October 08, 2025

Scaling Passive House at Bunker Hill

PhiusCon

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RDH BUILDING SCIENCE

Boston

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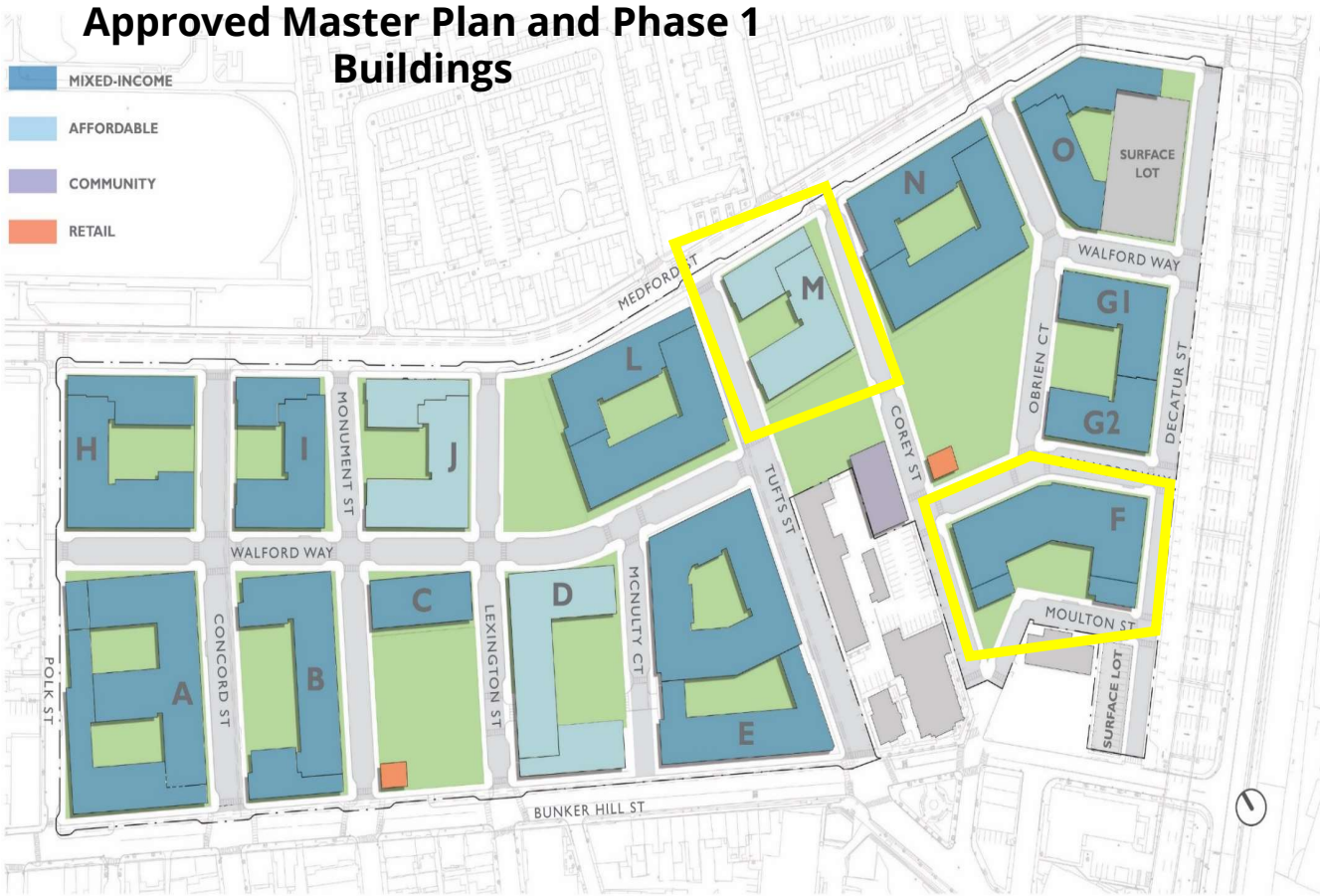
1 The Problem + The Mandate

The Problem + The Mandate

- 15 Buildings
- 2,699 units
- 37% deeply affordable to replace 1,010 of the existing public housing units
- 4-10 stories
- 7 Acres of Open Space
- ~50,000 SF retail
- 14,000 SF Community Center



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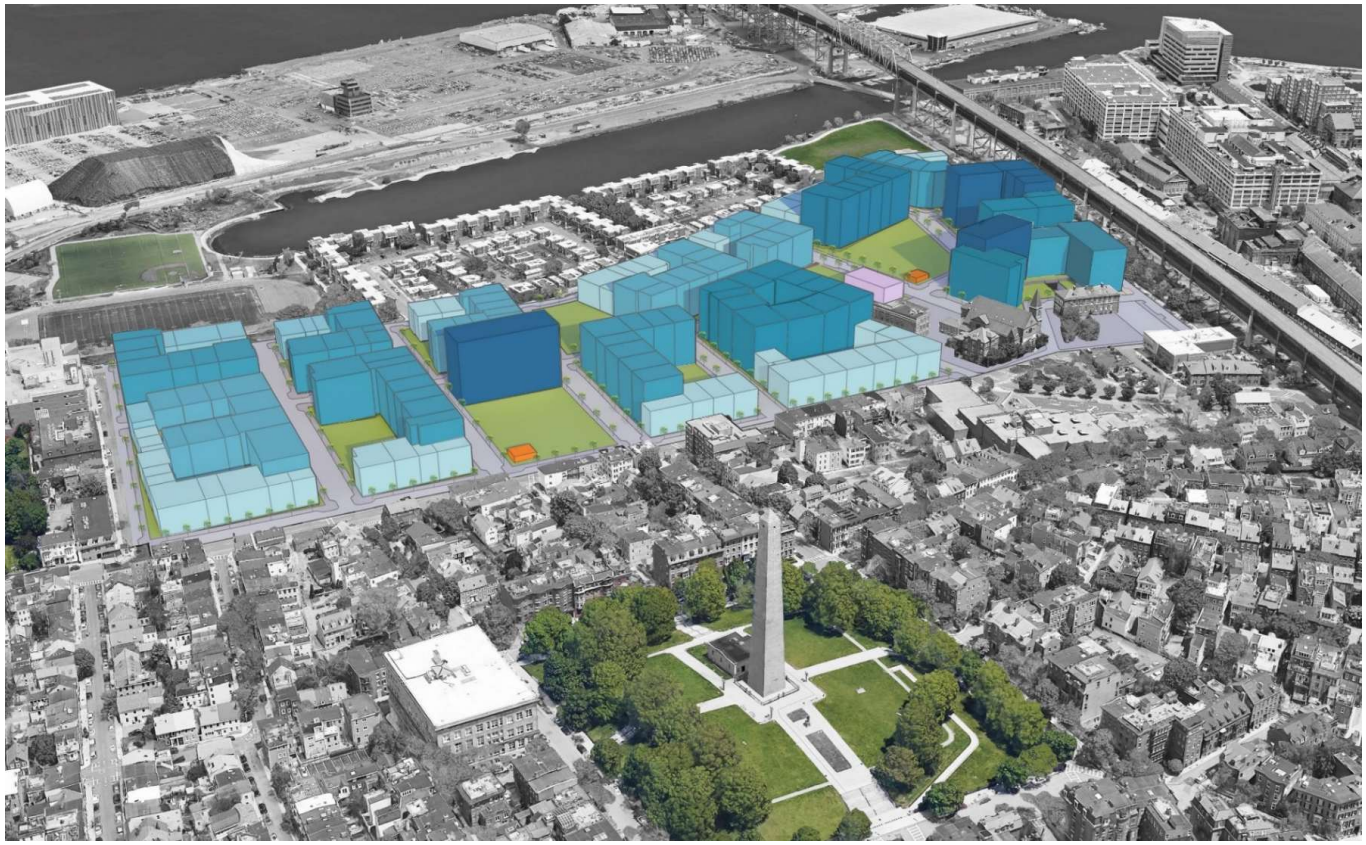


2 The Innovative Solution: A “Kit of Parts”

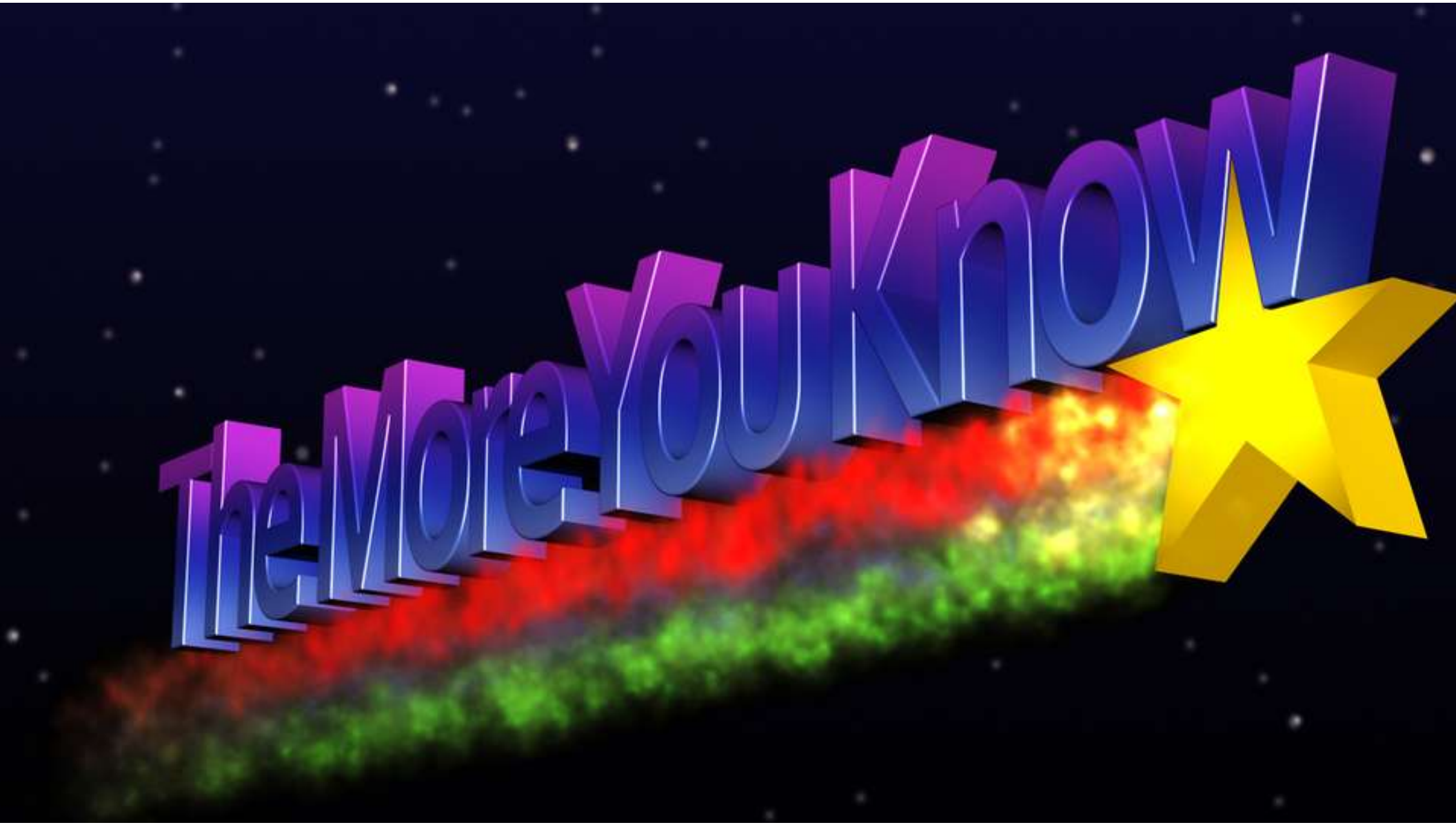
The Innovative Solution: A “Kit of Parts”

“The goal was to drive productivity as far as possible through an intelligent, value-packed set of components that can be put together in an infinite array of configurations, sizes, buildings, et cetera.”

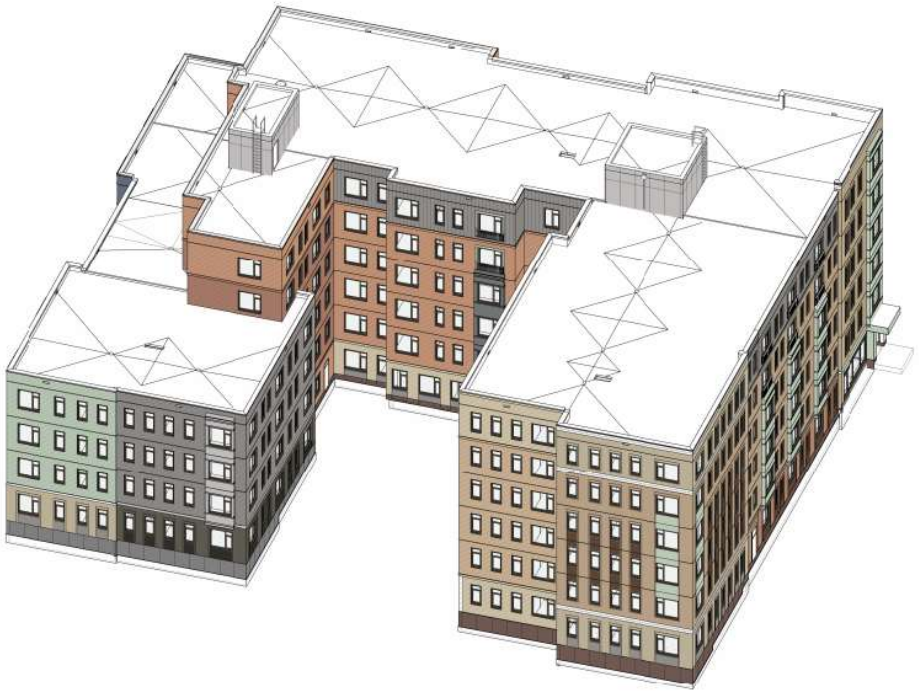
– Nick Nigro, Leggat McCall

The Innovative Solution: A “Kit of Parts”

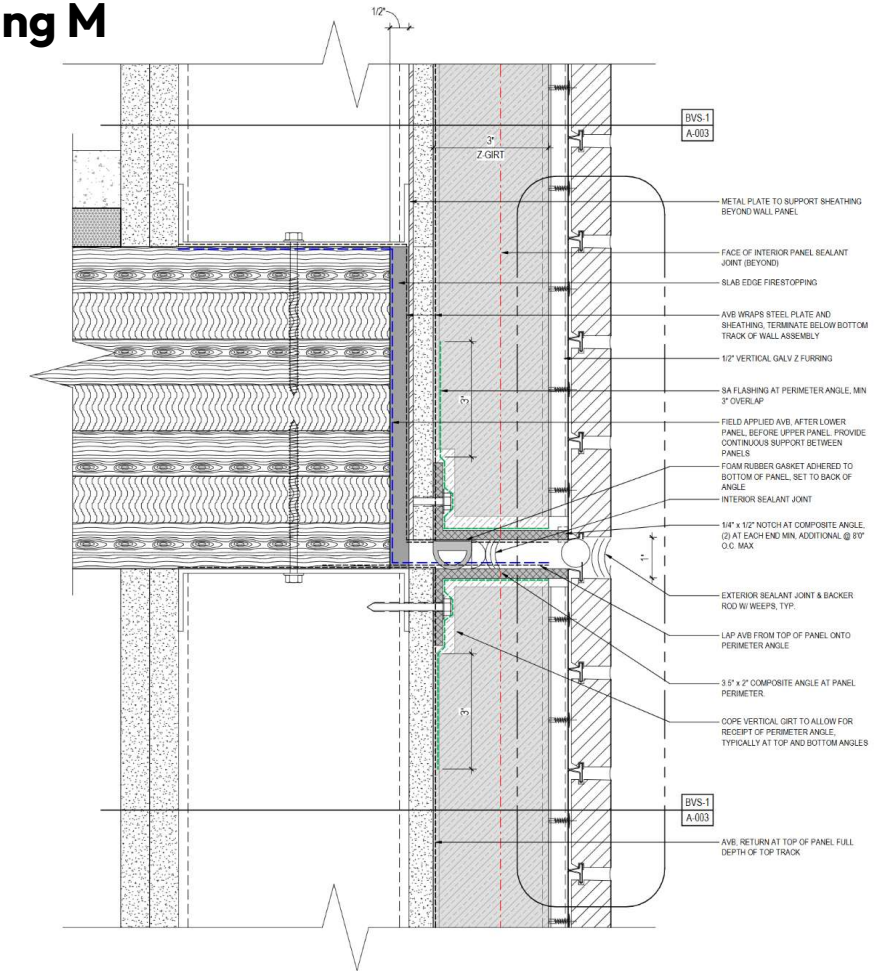
1. Precast Cores
2. 62′-0″ long 7-ply CLT
3. Load Bearing exterior wall panels


The More You Know

The Innovative Solution: A “Kit of Parts” - Building M

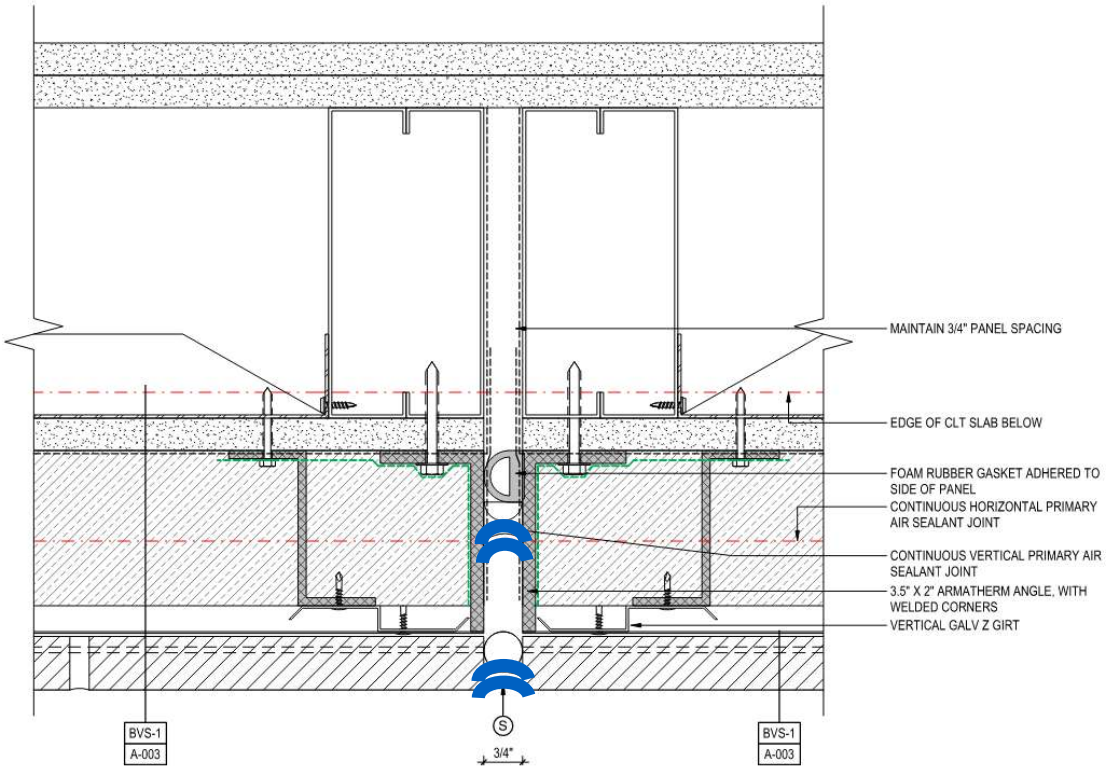


2 A-215 3D AXON - WEST - TUFTS STREET

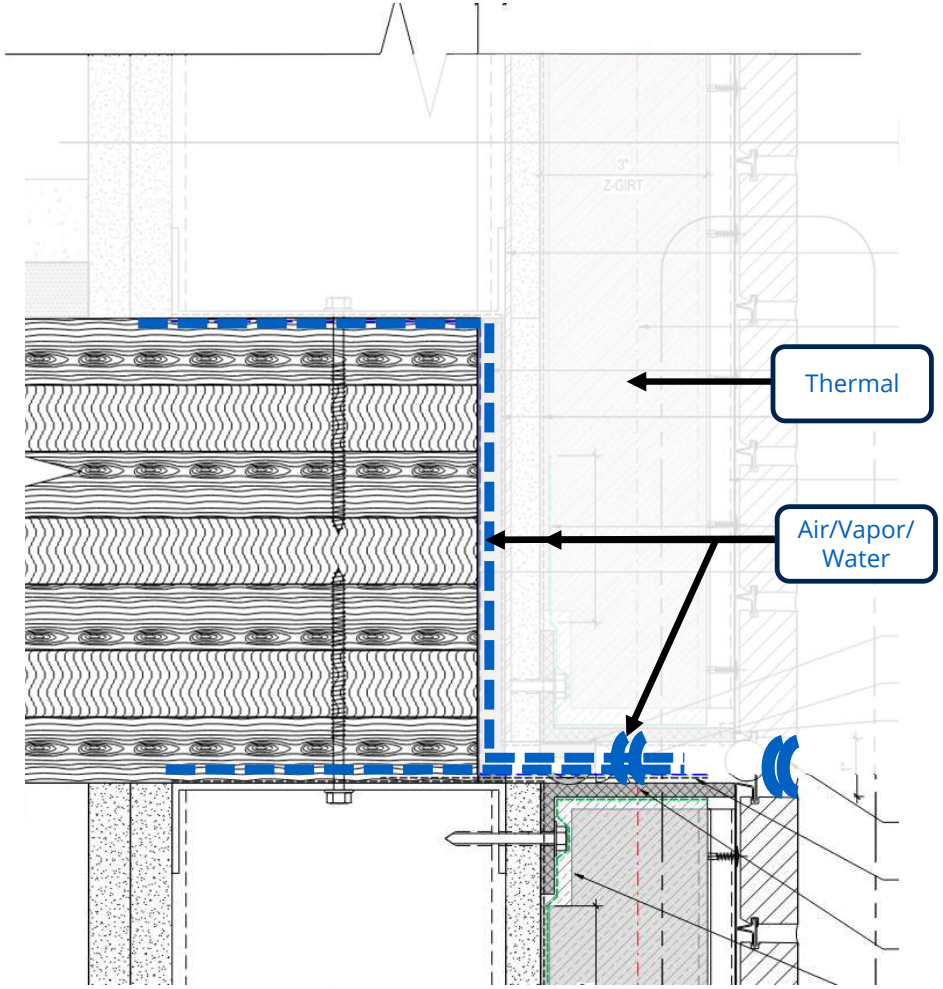


1 A-003 FACADE PANEL JOINT - SECTION @ CLT SLAB (BVS SYSTEM SHOWN)
6" = 1'-0"

The Innovative Solution: A “Kit of Parts”

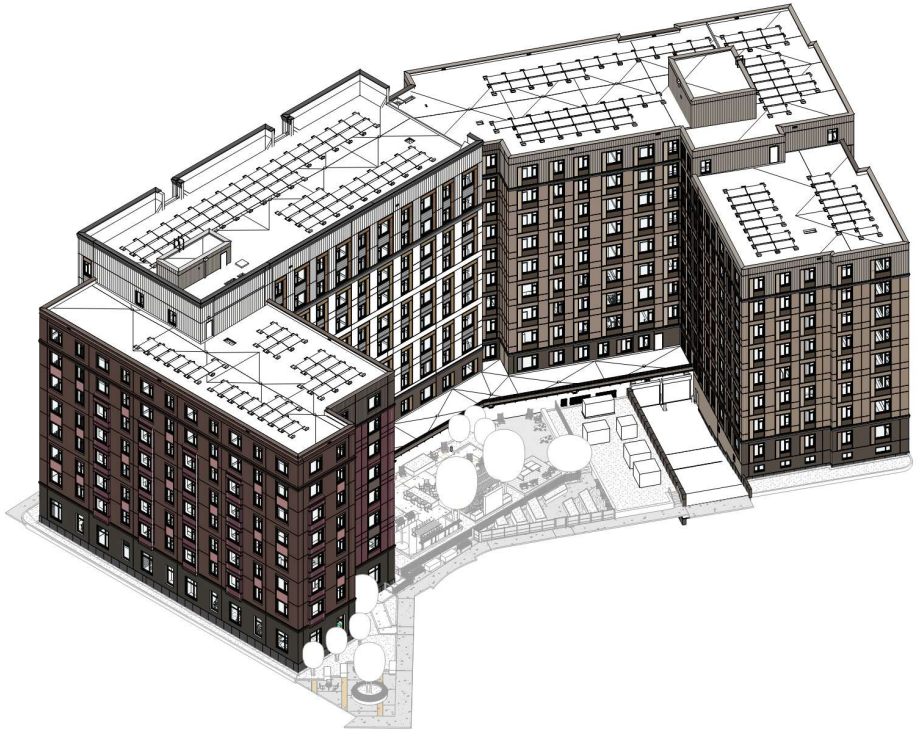


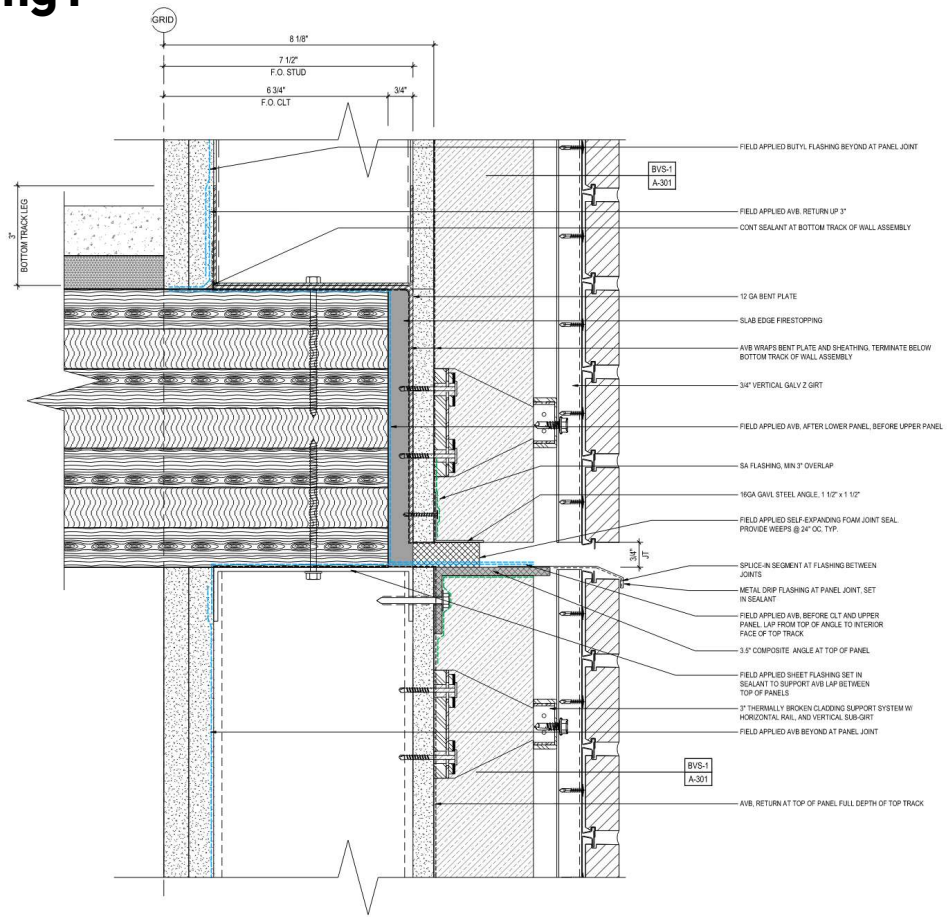
Typ. Vertical Joint



Typ. Horizontal Joint

The Innovative Solution: A “Kit of Parts” – Building F

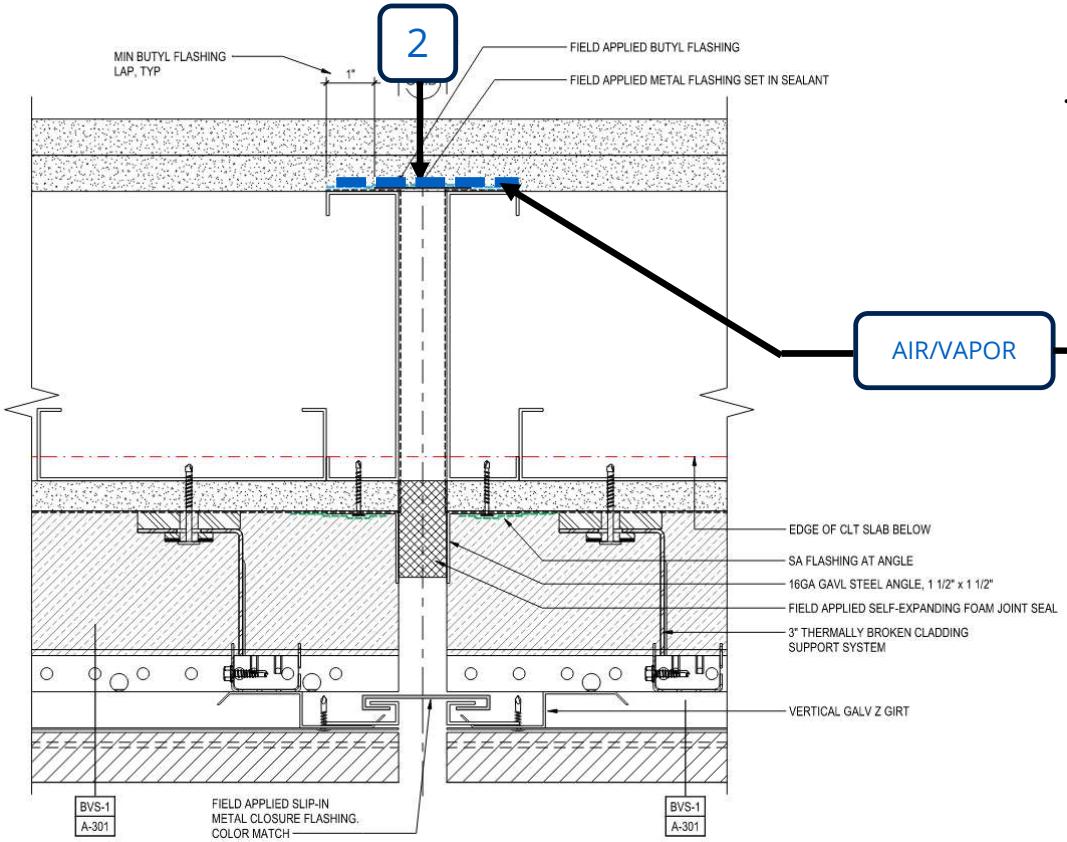




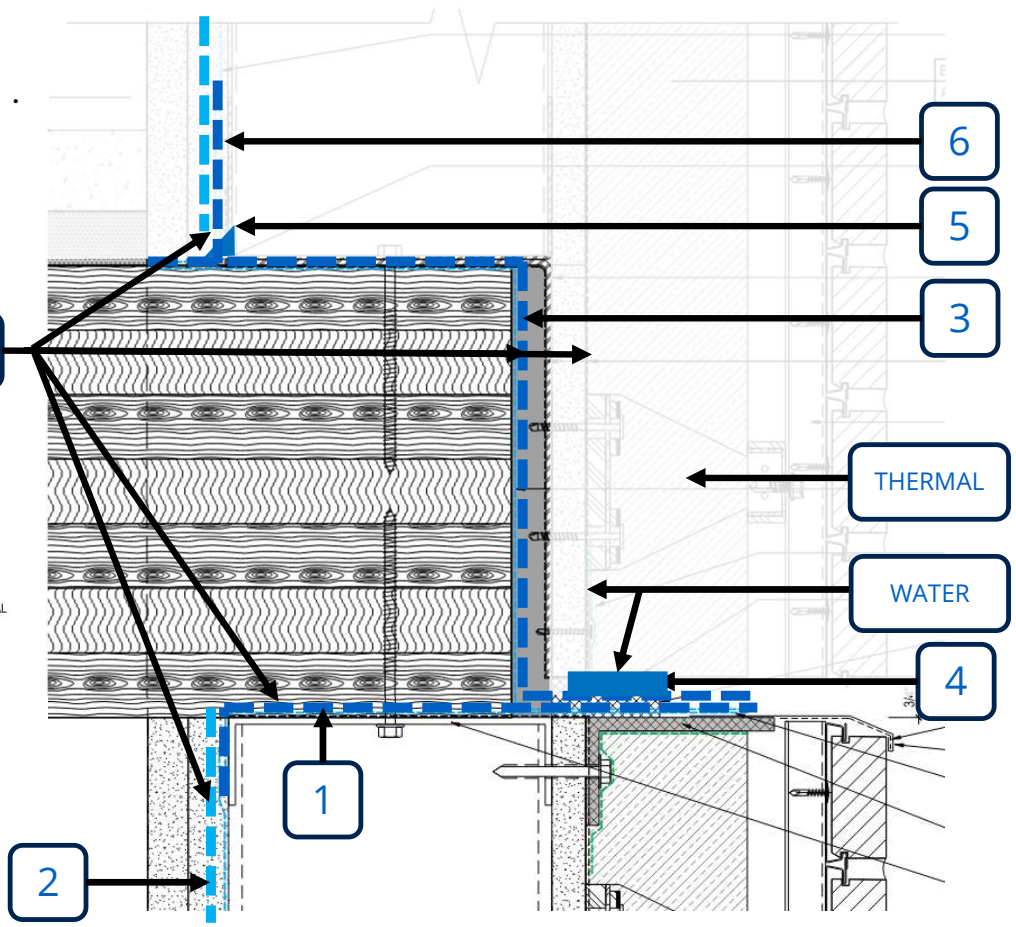
1 A-448 **FACADE PANEL JOINT - SECTION @ BVS**

6" = 1'-0"

The Innovative Solution: A “Kit of Parts” – The Next Iteration

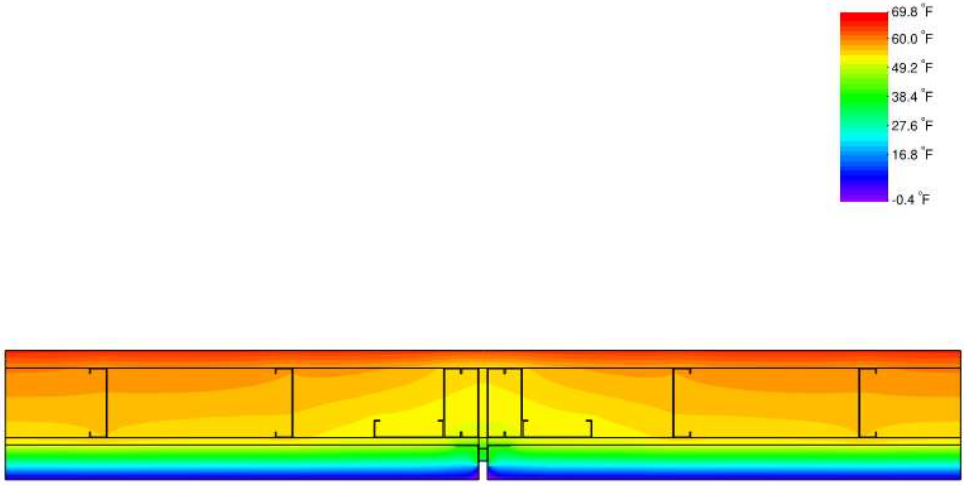


Typ. Vertical Joint

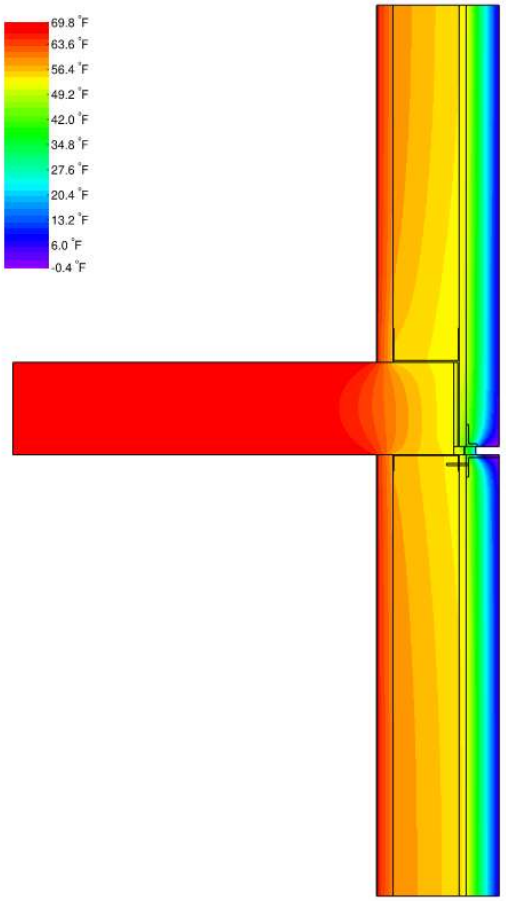


Typ. Horizontal Joint

The Innovative Solution: A “Kit of Parts” – The Next Iteration



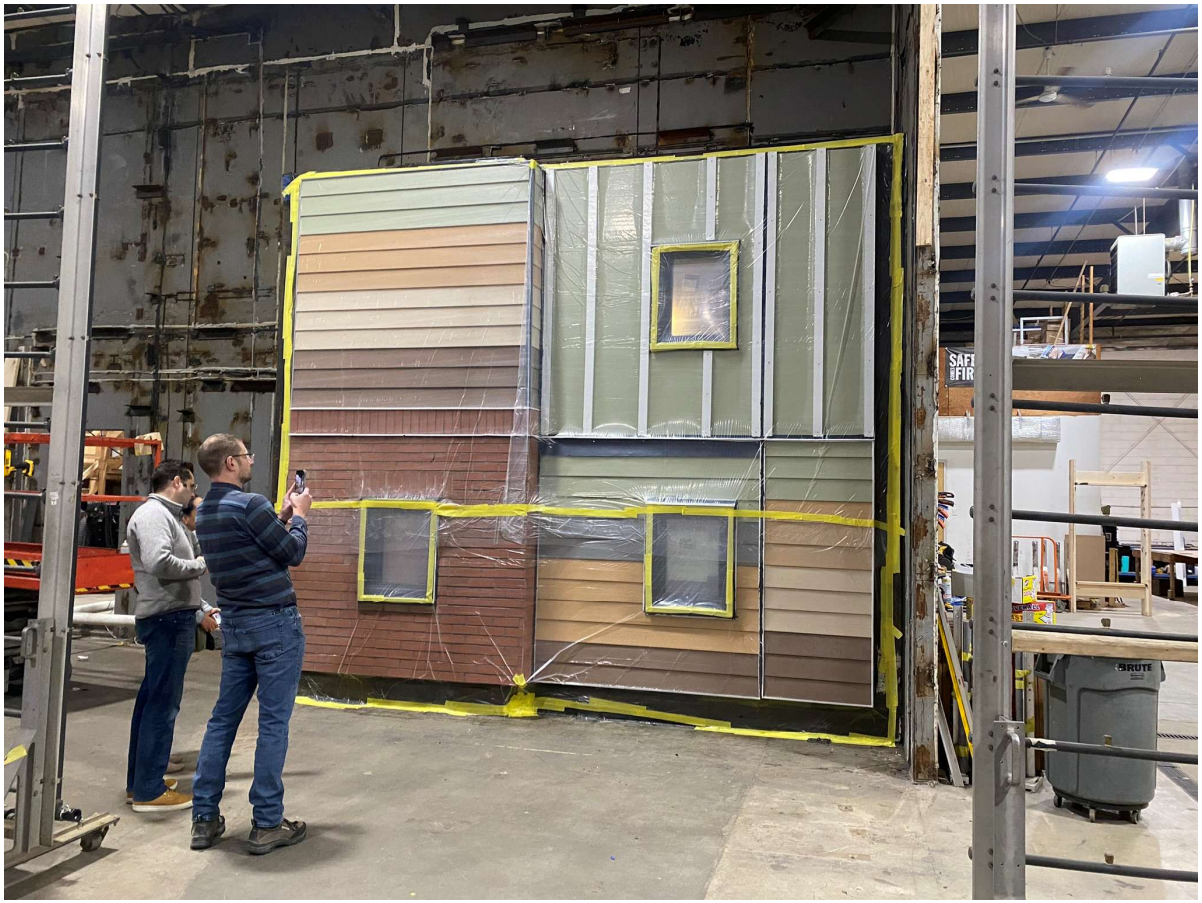
Clear Field Opaque R-Value:	R - 12.9
Psi Vertical Joint	Psi – 0.062
Psi Horizontal Joint:	Psi – 0.039



3 Testing + Proving the Concept

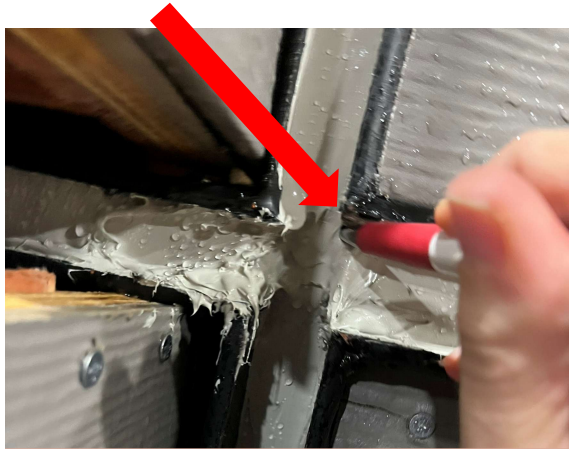
Testing + Proving the Concept

PMU Test 1



Testing + Proving the Concept

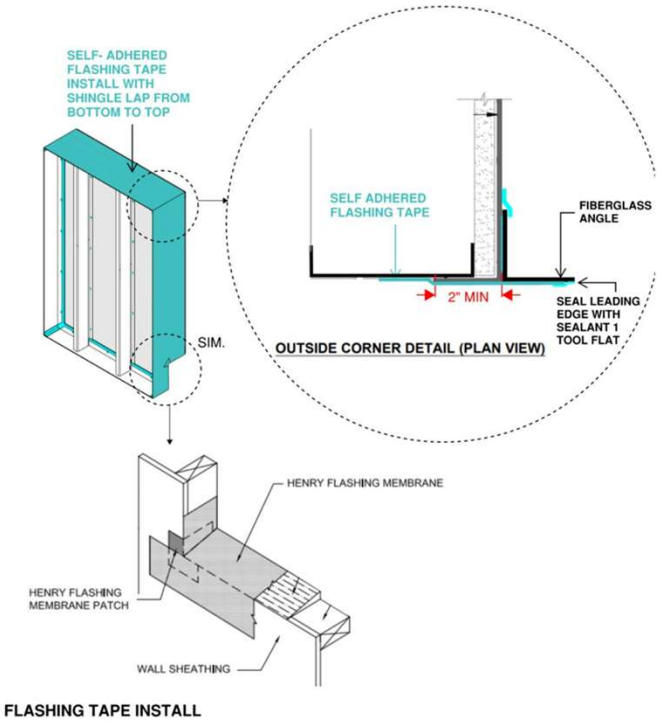
PMU Test 2



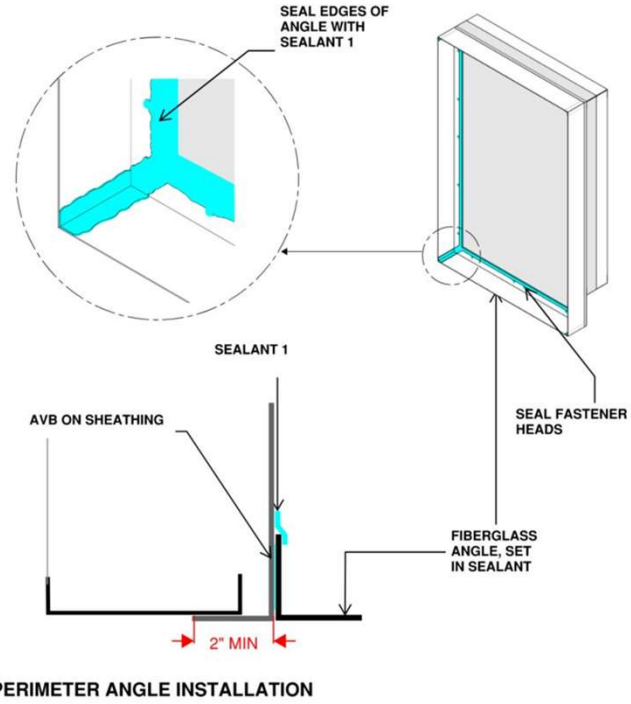
Testing + Proving the Concept

PMU 3 - Quality assurance with explicit assembly instructions and Testing

Performance Mock-Up Testing (AAMA 501.1)



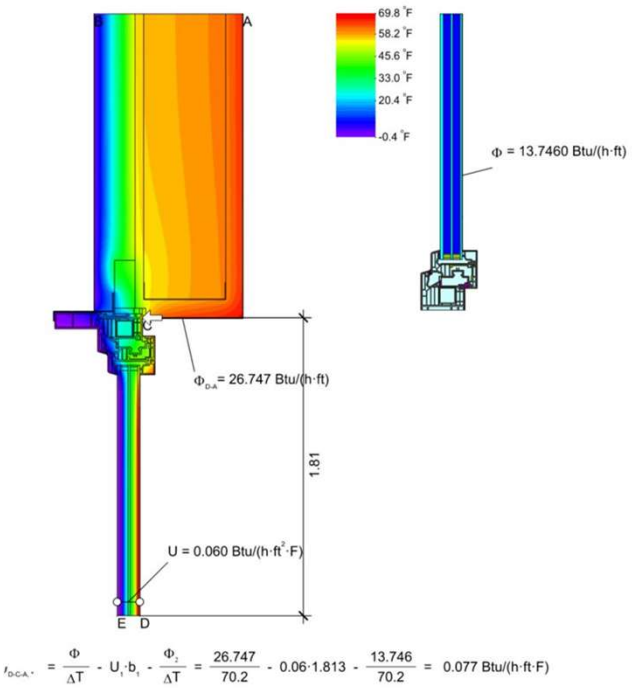
FLASHING TAPE INSTALL



PERIMETER ANGLE INSTALLATION

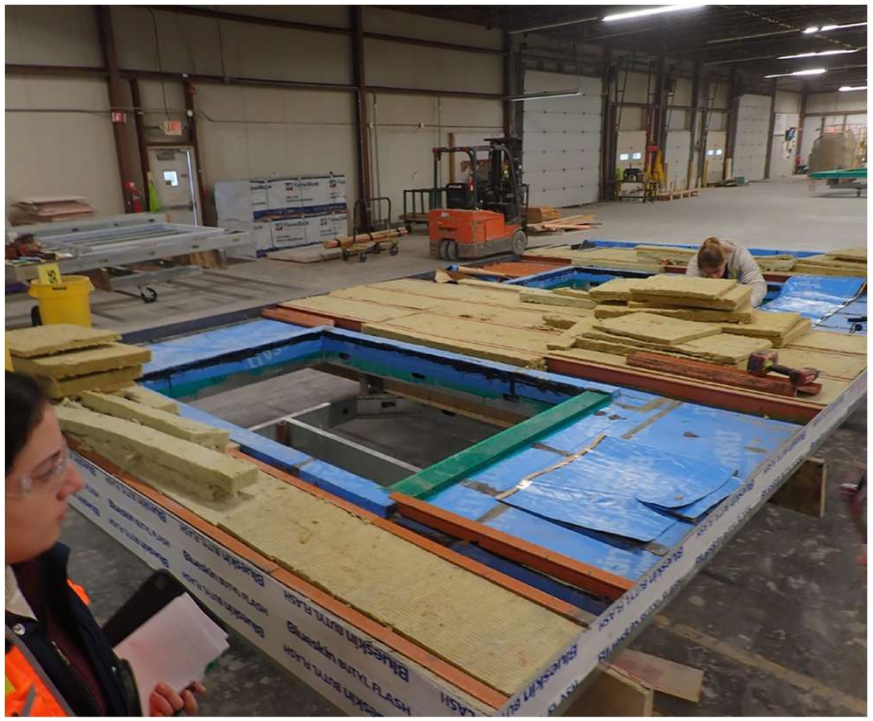
Testing + Proving the Concept

Quality assurance with explicit assembly instructions and Testing



$$f_{D\text{-}C\text{-}A} = \frac{\Phi}{\Delta T} - U_1 \cdot b_1 - \frac{\Phi_2}{\Delta T} = \frac{26.747}{70.2} - 0.06 \cdot 1.813 - \frac{13.746}{70.2} = 0.077 \text{ Btu/(h·ft·F)}$$

Thermal Modeling Verification

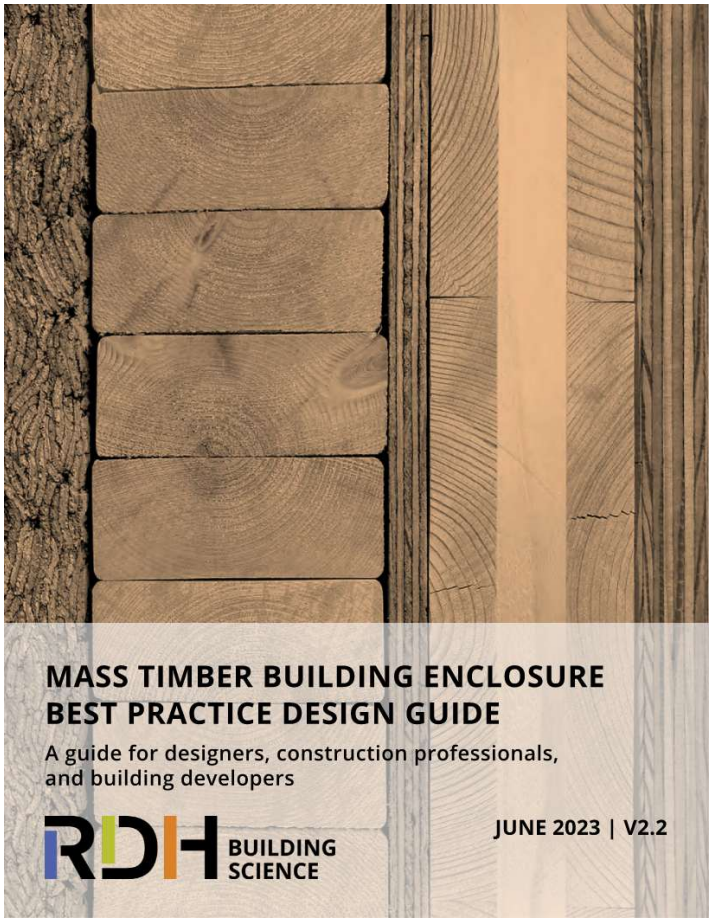


Factory Verification

Testing + Proving the Concept

4 Planning for Moisture Management

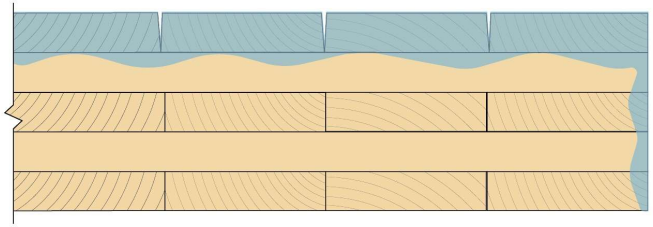
Planning for Moisture Management



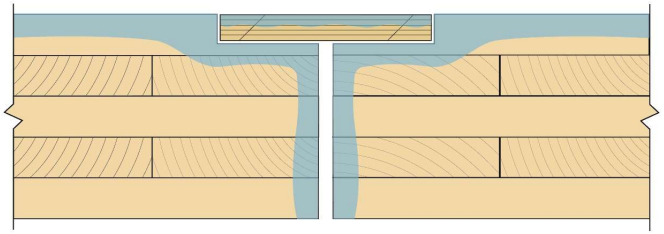
		MOSITURE EXPOSURE LEVEL		
		HIGH or LONG	MODERATE	LOW
PROTECTION ROBUSTNESS	LOW	X AVOID	? CAUTION	✓ OPTIMAL
	MODERATE	? CAUTION	✓ OPTIMAL	✓
	HIGH	✓ OPTIMAL	✓	✓

Planning for Moisture Management

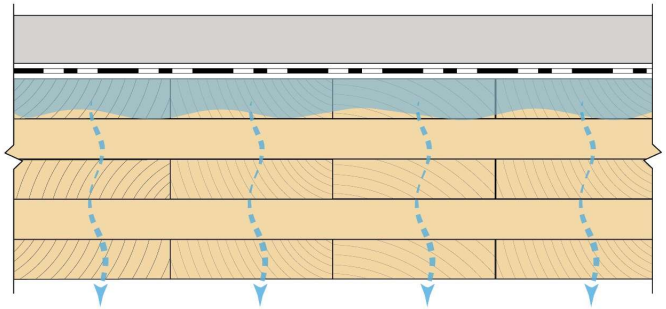
Mass timber components

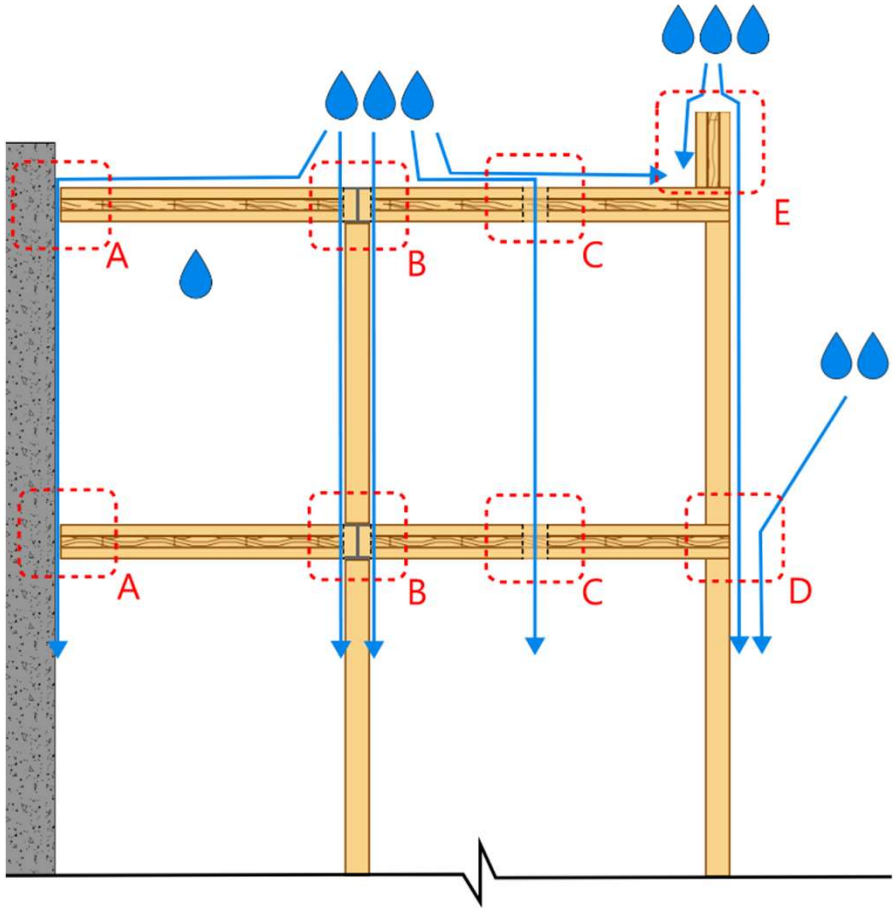


Mass timber connections



Mass timber assemblies





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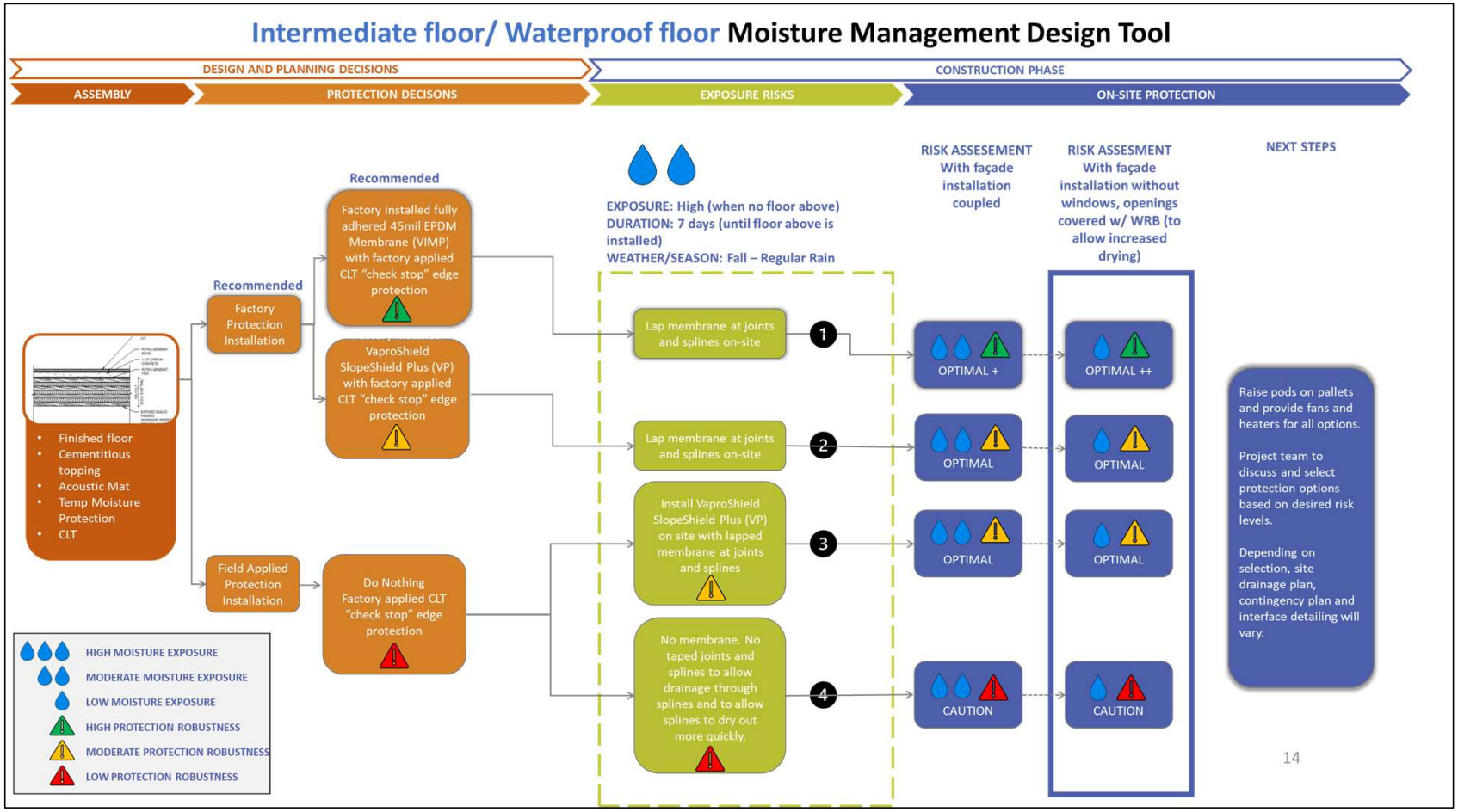


Planning for Moisture Management

RDH Comments
Lucas Nahrgang, PE
3/25/2024

SUFFOLK

Moisture Mitigation Plan

March 19, 2024

To protect the cross laminated timber (CLT) product and as discussed with the design team and ownership in the past, Suffolk will be:

1) Temporary Roof Installation:
   - Installing a temporary roof on the 3rd and 5th floors. Protection (Air and Vapor Barrier – Henry VP-160) of all splines and slab penetrations on each of these floors. Detailed drawings have been attached documenting these measures (Drawings 1, 2 & 3).
   - Drying with leaf blower as needed.
   - Use of temp drains as needed. (3 locations ea on floors 3 & 5, see drawings)
2) Roof Vapor Barrier on Level 6:
   - Coordinating with the roofer, Greenwood Industries, to install the vapor barrier layer (GAF SA Vapor Retarder XL40) of the roof installation on level 6.
3) AVB Detail Installation:
   - Installing AVB (Henry VP-160) detail at the edge of CLT on each floor, as per the attached detail (Detail 1, below).

Additional Measures:

4) Setting a temporary drain at three locations on floor 5 to allow water to be squeegeed off the floor and out of the building window.
5) Absorbent blankets will be used at locations where an immediate concern for a water leak or water pooling is located.
6) Procuring a moisture meter gauge and performing intermittent testing on the CLT as it arrives and after it is set in place on the building. Suffolk will keep records of these tests. (RDH had noted that moisture content they would like to see is 19%)

These measures aim to protect the CLT product during the construction process, ensuring its integrity and longevity. It's a comprehensive approach that covers various aspects of moisture protection and quality control.

RDH: Provide commentary on what happens on L2, L4.

RDH: Shop vaccuums should be considered as well.

RDH: Clarify the frequency of these additional measures? Is the plan to manage this water actively during a rain event? Immediately following? or when you get around to it?

RDH: Clarify frequency of monitoring.

RDH: Less than 16%. See previous Moisture Management Presentations.

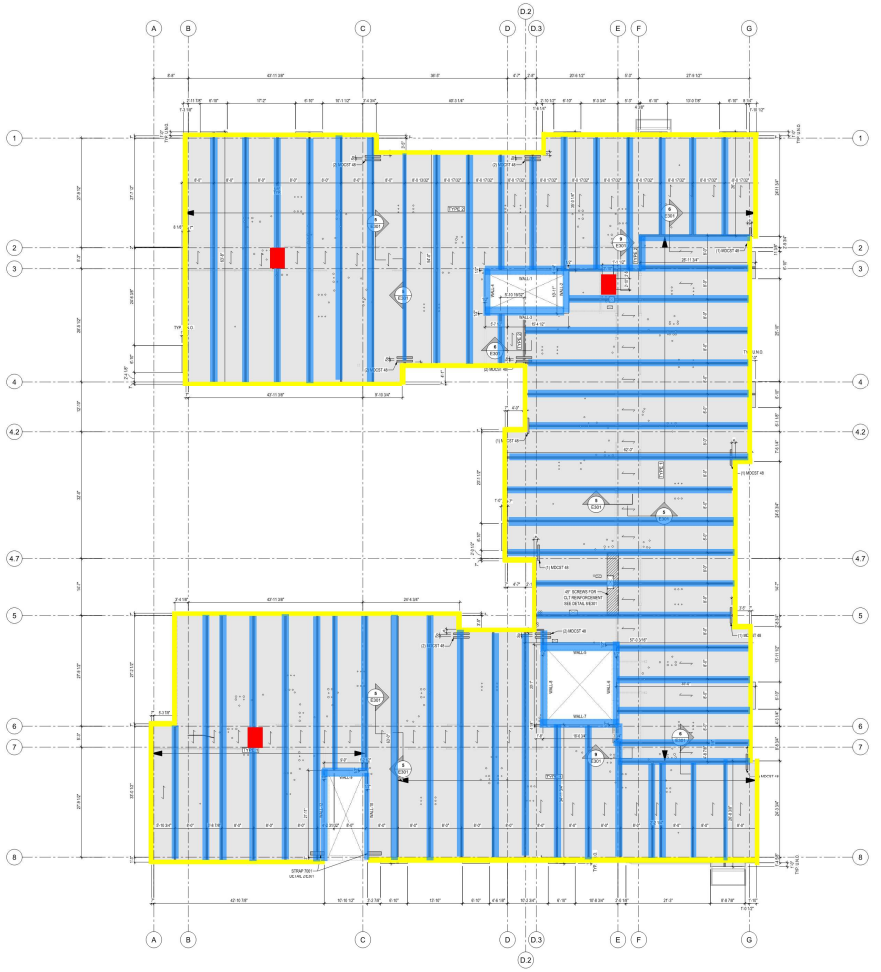
RDH: Additional measures such as fans, heaters, dehumidifiers may be needed to promote drying. However, the use of heat should be carefully considered as it can introduce additional moisture into the space.

AVB Detail at Edge of CLT

Taping of splines at CLT

AVB all MEP Penetrations

Temp Drains locations



DRAWING 1

Mass Timber Moisture Management

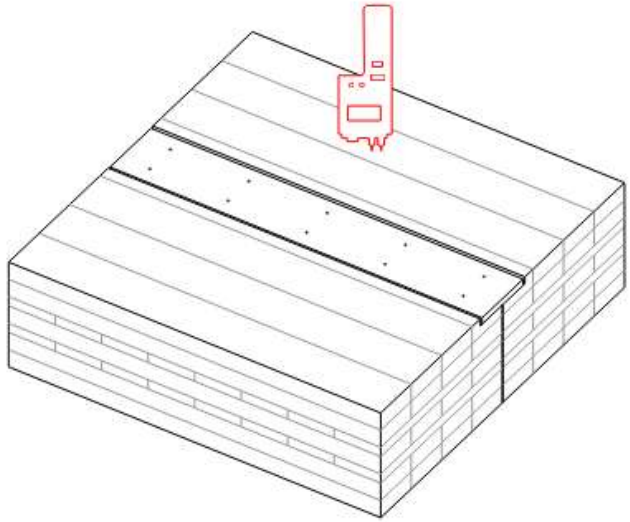
Floor Drain

CLT Moisture Management

Mass Timber Moisture Monitoring

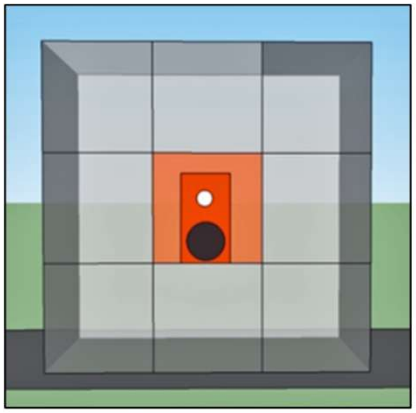
Weekly Spot Check:

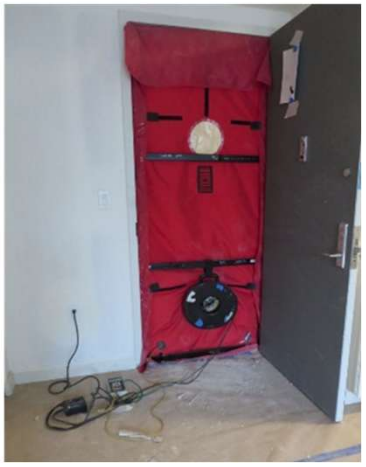
- If there is visual evidence of water, take steps to dry and move to Moisture Content/Drying Survey.
- Stick surface of CLT only (not spline) every 1,000-1,500 s.f.
- Make adjustments for temperature and wood species.
- Log readings.
- Any readings over 16% triggers a discussion about Moisture Content/Drying Survey.



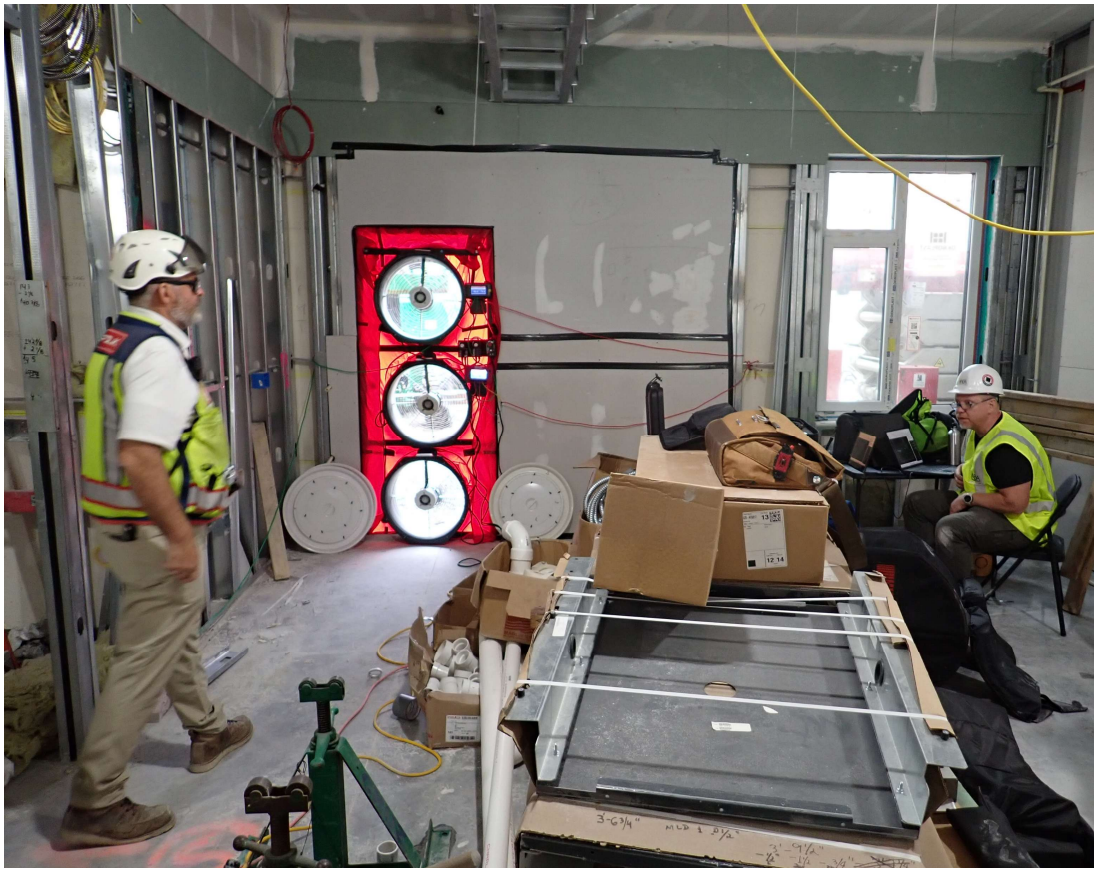
5 Success with Airtightness Testing

Success with Airtightness Testing



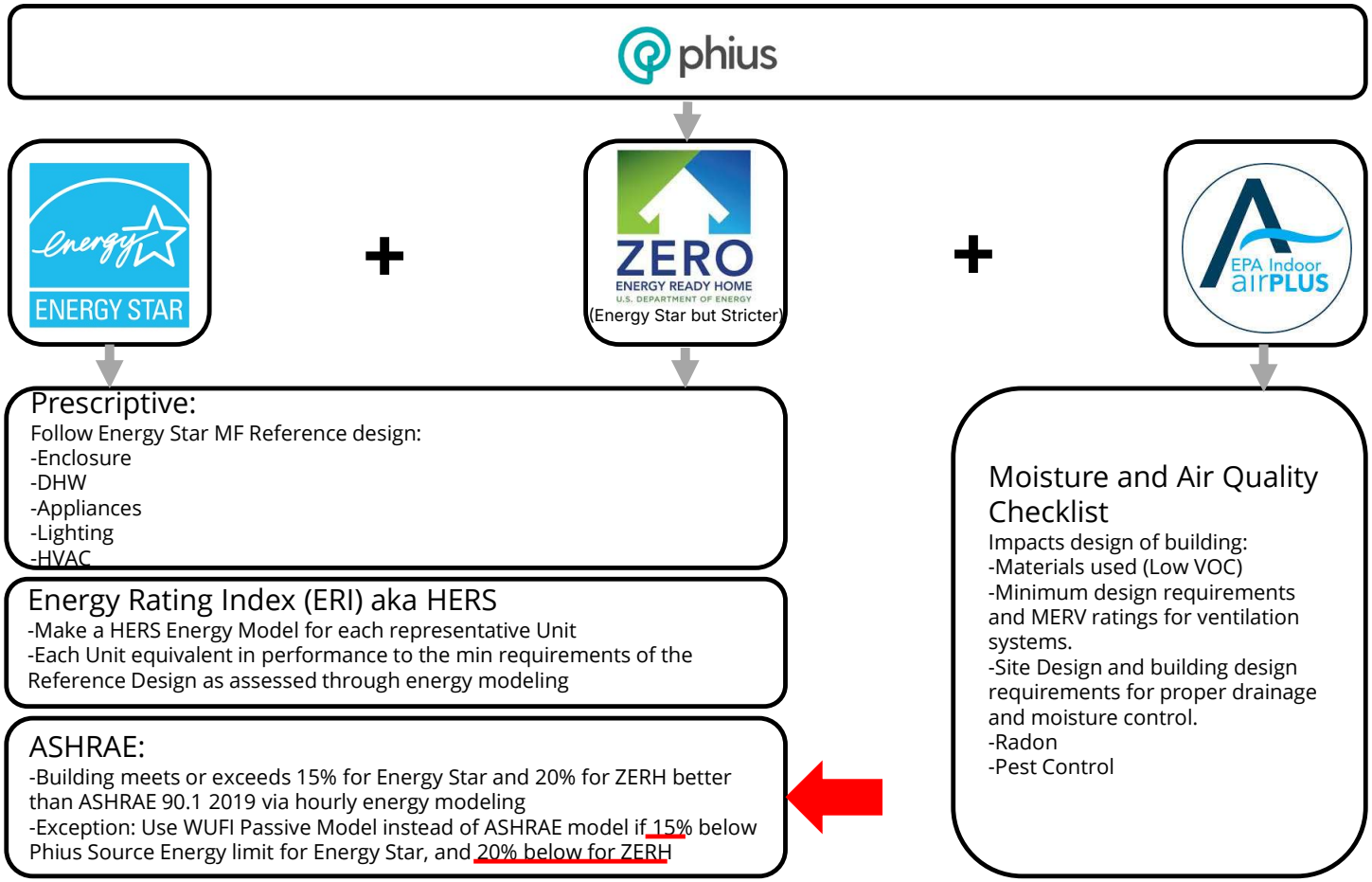


Compartmentalization Testing



Whole Building Airtightness Testing

Phius Co-Requisite Programs



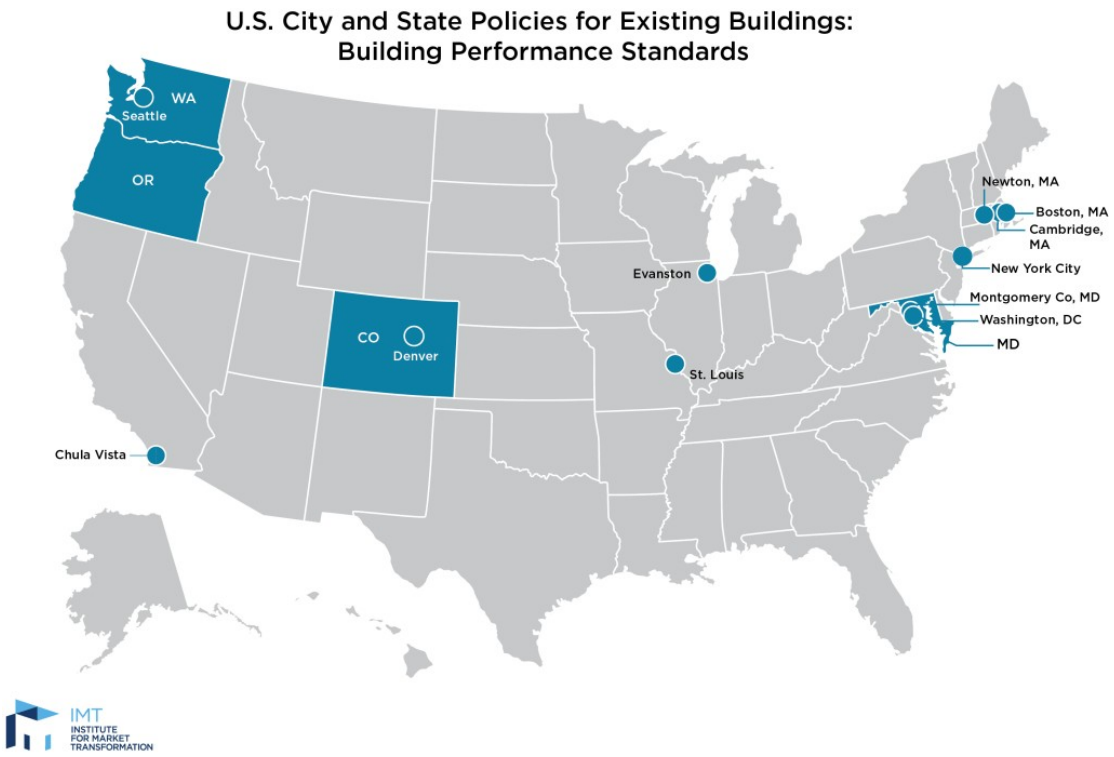
6 Critical Mass

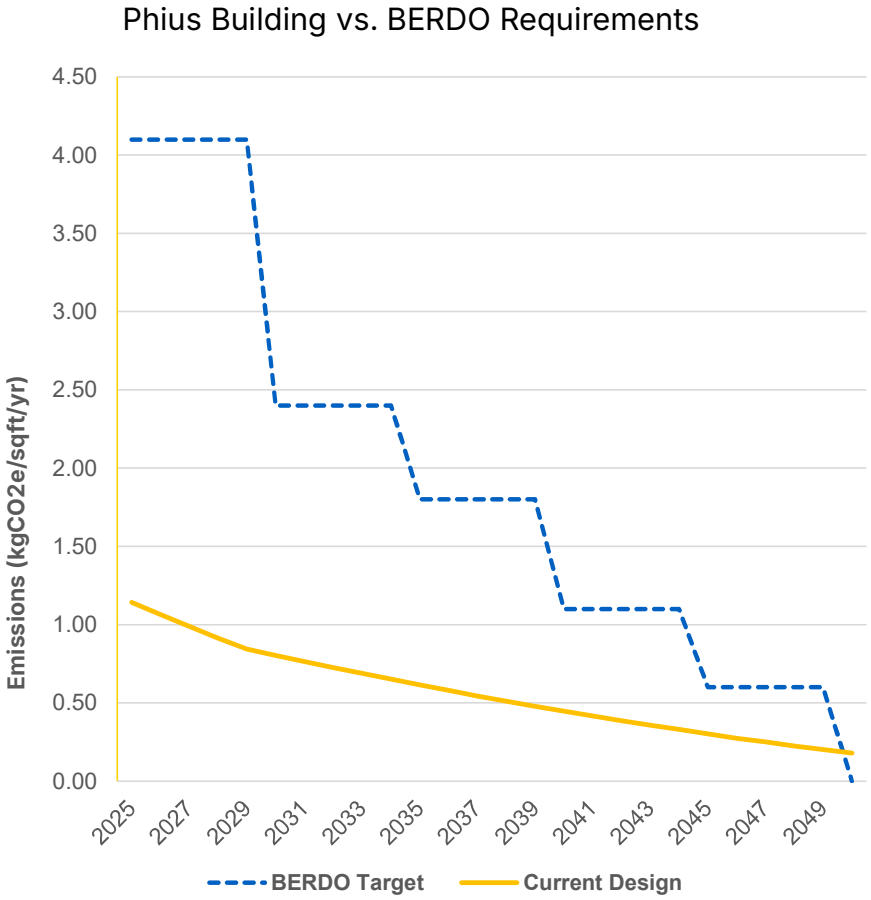
Broader Implications

We're trying to drive towards a way of achieving productivity and efficiency so we're getting to lower or stabilized construction costs without making these things lower quality, and without hurting the labor side of things. It makes the labor easier and less expensive so we can produce a whole lot more housing and put more people to work.

– Addie Grady, Leggat McCall

Building Performance Standards






Leggat McCall
PROPERTIES

Thank You

asteingiser@rdh.com

RDH BUILDING SCIENCE