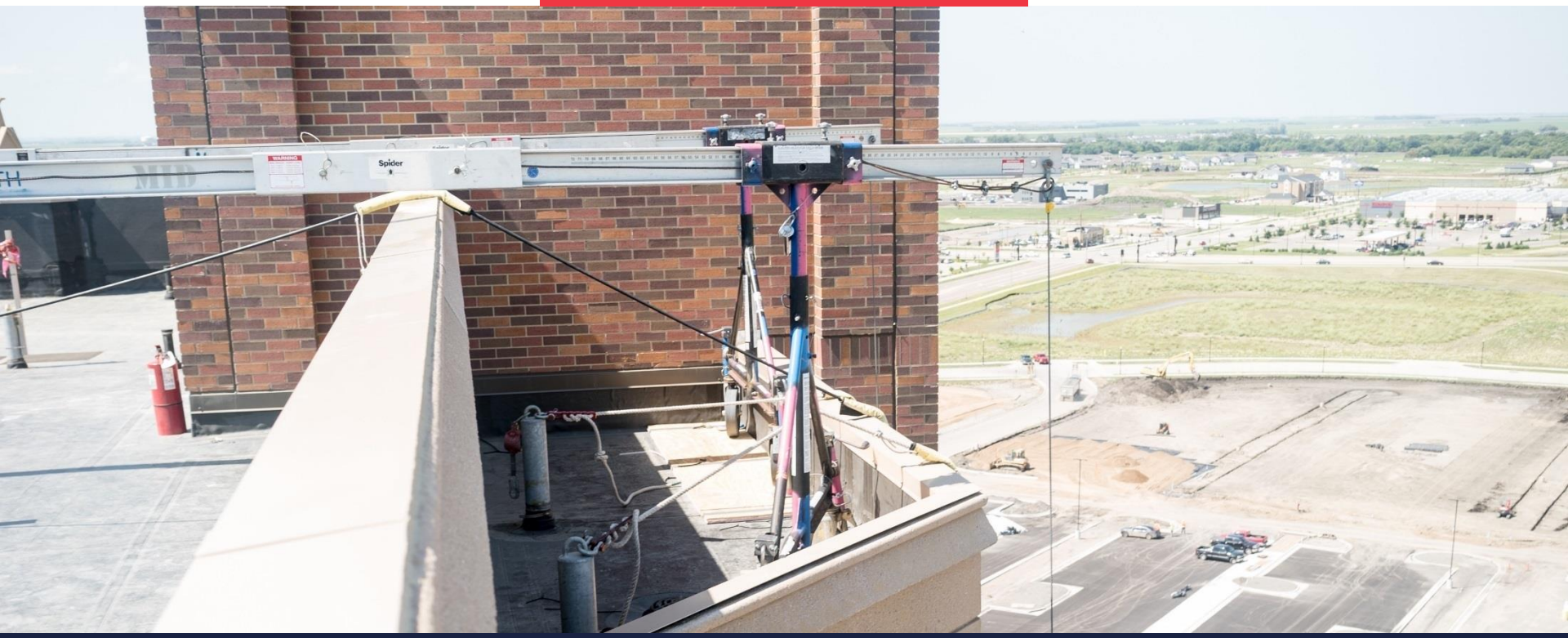
A'17 MN

AIA Minnesota

The Minnesota Conference on Architecture

November 14 - 17, 2017

Minneapolis Convention Center



Parapet Wall Design

Brian Erickson, P.E., RRC Ryan Krug -

8:30 am – 10:00 am

NOVEMBER 14, 2017

Speakers

- **Brian D. Erickson, P.E., RRC**
  - Vice President – Midwest, Pie Consulting & Engineering
  - Licensed PE in 6 states
  - Registered Roof Consultant
  - Iowa State University and University of Colorado
  - 3rd Speaking Opportunity at AIA MN!

- **Ryan Krug, BECxP, CxA+BE**
  - Project Manager, Pie Consulting & Engineering
  - Certified Building Envelope Commissioning Agent
  - Iowa State University
  - Curtainwall Guru – Trump Tower

Parapet Wall Design - Outline

- History of Parapets
- Weather/Air/Thermal/Vapor Barrier Integration
- Thermal Barrier Focus
- Construction Sequencing
- Curtainwall/Spandrel Parapets
- Wind Considerations

Parapet Wall Design

Brief History

Biblical Times - Deuteronomy 22:8 - "When thou buildest a new house, then thou shalt make a battlement for thy roof, that thou bring not blood upon thine house, if any man fall from thence. ”

London – Building Act of 1707 – Banned projected eaves; Brick parapets were required.

IBC – 705.11 – Parapets shall be provided on exterior walls of buildings.

- Exceptions – Fire separation distance, floor footprint, etc.
- 30 inches above the roof to wall intersection.
- Same fire rating as the wall assembly.
- Non-combustible faces for the uppermost 18-inches.

OSHA Standard 1926.502 – Fall protection systems criteria and practices.

Parapet Wall Design

Benefits

- Provide fall protection from the structure.
- Provide fire protection to the structure.
- Supplements design aesthetic.
  - Hide roof HVAC components.
- Reduce roof wind loads.

Parapet Wall Design

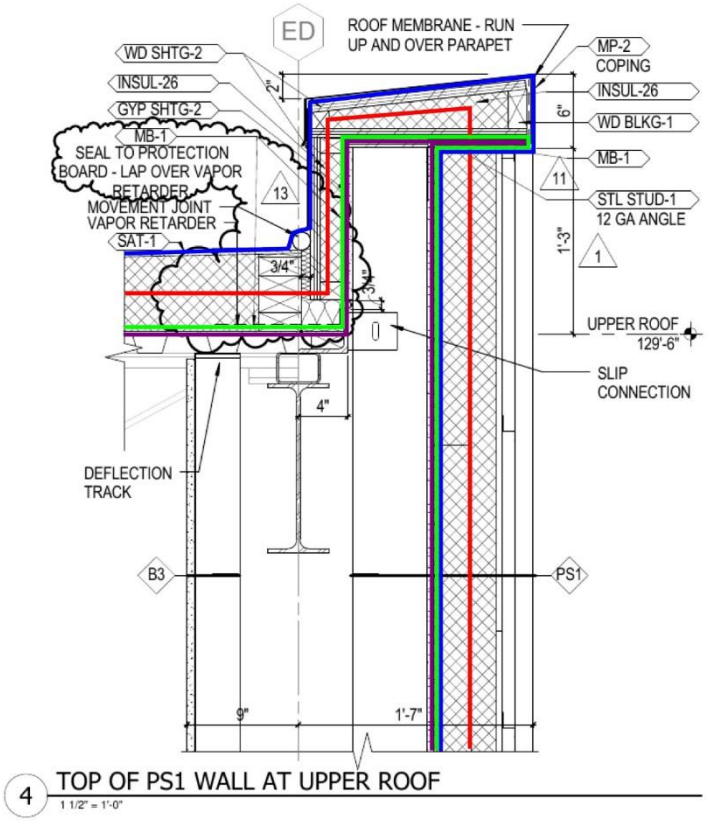
Basics

- Slope the coping toward the roof
- Provide a waterproof membrane under the coping

Parapet Wall Design

Challenges

- Challenging to ensure continuity to the weather, air, vapor, and thermal barriers.



Weather/Air/Vapor/Thermal Barriers

- **Weather Barrier** – The building assembly component which prevents moisture from infiltrating through the exterior wall assembly and damaging assembly or interior items.

- **Air Barrier** – The building assembly component which prevents transfer of air through the exterior wall assembly.

- **Vapor Barrier** – The building assembly component which manages water vapor transfer through the exterior wall assembly.

- **Thermal Barrier** – The building assembly component which impedes the flow of heat through the exterior wall assembly.

Weather Barrier

Weather Barrier

Weather Barrier

Air Barrier

Air Barrier

Air Barrier

pie CONSULTING & ENGINEERING

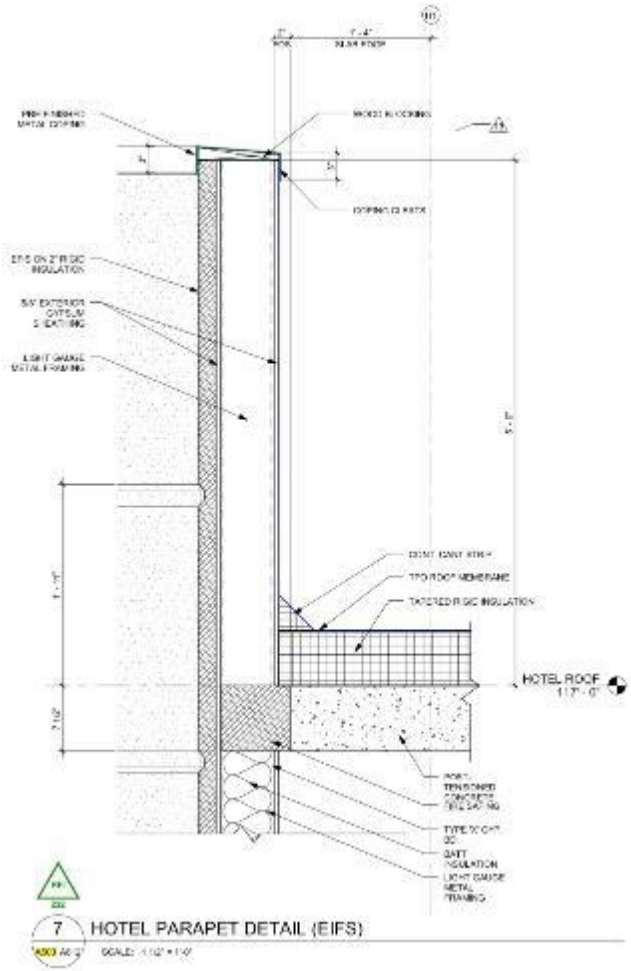
Condensation

Condensation

Thermal Barrier

Parapet Wall Design

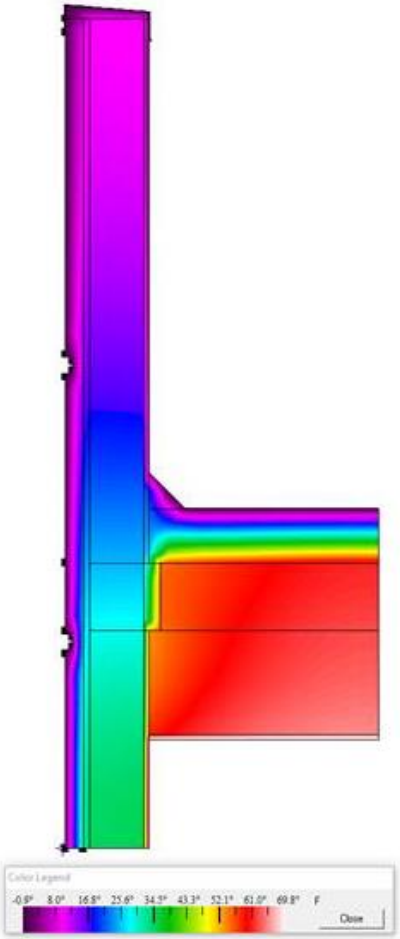
Assembly Configurations & Thermal Modeling



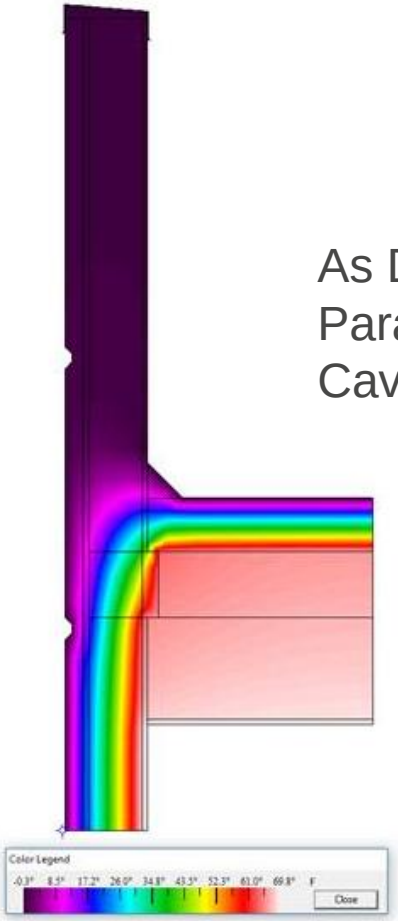
Parapet Wall Design

Assembly Configurations & Thermal Modeling

As Designed Parapet at Steel Stud Web



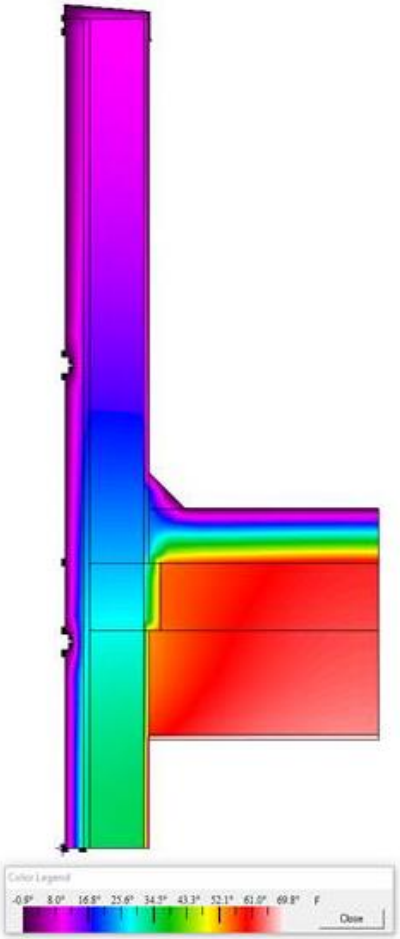
As Designed Parapet at Cavity Mid-span

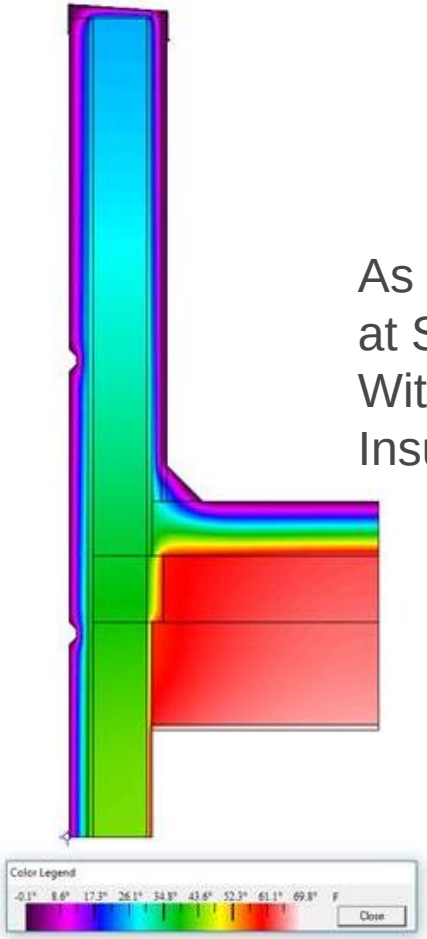


Parapet Wall Design

Assembly Configurations & Thermal Modeling

As Designed Parapet at Steel Stud Web



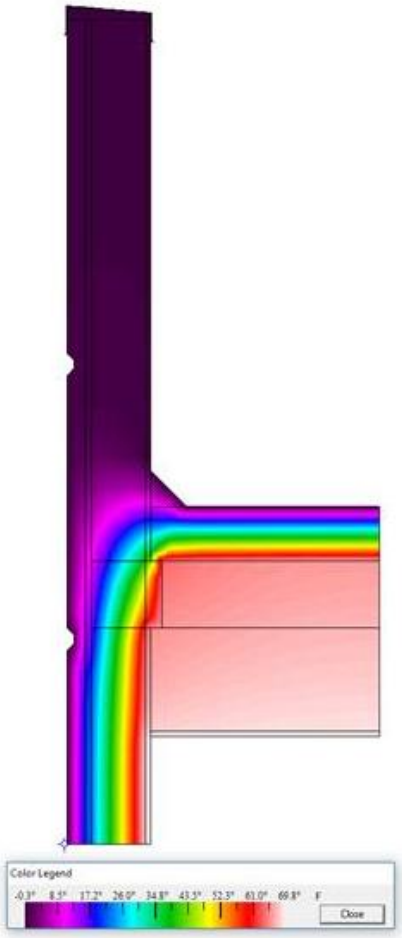


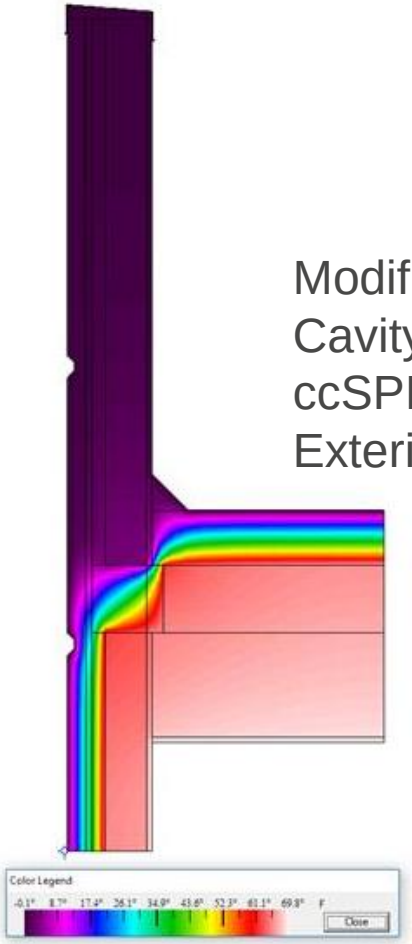
As Designed Parapet at Steel Stud Web With Roof Side Insulation

Parapet Wall Design

Assembly Configurations & Thermal Modeling

As Designed Parapet at Cavity Mid-span

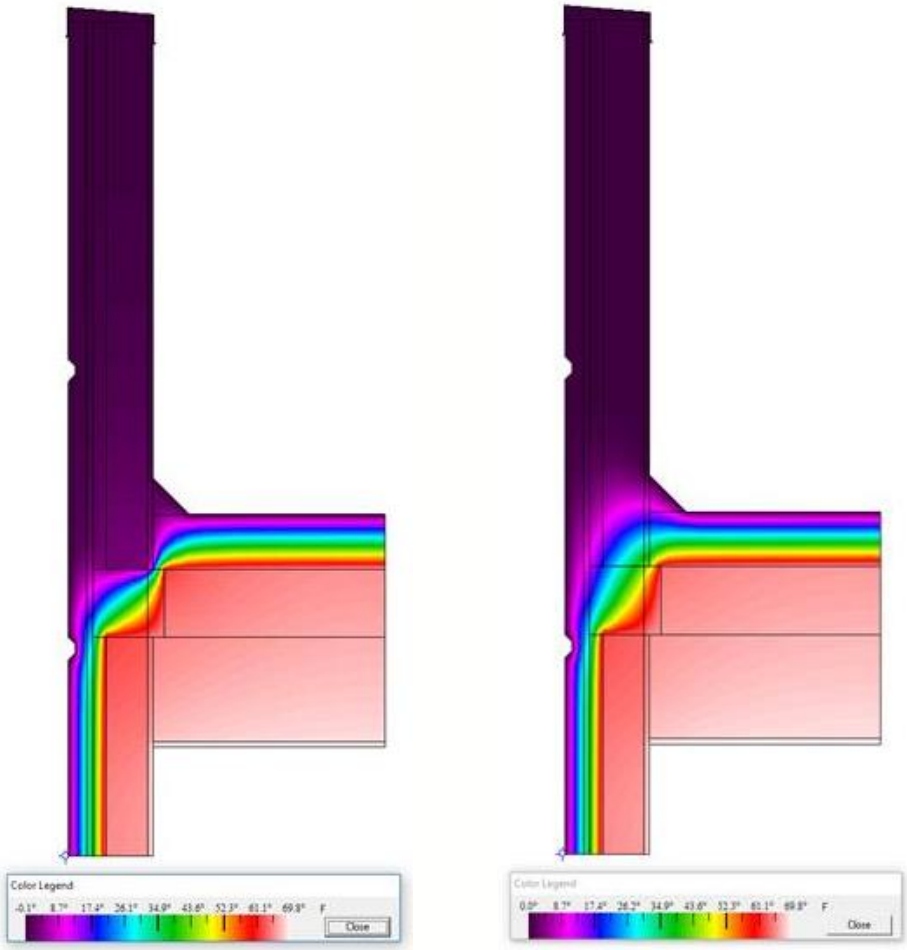




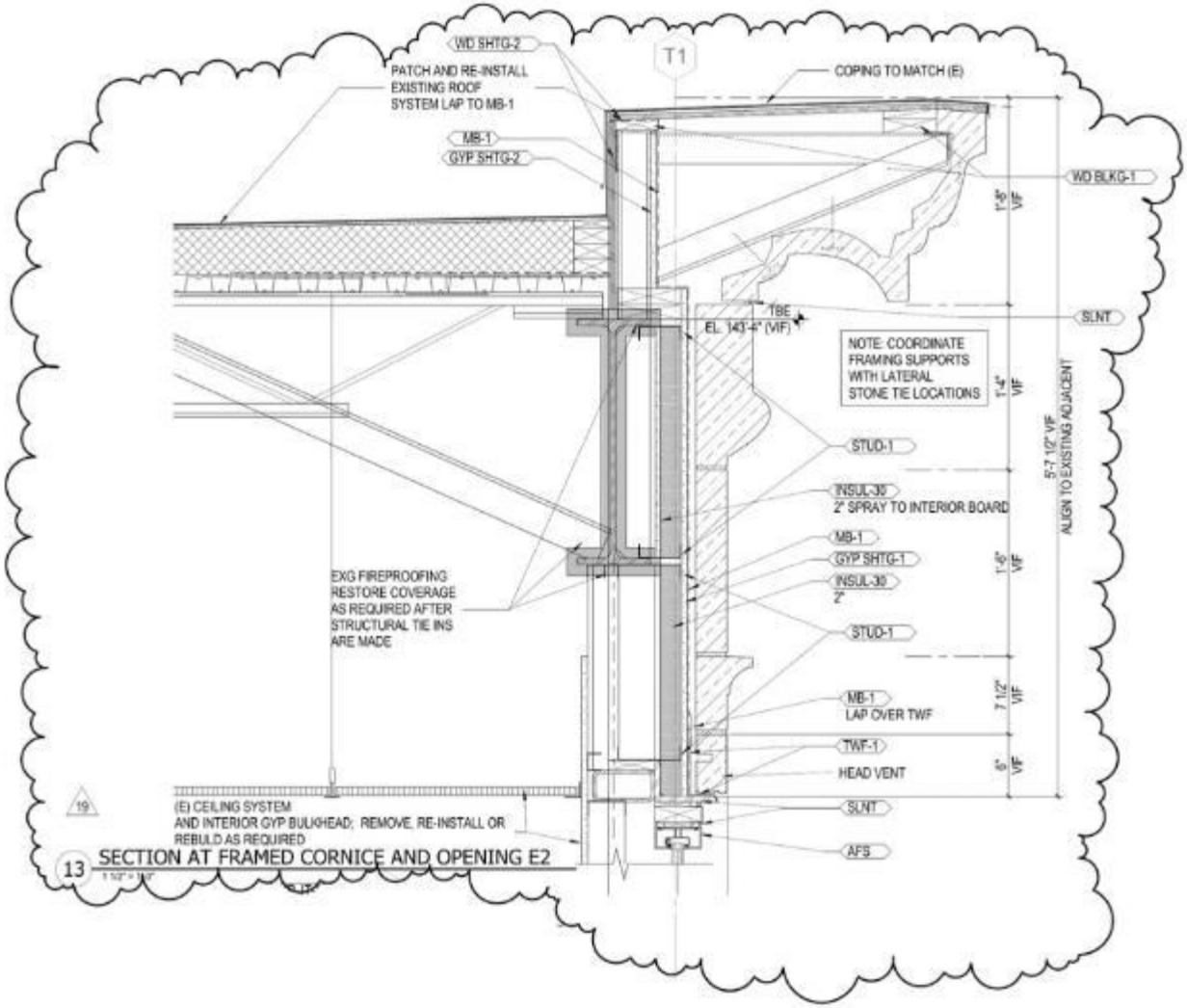
Modified Parapet at Cavity Mid-span with ccSPF on Interior of Exterior Sheathing

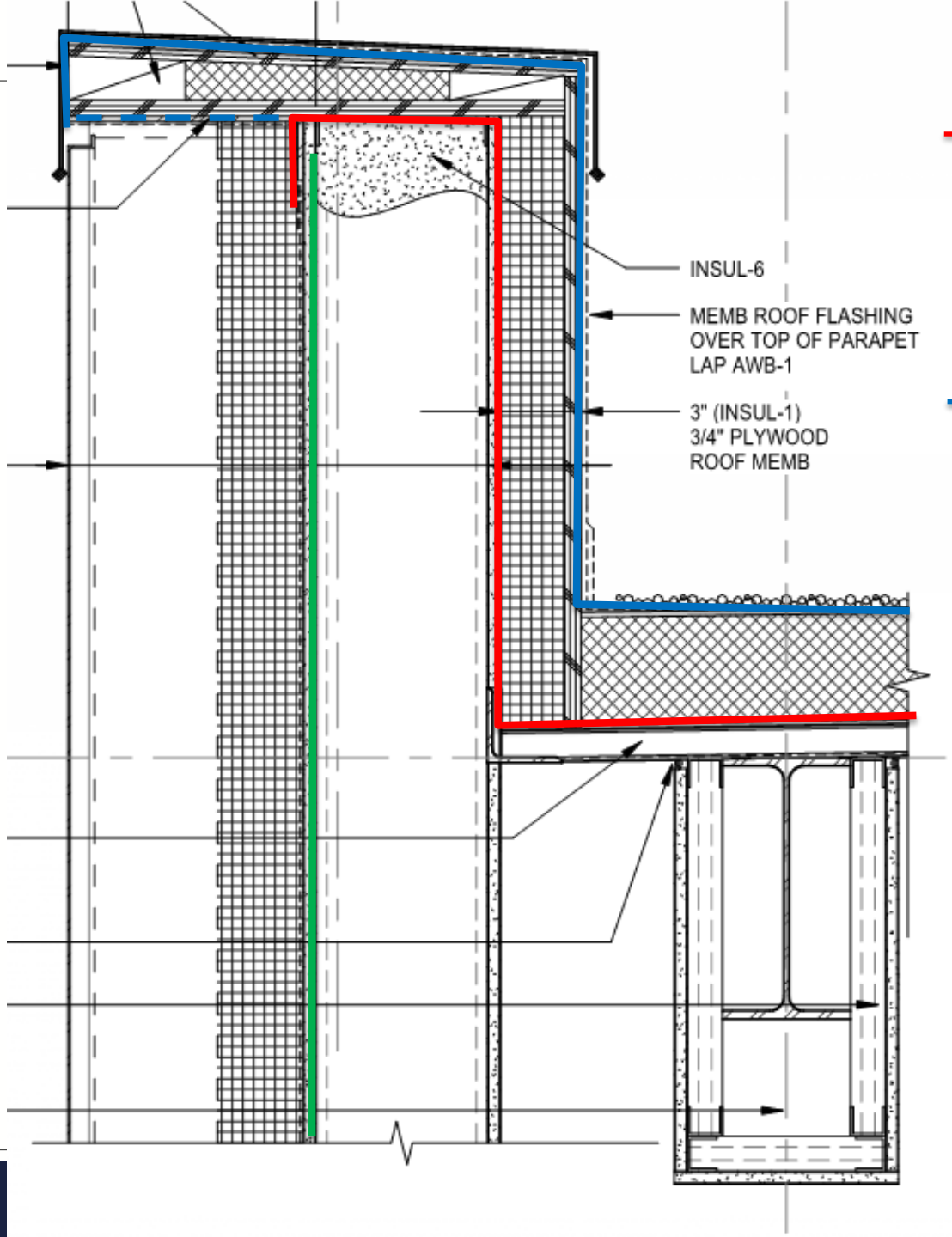
Parapet Wall Design

Assembly Configurations & Thermal Modeling



Thermal Barriers – Detailing/Sequencing





Roof – Air/Vapor Barrier

Roof Membrane

Wall – Air/Vapor/ Weather Barrier

REVEAL AND MATCH WIDTH.

(N) 12 ga. CONTINUOUS FORMED METAL WITH 3/4" PLYWOOD TO PROVIDE PARAPET CAP SUBSTRATE - FASTEN TO EXISTING METAL STUD RECEPTOR 6" O.C. STAGGERED

(N) 16 ga. CONTINUOUS Z-GIRT WITH WEEP HOLES 24" O.C. FASTENED WITH EPDM WASHERED FASTENERS 16" O.C.

3" MIN.

FULLY ADHERE ROOF MEMBRANE - LAP DETAIL MEMBRANE OVER EPDM AND INSTALL TERMINATION BAR WITH FASTENER 8" O.C. SEAL TOP EDGE AND FASTENER HEADS WITH JOINT SEALANT

ASSUME 5% METAL STUD REMEDIATION AT EACH STUD ALONG THE PARAPET

(N) PLYWOOD SHEATHING

2"

INFILL CAVITY OF STEEL STUDS WITH ccSPF FROM MINERAL WOOL INSULATION TO THE THICKNESS OF THE ROOF INSULATION. HEIGHT VARIES DUE TO TAPERED INSULATION

REFER TO DETAIL 6/A501 FOR DETAILED ROOFING INFORMATION

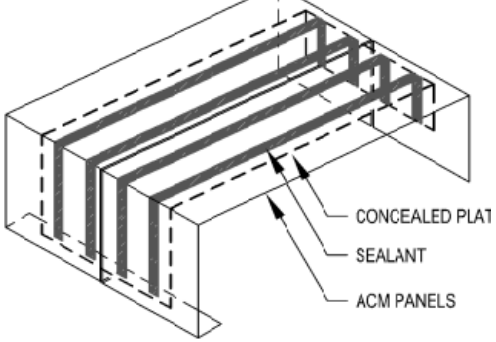
EXISTING CONSTRUCTION SHADED

(N) INSTALL CONTINUOUS VAPOR BARRIER AND UPTURN ON CURB EXTEND UP TO MIN. 2" ABOVE REINFORCED PERIMETER STRIP

INFILL GAP BETWEEN EXISTING DECK AND PARAPET SHEATHING WITH NEW CONTINUOUS 20 GA. 6" X (GAP + 3") METAL ANGLE

GAP IN DECK VARIES FROM 1/2" TO 6"

(N) 4-INCH MINERAL WOOL INSULATION FIRESTOPPING AT SLAB EDGE AND STEEL STUD CAVITY. INSTALL BRACING AS REQUIRED TO SUPPORT INSULATION



ISOMETRIC PANEL JOINT

Integration

Integration

Integration

Integration

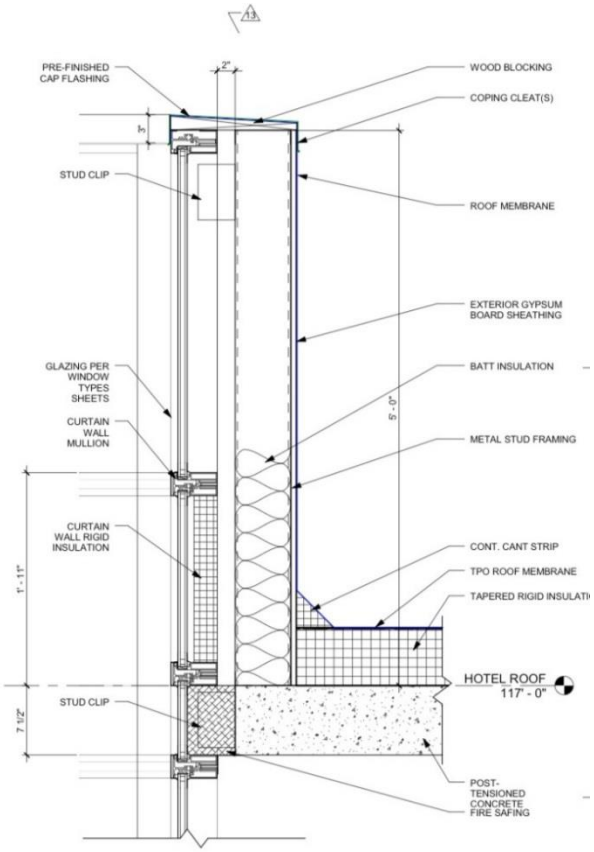
Integration

Integration

Integration

Parapet Wall Design

Curtain Wall



3 HOTEL PARAPET DETAIL (CURTAINWALL)

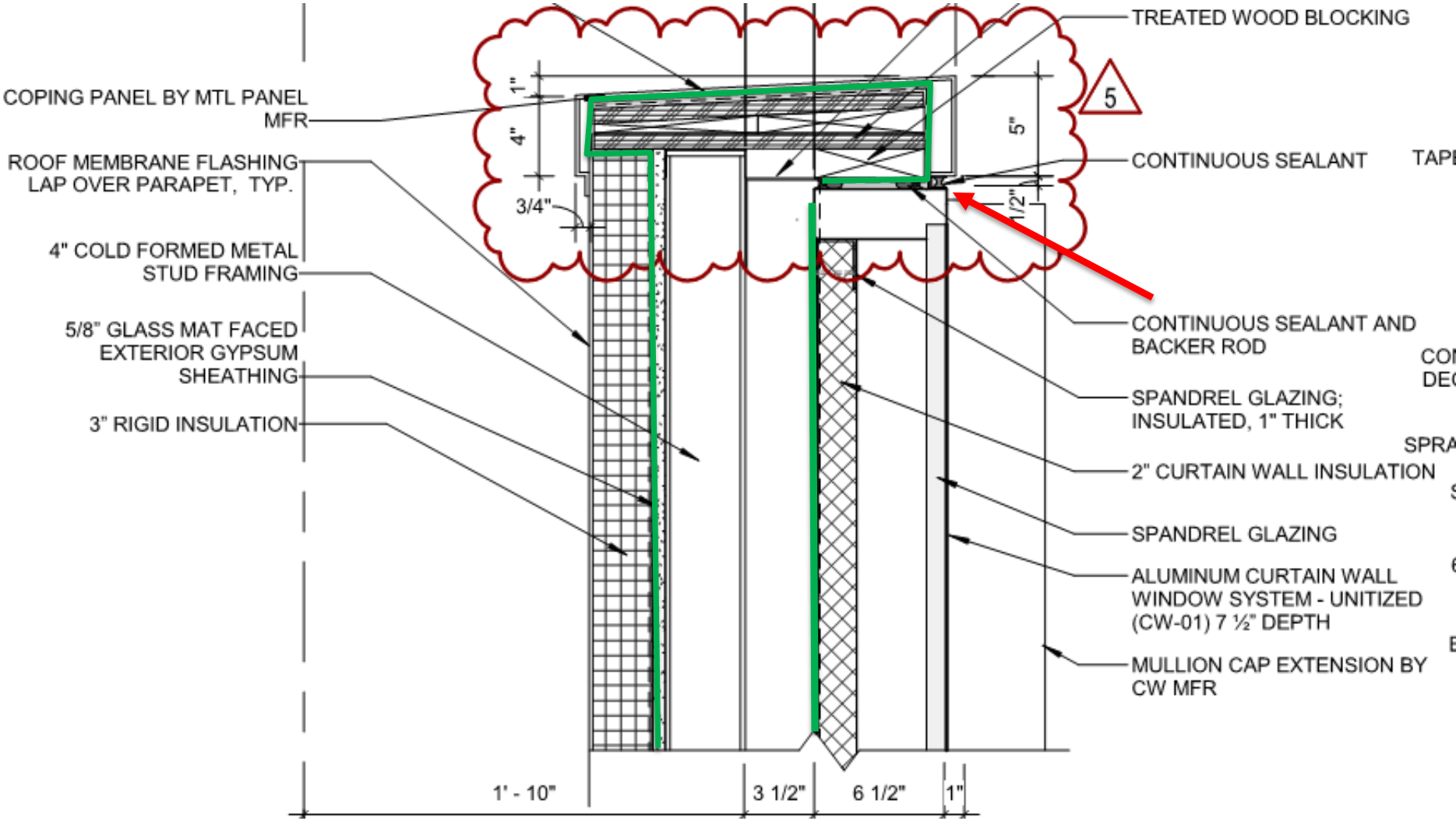
A511 A812 SCALE: 1 1/2" = 1'-0"

Parapet Wall Design

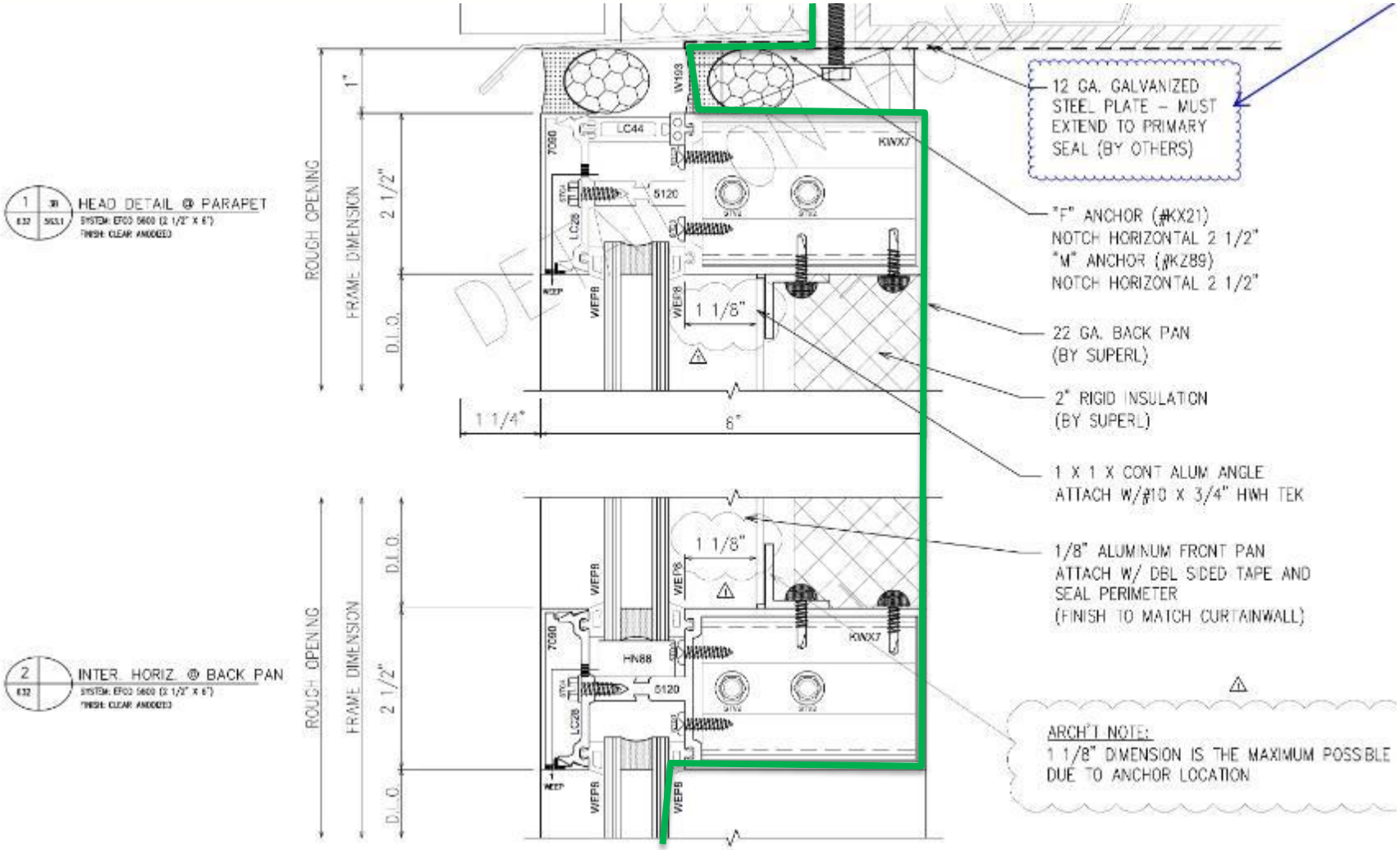
Curtain Wall

- Glass/aluminum are the weather, air, and vapor barriers for a glazing system.
- Typically, foil faced mineral wool or metal back pans are utilized in conjuncture with insulation to increase the system U-Value.
- Potential Problem – Air migration through discontinuities of the interior air barrier could result in condensation formation within the glazing system.
  - Glazing framing connections.
  - Anchor locations.
  - Slab lines.
- Ideally, fully sealed back pans with a discontinuous gasket at the horizontal member would be utilized to manage potential condensation through the glazing weep system.

Curtain Wall - Parapets

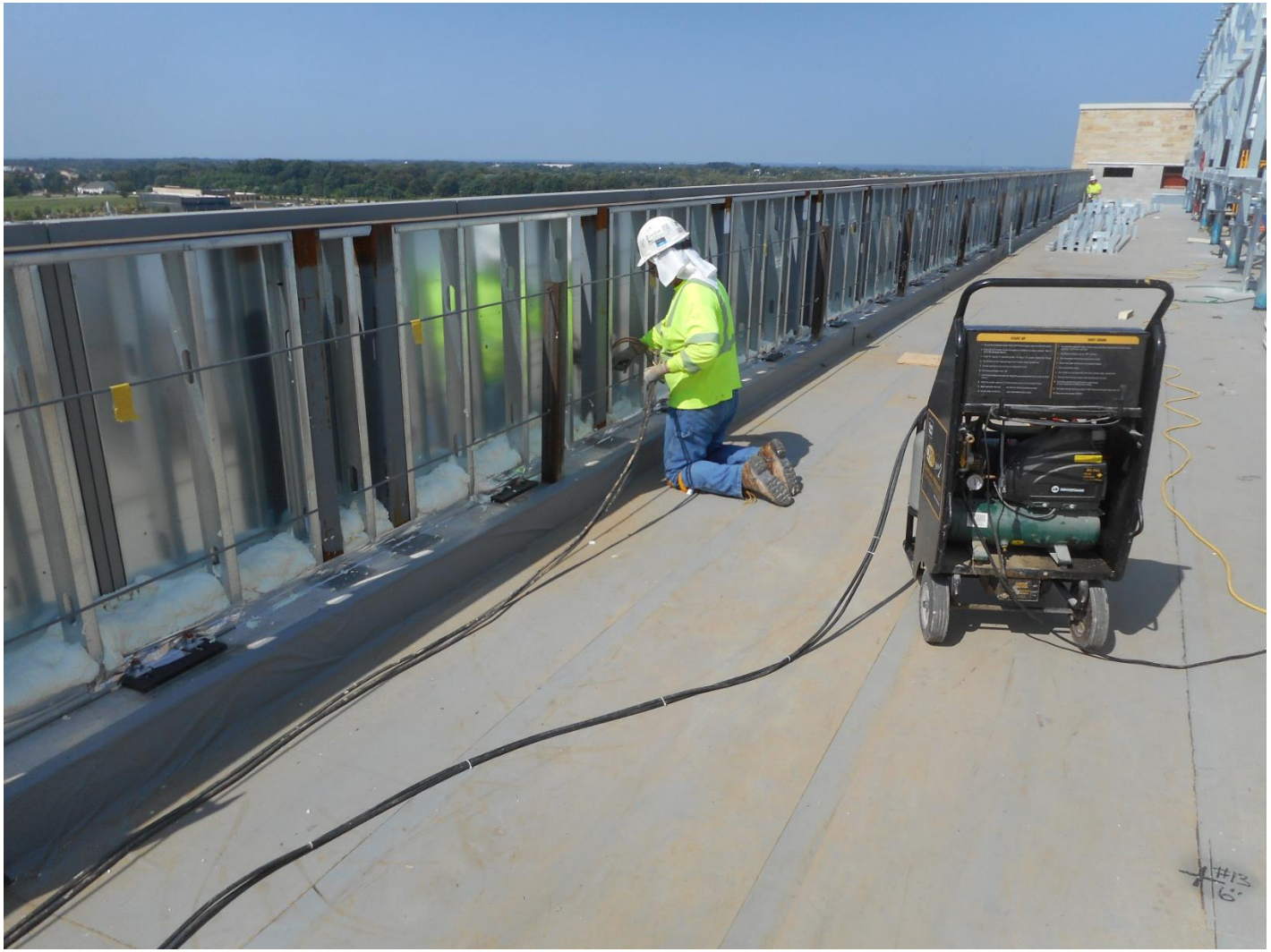


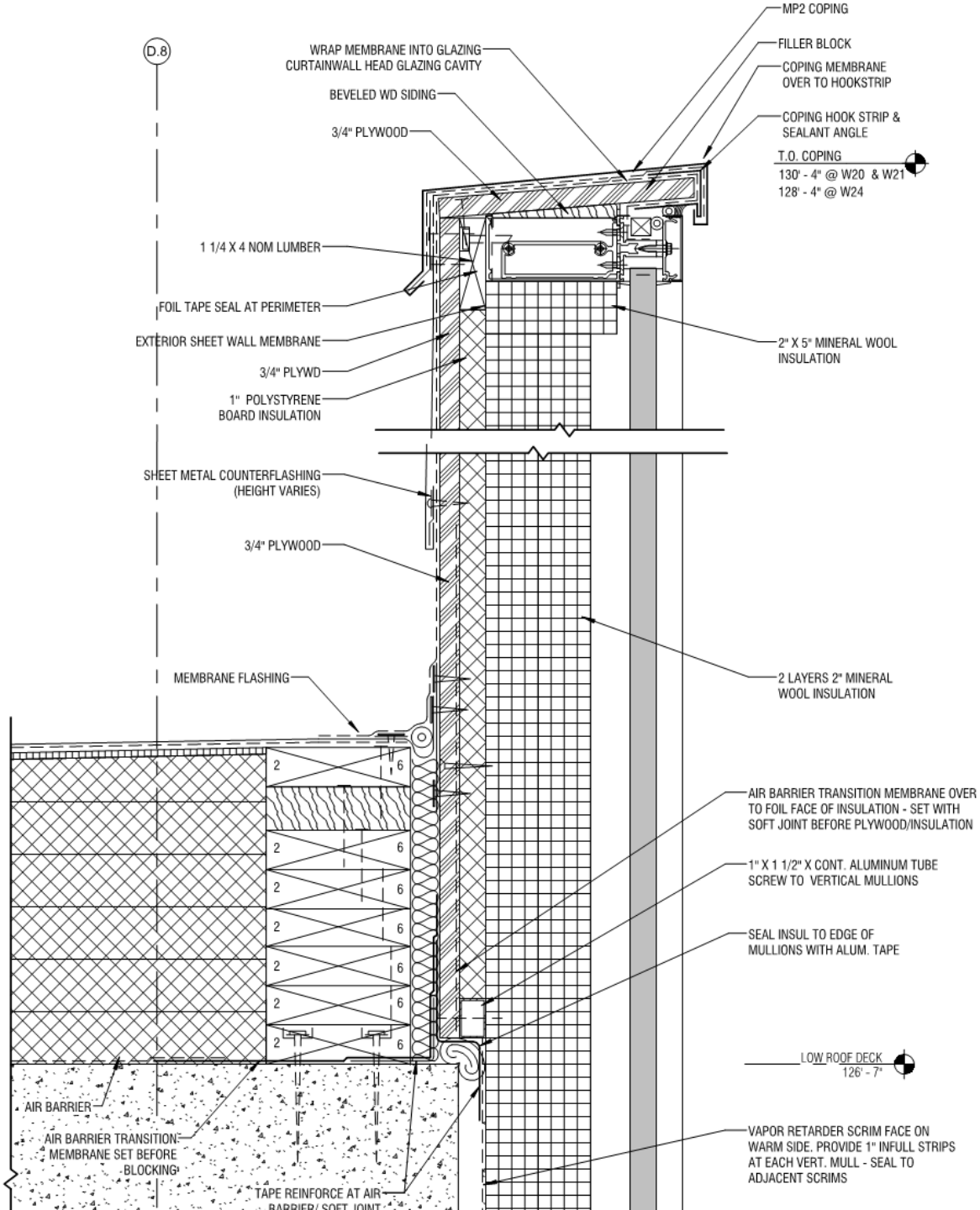
Curtain Wall - Parapets



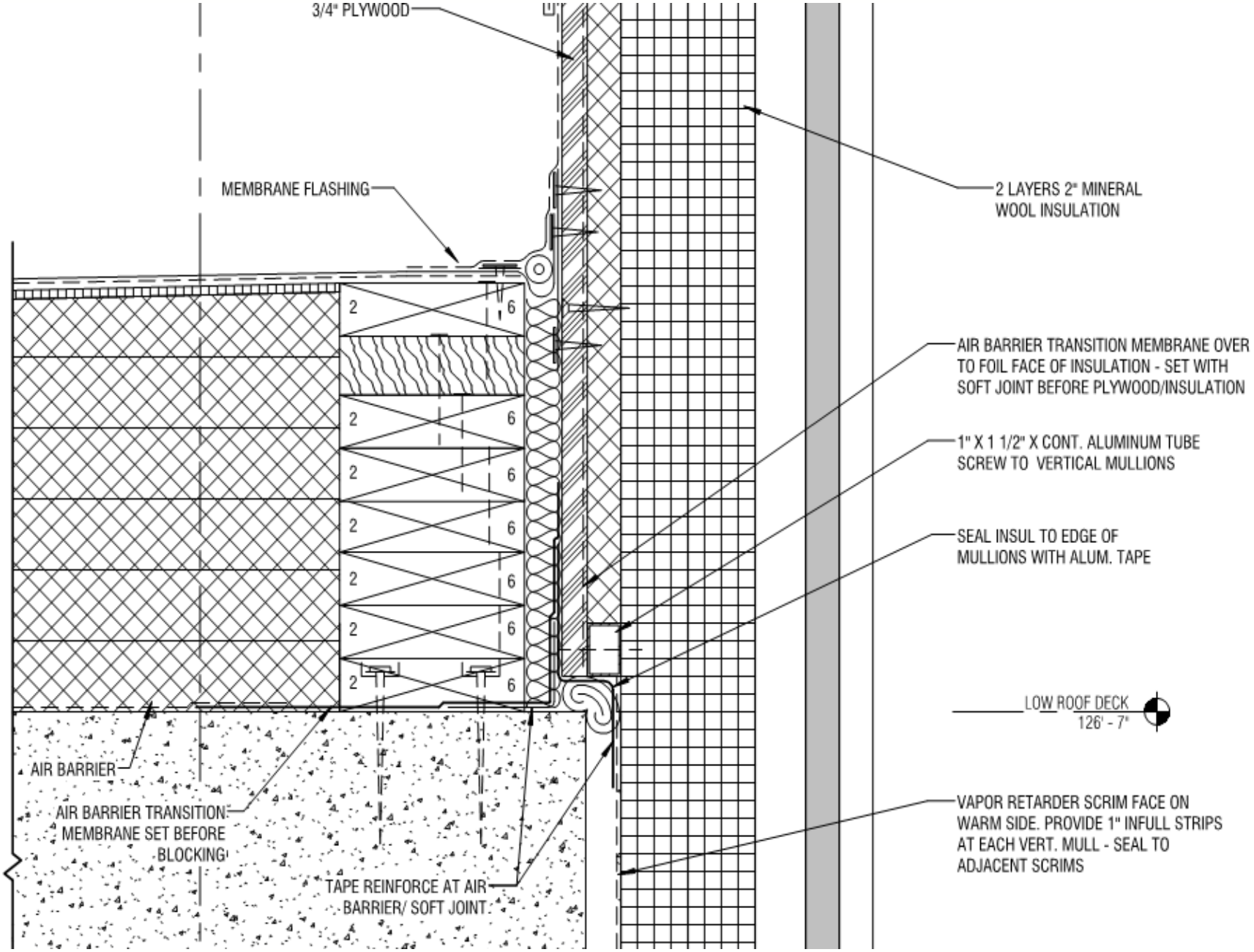
Curtain Wall - Parapets

Curtain Wall - Parapets




D.8
MP2 COPING
FILLER BLOCK
COPING MEMBRANE OVER TO HOOKSTRIP
COPING HOOK STRIP & SEALANT ANGLE
T.O. COPING
130' - 4" @ W20 & W21
128' - 4" @ W24
WRAP MEMBRANE INTO GLAZING CURTAINWALL HEAD GLAZING CAVITY
BEVELED WD SIDING
3/4" PLYWOOD
1 1/4 X 4 NOM LUMBER
FOIL TAPE SEAL AT PERIMETER
EXTERIOR SHEET WALL MEMBRANE
3/4" PLYWD
1" POLYSTYRENE BOARD INSULATION
2" X 5" MINERAL WOOL INSULATION
SHEET METAL COUNTERFLASHING (HEIGHT VARIES)
3/4" PLYWOOD
MEMBRANE FLASHING
2 LAYERS 2" MINERAL WOOL INSULATION
AIR BARRIER TRANSITION MEMBRANE OVER TO FOIL FACE OF INSULATION - SET WITH SOFT JOINT BEFORE PLYWOOD/INSULATION
1" X 1 1/2" X CONT. ALUMINUM TUBE SCREW TO VERTICAL MULLIONS
SEAL INSUL TO EDGE OF MULLIONS WITH ALUM. TAPE
LOW ROOF DECK
126' - 7"
AIR BARRIER
AIR BARRIER TRANSITION MEMBRANE SET BEFORE BLOCKING
TAPE REINFORCE AT AIR BARRIER / SOFT JOINT
VAPOR RETARDER SCRIM FACE ON WARM SIDE. PROVIDE 1" INFULL STRIPS AT EACH VERT. MULL - SEAL TO ADJACENT SCRIMS

GINEERING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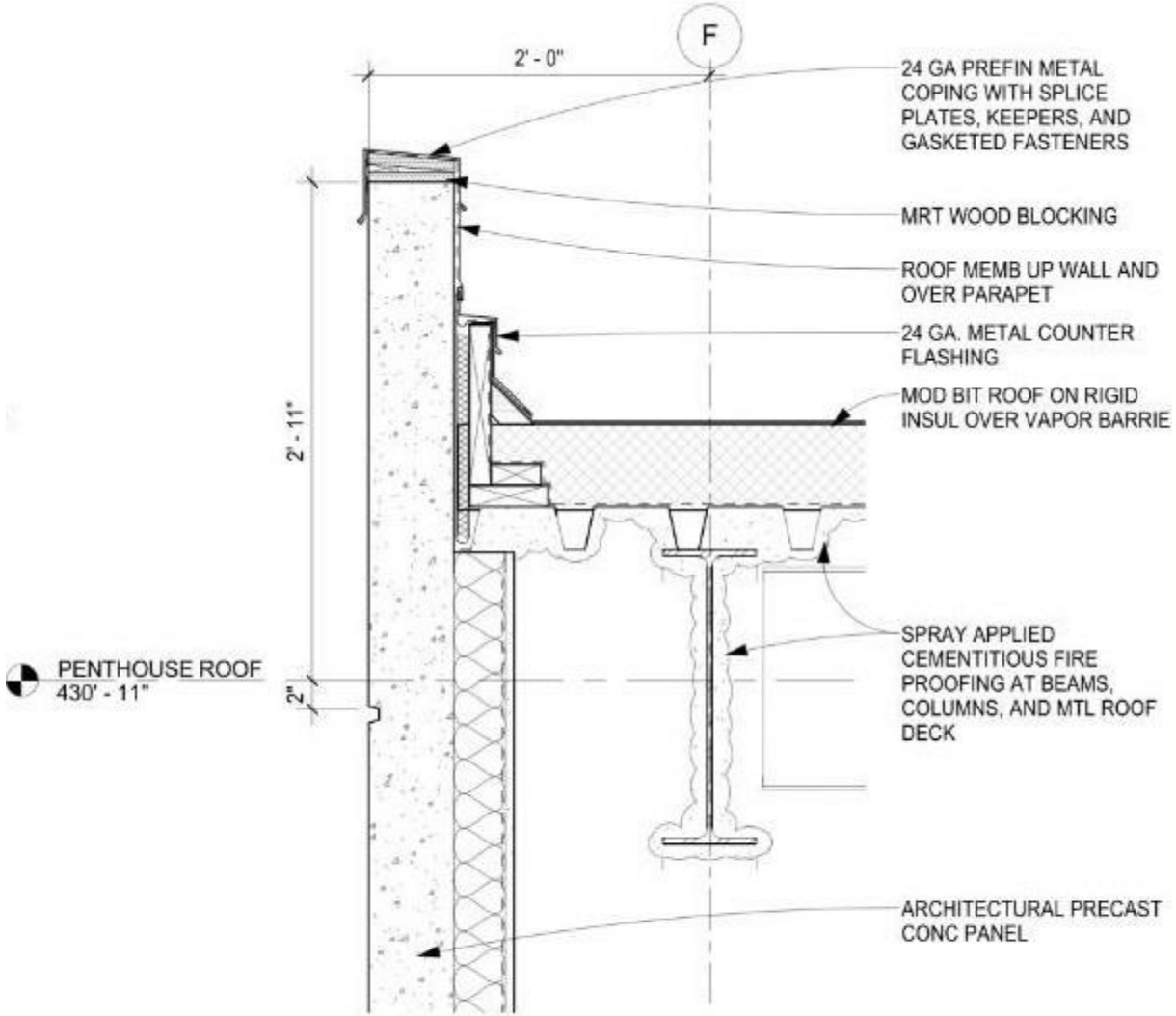
Owens Corning
Thermafiber

Architectural Precast



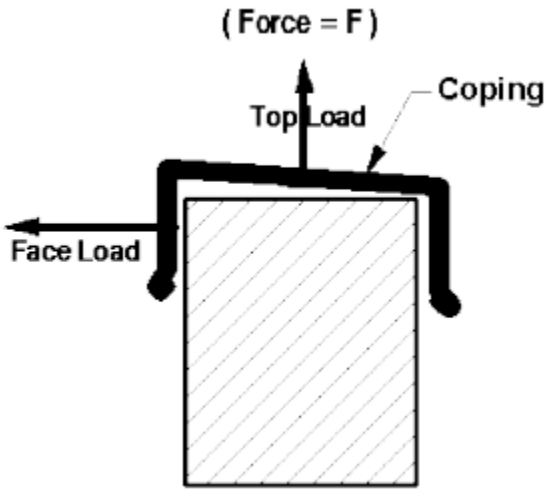
1 PENTHOUSE ROOF PARAPET

1" = 1'-0" (REF. 1/ A4.08)

Wind Resistance – Copings/Blocking

- **IBC Section 1504.5 – Edge Securement for Low-Slope Roofs**
  - Low slope membrane roof system metal edge securement, except gutters, shall be designed and installed for resistance in accordance with ANSI/SPRI ES-1, except the basic wind speed shall be determined from Figure 1609.

Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems



5.1. NAILER SECURED SYSTEMS

The attachment of the nailer to the structure shall be sufficient to resist the design wind uplift load and the load determined under Section 7.1. At outside building corners regions[a], nailer securement shall be designed to resist a load 1.5 times the load determined under Section 7.1. Wood nailers shall have minimum thickness of 1.5 inch (38 mm). For edge flashings used to secure the roofing (e.g., gravel stops), the substrate (e.g. nailer) shall extend at least 1/2 inch (13 mm) beyond the back edge of the horizontal flange of the roof edge device. The following fastener safety factors shall be applied to design loading.

Wind Resistance – Copings/Blocking

Questions?

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