

PlumbingVoid and Mudskipper

Presentation of Two Plumbing Isolation Systems
Foundation Performance Association
June 14, 2023

Agenda

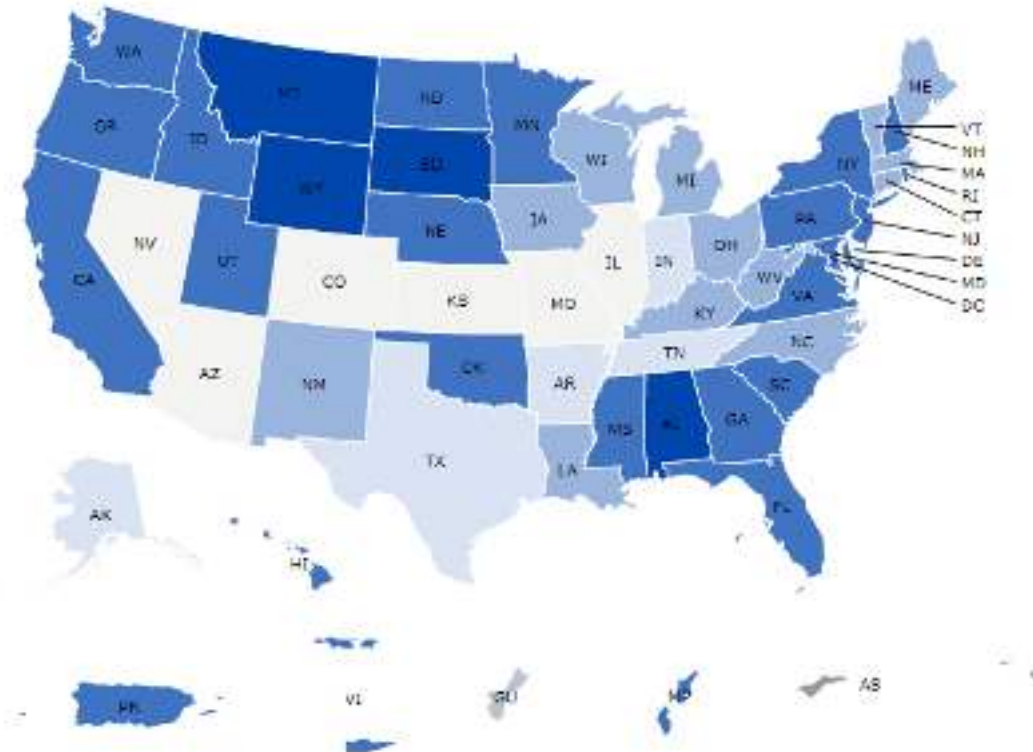
- General Code Requirements
- Design Comparison General
- Design and Execution Details PlumbingVoid
- Design and Execution Details Mudskipper
- Questions

For I-Codes adoption, click an I-Code abbreviation to see where each code has been adopted.



INTERNATIONAL BUILDING CODE® (IBC®)

ADOPTION MAP



MAP KEY

Edition of code currently in effect by state:

2021 IBC®

2018 IBC®

2015 IBC®

2012 IBC®

2009 IBC®

Local Adoptions

No state-wide IBC adoption

Adoption information is provided for states where the IBC is adopted statewide, adopted statewide for certain categories of buildings, or adopted by a state body to guide local code adoption.

Adoption information across this display is maintained by the International Code Council (ICC). ICC makes every effort to provide current, accurate code adoption information. To obtain more detailed information on amendments and changes to adopt codes, please contact the jurisdiction. To submit adoption information, please visit our [Code Adoptions Resources](#) page.

This map depicts the adopted revisions of the IBC by state. Note many are years behind current Code. Industry leaders are advocating for compliance with the IPC 2024 changes regardless of adoption status.

Codes

- Comparison of Different Revisions
 - IPC 2012, 2015, 2018, 2021
 - 305.2 Stress and strain. Piping in a plumbing system shall be installed so as to prevent strains and stresses that exceed the structural strength of the pipe. Where necessary, provisions shall be made to protect piping from damage resulting from expansion, contraction and structural settlement.
 - IPC 2024 (See next slides)
 - UPC 2021
 - Code does not address expansive soils and plumbing damage. The UPC 2024 change committee did agree something needs to be added but rejected the change proposal submitted which was similar to the IPC 2024 provided here.
 - IRC 2021
 - Code does not address expansive soils and plumbing damage.

The following is the approved IPC 2024 Code change to go in effect.

305.8 Expansive Soil. **Where expansive soil is identified under buildings in accordance with Section 1803.5.3 of the International Building Code, but not removed in accordance with Section 1808.6.3 of the International Building Code, plumbing shall be protected in accordance with Section 305.8.1 or 305.8.2.**

305.8.1 **Non-Isolated Foundations**. Under foundations with slabs that are structurally supported by a subgrade, it shall be permitted for plumbing to be buried.

305.8.2 **Isolated Foundations**. Under foundations with a slab or framing that structurally spans over an under-floor space which **isolates the slab or framing from the effects of expansive soil swelling and shrinking** in accordance with Section 1808.6.1 of the International Building Code, the plumbing shall be suspended so that plumbing, hangers and supports are isolated, by a void space, **from the effects** of expansive soil swelling and shrinking.



Exception: It shall be permitted for plumbing to be buried if the plumbing provides drainage of an under-floor space.

To protect the voidspace, **soil shall be sloped, benched or retained** in accordance with an approved design methodology.

It shall not be permitted for the plumbing, hangers and supports below the slab or below the framing to be in contact with soil or any assemblage of materials that is in contact **with soil within the active zone**. It shall **not be permitted for a slab and plumbing to be lifted as an assembly** to create the void space **unless** the under-floor space is a crawlspace with access to allow inspection of plumbing after lifting.

Exception: It shall be permitted for the piping, fittings, hangers, and supports below the slab or below the framing to be in contact with structural elements of the foundation that are designed to resist the effects of expansive soil swelling and shrinking in accordance with Section 1808.6.1 of the International Building Code.

Organic materials subject to decay shall not be used for hangers, supports and soil retention systems. Materials subject to corrosion shall not be used for hangers, supports and soil retention systems unless protected in an approved manner.

Where plumbing transitions to a buried condition **beyond the perimeter of the foundation**, an adequately **flexible expansion joint shall be provided** in the plumbing system to accommodate the effects of expansive soil swelling and shrinking.

2 Main Principles

1. Isolate plumbing under slab-on-void foundations from expansive soil movement where the plumbing is installed before the slab is poured

and,

2. Protect transitions at isolated flexible expansion joints between isolated and non-isolated plumbing (e.g. exterior soil-supported conditions)

General Design Comparison of Systems

- PlumbingVoid
 - Adapts to the released MEP plumbing drawing and specification
 - Isolates by retention of soil
- Mudskipper
 - Ideally works with the design group during the design phase using the project model
 - Encourages shallow piping with multiple exits from under foundation
 - Involves multiple disciplines throughout the design and implementation process
 - Isolates by benching the trench where piping is installed
 - Trench filled with carton forms to SlabVoid level
 - Introduction of perimeter vaults for transitions with flex-joints

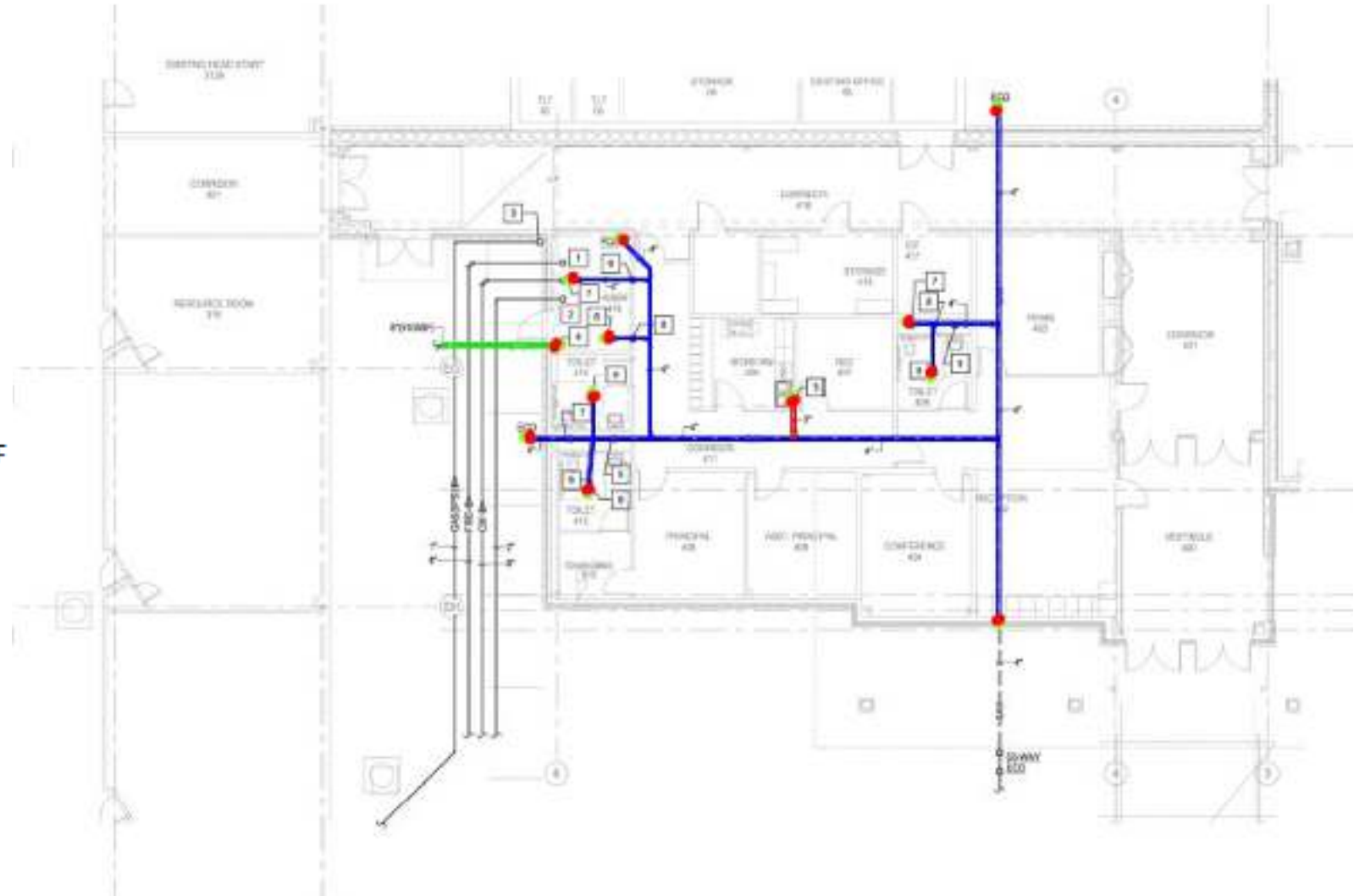
PlumbingVoid

Design and Execution Details PlumbingVoid

- Construction Phase Impact
- Single-Discipline
 - MEP
- Procurement
 - Most supplies purchased by plumber
- Coordination Between Trades

Sample Takeoff

- 24"x18" System Endcap - 12 EA
- 24"x8" Corner - 24 EA
- 24"x18" PlumbingVoid CR 8" Pipe PVC - 13 LF
- 24"x18" PlumbingVoid CR 4" Pipe PVC - 172 LF
- 24"x18" PlumbingVoid CR 2" Pipe PVC - 5 LF



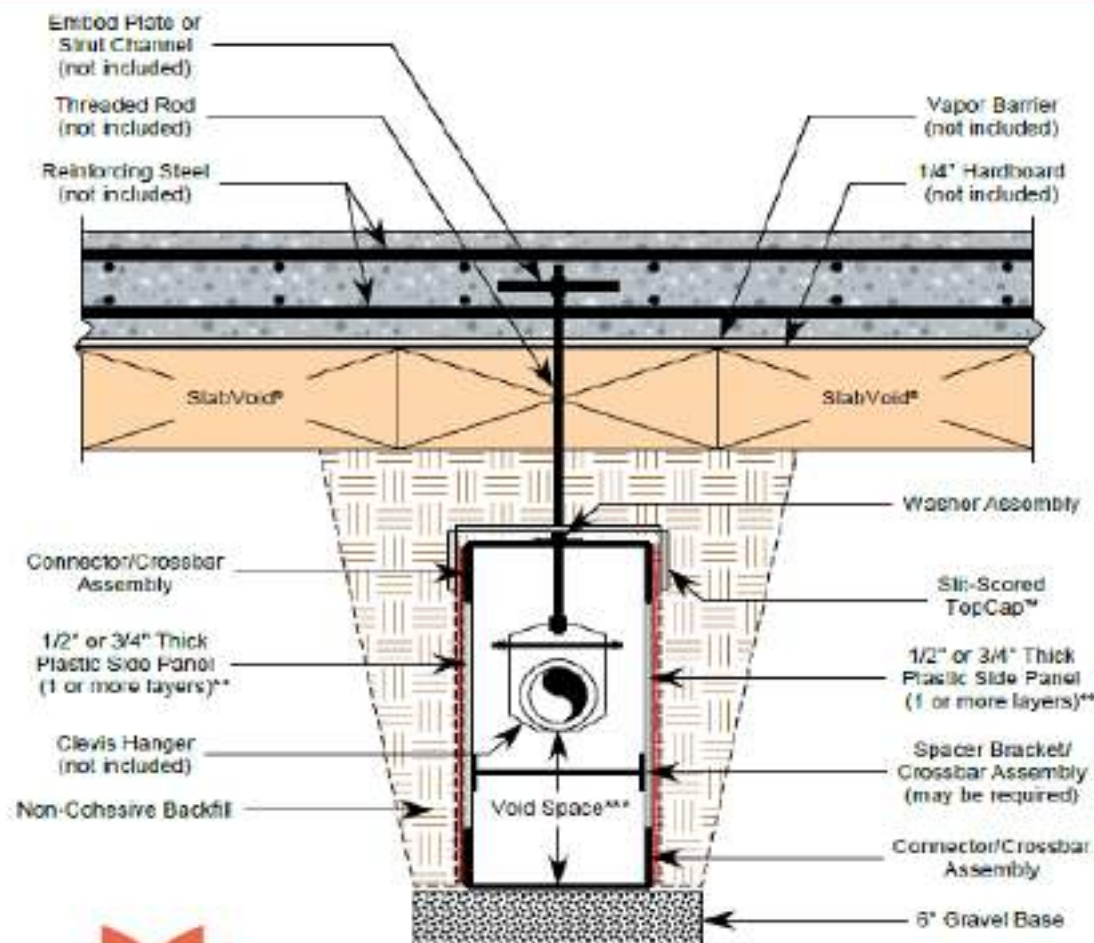
Common PlumbingVoid Design Issues

- Plumbing Drawings are often schematic in nature
- Plumbing Drawings missing invert heights
- Details too generic
- Details include information that is obsolete
- Standard clearance below pipe varies; Void Space vs. PVR
- Trap clearances
- Transition to soil supported pipe

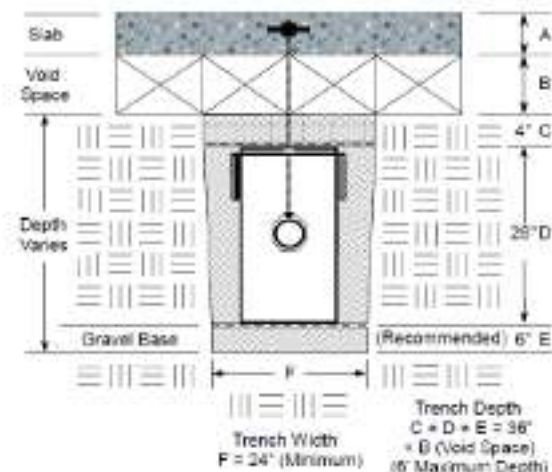
PlumbingVoid

Assembly and Installation

PlumbingVoid® System (Corrosion-Proof Components)*



Excavation Recommendations (24" x 18" System)



(For trench depths greater than 6' contact your product advisor.)

*The PlumbingVoid® System is made using corrosion-proof materials.)

**Panel thicknesses and/or additional layers are determined by strength requirements.)

***The required void space is determined by site-specific soil conditions.)

Trench Install



Ready for Backfill



Special Considerations

1. Pipe Installed too high
2. Multiple Pipes in one conveyance
3. Trap installation
4. Pipe diameters > 12"
5. Congested areas
6. Backfill and compaction
7. Insufficient spacers
8. Trapeze Hangers
9. Seal Top Cap penetrations
10. Fasten to or pass through grade beam

Mudskipper

Design and Execution Details Mudskipper

- Design Phase Impact
- Multi-Discipline
 - MEP-Piping
 - Structural-Vaults
 - Civil-Inverts and multiple tie-in
- MRO vs Shop Drawing w/open issues
- Procurement
 - Most supplies purchased by Concrete Contractor
- Coordination Between Trades

Drawing Sections

- Important Notes Regarding Sequencing and Responsibilities
- Important Notes to Purchaser
- Notes Regarding the Use of These Drawings
- Note Regarding Vehicle/Equipment Loads
- Plumbing Sub-Contractor
- Minimum Required Order (MRO)
- Important Note
- Various Local Notes

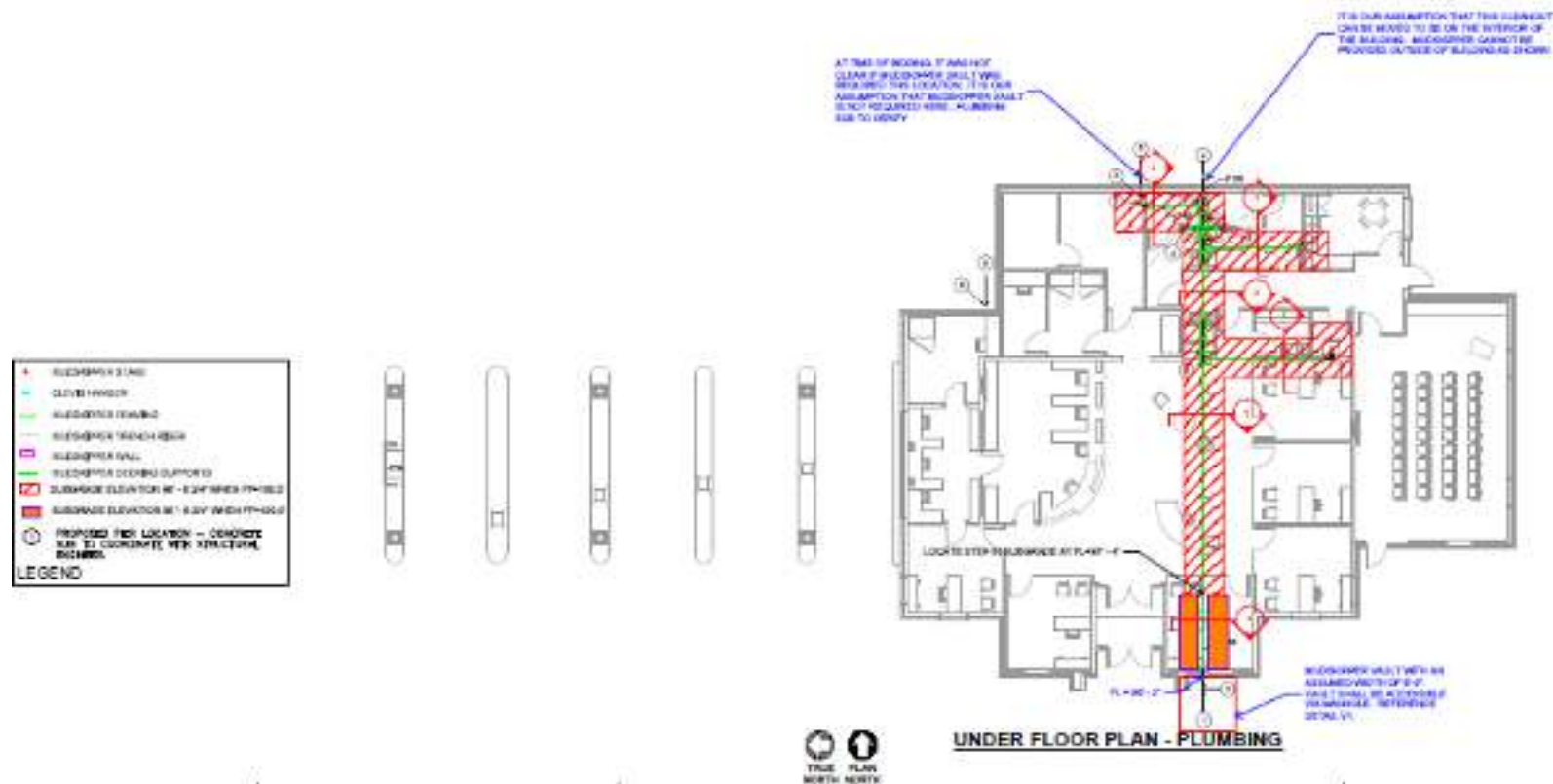
IT IS OUR ASSUMPTION THAT THE TOP OF ALL LINES CAN START AT A FINISHED FLOW LINE ELEVATION OF 98'-6" BASED ON A FF=100'-0". PLUMBING SUBCONTRACTOR TO VERIFY

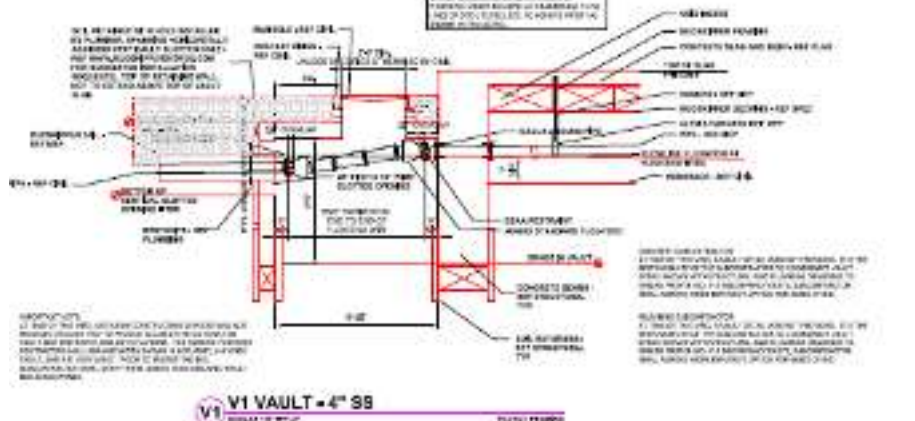
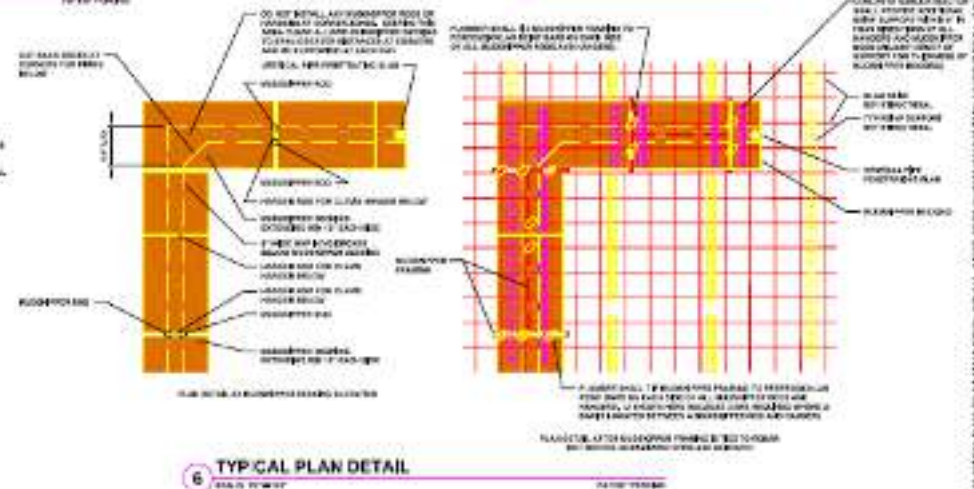
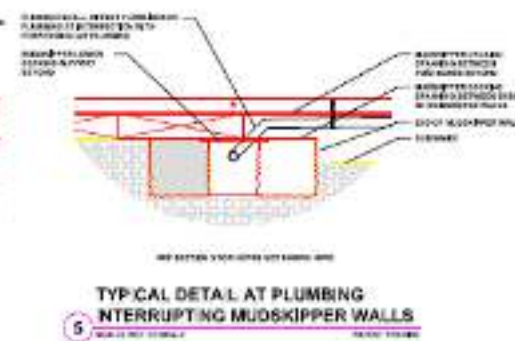
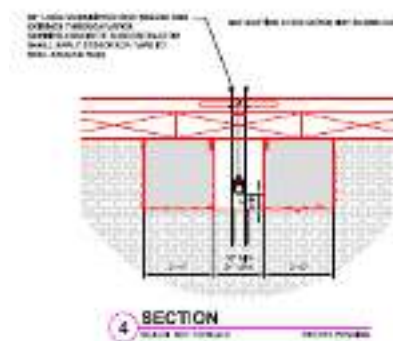
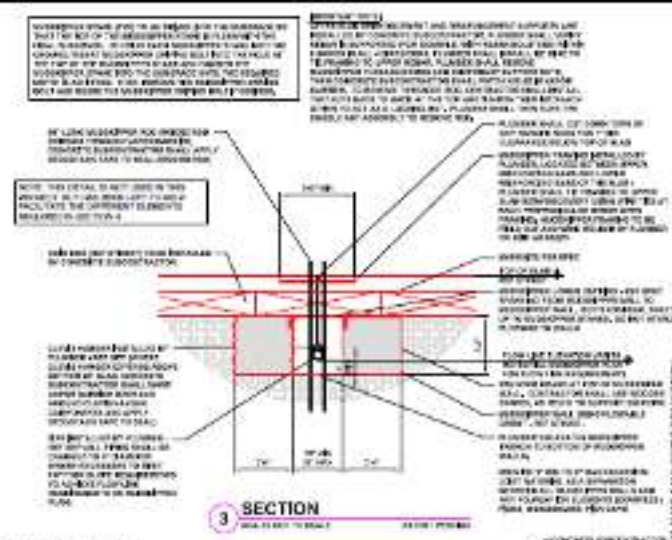
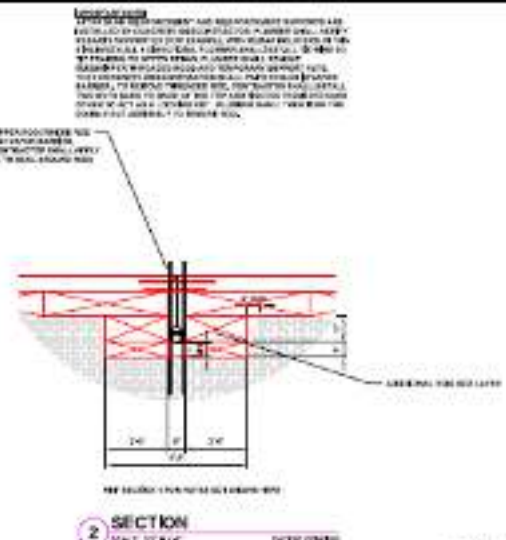
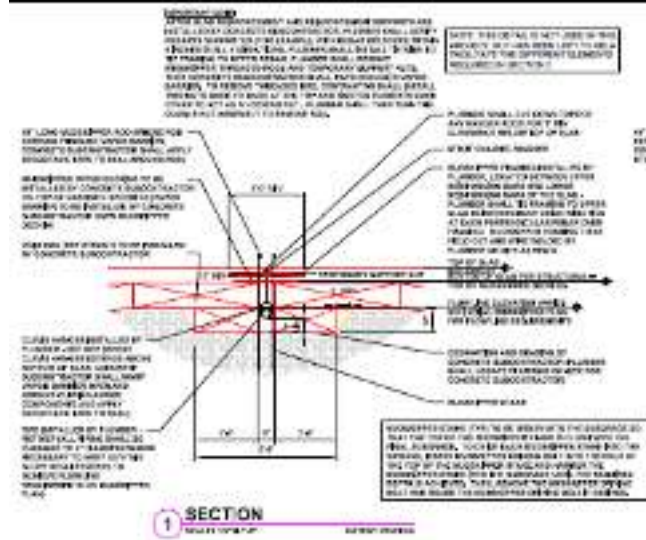
AT TIME OF THIS WRO SET, MUDSKIPPER DESIGN DETAILS WERE UNAVAILABLE FROM THE DESIGN TEAM. ALL DETAILS AND ASSUMPTIONS MADE HERE ARE WHAT MCFARLIN CONSTRUCTION SERVICES CONSIDERS STANDARD CONDITIONS. ANY DEVIATIONS REQUIRED TO SECTIONS AND ELEVATIONS SHOWN SHALL BE COORDINATED BY PLUMBING SUBCONTRACTOR.

PER CONVERSATIONS WITH STRUCTURAL
ENGINEER, IT IS OUR ASSUMPTION THAT A DESIGN
PVM OF 7" IS ACCEPTABLE

AT LOCATIONS WHERE PLUMBING INTERSECTS WITH STRUCTURAL GRADE BEAMS, IT IS OUR ASSUMPTION THAT CONCRETE SUBCONTRACTOR CAN DEEPEN GRADE BEAMS TO ALLOW PLUMBING PENETRATION. CONCRETE SUB TO COORDINATE WITH STRUCTURAL ENGINEER.

PLUMBING SUBCONTRACTOR:
IT IS OUR ASSUMPTION THAT AT ALL LOCATIONS WHERE THERE IS AN INTERFERENCE BETWEEN PLUMBING AND FOUNDATION ELEMENTS, THAT IT WILL BE POSSIBLE TO RELOCATE LINE TO AVOID CONFLICTS. IT IS THE RESPONSIBILITY OF THE SUBCONTRACTOR TO DETERMINE WHETHER OR NOT ADDITIONAL SUPPLIES WILL BE REQUIRED IN ORDER TO REROUTE LINES.





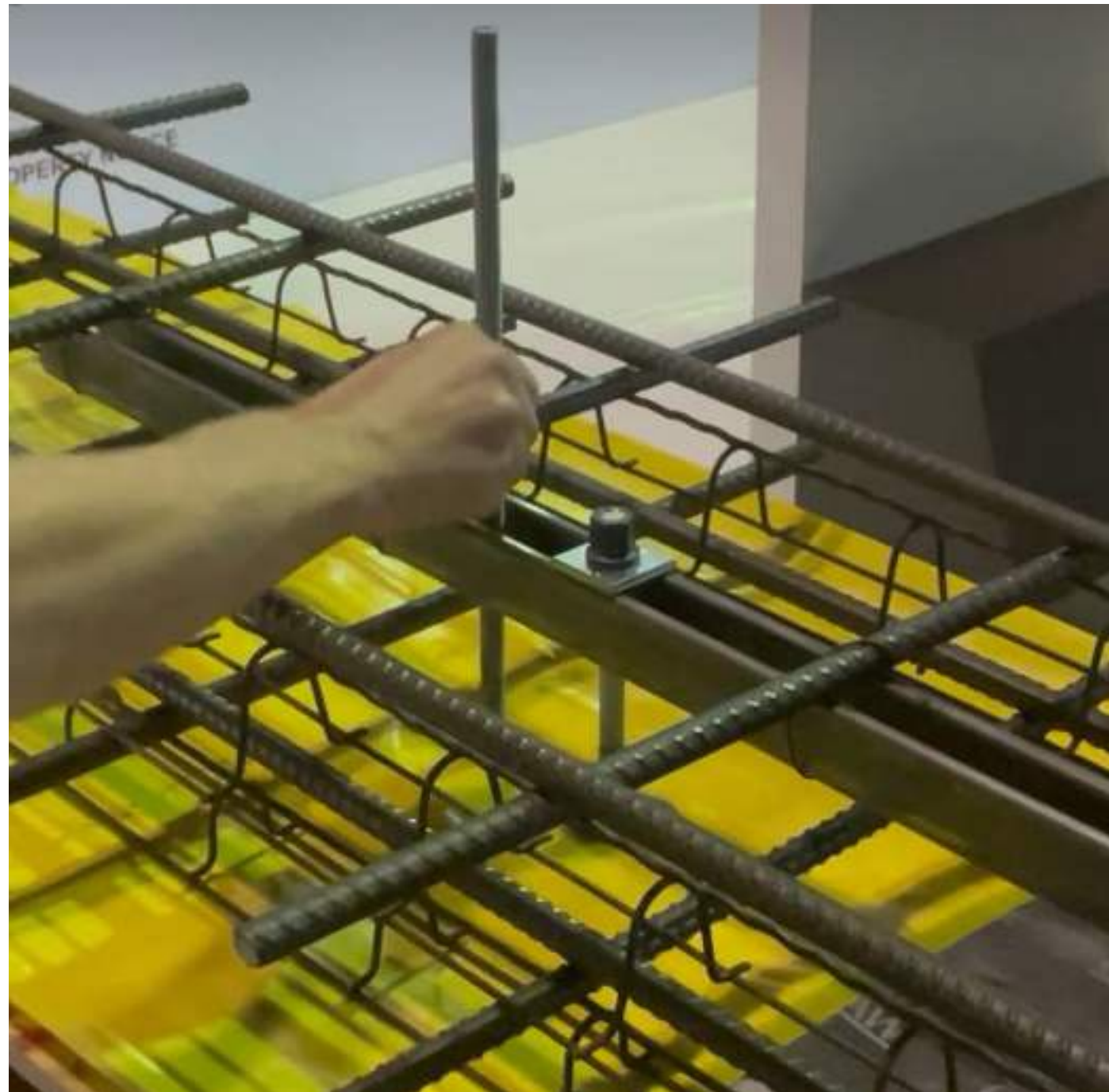
Mudskipper Framework



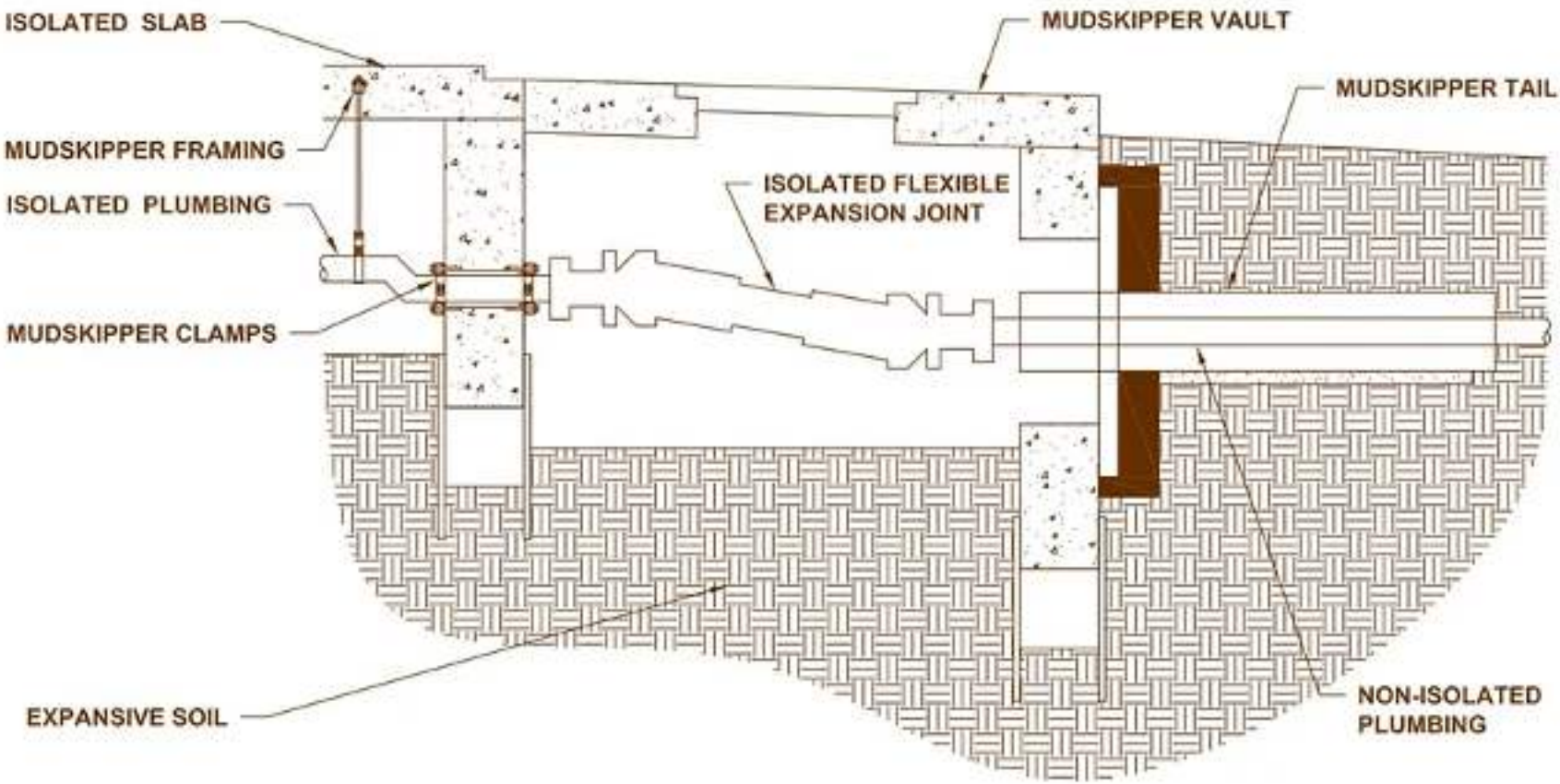
Framing ready for steel



Pulling the Threaded Rods



Vault with Flex Joint



Common Mudskipper Design Issues

Project not coordinated with all disciplines at the design phase.

Invert heights not specified.

Plumbing design has one gut line out rather than multiple shallow.

Structural drawing either missing vault details or differ in count from plumbing.

Mudskipper submittal documents contain unanswered questions.

Trap Clearances.

Limited Experience.

New Product – Composite Hangers

VoidForm Products, LLC will soon have fiberglass rods, nuts and PVC and fiberglass hangers available.



Super Hanger™ PVC pipe hanger is comprised of all nonmetallic, corrosion resistant materials and maintenance free properties. Sizes available for 1" to 10" pipe size.

Use the **Super Rod** Fiberglass Threaded Hanger Rod and **Super Nut** Hex Flange Nut for a complete pipe hanger system. Sizes available from 3/8" to 1" in diameter and 96" in length.

The **Super Loop Hanger** is great for industrial applications or commercial drainage pipes, where pipes sizes are considerably larger. The biggest advantage of using the Super Loop Hanger is that in any environment the Super Loop performs better than metallic counterparts, because of its rust-free properties.

Questions?

Thank You!

If you have any additional questions or would like more information:

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