15th Canadian Conference on Building Science and Technology

November 6-8, 2017

Vancouver, BC, Canada

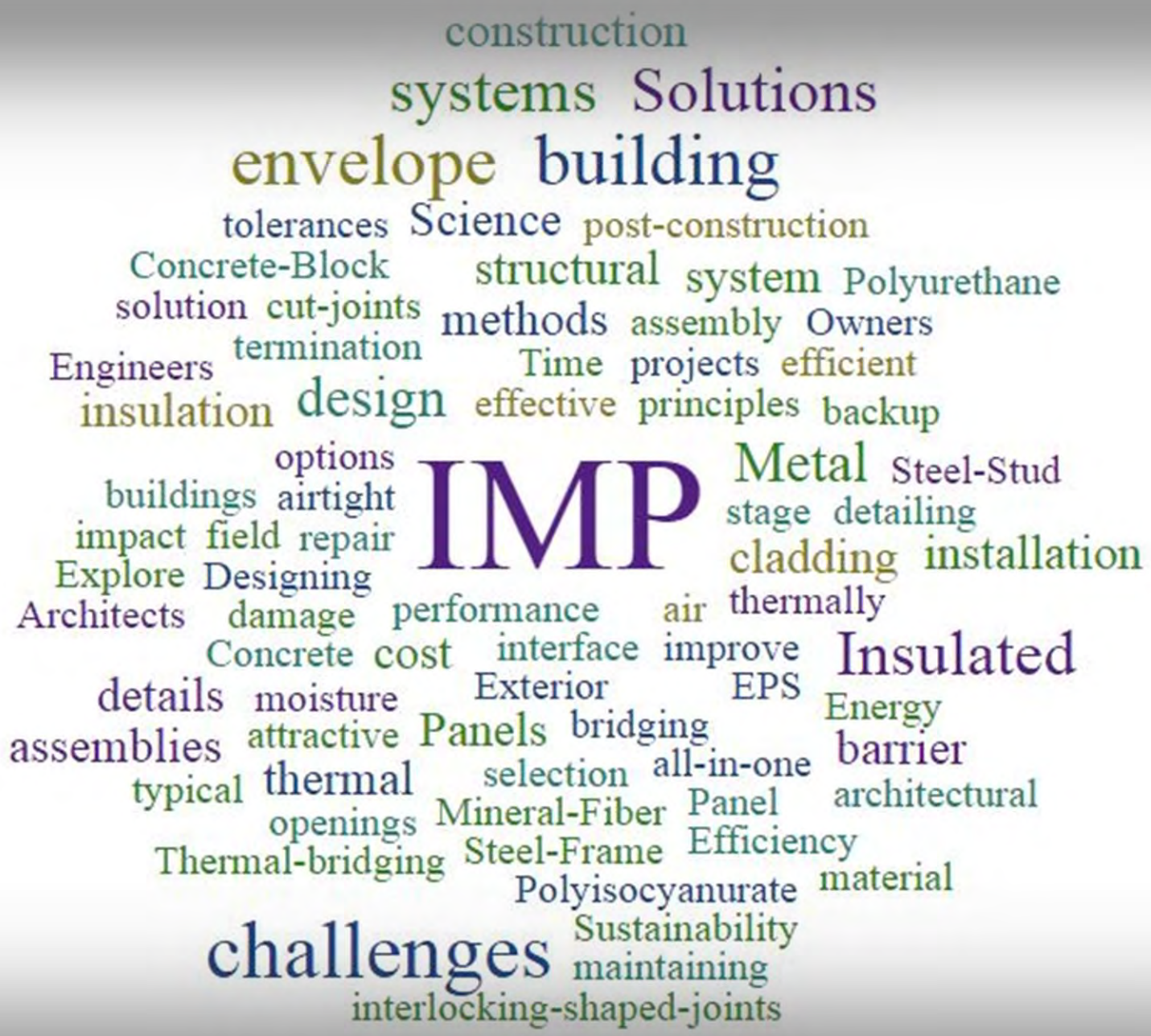
MORRISON HERSHFIELD

Insulated Metal Panels:

Tales from the field and how to improve your next design using IMP.

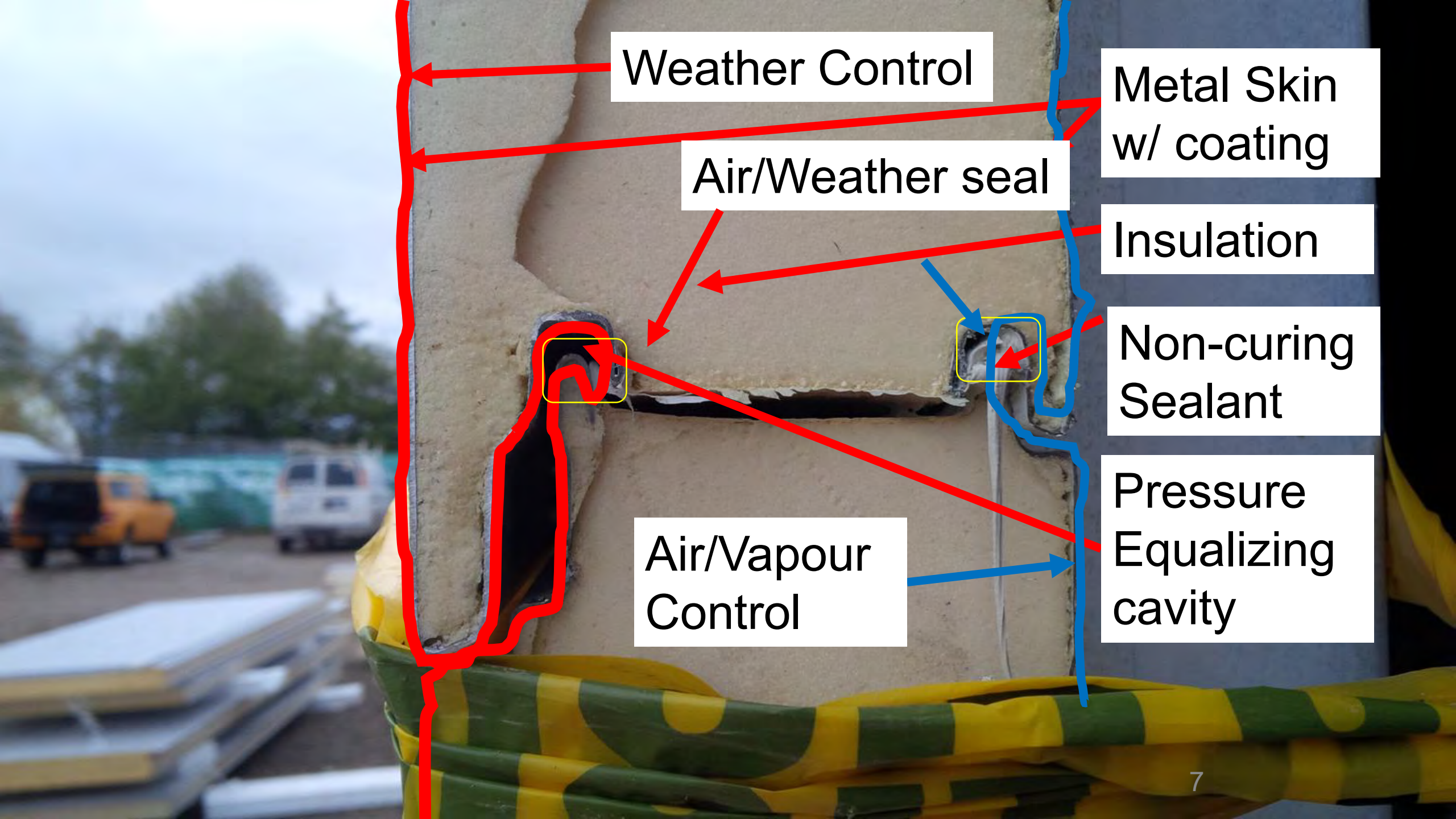
Harold Louwerse
BTech, RRO

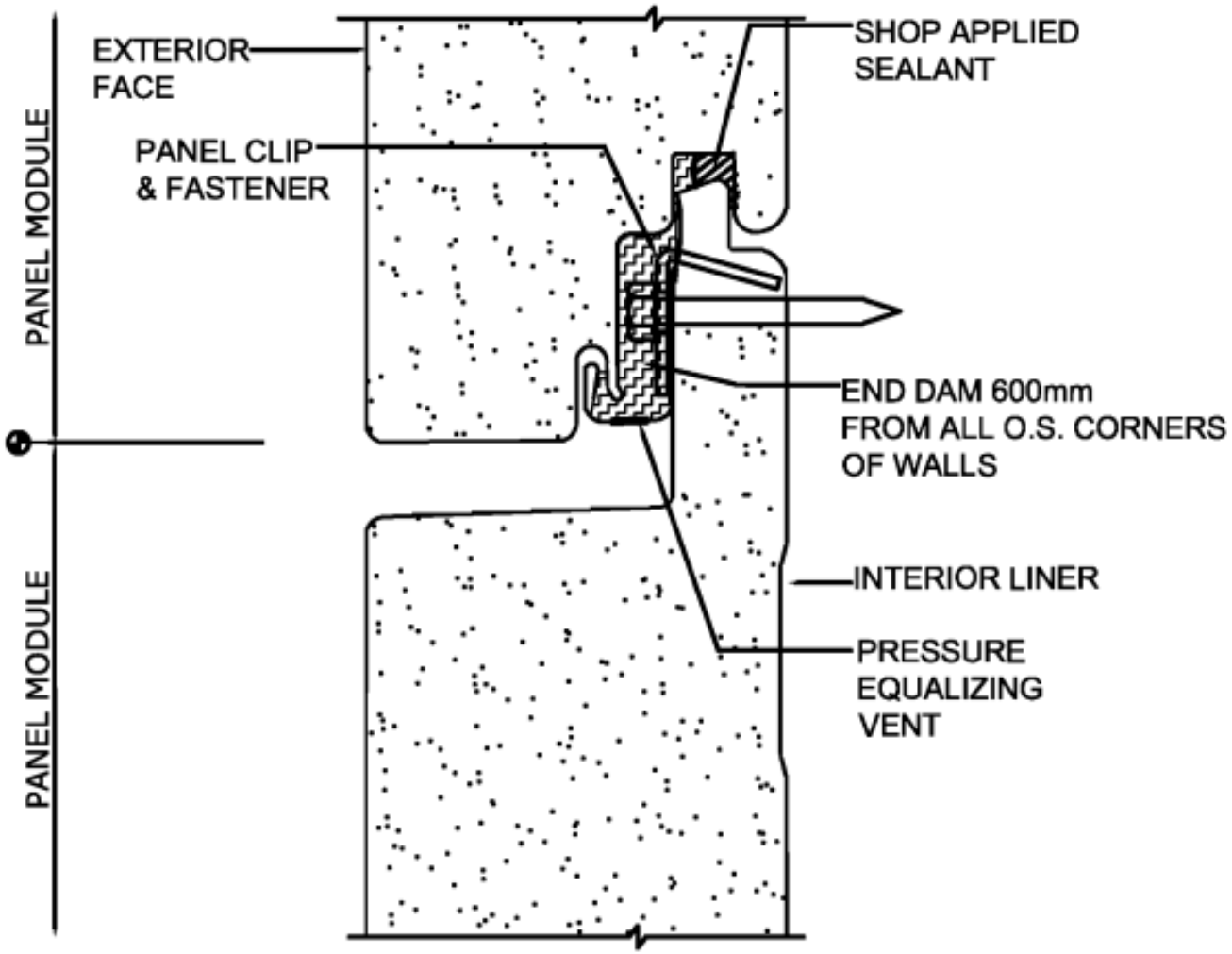
1) What is an IMP
2) IMP as a System
3) Why use IMP vs other systems
4) Uses/ Project Types
5) Design and Construction Considerations
6) Post Construction Repair and Maintenance


construction
systems
Solutions
envelope
building
tolerances
Science
post-construction
Concrete-Block
structural
system
Polyurethane
solution
cut-joints
methods
assembly
Owners
termination
Engineers
Time
projects
efficient
insulation
design
effective
principles
backup
options
IMP
Metal
Steel-Stud
buildings
airtight
stage
detailing
impact
field
repair
cladding
installation
Explore
Designing
Architects
damage
performance
air
thermally
Concrete
cost
interface
improve
Insulated
details
moisture
Exterior
EPS
Energy
assemblies
attractive
Panels
bridging
barrier
typical
thermal
selection
all-in-one
architectural
openings
Mineral-Fiber
Panel
Thermal-bridging
Steel-Frame
Efficiency
Polyisocyanurate
material
challenges
Sustainability
maintaining
interlocking-shaped-joints

Insulated Metal Panels

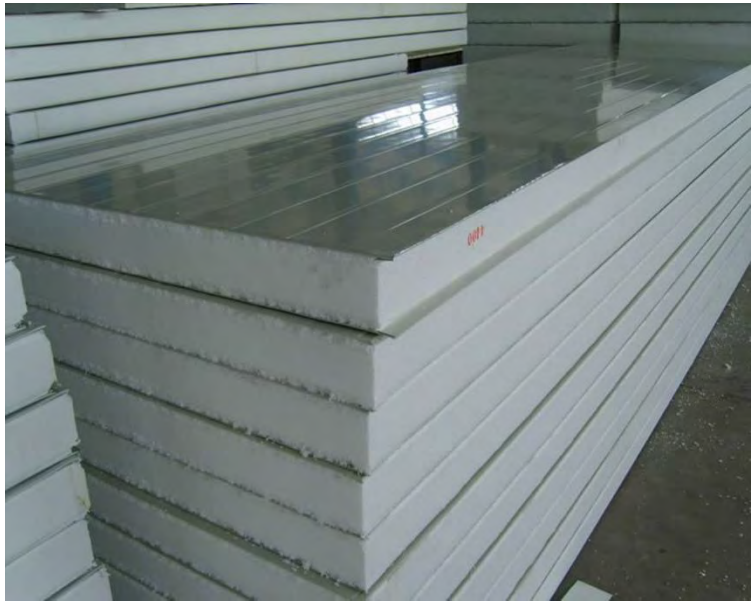
1) **What is an IMP**
2) IMP as a System
3) Why use IMP vs other systems
4) Uses/ Project Types
5) Design and Construction Considerations
6) Post Construction Repair and Maintenance


Weather Control
Metal Skin w/ coating
Air/Weather seal
Insulation
Non-curing Sealant
Pressure Equalizing cavity
Air/Vapour Control


EXTERIOR FACE
PANEL CLIP & FASTENER
PANEL MODULE
PANEL MODULE
SHOP APPLIED SEALANT
END DAM 600mm FROM ALL O.S. CORNERS OF WALLS
INTERIOR LINER
PRESSURE EQUALIZING VENT

PIR - Polyiso Insulation
~R-6.5 per inch

PUR - Polyurethane Insulation
~R-5.5 per inch



EPS Insulation ~ R-4 per inch

Mineral Fiber Insulation
~R4.3 per inch

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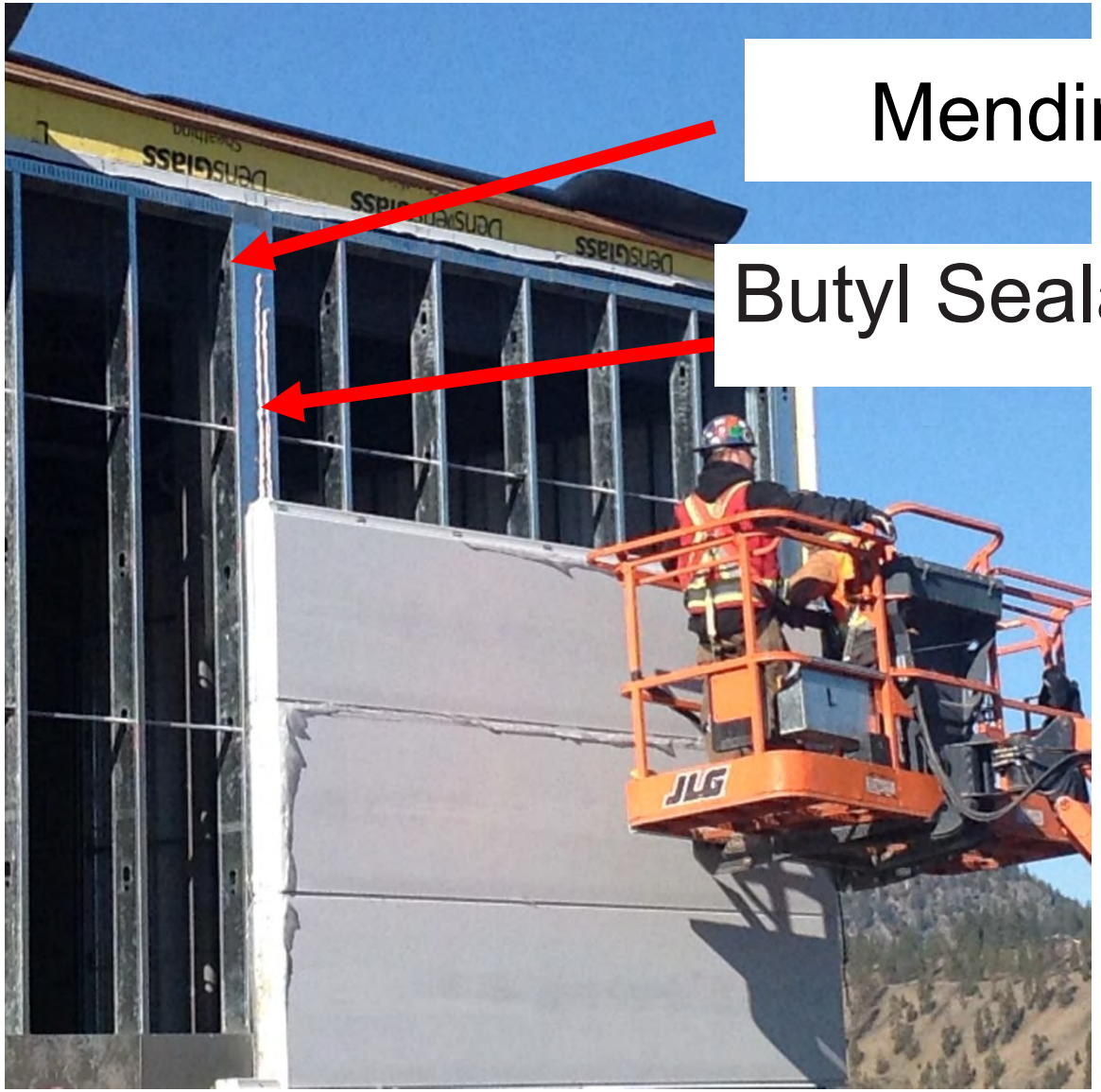
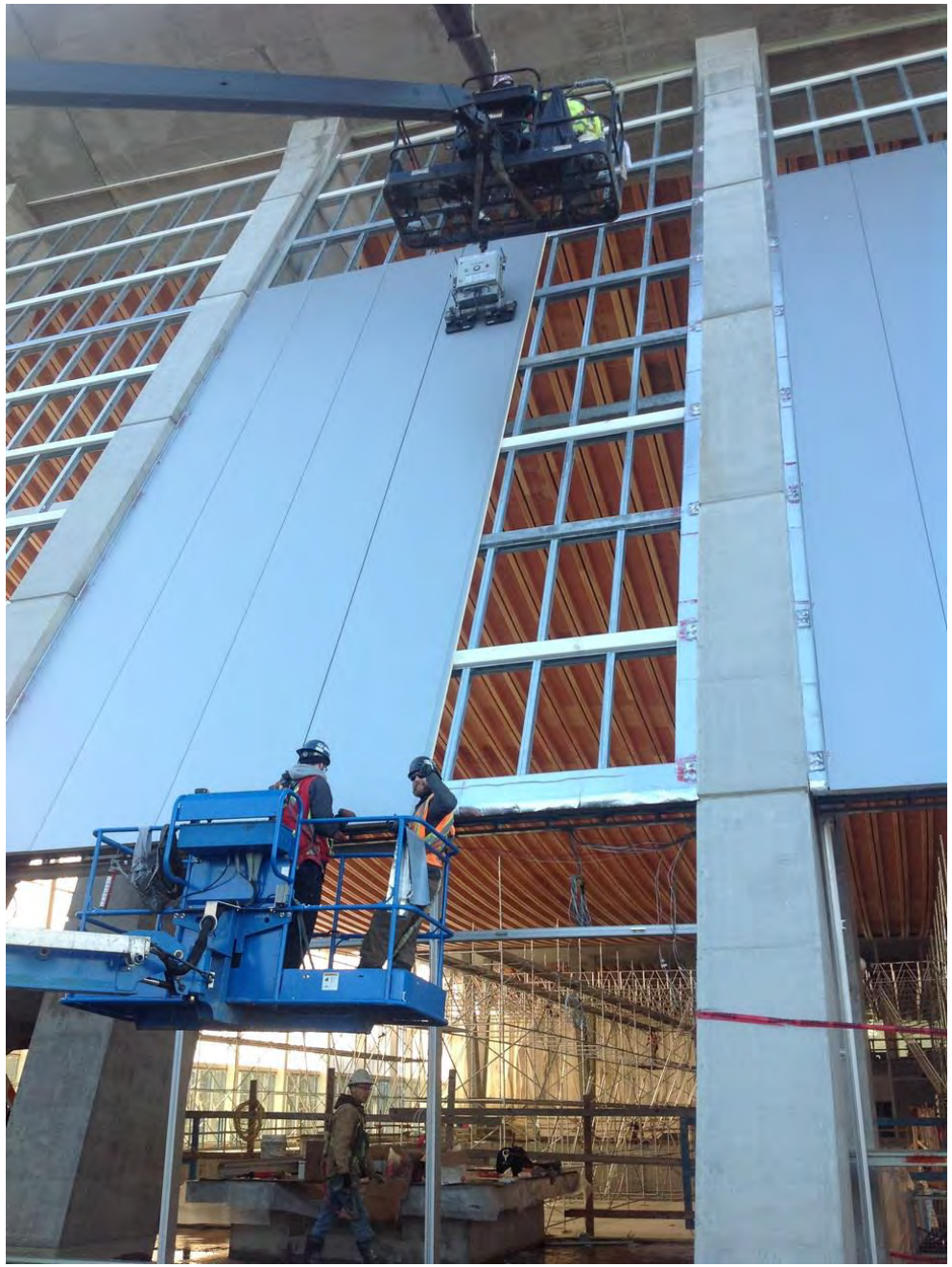
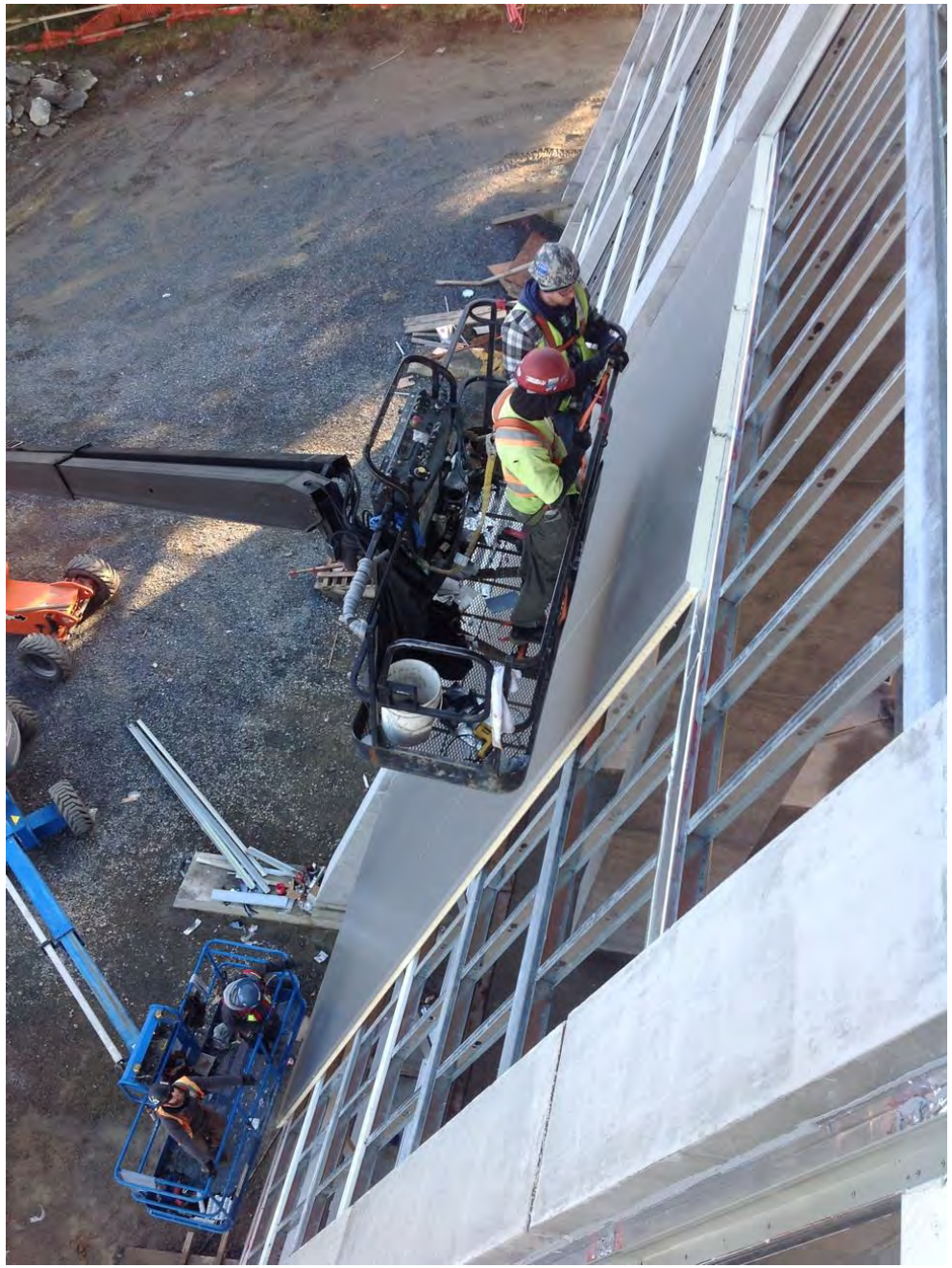

Mending Plate
Butyl Sealant
JLG

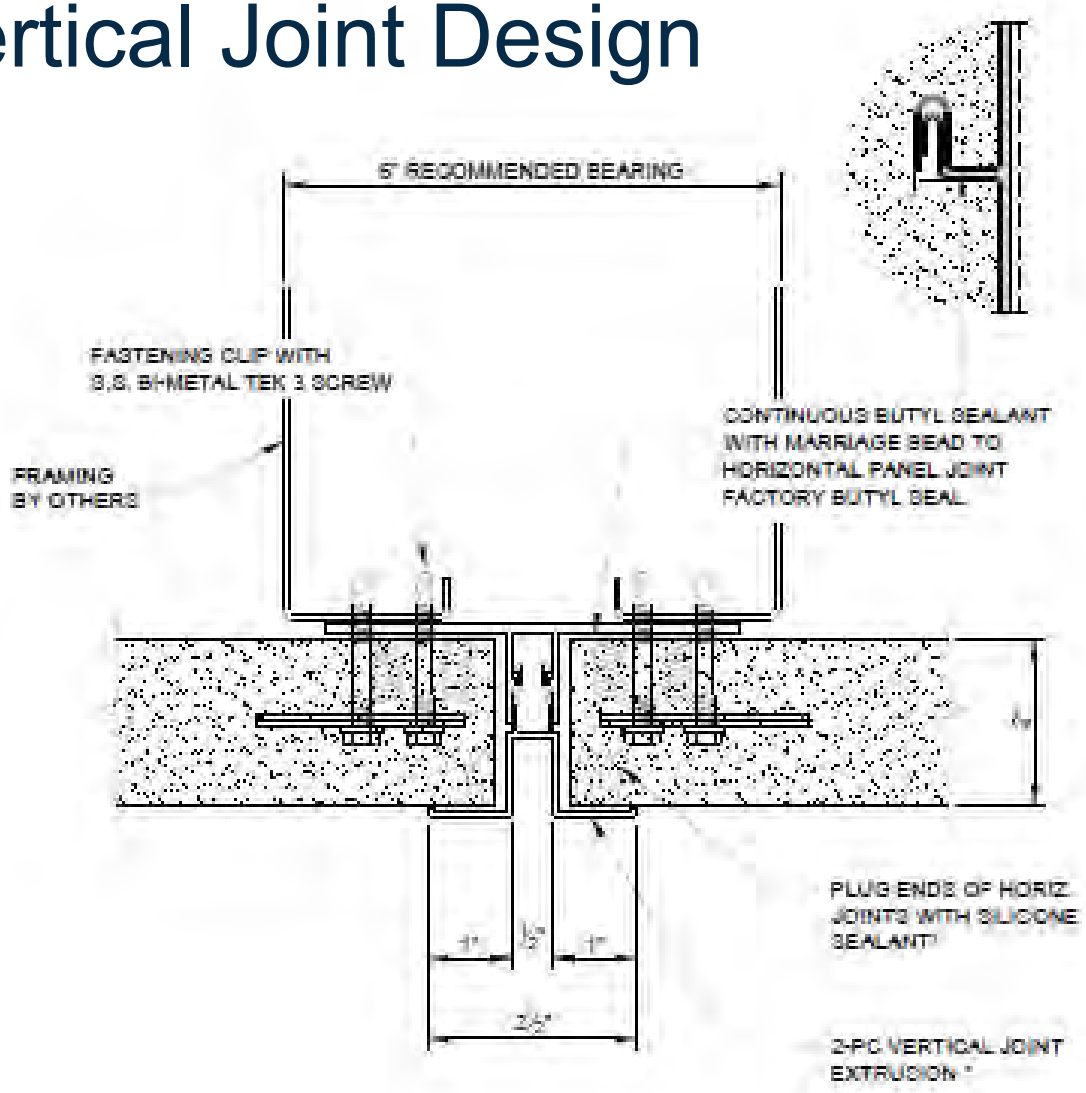
Panel Orientation and Joint Design

United Rentals
SKYTRAK
4X4

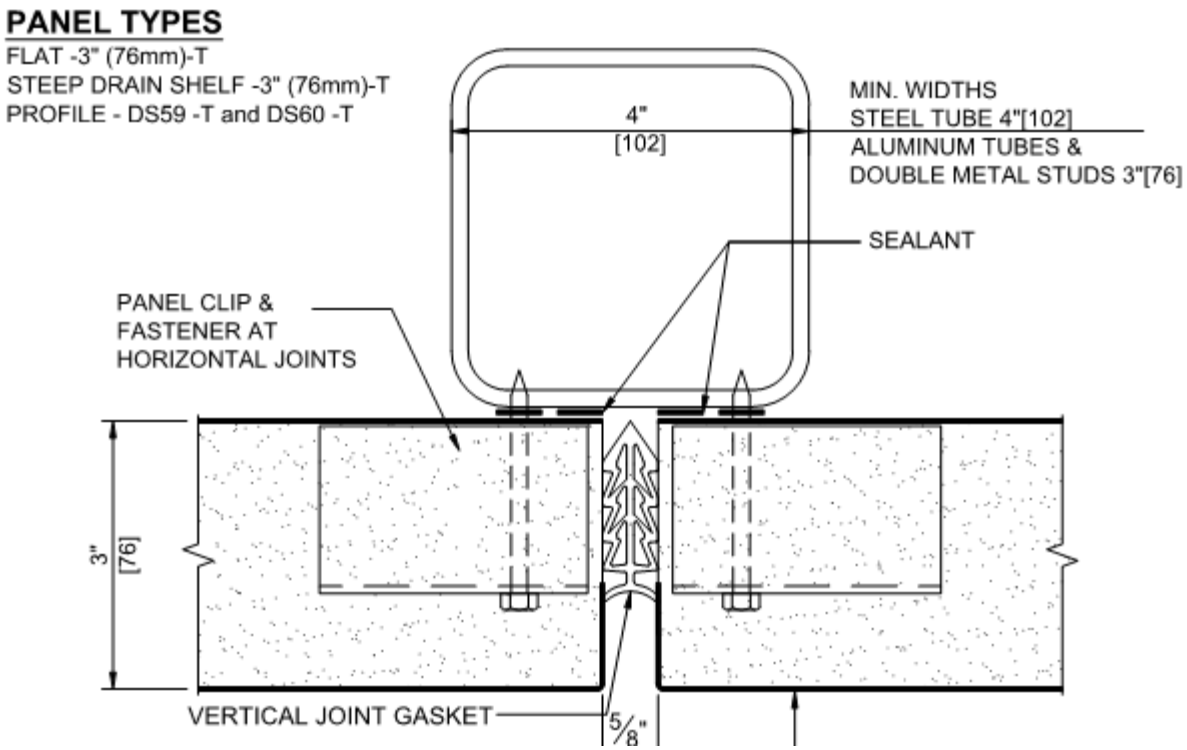




Horizontal Panel - Vertical Joint Design



Horizontal and Vertical Panel - Vertical Joint Design



Horizontal and Vertical Panel - Vertical Joint Design

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Why use IMP
vs.
Other Envelope Systems?

1) One envelope sub-trade
2) Quick installation
3) Price compared to alternative assemblies
4) Excellent thermal performance
5) Easy to maintain
6) Design Flexibility
7) Strength and Durability
8) Environmentally Friendly
9) Longevity/LifeCycle
10) Fire resistant solutions

1)What is an IMP
2)IMP as a System
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5)Design and Construction Challenges
6)Post Construction Repair and Maintenance

Saputo
1801

Canada

SAFETY VESTS
HARD HATS
SAFETY BOOTS
SAFETY
GLASSES
PPE REQUIRED
BEYOND THIS POINT

1)What is an IMP
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Design and Construction Consideration #1: Education - You and Other Stakeholders

Design and Construction Consideration #2: Substrate Issues / Construction Tolerances

Installer must examine the alignment of the structural steel before installation of the wall panels. The walls must be square, and support members to which panels are attached must be in the same plane, flat and free of obstructions such as weld marks, bolts or screw heads.

Support members shall be:

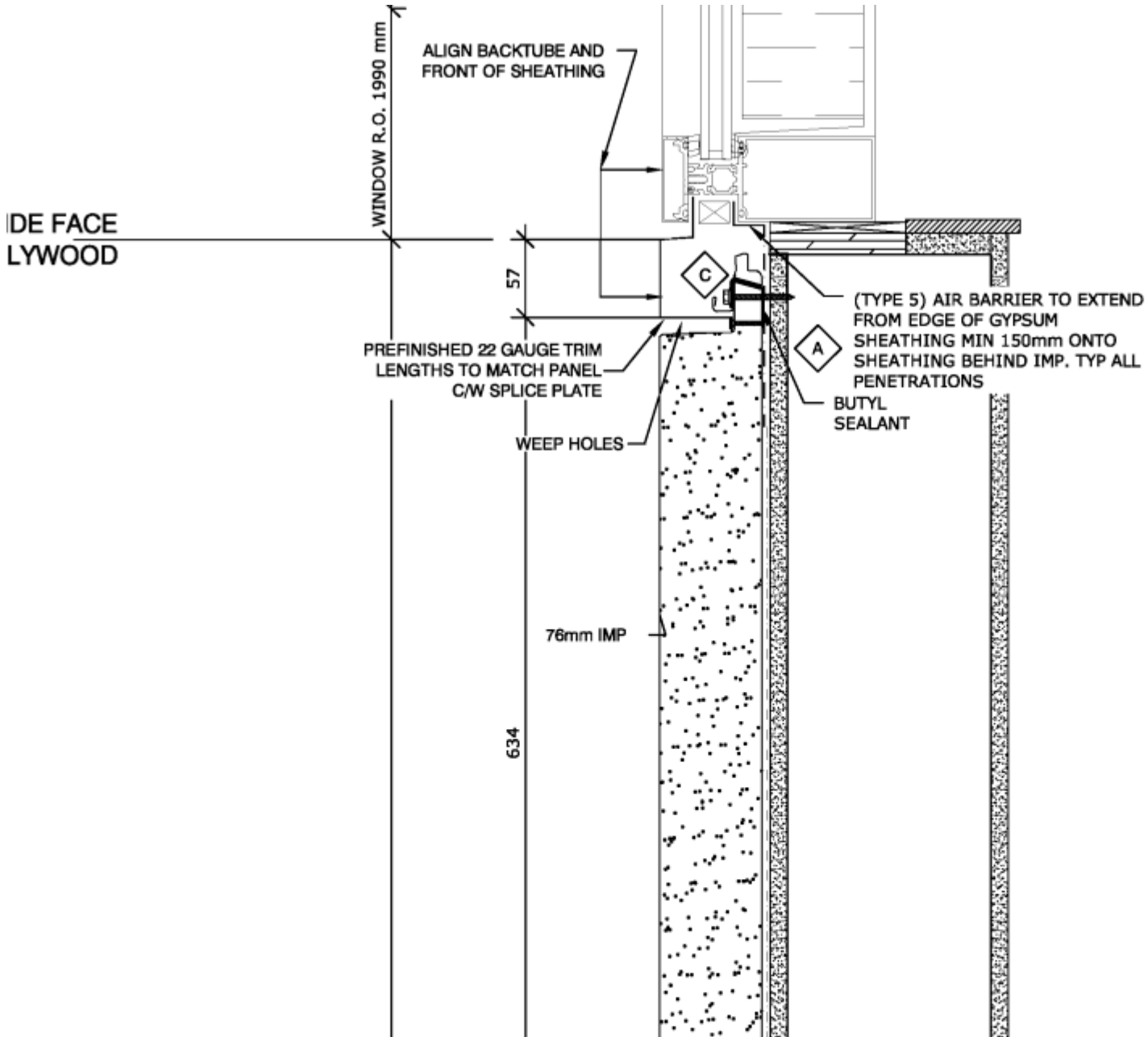
a. Plus or minus 1/8" (3.17 mm) in 5 feet (1524 mm) in any direction along plane of framing.

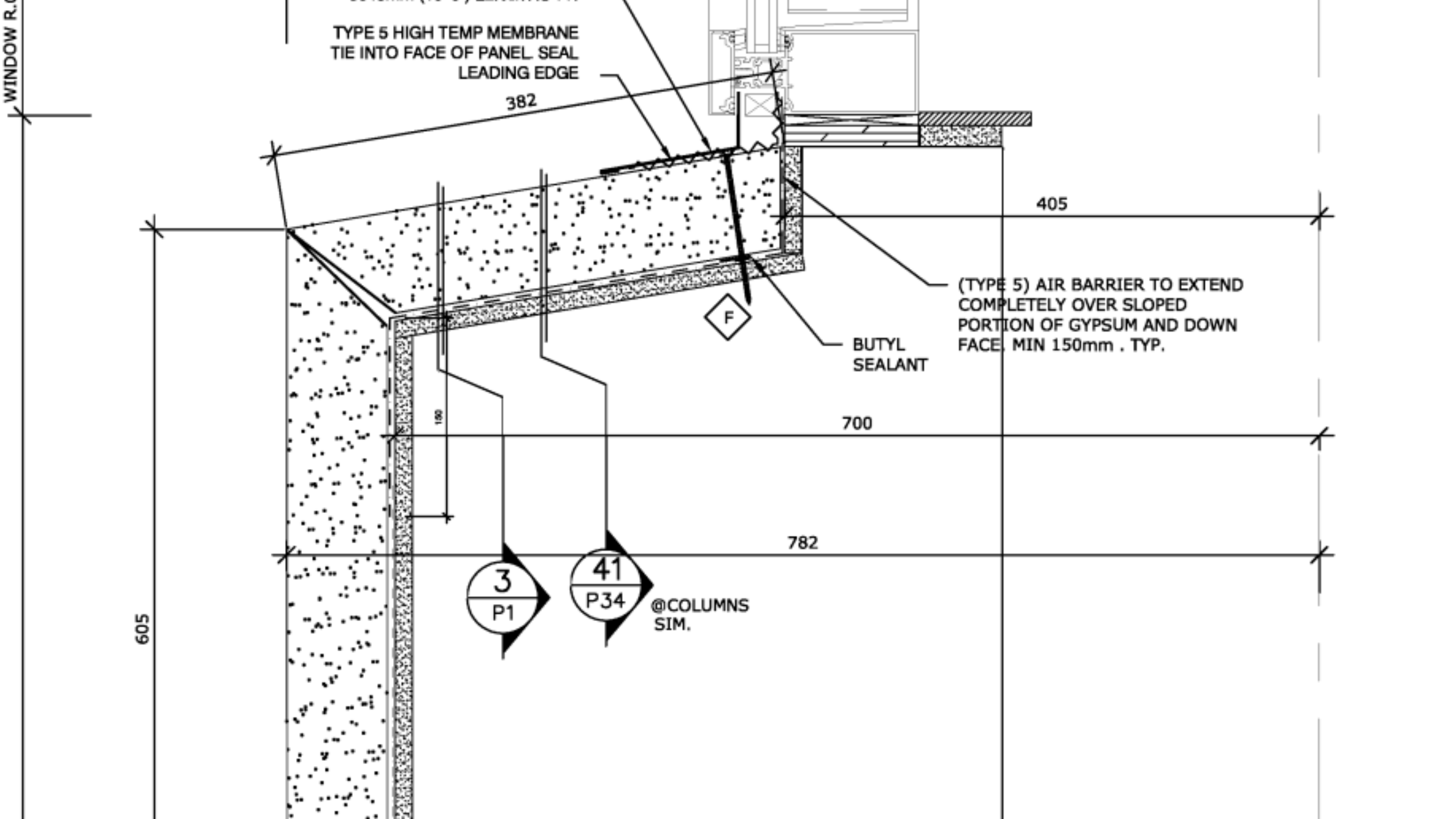
b. Plus or minus 1/4" (6.35 mm) in 20 feet (6096 mm) cumulative in any direction along plane of framing.

c. Plus or minus 1/2" (12.7 mm) from framing plane on any elevation. Panel supports must extend to the outer extremities at all panel terminations.

d. Plumb or level within 1/8" at all changes of wall direction for preformed corner panel applications.

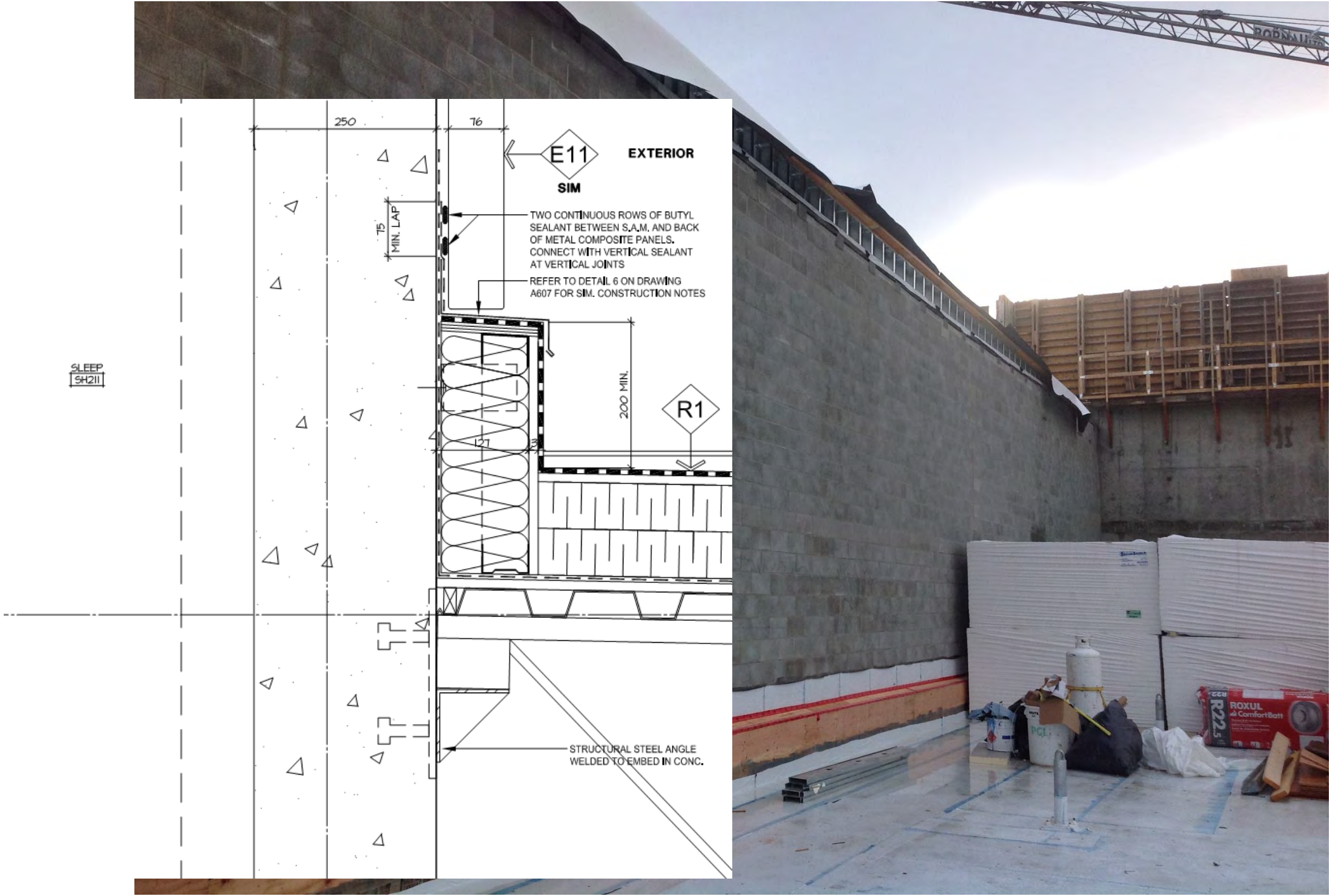
Any variance from tolerances can affect performance, aesthetics, and installation and must be reported to the general contractor, and corrected by the responsible party before panel installation begins.

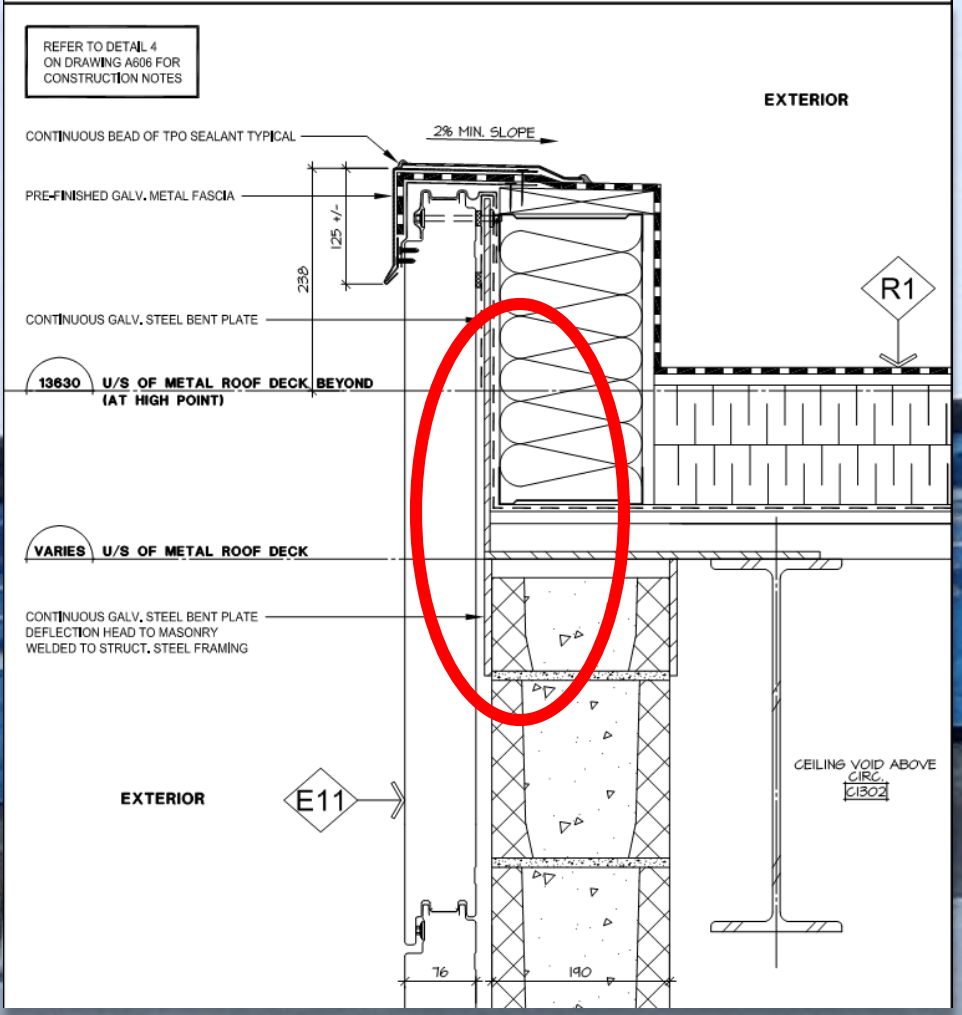

WINDOW R.O. 1990 mm
ALIGN BACKTUBE AND
FRONT OF SHEATHING
DE FACE
LYWOOD
57
C
(TYPE 5) AIR BARRIER TO EXTEND
FROM EDGE OF GYPSUM
SHEATHING MIN 150mm ONTO
SHEATHING BEHIND IMP. TYP ALL
PENETRATIONS
A
PREFINISHED 22 GAUGE TRIM
LENGTHS TO MATCH PANEL
C/W SPLICE PLATE
BUTYL
SEALANT
WEEP HOLES
76mm IMP
634


WINDOW R.O.
TYPE 5 HIGH TEMP MEMBRANE
TIE INTO FACE OF PANEL. SEAL
LEADING EDGE
382
405
(TYPE 5) AIR BARRIER TO EXTEND
COMPLETELY OVER SLOPED
PORTION OF GYPSUM AND DOWN
FACE. MIN 150mm . TYP.
F
BUTYL
SEALANT
700
782
605
3
P1
41
P34
@COLUMNS
SIM.

Call 1-800-44-TYVEK
DUPONT
The mira s of science

EUR


250
76
E11
EXTERIOR
SIM
75
MIN. LAP
TWO CONTINUOUS ROWS OF BUTYL SEALANT BETWEEN S.A.M. AND BACK OF METAL COMPOSITE PANELS. CONNECT WITH VERTICAL SEALANT AT VERTICAL JOINTS
REFER TO DETAIL 6 ON DRAWING A607 FOR SIM. CONSTRUCTION NOTES
SLEEP
SH211
200 MIN.
R1
STRUCTURAL STEEL ANGLE WELDED TO EMBED IN CONC.
ROXUL
ComfortBatt
R22


REFER TO DETAIL 4
ON DRAWING A606 FOR
CONSTRUCTION NOTES
EXTERIOR
CONTINUOUS BEAD OF TPO SEALANT TYPICAL
2% MIN. SLOPE
PRE-FINISHED GALV. METAL FASCIA
125 +/-
238
R1
CONTINUOUS GALV. STEEL BENT PLATE
13630 U/S OF METAL ROOF DECK BEYOND
(AT HIGH POINT)
VARIES U/S OF METAL ROOF DECK
CONTINUOUS GALV. STEEL BENT PLATE
DEFLECTION HEAD TO MASONRY
WELDED TO STRUCT. STEEL FRAMING
CEILING VOID ABOVE
CIRC.
C1302
EXTERIOR
E11
76
190

JLG LIFT
Electrical + Automation
Systems + Service
4X4

JLG

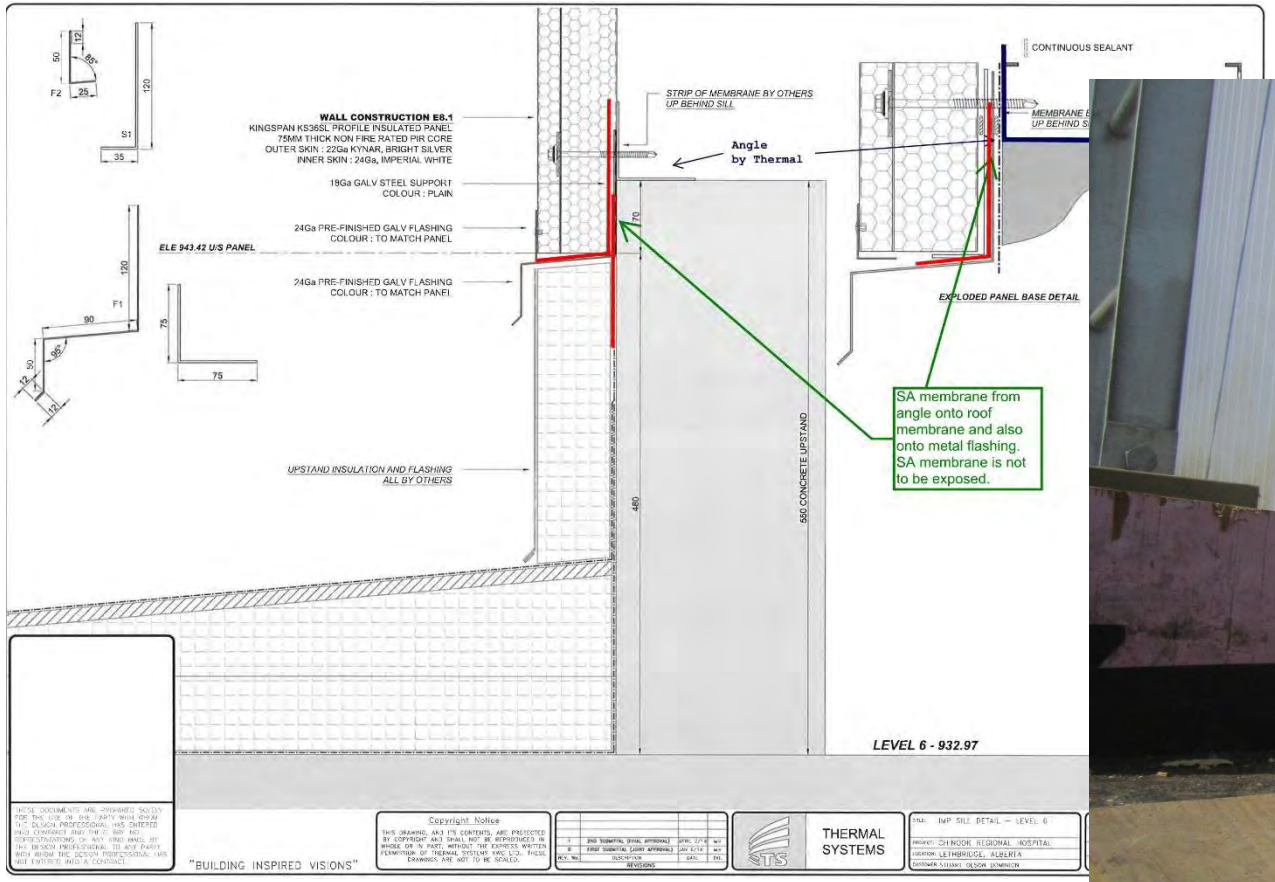
Design and Construction Consideration #03: Sequencing

LAING
ROOFING LTD

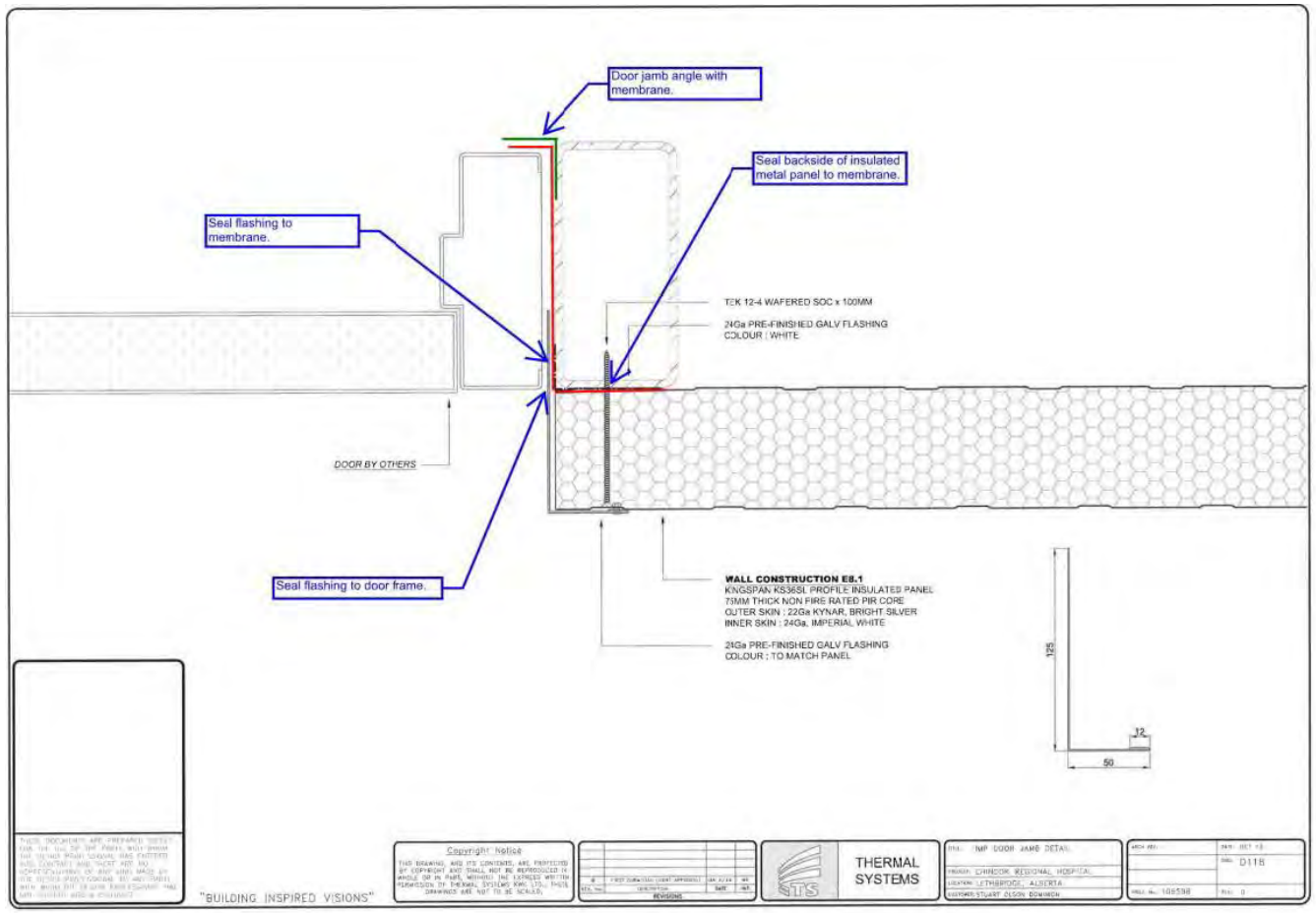
JLG LIFT

IMP Panel

Roof assembly vs IMP sequencing

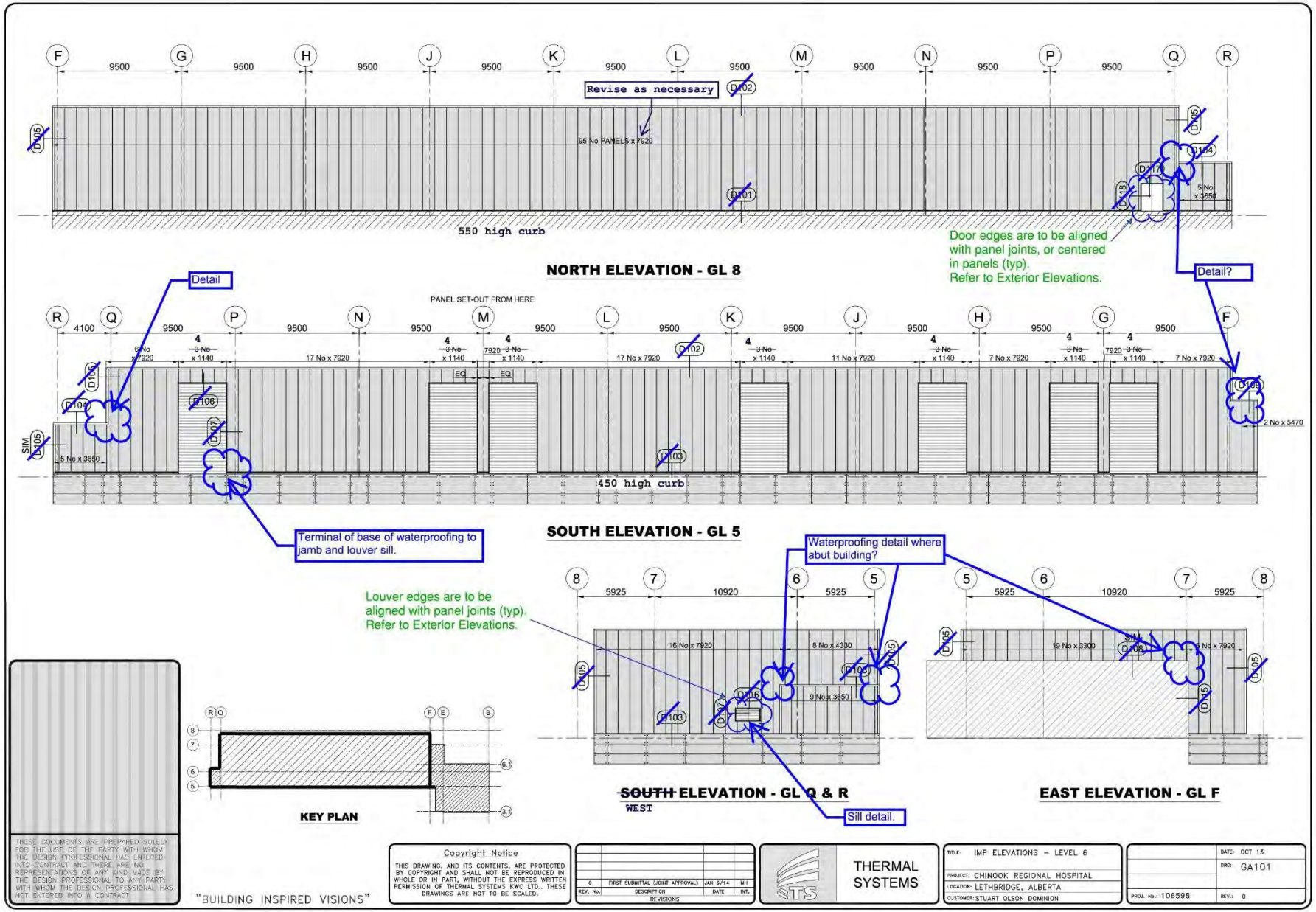


IMP Panel


Door jamb angle with membrane.
Seal backside of insulated metal panel to membrane.
Seal flashing to membrane.
TEK 12-4 WAFERED SOC x 100MM
24Ga PRE-FINISHED GALV FLASHING COLOUR : WHITE
DOOR BY OTHERS
Seal flashing to door frame.
WALL CONSTRUCTION E8.1
KINGSPAN KS36SL PROFILE INSULATED PANEL
75MM THICK NON FIRE RATED PIR CORE
OUTER SKIN : 22Ga KYNAR, BRIGHT SILVER
INNER SKIN : 24Ga, IMPERIAL WHITE
24Ga PRE-FINISHED GALV FLASHING COLOUR : TO MATCH PANEL
125
12
50
Copyright Notice
"BUILDING INSPIRED VISIONS"
REVISIONS
THERMAL SYSTEMS
IMP DOOR JAMB DETAIL
D116

IMP Panel

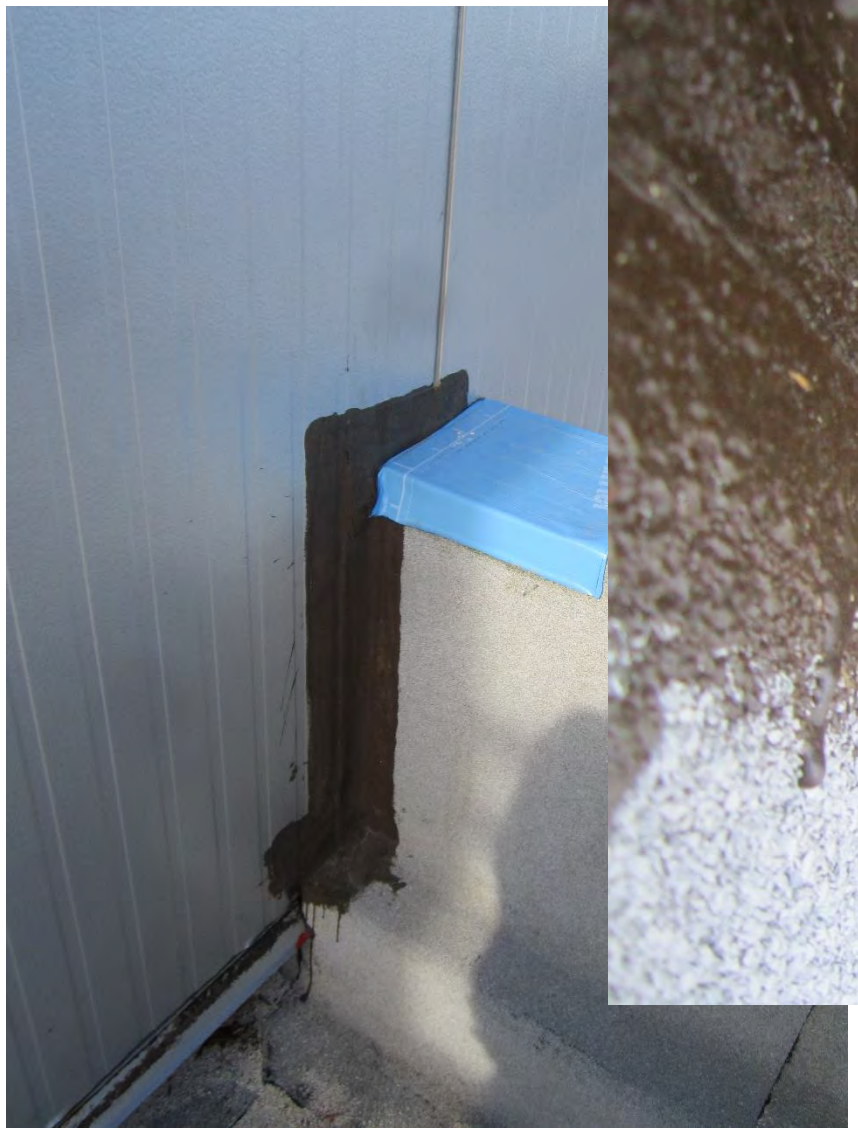
What about all the other missing tie in and transition details?

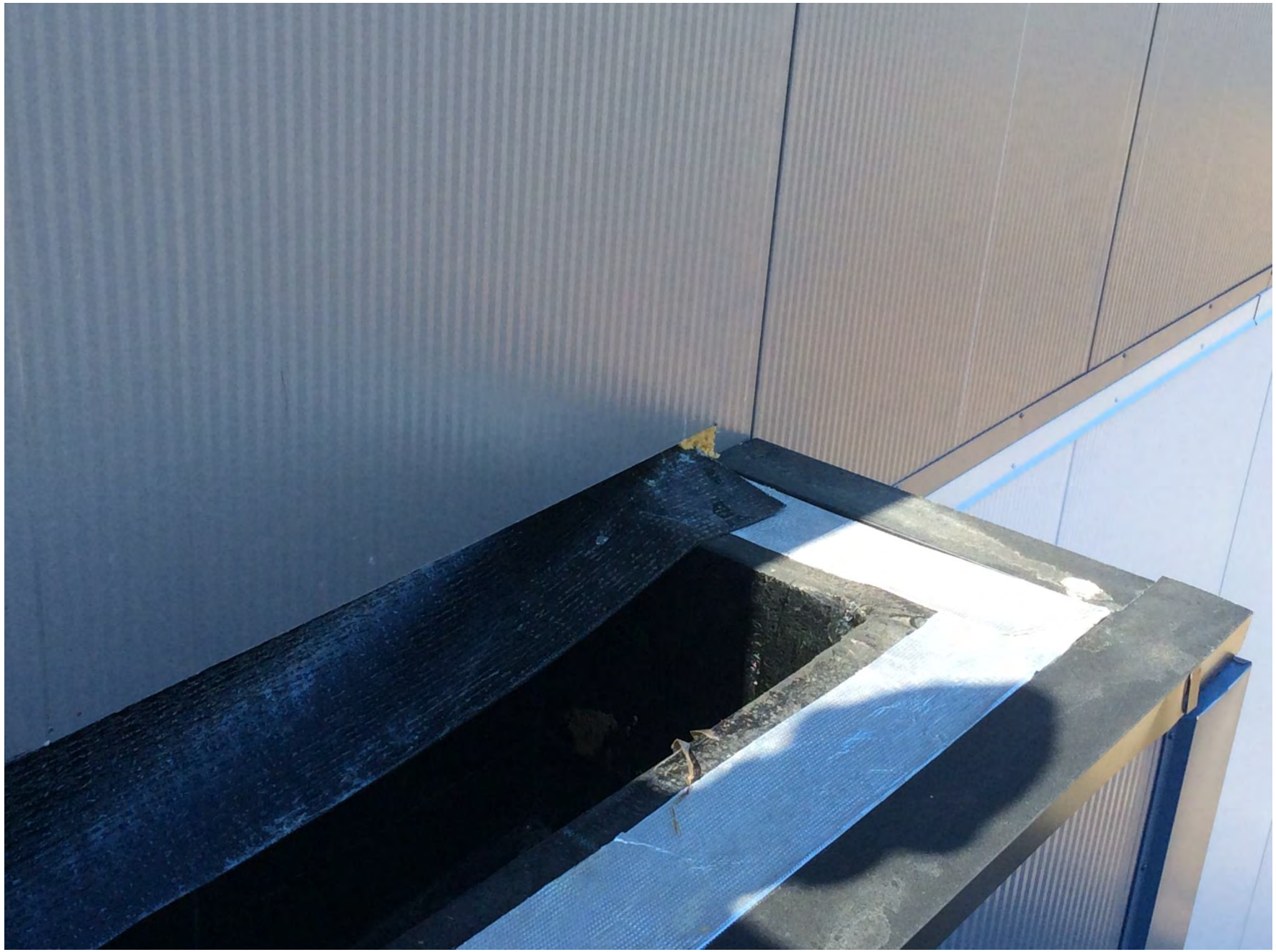


IMP Panel – Roof Parapet to wall

How do we detail this?

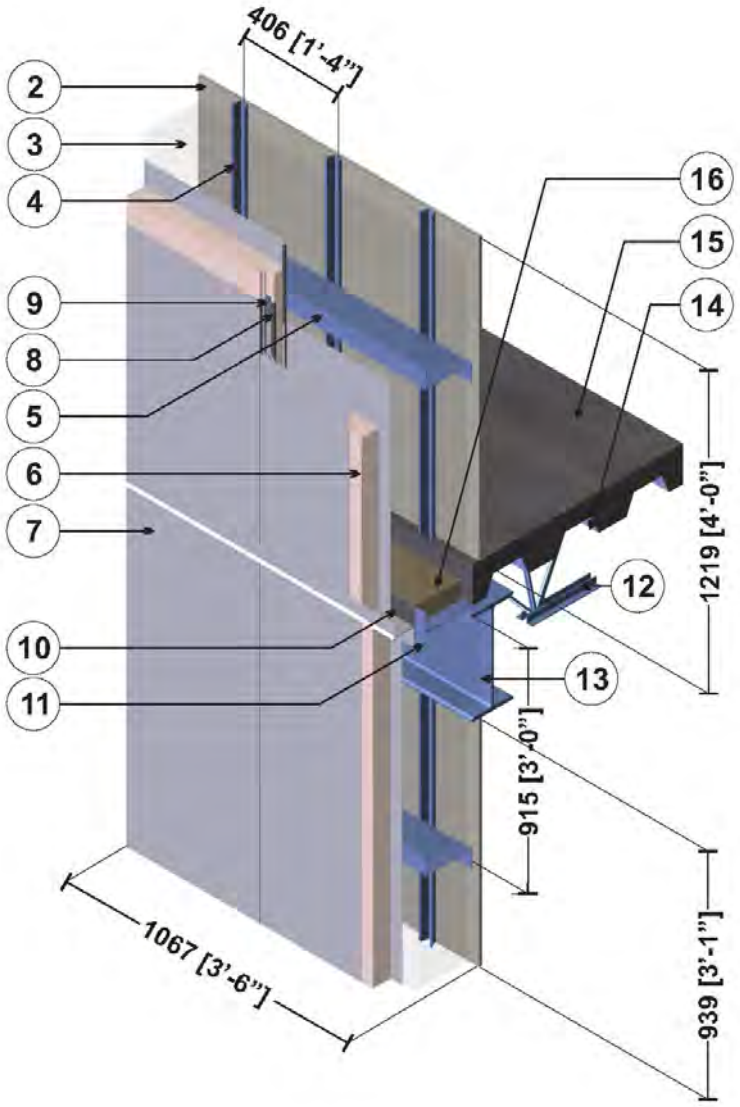
IMP Panel

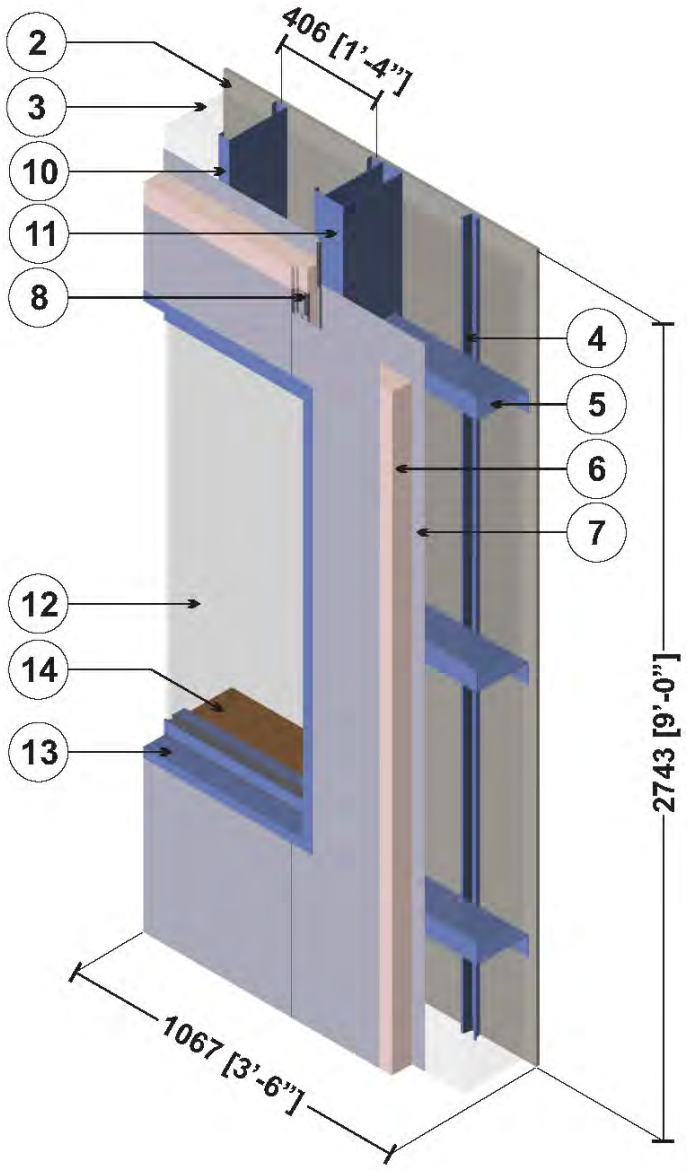




Design and Construction Consideration #04: Thermal Bridging

IMP – effectively continuous insulation





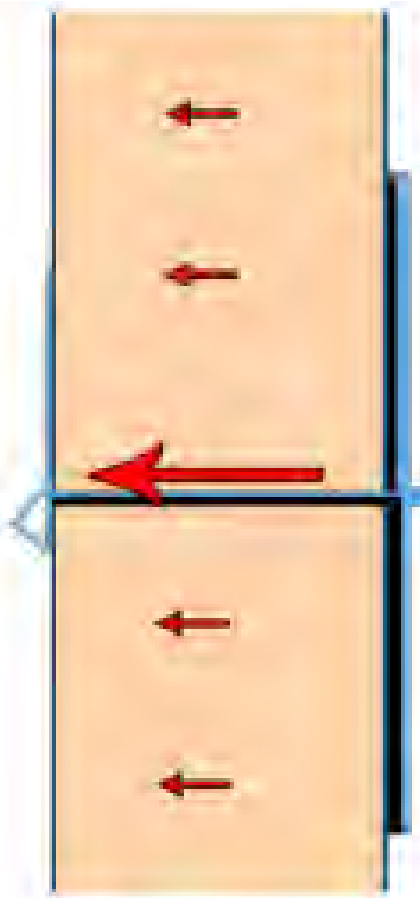
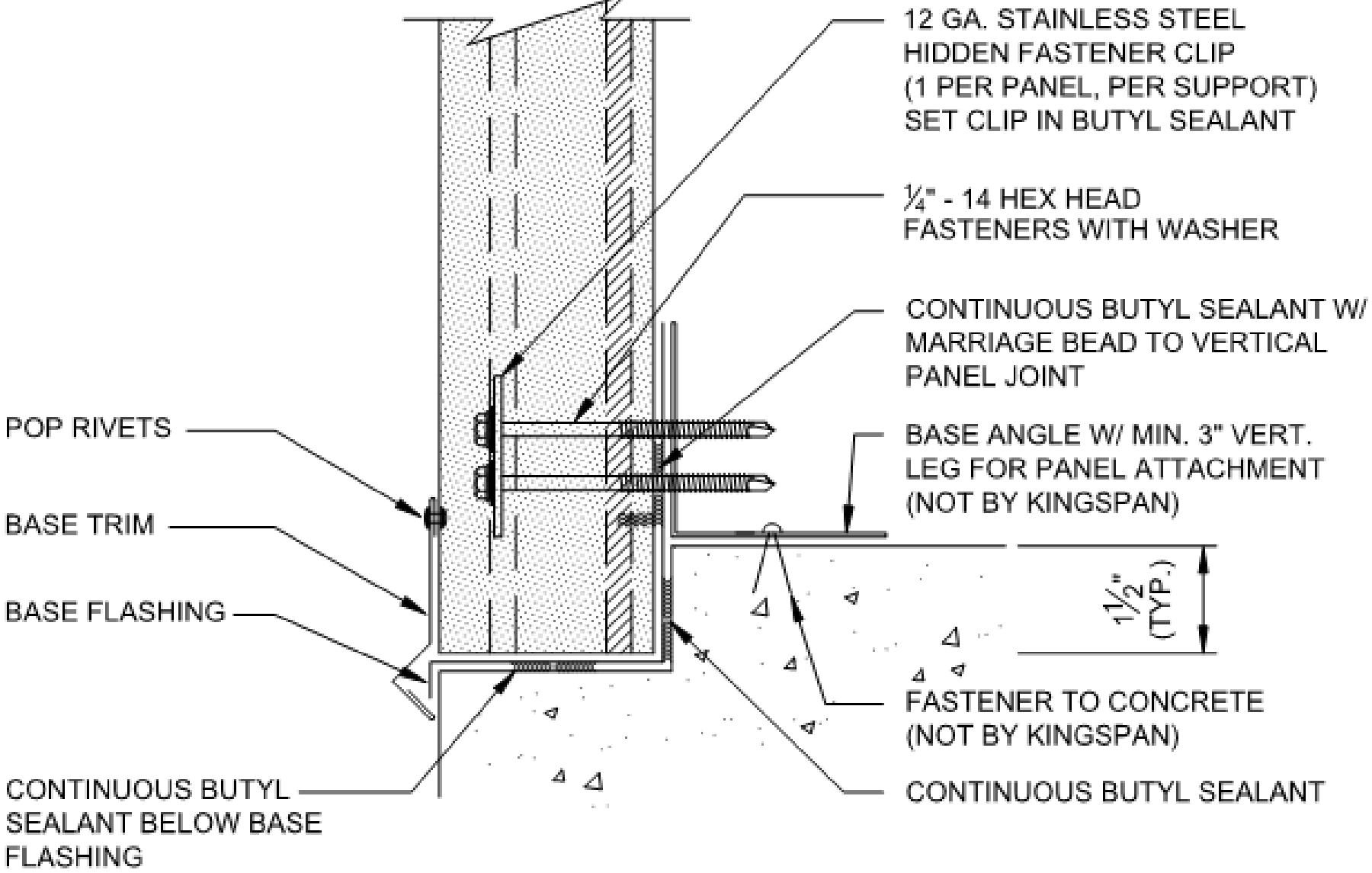


Figure 1: Stack flashing heat path

- Even with nominal R-21, panel <u>assembly</u> is only effective R-8 because of thermally inefficient details

Image from 2011 MH Report on Thermal Performance of IMP Details to the Metal Contractors Association (MCA)

-2.7
20.0
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10.0
°C



NOTE: SEE DETAIL CI-TL-01-KSV AND CI-TL-02-KSV FOR TYPICAL TRIM LAP INSTRUCTIONS

8.6
23.0
22
21
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4.0
°C

- Potentially 40% (plus) heat flow attributed to window transition

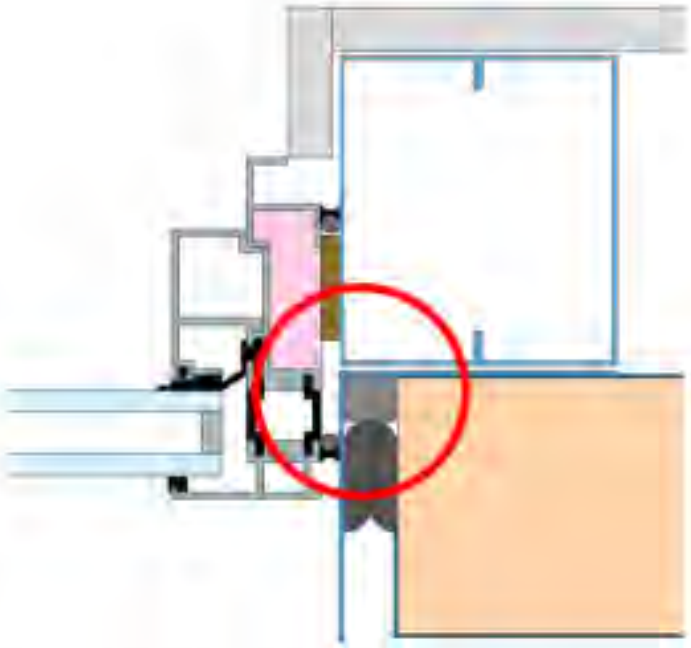


Figure 5a: Jamb trim detail for Horizontal IMP with flashing connected to interior support framing

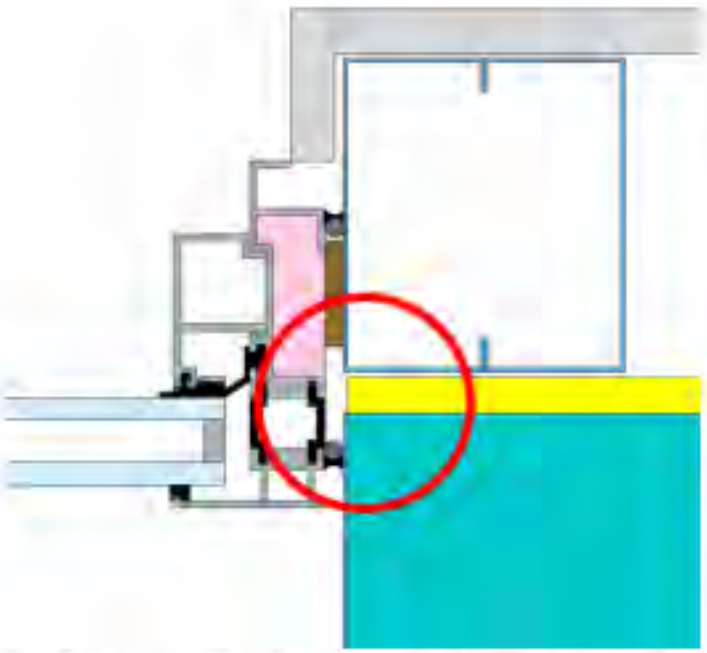
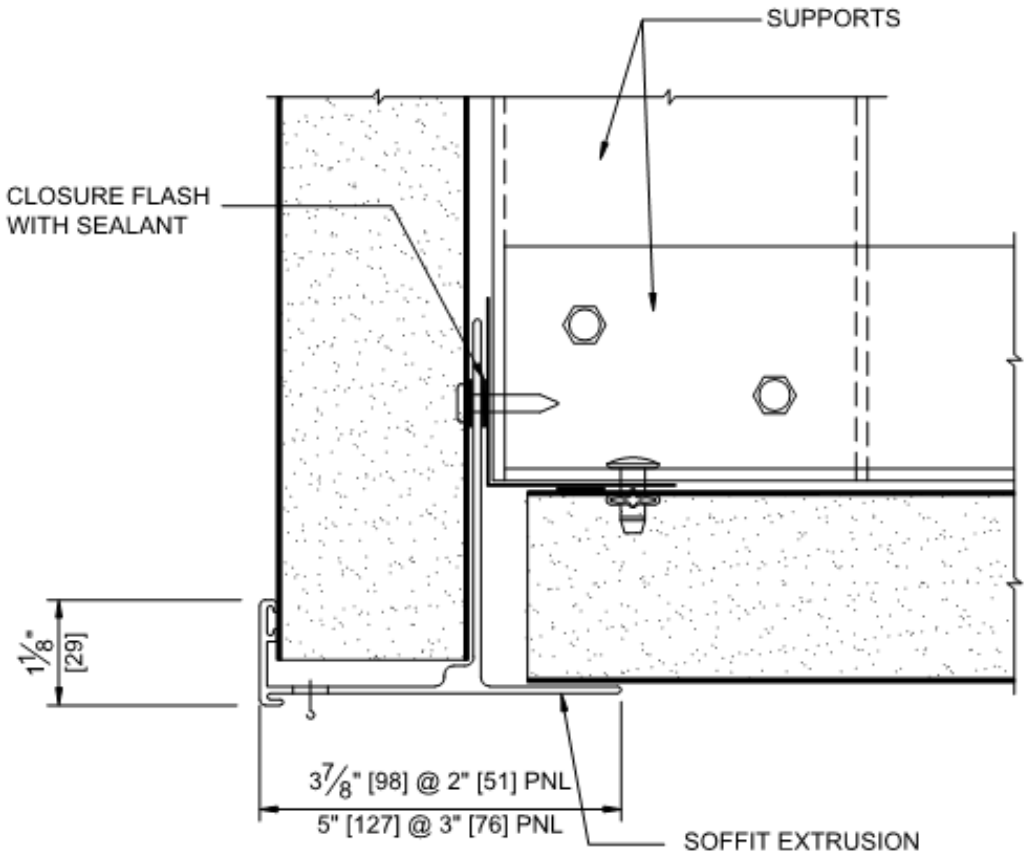
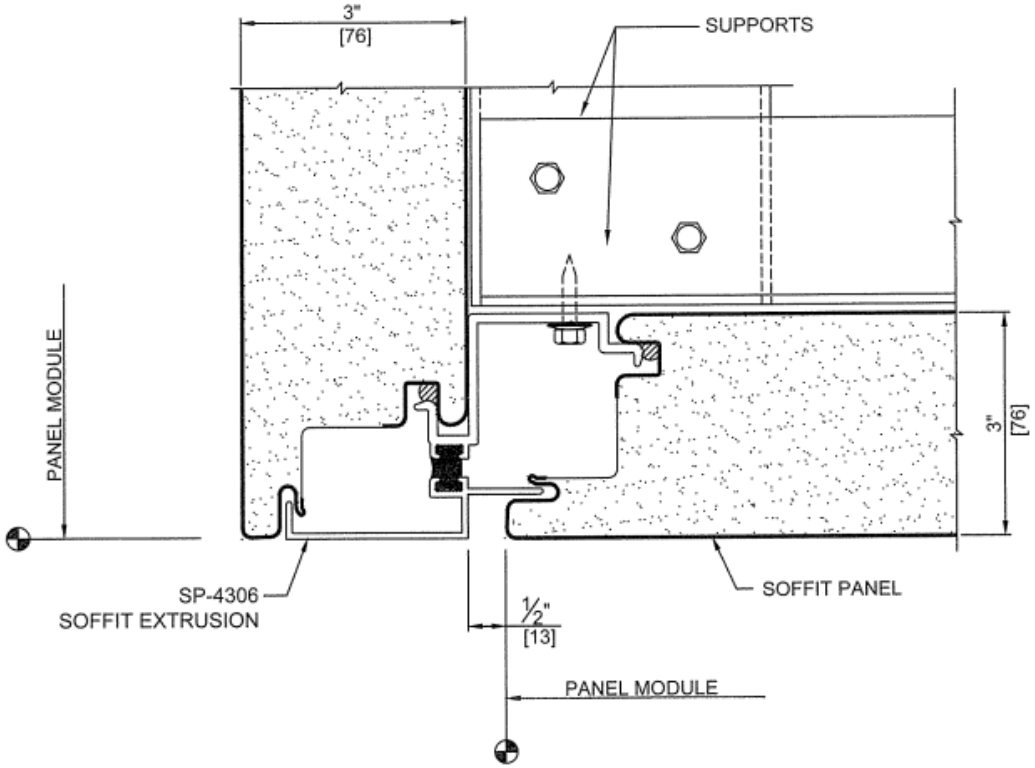


Figure 5b: Jamb trim detail for Exterior insulated steel stud assembly with flashing terminated at window thermal break

Images from 2011 MH Report on Thermal Performance of IMP Details to the Metal Contractors Association (MCA)





DETAIL 6d
SOFFIT-FRONT (on module)

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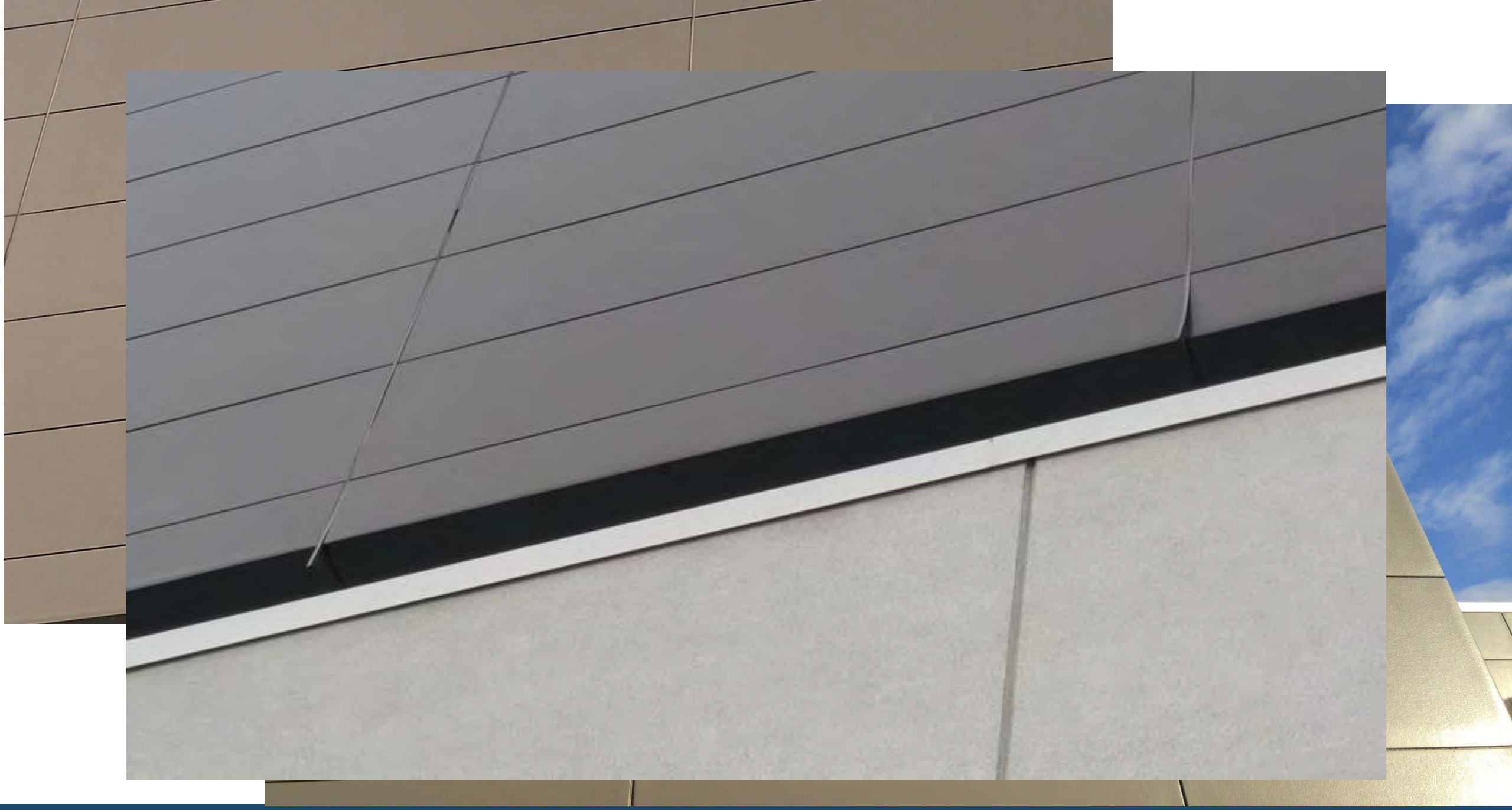

URBAN
Progressive

In Summary:

1) Great system, many benefits
2) Education, Communication + Planning
3) Good design practice
4) Monitoring during Construction

Thank you!

Harold Louwerse, BTech, RRO
Principal, Morrison Hershfield
Hlouwerse@morrisonhershfield.com

MORRISON HERSHFIELD

People • Culture • Capabilities