

**BUILDING** 20  
**ENCLOSURE** 23  
CONFERENCE

# Challenges and Solutions for Projecting Facade Elements

Elizabeth Cassin

**WJE** Wiss, Janney, Elstner Associates, Inc.

Steve Black

Power Construction





**Elizabeth Cassin**

Principal and Midwest  
Region Director  
WJE



**Steve Black**

Quality Support  
Manager  
Power Construction

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## Media Partners



# Learning Objectives

*At the end of this course, participants will be able to:*

1. Identify projecting elements that have increased risk for condensation
2. Understand how air leakage, thermal bridging, and thermal shorting at projecting elements creates risk for condensation
3. Understand that there are two different general concepts for detailing projecting elements
4. Identify various ways to minimize risk for condensation in projecting elements

# Outline

1. Legacy Concerns and Background
2. Parapets
3. Wing Walls
4. Overhangs

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# Legacy Concerns





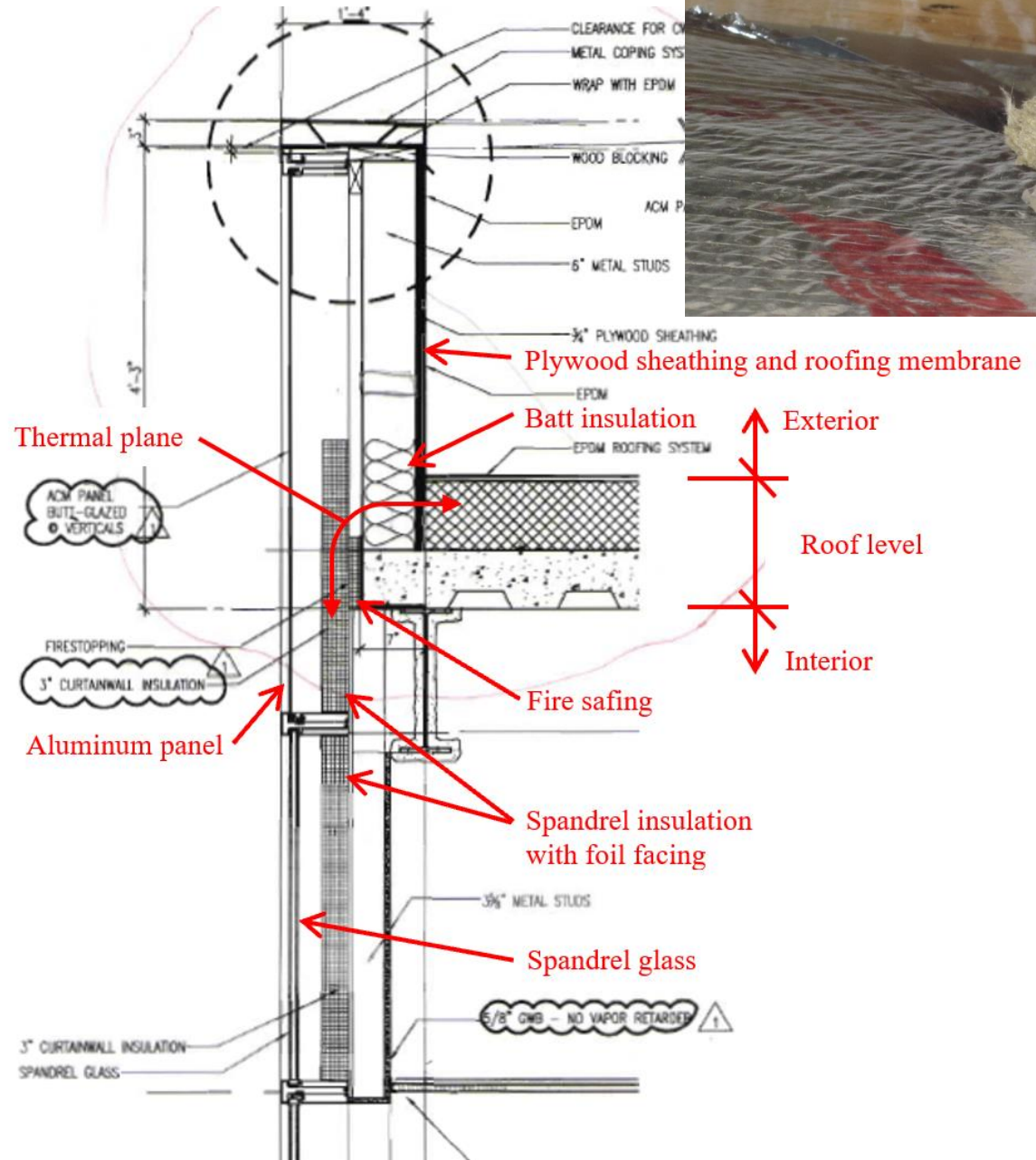
# Legacy Concerns



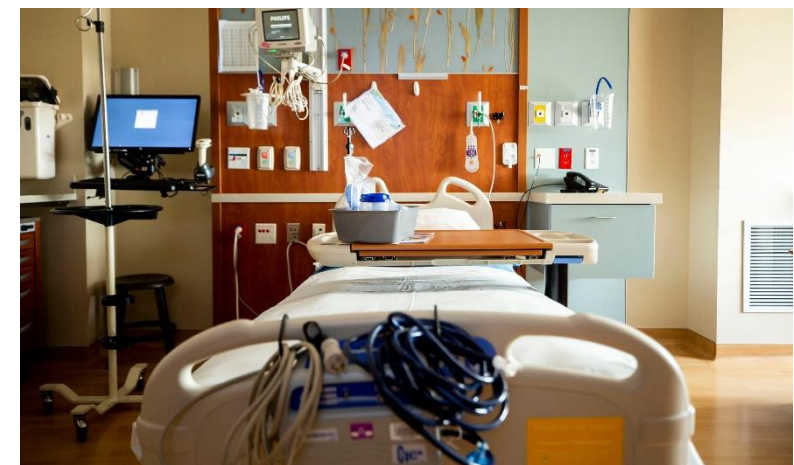
# Legacy Concerns



# Legacy Concerns



# Risk Tolerance

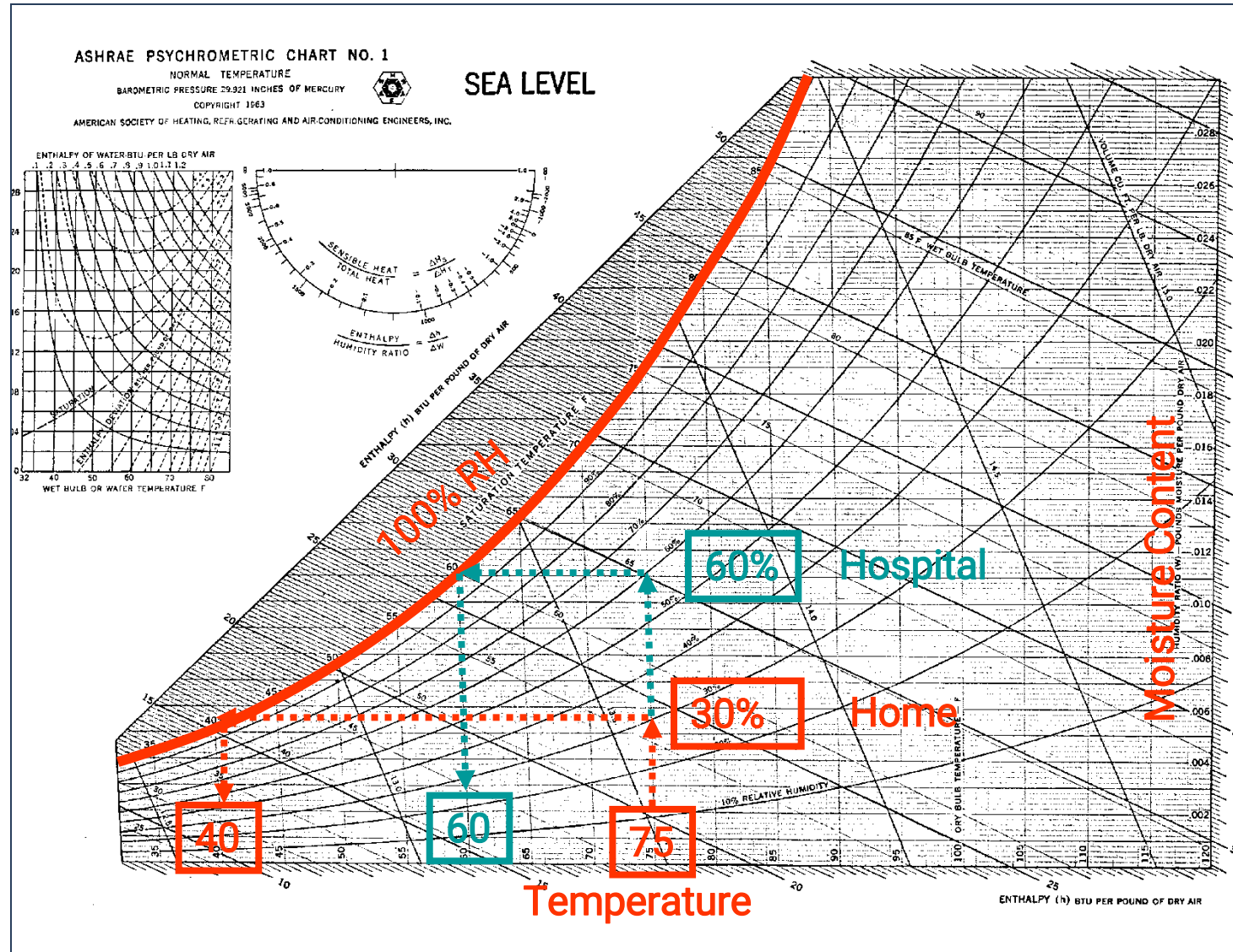


Lower Risk

Think as you draw

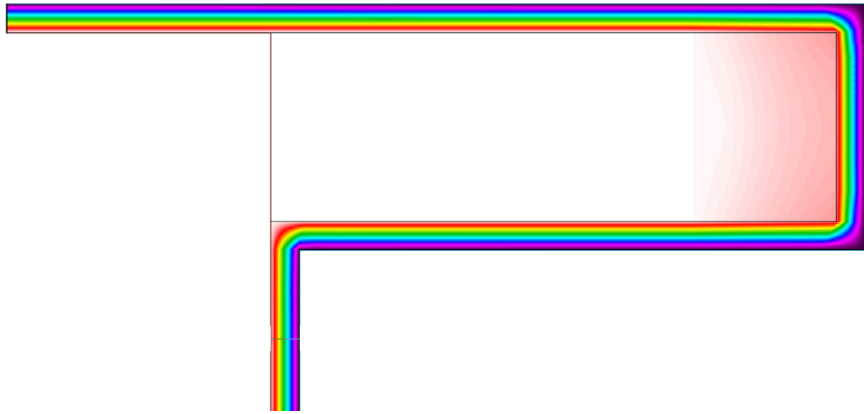
Seek help - High risk!

# Condensation – Dew Point

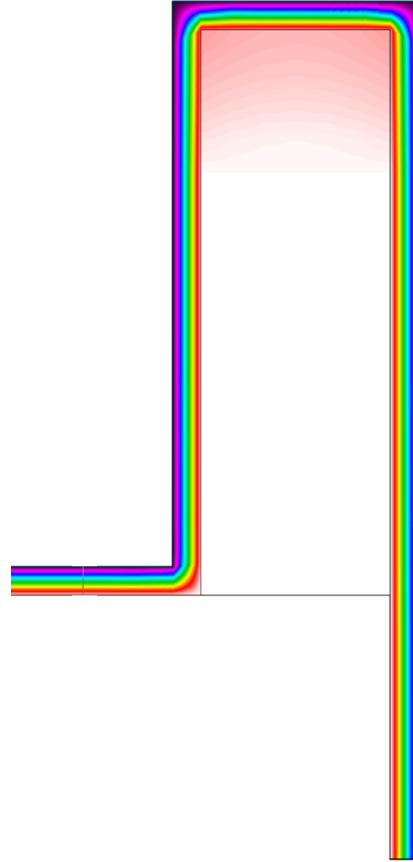


Air at 75° F and 30% RH = 40° F    Air at 75° F and 60% RH = 60° F

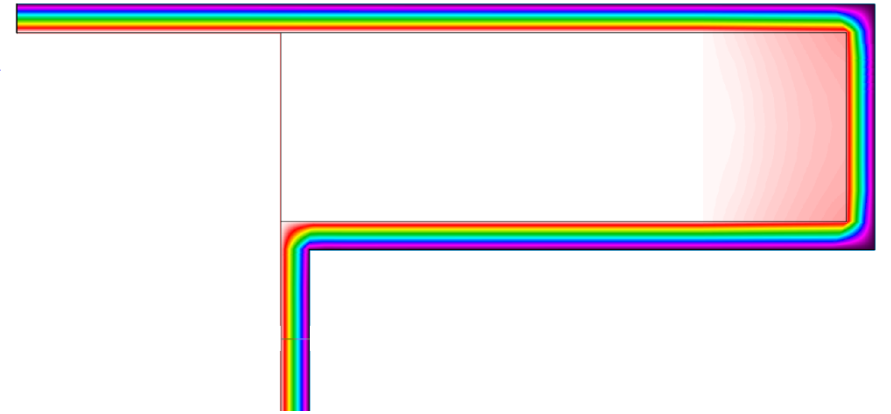
# Issues with Projections



Overhang  
(section)

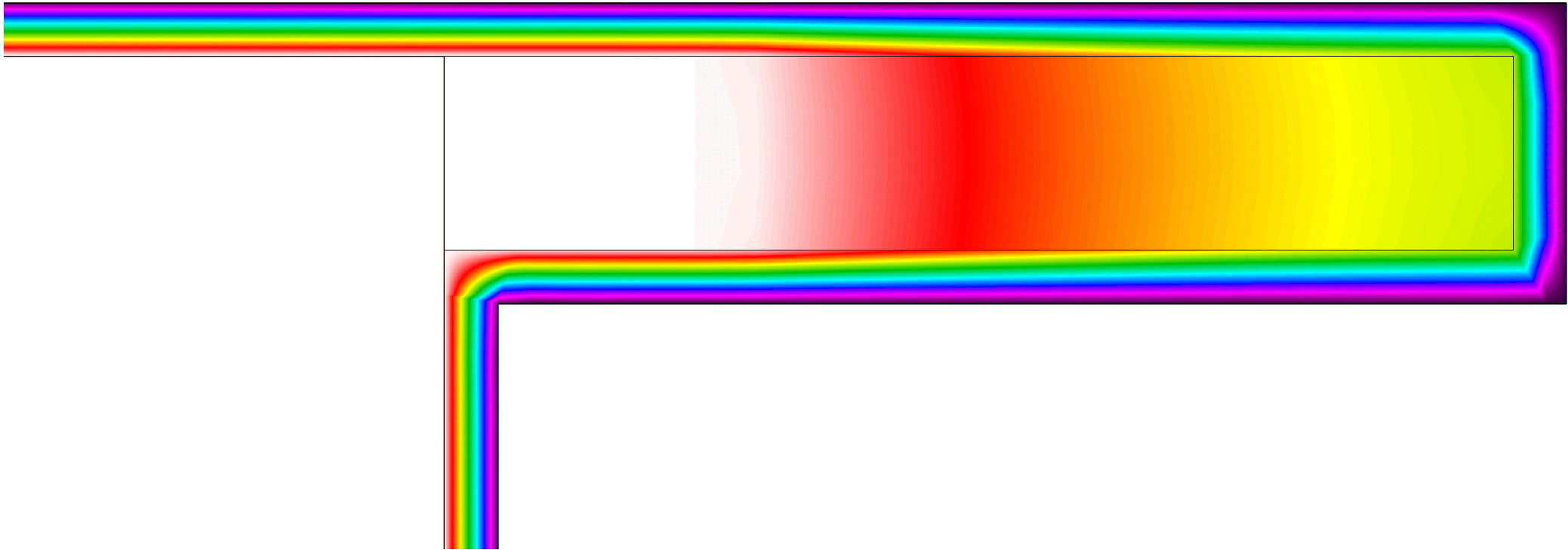


Parapet  
(section)



Wing Wall  
(plan)

# Issues with Projections



# Air Control

The logo for the International Energy Conservation Code (IECC) is displayed in large, bold, green letters.

INTERNATIONAL  
ENERGY CONSERVATION  
CODE®

A Member of the International Code Family®

## C402.5 Air leakage—thermal envelope (Mandatory).

The *thermal envelope* of buildings shall comply with Sections C402.5.1 through C402.5.8, or the building *thermal envelope* shall be tested in accordance with ASTM E 779 at a pressure differential of 0.3 inch water gauge (75 Pa) or an equivalent method approved by the code official and deemed to comply with the provisions of this section when the tested air leakage rate of the building thermal envelope is not greater than 0.40 cfm/ft<sup>2</sup> (2.0 L/s • m<sup>2</sup>). Where compliance is based on such testing, the building shall also comply with Sections C402.5.5, C402.5.6 and C402.5.7.

### C402.5.1 Air barriers.

A continuous air barrier shall be provided throughout the building thermal envelope. The air barriers shall be permitted to be located on the inside or outside of the building envelope, located within the assemblies composing the envelope, or any combination thereof. The air barrier shall comply with Sections C402.5.1.1 and C402.5.1.2.

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**Exception:** Air barriers are not required in buildings located in *Climate Zone 2B*.

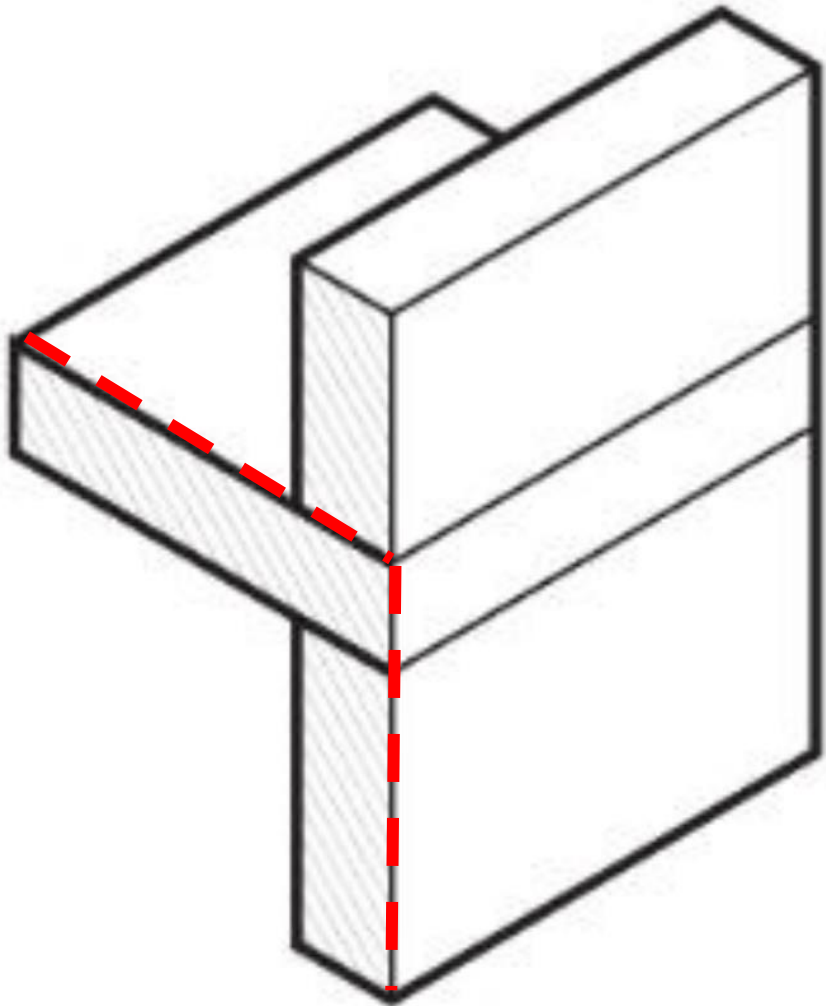
compatible with the construction materials and location. Sealing shall allow for expansion, contraction and mechanical vibration. Joints and seams associated with penetrations shall be sealed in the same manner or taped. Sealing materials shall be securely installed around the penetration so as not to dislodge, loosen or otherwise impair the penetrations' ability to resist positive and negative pressure from wind, stack effect and mechanical ventilation. Sealing of



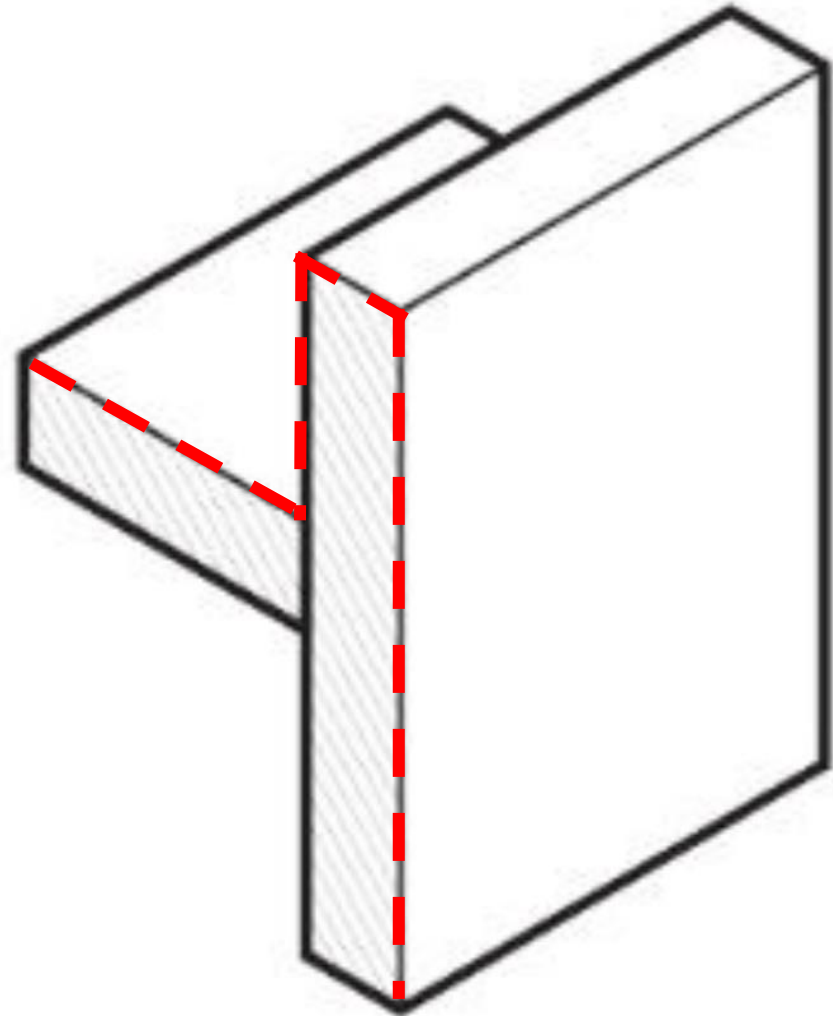
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# Air Control



Platform Framed



Balloon Framed

# Thermal Barrier

# IECC<sup>®</sup>

INTERNATIONAL  
ENERGY CONSERVATION  
CODE<sup>®</sup>

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# 2021

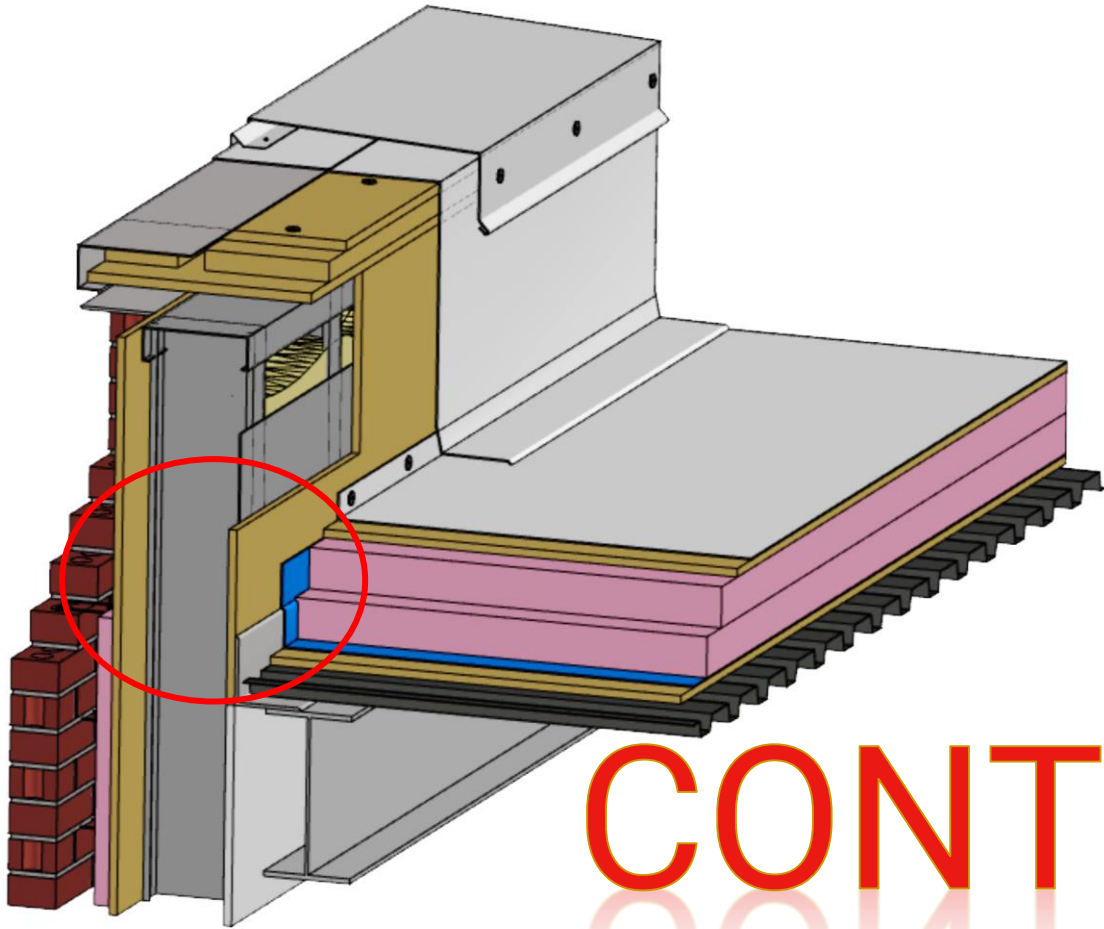


CLIMATE ZONE	5 AND MARINE 4	
	All other	Group R
Insulation entirely above roof deck	R-30ci	R-30ci
Metal buildings <sup>b</sup>	R-19 + R-11 LS	R-19 + R-11 LS
Attic and other	R-49	R-49
Mass <sup>f</sup>	R-11.4ci	R-13.3ci
Metal building	R-13 + R-14ci	R-13 + R-14ci
Metal framed	R-13 + R-10ci	R-13 + R-10ci
Wood framed and other	R-13 + R-7.5ci or R20 + R3.8ci	R-13 + R-7.5ci or R-20 + R-3.8ci
Below-grade wall <sup>d</sup>	R-7.5ci	R-10ci
Mass <sup>e</sup>	R-14.6ci	R-16.7ci
Joist/framing	R-30	R-30
Unheated slabs	R-15 for 24" below	R-20 for 24" below
Heated slabs <sup>g</sup>	R-15 for 36" below + R-5 full slab	R-15 for 36" below + R-5 full slab

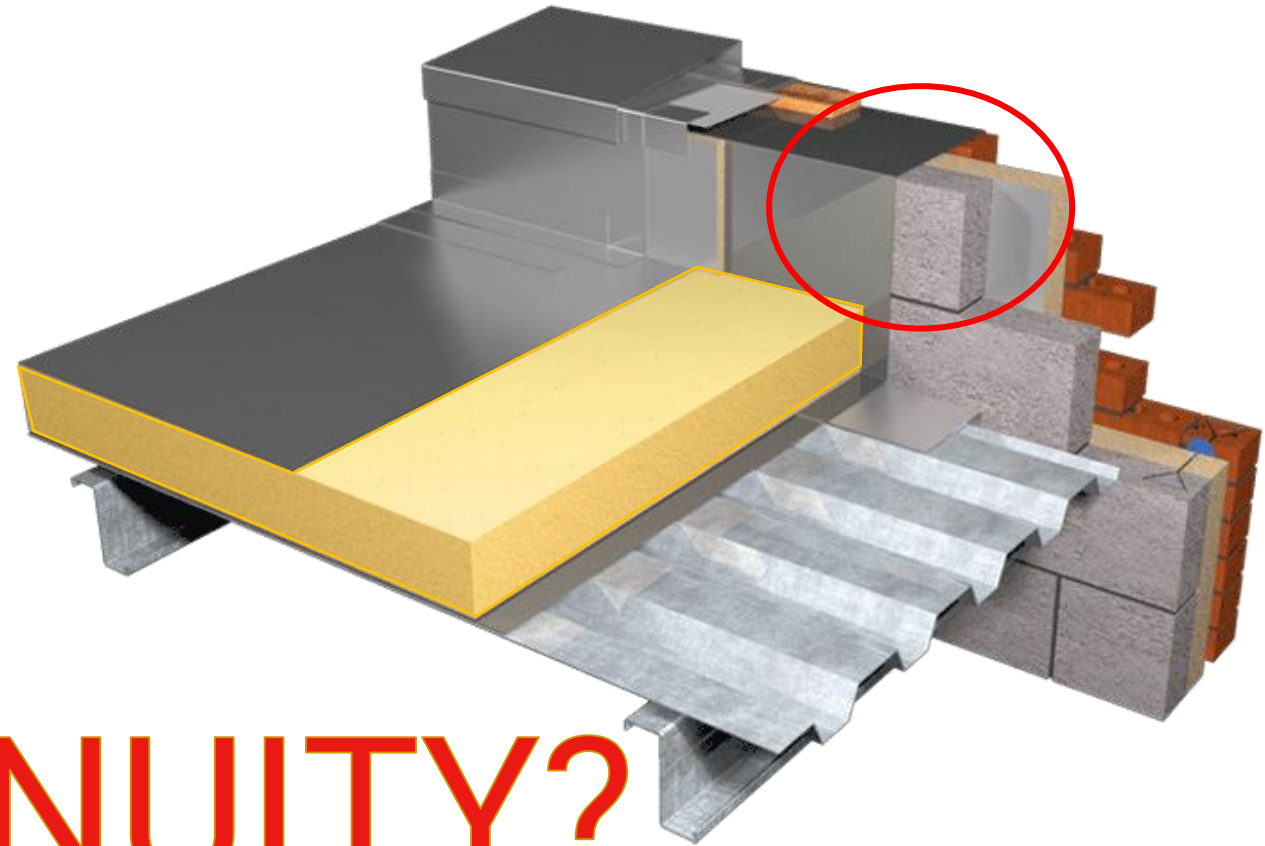
CLIMATE ZONE	5 AND MARINE 4	
	All other	Group R
Insulation entirely above roof deck	U-0.032	U-0.032
Metal buildings	U-0.035	U-0.035
Attic and other	U-0.021	U-0.021
Mass <sup>f</sup>	U-0.090	U-0.080
Metal building	U-0.050	U-0.050
Metal framed	U-0.055	U-0.055
Wood framed and other <sup>c</sup>	U-0.051	U-0.051
Below-grade wall <sup>c</sup>	C-0.119	C-0.092
Mass <sup>d</sup>	U-0.057	U-0.051
Joist/framing	U-0.033	U-0.033
Unheated slabs	F-0.52	F-0.51
Heated slabs	F-0.62	F-0.62
Nonswinging door	U-0.31	U-0.31
Swinging door <sup>g</sup>	U-0.37	U-0.37
Garage door < 14% glazing <sup>h</sup>	U-0.31	U-0.31

For SI: 1 pound per square foot = 4.88 ka/m<sup>2</sup>. 1 pound per square foot = 4.88 ka/m<sup>2</sup>.

# Thermal Control



Frame Construction



Masonry / Concrete Construction

**CONTINUITY?**

# Thermal Control

Prescriptive



R-value of  
insulation: R-13  
+ R-10 c.i.

~ U-Factor: 0.048

U-Factor Model



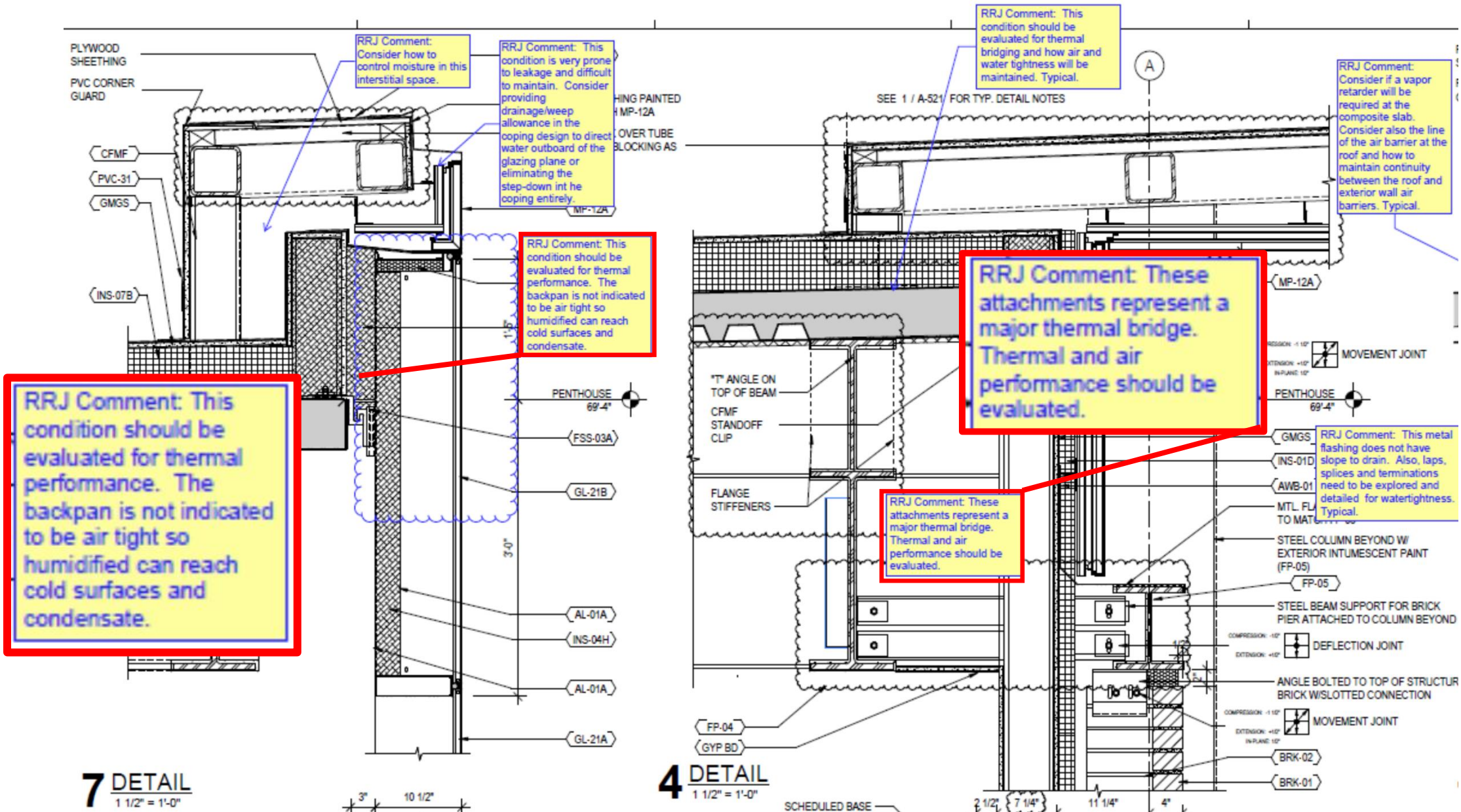
R-value of  
insulation: R-20  
+ R-5 c.i.

~ U-Factor: 0.040

# Outline

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# Drawing Review



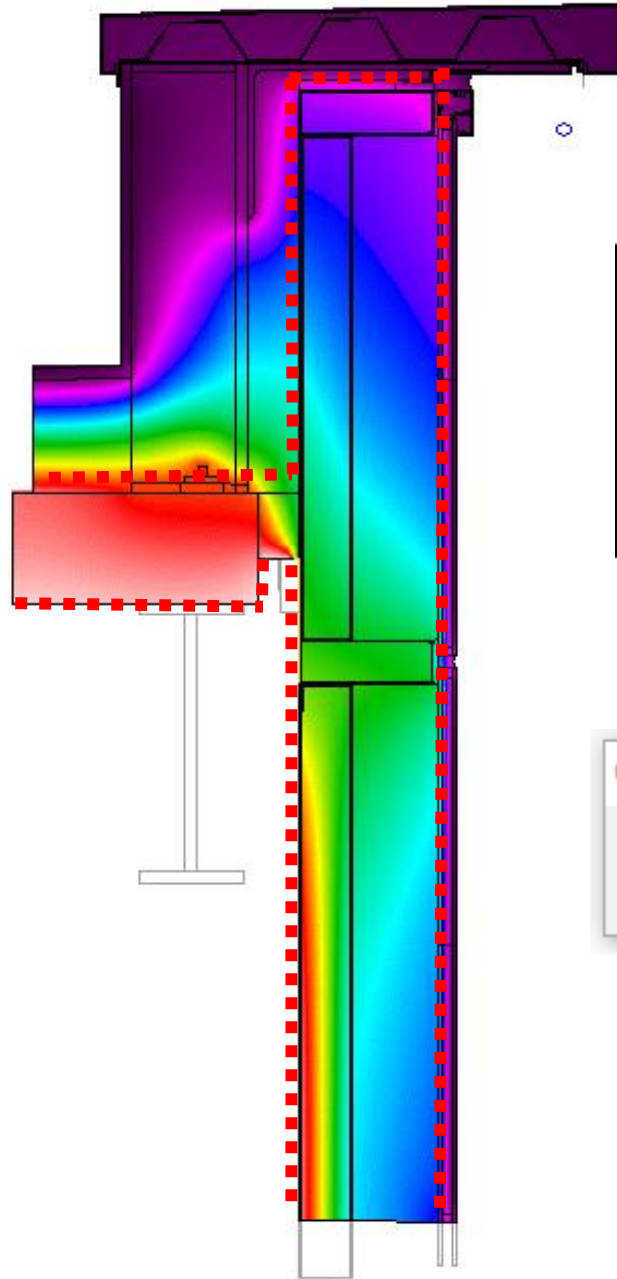
**7 DETAIL**  
1 1/2" = 1'-0"

**4 DETAIL**  
1 1/2" = 1'-0"

# Analysis – Thermal / Air

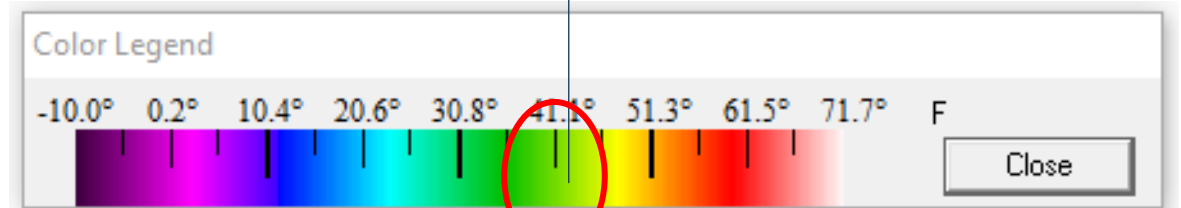
- What is the interior dew point?
- Determine air tightness plane
- Review surfaces inboard of the air tightness plane to verify temperatures are above the dew point

# THERM



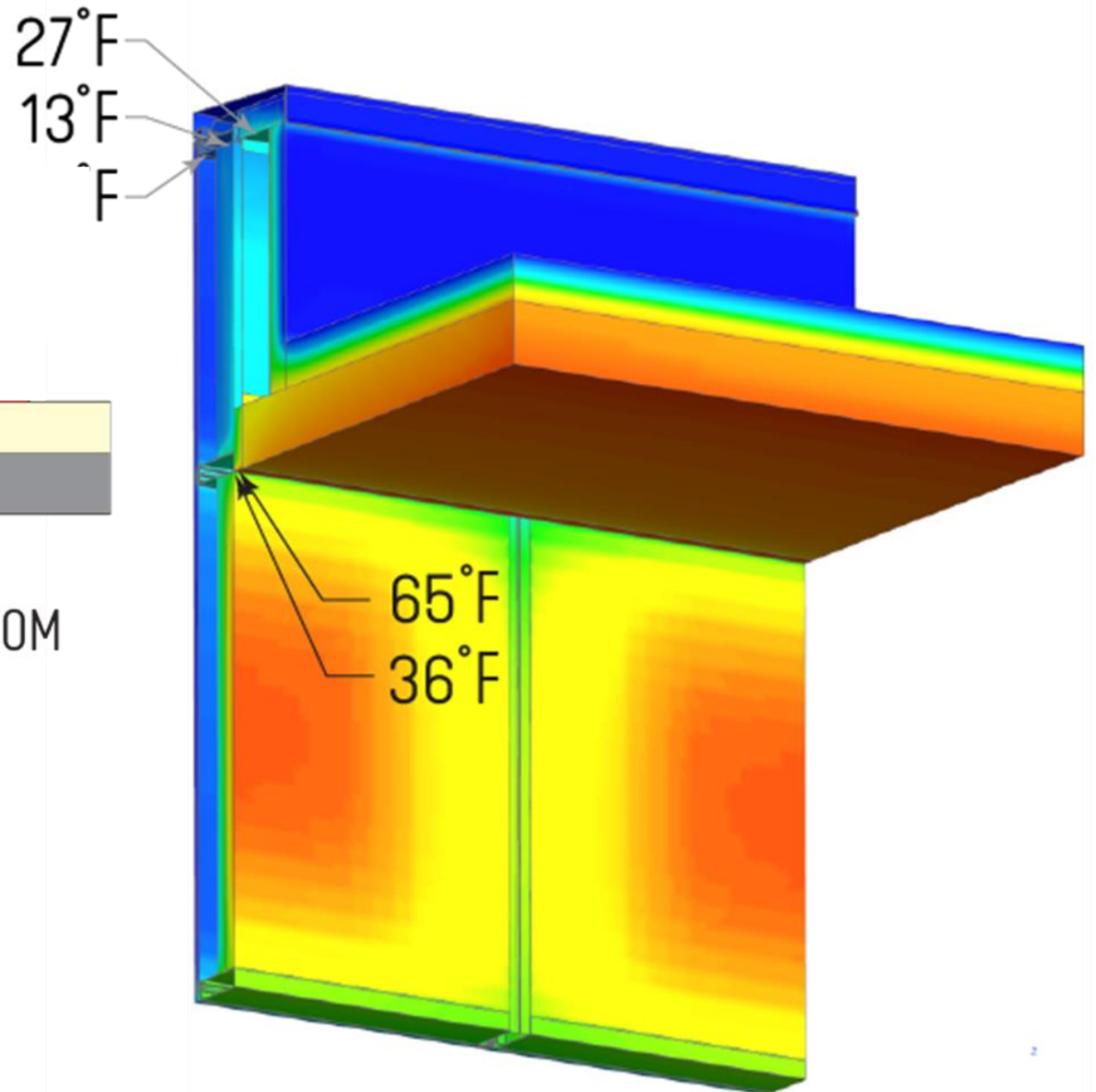
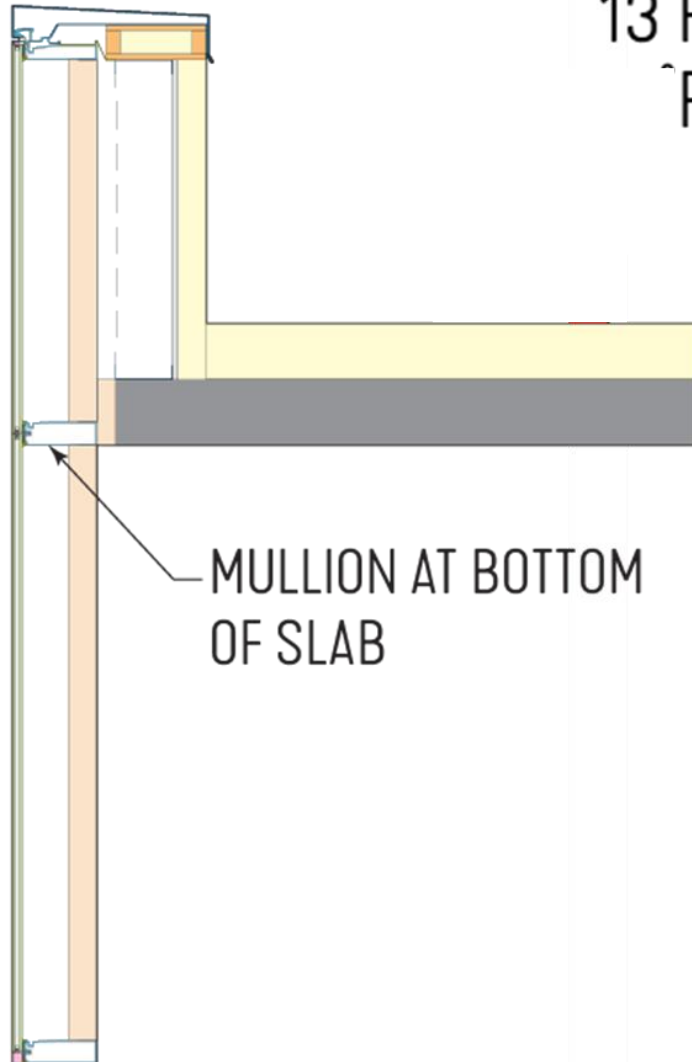
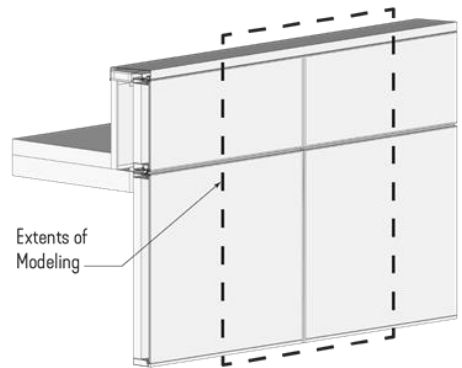
	DBT	RH
Outdoor	-10F	95%
Indoor	72F	35%

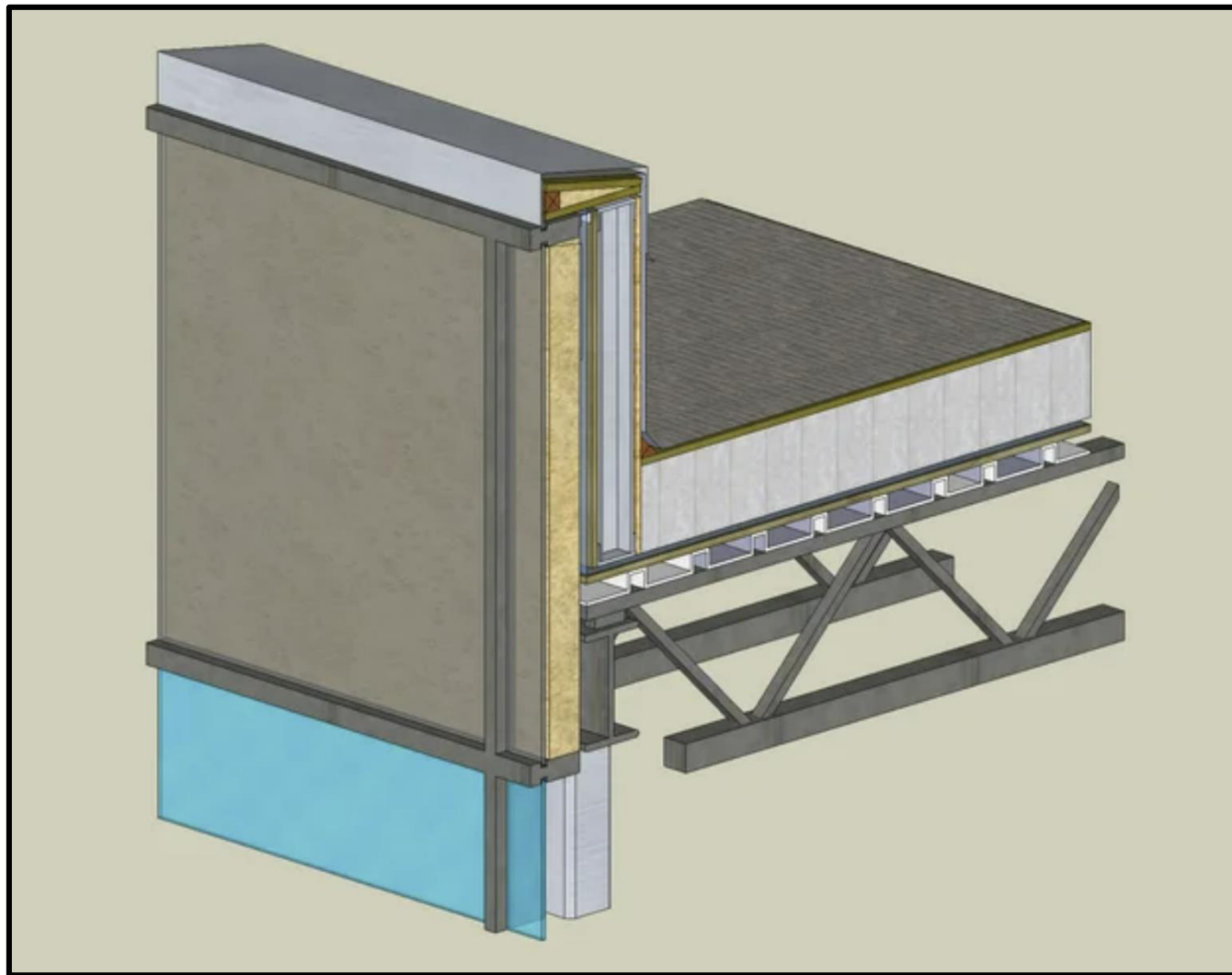
Dewpoint 42F





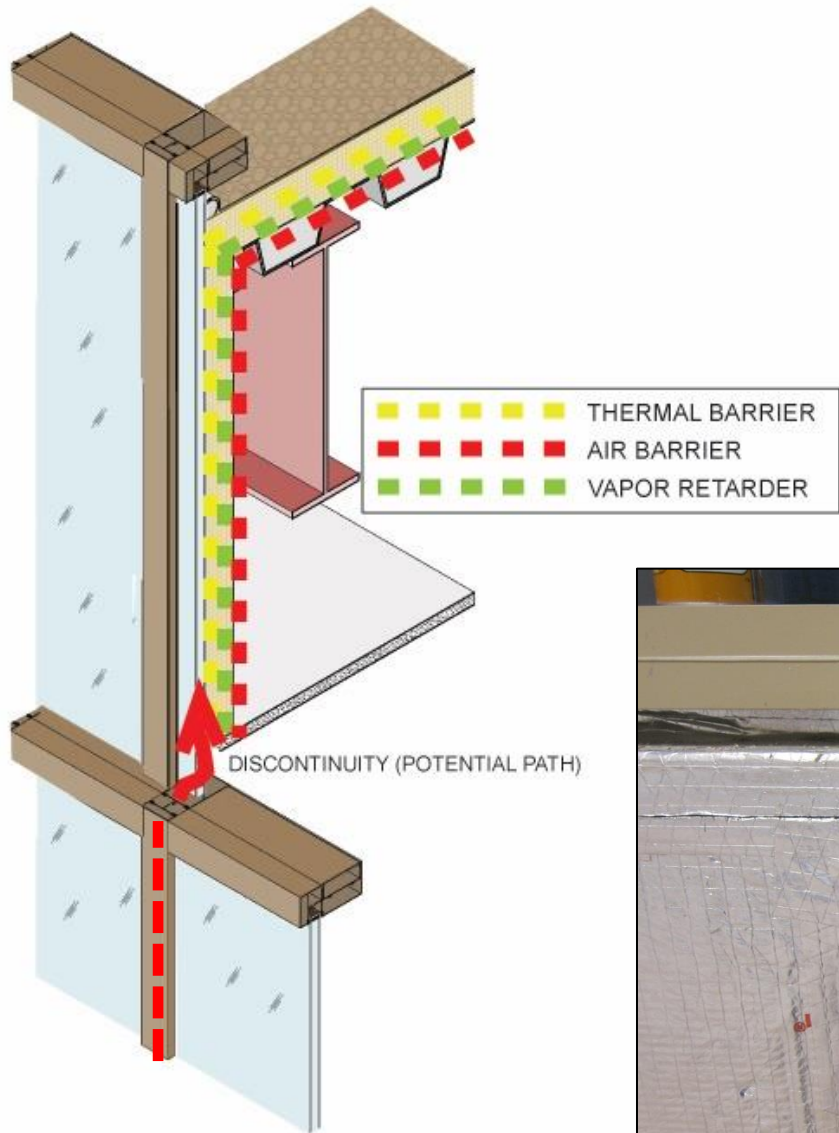
# 3D Effects





Courtesy of 3D Warehouse

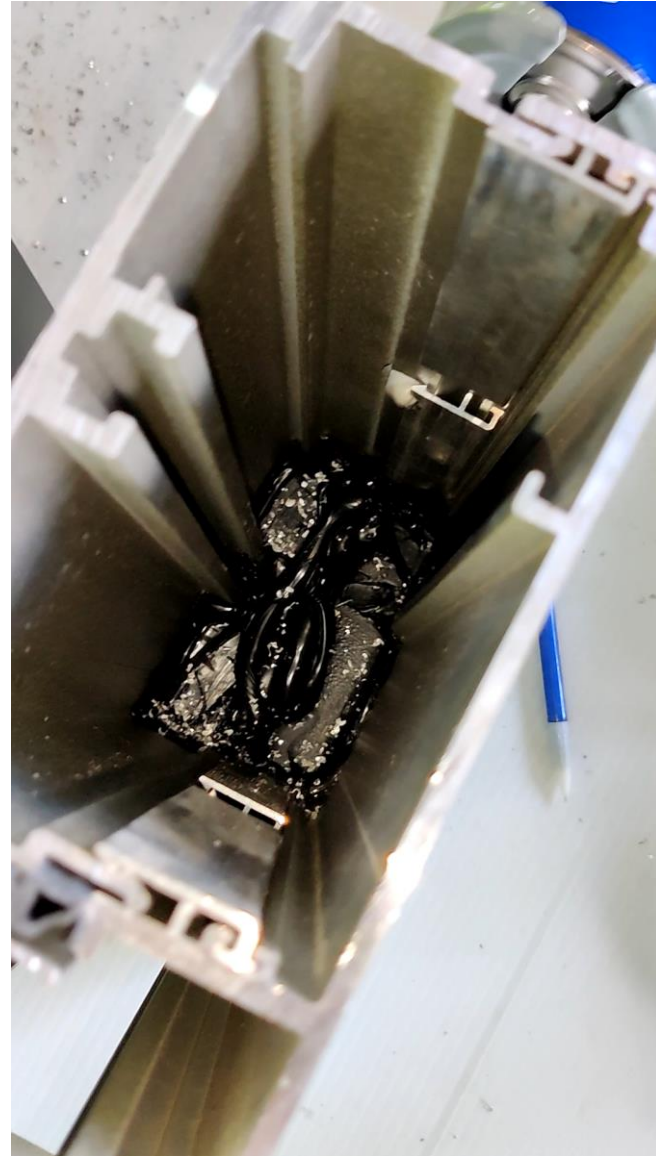
# Curtainwall Parapets



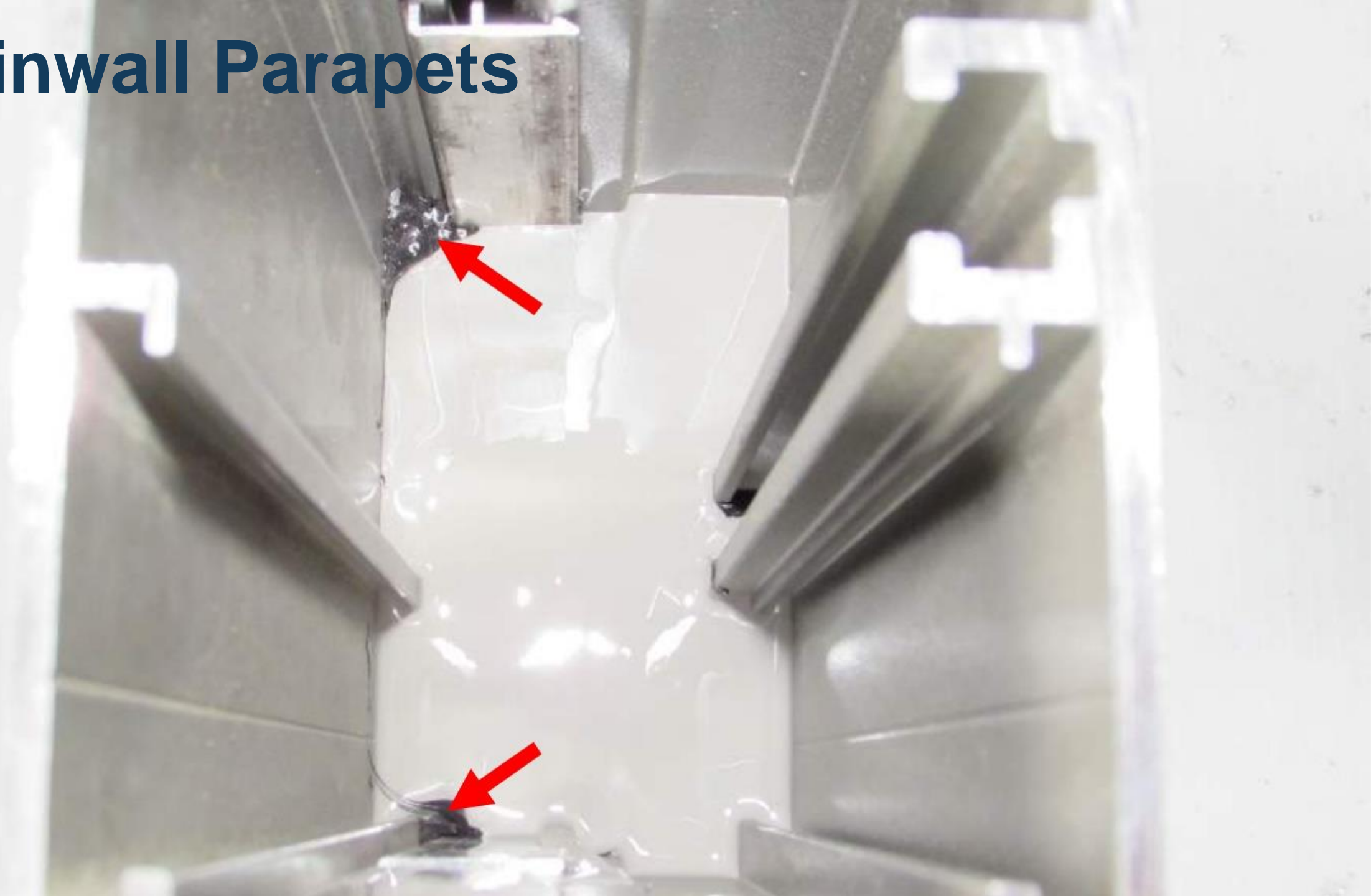
# Curtainwall Parapets



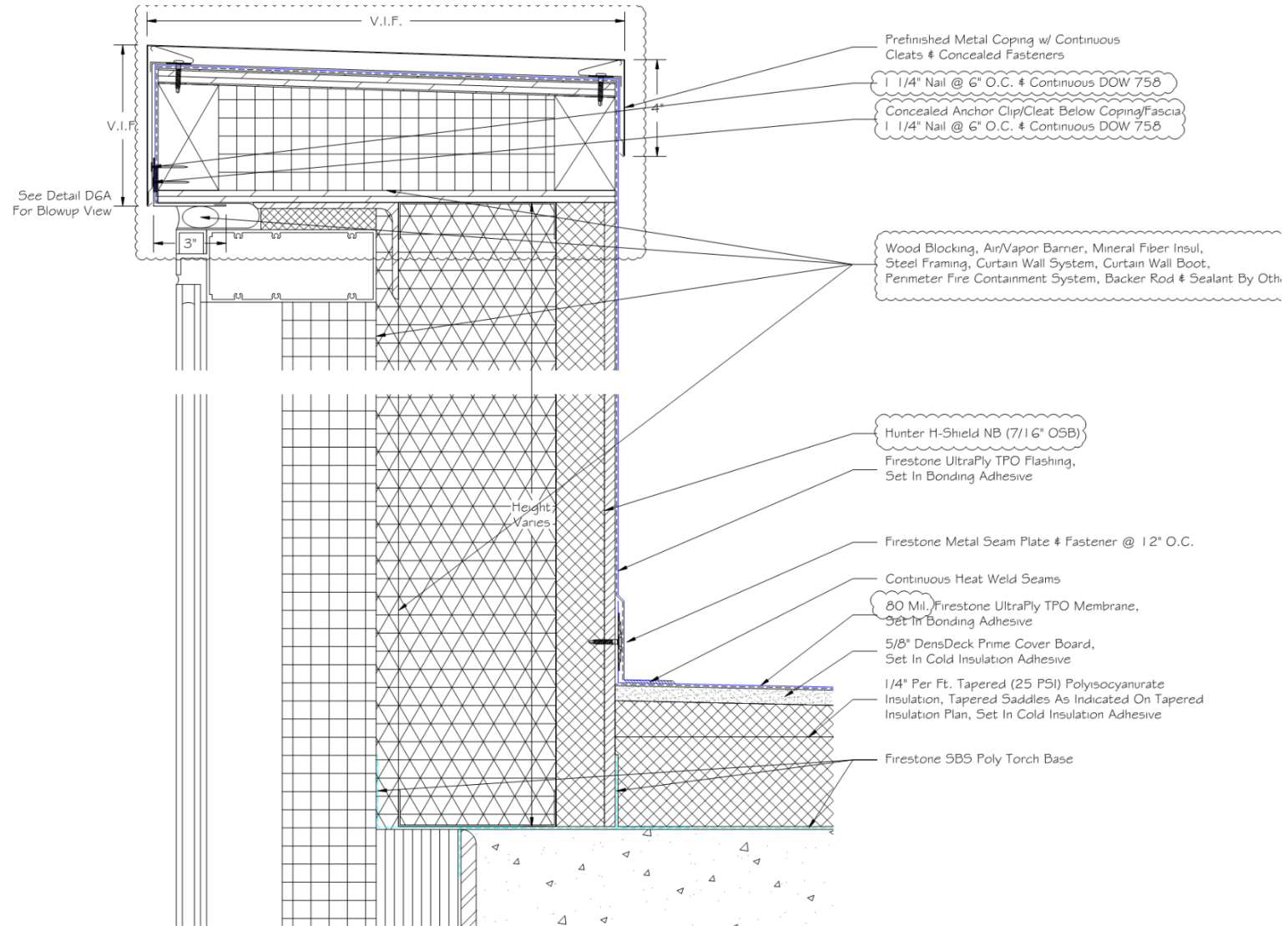
# Curtainwall Parapets



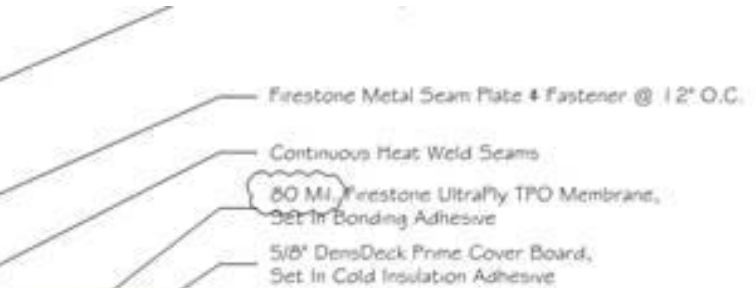
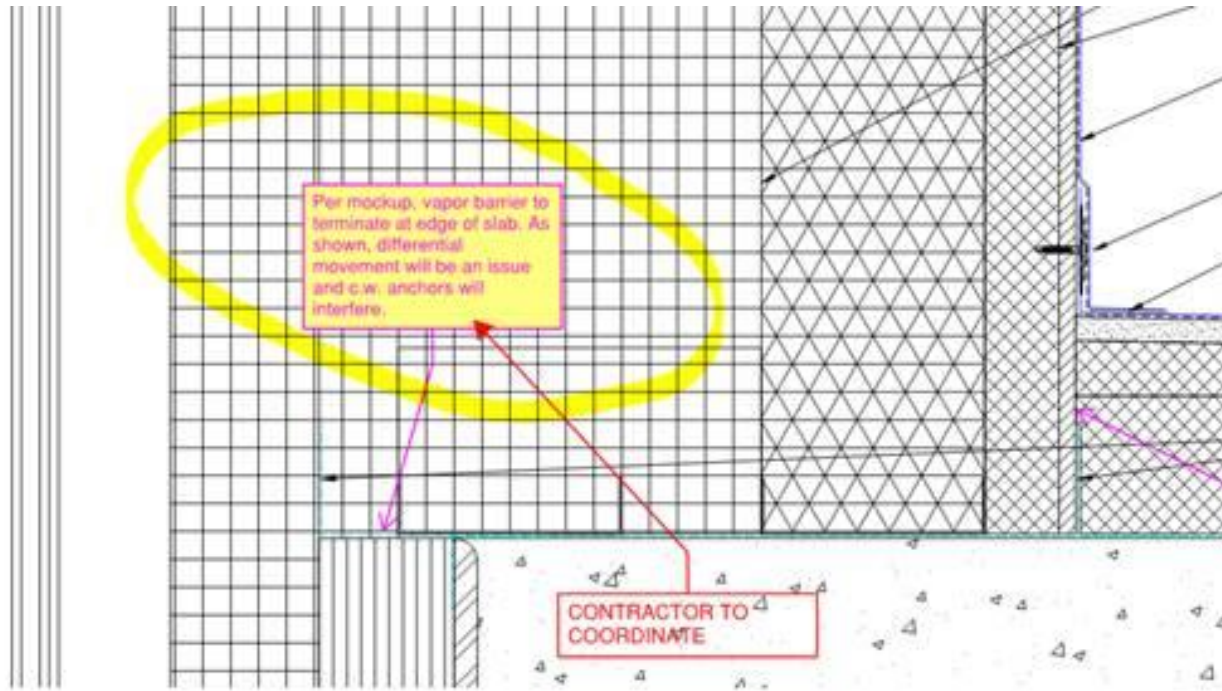
# Curtainwall Parapets



# Curtainwall Parapets



# Curtainwall Parapets



D5 Roof Flashing Detail @ Curtain Wall Roof Edge  
Scale: 3"=1'-0" (Detail Ref. C1/AE-520B)





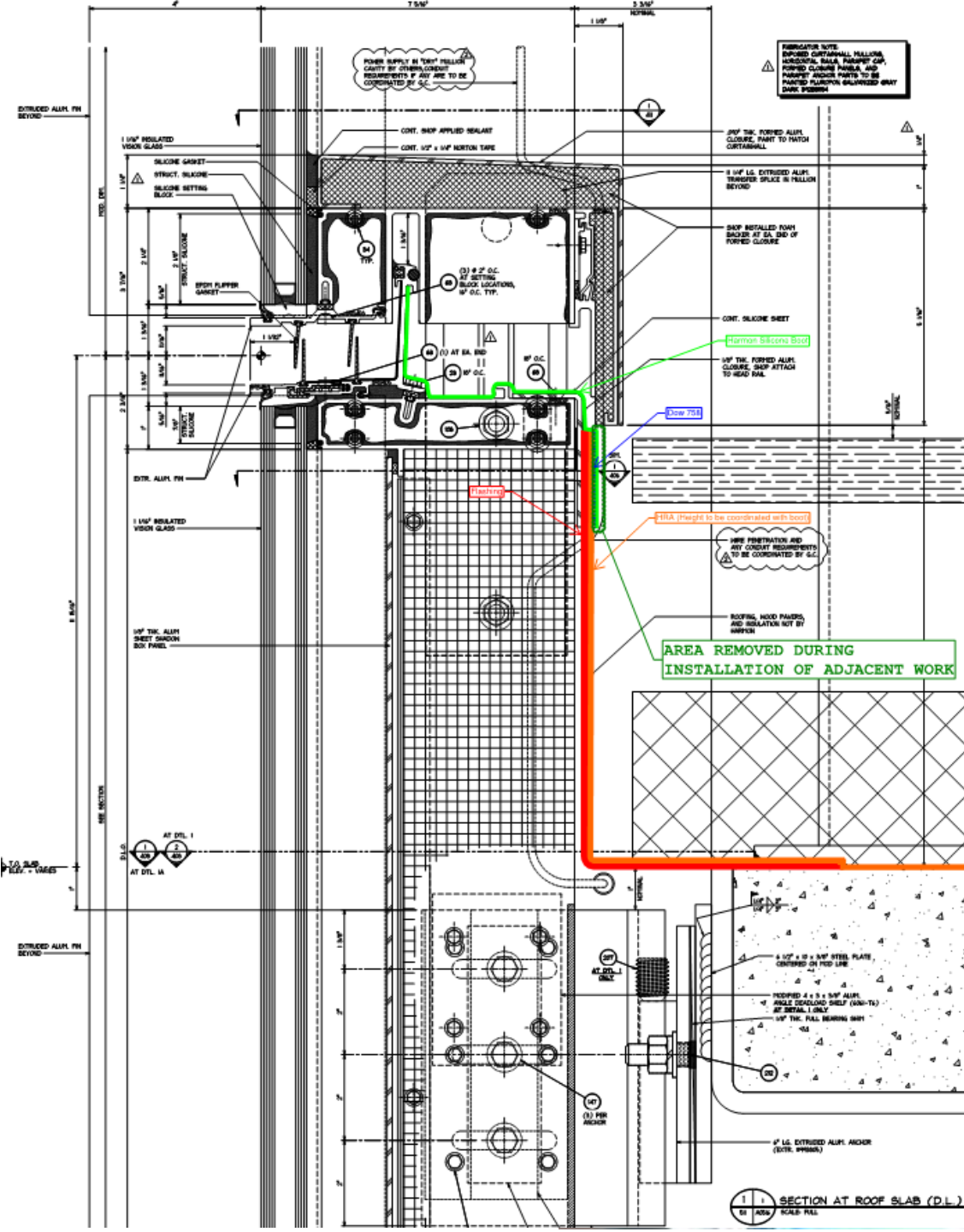


# Curtainwall Parapets



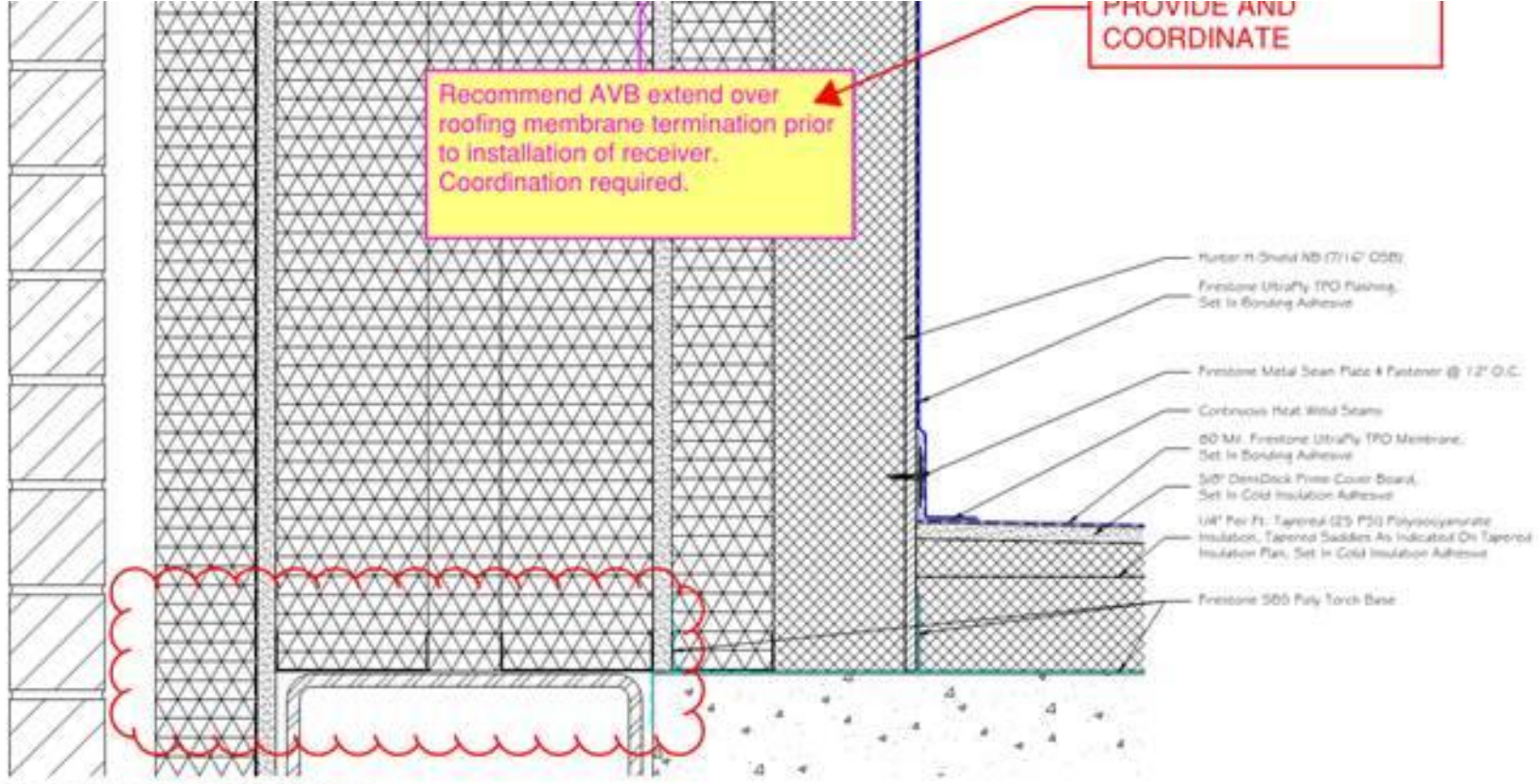
# Curtainwall Parapets





# Parapets

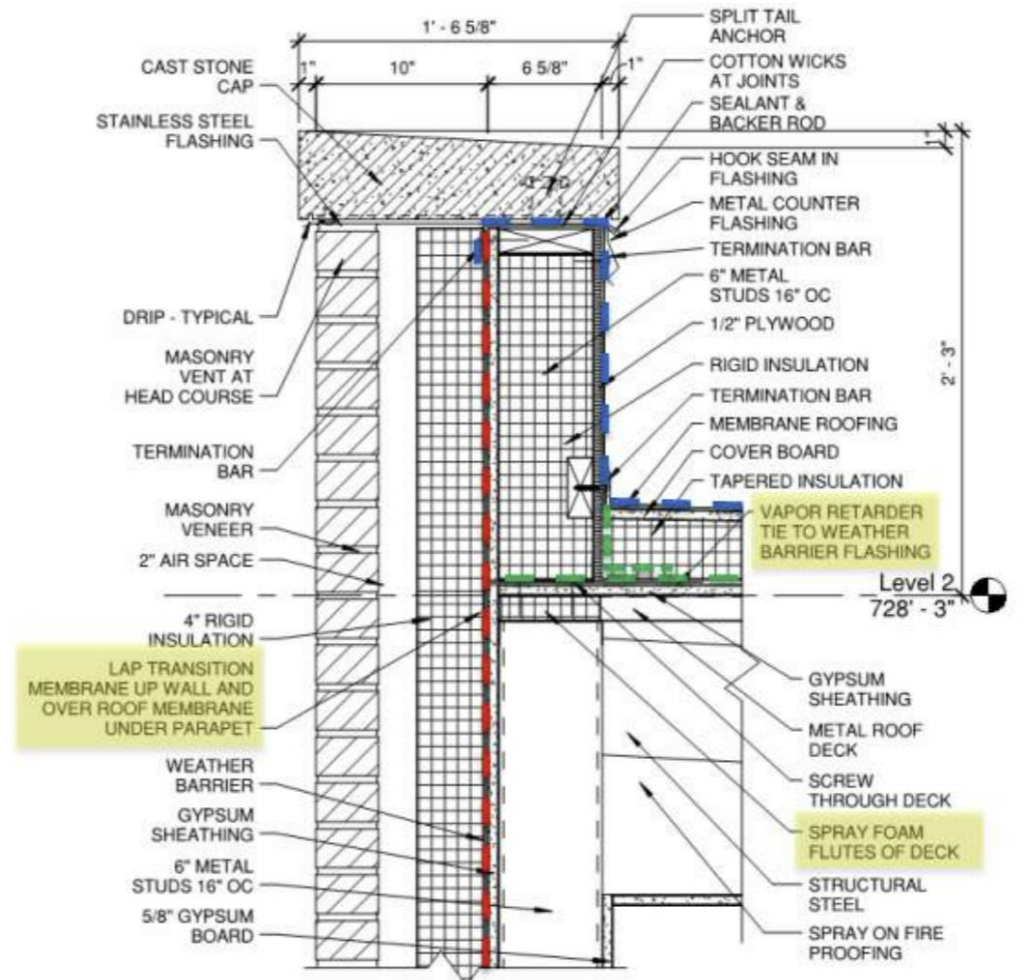
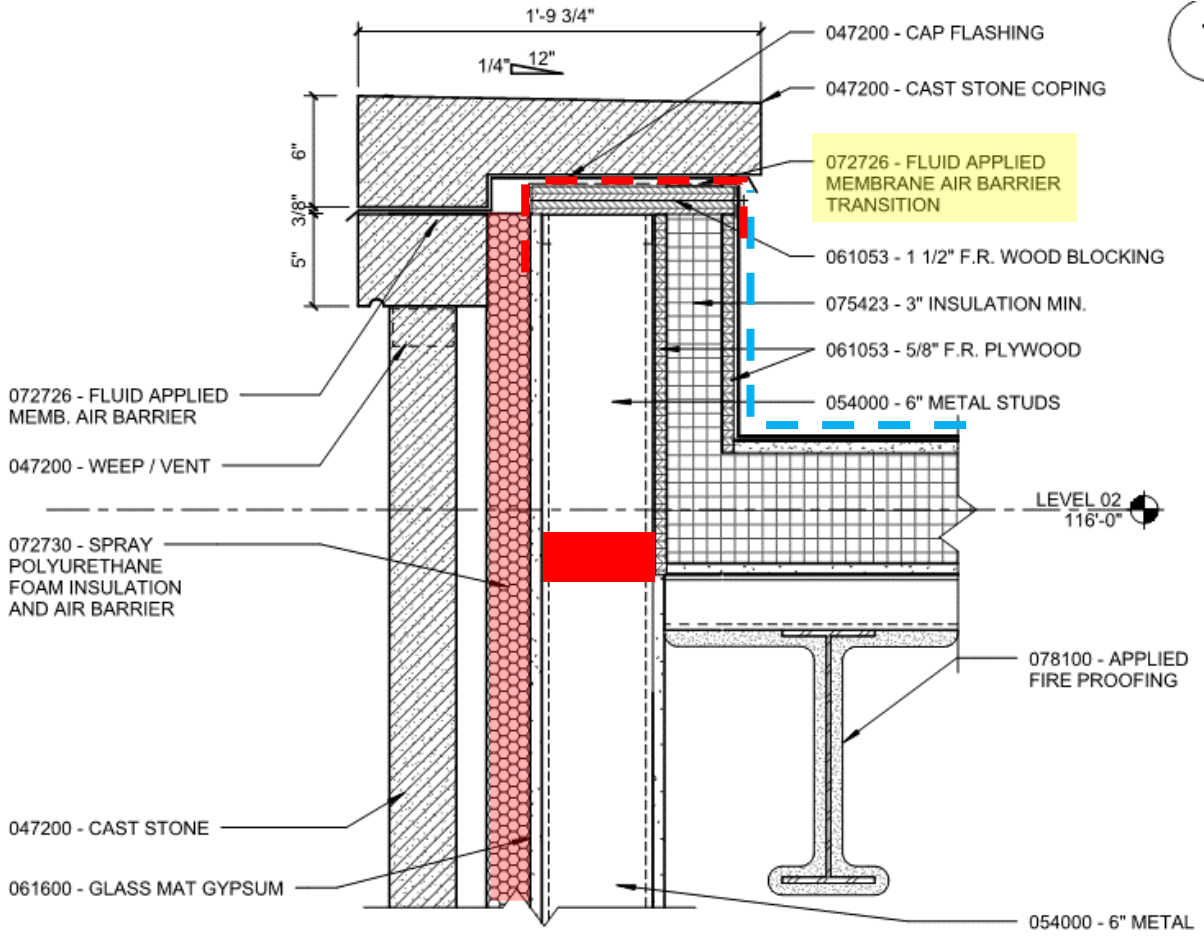
AVB AT  
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R ALL COLD  
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RY PIER



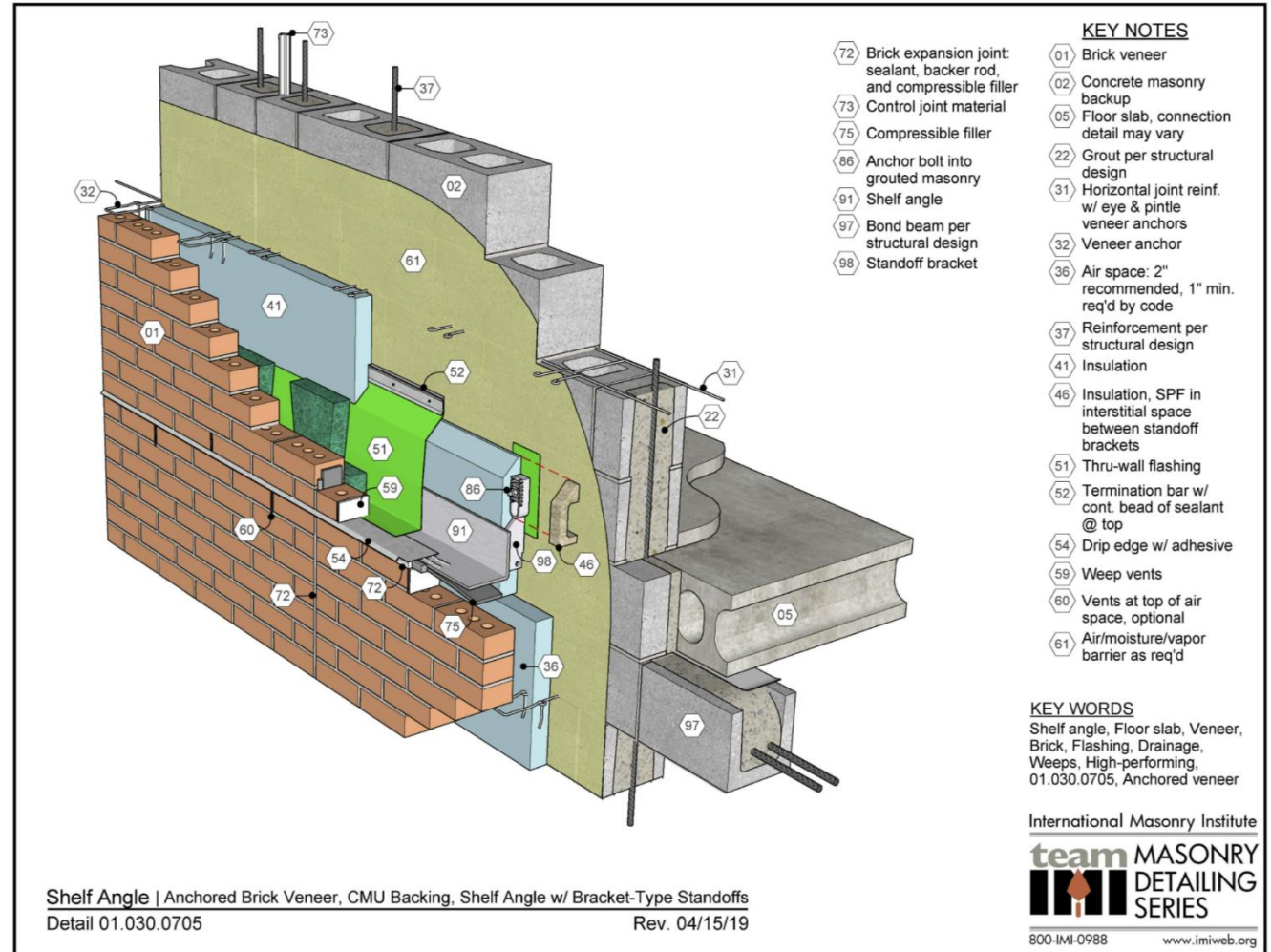
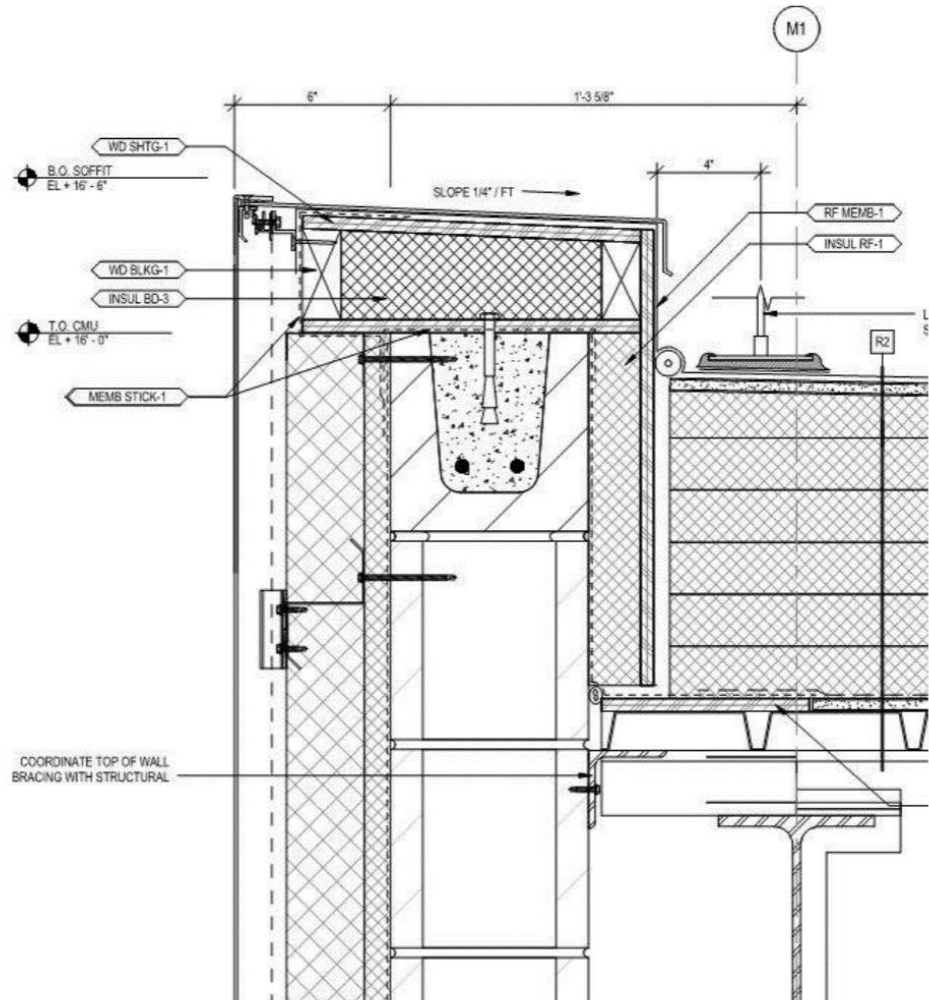
D22 Roof Flashing Detail @ Brick Wall Parapet  
Scale: 1/8"=1'-0" (Detail Ref: D1AE531B)

Issued For:	Rev:	Date:
Per Mark-Up B/13/19	#1	01/21/20
DRAWING TITLE:		
Roofing Shop Drawings		
PROJECT NO.:		
T.B.D.		
DRAWN BY:	SHEET NUMBER:	
MEF	D22	
DATE:	SCALE:	
06/2019	AS NOTED	

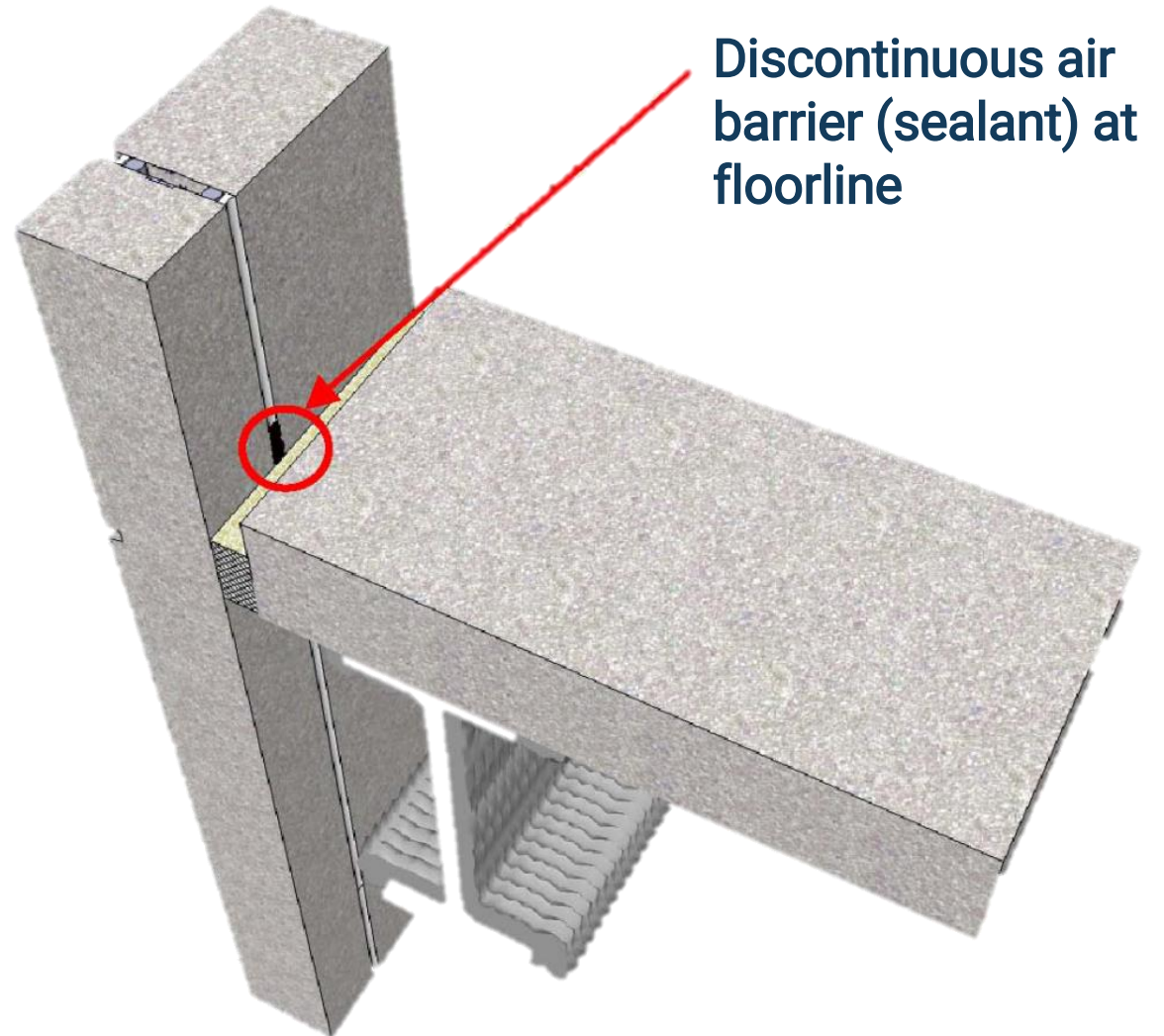
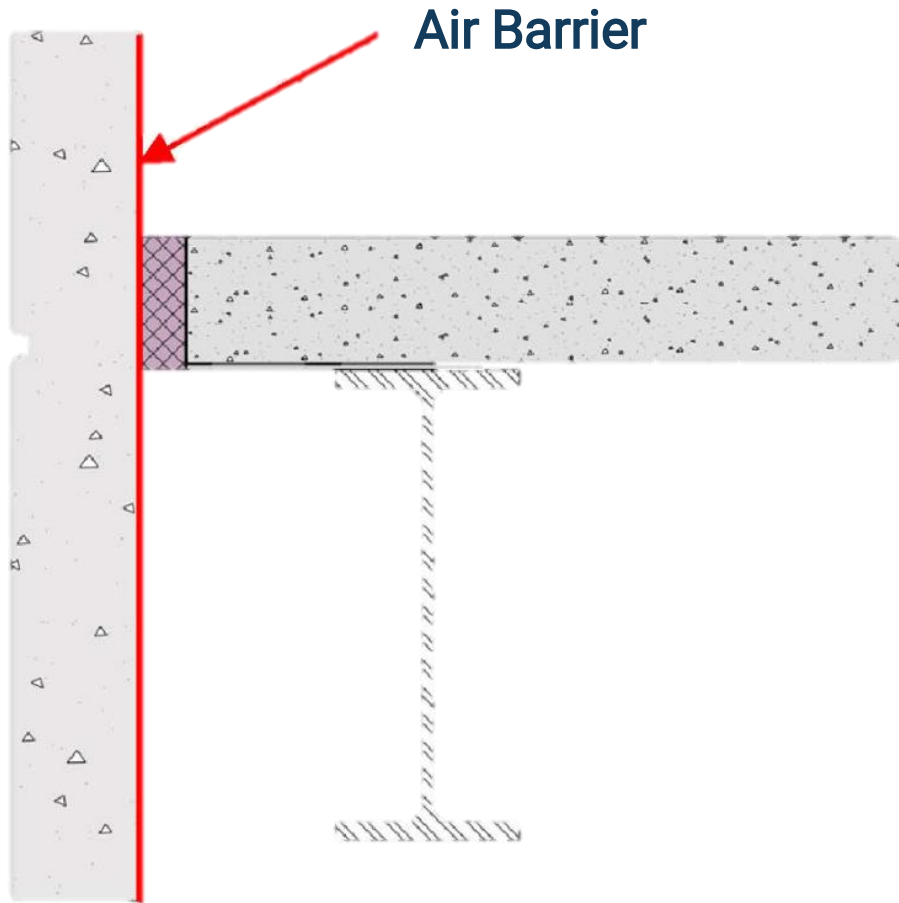
# Masonry Clad Parapets



# Masonry Clad Parapets



# Precast Parapet





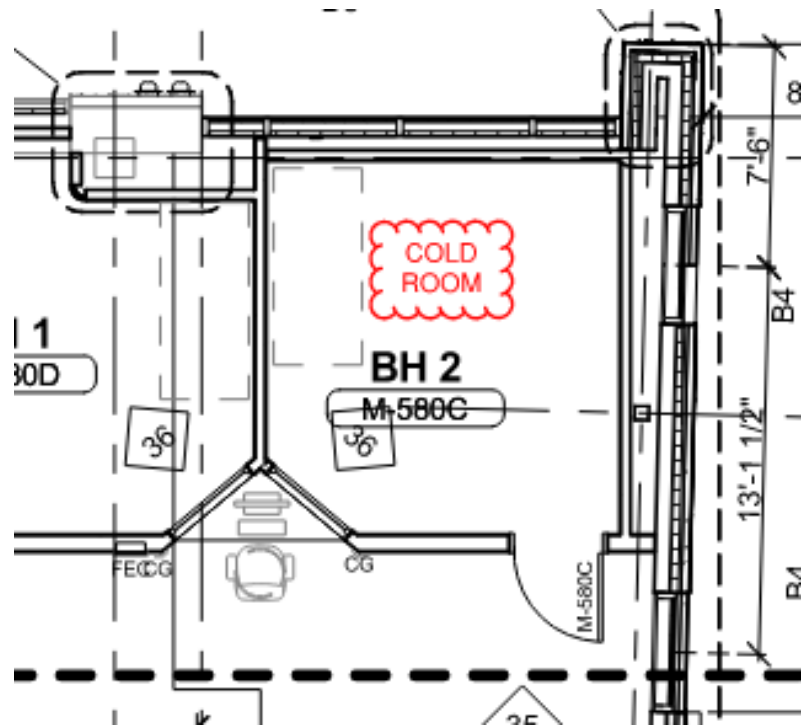
# Precast Parapet



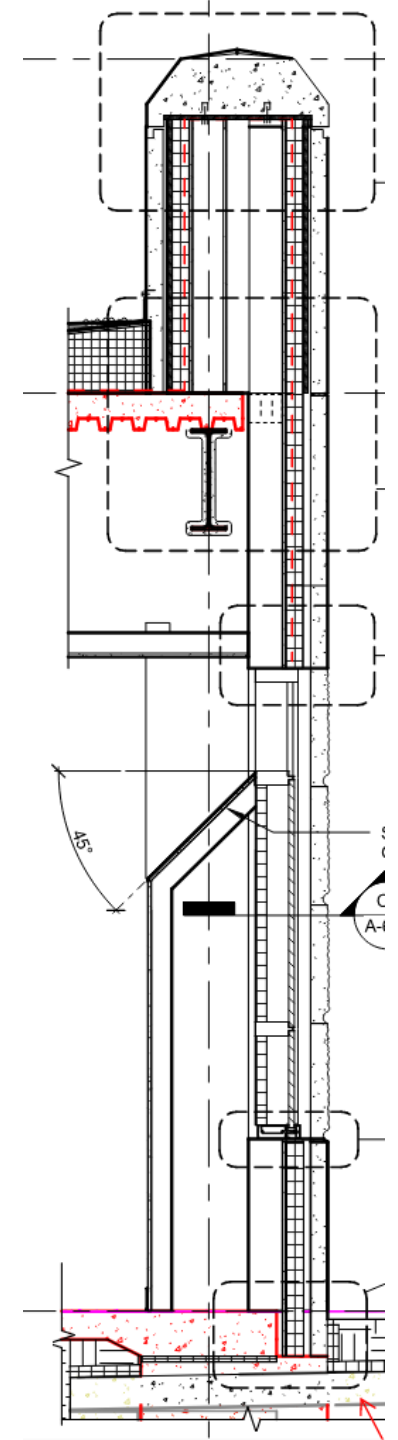
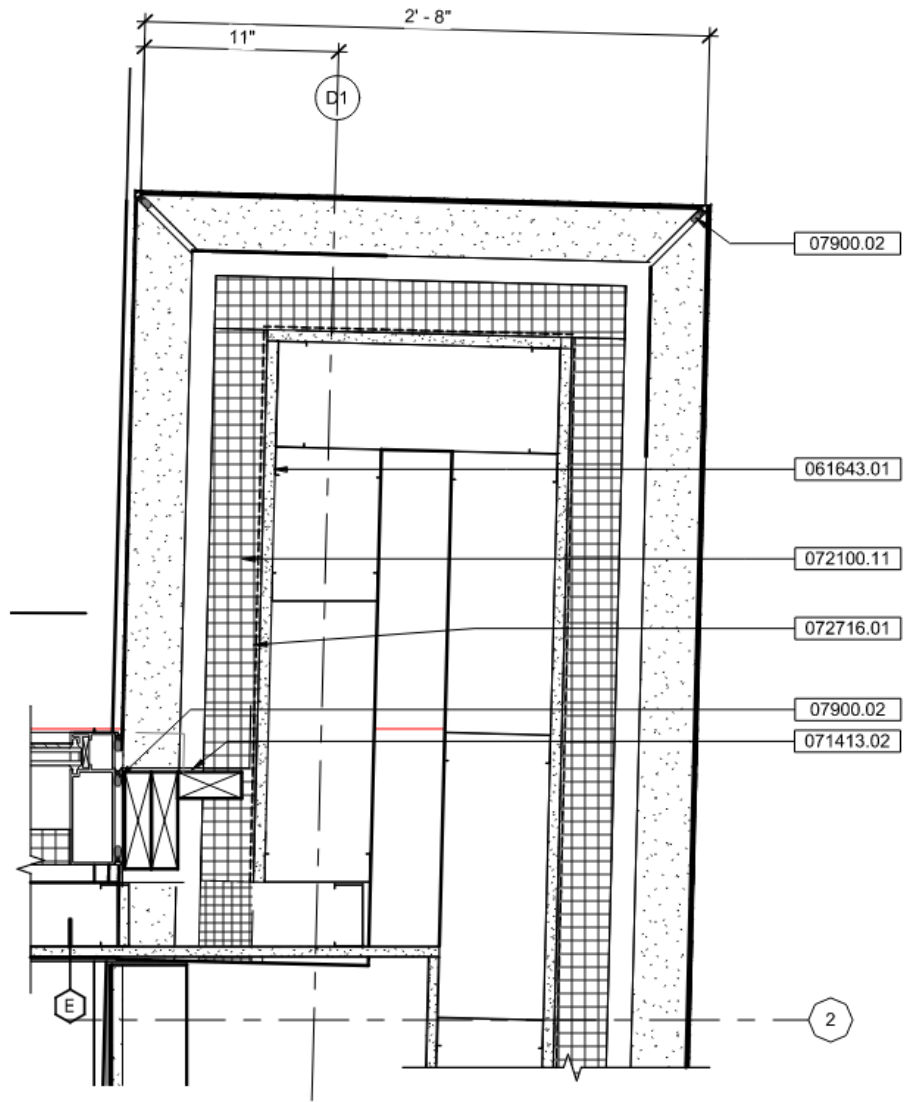
# Outline

1. Legacy Concerns and Background
2. Parapets
- 3. Wing Walls**
4. Overhangs

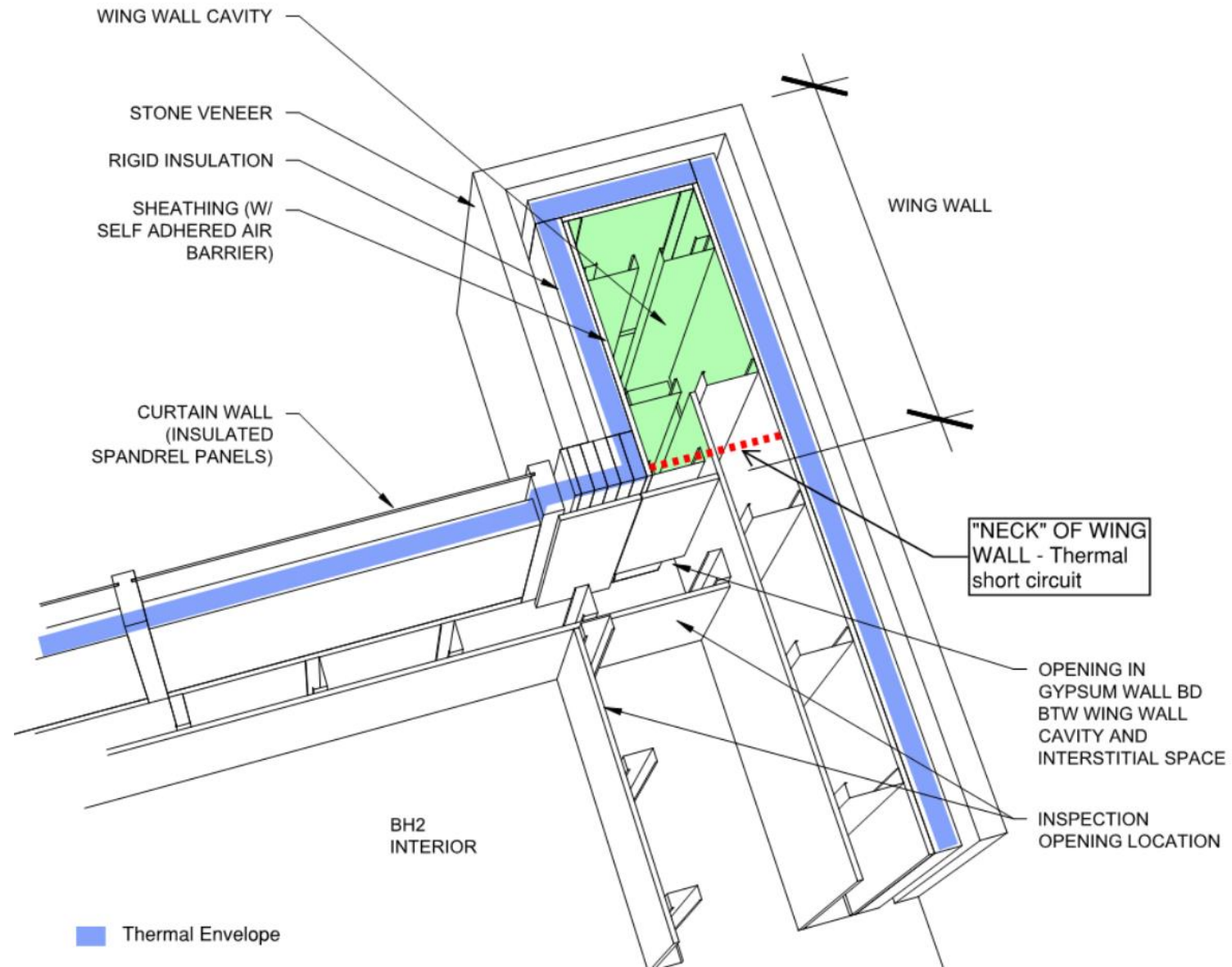
# Wing Walls



# Wing Walls



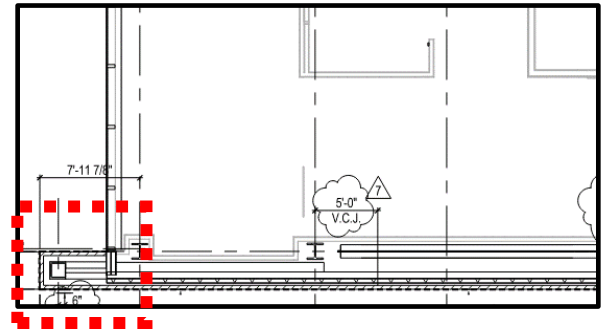
# Wing Walls



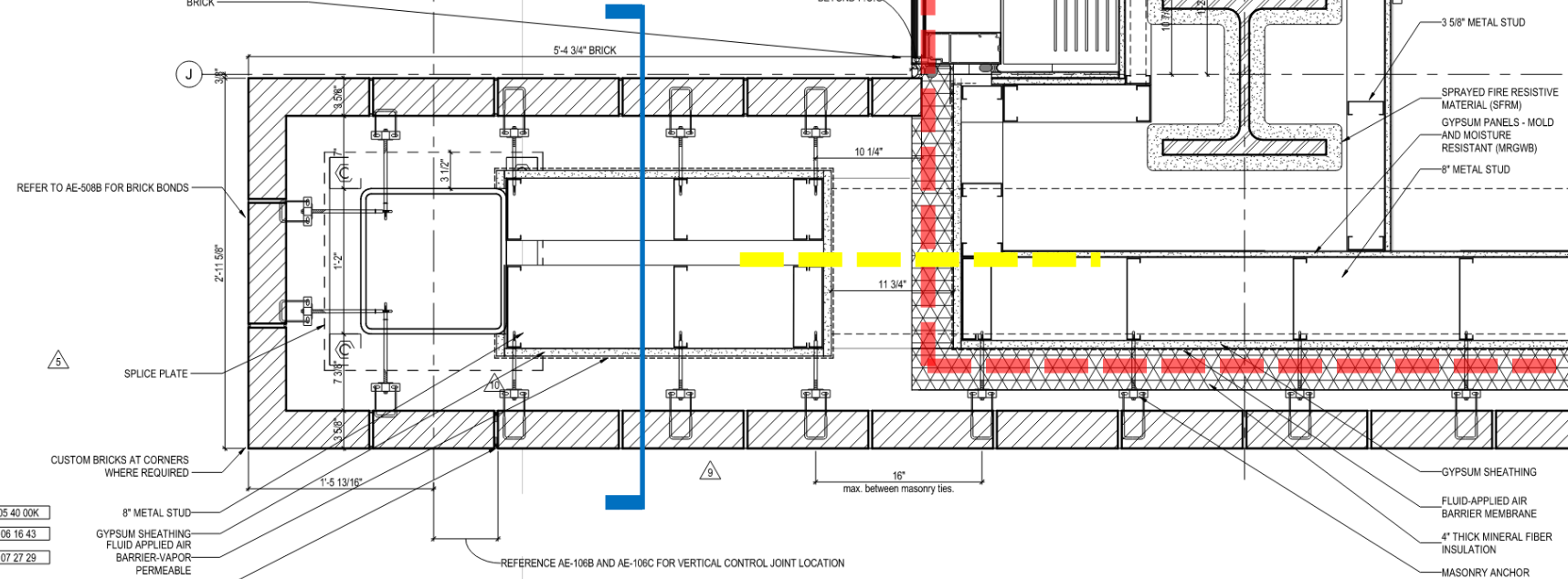
# Wing Walls



# Masonry Wing Wall



VERTICAL MORTAR JOINT WIDTH INCREASED UNIFORMLY FOR NORTH FACING BRICK, PROVIDE 1" OVERLAP FOR SEALANT BETWEEN CURTAINWALL & BRICK

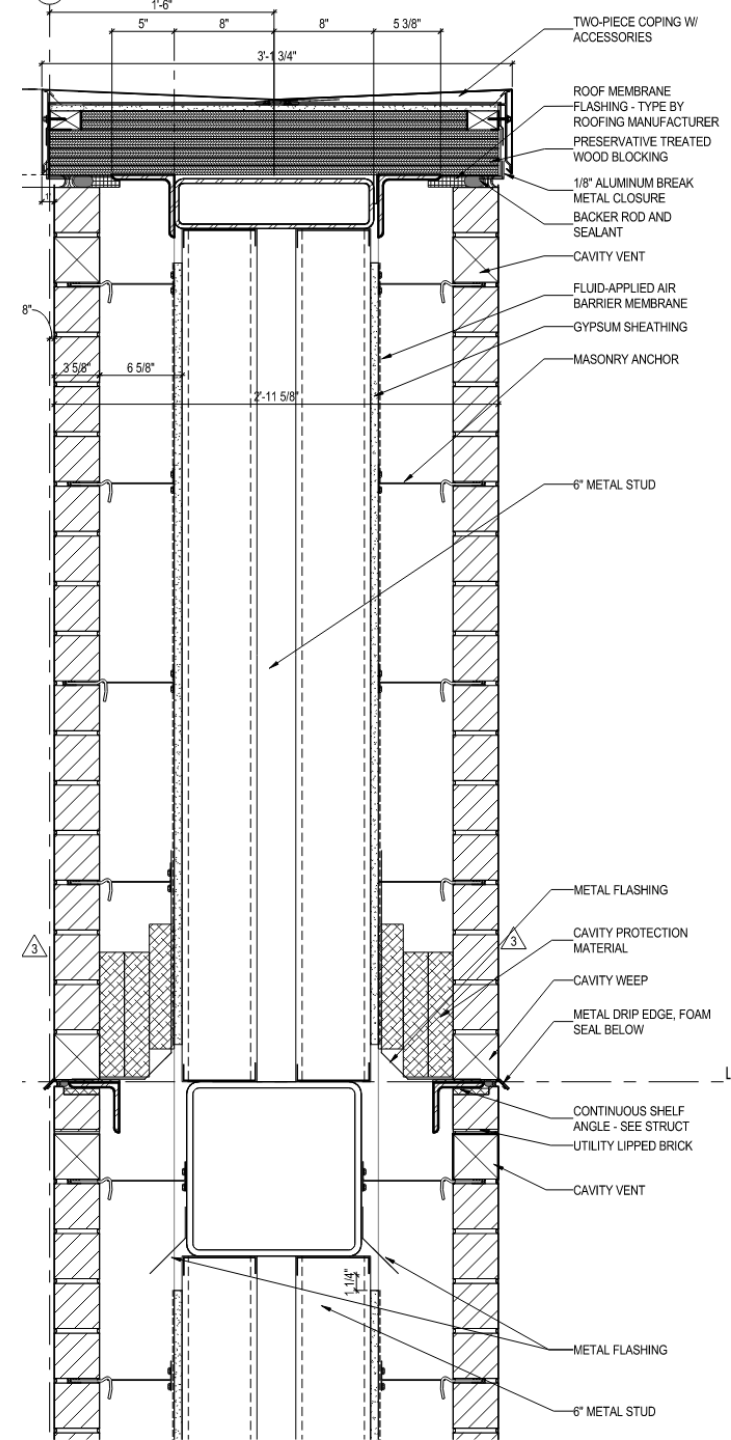


REFER TO AE-508B FOR BRICK BONDS

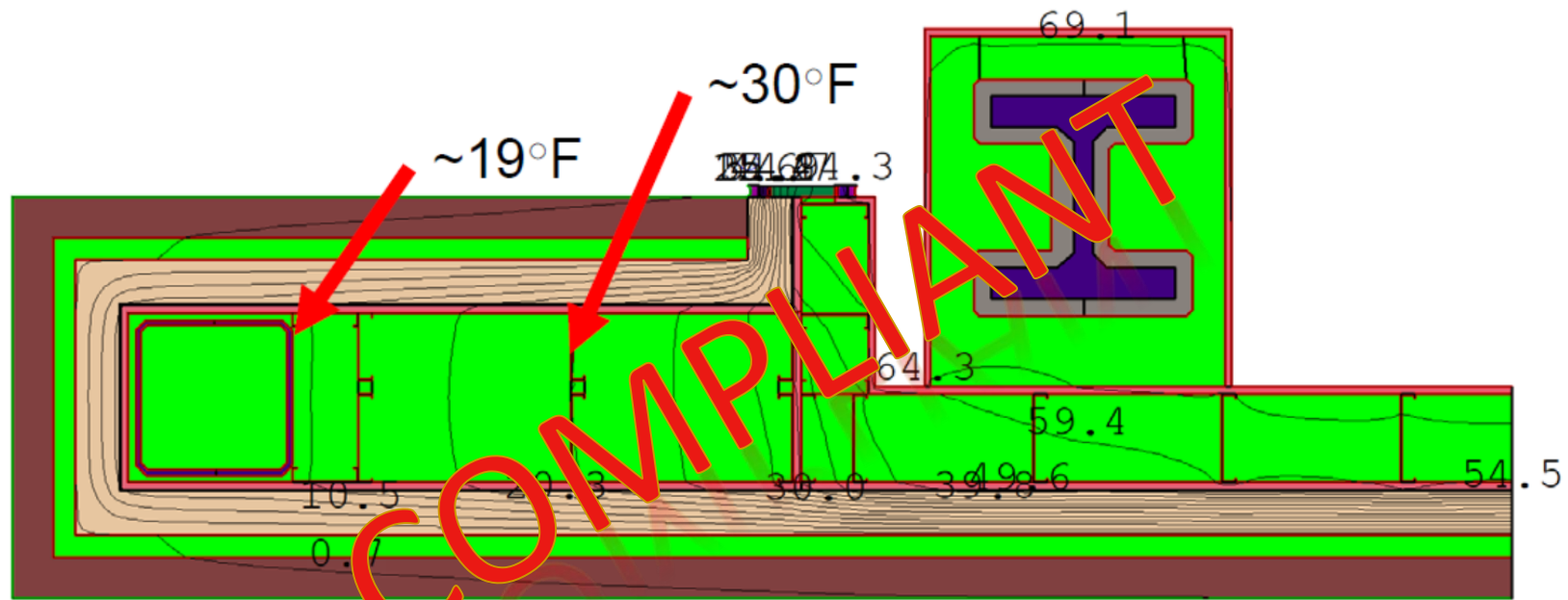
CUSTOM BRICKS AT CORNERS WHERE REQUIRED

- 05 40 00K 8" METAL STUD
- 06 16 43 GYPSUM SHEATHING
- 07 27 29 FLUID APPLIED AIR BARRIER-VAPOR PERMEABLE
- 04 05 23N VERTICAL EXP JT

REFERENCE AE-106B AND AE-106C FOR VERTICAL CONTROL JOINT LOCATION

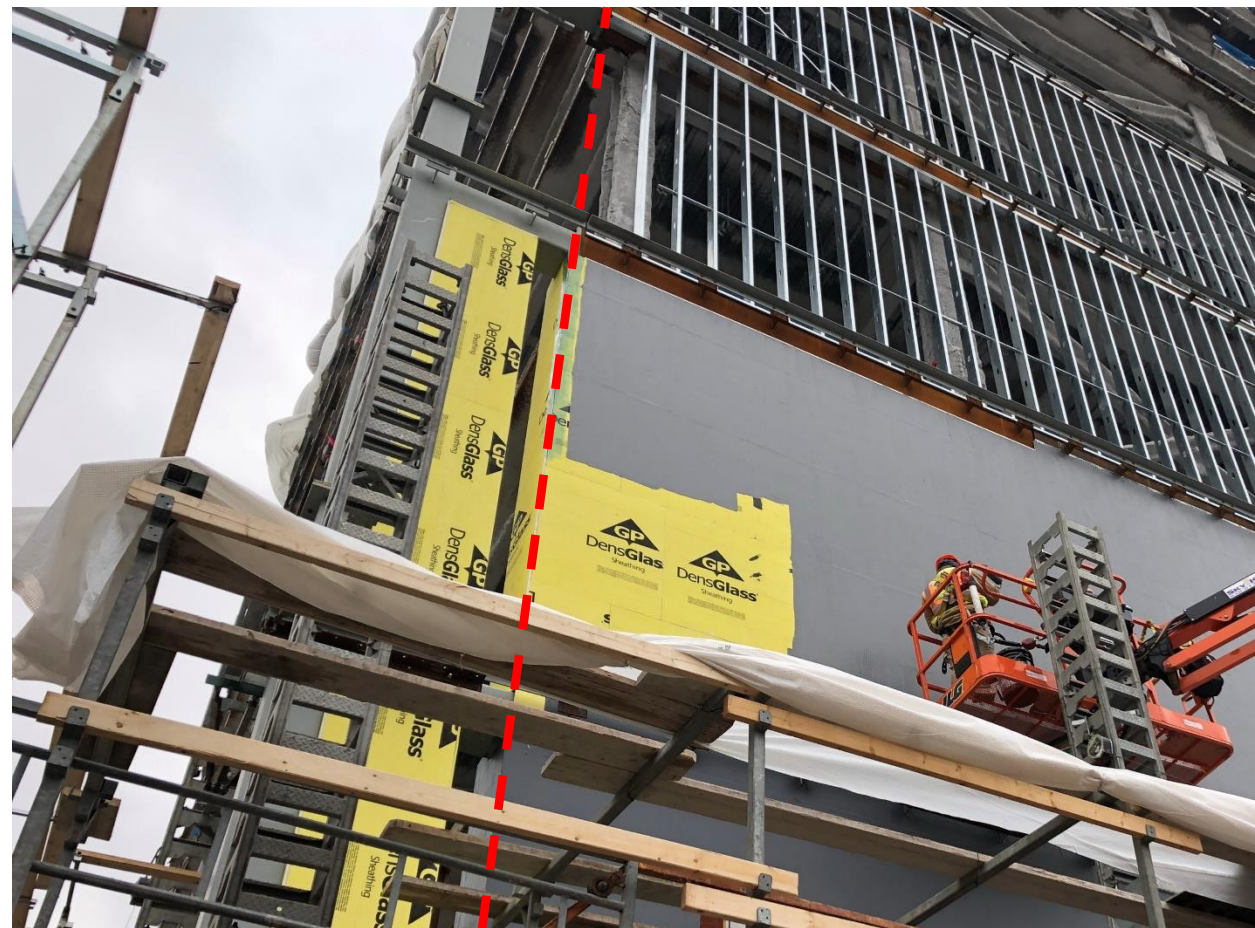
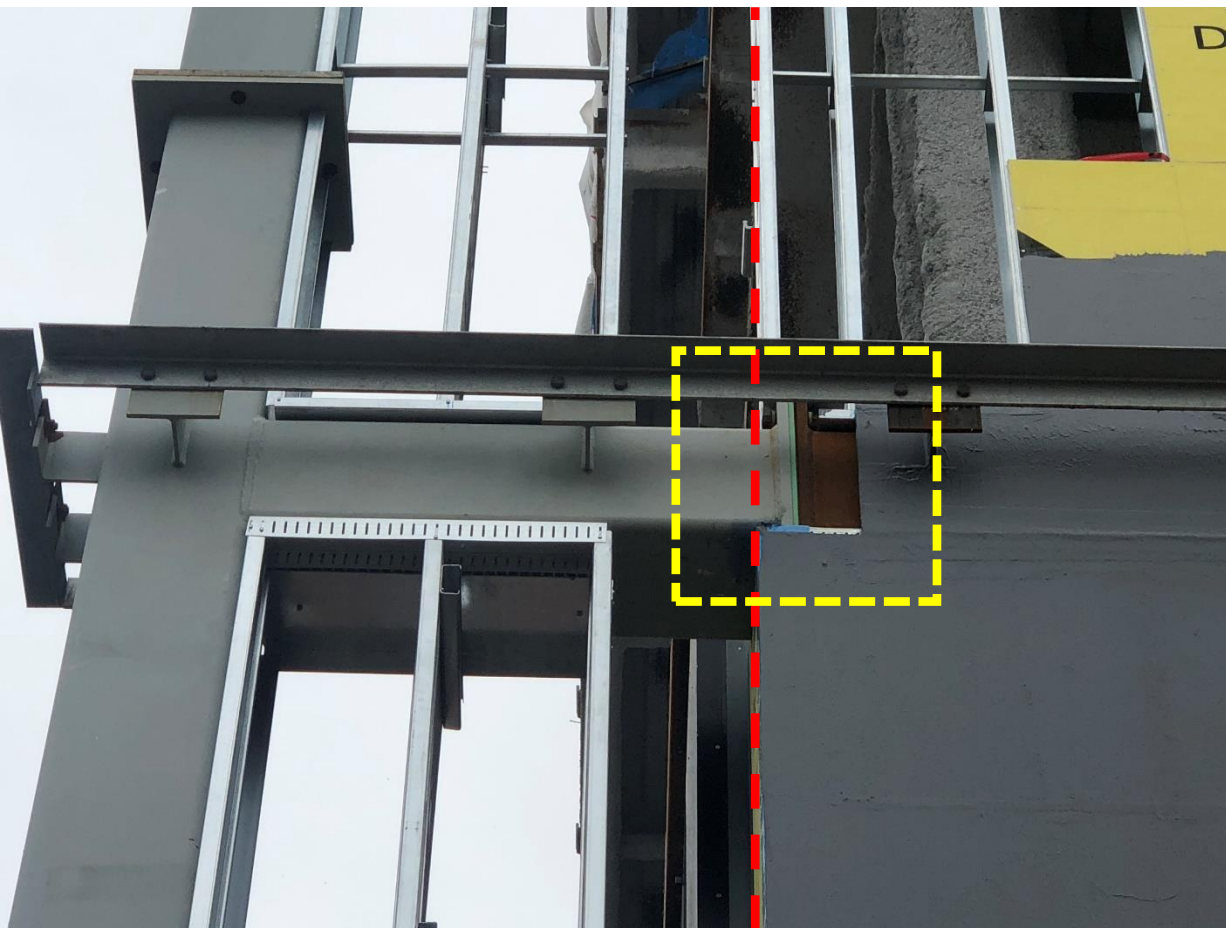


# Masonry Wing Wall

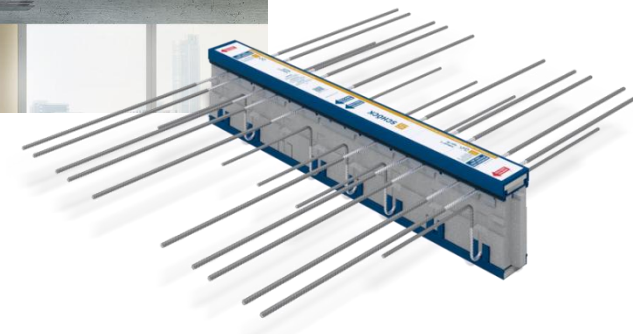
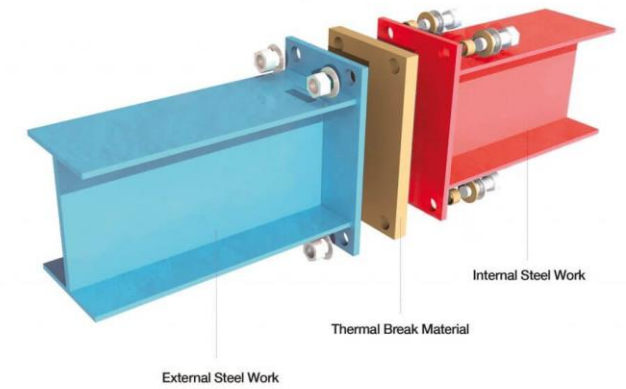
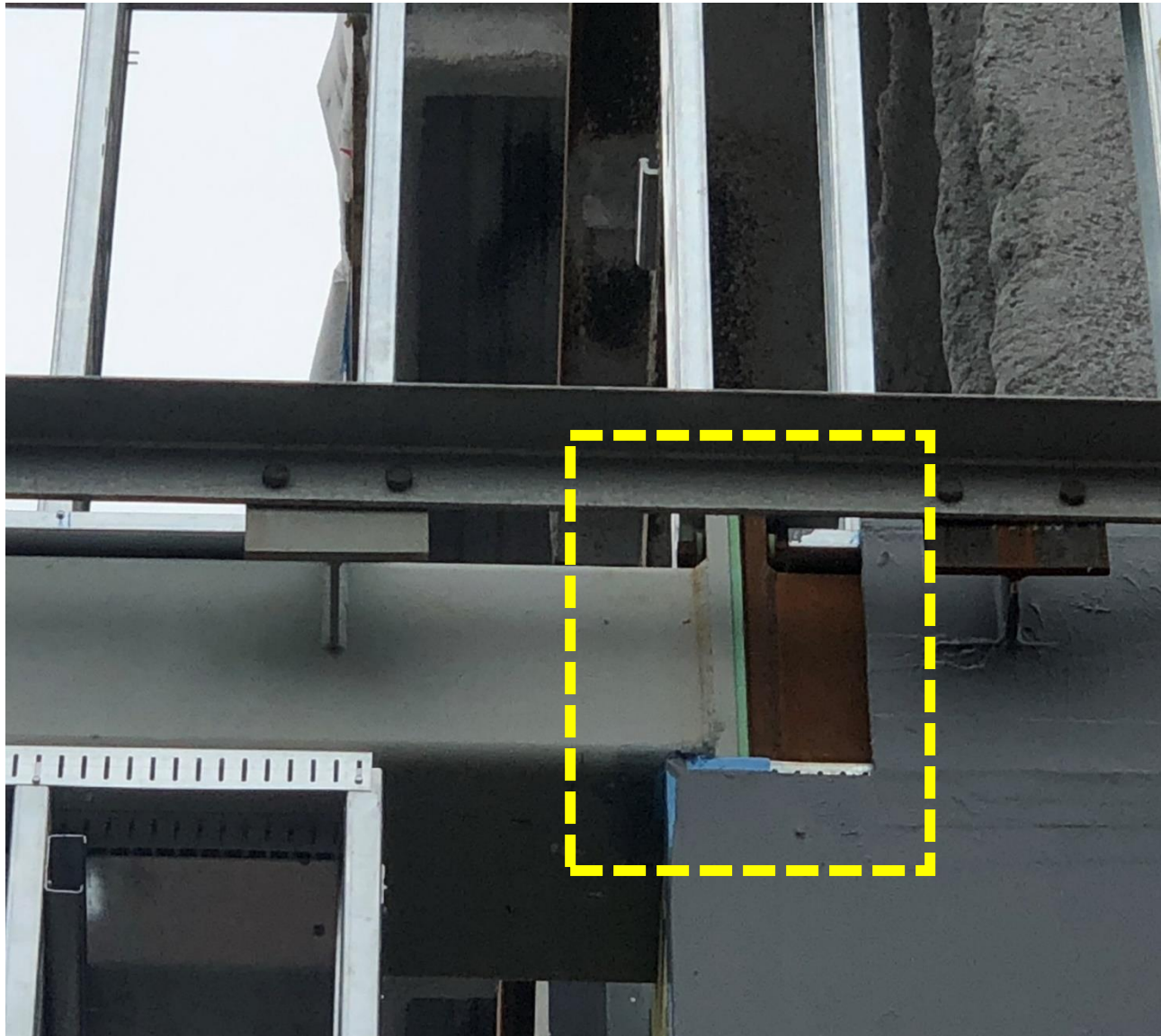




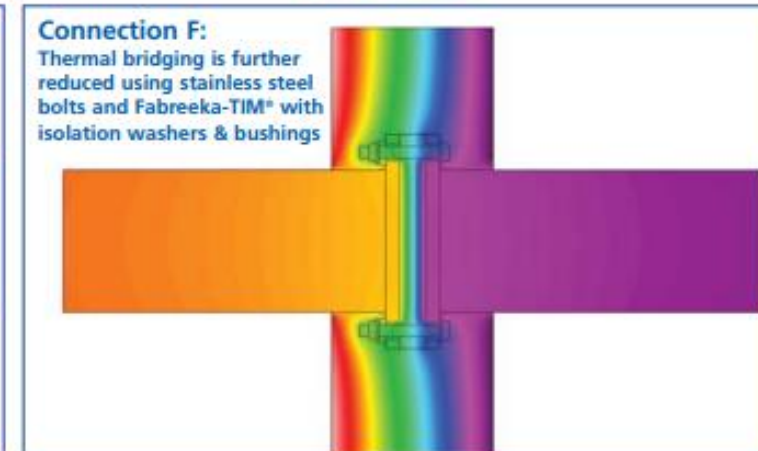
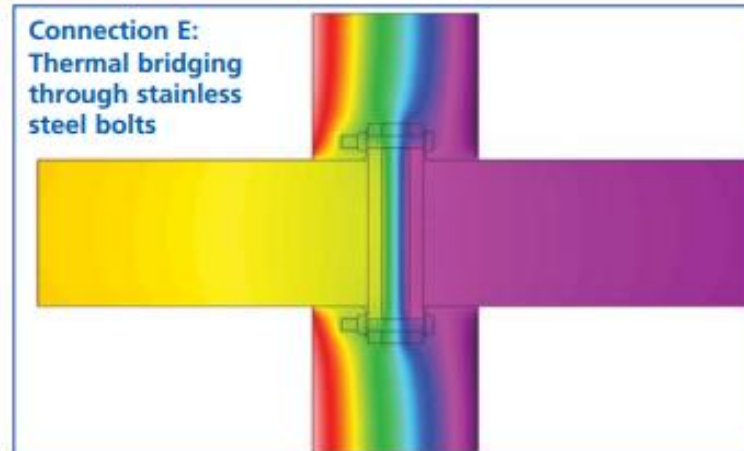
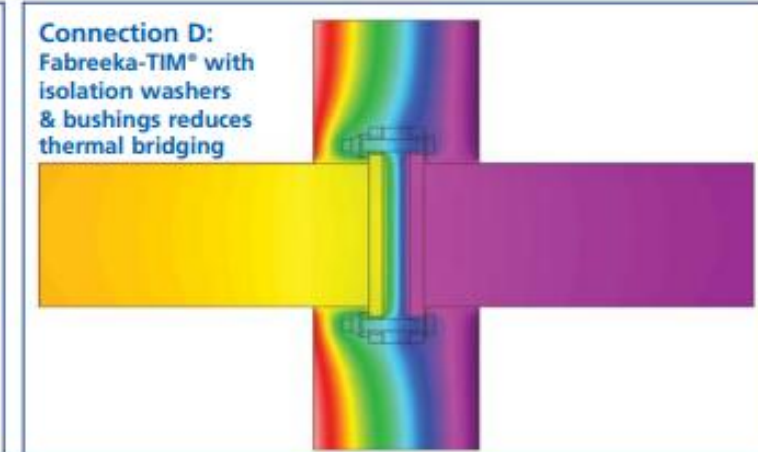
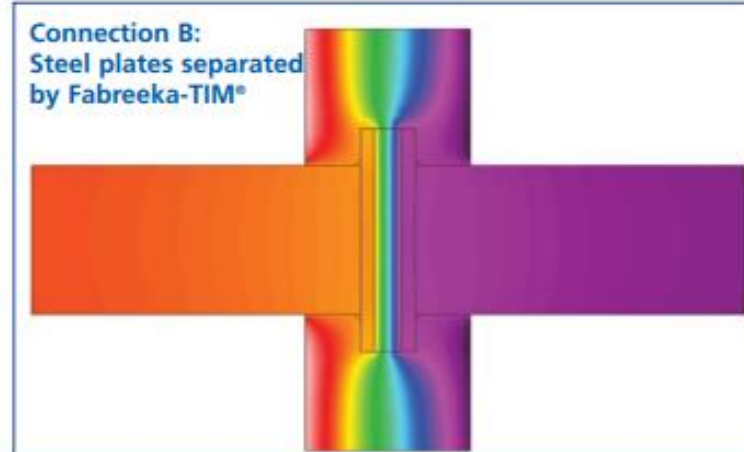
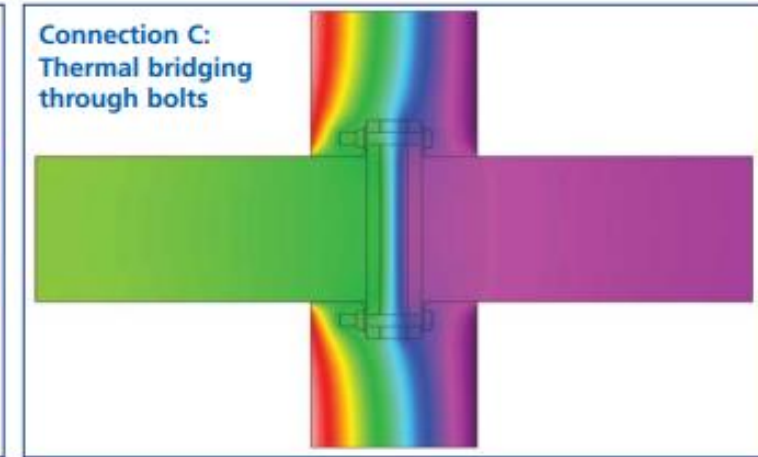
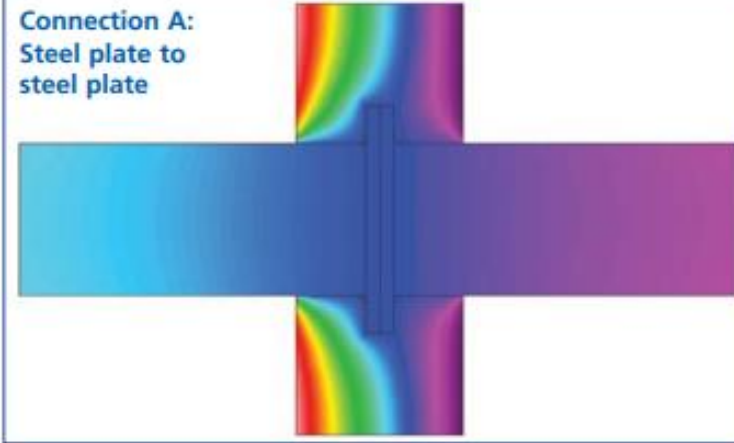
# Masonry Wing Wall



# Masonry Wing Wall



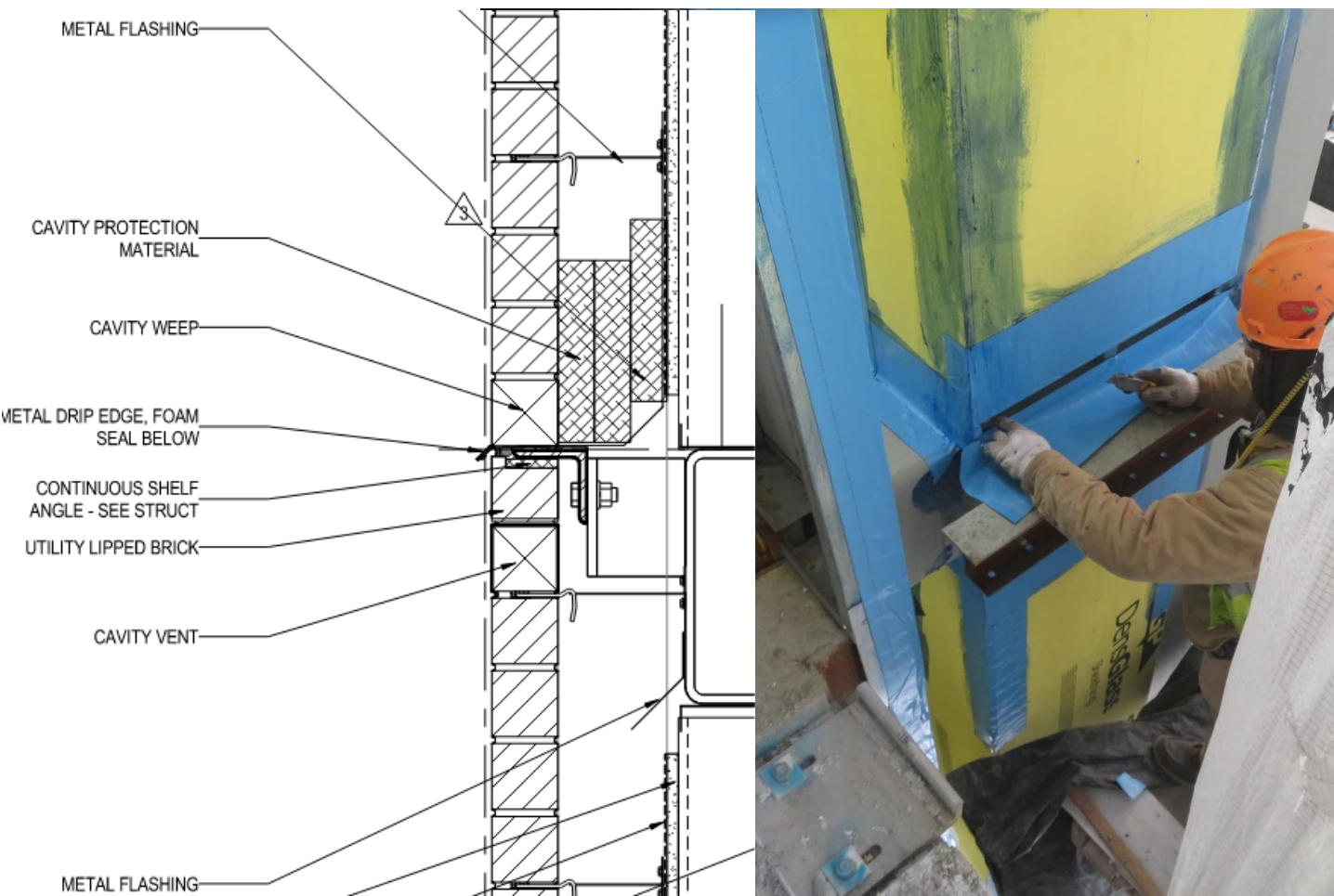
# Thermal Breaks



# Masonry Wing Wall



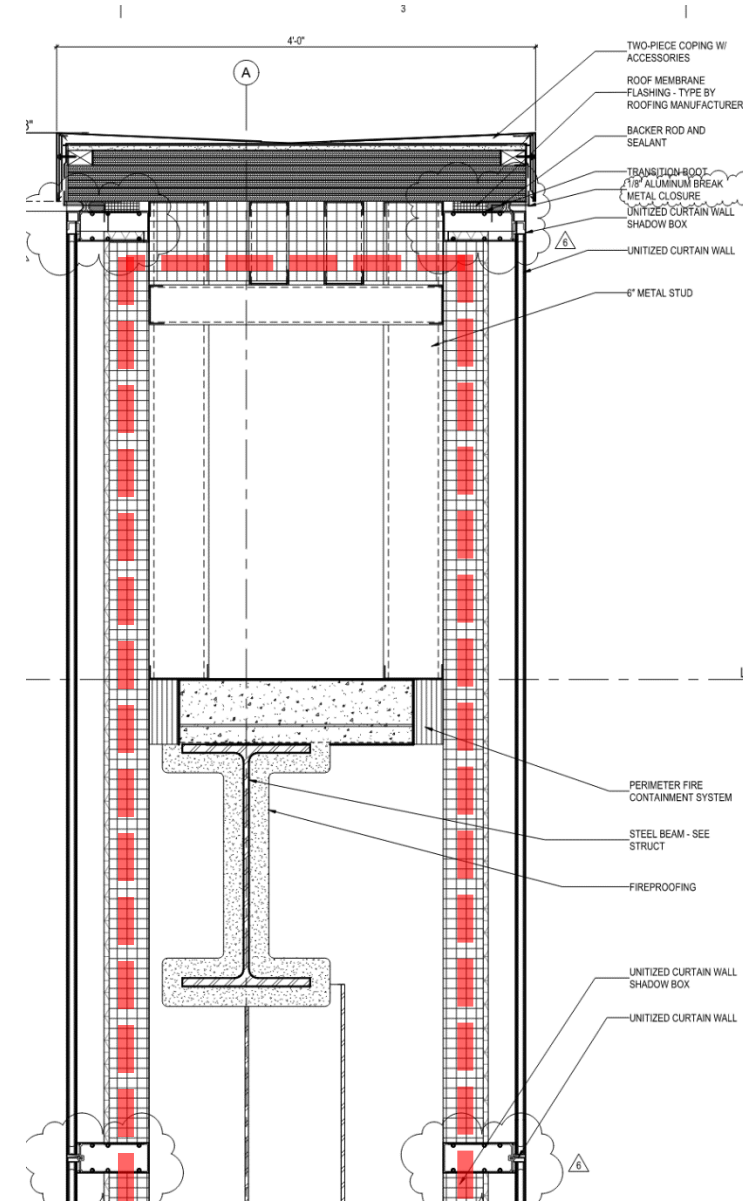
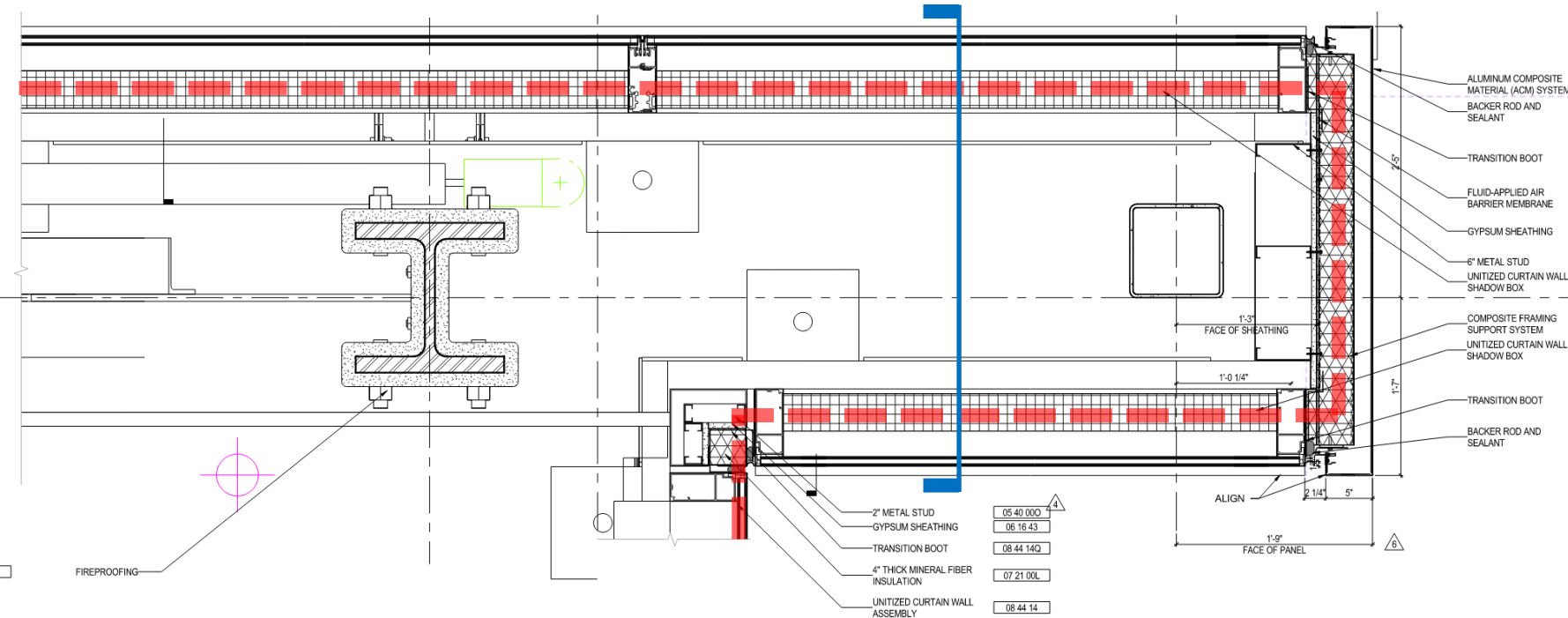
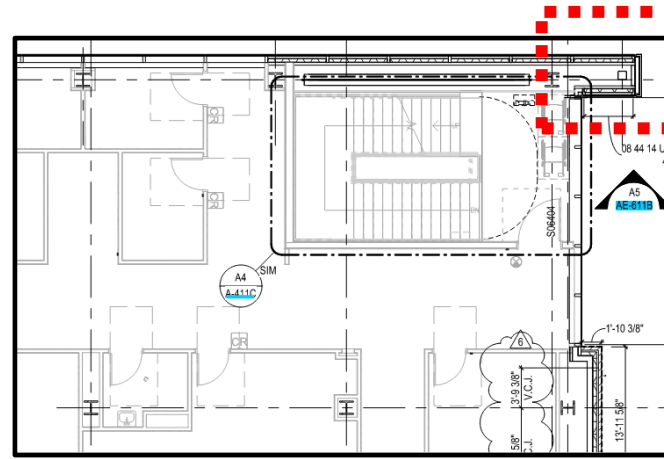
# Masonry Wing Wall



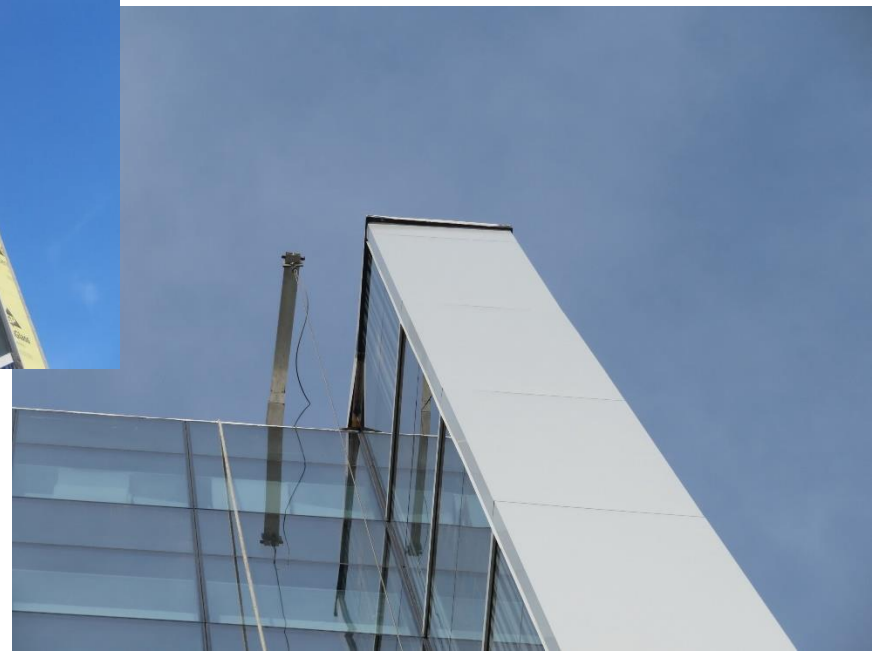
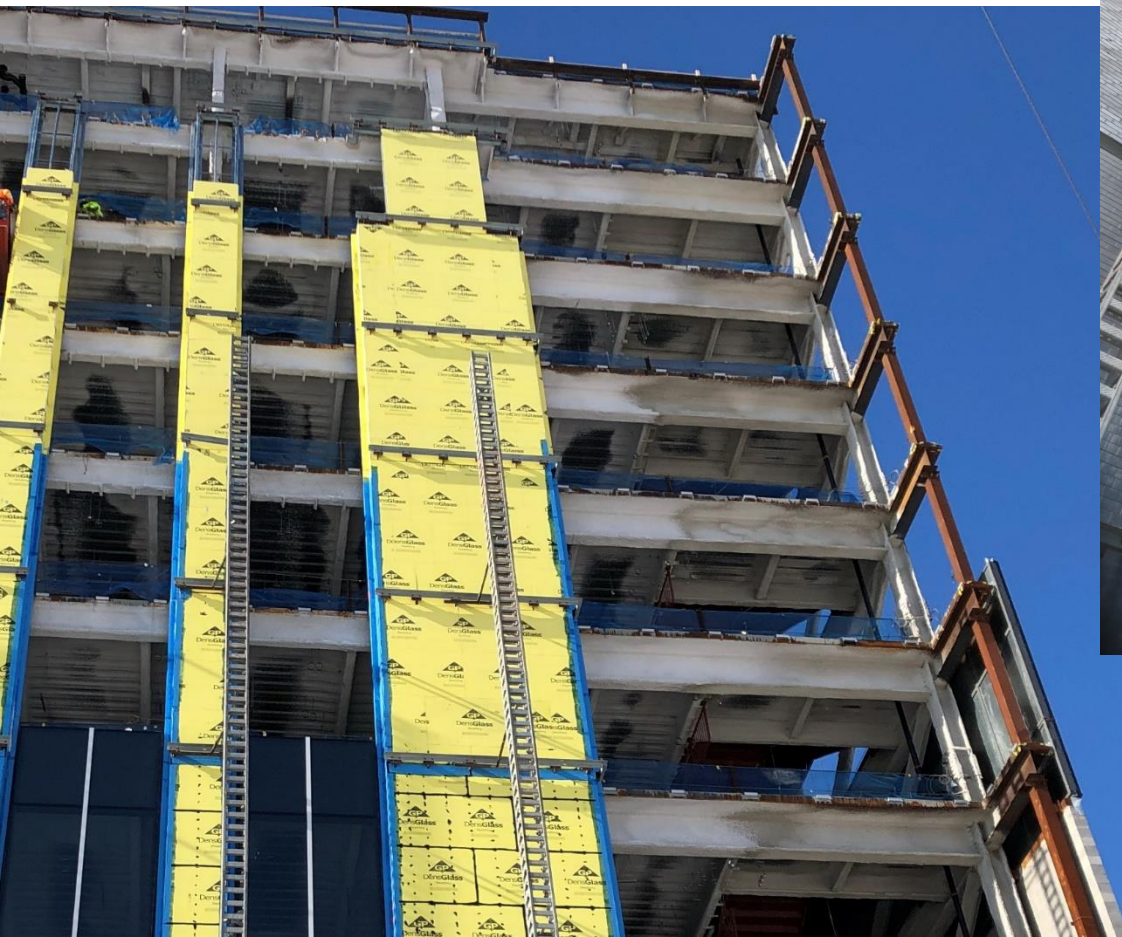
# Masonry Wing Wall



# Curtain Wall Wing Wall



# Curtain Wall Wing Wall

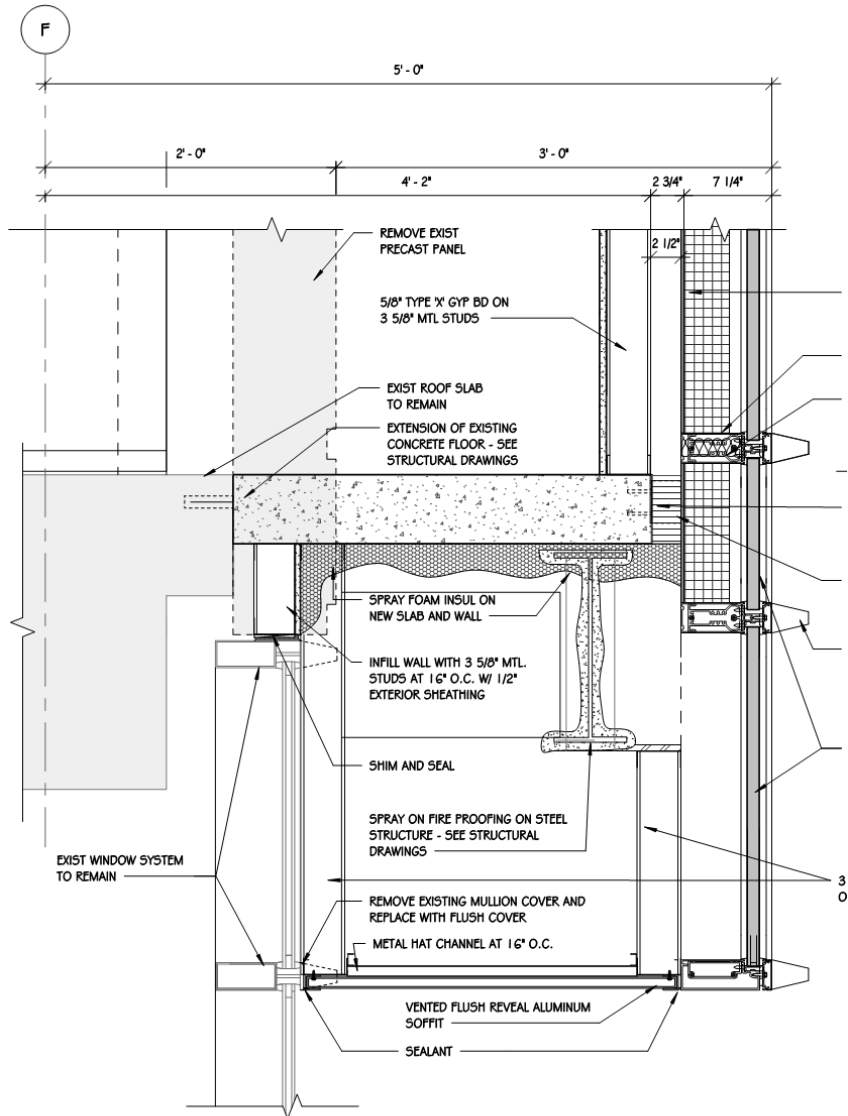




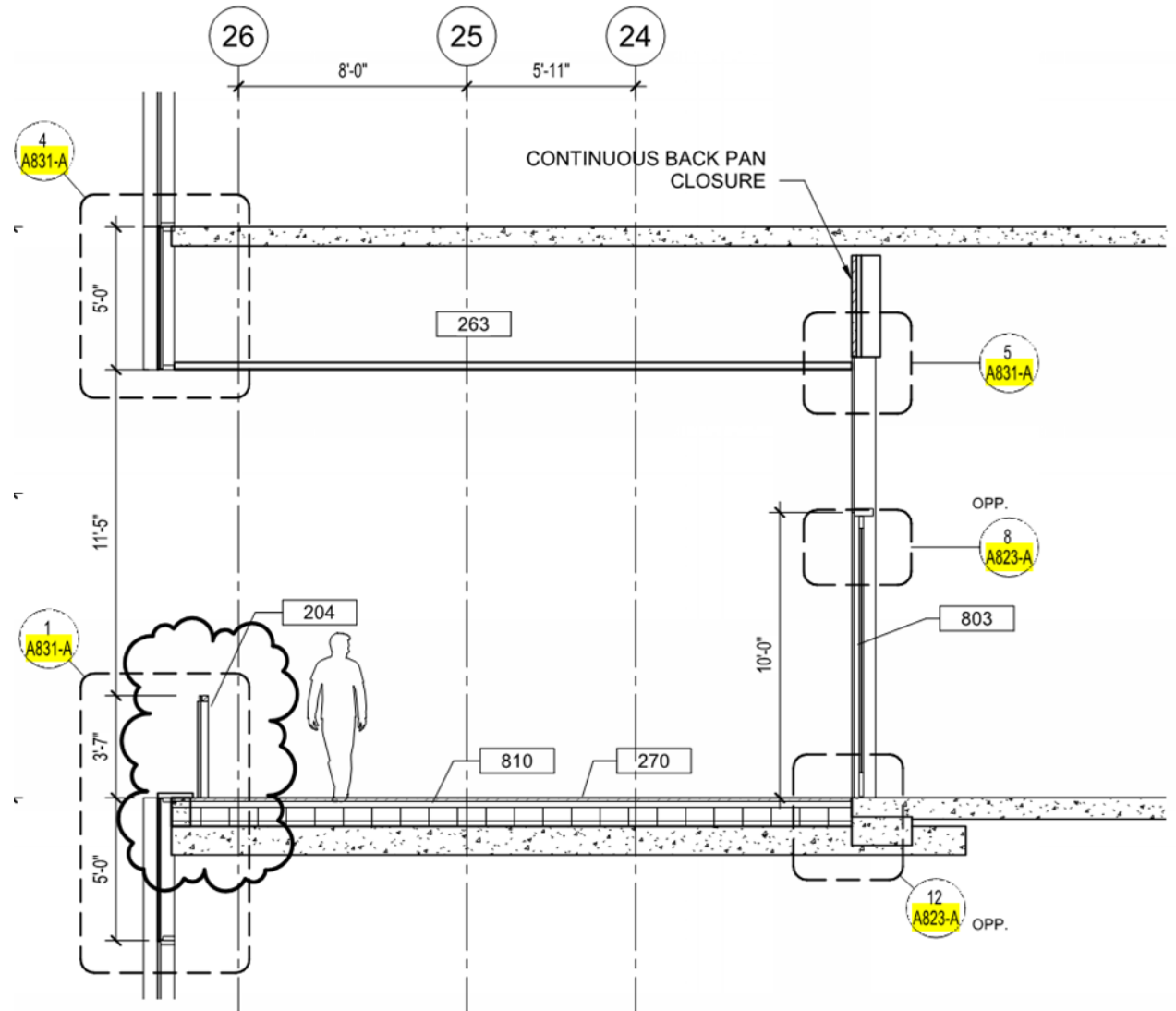
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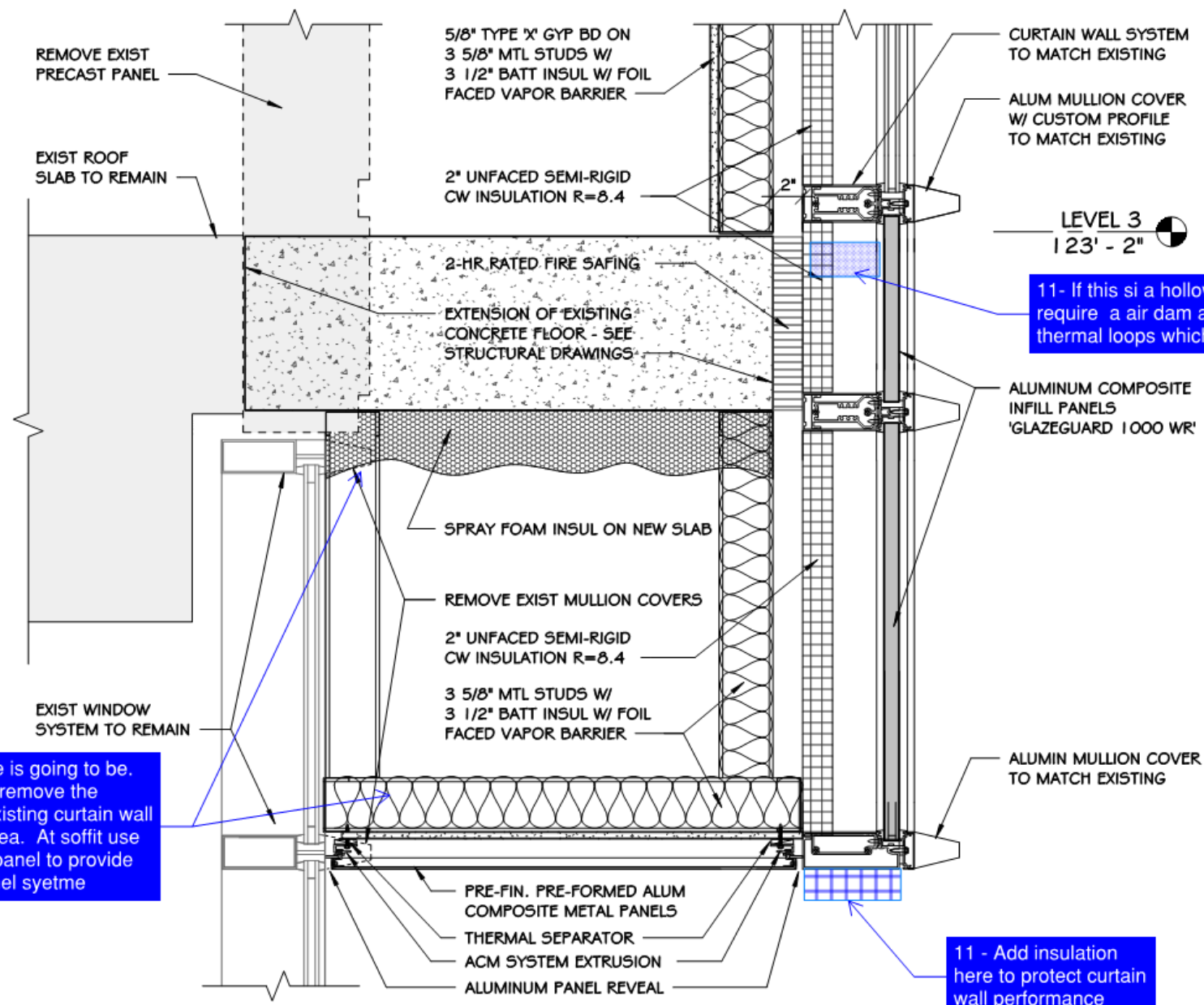
# Case Study - Soffits



⑦ CANTILEVER DETAIL 1  
1 1/2" = 1'-0"



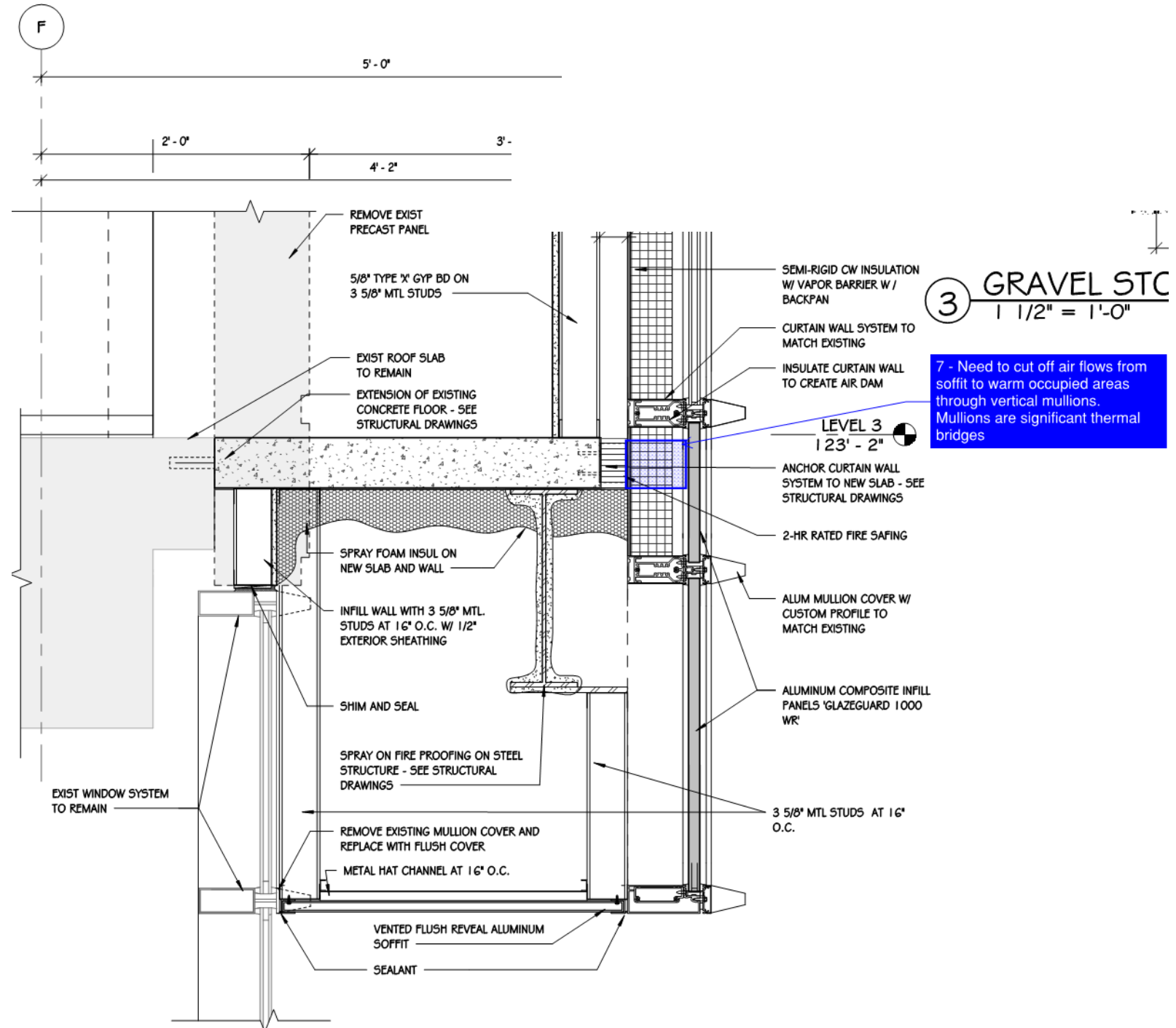
② LEVEL 3 TERRACE FACADE SECTION 1  
SCALE: 1/4" = 1'-0"

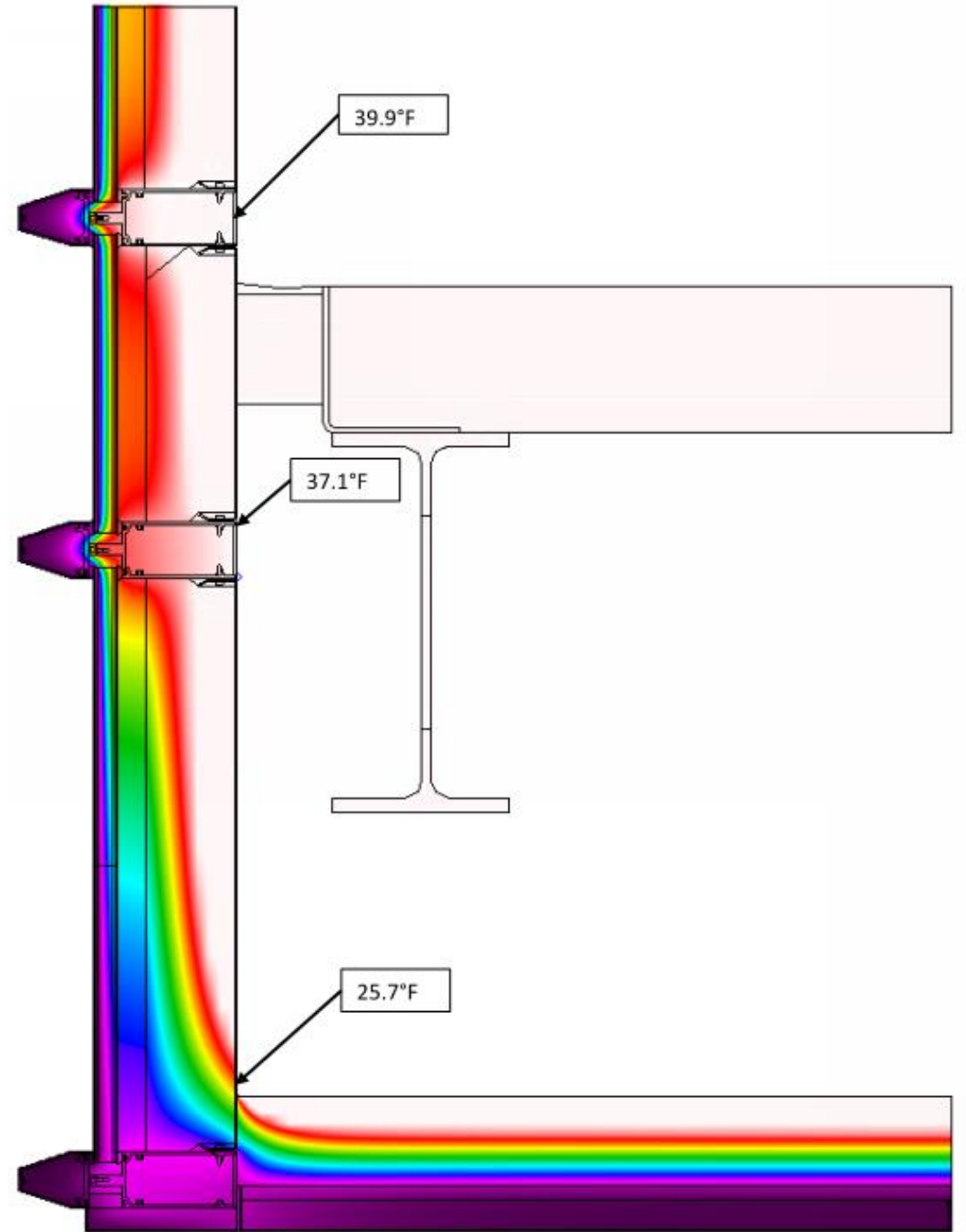
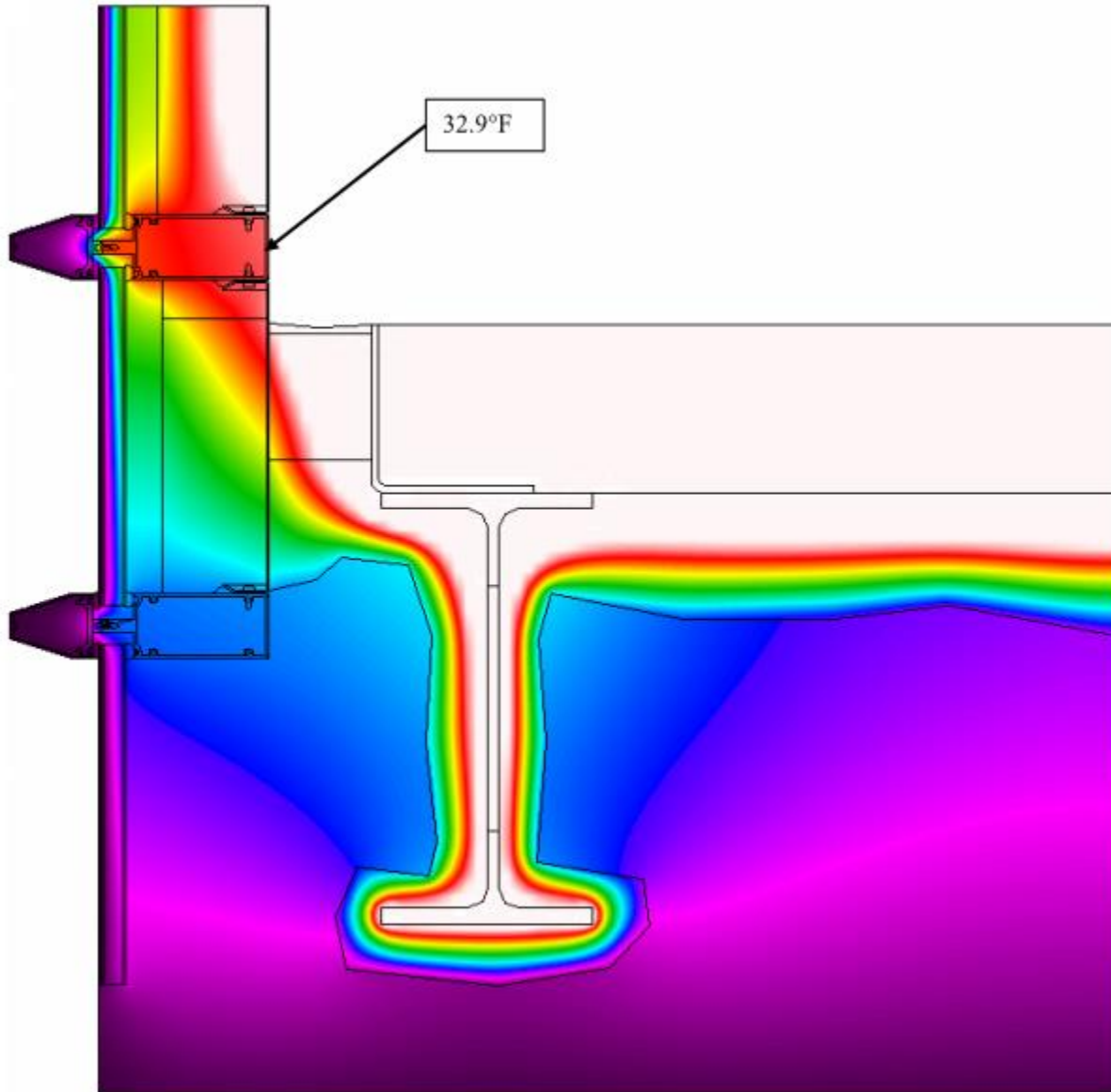


11- Choose where line of enclosure is going to be. Suggest it be at the soffit and then remove the glazing from the upper lite of the existing curtain wall to allow for air flow out into soffit area. At soffit use integrated insulation and plywood panel to provide high performance substrate for panel system

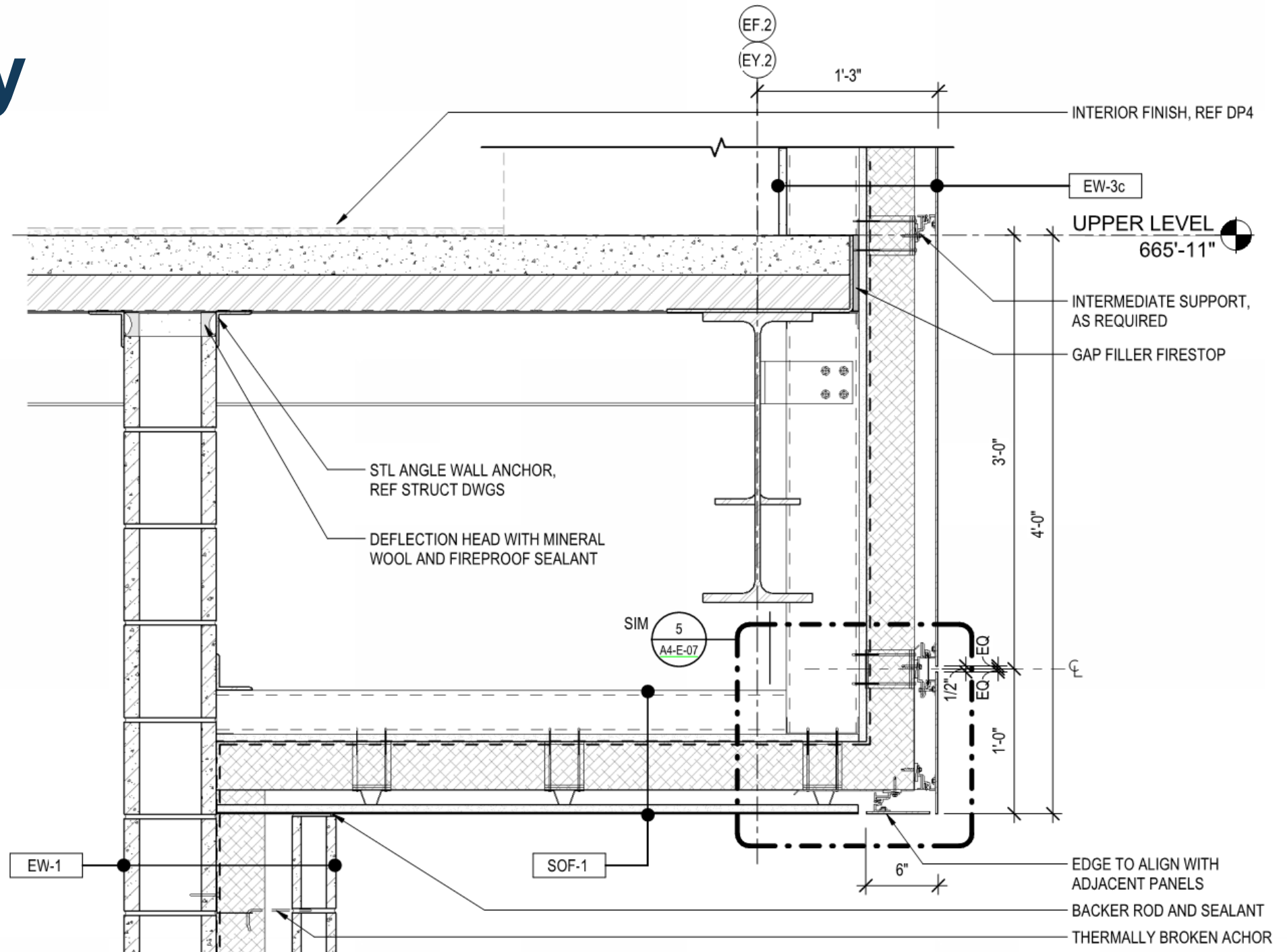
11- If this is a hollow tube type curtain wall assembly will require an air dam at slab level to mitigate convective thermal loops which will degrade performance

11 - Add insulation here to protect curtain wall performance

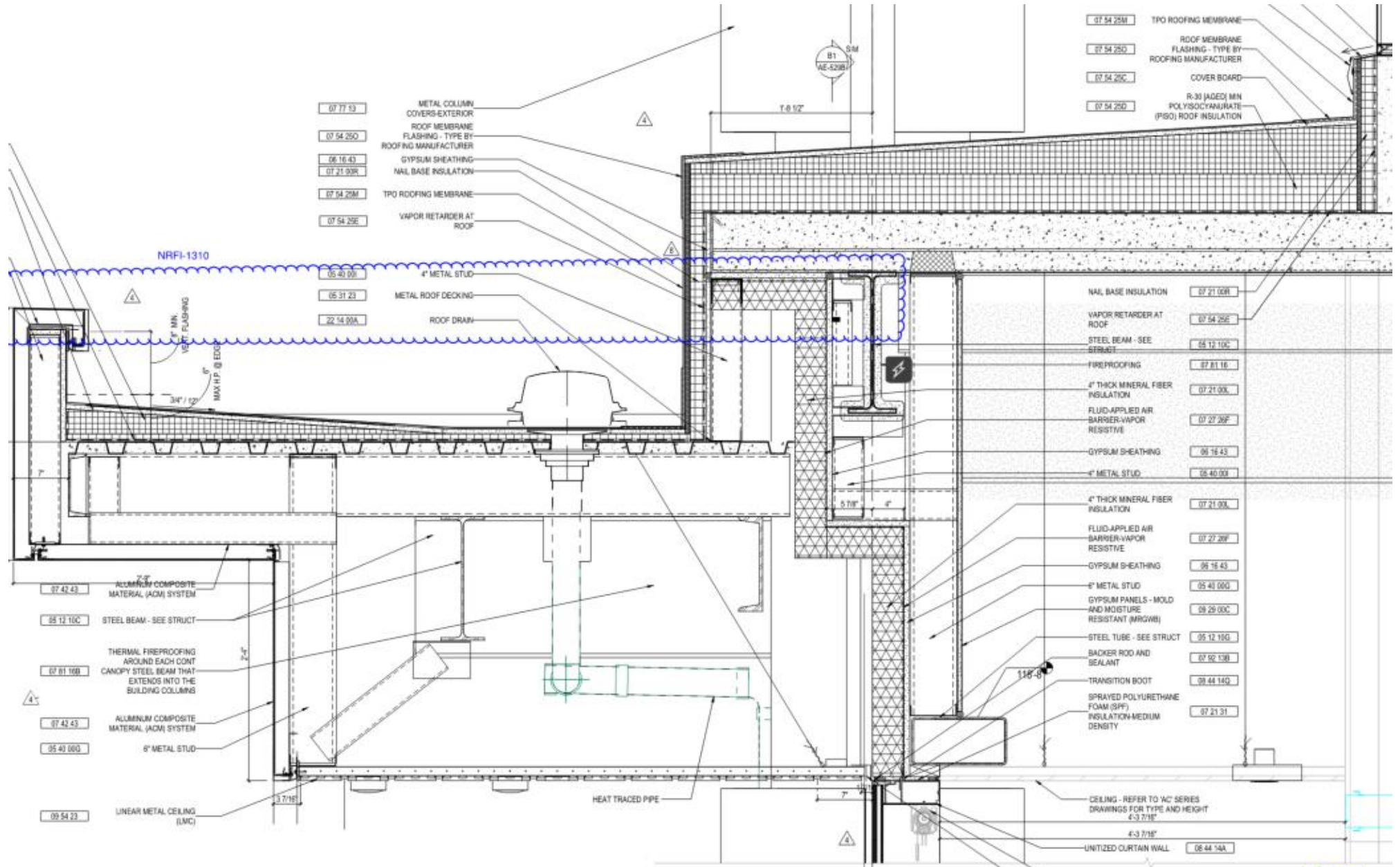




# Case Study



# Overhangs





# Closing Thoughts







Questions?



Thank you!