

**abaa2024** building  
enclosure  
conference

***Building Envelope Case Study :  
from Initial Constructability Review Through  
Occupancy 2016-2017***

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*AIA, NCARB, ALA, RBEC, RRC, REWC, RWC, RRO, CDT, CQM,  
CxA+BE, BECxP, CABS, LEED® AP BD+C, Level II Thermographer*

**May 2024**

**AIA**  
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# ***Building Envelope Case Study : from Initial Constructability Review Through Occupancy 2016-2017***

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Join me as I recount my building envelope journey with a large four-story CMU and masonry higher-educational building for a large university in the Midwest. We will start with the initial pre-bid constructability review and go through construction and turnover. We will review the air/vapor barrier, masonry flashing, waterproofing, window installation, and roof transitions. We will learn what was initially missing in the Contract Documents through mock-ups and first-work-in-place reviews. Once construction starts, we will review the building construction and perform testing throughout.



## **Learning Objectives**

1. Review constructability concerns in the mid-stage of design.
2. Engage with a building envelope review and what modifications took place with subcontractor input.
3. Understand the building complexities with mock-ups, first-work-in-place reviews, and testing.
4. Develop a better understanding of the installation of materials and the process of installation with construction observation reviews, reporting, and verification..



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# PROJECT DESCRIPTION

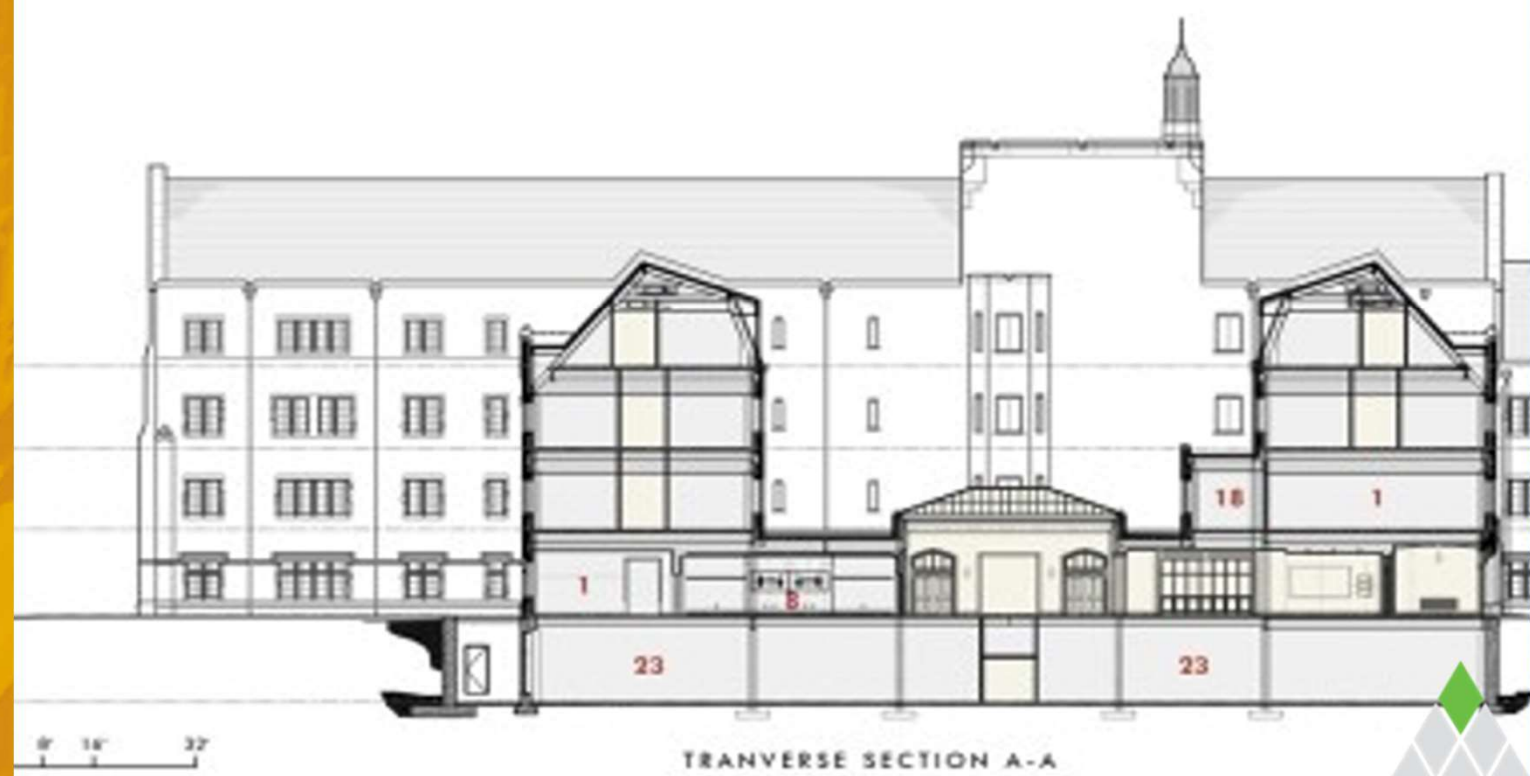


# Jenkins & Nanovic Halls – Notre Dame

Architect: HBRA Architects Inc

**185,500 SF, 4-story, Steel frame and CMU infill construction. A pair of new conjoined buildings that together comprise an integrated ensemble for the Social Sciences and the University's community of International Institutes,**







# QUALITY PROGRAM





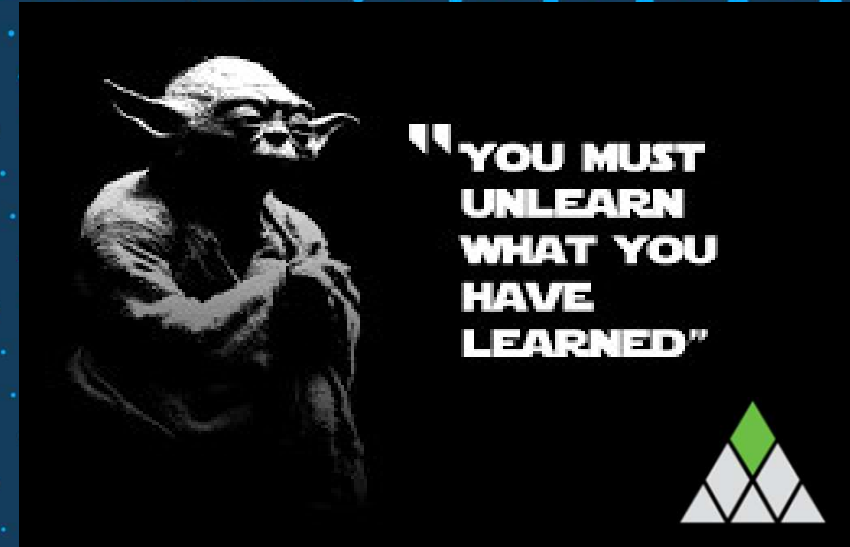
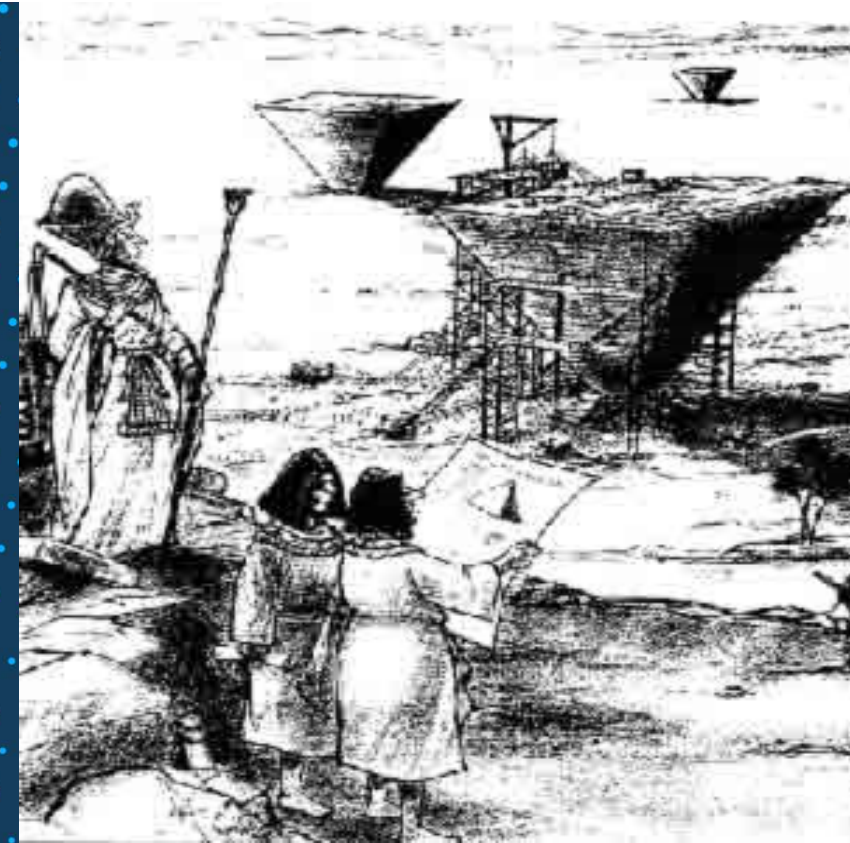
# Anatomy of our Quality Program

- *The program is designed to be preventative and proactive*
- *Review drawings during several phases of design to assist the project team*
- *Use quality metric data to assist with initial project specifications*
- *Building Envelope Meeting*
- *Pre-Installation Meeting*
- *Checklists*
- *Subcontractor Job Specific Quality Plan*
- *Mock-ups*
- *1<sup>st</sup> Work in-place / Substrate Review*
- *Regular site inspections*
- *Provide proper quality metrics to identify trends and give the team an idea of progress*
- *Testing*
- *Lessons Learned & Quality Bulletins that reflect our learning throughout the project*



# Setting Expectations

- Obtain clear understanding of the project goals
- Have all players in the room and review understanding of schedule, man-power, and project specific requirements
- The team must be open to understanding current requirements, sometimes new, for the exact product that is being installed or being installed adjacent to...
- Learn from mock-ups, first-work-in-place, and regular job site walk-thoughts



# Reporting

	Issues	Average Issue Weight	Sum of Approx Cost	Sum of Repeat Count	Sum of Prior Talk	Sum of PCC
	72	4.10	\$59,100.00	30	67	\$12,150.00
	14	3.36	\$10,250.00	2	6	\$2,550.00
05 CFMF / SHEATHING	10	3.60	\$13,100.00	1	8	\$2,200.00
06 - WOOD BLOCKING	5	4.60	\$4,800.00	0	4	\$1,050.00
07 - AIR BARRIER	50	3.92	\$32,500.00	19	44	\$8,575.00
07 - ROOFING	8	4.50	\$7,200.00	1	7	\$1,550.00
07 - ROOFING	7	3.43	\$4,000.00	3	6	\$1,000.00
07 - WATERPROOFING	9	2.89	\$2,200.00	0	9	\$1,000.00
08 WINDOWS	11	3.82	\$9,000.00	0	5	\$2,150.00
<b>Grand Total</b>	<b>186</b>	<b>3.90</b>	<b>\$142,150.00</b>	<b>56</b>	<b>156</b>	<b>\$32,225.00</b>

<b>Total Est. Subcontractor Cost to Correct:</b>	<b>\$270,350.00</b>	<b>Cost of Quality/Construction Cost:</b>	<b>0.6256%</b>	
<b>Total Est. Subcontractor Hours to Correct:</b>	<b>2,704</b>		<b>Subcontractor</b>	<b>PCC</b>
<b>Est. PCC Direct Quality Cost:</b>	<b>\$61,650.00</b>	<b>Cost of Repeat Items:</b>	\$58,300.00	\$15,225.00
<b>Est. PCC Direct Quality Hours Spent</b>	<b>617</b>	<b>Cost of Prior talk Items:</b>	\$227,300.00	\$50,900.00
		<b>Total Weeks</b>	<b>Week #</b>	<b>Percent Complete</b>
		97	90	92.78%
				<b>Cost to Date</b>
				<b>\$53,072,165</b>





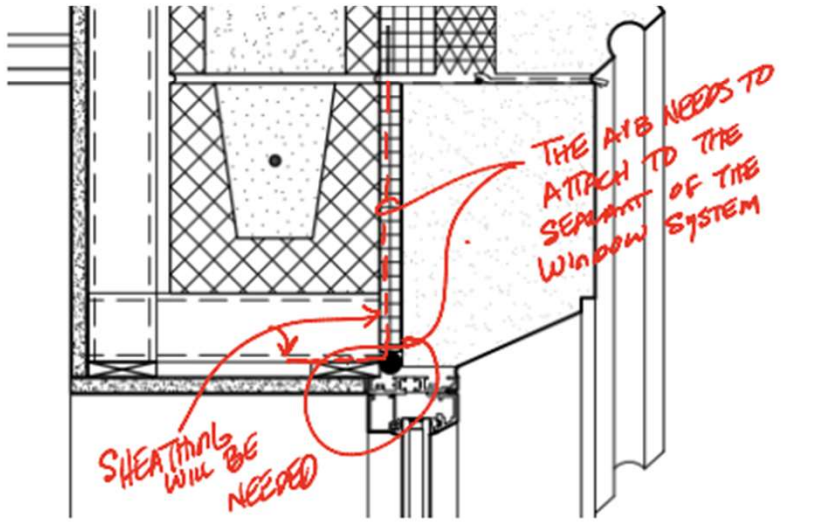
INITIAL  
QUALITY-  
REVIEW OF  
CONTRACT  
DOCUMENTS IN  
DD STAGE



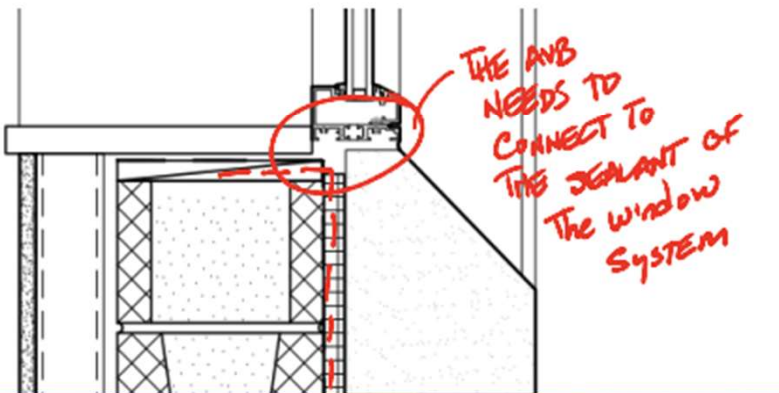
Item #	Description
--------	-------------

26	Detail 4/A5.10
	<ol style="list-style-type: none"> <li>There needs to be an AVB attachment to the window sealant. I suggest ETA.</li> <li>There should be sheathing on the metal framing.</li> <li>The AVB needs to be extended.</li> </ol>

Date of Review:	09-30-2014	Summary:	
Project Information		Exterior detail review of 100% DD set	Author: Corey S Zussman, AIA
University of Notre Dame Jenkins & Nanovic Halls		dated 09-17-2014	
Project:	#		

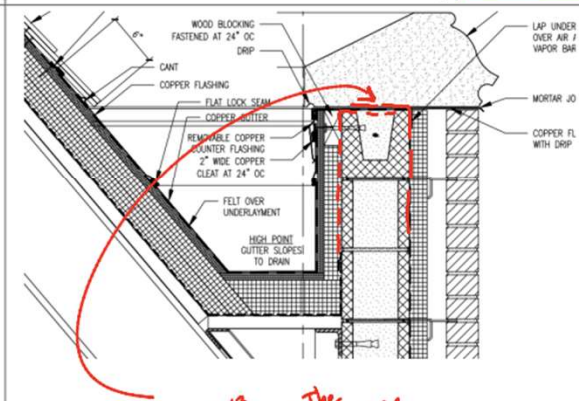


27	Detail 4/A5.10
	<ol style="list-style-type: none"> <li>There needs to be an AVB attachment to the window sealant. I suggest ETA.</li> <li>AVB needs to be extended.</li> </ol>



29 Detail 1/A5.51

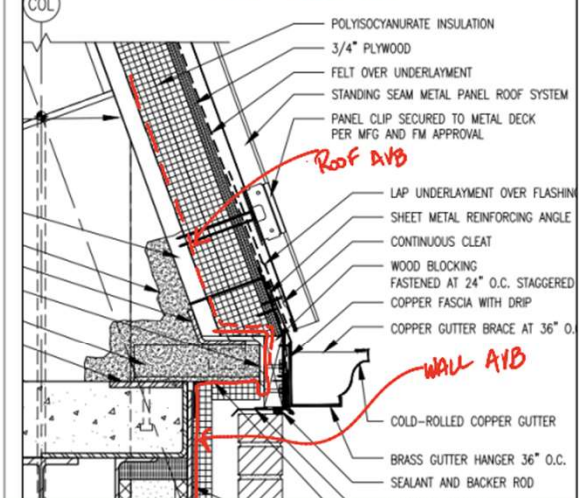
- The roof AVB should go up the parapet and over...and the wall AVB should go up the wall and over the roof AVB.



Labels in drawing: WOOD BLOCKING FASTENED AT 24" O.C. DRIP, CANT, COPPER FLASHING, FLAT LOCK SEAM, COPPER GUTTER, REMOVABLE COPPER COUNTER FLASHING, 2" WIDE COPPER CLEAT AT 24" O.C., FELT OVER UNDERLAYMENT, HIGH POINT GUTTER SLOPES TO DRAIN, LAP UNDER OVER AIR / VAPOR BAR, MORTAR JO, COPPER FL WITH DRIP.

31 Detail 1/A5.55

- The roof AVB should go down and on top of the wall AVB...and the wall AVB should go up the wall.



Labels in drawing: POLYISOCYANURATE INSULATION, 3/4" PLYWOOD, FELT OVER UNDERLAYMENT, STANDING SEAM METAL PANEL ROOF SYSTEM, PANEL CLIP SECURED TO METAL DECK PER MFG AND FM APPROVAL, LAP UNDERLAYMENT OVER FLASHING, SHEET METAL REINFORCING ANGLE, CONTINUOUS CLEAT, WOOD BLOCKING FASTENED AT 24" O.C. STAGGERED, COPPER FASCIA WITH DRIP, COPPER GUTTER BRACE AT 36" O.C., COLD-ROLLED COPPER GUTTER, BRASS GUTTER HANGER 36" O.C., SEALANT AND BACKER ROD.

Handwritten notes: 'Roof AVB' and 'Wall AVB' with arrows pointing to the respective components.



# Lessons Learned

Create a building profile reviewing:

- Potential materials
- Areas of concern to review in CD phase
- List of complex detailing
- Confirmation of Air, Water, Vapor, and insulation lines





# GENERAL CONTRACTOR JOB SPECIFIC QUALITY PLAN



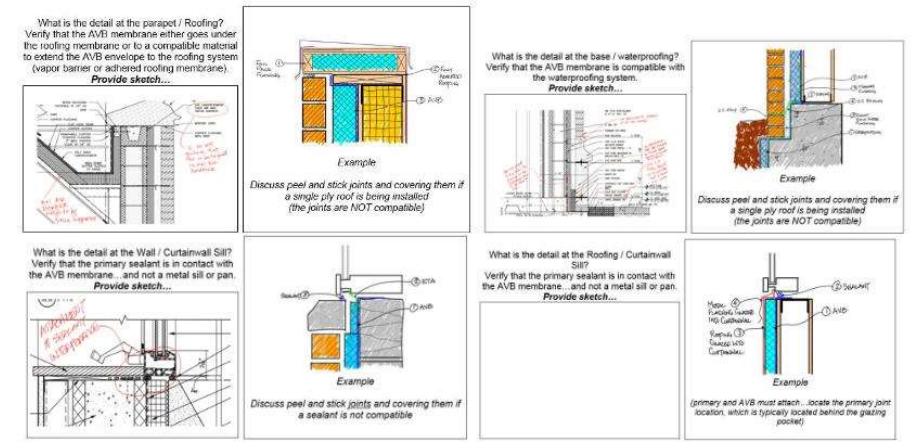


Make sure that the General Contractor has a Job Specific Quality Plan that reviews the building envelope & current material requirements



## Air-Vapor Barrier (AVB) Window / Roof Continuity:

- Verify if there is an ABAA Certified Contractor Requirement YES Confirm Contractor is Certified Will need to subcontract**
- Is there an AVB plan in the documents: No – QAQC review marked-up the AVB on plans and details
- Do we have an Air Barrier: No Vapor Barrier: No AVB: Yes
- Type of AVB being installed (*Liquid, Sheet, Tyvek, EIFS Mfr, Etc.*) Liquid and Sheet
- Roofing Type (*TPO, PVC, EPDM, Built-up, Etc.*) Flat – TPO-Fully Adhered, Slate on Slope AVB: TPO & AVB Sheet on sloped roof
  - A mech. fastened, shingled, or metal roof **will need a separate AVB** (*The underlayment typically is NOT an AVB*): Yes - Detailed
  - Do we have a roof Vapor Barrier that we will be connecting into (*Only if it is fully adhered*)? No – Using TPO Roofing
  - Will we need a metal transition anywhere...if so, under what trade's Contract? TBD – Transition will be needed (*Will typ. occur at backside of the parapet, connecting the Roofing to the incompatible AVB, such as a hot-applied roof, PVC, etc.*)
- Are we connecting into the waterproofing membrane: Yes (*Will we need a metal transition for unlike materials?*)
  - What is the waterproofing type: Liquid
  - Discuss protection of the system: Insulation
  - Covering with: Drainage board and insulation
- Ensure that the **concrete** is properly spec'd for a coating (*Surface Finish 3.0 & Surface Tolerance Class A*): Will review with Conc Subcontractor at their pre-installation meeting
- Verify that the mason will be tooling (slight concave) the CMU joints to receive AVB: Will review w/mason at pre-install
- Ensure that the masonry flashing is on TOP of the AVB (*not in the CMU or part of the AVB system*): Mason's Pre-Install
- Are we installing a building expansion joint(s): No (*We will need to connect to the Roof Expansion Joint*)
- When is the systems expected to be installed (*Season*): All Seasons, start in the summer
- Will the AVB be exposed to UV over 60 days (*Multi-story building or long lead veneer might be*): TBD – this needs to be reviewed
- Do we have a large overhang that will be difficult to connect the AVB and the roofing? Yes
  - Review detail with the Quality Department for clarification and detail: Reviewed during QAQC review
- Review the basic locations for connection of the AVB / Window / Waterproofing / Roofing system(s) described below to start the review: Reviewed during QAQC Reviews (*you are looking to make sure that there is continuity (no gaps)*)



- Ensure that the window sealant (primary) is attached to the AVB Yes – reviewed in QAQC review
  - Curtainwall primary is typically in line with the interior side of the glass: Yes
  - Storefront primary is typically in line with the backside of the frame: Yes
- Make sure that sealant is NOT attached to insulation Yes







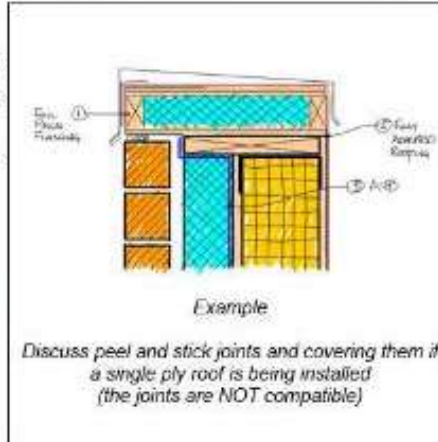
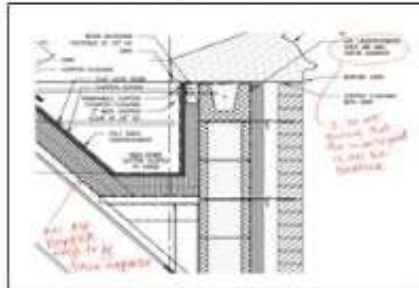
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  - Covering with: Drainage board and insulation
- Ensure that the **concrete** is properly spec'd for a coating (*Surface Finish 3.0 & Surface Tolerance Class A*): Will review with Conc Subcontractor at their pre-installation meeting
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- Do we have a large overhang that will be difficult to connect the AVB and the roofing? Yes
  - Review detail with the Quality Department for clarification and detail: Reviewed during QAQC review

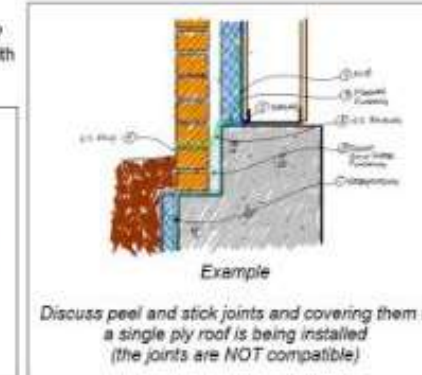
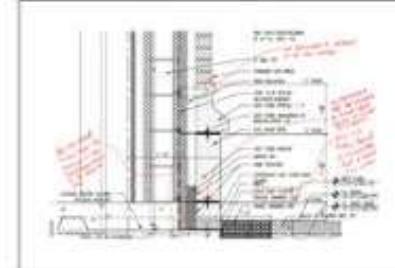


- ☒ Review the basic locations for connection of the AVB / Window / Waterproofing / Roofing system(s) described below to start the review: Reviewed during QAQC Reviews *(you are looking to make sure that there is continuity (no gaps))*

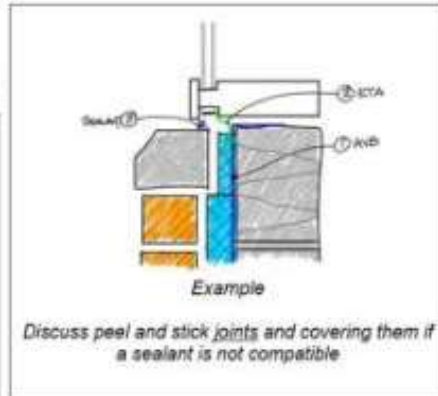
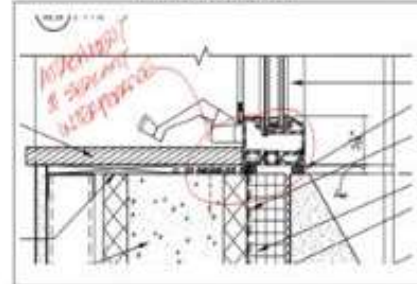
What is the detail at the parapet / Roofing?  
Verify that the AVB membrane either goes under the roofing membrane or to a compatible material to extend the AVB envelope to the roofing system (vapor barrier or adhered roofing membrane).  
**Provide sketch...**



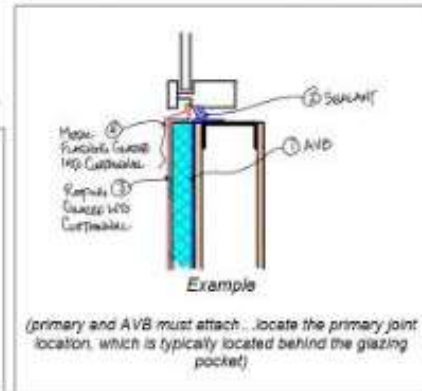
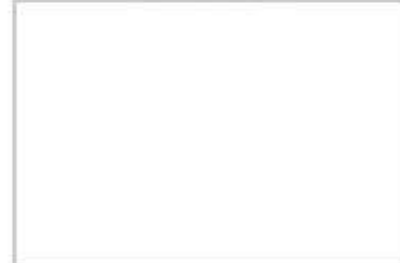
What is the detail at the base / waterproofing?  
Verify that the AVB membrane is compatible with the waterproofing system.  
**Provide sketch...**



What is the detail at the Wall / Curtainwall Sill?  
Verify that the primary sealant is in contact with the AVB membrane...and not a metal sill or pan.  
**Provide sketch...**



What is the detail at the Roofing / Curtainwall Sill?  
Verify that the primary sealant is in contact with the AVB membrane...and not a metal sill or pan.  
**Provide sketch...**



- ☒ Ensure that the window sealant (primary) is attached to the AVB Yes – reviewed in QAQC review
  - ☒ Curtainwall primary is typically in line with the interior side of the glass: Yes
  - ☒ Storefront primary is typically in line with the backside of the frame: Yes
- ☒ Make sure that sealant is NOT attached to insulation Yes

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### Material Season Schedule:

*Discuss at each of your jobsite meetings*

Provide a written plan outlining the procedures that will be taken during the event of Cold / Hot Weather...Please make sure that the temperature requirements of the materials being used are clearly identified.

- Hot / Cold Weather **Concrete** Procedure Form Required -
- Hot / Cold Weather **Masonry** Procedure -
- Hot / Cold Weather **EIFS** Procedure -

	Winter	Spring	Summer	Fall	Temp Limitations / Notes / Precautions
Concrete Footing/Foundations	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Waterproofing	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Concrete SOG	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Depends on Erection
Concrete on Metal Deck	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Tarps / Heat
Concrete - Elevated	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Concrete - Roof	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Precast Concrete	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Steel	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
CFMF	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Exterior Sheathing	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Masonry	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Metal Panels	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Air / Vapor Barrier	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Start Summer
Spray Insulation (ext)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
EIFS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Roofing	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	2016
Asphalt Roofing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Curtainwall	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Windows	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	2016
Exterior Coating / Painting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Sealant	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Pavers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Sidewalk	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	



### Floor / Roof Deflection:

*Discuss with your Engineer of Record and or Architect as soon as possible*

<input checked="" type="checkbox"/> Floor - Typical	Deflection:	3/4" per RFI
<input checked="" type="checkbox"/> Floor - Perimeter	Deflection:	3/4" per RFI
<input checked="" type="checkbox"/> Roof	Deflection:	3/4" per RFI
<input checked="" type="checkbox"/> Other	Deflection:	3/4" up and down on CFMF Spec only

### Mock-Up Requirements:

Mock-up:	Date of Scheduled Mock-up	Date of Completed Mock-up	Mock-up:	Date of Scheduled Mock-up	Date of Completed Mock-up
<input type="checkbox"/> Sidewalk	Click here to enter a date.	Click here to enter a date.	<input type="checkbox"/> Masonry (Simple)	Click here to enter a date.	Click here to enter a date.
<input type="checkbox"/> Concrete Patch	Click here to enter a date.	Click here to enter a date.	<input checked="" type="checkbox"/> Masonry (Complex)	Click here to enter a date.	Click here to enter a date.
<input type="checkbox"/> Precast Concrete	Click here to enter a date.	Click here to enter a date.	<input type="checkbox"/> Restoration - Masonry	Click here to enter a date.	Click here to enter a date.
<input type="checkbox"/> Precast Concrete Repairs	Click here to enter a date.	Click here to enter a date.	<input type="checkbox"/> Tuckpointing	Click here to enter a date.	Click here to enter a date.
<input type="checkbox"/> Architectural Concrete	Click here to enter a date.	Click here to enter a date.	<input checked="" type="checkbox"/> Masonry Cleaning	Click here to enter a date.	Click here to enter a date.
<input type="checkbox"/> Stained Concrete	Click here to enter a date.	Click here to enter a date.	<input type="checkbox"/> Colored Concrete	Click here to enter a date.	Click here to enter a date.
<input checked="" type="checkbox"/> Waterproofing	Click here to enter a date.	Click here to enter a date.	<input checked="" type="checkbox"/> Air/Vapor Barrier	Click here to enter a date.	Click here to enter a date.
<input type="checkbox"/> Curtain Wall	Click here to enter a date.	Click here to enter a date.	<input checked="" type="checkbox"/> Sealant	Click here to enter a date.	Click here to enter a date.
<input checked="" type="checkbox"/> Window	Click here to enter a date.	Click here to enter a date.	<input type="checkbox"/> Stucco	Click here to enter a date.	Click here to enter a date.

### Quality Review Hold-Point Assemblies/Items:

Pre-Installation Meeting	Date of Scheduled Meeting	Date of Completed Meeting	Pre-Installation Meeting	Date of Scheduled Meeting	Date of Completed Meeting
<input type="checkbox"/> Pavers/Plaza	Click here to enter a date.	Click here to enter a date.	<input type="checkbox"/> Building Expansion Joint	Click here to enter a date.	Click here to enter a date.
<input checked="" type="checkbox"/> Concrete	Click here to enter a date.	Click here to enter a date.	<input checked="" type="checkbox"/> Under slab Vapor Barrier	Click here to enter a date.	Click here to enter a date.
<input type="checkbox"/> Precast Concrete	Click here to enter a date.	Click here to enter a date.	<input type="checkbox"/> Concrete Restoration	Click here to enter a date.	Click here to enter a date.
<input type="checkbox"/> GFRC	Click here to enter a date.	Click here to enter a date.	<input checked="" type="checkbox"/> Epoxy Anchors	Click here to enter a date.	Click here to enter a date.
<input type="checkbox"/> Shotcrete	Click here to enter a date.	Click here to enter a date.	<input checked="" type="checkbox"/> Masonry Flashing	Click here to enter a date.	Click here to enter a date.
<input checked="" type="checkbox"/> Masonry - CMU	Click here to enter a date.	Click here to enter a date.	<input checked="" type="checkbox"/> Masonry	Click here to enter a date.	Click here to enter a date.
<input checked="" type="checkbox"/> Spray or Sheet Air / Vapor Barrier	Click here to enter a date.	Click here to enter a date.	<input type="checkbox"/> Steel Remediation	Click here to enter a date.	Click here to enter a date.
<input checked="" type="checkbox"/> Cold Formed Metal Framing	Click here to enter a date.	Click here to enter a date.	<input checked="" type="checkbox"/> Exterior Wall Sheathing	Click here to enter a date.	Click here to enter a date.
<input checked="" type="checkbox"/> Waterproofing	Click here to enter a date.	Click here to enter a date.	<input type="checkbox"/> Tyvek Air Barrier	Click here to enter a date.	Click here to enter a date.
<input checked="" type="checkbox"/> Spray Insulation	Click here to enter a date.	Click here to enter a date.	<input checked="" type="checkbox"/> Roof Systems	Click here to enter a date.	Click here to enter a date.



# Lessons Learned

Create an action plan of typical concerns that we need to get ahead of:

- Time sensitive construction
- List of tests and mock-ups
- List of Pre-installation meetings needed
- List of complex detailing
- Confirmation of Air, Water, Vapor, and insulation lines





INITIAL QUALITY  
REVIEW OF  
CONTRACT  
DOCUMENTS IN  
CD STAGE






# Lessons Learned

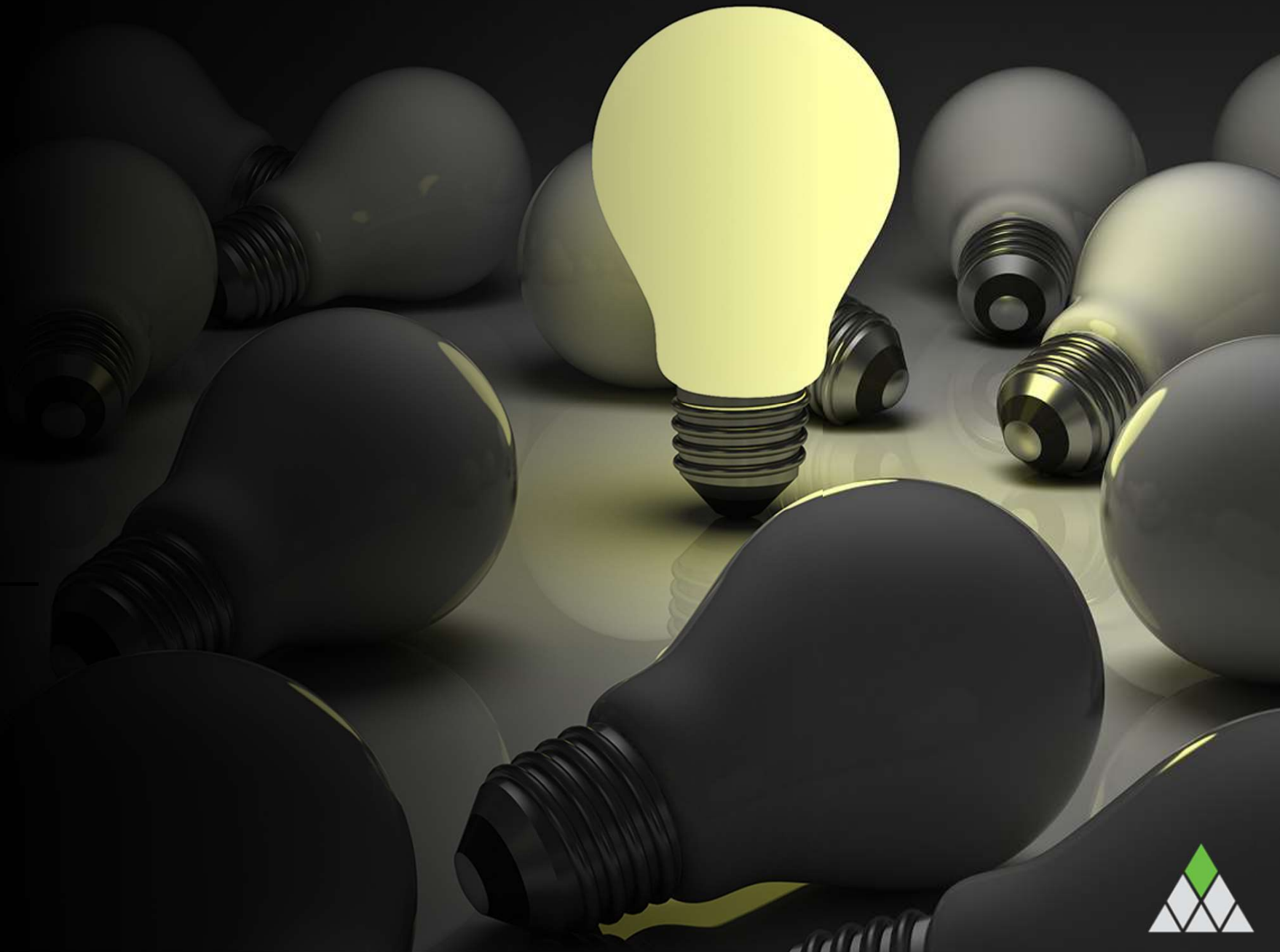
Confirm initial DD concerns:

- DD drawing comments resolved
- Confirm list of JSQP assumptions and follow-up
- Confirmation of Air, Water, Vapor, and insulation lines
- Set up early RFI list
- List of details that need further developement

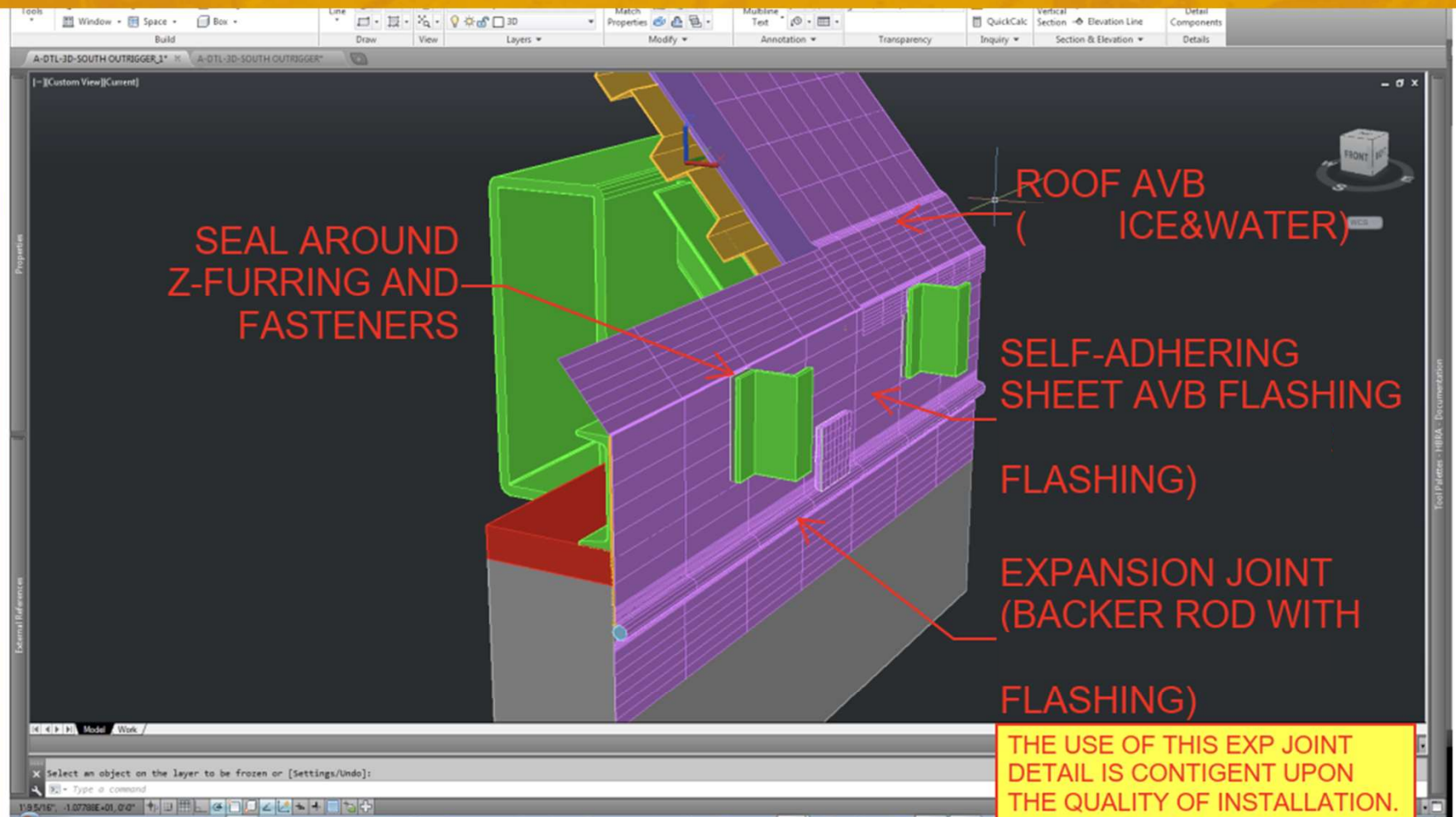




Thinking  
through the  
details...before  
bidding

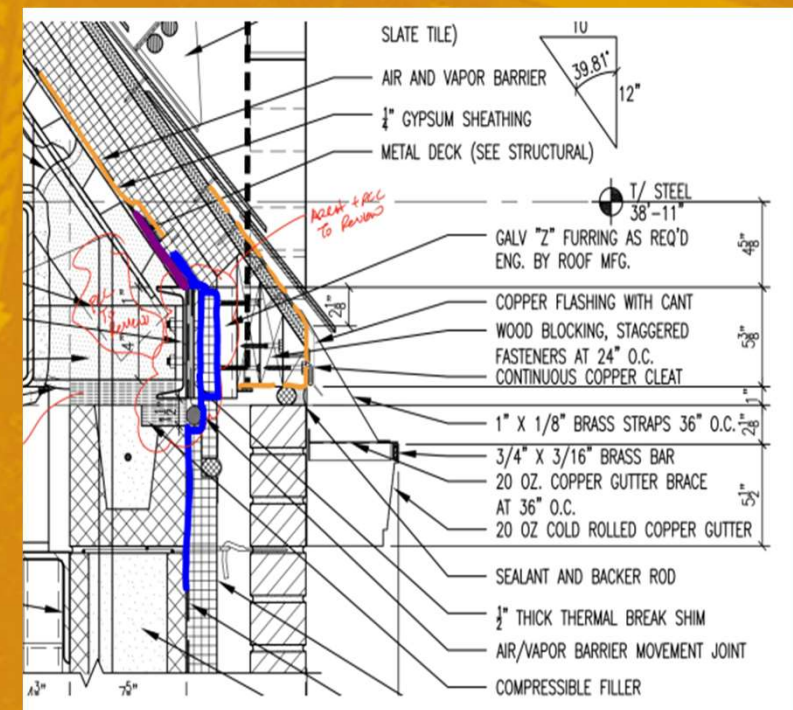






THE USE OF THIS EXP JOINT DETAIL IS CONTINGENT UPON THE QUALITY OF INSTALLATION. IF THE INTEGRITY OF THE AVB CANNOT BE MAINTAINED THEN THE USE OF AN EXTRUDED SILICONE ETA IS TO BE USED.

PROVIDE MOCKUP FOR REVIEW BY ARCHITECT



**Detail 13/A5.51**

for constructability & VB location and issue a revised sketch. We need to VB is not in between steel elements and still make a connection. eral wool will need to be installed prior to the SPF.



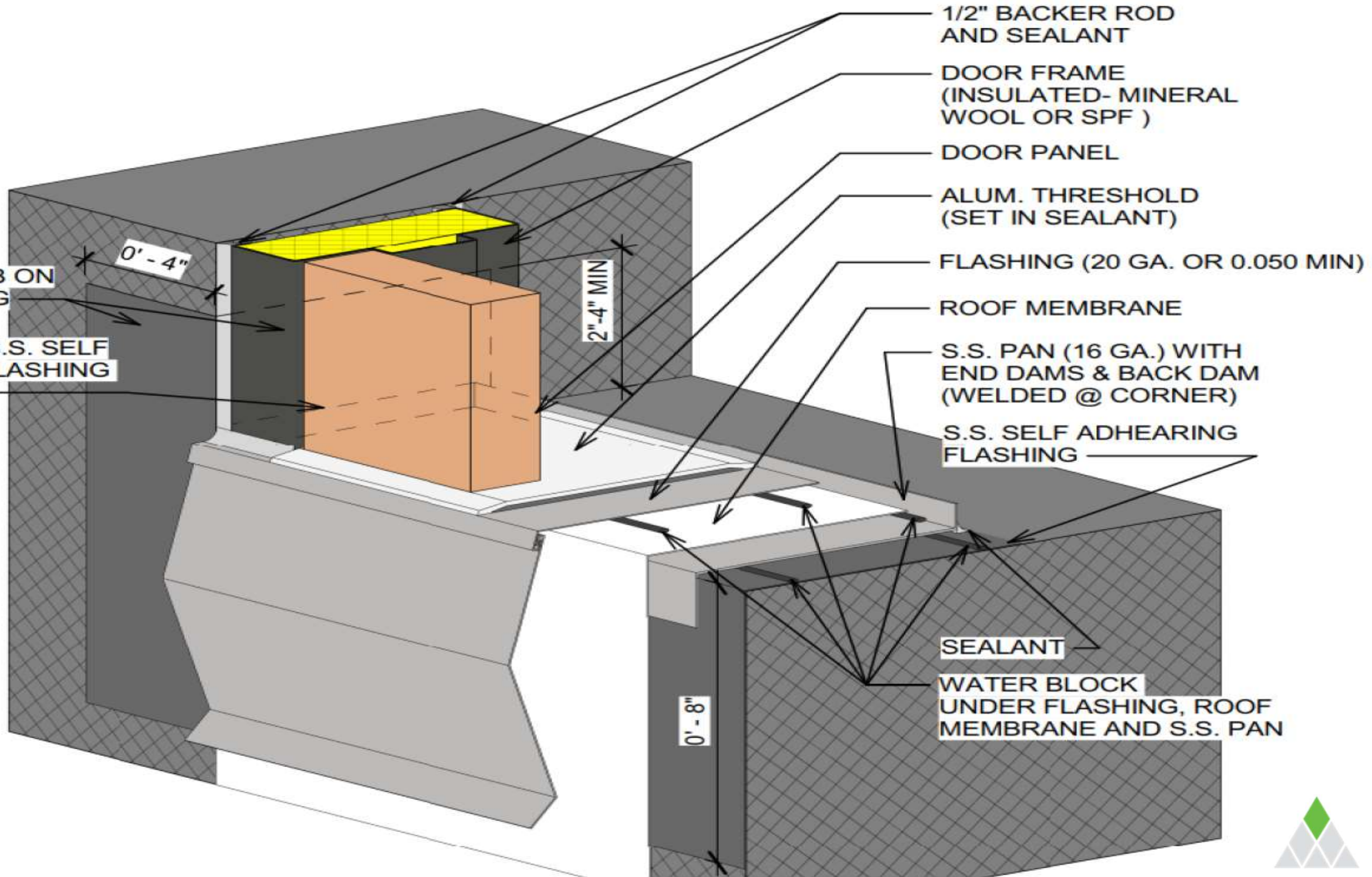


Installed detail as  
designed



OVERLAP AVB ON  
S.S. FLASHING

SEALANT @ S.S. SELF  
ADHEARED FLASHING  
& S.S. PAN



1/2" BACKER ROD  
AND SEALANT

DOOR FRAME  
(INSULATED- MINERAL  
WOOL OR SPF )

DOOR PANEL

ALUM. THRESHOLD  
(SET IN SEALANT)

FLASHING (20 GA. OR 0.050 MIN)

ROOF MEMBRANE

S.S. PAN (16 GA.) WITH  
END DAMS & BACK DAM  
(WELDED @ CORNER)

S.S. SELF ADHEARING  
FLASHING

SEALANT

WATER BLOCK  
UNDER FLASHING, ROOF  
MEMBRANE AND S.S. PAN

0' - 4"

2" - 4" MIN

0' - 8"



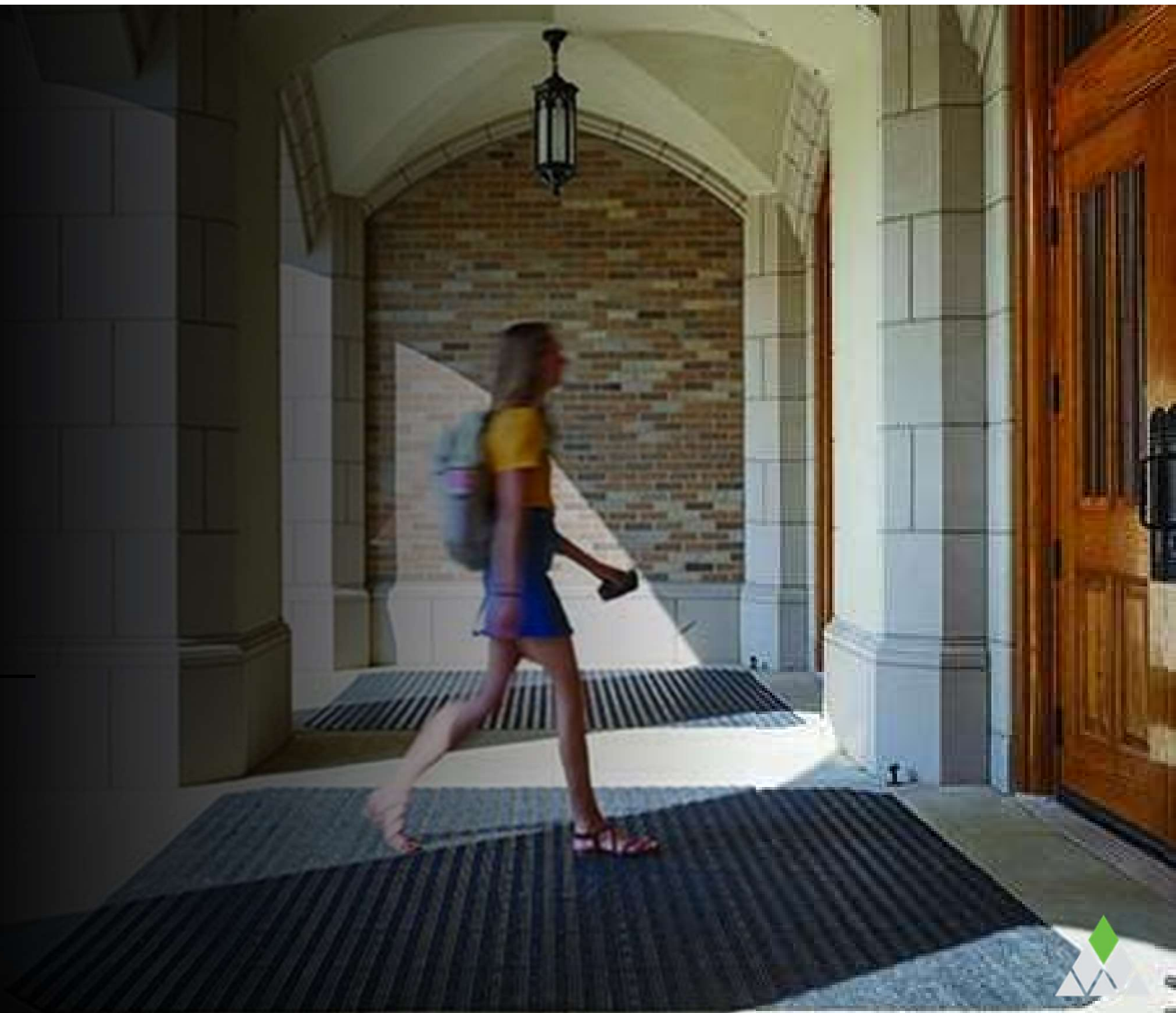


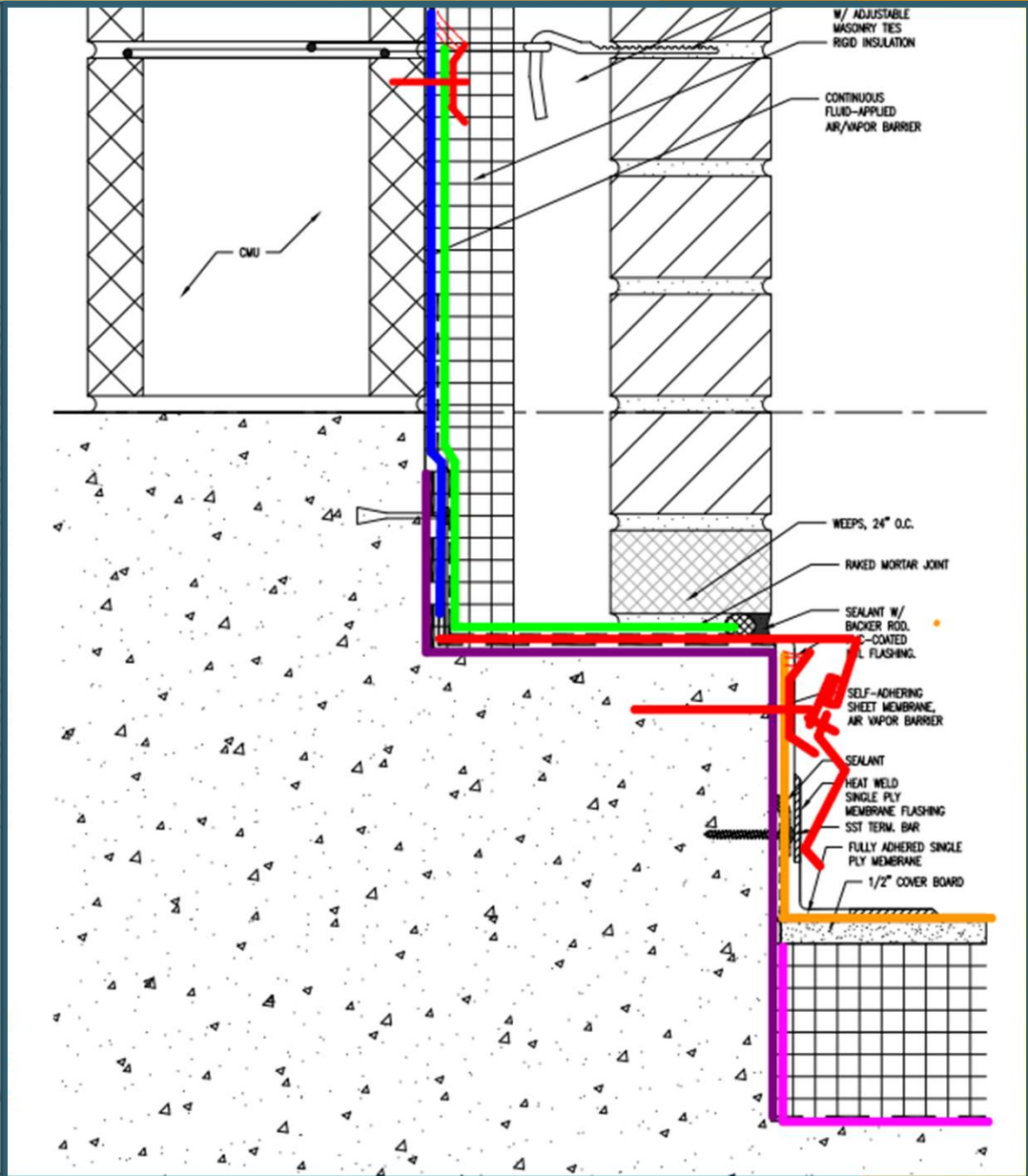
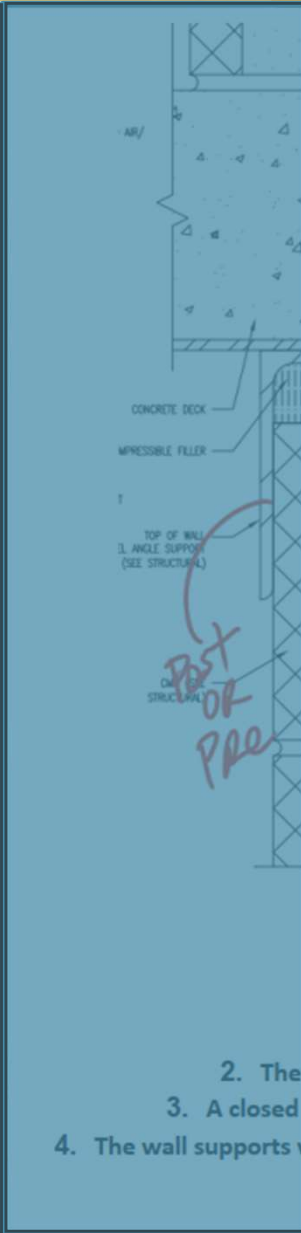
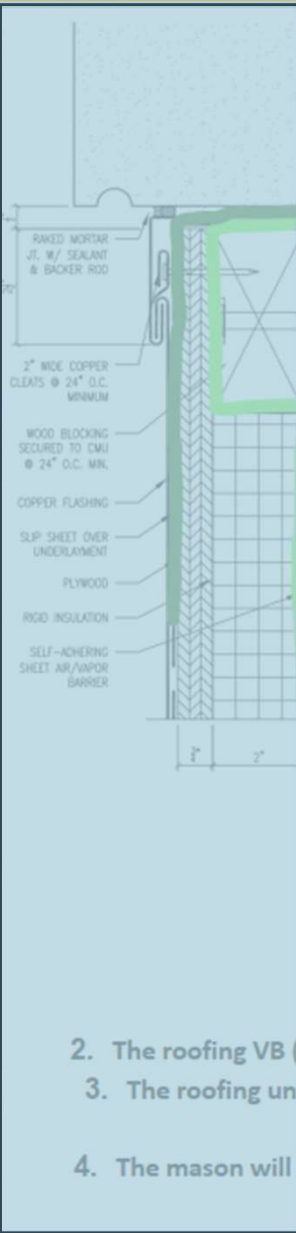
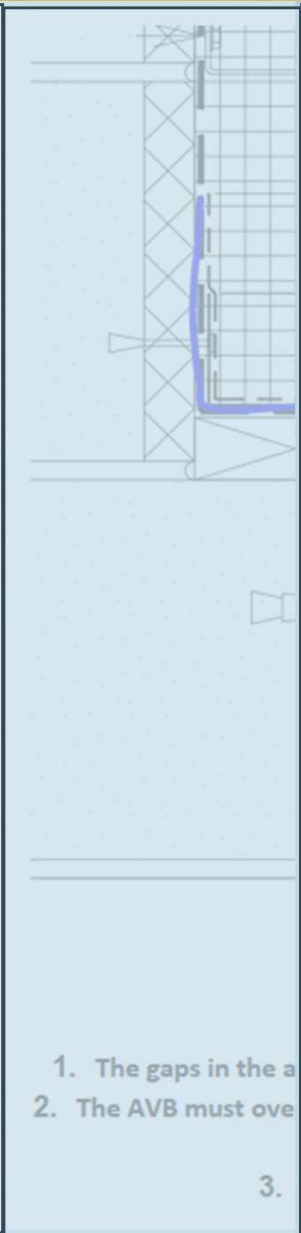
**The roof deck flutes under the curb should be filled with SPF (closed cell) in order to prevent air from getting under the roofing system**





BUILDING  
ENVELOPE  
(SKIN  
MEETING)  
REVIEW





# Lessons Learned

## Skin Meeting

- Confirm compatibility of actual materials being used
- Confirm detailing of actual systems being installed
- Confirm sequencing
- Confirm all components are assigned







# CONTRACTOR VALUE ENGINEERING CONVERSATIONS



07/05/2016



# VE attempt

Exchange pre-cured silicone for peel and stick at the exterior horizontal CMU joints

The detail included horizontal and vertical movement components

We did a First Work in Place to determine if the proposed VE would be efficient...







YOU DIDN'T FAIL.  
YOU JUST FOUND  
ANOTHER WAY  
THAT WON'T WORK.

[thingsweforget.blogspot.com](http://thingsweforget.blogspot.com)



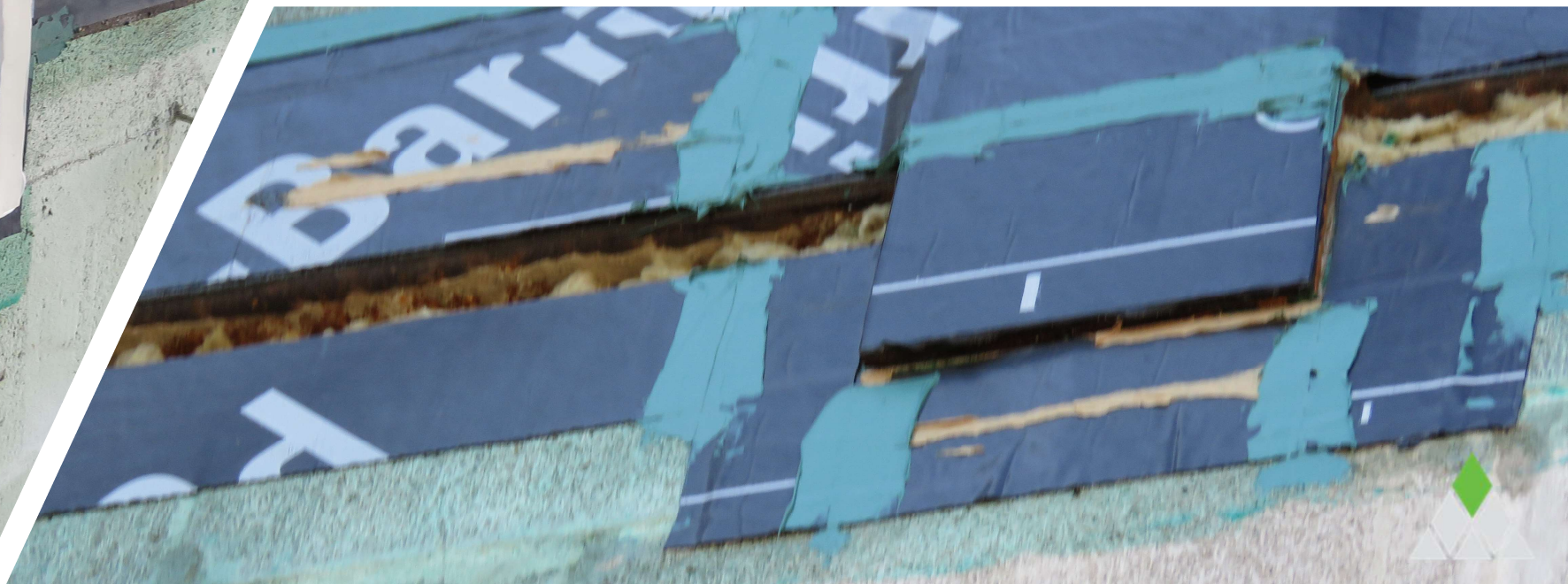
Understand the limitations of  
the materials:

*Construction Tolerance*

*Installation Limitations*

*Movement*





# Lessons Learned

Is it worth it:

- Perform a proper Value Engineering evaluation, making sure that the product or system suggested works as intended and is fit for use





AIR / VAPOR  
BARRIER +  
COORDINATING  
TRADE PRE-  
INSTALLATION  
MEETING



# Submittals should be Job Specific!





# The Importance of Updated Data Sheets

## Limitations

- EXP Sheathing is not a finished surface, nor is it a substrate for the direct application of joint compound, stucco, paint or textures in exterior wall applications. Placement of vapor retarders within the wall assembly is the responsibility of the design professional.
- Do not use EXP Sheathing as a nailing base. Mechanical fasteners should pass through the sheathing and engage the framing member behind the panel.
- Install materials used in conjunction with EXP Sheathing per the respective manufacturer's recommendations.
- EXP Sheathing is resistant to weather, but it is not intended for immersion in water and should not be subjected to ponding or to cascading water conditions.
- Do not apply EXP Sheathing below grade. Comply with building code grade clearance requirements.
- Do not laminate EXP Sheathing directly to masonry surfaces; fasten panels to furring strips or framing.
- EXP Sheathing is not intended for tile applications. For tile applications, Gold Bond® BRAND EXP® Tile Backer or PermaBase® BRAND Cement Board is recommended.
- Gypsum sheathing is not a replacement for specific structurally engineered sheathing in shear wall designs.
- Adhesive-only application of EXP Sheathing to framing is not recommended.
- Framing supports must not exceed 24 in. (610 mm) o.c.
- Design details, including fasteners, sealants and control joints, must be properly installed per system specifications. Openings and penetrations must be properly flashed and sealed according to code, building design and weather-resistive barrier manufacturer's instructions. Failure to do so will void the warranty; refer to EXP Sheathing warranty for terms, conditions and limitations.
- Avoid conditions that will create moisture in the air and condensation on EXP Sheathing. The use of unvented or improperly vented forced air heaters in the building creates water vapor volumes which can condense on the exterior sheathing. The use of these heaters and any resulting damage is not the responsibility of National Gypsum. Please consult heater manufacturer for proper use and ventilation.

111046 Rev. 3/19

**So, can you spot the difference?  
We have an extra paragraph under  
limitations. This is extremely  
important for the entire team to  
understand...including the  
subcontractor!**

**The Manufacturer determined an  
issue and placed that issue under  
the limitations section, telling us  
that there might be a new problem  
that we need to understand.**

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111046 Rev. 6/17



## 030000 Concrete

\* Typically Required  
for any project

Job Specific Quality Plan	Roof Protection Plan	Existing Flooring Protection Plan	Depressed Slab Procedure Plan	Architecturally Exposed Concrete Procedures
Formwork Shop Drawings and Calculations	Shoring and Calculations	Hot Weather Plan	Cold Weather Plan	Mass Concrete Procedure Plan
Flatwork Description Procedure	Slab Opening Coordination	Slab Edge Coordination	High FF (+50) Procedure	Pre/Post Tensioning Procedures
Mix Designs with identification	Concrete and Additive Material Product Data	Mix Design for Stair	Color Pigments	Floor Treatments
Fiber Reinforcement	Floor slab Treatments	Bonding Agents		Concrete Tolerance Acceptance
Rebar Shop Drawings	Rebar (and epoxy) Product Data	WWF Product Data	Epoxy Coated Rebar paint	Rebar Couplers
Diamond Dowels or Similar	Rebar Chairs	Dovetail Anchors	Embed Items	
Form Material(s) and locations	Form release <i>(Will send to Waterproofing and AVB Contractors)</i>	Form Liner(s)	Form Rustication Strips	Special Forms
Chamfer & Reveal Strips	Insulation	Curing Material		
Construction Joint Layout - Horizontal	Construction Joint Layout - Vertical	Control Joint Layout - Horizontal	Control Joint Layout - Vertical	Joint Filler
Vapor Retarders & Accessories and Installation Instructions	Waterstop and Installation Instructions	Epoxy and Installation Instructions	Grout and Installation Instructions	Sealant for joints
Vapor Barrier	Vapor Barrier Mastic	Vapor Barrier Tape	Vapor Barrier Concrete Tape	Vapor Barrier Installation instructions

The following is a list of typical submittals that we should be requesting for each project regarding the specific trades.

Make sure that the specifications regarding what to submit are followed. Some of these submittals are above what is required; however, it is what's needed for our proper review and Checklist records.

Discuss with the Architect if they want to receive the extra submittals.

The list is not a complete listing of submittals for your project, and not all listed submittals may pertain to your project.



## 042000 Masonry

*\* Typically Required for any project*

Job Specific Quality Plan	CMU Product Info – Including Rating Info	Brick Veneer(s) Product Info	Brick Veneer Efflorescence tests	Grout(s) product data
Mortar(s) product data	Lateral CMU Reinforcing(s)	Masonry Anchors	Post installed Masonry Anchors	Vertical Rebar Product Info
Vertical Rebar shop drawings	CMU CJ	Masonry Joint Filler	Weeps/Vents	Flashing / Primer
SS Drip	Bridging	Sealant/Backer		

## 054000 CFMF and Sheathing

*\* Typically Required for any project*

Insulation and clips	Job Specific Quality Plan	CFMF Components	Stamped Shop Drawings & Calculations	CFMF Fastener Data Sheets	CFMF Clips and Accessories
Cast Stone Anchor Calculations	Zinc Rich Paint for touch-up	Gypsum Sheathing	Sheathing Installation Instructions	Sheathing Fasteners (Corrosion Resistant)	Backer Rod & Sealant
Welding Certifications		Wood Sheathing			Horizontal EJ

## 060000 Rough Carpentry

*\* Typically Required for any project*

Job Specific Quality Plan	Wood Material Data	ECC-ES Report(s) for wood	Fastener Data	Fastener ICC-ES Report(s)
FRT Wood & Ext Treated	Ice & Water Shield (used if treated wood is in contact with Galv Metal)	Wood Fastener Calculations for Head, Sill, and Jambs	Wood Fastener Calculations for Parapet/Coping	Roof Protection Plan



## 071000 Waterproofing

*\* Typically Required for any project*

Job Specific Quality Plan	Job Specific Details	Waterproofing Installation Instructions	Installer Certification	Manufacturer Letter
Product Data	ICC-ES Report(s)	Hot & Cold Weather Plan	Sample Warranty	Repair Plan
Crack & Joint Treatment Plan	Compatibility Guide	Mfr Tech Bulletins	Protection Board	Drainage Panels
Sealant (under and or over)	Neoprene	Mastic	Aggerate / Sand	Reinforcement Fabric

SS Termination Bar

SS Fasteners

Backer R (Closed C

## 071800 Traffic Coating

*\* Typically Required for any project*

Root Barrier	Water Stopping and sealant or primer	Transitic Membran	Job Specific Quality Plan	Job Specific Details	Traffic Coating Installation Instructions	Installer Certification	Manufacturer Letter
EFMD (Testing)	Testing Plan	Tie-Back Cc Etc.	Product Data	ICC-ES Report(s)	Hot Weather Plan	Cold Weather Plan	Repair Plan
Samples	Liquid Flashing	Roof Prote Plan	Sample Warranty	Maintenance Manuals	Crack & Joint Treatment Plan	Compatibility Guide	Mfr Tech Bulletins
			Sealant (under and or over)	Concrete Patch Material(s) and installation Instructions	Samples	Aggerate / Sand	Neoprene Sheet
			Reinforcing Fabric	Flashing Tape	Liquid Flashing	Roof Protection Plan	Primer



## 072400 EIFS & DEFS

*\* Typically Required for any project*

Job Specific Quality Plan	Product Data	NFPA 285 (if 3 or more stories)	Sample Warranty	Installation Instructions
Job Specific Details	Hot & Cold	Installer	Manufacturer	Erection Tolerance

Tech Bulletins

Accessories

## 072700 Air / Vapor Barrier

*\* Typically Required for any project*

Job Specific Quality Plan	Product Data	NFPA 285 (if 3 or more stories)	Sample Warranty	Installation Instructions
Job Specific Details	Compatibility Guide	Installer Certification	Manufacturer Letter	Hot & Cold Weather Plan

Crack & Joint Treatment Plan

Compa  
Gu

## 074200 Metal Wall Panels

*\* Typically Required for any project*

Backer Rod (Closed Cell)	Neop	Job Specific Quality Plan	Product Data	NFPA 285 (if 3 or more stories)	Sample Warranty	Installation Instructions
SS Termination Bar	SS Fas	Job Specific Details	Hot & Cold Weather Plan	Installer Certification	Manufacturer Letter	Calculations
Liquid Flashing	Testin	Erection Tolerance Acceptance	Sealant	Backer Rod(s)	Drainage Mat	Underlayment
Reinforcement Fabric		Sub-Grit Data	Sub-Girt Calculations	Fastener Calculations	Fastener Data & ICC-ES Report	Insulation & Attachment
		Samples	Finish(es)	AVB Repair Plan	Accessories	Roof Protection Plan



## 074646 Cement Board Siding

\* Typically Required for any project

Job Specific Quality Plan	Product Data	NFPA 285 (if 3 or more stories)	Sample Warranty	Installation Instructions
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## 075000 / 076200 Roofing / Flashing

\* Typically Required for any project

Job Specific Details	Job Specific Quality Plan	Product Data	Sample Warranty	Job Specific Details	Installation Instructions
Erection Tolerances	ICC-ES Report	Hot & Cold Weather Plan	Installer Certification	Manufacturer Letter	Tech Letters
Accessories	Manufacturer Composition Letter	Tapered	Walk Way Pad	FM Letters and	ES-1 Coping

## 084000 Entrances / Curtainwall

\* Typically Required for any project

Fasteners & ICC-ES Report	Job Specific Quality Plan	Product Data	Samples/Colors	Installation Instructions	Sample Warranty
Adhesives	Shop Drawings	Accessories	Glass Product Data	Anchor / Attachment Calculations	Maintenance Manuals

## 089100 Louvers

\* Typically Required for any project

Roof Hatch / Stantions	Continuity for AVB System (Location of Sealant Primaries)	Job Specific Quality Plan	Product Data	Samples/Colors	Installation Instructions	Fastener Data & Fastener ICC-ES Report
UL Assemblies	Welding Certificate	Fastener Calculations	Shop Drawings	Sample Warranty	Screens	Roof Protection Plan
Green Roof Data	Roof Protection Plan	Color Samples	Sealant	Primer(s)	Backer Rod(s)	




# Lessons Learned

What is important to who

- In general, the team needs more submittals to review and confirm, at least the Contractor needs more
- Early identification of the required submittals are key to keep things on track







AIR / VAPOR  
BARRIER +  
ADJACENT  
TRADE  
SUBMITTALS





<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Have all required air barrier product submittal data required been approved and reviewed by the Mason? (including fasteners) <b>If NOT...When?</b>	<i>Req's for CMU discussed</i>
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Do the anchor fasteners need a gasket or sealant to maintain the AVB?	
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	What are the procedures, who provides/installs:	<i>T.B.D. e Mockup</i>
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Are we drilling into concrete or CMU for the anchor installation? If so, Review the air barrier requirements for sealing... Typically, when drilled into, the product will need to be treated, either peel and stick material, liquid membrane, etc.	
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	If there is an AVB installed on the exterior sheathing: Make sure that any penetrations that we do are properly repaired... such as pull lines attached to the building, tie offs, etc.: Obtain the instructions from the AVB installer.	 <i>AVB Contractor will provide proper sealant</i>

## Masonry Pre-Installation Meeting

<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<b>Surface Finish - 3.0</b> <ul style="list-style-type: none"> <li>Patch voids larger than 1/4" wide or 1/2" deep</li> <li>Remove projections greater than 1/8"</li> <li>Tie holes need to be patched</li> <li>Surface Tolerance Class A</li> <li>Mock-up required</li> </ul>	<i>AVB + Waterproofing</i>
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Is there a tie hole pattern required?	
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Section 3.4 of ACI 347-04 states that: "Class A is suggested for surfaces prominently exposed to public view where appearance is of special importance. Class B is intended for coarse-textured, concrete-formed surfaces intended to receive plaster, stucco, or wainscoting. Class C is a general standard for permanently exposed surfaces where other finishes are not specified. Class D is a minimum-quality requirement for surfaces where roughness is not objectionable, usually applied where surfaces will be permanently concealed."	<i>T.B.D - Will Review what is exposed</i>
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Unless otherwise specified, finish to Class B for exposed surfaces and Class D for unexposed.	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Generally, waterproofing, air/vapor barrier, Paint, etc. requires a Class A finish	<i>Discussed ✓</i>

## Concrete Pre-Installation Meeting

<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Obtain compatibility letters from EACH manufacture of EACH product being installed at the intersection of the <b>Vapor Barrier / Roof Membrane / AVB</b> . Obtain sign-offs from both of the products that are adjacent to each other:	<i>Most Self Adhered Vapor Barrier will have the sticky product exposed at the ends...which needs to be verified.</i>																				
Notes:			<table border="1"> <tr> <td>Vapor Barrier &amp; Roofing</td> <td><input checked="" type="checkbox"/></td> <td>Vapor Barrier &amp; AVB</td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td>Vapor Barrier &amp; Sealant(s)</td> <td><input checked="" type="checkbox"/></td> <td></td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td>ICE &amp; WATER SHEILD, BARRIER</td> <td><input checked="" type="checkbox"/></td> <td></td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td>FIELD MOCK UP THE TWO CONDITIONS</td> <td><input checked="" type="checkbox"/></td> <td></td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td></td> <td><input checked="" type="checkbox"/></td> <td></td> <td><input checked="" type="checkbox"/></td> </tr> </table>	Vapor Barrier & Roofing	<input checked="" type="checkbox"/>	Vapor Barrier & AVB	<input checked="" type="checkbox"/>	Vapor Barrier & Sealant(s)	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	ICE & WATER SHEILD, BARRIER	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	FIELD MOCK UP THE TWO CONDITIONS	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
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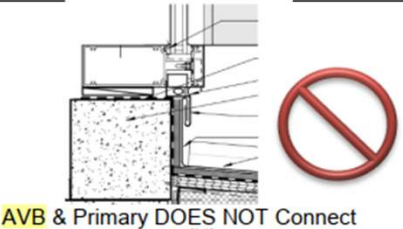
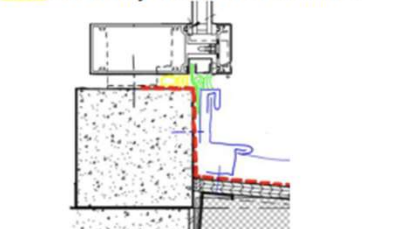
## Typical for all Pre-Installation Meetings



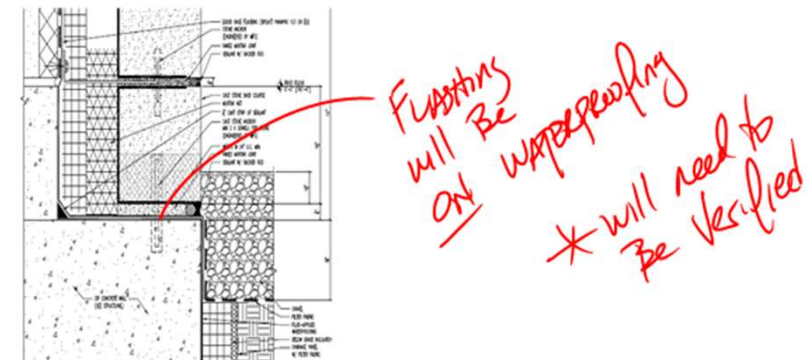
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Is the mastic sealed so the top, no gaps?	<input checked="" type="checkbox"/>	N/A	<i>Will Re</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	If placing d	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	N/A	Mastic on peel and stick seams are to be 1/8"-1/4" in thickness, tooled, and 1"-1 1/2" wide.		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	We need to seal from gaps.	<input checked="" type="checkbox"/>	N/A	<b>WE CAN NOT WITHOUT OR T MA EXCLU</b>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Will the mastic be filled with how log shall prior to plac air barrier?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	N/A	What is the minimum overlap required for the Self-adhered sheet Overlap Required:		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	This is intersect the	<input checked="" type="checkbox"/>	N/A		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Does the s	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	N/A	Review the overlap and make sure that the proper overlap is maintained at end of construction areas...i.e.: Expansion joints, corners, etc.		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Make s	<input checked="" type="checkbox"/>	N/A		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Review the is not prop	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	N/A	Always verify installation for pin holes, blisters, or other voids...	<input checked="" type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Start of v	<input checked="" type="checkbox"/>	N/A		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Prime su	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	N/A	What is the repair patching requirements/procedures:	<i>will provide letter from Grace</i>	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Review (Peel and	<input checked="" type="checkbox"/>	N/A		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Make sure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	N/A	How are penetrations detailed?	<i>Overlap 3" w/ Sealant c jt See Details</i>	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	(If drilled into	<input checked="" type="checkbox"/>	N/A		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Verify that from th	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	N/A			

## Air/Vapor Barrier Pre-Installation Meeting



Storefront				
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	N/A	Discuss storefront deflectors...make sure that they are being installed at all storefront head horizontals.	Yes
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	N/A	Make sure that the sill fasteners all 100% sealed.	Revised - skip MTB Confirmed
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	N/A	The sealant must be at the AVB line, under the sill.	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	N/A	Are we installing a deflection receiver channel at the head?	Yes - CMPS + Hold down Wash Bulbs
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	N/A	If not...how are we taking care of deflection?	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	N/A	Review the Air barrier connections and location of skip hoist...make sure that we coordinate the AVB so that it has proper overlapping material.	* will Review @ Confsm
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	N/A	Review the window system connection at the roof. Discuss the location of the AVB and the requirement to connect to the system primary sealant. <u>If the connection does not happen...we need to RFI the architect.</u>	 

## Window Pre-Installation Meeting

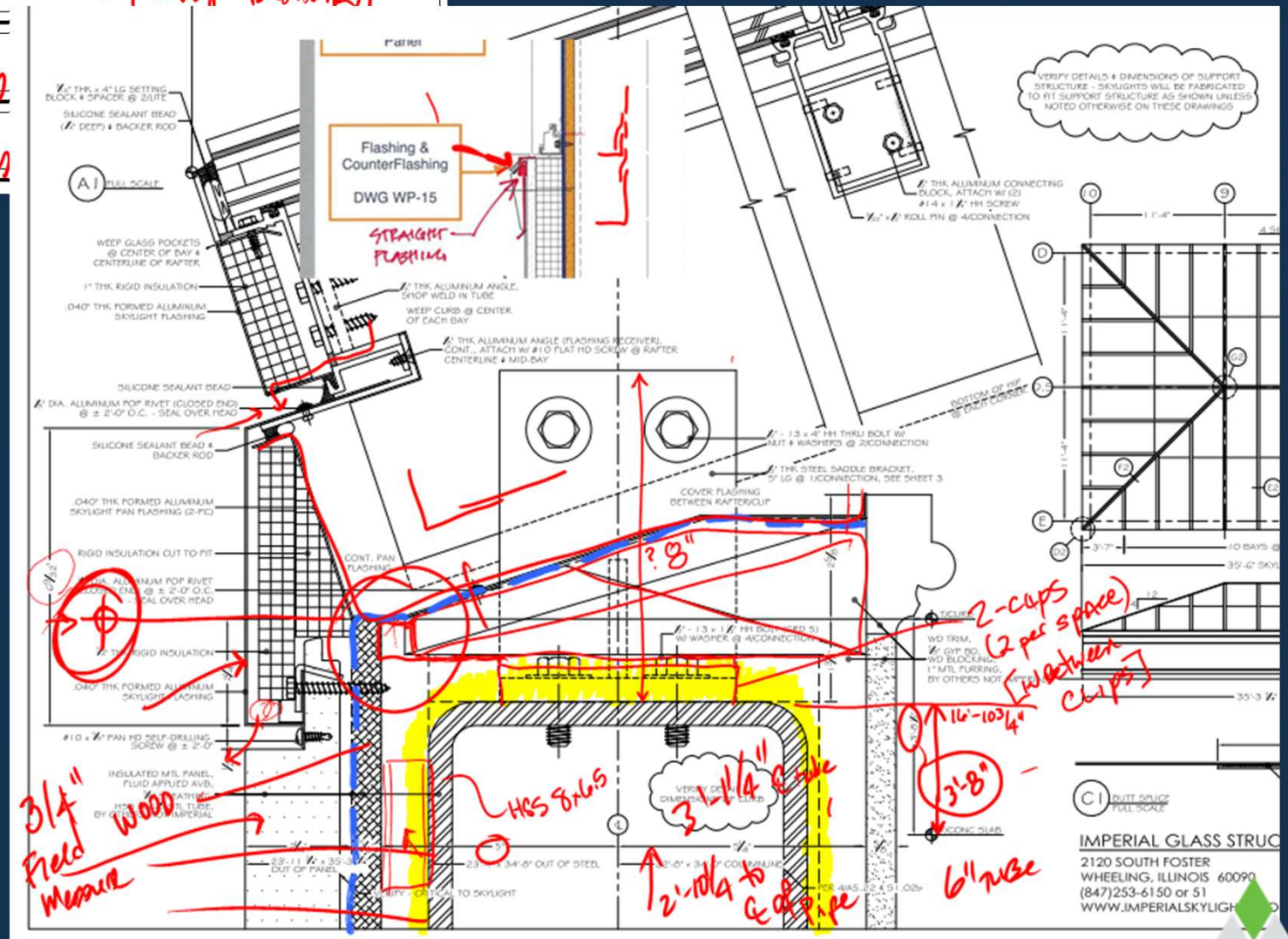
Door Electrical				
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	N/A	Who is providing the electrical raceways and how are we separating these two materials?	Electrician - Installed W. race
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	N/A	Do we have electric strikes...and what is the electrical route?	Will Penetrate on side
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	N/A	Make sure that the wire/conduit is properly sealed at the building (AVB) prior to the door frame installation.	* First not influence
Provide Drawing of Detail: <b>waterproofing on or under flashing</b>				
				
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	N/A	Are we installing waterproofing on or under AVB System?	Y N Discuss detail Transition Membrane
Provide Drawing of Detail: <b>waterproofing on or under AVB System</b>				
See detail				


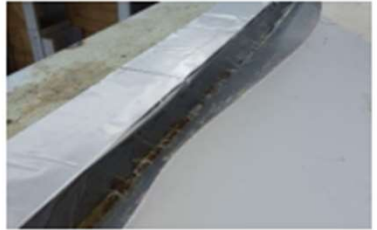
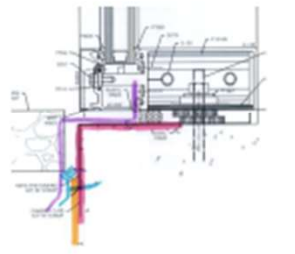
## Waterproofing Pre-Installation Meeting


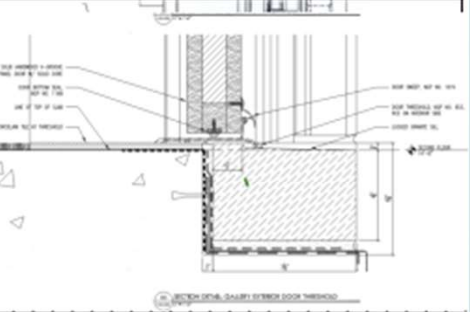
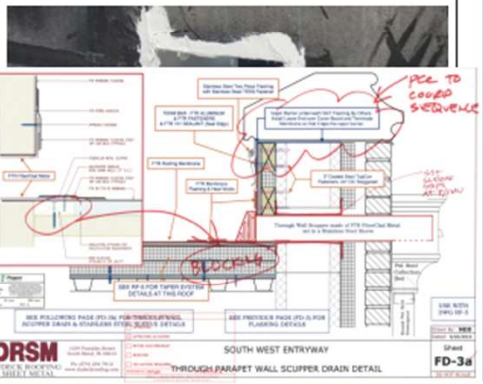


Skylights					
<input type="checkbox"/>	<input checked="" type="checkbox"/>	N/A	Skylight curbs must have an R-5 minimum curb or system to be NFRC 100 Labeled.	<input type="checkbox"/>	yes
<input type="checkbox"/>	<input checked="" type="checkbox"/>	N/A	Review the AVB connection and continuity.	<input type="checkbox"/>	yes - will conform w/ shop drawings
<input type="checkbox"/>	<input checked="" type="checkbox"/>	N/A	Make sure that there is not a weep interrupting the connection - might need to locate behind the weep system.	<input type="checkbox"/>	yes
<input type="checkbox"/>	<input checked="" type="checkbox"/>	N/A	Make sure that there is a condensation pan that extends past the end of the glass.	<input type="checkbox"/>	yes
<input type="checkbox"/>	<input checked="" type="checkbox"/>	N/A	Always install a pan flashing	<input type="checkbox"/>	yes

## Skylight Pre-Installation Meeting



✓	N/A	How does the vapor barrier go up the parapet? Identify path of Vapor Barrier and Air Barrier in all conditions and proper transitions between materials:	See Skops
✓	N/A	What is the detail at the parapet / Roofing? Verify that the AVB membrane either goes under the roofing membrane or to a compatible material to extend the AVB envelope to the roofing system (vapor barrier or adhered roofing membrane). <b>Provide sketch...</b>	 <p>Example</p> <p>Discuss peel and stick joints and covering them if a single ply roof is being installed (the joints are NOT compatible)</p>
✓	N/A	Review what material will be making the AVB / Roofing connection.	<p>Self-Adhered Stainless Steel with a butyl tape is a good option.</p> <p>See Sketched</p> 
✓	N/A	Discuss Vapor Barrier termination details and attachment to AV barrier as required. Verify Compatibility and Sequencing...	
✓	N/A	Discuss Vapor Barrier, Roof Membrane, and AVB compatibility and sequencing.	
✓	N/A	Need to discuss and detail the roofing and the curtainwall.  Make sure that the materials are compatible, sequence of installation is clear, and there is attachment to the curtainwall primary sealant and the roofing or roofing extension (such as stainless steel)  [Curtainwall sealant will not bond to most roofing materials]  (Review SKIN Meeting Notes)	

✓	N/A	Review what material will be making the AVB / Window or Door / Roofing connection.	<p>Self-Adhered Stainless Steel with a butyl tape is a good option.</p> 												
✓	N/A	Need to discuss and detail the roofing and the door threshold.  Make sure that the materials are compatible, sequence of installation is clear, and there is attachment to the curtainwall primary sealant and the roofing or roofing extension (such as stainless steel)  [sealant will typically not bond to most roofing materials] AS 65B  (Review SKIN Meeting Notes)													
✓	N/A	Discuss the <u>sequence</u> of installation with time required for cure at each step....	<table border="1"> <thead> <tr> <th colspan="2">SEQUENCE of Vapor Barrier / Roof Membrane / AVB</th> </tr> </thead> <tbody> <tr> <td>WALL AVB, MASONRY, THEN ROOFING SYSTEM</td> <td></td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> </tbody> </table>	SEQUENCE of Vapor Barrier / Roof Membrane / AVB		WALL AVB, MASONRY, THEN ROOFING SYSTEM									
SEQUENCE of Vapor Barrier / Roof Membrane / AVB															
WALL AVB, MASONRY, THEN ROOFING SYSTEM															
✓	N/A	Discuss the scuppers and how we are tying the roofing / scupper flashing with the AVB?  Discuss a transition piece or similar to make sure that all are compatible.													



# Lessons Learned

Can we do better next time?

- Evaluate current preinstall meetings for completeness and usefulness – constantly improve
- Update as new materials or new procedures are discovered





# CHECKLIST



# Fluid/Sheet Applied A/V Barrier Construction Checklist

08-02-2016

Date of Initial Review:	Location of Work Performed:	Day	initial	Weather	Beg Temp	End Temp
		Monday				
		Tuesday				
		Wednesday				
		Thursday				
		Friday				
Project:	#	Always review existing conditions PRIOR to the start of work EACH DAY and discuss with A/E as required				

N/A	Mon	Tue	Wed	Thur	Fri	Comments
N/A	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Verify the temperature will be above 40°F at time of application and during cure.
N/A	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Air barrier is backed with something solid... <b>DO NOT ALLOW THE AIR BARRIER TO SPAN OVER MATERIALS UNSUPPORTED.</b>
N/A	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Make sure ALL material is lifted off the ground and is properly covered to protect from water and sun.
N/A	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	CMU shall have struck flush or made flush joints.
N/A	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	CMU shall have mortar accumulation removed prior to installation.
N/A	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Sheathing and wood blocking is continuous and complete.
N/A	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Cementitious surfaces must be clean and smooth.
N/A	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Tape off area above the waterproofing at the base of the wall prior to installing membrane to avoid overspray onto the waterproofing.
N/A	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Voids in CMU greater than 1/2" shall be pre-treated with LM, S100, or a fast setting concrete mortar.
N/A	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Gaps greater than 1/4" should be pre-filled with a S100 and allowed to <u>skin over</u> .
N/A	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Install primer WB on all surfaces. Allow to dry to the touch prior to installation of detail membrane. (245 min at 75°F at 50% relative humidity)
N/A	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Detail membrane should be installed over skinned over S100 only.
N/A	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	S100 at sheathing joints & detail membrane at corners (inside/outside).
N/A	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Install "football" membrane at the inside corner of the window openings.
N/A	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Verify that the membrane is installed with shingle style lapping.
N/A	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Detail membrane to detail membrane should overlap a minimum 2".



AIR BARRIER PROJECT						
Type of Air Barrier System:	<input type="checkbox"/> Fluid- Applied Membrane	<input type="checkbox"/> Self-Adhered Membrane	<input type="checkbox"/> Spray-Foam			
Manufacturer:	<input type="checkbox"/> Carlisle	<input type="checkbox"/> Henry	<input type="checkbox"/> Prosoco	<input type="checkbox"/> Polyguard	<input type="checkbox"/> W.R. Grace	<input type="checkbox"/> Meadows <input type="checkbox"/> Other
Substrate:	<input type="checkbox"/> Gypsum	<input type="checkbox"/> CMU	<input type="checkbox"/> Concrete	Substrate Temp: (°F)	Ambient Temp: (°F)	
Installation Area:	Elevation:	<input type="checkbox"/> North	<input type="checkbox"/> South	<input type="checkbox"/> East	<input type="checkbox"/> West	<input type="checkbox"/> Other
From Level:	To Level:	Between CL:	To CL:			
<input type="checkbox"/> Verify that materials are properly stored in material storage areas.						
<input type="checkbox"/> Verify both ambient and substrate temperatures are within the limitations for material installation.						
<input type="checkbox"/> Review adjacent materials (windows, doors, ducts, penetrations) for conformance to details and instructions.						
<input type="checkbox"/> Verify that all penetrations are securely installed.						
<input type="checkbox"/> Verify that a continuous air barrier system is capable of being achieved before beginning installation.						
<input type="checkbox"/> Verify that substrate(s) are installed per manufacturer's instructions and are flat, free of fins and irregularities.						
<input type="checkbox"/> Verify that substrate is properly cured, dry, clean, sound, and free of dust, dirt, residue, and all other contaminants.						
<input type="checkbox"/> Verify that all gaps exceeding 1/4-inch are treated with approved sealant.						
<input type="checkbox"/> Verify that any surrounding areas and surfaces are protected from damage and staining during application of air barrier.						
<input type="checkbox"/> Verify spray equipment, hoses, and spray tips are clean and in proper working condition.						
<input type="checkbox"/> Verify that proper wet mil thickness is achieved during spray and/or roller application.						
<input type="checkbox"/> Verify that application is free of voids and pinholes.						
<input type="checkbox"/> Verify that details have been installed correctly according to details and instructions.						
<input type="checkbox"/> Protect finished work at the end of each day as necessary.						
<input type="checkbox"/> Note any physical damage to completed areas that may have occurred during construction and repair as needed.						
<input type="checkbox"/> Clean equipment and material areas per instructions and as required.						
<input type="checkbox"/> Verify proper removal of construction materials, equipment, and waste materials.						







# AIR BARRIER CONTRACTOR JOB SPECIFIC QUALITY PLAN



# Subcontractor Job Specific Quality Plan



- d. Review of Architectural and Manufacturer's Details
  - i. During Daily Tool Box Talks, the Quality Champion is to review the most current approved details and installation instructions for the upcoming installation.
  - ii. Weather concerns must be addressed as needed prior to beginning work for the day.
  
- e. Installer Quality Assurance – **Self-Adhering Sheet Air & Vapor Barrier**
  - i. Quality Champion will review the product application daily with the installation team to verify the field membrane is properly installed.
    1. All substrates should be smooth, sound, dry, and free of contaminants.
    2. Fluid-applied products should be applied in a continuous film free of pinholes, filling all cracks, voids, reveals, crevices, etc. with a total wet mil thickness meeting the manufacturer's guidelines. Mil thickness is to be verified using a wet mil gauge at regular intervals.
    3. When using rollers to install the product, crew members may need to apply the membrane in two coats allowing the first coat to reach initial set prior to application of second coat in order to avoid slumping.
    4. Self-adhering stainless steel detail transition strips should be placed in position and applied using positive pressure using a hand roller. Product should be wrinkle free and void of fishmouths.



# Lessons Learned

Why require?

- Proves a clear line of responsibility for installation and quality
- It's about procedure and quality of content
- Produces ownership of the work





# MOCK-UP REVIEW

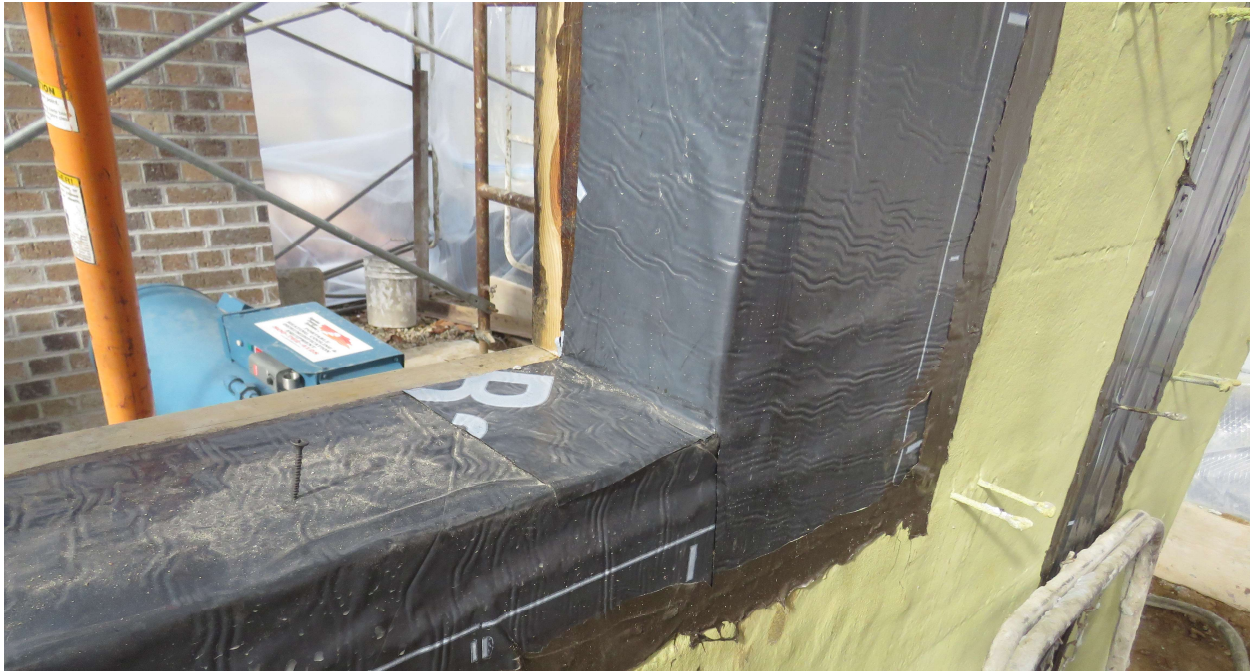






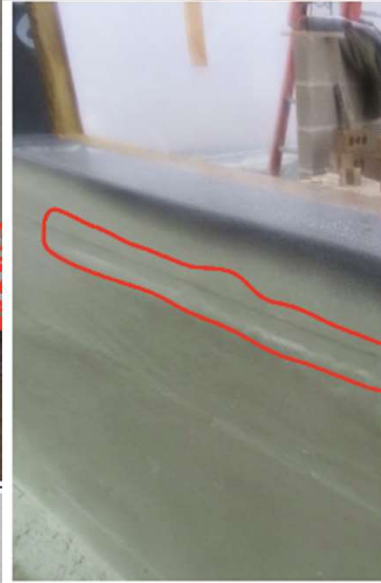
Each roof condition was reviewed for sequence, material compatibility, AVB continuity



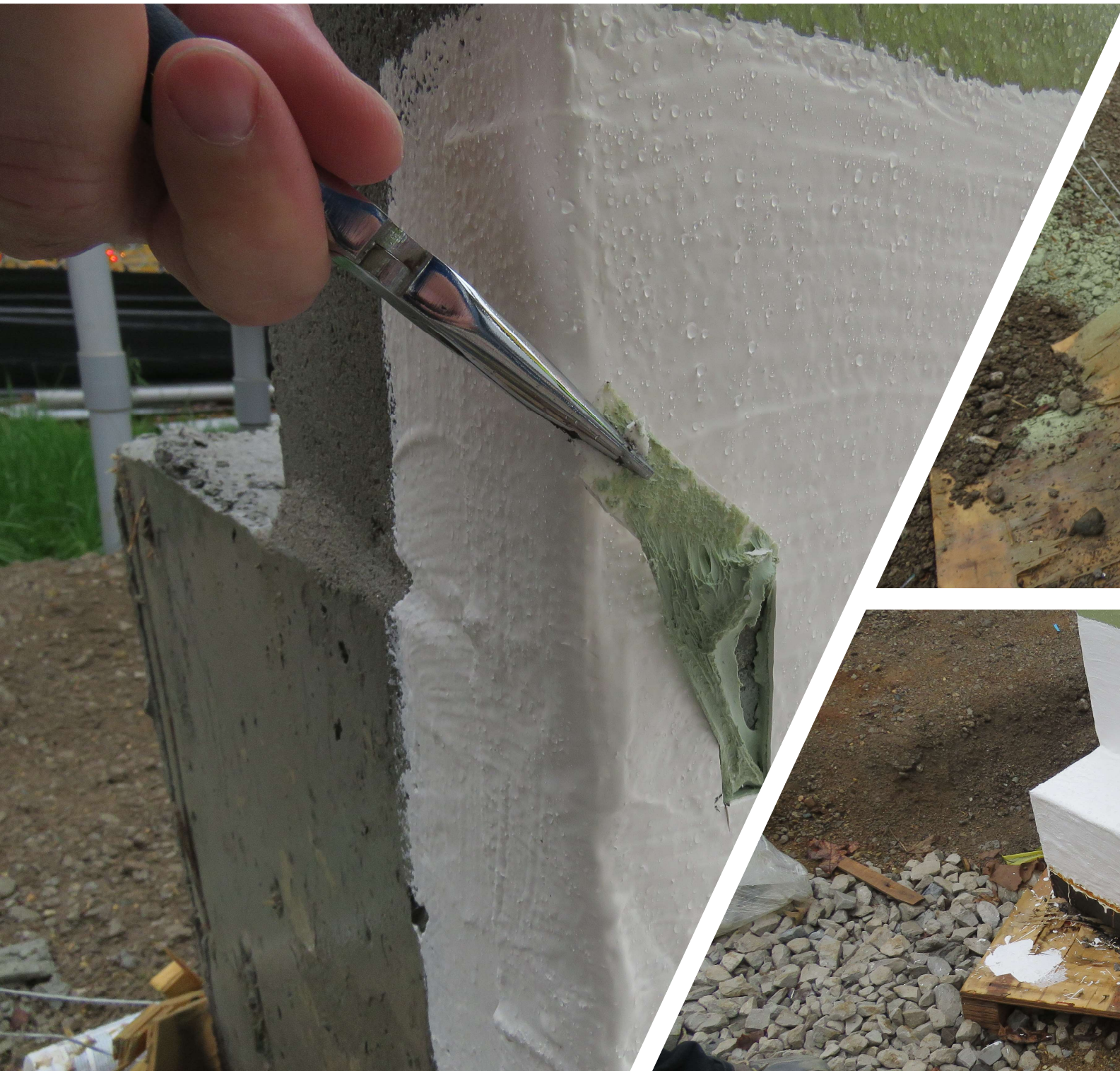


**Each Detail  
needs to be  
reviewed,  
with specific  
comments**

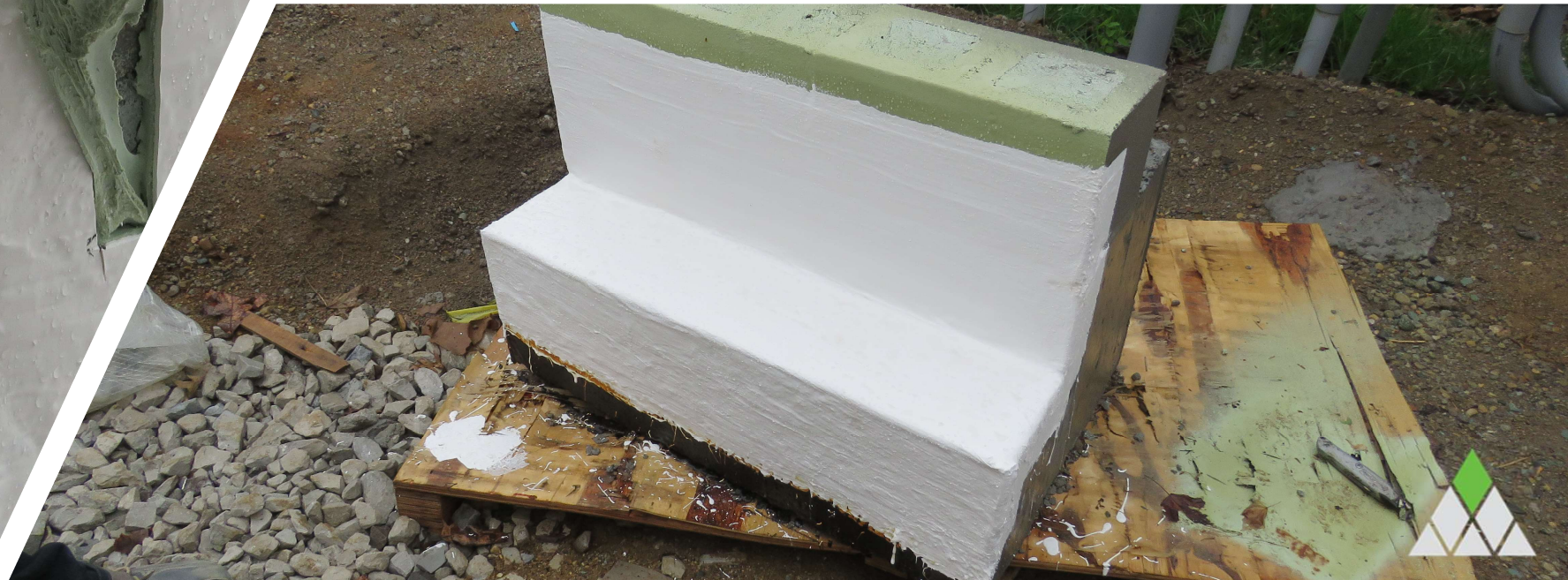








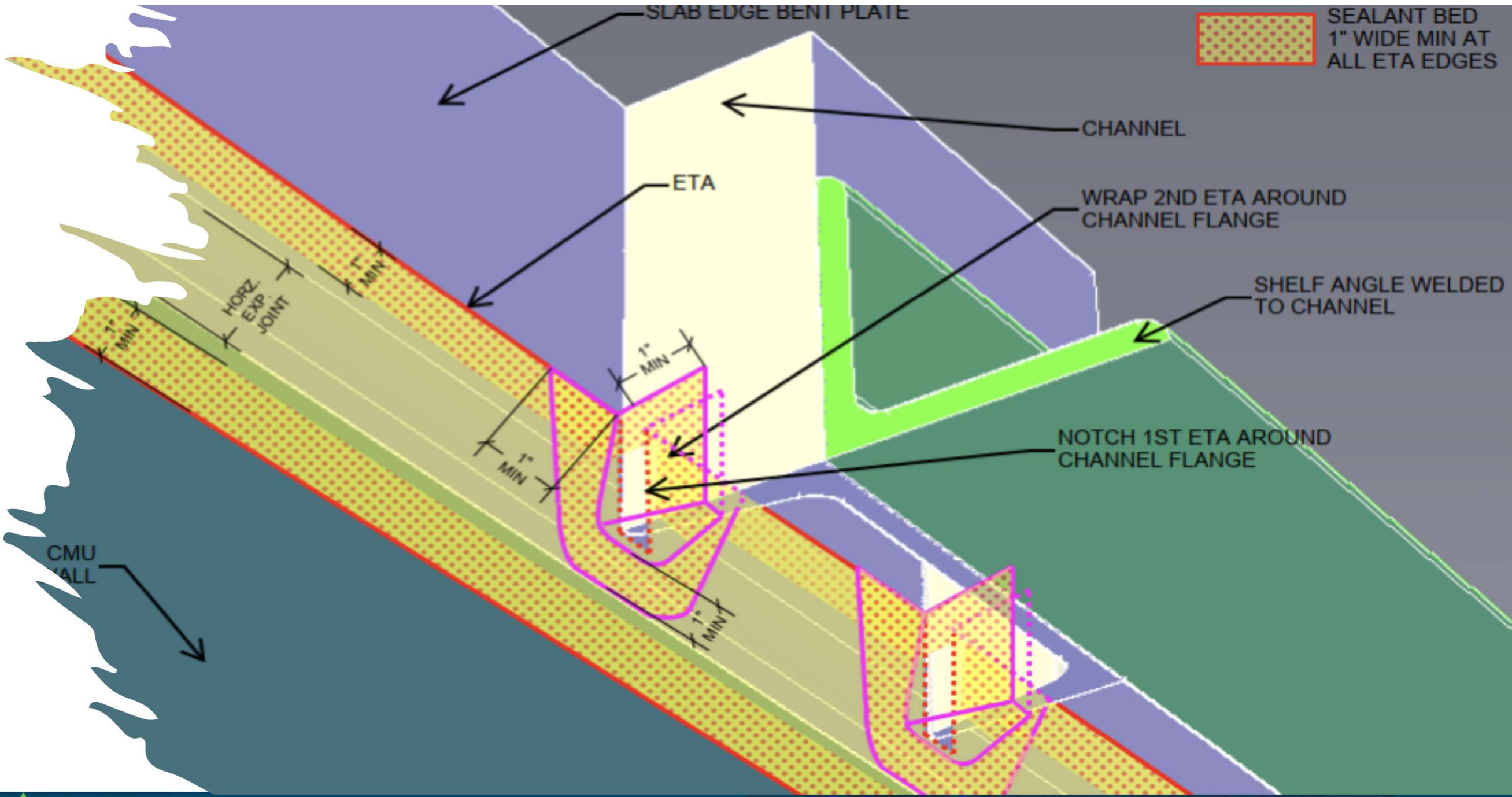
05/10/2016 07:44





# FIRST WORK IN PLACE







# Lessons Learned

What was learned and changed:

- Sequence was modified
- Material choices were changed
- Confirmed product selection and assumptions
- Understanding of products and installation
- Modifications to the pre-installation meeting and checklists





# SUBSTRATE REVIEW











# Lessons Learned

What was changed:

- How we approached substrate review before AVB installation – protection and verification / testing
- Manufacturer reviews





# JOB SITE REVIEWS









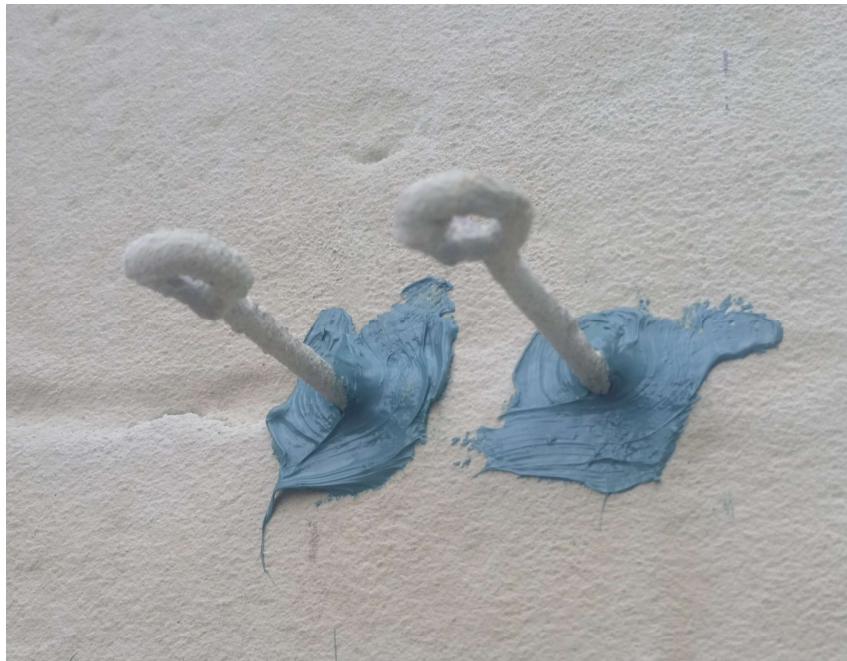










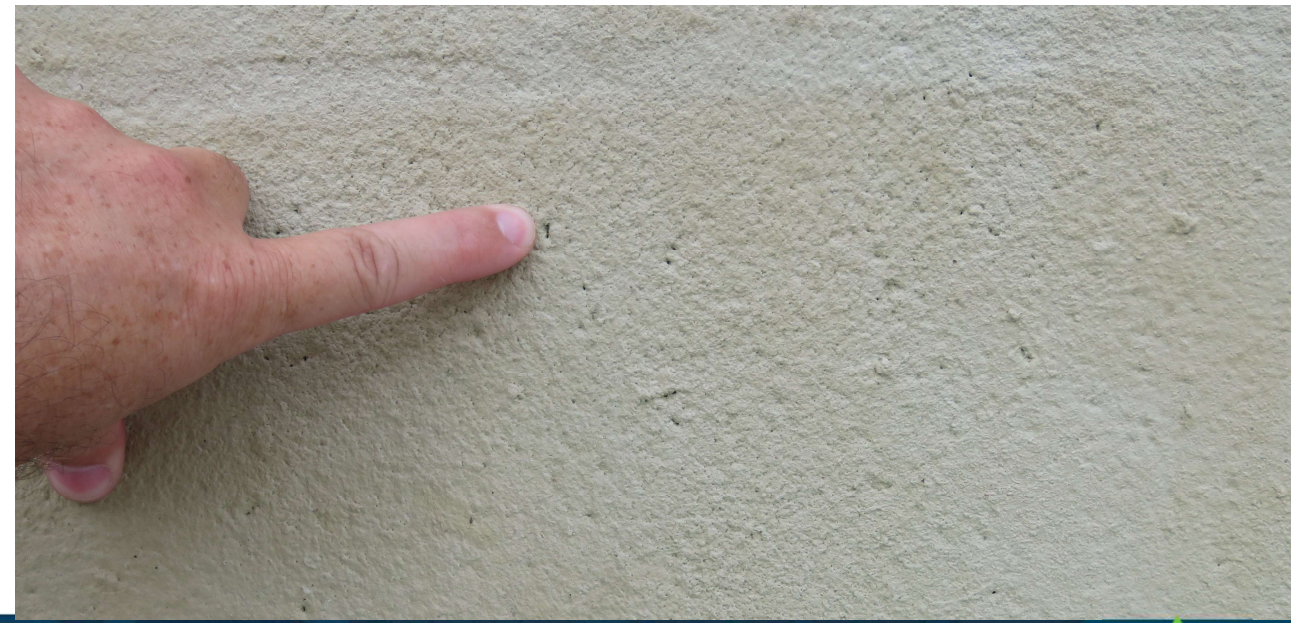




12/13/2016 09:26



08/23/2016 07:44



# Lessons Learned

Create a building profile reviewing:

- Modifications to the pre-installation meeting and checklists
- The need to re-review the pre-installation meeting on long projects that span multiple seasons
- Periodic group re-education

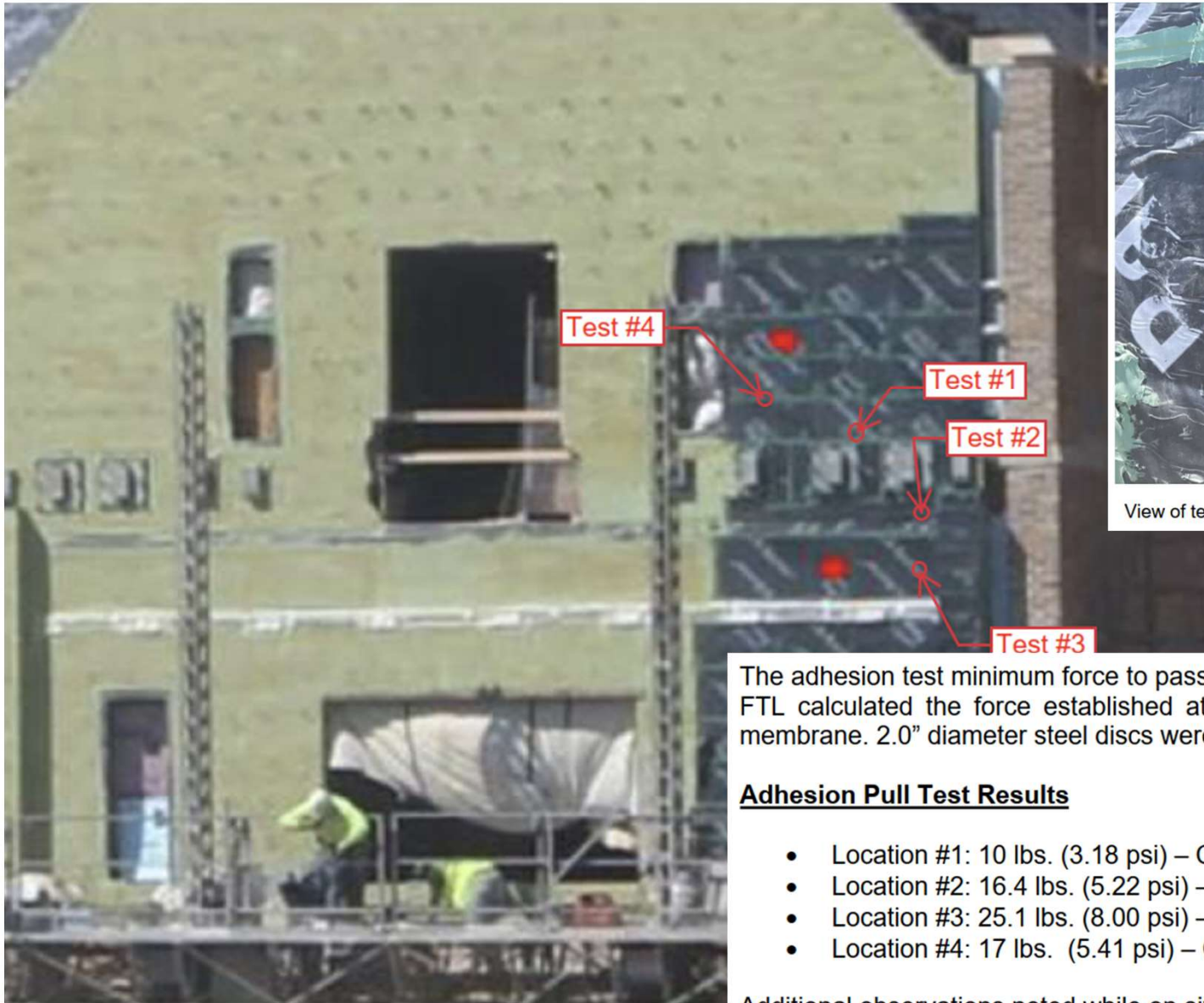




# TESTING







View of test location #1



View of test location #2

## Photo/Report: Flood Labs - Chicago


The adhesion test minimum force to pass was indicated to be 16 lbs. In order to convert the results to psi, FTL calculated the force established at each location by the area of the steel discs adhered to the membrane. 2.0" diameter steel discs were used at each location.

### Adhesion Pull Test Results

- Location #1: 10 lbs. (3.18 psi) – CMU substrate
- Location #2: 16.4 lbs. (5.22 psi) – CMU substrate
- Location #3: 25.1 lbs. (8.00 psi) – Gypsum Board substrate
- Location #4: 17 lbs. (5.41 psi) – CMU substrate

Additional observations noted while on site were that the membrane did not appear to have been properly rolled in at the time of application. Several areas appeared loose and/or not adhered. The substrate beneath the membrane appeared to have been primed but it is not known if the primer was properly applied or what conditions were present at the time of application. At the time of testing, the membrane had been exposed to the sun for some time and was warm. This may have had an effect on the adhesion of the membrane when the tests were performed. Test locations and photos are attached on the following pages. Please do not hesitate to contact me with any questions or concerns.





# GENERAL LESSONS LEARNED



# Lessons learned



- ❑ Transition Membrane capabilities & limitations
- ❑ Sloped roof materials & coordination
- ❑ Deflection Joints Locations, materials and detailing
- ❑ Preinstallation Mtgs having several meetings that include all installers for large projects





# Preplanning

- Are we spending the time to allow the team to review and plan the project?
- Are we creating a Job Specific Quality/Safety Plan?
- Are we understanding / modeling the logistics...
- Are we properly training?
- Are we expecting/overworking our teams?



# Communication

- Are we properly expressing what we expect?
- Are we talking to each other?
- Are we purposely leaving something out of the conversation?
- Are we getting the right players at the meetings?
- Are we talking enough?
- Are we sending the correct information over?
- Do we have the same agenda?





# Pepper

Tomorrow Transformed

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**Director of Quality Management – Illinois & Wisconsin**

**Pepper Construction Company /// BREAKING GROUND**

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**abaa2024** building  
enclosure  
conference