

Weathering the Build: Protection Strategies for Offsite Construction

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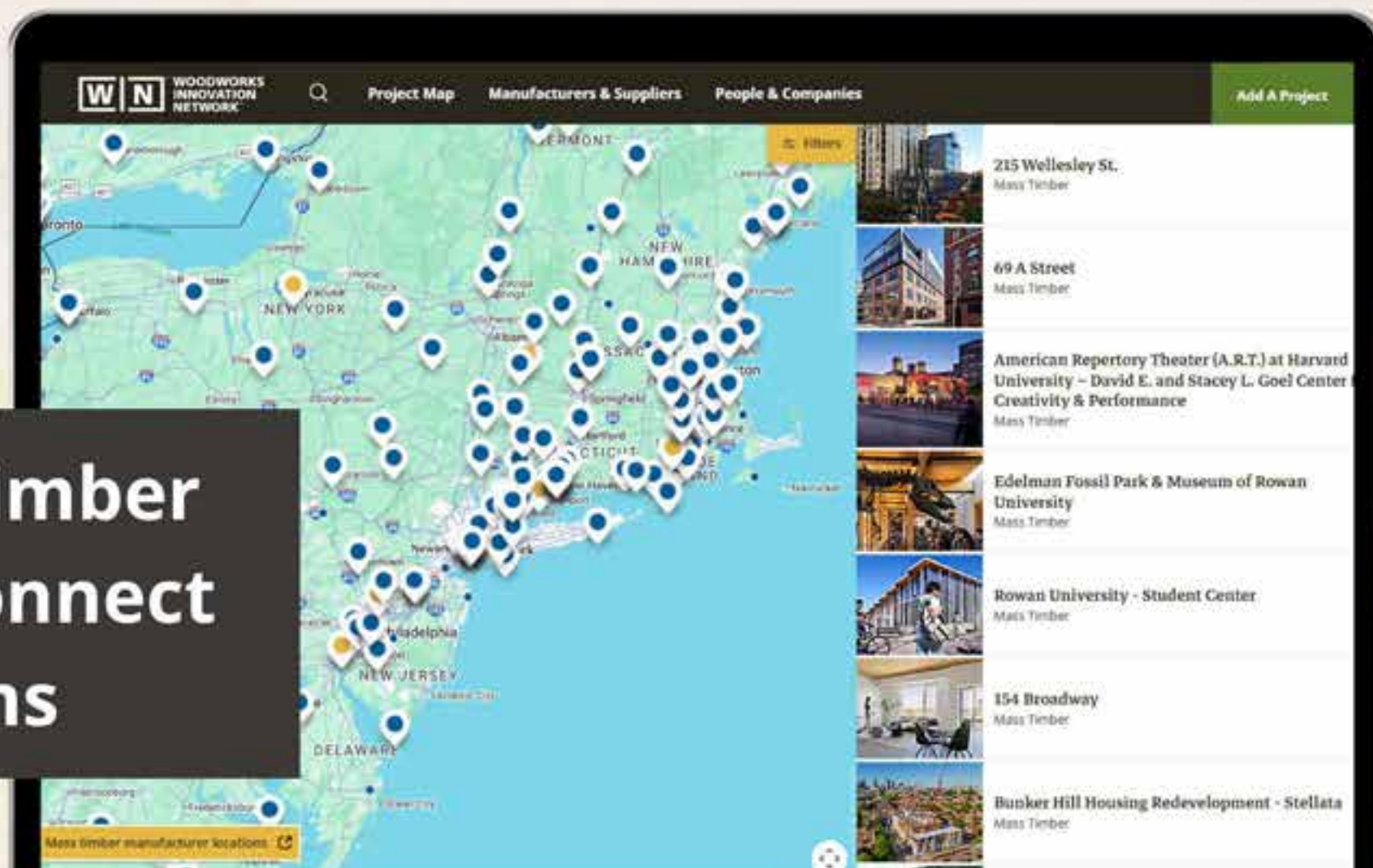
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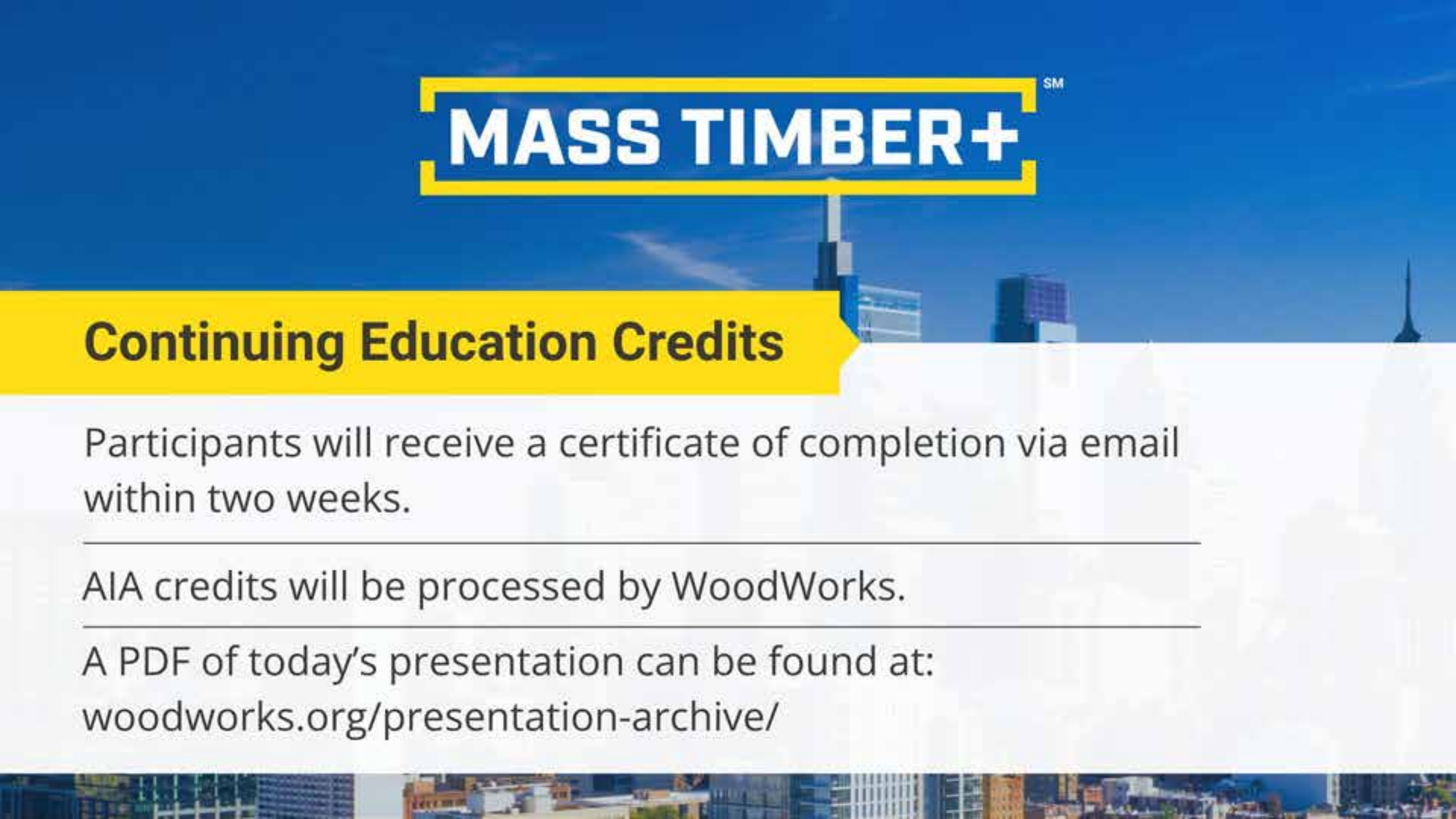
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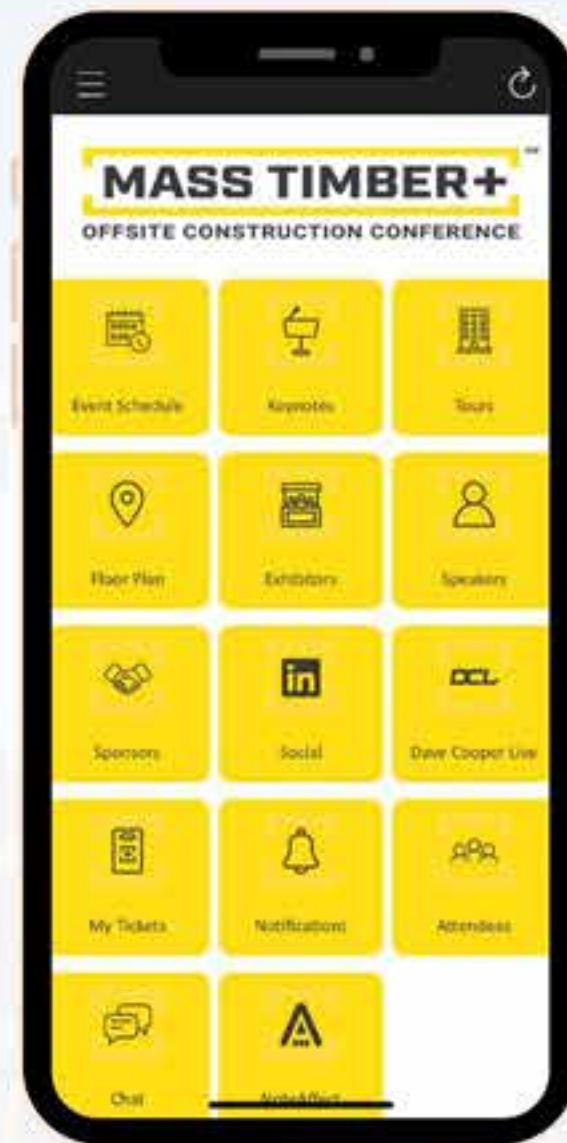


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Weathering the Build: Protection Strategies for Offsite Construction

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Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.



Course Description

Offsite construction can deliver greater speed, quality control, and predictability—but only when prefabricated components remain protected from water throughout their journey from fabrication to occupancy. Water intrusion during transport, storage, and/or installation remains a persistent risk across offsite construction practices such as panelized and volumetric modular construction. Vulnerabilities at joints, interfaces, roofs, temporary protection, and site conditions can increase the risk of negative outcomes including rising costs, delays, claims, and reputational damage for manufacturers, contractors, design professionals, developers, and owners alike.

Join this solutions-focused session where seasoned experts share strategies for minimizing risk from factory completion through installation and occupancy. Attendees will gain practical insights to improve coordination, strengthen quality control, reduce exposure, and build confidence in a broad range of offsite construction approaches.

Learning Objectives

1. Identify common sources of water intrusion and moisture exposure during fabrication, transport, storage, installation, and enclosure of panelized and volumetric modular construction.
2. Evaluate design details, temporary protection measures, and construction sequencing strategies that reduce the risk of moisture-related damage and support long-term building performance.
3. Explain how coordination among designers, manufacturers, contractors, and owners can improve quality control and reduce health, safety, and durability risks associated with water exposure in offsite construction.
4. Apply practical water-management strategies at joints, interfaces, roofs, and other vulnerable conditions to protect prefabricated assemblies from factory completion through installation and occupancy.



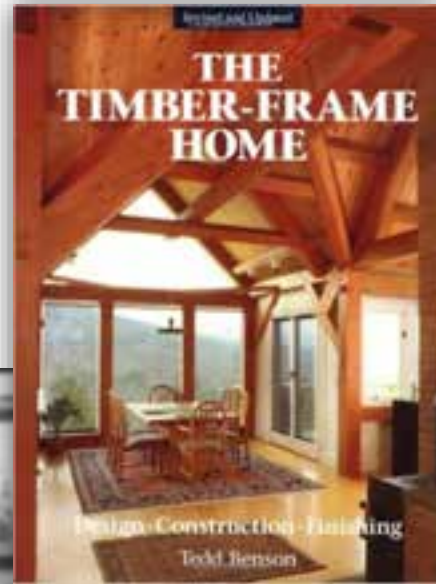
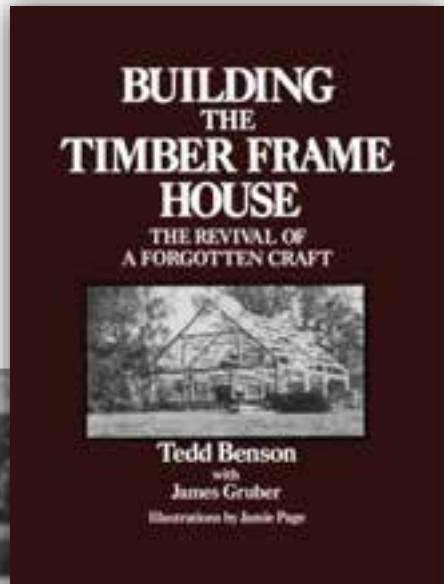
Weathering the Build

Panelized Construction & Weatherization

How offsite construction improves enclosure performance, reduces weather exposure, and supports long-term durability

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1970s - 1990s Alstead NH



50 Years of Refining Offsite Construction





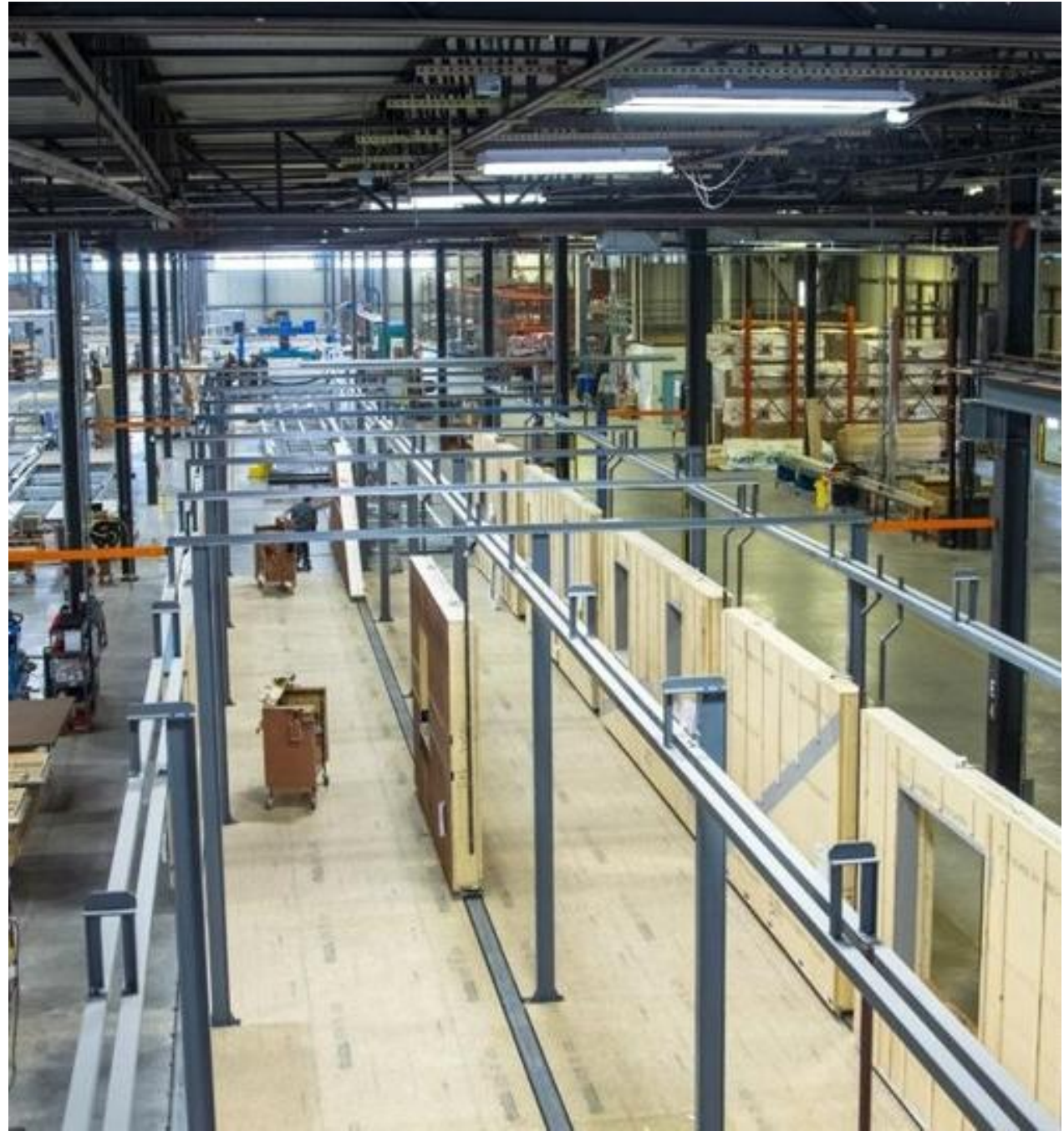
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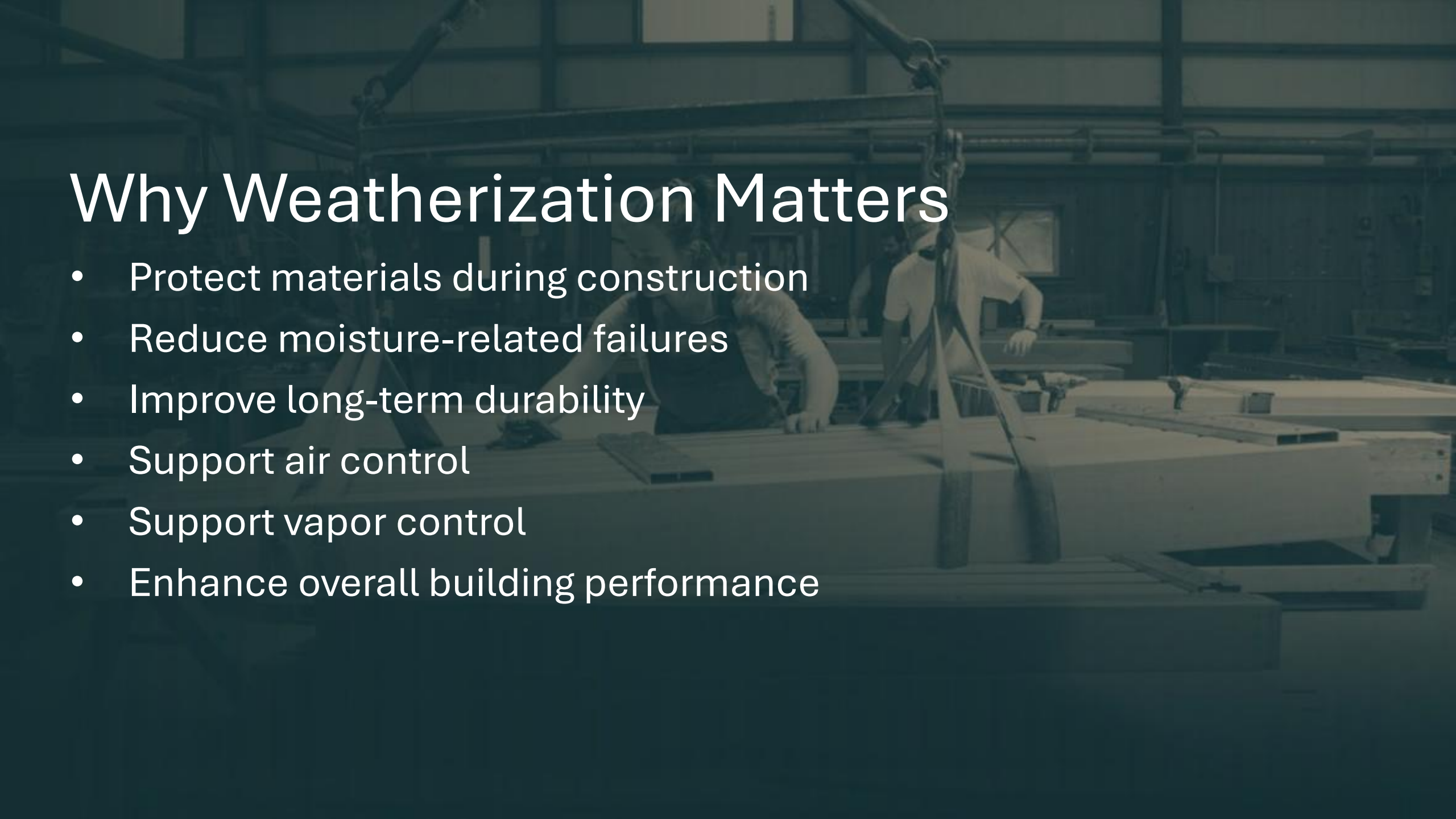
The Original Offsite Construction Method

- Precision fabrication offsite
- Virtual modeling & CNC manufacturing
- Pre-planned assembly sequencing
- Rapid onsite assembly
- Coordinated team execution

Expanded Manufacturing Capacity 2017 - present Keene, NH

- 110,000 SF advanced manufacturing facility
- Semi-automated production systems
- High-performance wall, floor, and roof assemblies
- Greater quality control and production consistency



A background image showing two construction workers in a large industrial or manufacturing facility. They are working with large, light-colored rectangular blocks, possibly concrete or insulation, which are being moved or positioned by a crane system. The workers are wearing safety gear, and the environment is filled with industrial equipment and structural elements.

Why Weatherization Matters

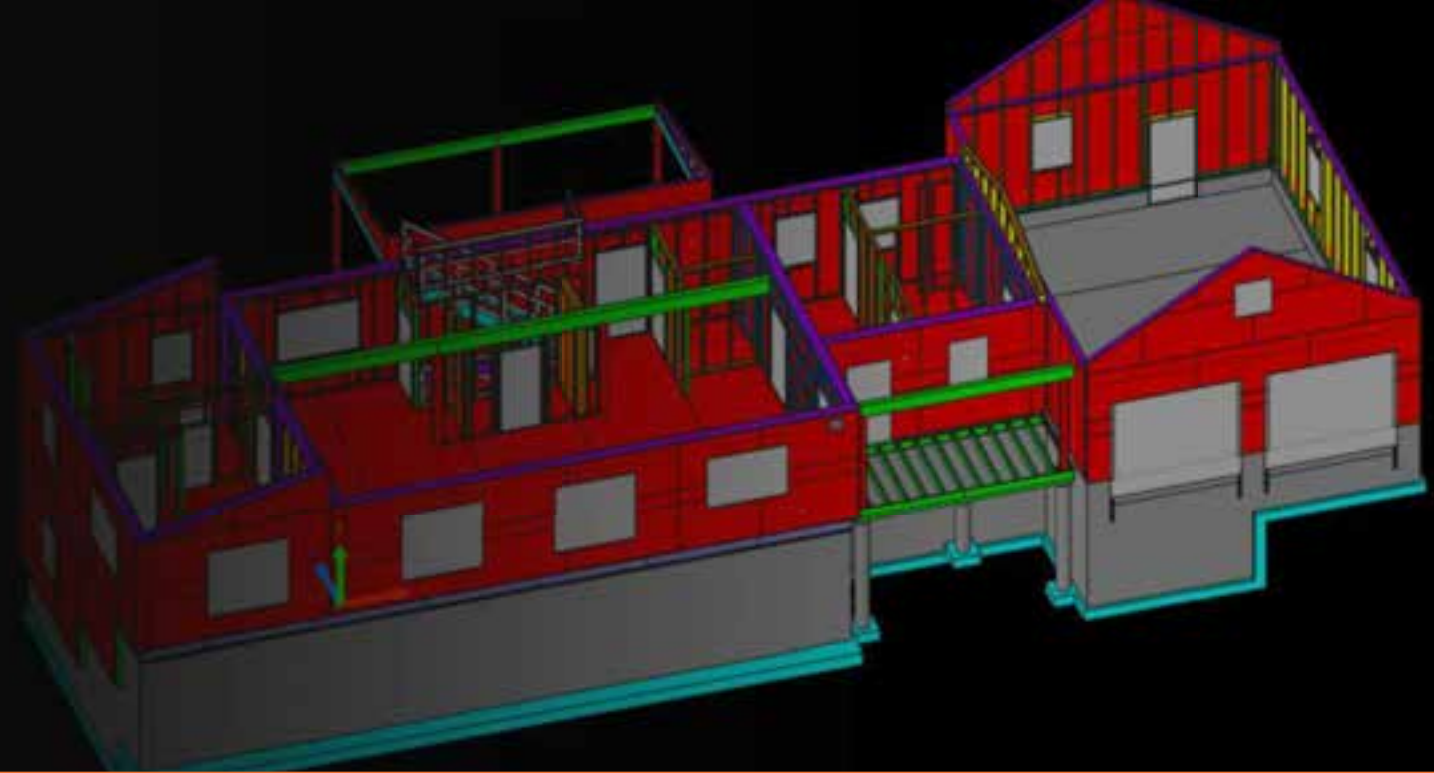
- Protect materials during construction
- Reduce moisture-related failures
- Improve long-term durability
- Support air control
- Support vapor control
- Enhance overall building performance

Weatherization Through Process Control

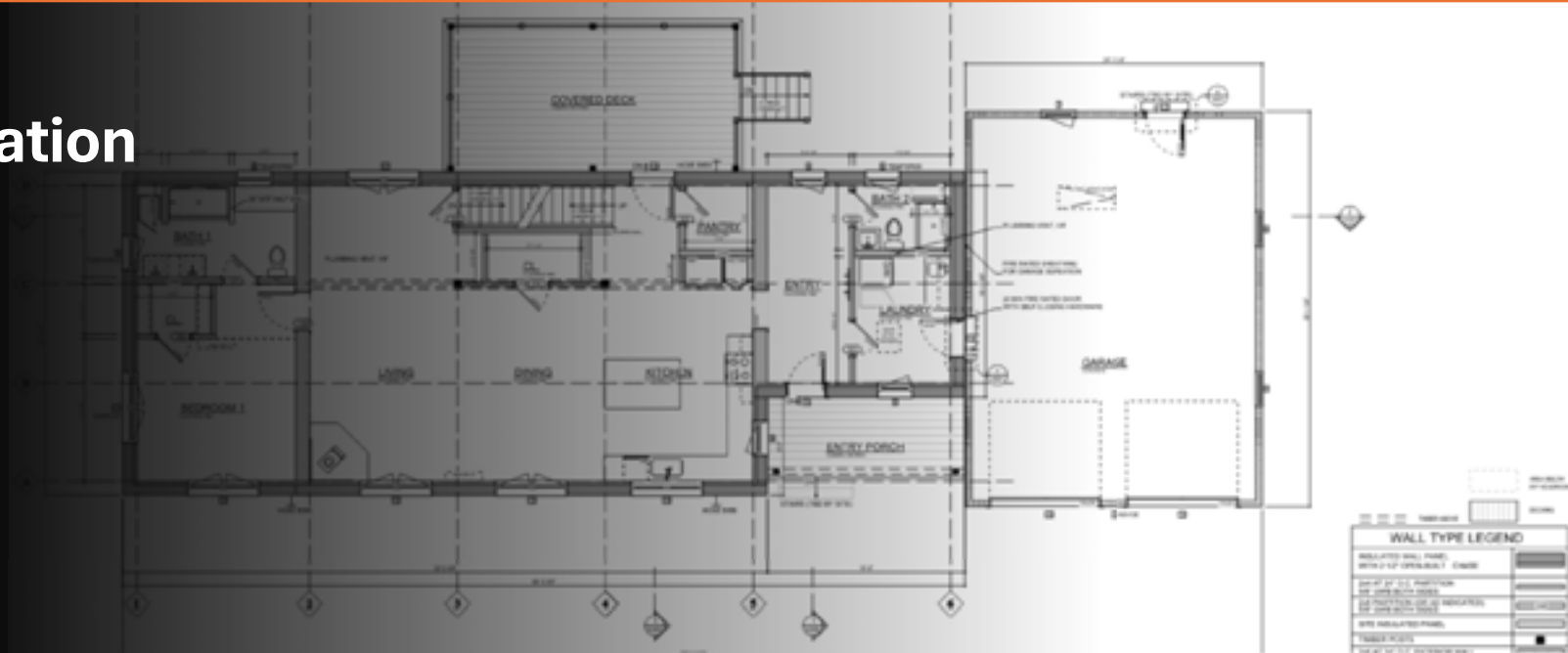
- Digital coordination → Fewer field penetrations
- Controlled manufacturing → Controlled sealant installation
- Sequenced logistics → Reduced exposure time
- Rapid enclosure completion → Earlier dry-in

Every stage of the panelized process is designed to reduce exposure, improve quality and accelerate dry-in

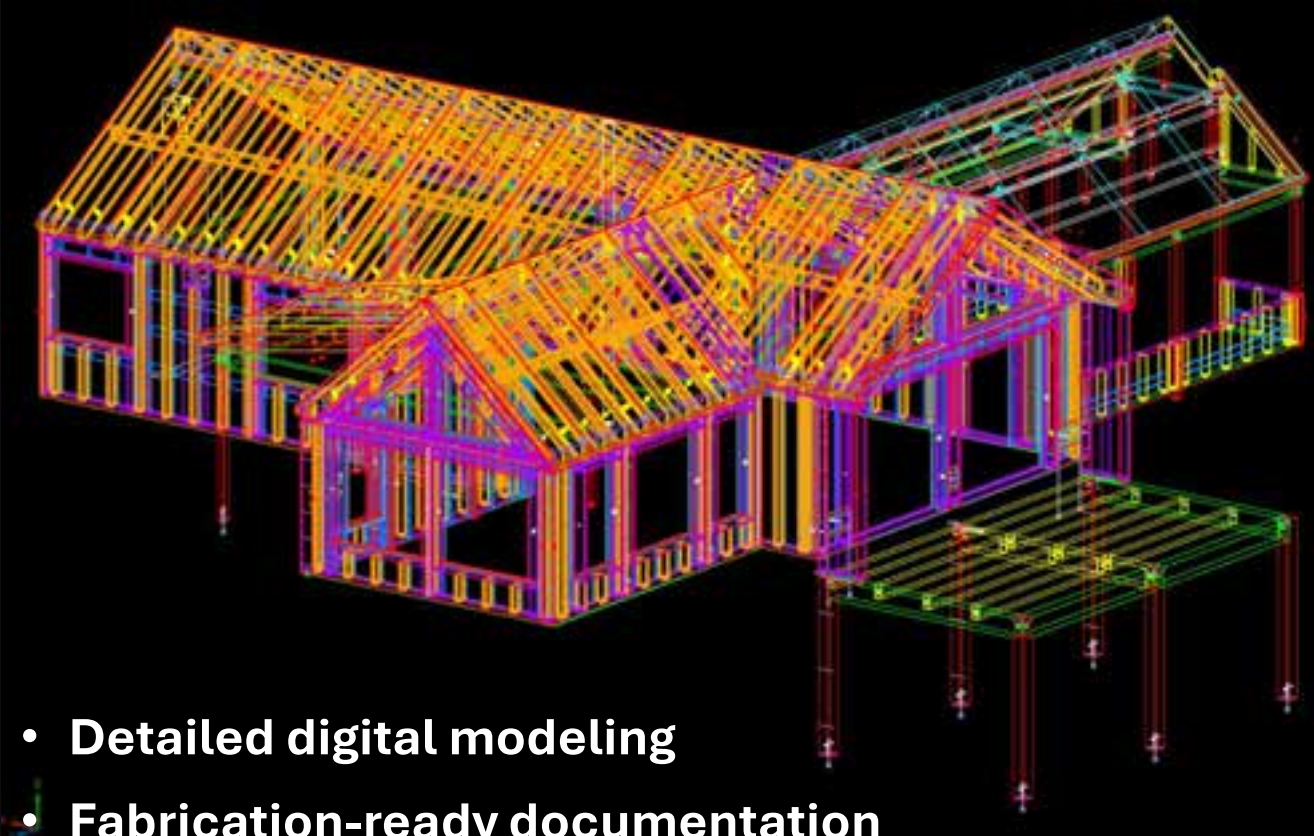
Design Coordination Through BIM



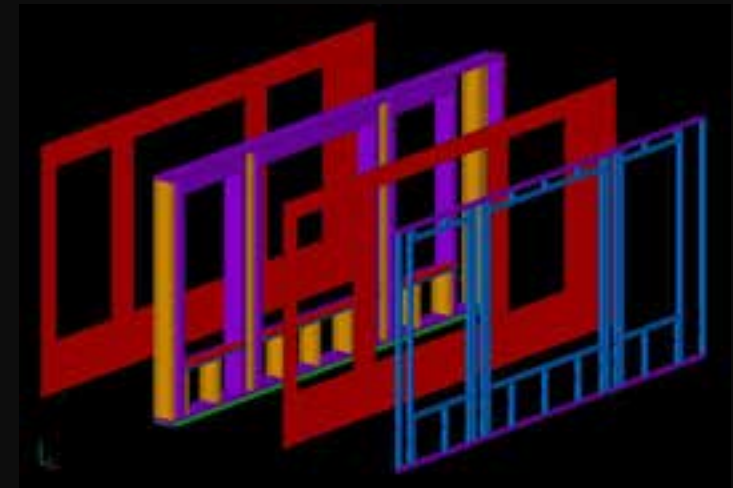
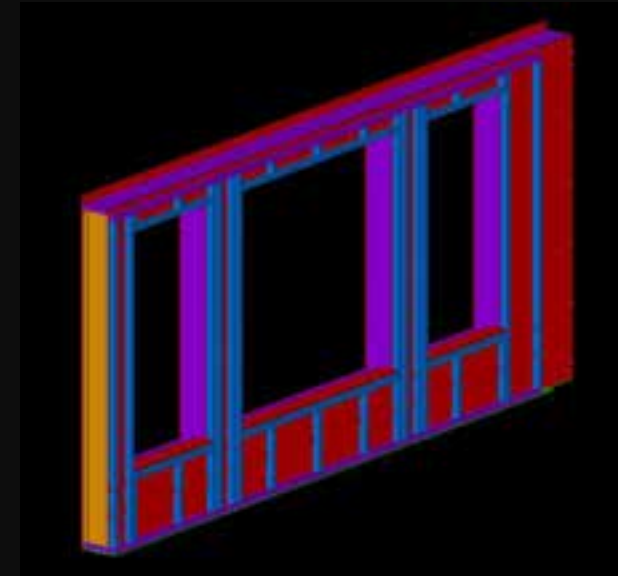
- Model to model coordination
- Design intent validation
- Clash detection
- Fabrication accuracy
- Installation readiness



Design Coordination / Virtual Fabrication



- Detailed digital modeling
- Fabrication-ready documentation
- Coordination before construction
- Reduced field modifications





Factory Production



Factory Weatherization Advantages

- Climate controlled environment
- Controlled temperature and humidity improve adhesive, tape, and sealant performance
- Glued and nailed sheathing
- Sealed insulation cavity
- Factory installed windows and doors
- Sheathing seams taped indoors
- Protected storage and shipping





Site Installation



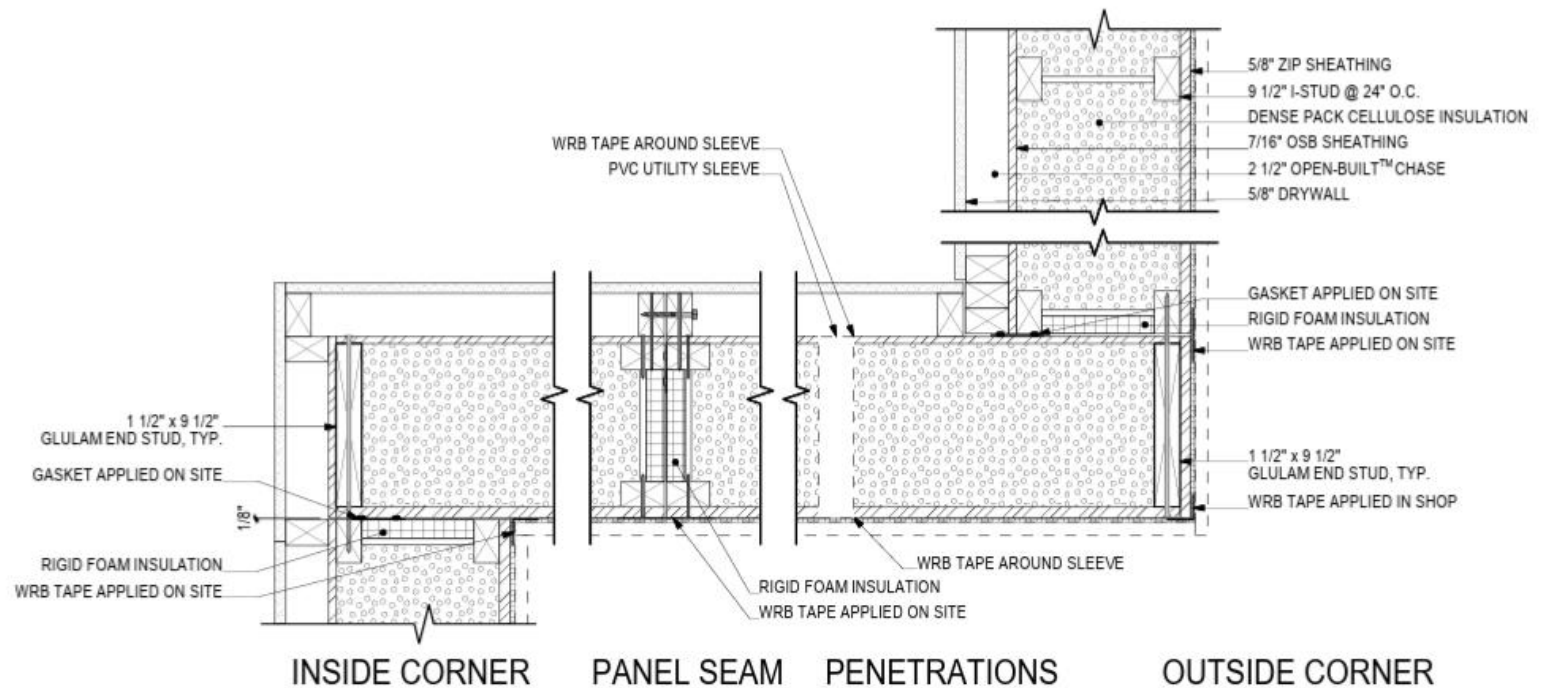
Site Installation

Site Weatherization Strategies

- Bundles remain wrapped until installation
- Panel seams sealed during raising
- Temporary protection of exposed surfaces
- Drainage maintained through floor openings
- Windows protected during interior work



Engineered Panel Seam Performance



7 TYP. OB+ VERTICAL PANEL SEAMS - PLAN VIEW
SCALE: 1 1/2"=1'-0"

- Dual 3/8" gasket system
- Mechanical compression during installation
- Continuous interior and exterior seals
- Long-term air and water performance

Strategic Scheduling Reduces Risk

- Fabrication aligned with site readiness
- Bundles sequenced for efficient raising
- Exposure time minimized
- Building enclosure prioritized
- Phasing supports early dry-in



Moisture Management After Raising

- Roofing underlayment installed promptly
- Exterior cladding completed within schedule requirements
- Humidity monitored continually
- Active dehumidification when necessary
- Avoid unvented propane and kerosene heaters
- Manage moisture from concrete curing





The Result:

Interior Performance

- Dry work environment
- Faster interior progress
- Reduced moisture exposure



The Result:

Building Enclosure Performance

- Improved air barrier continuity
- Improved water management
- Enhanced thermal control
- Increased durability
- Improved constructability
- Reduced weather-related rework



Weatherization Starts Long Before Construction

Successful weatherization is the result of coordinated design, manufacturing, logistics, installation, and moisture management.

- Weatherization begins during design and coordination.
- Controlled manufacturing can reduce weather-related variability.
- Installation sequencing directly affects exposure risk.
- Moisture management continues after dry-in.
- Successful weatherization is a project-delivery strategy.

October 7, 2026

Mass Timber + Offsite Construction Conference, Philadelphia, PA

Weathering the Build – from Factory to Field: 5 Essential Moisture Protection Strategies for Volumetric Modular Construction

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5 Essential Moisture Protection Strategies for Volumetric Modular Construction

- 1. Develop a Modular Moisture Protection Plan** (Note: project specific plan)
- 2. Protect all 6 sides of Modules** (Hint: shrink wrap is not enough)
- 3. Implement Factory QAQC and Testing** (Hint: not just a single mock-up)
- 4. Design Project Specific Module Joint Details** (Note: including base of wall, parapets, etc.)
- 5. Control and Monitor Moisture Conditions** (Note: use desiccants or dehumidifiers; install wireless RH/Temp/MC dataloggers)

1

Develop a Modular Moisture Protection Plan

Create a project-specific Moisture Protection Plan addressing the storage, transportation, lifting, setting, and installation of modules to minimize moisture exposure throughout the construction process.

Shrink Wrap for “Temporary” Exterior Yard Storage



Morning condensation on shrink wrap protecting roof of mods



Various cuts through shrink wrap at doorway openings

Shrink Wrap for “Temporary” Exterior Yard Storage – Moisture Accumulation on EPDM Roof flowed over the side walls



Leak through shrink wrap onto EPDM temp roof membrane



Water draining off EPDM temp roof membrane down unprotected side walls of mods, behind shrink wrap

Shrink Wrap for “Temporary” Exterior Yard Storage – Moisture Collection in Stud Bays



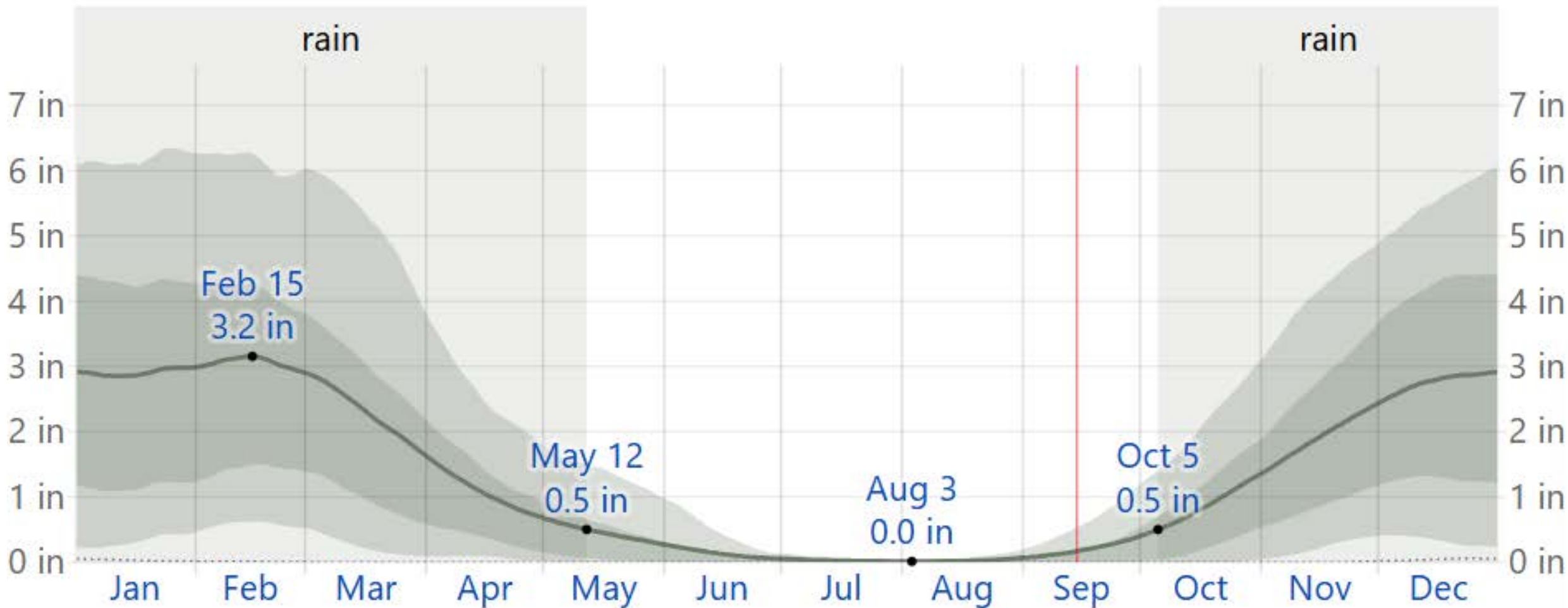
Moisture accumulation at stud bays, organic growth present, limited drying potential due to shrink wrap



Moisture accumulation at stud bays, organic growth present, limited drying potential due to shrink wrap

Example: Average Monthly Rainfall in Brentwood, CA (weatherspark.com)

Understand Local Climate versus Schedule of Setting Units

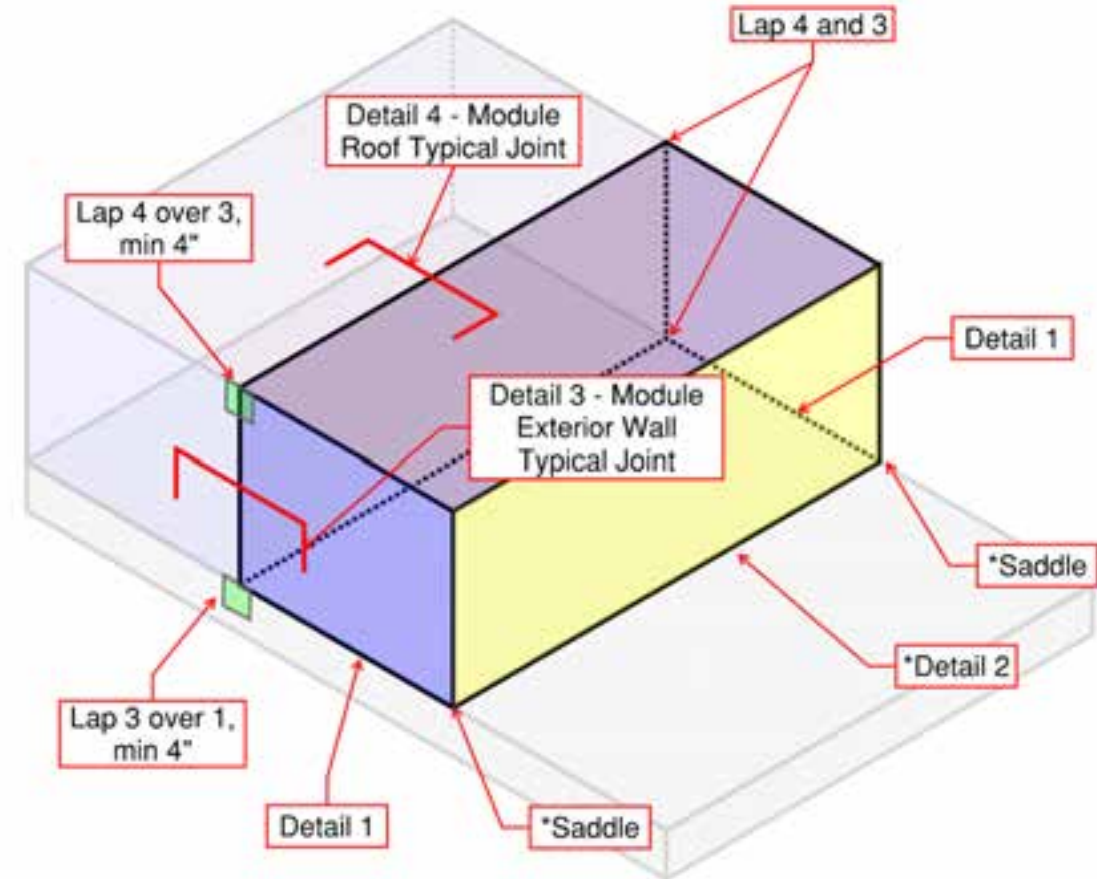
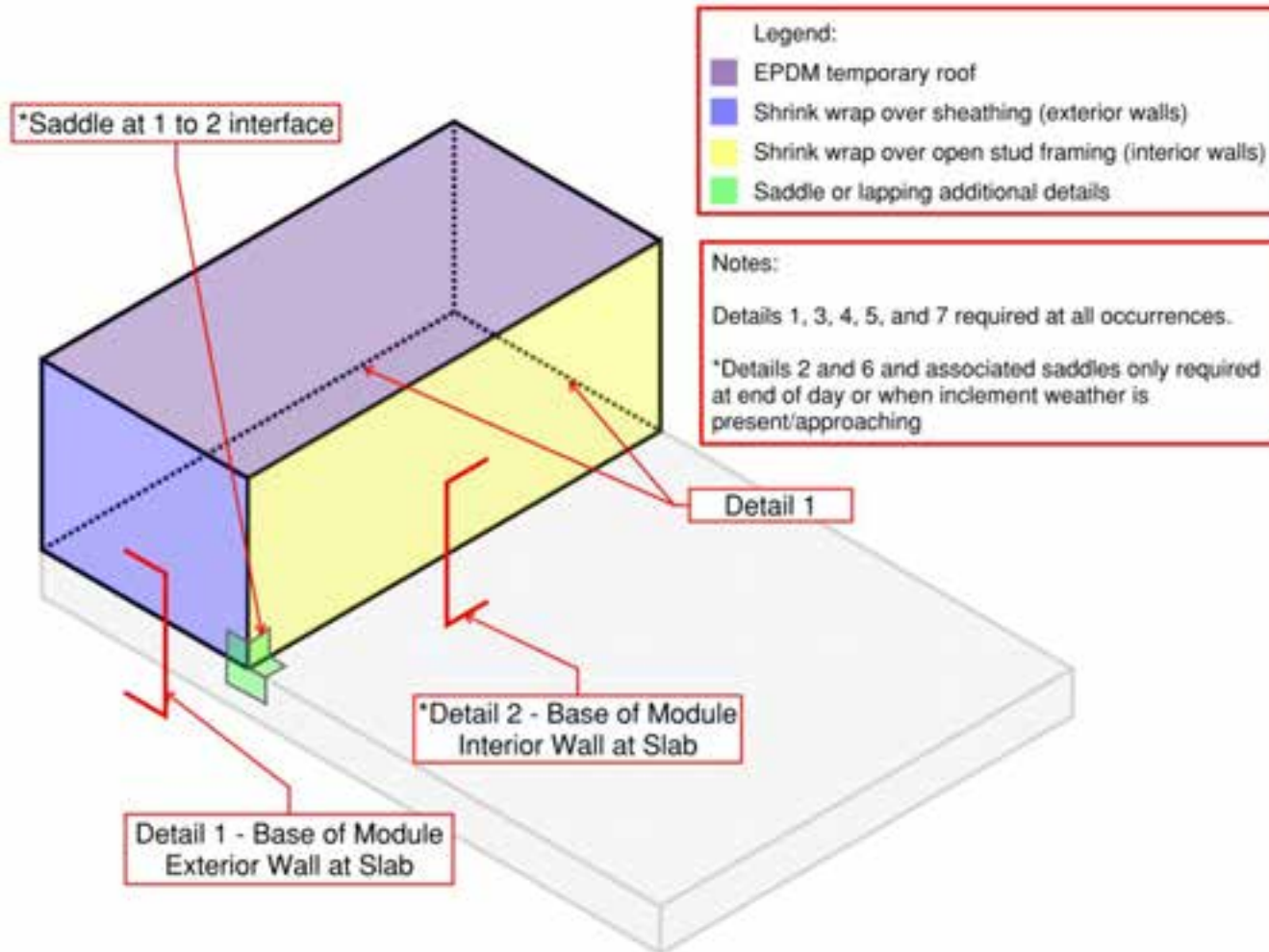


The average rainfall (solid line) accumulated over the course of a sliding 31-day period centered on the day in question, with 25th to 75th and 10th to 90th percentile bands.

Map out Module Journey from Factory to Site

MODULE FABRICATION		
Bow Island Alberta	Late July 2024	Late October 2024
	~15 Weeks	
MODULE TRANSPORTATION		
Bow Island Alberta to Metro Vancouver Area	Late August 2024	November 2024
	~1.5 Weeks per module loading and shipping	
MODULE STORAGE		
Metro Vancouver Area	September 2024	December 2024
	~3-4 Months	
MODULE PLACEMENT		
Surrey BC	January 2025	TBC
	TBC	

Plan Needs to Include Protection Measures while Setting Units & Setting Sequence



2

Protect all 6 Sides of Modules

Provide water-resistive barrier (WRB) and roofing membrane protection on all six sides of modules, including during transportation and storage. Standard shrink wrap alone is not sufficient moisture protection.

Protect all Six Sides of Modules

What is the Plan Here?



Protect all Six Sides of Modules

Need Contingency Plans!



Protect all Six Sides of Modules

Vapor Permeable Housewrap for Side Walls (in addition to final shrink wrap)



Does add cost but essential in our experience

Note: Fur off shrink wrap from WRB and allow drainage

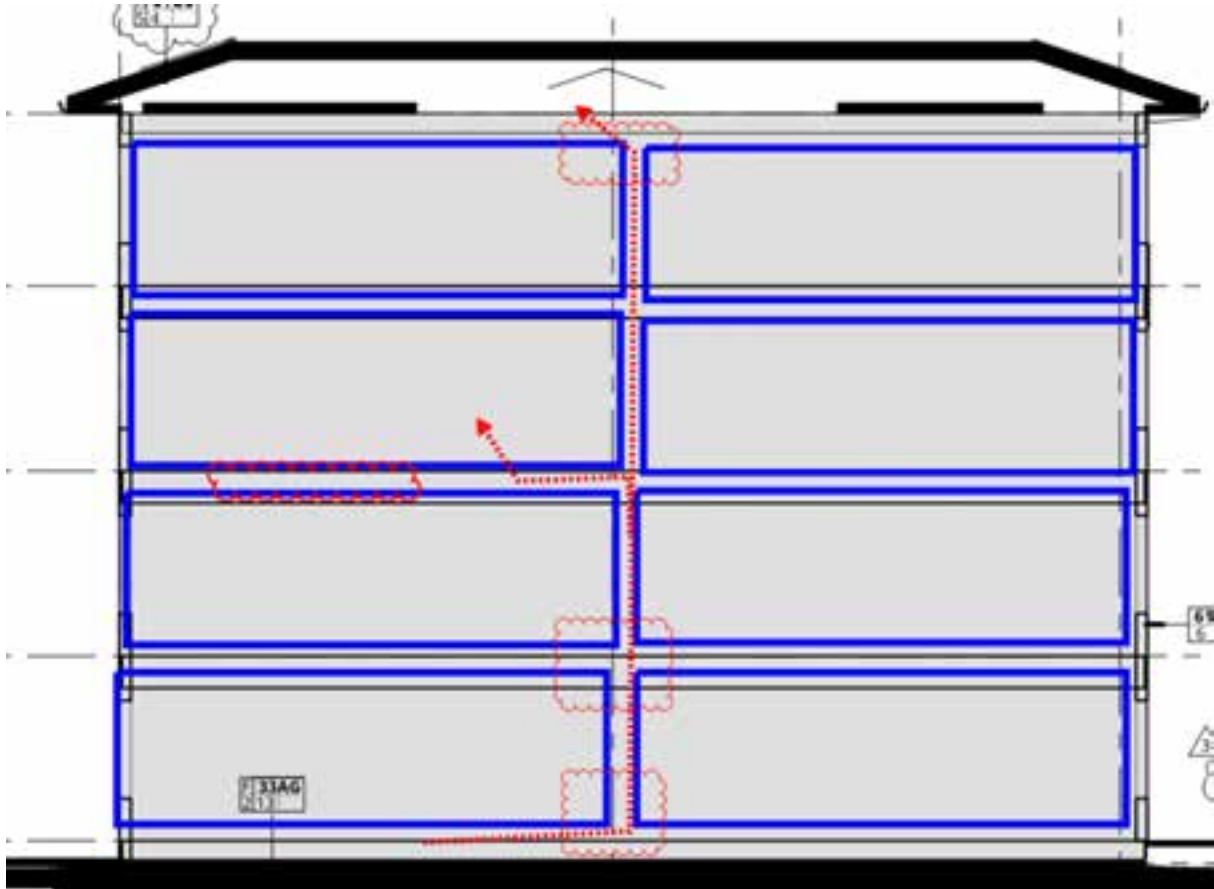
Protect all Six Sides of Modules

Example of Fully Sheathed Side Walls with Self-Adhered WRB



Protect all Six Sides of Modules

Wrapping all Six Sides also Allows for Better Air Sealing + Temp. Protection b/w Mods



Example of sealing off EPDM roofing membrane across mods at each level.

3

Implement Factory QA/QC and Testing

Establish a project-specific factory QA/QC program for WRB and window installation, including mock-ups, defined inspection protocols, and performance testing of a specified percentage of units prior to shipping.

The Promise of Better Quality in a Controlled Factory Environment Needs to be Validated

- ❑ Windows rough opening membrane installation errors due to non-experienced installers (e.g., drywall installers installing windows; jack of all trades but master of none)
- ❑ Is time allowed in factory for WRB and windows enough for a quality installation?
- ❑ Windows installed in the yard when mods were not level, resulting in racking and damage to windows during moving of mods.
- ❑ If project fails water or air leakage testing in field, question arises as to whose responsibility.
- ❑ Important to understand other project performance requirements such as whole building air tightness, stretch energy codes or Passive House, etc.



Photo 12.1f - Operable window with minimal compression of gasket. Unit 412 west elevation

Need for Detailed QA / QC Check Lists & Testing



Create step by step installation protocols similar to field mock-ups.



Consider air leakage testing in addition to water testing.

4

Design Project Specific Module Joint Details

Develop and coordinate temporary and permanent waterproofing details for module-to-module connections, including horizontal and vertical joints, base-of-wall conditions, and parapets.

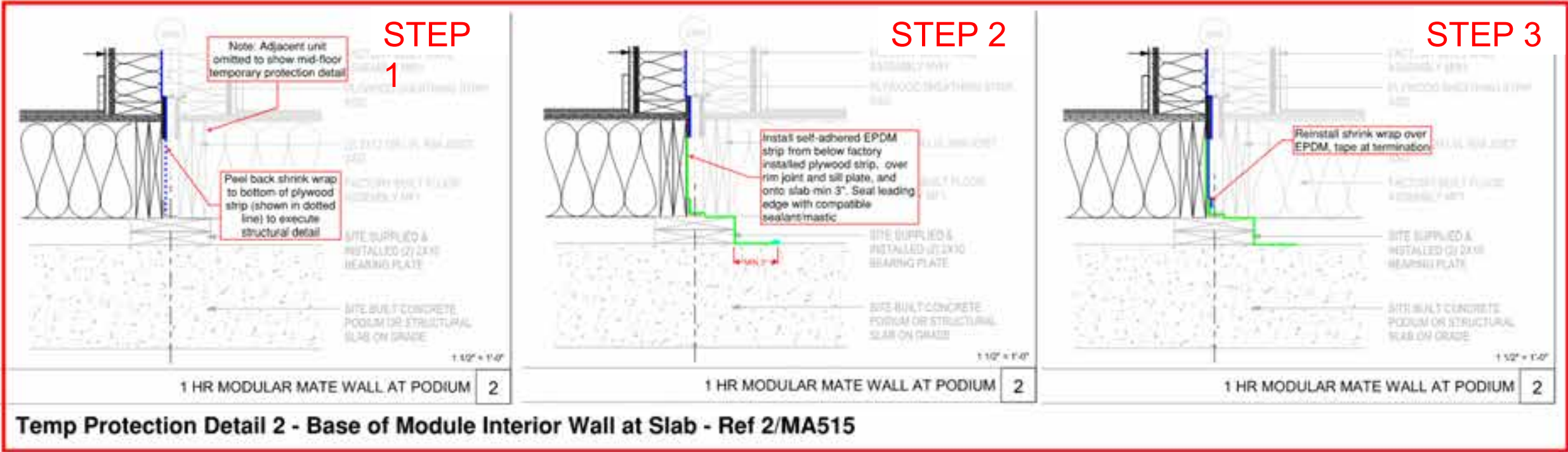
Project Specific Module Joint Details – Example of Base of Wall and Typical Structural Connections

Make Sure You Have Details for Sealing the Various Project Specific Conditions

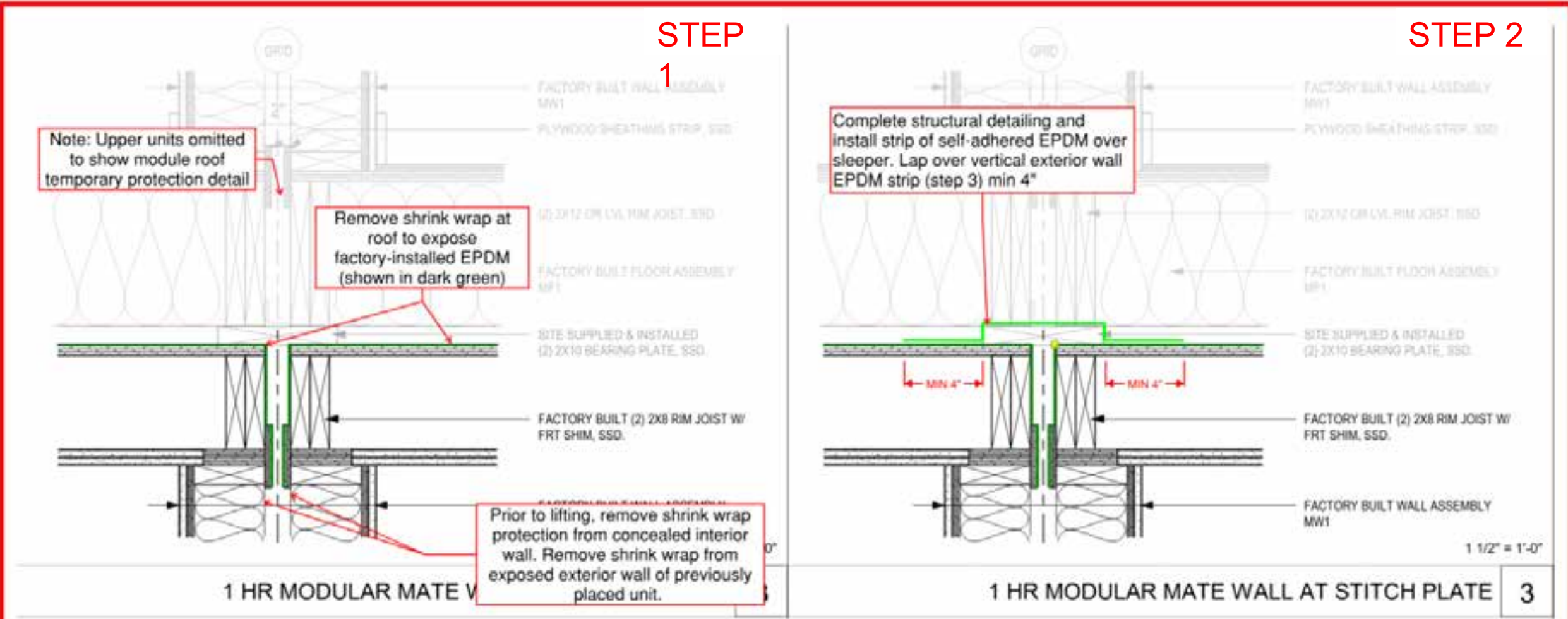




Development of Project-Specific Moisture Protection Detailing During Site Setting



Development of Project-Specific Moisture Protection Detailing During Site Setting



Temp Protection Detail 4 - Module Roof Typical Joint - Ref 3/MA515

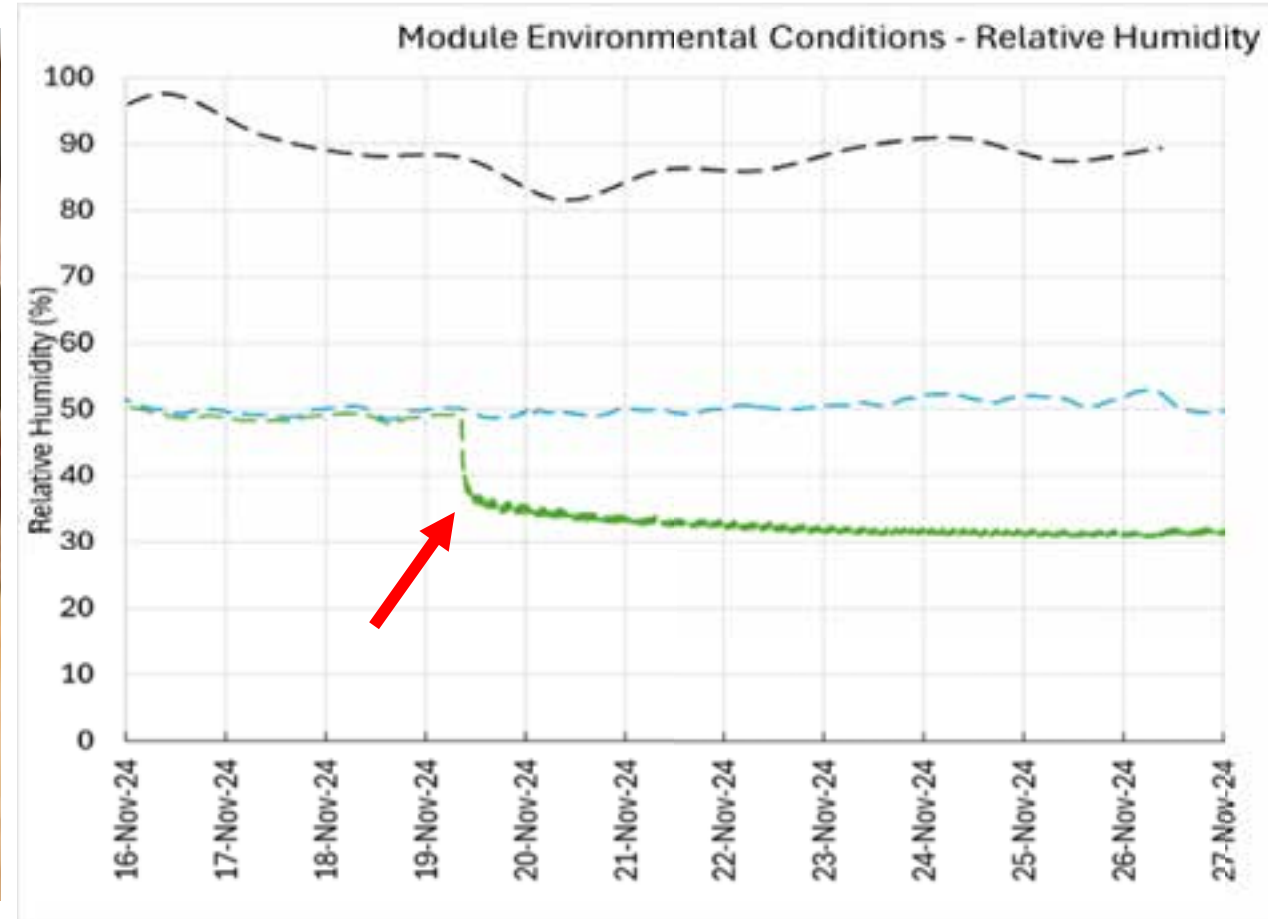
5

Control and Monitor Moisture Conditions

Manage humidity during extended storage using desiccants or dehumidifiers, as appropriate. Install wireless relative humidity (RH), temperature, and/or moisture content (MC) sensors to monitor and verify moisture conditions during storage, installation, and prior to project completion.

Control Moisture Conditions in Mods

Desiccant or Dehumidifiers Recommended



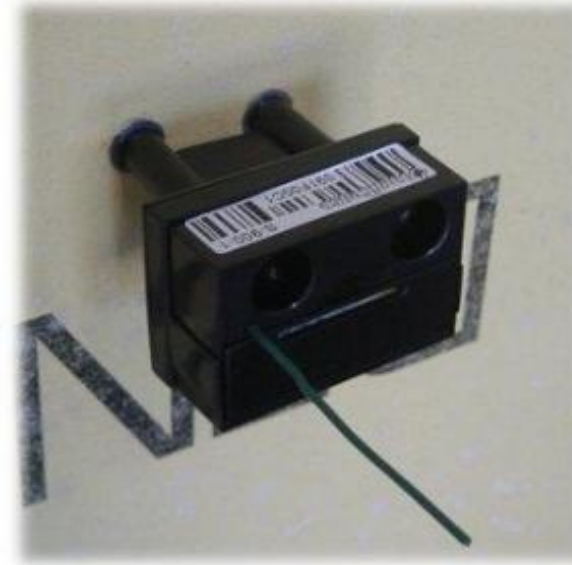
Remember: Mods are wrapped in plastic with very little ability to dry!

Monitor Moisture Conditions in Interior and Walls of Mods – Example Wireless Dataloggers

Temperature/Humidity Sensor Monitoring

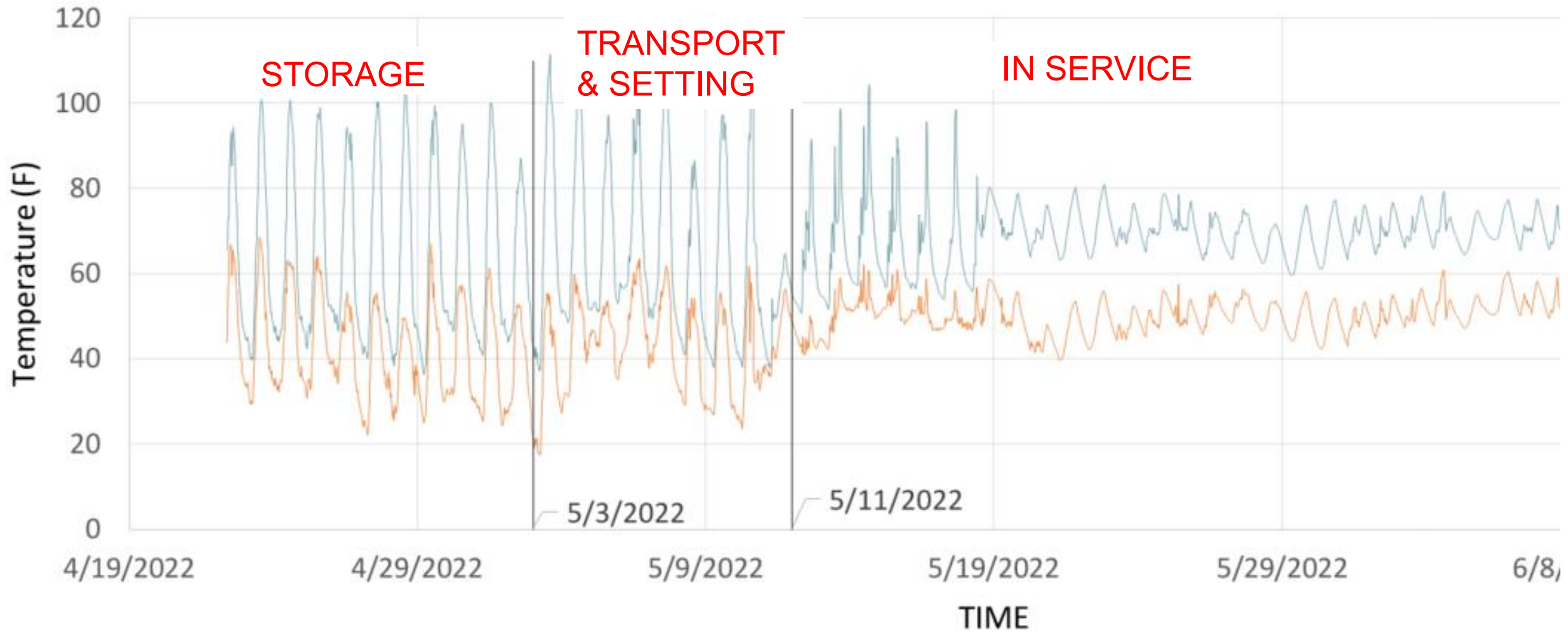


Temperature/humidity sensor installation



Cost of various sensors is ~\$100 each

Temperature/Humidity Sensor Monitoring



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Discussion + Questions



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