



May 20, 2015

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

Re: VCP # 14CVCP254K
E-Designation # 11RH-N223K
945 Bergen Street
Remedial Action Work Plan (RAWP) Stipulation List

Dear Mr. Chawla:

NOVA Consulting hereby submits a Remedial Action Work Plan (RAWP) Stipulation List for the referenced Site to the New York City Office of Environmental Remediation (OER) on behalf of Crow Hill Development, 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 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 was conducted on April 30th of 2015 that satisfied the requirements of the OER for a final Remedial Action Work Plan.
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. The referenced Site has enrolled in the Voluntary Cleanup Program. If the site contains hazardous waste that will be excavated and disposed of offsite, Crow Hill Development, LLC will work with the OER to seek an exemption for the property from the \$130/ton state Hazardous Waste Program Fee. Hazardous waste must result from remedial action set forth in a cleanup plan approved by OER; and OER must oversee the cleanup. Crow Hill Development, LLC will notify the OER Project Manager, copying supervising Project Manager and Shaminder Chawla, before hazardous waste is shipped from the site. Unless the Department of Environmental Conservation is notified before waste is shipped from the site, Crow Hill Development, LLC may not receive an exemption from the fee. The exemption does not cover, and the applicant remain liable for, the Special Assessment on Hazardous Waste (established by ECL§ 27-0923) which charges a fee of up to \$27 per ton for hazardous waste generated that is due at the State Department of Taxation and Finance 30 days after the end of the quarter in which the waste was generated. **Appendix 3** includes additional information about the Exemption for Hazardous Waste Program Fee.
6. Collection and analysis of three (3) end-point samples (EP-1 thru EP-3) from the bottom of the excavation will be collected to evaluate the performance of the remedy with respect to attainment of Track 4 SCOs. In addition, a total of five (5) confirmatory samples (CS-1 thru CS-5) will be collected and analyzed to achieve final clean closure certification. A map indicating end-point sampling and confirmatory sampling locations is attached in Figure 1 of **Appendix 4**. Samples will be analyzed for contaminants of concern (sVOCs).
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 contractor's 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 5**.
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 6**.



Nova Consulting

9. A 20-mil vapor barrier will only be installed beneath the two (2) ground floor concrete slabs adjacent to the SITE 1 property boundary. The barrier selected for this installation is manufactured by Liquid Boot®. **Appendix 7** provides manufactures specifications and PE/RA certified building plans with the extent of the vapor barrier installation details (penetrations, joints, etc.).
10. 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**.
11. The Soil Disposal Site Truck route is included in **Appendix 9** (Figures 2A thru 2C).
12. The signed RIR certification page and stamped/signed RAWP certification page is included in **Appendix 10**.
13. Development plans are included in **Appendix 11**.

Sincerely,

Nicholas M. Canonico, CPG
Sr. Associate

Cc: Eric Ilijevich, NYCOER

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 identified 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

**945 Bergen Street
Site #: 14CVCP254K**

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.

For more information,
log on to: www.nyc.gov/oer

Or scan with smart phone:



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

Shaminder Chawla at (212) 442-3007
or email us at brownfields@cityhall.nyc.gov

Appendix 3 Hazardous Waste Fee Exemption Fact Sheet



Exemption from the Hazardous Waste Program Fee

If your site is enrolled in the city Voluntary Cleanup Program and contains hazardous waste that will be excavated and disposed of offsite, OER can work with your development team to exempt your property from the \$130/ton state Hazardous Waste Program fee. This exemption does not cover, and you remain liable for, the Special Assessment on Hazardous Waste (established by ECL§ 27-0923).

To qualify for an exemption from the Hazardous Waste Program Fee:

1. A site must be enrolled in the city Voluntary Cleanup Program;
2. Hazardous waste must result from remedial action set forth in a cleanup plan approved by OER; and
3. OER must oversee the cleanup.

Process for obtaining a Hazardous Waste Program Fee exemption:

For each VCP site, OER will submit three certifications to the New York State Department of Environmental Conservation (DEC):

1. OER will prepare a Notice of Potential Generation after a soil test shows a site contains hazardous waste. To prepare this Notice, you must provide your OER project manager with:
 - the site's EPA generator ID number;
 - the date of the soil test confirming hazardous waste;
 - the amount of hazardous waste in tons that you anticipate shipping offsite; and
 - the anticipated dates for the start and completion of remediation.

DEC must receive this form **before** hazardous waste is shipped from your site. Otherwise your claim for an exemption may be denied.

2. After hazardous waste has been removed from the site, OER will distribute a Certification of Hazardous Waste Generation to your project team which when filled out documents how the hazardous waste was managed. Once completed, it must be signed by the generator (or site owner) and the site's Qualified Environmental Professional and returned to your OER project manager with a copy to Shana Holberston sholbertson@dep.nyc.gov and Mark McIntyre mmcintyre@cityhall.nyc.gov.

3. OER will then issue a Certification of Remedial Action that Generated Hazardous Waste to DEC representing OER's approval of how a site managed its hazardous waste.

Upon OER's submission of the last two certifications to DEC, the agency will issue a written statement exempting an individual site from the Hazardous Waste Program Fee. OER will then notify the project of the exemption.

For further information, please contact:

Shana Holberton
Program Manager
(212) 788-3220
SHolberton@dep.nyc.gov

or

Mark McIntyre
General Counsel
(212) 788-3015
MMcintyre@cityhall.nyc.gov

Contact OER to confirm that you are using the most updated version of this guidance.



NYC Office of Environmental
Remediation

**Exemption from the
Hazardous Waste Program
Fee**

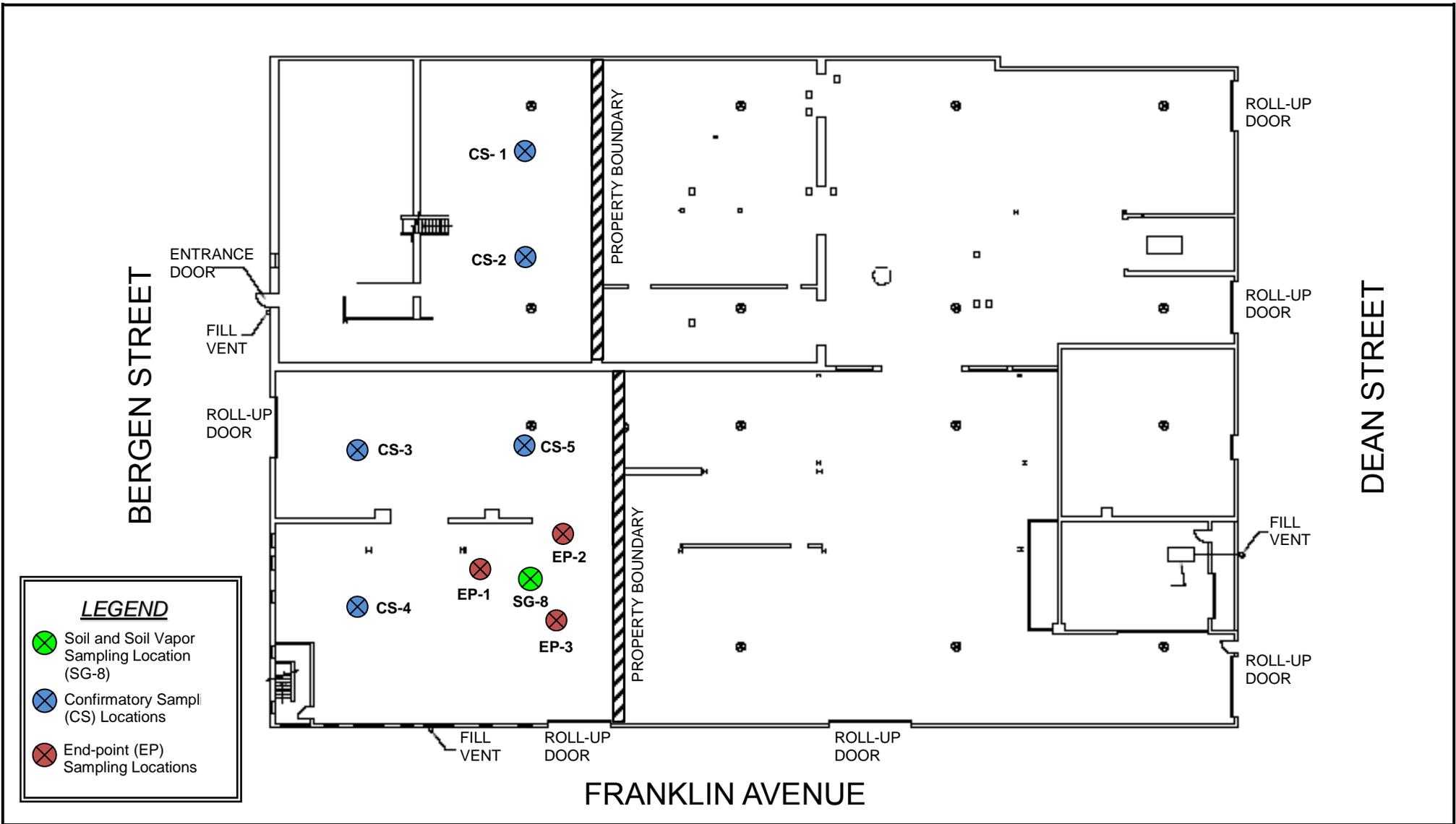
Ongoing Obligations:

Regardless of the Hazardous Waste Program Fee exemption, parties must:

- File a Hazardous Waste Annual Report with DEC by March 1 of each year if your site generated 15 tons of hazardous waste or more in the relevant calendar year. For details, see <http://www.dec.ny.gov/chemical/8770.html> To set forth the basis for an exemption from the Hazardous Waste Program Fee, put an X in the Exempt Remedial box in Box H of Section 1 of the Waste Generation and Management (GM) form and in the Comments Box (at the bottom of the form) include “New York City Voluntary Cleanup Program, VCP Site Number_____”; and
- Make quarterly payments of the Special Assessment on Hazardous Waste to the state Department of Taxation and Finance. For details see: <http://www.tax.ny.gov/bus/haz/hzrdwste.htm>

Contact OER to confirm that you are using the most updated version of this guidance.

Appendix 4
End-Point Sampling Map



Project No. NY13802

PROJECT MANAGER: N. Canonico

SCALE: NOT TO SCALE

DATE CHECKED: 05-20-15

DRAWING STATUS

Draft

Final

x

DATE APPROVED: 05-20-15



FIGURE 1
 PROPOSED END-POINT AND CONFIRMATORY SAMPLING LOCATIONS
 945 Bergen Street, Brooklyn, NY

Appendix 5
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.

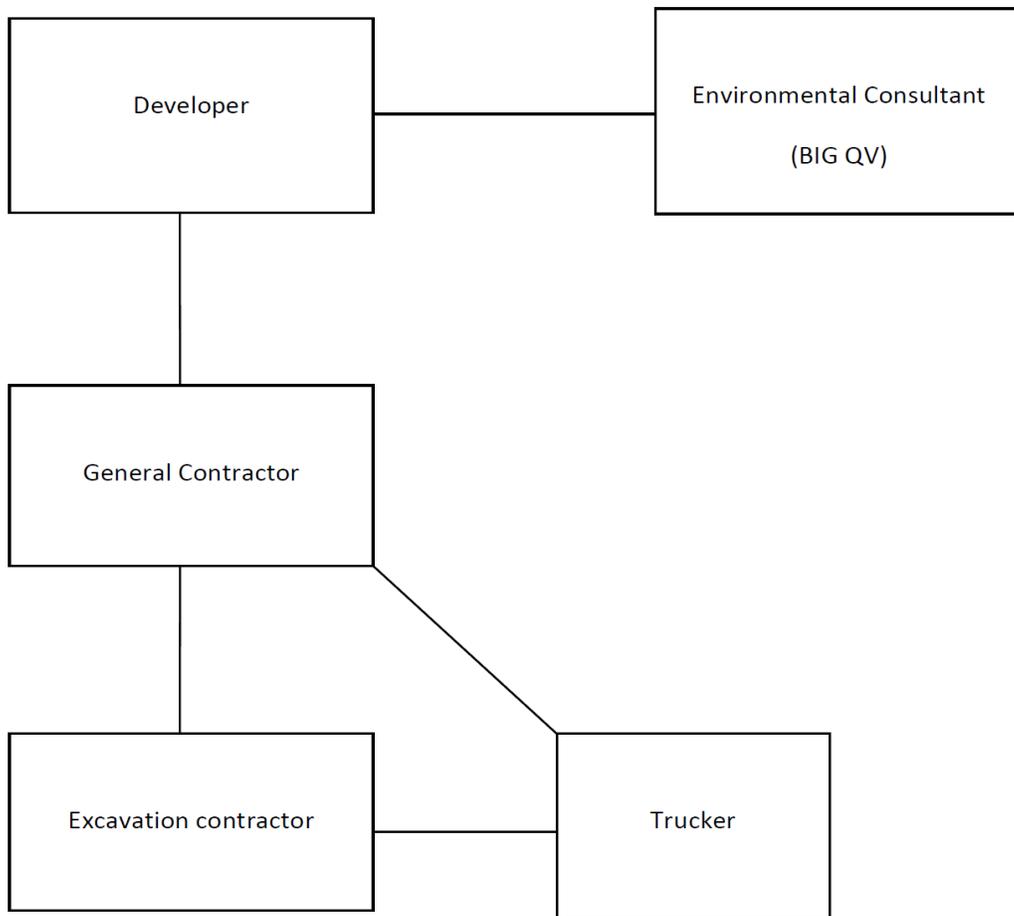
- Its environmental consultant(s) hired to oversee the cleanup must be:
 - a. a BIG Qualified Vendor; and
 - b. maintain Professional Liability (PL) insurance of \$1M per claim and annual aggregate.

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 6
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

Prepared By: **Enter Your Name Here**

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

VCP Project No.:	14CVCP000M	E-Number Project No.:	14EHAN000M	Date:	01/01/2014
Project Name:	Name or Address				

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.	
Working In Grid #: A1, B1, C1	

Samples Collected (Since Last Report): No samples collected or provide details
Air Monitoring (Since Last Report): No air monitoring performed or provide details Prestart Conditions – PID = 0.0 ppm, Dust = 0.000 High Conditions – PID = 0.0 ppm, Dust = 0.000
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:			
Tracking No.: 13CCSB000		Name/ Address (Approved by OER)			
Today	Trucks 5	Cu. Yds. 25	Total	Trucks 120	Cu. Yds. 600

Site Grid Map
 Insert the site grid map here

Photo Log

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

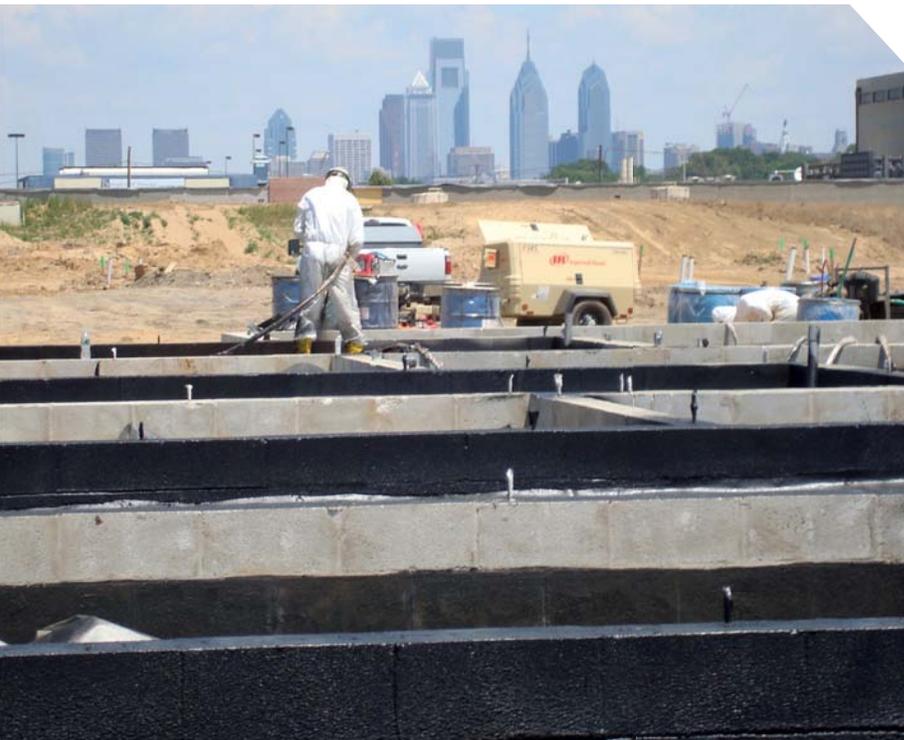
APPENDIX 7

LIQUID BOOT MANUFACTURERS INFORMATION

GAS VAPOR MITIGATION SYSTEMS

FOR PROTECTION AGAINST VAPOR INTRUSION

- ▶ **LIQUID BOOT**® Gas Vapor Barrier System
- ▶ **LIQUID BOOT**® **PLUS** Gas Vapor Barrier System
- ▶ **CoreFlex**™ Gas Vapor Barrier & Waterproofing System
- ▶ **GeoVent**™ Gas Venting System



With more than 60 years of experience, CETCO is an industry leader in Gas Vapor Mitigation technologies and solutions.

To speak to a technical expert about our innovative Gas Vapor Barrier and Venting Systems and how they can be custom tailored to your specific project, call us at 800-527-9948 to be connected to a representative in your area.

CETCO®

LIQUID BOOT® Gas Vapor Barrier System

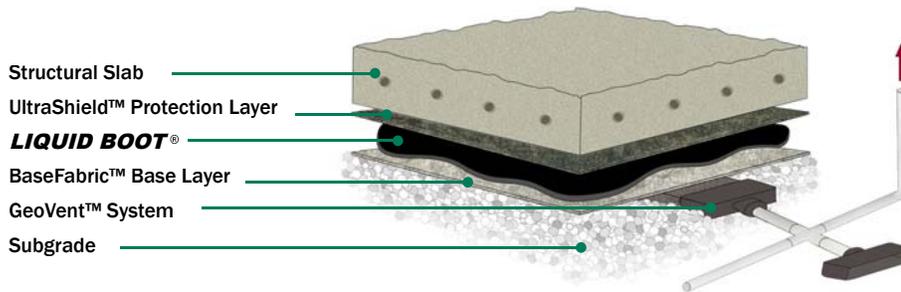
“Trusted protection against vapor intrusion for over 25 years”

SYSTEM DESCRIPTION

Liquid Boot® is a seamless, spray-applied, water-based membrane containing no VOCs, which provides a barrier against vapor intrusion into structures. Liquid Boot® is installed under slab and on below grade vertical walls as a gas vapor barrier to minimize vapor and nuisance water migration into buildings and is ideal for methane migration control. Liquid Boot® spray-application directly to penetrations, footings, grade beams, pile caps, etc., provides for a fully-adhered gas vapor barrier system.

TYPICAL USES

- ▶ Underslab and below-grade vertical wall gas vapor barrier, used to minimize vapor and nuisance water (non-hydrostatic conditions) migration into buildings
- ▶ Ideal for methane migration control
- ▶ Concrete water reservoir and tank liner used to prevent water seepage into concrete



BENEFITS

- ▶ Spray application provides excellent sealing of penetrations, eliminating mechanical fastening
- ▶ Seamless, monolithic membrane eliminates seaming-related membrane failures
- ▶ Unique formulation provides superior protection from methane gases and water vapor
- ▶ Fully adhered system reduces risk of gas migration



LIQUID BOOT® CHEMICAL & PHYSICAL PROPERTIES*

Additional technical information is located at <http://remediation.cetco.com>

CHEMICAL PROPERTY	TEST METHOD	RESULT
Acid Exposure (10% H ₂ SO ₄ for 90 days)	ASTM D543	Less than 1% weight change
Benzene Diffusion Coefficient	Tested at 43,000 ppm	2.90 x 10 ⁻¹¹ m ² /day
Chemical Resistance: VOCs, BTEXs (tested at 20,000 ppm)	ASTM D543	Less than 1% weight change
Diesel (1000 mg/l), Ethylbenzene (1000 mg/l), Naphthalene (5000 mg/l) and Acetone (500 mg/l) Exposure for 7 days	ASTM D543	Less than 1% weight change; Less than 1% tensile strength change
Hydrogen Sulfide Gas Permeability	ASTM D1434	None detected
Methane Permeability	ASTM 1434-82	Passed**
Microorganism Resistance	ASTM D4068-88	Passed**
Oil Resistance	ASTM D543-87	Passed**
PCE Diffusion Coefficient	Tested at 120 mg/L	1.32 x 10 ⁻¹³ m ² /sec
Radon Permeability	Tested by U.S. Department of Energy	Zero permeability to Radon (222Rn)
TCE Diffusion Coefficient	Tested at 524 mg/L	9.07 x 10 ⁻¹³ m ² /sec

PHYSICAL PROPERTY	TEST METHOD	RESULT
Accelerated Weathering & Ultraviolet Exposure	ASTM D822	No adverse effect after 500 hours
Bonded Seam Strength	ASTM D6392	Passed**
Dead Load Seam Strength	City of Los Angeles	Passed**
Elongation	ASTM D412	1,332% - Ø reinforcement, 90% recovery
Environmental Stress-Cracking	ASTM D1693-78	Passed**
Freeze-Thaw Resistance (100 Cycles)	ASTM A742	Meets criteria. No spalling or disbondment
Heat Aging	ASTM D4068-88	Passed**
Soil Burial	ASTM E154-88	Passed
Tensile Bond Strength to Concrete	ASTM D413	2,707 lbs/ft ² uplift force
Tensile Strength	ASTM D412	58 p.s.i. without reinforcement

*For additional Liquid Boot® technical information, please refer to the technical section on our website at <http://remediation.cetco.com>

**Passes all Los Angeles City and County Methane Criteria

GeoVent™ Gas Venting System

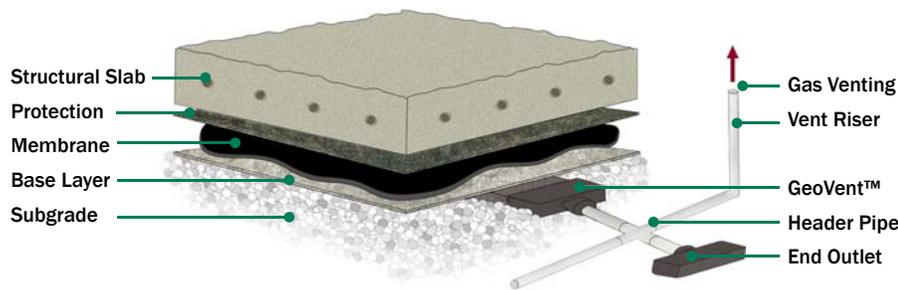
“GeoVent eliminates the need for costly and labor-intensive trenching.”

SYSTEM DESCRIPTION

Venting systems are typically installed in conjunction with a gas vapor barrier when volatile or explosive gases are present. GeoVent™ is a low profile pressure relief, trenchless collection and venting system designed to improve venting efficiency and reduce installation costs. GeoVent™ has several advantages over trenched installations and can be used as an “active” or “passive” venting system depending on the specific project. Used in conjunction with Liquid Boot® or CoreFlex™ gas vapor barrier systems, GeoVent™ can alleviate the accumulation of gas vapors under the slab.

TYPICAL USE

- ▶ GeoVent™ is designed for use as active or passive under-slab venting when used with all CETCO gas vapor mitigation systems.



DESIGN CONSIDERATIONS

- ▶ Venting systems should be properly designed to adequately relieve pressure and reduce gas concentrations from beneath the structure
- ▶ CETCO provides assistance with GeoVent layouts/design grids
- ▶ CETCO provides assistance with detail drawings for these types of systems

BENEFITS

- ▶ Installed directly on subgrade eliminating costly trenching and potential interference or damage to existing underground utilities
- ▶ Placed in closer proximity to the gas vapor barrier allowing for more effective venting of any accumulated gas vapor
- ▶ Greater opening area per lineal foot of pipe and integral filter fabric allowing for higher ventilation efficiency
- ▶ Installed at a higher elevation reducing susceptibility to inundation from perched groundwater that may accumulate beneath the building foundation
- ▶ Flow characteristics meet or exceed that of a typical trenched installation. The overall capacity of the system is far in excess of typical gas flux rates



GeoVent™ CHEMICAL & PHYSICAL PROPERTIES

CORE PROPERTY	TEST METHOD	RESULT
Compressive Strength	ASTM D 1621	9,500 psf
Flow Rate (Hydraulic gradient = .1)	ASTM D 4716	30 gpm/ft/width
Thickness	ASTM D 1777	1.0 in.

FABRIC PROPERTY	TEST METHOD	RESULT
A.O.S.	ASTM D 4751	70 US Sieve
Fabric - Mass / Unit Area	ASTM D 5261	4.0 oz/yd ²
Flow Rate	ASTM D 4491	140 gpm/ft ²
Grab Tensile Strength	ASTM D 4632	100 lbs.
Permeability	ASTM D 4491	0.21 cm/sec
Puncture Strength	ASTM D 4833	65 lbs.
UV Resistance	ASTM D 4355	70%

*For additional GeoVent™ technical information, please refer to the technical section on our website at <http://remediation.cetco.com>

CETCO® Quality Assurance

“CETCO provides a nation-wide network of approved installers and inspectors.”

CERTIFIED INSTALLERS AND INSPECTORS

In any proper gas vapor barrier system installation, it is important to perform QA/QC measures to ensure successful installations. CETCO maintains a nationwide network of certified installers and inspectors that are trained in the proper installation and inspection procedures of a CETCO gas vapor barrier system. CETCO pioneered the use of a smoke test, which is currently recognized by top guidance organizations as a reliable quality control method performed on CETCO gas vapor barrier systems.

SMOKE TESTING FOR GAS VAPOR BARRIER SYSTEMS

A smoke test is a method of ensuring that a membrane is free of holes. Smoke is pumped under the membrane for a specified period of time while the surface of the membrane is observed for minute holes where the smoke is clearly visible. During the smoke test, any holes detected can immediately be repaired. This process has been completed under hundreds of structures and found to be highly successful. The smoke testing process assures engineers, developers, and owners alike that they are getting a fully tested, gas-tight membrane installation.

THE SMOKE TESTING PROCESS



A GLOBAL ENVIRONMENTAL COMPANY

CETCO®, a wholly owned subsidiary of AMCOL® International Corporation, is a diversified global environmental company providing innovative products and practical solutions to challenging regulatory and construction problems. CETCO delivers a complete range of products and services built around engineering support, technical assistance, innovative product solutions and leadership in research and development.

For additional technical information and case studies on CETCO remediation products and applications, visit us on the web at <http://remediation.cetco.com> or call 800-527-9948 to be connected to a technical representative in your area.

LIQUID BOOT® Brownfield Membrane/Liner

Examination

All surfaces to receive gas vapor barrier shall be inspected and approved by the applicator at least one day prior to commencing work.

Surface Preparation

Provide 24 inch minimum clearance out from surfaces to receive the gas vapor barrier. The application surface shall be prepared and provided to the applicator in accordance with manufacturer's specifications listed below:

A. Concrete/Shotcrete/Masonry

Concrete surfaces shall be light broom finish or smoother, free of any dirt, debris, loose material, release agents or curing compounds. Fill all voids more than ¼ inch deep and 1.4 inch wide. Masonry joints, cold joints, and form joints shall be struck smooth. All penetrations shall be prepared in accordance with manufacturer's specifications. Provide a ¾ inch minimum cant of LIQUID BOOT or other suitable material as approved by manufacturer, at all horizontal or vertical transitions and other inside corners of 120 or less. Allow to cure overnight before the application of LIQUID BOOT. All cracks or cold joints greater than 1/16 inch must be completely grouted with non-shrink grout as approved by engineer. Install Hardcast reinforcing tape over all cold joints, cracks and form tie holes (after holes and cracks are grouted).

B. Dirt & Gravel

The sub-grade shall be moisture conditioned and compacted to a minimum relative compaction of 90 percent or as specified by civil/geotechnical engineer. The finished surface shall be smooth, uniform, free of debris and standing water. Remove all stones or dirt clods greater than ¼ inch. (NOTE: aggregate sub-bases shall be rolled flat, free from any protruding sharp edges). Penetrations shall be prepared in accordance with manufacturer's specifications. All form stakes that penetrate the membrane shall be or rebar which shall be bent over and left in the slab. Trenches shall be cut oversize to accommodate gas vapor barrier membrane and protection course with perpendicular to sloped sides and maximum obtainable compaction. Adjoining grade shall be finish graded and compacted. Excavated walls shall be vertical or slope back, free of roots and protruding rocks. Specific sub grade preparation shall be designed by a qualified civil or geotechnical engineer. If organic materials with potential for growth (ie: seeds or grasses) exist within the sub-base, spray apply soil sterilant at the sterilant manufacturer's recommended rate.

Installation

Installation on Concrete/ Shotcrete/Masonry (follow the procedures below carefully)

- A. Refer to section 3.03.30 Sealing Around Penetrations for procedures to seal around penetrations.
 - B. Provide a 3.4 inch minimum cant of LIQUID BOOT or other suitable material as approved by manufacturer, at all horizontal to vertical transitions and other inside corners of 120 or less. **Allow to cure overnight before the application of LIQUID BOOT.**
 - C. Delineate a test area **on site** with a minimum dimension of 10 feet by 10 feet (3m by 3m). Apply LIQUID BOOT to a thickness of 60 mils and let it cure for **24 hours**. Observe for blisters. If minor or no blistering occurs, proceed to the next step. (See note regarding blisters). If significant blistering does occur, apply a thin *10 mil) tack coat of LIQUID BOOT. "A" side without catalyst to the entire concrete surface and allow to cure before proceeding. (See also information regarding blister repair).
 - D. Spray apply LIQUID BOOT to a 60 mil minimum dry thickness. Increase thickness to 100 dry mils if shotcrete is to be applied directly to membrane. If a second coat is required, remove any standing water from the membrane before proceeding with the second application.
 - E. Do not penetrate membrane. Keep membrane free of dirt and debris and traffic until a protective cover is in place. It is the responsibility of the general Contractor to insure that the membrane and the protection system are not penetrated.
 - F. After membrane has cured and checked for proper thickness and flaws, install protection material pursuant to manufacturer's instructions. NOTE: All testing or inspection to be performed prior to placing protection course.
- NON-HORIZONTAL SURFACES:** spray on non-horizontal surfaces should begin at the bottom and work towards the top. This method allows the product to adhere to the surface before hitting catalyst runoff.
- Note: due to the nature of concrete as a substrate, it is normal for some blistering to occur. This is caused by either concrete's tendency to off-gas or water that is temporarily trapped between the concrete and the membrane. With time and the applied pressure of backfill or over-slab, blisters will absorb into the concrete without detriment to the membrane. A small number of blister heads should be sampled and checked for proper membrane thickness. If the samples have the minimum required membrane thickness, then the remaining blisters should not be punctured or cut. If the samples have less than the minimum required membrane thickness, then the area can either be re-sprayed to obtain the proper thickness, or the blisters can be cut out and the area re-sprayed or patched with LIQUID BOOT Trowel Grade.

Installation on Dirt Surfaces and Mudslabs

- A. Roll out Liquid Boot BaseFabric geotextile on sub-grade with the heat rolled side facing up. Overlap seams a minimum of six inches (6"). Lay geotextile tight at all inside corners. Apply a thin (10mil) tack coat of LIQUID BOOT "A" side without catalyst within the seam overlap. Line trenches with geotextile extending at least six inches (6") onto adjoining sub-grade if slab and footings are to be sprayed separately. Overlap seams a minimum of six inches (6"). Lay geotextile tight at all inside corners. Apply a thin (10mil) tack coat of LIQUID BOOT "A" side without catalyst within the seam overlap.
- B. Minimize the use of nails to secure the geotextile to the dirt subgrade. Remove all nails before spraying membrane, if possible. Nails that cannot be removed from the dirt subgrade are to be patched with geotextile or hardcast. Apply a thin tack coat of LIQUID BOOT under the geotextile patch, when patching with geotextile.
- C. Refer to section "Sealing Around Penetrations" for procedures to seal around penetrations.
- D. Sparily apply LIQUID BOOT onto geotextile to an 60 mil minimum dry thickness. Increase thickness to 100 dry mils if shotcrete is to be applied directly to membrane. If a second coat is required, remove any standing water from the membrane before proceeding with the second application.
- E. Do not penetrate membrane. Keep membrane free of dirt, debris and traffic until a protective cover is in place. It is the responsibility of the General Contractor to insure that the membrane and the protection system are not penetrated.
- F. After membrane has cured and checked for proper thickness and flaws, install protection material pursuant to manufacturer's instructions. NOTE: all testing or inspection to be performed prior to placing protection course.

Option 2 (For Gas Vapor Membrane Only)

- A. Clean all penetrations. All metal penetrations shall be sanded clean with emery cloth.
- B. For applications requiring LIQUID BOOT BaseFabric geotextile, roll out geotextile on sub-grade with the heat-rolled side facing up, overlapping seams a minimum of six inches (6"). Cut the geotextile around penetrations so that it lays flat on the sub-grade. Lay geotextile tight at all inside corners. Apply a thin (10 mil) tack coat of LIQUID BOOT "A" side without catalyst within the seam overlap.
- C. Spray-apply LIQUID BOOT to surrounding areas as specified for the particular application to an 60 mil minimum dry thickness. At the base of penetration install a minimum 3/4 inch thick membrane cant of LIQUID BOOT or other suitable material as approved by manufacturer. Extend the membrane at 60 mil thickness up the penetration a mimimum of three

- inches (3"). Allow to cure overnight before proceeding to D (See manufacturer's standard detail).
- D. Spray apply LIQUID BOOT the membrane at an 60 mil thickness three inches (3") around the base of penetration and up the penetration, completely encapsulation the collar assembly to a height of one and one half inches (1 ½") minimum above the membrane as described in C above. (see attached manufacturer's standard detail)
 - E. Allow LIQUID BOOT to cure completely before proceeding to step "F".
 - F. Wrap penetration with polypropylene cable tie at a point two inches (2") above the base of the penetration. Tighten the cable tie firmly so as to squeeze, but not cut, the cured membrane collar.

Field Quality Control

Field quality control is very important of all LIQUID BOOT applications. Applicators should check their own work for coverage, thickness and all around good workmanship before calling for inspections. The membrane must be cured at least overnight before inspecting for dry-thickness, holes, shadow shrinkage, and any other membrane damage. If water testing is to be performed, allow the membrane to cure at least 72 hours prior to the water test. When thickness or integrity is in question the membrane should be tested in the proper manner as described below. However, over-sampling defeats the intent of inspections. Inspectors should always use visual and tactile measurement to guide them. Areas suspected to being too thin to the touch should be measured with the gauges to determine the exact thickness. With practice and by comparing tactile measurements with those of the gauges, fingers become very accurate tools.

On Concrete/Shotcrete/Masonry & Other Hard Surfaces

- A. Membrane may be checked for proper thickness with a blunt-nose depth gauge, taking one reading every 500 square feet. Record the readings. Mark the test area for repair, if necessary.
- B. If necessary, test areas are to be patched over with LIQUID BOOT to a 60 mils minimum dry thickness, extending a minimum of one inch (1") beyond the test perimeter.

On Dirt and Other Soft Substrates

- A. Samples may be cut from the membrane and geotextile sandwich to a maximum area of 2 square inches. Measure the thickness with a mil-reading caliper, per 500 square feet. Deduct the plain geotextile thickness to determine the thickness of LIQUID BOOT membrane. Mark the test area for repair.
- B. Voids left by sampling are to be patched with geotextile overlapping the void by a minimum of two inches (2"). Apply a thin tack coat of LIQUID BOOT under the geotextile patch. Then spray or trowel apply LIQUID

BOOT to an 60 mils minimum dry thickness, extending at least three inches (3") beyond geotextile patch.

Smoke Testing For Holes (optional)

Holes or other breaches in the membrane can be detected by conducting a smoke test. This involves pumping smoke under the membrane for a specified period of time, under a specified pressure, which varies from project to project. Contact LBI Technologies for information about this test.

APPENDIX 8

RADON SEAL MANUFACTURERS INFORMATION



D-I-Y Concrete Crack Polyurethane Resin Injection Repair Guide

The information for waterproofing cracks in poured concrete has been compiled from several professional sources as recommended guidelines. Due to the variability in poured wall conditions, the selection of the proper material for the intended application and installation is the sole responsibility of the applicator.

REPAIR KIT CONTENTS

This kit includes all of the materials and accessories for low-pressure injection and repair of approximately 60 linear feet of cracks.

- 6 dual cartridges RadonSeal 901 Crack Seal and Port Adhesive
- 6 dual cartridges RadonSeal 102 Urethane Injection Foam
- 1 syringe 455-0.5 Fast port adhesive/blow hole repair
- Manual dispensing tool
- 8 ¼ x 24 element mixers & 8 retaining nuts (for use with Injection Resin)
- 6 crossover restrictors
- 100 surface ports & caps
- 10 corner ports & caps
- 8 hose assemblies
- 10 pair nitrile gloves
- 1 plastic trowel & 1 wire brush
- Safety glasses
- 1 tool box
- 1 squeeze bottle
- Complete instructions & instructional CD
- Product Data Sheets & MSDS/ How to use the Injection Tool

TOOLS REQUIRED

- Paper plate or scrap cardboard for mixing RadonSeal 901 Crack Seal and Port Adhesive.

CRACK PREPARATION

Place drop cloth on the floor in front of work area. Clean the surface surrounding the crack using the wire brush. Remove loose or flaking concrete, efflorescence, paint or coating to approximately 1-2 inches on either side of the crack. Wipe the surface clean of dust after brushing. The surface must be dry for proper installation of injection ports and surface seal. For best results if the surface is wet, wait until dry or if necessary, use a hot air gun, hair drier, or oil free compressed air to dry.

SURFACE PORT PLACEMENT

Starting at a point closest to the floor (vertical cracks), mark port locations on the wall. (Ports are placed apart the thickness of the concrete wall, usually about 8". Center ports over the crack (no drilling necessary).

SURFACE PORT ATTACHMENT AND CRACK SEALING

1. Prepare RadonSeal 901 Crack Seal & Port Adhesive by dispensing (using the Manual tool) a sufficient amount of the surface seal on to a paper plate or scrap piece of cardboard, mix with the supplied trowel (repeat this step each time you run out of mixed adhesive).



2. Remove the cap from the surface port, then apply a small amount of mixed adhesive to the bottom of the port base. Place the first port starting at the bottom of the crack and repeat every 8 inches until the

entire crack is ported. **NOTE!** Do not allow epoxy to block the bottom of the port opening or the crack beneath the port.

3. The next step is to work the mixed surface seal epoxy paste along the entire length of the crack using the plastic trowel. The recommended epoxy paste application is 1/8" thick and 2" wide. Make sure to mound sufficient extra epoxy around the base of the ports. Expect to use 20 ounces per 10-foot of crack. Do not work the epoxy "into" the crack, just paste over the surface.
4. Let the surface seal and port adhesive cure before beginning injection, about 2-4 hours until fingernail hard. (Not recommended to wait overnight.)



INJECTION PROCEDURE

1. Using the squeeze bottle, flush the crack with 1-2 cups of water

poured into the top port. Water should come out of every port below the top port indicating that the crack is contiguous and that ports are not blocked by epoxy. Water is also useful to flush the crack and aid in resin activation.



2. Place the RadonSeal 102

Injection Foam dual cartridge in to the manual dispensing tool.

Remove the plastic nut and then twist and pull to remove the plastic seal. Replace seal with restrictor, place the 1/4 X 24 mixing nozzle on top of restrictor over the end of the cartridge attaching with the plastic nut.

3. Attach the flexible hose assembly (wide end) over the mixer tip by pushing firmly.

4. For vertical cracks, attach the small end of the hose assembly into the lowest port by pressing firmly. For horizontal cracks begin at either end if one is not lower than the other.

5. Begin injecting slowly with low pressure (allowing the resin time to flow into and fill all small fissures) until the resin begins to flow from the port above it. Use the white plastic pinch valve on the hose assembly to turn off resin flow, plugging

the first port with the cap provided, and move up to the next port. Repeat this procedure until the entire crack has been injected with RadonSeal 102 Urethane Foam.



* The ports can be removed by striking with a hammer after foaming is complete in about 3 or 4 hours. Grind off the surface seal epoxy for a smooth finish. The surface seal epoxy is paintable if desired.



Hint: To improve the ability to penetrate very small & hairline cracks, heat the injection urethane system by placing the injection cartridge in a pail of hot tap water for 15-20 minutes. This temperature exposure should thin the material so that it can flow into the crack with less resistance proceed as before.

Note! The secret to effective crack injection is patient low-pressure introduction of the resin. Small or hairline cracks will require 3 - 4 minutes at each port for proper filling to take place.



HOW TO USE THE INJECTION TOOL

1. Attach mixer to the tube set
2. Load the INJECTION TOOL as follows:
 - With the tool facing upward, slide dual cartridges in until the cartridge front and retaining nut are within the notch of the carriage. Line up the tube set with the pistons and begin squeezing the trigger handle slowly, making sure the drive rod is riding inside one of the cartridges, and the pistons are inserted directly into each tube.
 - Hold the tool with installed tube set pointing upward; squeeze the trigger handle until the pistons make contact with the plungers, checking that the front is still locked in place. This will also remove any air trapped in the tube set. (Cannot stop material flow if air is trapped in cartridges)
 - Begin squeezing

NOTE: To release the pushrods depress the thumb plate while squeezing the trigger handle. This relieves the pressure on the thumb plate and allows the pushrods to release.

OVER SQUEEZING OF TRIGGER HANDLE MAY CAUSE

1. Leaking of material from rear of cartridges.
2. Cutting of the drive rod.



KEEP TOOL CLEAN - WIPE CLEAN
EVERY TIME THE CARTRIDGES
ARE CHANGED
FOR BEST RESULTS DON'T LEAVE
EMPTY OR PARTIALLY USED
CARTRIDGE IN TOOL.



RADONSEAL 102 HYDROPHOBIC URETHANE FOAM

GENERAL DESCRIPTION

RadonSeal 102 is a hydrophobic polyurethane liquid which is designed to stop water infiltration or exfiltration. When RadonSeal 102 meets water, it reacts with it and then repels it forming a closed cell foam barrier which will not allow water to pass through it. It adheres tenaciously to practically all substrates, wet or dry.

RadonSeal 102 is typically used to stop water leaks coming through cracked or honeycombed concrete, voids between wall and floor, wall and ceilings, expansion joints, cold joints and pipe intrusions. It is used to repair concrete walls, ceilings and floors that are leaking. It is used in tunnel, manhole, sewer line, concrete dam and parking deck repairs.

RadonSeal 102 is designed to be used when greater than 20% movement (expansion and contraction) of the substrate is anticipated or where epoxy is not considered as necessary.

<u>TEST TYPE</u>	<u>RESULTS</u>	<u>TEST METHOD</u>
DENSITY (CORE)	FREE RISE 2.02 LBS/FT	ASTM D-1622
LOW TEMPERATURE AGING (-20f) (SHRINKAGE)	<4%	ASTM D-2126
(SHRINKAGE)	<4%	1 DAY
		7 DAYS
WATER ABSORPTION (VOLUME CONFINED)	<1%	ASTM D-2127
SHEAR STRENGTH	34PSI	ASTM C-273
TENSILE STRENGTH	150 PSI	ASTM D-1623
ELONGATION	275%	ASTM D-1623
VISCOSITY	100-200 CPS	
% SOLID	100	
COLOR	AMBER	
TDI CONTENT	0%	

APPLICATIONS

Package: RadonSeal 102 is furnished in various packages. Most typically are 21+ ounces dual cartridges or in 5-gallon pails. The use of cartridges is suitable for low-pressure injection with manual tools, or up to 250 psi dispensing, utilizing pneumatic dispensing tools.

Quantity to Use: It is difficult to determine the amount of material to adequately seal a given crack. Experience in home foundation cracks (8' long with a wall thickness of 8-10") suggest the usage of 10-21 ounces of RadonSeal 102 per 8' crack (versus an average of 30-50 ounces of epoxy). Thus, while RadonSeal 102 can theoretically foam to 20 times its volume, more typical is 2-3 times its unfoamed volume for small cracks (1/32 - 1/4") as often found in foundation cracks.

Procedure:

Step 1 - Cleaning/Sealing Crack Surface - When crack is contaminated on outside, it will be necessary to clean the crack surface, so the crack can be exactly located. If it is a wide crack or high water flows are encountered, it will be necessary to seal the surface of the crack with a surface sealing material (e.g., hydraulic cement; epoxy gel).

Step 2A - Install Injection Packers (for high pressure injection) - Place the packer in the drilled 1/2" or 5/8" hole so that the top of the sleeve is just below the concrete surface. Tighten by a ratchet, socket or open-end wrench by turning clockwise as tightly as possible. Packers are supplied with a one-way ball valve or check valve.

Step 2B - Install Surface Injection Ports (for low pressure injection) - Space the surface ports the width of the concrete (approximately every 8") and place the surface ports directly over the crack. Bond with epoxy gel.

Step 3 - Flush Crack - It is sometimes necessary to flush the crack with water to remove debris and drill dust out of the cracks. Flushing will tell you how the crack will behave during grout injection and the water will prime the crack for the chemical reaction to occur. This is most necessary if crack is dry at time of repair.

Step 4 - Surface Seal Crack - Sometimes it may be necessary to surface seal the crack to prevent the unreacted grout from flowing back out. Use fast-setting hydraulic cement or epoxy gel to form a surface seal on crack.

Step 5 - Injection of RadonSeal 102 - Begin the injection at the lowest packer (surface port) on a vertical crack, or at the first packer (surface port) flushed for a horizontal crack. During injection, you will notice that water is displaced from the crack by RadonSeal 102. Keep injecting until material appears at the adjacent packer (surface port). Disconnect and start injection at adjacent packer (surface port). After injecting a few packers, come back to the first packer and inject all the ports for the second time. Some of the ports may take some grout, which will fill up and further densify the crack. Injection pressure will vary from 20psi to 250psi depending on the width of the crack, thickness of concrete and condition of concrete.

WARRANTY

Recommendations concerning the performance or use of this product are based upon independent test reports believed to be reliable. If the product is proven to be defective, at the option of the Manufacturer, it will be either replaced or the purchase price refunded. The Manufacturer will not be liable in excess of the purchase price. The user will be responsible for deciding if the product is suitable for his application and will assume all risk associated with the use of the product. This warranty is in lieu of any other warranty expressed or implied, including but not limited to an implied warranty of merchantability or an implied warranty of fitness for a particular use.

MATERIAL SAFETY DATA SHEET

MANUFACTURER: RADONSEAL, INC.
18 L'HERMITAGE DRIVE, SHELTON, CT 06484
EMERGENCY TELEPHONE 800-472-0603

SECTION I - PRODUCT IDENTIFICATION

PRODUCT NAME: RADONSEAL 102 A
SYNONYM: AROMATIC ISOCYANATE
CHEMICAL FAMILY: POLYMERIC DIPHENYLMETHANE DIISOCYANATE
DATE: FEBRUARY, 2010

SECTION II - HAZARDOUS INGREDIENTS AND OTHER COMPONENTS

<u>INGREDIENT</u>	<u>% BY WEIGHT</u>	<u>EXPOSURE LIMITS</u>	<u>CAS #</u>
4,4' Diphenylmethane diisocyanate (MDI)	Trade Secret	N.E.	101-68-8

SECTION III - PHYSICAL DATA

Boiling Point: 406°F 5 mm Hg
VP: < 10 - 5 (NW HG)
VD: 1.5 (MDI) AIR = I
Evaporation Rate: Slower than ethyl ether
Solubility in Water: Resin reacts slowly to liberate CO₂ gas

% Volatile by wt: ND
Density: 10.31 LB/GAL

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flash Point : 398 DEG F' (method= PMCC) **UEL:** (%) N.D.
Flammable Limits: LEL (%) N.D.
Extinguishing Media: Dry chemical, carbon dioxide foam, water spray for large fires.

SECTION V - HAZARDOUS SUMMARY

This material is designed and intended to be pumped, not sprayed. MDI becomes more hazardous when atomized(sprayed). The following data is derived from tests performed when the material is sprayed and should be considered but may not apply to pumping operations as recommended by the manufacturer. Harmful if inhaled. Toxic fumes are released in fire situations. Dark brown liquid. Mild odor.

NFPA Ratings: 0 = insignificant, 1 = slight, 2 = moderate, 3 = high, 4 = extreme

Health	Flammability	Reactivity
3	1	1

HMIS Ratings: 0 = insignificant, 1 = slight, 2 = moderate, 3 = high, 4 = extreme

Health	Flammability	Reactivity
3	1	1

PART A (CONT'D)

Potential Health Effects: At room temperature, MDI vapors are minimal due to low vapor pressure. However, heating, foaming or otherwise dispersing (drumming, venting or pumping) operations may generate more vapor or aerosol concentrations of isocyanate. Excessive exposure may cause irritation of the eyes, upper respiratory tract and lungs. Severe overexposure may lead to pulmonary edema. Respiratory sensitization with asthma-like symptoms may occur in susceptible individuals. MDI concentration below the exposure guidelines may cause allergic respiratory reactions in individuals already sensitized. Symptoms may include coughing, dryness of throat, headache, nausea, difficulty breathing and feeling of tightness in the chest. Effects may be delayed. Impaired lung function (decreased ventilators capacity) has been associated with overexposure to isocyanate.

Persons With Known Respiratory or Allergy Problems Must Not Be Exposed to This Product.

Skin Contact: No irritation is likely to develop following short contact periods with skin. Prolonged or repeated exposure can cause skin irritation, reddening, dermatitis and in some individuals, sensitization. Skin contact may result in allergic skin reactions or respiratory sensitization but is not expected to result in absorption or amounts sufficient to cause other adverse effects. May stain skin.

Eye Contact: As a liquid or dust may cause irritation, inflammation and or damage to sensitive eye tissue. Symptoms include watering or discomfort of eyes. Corneal injury is unlikely.

Ingestion: Single dose oral toxicity is considered to be extremely low. Can result in irritation and corrosive action in mouth, stomach tissue and digestive tract.

Chronic: As a result of previous repeated overexposure or a single large dose, certain individuals develop isocyanine sensitization (chemical asthma) or tissue injury in the upper respiratory tract. Animal tests indicate skin contact alone may also lead to allergic respiratory reaction. These effects may be permanent. Any person developing asthmatic reaction or other sensitization should be removed from further exposure.

Carcinogenicity: **MDI and polymeric MDI are not listed by the NTP, IARC or regulated by OSHA as carcinogens.** Lung tumors have been observed in laboratory animals exposed to aerosol droplets of MDI/Polymeric MDI (6mg/m³) for their lifetime. Tumors occurred concurrently with respiratory irritation and lung injury. Current exposure guidelines are expected to protect against these effects.

SECTION VI – FIRST AID MEASURES

Eyes: Flush eyes with plenty of water for at least 15 minutes. Materials containing MDI may react with the moisture of the eye forming a thick material that may be difficult to wash from the eyes. Seek medical attention.

Skin: Wash off in flowing water or shower. Remove and wash contaminated clothing and discard contaminated shoes. Seek medical attention if redness, itching or a burning sensation develops or persists after the area is washed.

Ingestion: If swallowed, drink 1 or 2 glasses of water or milk. Do not induce vomiting unless directed to do so by medical personnel. If gastrointestinal symptoms develop, consult medical personnel. (Never give anything by mouth to an unconscious person.)

Inhalation: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, oxygen should be administered by qualified personnel. Call a physician or transport to a medical facility immediately.

NOTE TO PHYSICIAN:

Eyes: Strain for evidence of corneal injury. If cornea is burned, instill antibiotic steroid preparation frequently. Workplace vapors have produced reversible corneal epithelial edema impairing vision.

Skin: This material is a known skin sensitizer. Treat symptomatically as for contact dermatitis or thermal burns. If burned, treat as thermal burn.

Ingestion: Treat symptomatically. There is no specific antidote. Inducing vomiting is contraindicated of the irritating nature of this product.

SECTION VII – ACCIDENTAL RELEASE MEASURES

Spill: Evacuate spill area. With adequate ventilation and appropriate personal protective equipment, cover the area with an inert absorbent such as clay or vermiculite and transfer to metal waste containers. Saturate with water or decontamination solution below, but do not seal the container with the isocyanate mixture. Larger quantities of liquid may be transferred directly to drums for disposal.

Note: Isocyanate will react with water and generate carbon dioxide. This could result in the rupture of any closed container.

Clean up: The area should then be flushed with a decontamination solution. The decontamination solution is a 5-10% mixture of sodium carbonate and .5% liquid detergent in water solution or a 3% concentrated ammonium hydroxide and .5% liquid detergent in water. Use 10 parts decontamination solution to 1 part spilled material. If the ammonium hydroxide solution is used, ammonia will be evolved as a vapor. Use caution to avoid exposure to high concentrations of ammonia. Allow to stand for 48 hours letting evolved carbon dioxide to escape.

PART A (CONT'D)

Disposal: Any disposal practice must be in compliance with all federal, state and local laws and regulations. Chemical additions, processing, storage, or otherwise altering this material may make the waste management information presented in this MSDS incomplete, inaccurate or otherwise inappropriate. Waste characterization and disposal compliance is the responsibility solely of the party generating the waste or deciding to discard or dispose of the material.

Refer to RCRA 40 CFR 261 and/or any other appropriate federal, state or local requirements for proper classification information.

Container Disposal: Drums/containers must be thoroughly drained to process or storage vessels before removal to an appropriate area for subsequent decontamination. Drums/containers must be decontaminated in properly ventilated areas by personnel protected from the inhalation of isocyanate vapors. Spray or pour 1 to 5 gallons of decontamination solution into the drum making sure the walls are well rinsed. Let the drum/container soak unsealed for 48 hours. Pour out the decontamination solution and triple rise the empty container. Puncture or otherwise destroy the rinsed container before disposal. Do not heat or cut empty containers with electric or gas torch.

SECTION VIII – STORAGE AND HANDLING

Storage: When stored between 60°F and 85°F (15° and 30°C) in sealed containers, typical shelf life is 6 months or more from the date of manufacture. Consult technical data sheet for shelf life requirements affecting performance quality. Should freezing occur, the material must be thawed thoroughly and mixed until uniform. Opened containers must be handled properly to prevent moisture contamination.

Heating: Use personal protective equipment when transferring material to or from drums, totes or other containers. Safety glasses and gloves are the minimum protection. Additional precautions must be used when splash hazards are present. The reaction of polyols and isocyanates generate heat. Contact of the reacting materials with skin or eyes can cause severe burns and may be difficult to remove from the affected areas. Immediately wash affected areas with plenty of water and seek medical attention. In addition, such contact increases the risk of exposure to isocyanate vapors. Do not smoke or use naked lights, open flames, space heaters or other ignition sources near pouring or frothing operations.

SECTION IX – EXPOSURE CONTROL

Exposure: MDI contains reactive isocyanate groups. Use with adequate ventilation to keep airborne isocyanate level below TLV or 0.005 ppm TWA (ACGIH) and PEL 0.02 ppm ceiling (OSHA). These control limits do not apply to previously sensitized individuals or to individuals with existing respiratory disease, such as bronchitis, emphysema or asthma. Respiratory protection may be needed where material is heated, sprayed or used in confined space, or if TLV is exceeded. Never try to detect MDI vapor by odor. **Persons with known respiratory or allergic problems must not be exposed to this product.**

Ventilation: MDI has a very low vapor pressure at room temperature. General/local ventilation typically controls exposure levels very adequately. More aggressive engineering controls or personal protective equipment may be required in some applications such as heating. Monitoring is required to determine engineering controls.

Respiratory Protection: A supplied air, full face piece, positive pressure or continuous flow respirator or a supplied air hood is required when airborne concentrations are unknown or exceed threshold values. A positive pressure self-contained breathing apparatus can be used in emergencies or other unusual situations. All equipment must be NIOSH/MSHA approved and maintained. Air purifying (cartridge type) respirators are not approved for protections against isocyanates.

Eye Protection: Chemical splash goggles or safety glasses or full face shield must be used consistent with splash hazard present. If vapor exposure causes eye discomfort, use a full-face piece respirator or air supplied hood.

Protective Clothing: Wear clothing and gloves impervious to MDI under conditions of use. Materials may include butyl rubber, nitrile rubber, neoprene and Saranex coated Tyvek.

SECTION X – STABILITY AND REACTIVITY

Stability: Polyisocyanates are highly reactive chemicals and should be handled and stored in a way to avoid exposure to many common substances, including water and moisture. Material is stable when stored in sealed containers under normal conditions. Avoid extended exposure over 110°F (45°C).

Hazardous Polymerization: May occur with incompatible reactants especially strong bases, water or temperatures over 320°F (160°C). Possible evolution of carbon dioxide gas from overheating or exposure to contaminants - may rupture closed containers.

PART A (CONT'D)

Reactivity: Reacts with water, acids, bases, alcohols, metal compounds. The reaction with water is very slow under 102°F (50°C), but is accelerated at higher temperatures and in the presence of alkalis, tertiary amines and metal compounds. Some reactions can be vigorous or even violent.

SECTION XI – SHIPPING INFORMATION

DOT(Domestic surface): Not regulated (Class 55)

IMO(Ocean): Not regulated

ICAO(AIR): Not regulated

SECTION XII – REGULATORY INFORMATION

OSHA Status: This product is hazardous under the criteria of the Federal OSHA Hazard Communications Standard 29 CFR 1910.1200.

TSCA Status: On the TSCA inventory

CERCLA Reportable Quantity: 4,4, Diphenylmethane Diisocyanate = 5,000 lbs.

SARA Title III

Section 302 Extremely Hazard Substances: None

Section 311/312 Hazard Categories: Immediate Health Hazard, Delayed Health Hazard, Reactive Hazard

Section 313 Toxic Chemicals: 4,4 Diphenylmethane Diisocyanate (MDI) CAS # 101-68-8 ca 100%

RCRA Status: MDI is not a hazardous waste. However, under RCRA, it is the responsibility of the user of products to determine, at any time of disposal, whether a product meets any of the criteria for hazardous waste. This MSDS complies with 29 CFR 1910.1200 (hazard communication standard). Read MSDS and safety/handling sheet before use.

All statements, technical information and recommendations contained herein are based upon available scientific test or data which we believe to be reliable since we cannot anticipate all conditions under which this information and our products or the products of other manufacturers in combination with our products may be used. RadonSeal makes no warranties, express or implied, and assumes no responsibility in connection with any use of this information.

MATERIAL SAFETY DATA SHEET

MANUFACTURER: RADONSEAL, INC.
18 L'HERMITAGE DRIVE, SHELTON, CT 06484
EMERGENCY TELEPHONE 800-472-0603

SECTION I - PRODUCT IDENTIFICATION

PRODUCT NAME: RADONSEAL 102 B
SYNONYM:
CHEMICAL FAMILY: POLYOL BLEND
DATE: FEBRUARY, 2010

SECTION II - HAZARDOUS INGREDIENTS AND OTHER COMPONENTS

<u>INGREDIENT</u>	<u>% BY WEIGHT</u>	<u>EXPOSURE LIMITS</u>	<u>CAS #</u>
NONE			

SECTION III - PHYSICAL DATA

Boiling Point: N.A.	Evaporation Rate: Slower than Ethyl Ether
VP: Nd	% Volatile by Wt: <3%
VD: Heavier Than Air	Specific Gravity: 1.08
Solubility in Water: Partial	Flash Point: > 200° F

SECTION IV – HAZARDOUS SUMMARY

Emergency Overview: Harmful if inhaled. Toxic fumes are released in fire situations. Clear yellow liquid.

Inhalation: Heating, foaming or otherwise mechanically dispersing (drumming, venting or pumping) operations of this blend may generate more vapor or aerosol concentrations of its components. This blend contains tertiary amine amounts less than what is required to report as hazardous, however the tertiary amine component is severely irritating to the upper respiratory tract and mucous membranes of the nose and throat and can result in coughing, chest discomfort and headache.

Skin Contact: Prolonged contact may lead to burning associated with severe reddening, swelling and tissue destruction.

Eye Contact: This blend will cause irritation on contact. Symptoms include watering or discomfort of the eyes with marked excess redness and swelling of the conjunctiva and chemical burns of the cornea. Tertiary amines can produce a blurring of vision against a general bluish haze and the appearance of halos around bright objects (referred to as "blue haze"). Tertiary amines can also cause severe conjunctivitis.

Ingestion: The tertiary amines, from this blend could cause severe irritation and possible chemical burns of the mouth, throat, esophagus and stomach with pain or discomfort in the mouth, throat, chest and abdomen. Symptoms include nausea, vomiting diarrhea, thirst, circulatory collapse and coma.

Carcinogenicity: The components of this blend are not listed by the NTP, IARC or regulated by OSHA as carcinogens.

SECTION V – FIRST AID MEASURES

Ingestion: Induce vomiting by giving two glasses of water and sticking finger down throat. Never give anything by mouth to an unconscious person.

Inhalation: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, oxygen should be administered by qualified personnel. Call a physician or transport to a medical facility immediately.

PART B (CONT'D)

SECTION VI – FIRE FIGHTING MEASURES

Flash Point: NDA

Autoignition temperature: NDA

NFPA: Combustible Class III B

Flammable limits: (STP): NDA

Fire Degradation Products: Toxic fumes are released in fire situations. Combustion may produce carbon dioxide, carbon monoxide and nitrogen oxides.

Extinguishing Media: Use dry chemical foam, carbon dioxide, halogenated agents or water. Use cold water spray to cool containers exposed to fire to minimize risk of rupture. A solid stream of water directed into the hot burning liquid could cause frothing. If possible, contain fire run-off water.

Protective equipment: Wear positive pressure self contained breathing apparatus with full face piece and full protective clothing.

SECTION VII – ACCIDENTAL RELEASE MEASURES

Spills: Evacuate spill area. Remove all sources of flames, heating elements, gas engines, etc. Emergency cleanup personnel should wear chemical goggles, rubber or plastic gloves and clothing as required to protect against contact. If mist and or hot vapors are present, use air purifying respirator or self-contained breathing apparatus as required. The type of respirator selected should prevent exposure from traces of propylene oxide which may be present. Prevent spreading and contamination of surface waters and drinking supplies. Notify local health officials and other appropriate agencies if such a contamination should occur.

Clean Up: With adequate ventilation and appropriate personal protective equipment, cover the area with an inert absorbent material such as clay or vermiculite and transfer to steel waste containers. The spill area should then be washed down with soap and water to dilute and remove traces of material. Ventilate area to remove the remaining vapors.

Disposal: Any disposal practice must be in compliance with all federal, state and local laws and regulations. Chemical additions, processing, storage, or otherwise altering this material may make the waste management information presented in this MSDS incomplete, inaccurate or otherwise inappropriate. Waste characterization and disposal compliance is the responsibility solely of the party generating the waste or deciding to discard or dispose of the material.

Refer to RCRA 40 - CFR 261 and/or any other appropriate, federal, state or local requirements for proper classification information.

Container Disposal: Empty containers retain product residue (liquid and/or vapor) and can be dangerous. Do not pressurize, or expose such containers to heat, flame, sparks, static electricity or other sources of ignition. All containers should be disposed in an environmentally safe manner and in accordance with government regulations.

SECTION VIII – STORAGE AND HANDLING

Storage: When stored between 60°F and 85°F (15° and 30°C) in sealed containers, typical shelf life is 6 months or more from the date of manufacture. Consult technical data sheet for shelf life requirements affecting performance quality. Should freezing occur, the material must be thawed thoroughly and mixed until uniform. Opened containers must be handled properly to prevent moisture contamination.

Heating: Use personal protective equipment when transferring material to or from drums, totes or other containers. Safety glasses and gloves are the minimum protection. Additional precautions must be used when splash hazards are present. The reaction of polyols and isocyanates generate heat. Contact of the reacting materials with skin or eyes can cause sever burns and may be difficult to remove from the affected areas. Immediately wash affected areas with plenty of water and seek medical attention. In addition, such contact increases the risk of exposure to isocyanate vapors. Do not smoke or use naked lights, open flames, space heaters or other ignition sources near pouring or frothing operations.

SECTION IX – EXPOSURE CONTROL

Ventilation: General/local ventilation typically controls exposure levels very adequately. More aggressive engineering controls or personal protective equipment may be required in some applications such as heating. Monitoring is required to determine engineering controls.

Respiratory Protection: The specific respirator selected must be based on contamination levels of this blend found in the workplace and must not exceed the working limits of the respirator and be jointly approved by NIOSH/MSHA. Air purifying respirators equipped with full faced organic vapor cartridges can be used only if isocyanate vapors are not present from the "A" component. In area of high concentrations, fresh air supplied respirators or self-contained breathing apparatus should be used. A positive pressure self-contained breathing apparatus can be used in emergencies or other unusual situations.

PART B (CONT'D)

Eye Protection: Chemical splash goggles or safety glasses or full face shield must be used consistent with splash hazard present. If vapor exposure causes eye discomfort, use a full-face piece respirator or air supplied hood. Contact lenses should not be worn by persons who work with this product.

Protective Clothing: Wear clothing and gloves impervious to .MDI under conditions of use. Materials may include butyl rubber, nitrile rubber, neoprene and Saranex coated Tyvek.

Other Protective Equipment: An eyewash station and safety shower or other drenching facilities are recommended in the work area.

SECTION X – STABILITY AND REACTIVITY

Stability: This is a stable material. Avoid high temperatures, sparks, flame and wended exposure over 110°F

Hazardous Polymerization: Will occur.

Reactivity: Incomplete with oxidizing materials, isocyanates and acids.

SECTION XI – REGULATORY INFORMATION

CERCLA and SARA Regulations (40 CFR 355, 370 and 372):

Section 313 Supplier Notification: This product contains the following toxic chemicals subject to the reporting requirements of Section 313 of the emergency Planning and Community Right to Know Act of 1996 and of 40

CFR: None

Section 311/312: NA

Dot Classifications: Domestic Surface Not regulated Air/Sea Export Not regulated

NFPA Ratings: 0 = insignificant, 1 = slight, 2 = moderate, 3 = high, 4 = extreme

Health	Flammability	Reactivity
1	1	1

HMIS Ratings: 0 = insignificant, 1 = slight, 2 = moderate, 3 = high, 4 = extreme

Health	Flammability	Reactivity
2	1	1

All statements, technical information and recommendations contained herein are based upon available scientific test or data which we believe to be reliable since we cannot anticipate all conditions under which this information and our products or the products of other manufacturers in combination with our products may be used. RadonSeal makes no warranties, express or implied, and assumes no responsibility in connection with any use of this information.



RADONSEAL 901 SURFACE SEAL & 1:1 EPOXY PASTE

GENERAL DESCRIPTION

RADONSEAL 901 1:1 is a high modulus epoxy gel designed to anchor dowel and tie bars into concrete pavement. It is also ideal for surface sealing of cracks prior to injection. It can also be used for bonding miscellaneous materials to concrete where a fast cure is required. RADONSEAL 901FDA 1:1 is moisture insensitive and will cure in damp environments. In addition to normal packaging, RADONSEAL 901 1:1 can be supplied in dual component, quick mix cartridges.

USES

- A) Anchoring dowel and tie bars into concrete pavement
- B) Setting parking bumpers
- C) Surface sealing

AREAS OF APPLICATION

As with any epoxy adhesive, surface preparation is critical. Concrete surfaces should be cleaned by sandblasting, water blasting or other mechanical means. All loose or unsound material must be removed. If patching, the outer perimeter of the spall should be saw cut or chipped to near vertical. Surfaces should be dry and dust free to insure a superior bond.

RADONSEAL 901 1:1 will cure in the presence of moisture although application onto wet surfaces is not recommended.

CLEAN UP

Use M.E.K. Xylene, or any other solvent. Clean equipment immediately after use.

SAFETY PRECAUTIONS

This product can cause skin irritation. Always wear protective clothing. Wash contaminated area with soap and water never solvent. In case of eye contact, flush with water for 15 minutes; immediately see a physician.

TECHNICAL DATA

RADONSEAL 901 1:1

<u>PROPERTIES</u>	<u>PART A</u>	<u>PART B</u>	<u>MIXED</u>
Solids by Volume	100%	100%	_____
Color	White	Black	Grey
Shelf Life	1 year	1 year	-----
Weight by Gallon	9.9 - 10.1 lbs	9.9 - 10.1 lbs	9.9 - 10.1 lbs
Mix Ratio (Vol)	-----	-----	1:1
Pot Life: (3 oz)	-----	-----	10-20 minutes
Gel Time (5 mil)	-----	-----	1-2 hours
Final Cure	-----	-----	1-3 days
Viscosity	-----	-----	Non sag gel
Hardness (Shore)	-----	-----	80-D
Ultimate Pull Out Strength	-----	-----	18,000 lbs (Concrete Failure)

PHYSICAL PROPERTIES

Tensile Strength,	ASTM D-638	6,000 psi
Tensile Elongation	ASTM D-638	3-4%
Compressive Strength	ASTM D-695	13,500 psi
Bond Strength	ASTM C-321	2,400 psi
Flexural Strength	ASTM D-790	8,000 psi
Deflection temp	ASTM D - 648	190°F

WARRANTY

Recommendations concerning the performance or use of this product are based upon independent test reports believed to be reliable. If the product is proven to be defective, at the option of the Manufacturer, it will be either replaced or the purchase price refunded. The Manufacturer will not be liable in excess of the purchase price. The user will be responsible for deciding if the product is suitable for his application and will assume all risk associated with the use of the product. This warranty is in lieu of any other warranty expressed or implied, including but not limited to an implied warranty of merchantability or an implied warranty of fitness for a particular use.

MATERIAL SAFETY DATA SHEET

MANUFACTURER: RADONSEAL, INC.
18 L'HERMITAGE DRIVE, SHELTON, CT 06484
EMERGENCY TELEPHONE 800-472-0603

SECTION I - PRODUCT IDENTIFICATION

PRODUCT NAME: RADONSEAL 901FDA, PART A
SYNONYM: THERMOSETTING RESIN
CHEMICAL FAMILY: MODIFIED EPOXY RESIN
DATE: FEBRUARY, 2010

SECTION II - HAZARDOUS INGREDIENTS AND OTHER COMPONENTS

<u>INGREDIENT</u>	<u>% BY WEIGHT</u>	<u>EXPOSURE LIMITS</u>	<u>CAS #</u>
Bisphenol a/diglycidyl Ether Resin	50-90	NE.	25068-38-6
Inert Powder	10-50	NE.	14807-96-6
Fumed silica	0-5		067762-90-7

SECTION III - PHYSICAL DATA

Boiling Point: >200°F
VP: >1 TORR @ 180°C
VD: >1 (air = 1)
Evaporation Rate: <1 (butyl acetate = 1)
Solubility in Water: Insoluble

SP GR: 1.32 (water = 1)
% Volatile by VL: NIL

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flash Point: >200°C
Flammable Limits: Acrid smoke/fumes
Extinguishing Media: Carbon dioxide, dry chemicals, foam, water spray.
Explosive Limits: LEL – NE
Special fire fighting procedures: Use self-contained breathing apparatus.
Unusual fire and explosion hazards: Decomposition and combustion products may be toxic.

SECTION V – HEALTH HAZARD DATA

Primary Route(s) of Entry: Inhalation, skin contact
Toxicological Data: LD SOs provided are the lowest values for type of bisphenol A diglycidal ether resins used.
Oral LD0: (rabbit) > 4000 mg/kg
Skin Irritation: (rabbits) Moderate irritation
Eye Irritation: (rabbits) Mild irritation
Sensitization: Sensitizer

PART A (CONT'D)

Effects of Overexposure: Irritation, sensitization, and dermatitis.

Medical Conditions Generally Aggravated by Exposure: Allergy, eczema, skin conditions

Carcinogenicity: None of the components of this material are listed as carcinogens by NTP, IARC, or OSHA.

In order to comply with California Proposition 65, we feel obligated to advise that some of our products may conceivably contain trace contaminants of some of the listed chemicals. While not necessarily added to our products as ingredients, some listed chemicals may be present in the raw materials from suppliers and over which we have no control. Therefore, even though some of the listed substances may not be present, a significant risk as defined by the regulations in order to comply with California law, we feel obligated to make the following statement:

WARNING: Our products may contain trace amounts of some chemicals considered by the State of California to be carcinogens or reproductive toxicants.

Emergency and first aid procedures:

Eyes: Flush with water for at least 15 minutes. If any ill effects develop, seek medical attention.

Skin: Wash with soap and water. Wash contaminated clothing before reuse.

Inhalation: Remove to fresh air and give oxygen if breathing is difficult.

Ingestion: Give large quantities of water and induce vomiting. Get medical attention.

SECTION VI – REACTIVITY DATA

Stability: Stable

Conditions to Avoid: Elevated temperatures

Incompatibility Materials to Avoid: Strong oxidizers, strong acids or bases in bulk.

Hazardous Decomposition Products: Carbon monoxide, carbon dioxide, aldehydes and other organics.

SECTION VII - SPILL OR LEAK PROCEDURES

Steps to be taken in case material is released or spilled: Avoid all personal contact. Wipe with rag for small spills. For larger spills, use absorbent material. Collect waste in designated container. Flush contaminated areas with water.

Waste Disposal Method: Dispose in accordance with federal, state and local regulations.

SECTION VIII - SPECIAL PROTECTION INFORMATION

Respiratory Protection: Avoid breathing vapors. Use adequate ventilation.

Ventilation: Good mechanical ventilation and local exhaust.

Eye Protection: Safety glasses.

Protective Gloves: Rubber or polyethylene.

Protective Equipment: Disposable containers and paper on work area. Use of barrier cream recommended. Use appropriate equipment to prevent eye or skin contact.

SECTION IX - SPECIAL PRECAUTIONS

Precautions to be taken in handling and storage: Causes irritation. May cause allergic skin reaction. Avoid contact with eyes, skin or clothing. Store in cool, dry area in closed cartridges.

Other precautions: Avoid breathing vapors, use with good ventilation. Wash hands thoroughly with soap and water after every use.

Health	Flammability	Reactivity	Personal Protection
2	1	0	B

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MATERIAL SAFETY DATA SHEET

MANUFACTURER: RADONSEAL, INC.
18 L'HERMITAGE DRIVE, SHELTON, CT 06484
EMERGENCY TELEPHONE 800-472-0603

SECTION I - PRODUCT IDENTIFICATION

PRODUCT NAME: RADONSEAL 901FDA, PART B
SYNONYM: EPOXY HARDENER
CHEMICAL FAMILY: MODIFIED POLYAMINE
DATE: FEBRUARY, 2010

SECTION II - HAZARDOUS INGREDIENTS AND OTHER COMPONENTS

<u>INGREDIENT</u>	<u>% BY WEIGHT</u>	<u>EXPOSURE LIMITS</u>	<u>CAS #</u>
Proprietary Polyamine/polyamide blend	<70	NE.	UK
Inert Powders	60-80	NE.	14807-96-6
Fumed silica	0-5	NE.	067762-90-7

SECTION III - PHYSICAL DATA

Appearance: Paste
Boiling Point: Not Determined (>200°F)
VP: N.D.
VD: Not determined (air = 1)
Evaporation Rate: <1 (butyl acetate = 1)
Solubility in Water: Appreciable

Color: Black
SP GR: >1.91 +/- .02 (water = 1)
% Volatile by VL: <1
Odor: Skunk like, pinc -0. 1

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flash Point: 185°F (PMCC)
Flammable Limits: Unknown
Extinguishing Media: Foam, dry chemicals, C02
Special fire fighting procedures: Avoid breathing smoke. Use self-contained breathing apparatus.

SECTION V - HEALTH HAZARD DATA

Primary Route(s) of Entry: Inhalation, skin contact
Toxicological Data: Polyamine Resin
Oral LD0: (rat) LD50-<5 CC/KG
Skin Irritation: (rabbits) Mild irritant
Eye Irritation: (rabbits) Conjunctival irritant
Effects of Overexposure: **Acute:** Will cause burns to skin and eyes. High concentrations of vapor can cause irritation of respiratory tract, nausea, and vomiting. **Chronic:** Prolonged or repeated exposure may cause asthma and skin sensitization or other allergic response.
Medical Conditions Generally Aggravated by Exposure: Allergy, eczema, skin conditions
Carcinogenicity: None of the components of this material are listed as carcinogens by NTP, IARC, or OSHA.

PART B (CONT'D)

In order to comply with California Proposition 65, we feel obligated to advise that some of our products may conceivably contain trace contaminants of some of the listed chemicals. While not necessarily added to our products as ingredients, some listed chemicals may be present in the raw materials from suppliers and over which we have no control. Therefore, even though some of the listed substances may not be present, a significant risk as defined by the regulations in order to comply with California law, we feel obligated to make the following statement:

WARNING: Our products may contain trace amounts of some chemicals considered by the State of California to be carcinogens or reproductive toxicants.

Emergency and first aid procedures:

Eyes: Flush with water for at least 15 minutes. Seek medical attention.

Skin: Immediately deluge skin with plenty of water. Remove contaminated clothing and shoes.

Inhalation: Remove to fresh air and give oxygen if breathing is difficult. Seek medical attention

Ingestion: If swallowed and conscious, give plenty of water and induce vomiting. Seek medical attention.

SECTION VI – REACTIVITY DATA

Stability: Stable

Conditions to Avoid: Mixing with oxidizers or epoxy resins in quantities over 1#.

Incompatibility Materials to Avoid: Strong oxidizing agents, acids.

Hazardous Decomposition Products: Carbon monoxide, carbon dioxide, nitrogen oxides.

Hazardous Polymerization: Will not occur.

SECTION VII - SPILL OR LEAK PROCEDURES

Steps to be taken in case material is released or spilled: Soak up with inert material or scrape up. Collect waste in designated waste containers. Avoid personal contact. Flush contaminated area with water.

Waste Disposal Method: Dispose in accordance with federal, state and local regulations.

SECTION VIII - SPECIAL PROTECTION INFORMATION

Respiratory Protection: Avoid breathing vapors. Use adequate ventilation.

Ventilation: Normal ventilation should be adequate. Local if vapors are vented.

Eye Protection: Safety glasses.

Protective Gloves: Rubber or impervious gloves recommended.

SECTION IX - SPECIAL PRECAUTIONS

Precautions to be taken in handling and storage: Store away from heat and open flame.

Other precautions: Avoid breathing vapors of heated material. Wash hands with soap and water after every use.

Adequate ventilation: Keep containers tightly closed when not in use.

Health	Flammability	Reactivity	Personal Protection
2	1	0	B

All statements, technical information and recommendations contained herein are based upon available scientific test or data which we believe to be reliable since we cannot anticipate all conditions under which this information and our products or the products of other manufacturers in combination with our products may be used. RadonSeal makes no warranties, express or implied, and assumes no responsibility in connection with any use of this information

Appendix 9
Truck Route Map



Project No. NY13802			
SCALE: NOT TO SCALE			
DRAWING STATUS	Draft	Final	X

PROJECT MANAGER: N. Canonico
DATE CHECKED: 05-20-15
DATE APPROVED: 05-20-15



FIGURE 2A
 TRUCK ROUTE MAP
 From: 945 Bergen Street, Brooklyn, NY
 To: Clean Earth - 115 Jacobus Avenue, Kearny, NJ 07032



Project No. NY13802			
SCALE: NOT TO SCALE			
DRAWING STATUS	Draft	Final	X

PROJECT MANAGER: N. Canonico
DATE CHECKED: 05-20-15
DATE APPROVED: 05-20-15



FIGURE 2B
 TRUCK ROUTE MAP
 From: 945 Bergen Street, Brooklyn, NY
 To: Clean Earth - 115 Jacobus Avenue, Kearny, NJ 07032



Project No. NY13802

PROJECT MANAGER: N. Canonico

SCALE: NOT TO SCALE

DATE CHECKED: 05-20-15

DRAWING STATUS

Draft

Final

X

DATE APPROVED: 05-20-15



FIGURE 2C
TRUCK ROUTE MAP
From: 945 Bergen Street, Brooklyn, NY
To: Clean Earth - 115 Jacobus Avenue, Kearny, NJ 07032

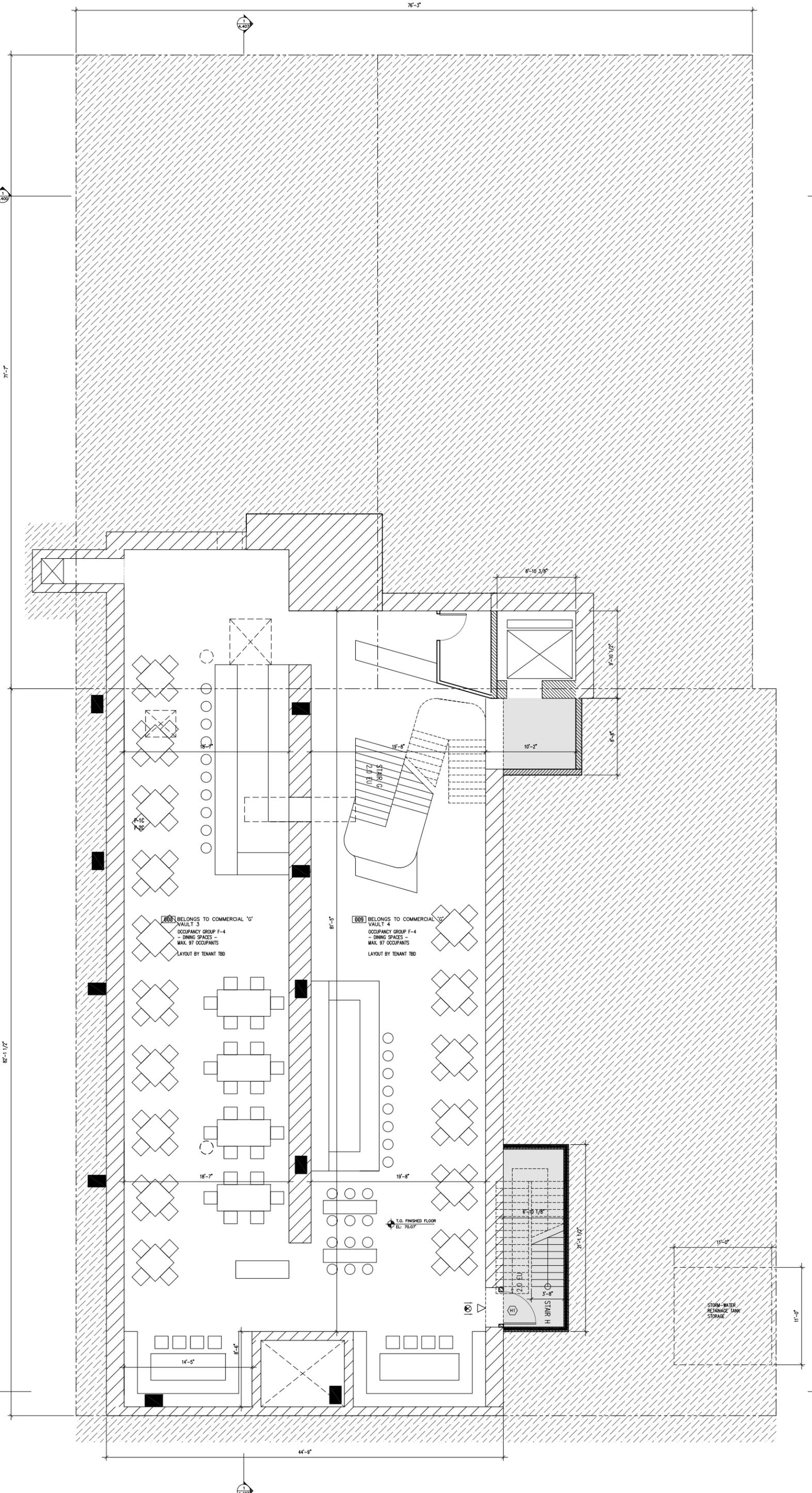
APPENDIX 10

RIR/RAWP CERTIFICATION

Appendix 11
Development Plans

SUB CELLAR FLOOR PLAN

AREA OF EXCAVATION

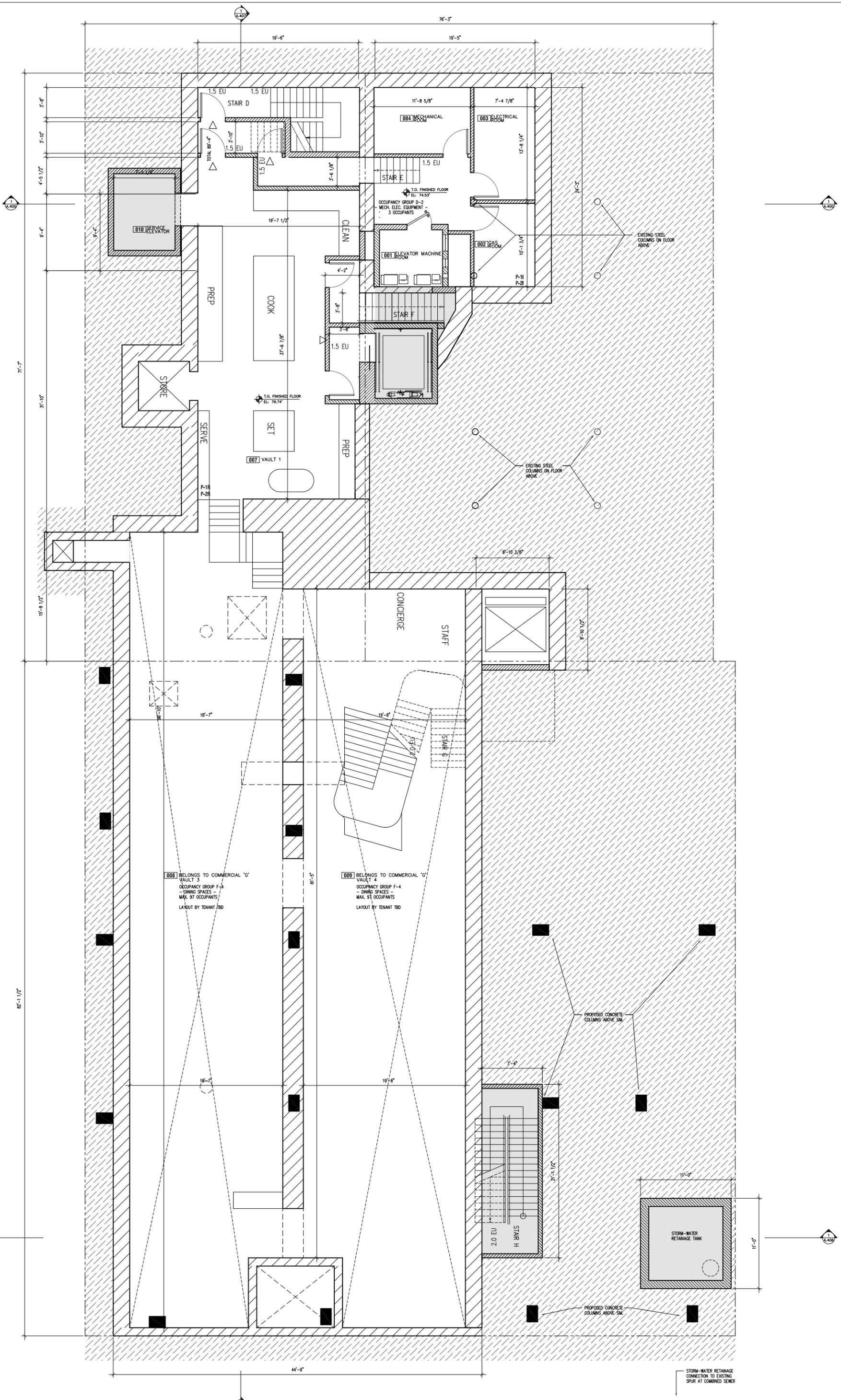


PROJECT 945 Bergen Street	DRAWING PROPOSED SUB CELLAR	A-010	REV#	DATE	ID
DATE 12/15/14	SCALE 3/32" = 1'-0"				

FORMACTIV

CELLAR FLOOR PLAN

AREA OF EXCAVATION

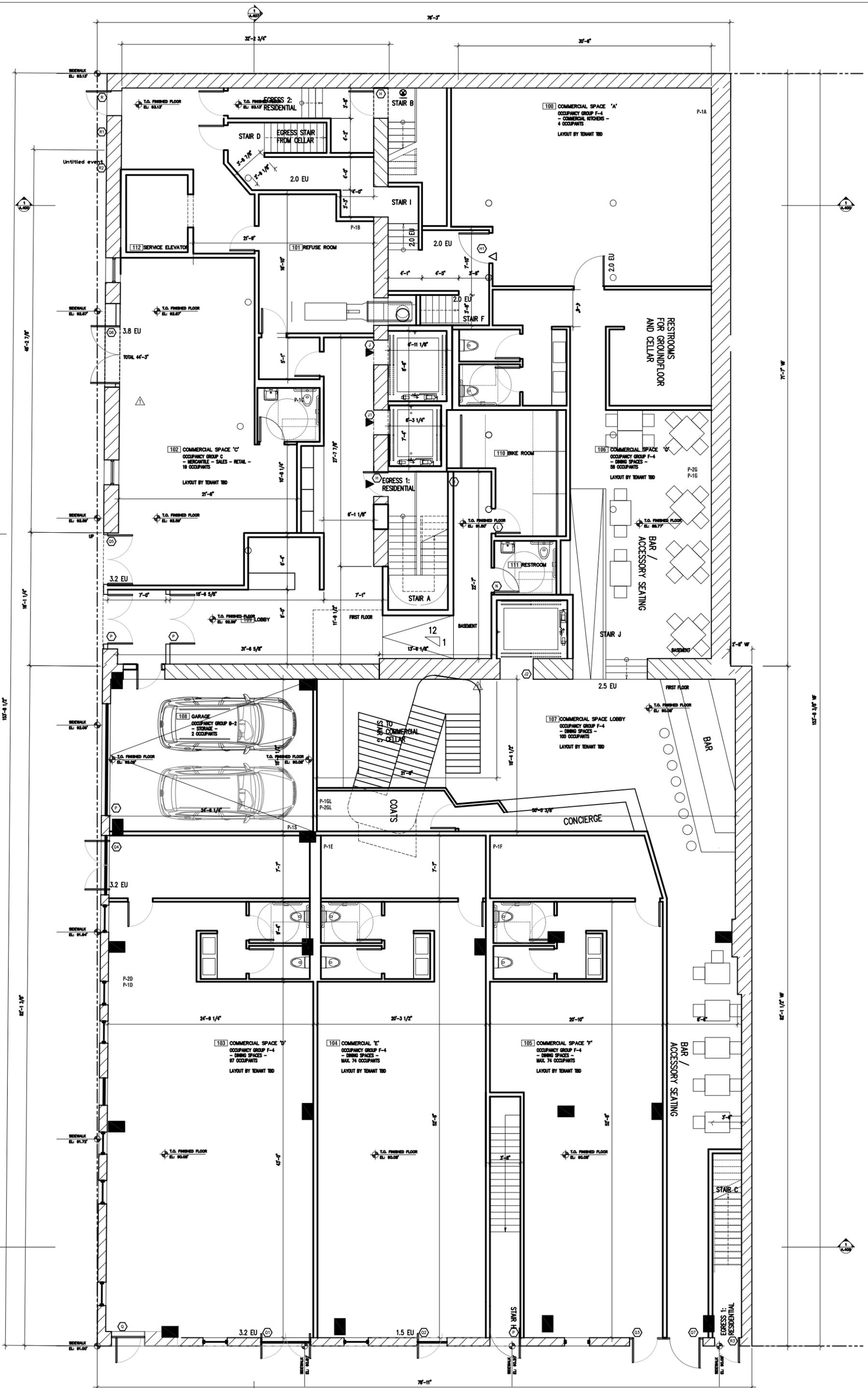


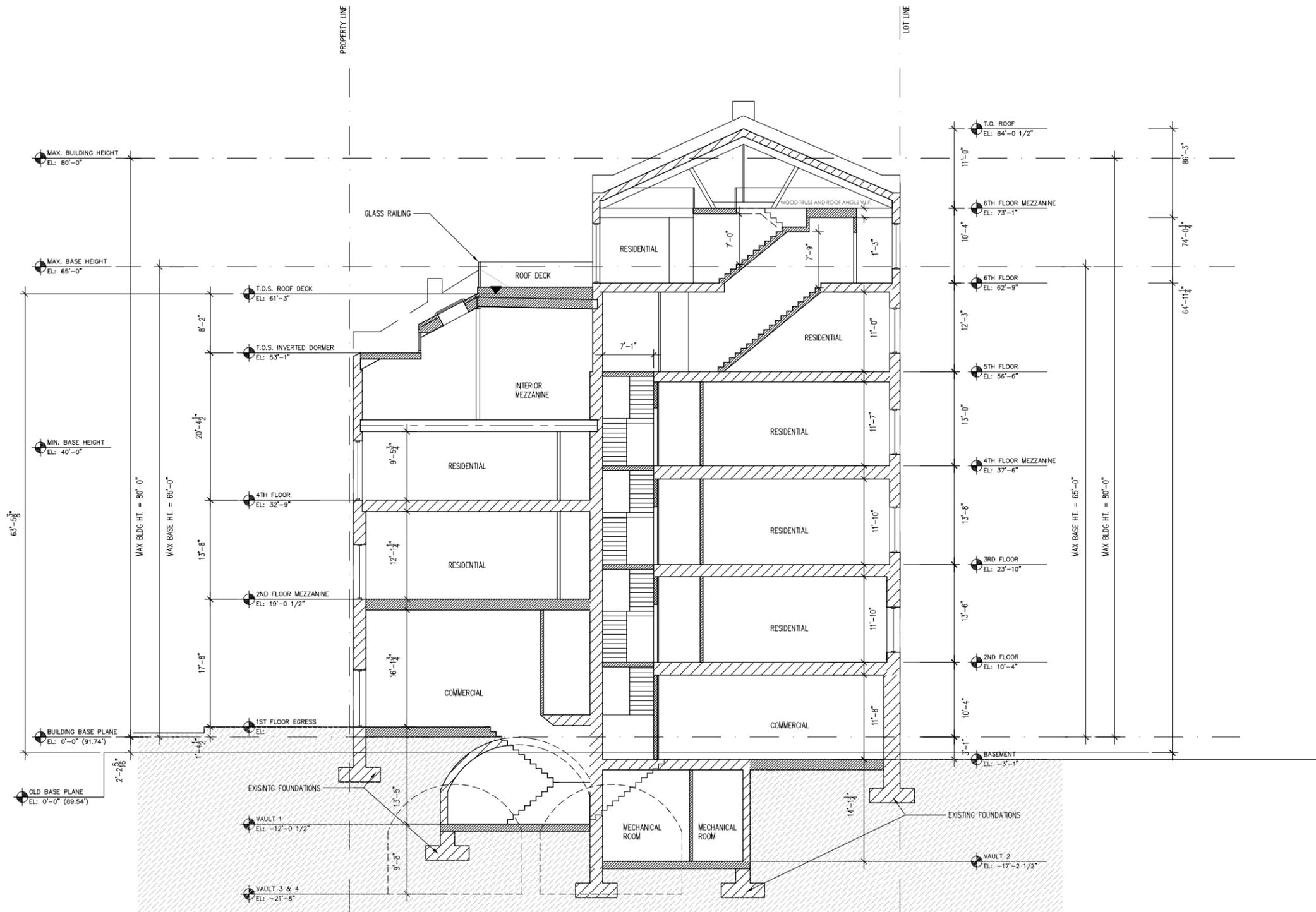
PROJECT 945 Bergen Street	DRAWING PROPOSED CELLAR	A-100	REV#	DATE	ID
DATE 12/15/14	SCALE 3/32" = 1'-0"				

FORMACTIV

STORM-WATER RETANAGE CONNECTION TO EXISTING SPUR AT COMBINED SEWER

GROUND FLOOR PLAN





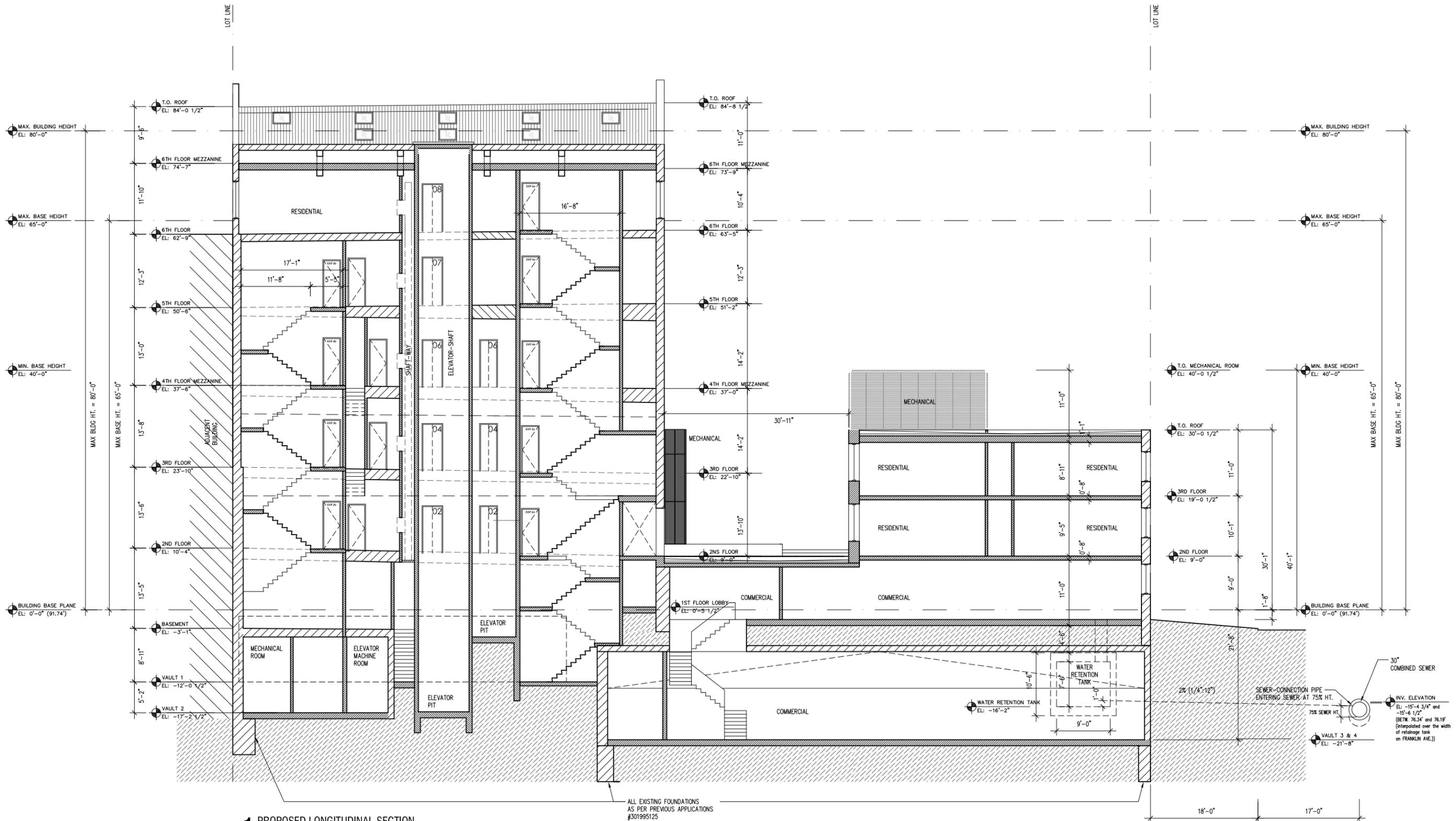
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SCALE: AS NOTED

PROJECT 945 Bergen Street	DRAWING SECTION 400	REV#	DATE	ID
DATE 12/15/14	SCALE 1/16" = 1'-0"			
FORMACTIV				



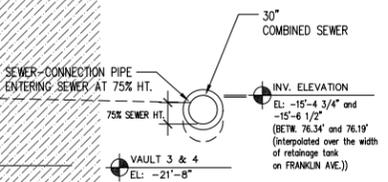
1 CROSS SECTION AT EAST END
 SCALE: AS NOTED
 ALL EXISTING FOUNDATIONS
 AS PER PREVIOUS APPLICATION
 #301995125

PROJECT 945 Bergen Street	DRAWING SECTION 406	REV#	DATE	ID
DATE 12/15/2014	SCALE 1/16" = 1'-0"			
FORMACTIV				



1 PROPOSED LONGITUDINAL SECTION
SCALE: AS NOTED

ALL EXISTING FOUNDATIONS
AS PER PREVIOUS APPLICATIONS
#301995125



PROJECT 945 Bergen Street	DRAWING SECTION 408	REV#	DATE	ID
DATE 12/15/2014	SCALE 1/16" = 1'-0"			
FORMACTIV				