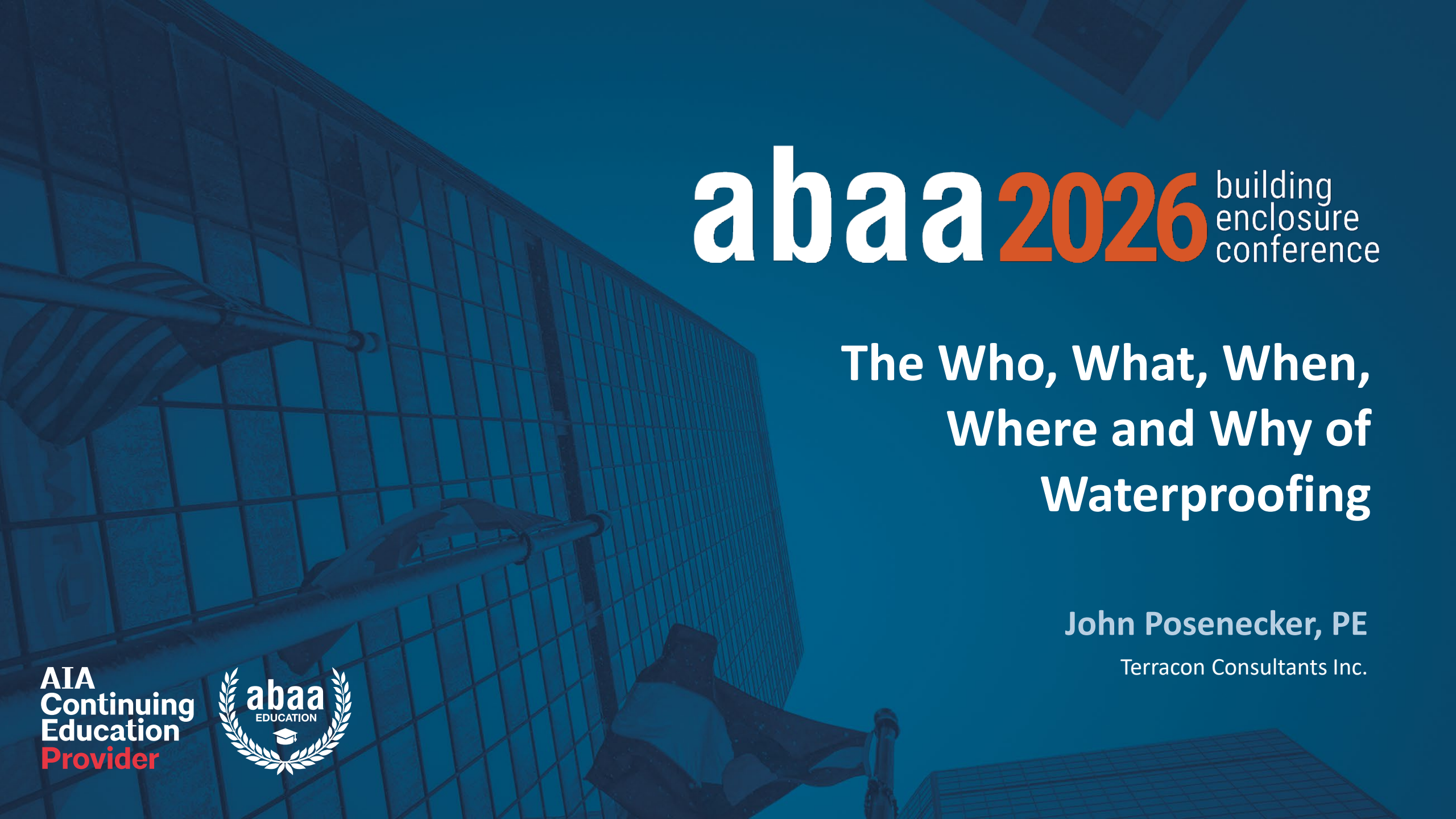

abaa 2026 building enclosure conference

The Who, What, When, Where and Why of Waterproofing

John Posenecker, PE

Terracon Consultants Inc.

AIA Continuing Education Provider

abaa EDUCATION

The Who, What, When, Where and Why of Waterproofing

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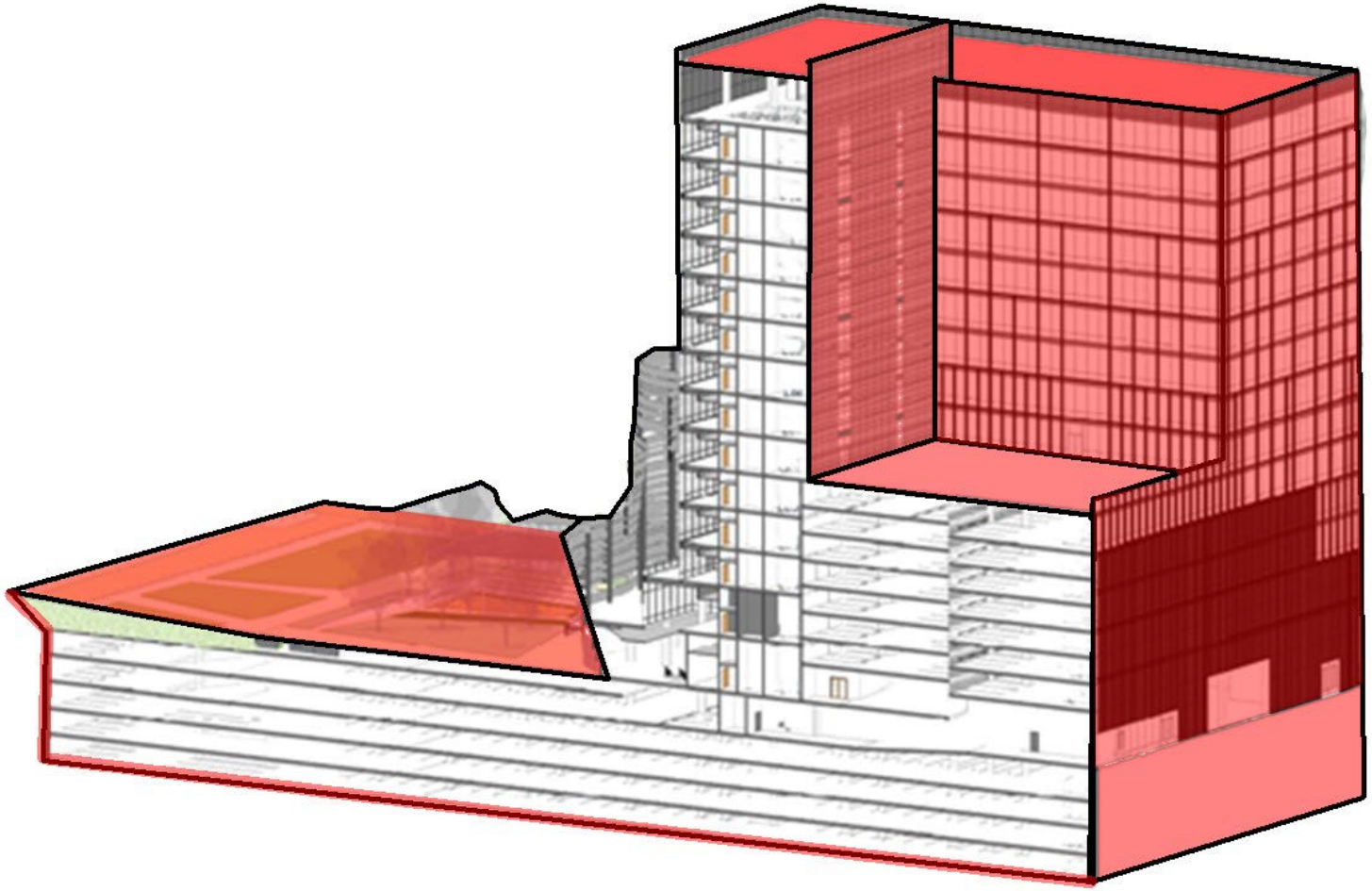
Learning Objectives

1. Locating the portions of the building enclosure that require waterproofing systems..
2. Identify the available types of waterproofing and associated drainage systems.
3. New Construction vs. Existing Buildings
4. Techniques for field performance testing of waterproofing systems.
5. Challenges associated with detailing and installing waterproofing and associated drainage systems.

Complete Building Enclosure



Building Enclosure – Control Layers

Phenomenon	Transport Mechanism	Control Strategy
Heat	Conduction Convection Radiation	Insulation Air Barriers
Air	Natural & Forced Ventilation	Air Barriers
Water (bulk)	Gravity Capillary Action Air Entrainment	Air & Water Resistive Barriers **Waterproofing** Flashing
Water (vapor)	Diffusion Humidity in Air	Vapor Retarders Air Barriers
Light	Non-Opaque Openings	Size and Translucency
Sound	Air Pressure Waves	Air Barriers STC of Assemblies
Vibration	Structural Vibration	Vibration Isolators

Who is Responsible for Waterproofing?

- Owner Sets Project Expectations
- Manufacturer's Develop Materials/Assemblies/Systems
- Designers Incorporate Owner's Requirements into Construction Documents
- Contractor's Install Materials and Integrate Systems
- Testing Agencies Confirm In-Situ Performance
- Property Managers Maintain Building Enclosure Components

Note: There is no college degree for "waterproofing".

What is Waterproofing?

Waterproofing

vs.

Dampproofing

vs.

Water Resistive Barriers

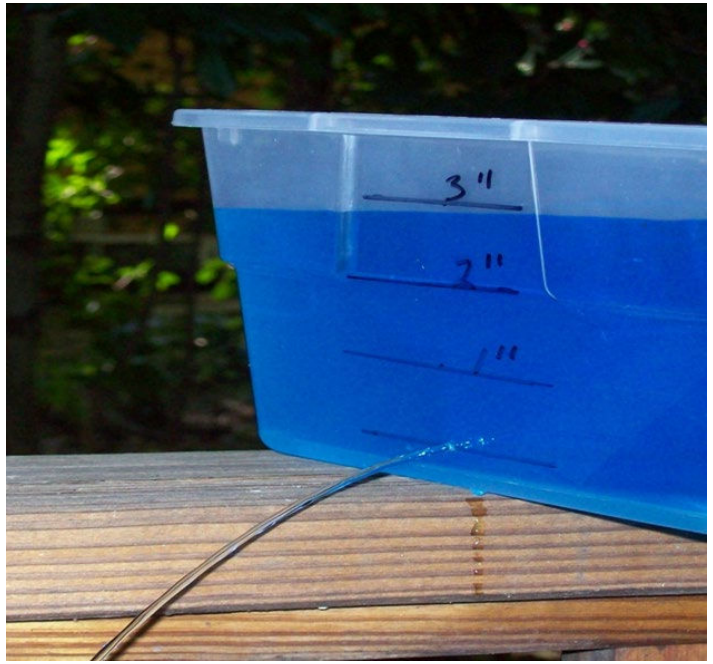
vs.

Vapor Barriers

The difference between “Waterproofing” and other barriers is the ability to resist hydro-static water pressure.

Waterproofing and Drainage is a Partnership

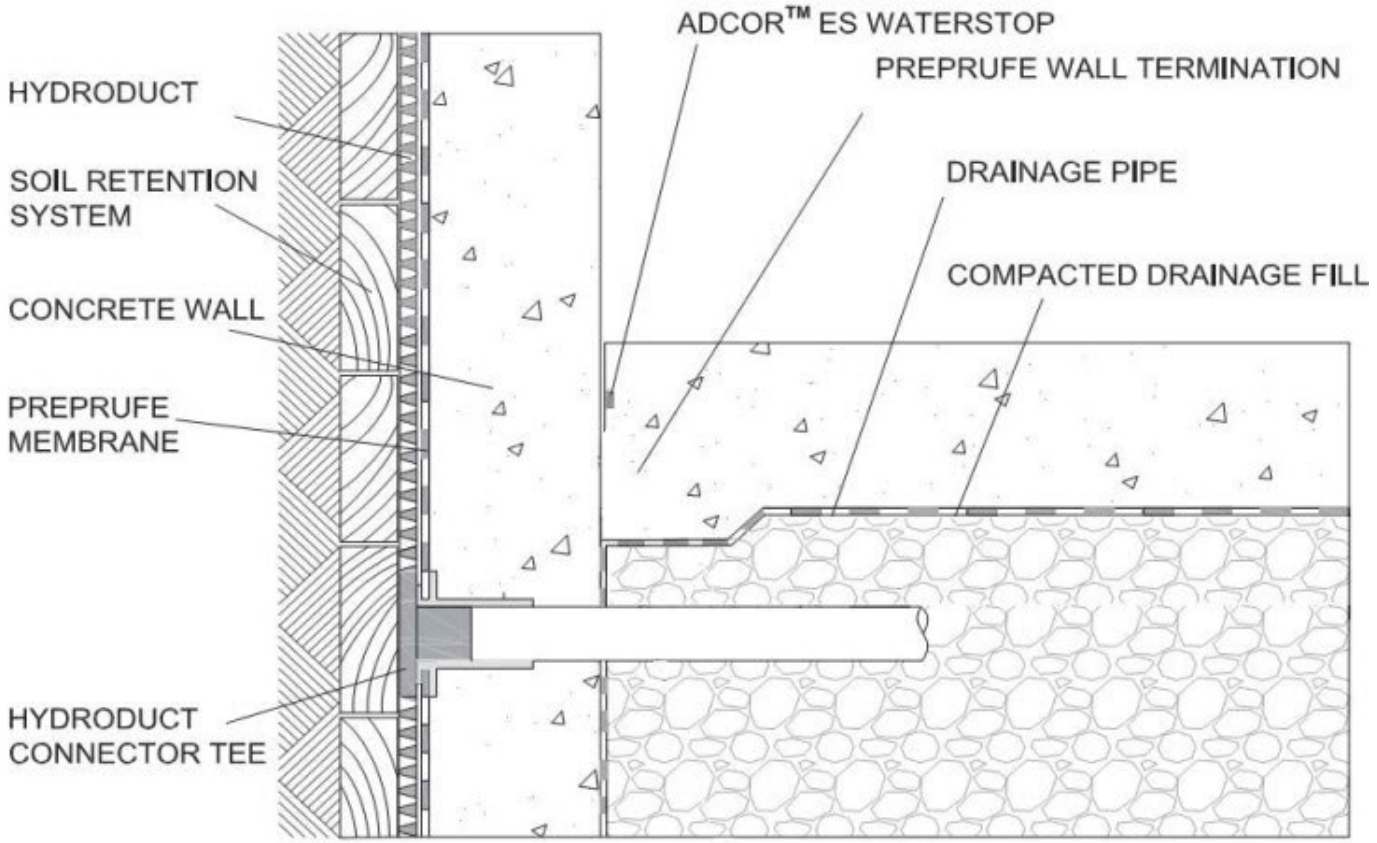
- Waterproofing is your defense, but drainage is your offense.
- Drainage Minimizes Hydrostatic Pressure
- Minimize the hydrostatic pressure so the waterproofing isn't challenged unnecessarily.
- Foundation drainage design is not an exact science.



10' of water = 4.335 PSI

4.335 PSI on a 20'x20' = 249,696 LBF

Drainage Systems

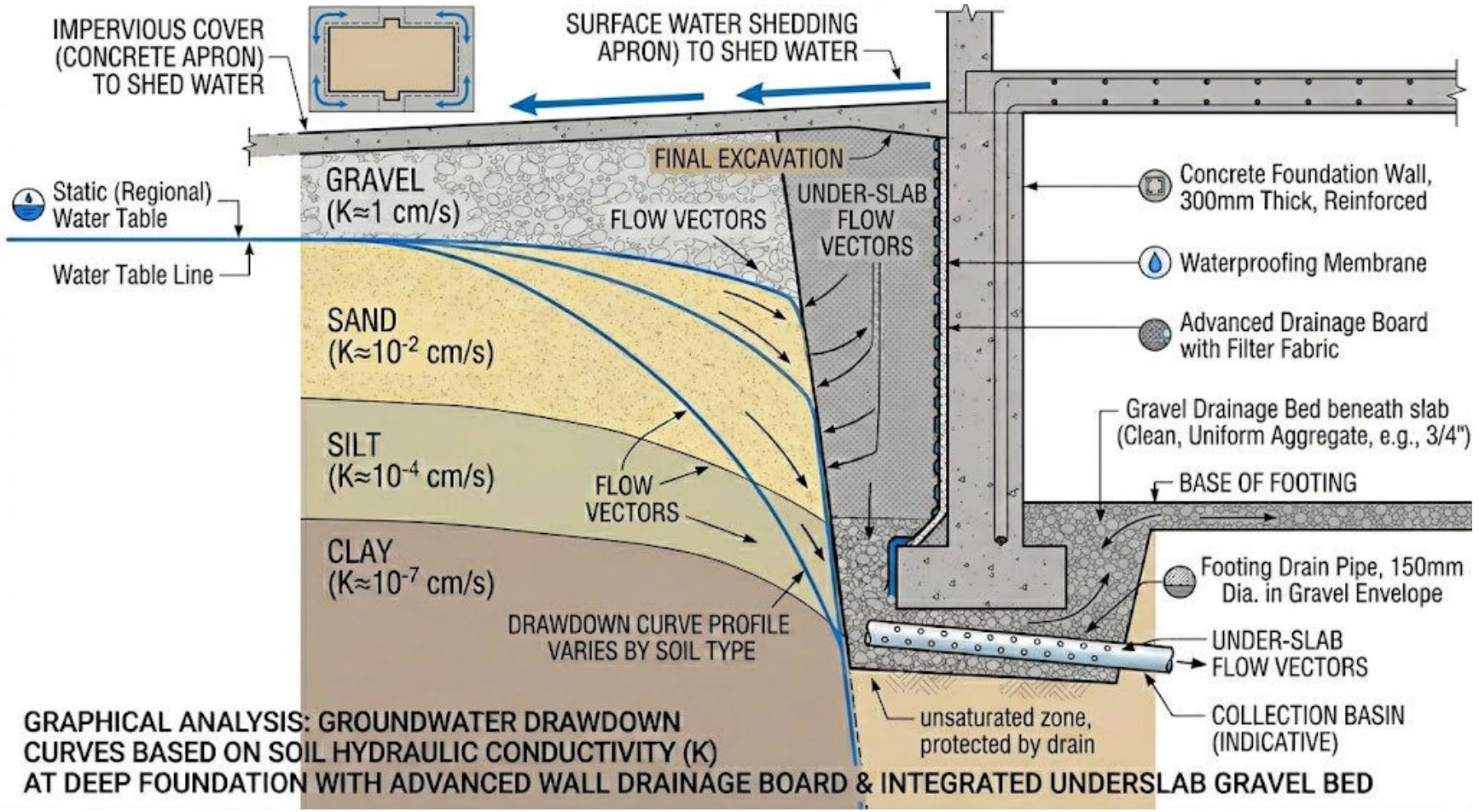


NOTE: NOT INTENDED FOR HYDROSTATIC CONDITIONS

Drainage Systems

- If there is no perimeter foundation drainage system, then the foundation wall waterproofing may be challenged by the hydrostatic pressure from groundwater or surface drainage.
- Typical waterproofing membranes have resistance to static water pressure more than 200 feet of water or 100 psi.
- Properly designed drainage systems can minimize/eliminate hydrostatic pressure at the waterproofing membrane.

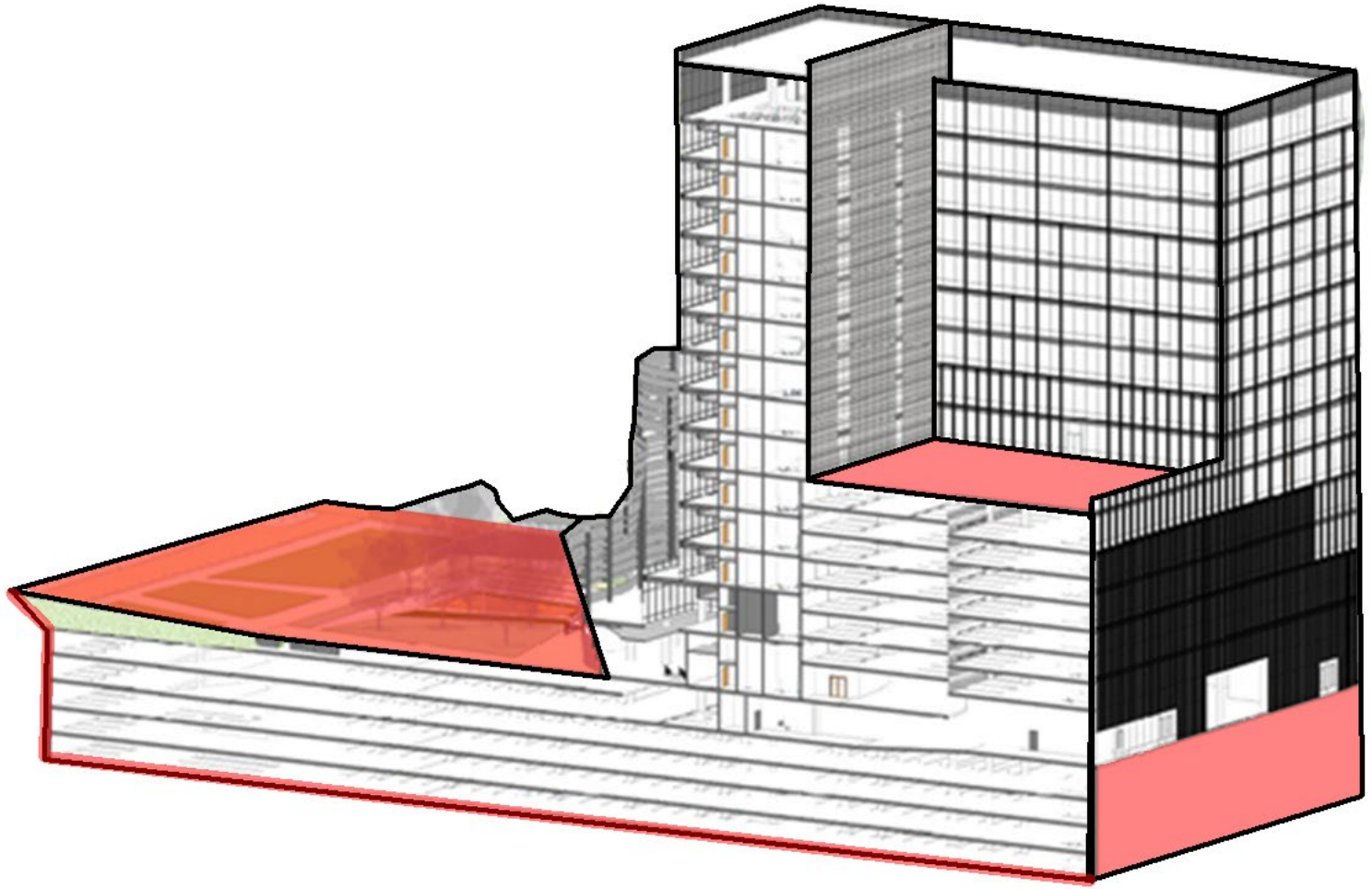
Drainage Systems



When is Waterproofing Applied?

- Construction Applications
  - Crystalline as Admixture in Concrete
  - Pre-Applied Prior to Concrete Pour
  - Post-Applied to Positive Side
  - Crystalline Post-Applied to Negative Side
- Remedial Injection to Stop Leaks in Concrete

Where is Waterproofing

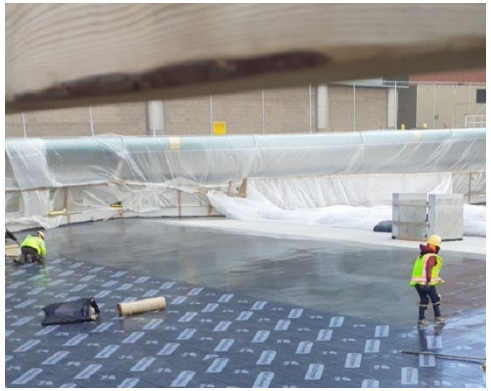


Where is the Waterproofing?

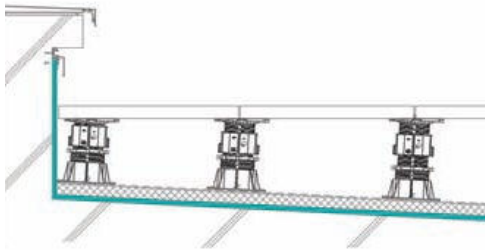
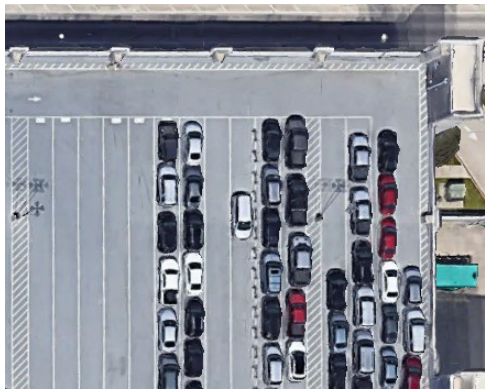
- Below Grade Foundations (vertical and horizontal)

Where is the Waterproofing?

- Elevated Decks
  - Amenities, Terraces, Balconies, Parking Garages





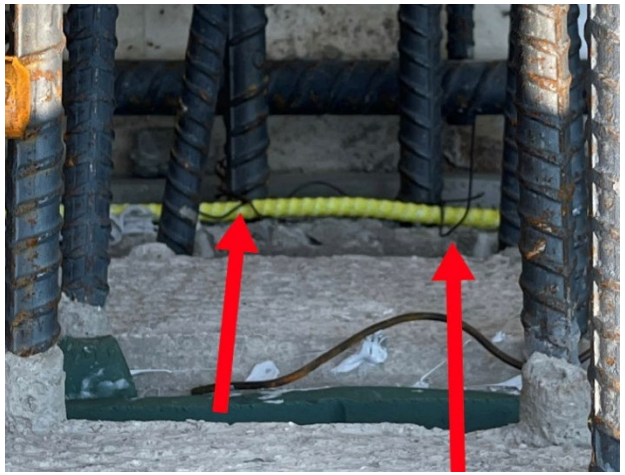



Where is the Waterproofing?

- Cisterns, Water Features, Lagoons

Where is the Waterproofing?

- Remedial Grout Injection Waterstops



Why is Waterproofing Important?

- 70-80 percent of construction litigation is the result of water infiltration into a building enclosure.
- Excessive Water in a Building Enclosure Assembly
  - Damage to Interior Finishes
  - Degradation of the Structure
  - Supports Biological Growth
  - Impacts Indoor Air Quality
  - Impacts Energy Efficiency

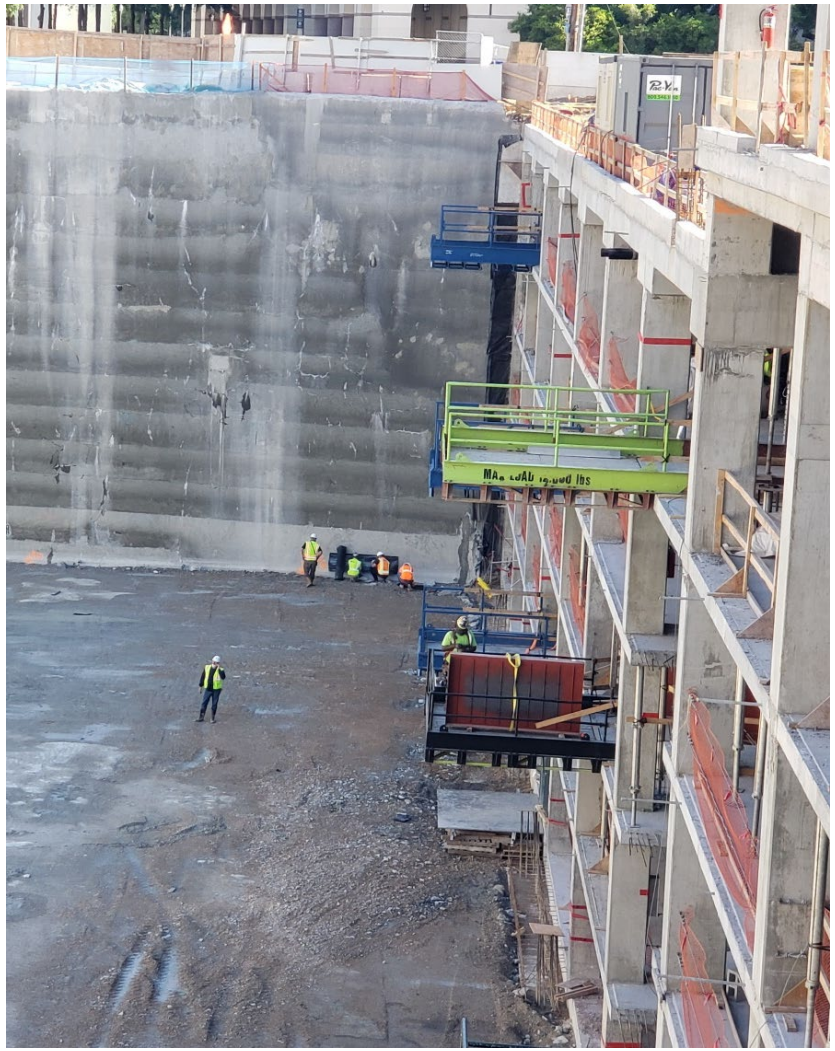
Waterproofing Truisms

- Waterproofing from the positive side is better than from negative side.
- Fully- adhered membranes minimize lateral migration of Water if/when leaks occur.
- There are **NO** “self-healing” waterproofing membranes.
- Most leaks occur at penetrations, transitions and details.

Pre-Applied Substrates

- Retention Walls
  - Walls
    - Wood Lagging
    - Shotcrete
  - Slabs
    - Compacted Subbase or Gravel Drainage Bed
    - Mud Slab
  - Surface Requirements
    - Gaps/Voids no larger than 1”
    - No Sharp Protrusions
    - Changes in Plane > ½” require special treatment

Retention Walls



Pre-Applied Sheet Membranes

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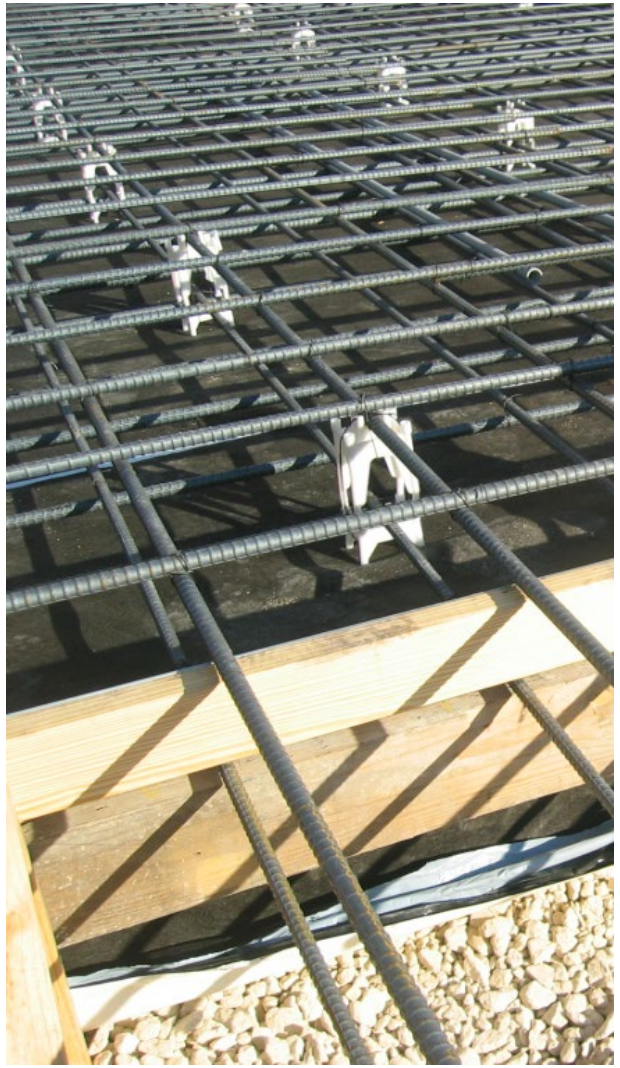
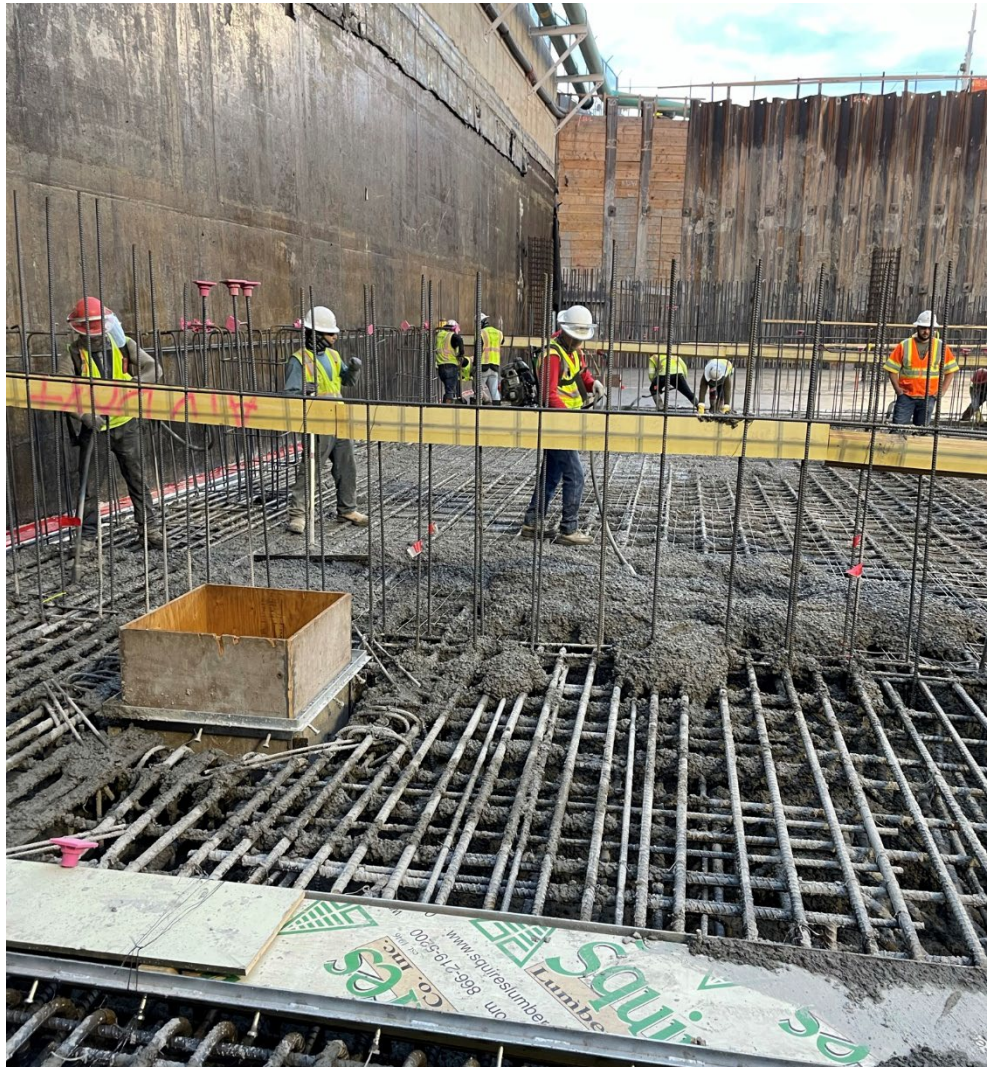


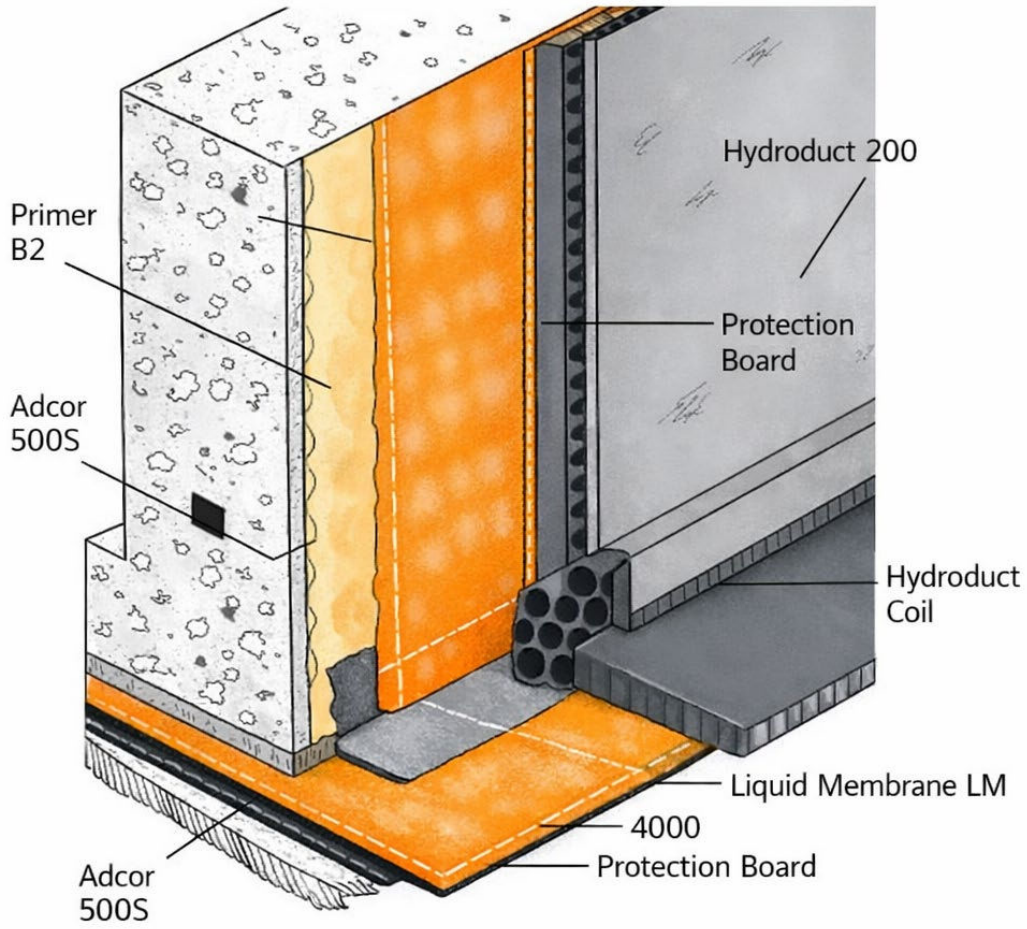


Pre-Applied Sheet Membranes

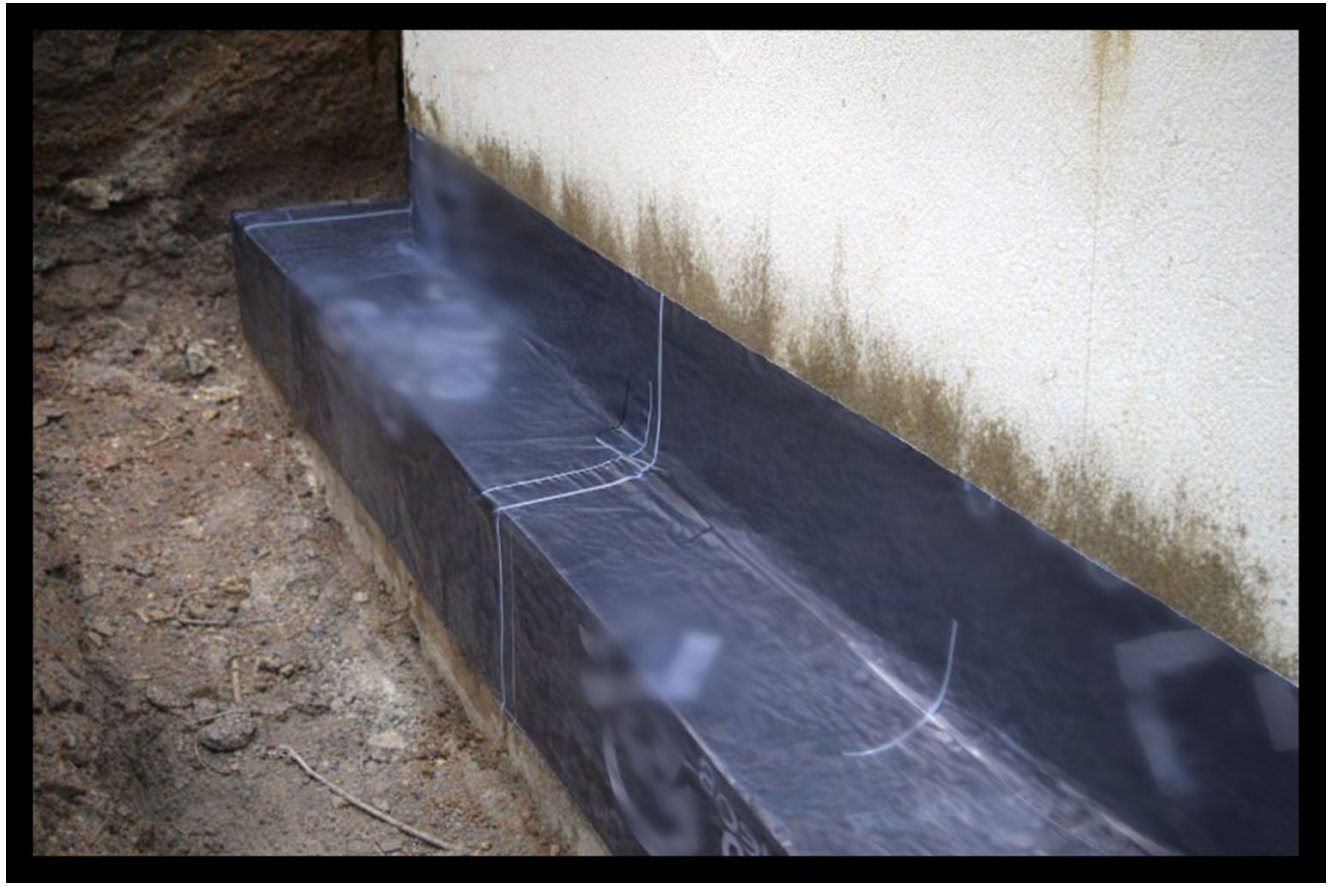
Post-Applied Membranes

- Fully Adhered Sheets
  - Self-Adhering Rubberized Asphalt
- Fluid Applied
  - Hot Fluid
  - Cold Fluid
  - Exposed Wear Surfaces
- Loose-Laid or Mechanically Fastened
  - Bentonite
  - Hybrids
- Other
  - Crystalline
  - Cementitious
  - Grout Injection

Self-Adhered Sheet Membranes

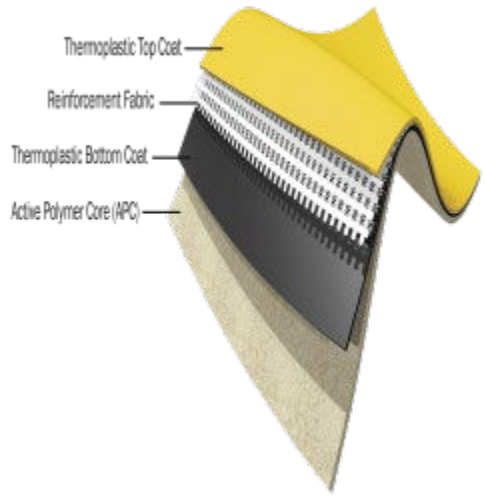


Self-Adhering Membranes

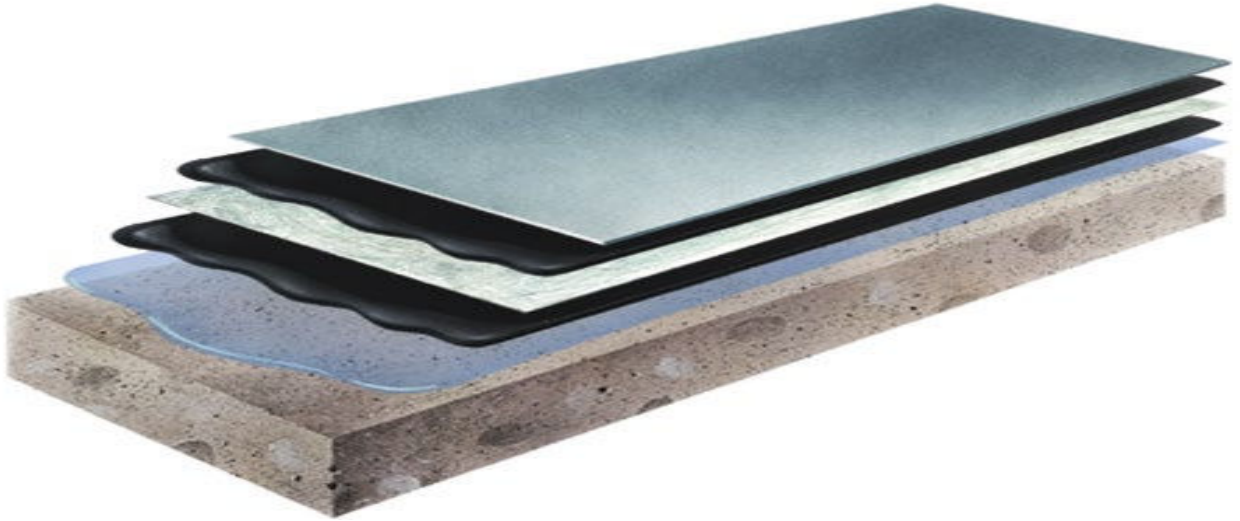


Self-Adhering Membranes

Non-Adhered Sheets



Hot Fluid Membrane



Hot Fluid Membrane

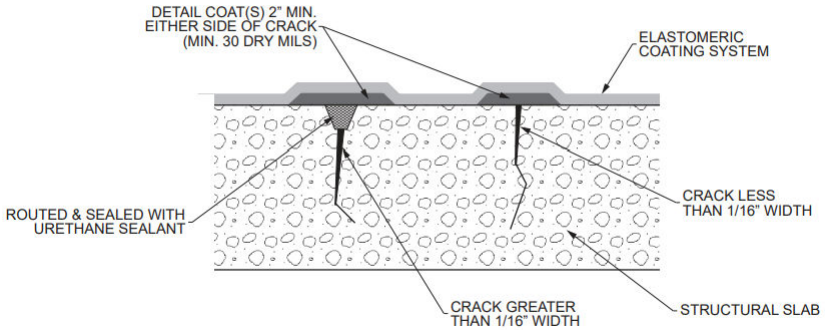
Cold Fluid Membranes

Fluid-Applied Membranes

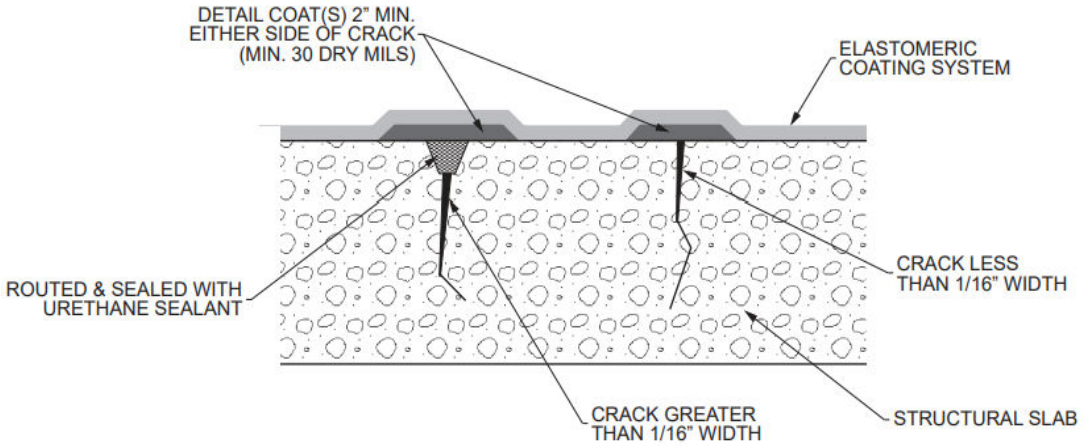
Exposed Coatings As a Wear Surface

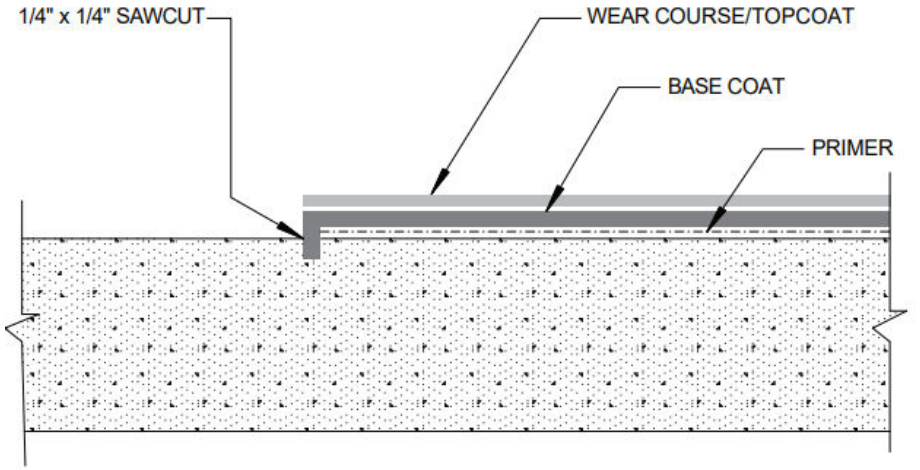
- Traffic/Deck Coatings
  - Pedestrian and Vehicular
- Polyurethane Coatings
  - Base, Intermediate and Topcoat
  - Aggregate for Anti-Slip
  - One- and Two-Part Systems
- Other Coating Systems
  - PUMA (polyurethane methyl methacrylate)
  - PMMA (polymethyl methacrylate)

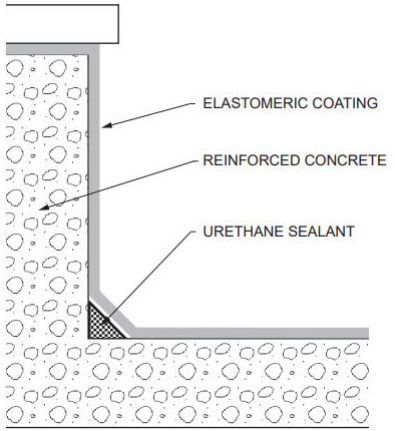
Exposed Coatings As a Wear Surface



Exposed Coatings As a Wear Surface







Surface Preparation

Adhesion Testing

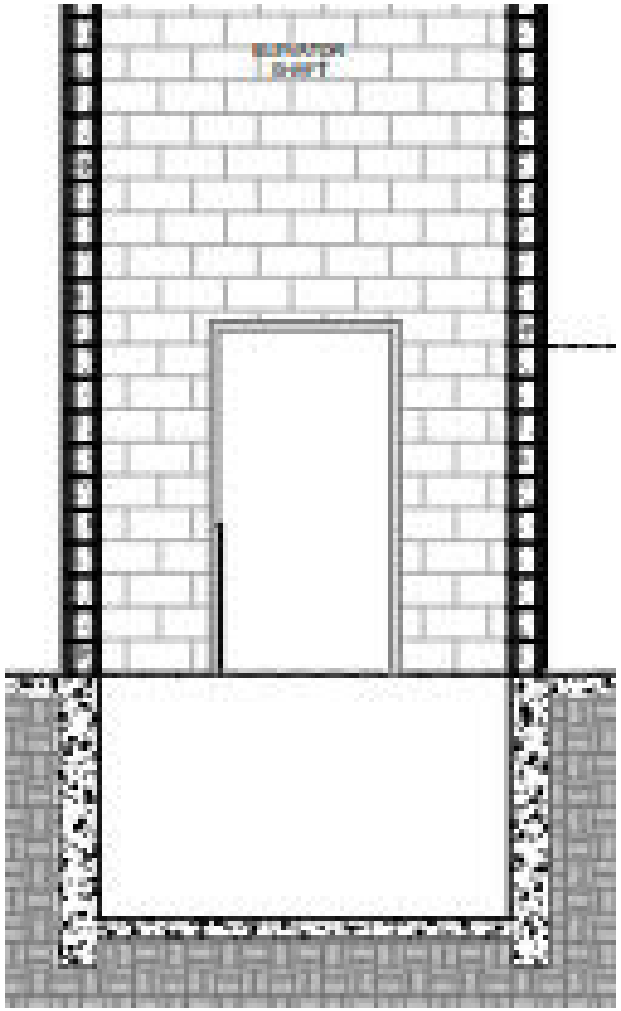
Leak Testing

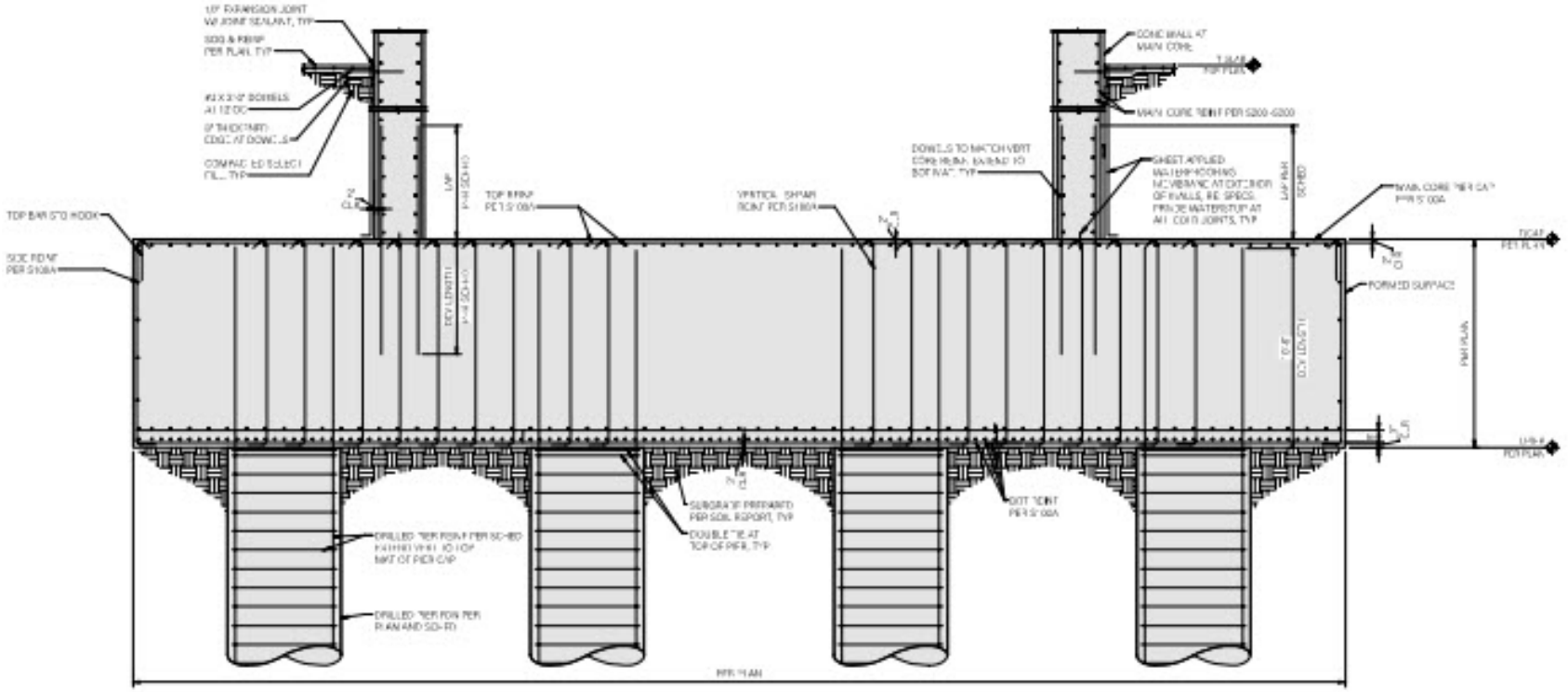
- Flood Testing
  - ASTM D5957 - Standard Guide for Flood Testing Horizontal Waterproofing Installations
  - Water Source and Disposal
  - Sloped Decks and Temporary Dams
  - Visual Inspection and Water Level
- Electronic Leak Detection (ELD)
  - ASTM D7877 - Standard Guide for Electronic Methods for Detecting and Locating Leaks in Waterproof Membranes
  - High Voltage
  - Low Voltage
    - Electronic Field Vector Mapping (EFVM)
  - Limitations

Flood Testing

ELD Testing

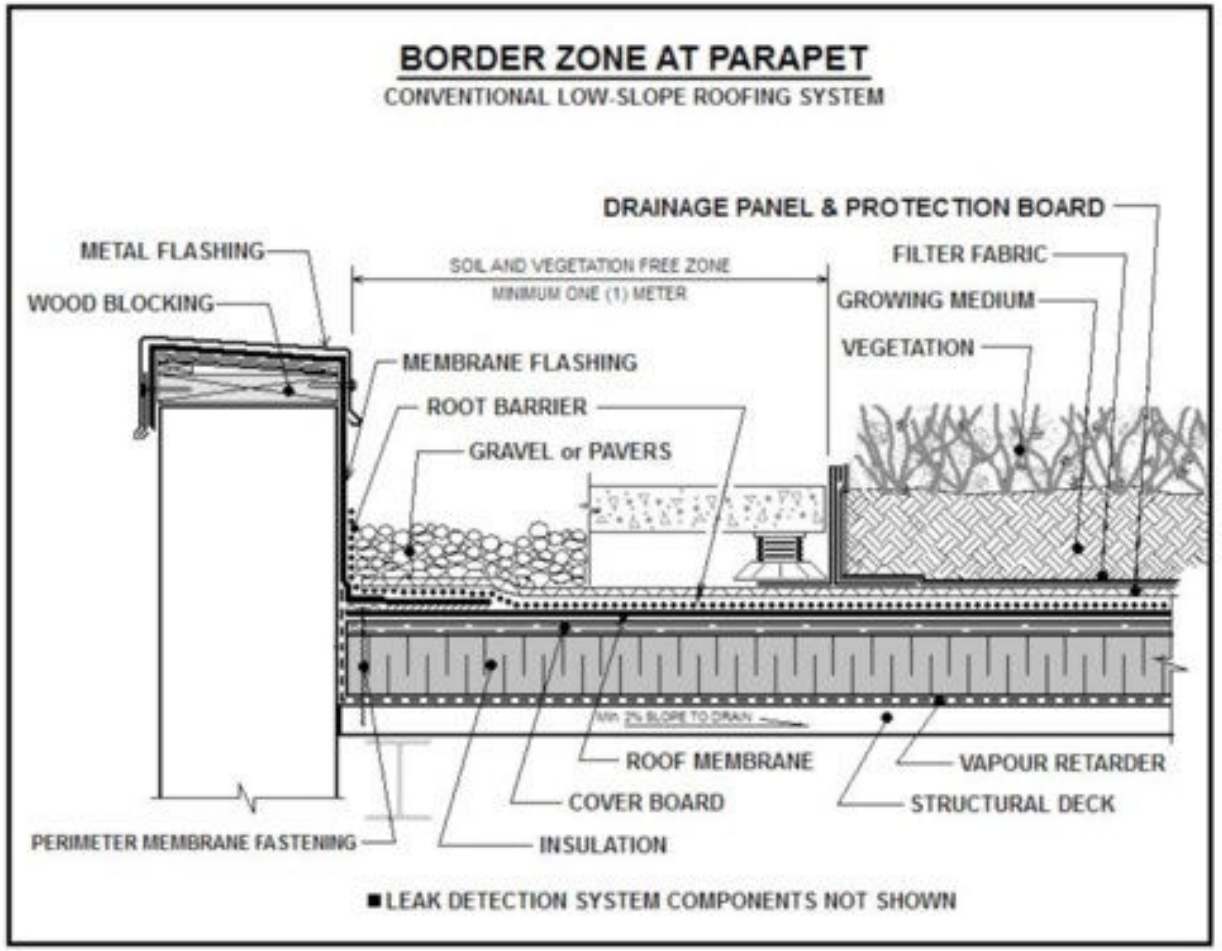
Elevator Pits





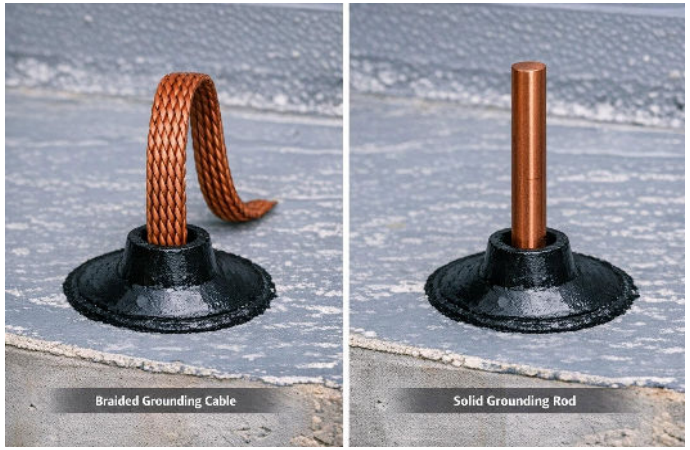
Elevator Pits

Overburden

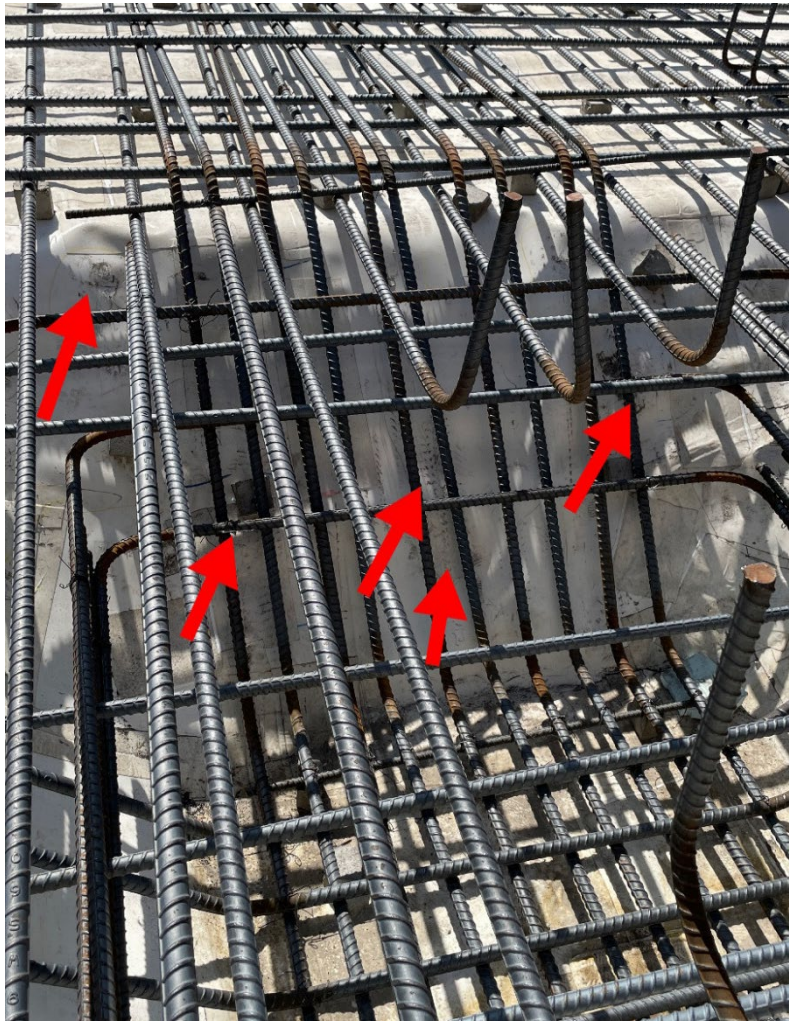

BORDER ZONE AT PARAPET
CONVENTIONAL LOW-SLOPE ROOFING SYSTEM
DRAINAGE PANEL & PROTECTION BOARD
METAL FLASHING
WOOD BLOCKING
SOIL AND VEGETATION FREE ZONE
MINIMUM ONE (1) METER
FILTER FABRIC
GROWING MEDIUM
VEGETATION
MEMBRANE FLASHING
ROOT BARRIER
GRAVEL or PAVERS
ROOF MEMBRANE
VAPOUR RETARDER
COVER BOARD
STRUCTURAL DECK
PERIMETER MEMBRANE FASTENING
INSULATION
■ LEAK DETECTION SYSTEM COMPONENTS NOT SHOWN

Overburden

Challenging Details



Challenging Details



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