



Mass Timber Stair & Elevator Cores, and Firewalls: Modern & Cost-Effective Alternatives to CMU & Other Fire Assemblies

Dave Johnson, *Lam-Wood Systems, Inc.*

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Introduction

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Agenda/Topics:

- Schedule Benefits: Speed & flexibility of Installation
- Fire & Acoustic considerations
- Product/Panel Solutions: CLT & Mass Ply CLT
- CLT/MPP as a part of the lateral system





Agenda/Topics:

- Additional Considerations
- Connection Details
- Sustainability/Carbon Sequestration
- Project Examples



Schedule Benefits

Speed of Installation

- Prefabricated
- Straight & square = easy fit-up
- Screwed connections
- Cores can be erected in hours, not weeks (CMU)
- Single inspection
- 1 & 2-hour FRR can be achieved without sheetrock

Schedule Benifits

Flexibility of Installation

- Can be erected in conjunction with floor levels.
- Can be installed at any time of year; no weather restrictions due to temperature.
- •Flexible attachment options and anchor points for elevator rails & equipment
- •Same crew for framing in single mobilization.
- •Creates safe egress and trade access to all floors

CLT (Cross Laminated Timber)

- Solid sawn 2x lumber (planed to 1-3/8") stacked crosswise and bonded with adhesives under pressure.
- Common species: Southern Pine (SP), Doug Fir (DF), Spruce-Pine-Fir (SPF)
- Typical Thicknesses: 3-ply (4-1/8"), 5-ply (6-7/8"), 7-ply (9-5/8"); other thicknesses are available
- Panel sizes vary per manufacturer, maximum available is 11'x51' (+/-)
- American Engineered Wood Association PRG-320



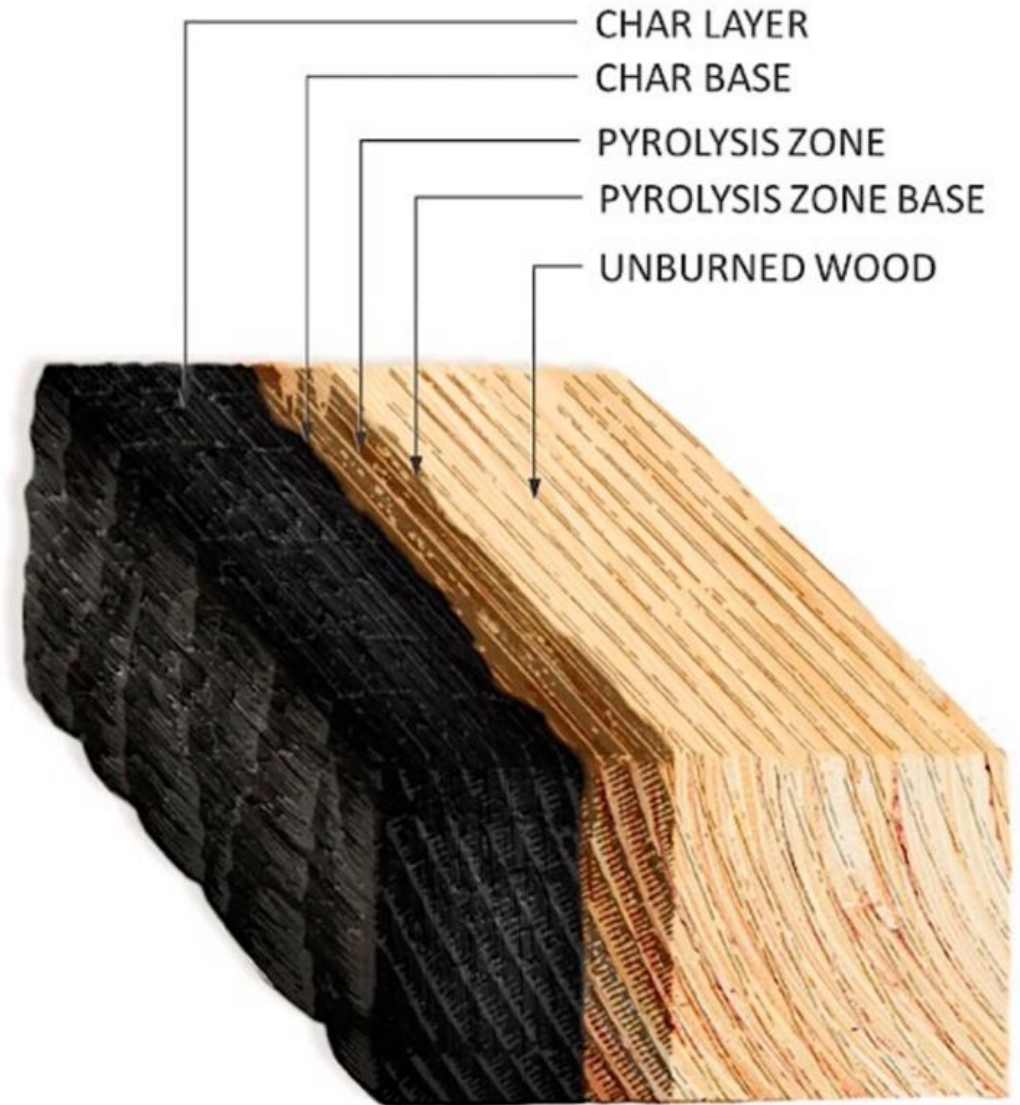
Mass Ply CLT

- Veneer-based, engineered wood consisting of multiple 1" layers (Lamellas) of density-graded veneers glued and pressed in a variety of combinations and orientations.
- Species: DF (Multiple Finishes)
- Thickness: 2" thru 12"
- Maximum panel size is 12'x48'



Fire Performance (FRR)

- Prescriptive & calculated methods allowed to achieve ratings, refer to IBC Ch 6 Section 601.
- 1 & 2 hour ratings are common, via prescriptive (meet minimum thicknesses) or char (direct calculation)
- 6" MPP is typical to meet 2-hour.
- 6.875" (5-ply) CLT is typical to meet 2-hour.
- Third party 2-hour test data available from some manufacturers (ASTM E119 is common)
- FDS – Free resource (currently) & where the NDS is referring designers to from now on



Acoustical Performance

- MT panels transmit sound and typically require additional layers (such as Acoustimat & Gypcrete over MT at floors)
- For shafts & stairwell, an STC of 50 is at typical requirement when adjacent to living area. Insulation within a furring wall should achieve the 50 STC.

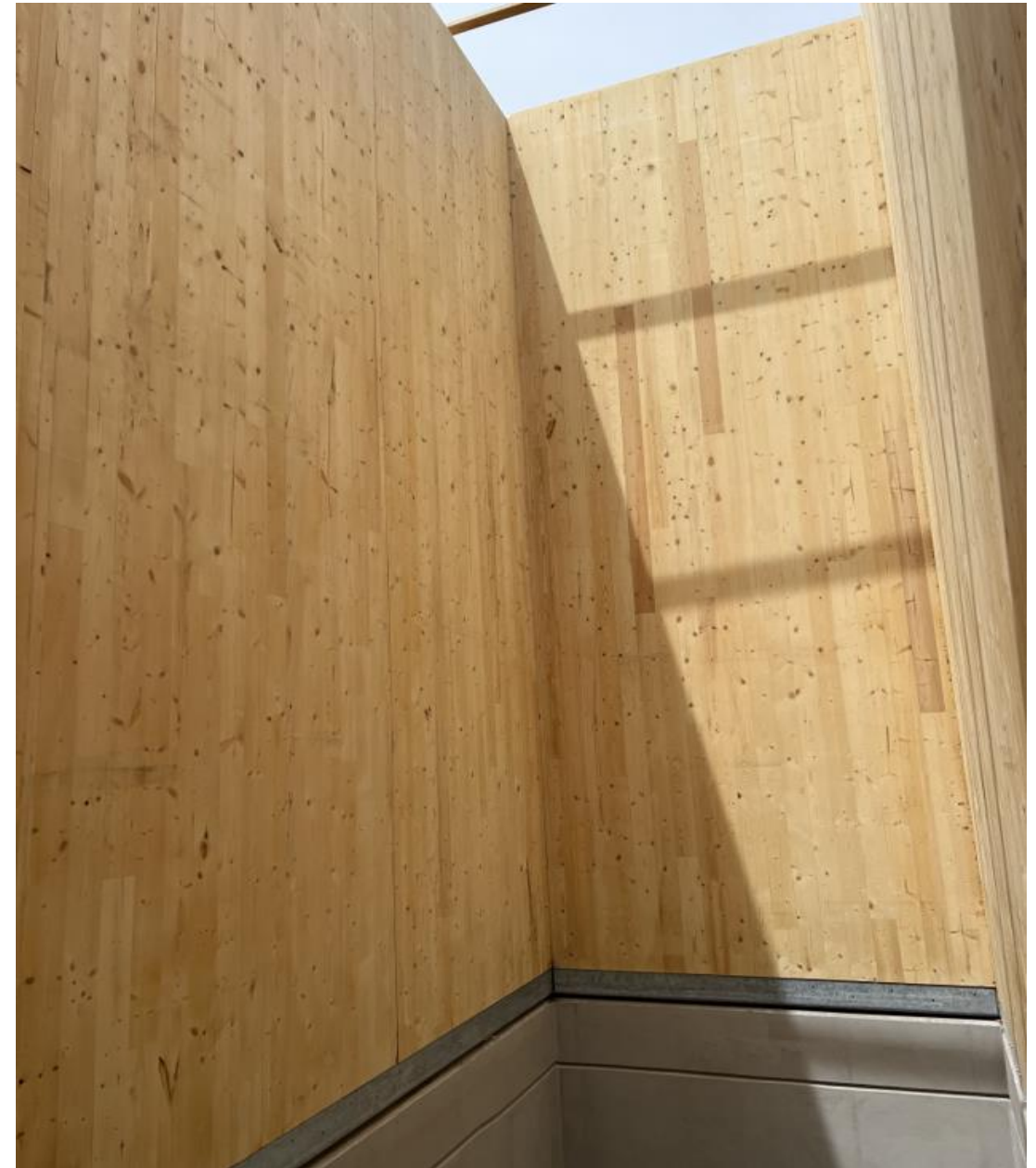
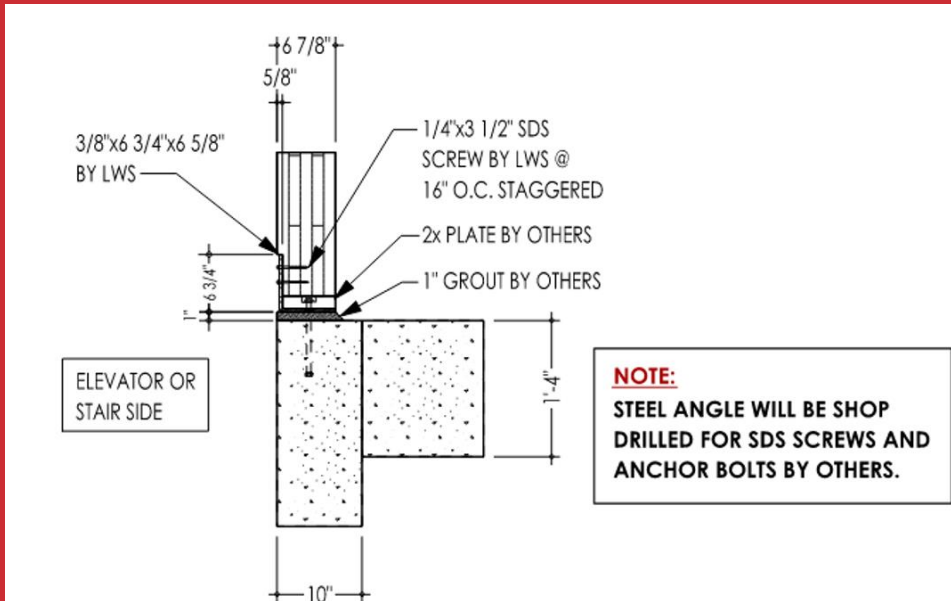


Lateral Load Resistance System (LLRS) Considerations

- Mass Timber cores design are easier to design if wall do not need to be a part of lateral design.
- If possible, we don't currently recommend utilizing MT core walls as a part of the lateral system.
- If Mass Timber core walls **are** utilized as a part of the lateral system, make sure to focus on the parameters and requirements with design and detailing as noted in the Special Design Provision for Wind & Seismic. (SDPWS)
- If lateral design is needed, the Response Modification Coefficient ("R") has been updated in ASCE 7-22 with better values when designing MT panels for lateral loads. (American Society of Civil Engineers.)

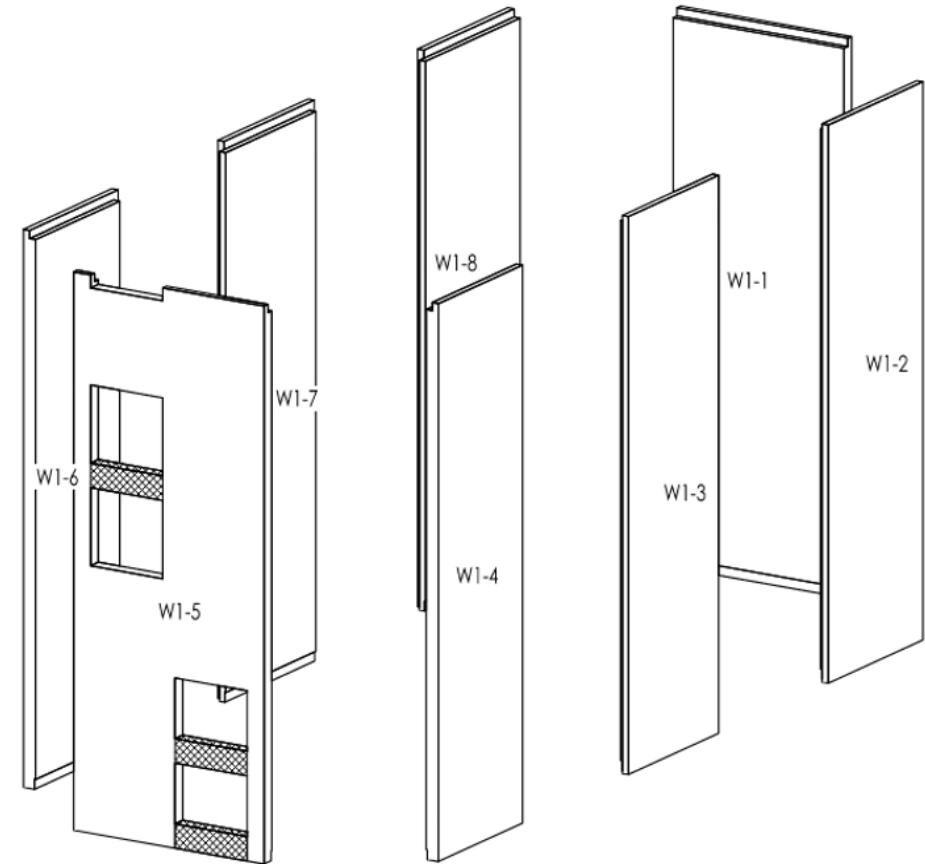
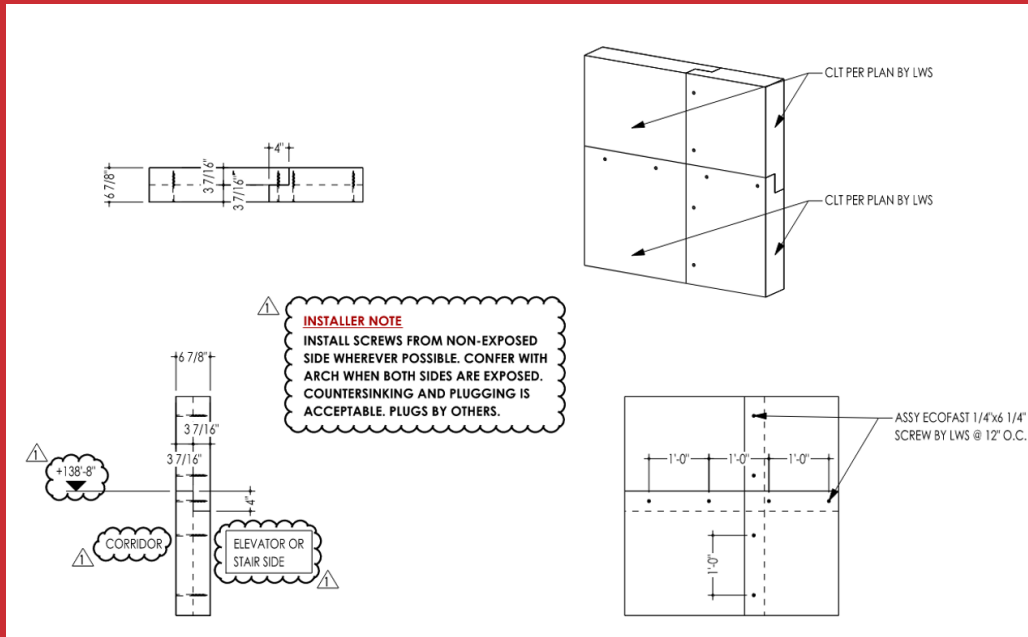
Installation: Base Connection

- Typical connection is for gravity loads only.
- Connections will be more significant if walls are a parts of the LLRS.)



Installation: Panel-to-Panel

- Panel to panel joints may vary but a "ship-lap" or "half-lap" joints are common.
- Panels are delivered to the jobsite with the joints fabricated and screwed together at the jobsite

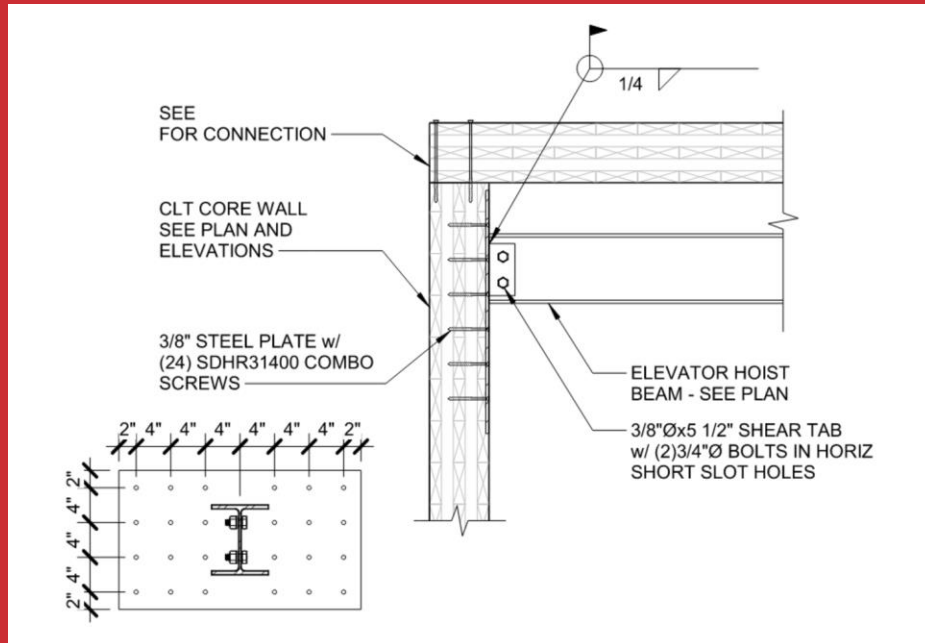


STAIR-01 EXPLODED ASSEMBLY

Scale: 3/16" = 1'-0"

Installation: Hoist Beam

- Various options; Beam pockets can be fabricated into panels



Additional Considerations:

- **Bracing:** Installation bracing is required if panels are installed prior to framing of adjacent floors. However, panels can be "dropped" in during framing so many choose to install panels during framing because that will brace the panels.



Additional Considerations:

- **Weight:** 6" thick panels can be 18-20 pounds per SQFT. (8'x48' could be 6,000 Lbs)
Work with the supplier to ensure the panel length is favourable to the capacities at the jobsite. (Installation and temporary storage prior to install.)
- **Rigging:** Connections for rigging is installed on panels and removed after. Straps can go thru openings



Additional Considerations:

- **Wood Shrinkage:** Shrinkage is a part of the design in multi-storied building. (Connections, etc.) However, Mass Timber panels are thick and will see little to no shrinkage that needs to be accounted for.
- **Design & specification:** Early specification takes full advantage of all the benefits of utilizing Mass Timber Panels. (Substitution of a specified CMU can be done but will require redesign.)
- **Building Types:** Panels are allowed in the Type III-A, III-B, IV-B, IV-C, V-A, or V-B.

Sustainability/Carbon Sequestration:

Carbon Summary



Results

-  Volume of wood products used:
26 cubic meters (917 cubic feet)
-  U.S. and Canadian forests grow this much wood in:
4 seconds
-  Carbon stored in the wood:
23 metric tons of carbon dioxide
-  Avoided greenhouse gas emissions:
9 metric tons of carbon dioxide
-  Total potential carbon benefit:
32 metric tons of carbon dioxide

Project Name: 8'x8'x50' Elevator Shaft
Date: February 3, 2026

Results from this tool are based on wood volumes only and are estimates of carbon stored within wood products and avoided emissions resulting from the substitution of wood products for non-wood products. The results do not indicate a carbon footprint or global warming potential and are not intended to replace a detailed life cycle assessment (LCA) study. Please refer to the References and Notes for assumptions and other information related to the calculations.

Equivalent to:

-  7 cars off the road for a year
-  Energy to operate 3 homes for a year

CLT - Project Review

- 7,150 SQFT of elevator shafts and stairwells
- SPF CLT
- Temporary bracing was provided prior to adjacent walls framed/installed; Adjacent wall are often installed first to eliminate temporary bracing



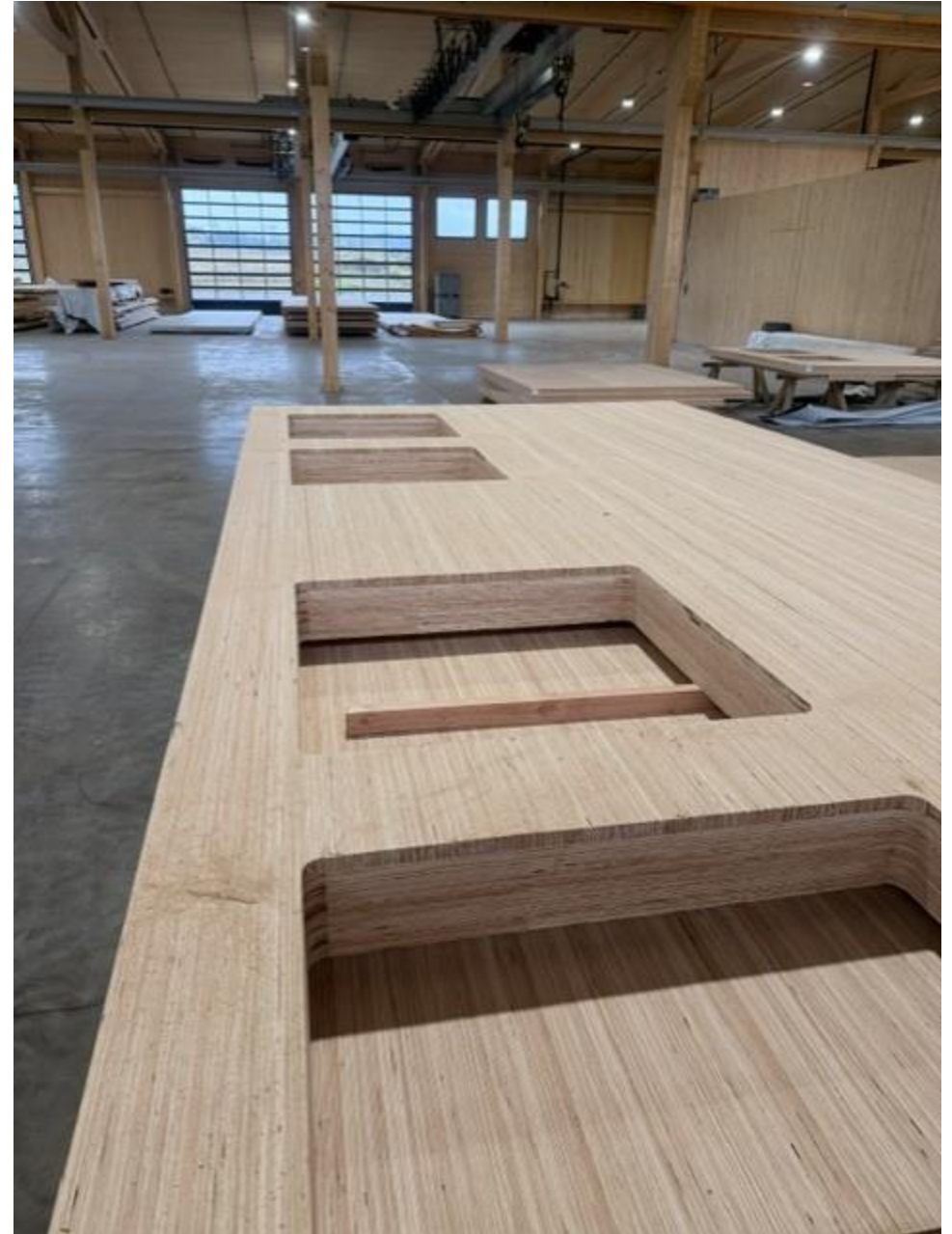
CLT - Project Review

- 7,150 SQFT of elevator shafts and stairwells
- SPF CLT



Mass Ply CLT - Project Review

- Fabricated prior to delivery to jobsite
- Walls exposed for aesthetics; Edge Grain Veneer option was chosen

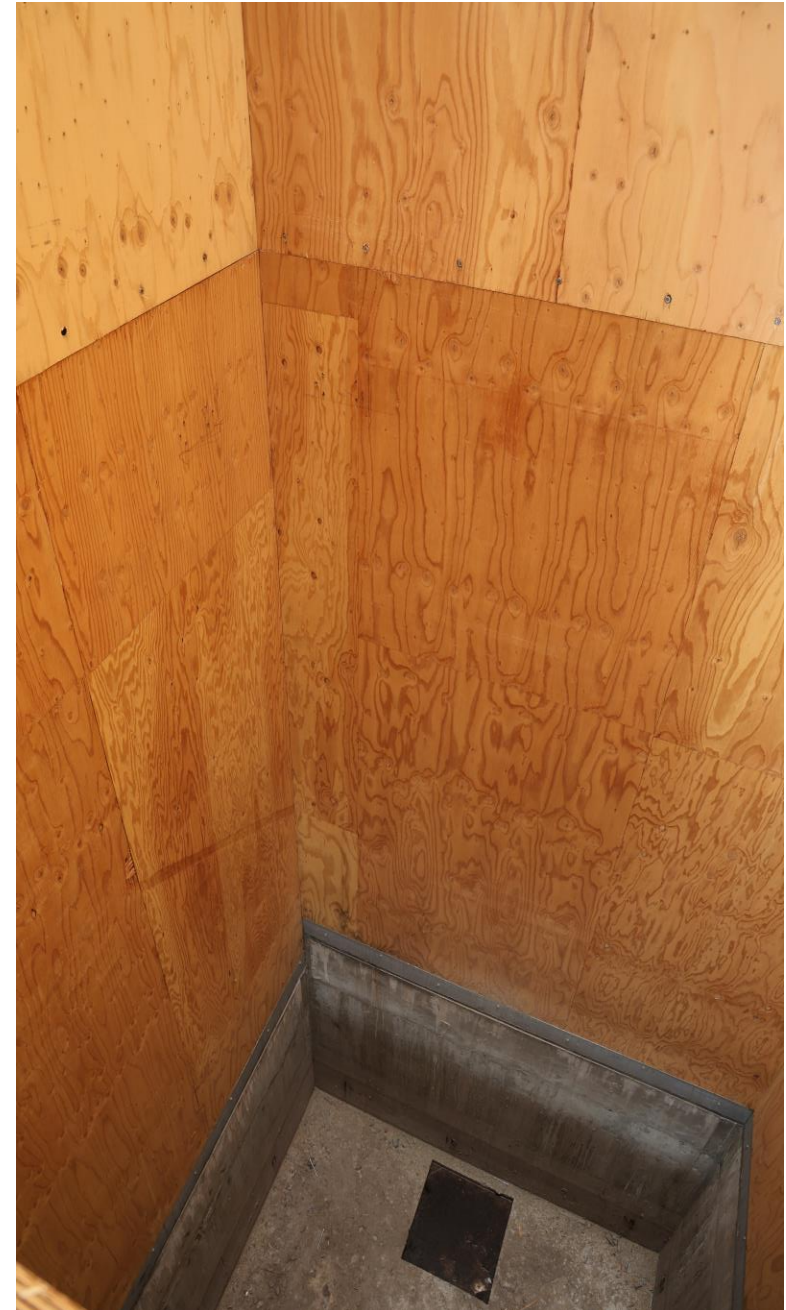


Mass Ply CLT - Project Review: Edge Grain Veneer

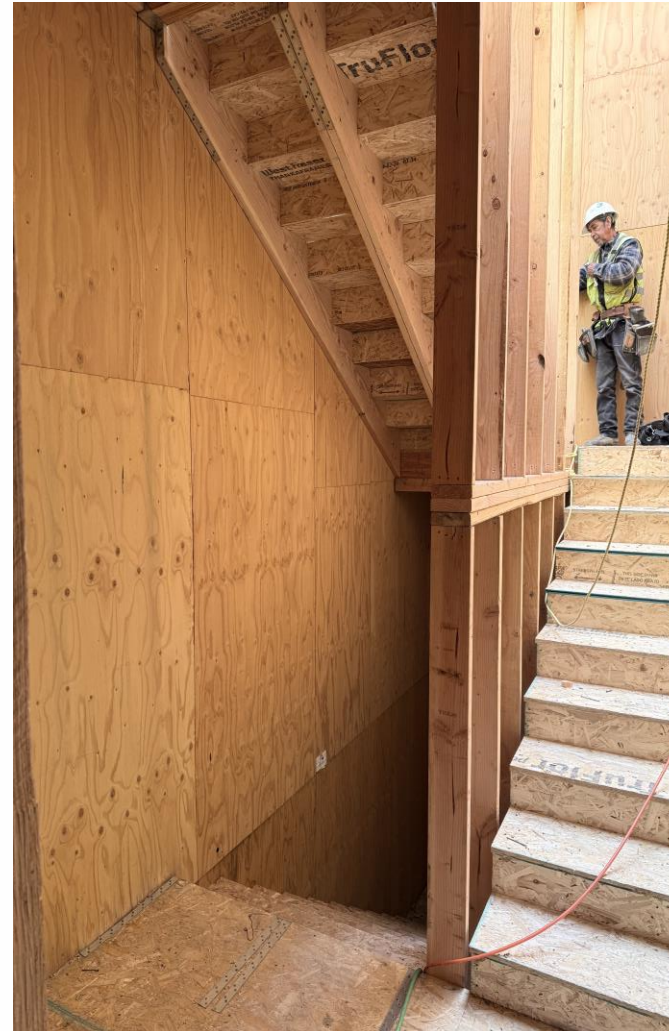
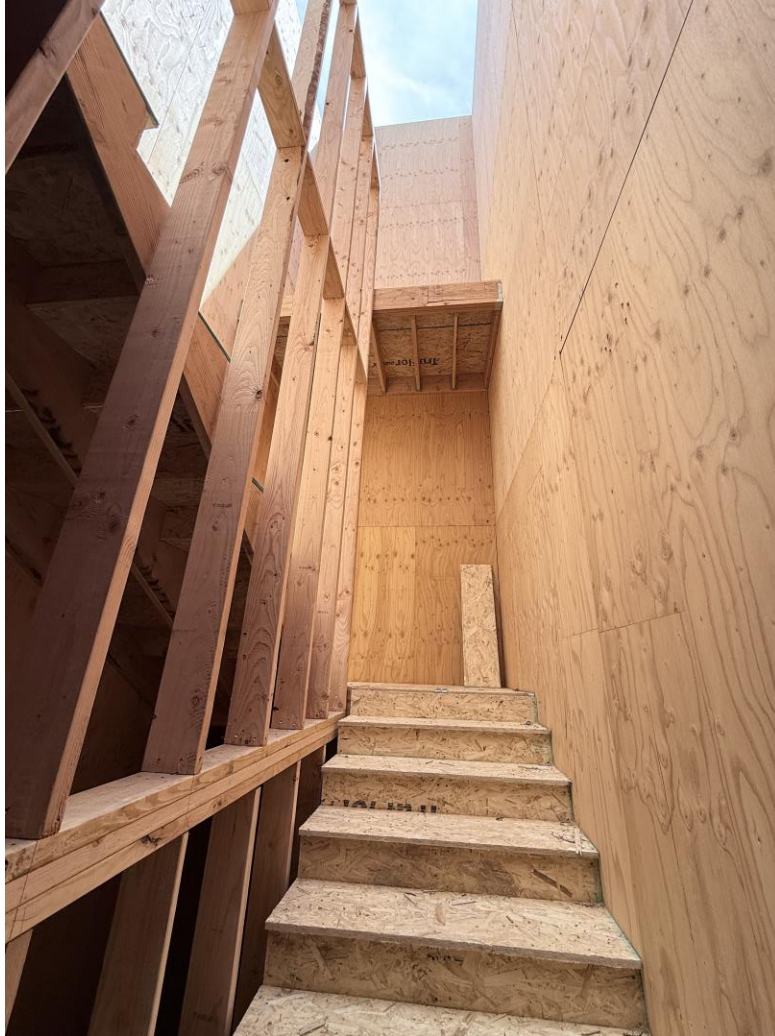


Mass Ply CLT: Elevator Shaft

- Architectural finish not provided on interior of shafts walls.
- No sheetrock required.



Mass Ply CLT - Project Review: Stairwell



Q&A

Education Session
Evaluation

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