

abaa2026 building
enclosure
conference

**AIR BARRIERS – THEY MIGHT BE
CONTINUOUS, BUT STILL IN DANGER OF
ALLOWING BUILDING COMPONENT DAMAGE**

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Let's begin by...



An aerial photograph of a construction site, showing a large concrete structure under construction. A worker in a hard hat and safety vest is visible on the left side of the frame. The entire image is overlaid with a semi-transparent yellow filter. The word "Definitions" is centered in white text.

Definitions

International Energy Conservation Code Definition

AIR BARRIER – One or more materials joined together in a continuous manner to restrict or prevent the passage of air through the building thermal envelope and its assemblies.

International Energy Conservation Code Definition

BUILDING THERMAL ENVELOPE – The basement walls, exterior walls, floor, roof and any other building elements assemblies that enclose conditioned space or provide a boundary between conditioned space and exempt or conditioned space.

International Energy Conservation Code Definition

INFILTRATION – The uncontrolled inward air leakage into a building caused by the pressure effects of wind or the effect of differences in the indoor and outdoor air densities or both.



Based on the IBC definitions, one could expect:

- A. No air flow is allowed through the thermal envelope.
- B. Some air flow is allowed through the thermal envelope.
- C. Who cares about airflow?

D. Answers B & C

An aerial photograph of a large-scale construction project, showing a complex network of steel beams, concrete structures, and scaffolding. The entire image is overlaid with a semi-transparent yellow filter. In the center, the text "Code Requirements" is written in a bold, white, sans-serif font.

Code Requirements

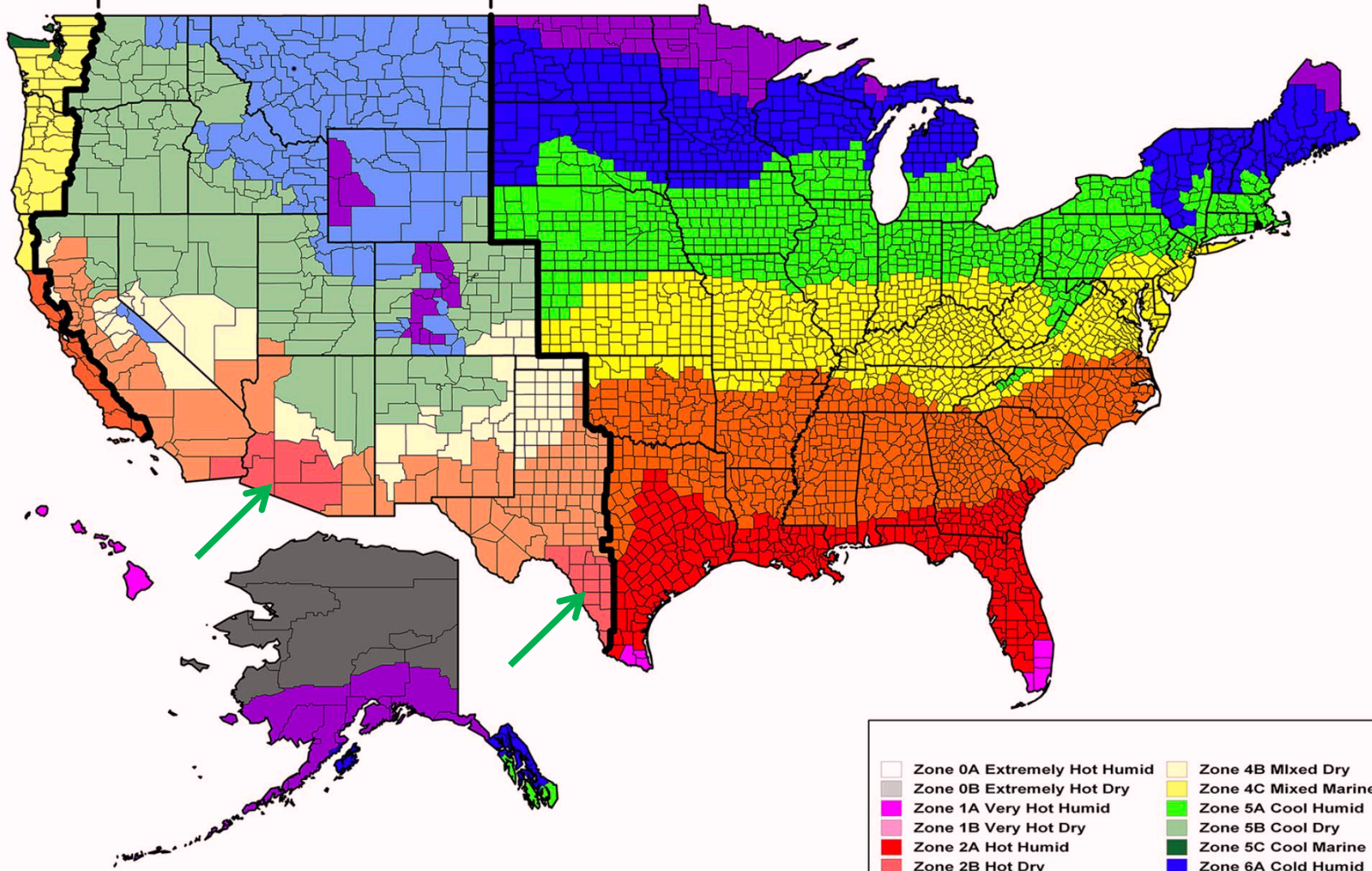
Air barriers are required except for when they're not.

Air barriers are not required in Climate Zone 2B.

Air barriers are required everywhere else.

Geographic location has an impact on the importance of air barriers.

← Marine (C) Dry (B) Moist (A) →



- | | |
|-----------------------------|-------------------------|
| Zone 0A Extremely Hot Humid | Zone 4B Mixed Dry |
| Zone 0B Extremely Hot Dry | Zone 4C Mixed Marine |
| Zone 1A Very Hot Humid | Zone 5A Cool Humid |
| Zone 1B Very Hot Dry | Zone 5B Cool Dry |
| Zone 2A Hot Humid | Zone 5C Cool Marine |
| Zone 2B Hot Dry | Zone 6A Cold Humid |
| Zone 3A Warm Humid | Zone 6B Cold Dry |
| Zone 3B Warm Dry | Zone 7 Very Cold |
| Zone 3C Warm Marine | Zone 8 Subarctic/Arctic |
| Zone 4A Mixed Humid | |

Air barriers are not completely airtight.

0.004 cfm/ft² – Air leakage through materials.

0.04 cfm/ft² – Air leakage through assemblies.

0.35 cfm/ft² – Air leakage through building envelope.

Air barriers are not completely airtight.

Fenestration is part of the air barrier and have air leakage rates.

TABLE C402.6.3 MAXIMUM AIR LEAKAGE RATE FOR FENESTRATION ASSEMBLIES

FENESTRATION ASSEMBLY	MAXIMUM RATE (cfm/ft ²)	TEST PROCEDURE
Windows	0.20 ^a	AAMA/WDMA/CSA101/I.S.2/A440 or NFRC 400
Sliding doors	0.20 ^a	
Swinging doors	0.20 ^a	
Skylights—with condensation weepage openings	0.30	
Skylights—all other	0.20 ^a	
Curtain walls	0.06	NFRC 400 or ASTM E283 at 1.57 psf (75 Pa)
Storefront glazing	0.06	
Commercial glazed swinging entrance doors	1.00	
Power-operated sliding doors and power operated folding doors	1.00	
Revolving doors	1.00	
Garage doors	0.40	ANSI/DASMA 105, NFRC 400, or ASTM E283 at 1.57 psf (75 Pa)
Rolling doors	1.00	
High-speed doors	1.30	

For SI: 1 cubic foot per minute = 0.47 L/s, 1 square foot = 0.093 m².

- a. The maximum rate for windows, sliding and swinging doors, and skylights is permitted to be 0.3 cfm per square foot of fenestration or door area when tested in accordance with AAMA/WDMA/CSA101/I.S.2/A440 at 6.24 psf (300 Pa).

Example:



8-Story Office Building

290,000 SF of Building Envelope

0.35 CFM/ft² for Building Leakage Rate

87,000 CFM at 75 Pa (0.3 in H₂O)

Equivalent to a 77 ft² Opening in the Façade

Testing History shows leakage rates of 0.15-0.2 CFM/ft² are typical.

Equivalent to a 35-38 ft² Opening in the Facade

The location of the air barrier within the envelope is not defined. It can be:

On the inside or outside of the assembly.

Located within the assemblies composing the envelope.

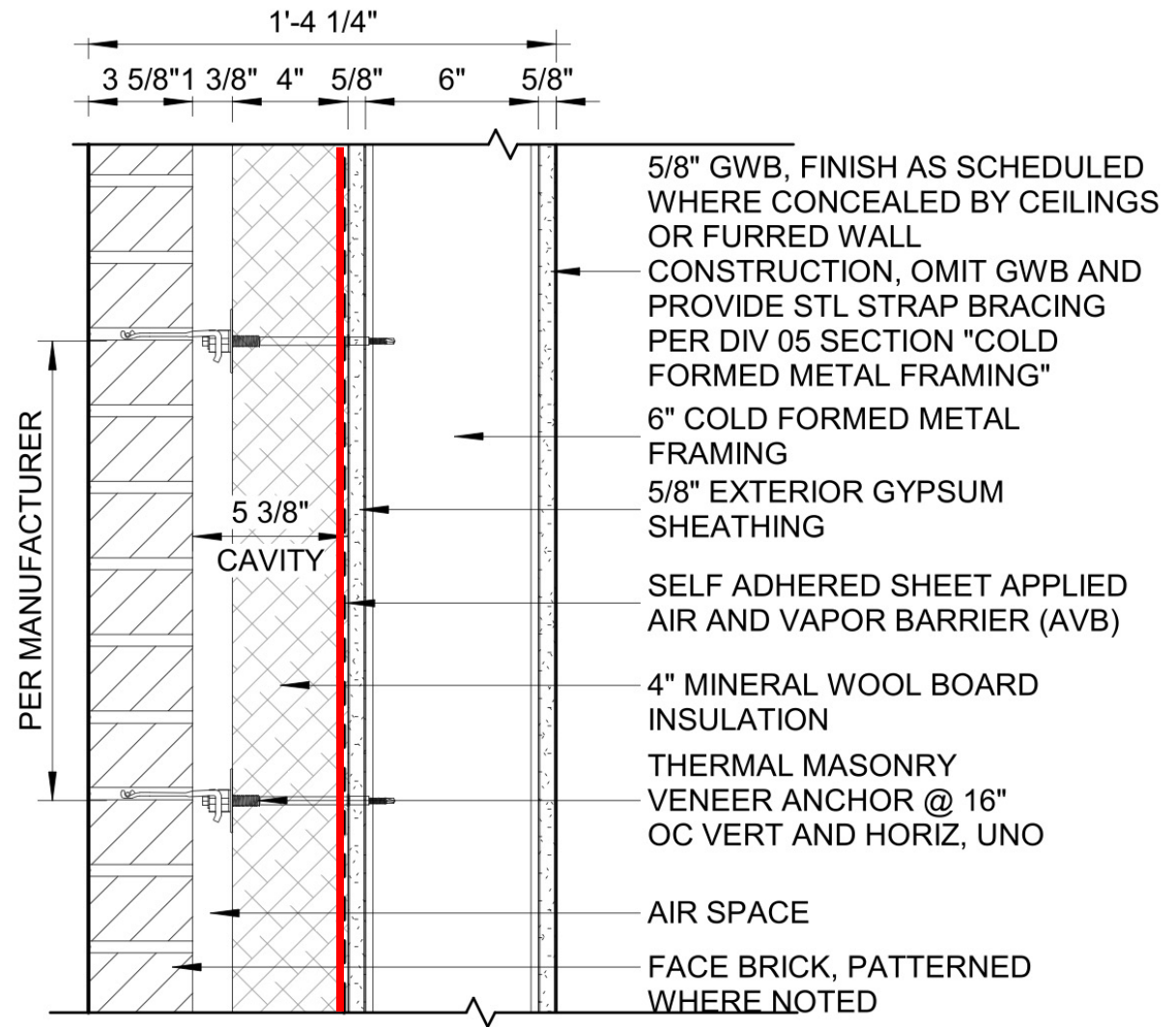
Or any combination thereof.

Code does not provide guidance as to where within the envelope the air barrier is to occur.

An aerial photograph of a large-scale construction project, possibly a highway interchange or a major infrastructure development. The image is heavily overlaid with a semi-transparent yellow color. In the center, the text "Commercial Construction" is written in a bold, white, sans-serif font. The background shows various construction elements like concrete structures, steel beams, and what appears to be a worker in the distance on the left side.

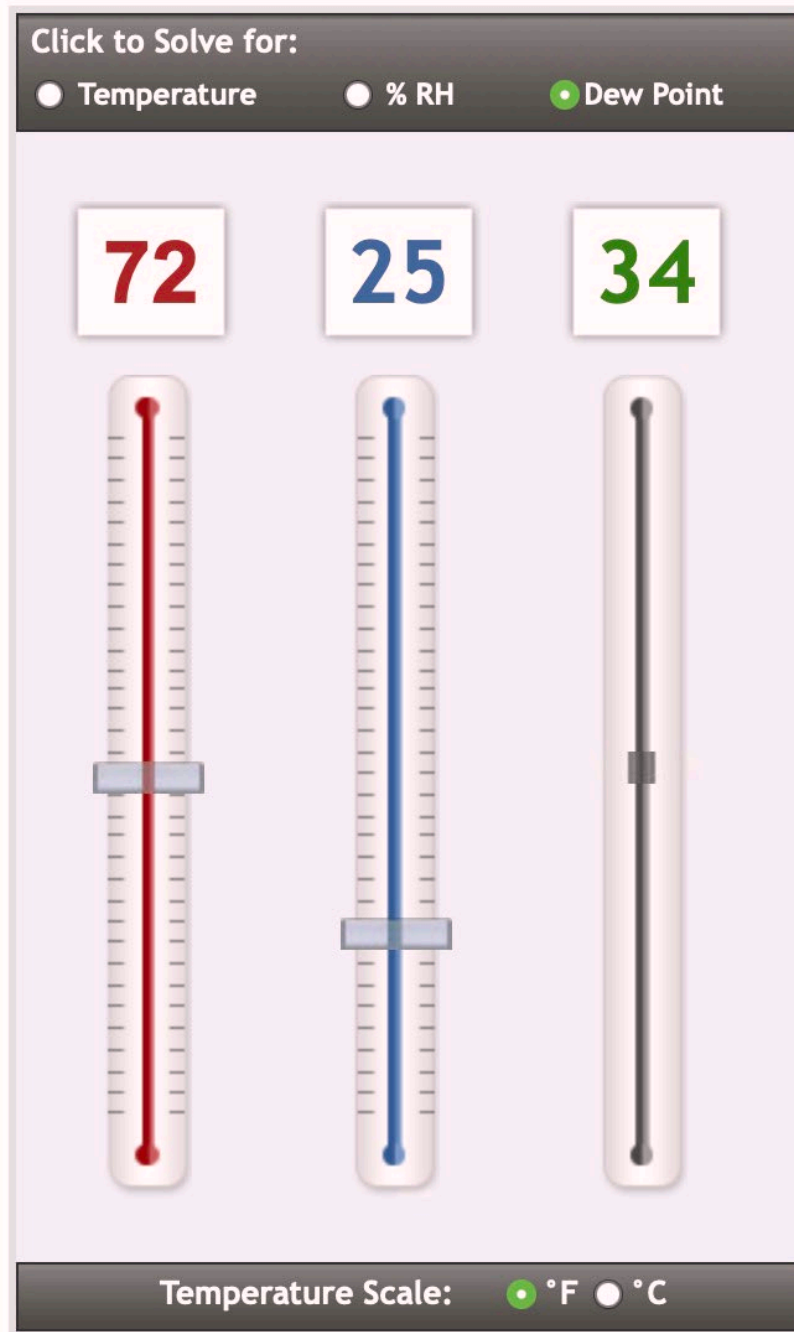
Commercial Construction

Typical Commercial Wall Assembly



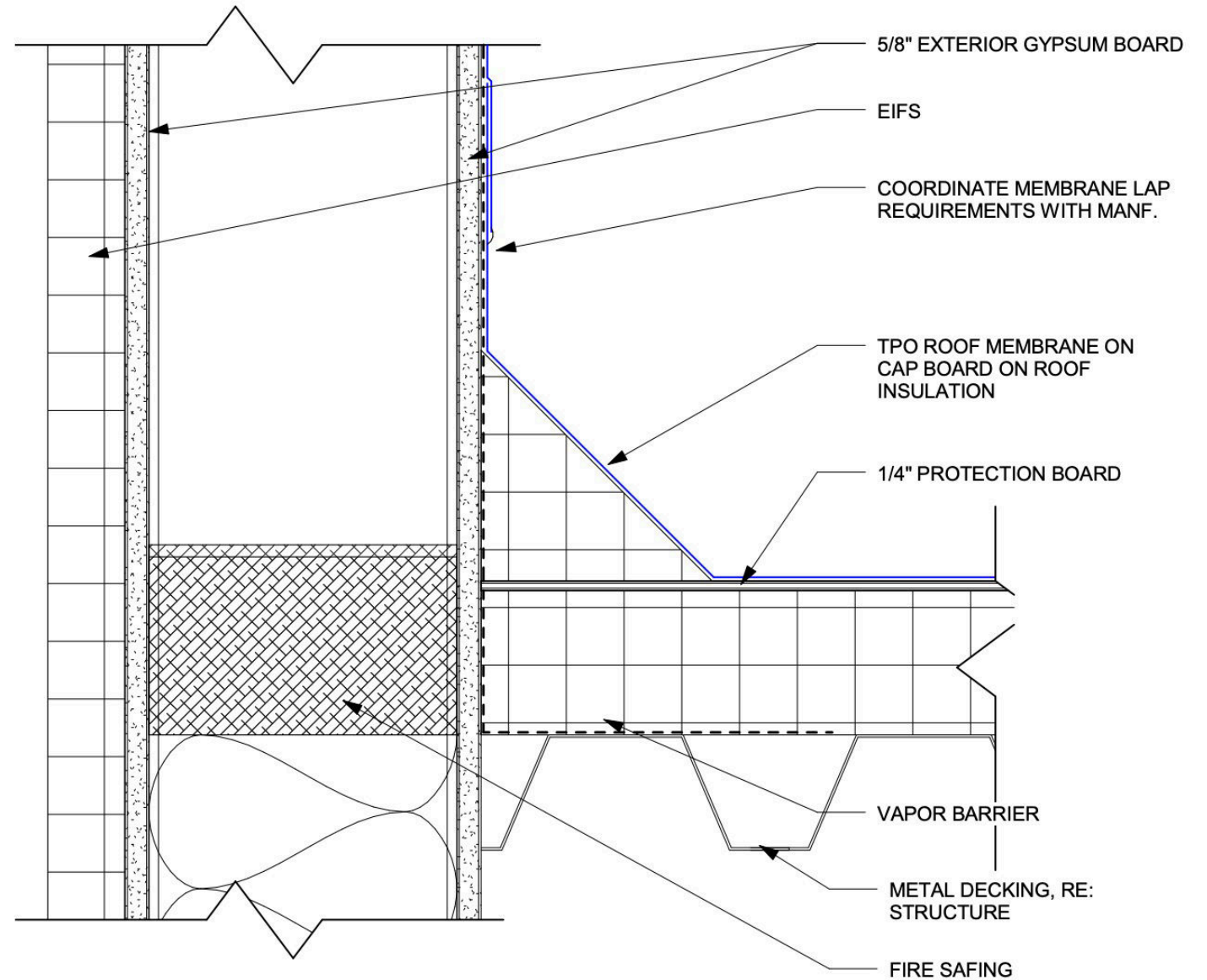
1 MV-1 - MASONRY VENEER ASSEMBLY - FACE BRICK
 SCALE: 1 1/2" = 1'-0"

Standard Interior Conditions



Parapets

Parapet Condition



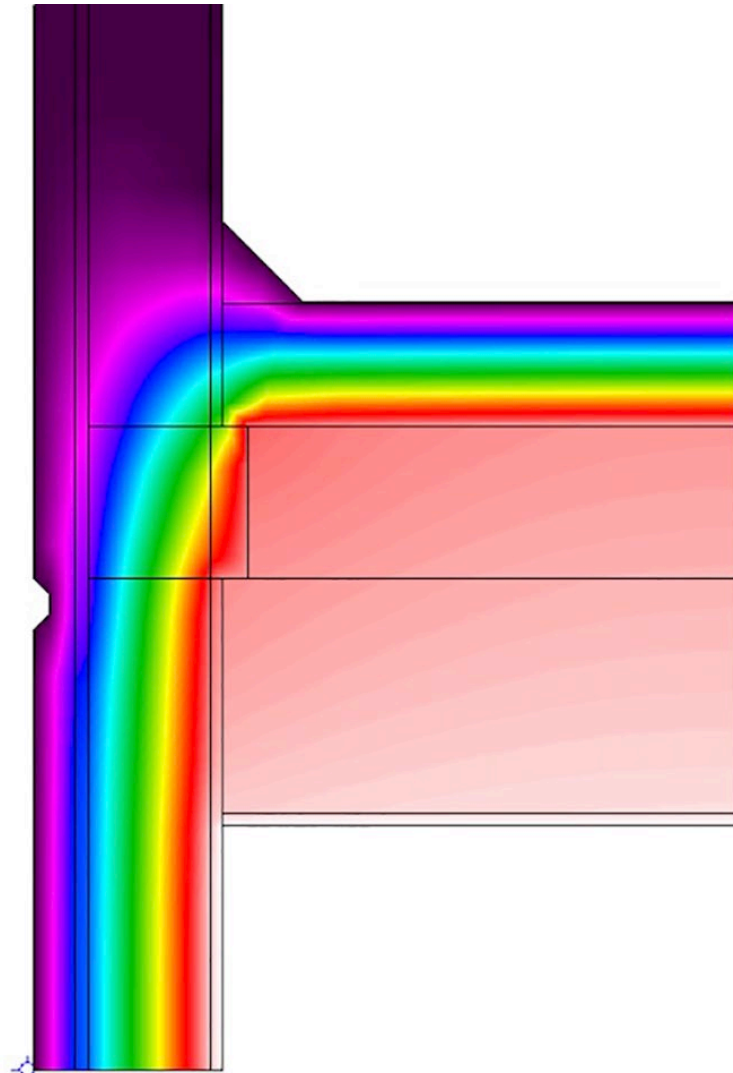
11

TYPICAL ROOF DETAIL

A521 | A821

SCALE: 3" = 1'-0"

Thermal Model of Parapet to Roof



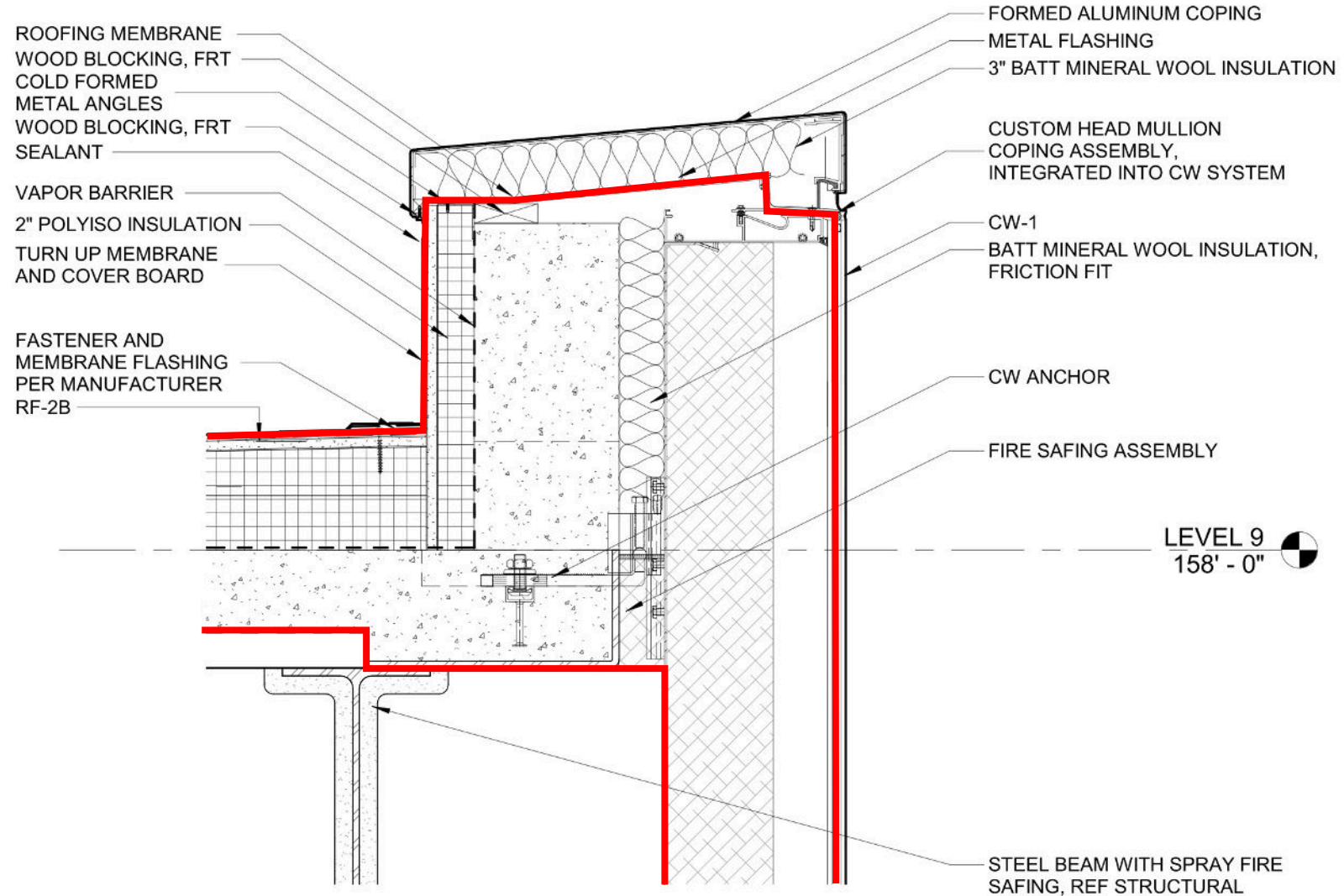
Color Legend

-0.3° 8.5° 17.2° 26.0° 34.8° 43.5° 52.3° 61.0° 69.8° F



Close

Condensation & Frost in Parapet Cavity



11 SECTION DETAIL @ CW-1 AND RF-2B PARAPET
SCALE: 1 1/2" = 1'-0"

Condensation & Frost in Parapet Cavity



Location of an Air Leak in Interior Air Barrier



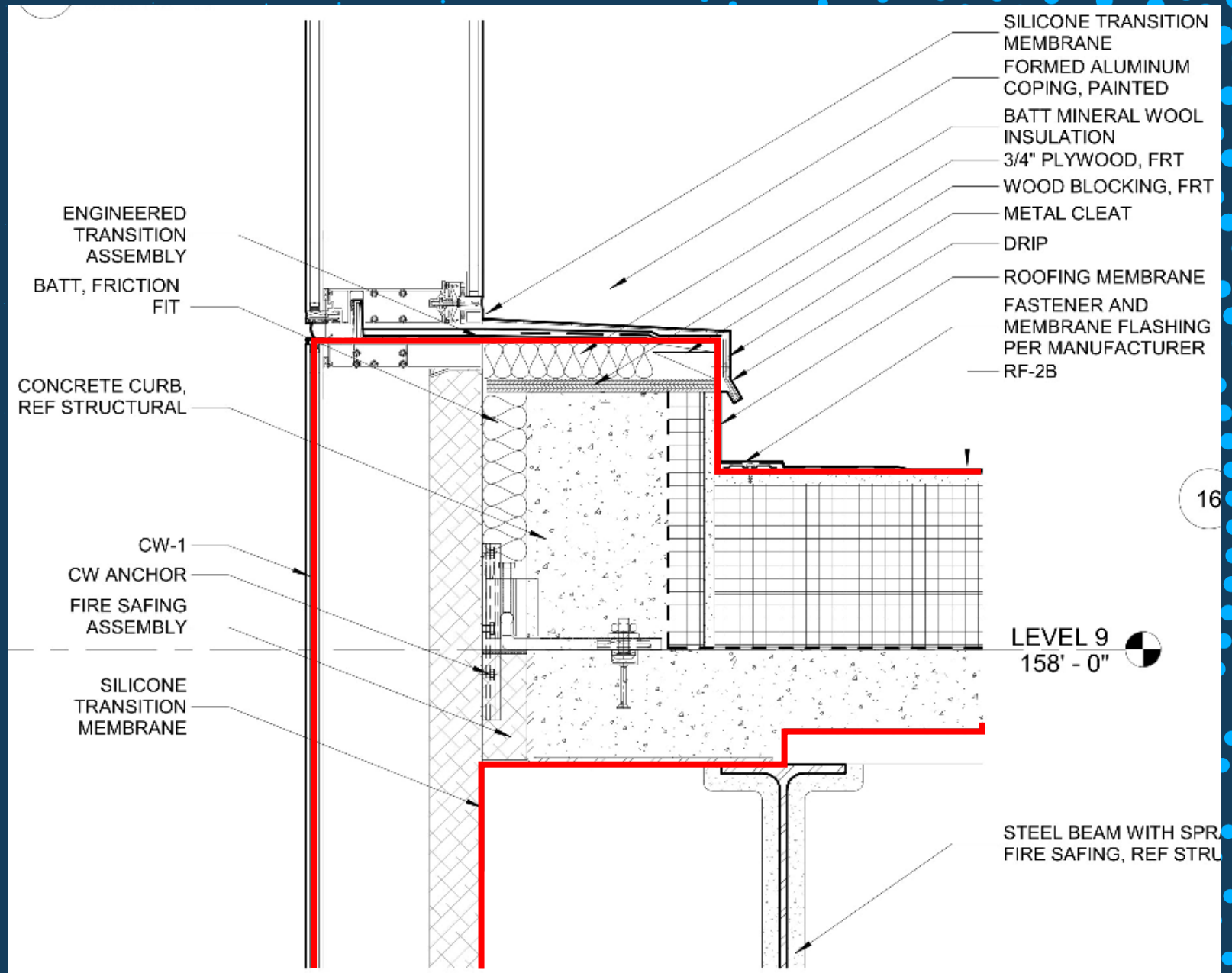
Parapet Damage of Similar Condition



Air Barrier Installation at Parapet



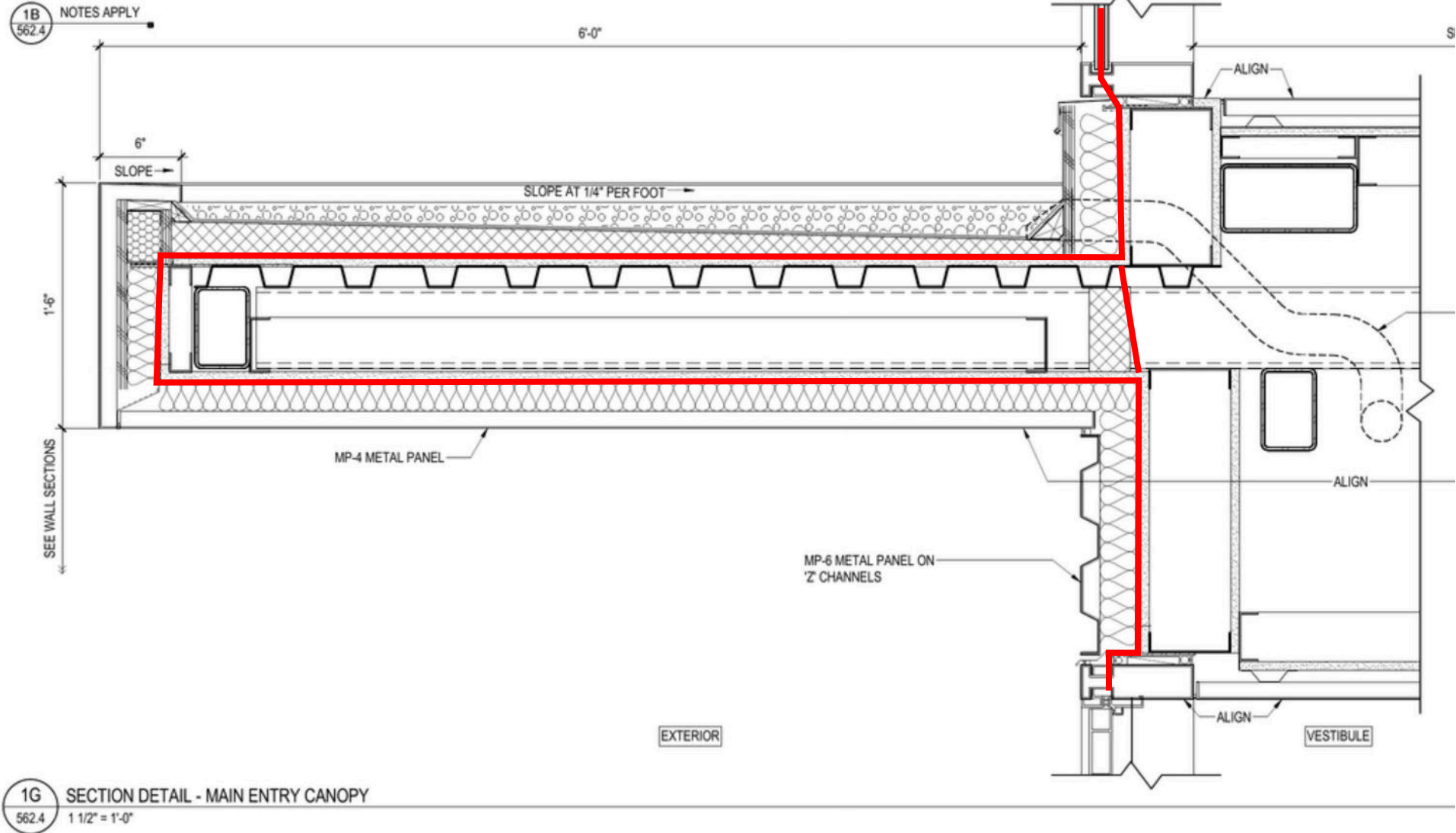
Parapet Condition



14 SECTION DETAIL @ BASE OF INPATIENT WINGWALL
SCALE: 1 1/2" = 1'-0"

Canopies

Canopy Condition

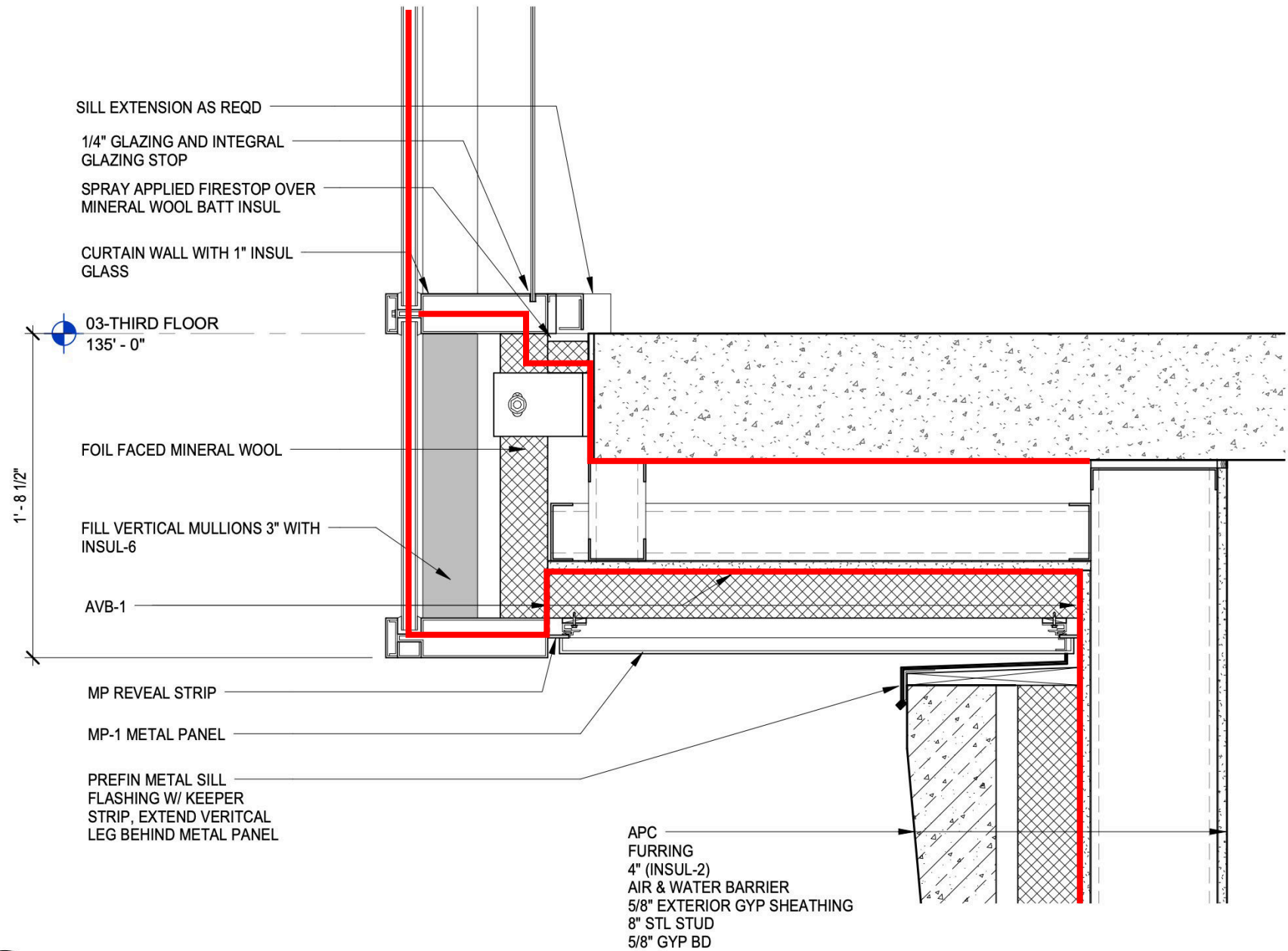


Canopy Condition



Soffits

Soffit Condition

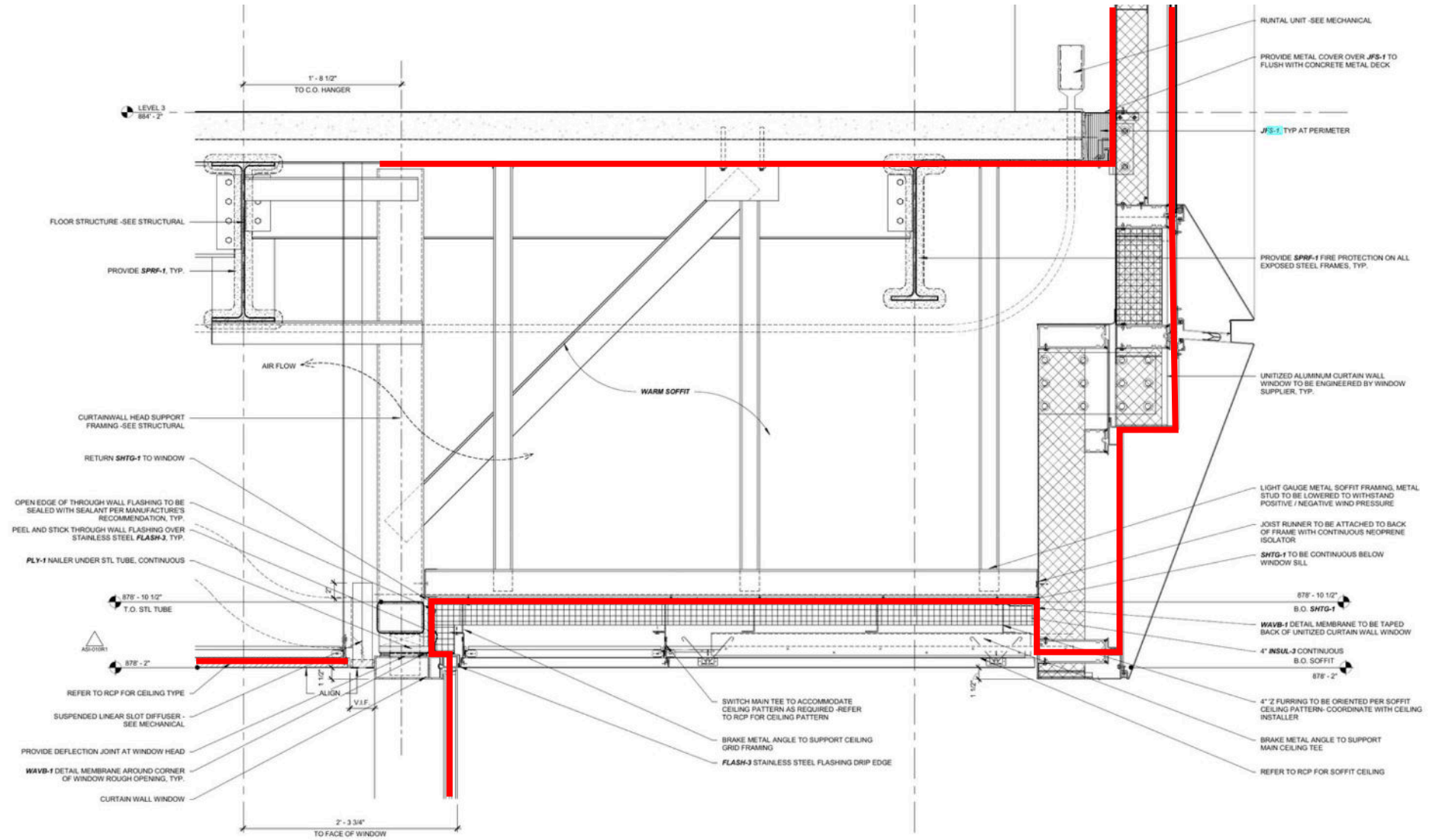


6 SECTION DETAIL - SOFFIT
 1 1/2" = 1'-0"

Soffit Condition



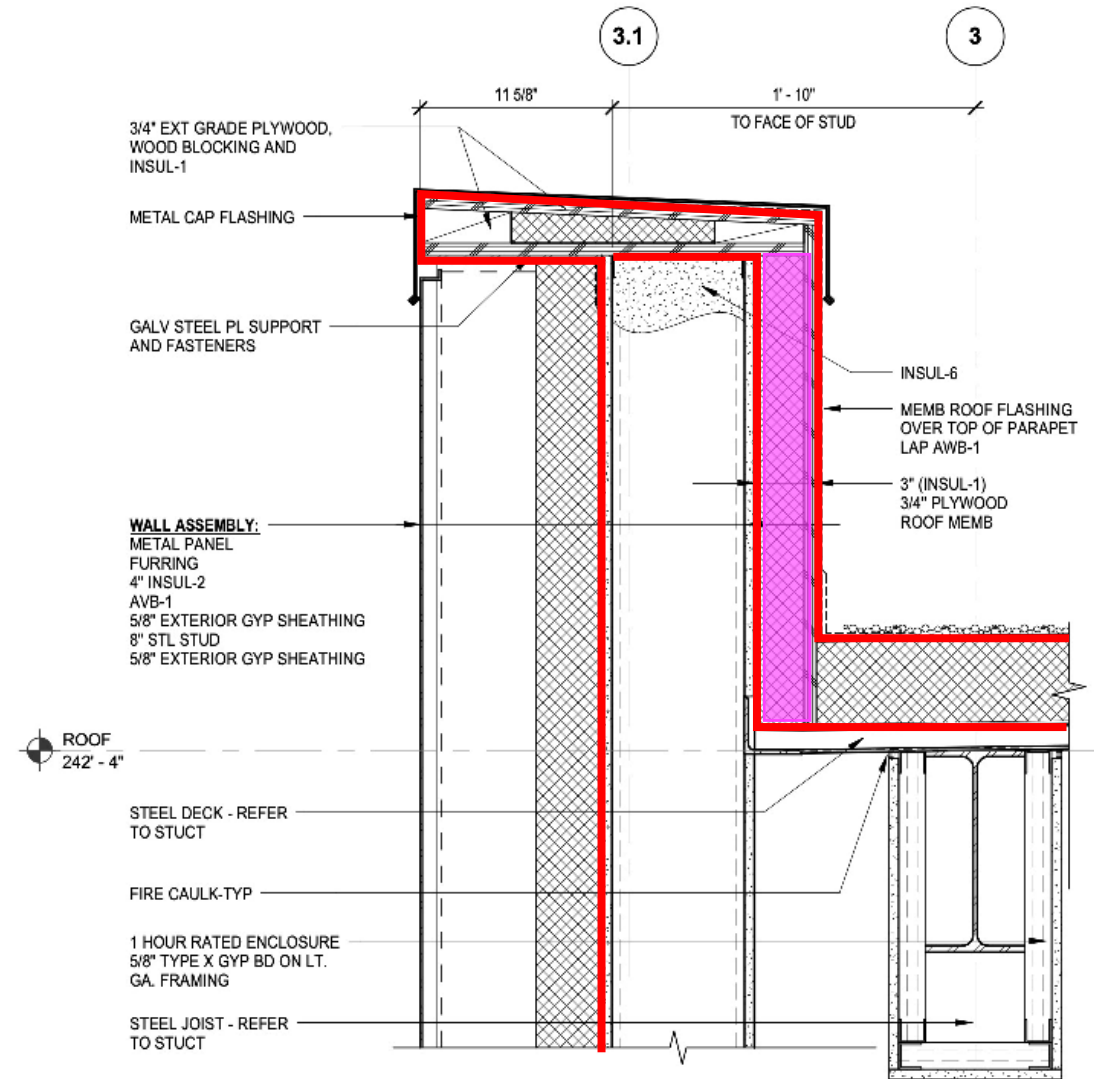
Soffit Condition



2 EXT WALL SECTION - TYPICAL SOFFIT AT LEVEL 3
A356 1 1/2" = 1'-0"

Roofs

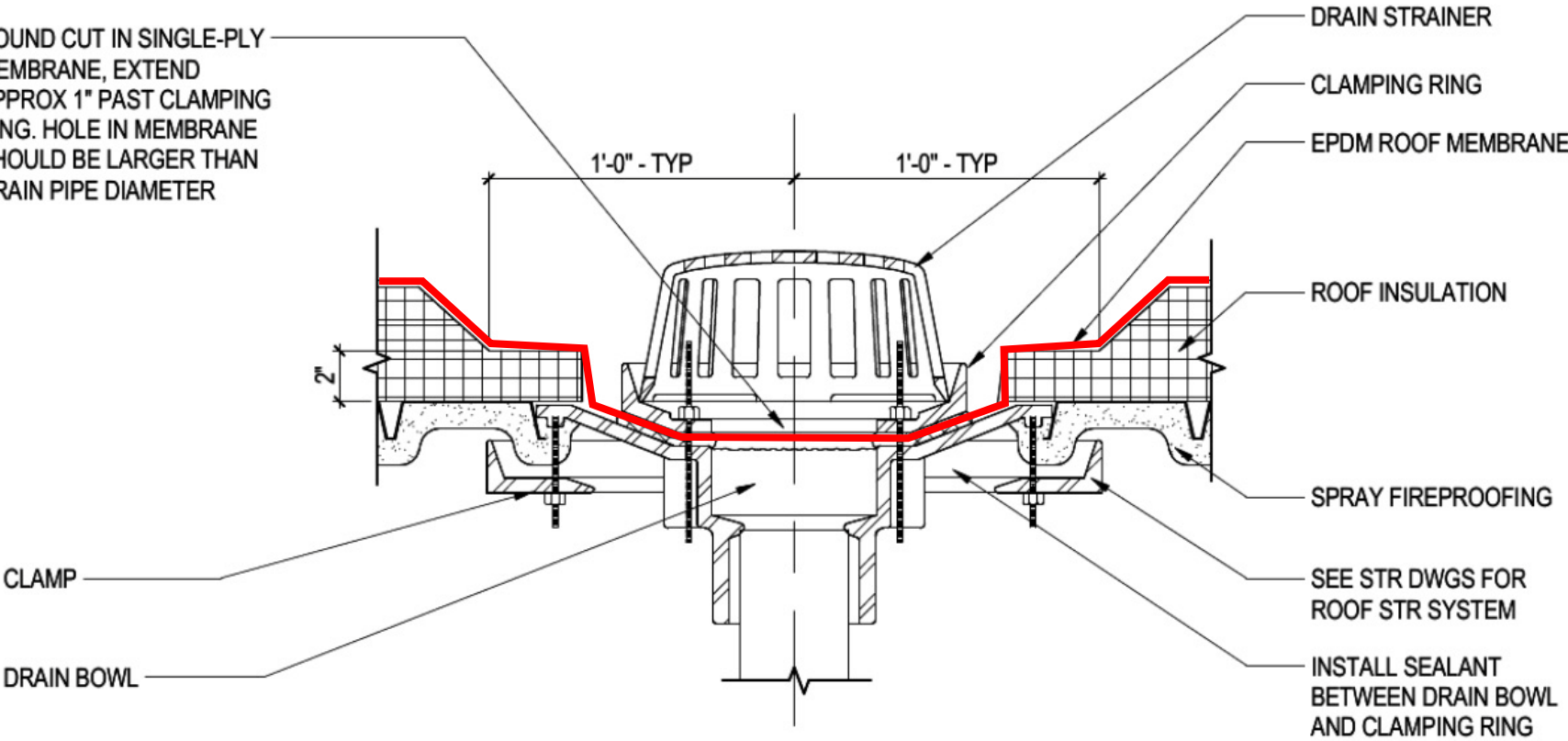
Parapet Condition



7 SECTION DETAIL - PARAPET @ METAL PANEL
 1 1/2" = 1'-0"

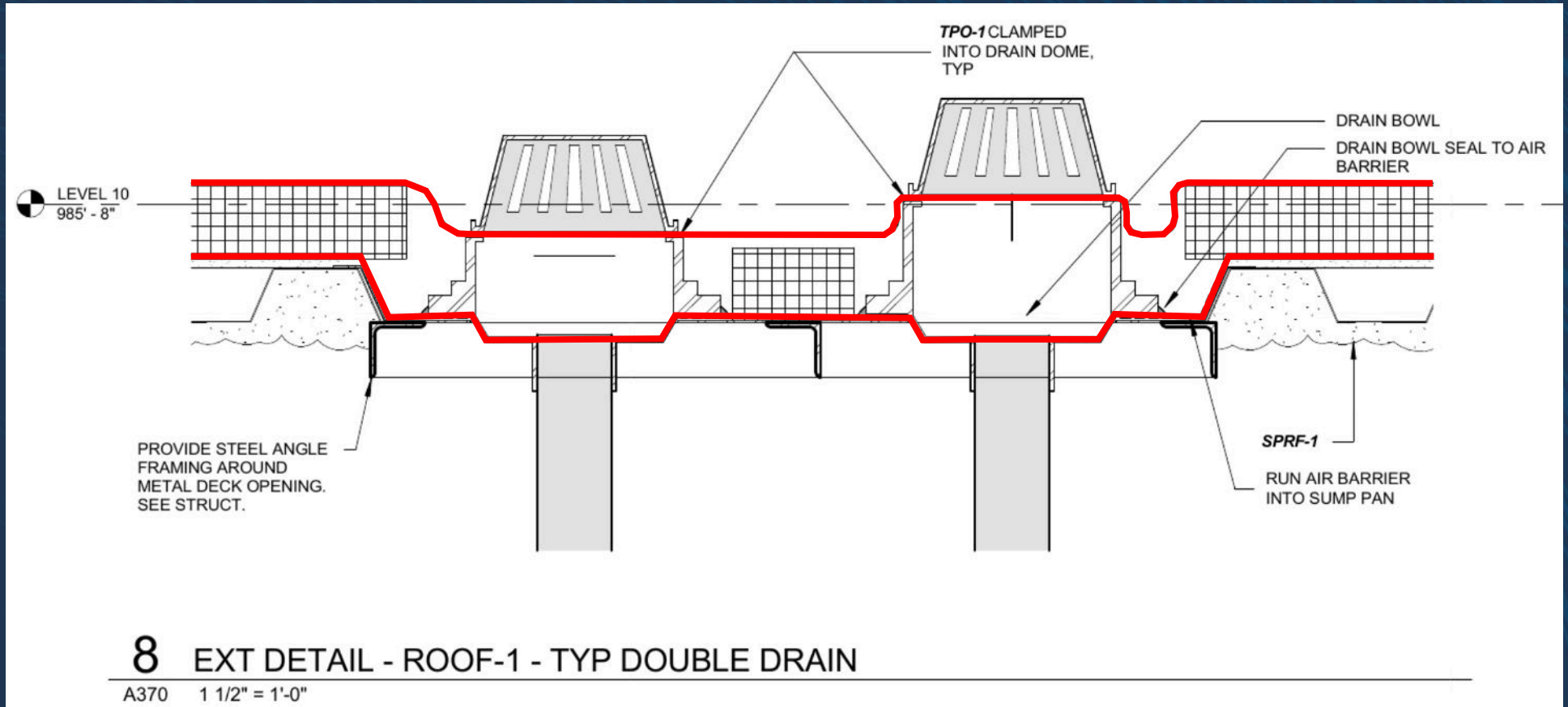
Drain Bowl Location

ROUND CUT IN SINGLE-PLY MEMBRANE, EXTEND APPROX 1" PAST CLAMPING RING. HOLE IN MEMBRANE SHOULD BE LARGER THAN DRAIN PIPE DIAMETER

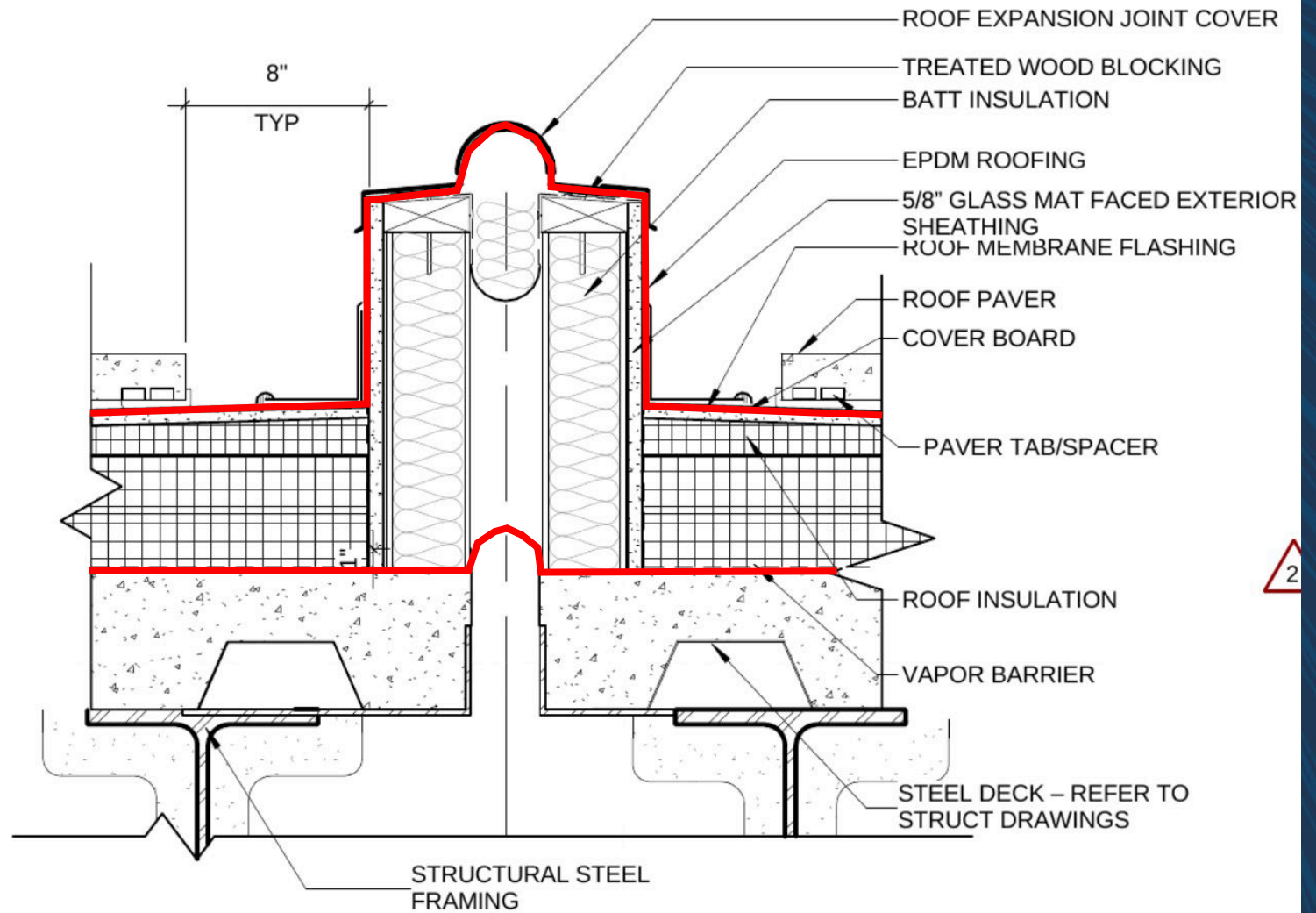


② TYPICAL ROOF DRAIN DETAIL AT METAL ROOF DECK
1 1/2" = 1'-0"

Drain Bowl Location



Expansion Joint



10 SECTION DETAIL

A-581

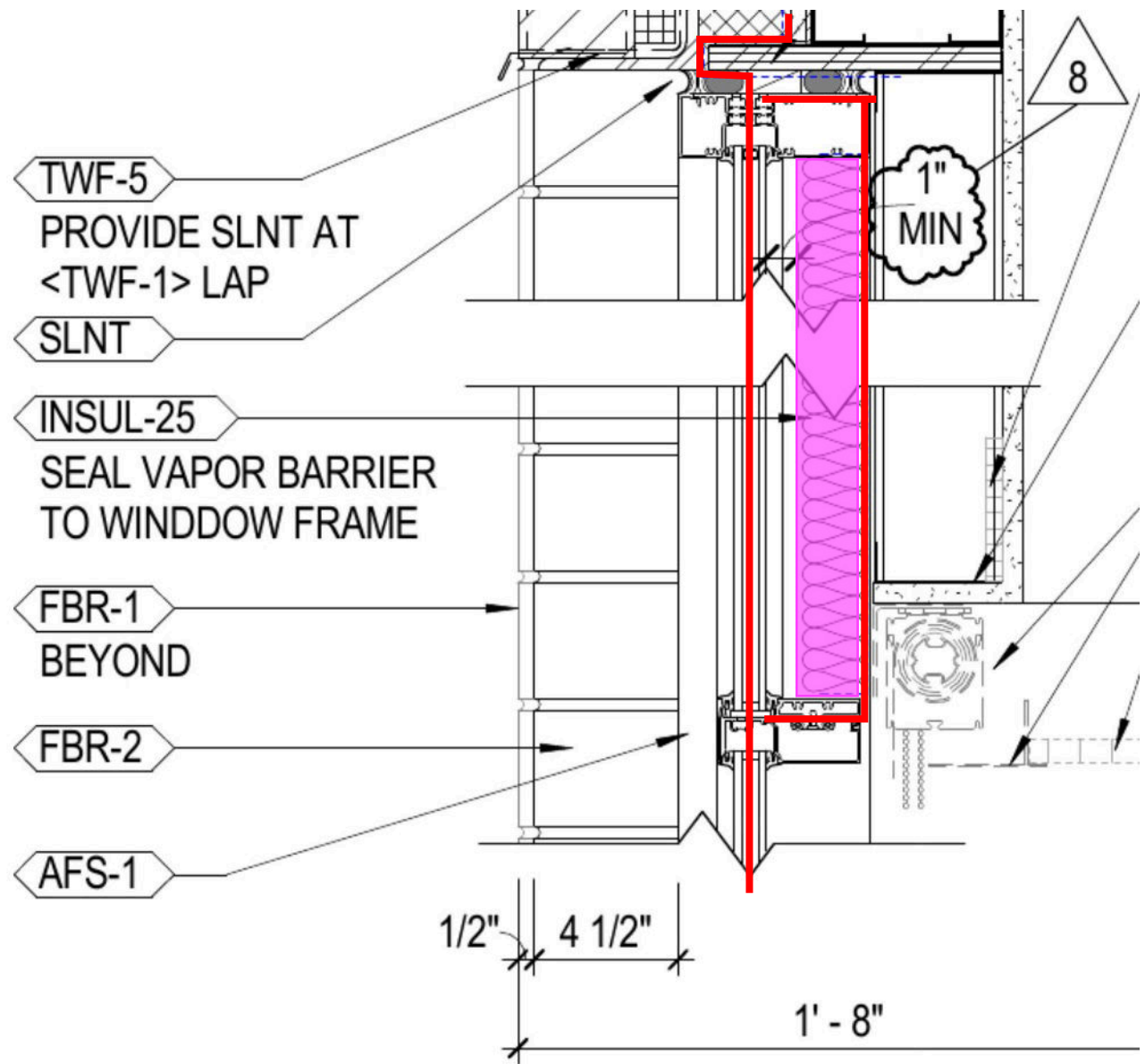
SCALE: 1 1/2" = 1'-0"

REF: A-103-Ax

Glazing Assemblies

Spandrel Insulation

U BIM
PORT
FOR



5

TYPICAL WINDOW HEAD/SLAB EDGE AT FBR

1 1/2" = 1'-0"

Spandrel Insulation



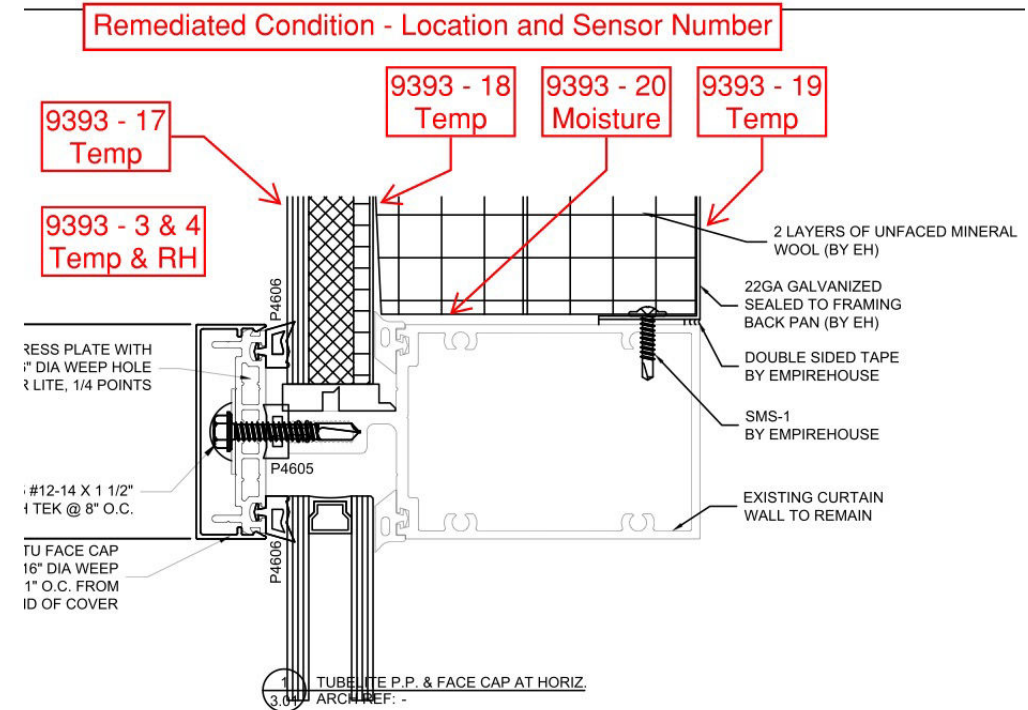
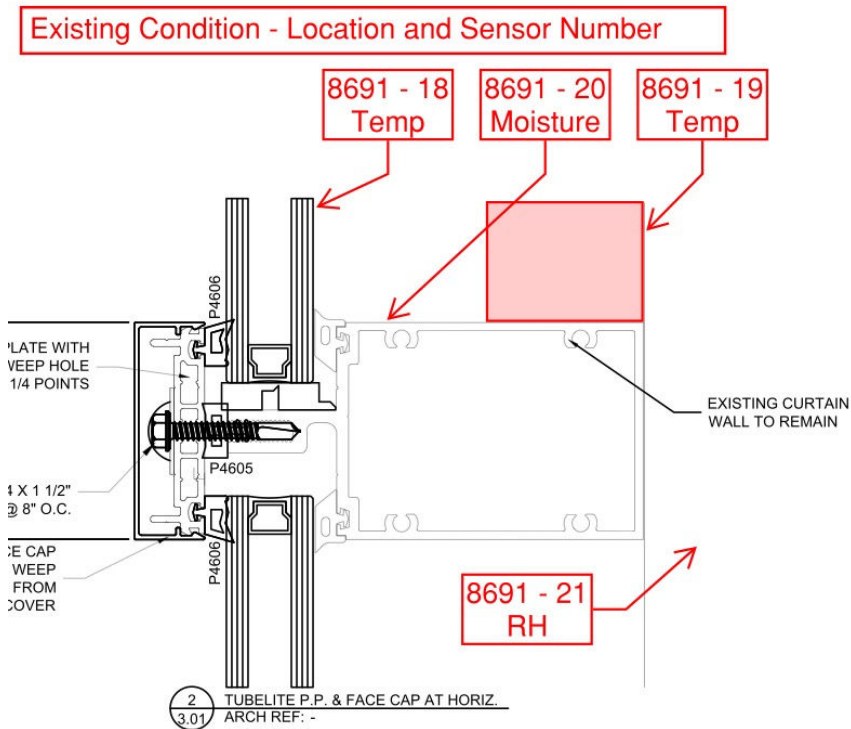
Spandrel Insulation



Spandrel Insulation



Spandrel Insulation



Spandrel Insulation

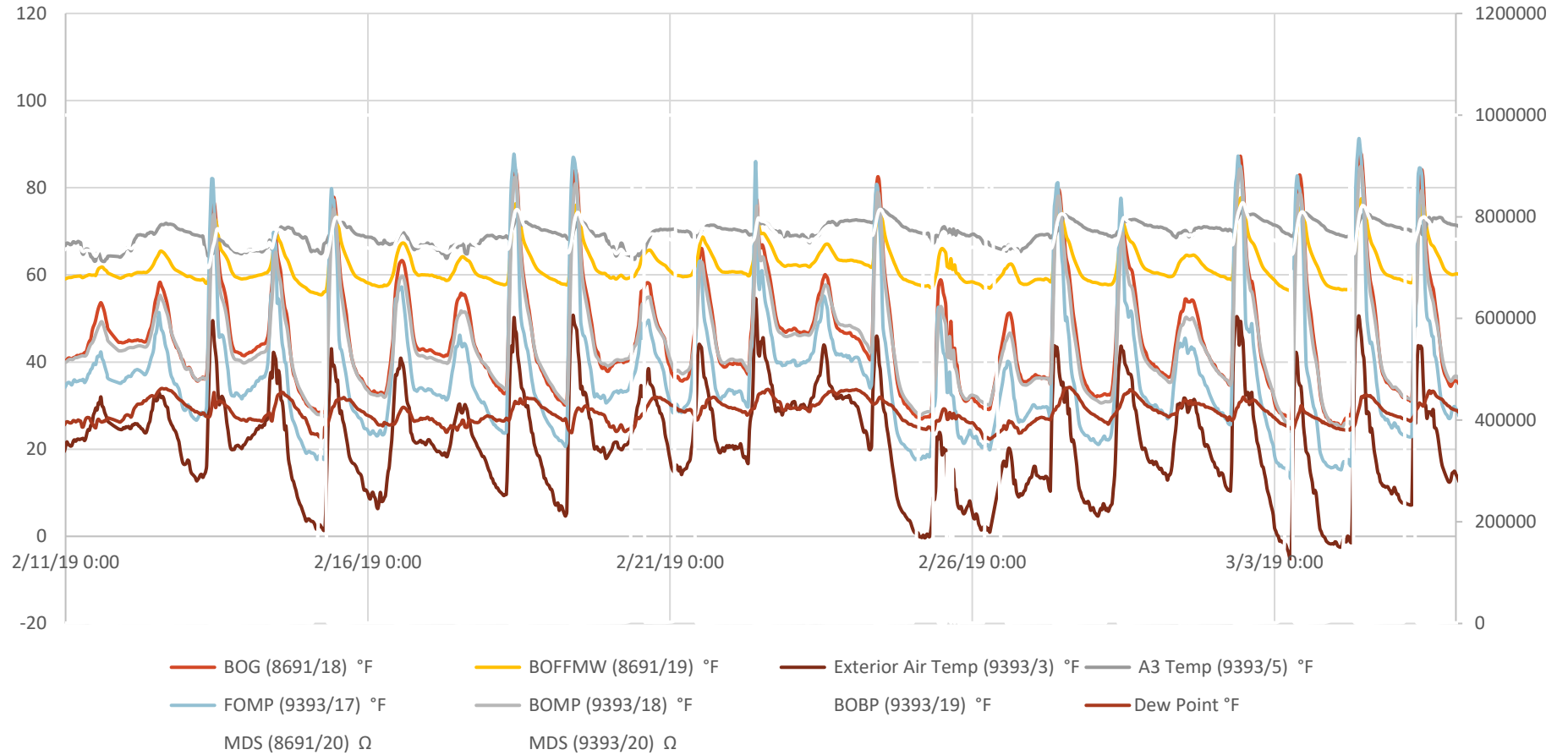


Spandrel Insulation

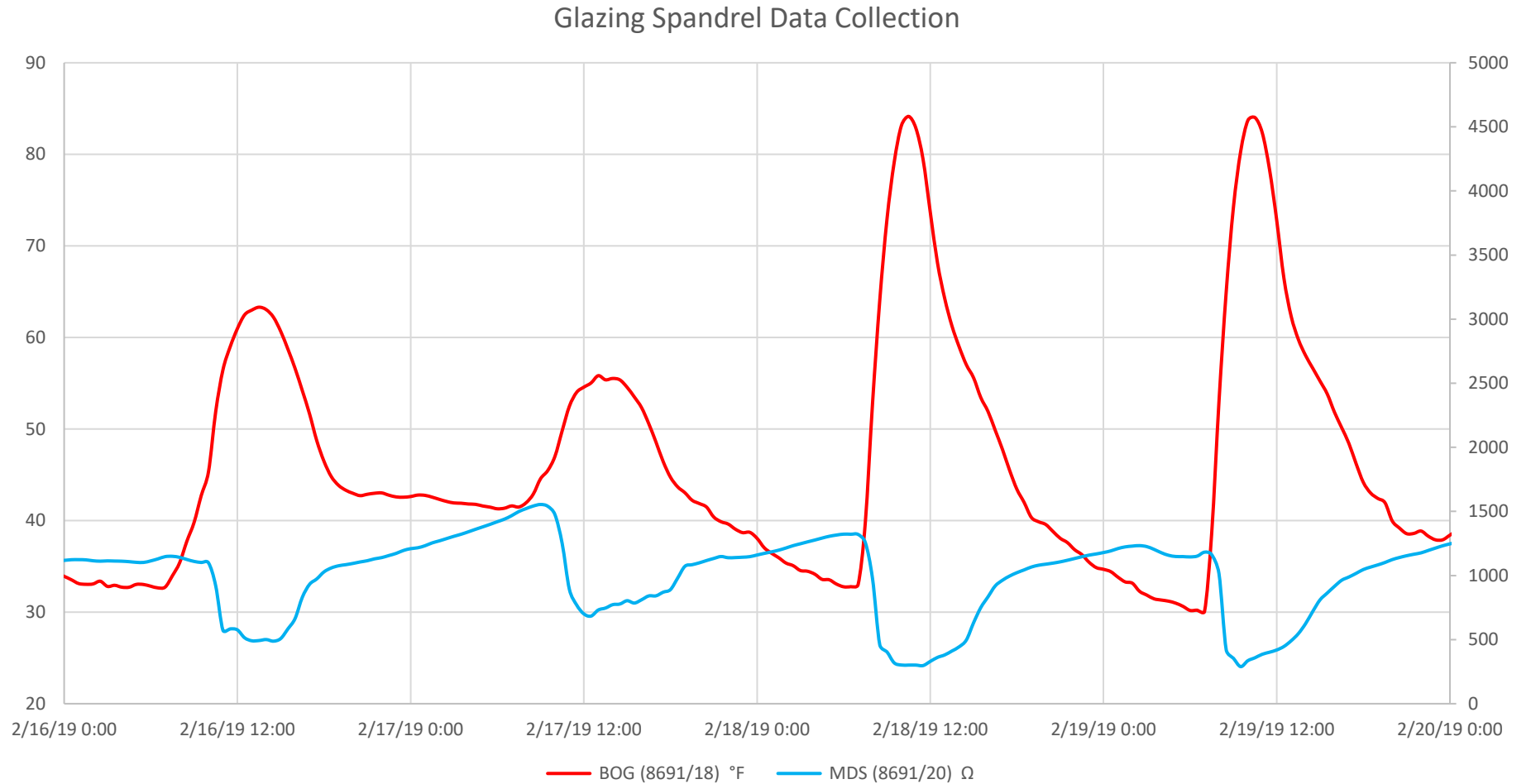


Spandrel Insulation

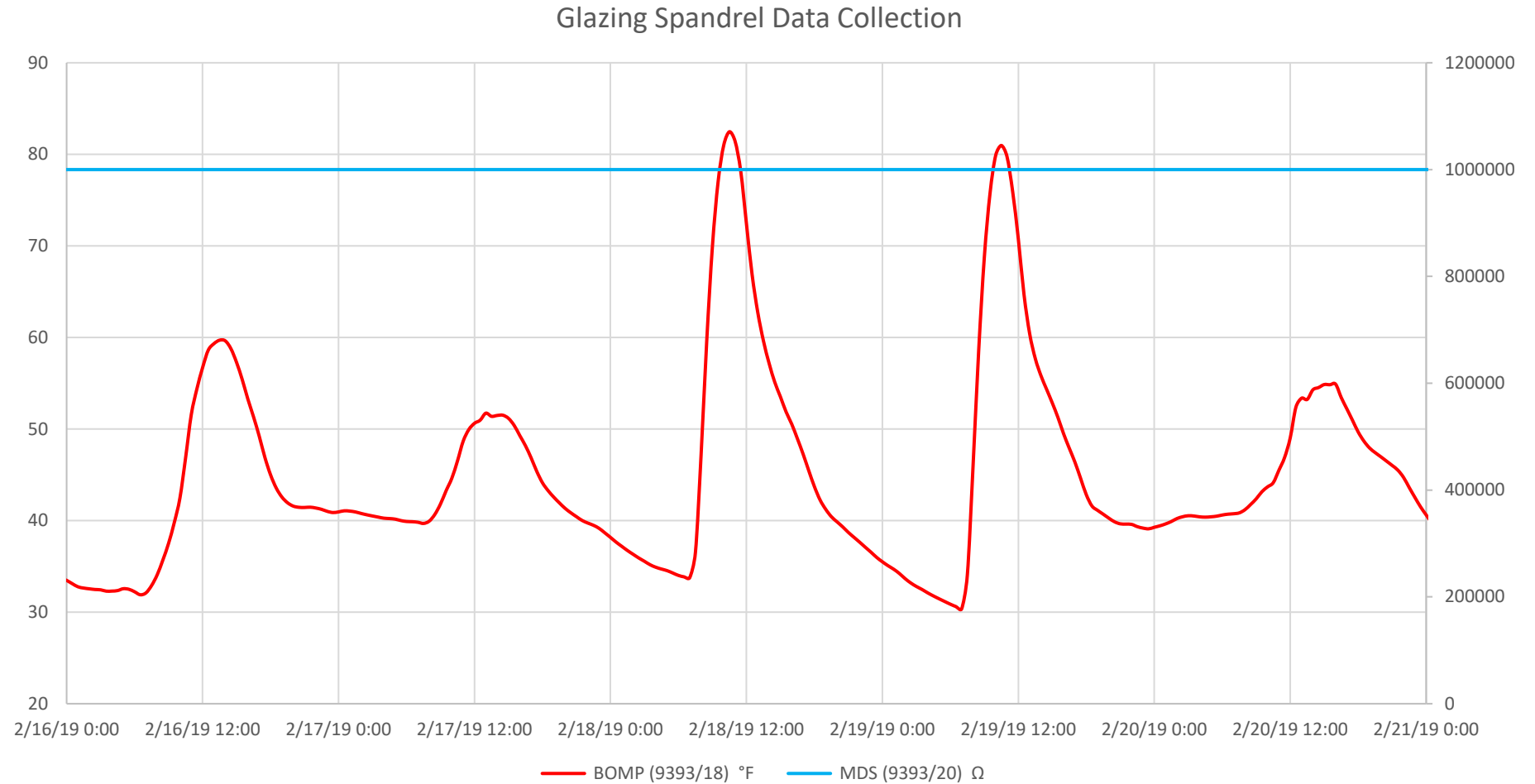
Glazing Spandrel Data Collection



Data at Existing Condition



Data at Remediated Condition

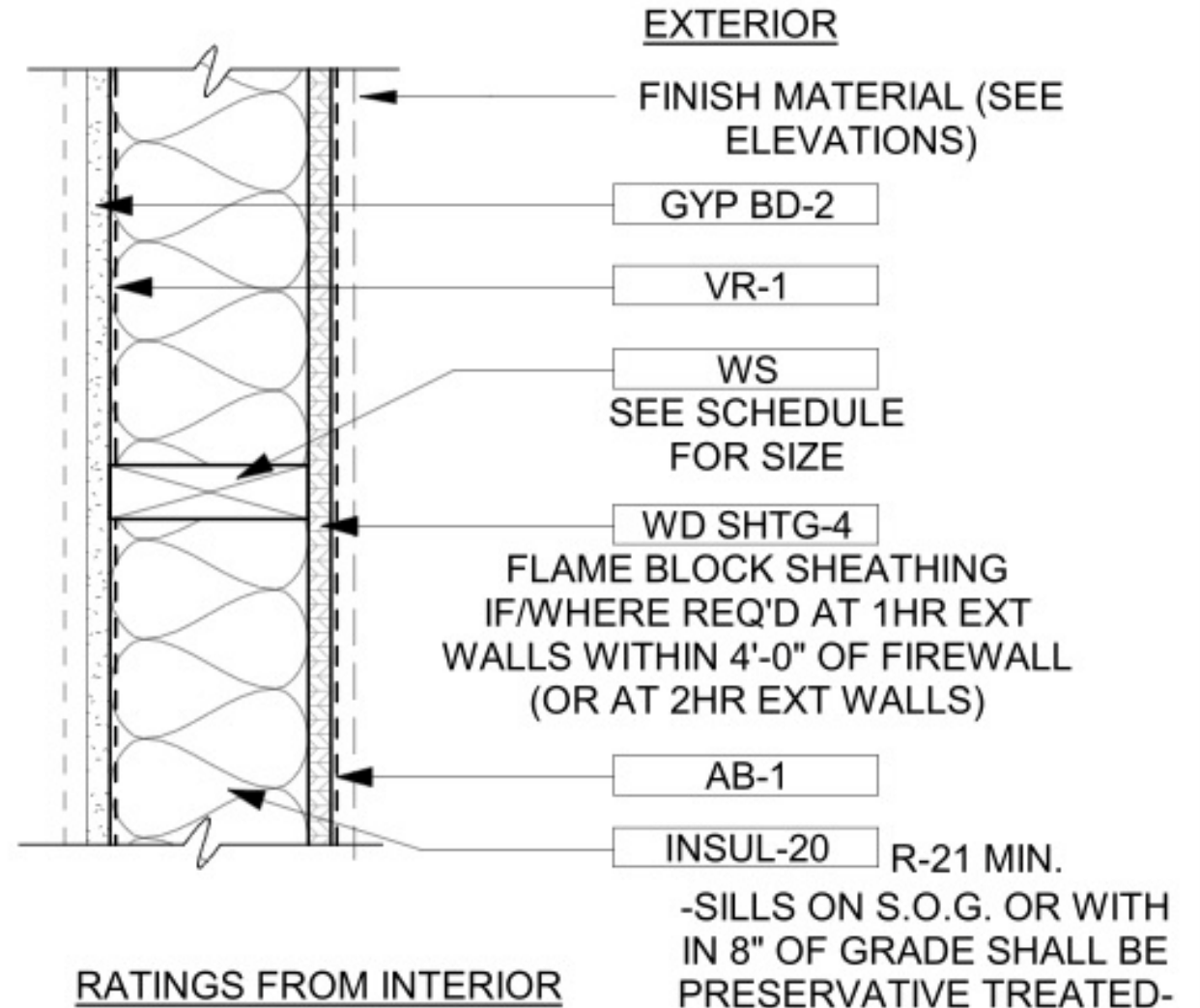


Wood Framed Construction

Typical Wood Framed Wall Assembly



WOOD STUD

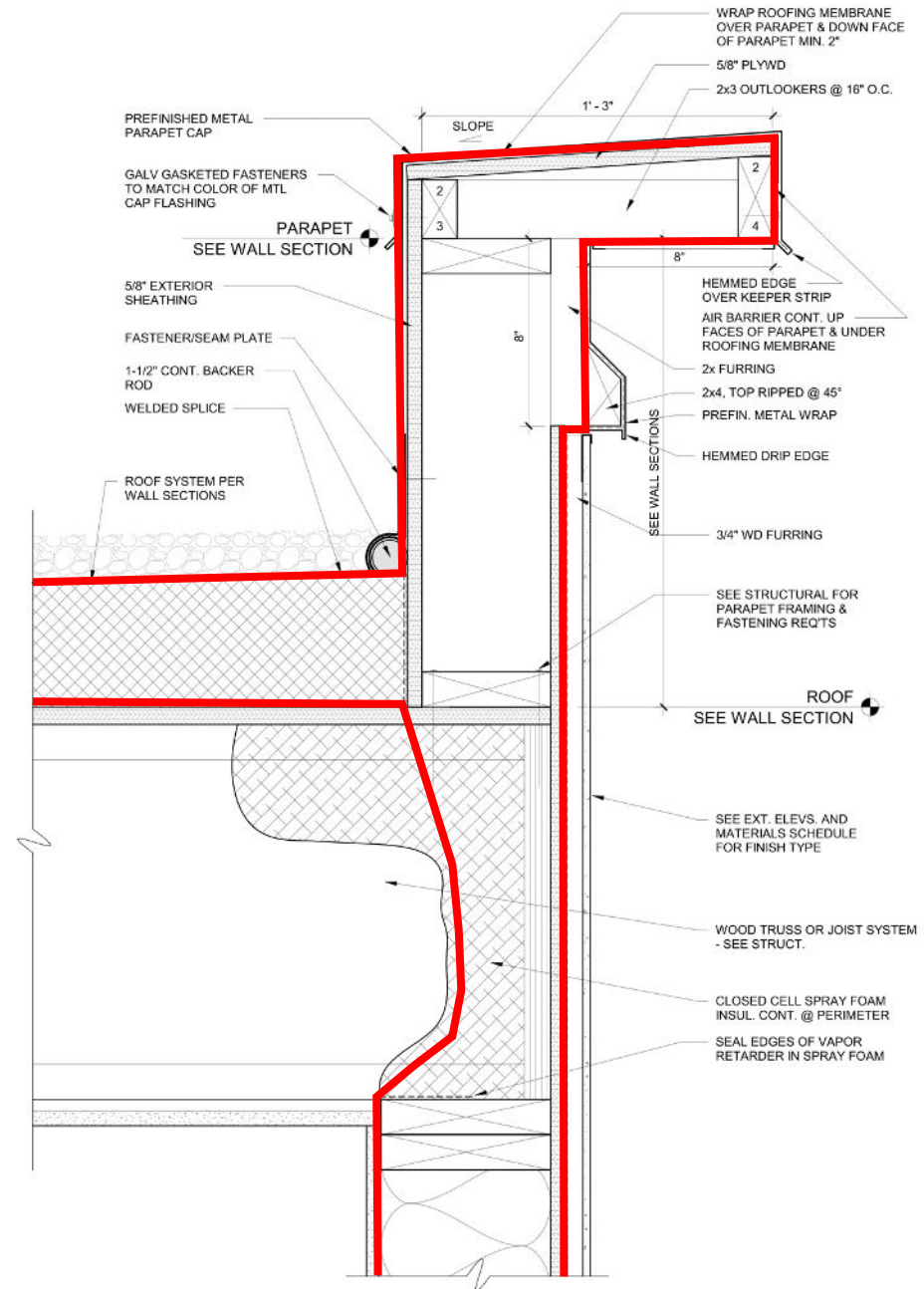


Parapets

Parapet Condition

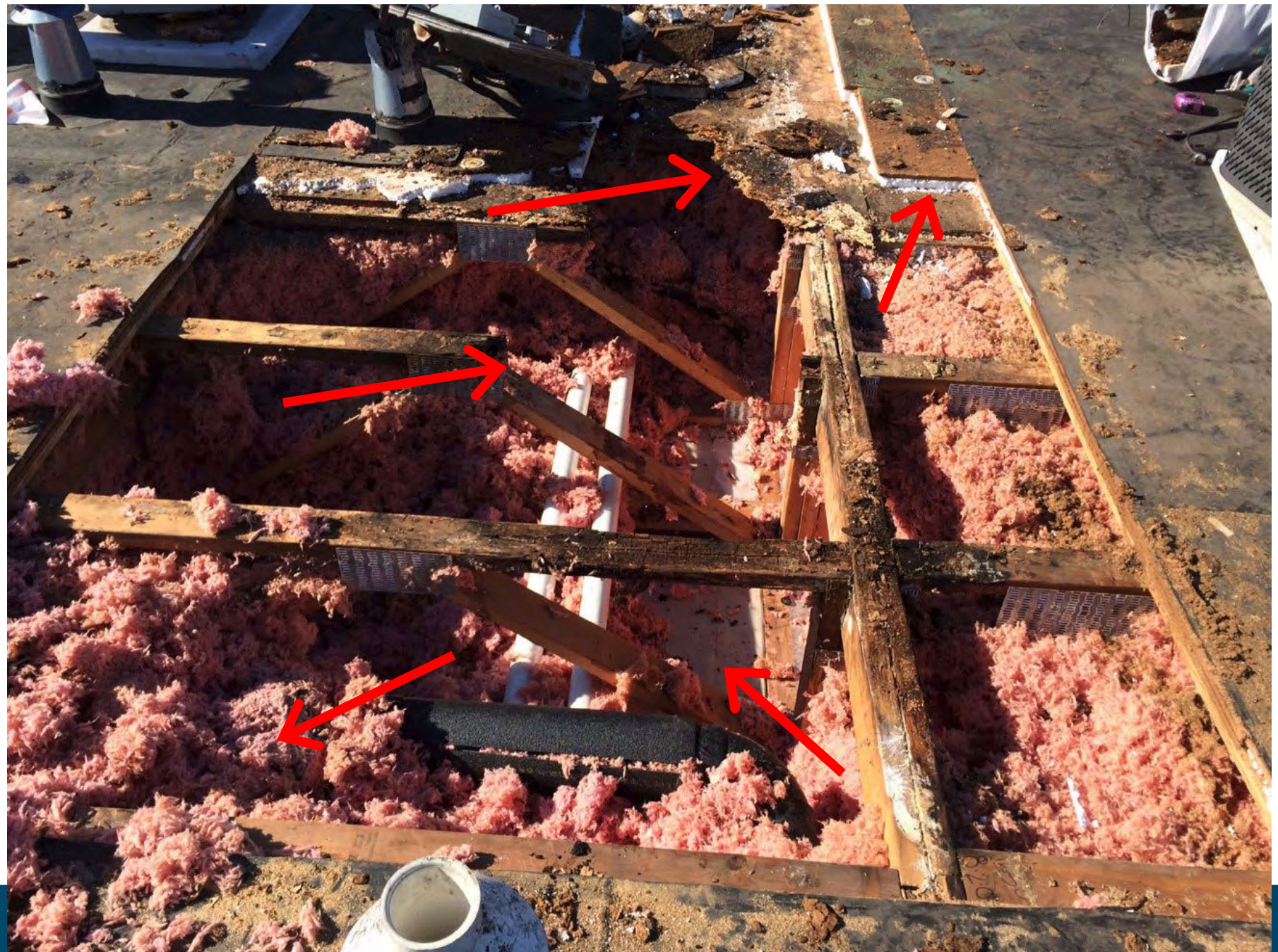


Parapet Condition

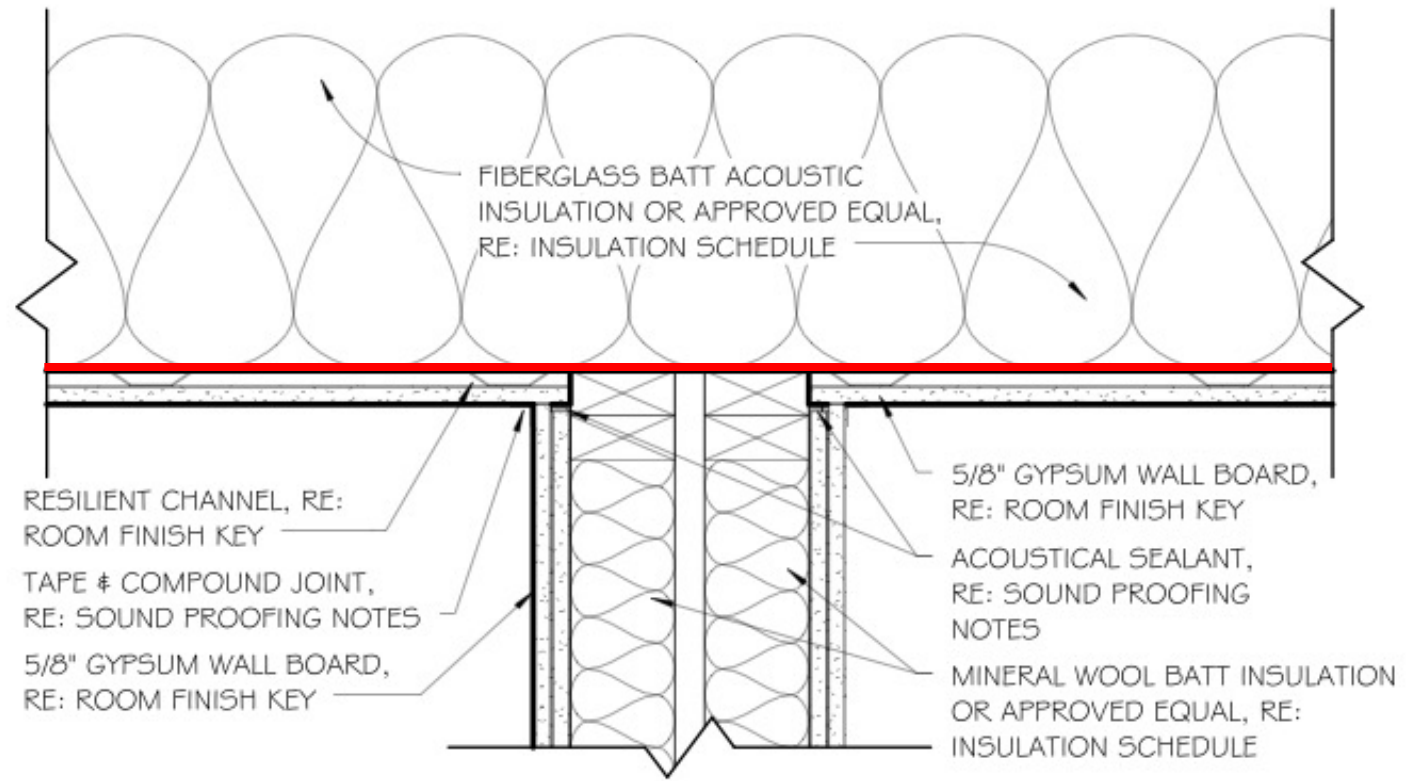


Roofs

Roof Assemblies



Roof Assemblies



6 Sound Proof Separation Wall @ Ceiling
A7.1 1 1/2" = 1'-0"

Summary

Summary

Air barriers are required except for Climate Zone 2B.

Building Code does not identify where in the assembly the air barrier is to be installed.

The distance of assembly components from the heat source impacts the surface temperatures of assembly components and must be considered in design.

Interior air barriers should be utilized in cold climates in most instances to minimize the potential for condensation in assemblies.

Code Changes

Code Changes

Air leakage rates must be tighter for colder climates.

Distance from interior conditioned space space considerations

Thermal breaks must be installed at penetrations of the envelope when temperatures below the dew point are expected (varies based on occupancy usage).

Questions?





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