1. Background
- Cross-laminated timber (CLT) is a promising renewable building material for mid-rise and even tall wood buildings owing to its high strength to weight ratio, fire performance, and prefabricated nature.
- Moisture intrusion in CLT is a potential issue since it directly affects durability of the structure.
- CLT may absorb and retain large amounts of moisture due to its high storage capacity but relatively low vapor permeability.
- Exposure to moisture can occur due to multiple reasons such as excessive wetting during or after construction, failure of internal plumbing, and failure of impermeable elements of facades or roofs.
- The impact of moisture on timber structures is well recognized, but the impact of moisture intrusion on the performance of CLT connectors is less understood.

2. Objective
- To study the effects of moisture intrusion and wood species on shear performance of CLT connections under different moisture exposure conditions.

3. CLT Material
Four major wood species of 3-ply CLT are used for the test specimens.

- Douglas fir
- Spruce pine fir
- Norway spruce
- Southern yellow pine

4. Test Specimen

The test specimen is fabricated with one vertical member of CLT having dimensions of 203.2 mm x 304.8 mm [8" X 12"] connected to one horizontal member of CLT having equal dimensions at the center with L-bracket on each side. The L-bracket is connected using A307A 15.9 mm bolts and 8d Shank nails. The connection used for this study was designed by Amini et al. (2018).

5. Testing Methodology
- Exposure conditions
- a) Certain amount (considering the max rainfall is 174 mm) of water will be sprayed daily for duration of a month.
- b) Entire connection will be submerged under the water for different exposure durations.

- Test Matrix

<table>
<thead>
<tr>
<th>Exposure type</th>
<th>Exposure Time (weeks)</th>
<th>No. of specimens for each wood species</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>1</td>
<td>6</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>6</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>6</td>
<td>24</td>
</tr>
<tr>
<td>b</td>
<td>4</td>
<td>8</td>
<td>32</td>
</tr>
</tbody>
</table>

6. Previous Study

Cyclic shear tests were performed at Oregon State University.

7. Ongoing Work
- Monotonic shear test has been performed on prototypes and we will perform quasi-static cyclic tests on CLT connections using Abbreviated Basic Loading History CUREE protocol.

8. References

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