



The Art of Designing & Implementing Constructable VI Mitigation Systems for Complex Industrial Projects

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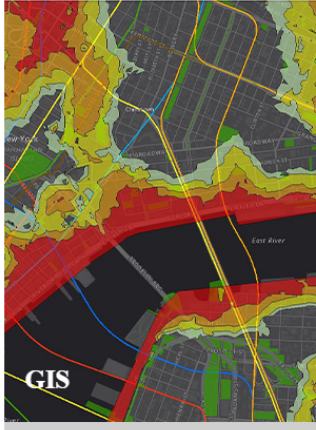
Warehouse & Distribution Centers

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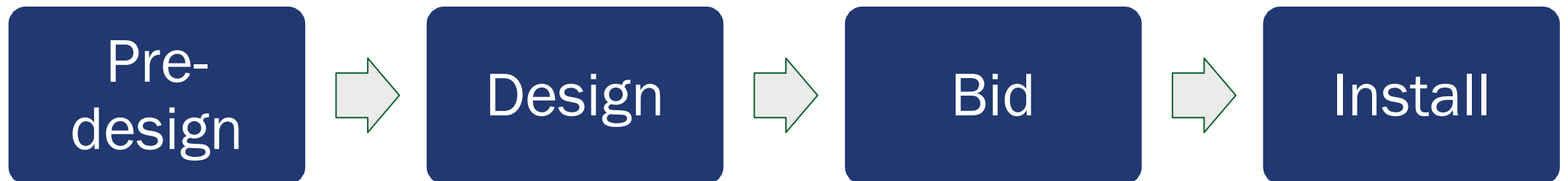


Data Centers

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Objectives

- Share VI insights specific to industrial development
- Help the VIMS Design community prepare for common challenges
- Identify best-practices that foster project team collaboration



An aerial photograph of a large-scale industrial construction project. A prominent red lattice boom crane stands on the left, lifting a component into place. The building's concrete frame is visible, featuring large window openings and structural bracing. The site is surrounded by flat, undeveloped land under a clear blue sky.

Considerations for Industrial Sites

- **Scale – BIG footprint. Tight Timelines.**
- **Building design**
 - **Structural foundation**
 - **Means & methods of construction**
- **Exposure risk to future tenants**
- **Managing long-term liability**

Location, Location, Location...

- Location matters!
- Optimal access to major markets and populations
- Environmental challenges may be perceived as a “pro” or a “con” to developers





Designing VI Mitigation Systems

Strategies: Block, Vent, Pressurize, Flush, Purify

- Vapor intrusion barrier
- Passive venting
- Active venting
- Positive Pressure HVAC
- Air Exchange HVAC
- Air Purification
- Additional components for MMS/LFG

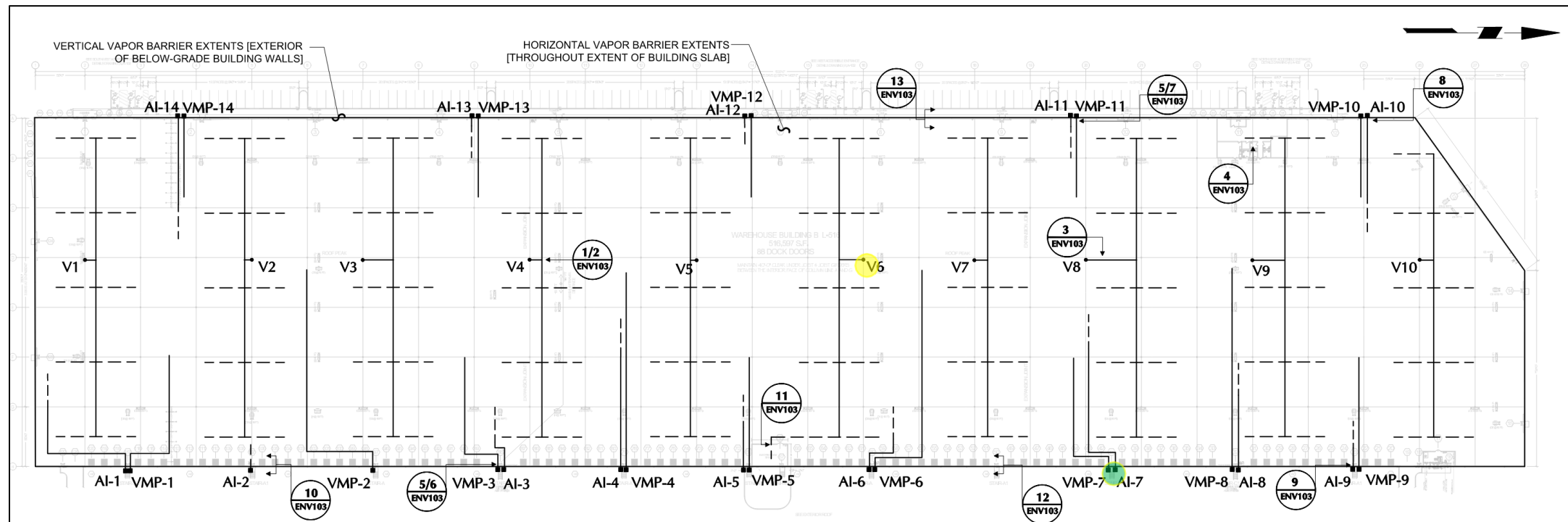
VIMS Design Materials

- **Aggregate Ventilation Layer**
 - High Air Intrinsic Permeability / Low Fines
 - ASTM #5 or #57 Stone [most common]
- **Mitigation Screen (Venting Network)**
 - Slotted / Perforated PVC or HDPE
 - J-Drain Material (Geo-Vent, TerraVent, Vapor-Vent)
- **Vapor Intrusion Barrier**
 - Sheet-Applied (taped, sprayed seams)
 - Spray-Applied composite
 - Waterproofing/VI membranes
- **Vent Risers**
 - Solid SCH40, SCH80 PVC (*Cast Iron or Black Steel in NYC*)
- **Vapor Monitoring Points and Air Inlets**
 - Solid and Slotted SCH40 PVC (*no PVC glue*)
 - Baroball Valves



Mitigation System Layout

- Architect Hat: mindful of building functionality & aesthetic
 - VR: Co-locate with columns – yellow
 - VMP: Run to perimeters for exterior access – green



Design Considerations

Industrial-specific construction methods

- Tilt up, Pre-cast, Pre-fab
- Influences mobilizations, production, installation sequencing



Design Considerations

- End-use considerations
 - Spec v. BTS
 - Tenant improvements later?
 - Tenant-specific standards?
- Building construction sequencing impacts the mitigation system if not proactively addressed
 - Communicate VIMS temperature/weather constraints



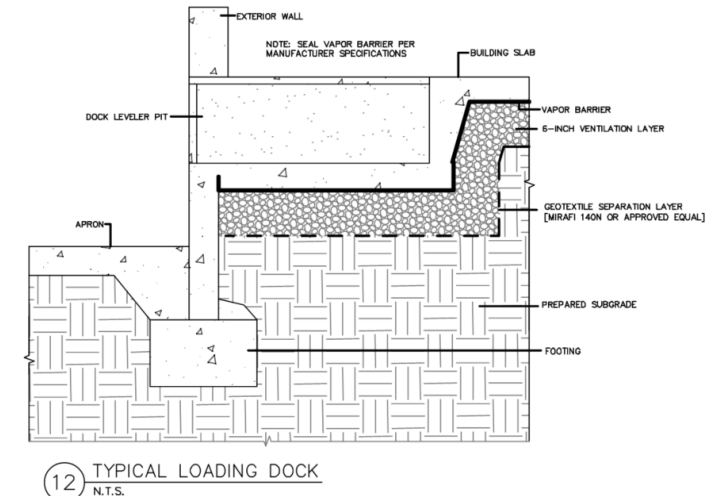
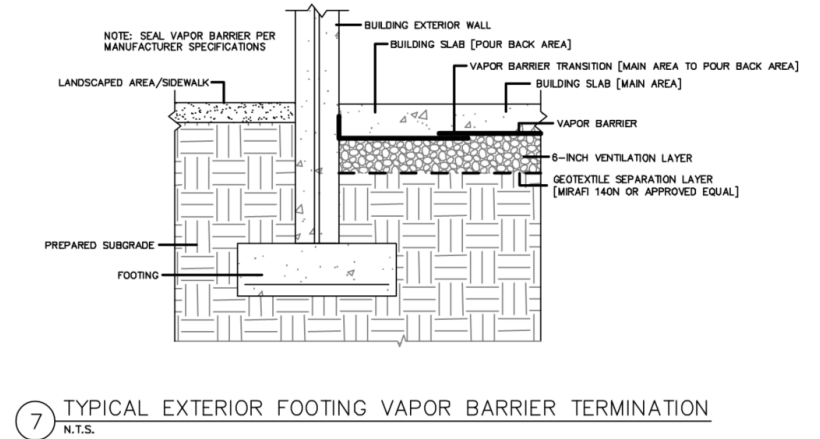
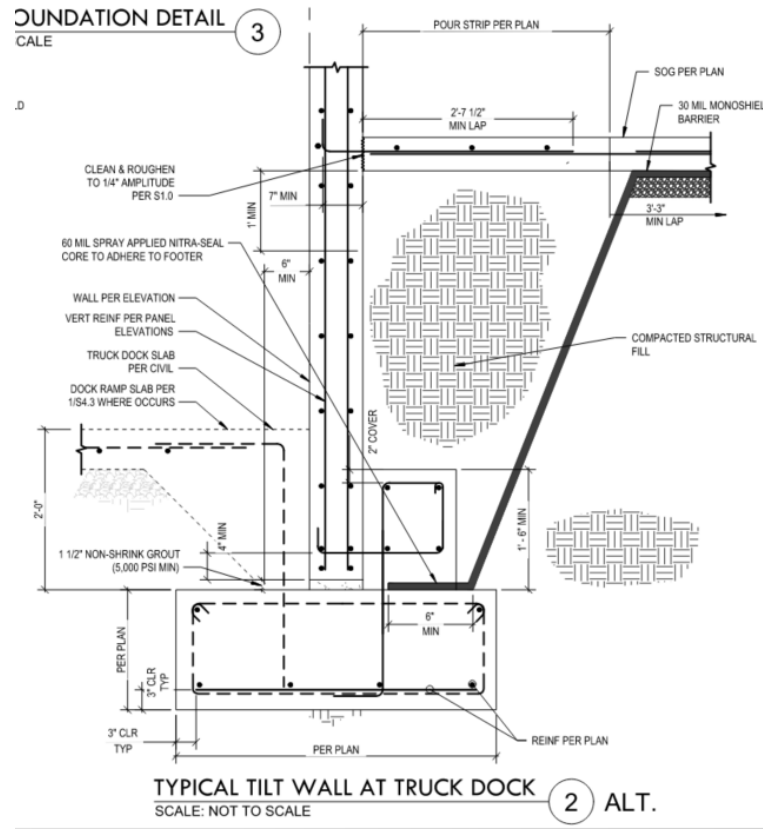
*Who could have
seen this
coming?!?*



Design Considerations

Design details

- Membrane termination points
- Pour back attachments
- Dock pits
- **Note:** Panel joints / vent risers



Common Challenges: Concrete Placement Methods

- Pumping concrete is common for industrial sites
- Driving concrete trucks on the membrane is almost always a NO!
- Tailgating requires more coordination with concrete sub and/or appropriate vertical profile designed to protect the VIMS



Vapor Barrier Durability

What influences durability?

- Thickness
- Material(s)
- Anticipated Activities on the barrier

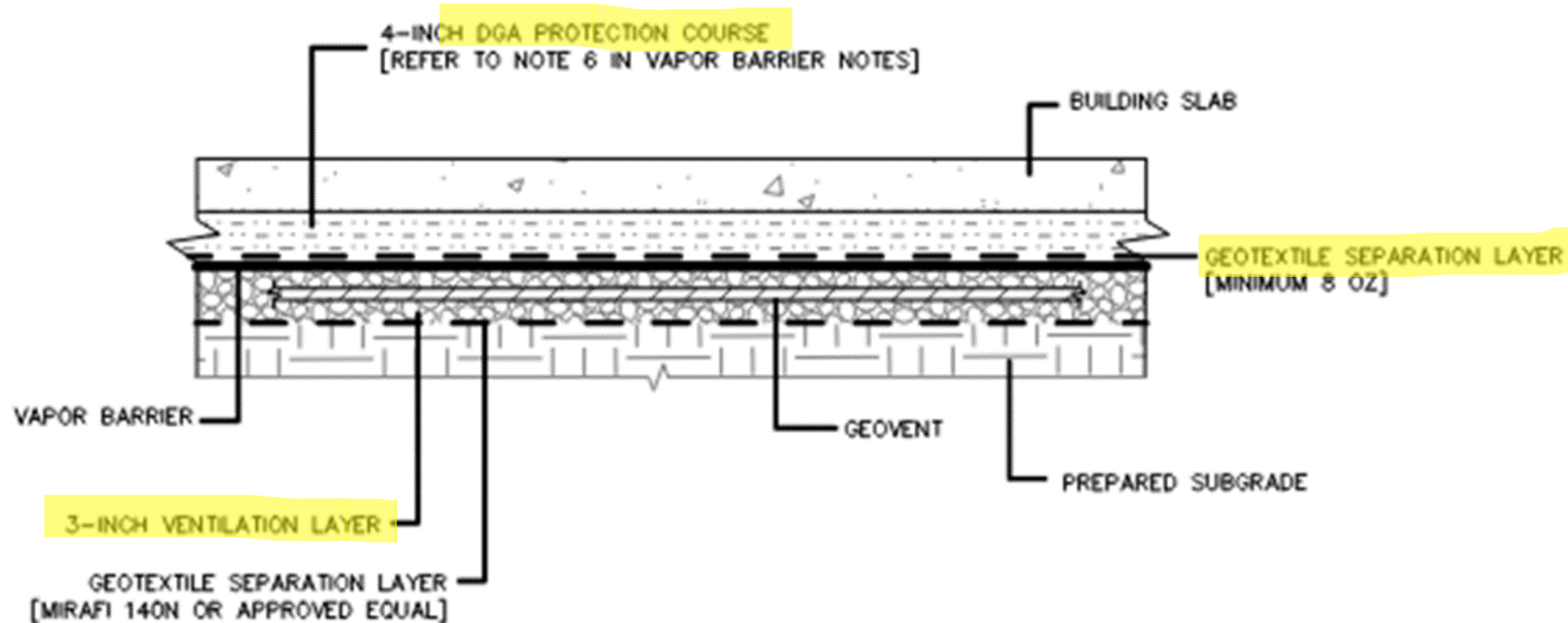
Strategies to protect the membrane

- COMMUNICATION
- Qualified Installer
- Additional protective layers
- Limited activities
- Oversight



VIMS: Vertical Profile

Plays a role in the system durability and cost implications



Case Study #1 – Northeast US

- (2) 1MM SF Buildings
- Vapor Intrusion Barrier System ONLY
- Building Structure BEFORE Slab
 - Shell first / Pre-Cast
- Concrete Pumped in







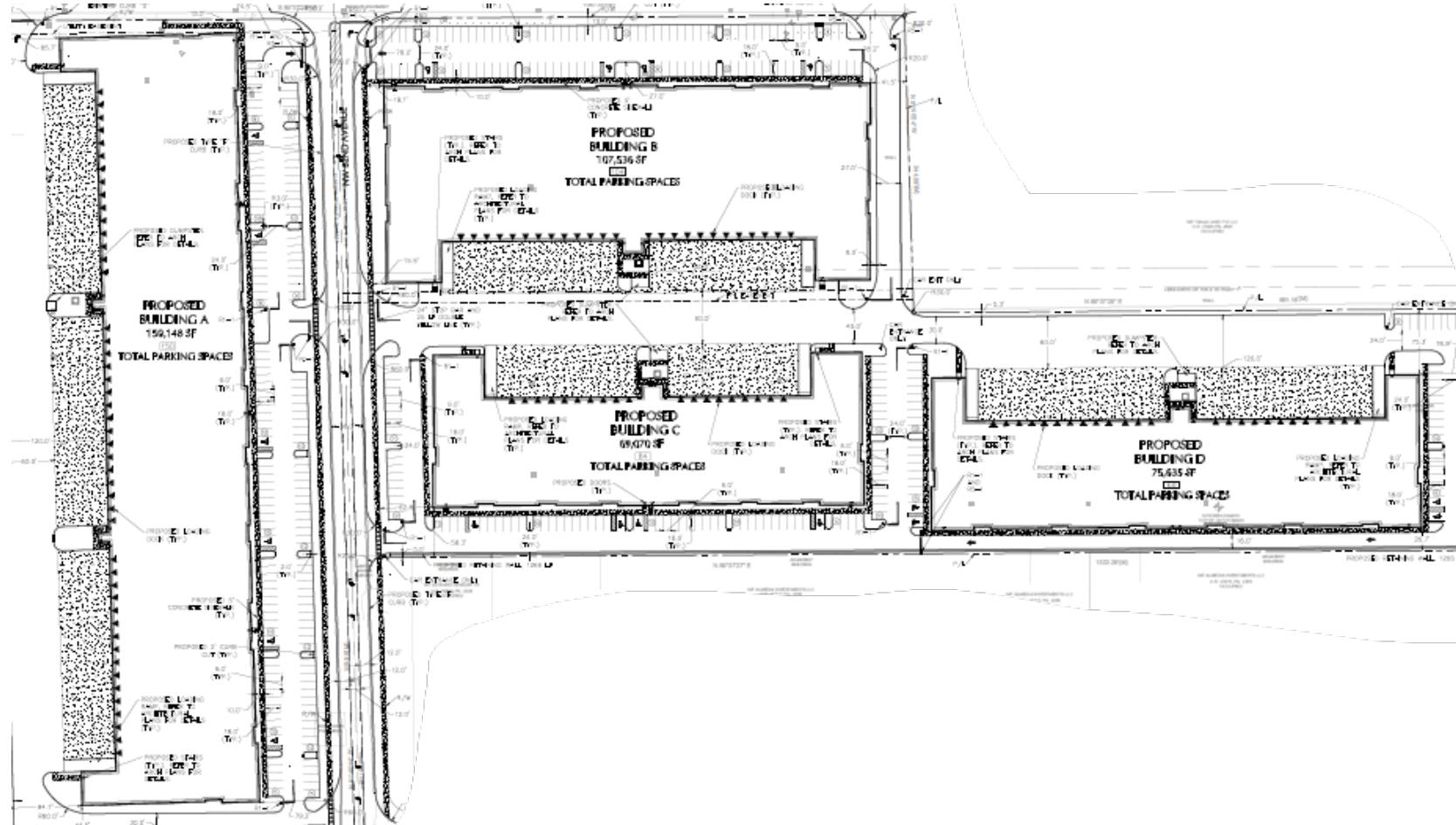
Case Study #2: Southeast US

(4) Buildings:

70k – 150k SF

Approach: Under-slab passive venting system + Vapor Intrusion Barrier

Challenges: Aggregate Material Availability

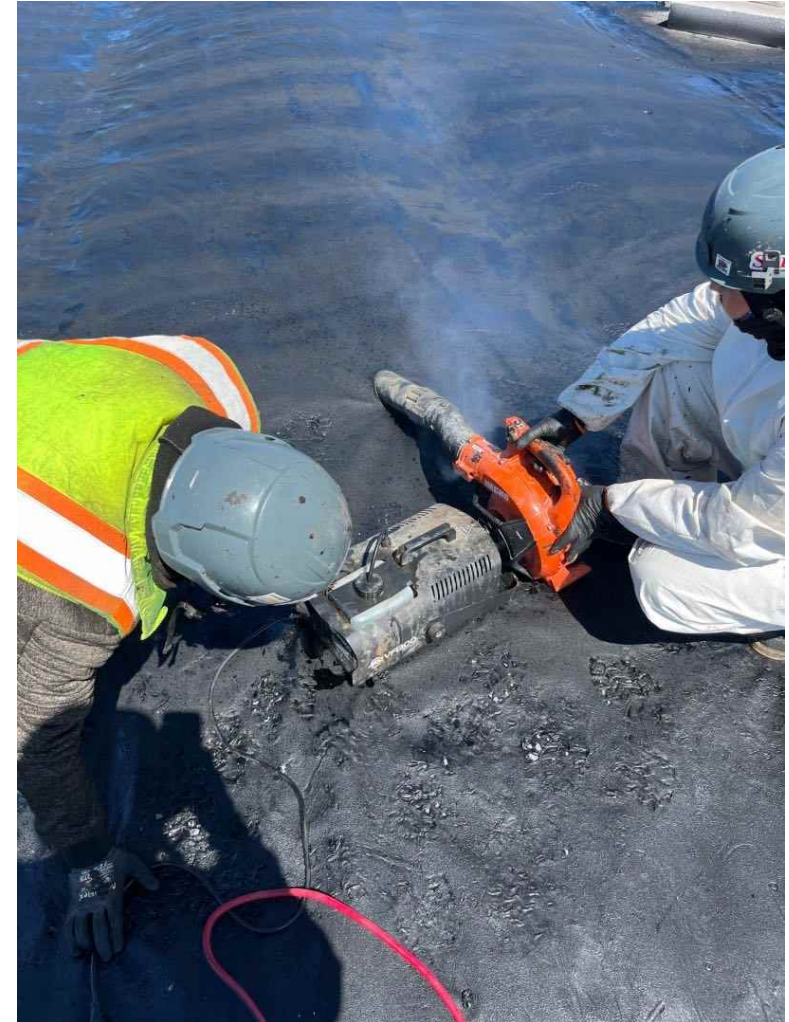






Quality Assurance and Control

- In-field quality assurance measures
 - Qualified Installer
 - Smoke testing
 - Visual inspections
 - 3rd party oversight
- Does the VIMS installation match the Design?



Conclusion

- Adopting a thorough, proactive VIMS design process improves successful construction outcomes
- Preparing for challenges is a team sport:
 - Engage installation contractors in the design approach discussion, CBA/budgeting → we've seen A LOT!



Questions? Contact us:

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