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Mass Timber - Moisture Control During Construction

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

AIA Approved Continuing Education

Course Description

Mass timber projects require thoughtful moisture management throughout construction to support structural performance, dimensional stability, finish quality, and long-term building durability. This webinar examines practical strategies for managing moisture exposure before, during, and after installation of mass timber components. Drawing from real-world project experience, contractors Chad Hamilton of XL Construction and Matthew Tonello of Consigli will share lessons learned from completed mass timber buildings, including approaches to planning, sequencing, temporary protection, monitoring, and response protocols.

The presenters will discuss how early coordination among project teams, informed construction planning, and proactive site management can help maintain construction quality, reduce project risk, and support efficient project delivery. Attendees will gain insights into field-tested methods for protecting mass timber elements while balancing schedule, cost, safety, and constructability considerations.

Learning Objectives

1. Identify common sources of moisture exposure during mass timber construction and explain their potential impacts on structural performance, dimensional stability, finish quality, and long-term durability.
2. Describe preconstruction planning and coordination strategies that support effective moisture management during mass timber installation and enclosure.
3. Evaluate temporary protection methods, sequencing approaches, and site management practices used to minimize moisture exposure and maintain the performance of mass timber systems during construction.
4. Discuss field-tested monitoring techniques and response protocols that help project teams manage moisture exposure while supporting construction quality, project efficiency, and resilient building outcomes.

CHAD HAMILTON

XL Construction



GRAHAM

XL CONSTRUCTION

We Build to Improve Lives
General Contractor delivering mass timber buildings since 2018

ELEVATED CONSTRUCTION SERVICES

Mass Timber Structure Builders
- Design-Assist
- Manufacturer Selection and Management
- Receipt and Laydown
- Mass Timber Erection

TIMBERQUEST

Built Fast. Designed to Last.
Prefabricate mass timber education buildings since 2021

XL CONSTRUCTION

33
Years in Business
600+
Employees in the US
1 Million +
Square Footage of Mass Timber Installed
31
Mass Timber Buildings
2018
First Year Delivering Mass Timber
100+
Industry Awards

Connect on Linkedin

MATTHEW TONELLO

Consigli Construction Co. Inc.



Great People. Great Projects. Great Relationships.

Leading Construction Manager | Northeast and Mid-Atlantic

- Established 1905
- 5th generation family-led
- 100% employee-owned (ESOP)

Genuine Builders

- 900 skilled laborers, carpenters & masons on staff
- Hands-on knowledge of construction means and methods

CONSIGLI

121
Years in Business

2,600+
Employees

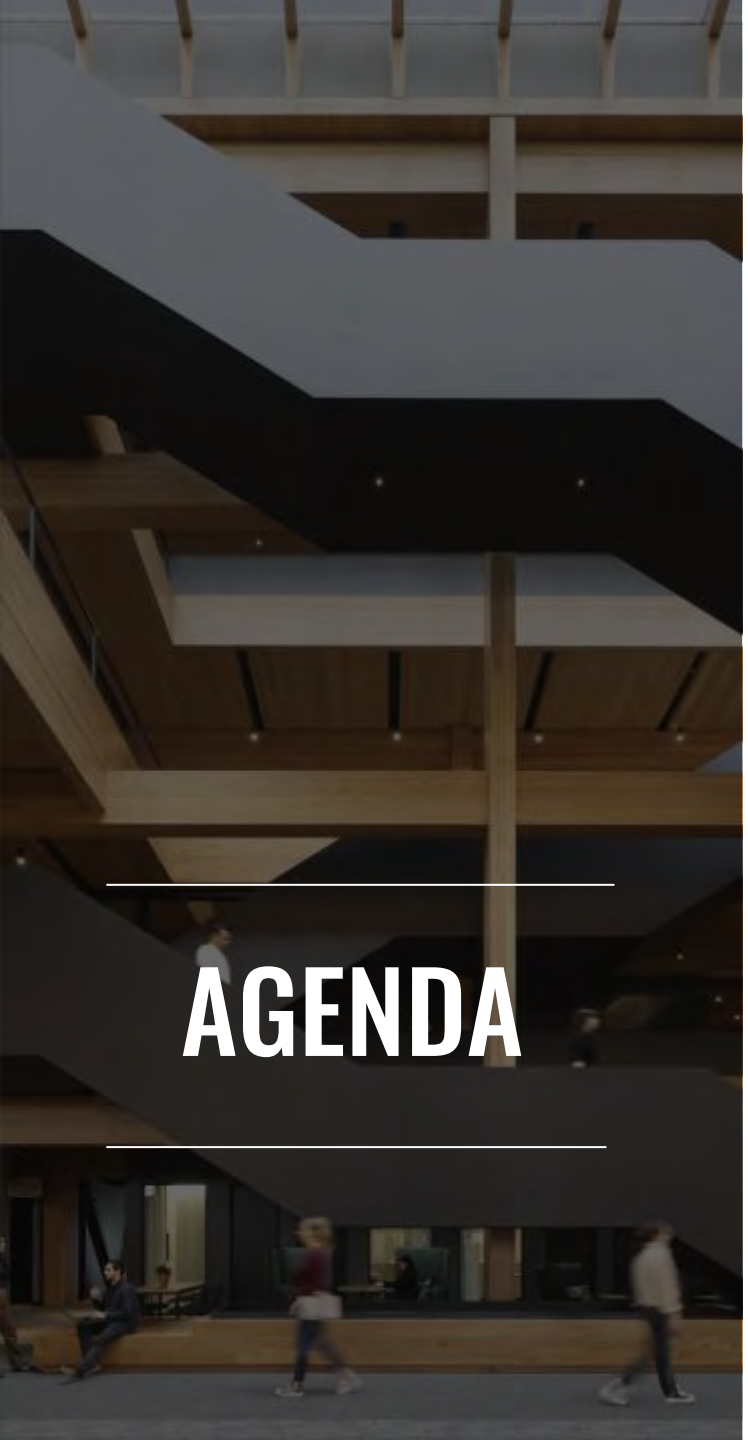
#17
ENR Top 100 Construction Management-at-Risk Firms

35+
Mass Timber Projects

15
Self-performed Mass Timber Installations

2010
First Year Delivering Mass Timber

Connect on Linkedin



AGENDA

- Moisture Management Plan Development
- Preconstruction
- Design
- Procurement/Fabrication
- Logistics/Storage
- Erection/Execution
- React & Maintenance
- Innovation
- Q&A



PLAN DEVELOPMENT

Moisture Management Plan - Lessons Learned

- Planning for Summer installation is not a Moisture Management Plan





Developing a Moisture Management Plan

Plan for the Worst; Hope for the Best

- Why is this important?
- Who prepares it?
- What is included?
- Who helps inform?
- What did we forget & lessons learned



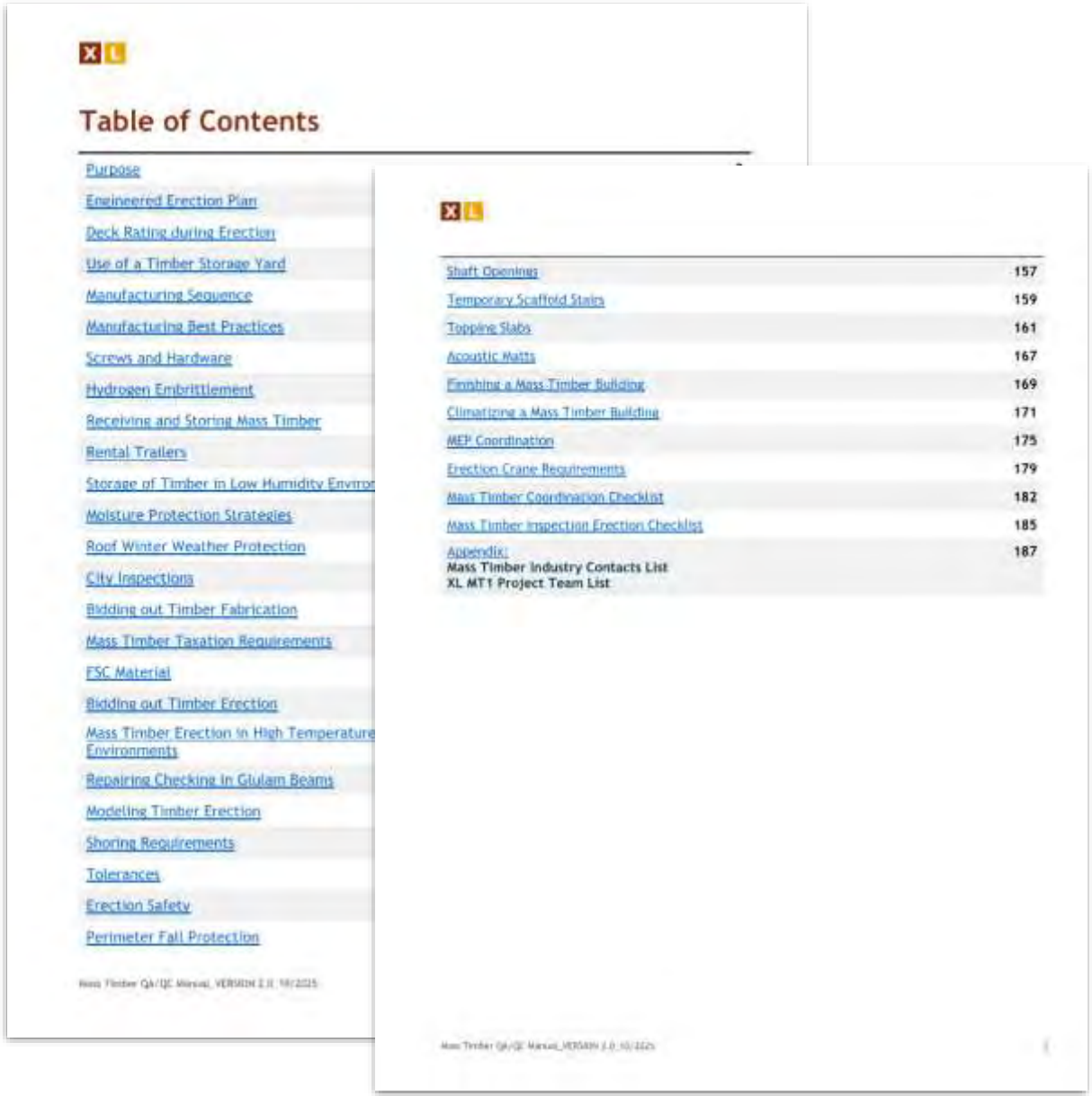


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Moisture Management Plan - Lessons Learned

Repeating floorplates

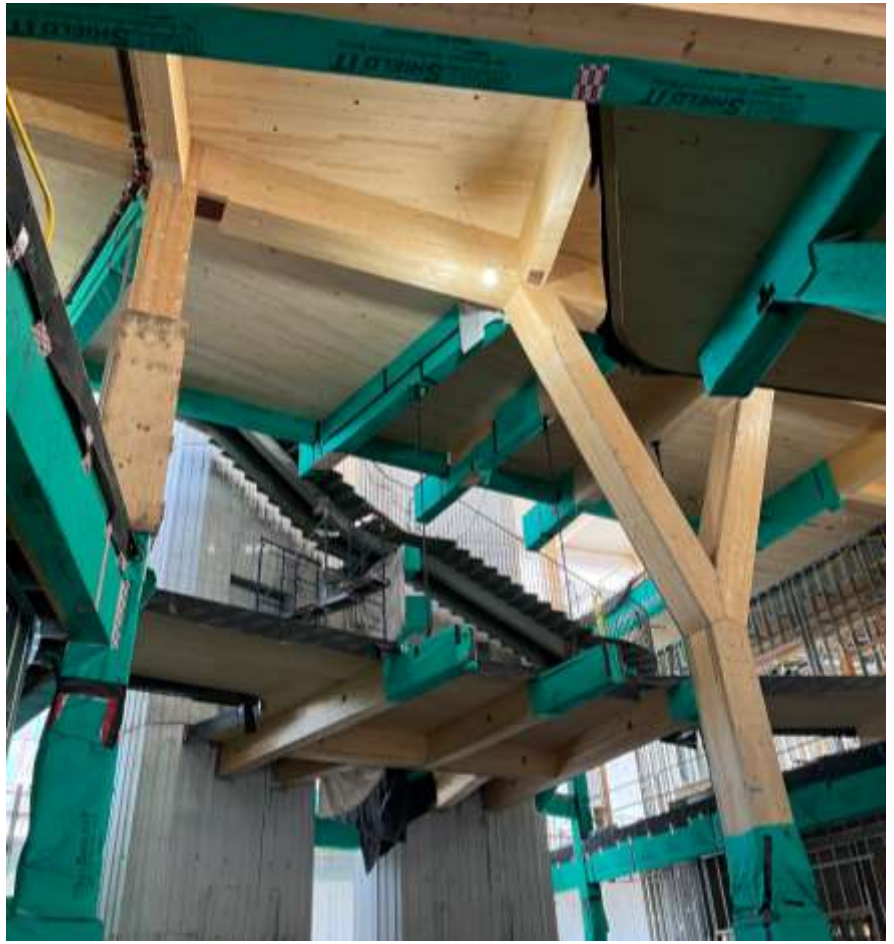




- Repeating /Regular Geometry
- Detailing Repeat Conditions

Moisture Management Plan - Lessons Learned





- Complex Non-repeating Geometry
- Custom Detailing at Numerous Unique Conditions

Moisture Management Plan - Lessons Learned





- Custom Detailing at Numerous Unique Conditions



PRECONSTRUCTION

Preconstruction Considerations

- Budgeting and Procuring Mass Timber
- Budgeting GC/GRs
- Aligning on Allowances
- Defining Subcontractor Scopes
- Budgeting Insurance



Field Applied Moisture Barriers

GC Makes Decision on What to Procure and How to Install

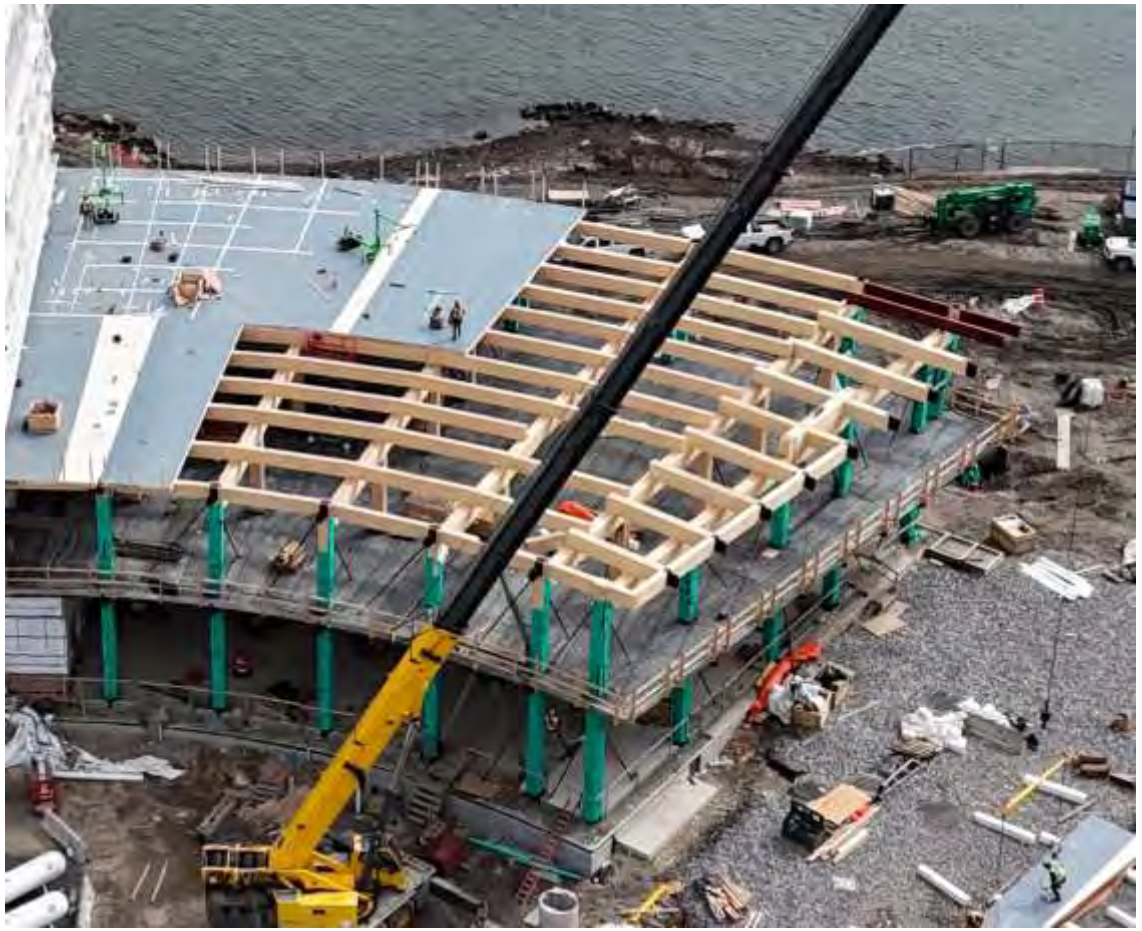




- Field Installed Vapor Permeable

Field Applied Moisture Barriers

GC Makes Decision on What to Procure and How to Install



- Factory Installed Vapor Permeable

Field Applied Moisture Barriers

GC Makes Decision on What to Procure and How to Install





- No Membrane
- Field Installed Vapor Impermeable

Vapor Retardants - Initial Protection

Field and Factory Options

Factory Applied end Grain Sealant



- Prevents moisture absorption into end grain and between panels

Field Applied Water Repellant



- Provides initial protection from water penetrating the CLT

Temporary Protection vs Permanent Protection

Stages of Protection



- Temp Weather Barrier - Tarps

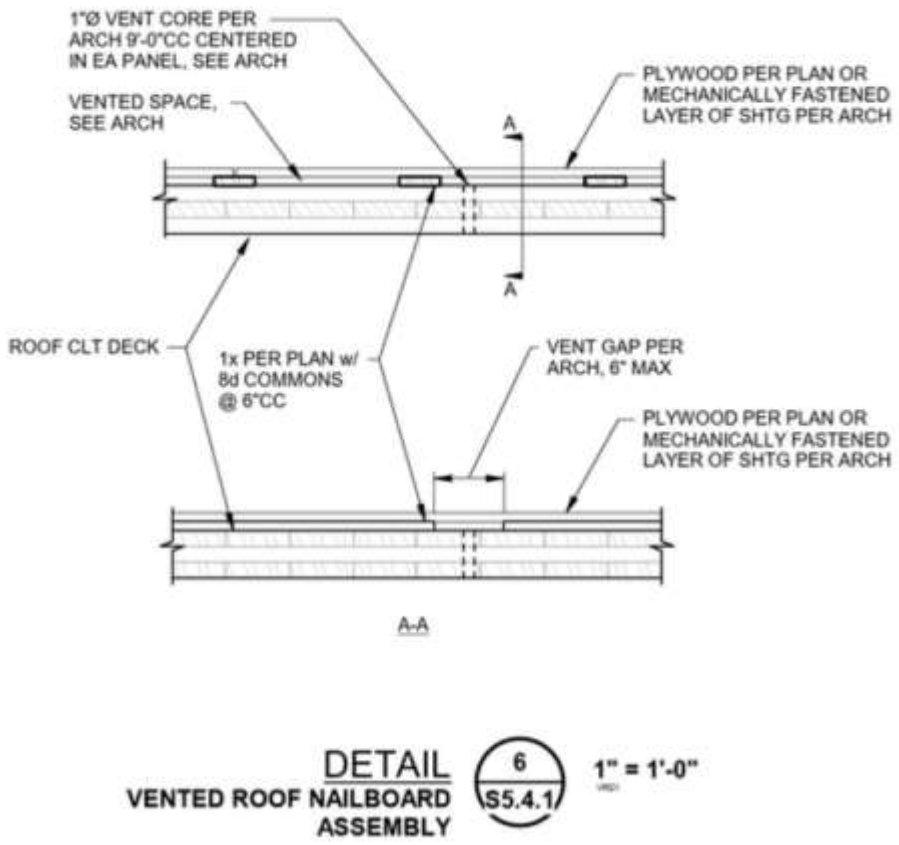


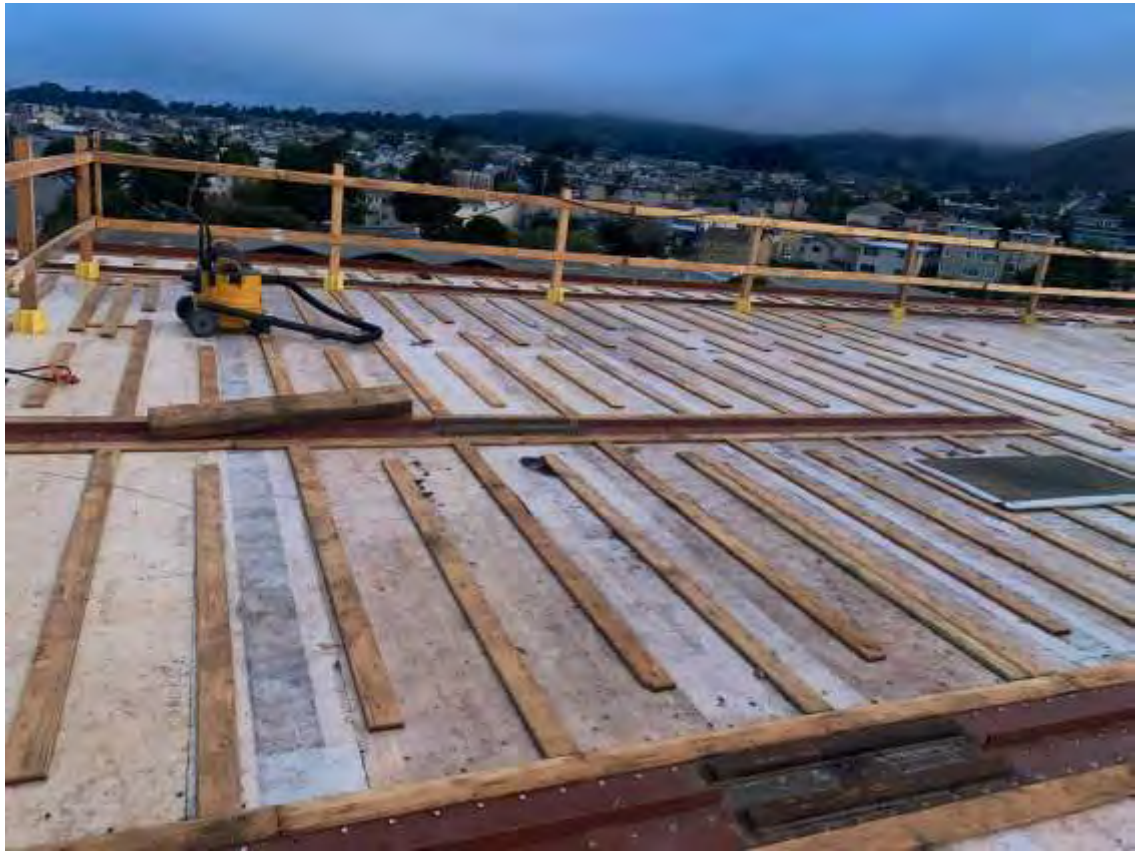
- Prefabricated Facade Framing



- Temp Weather Barrier - Engineering for Wind Load

Vented Roof Detail





- Allowed Construction to Proceed when CLT is damp



DESIGN

Design Considerations

- Timber Design
- Building envelope
- MEP Infrastructure (Temporary Drainage included)

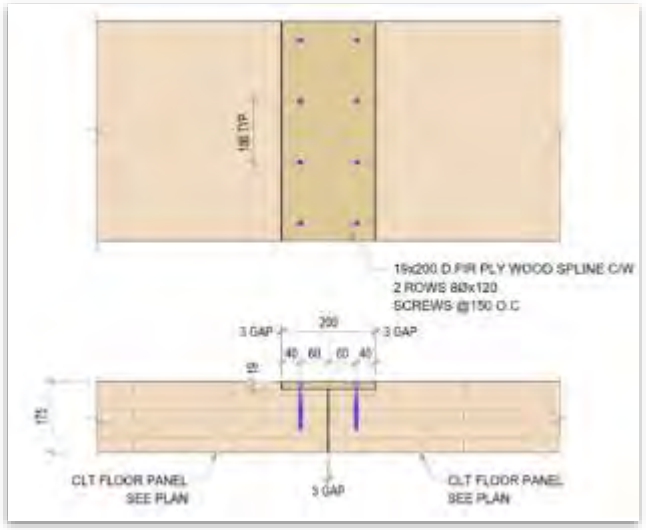


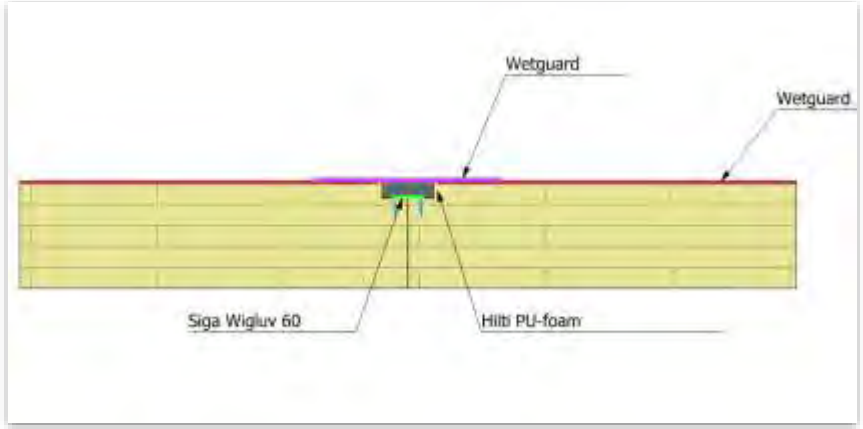
Splines

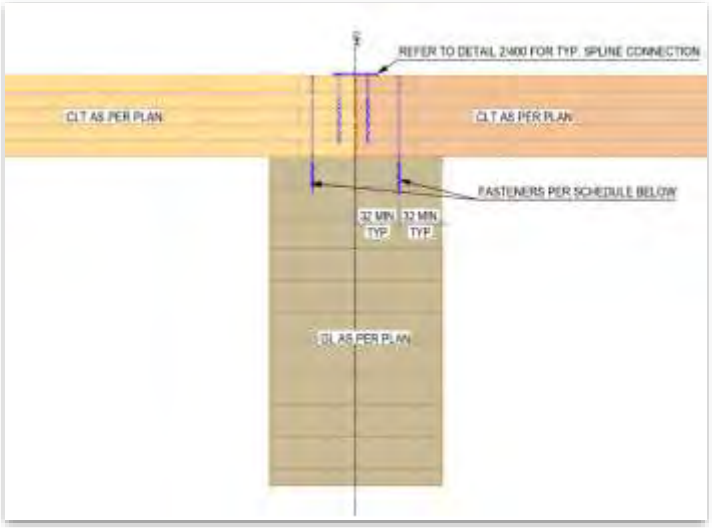












- Plywood Spline - inexpensive but swells and holds moisture
- LVL Spline - Less moisture absorption
- Coil Strap – Proprietary

Final Building Envelope

Unitized Façade Speed Matters





Final Building Envelope





Prefabricated Roof Assemblies

Minimize Exposure from Large Openings





- Prefab Doghouse
- Temp Containment to Dehumidify CLT

Drain Assemblies

Controlling Moisture







- Temporary Drain Housing
- Permanent Drain Assembly

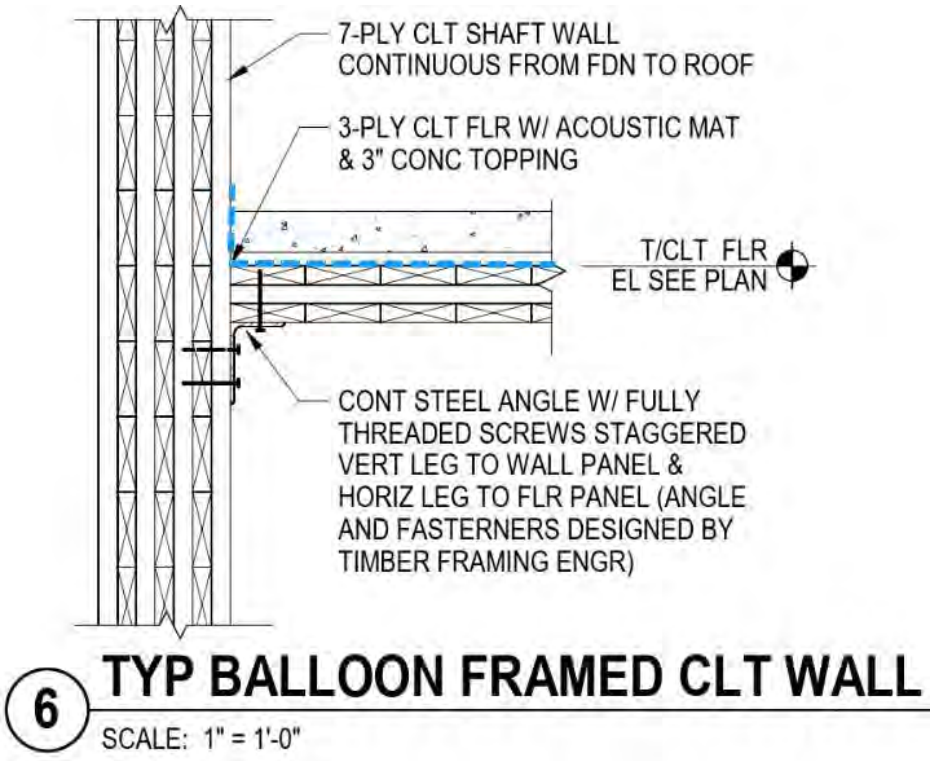


PROCUREMENT

Procurement and Fabrication Considerations

- Connection Detailing
- Fasteners & Steel
- Roofing Coordination

Detailing - Identify Areas of Risk







- Terminations at Shear Walls
- Terminate Temp to walls
- Plan for Splashback

Detailing - Identify Areas of Risk continued

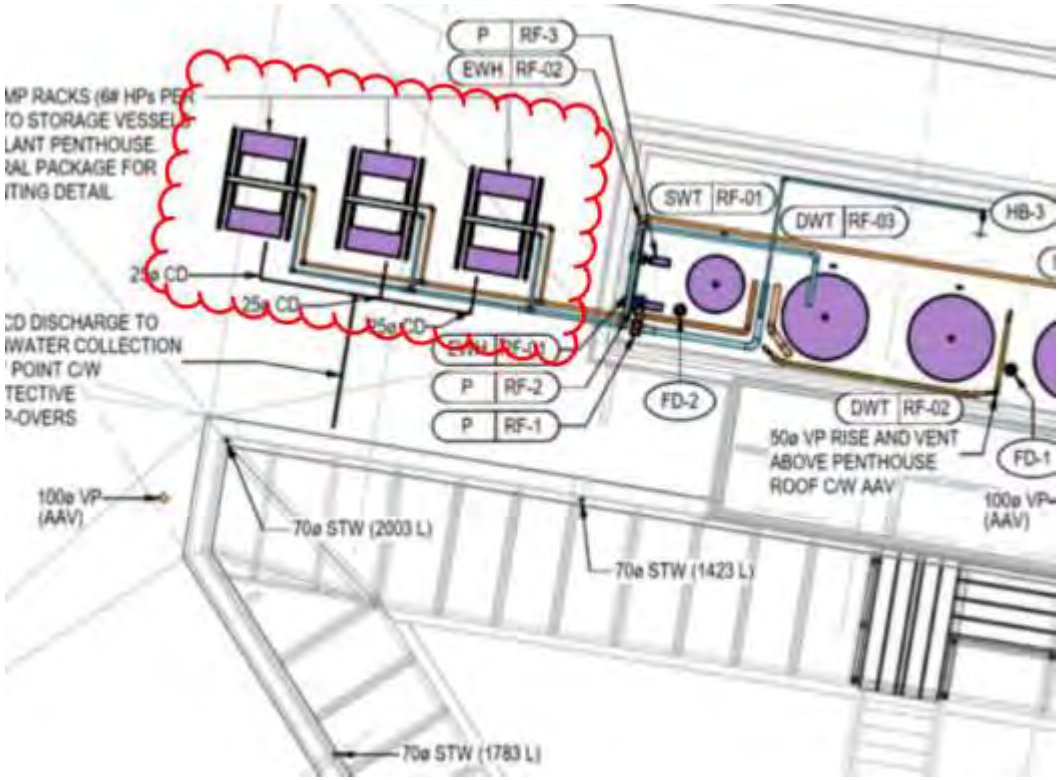
- Avoiding moisture traveling through the building until enclosed and decks placed







Detailing - Identify Areas of Risk continued





- Mechanical roof curbs create areas for water to pool
- More robust membrane and temp drains required



LOGISTICS & STORAGE

Logistics and Storage Considerations

- Moisture Tracking
- Transportation Risks
- Storage Best Practices
- Handling Strategies
- Delays



Receiving and Storage - Protection



- Trapped moisture in Factory Wrap



- UV Tarp Protection



- Factory Protection with ventilation

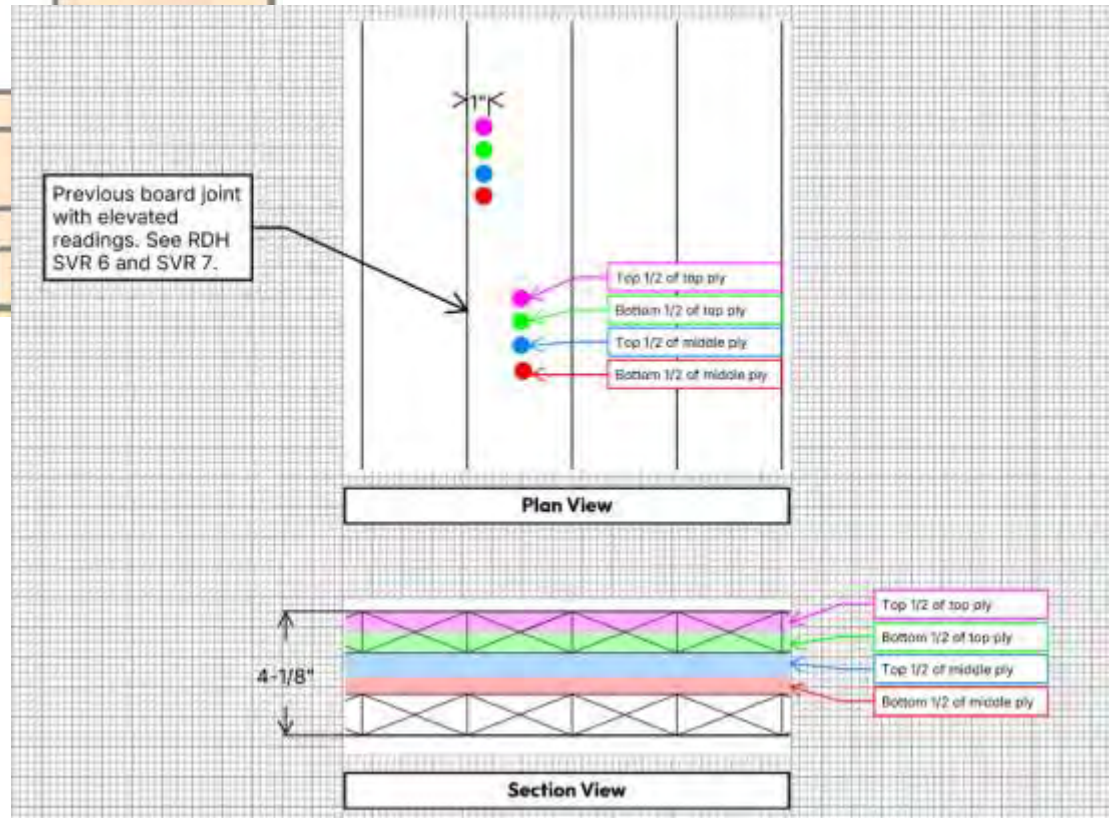
Moisture Tracking





- Surface Testing



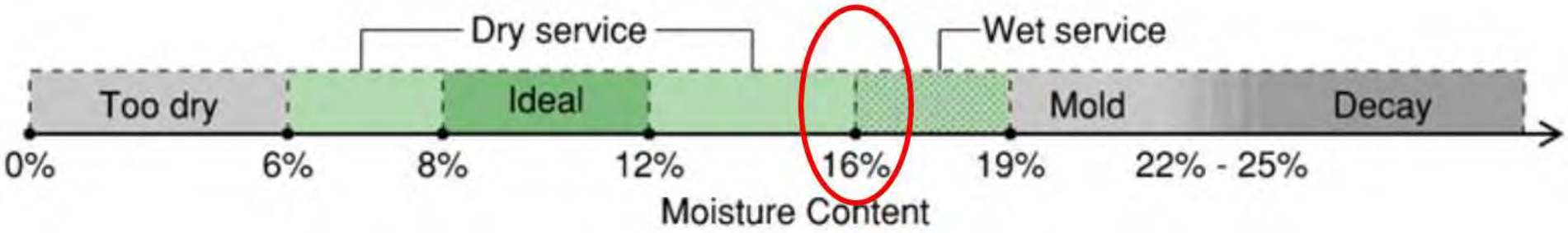


- Tracking Moisture

Moisture Over the Course of Construction







- GET Consensus During Precon on what target MC is for follow on trade work

Moisture Over the Course of Construction

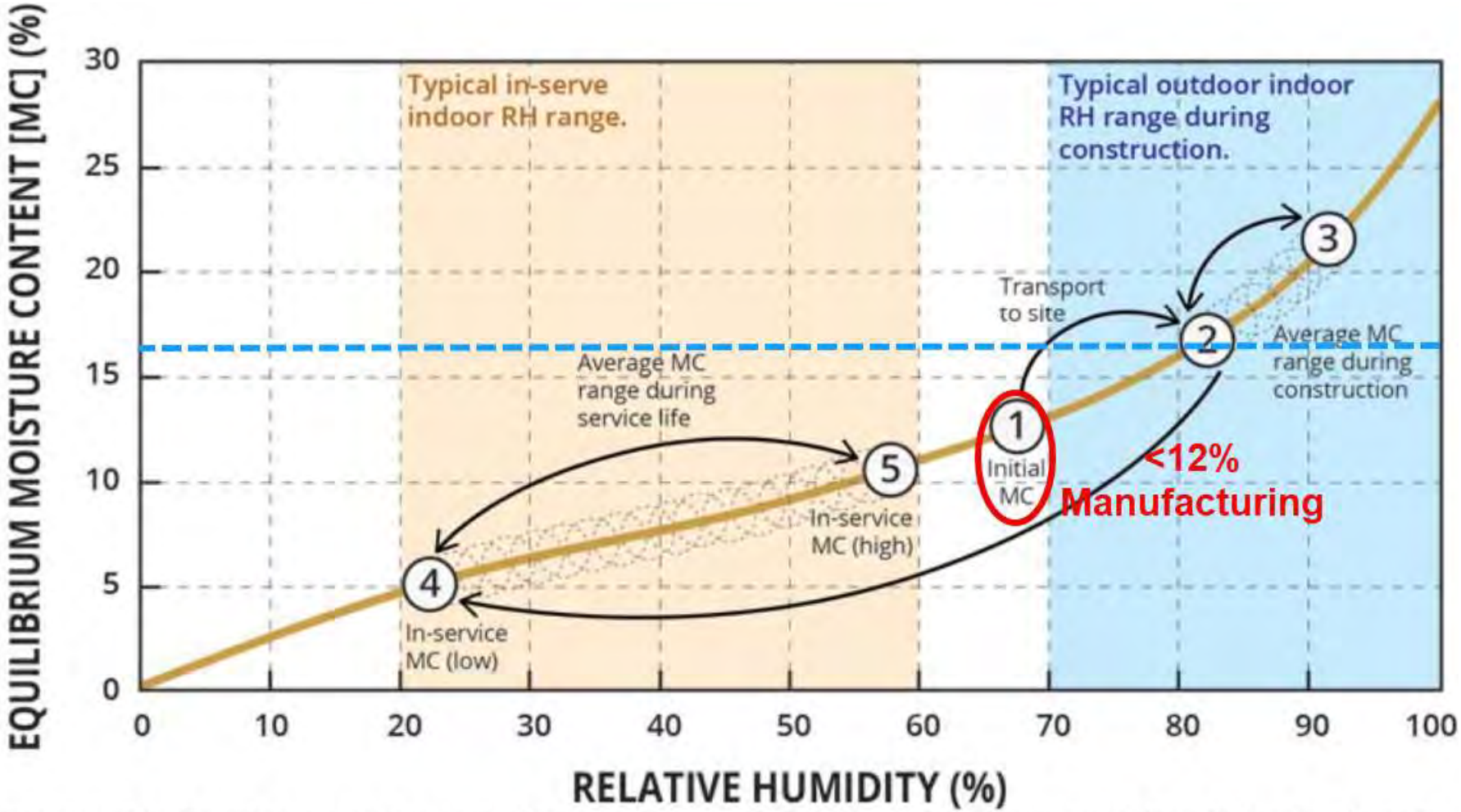


Image 1 of 1 - Equilibrium moisture content changes in mass timber elements with movement from factory to site and then a finished building. Photo © RDH Building Science Inc.
https://www.constructionspecifier.com/moisture-management-for-tall-wood-buildings/2/

- Moisture Content At Time of Shipping from Manufacturer

Moisture Over the Course of Construction

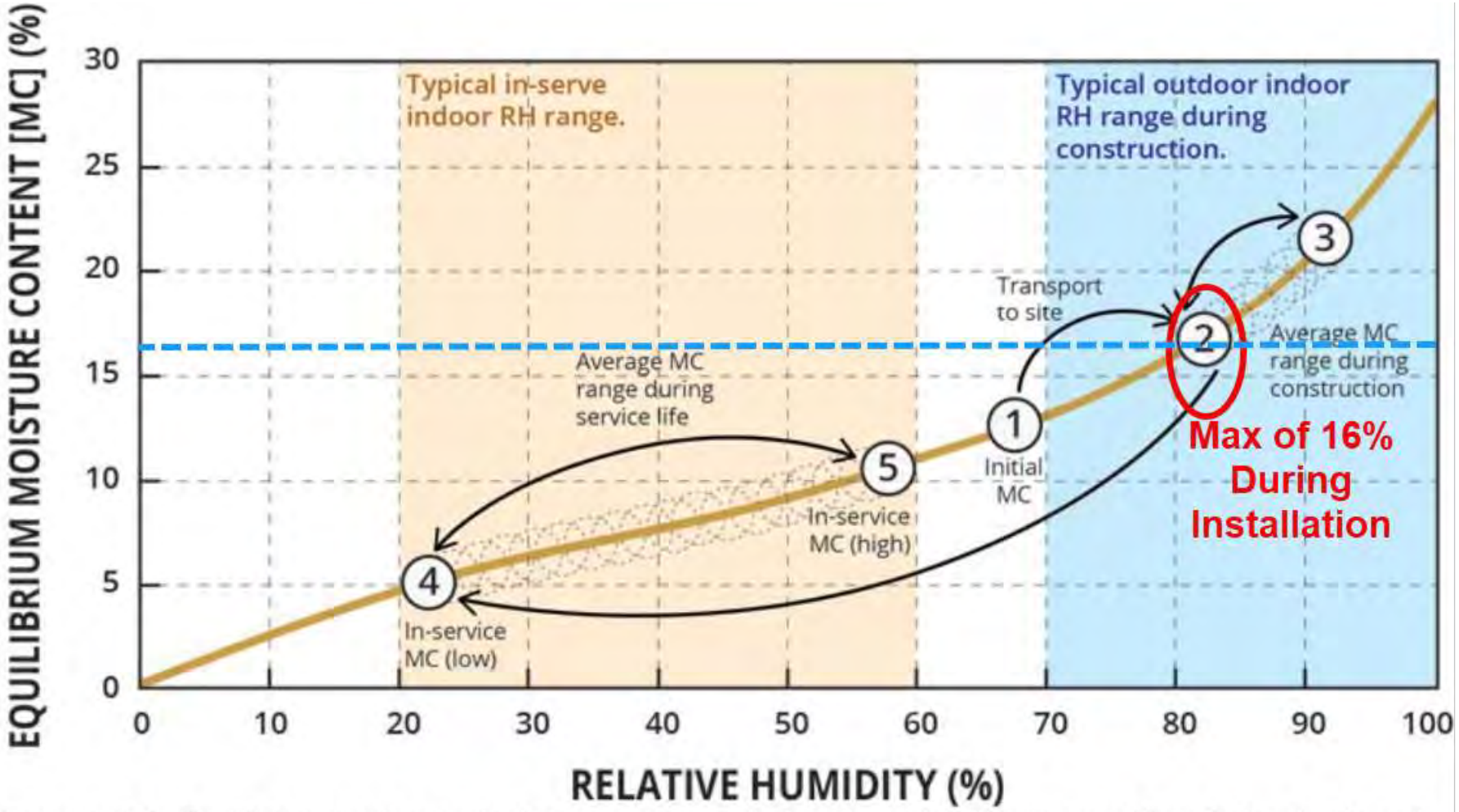


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- Moisture Content Transportation and Installation <16%

Moisture Over the Course of Construction



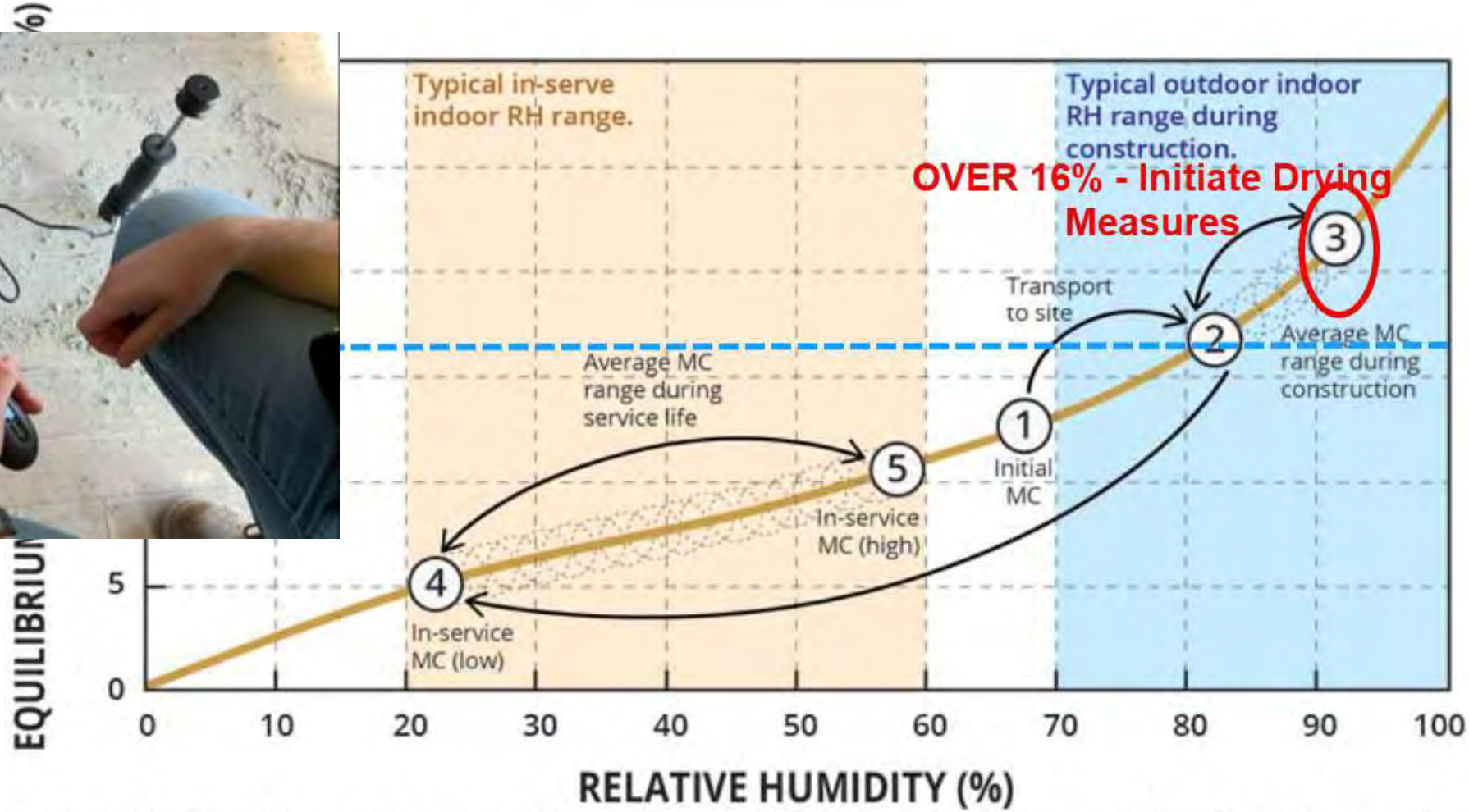


Image 1 of 1 - Equilibrium moisture content changes in mass timber elements with movement from factory to site and then a finished building. Photo © RDH Building Science Inc.

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- Liquid / Ponding Water Culprit

Moisture Over the Course of Construction

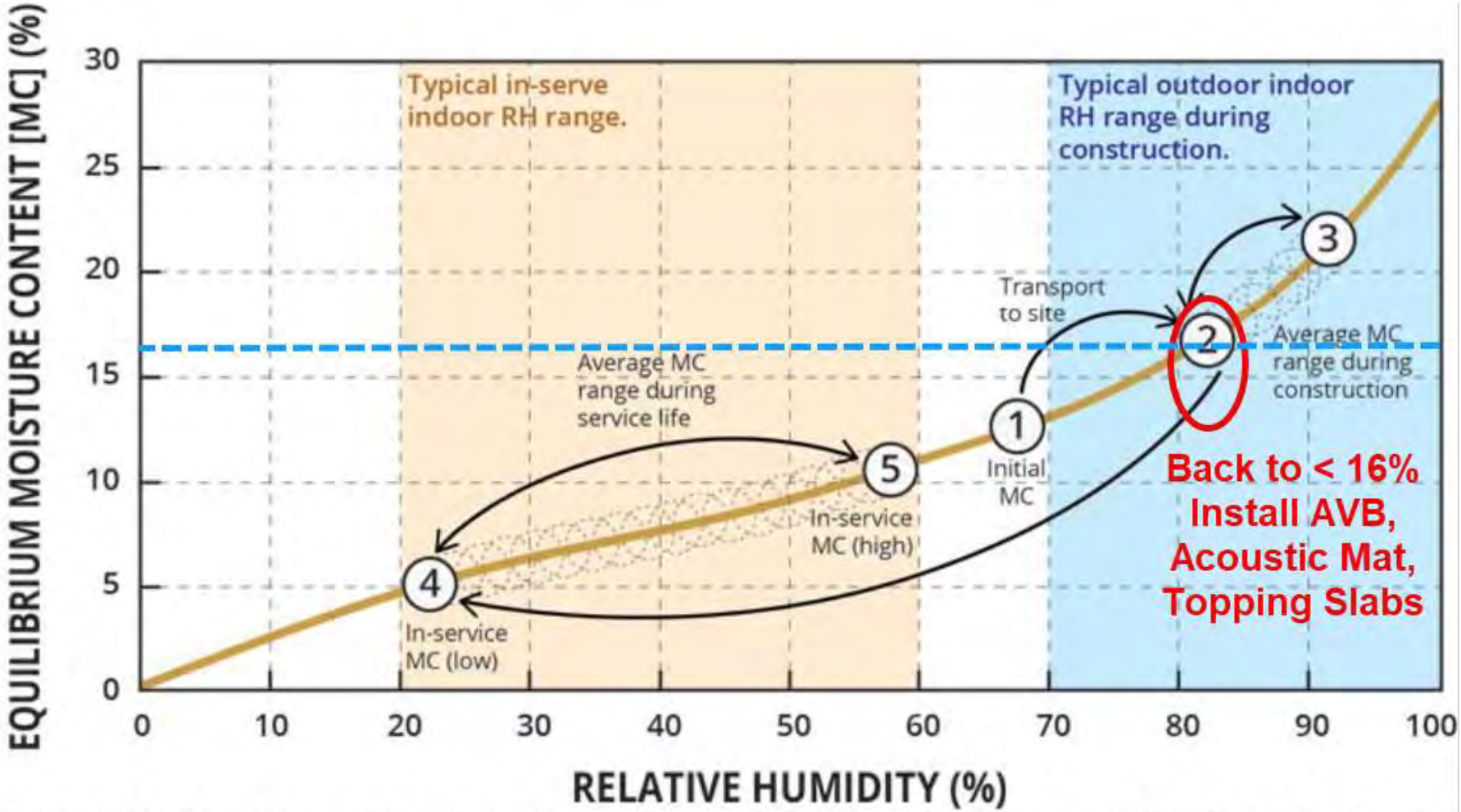


Image 1 of 1 - Equilibrium moisture content changes in mass timber elements with movement from factory to site and then a finished building. Photo © RDH Building Science Inc.
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- Achieve Target 16% MC Max

Moisture Over the Course of Construction

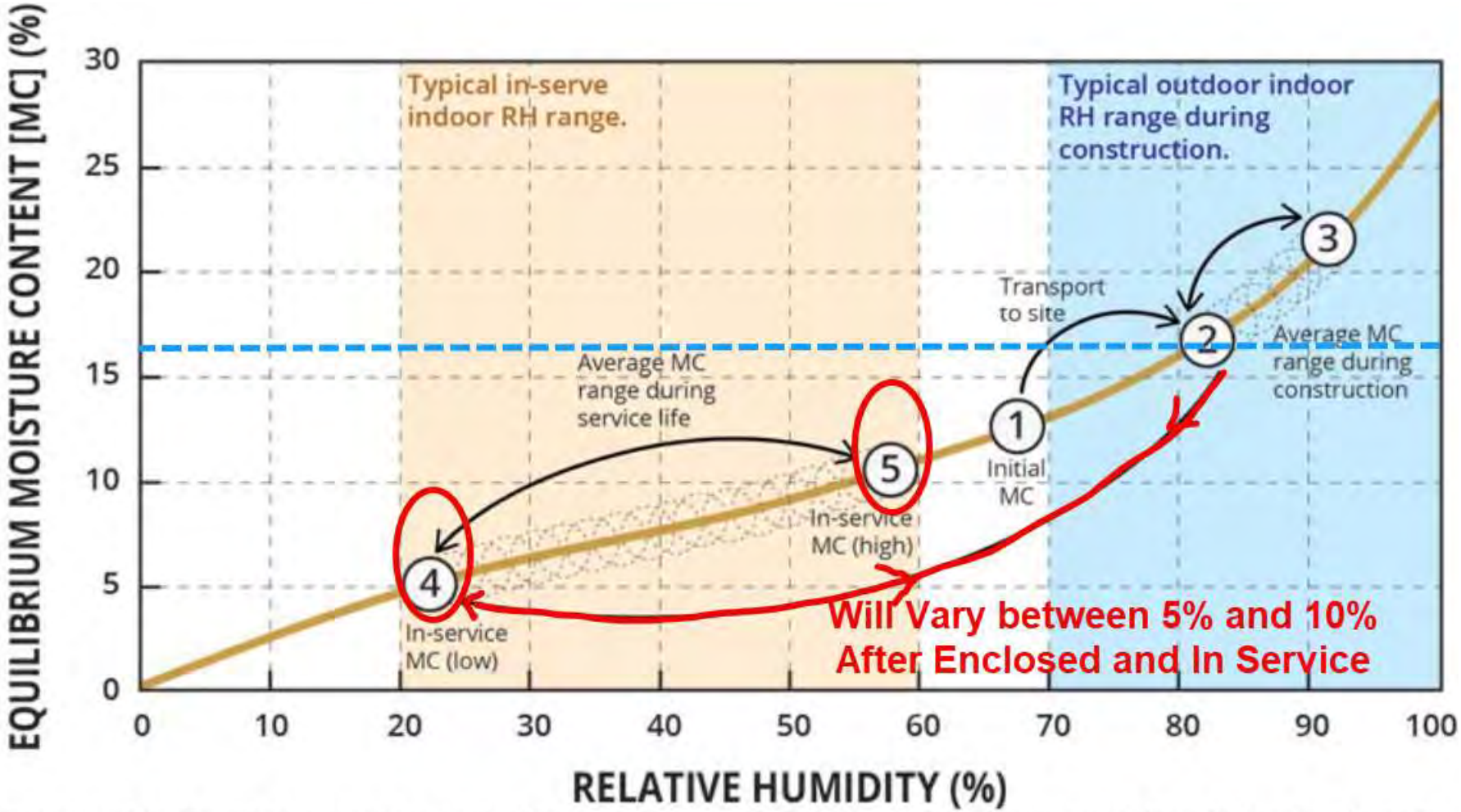


Image 1 of 1 - Equilibrium moisture content changes in mass timber elements with movement from factory to site and then a finished building. Photo © RDH Building Science Inc.
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- Enclosure and Condition - Drying

Planning for Expansion – DLT / NLT / GLT





- Vertically Oriented Boards in MT Panel require Expansion
- Wood Expands ~.03” / 1% MC per 12” – Not Much? 10% Moisture Content Change =><u>1.2” per 4’ panel</u>



ERECTION & EXECUTION

Erection Considerations

- Execution Principles
- Safety & Coordination
- Site Specific Moisture Management
- Avoiding Stains and Damage

Obstructions to Moisture Management





- When squeegees won't work
- Drag Straps and Columns

Building Drainage

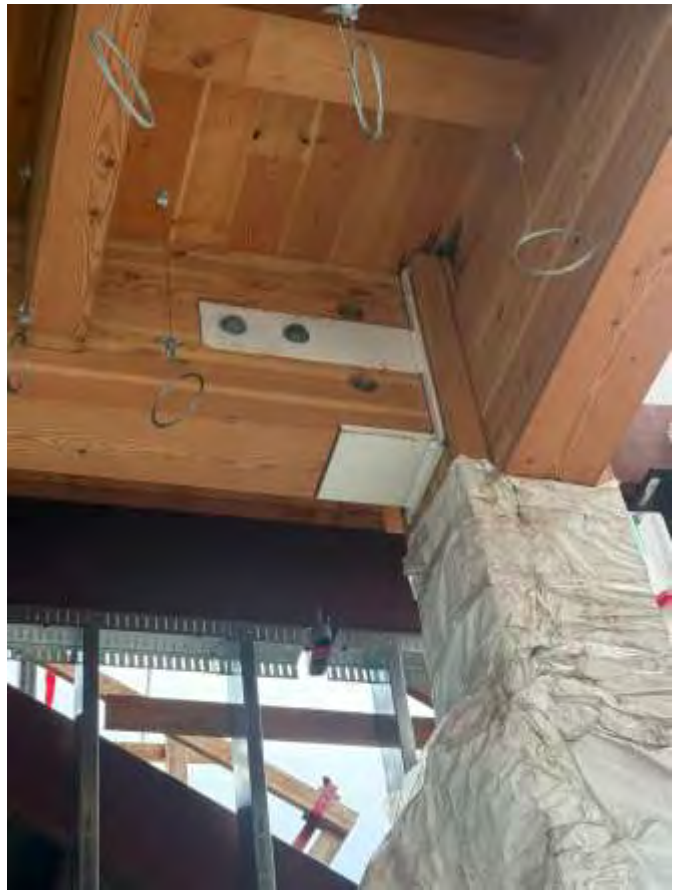


- Temp Drain is quick but requires much maintenance



- Rigid pipe at temp drain can be pre-fabricated and eliminate future maintenance

Erection





- Field Galvanizing/Priming to avoid staining



ACTIVE MAINTENANCE

Handling Real-Time Site Conditions

- Responding to events
- Onsite systems
- Team readiness



Responding to Unforeseen Conditions







Responding to Unforeseen Conditions

Venting Strategies





- Venting below barriers (acoustamat) to dry CLT
- Verify MC and Dry Before Acoustic Mat or Concrete topping Installation

Repairing Damage From Construction Operations

Budget for Repairs





Building Drainage

- Moisture at upper deck; dry floor below
- Breathable Protection, Sealing Floor to Floor














INNOVATION

Innovation in Moisture Management

- Improved membranes/coatings
  - Wearable surfaces
  - Sealed Fasteners
  - Release moisture while keeping at the surface
- Better moisture tracking standards
  - Definition about how to track and acceptable vs unacceptable
- Integrated safety
- Real Time Moisture Monitoring Systems

QUESTIONS?

This concludes The American Institute of Architects Continuing Education Systems Course

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Challenges to be solved

- Moisture drive from saturated mass timber floors when covered with a vapor permeable or impermeable membrane
- Consensus among AOR/EOR/Envelope Consultant/General Contractor/Installer/ Supplier on protection membranes.
- Establishing ownership on the contractor team for moisture management.
- Developing a moisture management plan where permanent roofing assemblies directly contact the construction moisture barrier.
- Developing awareness during the preconstruction phase of what obstructions / hardware / unique details will exist once the structural and rough in phase is complete on a timber deck.