



Connection Design Assistance Manual

Architectural
Precast
Concrete



Glass
Fiber
Reinforced
Concrete



Cast
Stone





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PART 1

Architectural Precast Concrete

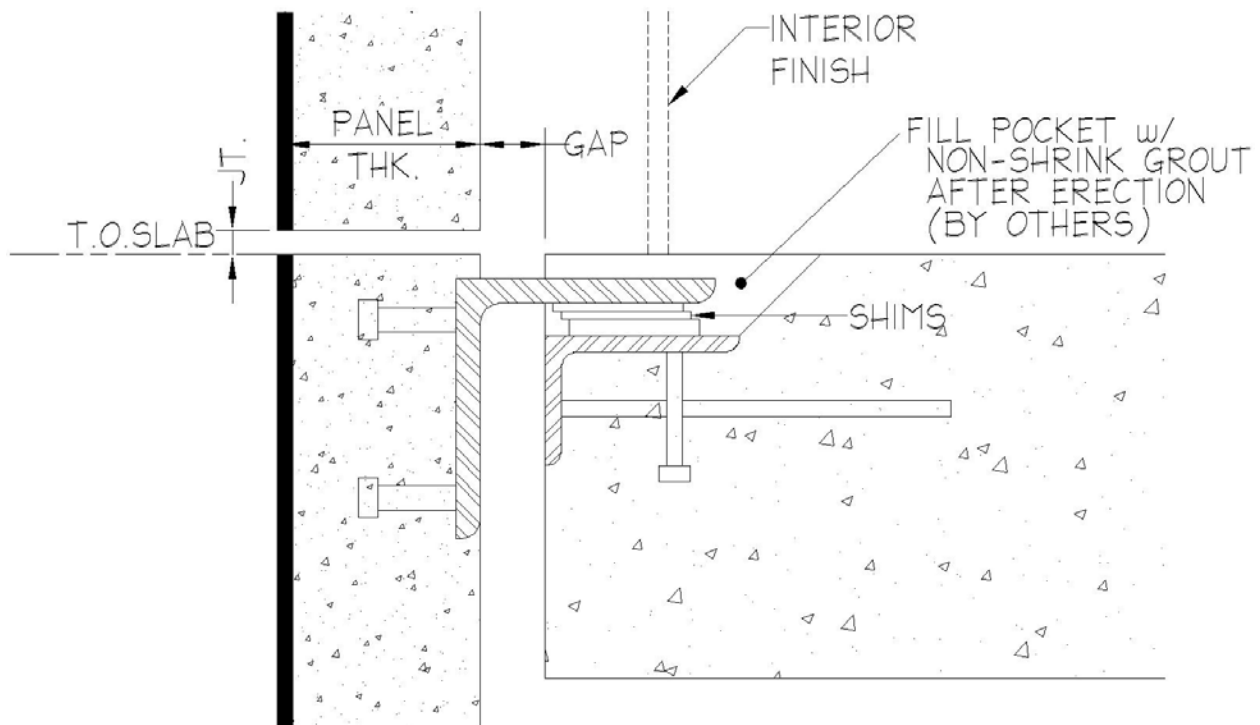


PART 1 - ARCHITECTURAL PRECAST CONCRETE

1.1 CONCRETE STRUCTURE

A. Type 1 - Load Bearing to Floor Slab

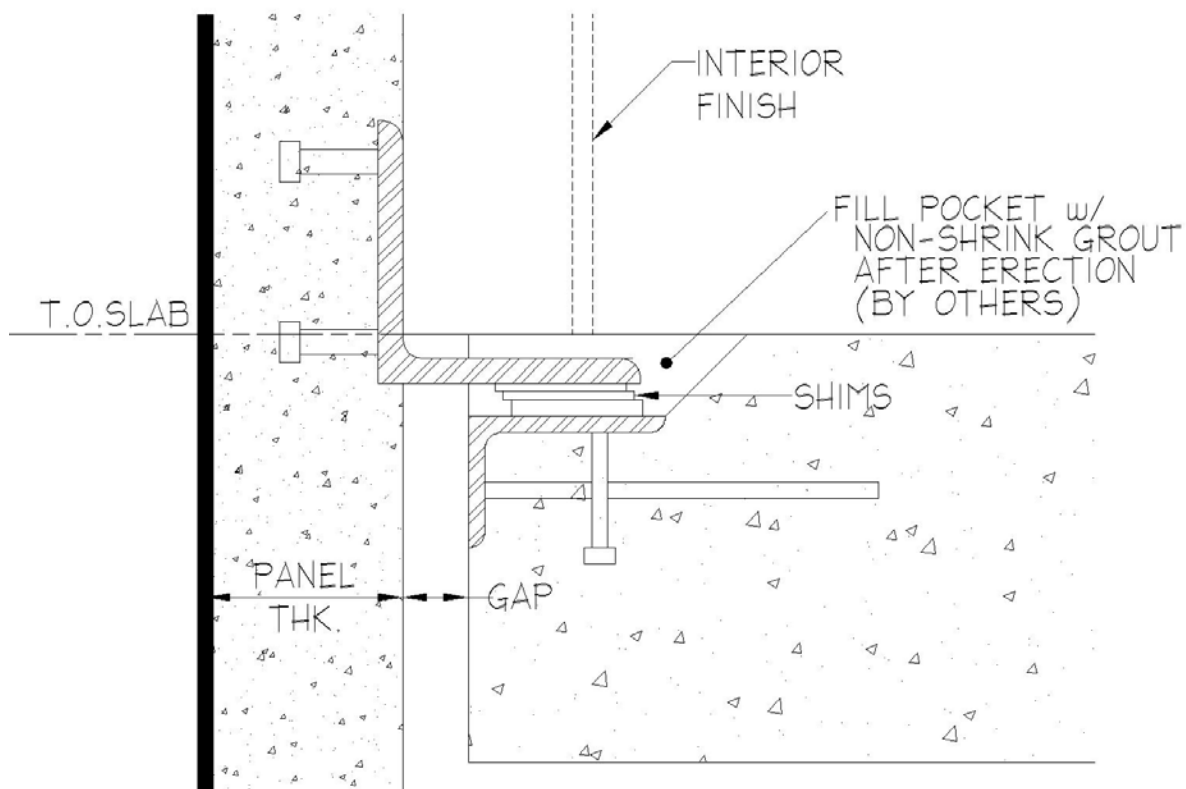
- Connection to concrete slab with precast panel terminating at top of slab.



*Each illustrative connection is shown for concept only.
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B. Type 2 - Load Bearing to Floor Slab

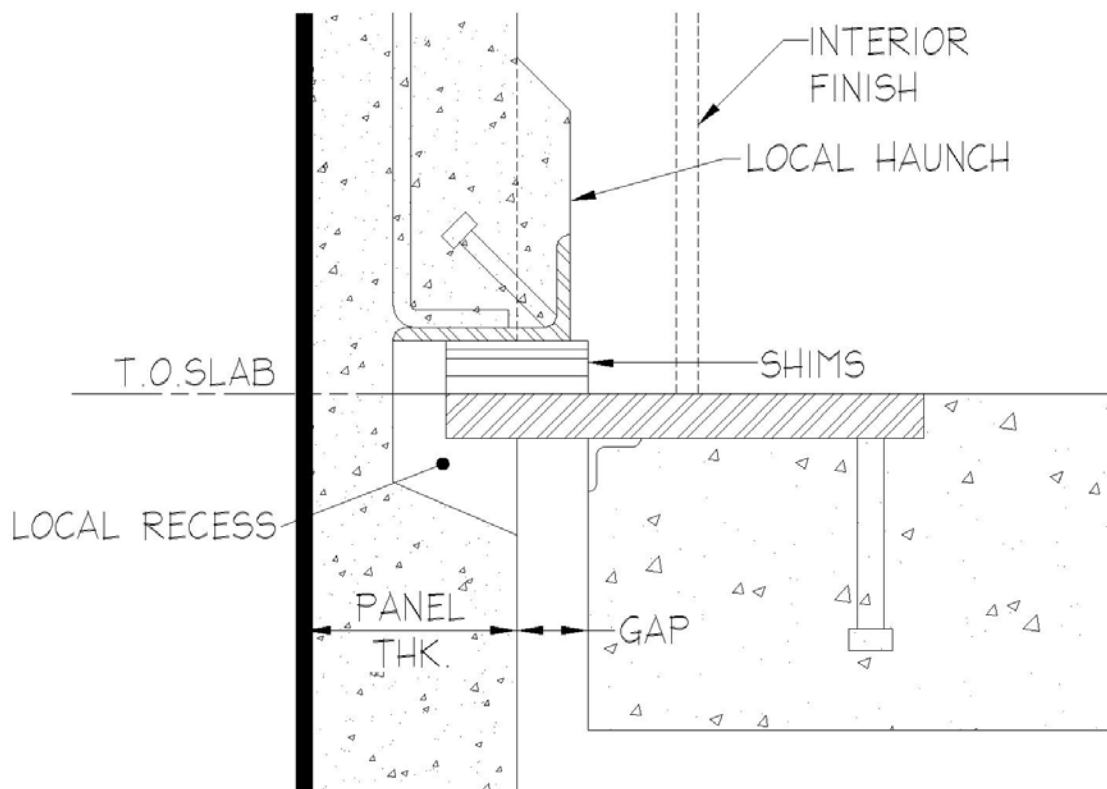
- Top of panel terminates above floor line.
- Load bearing to concrete floor slab with recessed pocket.
- Embed recessed so not to interfere with interior finishes.



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C. Type 3 - Load Bearing to Floor Slab

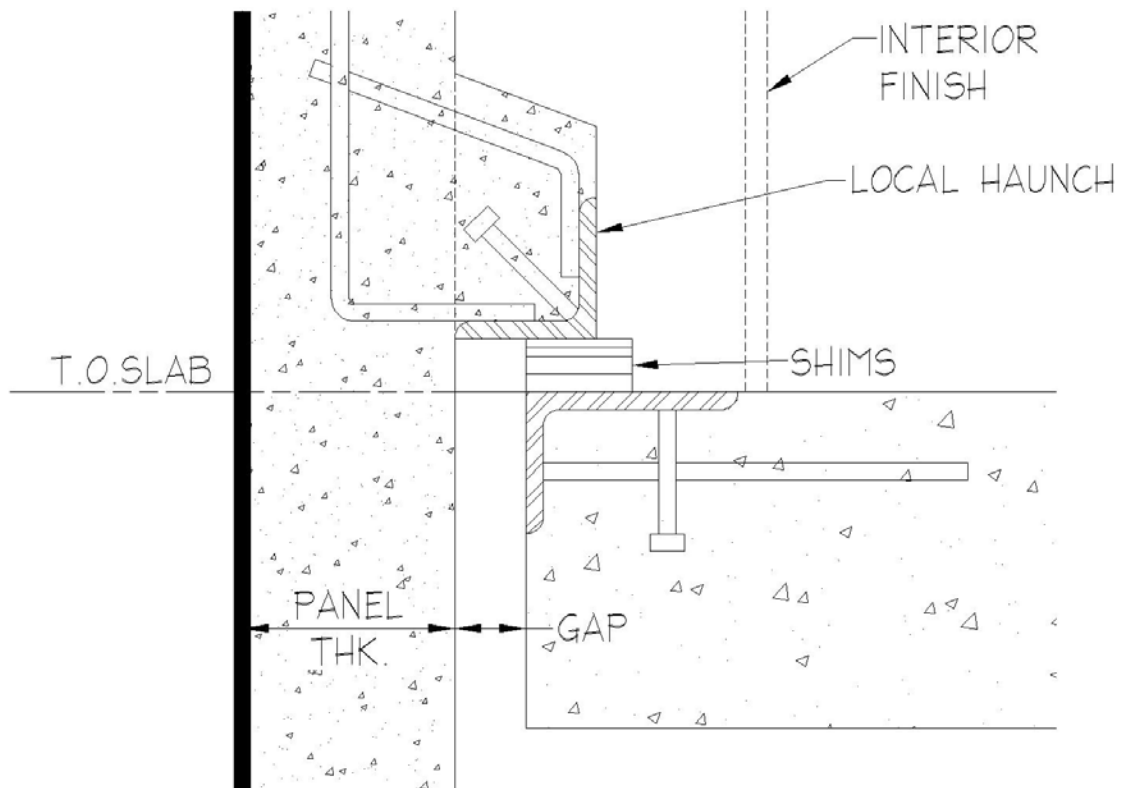
- Projecting bearing plate flush with top of slab.
- Ideal for minimum distance from edge of slab to interior finishes.



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D. Type 4 - Load Bearing to Floor Slab

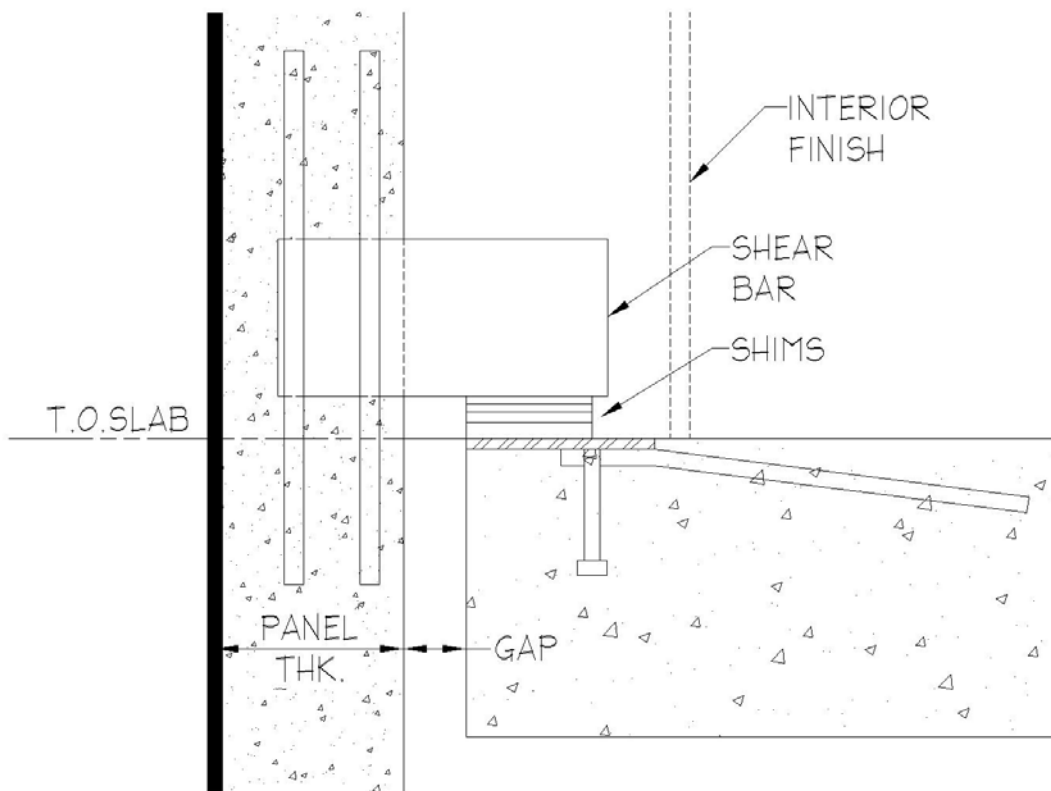
- Typical distance from edge of slab to interior finish.



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E. Type 5 - Load Bearing to Floor Slab

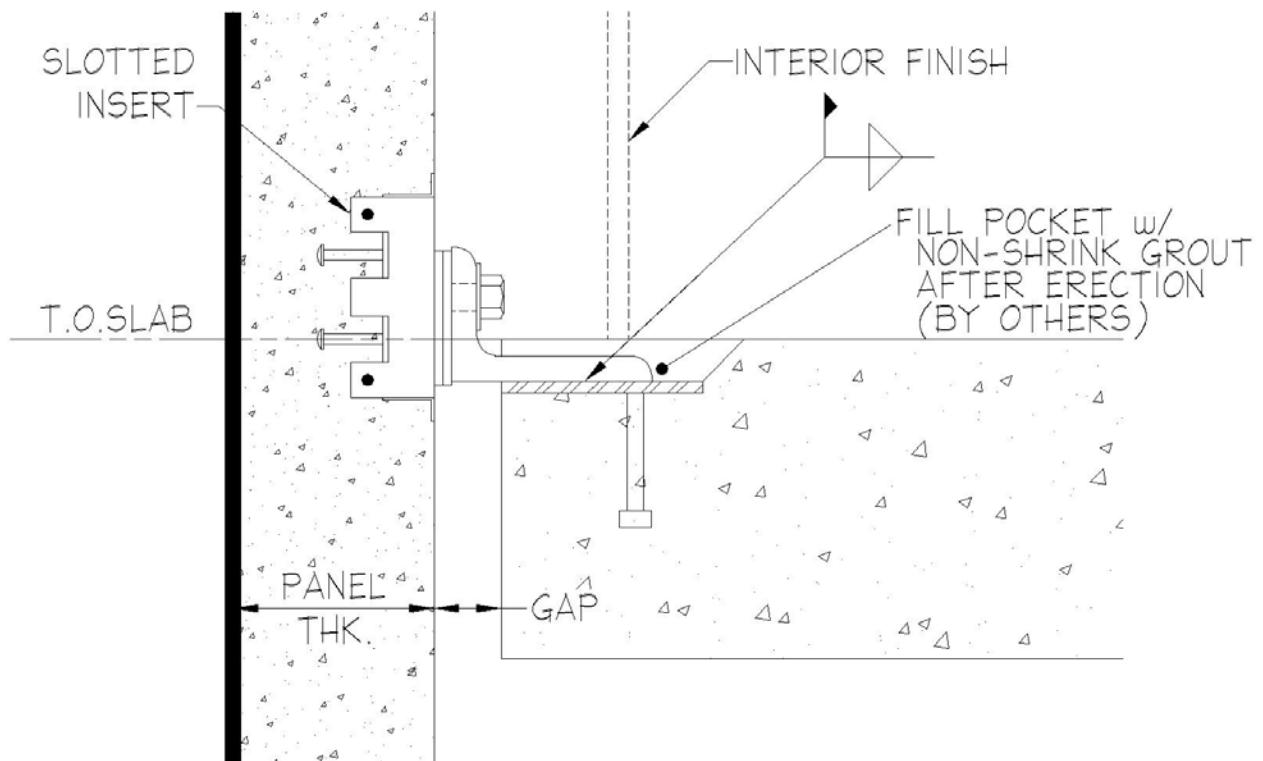
- Similar condition to concrete haunch (connection D).
- This connection may be more cost effective for the precast manufacturer.



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F. Lateral Tieback to Top of Slab

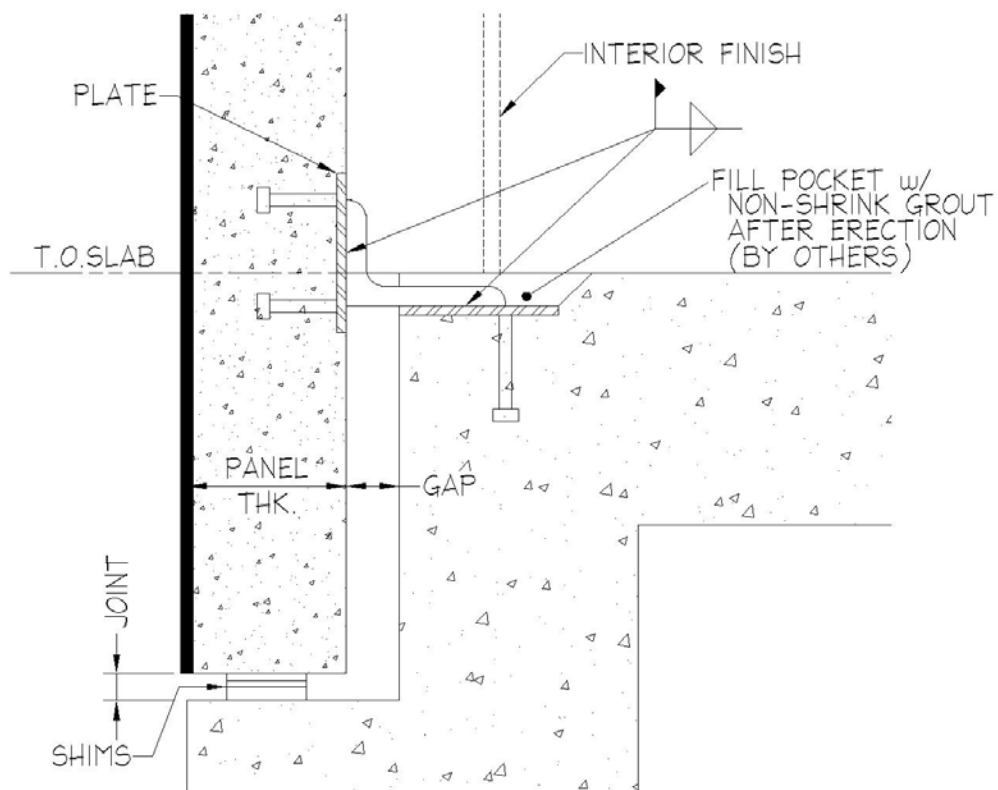
- Slotted insert (vertical) permits deflection of slab.
- Fixed insert in panel may be used with slotted angle in lieu of slotted insert.



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G. Load to Foundation or Curb

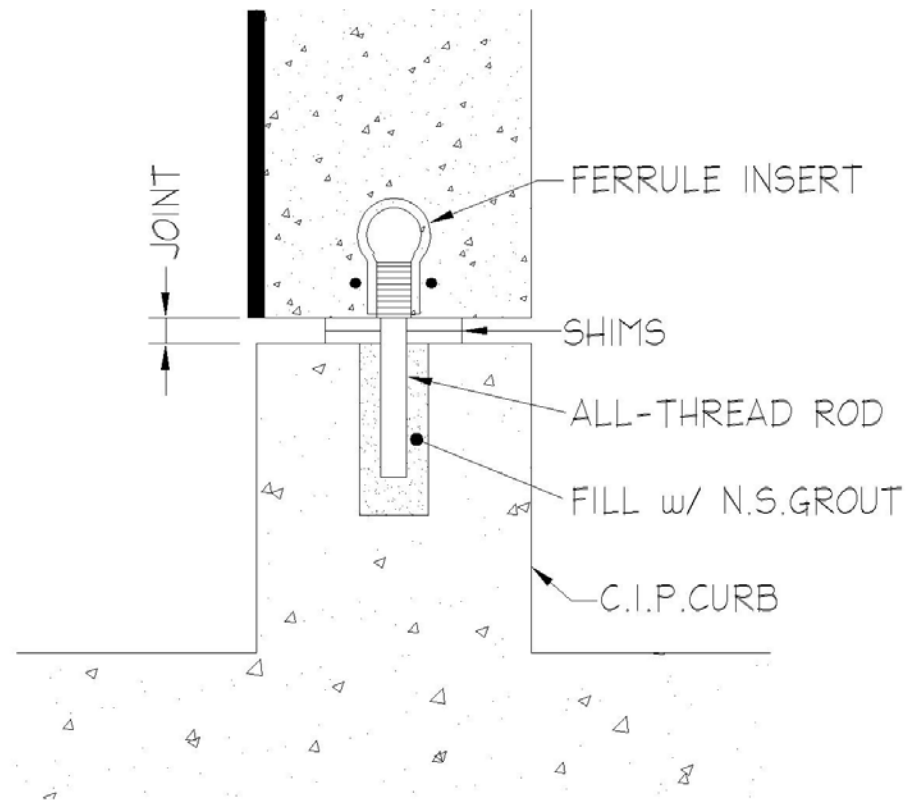
- With lateral tieback to structure.
- Tieback may be welded solid. Foundation will not deflect.
- Waterproofing and grout, if required, by others.



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H. Load Bearing to Cast-in-Place Curb

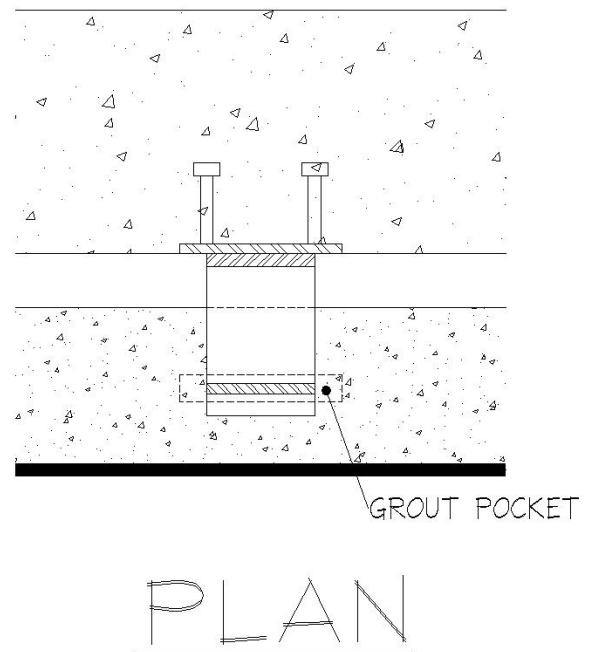
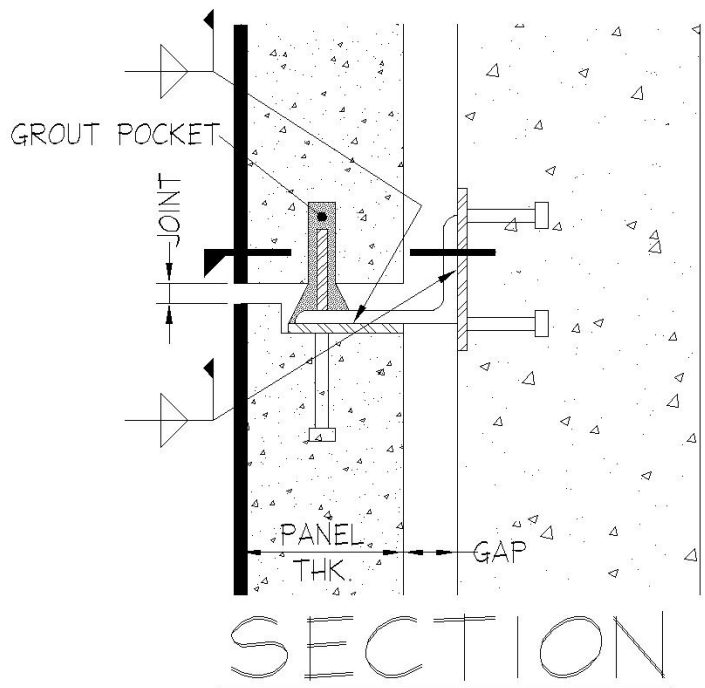
- Shims shown beyond.



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I. Load and Tieback to Shear Wall

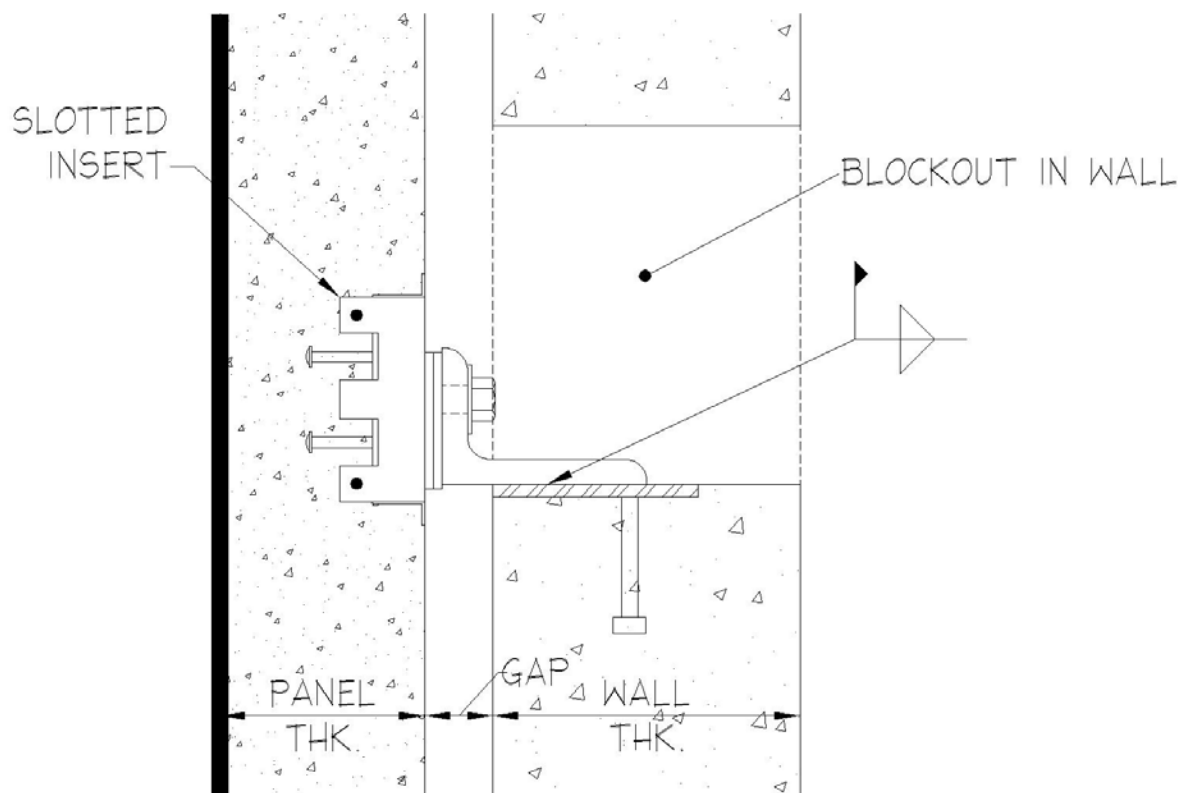
- Access from precast panel face.
- Grout is dammed in place to prevent leakage.
- Shear wall will not deflect, therefore, slotted connection not required.



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J. Lateral Tieback to Shear Wall

- Local breakout in shear wall for access from inside structure.
- Filling local breakout by others.
- Insert does not need to be slotted. Shear wall will not deflect.

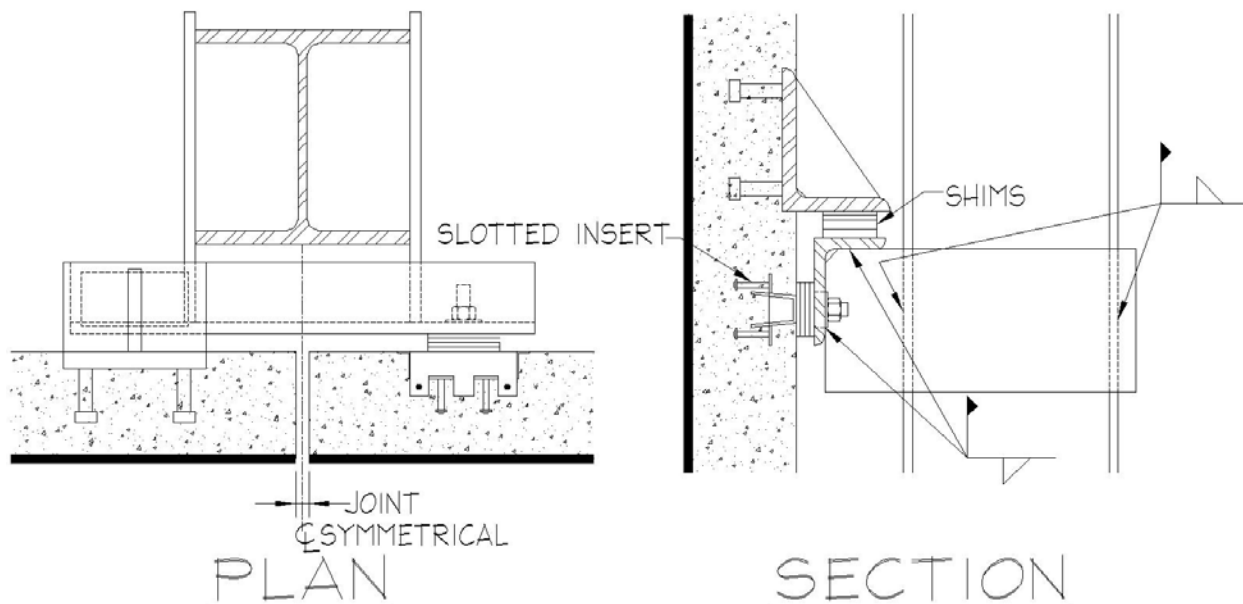


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1.2 STEEL STRUCTURE

A. Load to Column

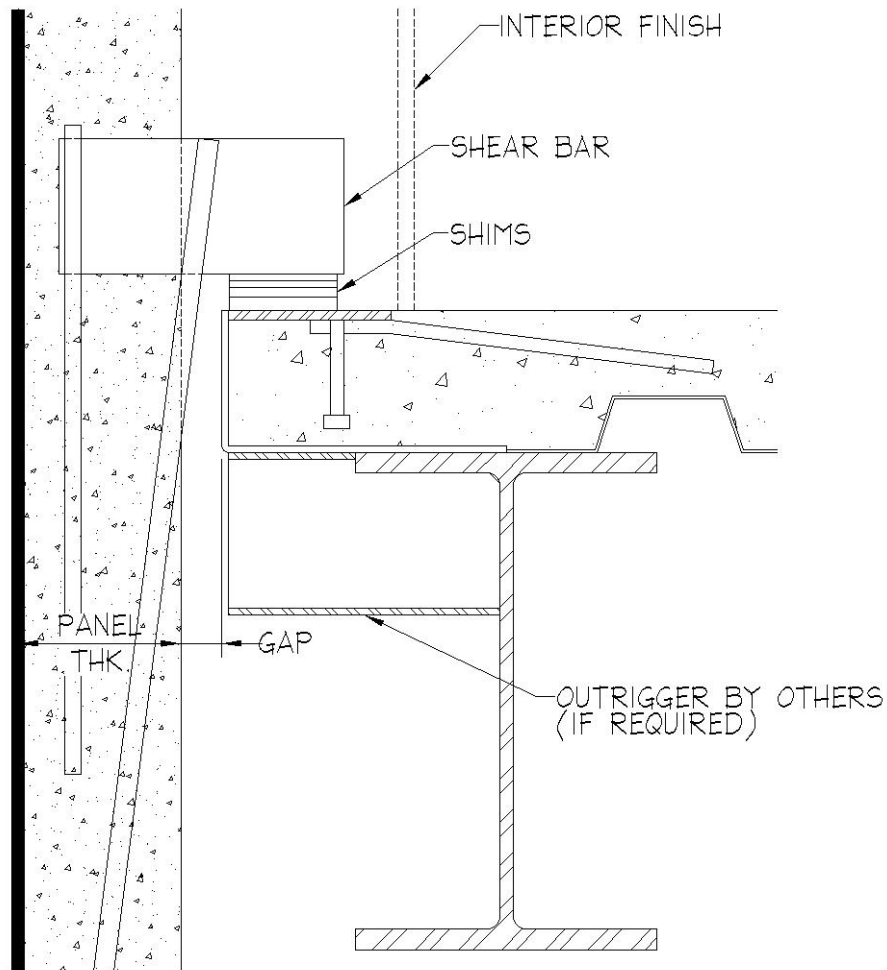
- The precast erector may weld the plates to the column or they may be welded in the shop by the steel fabricator.
- Note that the connection is symmetrical about the centerline of column. Each load-bearing angle receives a tie back connection.
- Angle with slots may be used in lieu of slotted inserts



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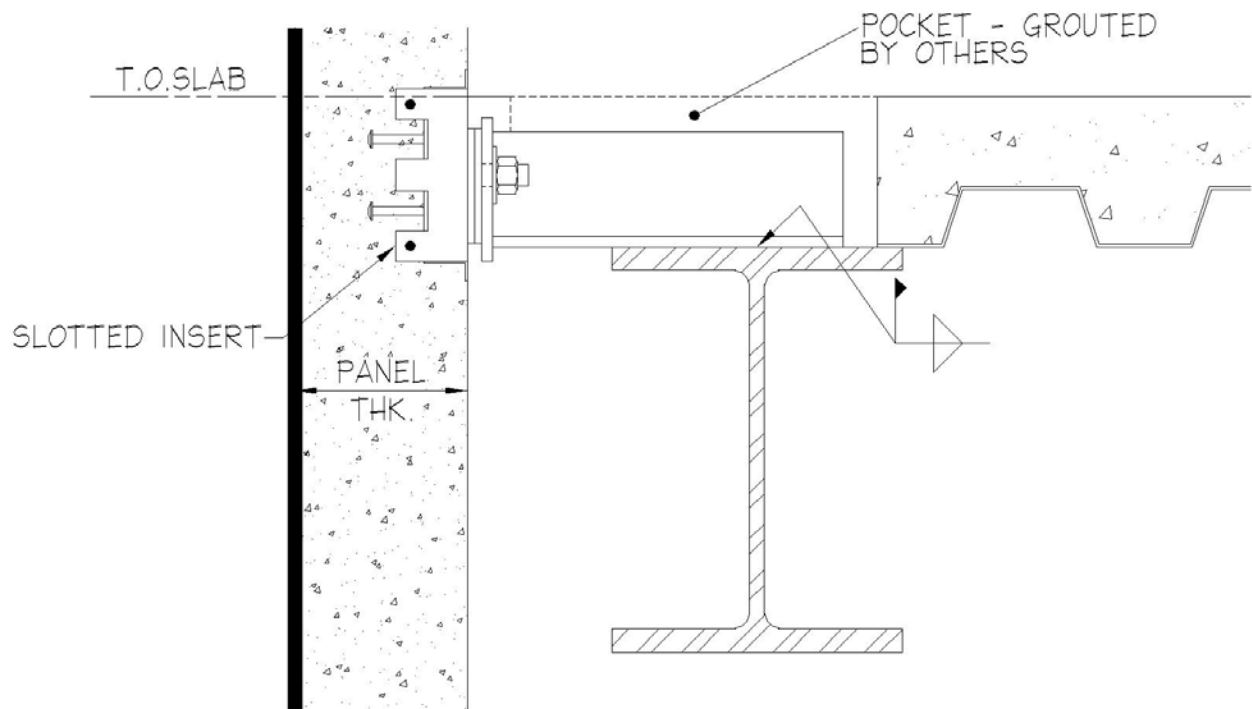
B. Load to Perimeter Beam

- Load to top of concrete deck.
- See connection 1.2, C for lateral tieback example. Slotted insert would run horizontal.



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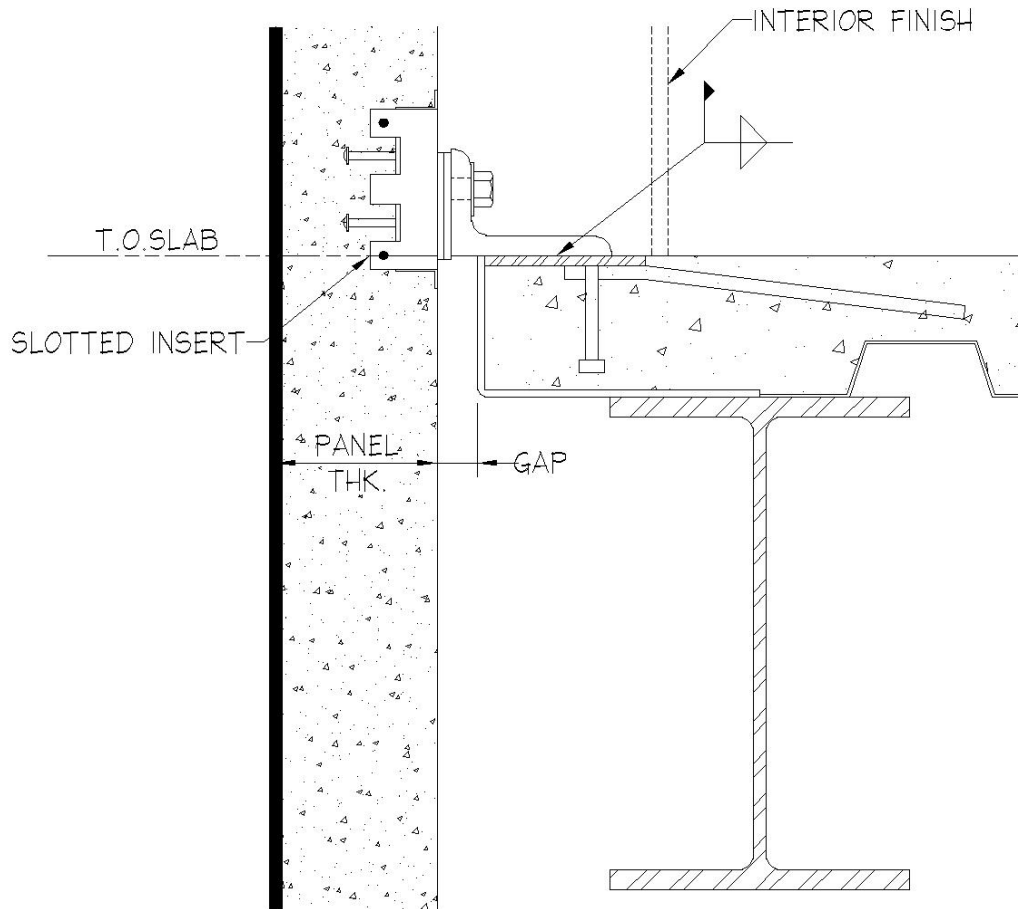
C. Tieback to Top of Beam



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D. Tie Back Top of Concrete Deck

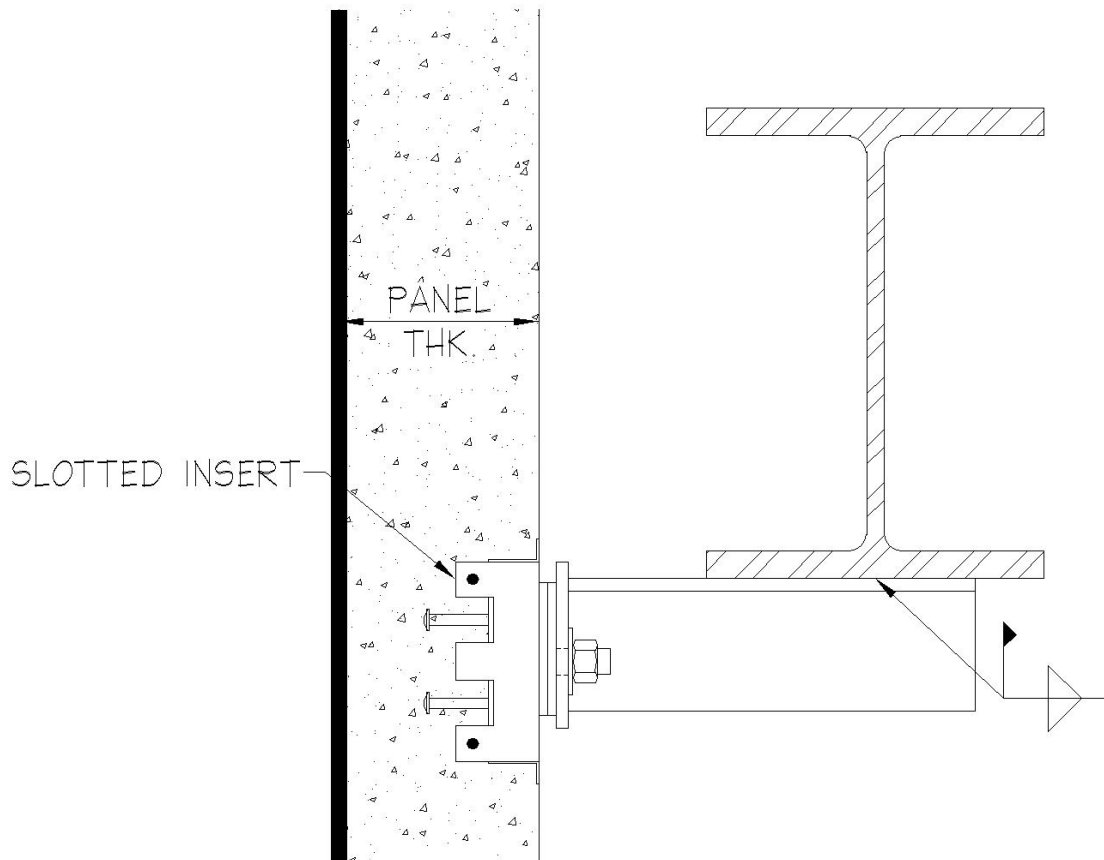
- Used between bearing points.



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E. Tie Back to Underside of Beam

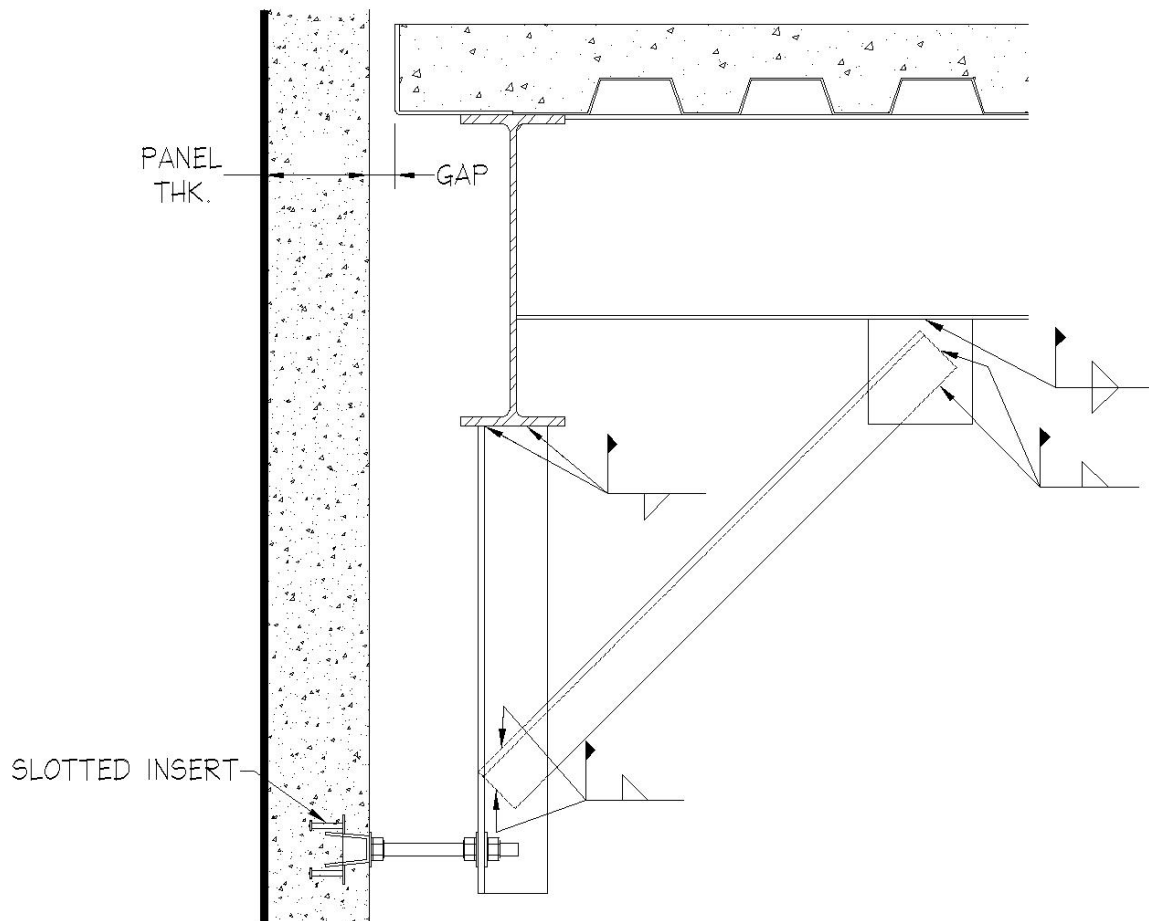
- Bracing of beam may be required to prevent twisting due to lateral loads.



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F. Lateral Connection Below Beam

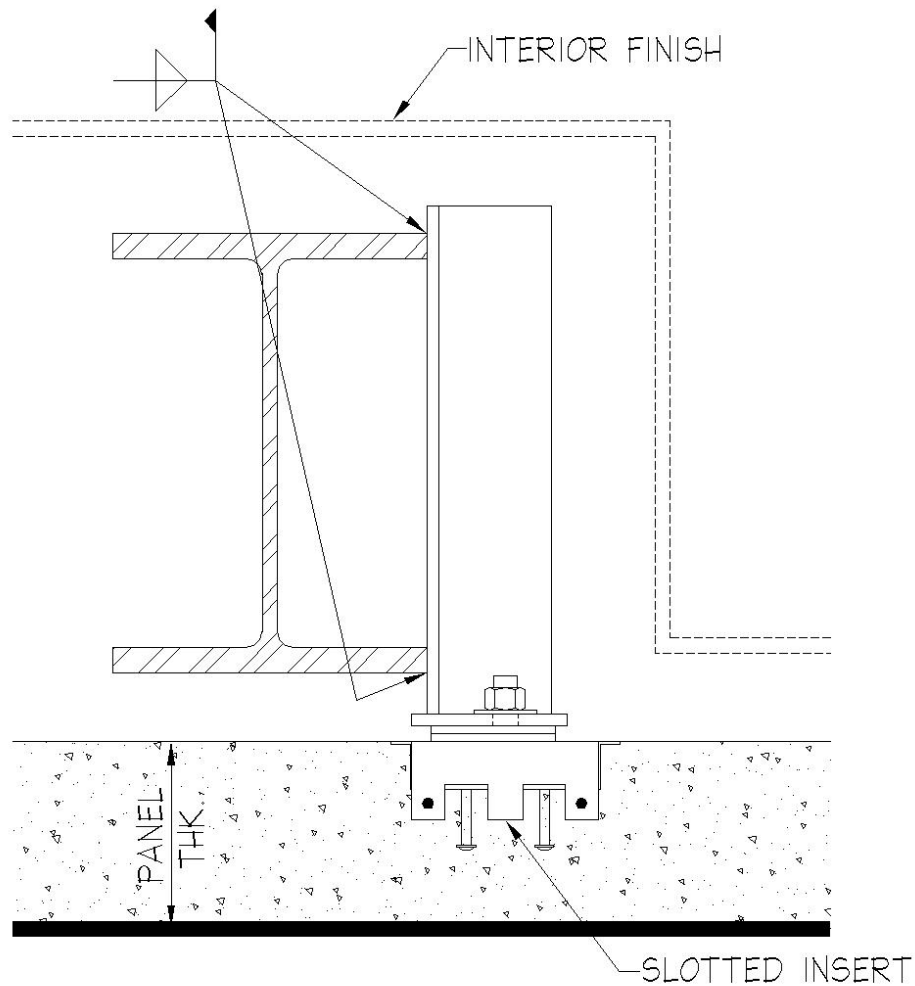
- Connection falls below structure.
- May be used when more panel hangs below top of slab and lateral bracing is required.
- Field installed.



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G. Tie back Connection to Column

- Angle shown. Plates or channels may be used when interior finish to column is reduced.

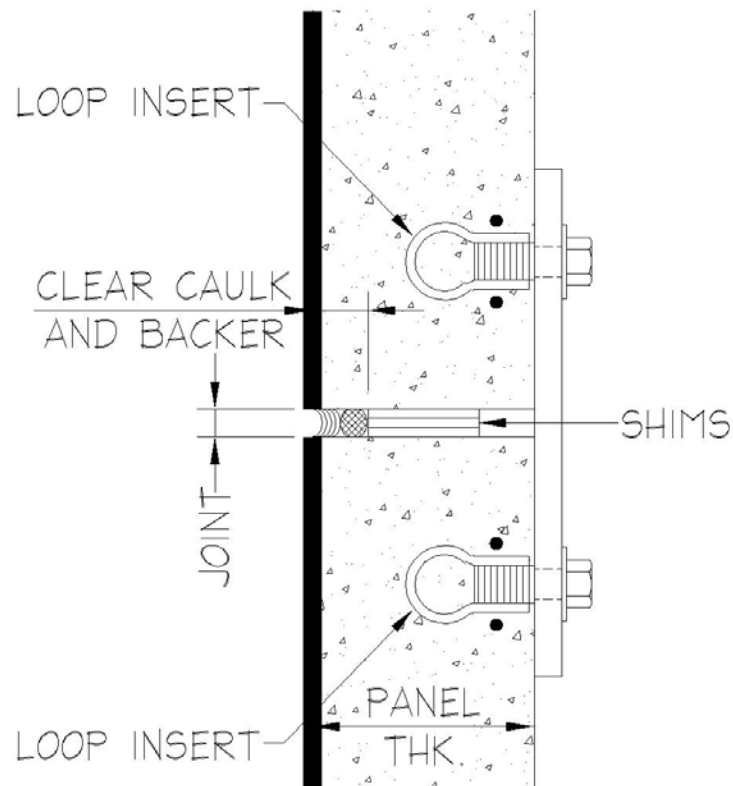


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1.3 MISCELLANEOUS CONNECTIONS

A. Panel to Panel Stacked Load Bearing

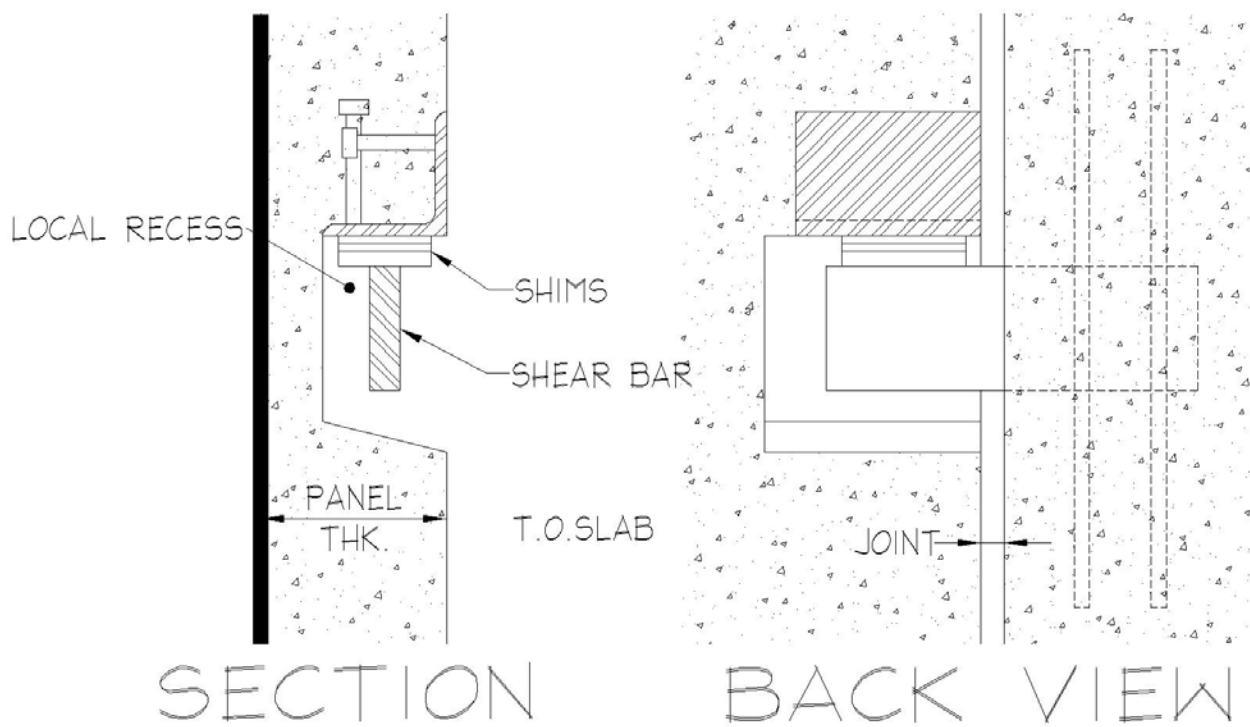
- Vertical load is transferred to panel below via shims.



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B. Panel to Panel Load Bearing

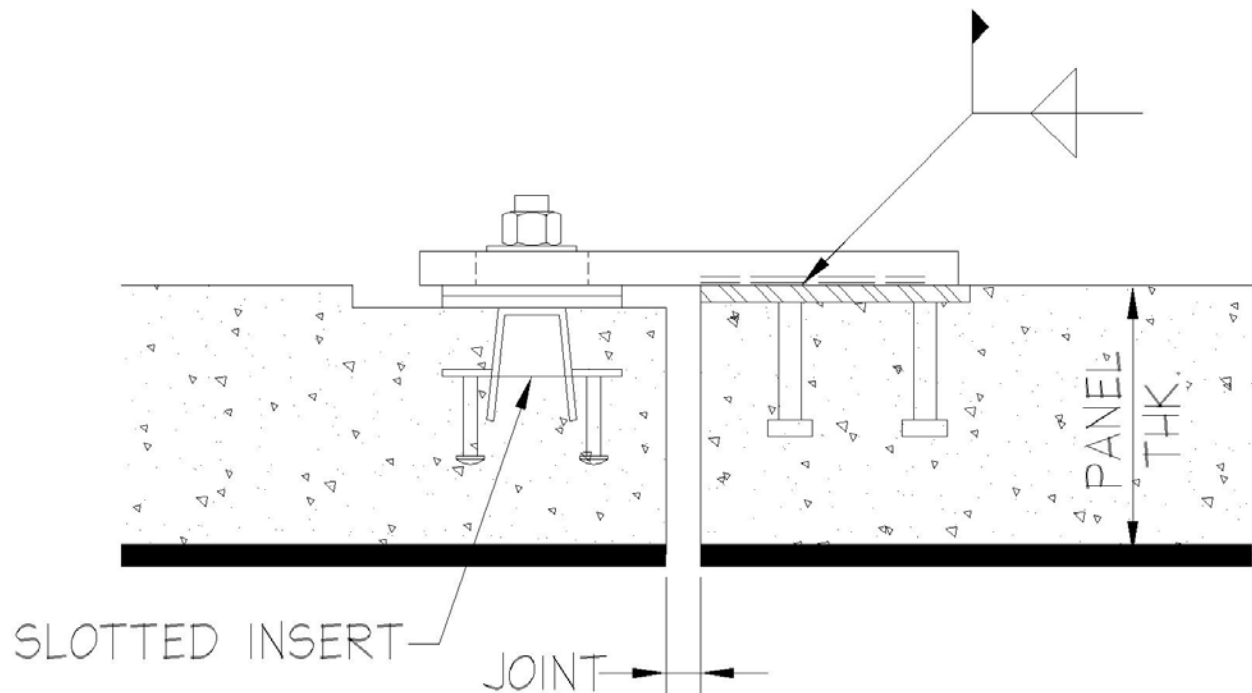
- Column on each side of opening carry load of spandrel.
- Ideal when bearing to structure beyond structural column location is required.
- Precast spandrel transfers vertical load to column.



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C. Panel to Panel – Non Load Bearing

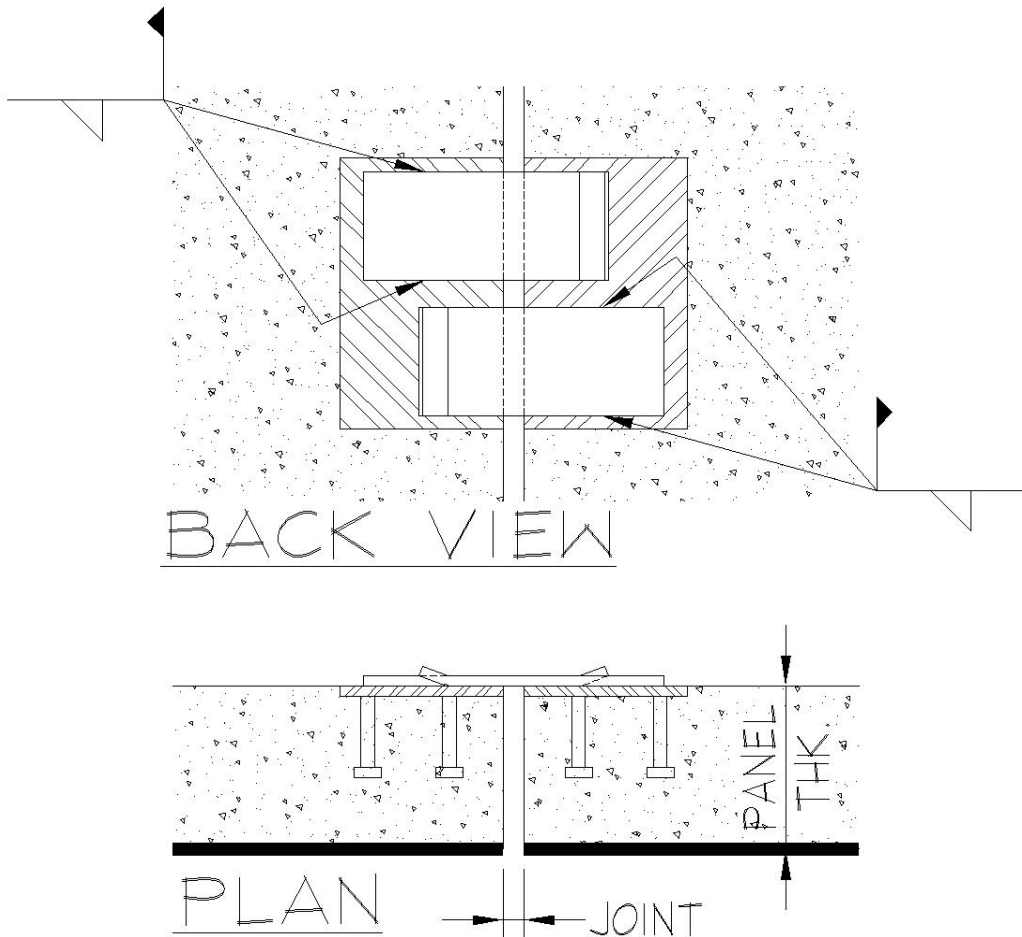
- Access from backside.
- Slotted plates may also be used.



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D. Panel to Panel – Non Load Bearing

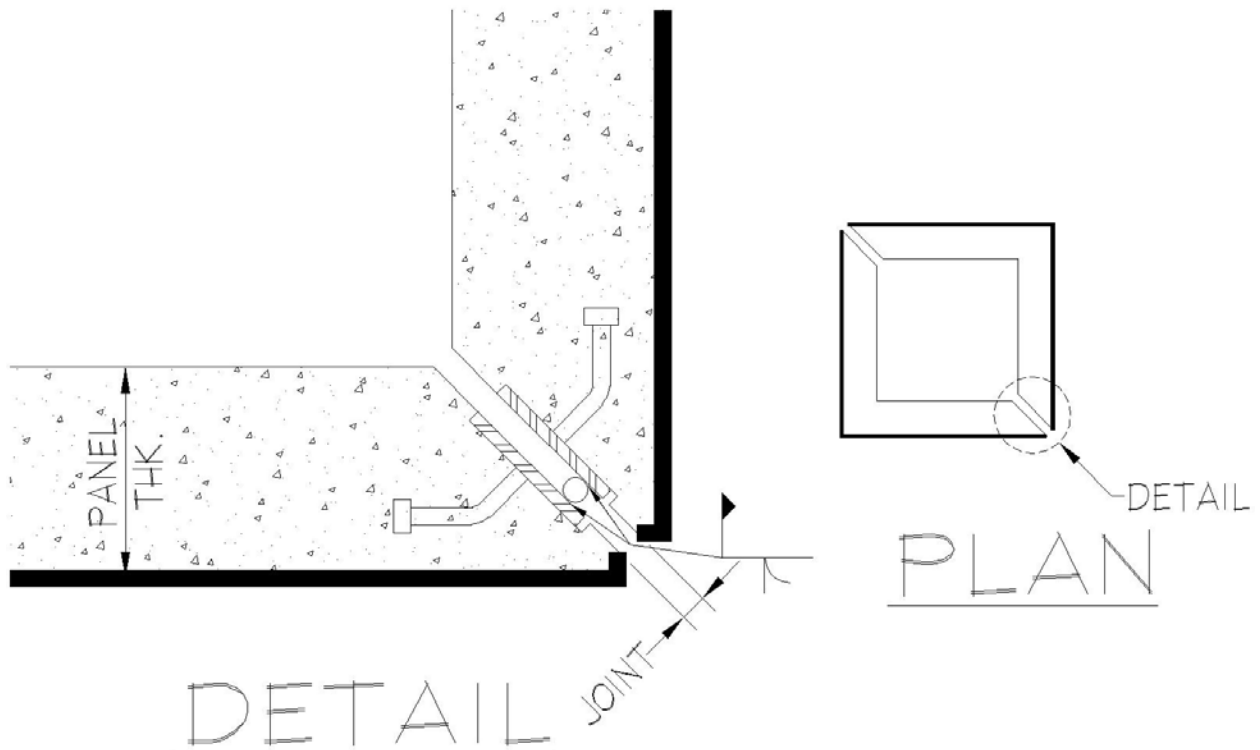
- Slip connection for panel-to-panel alignment only.
- Ideal for above roofline when exposed to view.



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E. Type 1 - Column Enclosures Connection

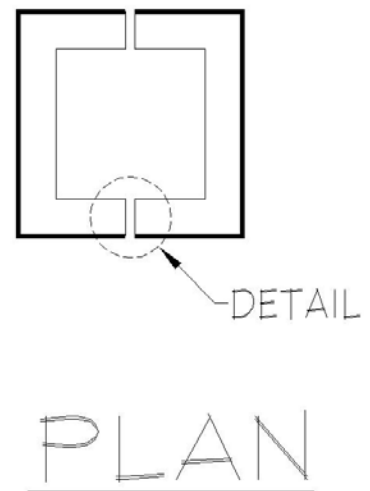
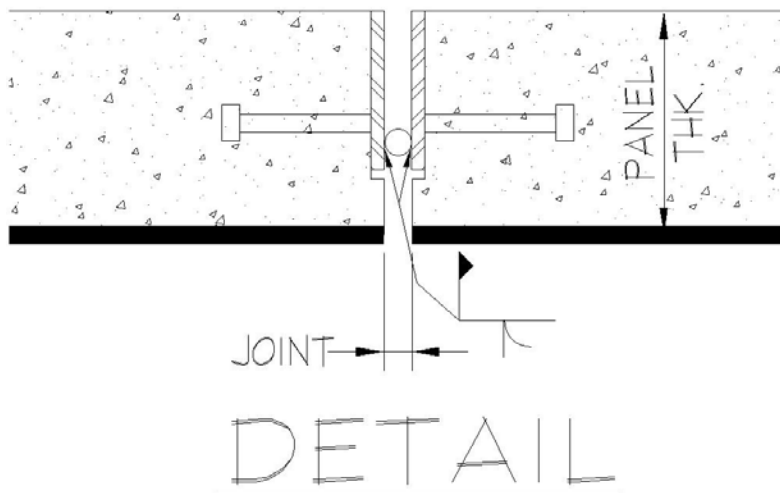
- Access from front face.
- Steel rod is used to bridge plates for welding.



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F. Type 2 - Column Enclosures Connection

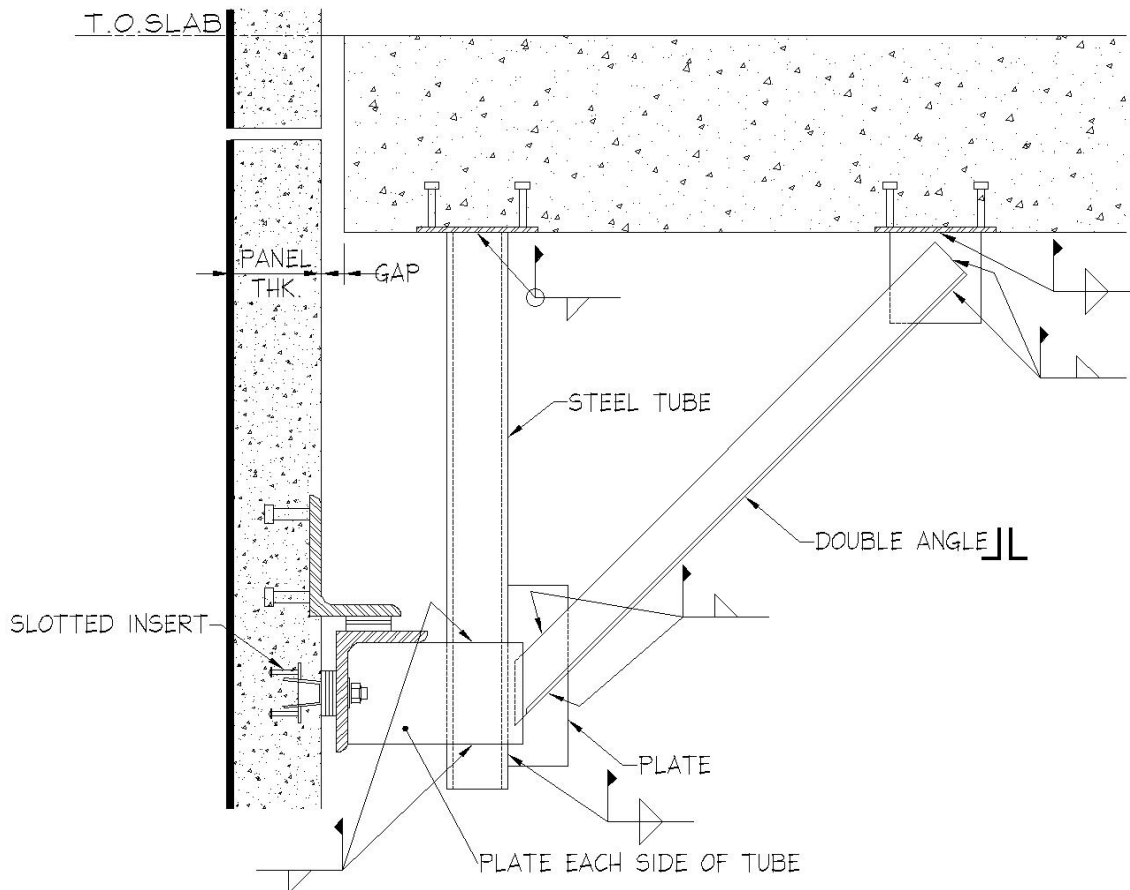
- Access from front face.
- Steel rod is used to bridge plates for welding.



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G. Load Bearing Below Structure

- Used primarily with excessive floor-to-floor heights.
- Concrete structure shown. Steel structure similar.



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PART 2

Glass Fiber Reinforced Concrete

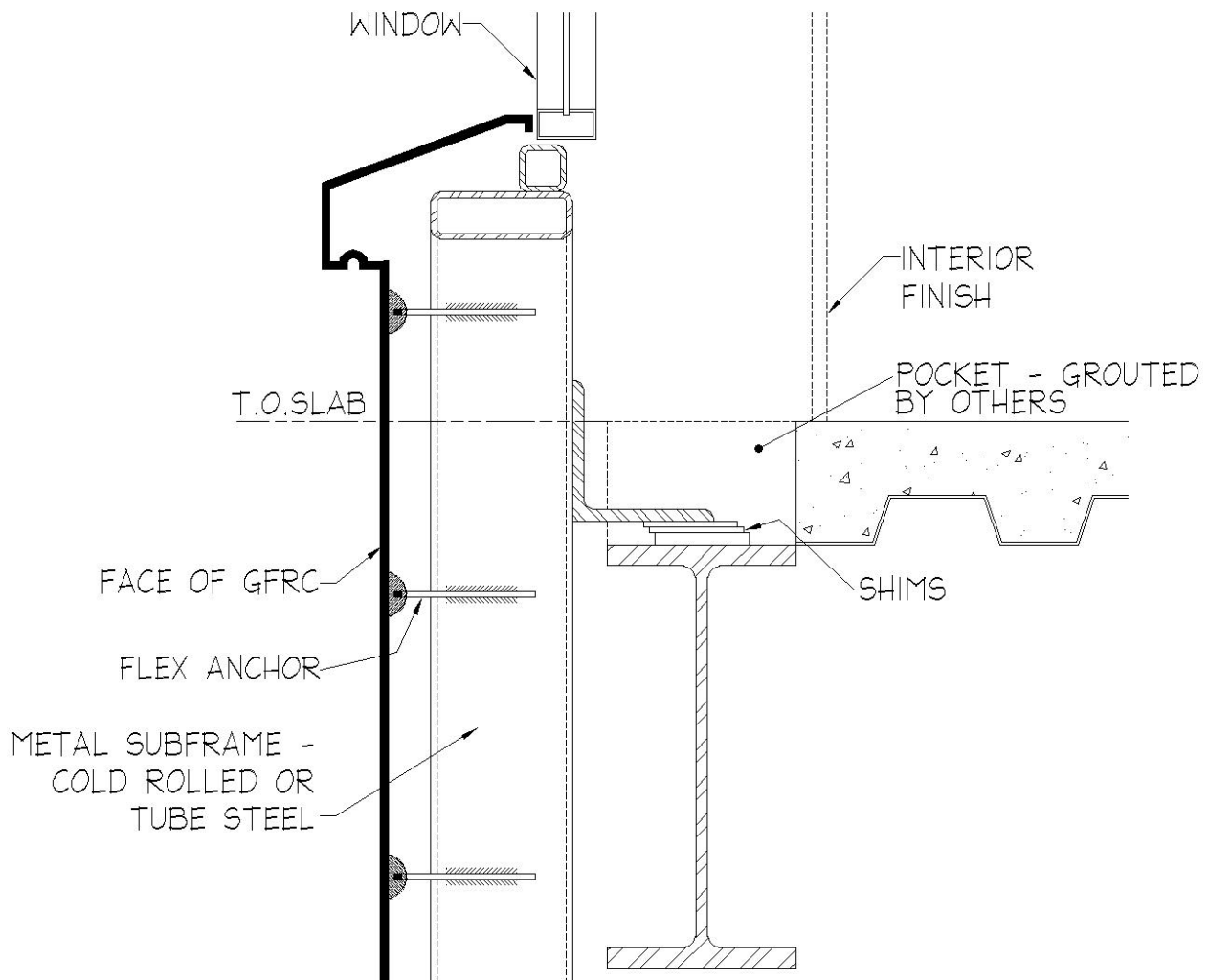


PART 2 - GLASS FIBER REINFORCED CONCRETE (GFRC)

2.1 CONNECTIONS

A. Load to Top of Perimeter Beam

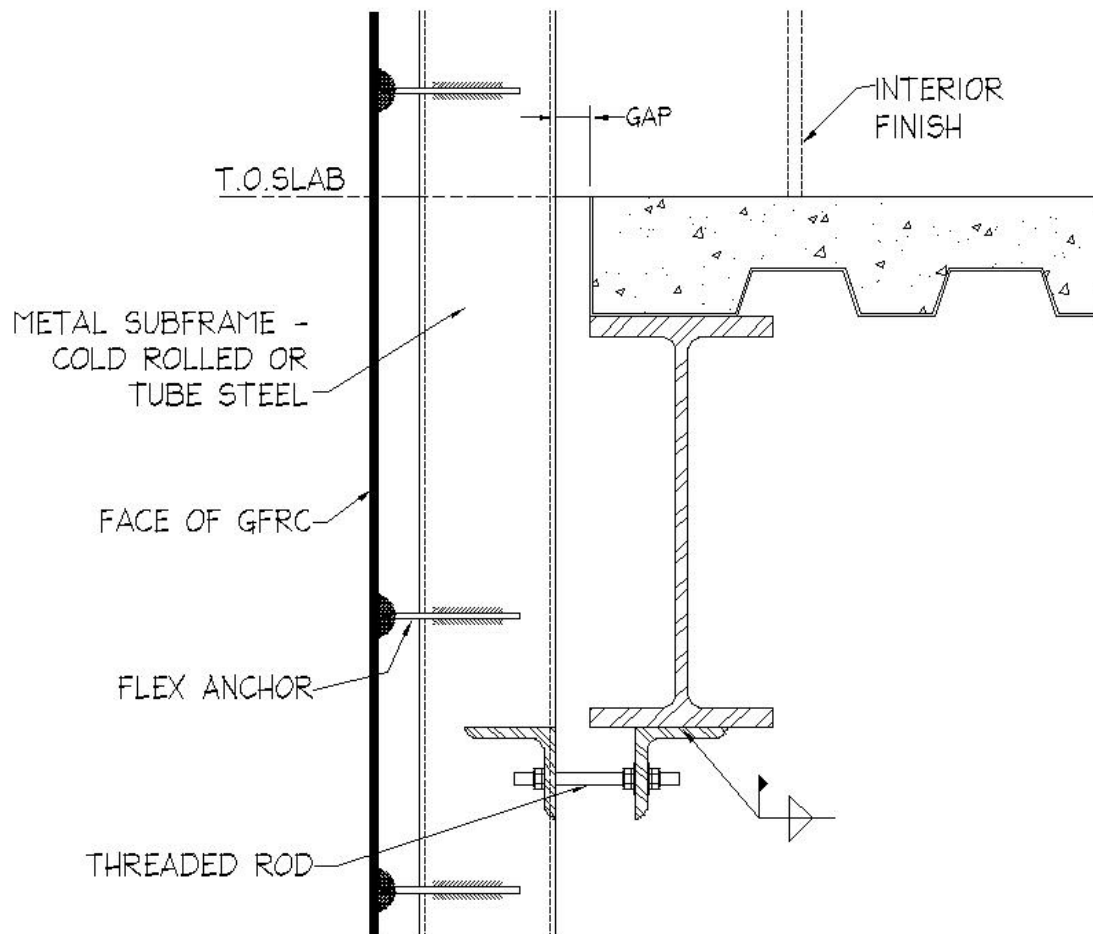
- Large window unit panelization.
- Bearing angle is pre-attached to subframe.
- Steel frame picks up window dead loads.



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B. Tie Back to Underside of Steel Beam

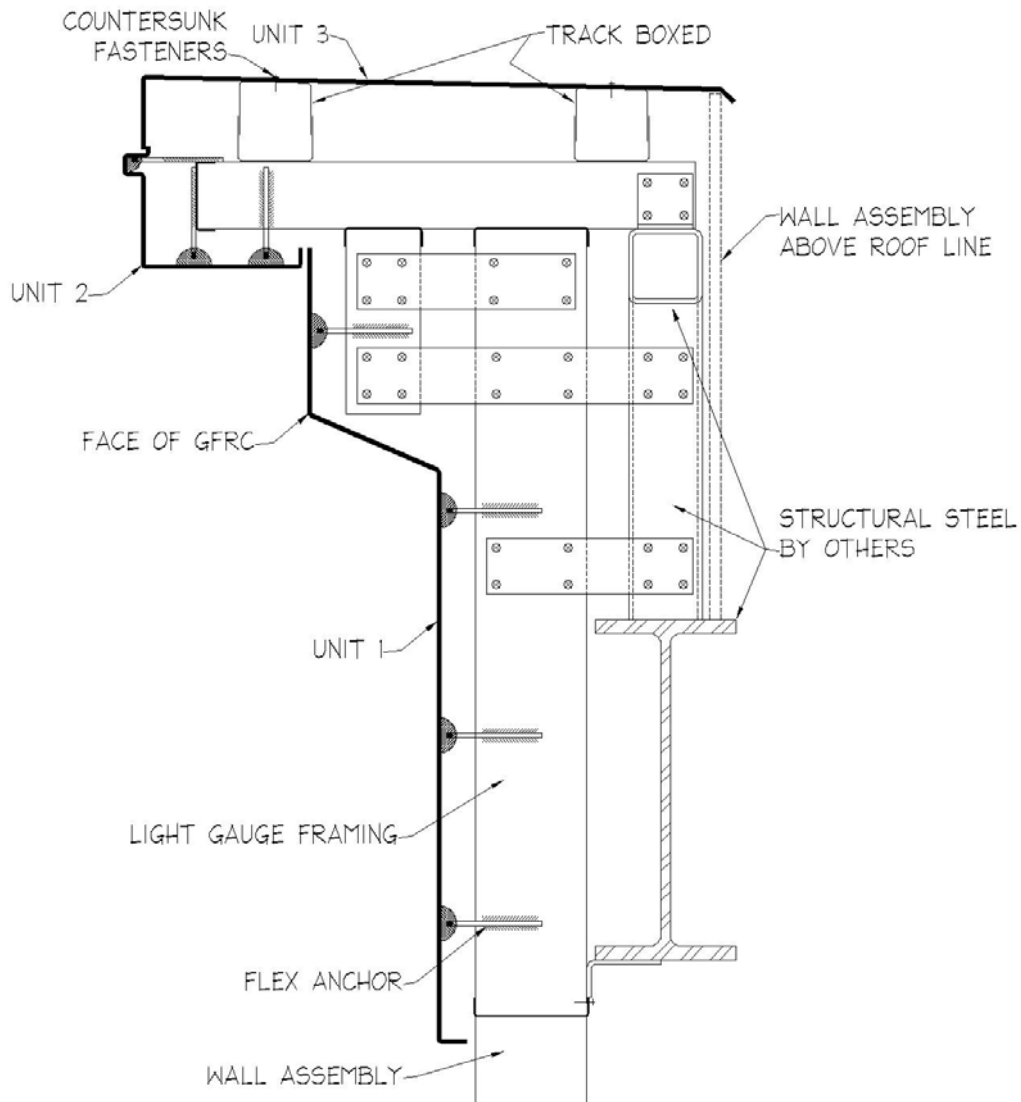
- Large panel configuration.
- Clips to metal subframe are pre-attached.



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C. Roof Cornice

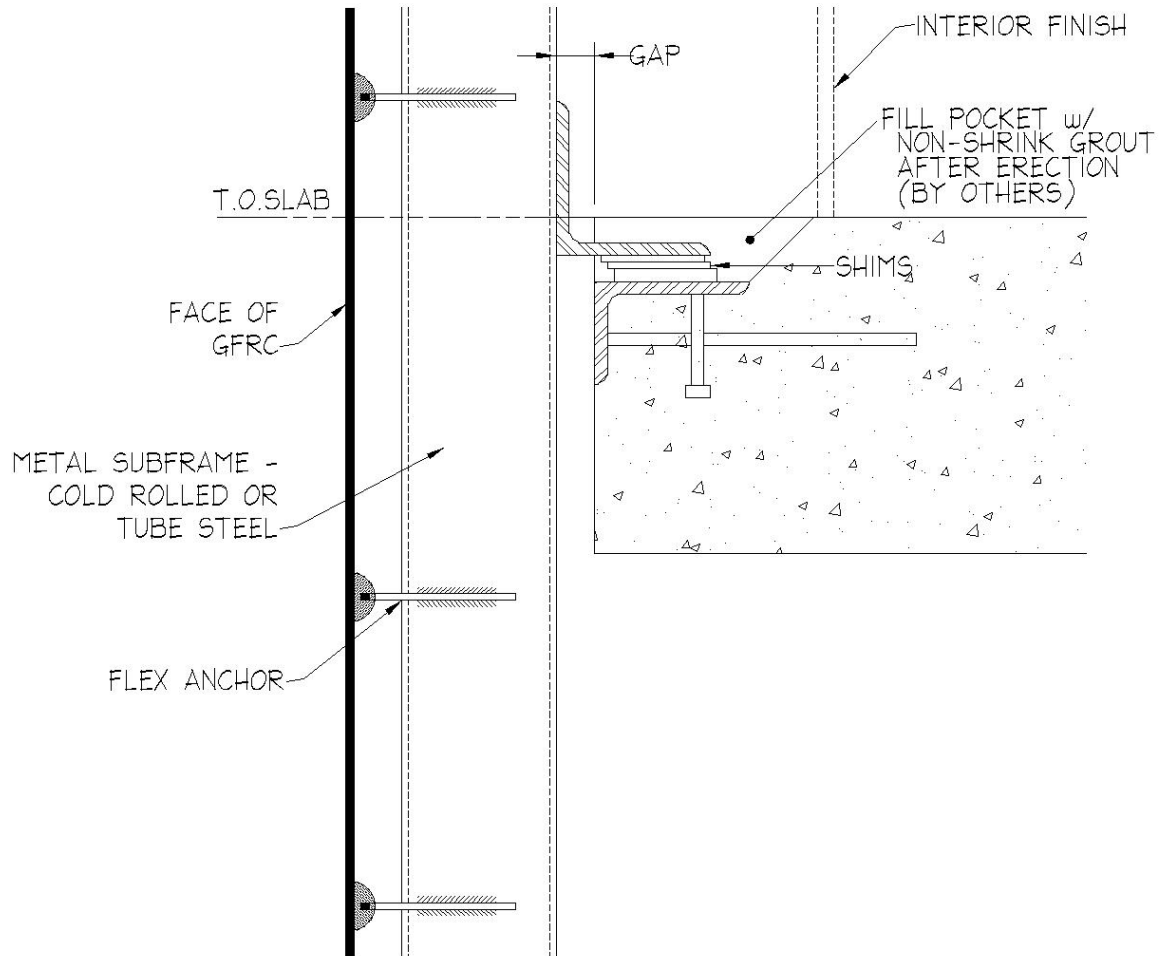
- Several units form cornice.
- Light gauge framing.
- The erector caulks field-installed fasteners.



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D. Load Bearing to Concrete Floor Slab

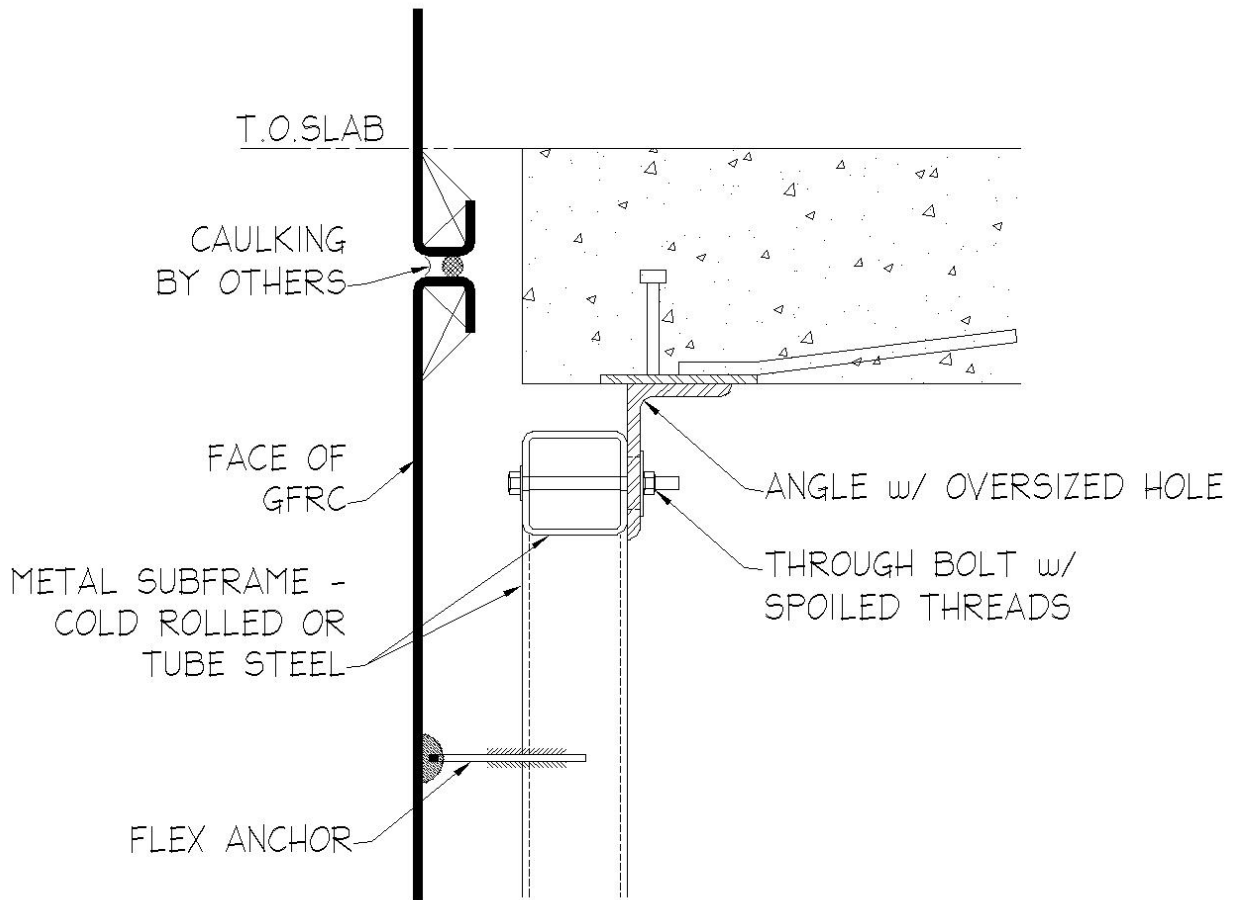
- Bearing angle in recessed pocket.
- Angle shop applied to subframe.



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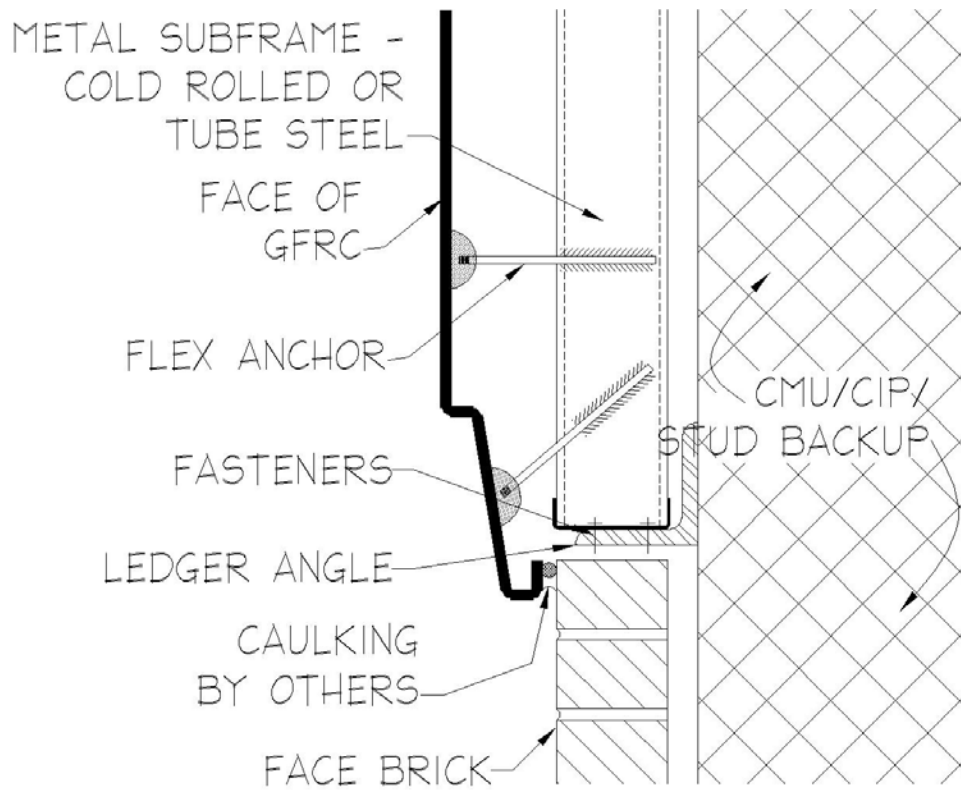
E. Lateral Tieback to Underside of Concrete Slab

- Angel allows for deflection of slab.



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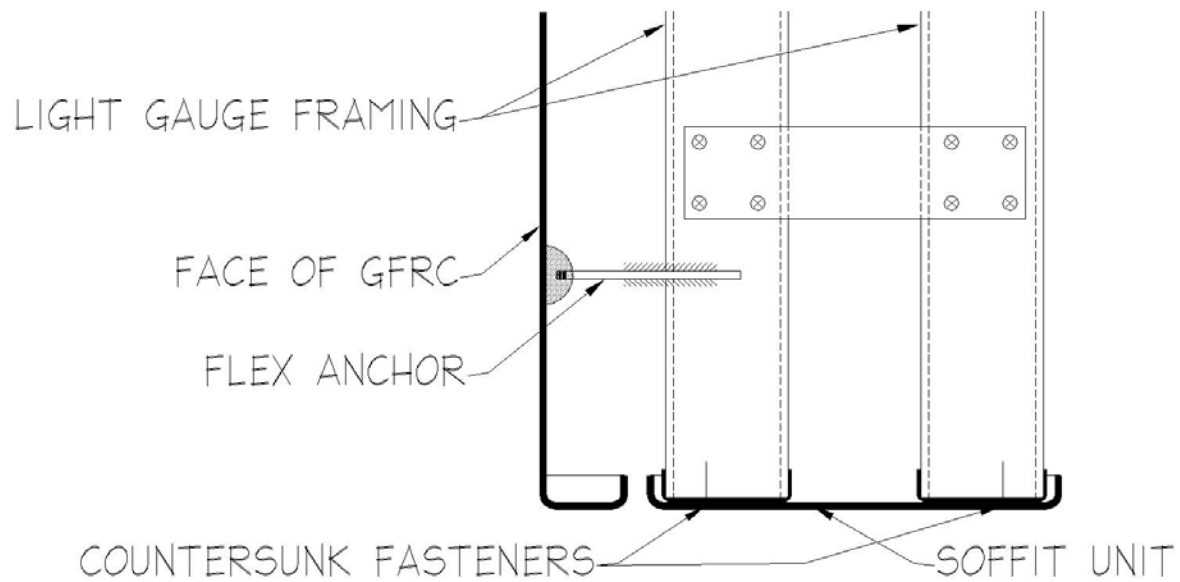
F. Accent Banding



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G. Soffit

- Erector counter sinks and caulks exposed fasteners.



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PART 3

Cast
Stone

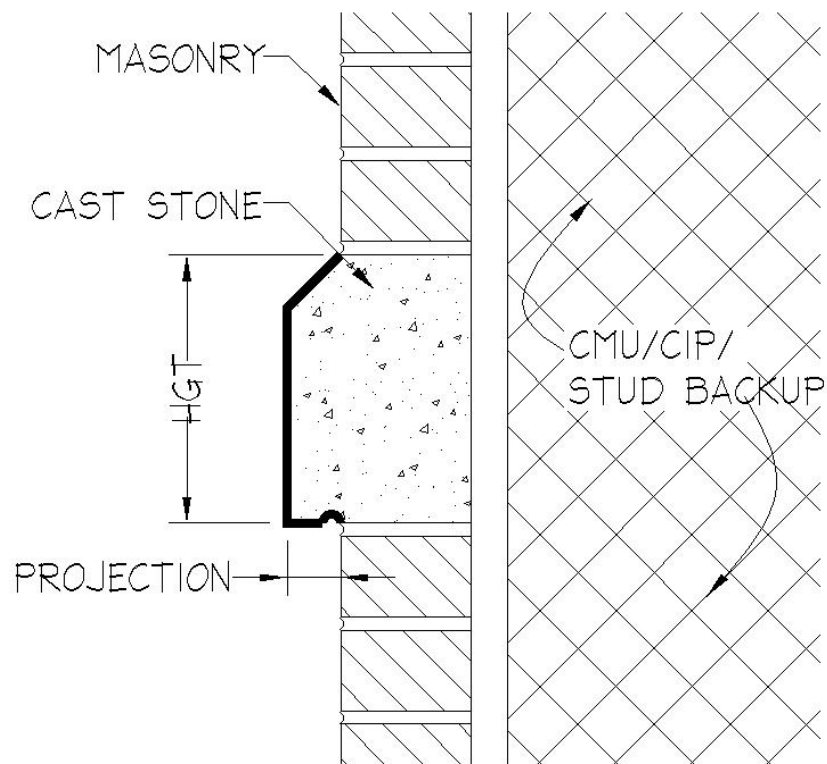


PART 3 - CAST STONE

3.1 CONNECTIONS

A. Accent Banding Without Mechanical Fasteners

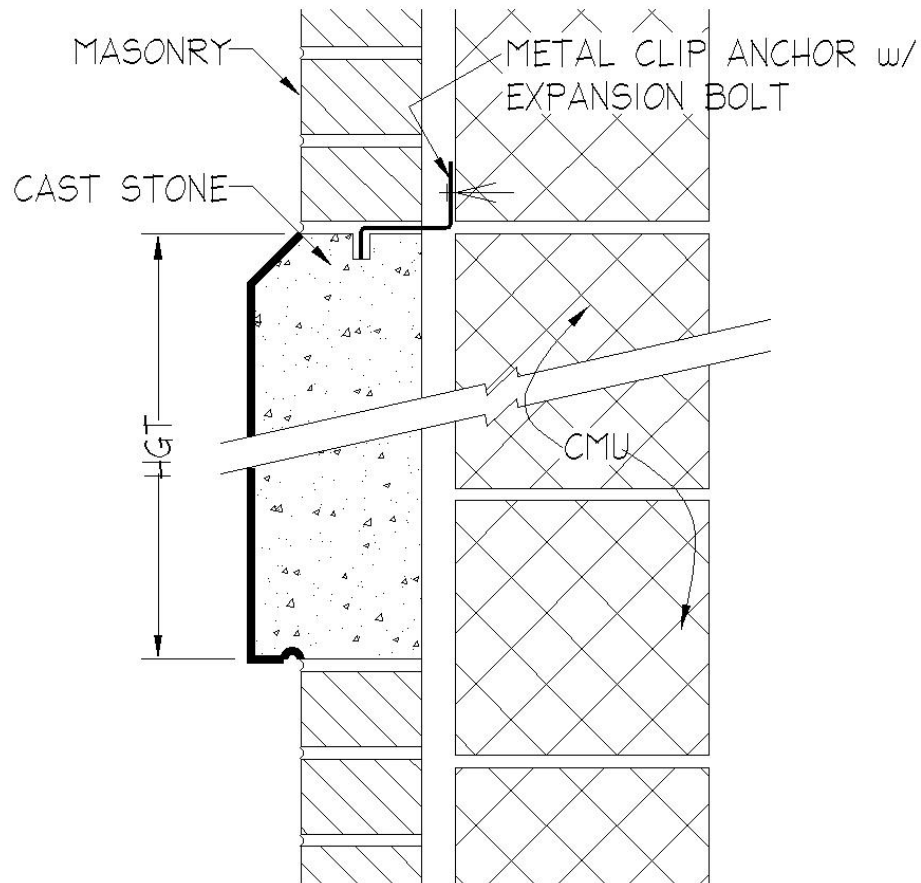
- Laid in place with mortar.



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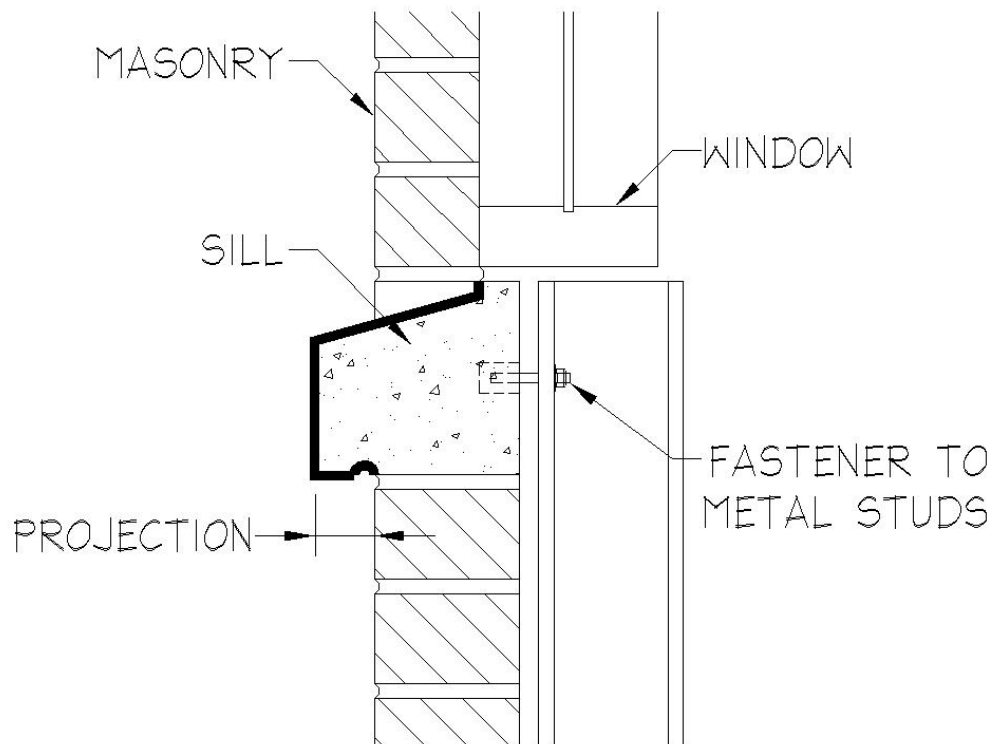
B. Accent Banding With Mechanical Fasteners

- Larger units mortared in place and tied back to structure.



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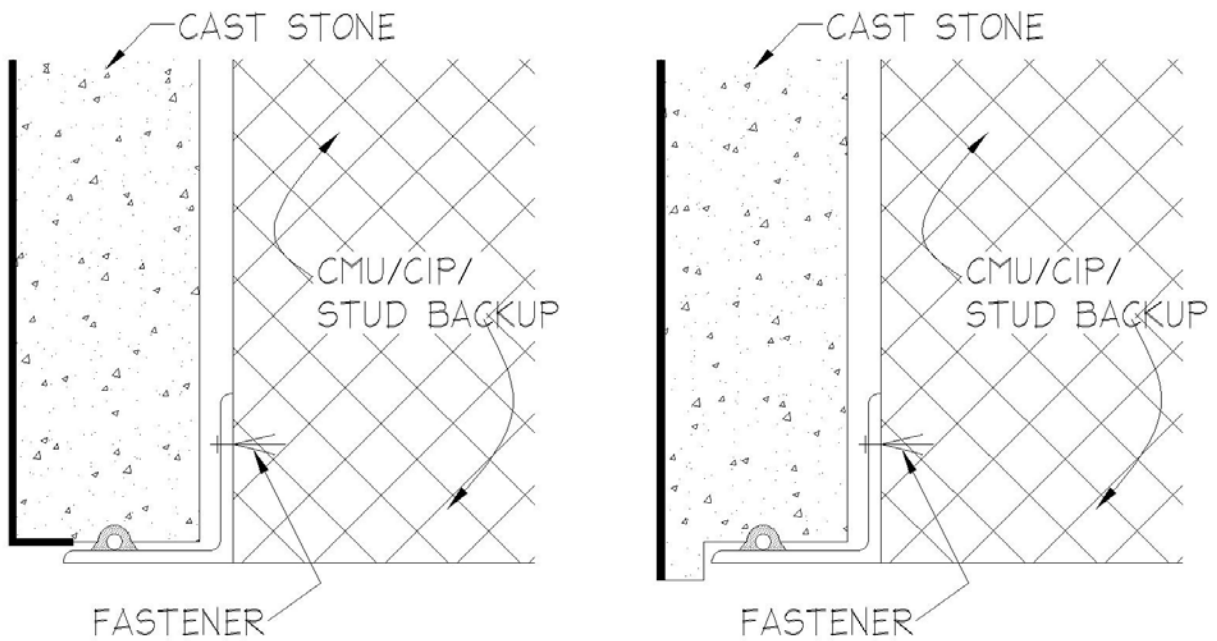
C. Window Sill



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D. Window Lintels

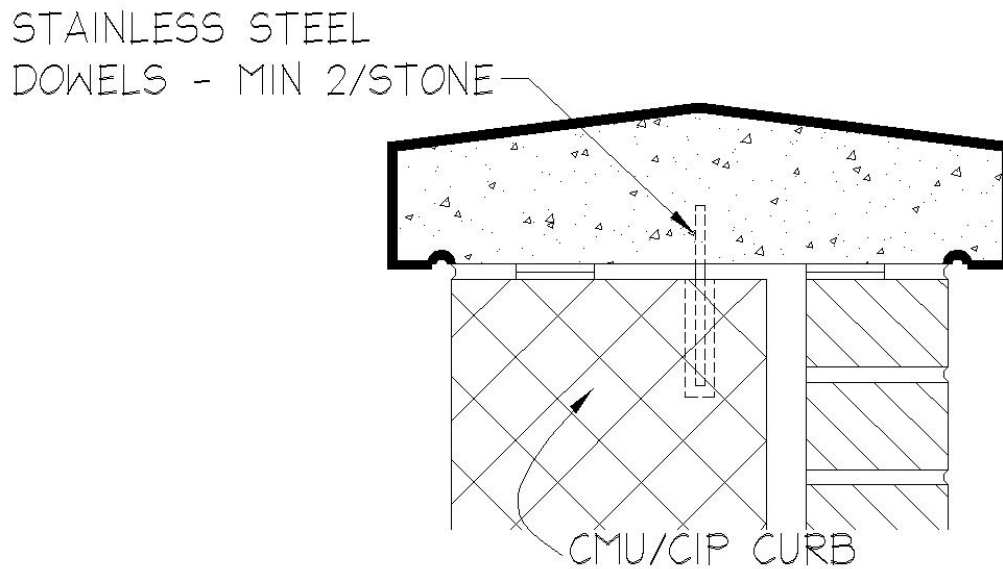
- Using relieving angels.



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E. Doweled Coping

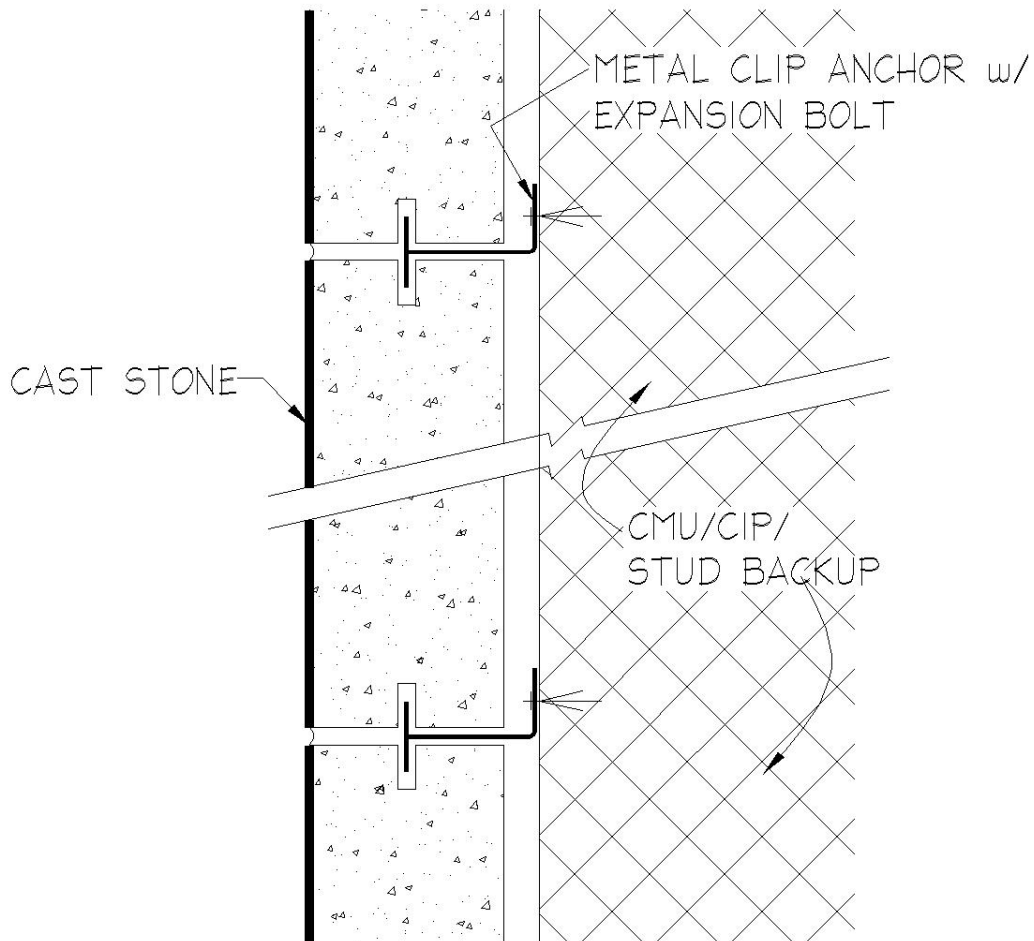
- Similar detail using masonry exposed both sides.



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F. Multiple Units with Mechanical Fasteners

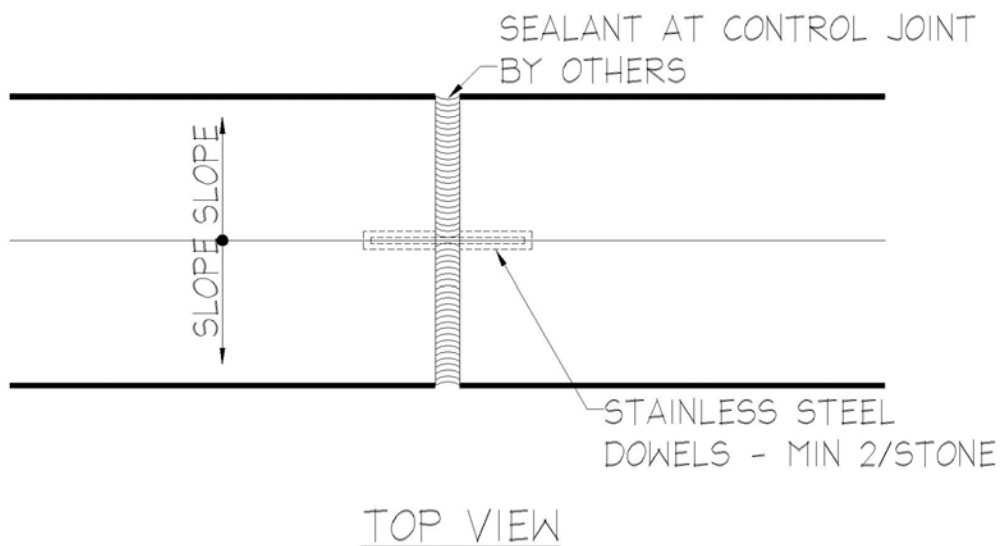
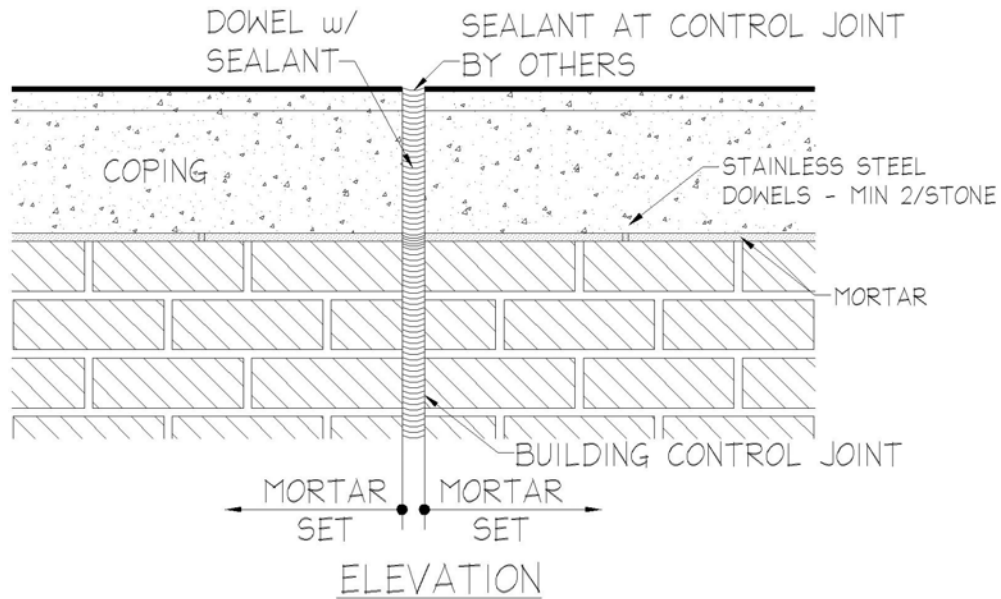
- Units are stacked and set with mortar.



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G. Parapet - Control Joints

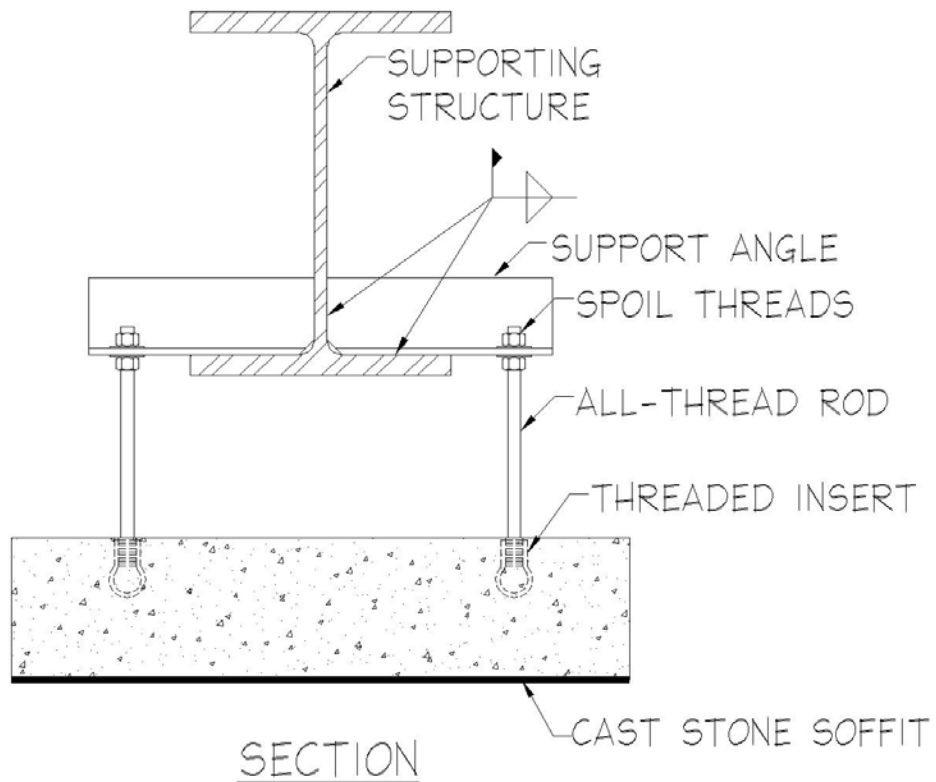
- Control joints are caulked by others with sealant.



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H. Soffits

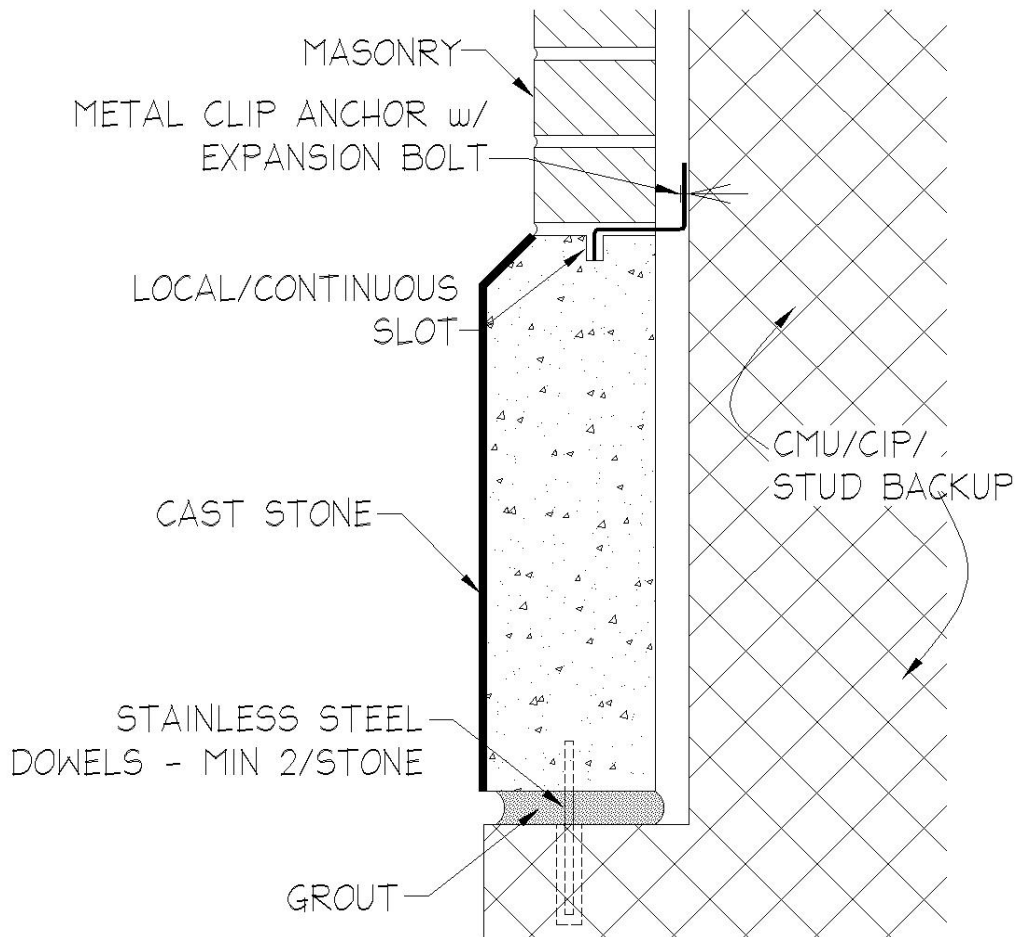
- Supported from steel structure.



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I. Watertable

- Doweled, grouted and mechanically fastened.



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