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# Mass Timber Enclosure Overview

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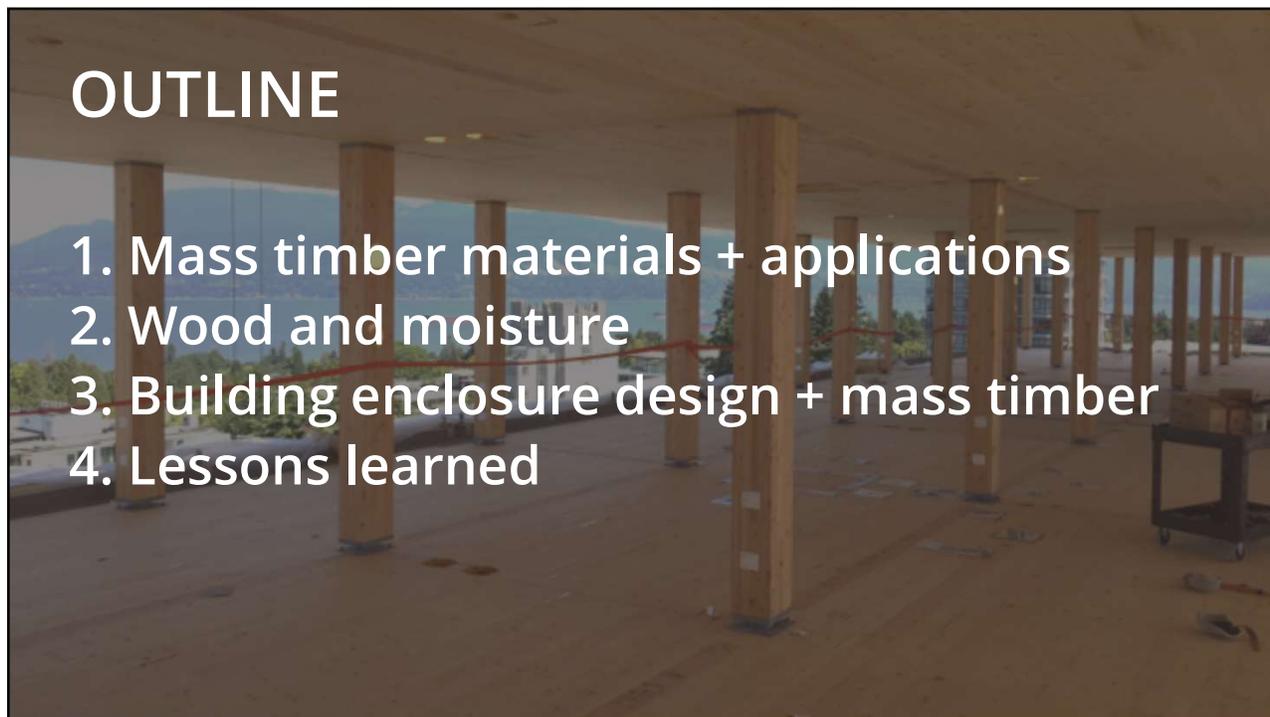
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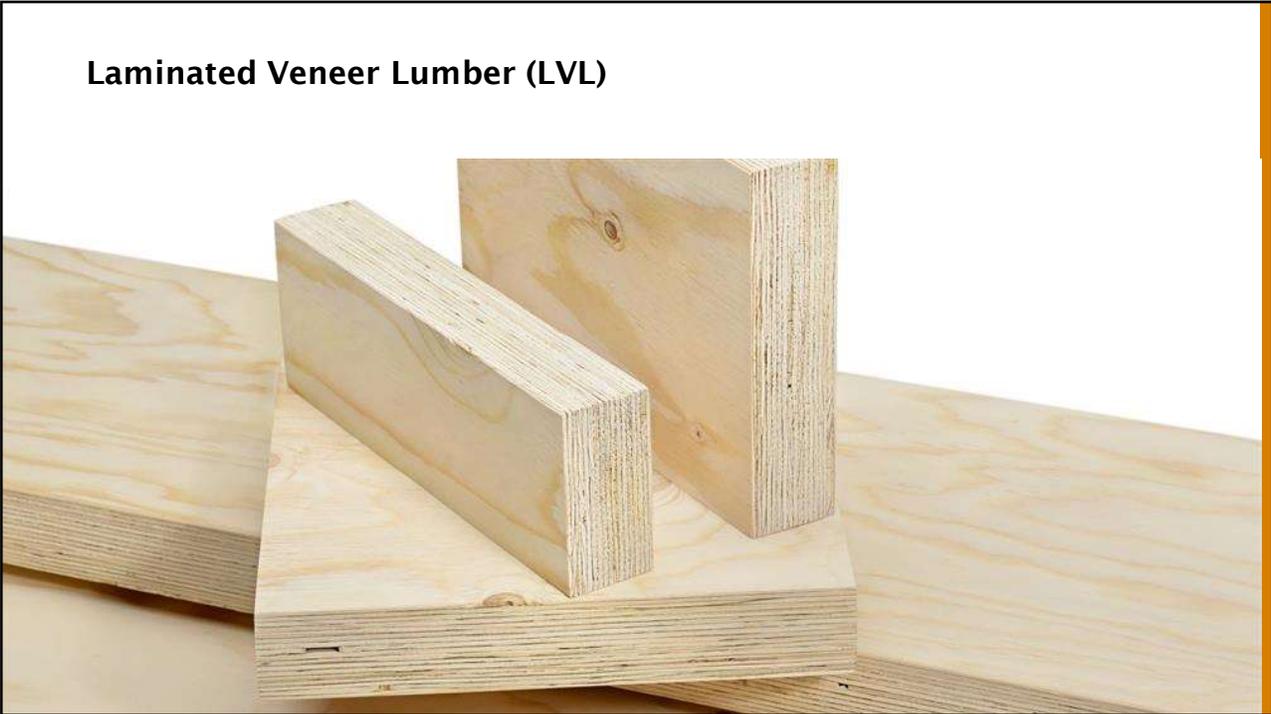
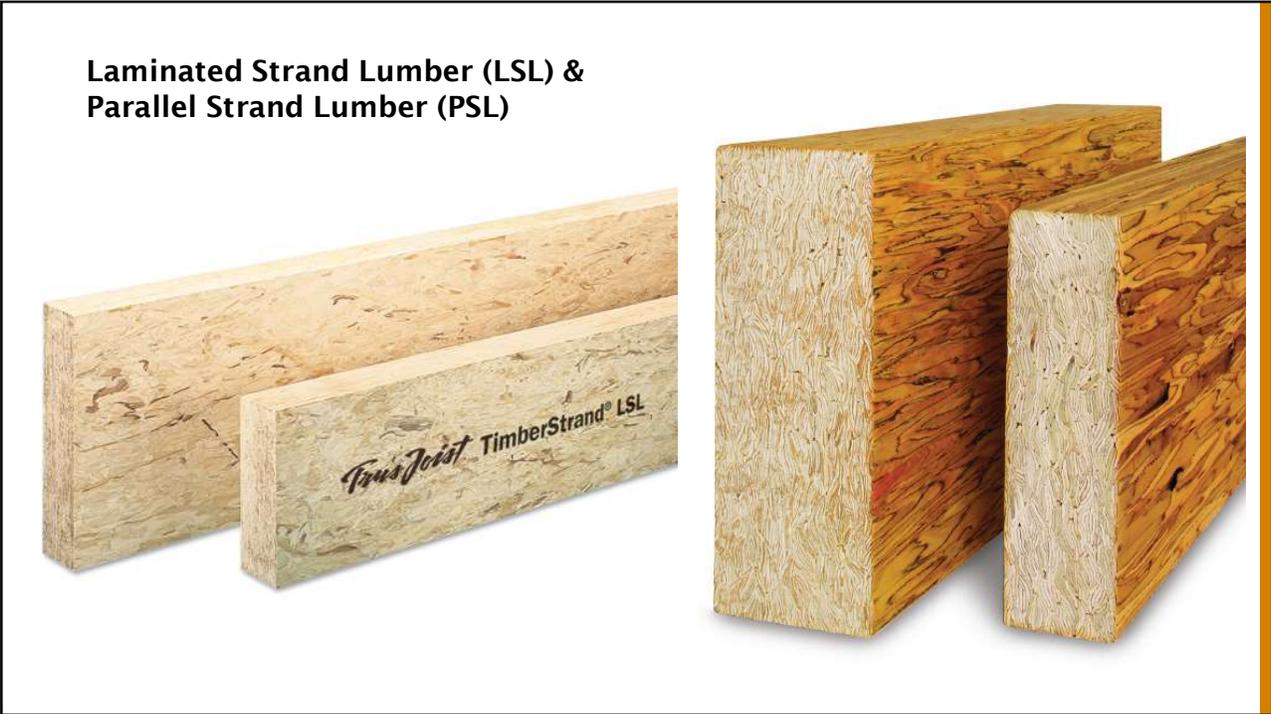


**Nail Laminated Timber (NLT)**



**Dowel Laminated Timber (DLT)**



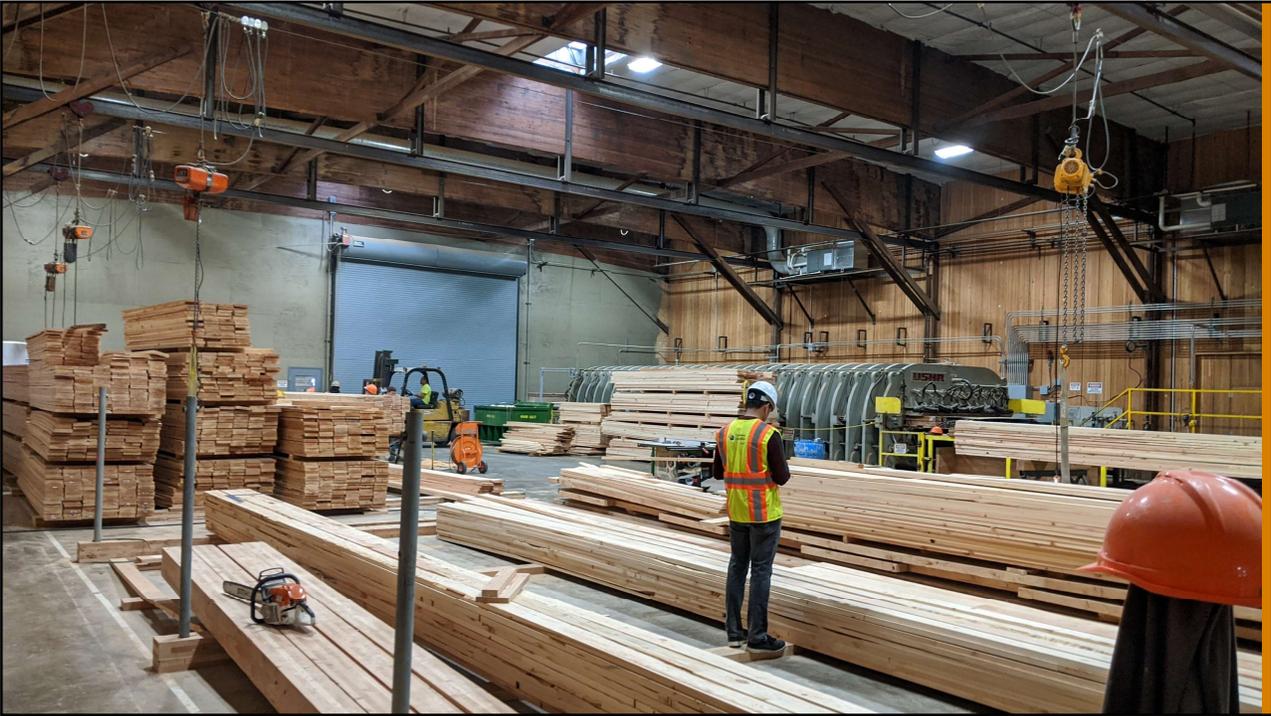


**Mass Plywood Panel (MPP)**

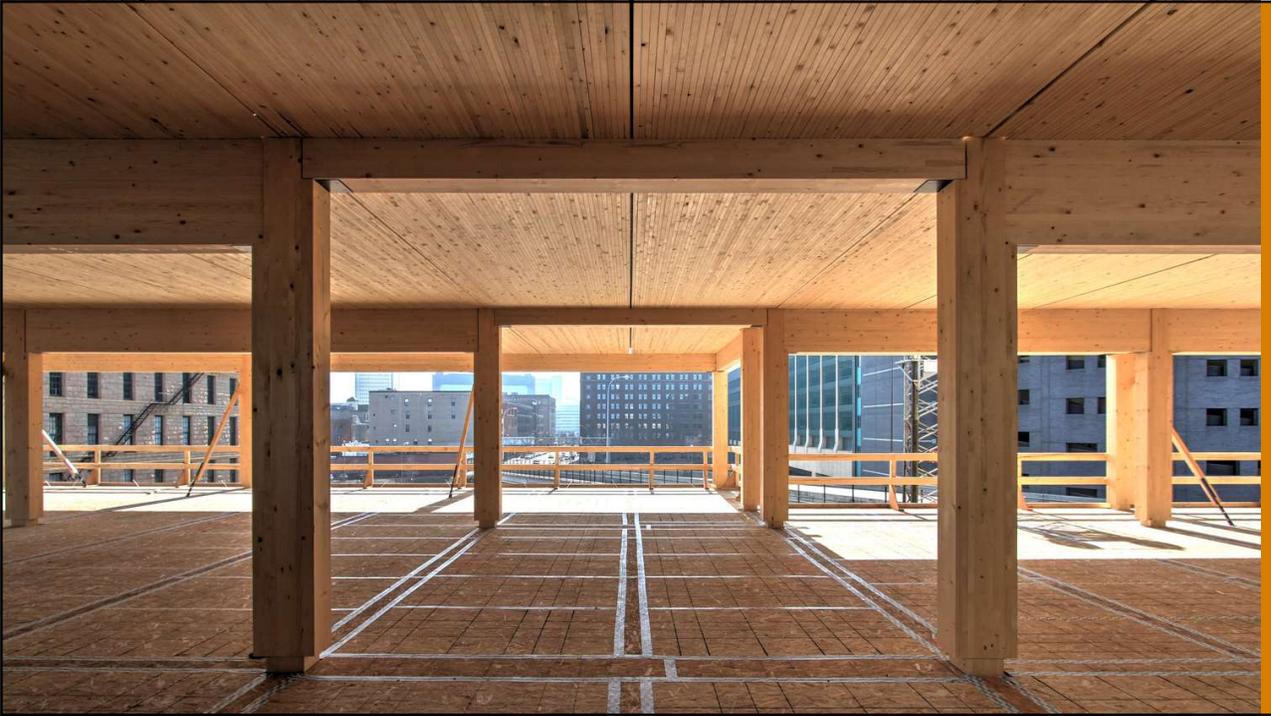


**Cross Laminated Timber (CLT)**











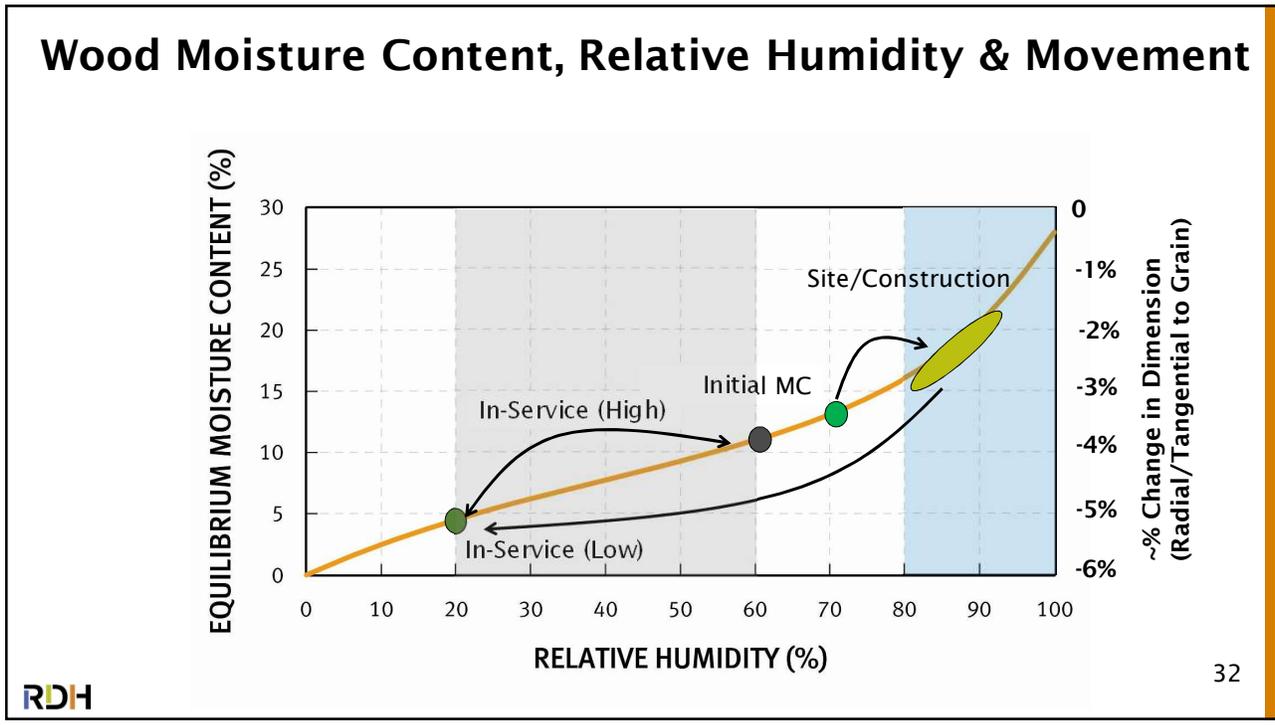
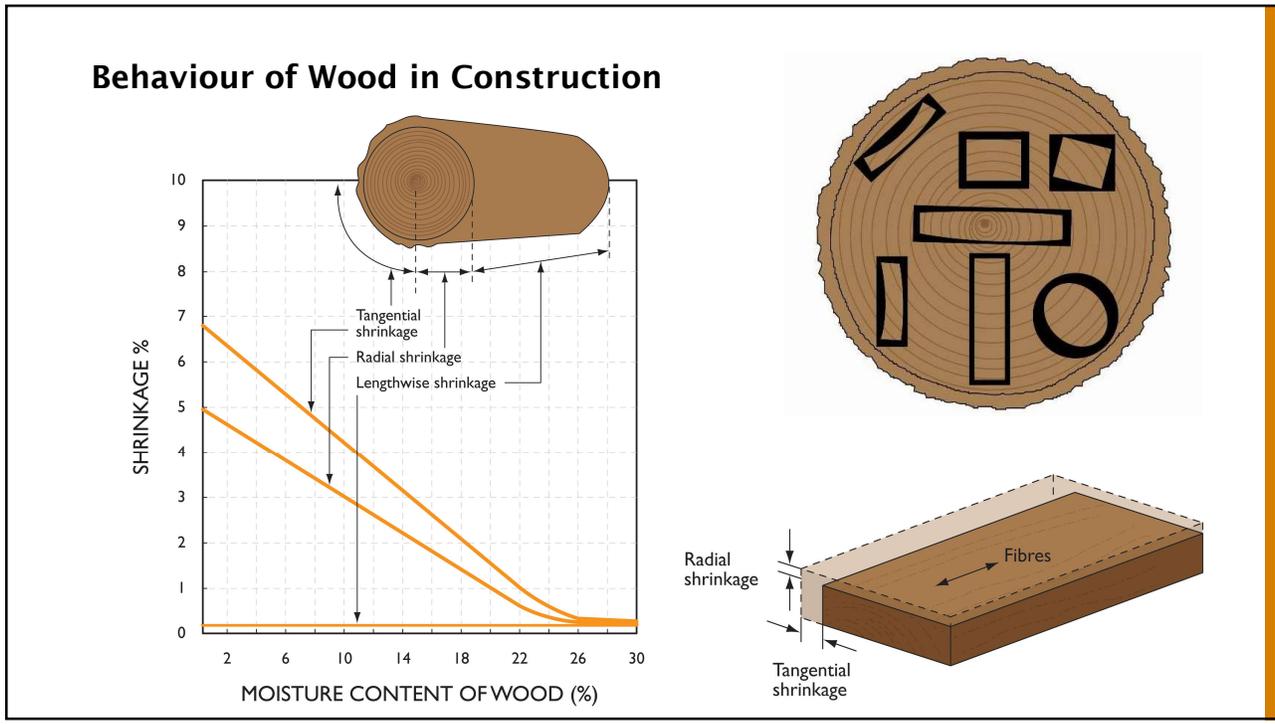










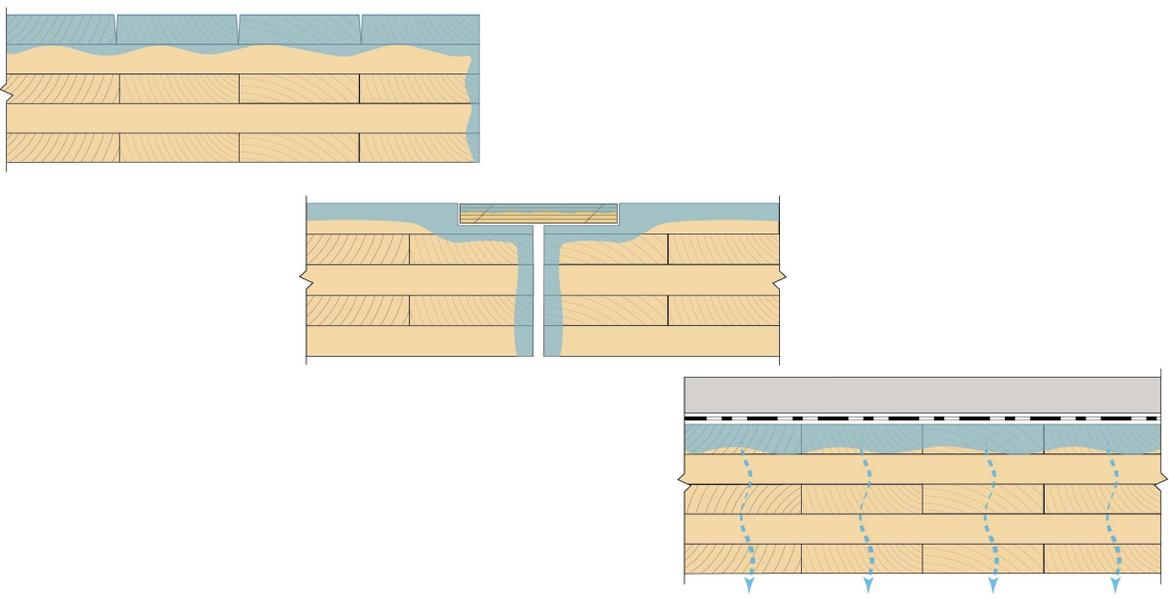


### Mass Timber and Moisture: CLT



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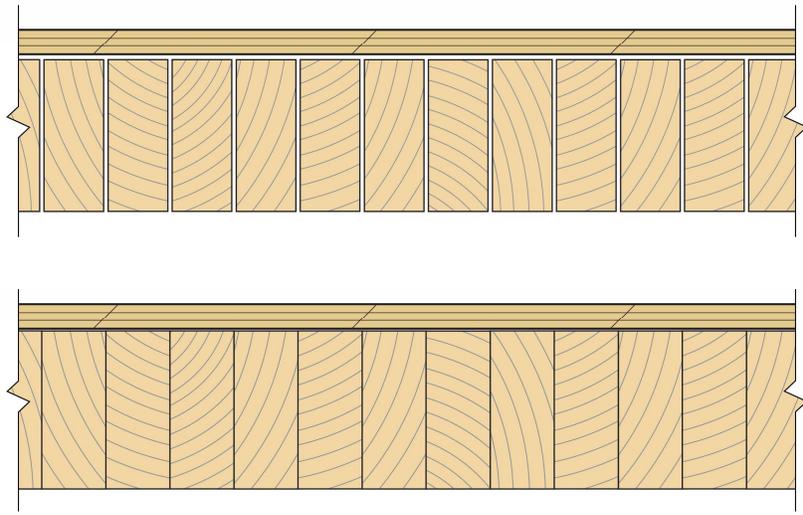


### Mass Timber and Moisture: NLT, DLT and GLT(Glulam)



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### Mass Timber and Moisture: NLT, DLT and GLT(Glulam)



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### Mass Timber and Moisture: LVL and MPP

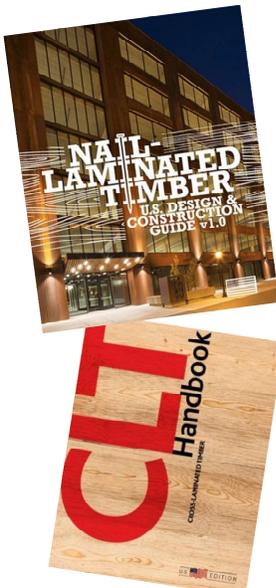


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### Mass Timber and Moisture: PSL & LSL



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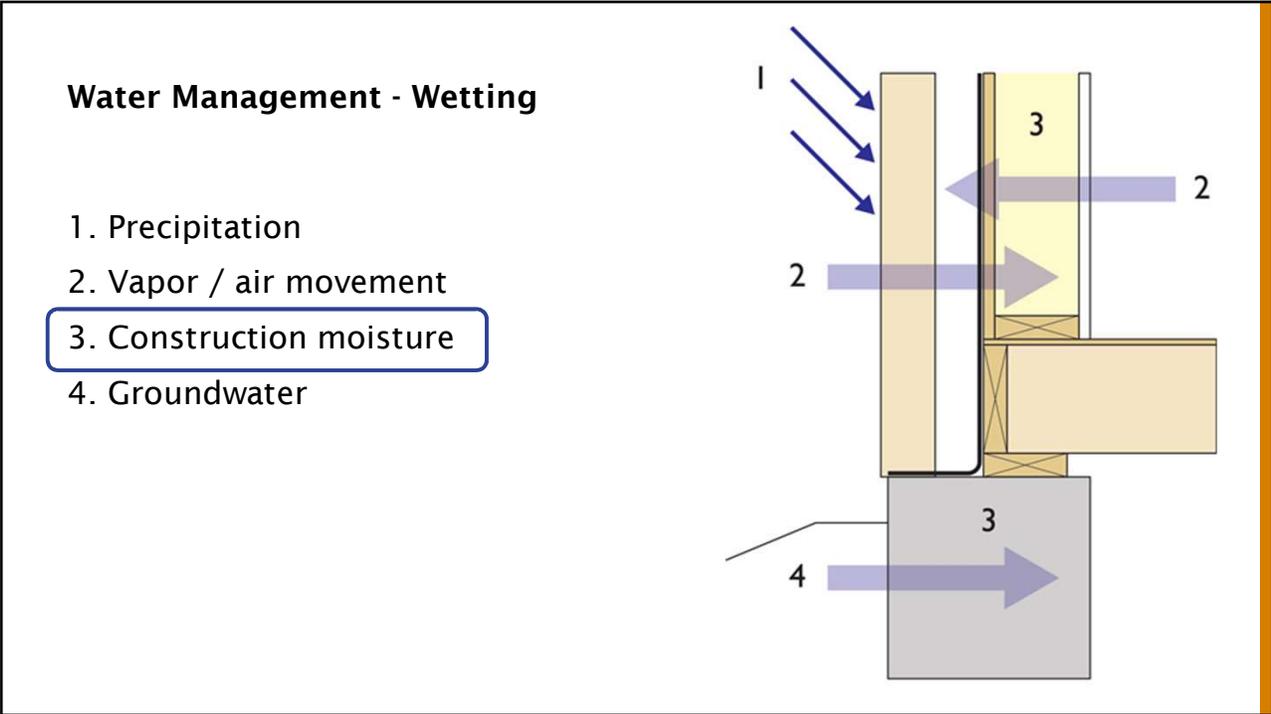
| PROTECTION LEVEL    | TMMS MEMBRANE / JOINT TREATMENT  | BENEFITS   | CHALLENGES / LIMITATIONS   | RECOMMENDED CLIMATE INDEX / SEASON                                  |
|---------------------|--|--|--|---|
| HIGH                | Field Membrane: Fully adhered, vapor impermeable waterproof membrane on sheathing.<br>Joint Treatment: Fully adhered or welded field membrane laps.                              | Factory applied field membrane prior to shipping minimizes errors and weather limitations of on-site application.<br>Field membrane may serve as part of permanent roof membrane or flooring underlayment.<br>Allows for immediate installation of joint treatment following panel installation if skilled workers are available.<br>High durability of membrane laps when torched or welded (welded self-adhered laps). | Requires pre-coordination with subcontractor installing TMMS.<br>Can trap moisture within the NLT assembly and significantly reduce drying should water penetrate the membrane.  | All Climate Indexes / All Seasons                                   |
| MODERATE            | Field Membrane: Precast, moisture-resistant bonded water-resistant coating on sheathing.<br>Joint Treatment: Taped and/or sealed (e.g., flexible flashing membrane or laps).     | Precast sheathing minimizes need for experienced membrane installers.<br>Sheathing and TMMS field membrane are combined into a single fabrication step.<br>Allows immediate installation of joint treatment following panel installation.  | Sheathing attachment penetrates through TMMS field membrane, impacting over fasteners.<br>May be susceptible to damage and/or adhesion failure due to trade activities.<br>May have limited exposure time, ponding water may result in water absorption and slow drying. | Climate Index ≤ 70 / All Seasons                                    |
| MODERATE            | Field Membrane: Fully adhered, vapor permeable and moisture-resistant membrane on sheathing.<br>Joint Treatment: Taped and/or sealed (e.g., flexible flashing membrane or laps). | Factory applied field membrane prior to shipping minimizes errors and weather limitations of on-site application.<br>Allows for immediate installation of joint treatment following panel installation if field membrane is pre-applied to sheathing.  | Requires pre-coordination with subcontractor installing TMMS.<br>TMMS may be susceptible to damage and/or adhesion failure due to trade activities.<br>May require skilled/experienced installer.  | Climate Index ≤ 70 / All Seasons                                    |
| MODERATE            | Field Membrane: None. Exposed plywood or OSB sheathing.<br>Joint Treatment: Taped and/or sealed (e.g., flexible flashing membrane or laps).                                      | Allows for immediate installation of joint treatment following panel installation.<br>Skilled/experienced workers not required for joint treatment installation.<br>Additional applications of water sealer may further increase water resistivity of the sheathing.<br>Cost effective compared to options with field membrane.  | Some joint treatment products may not bond to damp or wet sheathing substrate.<br>Joint treatment may be susceptible to damage and/or adhesion failure due to trade activities.  | Climate Index ≤ 35 / All Season<br>Climate Index ≤ 70 / Dry Seasons |
| LOW                 | Field Membrane: None. Exposed plywood or OSB sheathing.<br>Joint Treatment: None. Exposed sheathing joints.  | Cost effective.<br>May minimize schedule impacts.  | System permits water migration between sheathing joints and into the NLT in wet weather conditions.  | Climate Index ≤ 35 / All Season                                     |
| LOW                 | Field Membrane: None. Exposed NLT connections.<br>Joint Treatment: Not applicable.   | Accommodates sheathing installation at a later date or following site installation.<br>May minimize schedule impacts.<br>Cost effective.   | Option permits water migration between NLT in wet weather conditions.  | Climate Index ≤ 35 / All Season                                     |
| ISOLATED AREAS ONLY | Field Membrane: Loose laid sheet over sheathing.<br>Joint Treatment: Taped and/or sealed (e.g., flexible flashing membrane or laps).   | Serves as short-term temporary protection for isolated areas.  | Low durability.<br>Difficult to walk.<br>Typically slippery and dangerous to walk on.<br>Allows lateral moisture movement beneath membrane.  | Varies Conditions (evaluate for project specific appropriateness)   |
| ISOLATED AREAS ONLY | Field Membrane: Membrane under sheathing and over NLT attachments.<br>Joint Treatment: Varies.   | Sheathing protects membrane from trade damage.   |  |   |

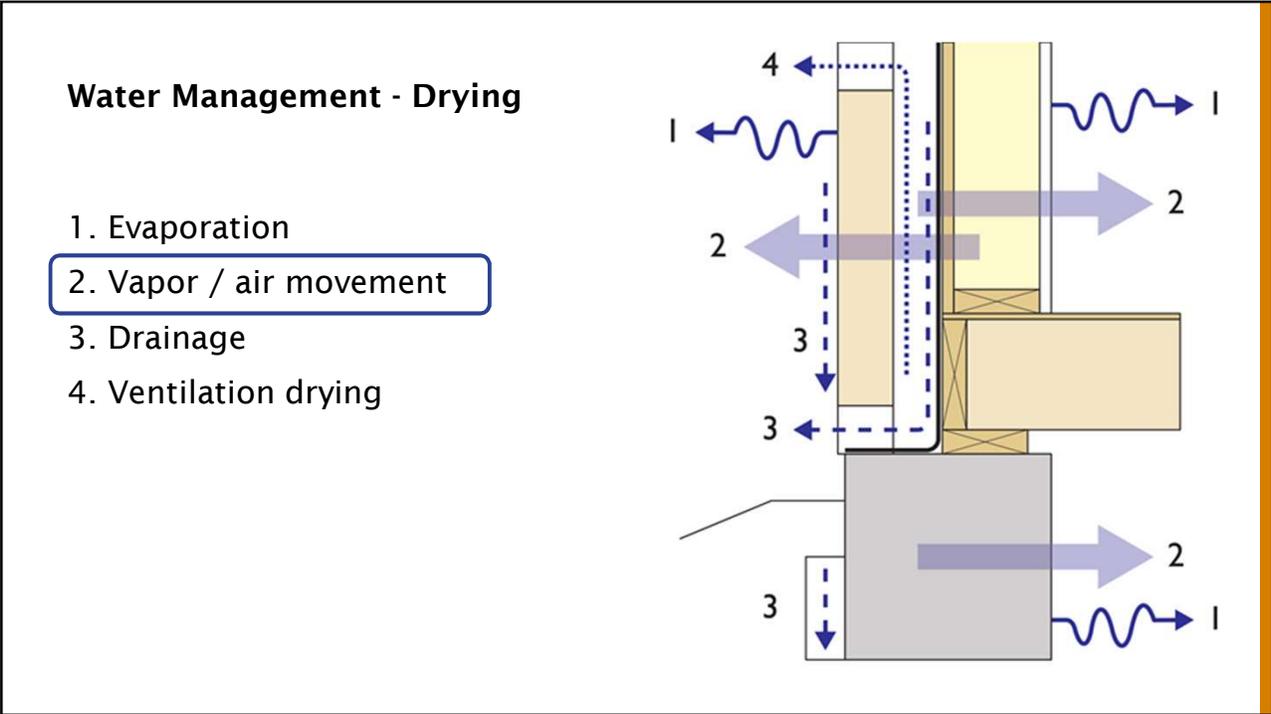
guidance

### Managing Movement

- Critical to consider vertical displacement differences between different vertical elements
  - Floors and columns
  - Core elements
  - Façade elements
- Minimize magnitude of differential movements that need to be accommodated
  - Keep wood dry, watch saturation of floor framing during construction
  - Remove floor framing from the vertical load path







Ronald McDonald House - Vancouver, BC



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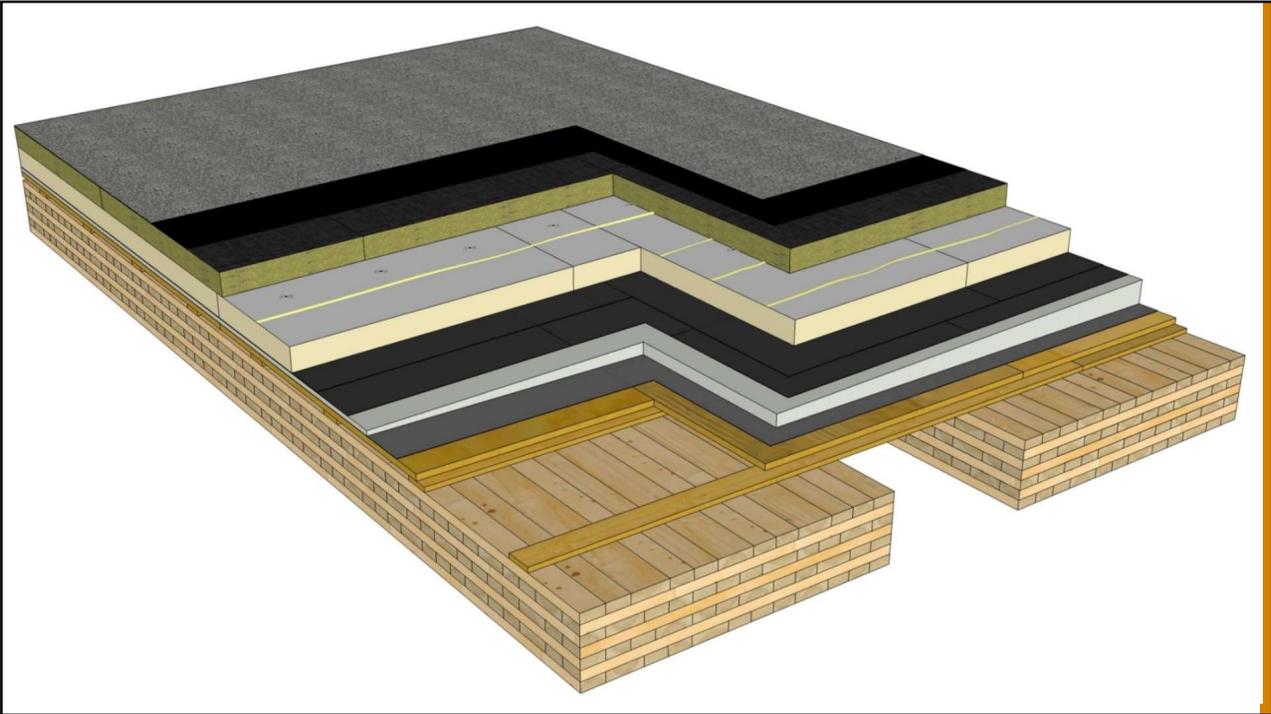


**First Tech Credit Union – Hillboro, OR**



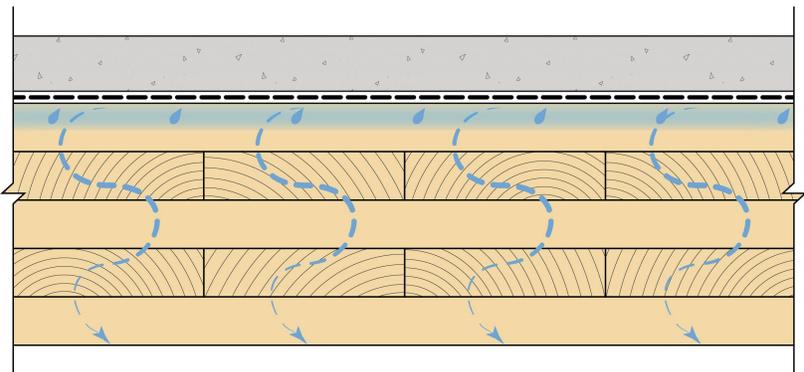
**Carbon 12 – Portland, OR**





### Roofs + Topping Slabs

- “Vapor open” approach doesn’t work at roofs
- Need to be even more diligent about managing construction wetting
- Composite concrete-wood decks particularly difficult
- Temporary membrane in factory?
- Structural anchorage



# Discussion + Questions

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Learn more at  
[rdh.com](http://rdh.com)

