. Roll firmly onto the inverted Bituthene strip. Apply Preprufe Tape centered over the Preprufe Membrane termination. Remove the release liner and roll firmly. Seal Bituthene Membrane and Preprufe Tape edge with a termination bead of Liquid Membrane.

**Pile Cap Option 2 for Non-Continuous Covering**  
If the Structural Engineer or the design does not allow for the waterproofing to "cover" the pile cap, there must be a minimum 6" (150 mm) continuous shoulder along the perimeter of the pile cap to allow for a proper termination. Apply a continuous 90 mil (2.2 mm) coating of Bituthene Liquid Membrane or Procor onto the top of the pile cap along the outside edge.

Apply a 6" (150 mm) strip of Bituthene Membrane onto the Bituthene Liquid Membrane or Procor along the edge of the pile cap. Install Preprufe Membrane over the prepared substrate and terminate it 2" (51 mm) onto the pile cap. Apply Preprufe Tape centered over the Preprufe Membrane termination. Remove the release liner and roll firmly. Seal Bituthene Membrane and Preprufe Tape edge with a termination bead of Liquid Membrane.

**Construction Joints**

Install the Preprufe membrane according to standard horizontal and vertical application instructions detailed above. Preprufe CJ Tape should be applied to the surface of the Preprufe membrane and centered along the line of all concrete joints. Remove release liner and roll firmly.

**Tie-Ins**

**Preprufe 160R to Preprufe 300R Sub Slab Waterproofing** - Install Preprufe 300R Membrane over the prepared substrate as detailed in horizontal and vertical applications above. Continue onto the vertical surface of the prepared soil retention system a minimum of 18" (450 mm) above the finished elevation of the structural floor slab.

Secure the top of the membrane to temporarily hold it in place on the vertical substrate. Care should be taken to prevent damage to this exposed membrane from concrete back-splash as well as slag from rebar welding in wall forms. The exposed membrane on the vertical surface can be protected with

protection board, plywood or other materials.

Following the vertical application instructions detailed above, install Preprufe 160R Membrane over the prepared vertical soil retention system. Unfasten the vertical length of the Preprufe 300R Membrane and tuck the Preprufe 160R behind the 18" (450 mm) length of Preprufe 300R, ensuring a minimum 3" (75 mm) lap. Complete the detail by installing Preprufe Tape centered over the lap being careful to seal any holes from fasteners. Roll firmly and remove the release liner.

**Preprufe 300R to Post-Applied Wall Waterproofing** - There are 2 options available to tie Preprufe 300R Membrane into wall waterproofing. In Option 1, the Preprufe 300R Membrane is installed under the concrete slab and the footing. Option 2 is intended for applications where the Preprufe 300R Membrane and wall waterproofing are connected through the wall and footing junction.

- Option 1 - Install Preprufe 300R Membrane over the prepared horizontal substrate and extend it up the vertical surface of the slab formwork. Terminate the membrane 6" (150 mm) above the top elevation of the structural floor slab or wall footing. Once the slab or footing is poured and cured for 7 days, remove the forms and trim the excess membrane above the slab (see Technical Letters). Install the wall membrane according to standard application procedures of the post-applied waterproofing manufacturer. Ensure that the wall membrane overlaps onto the surface of the Preprufe 300R by a minimum of 6" (150 mm).
- Option 2 - Prior to the pouring of the wall, apply a 90 mil (2.2 mm) coating of Bituthene Liquid Membrane on top of the footing area using standard application procedures. Extend the Bituthene Liquid Membrane 3" (75 mm) beyond the proposed wall width in each direction. Install the wall membrane according to standard application procedures of the post-applied waterproofing manufacturer. Ensure that the wall membrane overlaps onto the surface of the Preprufe 300R by a minimum of 6" (150 mm). On the inside of the wall, install a minimum 9" (225 mm) strip of Bituthene sheet membrane over the Bituthene Liquid Membrane that extends beyond the footing area. Install Bituthene Membrane by removing the release liner and firmly rolling the product in place. Install Preprufe 300R Membrane over the prepared substrate and terminate it at the center of the Bituthene sheet membrane strip. Apply Preprufe CJ Tape centered over the Preprufe

300R Membrane termination. Remove the release liner and roll firmly.

**Preprufe 160R to Plaza Deck Waterproofing** - Install Preprufe 160R over the prepared vertical surface following the standard vertical application instructions above. Terminate the Preprufe 160R Membrane 6" (150 mm) above the proposed height of the finished wall. Once the wall is poured and properly cured, remove temporary forming and trim the excess Preprufe 160R remaining above the wall. Install the plaza deck waterproofing according to the manufacturer's standard installation procedures. Ensure that the plaza deck waterproofing overlaps the 160R membrane a minimum of 9" (225 mm) and terminate it onto the Preprufe 160R using a bead of Bituthene Liquid Membrane.

**Preprufe 160R to Post-Applied Wall Waterproofing** - Install Preprufe 160R over the prepared vertical surface following the standard vertical application instructions above. Extend the Preprufe 160R Membrane 12" (300 mm) beyond the end of the blind-side wall. As the foundation wall formwork is installed, fold the 12" (300 mm) piece of Preprufe 160R Membrane to form a sharp corner. Secure it to the inside face of the exterior form panel. Once the wall is poured and cured for seven days, remove the formwork and install the post-applied waterproofing according to the manufacturer's standard installation procedures.

**Preprufe 300R Membrane Wall Termination**

- **Option 1 (Liquid Membrane Detail)** - Install Preprufe 300R Membrane over a mud slab as detailed in horizontal applications above. For compacted earth, contact a local Grace representative. Install Preprufe 300R Membrane tight to all vertical and horizontal intersections. At the termination of the membrane, place a 1" (25.4 mm) fillet of Bituthene liquid membrane and trowel a 90 mil (2.2 mm) coating a minimum of 3" (75 mm) onto vertical and horizontal surfaces. Remove the release liner and install a minimum 12" (300 mm) strip of Bituthene Membrane centered over the horizontal termination. Install Preprufe Tape to cover the strip of Bituthene Membrane by overlapping a minimum of 1" (25.4 mm) until a minimum of 2" (51 mm) overlap onto the Preprufe Membrane is achieved. Terminate the top edge of the strip of Bituthene Membrane and Preprufe Tape along the wall with a

bead of Bituthene Liquid Membrane.

- **Option 2 (Sheet Membrane Detail)** - Install Preprufe 300R Membrane over the prepared substrate as detailed in horizontal applications above. Install Preprufe 300R Membrane tight to all vertical and horizontal intersections. Install a minimum 6" (150 mm) strip of Bituthene Membrane on the vertical surface along the joint. Mix and apply Bituthene Liquid Membrane to form a minimum 1" (25.4 mm) continuous fillet between the Preprufe Membrane and the wall. Install Preprufe CJ Tape 6" (150 mm) from the edge of the wall onto the Preprufe Membrane and terminate 2" (51 mm) onto the strip of Bituthene Membrane. Install Preprufe CJ Tape onto the strip of Bituthene Membrane and overlap onto the previous Preprufe CJ Tape a minimum of 2" (51 mm). Terminate the top edge of the strip of Bituthene Membrane and Preprufe Tape along the wall with a bead of Bituthene Liquid Membrane.

**Membrane Repair**

Inspect the membrane for damage before placement of reinforcing steel, formwork and concrete. Repair small punctures 1/2" (12 mm), or less, and slices by applying Preprufe Tape centered over the damaged area and roll firmly. Remove the release liner from the tape. Repair holes and large punctures by applying a patch of Preprufe membrane, which extends 6" (150 mm) beyond the damaged area. Seal all edges of the patch with Preprufe Tape, remove the release liner from the tape and roll firmly.

**CONCRETE PLACEMENT**

Lightly soiled membrane should be cleaned with air blower and heavily soiled membrane should be cleaned with a power-washer. Cast concrete within 56 days (42 days in hot climates) of application of the membrane. Concrete must be placed carefully to avoid damage to the membrane. Never use a sharp object to consolidate concrete.

**REMOVAL OF FORMWORK**

Preprufe Membranes can be applied to removable formwork, such as slab perimeters, elevator and lift pits, etc. Once the concrete is poured, the formwork must remain in place until the concrete has gained sufficient compressive strength to develop the surface bond. Preprufe Membranes are not recommended for conventional twin-sided wall forming systems.

A minimum concrete compressive strength

of 1500 psi (10 N/mm<sup>2</sup>) is recommended prior to stripping formwork supporting Preprufe Membranes. Premature stripping may result in displacement of the membrane and/or spalling of the concrete.

As a guide, to reach the minimum compressive strength stated above, a structural concrete mix with an ultimate strength of 6000 psi (40 N/mm<sup>2</sup>) will typically require a cure time of approximately 6 days at an average ambient temperature of 25 degrees F (-4 degrees C) or 2 days at 70 degrees F (21 degrees C).

## 6. Availability & Cost

**AVAILABILITY**

A network of distributors carries Preprufe and Bituthene products for prompt delivery to project sites.

**COST**

For specific information, contact a local distributor or a Grace Construction Products representative.

## 7. Warranty

A 5 year material warranty for Preprufe and Bituthene membrane products is available from the manufacturer upon request.

## 8. Maintenance

Preprufe 300R and Preprufe 160R membranes will not require maintenance when installed in accordance with Grace's recommendations.

## 9. Technical Services

Support is provided by full-time, technically trained Grace field sales representatives and technical service personnel, backed by a central research and development staff.

## 10. Filing Systems

- Reed First Source
- Additional product information is available from the manufacturer.

W. R. Grace & Co. -Conn. hopes the information here will be helpful. It is based upon data and knowledge considered to be true and accurate and is offered for the users' consideration, investigation and verification, but we do not warrant the results to be obtained. Please read all statements, recommendations and suggestions in conjunction with our conditions of sale, which apply to all goods supplied by us. No statement, recommendation or suggestion is intended for any use which would infringe any patent or copyright. W. R. Grace & Co. -Conn., 62 Whittemore Avenue, Cambridge, MA 02140. In Canada, W. R. Grace & Co. Canada, Ltd., 294 Clements Road, West, Ajax, Ontario, Canada L1S 3C6.

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## BITUTHENE® LIQUID MEMBRANE

Two component, elastomeric, liquid applied detailing compound for use with Grace waterproofing membranes

### Description

Bituthene® Liquid Membrane is a two component, elastomeric, cold applied, trowel grade material designed for a variety of uses with the Grace waterproofing systems. The VOC (Volatile Organic Compound) content is 10 g/L.

Architectural and Industrial Maintenance Regulations limit the VOC content in products classified as Architectural Coatings. Refer to Technical Letters at [www.graceconstruction.com](http://www.graceconstruction.com) for most current list of allowable limits.

### Advantages

- **Liquid applied**—conforms to irregular profiles
- **Waterproof**—resistant to water vapor and water pressure
- **Tough, rubber-like**—flexible and damage resistant
- **Chemically cured**—unaffected by in-service temperature variations
- **Cold applied**—no flame hazard
- **System compatible**—formulated for use with Grace waterproofing membrane systems

### Use

Bituthene Liquid Membrane is ideally suited for the following uses:

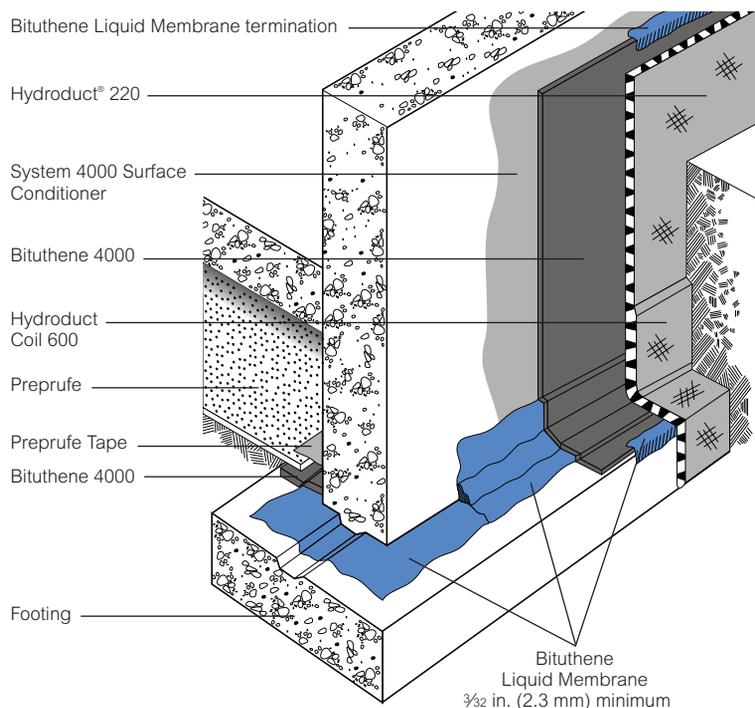
- Fillet material at inside corners
- Reinforcement material at inside corners

- Flashing material around drains, protrusions, curbs and parapets
- Sealing material at terminations
- Repair material for defects on concrete surfaces
- Flashing material at corners

The two parts of Bituthene Liquid Membrane are mixed on site and troweled on to provide a simple and quick waterproofing detailing aid in conjunction with Bituthene, Preprufe® and Procor® systems.

### Compatibility

Bituthene Liquid Membrane is completely compatible with Bituthene, Preprufe and Procor, and with existing asphalt or coal tar-based waterproofing materials. It is also compatible with cured silicone and polyurethane sealants. It is not compatible with creosote, pentachlorophenol, linseed oil or polysulfide-based sealants.



Drawings are for illustration purposes only. Please refer to [www.graceconstruction.com](http://www.graceconstruction.com) for specific application details.

### Product Advantages

- Liquid applied
- Waterproof
- Tough, rubber-like
- Chemically cured
- Cold applied
- System compatible

## Supply

Bituthene Liquid Membrane (Parts A & B)		
Unit size	1.5 gal (5.7 L)	4 gal (15.1 L)
Weight per unit	16 lbs (8 kg)	44 lbs (20 kg)
Units per pallet	100	24

## Physical Properties

Property	Typical Value	Test Method
Color		
Part A	Black	
Part B	Clear	
Mixture of Parts A and B	Black	
Solids content	100%	ASTM D1644
Elongation	250% minimum	ASTM D412
Peel strength	5 lbs/in. (880 N/m) minimum	ASTM D903
Flexibility, 180° bend over 1 in. (25 mm) mandrel at -25°F (-32°C)	Unaffected	ASTM D1970

## Application Procedures

### Safety, Storage and Handling Information

Bituthene products must be handled properly. Vapors from solvent-based primers and mastic are harmful and flammable. For these products, the best available information on safe handling, storage, personal protection, health and environmental considerations has been gathered. Material Safety Data Sheets (MSDS) are available at [www.graceconstruction.com](http://www.graceconstruction.com) and users should acquaint themselves with this information. Carefully read detailed precaution statements on product labels and the MSDS before use.

### Surface Preparation

All surfaces must be dry and free from dirt, grease, oil, dust or other contaminants. Bituthene Liquid Membrane may be applied at temperatures of 25°F (-4°C) or above. Below 40°F (5°C), store in a warm place before application.

### Mixing

Add the entire contents of the Part B container to Part A and mix for 3 to 5 minutes until uniform. Part A is black and Part B is clear. Take care to scrape material from the side and bottom of the containers to assure thorough mixing. A low speed (150 rpm) mechanical mixer with flat paddle blades is required. Do not apply any material if streaks can be seen due to insufficient mixing.

Once mixed, Bituthene Liquid Membrane must be applied by trowel within 1.5 hours. More time is available at lower temperatures. At high temperatures, thickening and curing will be faster. Material that has thickened must be discarded. The material will cure to a very flexible rubber-like material.

Bituthene Liquid Membrane must be applied at a minimum thickness of  $\frac{3}{32}$  in. (2.3 mm) unless otherwise noted on details. In fillet applications, the face of the fillet should be a minimum of  $\frac{3}{4}$  in. (20 mm). In corner flashing application details, it should extend 6 in. (150 mm) in each direction from the corner. Bituthene Liquid Membrane will adhere to primed or unprimed concrete.

Bituthene Liquid Membrane should be allowed to cure at least 24 hours before flood testing.

### Coverage

As a fillet material, 1 gal (3.8 L) will cover approximately 100 linear feet (30 m). As a flashing material, 1 gal (3.8 L) will cover approximately 17 ft<sup>2</sup> (1.6 m<sup>2</sup>). As a fillet and reinforcement, 1 gal (3.8 L) will cover approximately 14 linear feet (4.3 m).

### Cleaning

Clean tools and equipment with mineral spirits before Bituthene Liquid Membrane has cured. Mineral spirits is a combustible liquid and should be used only in accordance with the manufacturer's safety recommendations. Do not use solvents to clean hands or skin.

[www.graceconstruction.com](http://www.graceconstruction.com)

For technical assistance call toll free at 866-333-3SBM (3726)

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We hope the information here will be helpful. It is based on data and knowledge considered to be true and accurate and is offered for the users' consideration, investigation and verification, but we do not warrant the results to be obtained. Please read all statements, recommendations or suggestions in conjunction with our conditions of sale, which apply to all goods supplied by us. No statement, recommendation or suggestion is intended for any use which would infringe any patent or copyright. W. R. Grace & Co.-Conn., 62 Whittemore Avenue, Cambridge, MA 02140. In Canada, Grace Canada, Inc., 294 Clements Road, West, Ajax, Ontario, Canada L1S 3C6.

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## Bituthene® System 4000

### Self-adhesive HDPE waterproofing membrane with super tacky compound for use with patented, water-based System 4000 Surface Conditioner

#### Advantages

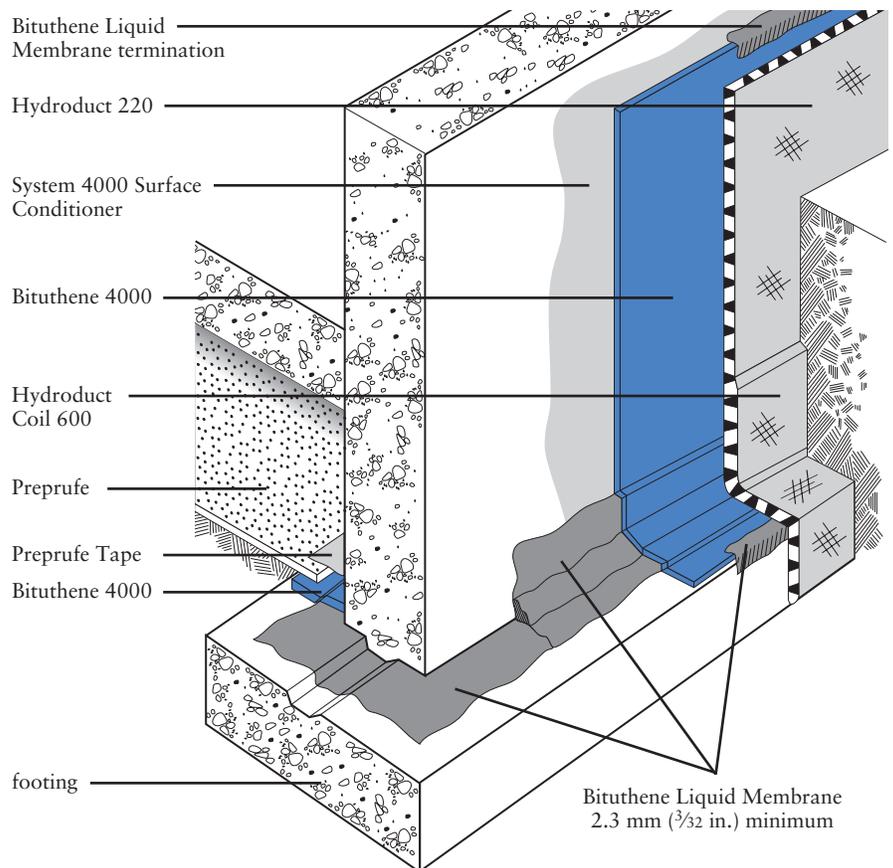
- **Excellent adhesion** – special adhesive compound engineered to work with high tack System 4000 Surface Conditioner
- **Cold applied** – simple application to substrates, especially at low temperatures
- **Reduced inventory and handling costs** – System 4000 Surface Conditioner is included with each roll of membrane
- **Wide application temperature range** – excellent bond to self and substrate from -4°C (25°F) and above
- **Overlap security** – minimizes margin for error under site conditions
- **Cross laminated, high density polyethylene carrier film** – provides high tear strength, puncture and impact resistance
- **Flexible** – accommodates minor structural movements and will bridge shrinkage cracks

#### Description

Bituthene® System 4000 is a 1.5 mm (1/16 in.) flexible, pre-formed waterproof membrane which combines a high performance, cross laminated, HDPE carrier film with a unique, super tacky, rubberized asphalt compound.

System 4000 Surface Conditioner is a unique, water-based, latex surface treatment which imparts an aggressive, high tack finish to the treated substrate. It is specifically formulated to bind site dust and concrete efflorescence, thereby providing a suitable surface for the Bituthene System 4000 Waterproofing Membrane.

Conveniently packaged in each roll of membrane, System 4000 Surface Conditioner promotes good initial adhesion and, more importantly, excellent permanent adhesion of the Bituthene System 4000 Waterproofing Membrane. The VOC (Volatile Organic Compound) content is 125 g/L.



## Use

Bituthene is ideal for waterproofing concrete, masonry and wood surfaces where in-service temperatures will not exceed 57°C (135°F). It can be applied to foundation walls, tunnels, earth sheltered structures and split slab construction, both above and below grade. (For above grade applications, see “Above Grade Waterproofing Bituthene System 4000.”)

Bituthene is 1.5 mm (1/16 in.) thick, 0.9 m (3 ft) wide and 20 m (66.7 ft) long and is supplied in rolls. It is unrolled sticky side down onto concrete slabs or applied onto vertical concrete faces primed with System 4000 Surface Conditioner. Continuity is achieved by overlapping a minimum 50 mm (2 in.) and firmly rolling the joint.

Bituthene is extremely flexible. It is capable of bridging shrinkage cracks in the concrete and will accommodate minor differential movement throughout the service life of the structure.

## Application Procedures

### Safety, Storage and Handling Information

Bituthene products must be handled properly. Vapors from solvent-based primers and mastic are harmful and flammable. Grace Protection Board Adhesive is extremely flammable. For these products, the best available information on safe handling, storage, personal protection, health and environmental considerations has been gathered. Material Safety Data Sheets (MSDS) are available at [www.graceconstruction.com](http://www.graceconstruction.com) and users should acquaint themselves with this information. Carefully read detailed precaution statements on product labels and the MSDS before use.

## Surface Preparation

Surfaces should be structurally sound and free of voids, spalled areas, loose aggregate and sharp protrusions. Remove contaminants such as grease, oil and wax from exposed surfaces. Remove dust, dirt, loose stone and debris. Concrete must be properly dried (minimum 7 days for normal structural concrete and 14 days for lightweight structural concrete).

**If time is critical, Bituthene Primer B2 may be used to allow priming and installation of membrane on damp surfaces or “green” concrete. Priming may begin in this case as soon as the concrete will maintain structural integrity.** Use form release agents which will not transfer to the concrete. Remove forms as soon as possible from below horizontal slabs to prevent entrapment of excess moisture. Excess moisture may lead to blistering of the membrane. Cure concrete with clear, resin-based curing compounds which do not contain oil, wax or pigment. Except with Primer B2, allow concrete to thoroughly dry following rain. Do not apply any products to frozen concrete.

Repair defects such as spalled or poorly consolidated areas. Remove sharp protrusions and form match lines. On masonry surfaces, apply a parge coat to rough concrete block and brick walls or trowel cut mortar joints flush to the face of the concrete blocks.

## Temperature

- Apply Bituthene System 4000 Membrane and Conditioner only in dry weather and when air and surface temperatures are -4°C (25°F) or above.
- Apply Bituthene Primer B2 in dry weather above -4°C (25°F). (See separate product information sheet.)

## Conditioning

Bituthene System 4000 Surface Conditioner is ready to use and can be applied by spray or roller. For best results, use a pump-type air sprayer with fan tip nozzle, like the Bituthene System 4000 Surface Conditioner Sprayer, to apply the surface conditioner.

Apply Bituthene System 4000 Surface Conditioner to clean, dry, frost-free surfaces at a coverage rate of 7.4 m<sup>2</sup>/L (300 ft<sup>2</sup>/gal). Coverage should be uniform. Surface conditioner should not be applied so heavily that it puddles or runs. **Do not apply conditioner to Bituthene membrane.**

Allow Bituthene System 4000 Surface Conditioner to dry one hour or until substrate returns to its original color. At low temperatures or in high humidity conditions, dry time may be longer.

Bituthene System 4000 Surface Conditioner is clear when dry and may be slightly tacky. In general, conditioning should be limited to what can be covered within 24 hours. In situations where long dry times may prevail, substrates may be conditioned in advance. Substrates should be reconditioned if significant dirt or dust accumulates.

Before surface conditioner dries, tools should be cleaned with water. After surface conditioner dries, tools should be cleaned with mineral spirits. Mineral spirits is a combustible liquid which should be used only in accordance with manufacturer's recommendations. **Do not use solvents to clean hands or skin.**

## Corner Details

The treatment of corners varies depending on the location of the corner. For detailed information on Bituthene Liquid Membrane, see separate product information sheet.

- At wall to footing inside corners – **Option 1:**

Apply membrane to within 25 mm (1 in.) of base of wall. Treat the inside corner by installing a 20 mm ( $\frac{3}{4}$  in.) fillet of Bituthene Liquid Membrane. Extend Bituthene Liquid Membrane at least 65 mm ( $2\frac{1}{2}$  in.) onto footing, and 65 mm ( $2\frac{1}{2}$  in.) onto wall membrane.

### **Option 2:**

Treat the inside corner by installing a 20 mm ( $\frac{3}{4}$  in.) fillet of Bituthene Liquid Membrane. Apply 300 mm (12 in.) wide strip of sheet membrane centered over fillet. Apply wall membrane over inside corner and extend 150 mm (6 in.) onto footing. Apply 25 mm (1 in.) wide troweling of Bituthene Liquid Membrane over all terminations and seams within 300 mm (12 in.) of corner.

- At footings where the elevation of the floor slab is 150 mm (6 in.) or more above the footing, treat the inside corner either by the above two methods or terminate the membrane at the base of the wall. Seal the termination with Bituthene Liquid Membrane.

## Joints

Properly seal all joints with waterstop, joint filler and sealant as required. Bituthene membranes are not intended to function as the primary joint seal. Allow sealants to fully cure. Pre-strip all slab and wall cracks over 1.5 mm ( $\frac{1}{16}$  in.) wide and all construction and control joints with 230 mm (9 in.) wide sheet membrane strip.

## Application on Horizontal Surfaces

(Note: Preprufe® pre-applied membranes are strongly recommended for below slab or for any application where the membrane is applied before concreting. See Preprufe product information sheets.)

Apply membrane from the low point to the high point so that laps shed water. Overlap all seams at least 50 mm (2 in.). Stagger all end laps. Roll the entire membrane firmly and completely as soon as possible. Use a linoleum roller or standard water-filled garden roller less than 760 mm (30 in.) wide, weighing a minimum of 34 kg (75 lbs) when filled. Cover the face of the roller with a resilient material such as a 13 mm ( $\frac{1}{2}$  in.) plastic foam or two wraps of indoor-outdoor carpet to allow the membrane to fully contact the primed substrate. Seal all T-joints and membrane terminations with Bituthene Liquid Membrane at the end of the day.

## Protrusions and Drains

Apply membrane to within 25 mm (1 in.) of the base of the protrusion. Apply Bituthene Liquid Membrane 2.5 mm (0.1 in.) thick around protrusion. Bituthene Liquid Membrane should extend over the membrane a minimum of 65 mm ( $2\frac{1}{2}$  in.) and up the penetration to just below the finished height of the wearing course.

## Vertical Surfaces

Apply membrane in lengths up to 2.5 m (8 ft). Overlap all seams at least 50 mm (2 in.). On higher walls apply membrane in two or more sections with the upper overlapping the lower by at least 50 mm (2 in.). Roll all membrane with a hand roller.

Terminate the membrane at grade level. Press the membrane firmly to the wall with the butt end of a

hardwood tool such as a hammer handle or secure into a reglet. Failure to use heavy pressure at terminations can result in a poor seal. A termination bar may be used to ensure a tight seal. Terminate the membrane at the base of the wall if the bottom of the interior floor slab is at least 150 mm (6 in.) above the footing. Otherwise, use appropriate inside corner detail where the wall and footing meet.

## Membrane Repairs

Patch tears and inadequately lapped seams with membrane. Clean membrane with a damp cloth and dry. Slit fishmouths and repair with a patch extending 150 mm (6 in.) in all directions from the slit and seal edges of the patch with Bituthene Liquid Membrane. Inspect the membrane thoroughly before covering and make any repairs.

## Drainage

Hydroduct® drainage composites are recommended for both active drainage and protection of the membrane. See Hydroduct product information sheets.

## Protection of Membrane

Protect Bituthene membranes to avoid damage from other trades, construction materials or backfill. Place protection immediately in temperatures above 25°C (77°F) to avoid potential for blisters.

- On vertical applications, use Hydroduct 220 Drainage Composite. Adhere Hydroduct 220 Drainage Composite to membrane with Hydroduct Tape. Alternative methods of protection are to use 25 mm (1 in.) expanded polystyrene or 6 mm ( $\frac{1}{4}$  in.) extruded polystyrene that has a minimum compressive strength of 55 kN/m<sup>2</sup> (8 lbs/in.<sup>2</sup>). Such alternatives do not provide positive drainage to the system.

If 6 mm (1/4 in.) extruded polystyrene protection board is used, backfill should not contain sharp rock or aggregate over 50 mm (2 in.) in diameter. Adhere polystyrene protection board with Bituthene® Protection Board Adhesive or Hydroduct Tape.

- In mud slab waterproofing, or other applications where positive drainage is not desired and where reinforced concrete slabs are placed over the membrane, the use of 6 mm (1/4 in.) hardboard or 2 layers of 3 mm (1/8 in.) hardboard is recommended.

### Insulation

Always apply Bituthene membrane directly to primed or conditioned structural substrates. Insulation, if used, must be applied over the membrane. Do not apply Bituthene membranes over lightweight insulating concrete.

### Backfill

Place backfill as soon as possible. Use care during backfill operation to avoid damage to the waterproofing system. Follow generally accepted practices for backfilling and compaction. Backfill should be added and compacted in 150 mm (6 in.) to 300 mm (12 in.) lifts.

For areas which cannot be fully compacted, a termination bar is recommended across the top termination of the membrane.

### Placing Steel

When placing steel over properly protected membrane, use concrete bar supports (dobies) or chairs with plastic tips or rolled feet to prevent damage from sharp edges. Use special care when using wire mesh, especially if the mesh is curled.

### Approvals

- City of Los Angeles Research Report RR 24386
- U.S. Department of Housing and Urban Development (HUD) HUD Materials Release 628E

### Warranty

Five year material warranties covering Bituthene and Hydroduct products are available upon request. Contact your Grace sales representative for details.

### Technical Services

Support is provided by full time, technically trained Grace representatives and technical service personnel, backed by a central research and development staff.

## System 4000 Surface Conditioner Sprayer

The Bituthene System 4000 Surface Conditioner Sprayer is a professional grade, polyethylene, pump-type, compressed air sprayer with a brass fan tip nozzle. It has a 7.6 L (2 gal) capacity. The nozzle orifice and spray pattern have been specifically engineered for the optimum application of Bituthene System 4000 Surface Conditioner.

Hold nozzle 450 mm (18 in.) from substrate and squeeze handle to spray. Spray in a sweeping motion until substrate is uniformly covered.

Sprayer should be repressurized by pumping as needed. For best results, sprayer should be maintained at high pressure during spraying.

To release pressure, invert the sprayer and spray until all compressed air is released.

### Maintenance

The Bituthene System 4000 Surface Conditioner Sprayer should perform without trouble for an extended period if maintained properly.



Sprayer should not be used to store Bituthene System 4000 Surface Conditioner. The sprayer should be flushed with clean water immediately after spraying. For breaks in the spray operation of one hour or less, invert the sprayer and squeeze the spray handle until only air comes from the nozzle. This will avoid clogging.

Should the sprayer need repairs or parts, call the maintenance telephone number on the sprayer tank (800-323-0620).

## Supply

<b>Bituthene System 4000</b>	0.9 m x 20 m roll (18.6 m <sup>2</sup> ) 3 ft x 66.7 ft (200 ft <sup>2</sup> )
Roll weight	38 kg (83 lbs) gross
Palletization	25 rolls per pallet
Storage	Store upright in dry conditions below +35°C (95°F).
<b>System 4000 Surface Conditioner</b>	1 x 2.3 L (0.625 gal) bottle in each roll of System 4000 Membrane

### Ancillary Products

Surface Conditioner Sprayer	7.6 L (2 gal) capacity professional grade sprayer with specially engineered nozzle
Bituthene Liquid Membrane	5.7 L (1.5 gal) pail/125 pails per pallet or 15.1 L (4 gal) pail/48 pails per pallet
Hydroduct Tape	2.5 cm x 61.0 m (1 in. x 200 ft) roll/6 rolls per carton
Bituthene Mastic	12 – 0.9 L (30 oz) tubes/carton or 18.9 L (5 gal) pail/36 pails per pallet

### Complimentary Materials

Hydroduct	See separate data sheets.
Protection Board Adhesive	18.9 L (5 gal) pail/36 pails per pallet

Equipment by Others: Soft broom, utility knife, brush or roller for priming

### Physical Properties for Bituthene 4000 Membrane

Property	Typical Value	Test Method
Color	Dark gray-black	
Thickness	1.5 mm (1/16 in.) nominal	ASTM D3767 – Method A
Flexibility, 180° bend over 25 mm (1 in.) mandrel at -32°C (-25°F)	Unaffected	ASTM D1970
Tensile Strength, Membrane, Die C	2240 kPa (325 lbs/in. <sup>2</sup> ) minimum	ASTM D412 Modified <sup>1</sup>
Tensile Strength, Film	34.5 MPa (5,000 lbs/in. <sup>2</sup> ) minimum	ASTM D882 Modified <sup>1</sup>
Elongation, Ultimate Failure of Rubberized Asphalt	300% minimum	ASTM D412 Modified <sup>1</sup>
Crack Cycling at -32°C (-25°F), 100 Cycles	Unaffected	ASTM C836
Lap Adhesion at Minimum Application Temperature	880 N/m (5 lbs/in.)	ASTM D1876 Modified <sup>2</sup>
Peel Strength	1576 N/m (9 lbs/in.)	ASTM D903 Modified <sup>3</sup>
Puncture Resistance, Membrane	222 N (50 lbs) minimum	ASTM E154
Resistance to Hydrostatic Head	70 m (210 ft) of water	ASTM D5385
Permeance	2.9 ng/m <sup>2</sup> sPa (0.05 perms) maximum	ASTM E96, Section 12 – Water Method
Water Absorption	0.1% maximum	ASTM D570

#### Footnotes:

1. The test is run at a rate of 50 mm (2 in.) per minute.
2. The test is conducted 15 minutes after the lap is formed and run at a rate of 50 mm (2 in.) per minute at 5°C (40°F).
3. The 180° peel strength is run at a rate of 300 mm (12 in.) per minute.

## Physical Properties for System 4000 Surface Conditioner

Property	Typical Value
Solvent Type	Water
Flash Point	>60°C (>140°F)
VOC* Content	125 g/L
Application Temperature	-4°C (25°F) and above
Freeze Thaw Stability	5 cycles (minimum)
Freezing Point (as packaged)	-10°C (14°F)
Dry Time (hours)	1 hour**

\* Volatile Organic Compound

\*\* Dry time will vary with weather conditions

For Technical Assistance call toll free at 866-333-3SBM (3726).

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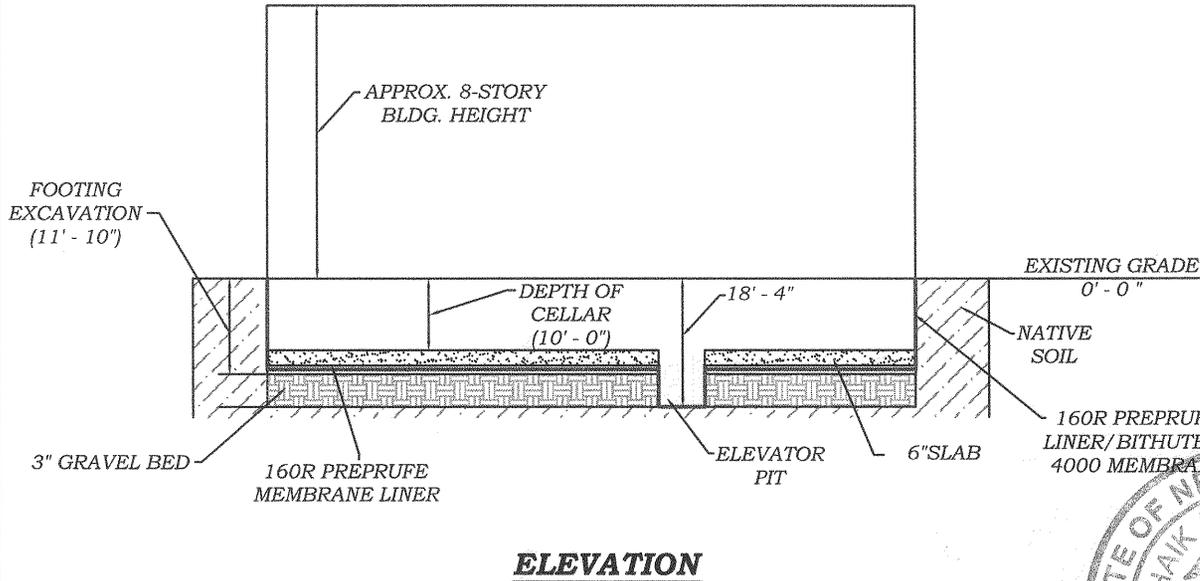
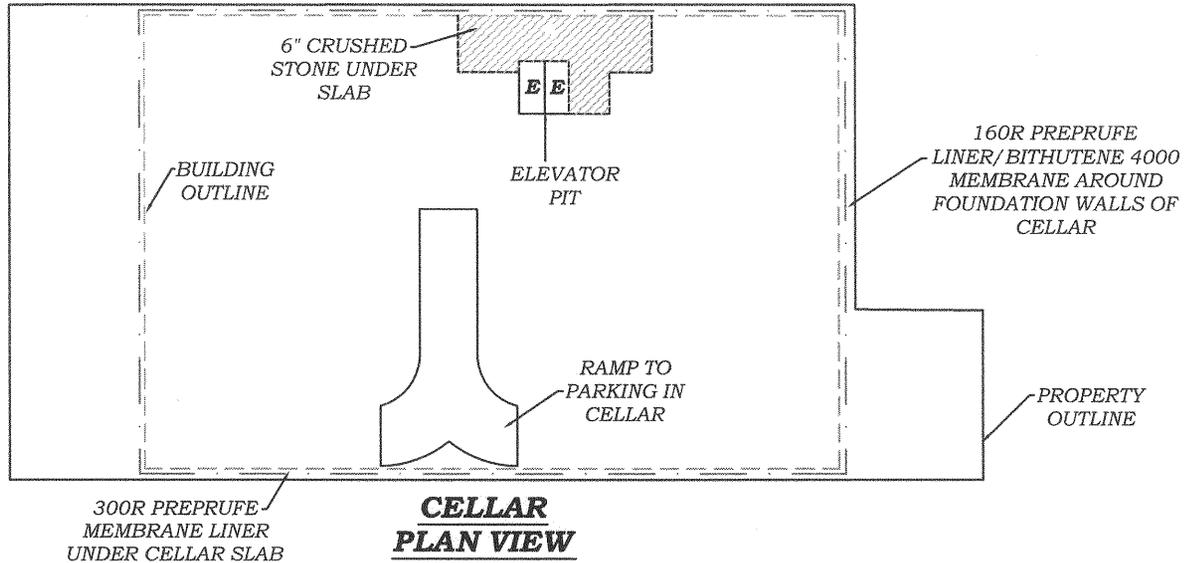
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**GRACE**  
Construction Products

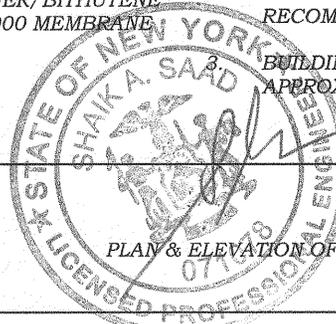
MYRTLE AVENUE



**NOTES:**

1. ALL ELEVATIONS ARE RELATIVE TO FIRST FLOOR SLAB ELEVATION.
2. THE VAPOR BARRIER DESIGN IS INDEPENDENT OF THE ACTUAL TYPE OF FOUNDATION CONSTRUCTED AT THE SITE, ANY OBJECTS THAT BISECT THE LINER SUCH AS PIERS OF PILES MUST BE CUT THROUGH THE LINER AND CONTACT BETWEEN THE BARRIER AND OBJECT MUST BE SEALED AS PER THE MANUFACTURER'S RECOMMENDATIONS.

BUILDING HEIGHT AND THE SHAPE OF THE ROOF ARE APPROXIMATE.



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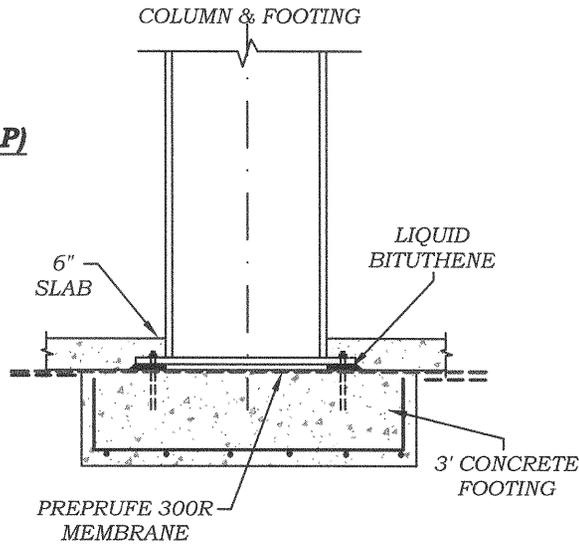
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Drawn By: C.O.  
 Reviewed By: M.R.  
 Approved By: M.R.  
 Date: 12/16/14  
 Scale: AS NOTED

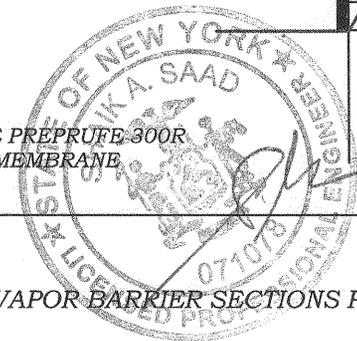
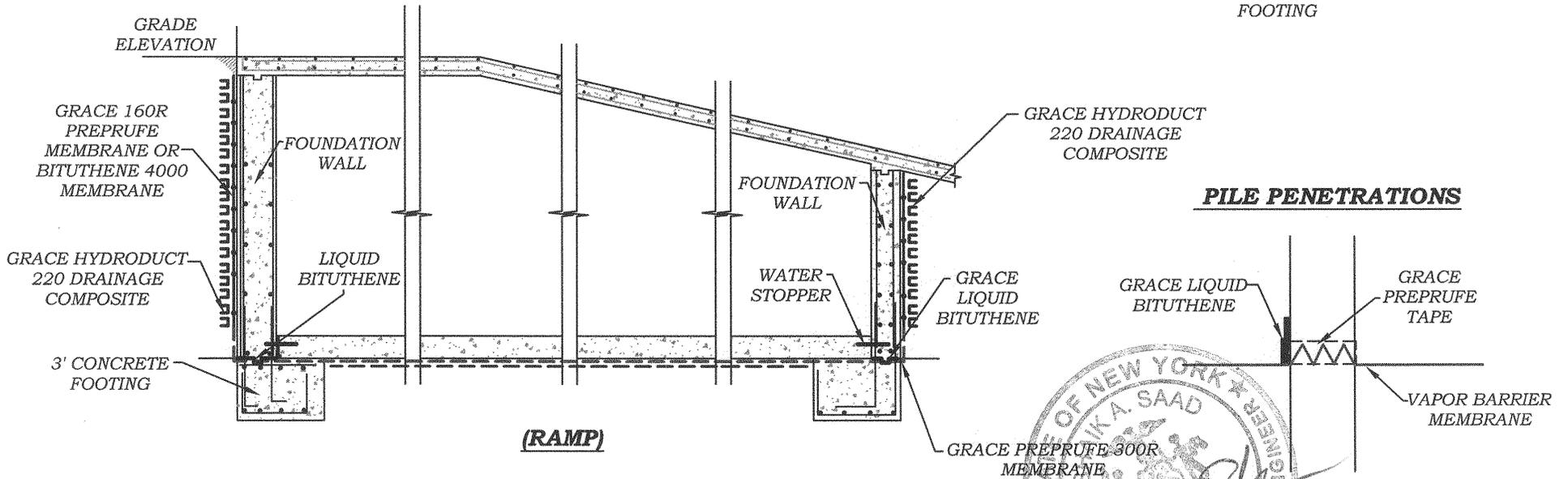
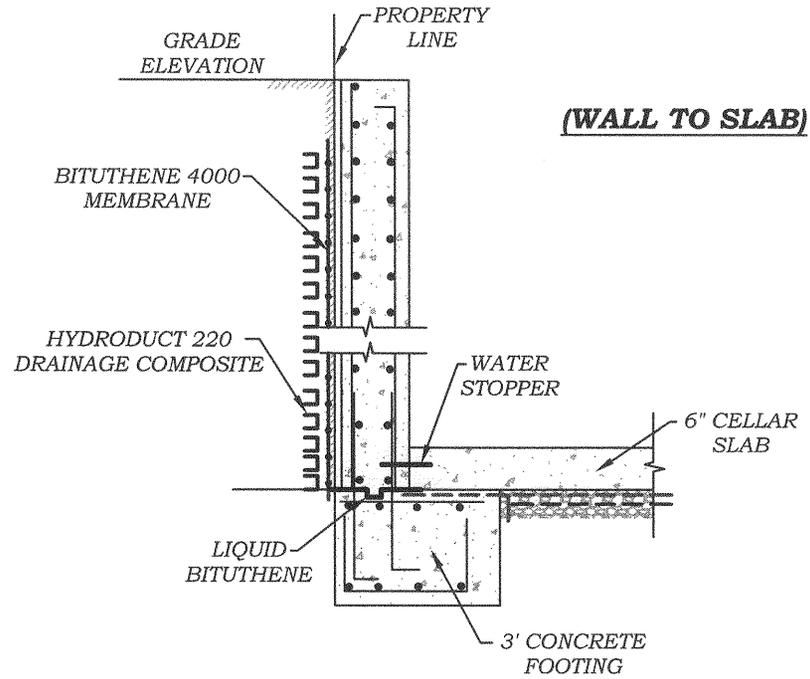
TITLE:

PLAN & ELEVATION OF VAPOR BARRIER DESIGN PLAN

**(PILE CAP)**



**(WALL TO SLAB)**



VAPOR BARRIER SECTIONS PLAN



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TITLE:

**Appendix 8**  
Structural Drawings of the Composite Site Cover

#### GENERAL NOTES:

- All work shall conform to the requirements of the 2008 New York City Building Code.
- The Contractor shall verify all dimensions and conditions in the field prior to commencing work. Where dimensions and elevations of existing construction could affect the new construction, it is the Contractor's responsibility to make field measurements in time for their incorporation in the Shop Drawings. The Architect and Engineer shall be notified of any discrepancies that may exist.
- See architectural drawings for floor elevations, slopes, locations of depressed floor areas, and floor openings. The Contractor shall compare the structural drawings with the architectural drawings and report any discrepancy to the Architect and Engineer prior to construction.
- Principal openings through the framing are shown on these drawings. The General Contractor shall examine the structural, architectural and mechanical drawings for the required openings and shall verify size and location of all openings with the Mechanical Contractor. Providing of openings required by the Mechanical, Electrical, or Plumbing trades shall be a part of the General Contract, whether or not shown in the structural drawings. Any deviation from the openings shown on the structural drawings shall be brought to the Engineer's attention for review.
- Furnish and place all supports, temporary and permanent, whether shoring, bracing, needling, underpinning, or sheet piling, necessary to brace existing walls or framing to remain, so that no horizontal or vertical settlement occurs to the existing structures. Temporary supports shall be maintained in place until permanent supports are installed. Design of these supports shall be by a registered Structural Engineer in the state of New York in the employ of the Contractor.
- Alternate connection details may be approved if such details are submitted to the Engineer for review and acceptance is granted. However, the Engineer shall be the sole judge of acceptability and the Contractor's bid shall anticipate the use of those specific details shown on the drawings. The Contractor shall retain a registered Structural Engineer to be responsible for the design of any alternate details which he proposes.
- Work not indicated on a part of the drawings but reasonably implied to be similar to that shown at corresponding places, shall be included in the Contractor's work.
- The Contractor shall be completely responsible for the safety of adjacent structures, property, his workmen, and the public, as affected by the construction of this project.
- All Contractors are required to examine the drawings and specifications carefully, visit the site and fully inform themselves as to all existing conditions and limitations, prior to agreeing to perform the work. Failure to visit the site and familiarize themselves with the existing conditions and limitations will in no way relieve the Contractor from furnishing any materials or performing any work in accordance with drawings and specifications without additional cost to the Owner.
- Structural drawings may represent construction with a reference scale. Due to the inherent process of drawing development and presentation not all work may be shown "exact" in that scale. Do not "scale" drawings to obtain any missing information or to interpret any information not specifically dimensioned for "exact" detailing or construction purposes.
- The Contract Documents represent final conditions. Stability of the structure during construction and means and methods that impose temporary loading conditions on the incomplete structure is the sole responsibility of the General Contractor. This responsibility includes, but is not limited to, the design and furnish of any temporary supports, shoring, and/or bracing required for the safety and stability of the structure during construction.

#### DESIGN LOADS:

- ASCE 7-02 Occupancy category II
- See framing plans for occupancy design loads
- 3 Roof Live Load:  
Minimum roof live load=20 psf
- 4 Roof Snow Load:  
Ground snow load,  $p_g$  25 psf  
Flat roof snow load,  $p = 0.7 \times C_e \times C_{pit} \times p_g = 18$  psf  
Snow exposure factor,  $C_e = 1.0$   
Thermal factor,  $C_{pit} = 1.0$   
Snow load importance factor,  $I_s = 1.0$   
Snow drift conditions in accordance with Section 1608.0
- 5 Concentrated Live Loads:  
Floors have been designed to support the uniformly distributed live loads prescribed in (2) above, or the following concentrated loads, whichever produces the greater stress. All concentrated loads above have been assumed to be non-concurrent with uniform live loads.

LOCATION	CONCENTRATED LOAD
Elevator machine room gratings (on 20 inches square)	300 lbs.
Floor areas and roofs with concrete (on 30 inches square)	2000 lbs.
Hatches, skylight ribs, and accessible ceilings (on 10 inch square)	200 lbs.
Stair treads (on 2.0 inches square)	300 lbs.
Roofs w/o concrete (on 6 inches square)	300 lbs.

- 6 Live Load Reduction:  
For design live loads of 100 psf or less. Except for places of public assembly, floors of passenger car garages, and roofs, a structural member having a tributary area of  $K_A$  that is greater than 400 square feet, may be designed for a reduced live load,  $L$ , as follows:  
 $L = L_0 \times [0.25 - \sqrt{A/100,000}]$ , where  
 $L_0$  basic design live load  
 $A_1$  loaded area in ft<sup>2</sup> to the member, square feet  
 $K_A$  live load element factor as follows:  
 $K_A = 4$  for interior columns and exterior columns without cantilever slabs  
 $K_A = 3$  for edge columns with cantilever slabs  
 $K_A = 2$  for corner columns with cantilever slabs, edge beams without cantilever slabs, and interior beams  
 $K_A = 1$  for all others  
 $L$  shall not be less than 0.50L for members supporting one floor and not less than 0.40L for members supporting two or more floors.

- Places of public assembly, passenger car garages, and design live loads greater than 100 psf for members supporting load from more than one floor may be designed for a reduced live load equal to 0.80L, but shall not be less than  $L$ , as calculated above.

7. Wind Loads:  
Basic Wind Speed (3 Second gust) = 98 mph.  
Wind Importance factor,  $I_w = 1.0$   
Wind Exposure = B  
Design wind pressures for main wind force resisting system in accordance with ASCE 7-02 Section 6.5.12.2  
Design wind pressures on components and cladding in accordance with ASCE 7-02 Section 6.5.12.4

8. Earthquake Loads:  
Seismic importance factor,  $I_e = 1.0$   
Spectral response acceleration at short periods,  $S_s = 0.365$   
Spectral response acceleration at 1-second period,  $S_1 = 0.071$   
Site class C  
Design spectral response acceleration at short periods,  $S_{ds} = 0.292$   
Design spectral response acceleration at 1-second period,  $S_{d1} = 0.088$   
Seismic design category = B  
Basic Seismic force resisting system-Structural Steel, R=3 (N-S direction)  
= Structural Steel, R=3 (E-W direction)  
Seismic Base Shear = 266k (E-W direction)  
= 677k (N-S direction)  
Seismic response coefficient,  $C_s = 0.027$  (E-W direction)  
= 0.027 (N-S direction)  
Response Modification Coefficient = 3 (E-W direction)  
= 3 (N-S direction)  
Analysis procedure = Equivalent Lateral Force

9. Foundation walls are designed for the following equivalent fluid pressures in pounds per cubic foot:  
10. Walls supported at top = 65 PCF  
11. Cantilevered Walls = seismic coeff 0.4  
12. Soil UH/W/T = (130 PCF)  
13. Vertical surcharge load of 600 PSF  
Horizontal surcharge = 240 PLF (top 10' FT of walls)  
= 100 PLF (below top 10' FT of walls)

#### FOUNDATIONS:

- The foundation design is based on recommendations contained in the Geotechnical Report by the Carlin Simpson & Associates dated Feb. 8, 2013 This report is available to bidding Contractors for their information, however their attention is directed to the limitations of the report described therein.
- All footings shall be carried down to soil having minimum bearing capacity of 3 tsf tons per square foot. Elevations if given, are the bottom of the footings, are minimum depths, and are not to be construed as limiting in any way the depth of excavation required to reach good bearing.
- All footing excavations are to be finished by hand, unless otherwise directed by the Geotechnical Engineer.
- Individual pile location notes to submit to the Structural Engineer for review prior to fabrication of reinforcing for pile caps. Pile caps with piles driven out of plan tolerance will require adjustment to cap size and reinforcing. Adjustments may also be required at adjacent tie beams and grade beams. Plan dimensions shown for pile caps to represent minimum requirements, structural drawings.
- No foundations shall be placed in water or on frozen ground.
- All finished foundation excavations shall be inspected and approved by the Geotechnical Engineer or his designate before any concrete is placed.
- Unless otherwise noted, all foundations and buttresses shall be centered under supported members.
- Carefully follow the requirements of the specifications for back fill under or adjacent to any portion of the building.
- Where foundation elements are to have fill on both sides, each side shall be filled simultaneously, maintaining a common elevation.
- Coordinates under floor drain requirements with architectural and mechanical drawings and the requirements of the Geotechnical Engineer.
- Contractor shall provide continuous control of surface and underground water as required during construction such that the work is done in the dry. However, the Contractor shall insure that ground water under adjacent structures are not lowered by his construction techniques. Additionally, if so directed by notes in the plans, the Contractor will continue to maintain a condition of no hydrostatic pressure until sufficient building weight is in place to prevent flotation of any part of the structure.
- Building walls retaining earth rely on the completed floor slabs for lateral support. If required by the construction sequence, the Contractor shall temporarily brace all building walls against which back fill is to be placed until all floor slabs supporting the walls are in place and have attained at least 75% of their specified design strength. Design of temporary braces shall be by a registered Structural Engineer in the state of New York in the employ of the Contractor.

#### CONCRETE:

- All concrete work shall conform to the 2002 edition of the ACI Building Code Requirements for Reinforced Concrete (ACI 318) and the 2008 New York City Building Code. In case of conflict, the New York City Building Code shall prevail.
- All concrete shall be controlled concrete, mixed and placed under the supervision of an approved concrete testing agency.
- Concrete shall be normal weight concrete unless otherwise noted with sand and gravel aggregate. Type I or Type II Portland Cement and minimum compressive strength (F<sub>c</sub>) in 28 days as specified in the Concrete Strength Table.
- All concrete exposed to the weather or possible freeze/thaw action shall contain an air entrainment admixture. See specifications for air content.
- With the exception of piles, all concrete shall be proportioned for a maximum allowable unit shrinkage of 0.03% measured at 28 days after curing in water as determined by ASTM C 157 (using air storage).
- All concrete shall be placed without horizontal construction joints, except where specifically noted. Vertical construction joints and stops in shored concrete work shall be made at midspan. Horizontal reinforcement shall be continuous through vertical construction joints. Construction joint locations other than shown on the drawings are permitted subject to prior approval of the Engineer. Expansion joint and control joint locations are mandatory as shown. Contractor shall submit drawings showing intended placing sequences and locations of construction joints to the Engineer for approval.
- Unless otherwise shown on drawings, slabs on grade shall be cast in alternating strips, one (1) column bay wide. Adjacent sections shall be placed no sooner than three days apart. Alternatively, slab on grade areas may be poured in as large an area as can be handled provided that saw cut joints are cut as soon as the concrete will support a man's weight without permanent deformation and the joint process does not dislodge aggregates. Saw cut locations shall be submitted to engineer for review prior to construction.
- GROUT under column base plates and under other bearing plates shall be non-shrink, nonelastic grout with a minimum compressive strength of 5000 psi at 3 days.
- Pipes or conduits placed in slabs on grade shall not be placed closer than 3 diameters on centers and shall have an outside diameter less than 1/3 of the slab thickness and be positioned so that they do not interfere with slab reinforcement. Aluminum conduits shall not be placed in concrete. No conduits or pipes shall be placed in composite slabs on metal decks.
- All keys shall be 2" x 4" (nominal) unless otherwise shown on the drawings.
- Concrete cast on sloped surfaces shall begin at the lowest elevation and continue monolithically toward the higher elevations until the intended pour is completed.
- No concrete shall be cast before review and approval of the reinforcing and embedded items have been obtained from the Special Inspector.
- All exposed edges of concrete members shall be chamfered 3/4" unless shown otherwise on architectural drawings.
- Concrete must reach the following percentages of its 28-day compressive strength (F<sub>c</sub>) before forms or shores may be removed: Pile caps...20%. Walls and beam sides...20%. Columns...40% (1500psi min). Beam bottoms (if shored)...70%. Floor systems...85%. Refer to architectural drawings for concrete finishes. Where finish is not specified, conform to requirements of ACI 301 - "Specifications for Structural Concrete for Buildings".
- See architectural drawings for door and window openings, dips, washes, registers, concrete finishes, masonry anchors, and miscellaneous embedded plates, bolts, anchors, angles, etc.
- The placement of sleeves, outlet boxes, box-outs, anchors, etc., for the mechanical, electrical and plumbing trades is the responsibility of the trade involved. However, any box-outs not covered by typical details in the structural drawings shall be submitted for approval. At sawcutting of existing concrete, including slabs on grade, no overcut at corners is allowed. All corners shall have a core hole of sufficient diameter made prior to cutting at adjacent sides to prevent cut beyond the required dimension.

CONCRETE STRENGTH TABLE		
Intended Use	28 Day Strength, F <sub>c</sub> (psi)	Other Requirements & Admixtures
Mass foundations	4000 psi	
Footings and piers	4000 psi	
Grade beams	4000 psi	
Foundation tie beams	4000 psi	
Walls	4000 psi	
Slabs on grade	4000 psi	
Parking slabs on grade	4000 psi	
Columns	(See column schedule)	
All (other) Foundation concrete	4000 psi	
Framed slabs and beams	4000 psi	
Fill concrete	4000 psi	
Mud mats	4000 psi	
Precasts plank	5000 psi	
Topping for precast plank	4000 psi	
Steel member encasement	4000 psi	
Shear walls	4000 psi	
Slabs on metal deck	(See note 6 above)	

CONCRETE COVER TABLE (UNO)		
Condition	Cover	
Surfaces cast against earth	3 inches	
Formed surfaces exposed to earth or weather:	#6 bars and larger	2 inches
	#5 bars and smaller	1 1/2 inches
Formed surfaces not exposed to earth or weather:	#11 bars and smaller	3/4 inches
Slabs, walls, joists:	beams, columns	1 1/2 inches
Slabs on grade (from top of slab)		1 1/2 inches
Slabs on metal deck	Top	3/4 inches
	Bottom	3/4 inches
Slabs on metal deck (Parking Levels or Parking Ramps)	Top	1 1/2 inches
	Bottom	3/4 inches

#### REINFORCING:

- Detailing of concrete reinforcement and accessories shall be in accordance with ACI 315 - "Manual of Standard Practice for Detailing Reinforced Concrete Structures," latest edition.
- Reinforcement shall be continuous through all construction joints unless otherwise noted on drawings.
- Provide and schedule with the shop drawings, all necessary accessories to hold reinforcing securely in position. Minimum requirements shall be: High chairs... 4'-0" OC, Slab bolsters... 4'-0" OC. Support bars for high chairs shall be #5 min.
- All continuous reinforcing bars shall have a minimum lap as required for a Class B splice (ACI 318) unless noted otherwise.
- W.W.F. shall be provided in flat sheets. All laps in W.W.F. shall be one mesh plus two inches at splices.
- Concrete protection for reinforcement including W.W.F. shall be provided as follows unless otherwise shown on the drawings:  
7. All hooks shown on drawings shall be standard hooks unless noted otherwise.  
8. Where continuous bars are called for, they shall run continuously around corners and be lapped at necessary splices, or hooked at discontinuous ends. Lap lengths shall be as given in the splice and development table. Lap beam top bars at mid-span and beam bottom bars at supports, unless otherwise noted.

REINFORCING MATERIAL TABLE			
Reinforcing element	ASTM	Grade, Fy (ksi)	Comments
Reinforcing bars	A615	60	
Welded reinforcing	A706	60	Reinforcing bars may not be welded without prior approval of the Structural Engineer.
Slab on grade (6x6 - W6, 6x W 6.5)	A185	65	
Slab on metal deck ( 6x6 - W2, 1 x W2, 1)	A185	65	
Around structural members encased in concrete (4x4 - W1.4 x W1.4), plus (1)-#5 spacer bar each corner	A185	65	
In middle of concrete fill for stairs (2x2 - W1.4 x W1.4)	A185	65	Fibermesh at 1 1/2in/cu. yd. may be substituted for W.W.F. in stairs.

#### REINFORCED MASONRY:

- All masonry work shall conform to the " Building Code Requirements of Masonry Structures" (ACI 530.02 / ASCE 5-02) and (ACI 530-1.02 / ASCE 6-02).
- The compressive strength of the masonry, F<sub>m</sub>, shall be at least 1500 psi. Unless otherwise approved by the Structural Engineer on the basis of prism testing the components of the masonry shall have compressive strengths as given below: 2000psi.
- All concrete masonry units (CMU) shall conform to ASTM C90, grade N-1, with an individual compressive strength of 2400 psi.
- Mortar for block wall construction shall be Type M or S conforming to ASTM C270.
- GROUT for piers and block walls shall conform to ASTM C476 with a minimum compressive strength of 2000 psi determined in accordance with the provisions of ASTM C1019.
- Reinforcing bars shall conform to ASTM A615, Grade 60, except bars to be welded shall conform to ASTM A706.
- Wire for joint reinforcing shall conform to ASTM A82, yield point = 70 ksi (min.).
- Unless noted otherwise provide minimum reinforcing per the Minimum Reinforcing Table.
- Provide bond beams with (2)-#5 continuous, at the top of parapets, at each floor level, and where shown on the drawings.
- Unless noted otherwise on plans, provide the following additional vertical reinforcement in the walls immediately adjacent to each side of a masonry opening and in the cell of discontinuous walls. This cell bars are to extend full height of the wall or in the case of masonry openings at multi-story walls, from story to level above to story level below the opening. For 6" and 8" CMU Walls provide (2)-#5. For 10" and 12" CMU Walls provide (2)-#6.
- Extend additional reinforcement a minimum of 36 bar diameters beyond the opening.
- The minimum length of lap for reinforcing bars embedded in grout is 48 bar diameters, unless shown otherwise on the drawings.
- Place reinforcing bars before grouting. Place grout in lifts not exceeding 5 feet. Consolidate each lift by mechanical vibration. The next lift of the pour may be made after the initial water loss and reconsolidation of the prior lift, while it is still plastic.
- Properly secure reinforcing bars to maintain the positions indicated on the drawings. Bars to be located in center of cells unless otherwise noted.
- All CMU shall be braced during construction for the governing code lateral design loads until permanent restraints have been installed.
- The following steps are to be followed when laying masonry in the temperatures stated below:

MINIMUM MASONRY REINFORCING TABLE			
VERTICAL	HORIZONTAL		
6" and 8" CMU: ≤16" High 16" c. #4@24"	6"-12" High #12	>12" High #12	6" and 8" CMU: #9 Dur-o-wall Lador (2)-W1.1 wires @
10" and 12" CMU: ≤16" High 16" c. #4@24"	#8@32"	#8@32"	10" and 12" CMU: 3/16" Dur-o-wall Lador (2)-W1.7 wires @

COLD WEATHER MASONRY CONSTRUCTION	
Mean daily air temperature	Instructions
40° - 32° F	Heat mixing water or aggregate to 70° F. Protect masonry from rain or snow for 24 hours.
32° - 20° F	Heat mixing water and aggregate to 70° F. Provide wind breaks for rain or snow in excess of 15 m.p.h. Cover masonry with insulating blankets for 24 hours and provide heat sources on both sides of masonry construction.
Below 20° F	Heat mixing water and aggregate to 70° F. Provide enclosures and heat to maintain 40° minimum temperature. Temperature of masonry units must be 40° F minimum when laid. Maintain masonry above 40° F for 24 hours by enclosures and supplemental heat.

Steel Loose Lintel Schedule					
Masonry Wall Thickness...	Spans 5'-0"	5'-0" ≤ Span < 7'-0"	7'-0" ≤ Span < 9'-0"	9'-0" ≤ Span < 12'-0"	
4"	L4 x 3 1/2 x 5/16	L5 x 3 1/2 x 5/16	L6 x 3 1/2 x 3/8	L6 x 3 1/2 x 1/2	
6"	L6 x 6 x 5/16	L6 x 6 x 5/16	L6 x 6 x 3/8	L6 x 6 x 1/2	
8"	2 - L4 x 3 1/2 x 1/2	2 - L5 x 3 1/2 x 1/2	2 - L6 x 3 1/2 x 3/8	2 - L6 x 3 1/2 x 1/2	
12"	2 - L6 x 6 x 5/16	2 - L6 x 6 x 5/16	2 - L6 x 6 x 3/8	2 - L6 x 6 x 1/2	

#### STRUCTURAL STEEL:

- Structural steel design conforms to 1999 Specification for structural steel Building (AISC, LRFD, 3rd Edition).
- Structural steel rolled shapes, plates, and bars shall conform to ASTM designations, see Steel Material Table
- Shop painting of structural steel is not required unless otherwise noted.
- Reinforcing bars exposed to the weather in the completed building shall be hot dip galvanized, including bolts and accessories.
- Filler beams shall be spaced equally between established dimensions, unless noted otherwise.
- The concrete slab and/or composite steel decks (including precast plans) are part of the stability system for a completed structure. The Contractor shall provide temporary erection bracing to maintain structural steel in proper position until permanently secured. Remove temporary bracing and their connections only after erection of permanent members is complete and all concrete slabs have been placed and cured and non-composite steel decks are proper. The Contractor shall provide bracing to be bolted to the building exterior and/or interior expansion joints where they exist between building segments.
- Shear connectors shall be 3/4" diameter headed studs, field applied, with a nominal shear strength of 28.7 kips per connector, where Fu=65ksi. The number of shear connectors is indicated in brackets by each beam. More than one number in a bracket indicates groups of shear connectors to be placed between connection points of intersecting beams. Substitution of shear connectors with nominal strength less than given above, if approved, will require an adjustment in the number of shear connectors to maintain the same total shear transfer capacity and will be at the Contractor's expense.
- All composite beams, using concrete slab as compression flange, are designed for strength assuming unshored construction, unless otherwise noted.
- Provide an upward beam camber at the mid span between supports where indicated thus: "+C= 1" 1/2", if specified on drawings. Camber is to be provided by mill rolling or shop fabrication, or a combination of each. Contractor is to note that mill rolling or shop fabrication, or a combination of each, Contractor is to note that the structural steel beams have been cambered in an effort to limit extra concrete deflection due to the deflection of the structural steel beams and girders. However, the amount of actual camber for each structural steel member may vary due to mill or shop tolerance and beams with completed initial deflections of no more than 3/4" are not cambered at all. Therefore, the Contractor may not assume that the cambers indicated eliminate the need for extra concrete placement.
- Shop connections unless otherwise noted, shall be made by welding, or by using snug tight 3/4"Ø high strength bolts, minimum.
- All shop and field welds shall be made by certified welders, and shall conform to "Structural Welding Code - Steel" (AWS D1.1:2000).
- Electrodes for all field and shop welding shall conform to AWS E-70 Series.
- Bolted field connections shall be made with 3/4" diameter A325 bolts, minimum, unless otherwise noted.
- A325 bolts installed with the bolt tension (pre-tensioned) specified in Table J3.1 of the AISC LRFD Third Edition Specification, shall be used for the connections listed in Table 2.
- Connections are generally schematic. They are intended to define the spatial relationship of the framed members and show a feasible method of making the connection. Any connection that is not shown or is not completely detailed on the structural drawings shall be designed by a registered professional Engineer licensed in the State of New York, retained by the fabricator. Details and connections may be designed to conform to AISC Manuals Third Edition - LRFD. Completely detailed means the information in Table 3 is shown on the shop detail drawings.
- All rectangular HSS members to be orientated long side vertical u.o.c.
- Details and connections completely detailed in the Contract Drawings may not be altered without written approval by the Engineer. Where approved, altered connections shall be completely detailed by the fabricator's engineer clearly on the shop drawings.
- Alterations of schematic connection details may impact architectural concept and shall not be made without prior written approval of the Engineer.
- Minimum connection plate thickness shall be 3/8", unless otherwise indicated in the Contract Drawings.
- Unless otherwise noted, beam to beam connections and beam to column connections shall be double angle ("E" or "H" framed beam connections shop welded per Table 10.2 of the AISC Manual (Thirteenth Edition - LRFD) using weld A, or shop bolted using Table 10-1 and using 3/4" diameter A325-N bolts in standard or horizontally sloped holes for the field connection. The number of rows of bolts, n, shall be in accordance with Table 4. The table applies to composite and non-composite beams. Where the Fabricator proposes an alternate connection, it shall have at least the shear capacity indicated in Table 4. Where reactions are indicated in the drawings (example: R=RS), they supersede Table 4 and the Fabricator shall provide a connection with a capacity at least equal to the reaction indicated. Seated beam connections will not be allowed unless the seat is used for erection purposes only. For other beam shapes (S, C, MC) provide a web bolt connection unless otherwise shown on the drawings. Where reactions are posted, they have been factored per New York City Building Code.
- The connection at the ends of tension or compression members shall develop the force due to the design load, but not less than 100% of the tension strength of the member where no design load is posted. Design forces, if posted, have been factored in accordance with the Governing Building Code and no stress increase is permitted. Tension strength of member = 0.9F<sub>y</sub> x A<sub>g</sub>. When design force is based on tension capacity of member, load is to be applied as a tension or compression force.
- Splicing of structural members where not detailed on the drawings is prohibited without prior approval of the Structural Engineer.
- Provide welded stiffener plates on both sides of the web of beams at points of concentrated loads including beams supporting columns or running over the tops of columns or other beams. Minimum stiffener plate thickness shall be 5/8" or flange thickness of column above or below, whichever is greater.
- Creed plates, pour stops and slab supports at slab openings, at slab edges and supports for metal deck around columns shall be furnished by the contractor as required to complete the work.
- Cuts, holes, coping, etc. required for work of other trades shall be shown on the shop drawings and made in the shop. Cuts or burning of holes in structural steel members in the field will not be permitted, unless specifically approved in each case by the Structural Engineer.
- Unless otherwise detailed in the drawings, provide galvanized loose steel angle lintels over all openings in masonry walls per Table 5 - Loose Lintel Schedule. Lintels shall have a minimum of 8" bearing on each side of opening. Steel angles in pairs shall be placed welded or bolted at 2'-0" o.c. or stich welded top and bottom at 1'-0" o.c.
- All structural steel directly supporting a concrete floor slab shall have shear studs spaced longitudinally at no more than 12" o.c. unless otherwise noted.
- All HSS shapes except diagonal bracing members (round, square rectangular, etc.) are to have a 1/4" cap plate at all exposed ends. Cap plates to be seal welded all around, u.o.c.
- All weld sizes not shown in details herein shall be the minimum required size based on thickness of thinner part as per AISC, Tables J2.8 & J2.4. Exception: At member splices, welds or bolts shall develop full strength of the member or components being connected.
- All around welds indicated herein shall be discontinuous at the flange tips of open sections.
- Any alteration made by the detailer on the structural steel drawings shall be clearly identified by clouding or by direct note on the shop drawing by the detailer prior to submission to the engineer.
- Any member sizes shown on the plans, and currently listed in the AISC Manual of Steel Construction, Latest Edition, which are not currently available must be brought to the Architect and Structural Engineers attention prior to award of steel contract. No claim for additional cost will be accepted after the award, for member/built up member substitutions for these sizes.
- Flat bar stock of equal thickness and material grade may be substituted for "fitted" stiffener plates at all locations. Width of bar may be within (-0", +3/4") of "fitted" plate dimension.
- The submerg arc welding process may be substituted for welding together bolted girder sections. Fabricator to submit equivalent weld sizes to be used in lieu of the requirements specified herein.

Drawing List	
Sheet Number	Sheet Name
S-001	GENERAL NOTES
FO-100	FOUNDATION PLAN
FO-200	CONCRETE SPREAD FOOTINGS
FO-201	CONCRETE FOUNDATION WALL
FO-202	CONCRETE SLAB ON GRADE
FO-210	REINF. DEVELOPMENT AND SPLICE TABLES
FO-300	FOUNDATION SECTIONS
S-010	1ST FLOOR FRAMING PLAN
S-020	2ND FLOOR FRAMING PLAN
S-030	3RD-FLOOR FRAMING PLANS
S-070	ROOF FRAMING PLAN
S-090	COLUMN SCHEDULE
S-915	TYPICAL COLUMN DETAILS
S-920	BRACE FRAME ELEVATIONS
S-950	TYPICAL STEEL DETAILS
S-951	TYPICAL STEEL DETAILS
S-952	TYPICAL STEEL DETAILS
S-953	TYPICAL STEEL DETAILS
S-954	TYPICAL STEEL DETAILS
S-955	TYPICAL STEEL DETAILS
S-960	TYPICAL MASONRY DETAILS

Structural Steel Table 1 - Steel Material					
STEEL ELEMENT	ASTM / TYPE	Fy(KSI)	Fu (KSI)	Fu (KSI)	COMMENTS
Anchor rods	F1554 GR 55	55	75		Weldable, Heavy hex headed
Anchor rods on masonry	F1554 GR 36, F1554 GR 55, or A307 Grade A/C	36	58		Weldable, STD Hex Head
Bolts	A325 or F1852	-	120		Bolts are 3/4" UNO, use tension-controlled where possible
Cold-formed studs/plate, 33 and 43 ml	A1003	33	-	-	
Cold-formed studs/plate, 54 ml and heavier	A1003	50	-	-	
Cold-formed track, all thicknesses	A1003	33	-	-	
DAS	A496	70	80	-	
HAS	A108	51	65		Studs are 3/4" UNO
Other shapes	A36	36	58	-	
Pipe	A53 GR B	35	60	-	
Plates	A36	36	58	-	
Rect HSS	A501 GR B	46	58	-	
Round HSS	A501 GR B	42	58	-	Per AWS
Welding electrodes, thickness of thinner part > 0.1 inches (12 GA)	E70	-	-	-	Per AWS
Welding electrodes, thickness of thinner part <= 0.1 inches (12 GA)	E60 or E70	-	-	-	Per AWS
Wide flanges, WT (UNO)	A992	50	65	-	

Structural Steel Table 2 - List of Slip Critical Bolt Connections	
a. Column splices	
b. Connections of beams and girders to columns	
c. Bolted moment connections	
d. Bracing members	
e. Hangers	
f. Connections noted as Type SC on the design drawings	
g. Connections of beams and girders to columns in brace frames	
h. Connections c. e, f, and g shall be designed as "slip critical" connections.	
Connections d, bracing members, shall meet the requirements for slip-critical faying surfaces in accordance with AISC 300-05 Section J3.8 with a Class A surface. Oversized holes shall be permitted when the connections are designed as slip-critical joints, and the oversized holes are in one ply only. The available shear strength of bolted joints using standard holes shall be calculated as that for bearing-type joints, except that the nominal bearing strength at both holes shall not be taken greater than 2.4dF.	
*All other A325 bolts may be pre-tensioned as defined by AISC.	
*All other A325 bolts shall not be pre-tensioned but shall be installed to the snug tight condition as defined by AISC.	

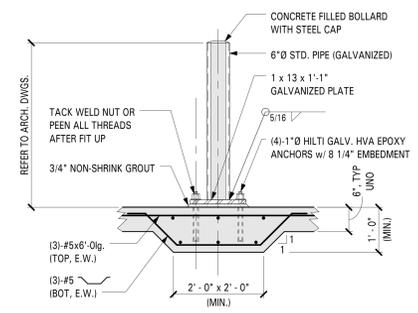
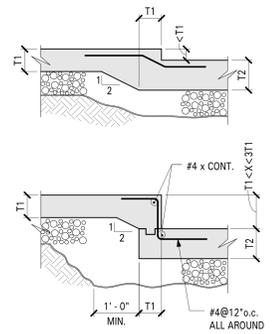
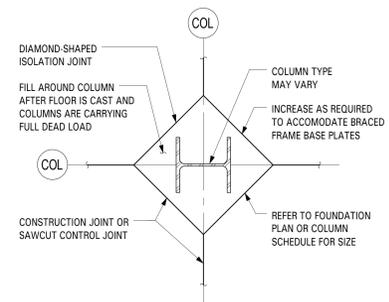
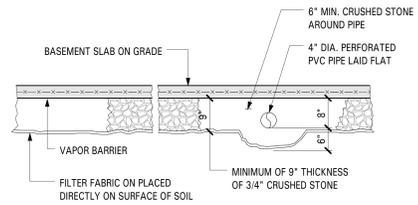
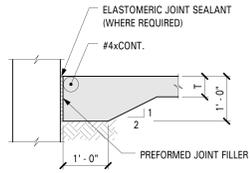
Structural Steel Table 3 - Required Shop Drawing Information	
a. All plate dimensions and grade	
b. All weld sizes, lengths, pitches and returns	
c. All hole sizes and spacings	
d. Number and type of bolts: where bolts are shown but no number is given, the connection has not been completely detailed	
e. Where partial information is given, it shall be the minimum requirement for the connection.	
f. Method of design.	

Structural Steel Table 4 - LRFD			
Beam Size	# of bolt rows, n	Min Shear	Ultimate Strength LRFD
W8x10, W10x12	2	2	18.5
W8x13, 15, W10x15	2	24	24.0
W8x18, 21, 24 W10x17, 19, 22, 26	2	26	26.9
W8 >= 28, W10 >= 30	2	34	34.8
W12x14, W12x16	3	33	33.0
W14 <= 30, W12x19, 22, 26, 30	3	34	40.2
W12x35, 40, 45 W14x34, 38, 43, 48	3	34	52.1
W12 >= 50 W14 >= 53	3	63	63.0
W16x26, 31	4	60	60.0
W16x36, 40 W18x35, W18x40	4	4	71.9
W16 >= 45, W18x46, 50, 55	4	84	84.2
W18 >= 60, W21 <= 62, W24x55	5		









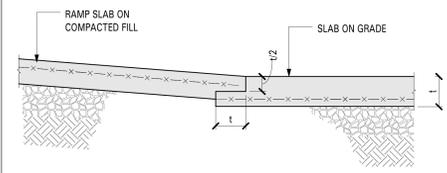
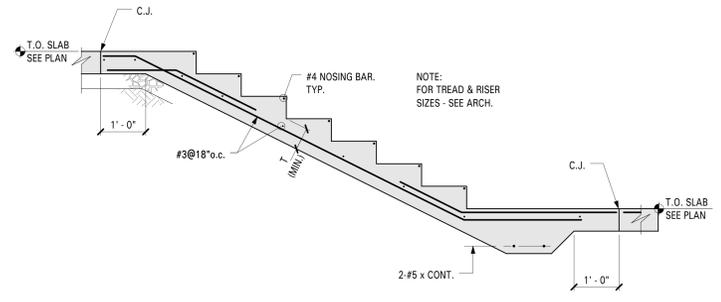
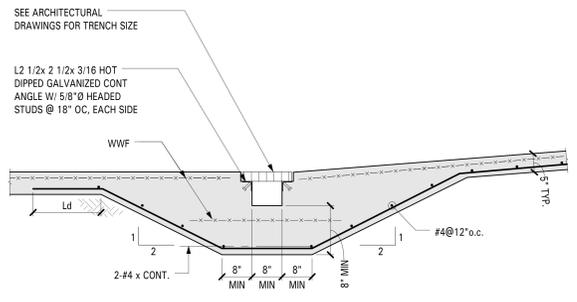
1 ISOLATION JOINT

2 TYP. UNDERSLAB DRAINAGE PIPE

3 TYP. W COLUMN ISOLATION DETAIL

4 TYP. SLAB ON GRADE DEPRESSIONS

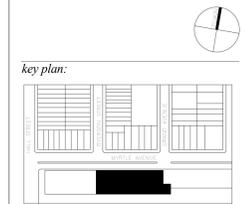
5 TYP. BOLLARD DETAIL AT SLAB ON GRADE



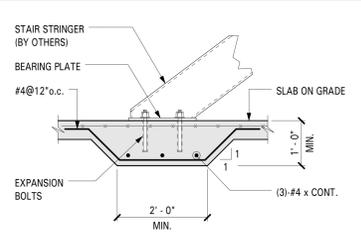
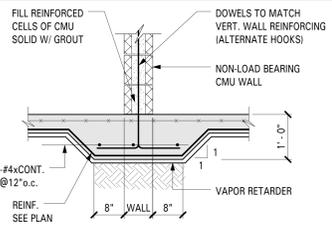
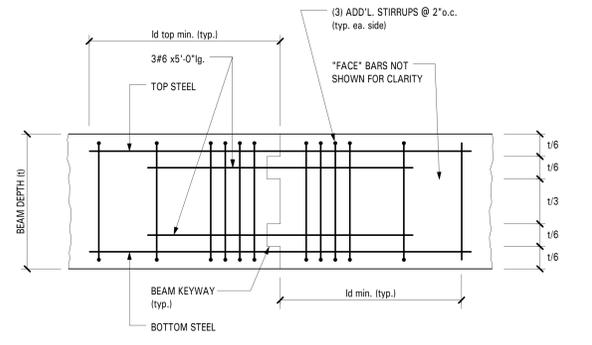
6 SECTION AT TRENCH DRAIN

7 TYP. INTERIOR STAIR DETAIL

8 TYPICAL RAMP TRANSITION TO SLAB ON GRADE

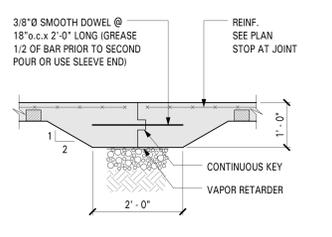
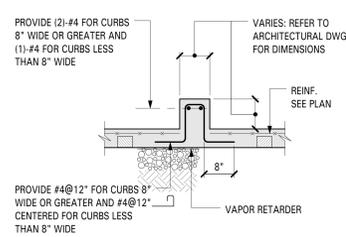


key plan:



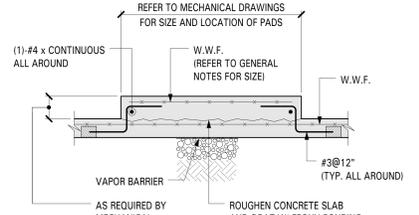
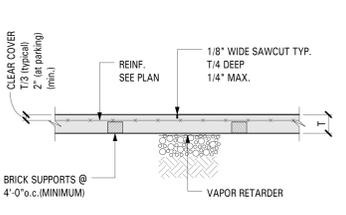
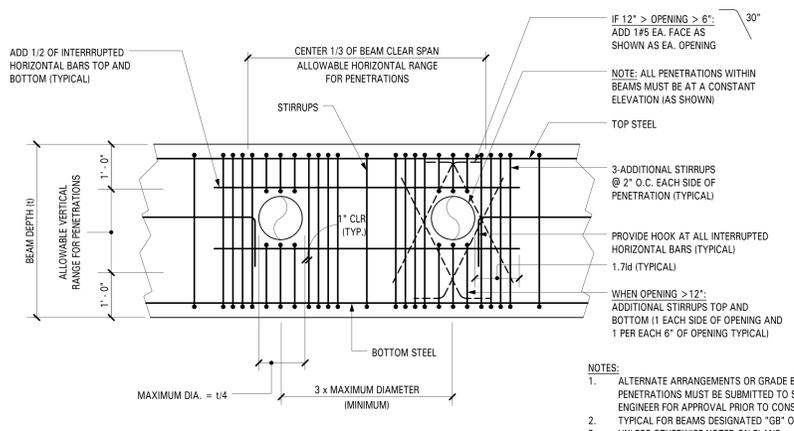
TYPICAL HAUNCH SLAB AT CMU WALLS

TYPICAL HAUNCH SLAB AT STAIR STRINGER



TYPICAL CONCRETE CURB

CONSTRUCTION JOINT



CONTROL JOINT

HOUSEKEEPING PAD PARKING GARAGE ISLAND CURBS

10 TYP. DETAIL AT GRADE BEAM AND STRAP BEAM PENETRATIONS

11 TYP. SLAB ON GRADE DETAILS

project:  
**504 MYRTLE AVENUE**  
**BROOKLYN, NY 11205**

revisions:

issued:

11/12/2014 DOB APPROVAL

CONCRETE SLAB ON GRADE

DATE: 11/12/14  
 PROJECT No: 141010  
 DRAWING BY: Author  
 CHECKED BY: Checker  
 SCALE: As indicated  
 DWG No: FO-202.00  
 Approver: CF 14

These drawings are an instrument of service and are the property of the architect. Infringements will be prosecuted.

TENSION DEVELOPMENT LENGTH (Lap Class A) AND LAP SPLICE LENGTHS (Lap Class B) FOR GRADE 60 DEFORMED REINFORCING BARS (inches)																					
UNLESS SHOWN OTHERWISE ON DRAWINGS																					
f <sub>c</sub> = 4000 PSI, NORMAL WEIGHT CONCRETE																					
BAR SIZE	LAP CLASS	CONCRETE COVER >= 0.75 in. CLEAR BAR SPACING >= 1.5 in.				CONCRETE COVER >= 1.00 in. CLEAR BAR SPACING >= 2.0 in.				CONCRETE COVER >= 1.50 in. CLEAR BAR SPACING >= 3.0 in.				CONCRETE COVER >= 2.00 in. CLEAR BAR SPACING >= 4.0 in.				CONCRETE COVER >= 3.00 in. CLEAR BAR SPACING >= 6.0 in.			
		UNCOATED		EPOXY COATED		UNCOATED		EPOXY COATED		UNCOATED		EPOXY COATED		UNCOATED		EPOXY COATED		UNCOATED		EPOXY COATED	
		TOP <sup>1</sup>	OTHER	TOP <sup>1</sup>	OTHER	TOP <sup>1</sup>	OTHER	TOP <sup>1</sup>	OTHER	TOP <sup>1</sup>	OTHER	TOP <sup>1</sup>	OTHER	TOP <sup>1</sup>	OTHER	TOP <sup>1</sup>	OTHER	TOP <sup>1</sup>	OTHER	TOP <sup>1</sup>	OTHER
#3	A	12	12	15	13	12	12	15	13	12	12	14	12	12	14	12	12	14	12	14	12
#3	B	16	16	19	17	16	16	19	17	16	16	19	16	16	18	16	16	18	16	16	18
#4	A	19	15	24	22	15	12	20	17	15	12	18	14	15	12	18	14	15	12	18	14
#4	B	24	19	32	28	20	16	25	22	20	16	23	18	20	16	23	18	20	16	23	18
#5	A	28	21	36	32	22	17	29	26	19	15	24	22	19	15	22	17	19	15	22	17
#5	B	36	28	47	41	29	22	38	33	24	19	32	28	24	19	29	22	24	19	29	22
#6	A	37	29	49	43	31	24	40	35	22	17	29	26	22	17	29	26	22	17	27	21
#6	B	48	37	63	56	40	31	52	46	29	22	38	34	29	22	38	34	29	22	35	27
#7	A	60	46	78	69	50	38	65	57	37	28	48	42	33	25	43	38	33	25	39	30
#7	B	78	60	102	90	64	50	84	74	48	37	62	55	42	33	55	49	42	33	51	39
#8	A	74	57	97	86	62	48	81	71	47	36	61	54	37	29	49	43	37	29	45	34
#8	B	96	74	126	111	80	62	105	93	60	47	79	70	48	37	63	56	48	37	58	45
#9	A	90	69	117	104	78	58	99	87	57	44	75	68	46	36	60	53	42	32	55	48
#9	B	117	90	153	135	98	76	128	113	74	57	97	86	60	46	78	69	55	42	71	63
#10	A	108	83	141	125	92	70	120	106	70	54	92	81	57	44	74	66	47	36	62	55
#10	B	140	108	183	162	119	92	155	137	91	70	119	105	74	57	97	85	61	47	80	71
#11	A	127	98	166	146	108	83	141	125	84	64	109	97	68	53	89	79	52	40	69	60
#11	B	165	127	215	190	141	108	184	162	109	84	142	125	89	68	116	102	68	52	89	79

TENSION DEVELOPMENT LENGTH (Lap Class A) AND LAP SPLICE LENGTHS (Lap Class B) FOR GRADE 60 DEFORMED REINFORCING BARS (inches)																					
UNLESS SHOWN OTHERWISE ON DRAWINGS																					
f <sub>c</sub> = 5000 PSI, NORMAL WEIGHT CONCRETE																					
BAR SIZE	LAP CLASS	CONCRETE COVER >= 0.75 in. CLEAR BAR SPACING >= 1.5 in.				CONCRETE COVER >= 1.00 in. CLEAR BAR SPACING >= 2.0 in.				CONCRETE COVER >= 1.50 in. CLEAR BAR SPACING >= 3.0 in.				CONCRETE COVER >= 2.00 in. CLEAR BAR SPACING >= 4.0 in.				CONCRETE COVER >= 3.00 in. CLEAR BAR SPACING >= 6.0 in.			
		UNCOATED		EPOXY COATED		UNCOATED		EPOXY COATED		UNCOATED		EPOXY COATED		UNCOATED		EPOXY COATED		UNCOATED		EPOXY COATED	
		TOP <sup>1</sup>	OTHER	TOP <sup>1</sup>	OTHER	TOP <sup>1</sup>	OTHER	TOP <sup>1</sup>	OTHER	TOP <sup>1</sup>	OTHER	TOP <sup>1</sup>	OTHER	TOP <sup>1</sup>	OTHER	TOP <sup>1</sup>	OTHER	TOP <sup>1</sup>	OTHER	TOP <sup>1</sup>	OTHER
#3	A	12	12	13	12	12	12	13	12	12	12	12	12	12	12	12	12	12	12	12	12
#3	B	16	16	17	16	16	16	17	16	16	16	16	16	16	16	16	16	16	16	16	16
#4	A	17	13	22	19	14	12	18	16	14	12	16	13	14	12	18	13	14	12	16	13
#4	B	22	17	28	25	19	16	23	20	18	16	21	16	18	16	21	16	18	16	21	16
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#5	B	32	25	42	37	26	20	34	30	22	17	28	25	22	17	26	20	22	17	26	20
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#6	B	43	33	57	50	35	27	46	41	26	20	34	30	26	20	34	30	26	20	31	24
#7	A	54	41	70	62	44	34	58	51	33	25	43	38	29	23	38	34	29	23	35	27
#7	B	70	54	91	80	58	44	75	66	43	33	56	49	38	29	50	44	38	29	45	35
#8	A	66	51	87	77	55	43	72	64	42	32	54	48	33	26	44	38	33	26	40	31
#8	B	86	66	113	100	72	55	94	83	54	42	71	62	43	33	67	50	43	33	52	40
#9	A	80	62	105	93	68	52	88	78	51	40	67	59	41	32	54	48	38	29	49	43
#9	B	104	80	136	120	88	68	115	101	67	51	87	77	54	41	70	62	49	38	64	56
#10	A	97	74	126	111	82	63	107	94	63	48	82	72	51	39	67	59	42	33	55	48
#10	B	126	97	164	145	106	82	139	123	82	63	107	94	66	51	86	76	55	42	72	63
#11	A	113	87	148	131	97	75	128	112	75	58	98	86	61	47	80	70	47	36	61	54
#11	B	147	113	192	170	126	97	164	145	97	75	127	112	79	61	104	92	61	47	80	70

**TYPICAL REINFORCING BAR DEVELOPMENT LENGTH/LAP  
SPLICE LENGTH SCHEDULES, U.N.O.**

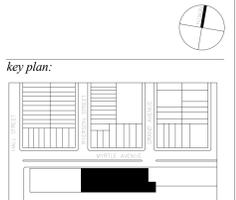
- NOTES:
- TOP BARS ARE HORIZONTAL BARS WITH MORE THAN 12 INCHES OF CONCRETE CAST BELOW THE BARS.
  - CLEAR BAR SPACING = CENTER TO CENTER SPACING - BAR DIAMETER.
  - AVOID SPLICES IN REGIONS OF MAXIMUM MOMENT. IF THIS IS NOT POSSIBLE, STAGGER SPLICES SO THAT SPLICES DO NOT REQUIRE MORE THAN 50% OF THE BARS ARE SPLICED WITHIN A REQUIRED SPLICE LENGTH OTHERWISE INCREASE SPLICE LENGTH BY 30%.
  - FOR GRADE 75, REINFORCING BARS SPLICE LENGTHS SHOWN ABOVE SHALL BE INCREASED BY A FACTOR = 1.25.

Executive Architect:  
**HTO**  
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370 7th Ave  
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62 West 45th Street, 11th Floor  
New York, NY 10036

MEP Engineer:  
SJC Engineering, PC  
60 East 42nd Street, suite 956  
New York, NY 10165



project:  
**504 MYRTLE AVENUE  
BROOKLYN, NY 11205**

revisions:

issued:  
11/12/2014 DOB APPROVAL

DRAWING TITLE  
**REINF DEVELOPMENT AND  
SPLICE TABLES**

DATE: 11/05/14  
PROJECT NO: 1415010  
DRAWING BY: JPM  
CHECKED BY: NAC  
SCALE: 1/8" = 1'-0"  
DWG NO: **FO-210.00**  
Appr. OF 74







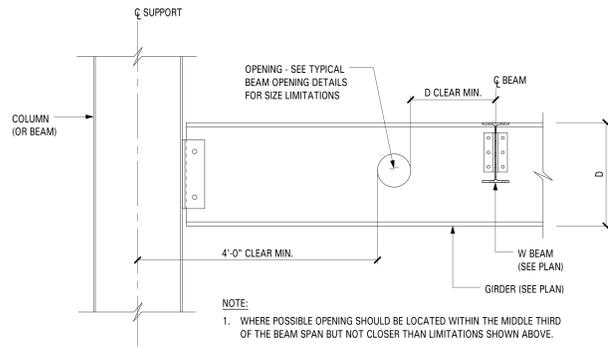






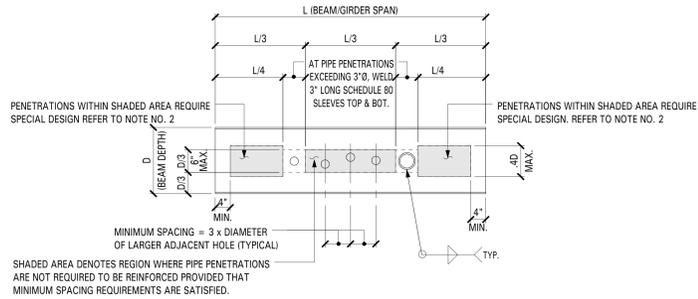




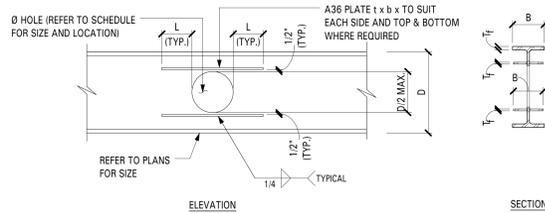


**HORIZONTAL LOCATION OF BEAM OPENING**

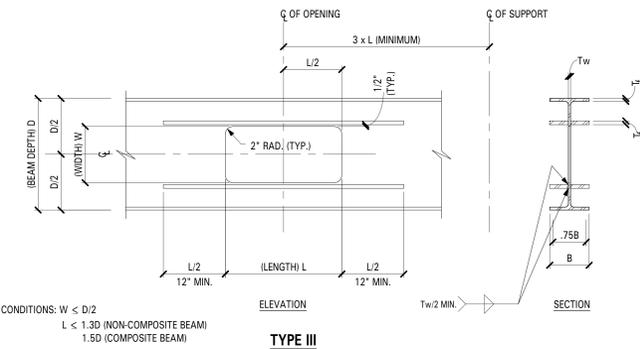
NOTE:  
1. WHERE POSSIBLE OPENING SHOULD BE LOCATED WITHIN THE MIDDLE THIRD OF THE BEAM SPAN BUT NOT CLOSER THAN LIMITATIONS SHOWN ABOVE.



**TYPE I**



**TYPE II**

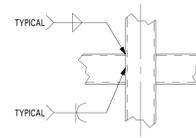


**TYPE III**

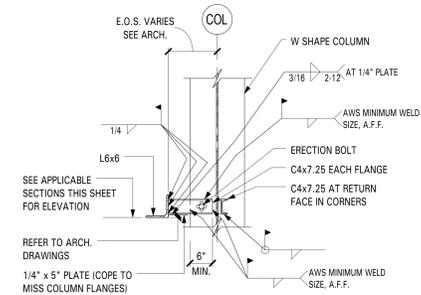
- NOTES:
1. SIZE AND LOCATION OF BEAM OPENINGS NOT INDICATED ON STRUCTURAL DRAWINGS SHALL BE SUBMITTED TO THE ARCHITECT/ENGINEER PRIOR TO FABRICATION.
  2. FINISH LAST 1/8" OF HOLE BY REAMING OR GRINDING.
  3. LIMITS SHOWN ARE FOR GUIDANCE ONLY.
  4. PROVIDE STIFFENER, WHERE REQUIRED, WITH  $F_y = 50 \text{ ksi}$
  5. FOR PRICING: BASE TO INCLUDE THE QUANTITIES AS SHOWN IN TABLE: BEAM OPENINGS AT LOCATIONS ARE TO BE DETERMINED DURING COORDINATION AND SHOP DRAWING APPROVAL, WITH SHOP FABRICATED REINFORCING AS DETAILED HERE.

TYPE	QUANTITY
I	
II	
III	

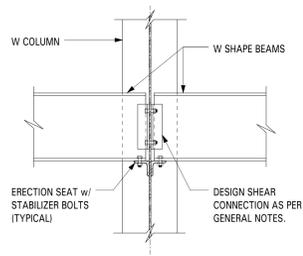
- UNIT PRICES FOR ADDITIONAL BEAM OPENINGS WITH REINFORCING AS DETAILED HERE WHICH ARE:
- a. SHOP FABRICATED: 40 PER FLOOR, 50% REINFORCED
  - b. FIELD FABRICATED: 10 PER FLOOR, 50% REINFORCED



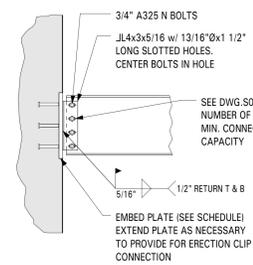
**TYP. HSS-TO-HSS CONNECTION**



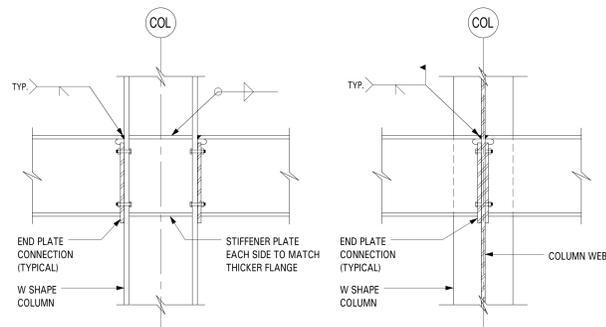
**TYP. BRICK SUPPORT DETAIL AT COLUMNS U.N.O.**



**TYP. CONNECTION AT BACK TO BACK GIRDERS TO COLUMN WEB**

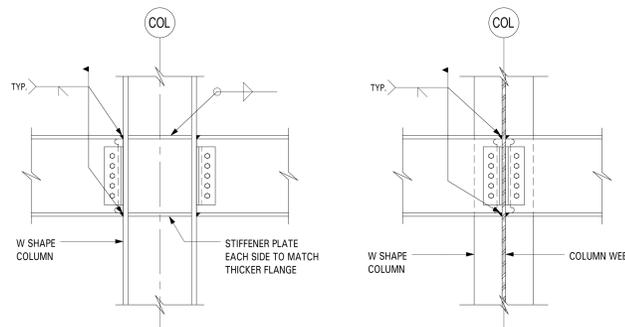


**TYP. BEAM CONNECTION TO EMBEDDED PLATES**

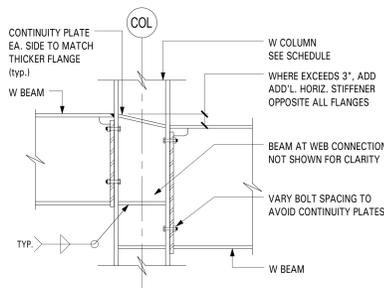


**TYPICAL AT END PLATE CONNECTION**

NOTE: STIFFENER PLATE WELD TO DEVELOP FLANGE FORCE =  $0.9F_y F_t F$

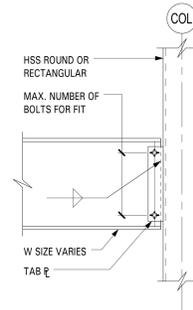


**TYPICAL AT DOUBLE ANGLE SHEAR CONNECTION**

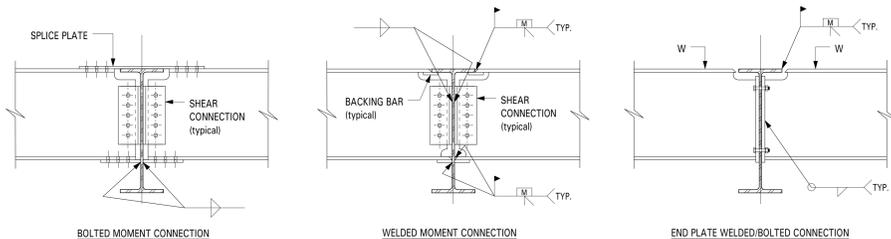


**TYPICAL AT GIRDERS OF DIFFERENT DEPTHS OR OFFSET T.O. STEEL ELEVATIONS**

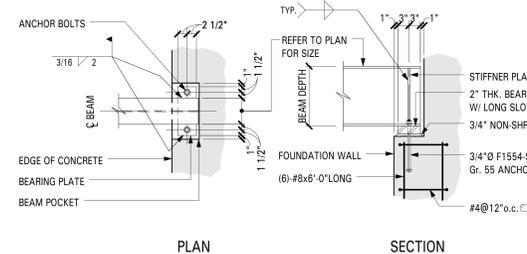
NOTE: SIMILAR AT DOUBLE ANGLE SHEAR CONNECTION



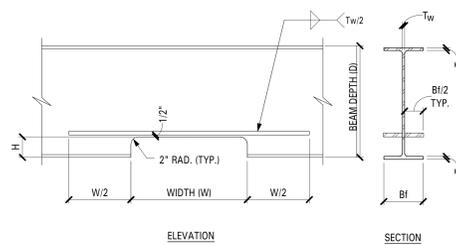
**TYP. W-BEAM TO HSS COLUMN CONNECTION UNO**



**TYP. BEAM-TO-GIRDER MOMENT CONNECTION DETAILS**



**TYP. STEEL BEAM POCKET DETAIL**



NOTE:  
1. SIZE AND LOCATION OF BEAM NOTCH NOT INDICATED ON STRUCTURAL DRAWINGS SHALL BE SUBMITTED TO THE ARCHITECT/ENGINEER PRIOR TO FABRICATION.  
2. PROVIDE STIFFENER, WHERE REQUIRED, WITH  $F_y = 50 \text{ ksi}$

**TYPICAL BEAM/GIRDER NOTCH DETAIL**

Owner:  
Madison Realty Capital  
825 3rd Avenue, 37th Floor  
New York, NY 10022

Structural Engineer:  
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MEP Engineer:  
SJC Engineering, PC  
60 East 42nd Street, suite 956  
New York, NY 10165

key plan:



project:  
**504 MYRTLE AVENUE**  
BROOKLYN, NY 11205

revisions:

issued:

11/12/2014 DOB APPROVAL

DRAWING TITLE

**TYPICAL STEEL DETAILS**





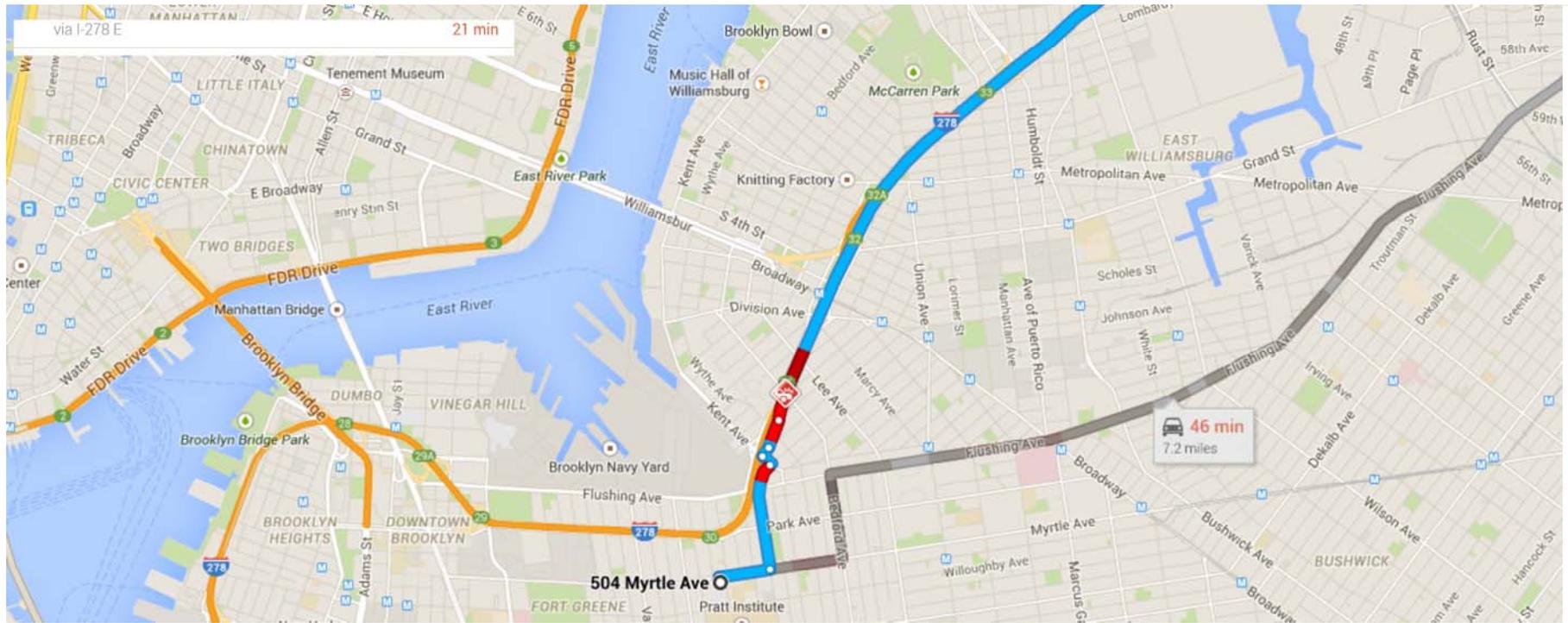








**Appendix 9**  
Truck Route



طسءءءءء 5347ءءءءء 5333ءء

**Appendix 10**  
Revised RA Stamped Project Description Letter

Mr. Shaminder Chawla  
Office of Environmental Remediation  
253 Broadway, 14<sup>th</sup> Floor  
New York, NY 10007

November 24, 2014

Re: 504 Myrtle Avenue  
Brooklyn, NY 11205  
Block #1905, Lot # 30  
OER Project #: Unassigned

Dear Mr. Chawla,

The above referenced project involves the development of an 8-story new residential building with commercial at the ground floor; there will be no community facility. There is below-grade parking on premises. The entire site perimeter will be excavated to the depth of approximately 11'-10" below grade for the layout of the new building foundations & cellar. There will be 1 elevator pit below the foundation slab and it will be 6'-0" deep with a 6" slab on grade.

The area of the lot is 27,500 sf. The area of the building footprint is to be as follows:

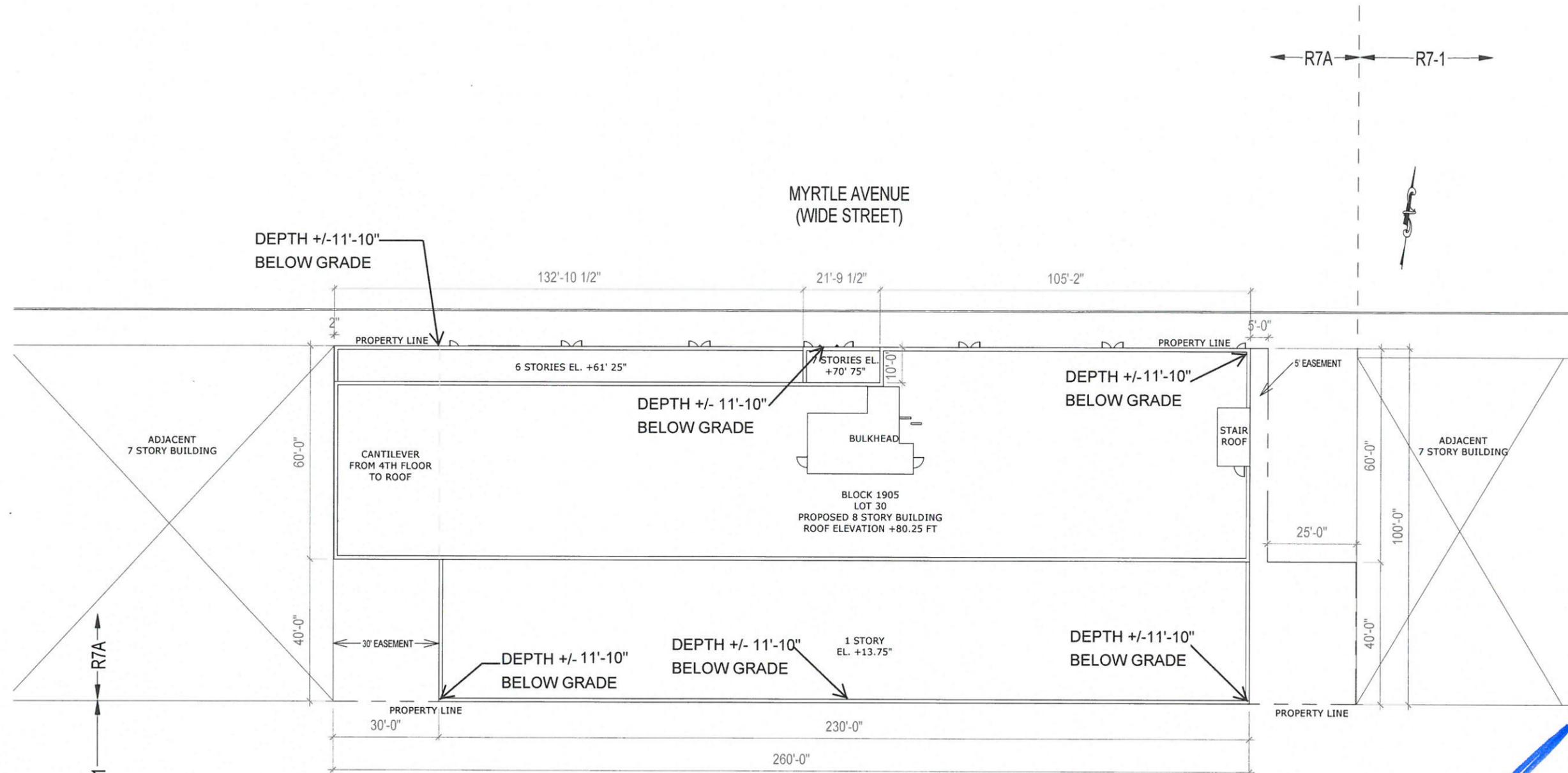
- Cellar - 23,001 sf.
- 1 - 21,888 sf.
- 2 - 13,802 sf.
- 3 - 13,802 sf.
- 4 - 15,590 sf.
- 5 - 15,590 sf.
- 6 - 15,590 sf.
- 7 - 14,262 sf.
- 8 - 14,044 sf.

Building foundation will consist of a 6" thick concrete slab on grade with 3'-0" localized spread footings over Grace Preprufe 300R waterproofing membrane. The foundation walls are to consist of 1'-0" thick concrete with Grace Preprufe 160R waterproofing membrane.

Sincerely,

H. Thomas O'Hara Jr., AIA





MYRTLE AVENUE  
(WIDE STREET)

R7A R7-1

DEPTH +/- 11'-10"  
BELOW GRADE

132'-10 1/2"

21'-9 1/2"

105'-2"

PROPERTY LINE

PROPERTY LINE

6 STORIES EL. +61' 25"

7 STORIES EL. +70' 75"

DEPTH +/- 11'-10"  
BELOW GRADE

DEPTH +/- 11'-10"  
BELOW GRADE

ADJACENT  
7 STORY BUILDING

CANTILEVER  
FROM 4TH FLOOR  
TO ROOF

BULKHEAD

STAIR  
ROOF

ADJACENT  
7 STORY BUILDING

BLOCK 1905  
LOT 30  
PROPOSED 8 STORY BUILDING  
ROOF ELEVATION +80.25 FT

60'-0"

60'-0"

100'-0"

40'-0"

40'-0"

30' EASEMENT

DEPTH +/- 11'-10"  
BELOW GRADE

DEPTH +/- 11'-10"  
BELOW GRADE

1 STORY  
EL. +13.75"

DEPTH +/- 11'-10"  
BELOW GRADE

PROPERTY LINE

PROPERTY LINE

30'-0"

230'-0"

260'-0"

ADJACENT  
PARKING LOT

R7A  
R7-1

**HTO**  
ARCHITECT, PLLC

370 7th Ave  
Suite 220  
New York, NY 10001  
212 695 3117  
www.hto-architect.com



11.11.14

project: 504 MYRTLE AVENUE  
drawing title: SITE PLAN  
drawing number: OER-01  
date: 10/15/14  
project number: 14025  
AS NOTED  
drawn by: KBR checked by: DEG

**Appendix 11**  
Revised Architectural Development Plans









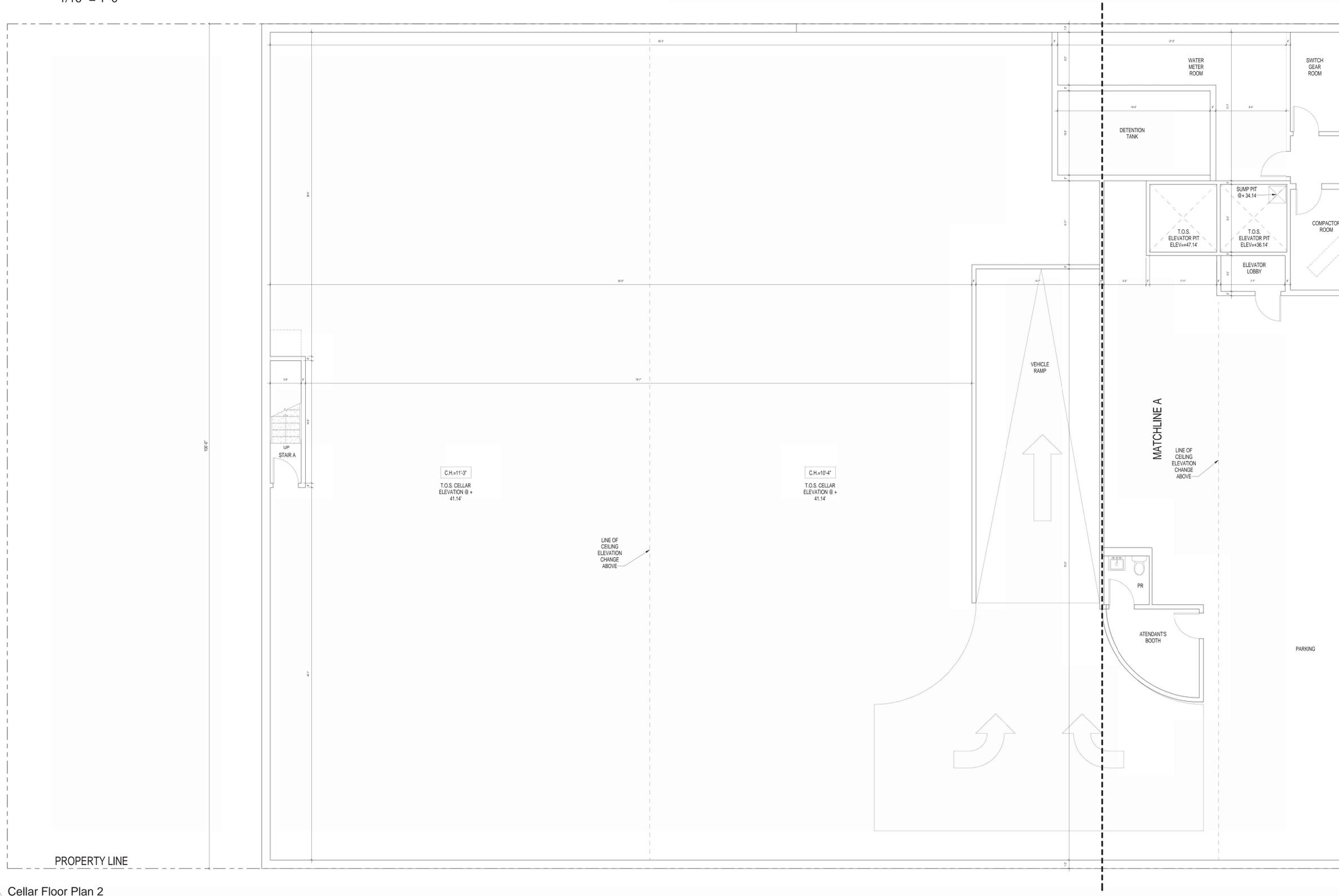








2 Cellar Floor Key Plan 1  
1/16" = 1'-0"



1 Cellar Floor Plan 2  
1/4" = 1'-0"

Executive Architect:  
**HTO**  
ARCHITECT, PLLC  
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www.hto-architect.com

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MEP Engineer:  
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New York, NY 10165

key plan:



project:  
**504 MYRTLE AVENUE  
BROOKLYN, NY 11205**

revisions:

issued:

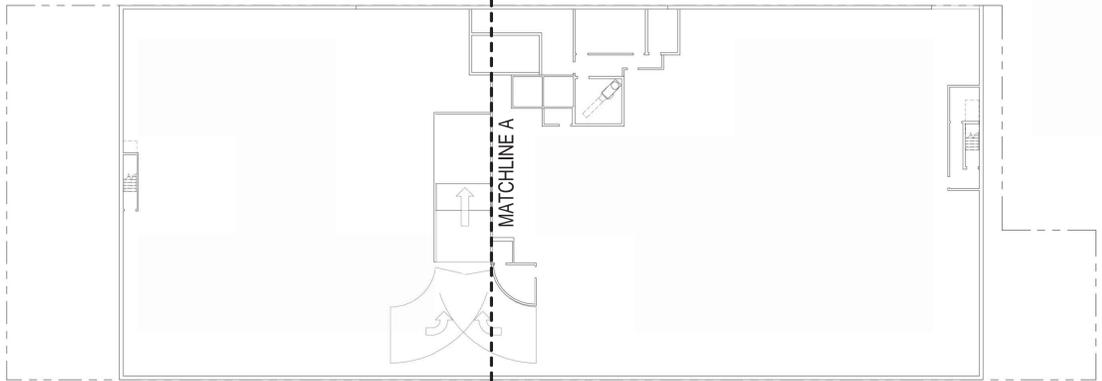
11/07/2014 HPD FILING

DRAWING TITLE

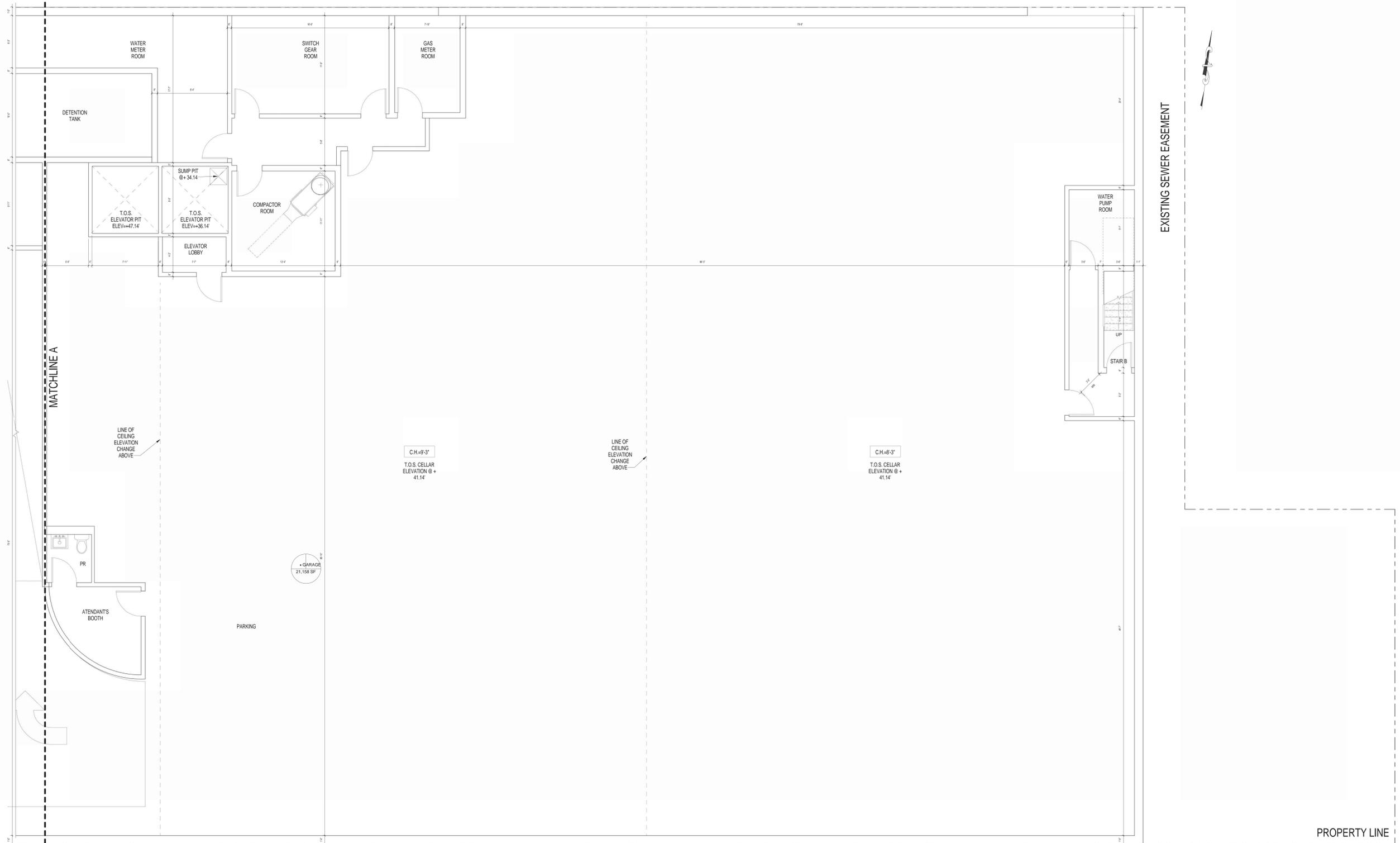
**CELLAR FLOOR**

	DATE:	10/08/14
	PROJECT No.:	1055
	DRAWING BY:	Author
	CHECKED BY:	Checker
SCALE:		As Indicated
DWG. No.:		<b>A-101.00</b>
		Approved: CF 74

These drawings are an instrument of service and are the property of the architect. Infringements will be prosecuted.



2 Cellar Floor Key Plan 2  
1/16" = 1'-0"



1 Cellar Floor Plan 1  
1/4" = 1'-0"

Executive Architect:  
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ARCHITECT, PLLC  
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New York, NY 10165

key plan:



project:  
504 MYRTLE AVENUE  
BROOKLYN, NY 11205

revisions:

issued:

11/07/2014 HPD FILING

DRAWING TITLE

CELLAR FLOOR

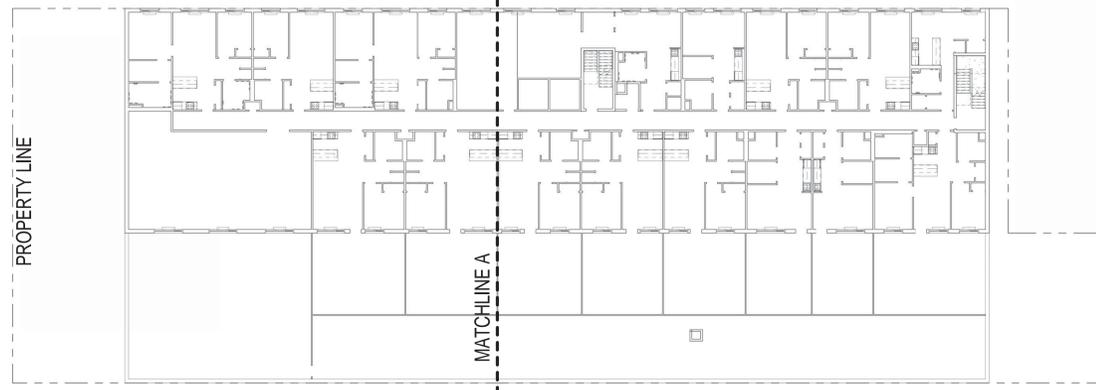
DATE & SIGNATURE	DATE: 10/29/14
PROJECT No:	1055
DRAWING BY:	Author
CHECKED BY:	Chen
SCALE:	As Indicated
DATE:	
PROJECT No:	
DRAWING BY:	
CHECKED BY:	
SCALE:	
DATE:	

REGISTERED ARCHITECT  
STATE OF NEW YORK  
2012  
A-102.00  
Approved: CF 74

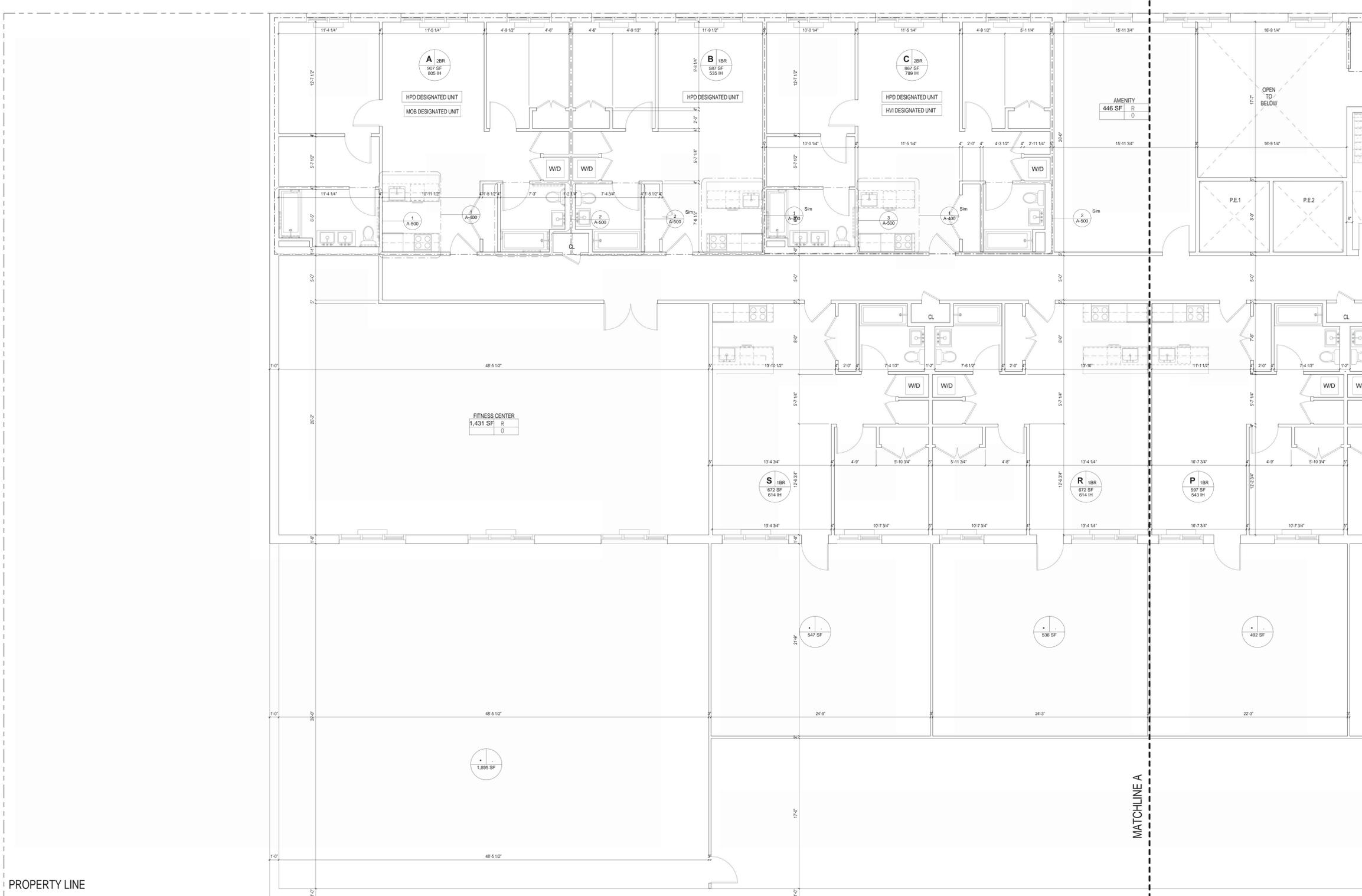
These drawings are an instrument of service and are the property of the architect. Infringements will be prosecuted.







1 2nd Floor Key Plan 1  
1/16" = 1'-0"



2 2nd Floor Plan 1  
1/4" = 1'-0"

Executive Architect:  
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key plan:



project:  
504 MYRTLE AVENUE  
BROOKLYN, NY 11205

revisions:

issued:

11/07/2014 HPD FILING

DRAWING TITLE

2ND FLOOR

DATE & SIGNATURE	DATE
	10/29/14
PROJECT No.	1405
DRAWING BY	Author
CHECKED BY	Checker
SCALE	As Indicated
DATE	
PROJECT No.	
DRAWING BY	
CHECKED BY	
SCALE	
DATE	

**A-105.00**  
Appendix CF 74

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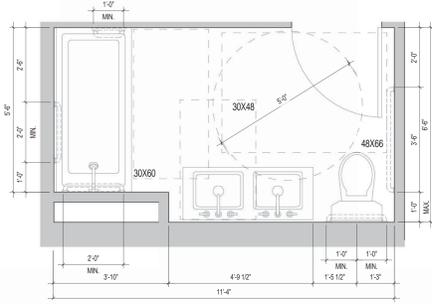




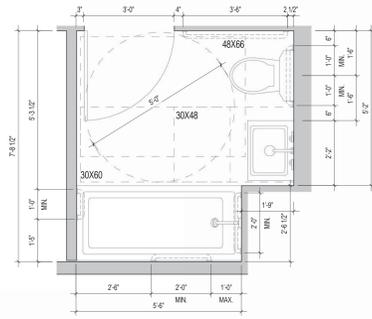




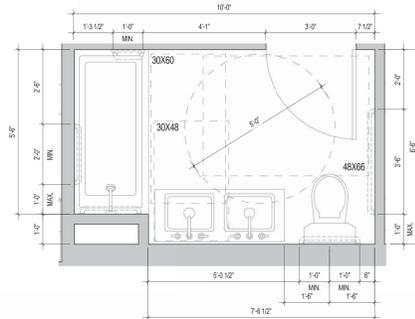




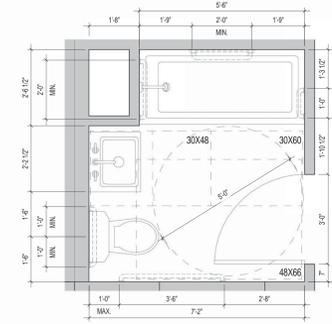
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1/2" = 1'-0"



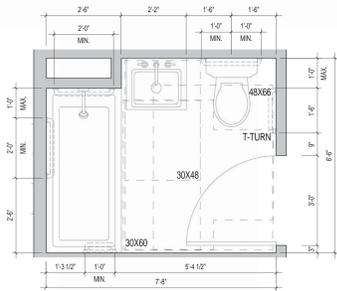
2 02-TYPICAL BATHROOM 2  
1/2" = 1'-0"



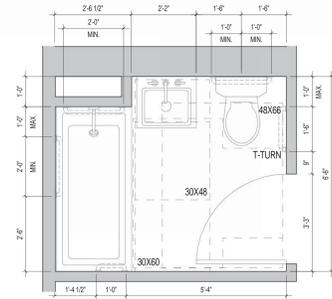
3 02-TYPICAL BATHROOM 3  
1/2" = 1'-0"



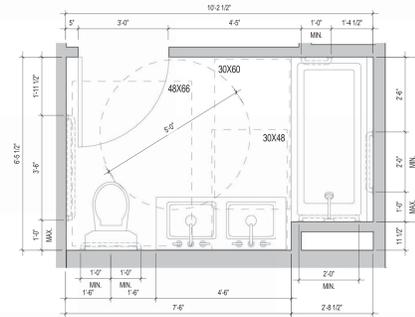
4 02-TYPICAL BATHROOM 4  
1/2" = 1'-0"



5 02-TYPICAL BATHROOM 5  
1/2" = 1'-0"



6 04-TYPICAL BATHROOM 6  
1/2" = 1'-0"



7 04-TYPICAL BATHROOM 7  
1/2" = 1'-0"

key plan:



project:  
504 MYRTLE AVENUE  
BROOKLYN, NY 11205

revisions:

issued:

11/07/2014 HPD FILING

DRAWING TITLE

TYPICAL BATHROOM PLANS

DATE: 10/31/14	PROJECT No: 1405
DESIGNED BY: HTO	DRAWING BY: AHP
CHECKED BY: CHEN	SCALE: 1/2" = 1'-0"
DATE: 11/07/14	PROJECT No: 1405
<b>A-500.00</b>	
Approved: CF 74	



