

Precast Concrete Enclosures

John Straube



Enclosure Functions

- **Support**
- **Control**
 - **Heat**
 - continuous insulation layer
 - **Air**
 - continuous air barrier
 - **Moisture (rain, construction, vapor)**
 - Drainage plane
 - **Fire, smoke, sound**
- **Finish**

Precast

- **Advantages**

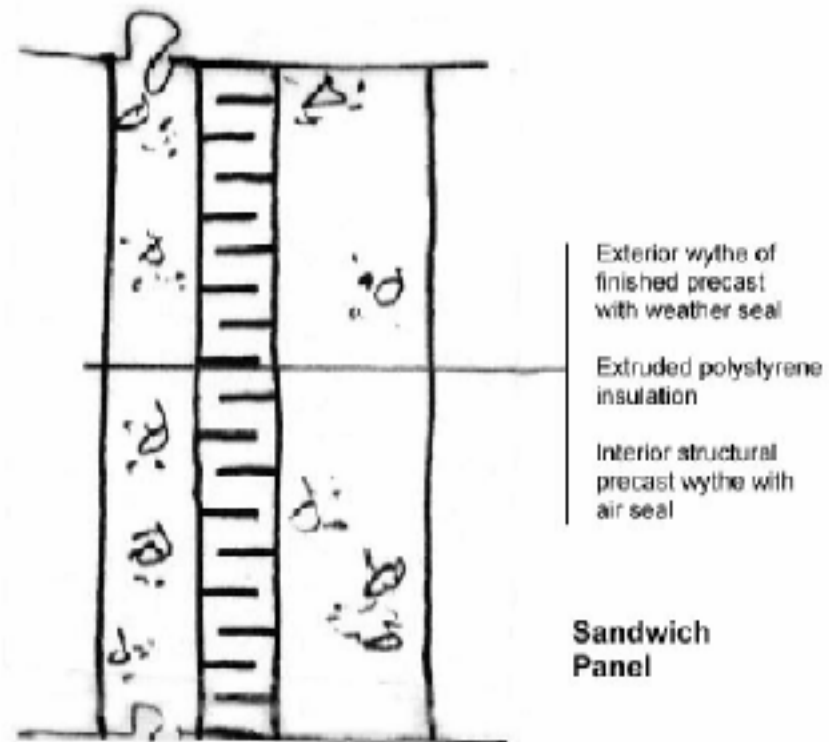
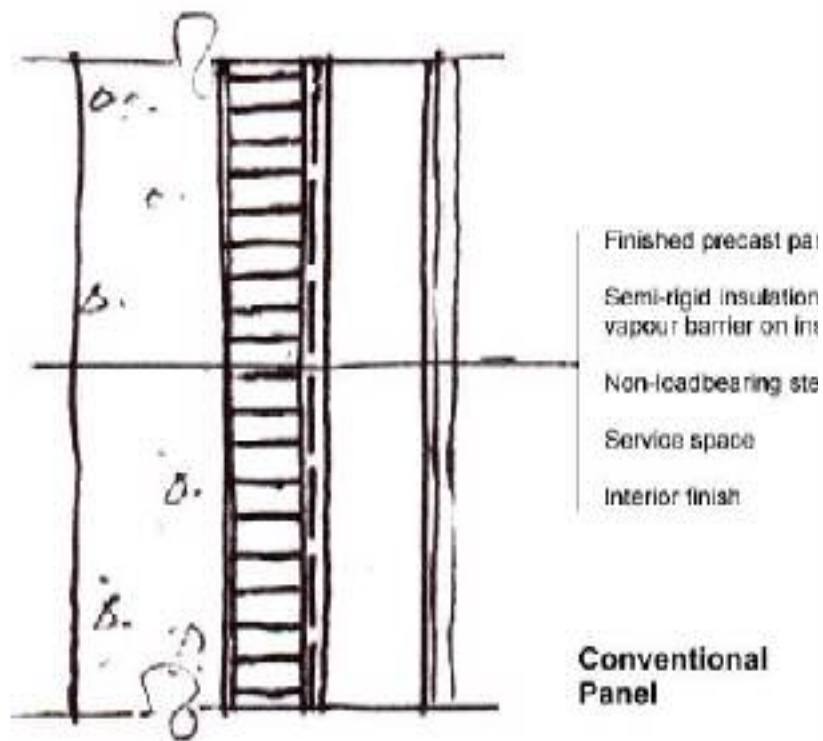
- **Impact and fire resistant**
- **Moisture tolerant materials**
 - Beware steel connections and interior finishes
- **Long term durability possible**
- **Prefabricated – speed, weather insensitive**
- **Inherently separates primary structure**

Precast

- **Disadvantages**
 - Heavy
 - Prefab means less flexibility on site and requires design precision
 - Moderate to high cost
 - Requires large crane and lots of crane time

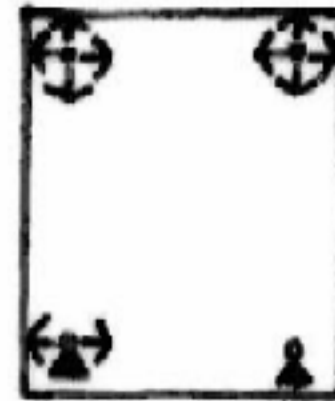
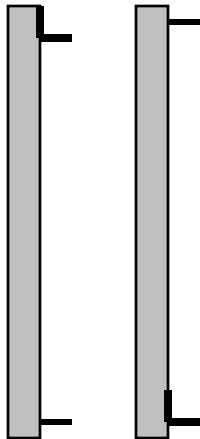
Basic Types

- Architectural Precast (cladding)
- Sandwich panel (enclosure system)



Precast Support

- Heavy=Important
- 1 to 20 m² area!
- Allow movement

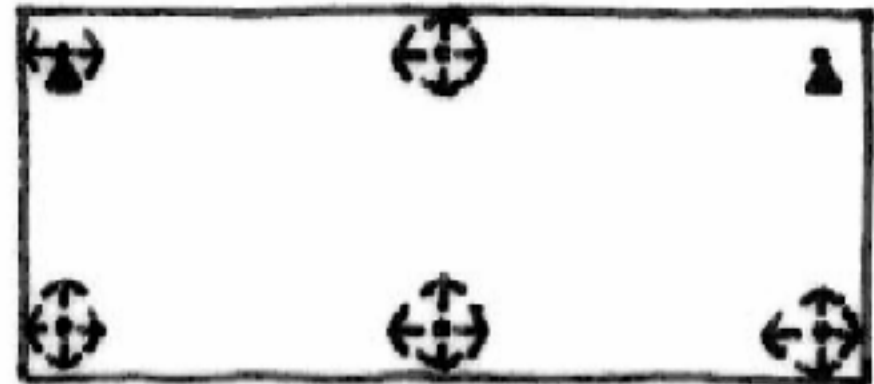


Denotes lateral connection
that can swide in direction
of arrow

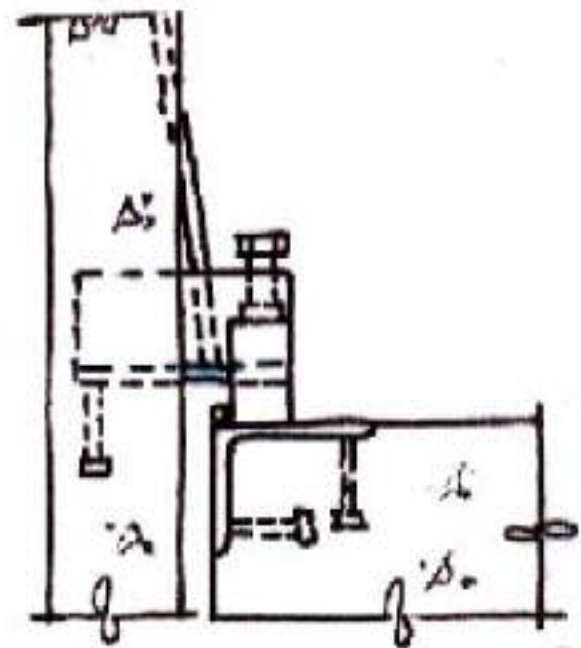
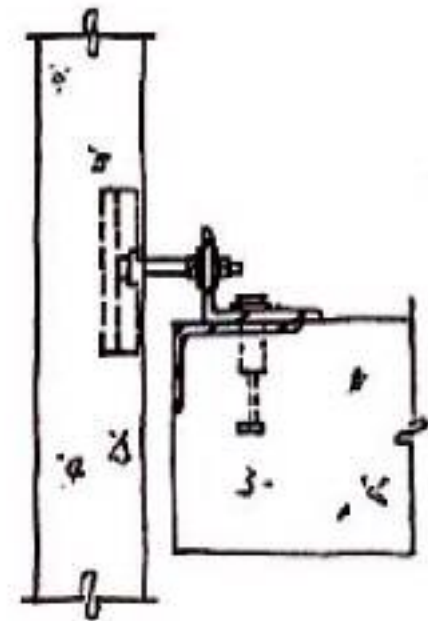
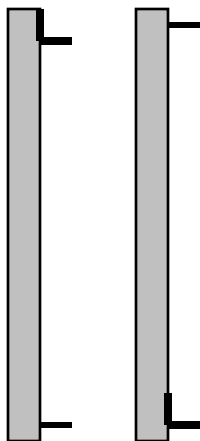


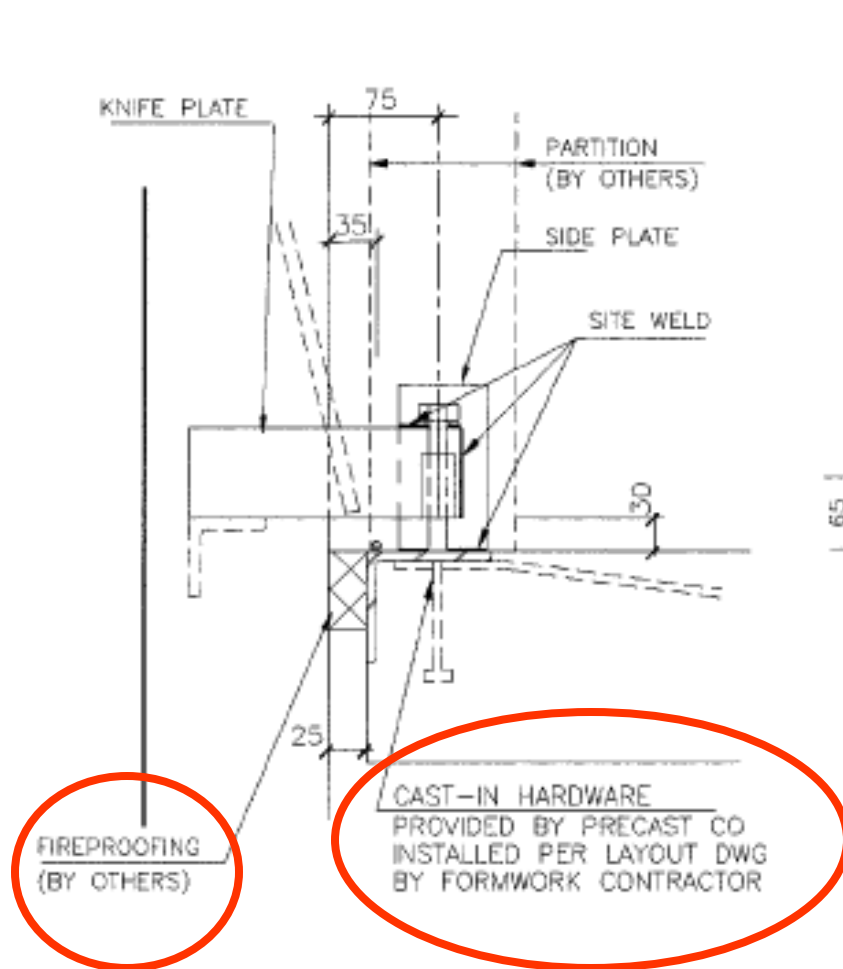
Denotes load support
connection

All connectors carry load
perpendicular to panel



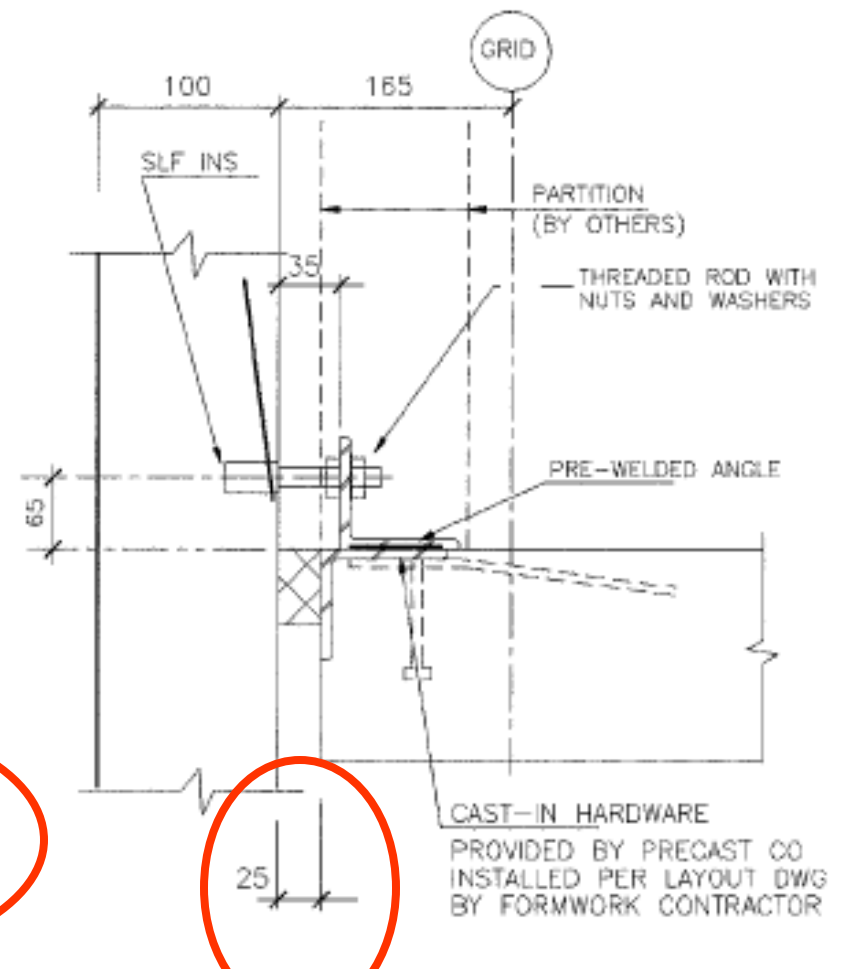
Par
Cor





Section

Load Bearing & Lateral
Conn D-1



Section

Sliding vertically

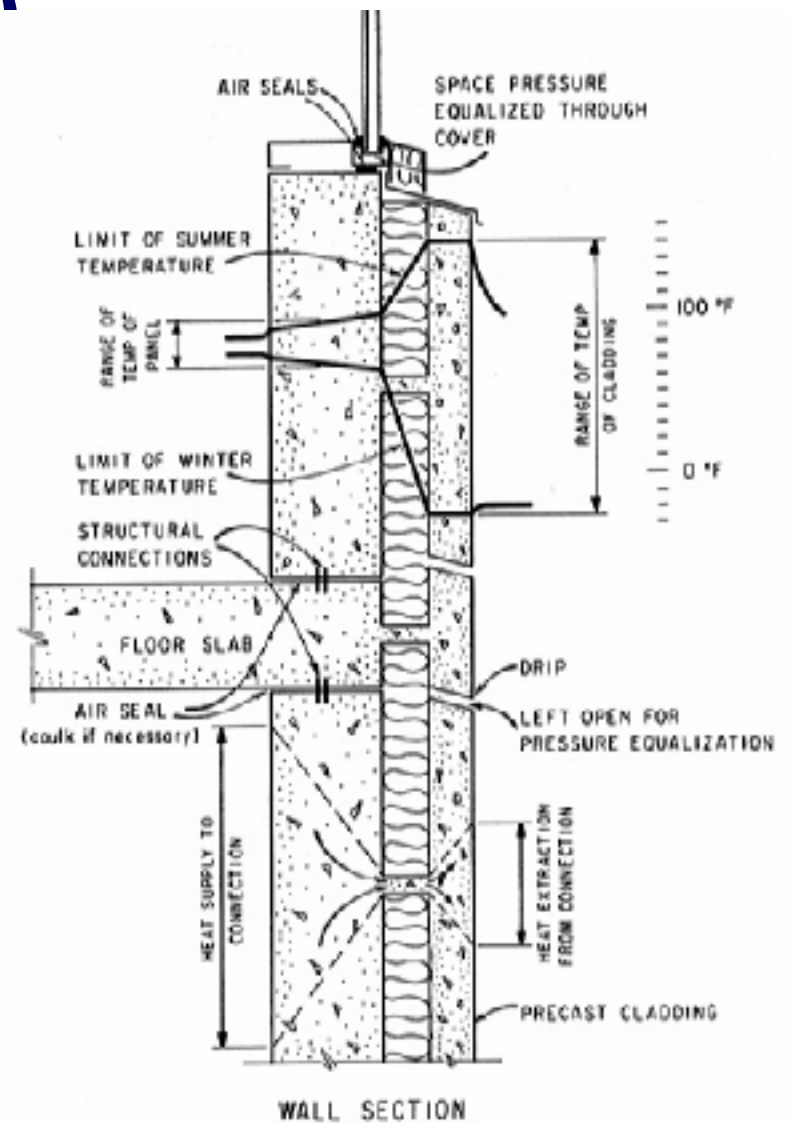
Lateral Connection
Conn D-2

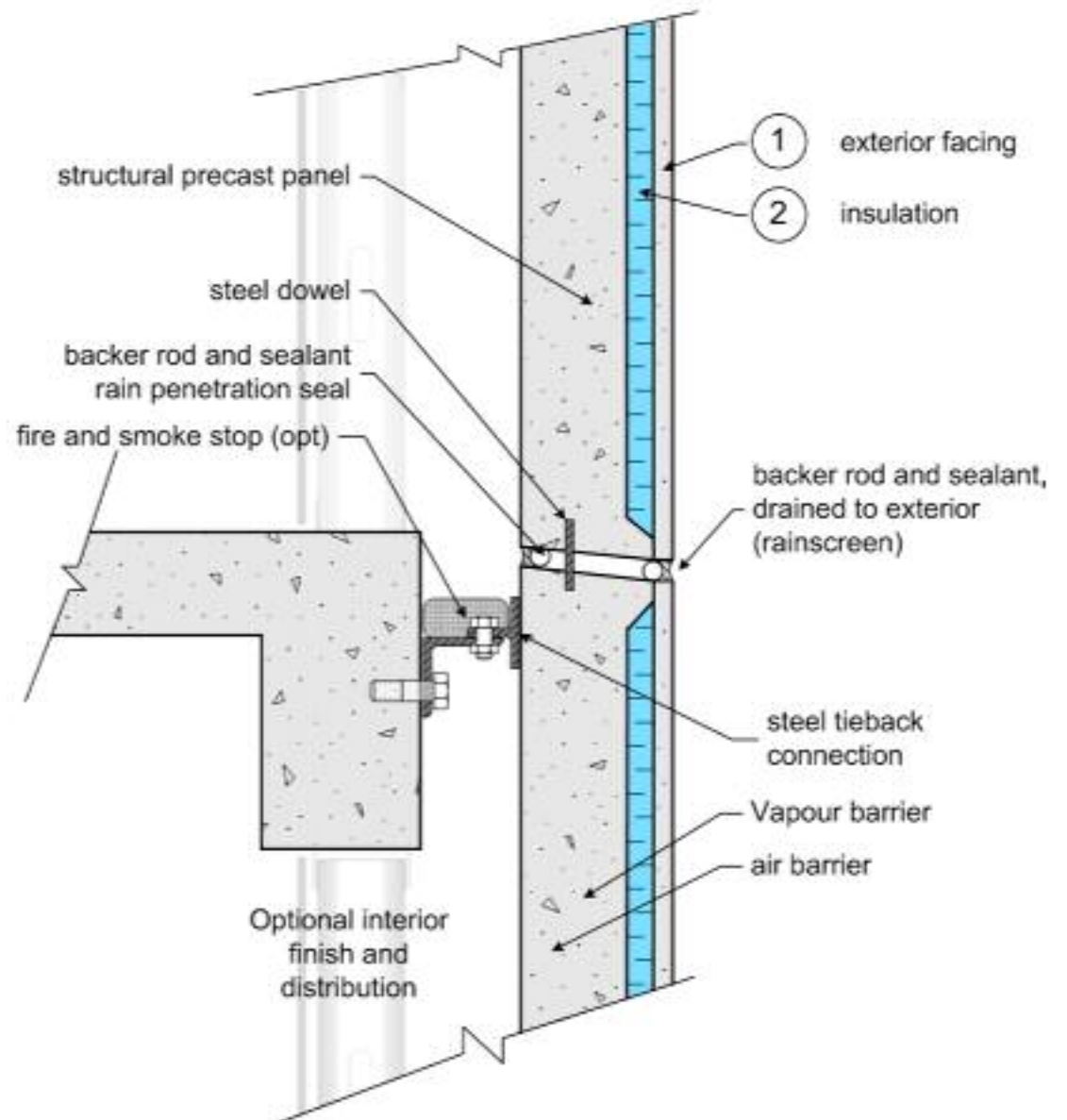
Precast Control

- **Rain**
 - Precast concrete *generally* watertight
 - Quality control, coatings, additives
 - Deal with the joints!
- **Air leakage**
 - Precast concrete IS airtight
 - Joints and continuity key
- **Good concrete is a vapor barrier**
- **Fire Smoke Sound**

CBD-94 (Latta 1967)

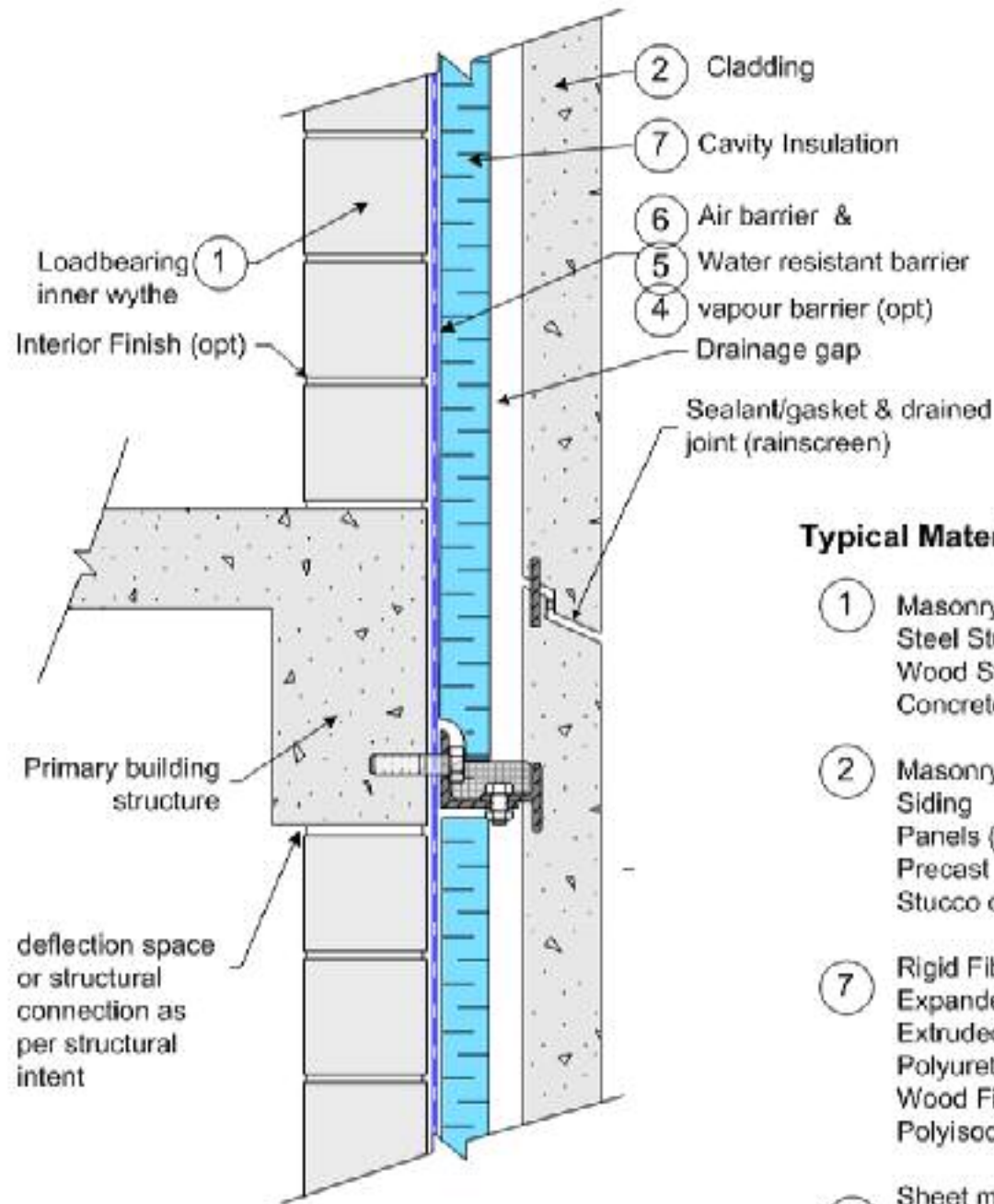
- Basic principals same





Typical Construction Materials

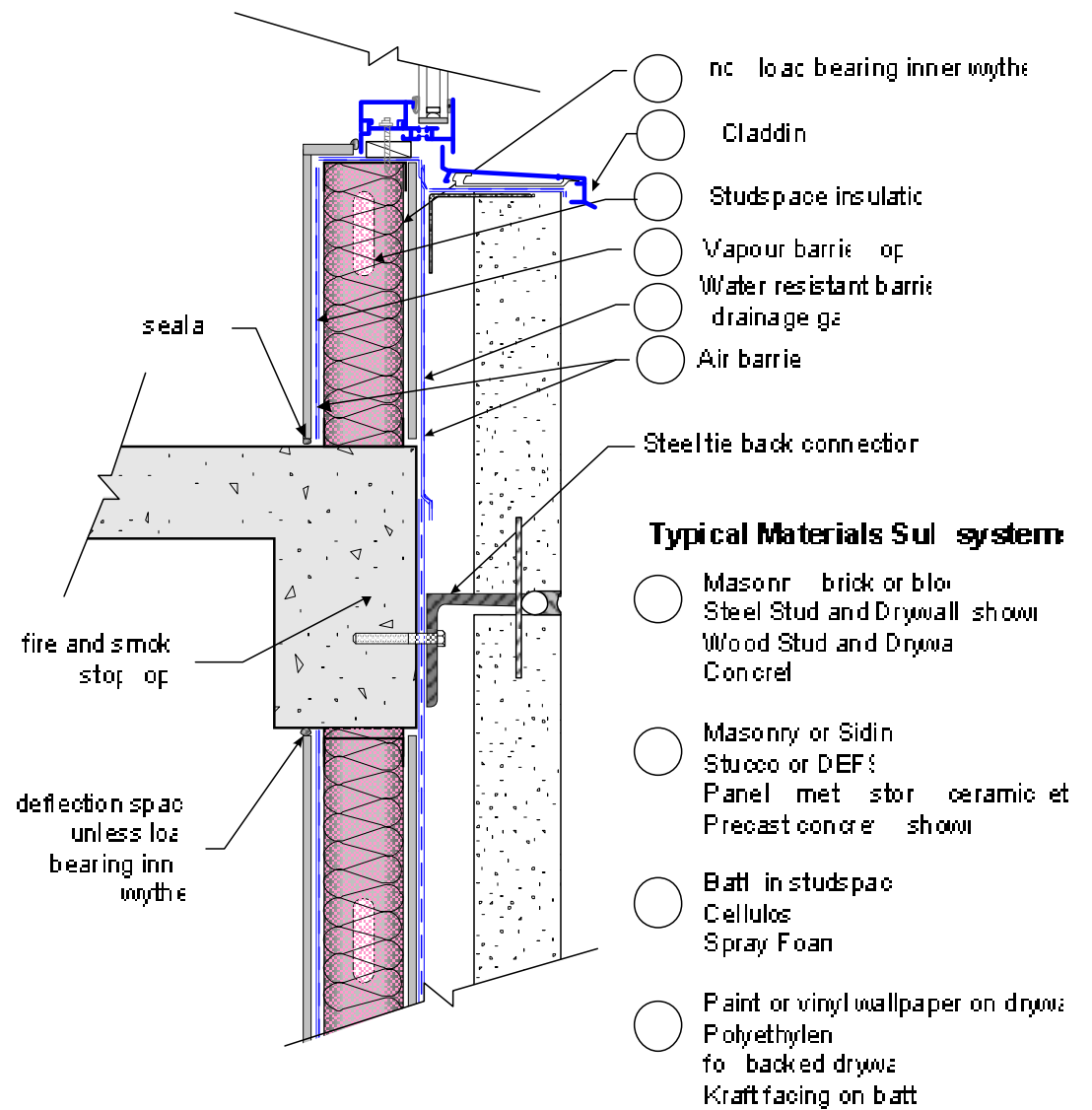
- ① Stone products
Precast concrete



Typical Materials/Sub-systems

- (1) Masonry (shown)
Steel Stud (uninsulated)
Wood Stud (uninsulated)
Concrete
- (2) Masonry (shown)
Siding
Panels (steel, stone, etc)
Precast
Stucco or EIFS
- (7) Rigid Fibrous
Expanded Polystyrene
Extruded Polystyrene
Polyurethane Products
Wood Fibreboard
Polyisocyanurate
- (4) Sheet membrane
Trowel- and spray-applied
- (5) Spray foam

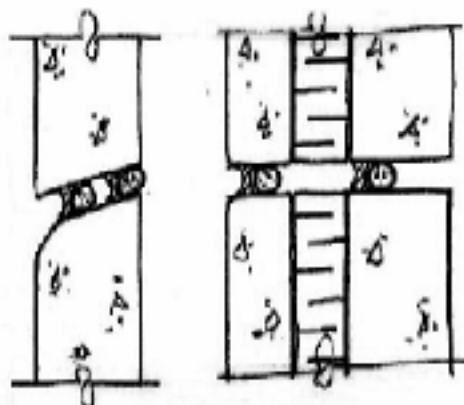
Conceptual Drawing only!



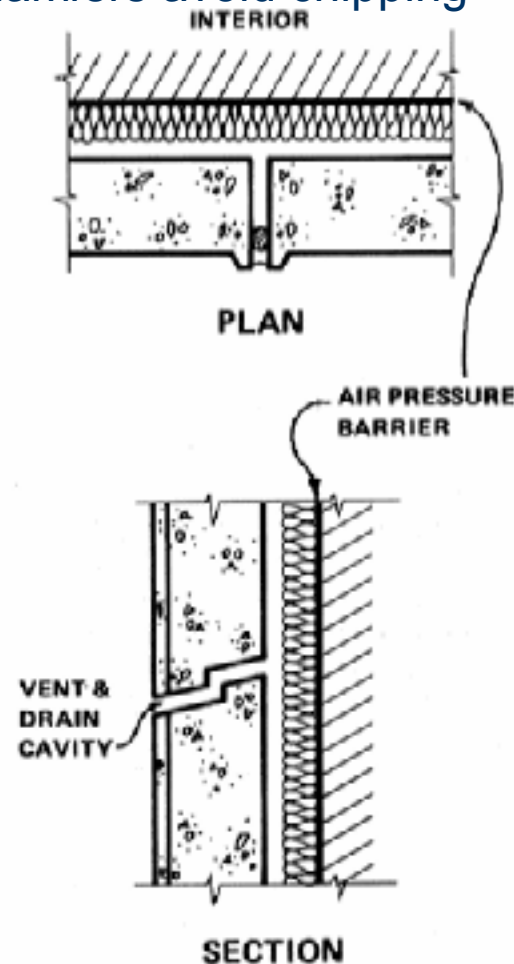
Conceptual Drawing only
Important details not shown
Just arrangement of layers. Some
combinations may not be
practical or may perform poorly

Joints

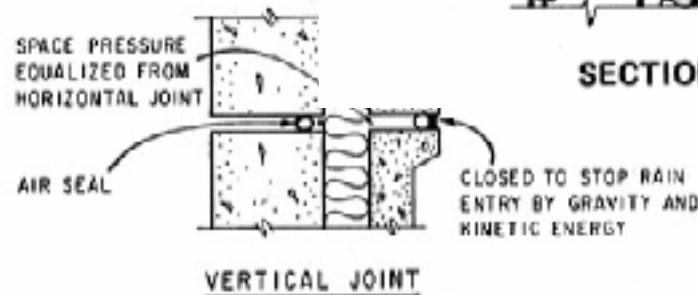
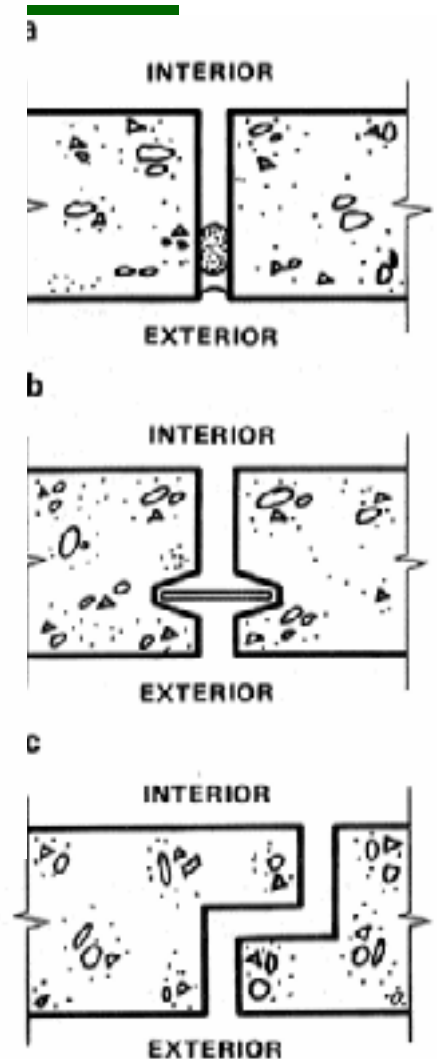
Spec 15 – 25 mm to allow movement and buildability
 Consider HOW to install inner seal
 Perhaps avoid sealant, use baffles, on exterior
 Chamfers avoid chipping



Two-Stage Panel Joints
 Horizontal Section

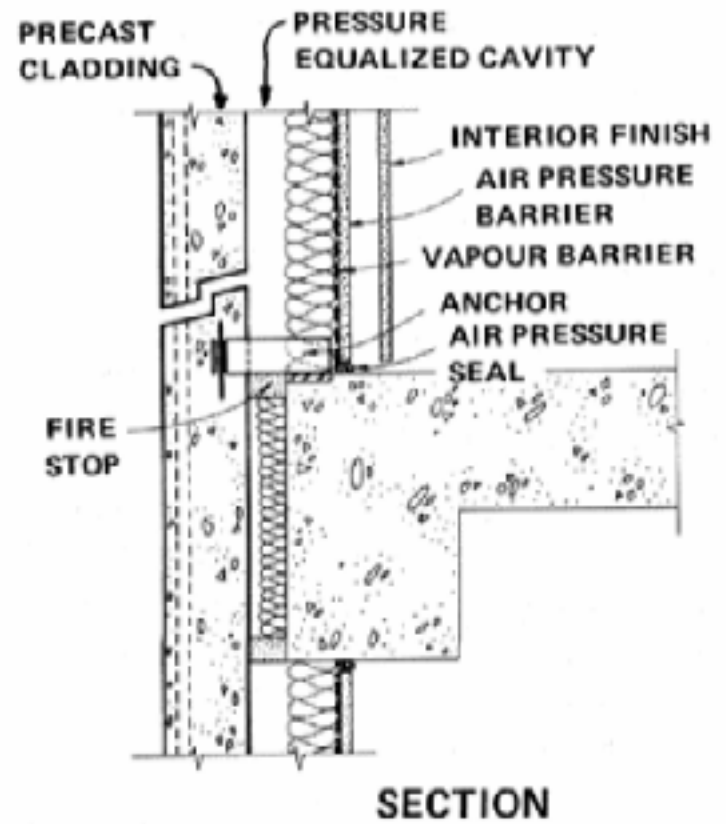
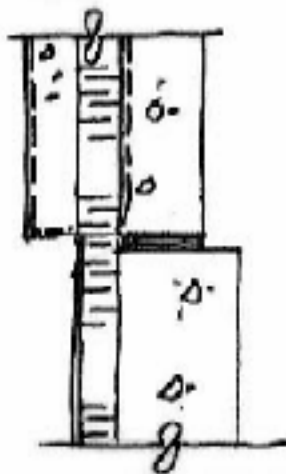
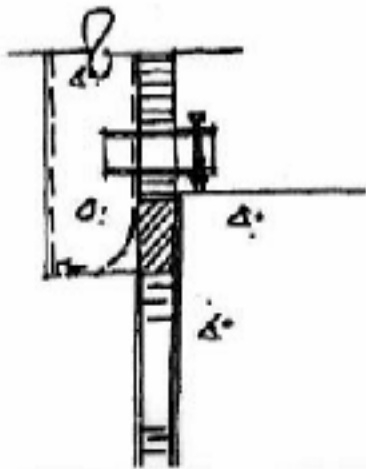
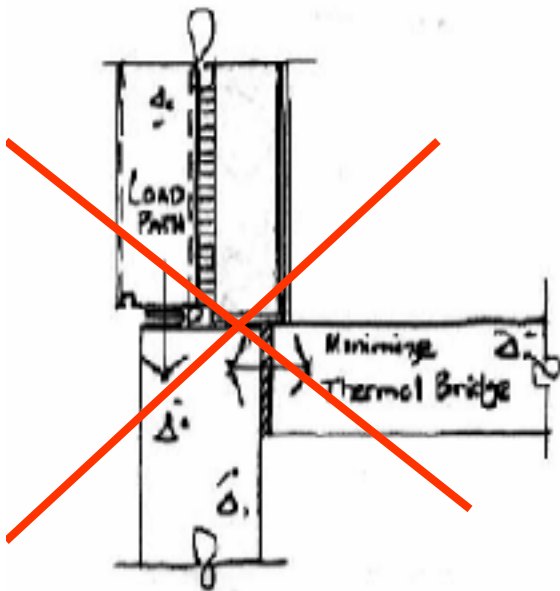


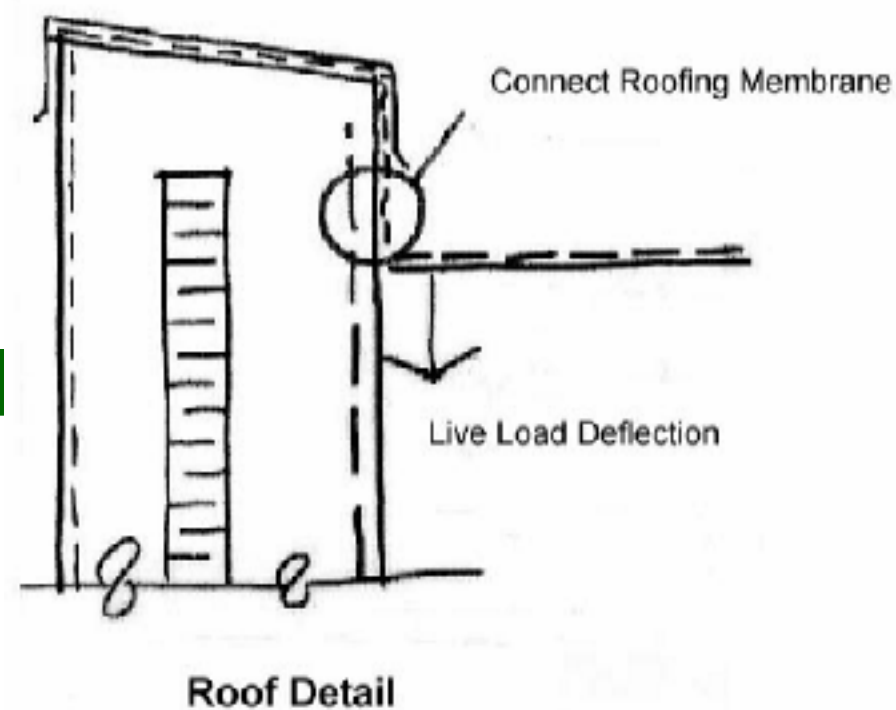
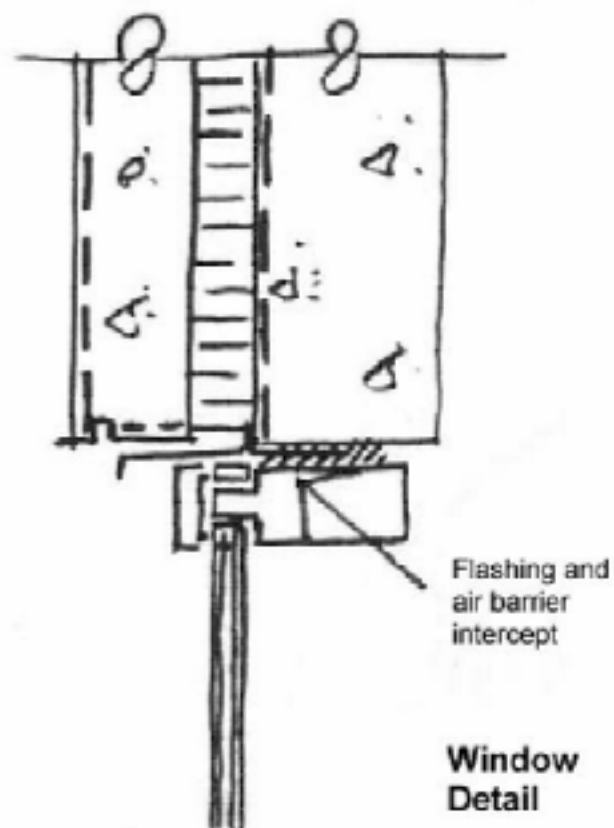
SECTION



VERTICAL JOINT

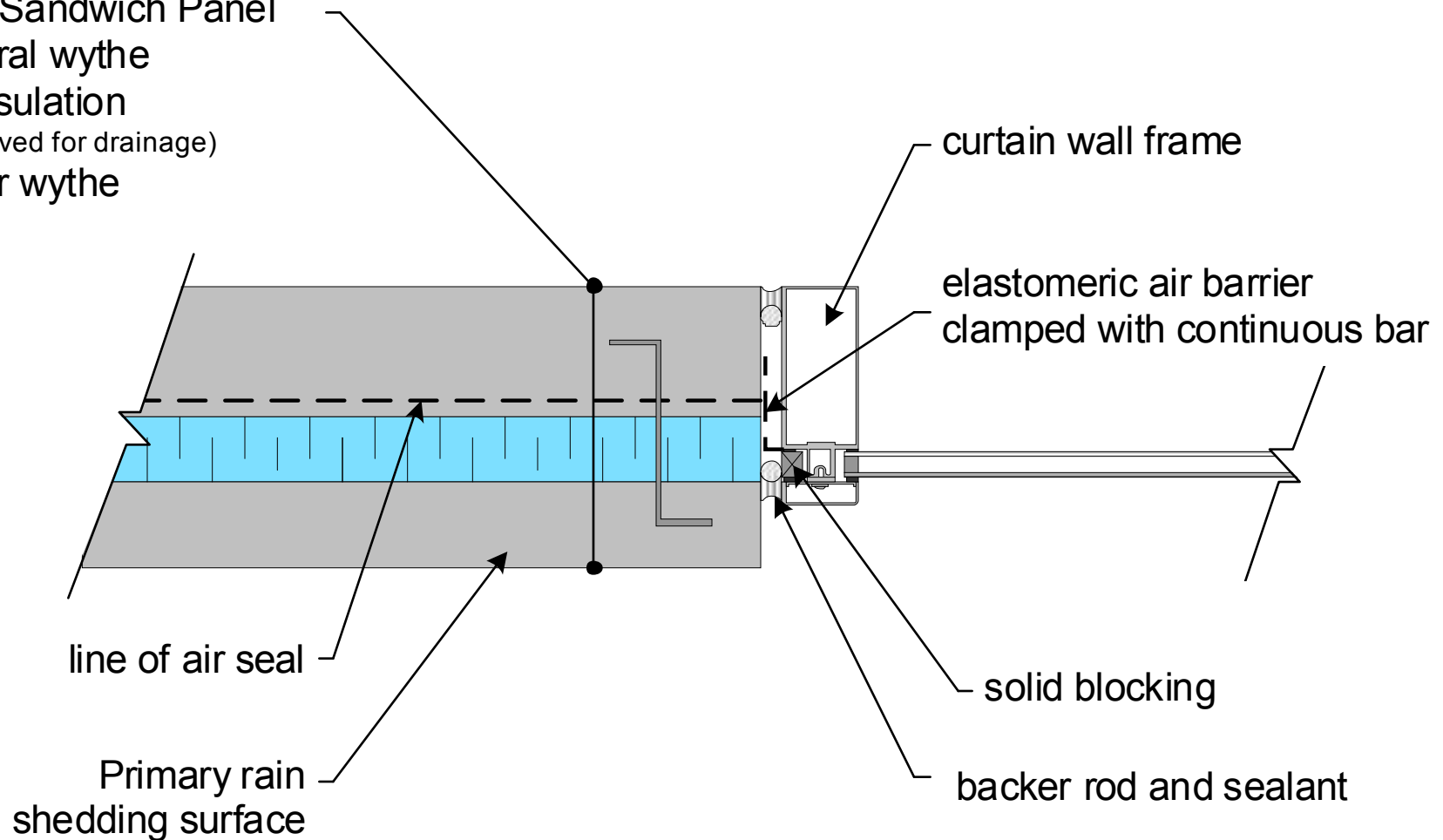
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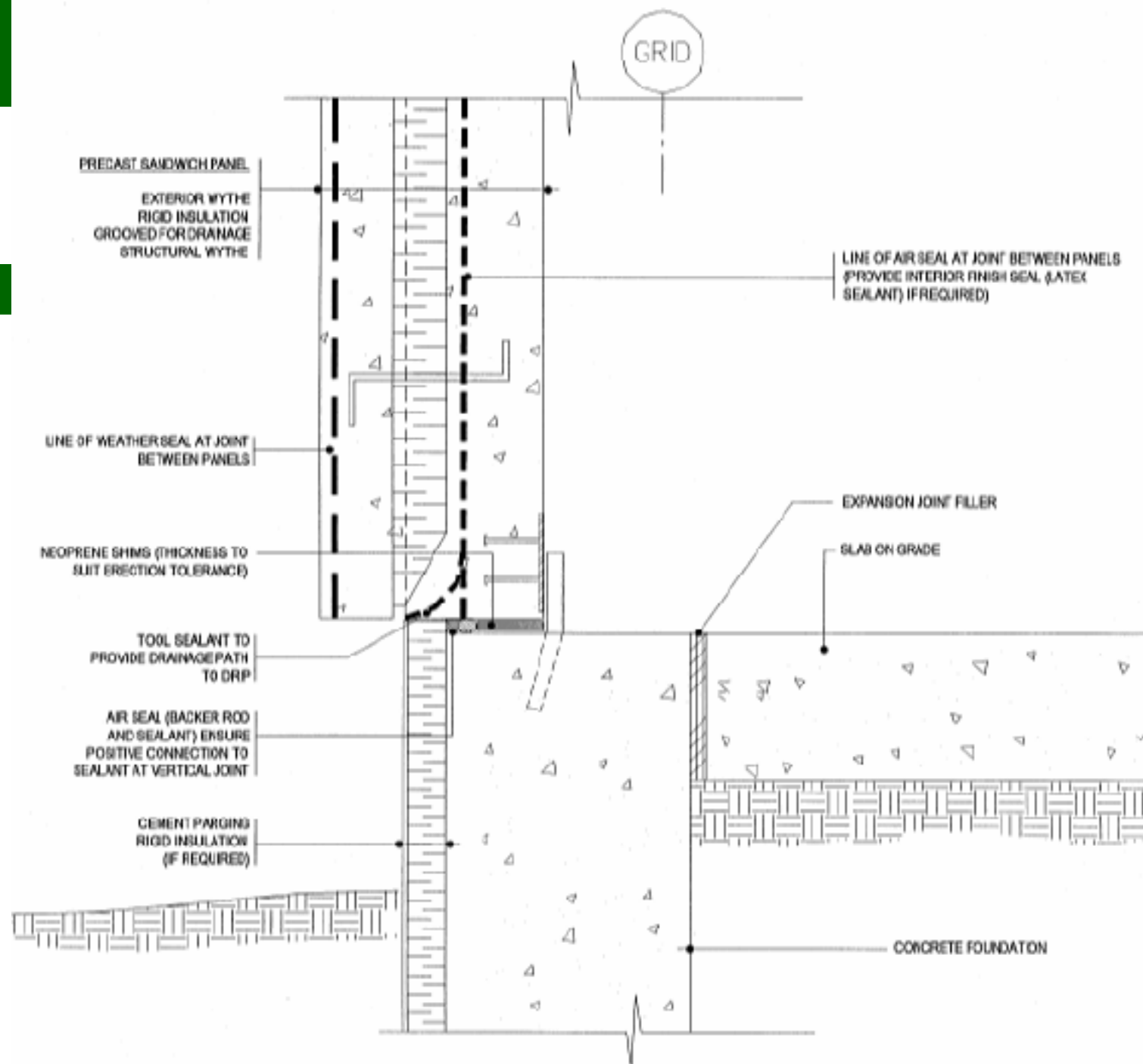


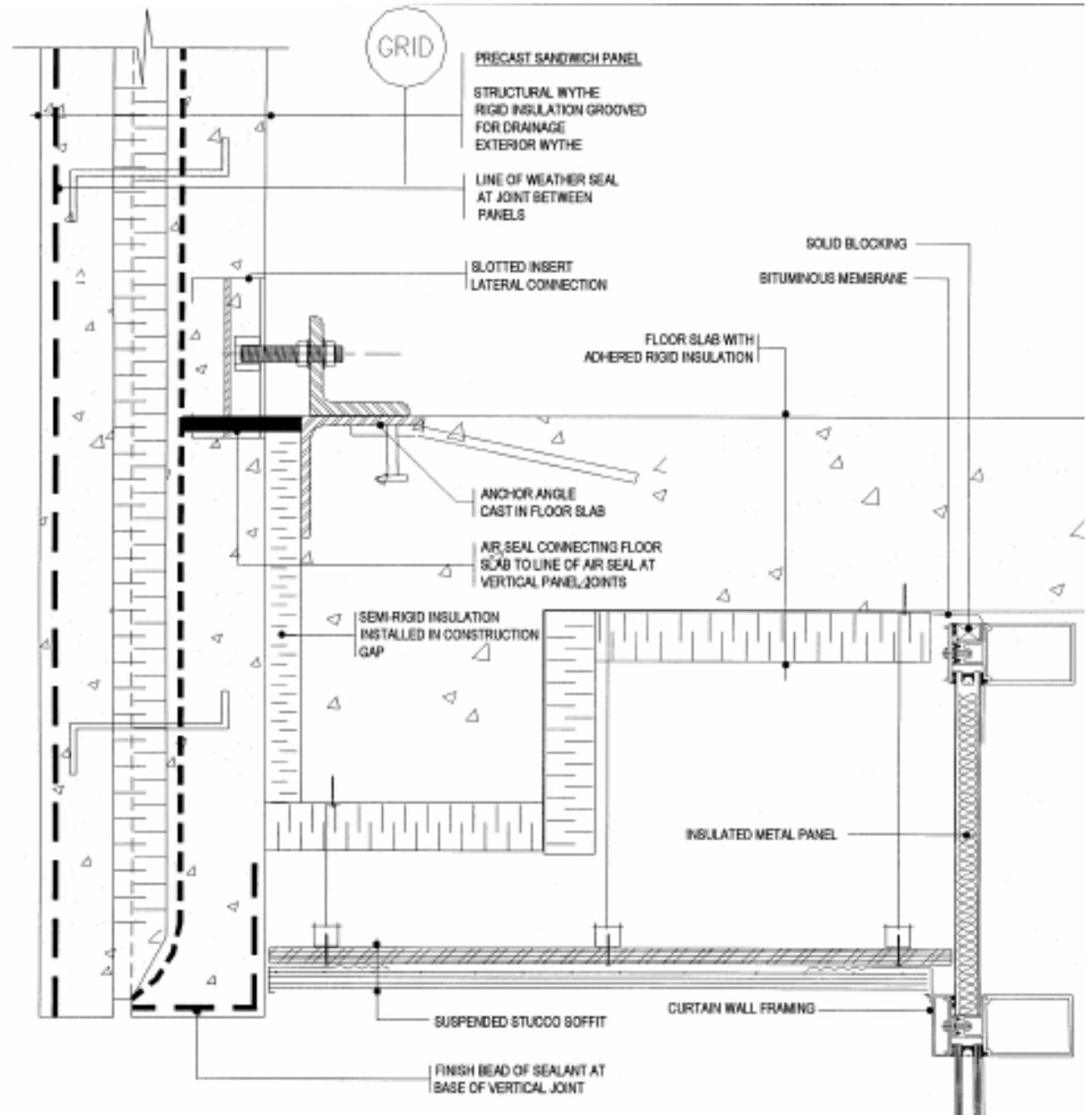


Window connections

Precast Sandwich Panel
structural wythe
rigid insulation
(opt. grooved for drainage)
exterior wythe

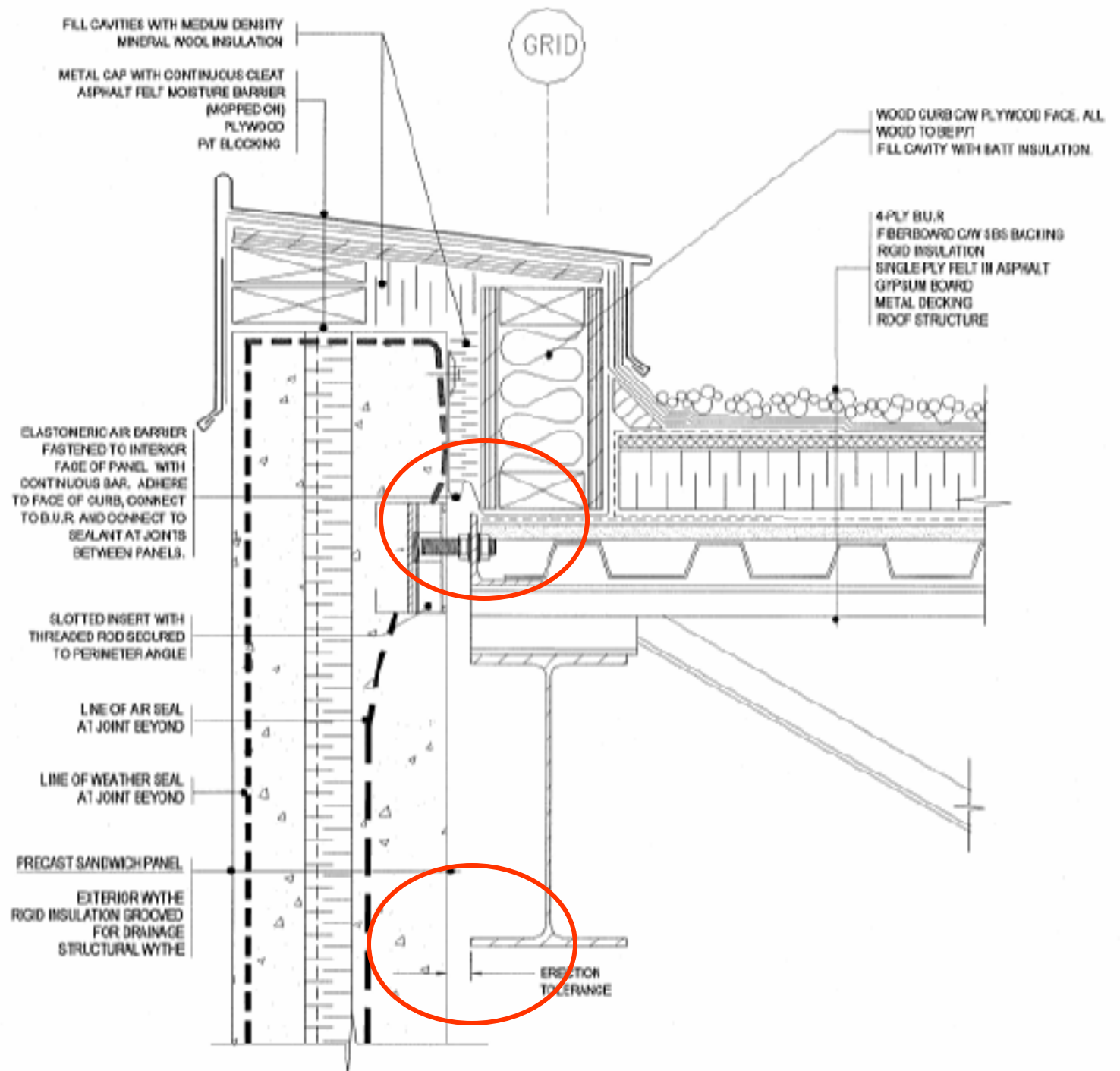






PRECAST SANDWICH PANEL
SUSPENDED STUCCO SOFFIT

From: CMHC BPG



Final Considerations

- **Finishes**
 - Dirt hiding, repairability
- **Erection, transport**
 - Generally as big as possible
- **Beware sagging structure and bowing panels**