

WCTE 2025 – 9E



Comprehensive Analysis of Point Supported Timber Construction: Structural and Fire Safety Insights

Holmes

Presented by Parisa Nassiri
25 June 2025

Holmes Mass Timber



Number of Projects

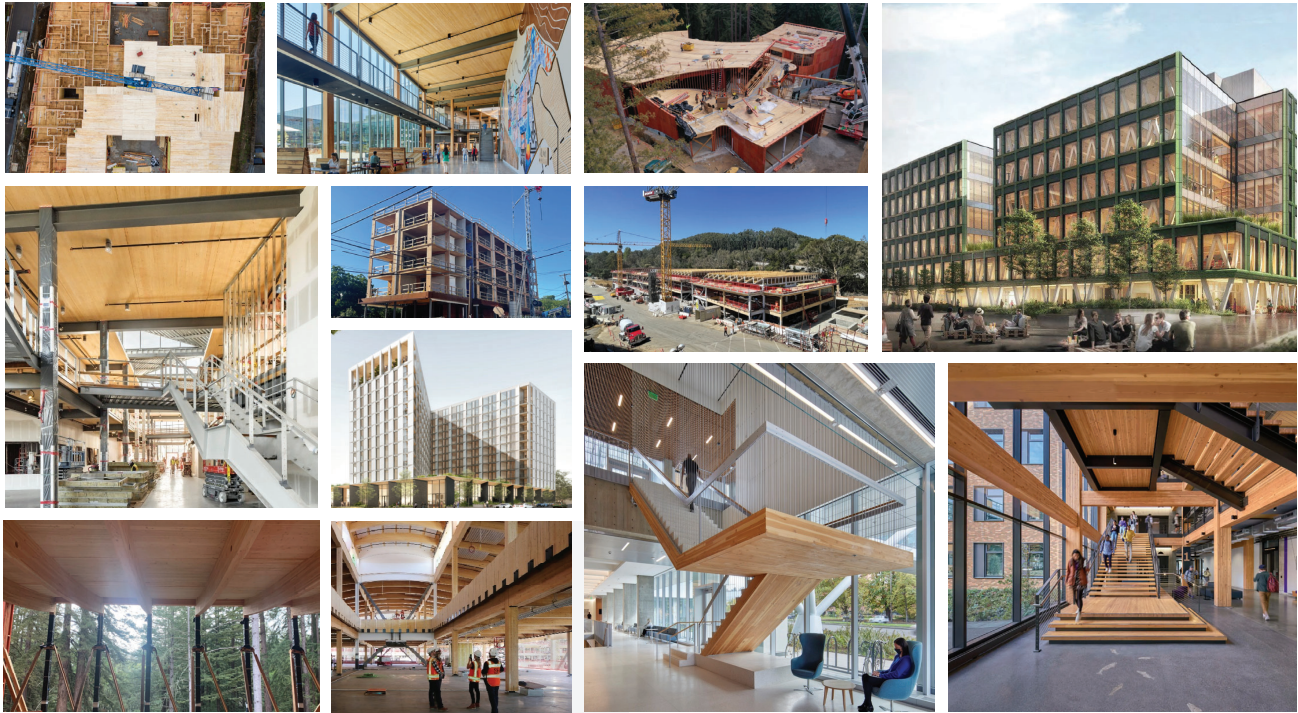
~79 ——— 43 projects in CA

Largest Project Size

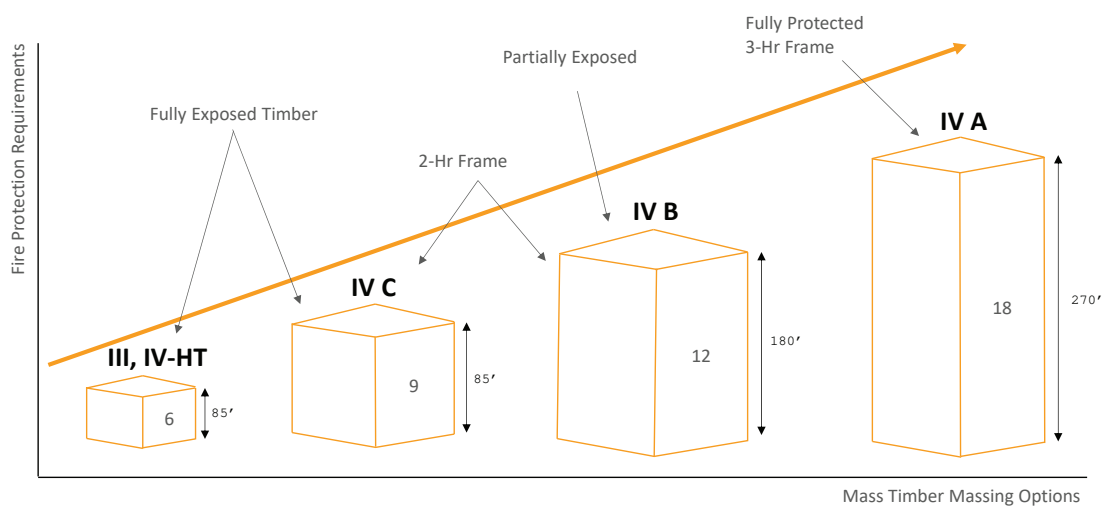
~1.2M sf

Services Performed

- Structural Engineering
- Fire & Life Safety
- Product Testing & Development



Mass Timber Construction Types



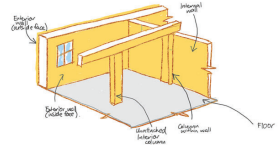
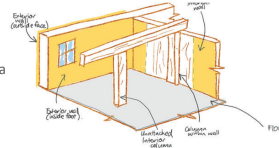
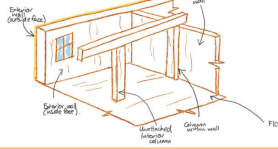
Fire-Resistance Rating of Building Elements

IBC Table 601

Type of Construction	Type I-A (podium)	Type III-A	Type III-B	Type IV-A	Type IV-B	Type IV-C	Type IV-HT	Type V-A	Type V-B
Primary Structural Frame	3 HR	1 HR	0 HR	3 HR	2 HR	2 HR	HT	1 HR	0 HR
Exterior Bearing Walls	3 HR	2 HR	2 HR	3 HR	2 HR	2 HR	2 HR	1 HR	0 HR
Interior Bearing Walls	3 HR	1 HR	0 HR	3 HR	2 HR	2 HR	HT	1 HR	0 HR
Exterior Non-Bearing Walls	Per IBC Table 602								
Interior Non-Bearing Walls	0 HR	0 HR	0 HR	0 HR	0 HR	0 HR	IBC 2304.11.2	0 HR	0 HR
Floor	2 HR	1 HR	0 HR	2 HR	2 HR	2 HR	HT	1 HR	0 HR
Roof	1½ HR	1 HR	0 HR	1½ HR	1 HR	1 HR	HT	1 HR	0 HR

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Mass Timber Construction Types

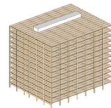
Construction Type	# Stories	Max Height	Mass Timber	Primary Frame Fire Rating
IV-A	18	270'	Fully Protected 	3 hour (2-hour floors)
IV-B	12	180'	Partially Exposed (20% of ceilings or 40% of walls or a combination of thereof allowed to remain exposed) 	2 hour
IV-C	9	85'	Fully Exposed (Except outside of external walls, shafts and concealed spaces) 	2 hour

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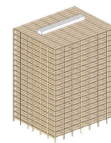
Mass Timber Construction Types



V, III & IV-HT



IV-C & IV-B



IV-A

Construction Type h	Stories	Max Height	Mass Timber	Sprinklers	Primary Frame Fire Rating	Stair Tower
V-B	4	60'	Exposed	Yes	0 HR	Mass Timber
V-A					1 HR	
III-B	4-5	75'- 85'			0 HR	
III-A					1 HR	
IV-HT					HT	
IV-C	7-8				2 HR	
IV-B	11-12	180'	Partially Exposed			
IV-A	17-18	270'	Fully Protected			3 HR

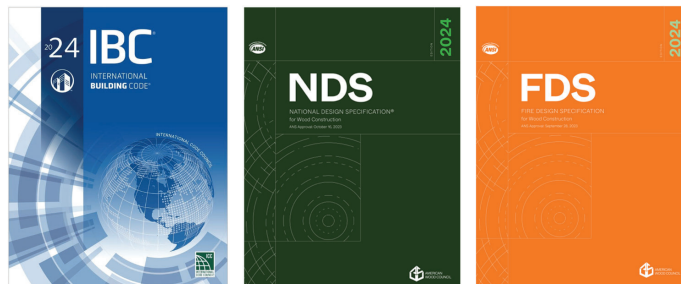
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Determination of Fire-Resistance Rating

Structural Fire Resistance

Thermal Separation

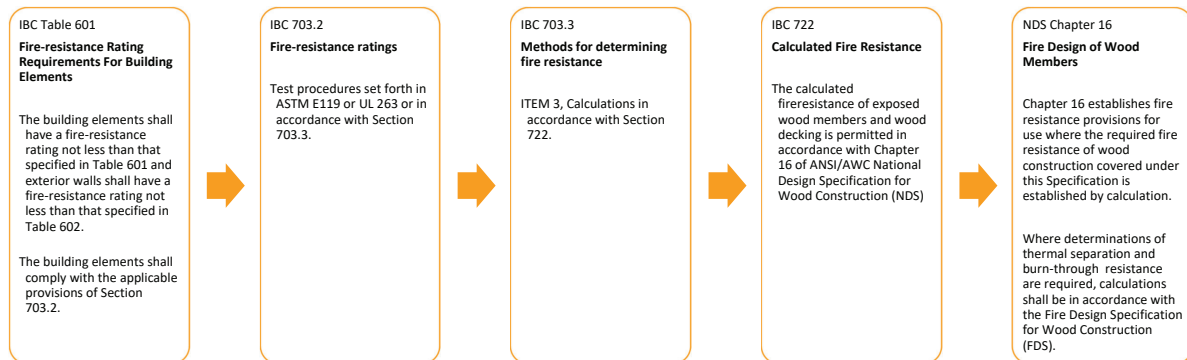
Burn Through



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Determination of Fire-Resistance Rating

For Mass Timber Construction



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Connection Fire-Resistance Rating

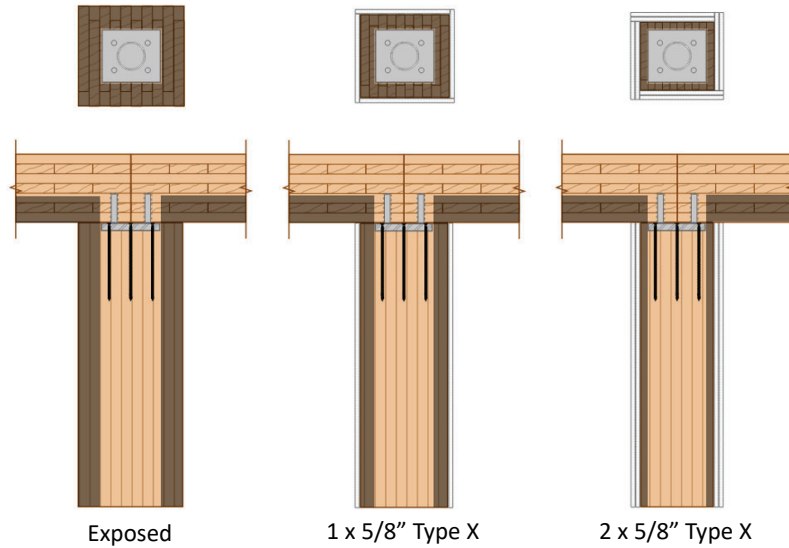
FRR for connections in Type IV-A IV-B, or IV-C construction shall be determined by one of the following:

1. **Testing** in accordance with Section 703.2 where the connection is part of the fire resistance test.
2. **Engineering analysis** that demonstrates that the temperature rise at any portion of the connection is limited to an average temperature rise of 250°F (139°C) and a maximum temperature rise of 325°F (181°C) for a time corresponding to the required fire resistance rating of the structural element being connected.

For the purposes of this analysis the connection includes connectors fasteners and portions of wood members included in the structural design of the connection.

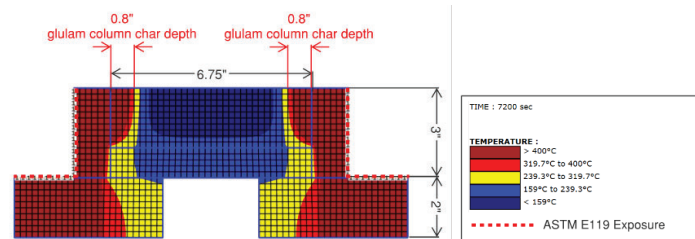
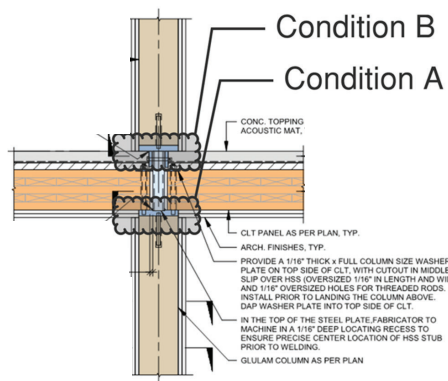
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FRR and Connection Protection

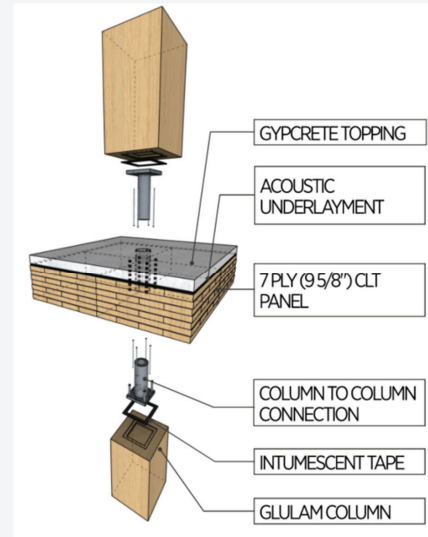


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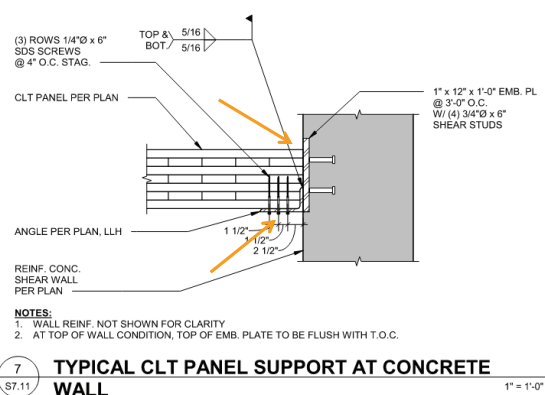
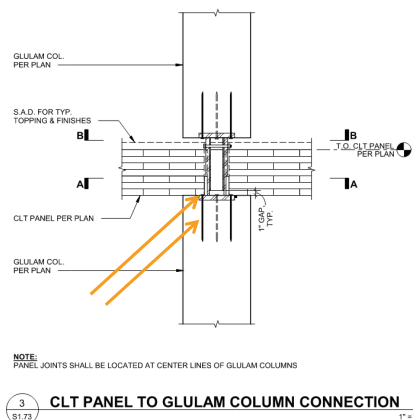
Connection Protection



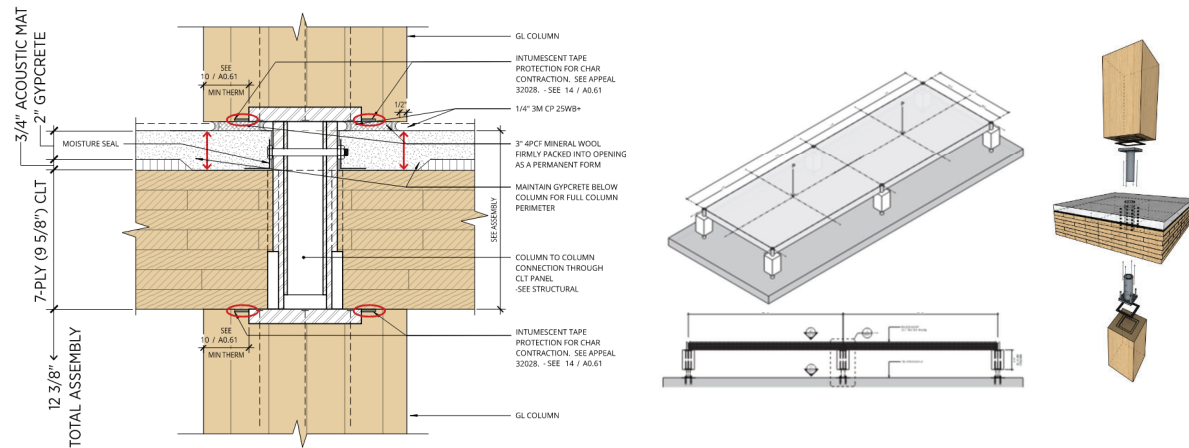
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Connections



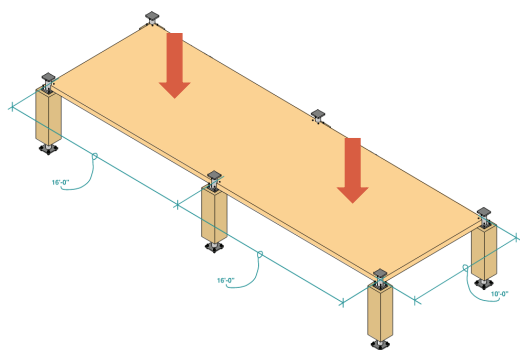
Connections



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CLT Panel Testing

REACTS Testing @ OSU:



[Rendering Courtesy of Timberlab]



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CLT Panel Testing



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Point Supported Mass Timber Considerations

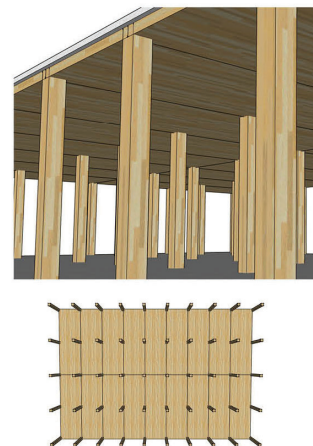
Project Massing and Program

Fire Resistance Rating

- Structural Fire Resistance, exposed vs protected
- Thermal Separation
- Burn Through

Mass Timber Details

- Connections
- Joints
- Penetrations



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Thank you



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