

Vapor Intrusion Mitigation Barriers

Concept, Design and Installation



Geo-Seal[®]

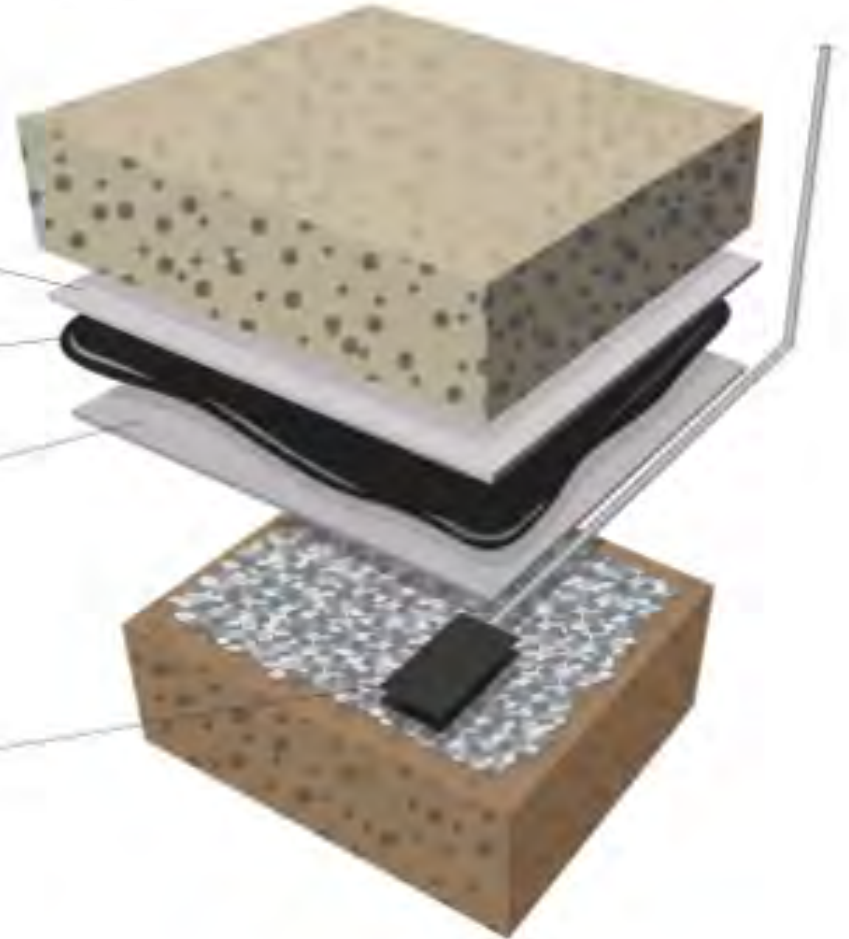
Vapor Intrusion Barrier

Geo-Seal Bond
(HDPE/Geotextile)

Geo-Seal Core
(spray applied
polymer modified
asphaltic membrane)

Geo-Seal Base
(Geotextile/HDPE)

Geo-Seal Vapor
Vent System



What is Vapor Intrusion Mitigation?

When is it Used?

- Primarily used in new construction AND in conjunction with a sub-slab venting system
- Active or Passive Mitigation Systems



Source: Copyright ITRC Vapor Intrusion Mitigation Training

Vapor Intrusion Barrier Defined

- Vapor Barrier \neq contaminated vapor
- Designed to be chemically resistant to common COC's while creating tight seals at seams, penetrations and terminations AND withstanding the construction process.
- Testing is the key differentiator



Source: Copyright ITRC Vapor Intrusion Mitigation Training

History of Use

- 30+ years
- All types of structures
- Wide range of contaminants
- Wide range of use
 - Real risk
 - Preemptive risk / Asset protection



Source: Copyright ITRC Vapor Intrusion Mitigation Training

Regulatory Perspective of Vapor Intrusion Barrier

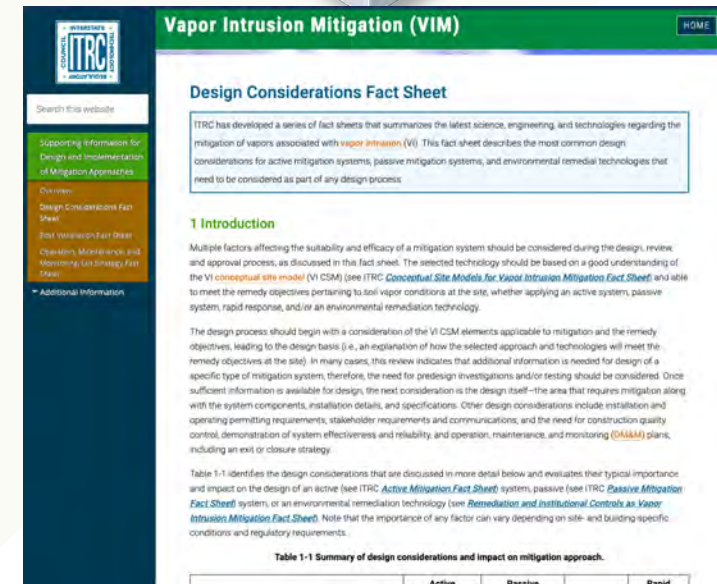
- Regulators are learning more
- Limited consensus on regulations/guidance
- Monitoring continues to be the biggest challenge



Source: Copyright ITRC Vapor Intrusion Mitigation Training

Where can you Learn More?

- AEHS West Coast – US EPA Update
- ITRC Vapor Intrusion Mitigation Training
- AVIP New Orleans Conference – November 2023



Source: Copyright ITRC Vapor Intrusion Mitigation Training

Step 1 – Plan the Outcome

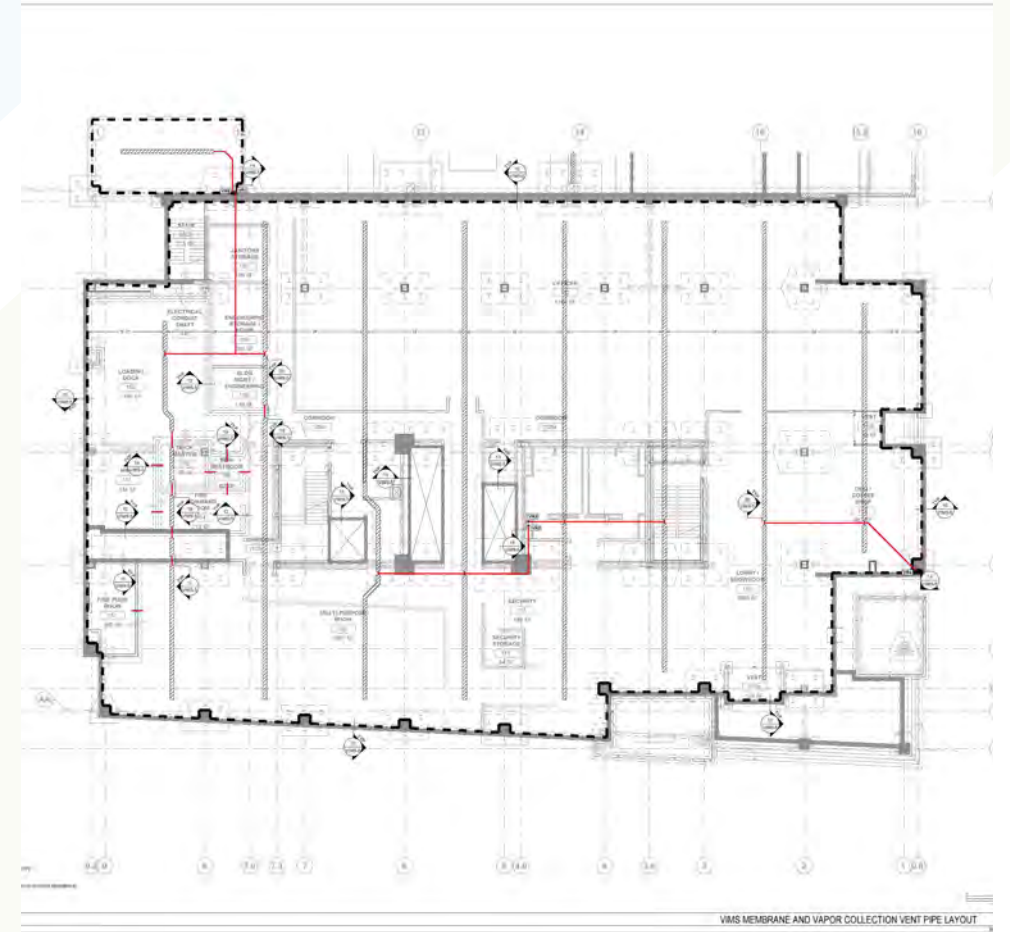
Start on the Right Foot

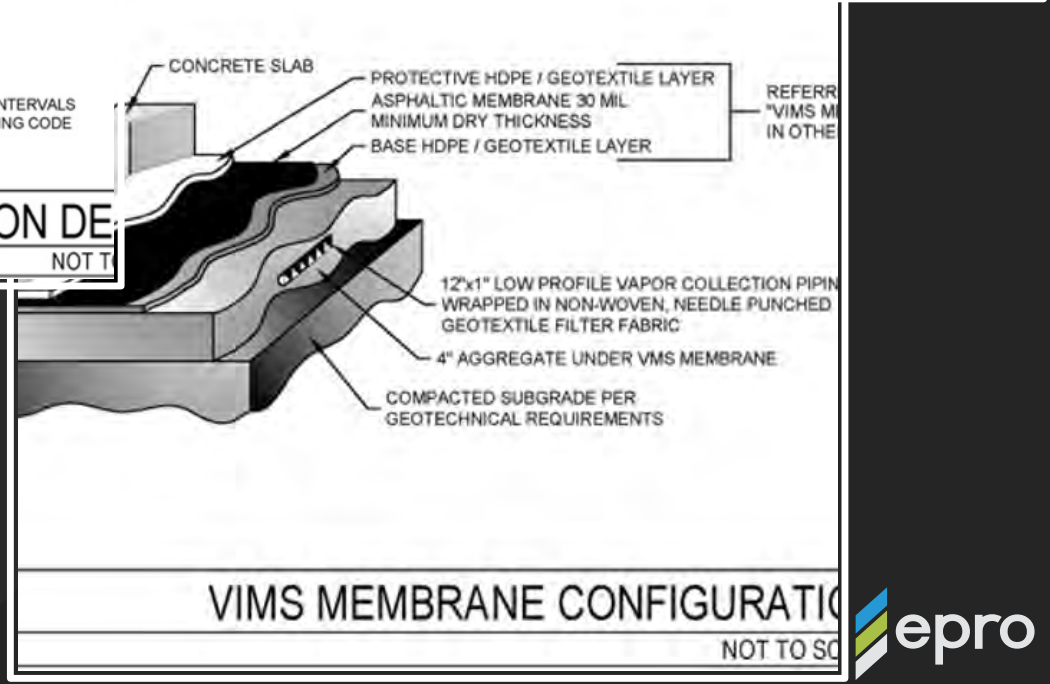
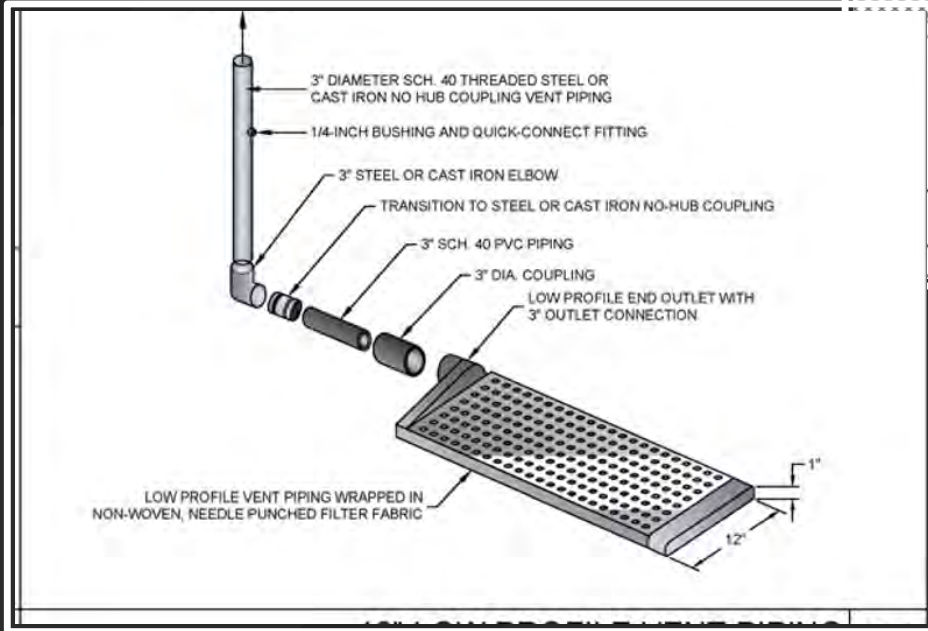
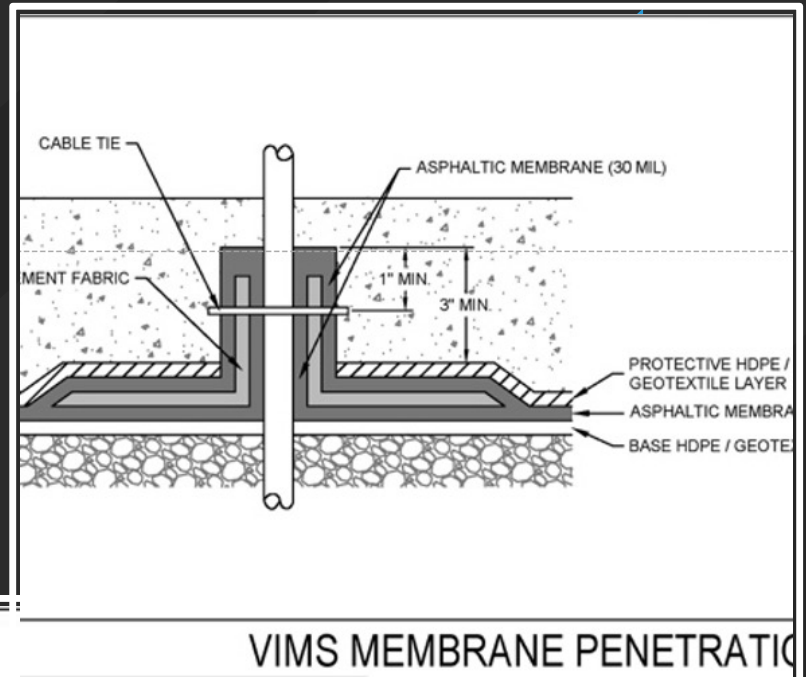
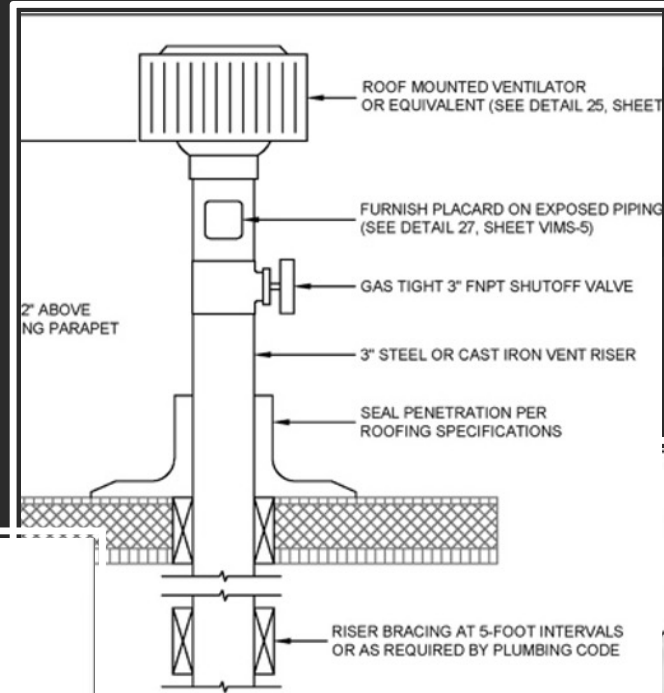
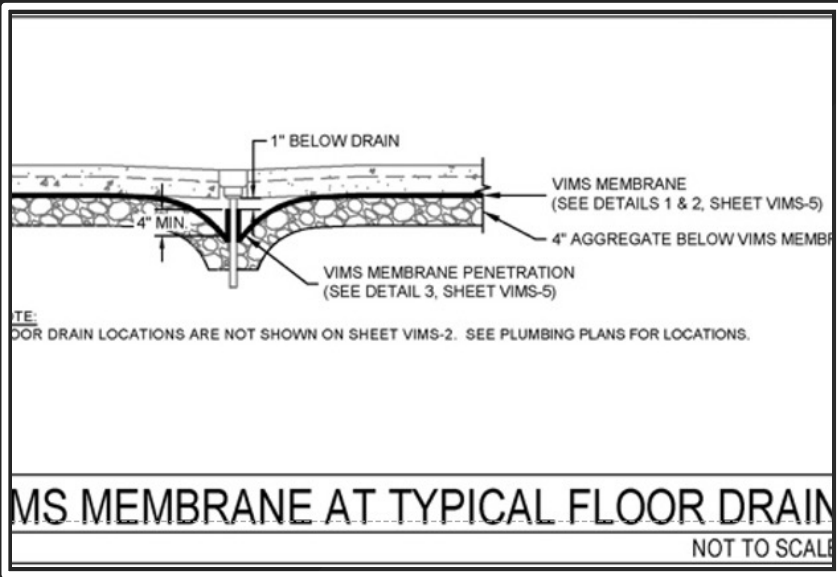
- Coordinate with the project team early
- Knowing your regulatory requirements
- Checking with the stakeholder's



Elements of a Good Design

- Project specific details reflecting the building foundation, the structure and mitigation components.
 - Materials used
 - Vent riser and stack locations
 - Sampling ports
- Product specifications and installation instructions
- QA/QC guidelines
- OM&M





Step 2 – Select the Right Approach

You only have one chance!

- The construction process presents many variables, known and unknown
- Building foundations and site specific conditions have the greatest impact on a systems success



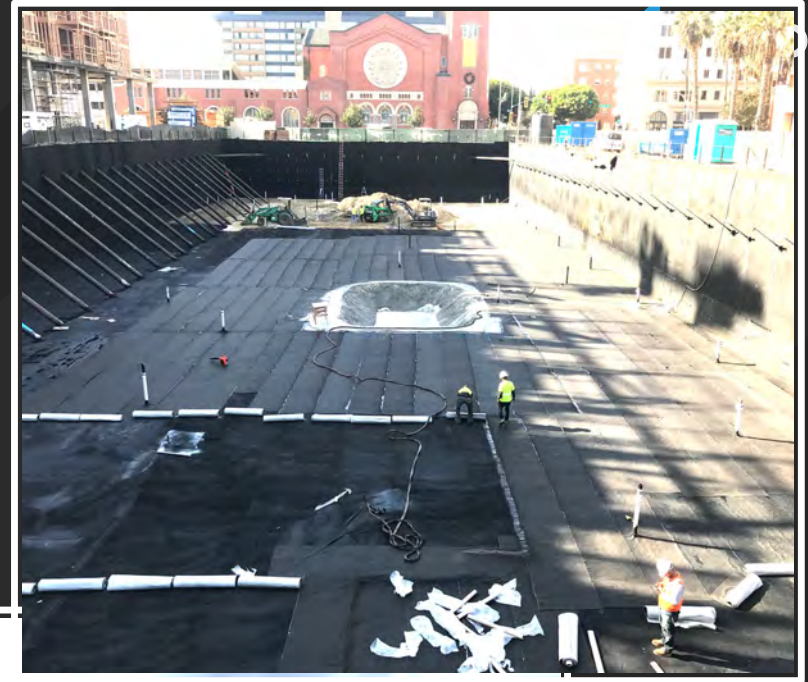
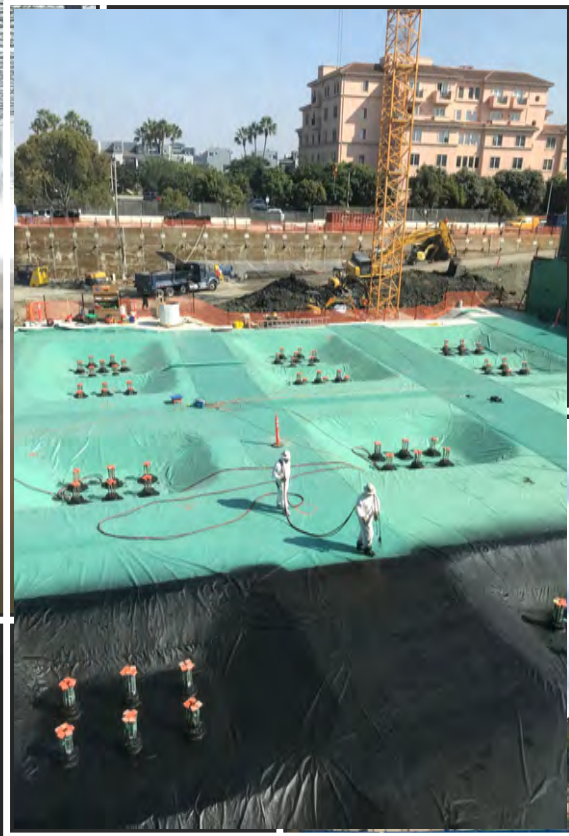
Composite Systems vs. Single Sheet Membranes

Composite Systems

- Thicker, generally more robust
- Seamless
- High chemical resistance
- Increased constructability
- Easy documented QA/QC

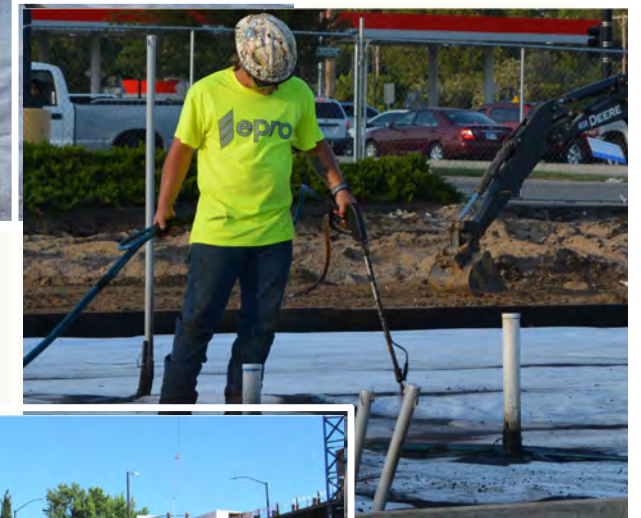
Single Sheet Membranes

- High level of chemical resistance relative to thickness
- Several seaming options
- Ideal for flat foundations
- High variability in installation quality



Composite Systems

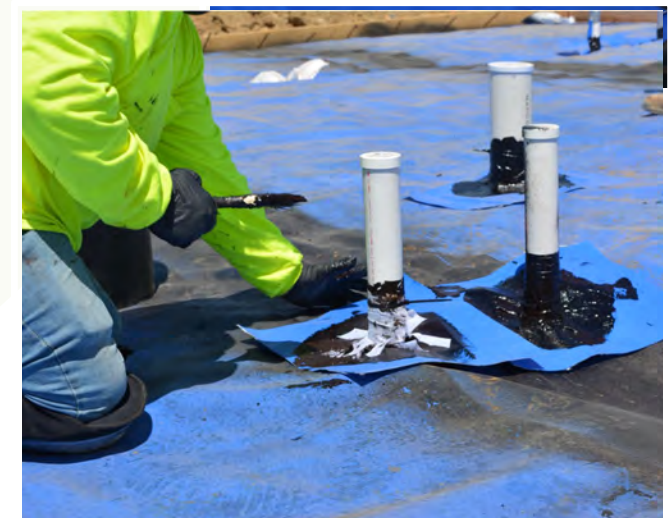
- Comprised of a base sheet, spray membrane and protection course.
- Spray layer is the binder for the system.
- Thickness can vary, but as thickness increases, so does durability
- Sum is greater than the individual parts
- Composite systems are seamless





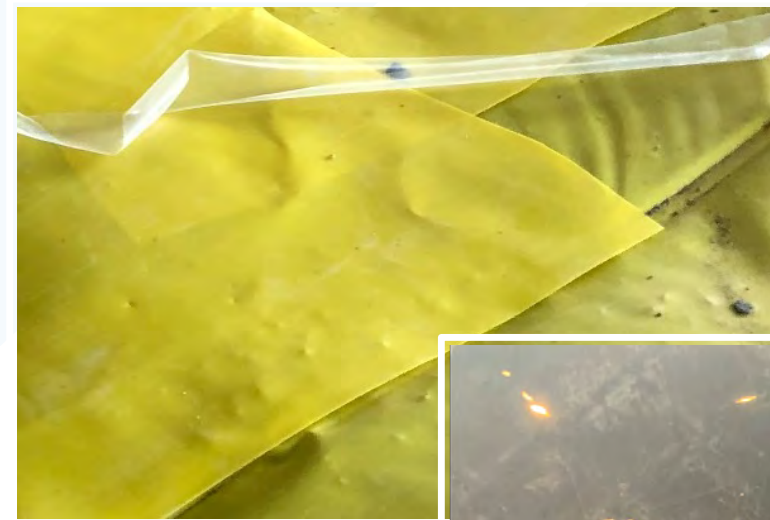
Single Sheet Systems

- One membrane made from one or more materials
- A lot of variance in installation methodologies and QA/QC
- The key to success is durability and seam integrity



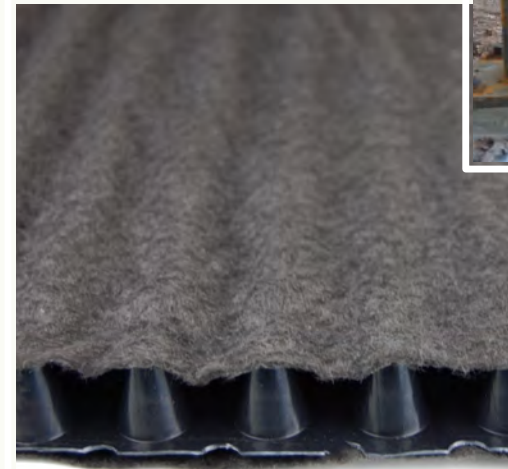
Know What Your Getting

- Know the difference between Vapor Intrusion Barrier, Vapor Intrusion Retarder and Vapor Barrier
- Permeable substrates can impact integrity
- Marketing materials can be deceptive



Vapor Collection Systems

- Trenched pipe and gravel
- Low profile trenchless
- Collection area vs internal flow
- Large difference in cost



Step 3 – Trust but Verify

Pre-Construction Planning

Bring the Team Together

- Coordinate the design team and all trades

Verify Project Conditions

- Anything change?
- Watchout for elevator pits!

Confirm QA/QC

- Frequency and duration



QA/QC and Documentation

Smoke Testing

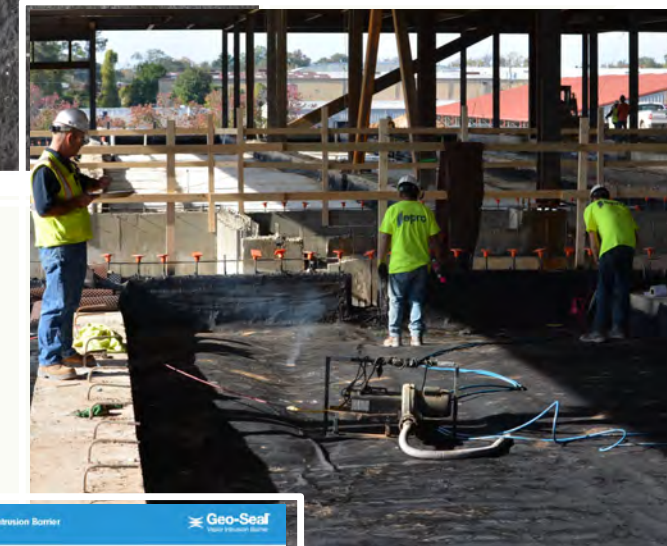
- Identifies any deficiency in the system

Certified Applicators and Inspection

- Installers and inspectors should be trained by the manufacturer
- Level of oversight will vary

Documentation

- Create a formal record
- Document changes to the design



epro Geo-Seal Checklist: Vapor Intrusion Barrier **Geo-Seal**
Vapor Intrusion Barrier

Project Information

Project Name: _____

Reference Report Number: _____

This Checklist provides guidance on the installation of the **Geo-Seal System** for methane gas or contaminant vapor barrier applications only.

Base Course: Geo-Seal Base Layer

General: Substrate free from standing water	<input type="radio"/> N/A	<input type="radio"/> Yes	<input type="radio"/> No	Action Item #
Base Course: Seams overlapped 6 inches	<input type="radio"/> N/A	<input type="radio"/> Yes	<input type="radio"/> No	Action Item #
Penetration: Penetrations spaced a min. of 3' apart	<input type="radio"/> N/A	<input type="radio"/> Yes	<input type="radio"/> No	Action Item #
Penetration: No greater than 1/8" gap between the base course and pipe penetration	<input type="radio"/> N/A	<input type="radio"/> Yes	<input type="radio"/> No	Action Item #
Penetration: Reinforcement detail installed around the base of the pipe penetration and secured with a collar tie	<input type="radio"/> N/A	<input type="radio"/> Yes	<input type="radio"/> No	Action Item #
Termination Surface: Concrete surfaces are a light broom or wood float finish	<input type="radio"/> N/A	<input type="radio"/> Yes	<input type="radio"/> No	Action Item #
Termination Surface: Base sheet welded to termination surface with all ribs of Geo-Seal Core	<input type="radio"/> N/A	<input type="radio"/> Yes	<input type="radio"/> No	Action Item #
Sealing of Base Sheet: All fasteners used to secure base layer are detailed with reinforcement detail	<input type="radio"/> N/A	<input type="radio"/> Yes	<input type="radio"/> No	Action Item #

Notes:

Polymer Modified Asphalt Membrane: Geo-Seal Core Layer

General: Surface is free from any pins, nails, protrusions, or any other foreign objects not previously installed and detailed prior to Geo-Seal Core	<input type="radio"/> N/A	<input type="radio"/> Yes	<input type="radio"/> No	Action Item #
General: Base layer is free from standing water, or other foreign material that would inhibit a direct bond of a epoxy to the surface	<input type="radio"/> N/A	<input type="radio"/> Yes	<input type="radio"/> No	Action Item #
Application: Coupon samples taken to confirm Geo-Seal Core mil thickness	<input type="radio"/> N/A	<input type="radio"/> Yes	<input type="radio"/> No	Action Item #
Application: Geo-Seal Core applied to specified mil thickness	<input type="radio"/> N/A	<input type="radio"/> Yes	<input type="radio"/> No	Action Item #

Vapor Intrusion Mitigation in Action

Florida Ave Development Washington D.C.

Former Gas Station

- Ethylbenzene, Xylenes, Naphthalene

Below-Grade Construction

- Both VIMS and waterproofing

A System for Each Condition

- Under-slab
- Elevator Pit
- Shoring
- Double-Formed Walls



Blue River Commerce Kansas City, MO

Former Bannister Federal Complex

- Aircraft Manufacturing
- 200 Acres

Site Conditions

- Chlorinated Solvents, BTEX
- 7 Buildings

VI Mitigation

- Single Sheet Membrane
- Sub-Slab Depressurization



Epoxy Floor Coating

Geo-Seal EFC

VI Protection for Existing Structures

- Two-part epoxy system resistant to high concentrations of solvent and hydrocarbon vapor
- Consists of primer and topcoat
- Can be customized to meet any aesthetic look, or made more robust to handle vehicle traffic



Wrapping It All Up

Proper Planning

Knowing Site Conditions

Proper Execution



Thank you!

Contact information

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