

Appendix G Vapor Barrier Design Plan

Methane & Volatile Organic Compound Mitigation System Plans & Specifications for

New Residence & ADU

12550 Honolulu Terrace - Whittier, California 90601 - Los Angeles County

Project Site



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Design Team

- Owner/Developer:** **Partner**
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-
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Irvine, California 92618
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-
- Architect:** **AG Concepts**
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Glendora, California 91741
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-
- Structural Engineer:** **KY Engineering, LLC.**
3130 East Willow Street
Signal Hill, California 90755
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Notice for Contractor
All contractors and subcontractors performing work shown on or related to these plans shall conduct their operations so that all employees are provided a safe place to work and the public is protected. All contractors and subcontractors shall comply with the "Occupational Safety and Health Regulations" of the U.S. Department of Labor and with the state of California Department of Industrial Relations "Construction Safety Orders."
The Developer and the Project Methane Engineer shall not be responsible in any way for contractors' and subcontractors compliance with the "Occupational Safety and Health Regulations" of the U.S. Department of Labor or with the State of California Department of Industrial Relations "Construction Safety Orders."
Contractor agrees that he shall assume sole and complete responsibility for job site conditions during the course of construction of this project, including safety of all persons and property, that this requirement shall apply continuously and not be limited to normal working hours, and that the contractor shall defend, indemnify and hold the owner and the Engineer harmless from any and all liability real or alleged, in connection with the performance of work on this project, excepting for liability arising from the sole negligence of the Owner or the Engineer.

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GeoKinetics Geotechnical & Environmental Engineers			
Date		By	Rev.
Description		Revisions	
77 Bunsen Irvine, CA 92618 Tel 949.502.5353 Fax 949.502.5354			

New Residence and ADU - 12550 Honolulu Terrace - Whittier, California

Title Sheet

Original Scale in Inches for Reduced Plans 0 1 2 3

Sheet 1

General Notes

I. Applicability:

The Methane/VOC Vapor Mitigation details presented in these plans and specifications shall be utilized in the construction of building on the lots so designated on Sheet No. 3 of these plans.

II. Sub-Slab Passive Venting:

- A passive venting system shall be installed beneath the slab / foundation of the designated building.
- General Specifications for this system are provided below.
 - 2-inch thick sand blanket;
 - Three-inch (3") diameter, perforated, ADS polyethylene Sub-Slab Vent Lines within a 2" sand blanket;
 - Vent Risers that extend from the vent piping to outlets are located above the roofline of the building;
- The Sub-Slab Vent Piping shall consist of 3" diameter ADS 401 polyethylene pipe, or an equivalent product approved by the Vapor Engineer.
- Where piping transitions through building footings, the penetration shall be accomplished in compliance with the Uniform Building Code and with the approval of the Project Structural Engineer and the Building Official.
- Perforated pipes shall be connected to solid vertical venting pipe. Vertical venting pipe shall not be less than 2-inch in diameter and shall be constructed of materials that comply with the Uniform Plumbing and Mechanical Codes. All joints shall be tightly sealed with approved materials.
- Solid vent pipe may be located within the walls/chases or shall be similarly protected from physical damage.
- Vent pipe shall be installed in a manner that will allow it to be connected to an active venting system without modification or damage to the structure (e.g. Capped TEE fitting located near the foundation).
- Vent pipes shall terminate a minimum of 12" above the roof-line adjacent to the vent.
- Vent pipes shall terminate 10 feet min. away from, or at least 5' above any building opening or air intake and 3' min. in every direction from any lot line, alley, and street.
- The termination of all vent pipes shall be provided with a TEE connection or other approved rain cap to prevent the intrusion of rain water.
- Vent riser shall be clearly marked to indicate that the pipe may contain vapors. This may be accomplished through stencils, labels, or other permanent labeling method. Pipes shall be clearly and permanently labeled "Vapor", in ½" high letters, near their termination point and at 5-foot intervals along the remainder of the vent pipe. This includes sections encased within walls or other enclosures.
- Vent risers shall be constructed using schedule 40 PVC piping in compliance with Section 1212 of the Uniform Plumbing Code. Risers located within buildings shall terminate at an approved outlet in accordance with Section 506 of the Uniform Building Code.
- Subsurface drainage systems are not to be combined with the vent system - although a common trench may be utilized for the installation of both systems.

III. Methane/VOC Vapor Barrier:

A. General:

- A Methane/VOC Vapor barrier shall be installed beneath the slab / foundation of the designated building shown on Sheet 3 of these plans. General specifications for this system are as follows:
 - The Methane/VOC Vapor barrier shall have a minimum cured thickness of 60 mil (40 mil Liquid Boot + 20 mil HDPE) and consist of spray on chloroprene modified asphalt (CMA) emulsion, or equivalent, approved by the Vapor Barrier Engineer. The vapor barrier at this project shall be constructed using Liquid Boot® Plus High Performance Gas Vapor Barrier System or an equivalent product, approved by the Vapor Barrier Engineer.
 - The Liquid Boot® 500 should be Spray Applied over VI-20™, a 20-mil, high performance polyethylene-EVOH copolymer membrane or an equivalent product, approved by the Vapor Barrier Engineer and the City of Commerce.
 - The Methane/VOC Vapor barrier shall be placed between the bottom of the floor slab and the subgrade, and around or fastened to footings and trenches, in accordance with these plans and details. The barrier shall not be placed more than 6-inches below the bottom of the floor slab - except where the barrier may pass beneath a deepened interior or perimeter footings.
 - Seams shall be overlapped a minimum of 6-inches and sealed in accordance with the specifications set forth in these plans.
 - Prior to placing the floor slab over the barrier, the Vapor Barrier Engineer shall inspect and approve the membrane in accordance with these plans and specifications. Construction of the floor slab shall not proceed without written certification of the successful installation of the vapor barrier system by the Contractor / Applicator and the Vapor Barrier Engineer.
 - Where piping, electrical conduits, etc. penetrate the vapor barrier, a 3" collar or boot shall be provided to create a vapor-tight seal around the penetration in accordance with Detail K, Sheet D1.
 - The subgrade under the barrier shall be rolled smooth and well compacted.
 - The upper surface of the vapor barrier shall be protected by a layer of Liquid Boot Ultrashield G-1000 or 2" layer of SE-30 sand, placed between the floor slab and the barrier, as specified on these plans.
 - A 2" sand layer shall be provided below the barrier in accordance with the details shown in these plans. The gradation of the sand placed below the barrier shall conform to the table shown in Detail B, Sheet D1.

- Reinforcing steel, piping, forms, etc. shall not be supported directly on the barrier or protective covering and equipment shall not be driven over the barrier or its protective covering.
- All vent lines associated with the Subslab Passive Venting System shall be installed below the barrier, or shall be sealed using approved seals or boots in accordance with these plans, where they penetrate the barrier.

B. Quality Assurance:

- The vapor barrier Contractor / Applicator shall be trained and approved by the Vapor Barrier Manufacturer (i.e. CETCO, Inc. for LIQUID BOOT®). The vapor barrier Contractor / Applicator shall provide the Vapor Barrier Engineer with a letter from the manufacturer (a) confirming that the vapor barrier Contractor / Applicator is certified by the manufacturer for installation of the product; and (b) warranting its product to be free of defects when that product is installed by the vapor barrier Contractor / Applicator retained by the Owner for the performance of this scope of work. The following installer is certified by CETCO, Inc. for installation:

Advanced Construction Technologies
77 Bunsen
Irvine, California 92618
(949) 502-5355
www.actcc.com

- A pre-installation conference is recommended prior to the application of the vapor barrier to assure proper substrate and installation conditions and procedures. The vapor barrier Contractor / Applicator, site superintendent, the foundation subcontractor, and the Vapor Barrier Engineer or representative should be present at this meeting.

- The installation of the vapor barrier shall be closely monitored by the Vapor Engineer, or a designated representative of his office. Inspections shall typically be performed prior to, during, and subsequent to the application of the product.

- All surfaces to receive vapor barrier shall be inspected and approved by the Contractor / Applicator and the Vapor Barrier Engineer prior to commencing work.

C. Submittals:

- The Vapor Barrier Contractor shall submit any updates or revisions to the manufacturers product data and recommended installation procedures to the Project Vapor Engineer for review and approval at least two weeks prior to the construction of the vapor barrier.
- The Vapor Barrier Contractor or Foundation Contractor shall submit representative samples of the following to the Project Vapor Engineer for approval:
 - o Vapor Barrier Material
 - o Sand Backfill
 - o Sub-Slab Vent Piping and Vent Riser
 - o Protection course geotextile

- At the completion of installation, the Contractor shall submit a letter to the Vapor Barrier Engineer certifying that installation was completed in accordance with the project plans and specifications as well as the procedures recommended by the manufacturer. Letter should include the dates on which the installation was completed and inspected.

D. Job Conditions:

- The areas adjacent to the vapor barriers are to be protected by the Contractor / Applicator during the installation process. Where necessary, masking or other protective measures shall be utilized to prevent staining of surfaces beyond the limits of the application.
- Work is to be performed only when existing and forecasted weather conditions are within the manufacturers recommendations for the material and product used. The application of the vapor barrier compounds shall be suspended if the ambient temperature falls below 32° F, or during periods of precipitation.
- A minimum clearance of 24 inches is required for spray application of product Liquid Boot®.
- All plumbing, electrical, mechanical and structural items that are located beneath, or that pass through, the vapor barrier shall be positively secured in their proper positions and appropriately protected prior to application of the membrane.
- The vapor barrier shall be installed before placement of reinforcing steel. If reinforcing steel is present at the time of application, all exposed reinforcement shall be masked by the Foundation Subcontractor prior to membrane application.

E. Materials:

- The vapor barrier shall consist of LIQUID BOOT® sprayed on, or locally trowel applied, to a minimum cured thickness of 60 mil along an underlying 20 mil VI-20™ Geomembrane for a combined thickness of 80 mils.
- The application substrate shall consist of Liquid Boot VI-20™ geomembrane 20-mil high performance polypropylene - EVOH copolymer membrane.
- Protective geotextile (Ultrashield G-1000) shall consist of non-woven polypropylene, 10 oz/yd² fabric.
- All materials are to be delivered to the project site in their original unbroken packages bearing the manufacturers label showing brand, weight, volume and batch number. Materials are to be stored at the project site in strict compliance with the manufacturers instructions.

F. Installation:

- For two pour foundations: Concrete surfaces shall be light broom finished or smoother, free of any dirt, debris, loose material, release agents or curing compounds. All voids more than 1/4-inch in depth and 1/4-inch in width shall be properly filled. Masonry joints shall be struck smooth with a metal trowel. All penetrations shall be prepared in accordance with the manufacturers specifications
- A minimum 3/4" cant of LIQUID BOOT® Trowel Grade, or other suitable material, shall be applied at all horizontal to vertical transitions and other inside corners of 120° or less. The material shall be allowed to cure overnight before subsequent applications.
- The sub-grade shall be moisture conditioned and compacted to a minimum relative compaction of 90 percent by the grading contractor accordance with ASTM D1557 procedures and the recommendations of the Soils Engineer. The finished surface shall be smooth, uniform, free of debris and standing water. All stones or dirt clods greater than 1/4-inch in diameter shall be removed. Final sub-grade inspection / preparation shall not precede the barrier application by more than 72 hours.
- All penetrations shall be prepared in accordance with manufacturers specifications. Any form stakes that penetrate the vapor barrier shall be re-bar which shall be bent over and left in the slab.
- Trenches shall be cut oversize as necessary to accommodate the vapor barrier and any protection course/layer.
- The walls of footing or utility trenches shall be smooth and free of roots or protruding rocks. All surfaces to receive Vapor Barrier shall be free of laitance, sharp projections, oil, dirt or other contaminants. Prepare surfaces in accordance with the manufacturer's instructions.
- If organic materials with potential for growth (i.e. seeds or grasses) are present within the subgrade the General Contractor shall apply a soil sterilant at the manufacturer's recommended rate prior to the construction of the vapor barrier.
- The VI-20 geotextile substrate shall be laid on the sub-grade per manufacturers specification. All seams shall be overlapped a minimum of six inches (6"). The geotextile shall be in integral contact with all interior foundation corners. LIQUID BOOT® shall be spray applied at all overlapped seams to a thickness of 120 mils minimum. See Detail R, Sheet D3.
- Any open utility, footing, or other trench present at the time of application shall be lined with VI-20 geomembrane extending at least six inches (6") onto the adjoining sub-grade. Seams shall be overlapped a minimum of six inches (6"). The geotextile shall be in integral contact with the subgrade at all interior corners. LIQUID BOOT® shall be spray applied at any seam overlap to a thickness of 120 mils minimum.
- Appropriate care shall be exercised to protect the barrier and prevent penetrations subsequent to its application. The barrier shall be kept free of dirt, debris and traffic until the protective sand cover is in place. It shall be the responsibility of the General Contractor to insure that the barrier and the protection system are not penetrated after the completion of the installation.

- Installation of the materials shall be in accordance with the manufacturer's instructions, a copy of which shall be kept at the job site.
- ### G. Sealing Penetrations:
- All penetrations shall be cleaned, as necessary, to provide a vapor tight seal. All metal penetrations shall be sanded clean as necessary with Emery cloth.
 - The VI-20 Geotextile shall be cut around penetrations so that it lays flat on the sub-grade.
 - LIQUID BOOT® shall be applied at an 60 mil minimum dry thickness in a three inch (3") wide ring around the penetration, and vertically up the penetration a minimum of three inches (3"). The application shall be allowed to cure completely before proceeding.
 - The penetration shall be wrapped with a nylon cable tie at a point two inches (2") above the base of the penetration. The cable tie shall be tightened firmly so as to squeeze the cured barrier collar.

H. Inspections and Testing

- Field Quality Control is a very important part of all LIQUID BOOT® applications. The vapor barrier subcontractor retained by the Owner for the performance of this scope of work shall check his own work for coverage, thickness, and all around good workmanship, before calling for inspections.
- When thickness or integrity is in question, the vapor barrier should be tested in the manner described in Note #3 below.
- Samples to be inspected shall be cut from the barrier and geotextile composite to a maximum area of 2 square inches per 500 square feet of application by the Vapor Barrier Engineer. The thickness of the composite layer shall be measured with a digital caliper having a resolution of 1 mil or better. The thickness of the plain geotextile (as determined from uncoated samples) shall be deducted from the composite thickness in order to determine the thickness of the LIQUID BOOT® barrier. The test area shall be marked for repair by the Vapor Barrier Engineer.

- Voids left by sampling shall be patched with geotextile by the vapor barrier subcontractor retained by the Owner for the performance of this scope of work overlapping the void by a minimum of two inches (2"). A thin tack coat of LIQUID BOOT® shall be applied under the geotextile patch. Spray or trowel applied LIQUID BOOT® shall then be applied to an 40 mil minimum dry thickness, extending at least three inches (3") beyond the geotextile patch.
- On concrete surfaces, the vapor barrier shall be checked for coverage with a lightly oiled, needle nose depth gauge. Four (4) readings shall be taken over a one square inch area for every 500 square feet of application. The minimum reading shall be recorded and the test area shall be marked for repair by the Vapor Barrier Engineer.

- Concrete test areas shall be patched with LIQUID BOOT® to an 60 mil minimum dry thickness, extending a minimum of one inch (1") beyond the test perimeter.

- Concrete test areas shall be patched with LIQUID BOOT® to an 60 mil minimum dry thickness, extending a minimum of one inch (1") beyond the test perimeter.

- Each completed vapor barrier shall be smoke tested at the completion of the installation in accordance with standard GeoKinetics' protocol to confirm the integrity of the vapor barrier system. Smoke test area not more than 3,000 Sq. Ft. Each. Any leaks which are identified shall be repaired, and the barrier re-tested, until all leaks/perforations are eliminated.

- Prior to placing the concrete slab over the Vapor Barrier, the Vapor Barrier installer shall certify in writing that the Vapor Barrier has been installed and tested in accordance with the manufacturer's specifications and is free of leaks.

IV. Inspections:

- The inspection and periodic observations of membrane and vapor control measures shall be performed by the Vapor Barrier Engineer (i.e. the Engineer or his Designee). At a minimum, inspection/observation shall take place at the following stages of the installation:
 - During the installation of the (sub-slab) vent piping;
 - After backfilling of the (sub-slab) vent piping;
 - During the installation of the (sub-slab) vapor barrier;
 - After the installation of the (sub-slab) vapor barrier (Prior to backfilling). The vapor barrier shall be smoke tested at this time in accordance with note H-7. These test shall be documented in the as-built report.
 - During the placement of the protective course;
 - Immediately prior to placement of foundation concrete (Prior to placing the concrete slab over the Vapor Barrier, the Vapor Barrier installer shall certify in writing that the Vapor Barrier has been installed and tested in accordance with the manufacturer's specifications and is free of leaks.
 - During, and at the completion of, the vent riser installation for the (sub-slab) vent piping; and
 - At the completion of construction prior to the issuance of the system certification and certification of occupancy.
- Separate inspection reports will be prepared by the Vapor Barrier Engineer (i.e. the Engineer or his Designee) for each item listed above. These reports will be submitted to the project superintendent and the City of Commerce for approval. Work on the next step shall not be started until approval from the COA has been obtained for previous steps.
- As-built plans and final certification of the vapor barrier system shall be submitted to the Owner and the City of Commerce Building Inspection Department at the completion of the final inspection.
- The Vapor Barrier Engineer/Engineer of Records shall provide a report of the Observation to the City of Commerce Inspector at the conclusion of the installation. The report shall state that the installation complies with all the requirements contained in these Requirements for Approval.

V. Utility Trench Dams:

- A vapor migration barrier shall be installed in all utility trenches that extend beneath the buildings foundation from areas outside the perimeter of the buildings.
- The vapor migration barrier shall be installed in the utility trench immediately adjacent to the exterior perimeter of the buildings foundation.
- The vapor migration barrier shall consist of one of the following:
 - A minimum 3-foot continuous length of Sand Slurry consisting of a mixture of 4% Type II Cement, and 2% powdered bentonite by weight. The slurry shall extend from the bottom of the trench to a level of 6-inches above the base of the adjacent footing.
 - A minimum 5-foot continuous length of native soil backfill compacted to at least 90% Relative Compaction in accordance with ASTM D-1557 testing procedures. The compacted soil backfill shall extend from the bottom of the trench to a level at least 6" above the base of the adjacent footing

VI. Slab Penetrations:

- All underground electrical conduits penetrating the slab or foundation of the building shall be provided with integral gas tight seal or a seal off device. This seal is intended to prevent the travel of gas into the occupied portion of the structure through conduit runs.

- All Federal, State and local safety requirements shall be complied with.

IX. Contingency Plan:

The owner shall implement the requirements of the contingency plan outlined below as directed by LA County DPW. The contingency plan is as follows:

- When the methane alarm system activates, the occupants of the building shall:
 - Evacuate the building.
 - While evacuating, leave open all doors and windows on the first level immediately above grade and, if possible / applicable, below grade levels of the building that have windows.
 - The building shall remain unoccupied until gas concentrations have been eliminated, as evidenced by daily monitoring, unless otherwise approved by the County of Los Angeles.
- Investigate the cause of the alarm and resolve / repair the issue causing the alarm.

Original Scale in Inches
for Reduced Plans

0 1 2 3

Date	By	Rev.	Description

Revisions

Preliminary
Not for Construction

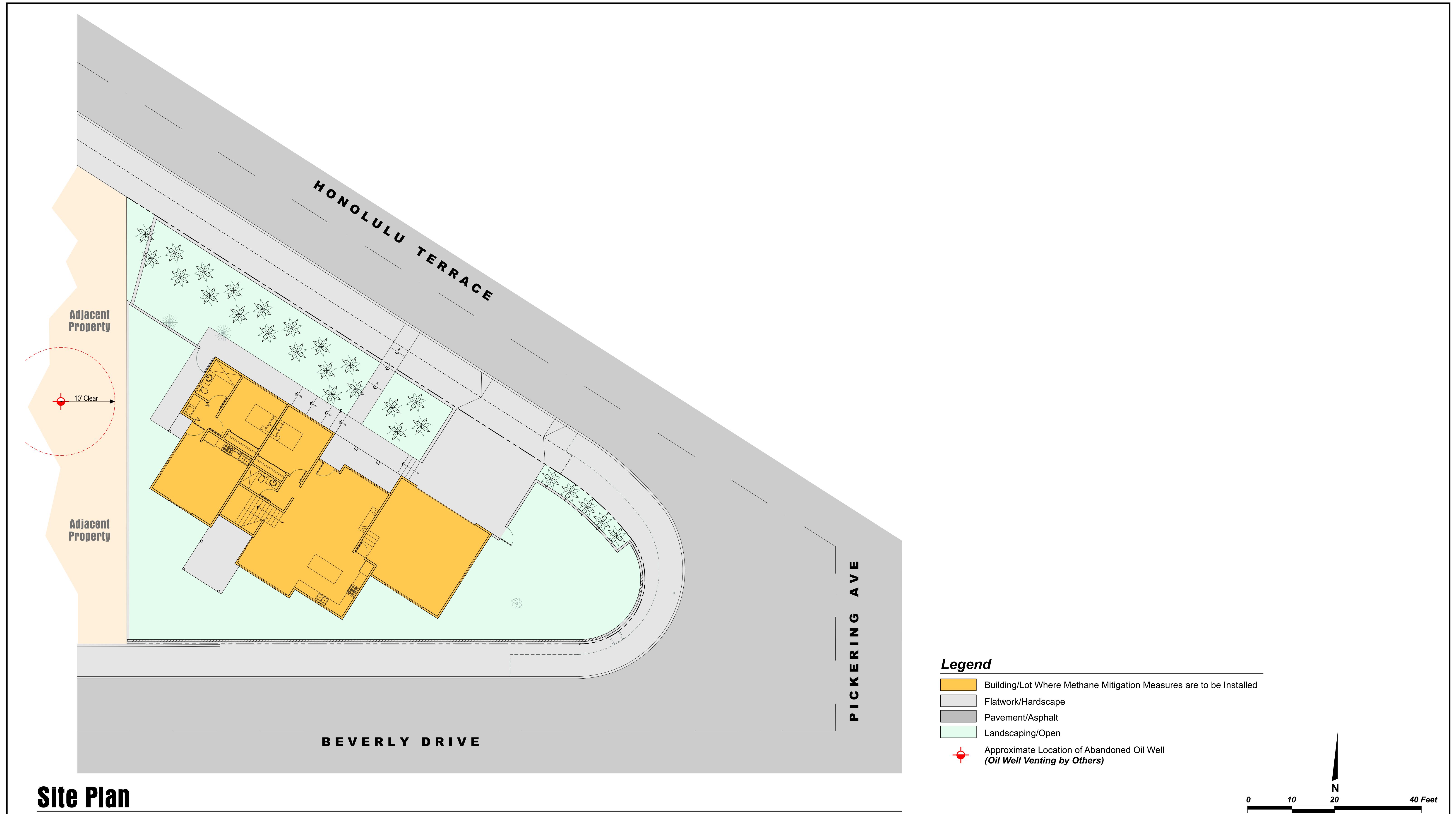
General Notes

GeoKinetics

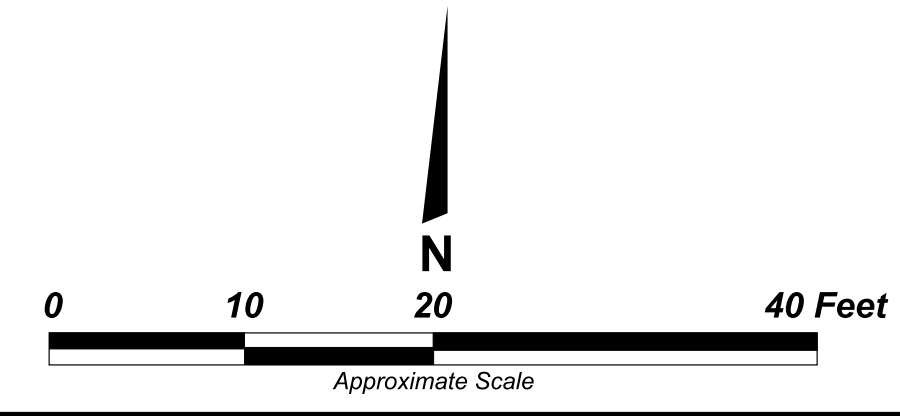
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Site Plan



Original Scale in Inches for Reduced Plans 0 1 2 3

Date	By	Rev.	Description

Preliminary
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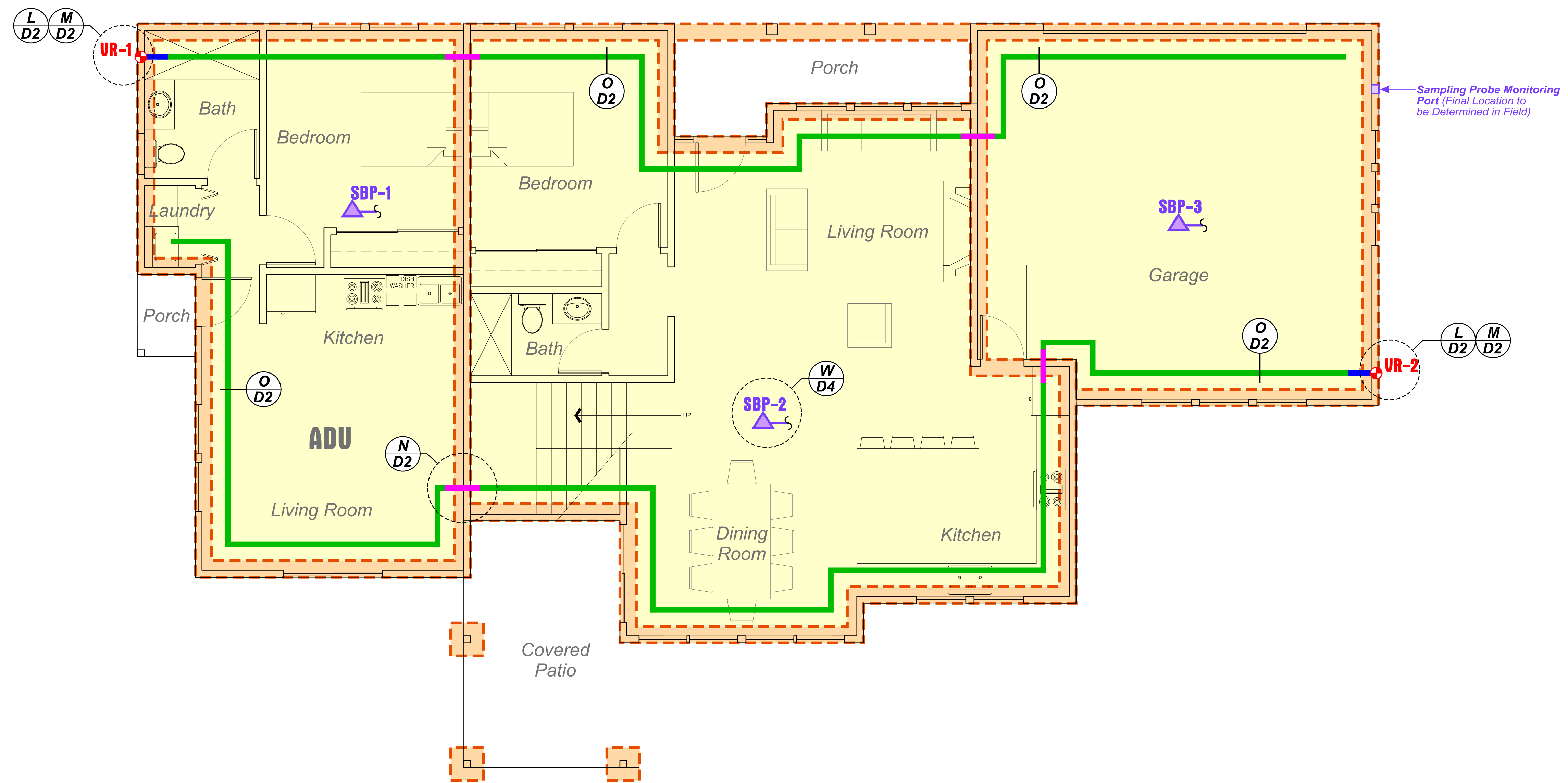
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New Residence and ADU - 12550 Honolulu Terrace - Whittier, California

Site Plan

Sheet 3

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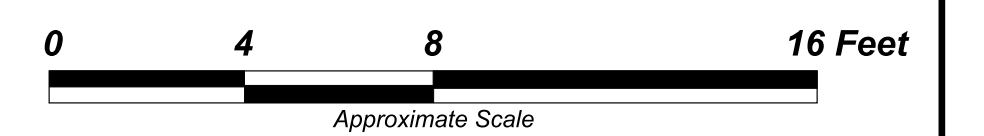


First Floor Plan

Legend

- Limits of Gas Membrane
- Limits of Foundation / Pad Footing
- 3" Dia. Perforated ADS Sub-Slab Vent Piping
- 3" Dia. Solid ADS Sub-Slab Transition Vent Piping (If Encountered)
- UR-1 ↕ Vent Riser With Designation Extending Up to Roof Level With Transition Piping
- SBP-1 ▲ Location of Soil Gas Sampling Probe With Designation (**See Detail W, Sheet D4**)
*SBP = Sub-Barrier Probe (Probe Within the Sand Blanket Below Primary Vapor Barrier)
↖ To Sampling Probe Monitoring Port

Note: All Vent Piping and Riser Locations Should Be Coordinated With Architectural, Structural and Plumbing Plans Prior to Commencement of Work.
 Final Vent Stub-Up Locations Should be Coordinated with Site Superintendent for Position Within Wall Prior to Installation of Slab.



Original Scale in Inches for Reduced Plans 0 1 2 3

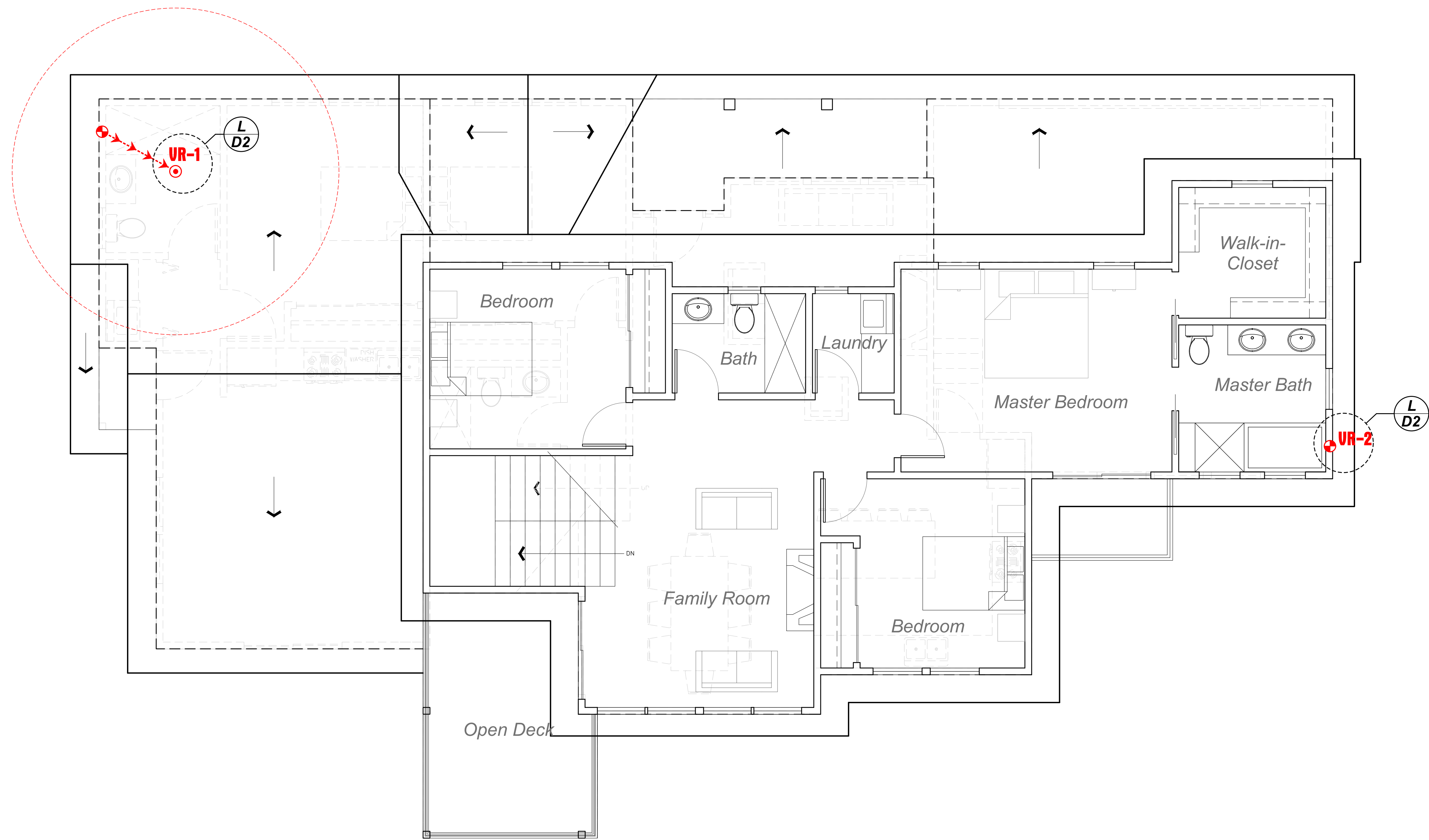
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First Floor Plan

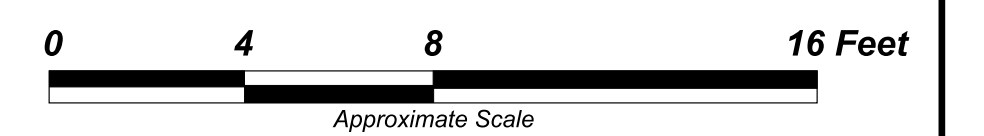


Second Floor Plan

Legend

- UR-2** ⚙️ Vent Riser Extending Up to Roof Level With Designation
- UR-1** ⚙️ Vent Riser Extending Above Roof Level With Designation
- Vent Riser Pipe Mounted Within Roof/Ceiling (Min. 2% Slope Upwards Towards Outlet)
- ⊙ 10' 10' Radius Clear From Any Roof Air Intakes

Note: All Vent Piping and Riser Locations Should Be Coordinated With Architectural, Structural and Plumbing Plans Prior to Commencement of Work.
Final Vent Stub-Up Locations Should Be Coordinated with Site Superintendent for Position Within Wall Prior to Installation of Slab.



Original Scale in Inches for Reduced Plans 0 1 2 3

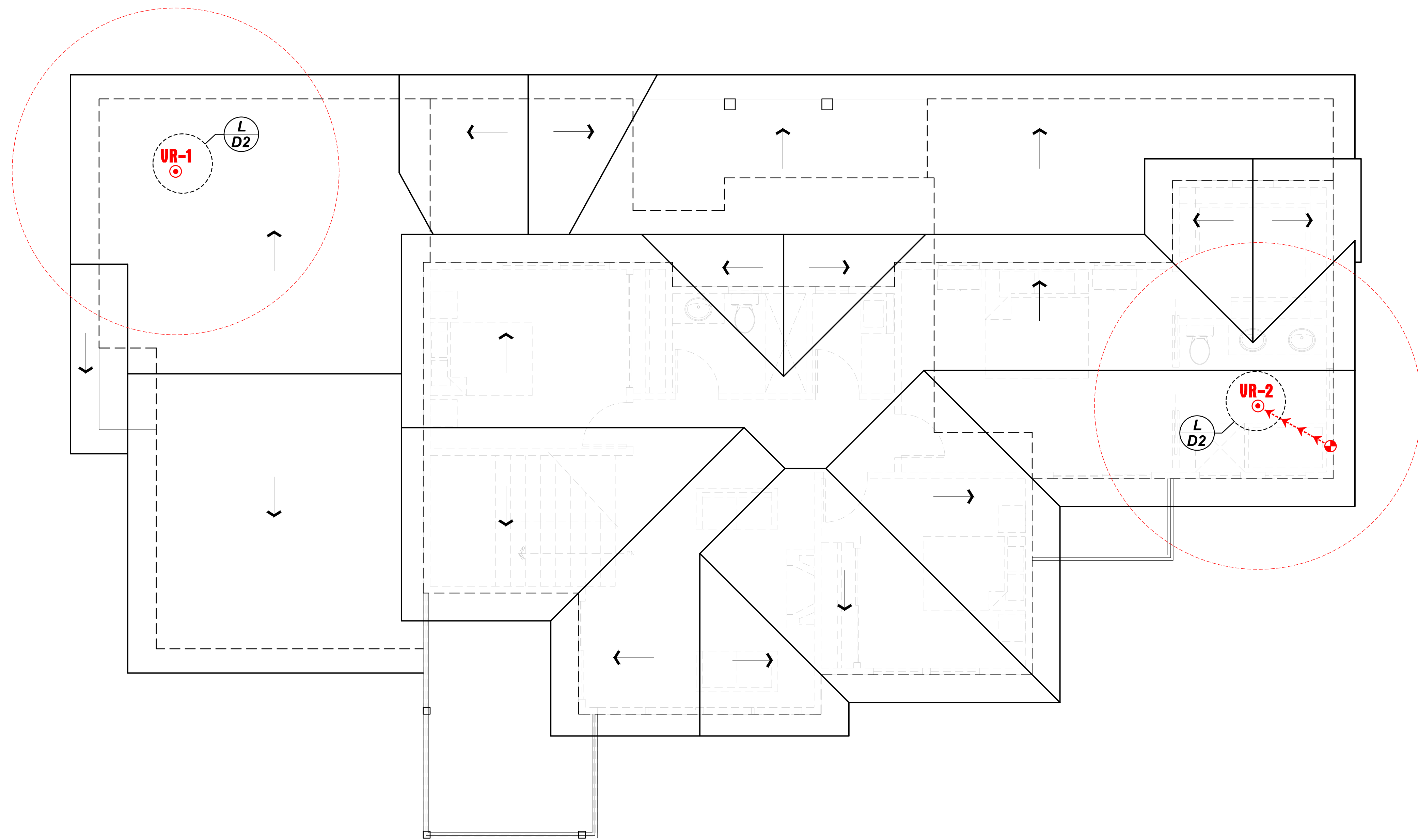
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Second Floor Plan

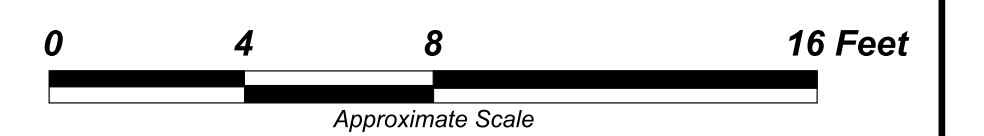


Roof Plan

Legend

- Vent Riser Extending Up to Roof Level
- Vent Riser Extending Above Roof Level With Designation
- Vent Riser Pipe Mounted Within Roof/Ceiling (Min. 2% Slope Upwards Towards Outlet)
- 10' Radius Clear From Any Roof Air Intakes

Note: All Vent Piping and Riser Locations Should Be Coordinated With Architectural, Structural and Plumbing Plans Prior to Commencement of Work.
Final Vent Stub-Up Locations Should be Coordinated with Site Superintendent for Position Within Wall Prior to Installation of Slab.



Original Scale in Inches for Reduced Plans 0 1 2 3

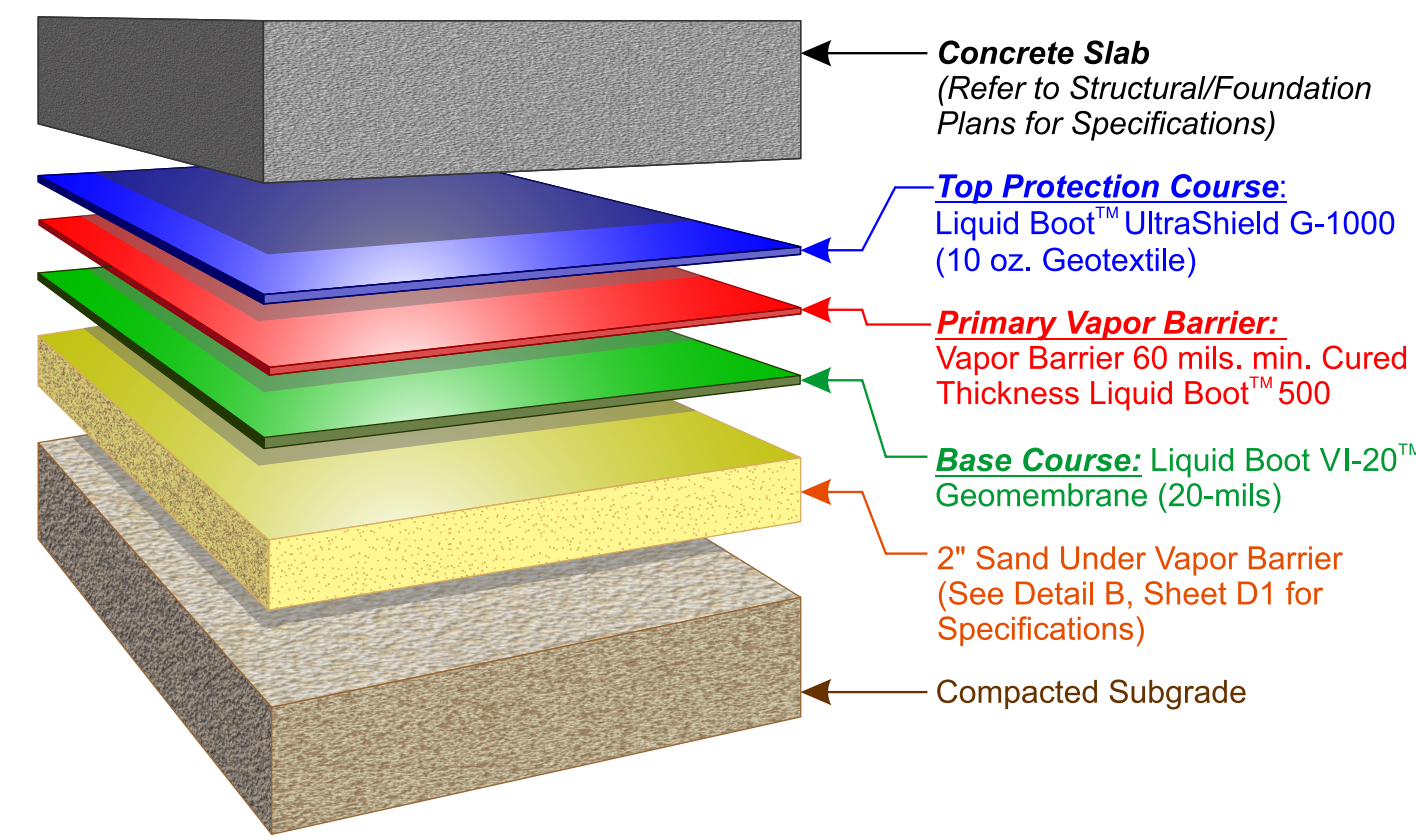
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Roof Plan

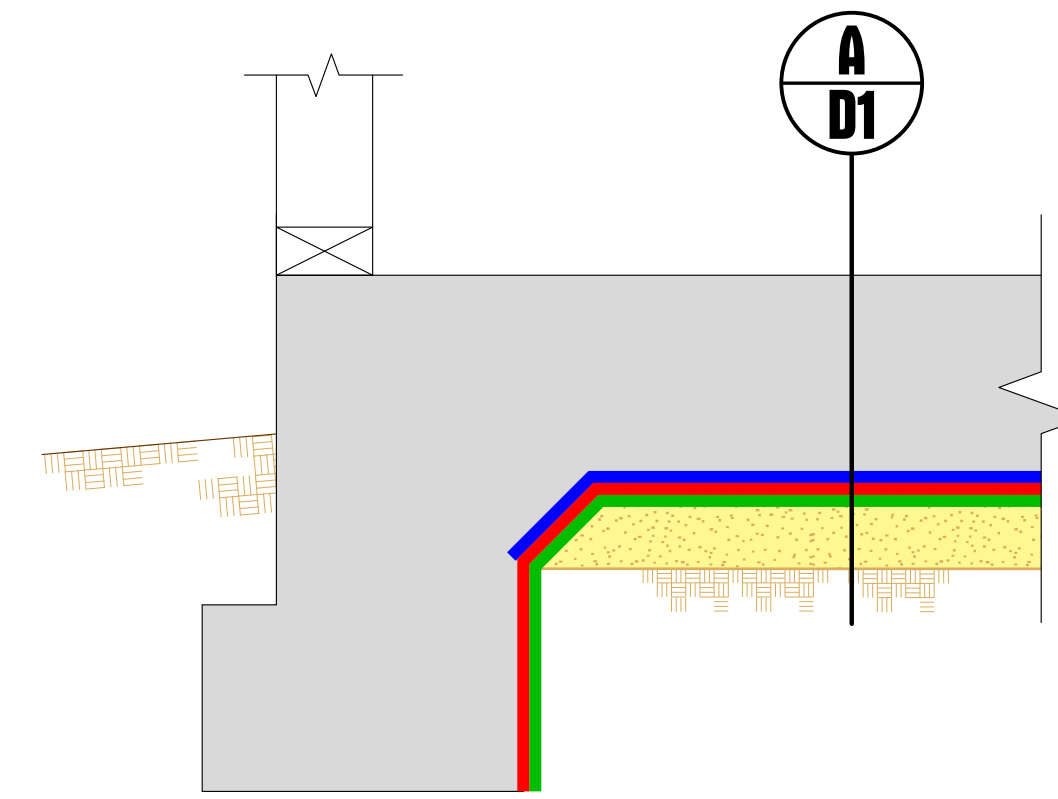


A Typical Vapor Barrier - Liquid Boot[®] 500 Plus High Performance System Configuration
Not to Scale

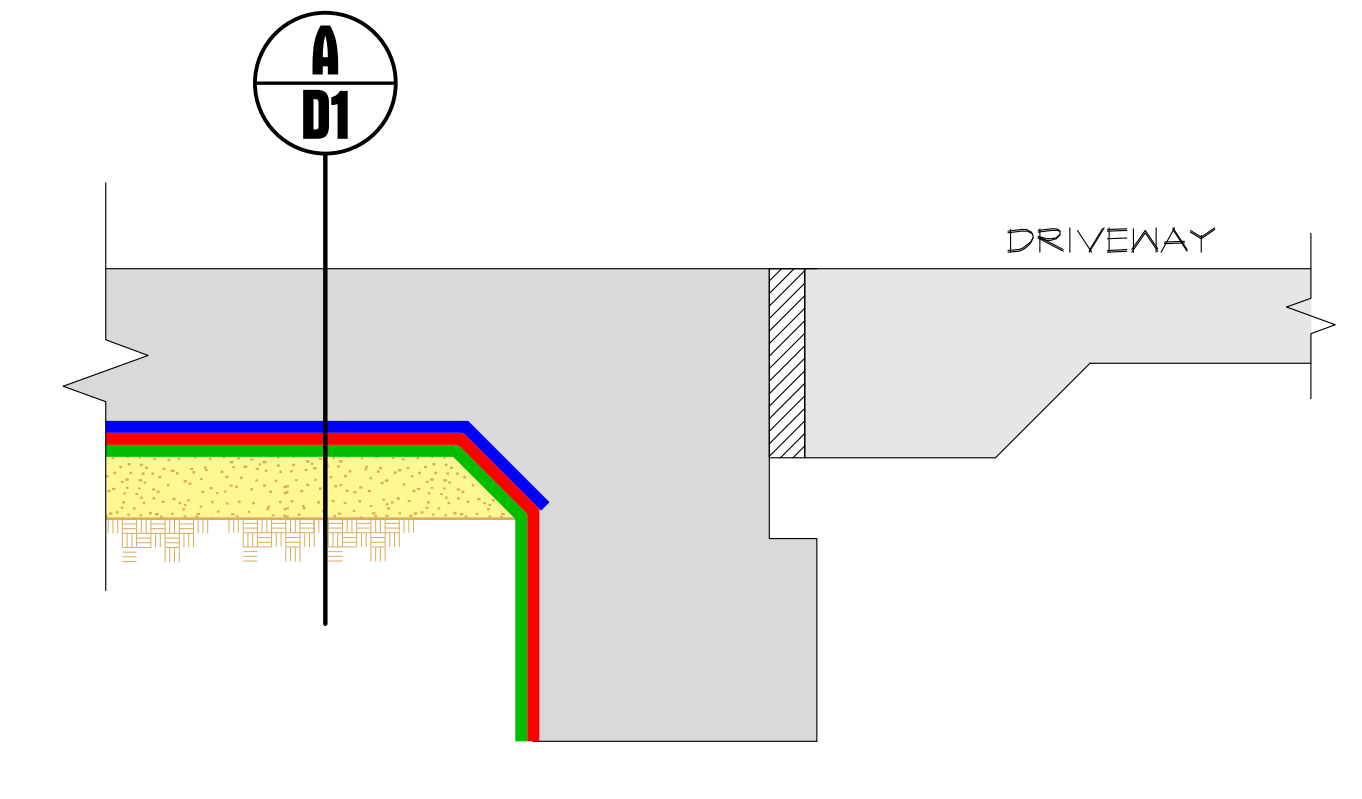
Specifications For Sand

SIEVE SIZE	PERCENTAGE PASSING SIEVE
3/8" (9.5 mm)	100
No. 4 (4.75 mm)	90-100
No. 8 (2.36 mm)	75-90
No. 16 (1.18 mm)	55-75
No. 30 (600 μm)	30-50
No. 50 (300 μm)	10-25
No. 100 (150 μm)	2-10
No. 200 (75 μm)	0-5

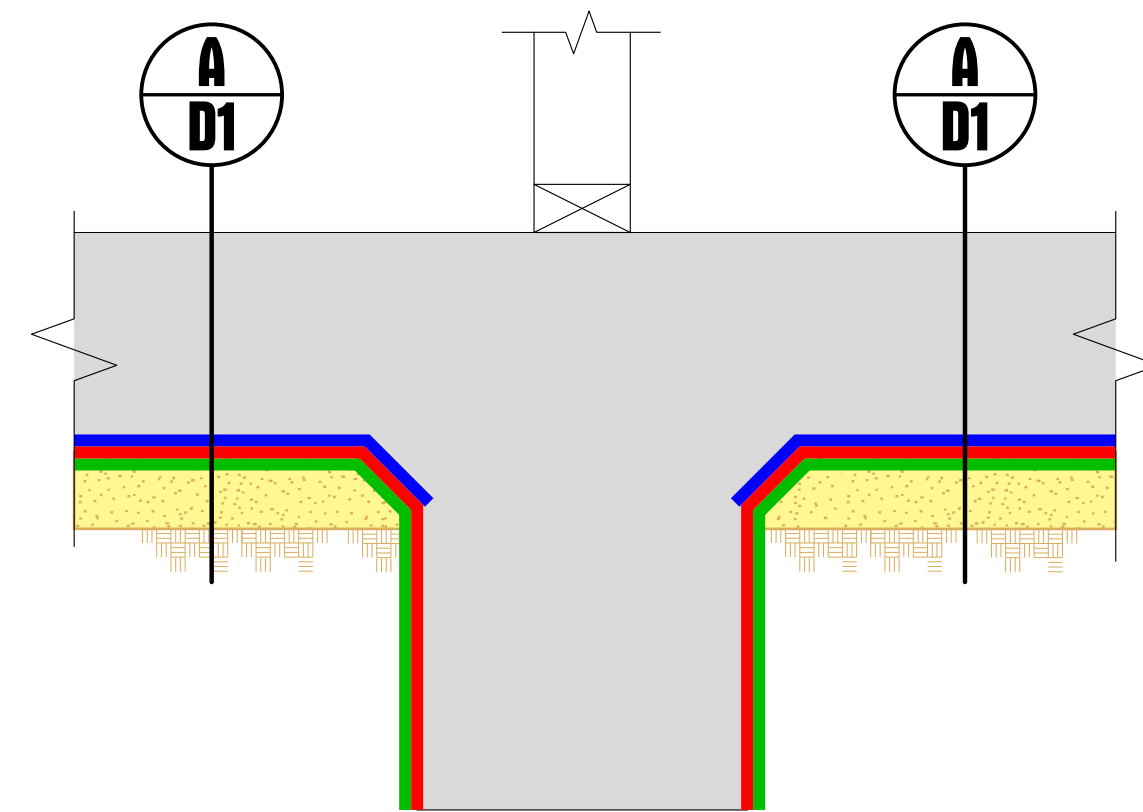
B Specifications for Sand



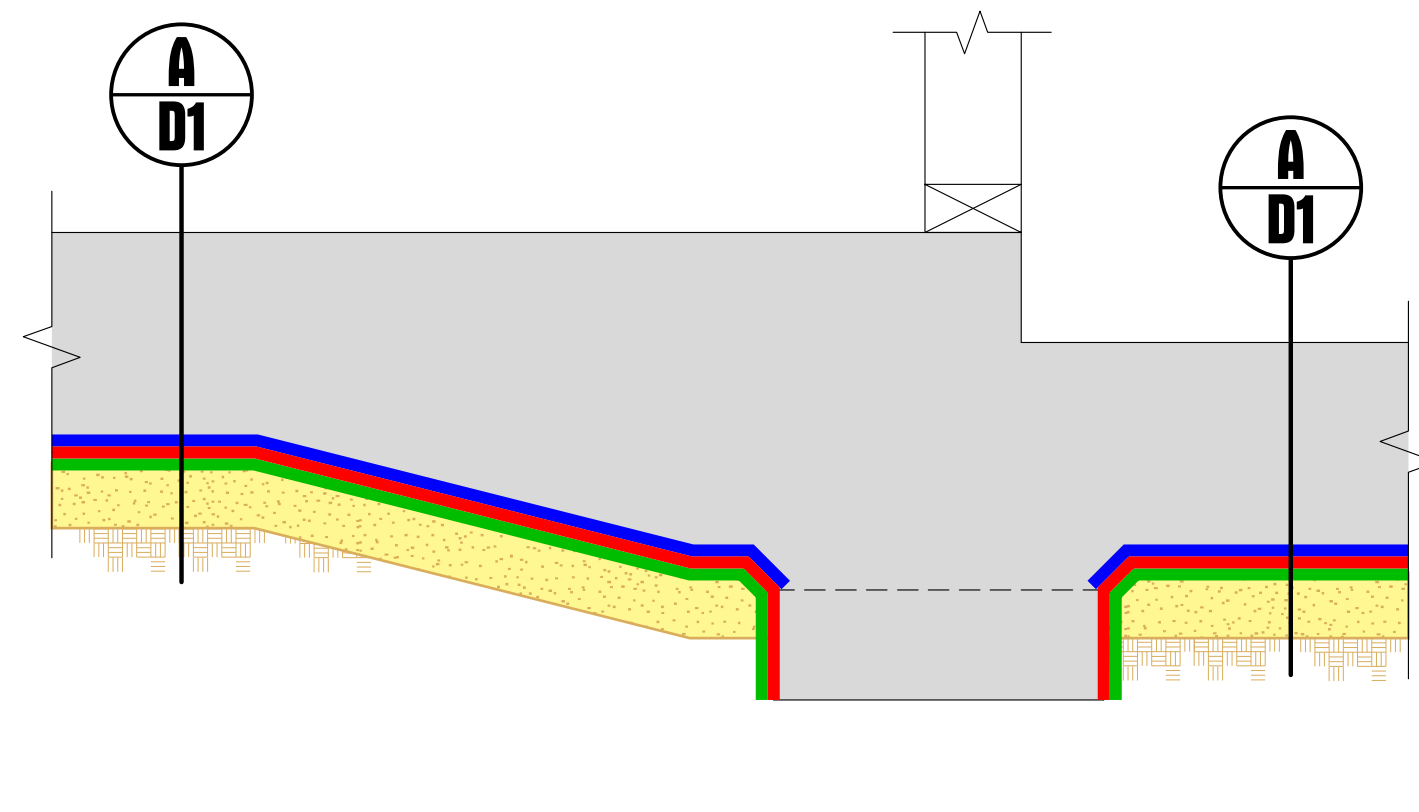
C Typical Gas Membrane at Exterior Footing
Not to Scale



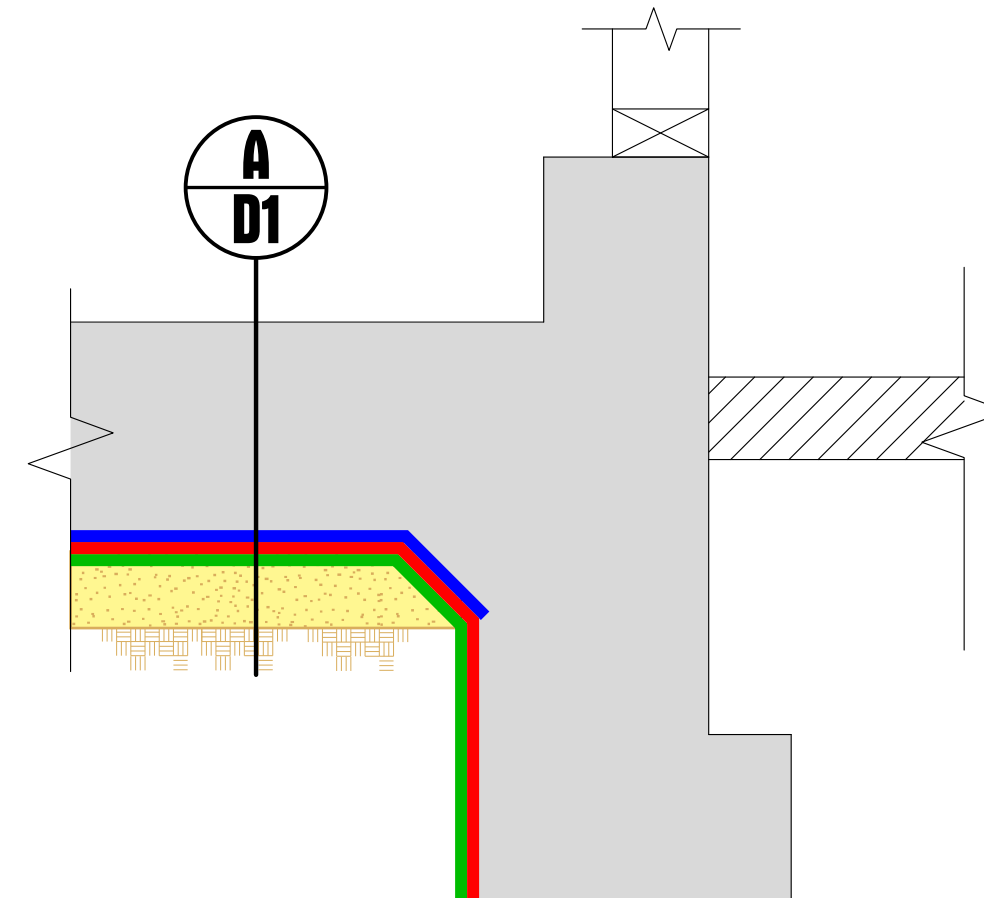
D Typical Gas Membrane at Exterior Garage Door
Not to Scale



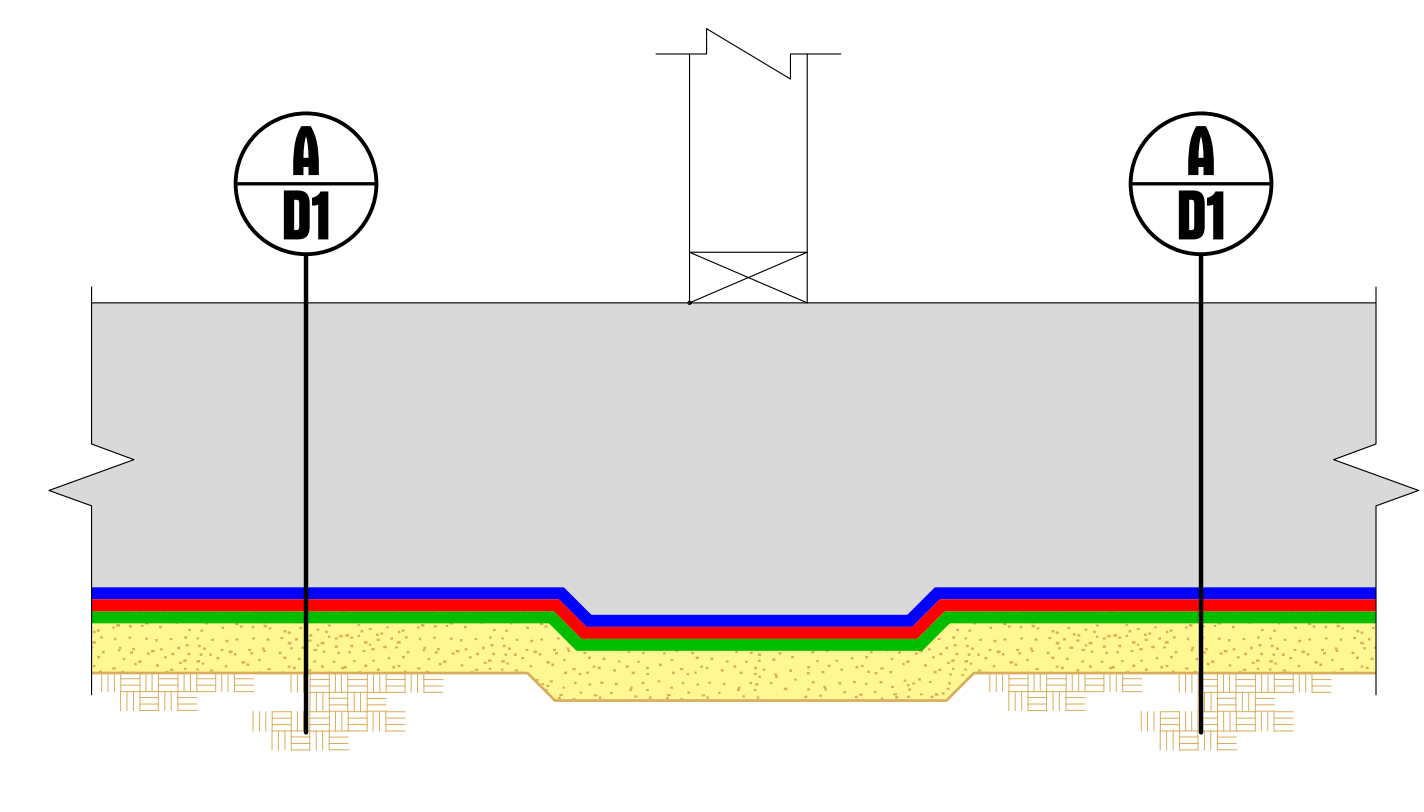
E Typical Gas Membrane at Interior Footing
Not to Scale



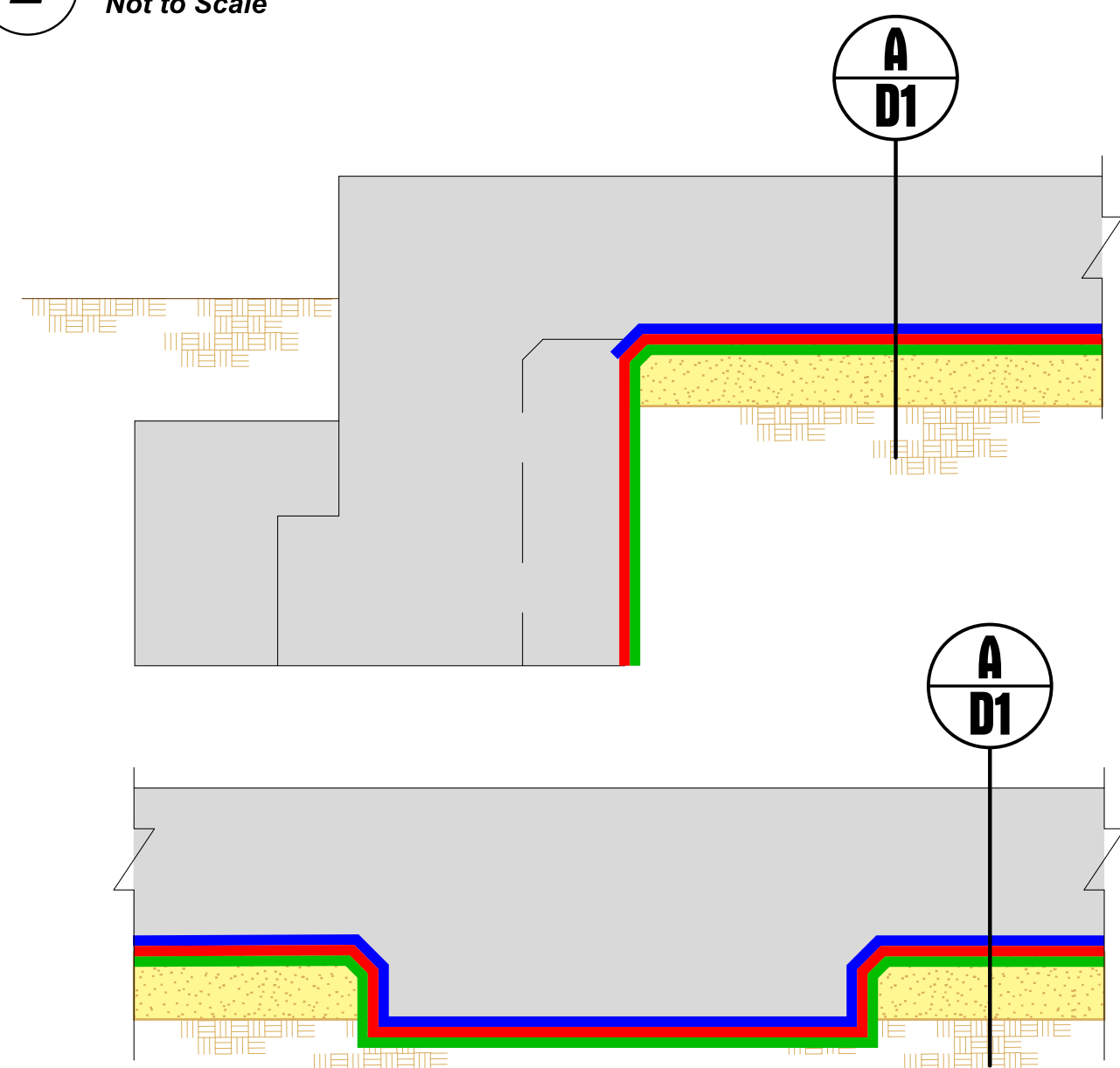
F Typical Gas Membrane at Slab Step
Not to Scale



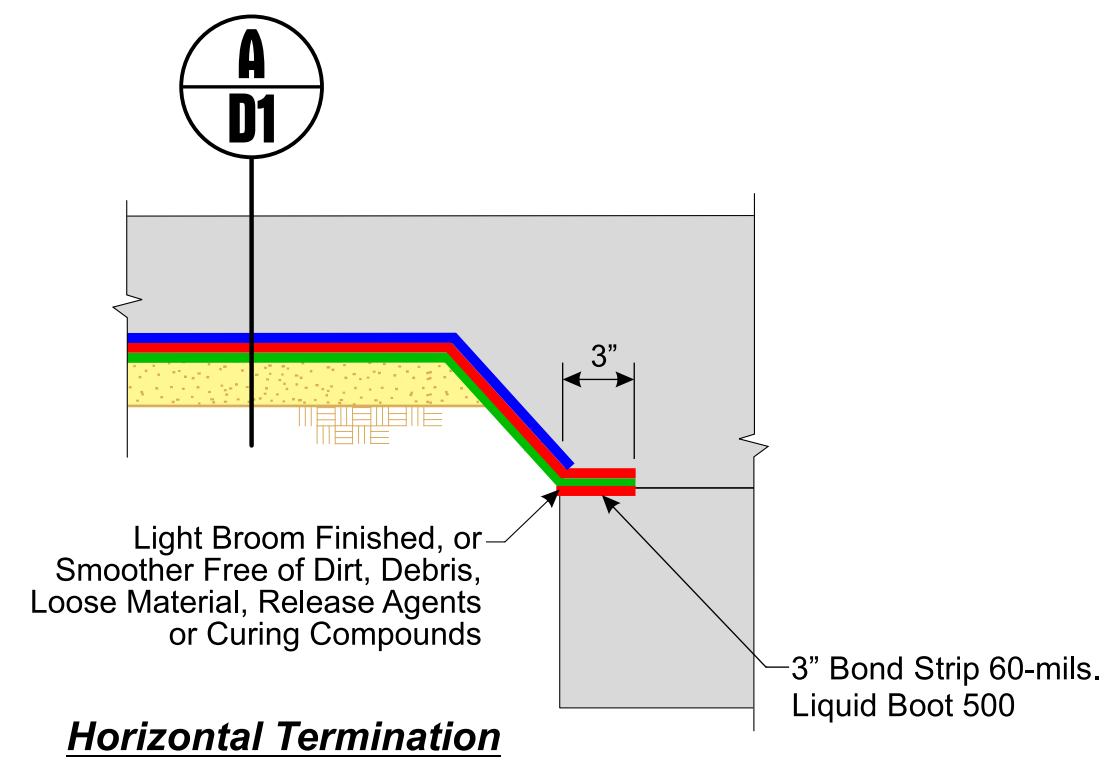
G Typical Gas Membrane at Ext. Wall
Not to Scale



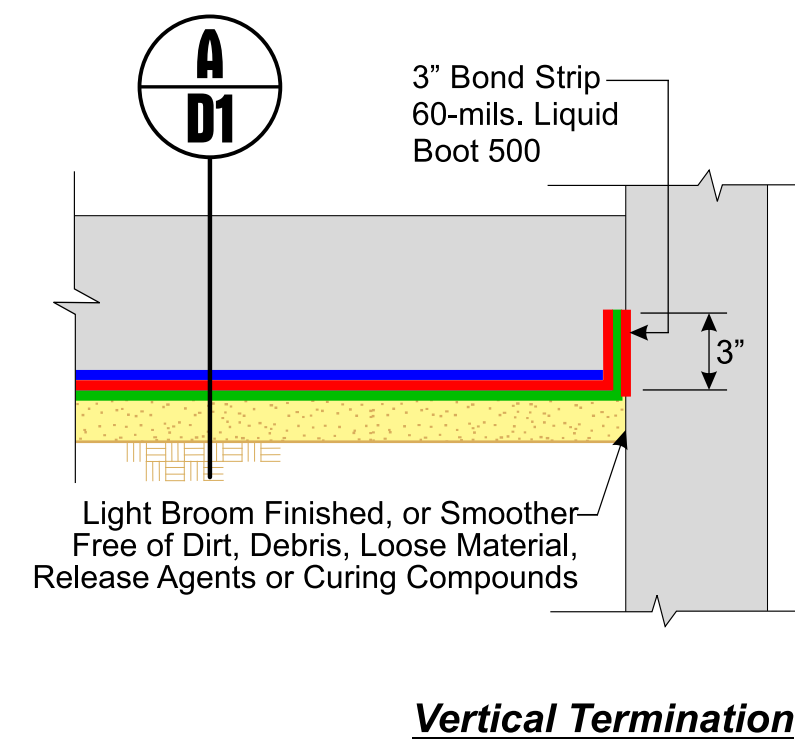
H Typical Gas Membrane at Interior Wall
Not to Scale



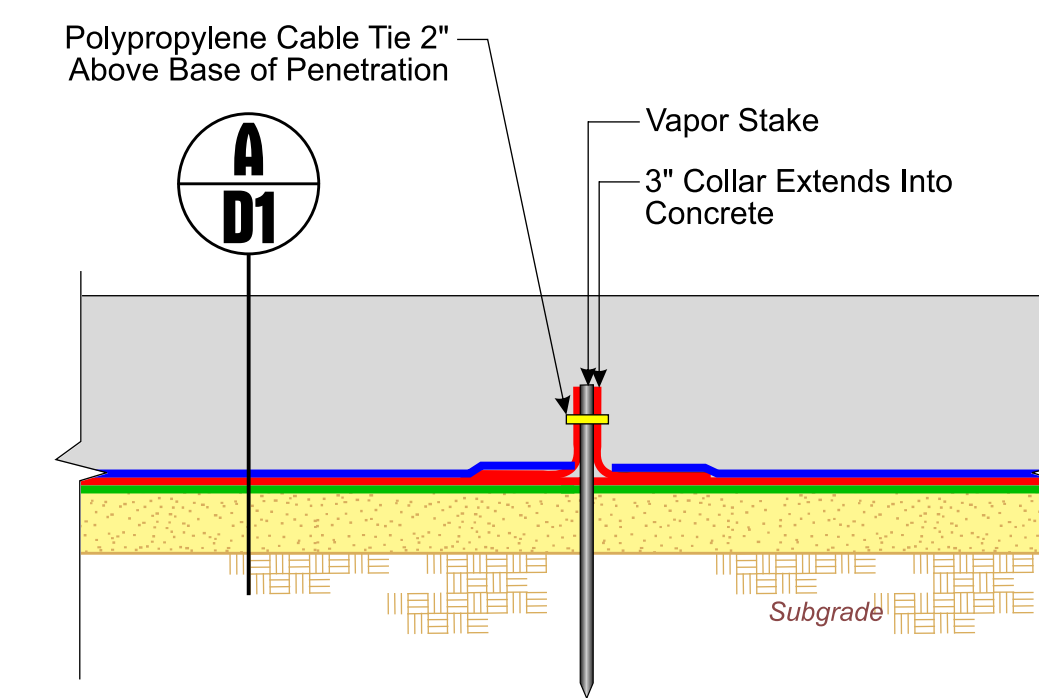
I Typical Gas Membrane at Pad Footing
Not to Scale



J Typical Gas Membrane Termination Detail
Not to Scale



K Typical Staking Detail
Not to Scale



VaporStake, LLC

VaporStake™ Description

- Non-corrosive, leak-resistant, permanent, plastic stake
- 18", 24", 30", 36" and 48" lengths
- 3/4" and 1" diameters
- Made of solid recycled PVC for LEED credit
- Acts as a permanent plug in the vapor retarder
- Helps meet ASTM E 1643-11

When used with vapor retarder's sealing mastic

- Pre-pointed
- Pre-drilled holes for 16D duplex nails (18" no holes)
- Can be easily drilled in field for additional holes
- Made in the USA
- A Patent Pending Product
- builditgreen.org approved

VaporStake™ Installation

- Use the VaporStake™ as you would a typical stake
- Can be used with sprayed-on vapor retarders or polyolefin vapor retarders
- Seal the vapor retarder to the VaporStake™ as you would a pipe penetration
- Do not pull the stake out
- Using a power saw, cut the stake off above the seal, but below the concrete's finished surface
- The lower portion of the VaporStake™ remains in place, permanently plugging the penetration
- Always use proper safety equipment and procedures

VaporStake™ Availability

- Sold wholesale only
- 25 stakes per bundle for easy carrying
- To contact email: info@vaporstake.com or call: (714) 519-4211

Notes:

Field Situations Not Specially Detailed Shall be Handled Per the Intent of These Plans and Specifications With the Approval of the Methane/Vapor Engineer. The Applicator/Contractor May Submit Shop Drawings for Alternative Methods.

See Structural Foundation Plans for Complete Depth and Details of Footings. Depths of Footings Shown are Generalized, Actual Footing Depths May Vary.

Original Scale in Inches 0 1 2 3

Date	By	Rev.	Description
Revisions			

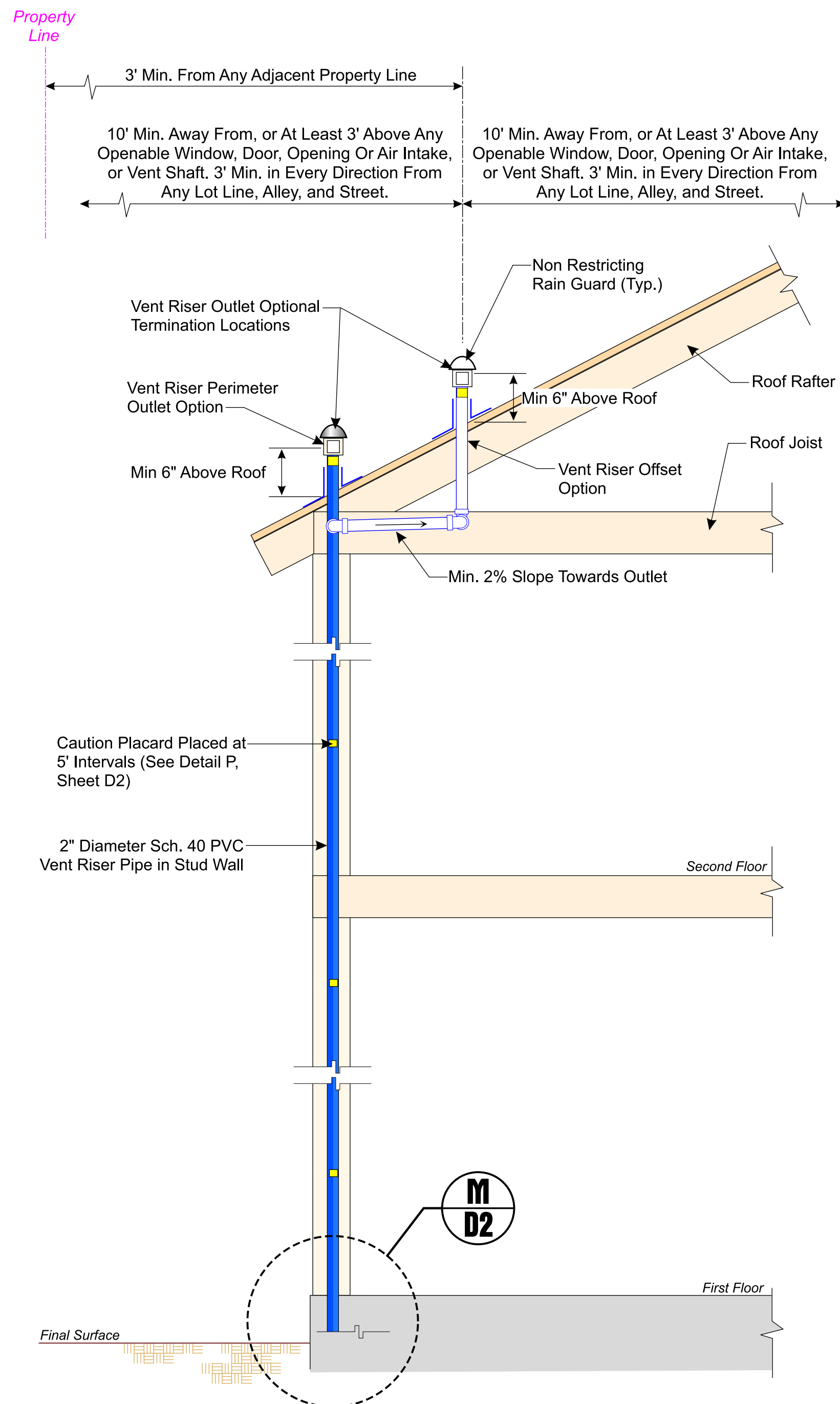
Preliminary
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GeoKinetics
Geotechnical & Environmental Engineers
77 Bunsen
Irvine, CA 92618
Tel: 949.502.5353
Fax: 949.502.5354

New Residence and ADU - 12550 Honolulu Terrace - Whittier, California

Gas Membrane and Vent Piping Details

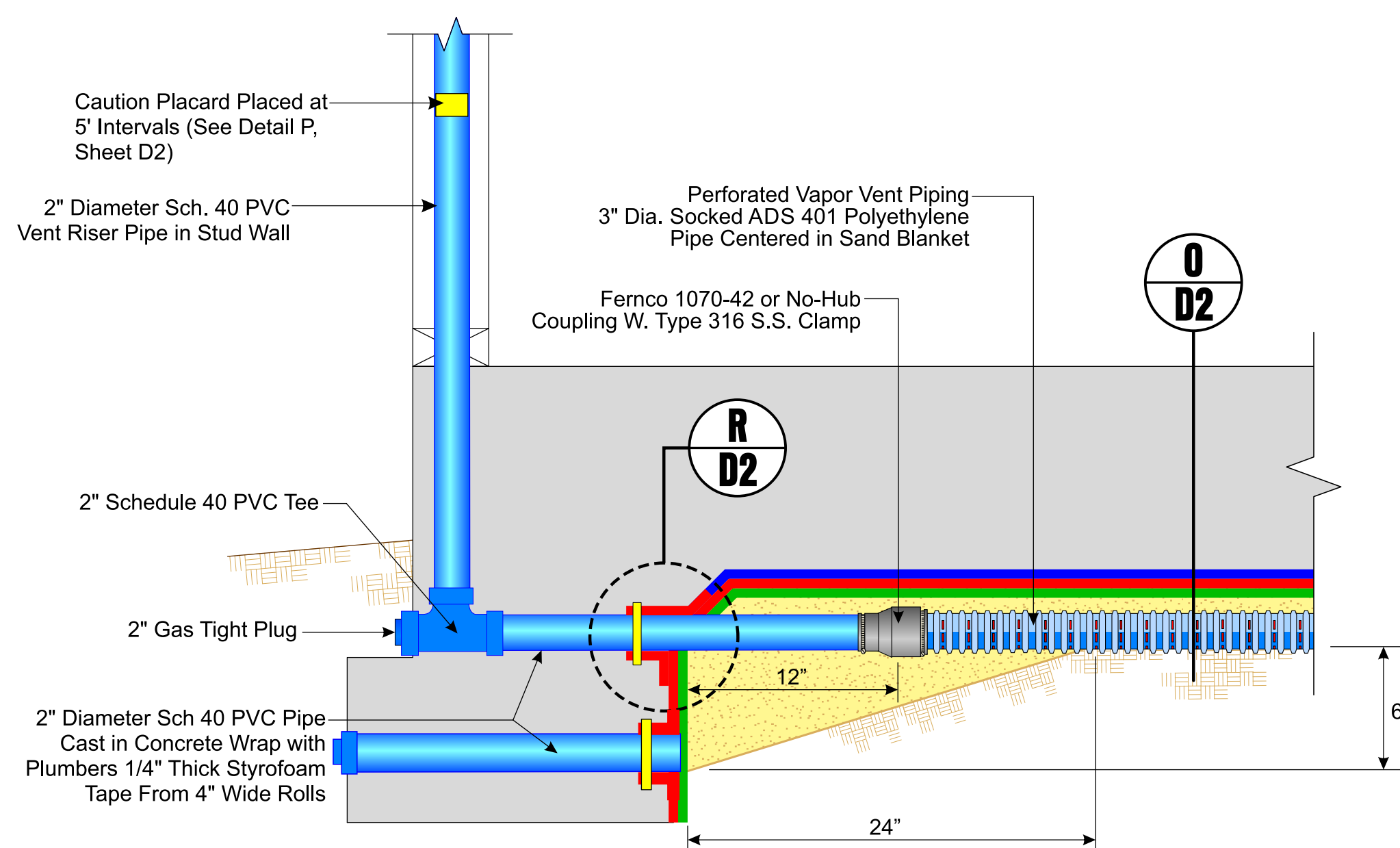
Sheet D1



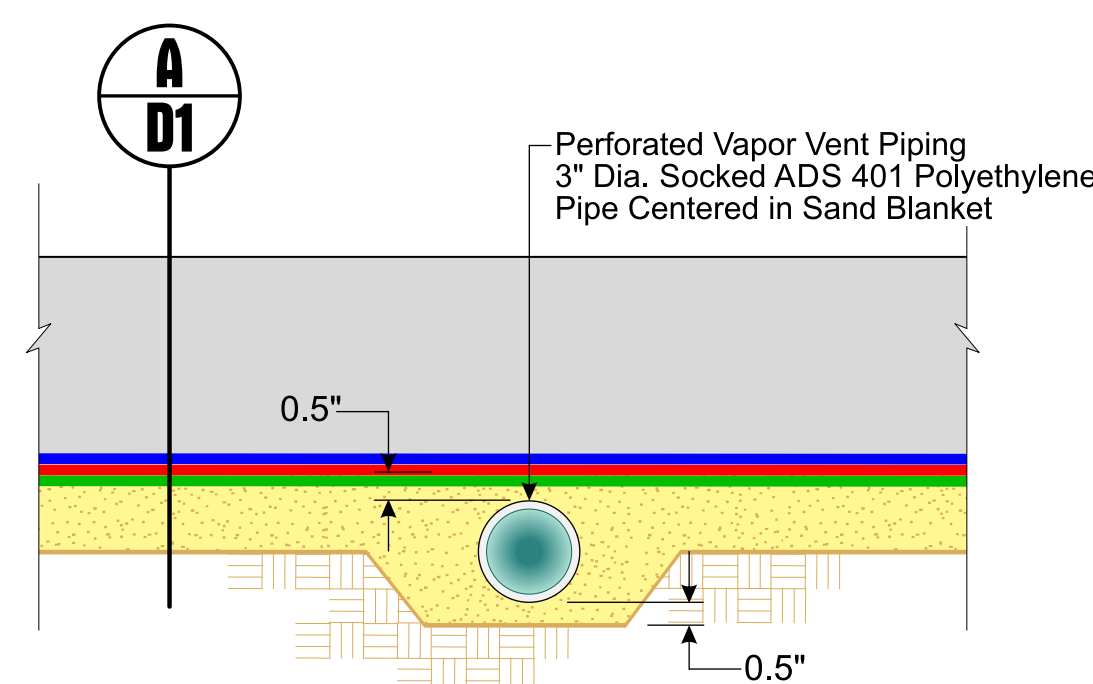
Note:

- Termination of Passive Vent Riser shall be as follows
 - 10' min. away from, or at least 3' above any openable window, door, opening or air intake, or vent shaft.
 - 3' min. in every direction from any lot line, alley, and street.
 - Extend through the vent flashing, 6" min. above the roof, and 1' min. from any parapet or building wall.
- Wrap all piping with approved material through the concrete slab or floor.
- Support all piping per Plumbing Codes.
- Vent Riser Shall be Finished with Roof Jack Similar to Sanitary Vent.
- No 90 Degree Bends in vent pipe above grade, minimum 2% Slope Towards Outlet.
- Pipe to be solvent welded or threaded above ground.
- All Vent Termination Locations Shall be Approved by the Architect.

L Typical Vent Riser to Roof Transition
Not to Scale



M Typical Vent Pipe to Vent Riser Transition
Not to Scale

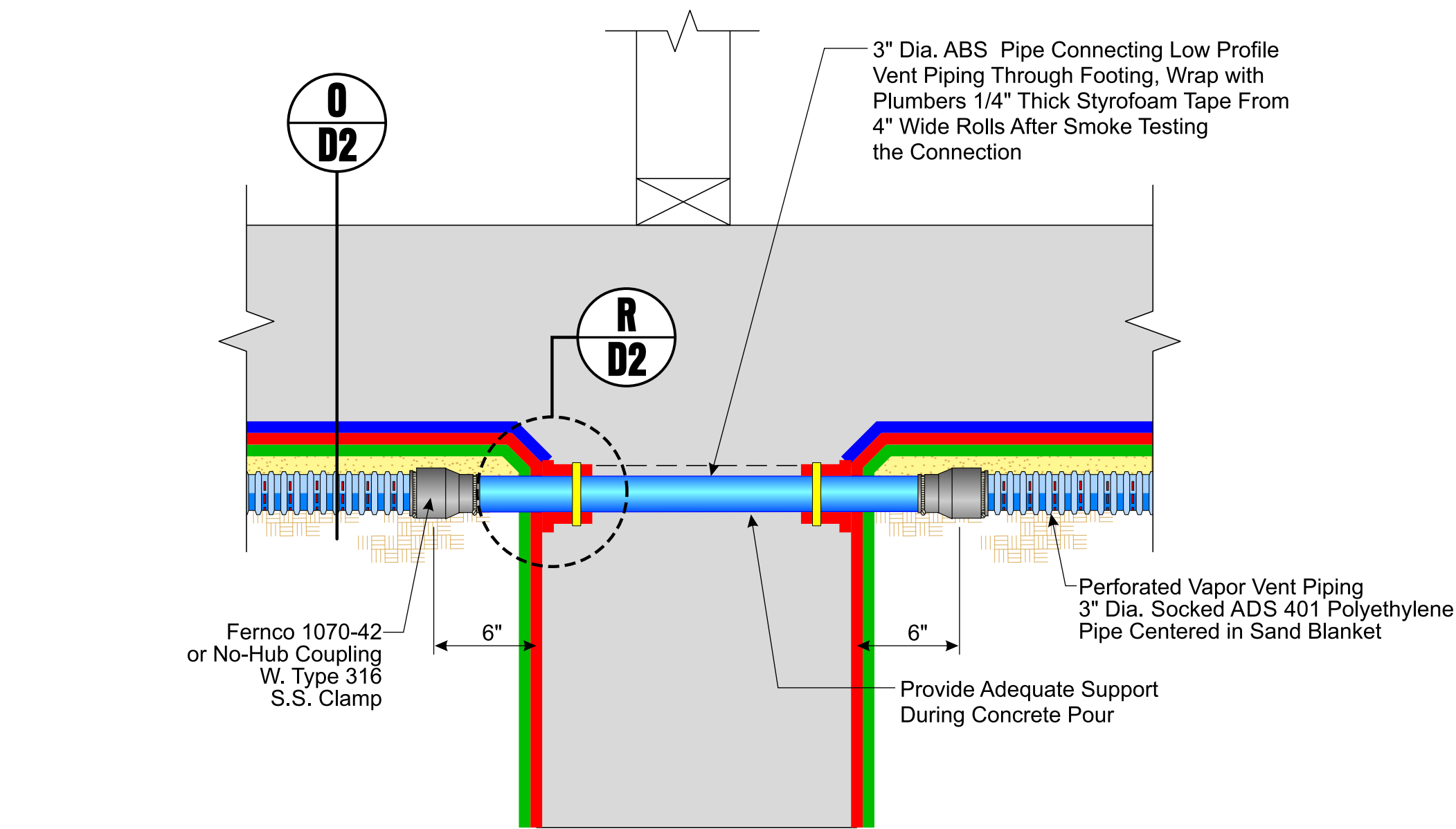


O Typical Sub-Slab Vent Piping Collection System
Not to Scale

CAUTION
METHANE GAS IN PIPE
IF DAMAGED
IMMEDIATELY NOTIFY
FIRE DEPARTMENT
NO SMOKING OR SPARKS
WITHIN 10 FEET

- 3"x4" Wide
- All Signs Plastic With Adhesive Backing.
- Large Letters Min. 1/2" High
- Red Letter on White or Yellow Background
- 3 Min. Required Per Vent Riser
- This Sign Shall Be Posted On Each Vent Riser at Approximately 5-Foot Vertical Intervals (Max.) and at Roof Outlet

P Typical Placard at Vent Pipe Outlet
Not to Scale

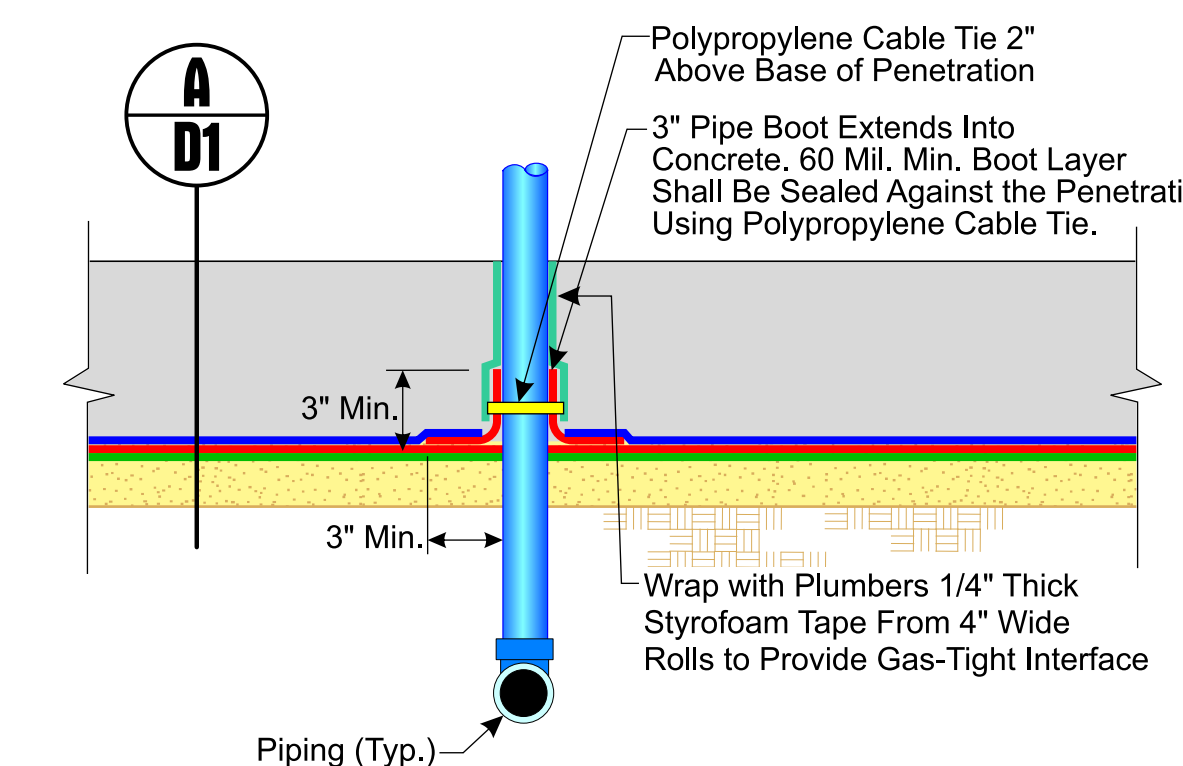


N Typical Vent Pipe Through Deepened Footing (If Encountered)
Not to Scale

WARNING
THIS BUILDING IS PROTECTED WITH A METHANE GAS CONTROL BARRIER. ANY PROPOSED PENETRATION OR ALTERATION OF FLOOR SLAB REQUIRES APPROVAL OF THE BUILDING DEPARTMENT AND INSPECTION BY A QUALIFIED ENGINEER

- This Notification is to be Permanently Stamped or Etched in the Surface of All Level A and Level B Garage Slabs at the Time it is Poured
- Location of Notification to be determined by Project Superintendent and Building Official
- All Letters 1/2" (Min.) in Height
- 1 Required per Home

Q Typical Gas Membrane Identification
Not to Scale



R Typical Gas Membrane at Pipe Penetration
Not to Scale

Notes:

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Original Scale in Inches for Reduced Plans 0 1 2 3

Date	By	Rev.	Description
Revisions			

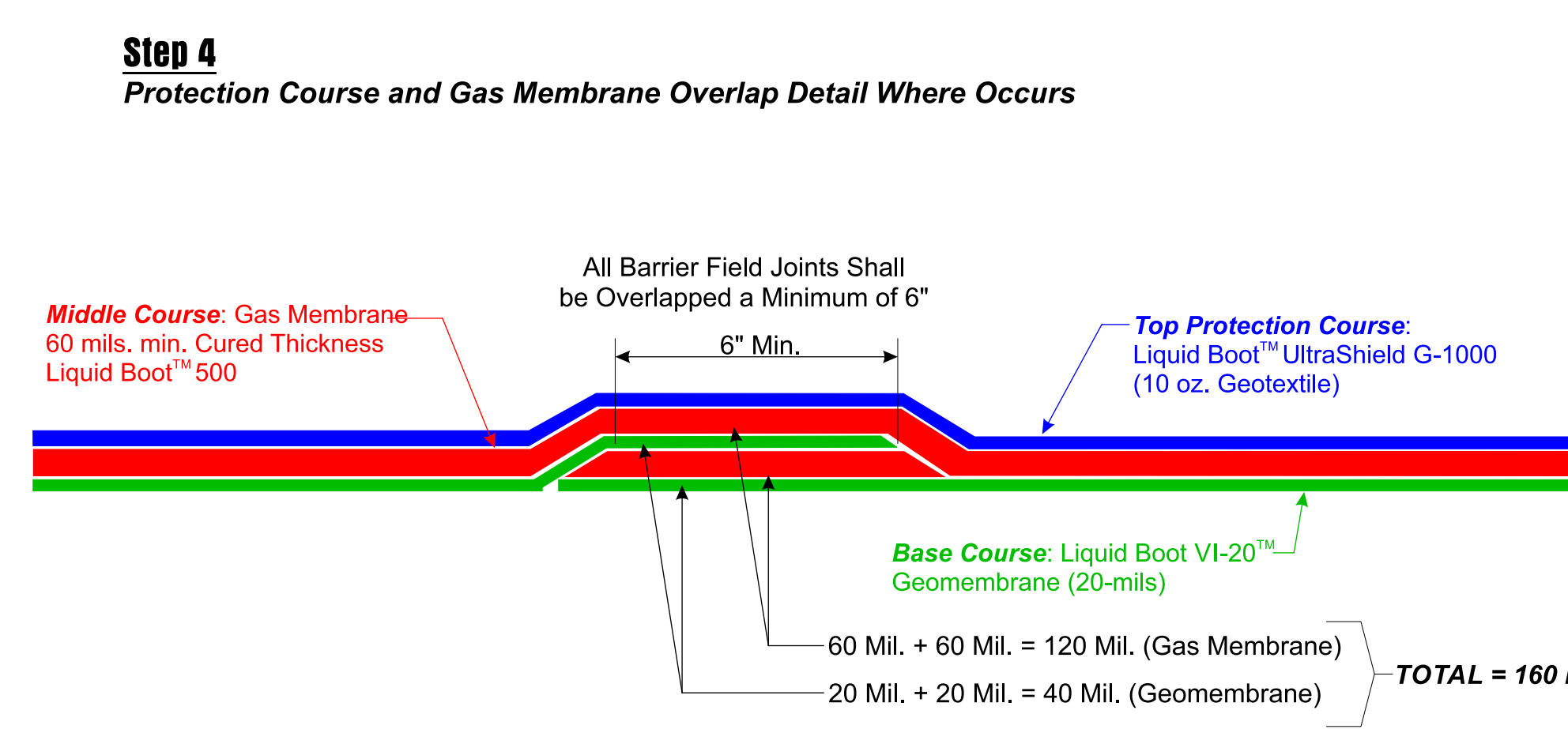
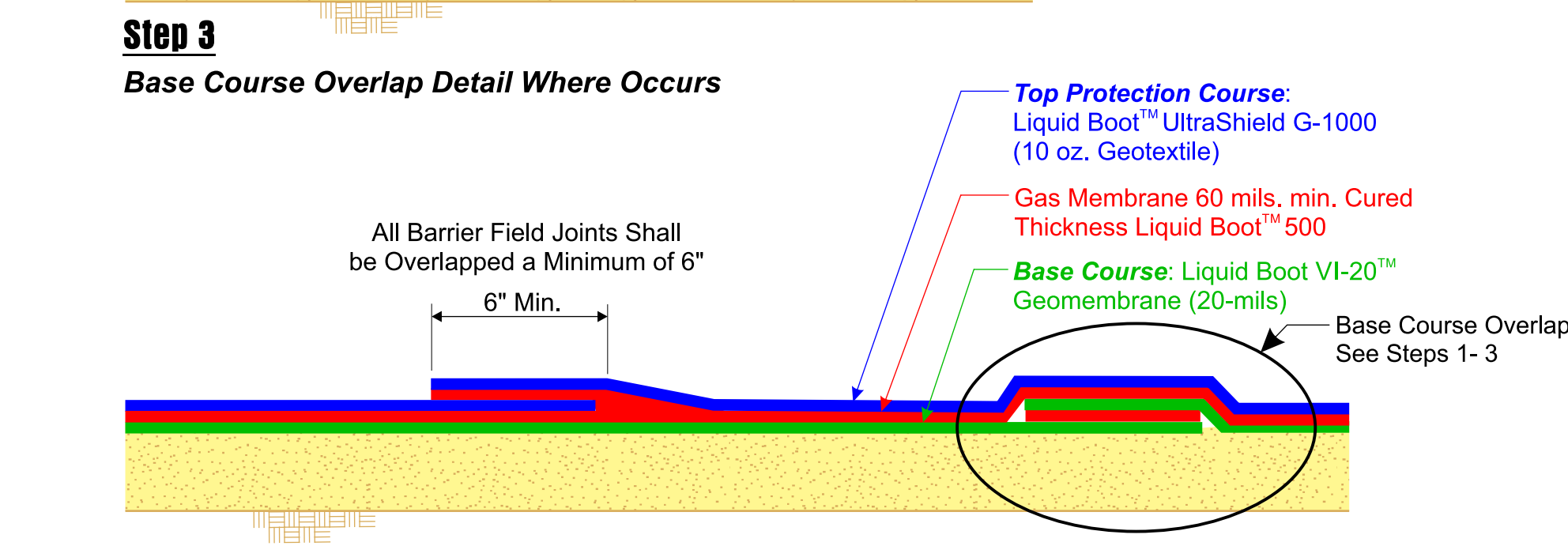
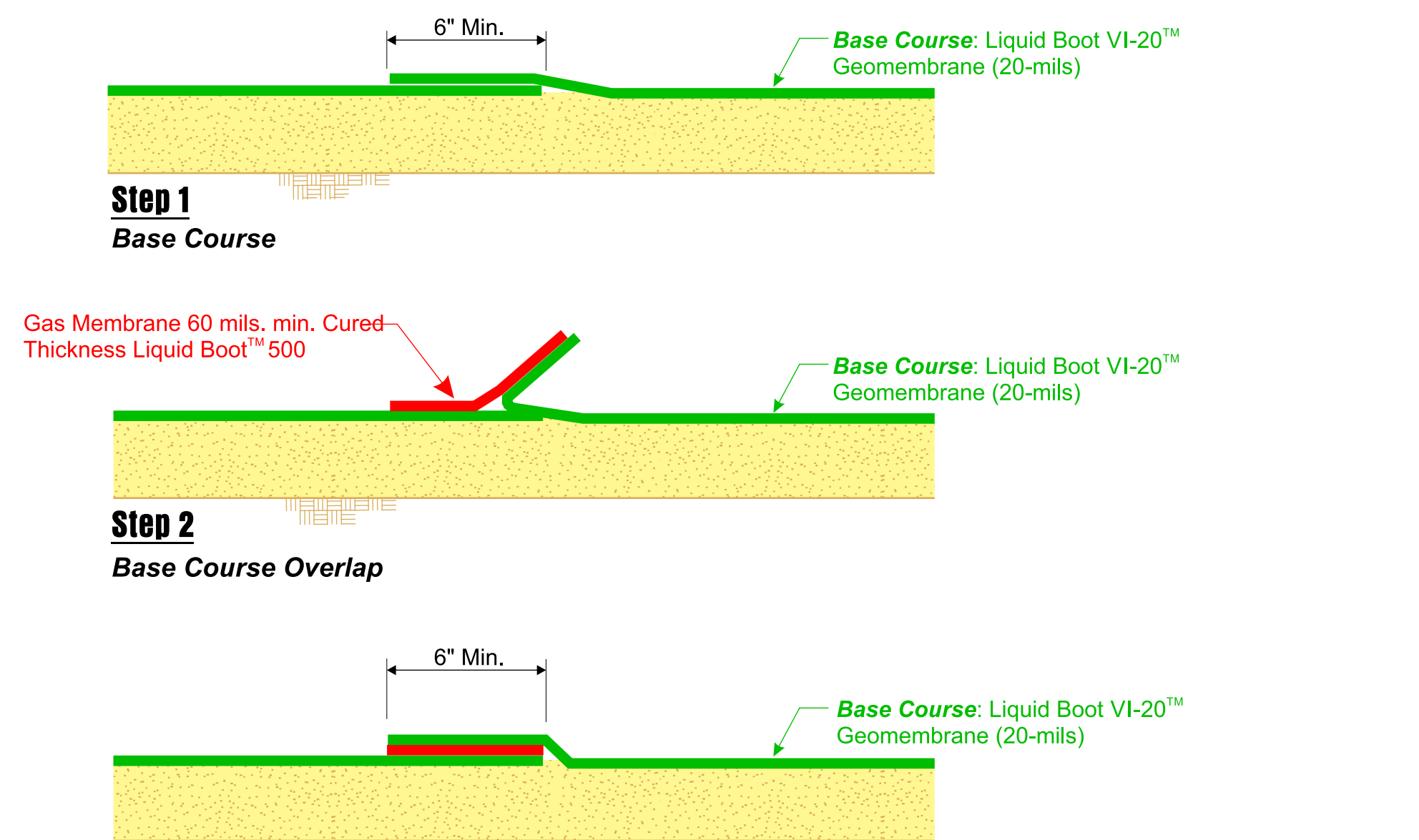
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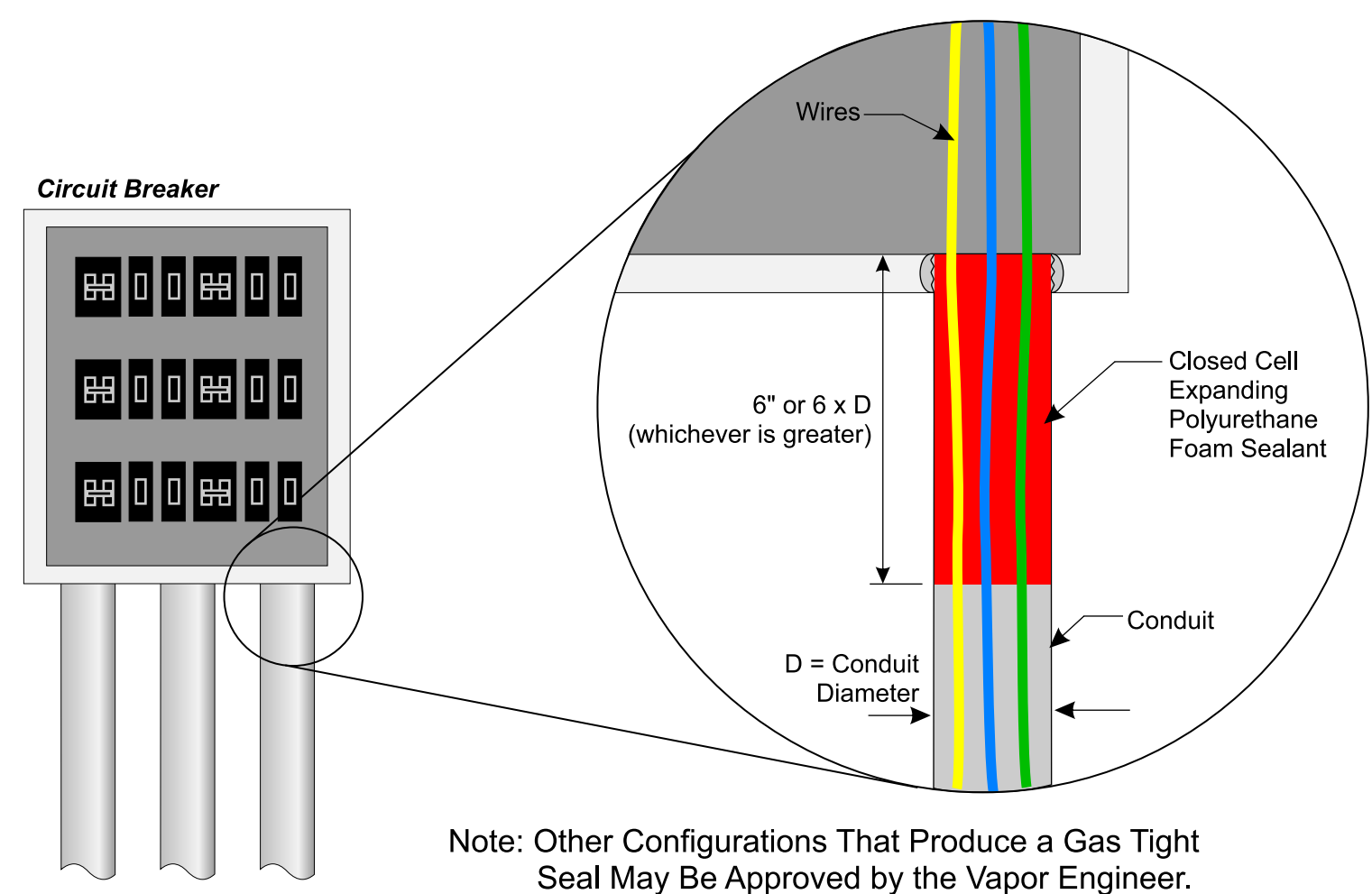
New Residence and ADU - 12550 Honolulu Terrace - Whittier, California

Gas Membrane and Vent Piping Details

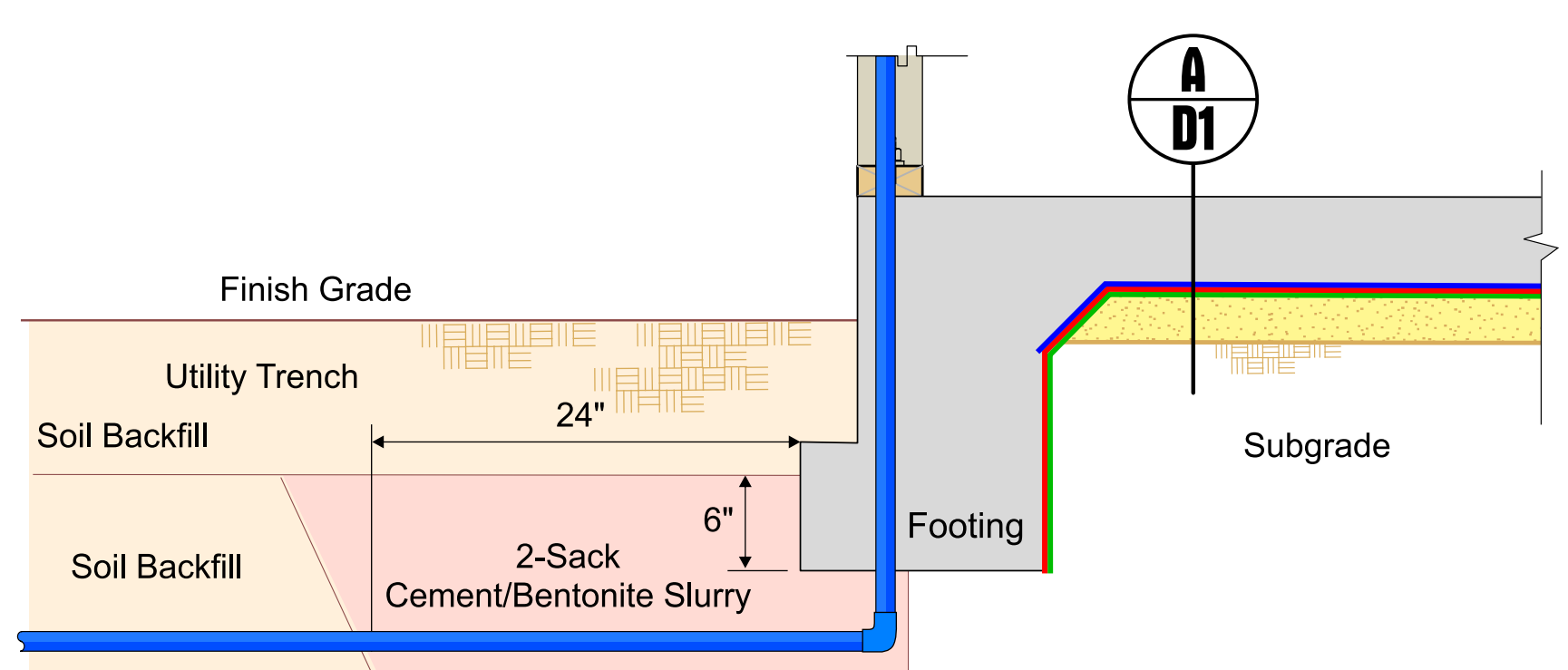
Sheet D2



S Typical Gas Membrane Overlap Detail & Process
Not to Scale



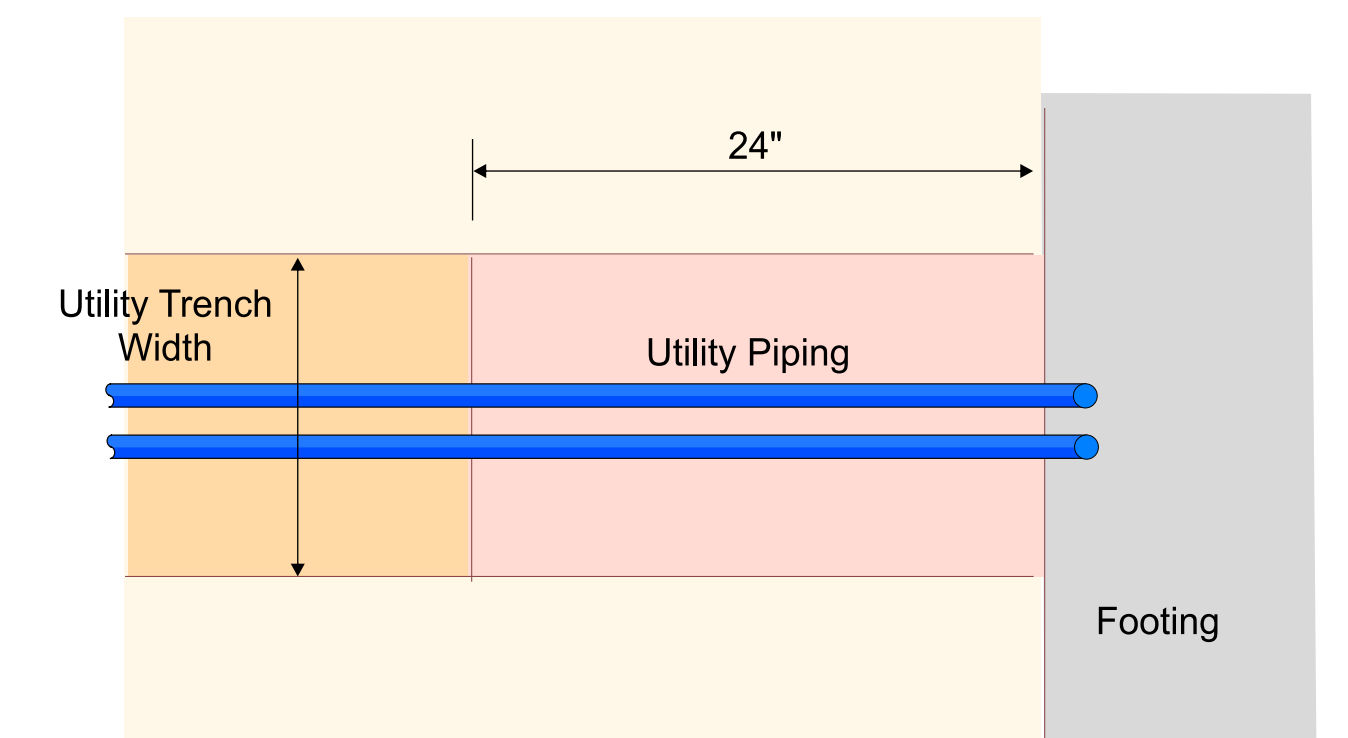
T Typical Conduit Seal Detail
Not to Scale



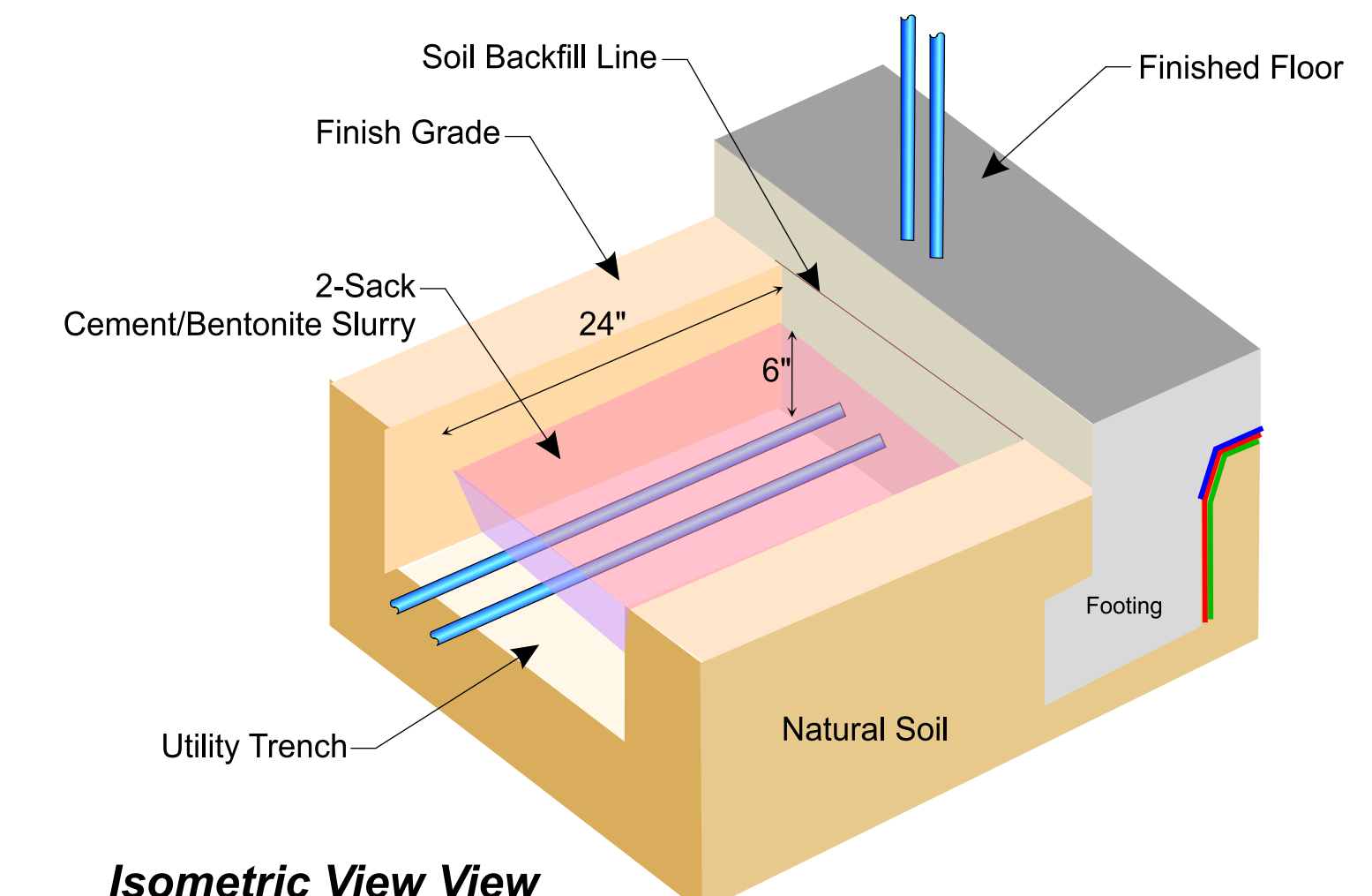
Utility Trench Dams

Utility Trench Dams

- A. A gas migration barrier shall be installed in all utility trenches that extend beneath the house foundation from areas outside the perimeter of the home.
- B. The gas migration barrier shall be installed in the utility trench immediately adjacent to the exterior perimeter of the house foundation.
- C. The gas migration barrier shall consist of one of the following:
 1. A minimum 2-foot continuous length of Sand Slurry consisting of a mixture of 4% Type II Cement, and 2% powdered bentonite by weight. The slurry shall extend from the bottom of the trench to a level of 6-inches above the base of the adjacent footing.
 2. A minimum 5-foot continuous length of native soil backfill compacted to at least 90% Relative Compaction in accordance with ASTM D-1557 testing procedures. The compacted soil backfill shall extend from the bottom of the trench to a level at least 6" above the base of the adjacent footing.



Plan View



Isometric View View

U Typical Utility Trench Dam
Not to Scale

Notes:

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Original Scale in Inches for Reduced Plans 0 1 2 3

Date	By	Rev.	Description
Revisions			

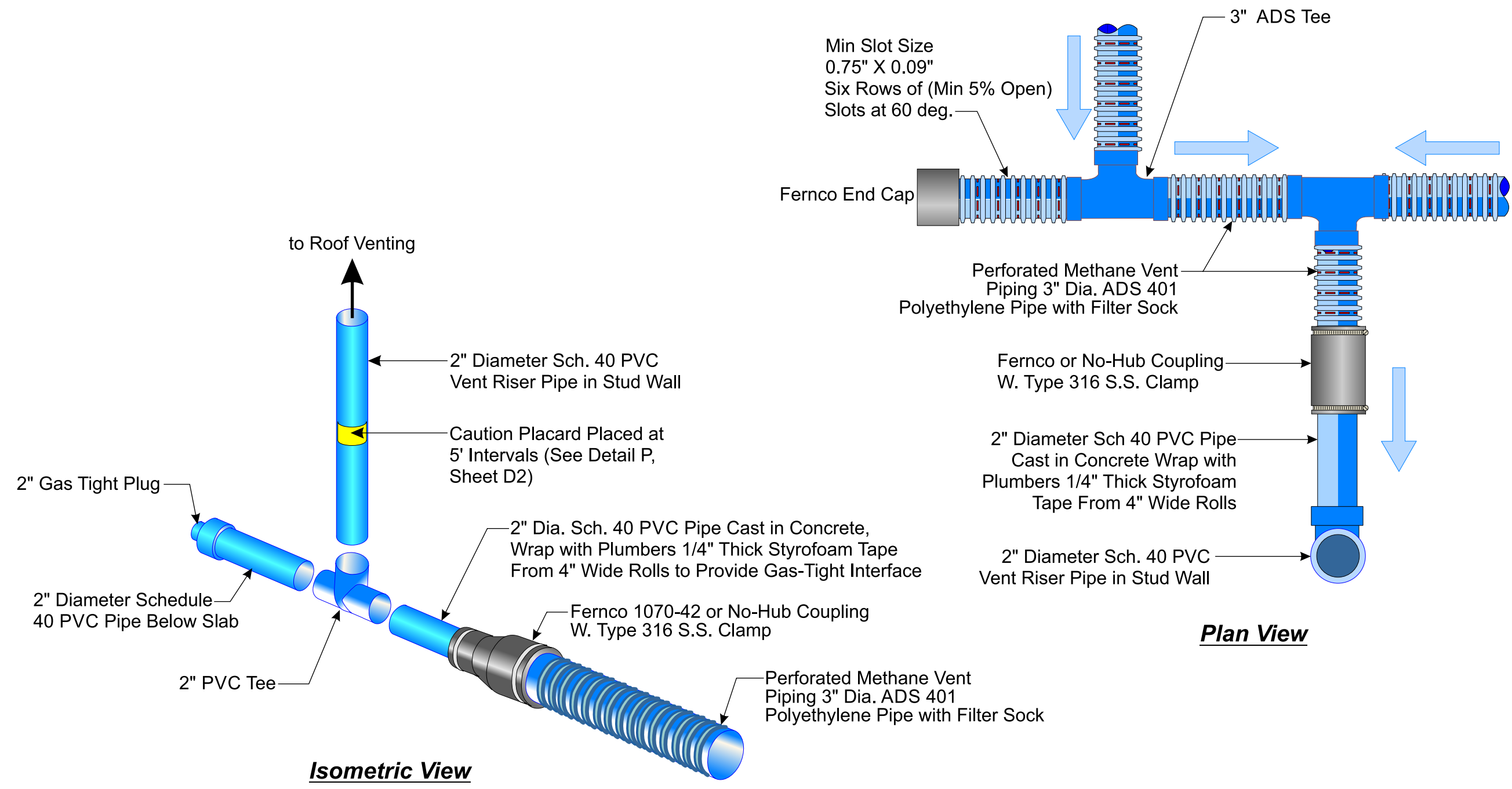
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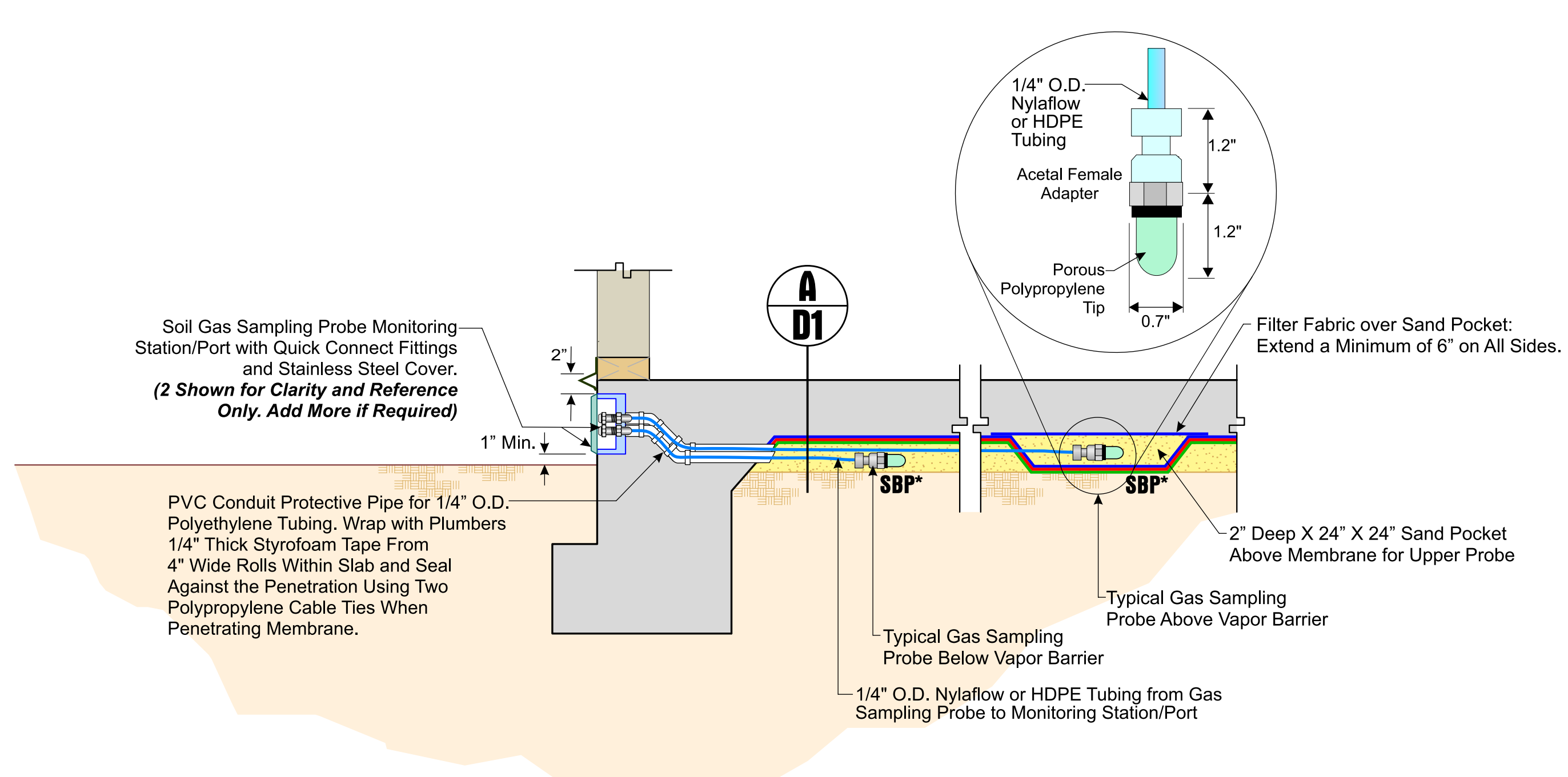
New Residence and ADU - 12550 Honolulu Terrace - Whittier, California

Gas Membrane and Vent Piping Details

These drawings and specifications and the ideas, designs, and arrangements represented on these plans are and shall remain the property of Geokinetics and no part thereof shall be copied, reproduced in part or in whole, or used in connection with any other work or project other than the specific project for which they have been prepared and developed without the expressed written consent or permission of Geokinetics.



V Typical Low Profile Sub-Slab Vent System Components
Not to Scale



W Typical Sub-Slab Vapor/Gas Sampling Probe Monitoring Detail
Not to Scale

TECHNICAL DATA

VI-20™ GEOMEMBRANE

HIGH-PERFORMANCE VAPOR INTRUSION BARRIER

DESCRIPTION
VI-20™ is a 7-layer co-extruded geomembrane made using high quality virgin grade polyethylene and EVOH resins that provide unmatched impact strength as well as superior resistance to VOC vapor transmission. EVOH technology serves as a highly resilient, underlaid and vertical wall barrier designed to resist methane, radon and other harmful chemicals. Applications for EVOH originated in the manufacturing of automotive fuel systems to control emissions of hydrocarbons, whose use was mandated by the US EPA and the CA Air Resources Board (ARB) to reduce VOC emissions.

APPLICATION
VI-20™ is a 20 mil, high performance polyethylene-EVOH copolymer geomembrane, specially designed for use as a VOC barrier when used in conjunction with Liquid Booth® spray-applied vapor intrusion membrane to minimize vapor intrusion and radon gas entry from hydrocarbon, radon, migration into buildings. VI-20™ is ideal for applications with chlorinated solvents, BTEX and other HAPs.

BENEFITS
Polyethylene layers provide excellent chemical resistance and physical properties. EVOH barrier technology provides superior protection against diffusion of chemicals when compared to typical HDPE geomembranes. Manufactured to ISO 9001:2008 certified plant.

INSTALLATION
For use as a component of the Liquid Booth® Plus system, VI-20™ geomembrane is rolled out on prepared sub-grade, overlapping seams a minimum of six inches (6"). The geomembrane is cut around penetrations so that it lays flat on the sub-grade and tight at all inside corners. A thin (20 mil) back coat of Liquid Booth® F/A™ side without catalyst is sprayed within the seam overlap. Once the VI-20™ geomembrane is installed, penetrations are then treated with VI-20™ Detailing Fabric prior to installation of the Liquid Booth® spray-applied vapor intrusion membrane and using a 10000 protection course.

PACKAGING
VI-20™ geomembrane is available in the following packaging options:
• 50 ft x 120 ft (5 m x 4.3 m) Rolls

NOTE:
These are typical property values.

North America: 847.551.1800 | 800.527.9945 | www.cetco.com
UPDATED: MAY 2017

X CETCO VI-20™ Geomembrane Specifications
Not to Scale

TECHNICAL DATA

VI-20™ GEOMEMBRANE

HIGH-PERFORMANCE VAPOR INTRUSION BARRIER

VI-20™ CHEMICAL & PHYSICAL PROPERTIES

CHEMICAL PROPERTY	TEST METHOD	RESULT
Benzene Diffusion Coefficient	EPA Method 8260	4.5 x 10 ⁻¹³ m ² /s
Ethylbenzene Diffusion Coefficient	EPA Method 8260	4.0 x 10 ⁻¹³ m ² /s
m,p-Xylenes Diffusion Coefficient	EPA Method 8260	3.7 x 10 ⁻¹³ m ² /s
Methane Permeance	ASTM D1434	< 1.7 x 10 ⁻¹³ m ³ /d·atm
o-Xylene Diffusion Coefficient	EPA Method 8260	3.7 x 10 ⁻¹³ m ² /s
Radon Diffusion Coefficient	SP Test Method	< 0.25 x 10 ⁻¹³ m ² /s
Toluene Diffusion Coefficient	EPA Method 8260	4.2 x 10 ⁻¹³ m ² /s

PHYSICAL PROPERTY	TEST METHOD	RESULT
Membrane Composite Thickness	ASTM D5199	20 mil (0.5 mm)
Impact Resistance	ASTM D1709	2,600 g
Tensile Strength	ASTM E154 Section 9	58 lb/in (1.0 N/m)
Water Vapor Transmission	ASTM E154 & E96	0.004 grams/hr·ft ² (0.0028 g/hr·m ²)
Water Vapor Retarder Classification	ASTM E1745	Class A, B & C

Y Single Station CO/Gas Ceiling Mounted Sensor
Not to Scale

Kidde

AC Powered, Plug-In CO/Gas Combination Alarm w/ Battery Backup

Part Number 900-0113 Model KN-COEG-3

Digital Display
Displays the level of carbon monoxide the unit is sensing.

Test/Reset Button
Tests unit's electronic circuitry operation and allows you to immediately silence the alarm.

Peak Level Memory
Recalls the highest CO concentration detected.

Alerts user to replace CO alarm after 7 years of operation

Description
The Kidde 900-0113 AC powered, plug-in CO and explosive gas alarm protects you and your family from two deadly threats. The 900-0113 includes 9V battery back up that provides protection during a power outage, when AC-only units can not provide protection. By pressing the Peak Level Button you can see the peak CO level recorded by the alarm since it was last reset or unpowered. The continuous digital display shows you the level of carbon monoxide (if any) the unit is sensing as well as if gas is present. The gas sensor is a metal oxide sensor designed to detect natural gas (methane) or propane.

Alarm
• **Sounder Alarm** - The 900-0113 offers a loud 85-decibel warning alarm that will sound to alert you to a potential problem.

Alarm Condition
• **Carbon Monoxide** - 4 quick beeps, followed by 5 seconds of silence, followed by 4 quick beeps. Repeat with a number showing in the display (CO concentration in ppm).
• **Gas** - one second of alarm on, one second of alarm off, repeating with "GAS" shown in display.

Consumer Benefits
The Kidde 900-0113 provides you and your family a level of protection that you have come to expect in a Kidde product. The alarm is easily installed in any of your AC-wired outlets, giving you the choice of a direct plug, a 6' power cord or a table top unit. Depending on how or where you wish to mount your unit, you can get exactly what you need for a perfect application. The 900-0113 is UL listed and offers a 7-year life and a 5-year limited warranty.

Ordering Information
Claim Sheet UPC: 7-84908-0130-5

Part Number	1 of 5	Peak Quantity	Dimensions (in x d x h in inches)	Weight	Case Size	Layers/Case	Skid Weight
900-0130-5	100	1000	7.25 x 2.25 x 11.25	1.5 lbs	100	100	100
900-0130-02	107	84908-0130-2	RFD 12 units	7.75 x 4.5 x 12	3.56 lbs	100	3
900-0130-16	297	84908-0130-9	Cut Case (12 units)	16 x 18 x 12	16.67 lbs	18	5
900-0130-37	307	84908-0130-6	Power Tower (26 units)	20 x 24 x 41 (incl. pallet)	40 lbs	3	120 lbs

Kidde
1916 Commerce Park Drive
Mebane, NC 27552
1-800-886-6795
www.kidde.com

AC Powered, Plug-In CO/Gas Combination Alarm
Part Number 900-0113 Model KN-COEG-3

Architectural and Engineering Specifications
The carbon monoxide and explosive gas alarm shall be Kidde Unit Number KN-COEG-3 (Part Number 900-0113) or approved equal. It shall be powered by a 120VAC, 60 Hz source along with a 9V battery back up. The temperature operation range shall be between 40°F and 100°F (4°C and 38°C) and the humidity operating range shall be 20% to 95% relative humidity.
The CO sensor shall be of a fuel cell design and shall meet the sensitivity requirements of Underwriters Laboratories (UL) 203A Single and Multiple Station Carbon Monoxide Detectors. The unit shall provide accuracy of ±20% +15 ppm when reading CO concentration levels.
The gas sensor shall be of a metal oxide sensor designed to detect natural gas (methane) or propane. The gas sensor shall be calibrated to alarm before 2% of the LEL.
The alarm shall include an attached plug that can be installed in any outlet following the UL/ANSI/Manufacturer's recommended guidelines. The plug can be stepped into the back of the unit and shall be capable of being rotated so the alarm remains vertical independent of whether the electrical socket is mounted vertically or horizontally. In addition, the alarm plug will have an attached extension cord so the unit can be plugged into the wall outlet and then placed on a table or shelf.
The unit shall incorporate a digital display that meets the sensitivity requirements of UL203A. The display will identify the levels of CO in parts per million (ppm) once that level reaches 30ppm (i.e. "Abnormal" level). The display will identify "GAS" if gas is present. The display will have a red LED in the lower right corner that will blink to indicate the normal operation.
The alarm shall include a test button that will electronically simulate the presence of CO or GAS and cause the unit to go into alarm (the equivalent with the unit's electronic sensor).
The alarm shall include a peak level memory feature that will store the peak CO level sensed once the unit was last reset. The peak CO level stored in the unit's memory shall be displayed in ppm on the digital display by pressing the appropriate button on the unit. The memory shall also be capable of being reset.
The unit shall also include a low battery warning (using each of the following methods: a blinking dot will be displayed and the sounder will chirp every 15 seconds, the display will alternate between "Low Battery" and CO reading while chirping).
The unit shall be listed to UL 203A. It shall also include a 5-year manufacturer's limited warranty.

Technical Specifications
Part Number: 900-0113
Model: KN-COEG-3
UPC Number: 7-84908-0130-5
Power Source: 120VAC
Sensor: Electrochemical
Audio Alarm: 85dB at 10ft
Temperature Range: 40°F (4°C) to 100°F (37.8°C)
Humidity Range: 5%-95% relative humidity (RH)
Size: 6.1" L x 3.8" W x 1.8" H
Weight: 1.5 lbs
Interconnects: No
Wiring: Plug-In
LED: Displays CO concentration in PPM
Warranty: 5 year limited

Ordering Information
Claim Sheet UPC: 7-84908-0130-5

Part Number	1 of 5	Peak Quantity	Dimensions (in x d x h in inches)	Weight	Case Size	Layers/Case	Skid Weight
900-0130-5	100	1000	7.25 x 2.25 x 11.25	1.5 lbs	100	100	100
900-0130-02	107	84908-0130-2	RFD 12 units	7.75 x 4.5 x 12	3.56 lbs	100	3
900-0130-16	297	84908-0130-9	Cut Case (12 units)	16 x 18 x 12	16.67 lbs	18	5
900-0130-37	307	84908-0130-6	Power Tower (26 units)	20 x 24 x 41 (incl. pallet)	40 lbs	3	120 lbs

Kidde
1916 Commerce Park Drive
Mebane, NC 27552
1-800-886-6795
www.kidde.com

Kidde KN-COEG-3 (or approved equal) Single Station Methane & CO Sensor / Alarm shall be installed on First Floor of Each Home.

Notes:
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Not for Construction

Gas Membrane and Vent Piping Details

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Sheet D4