Tall Mass Timber in Portland: An Insider's Look at Prescriptive Design

Presented by

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Photo courtesy of Access Architecture



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

Course Description

The first IV-C building to break ground in Portland, OR, TimberView is an 8-story multi-family mass timber building constructed with post and beam glulam framing and 5-ply cross-laminated timber (CLT). The building's lateral system is steel braced frames with non-bearing steel stud infill walls. In this unique educational session, the project architect and structural engineer will share their experiences with key design and detailing approaches used, manufacturer and contractor coordination strategies employed throughout pre-construction, and working with city building officials on project approvals. Features of the project, which is set to break ground in February 2023, include 105 units of affordable housing as well as ground floor retail and restaurant space. Attendees can expect to gain valuable insights into critical project-specific tall mass timber design steps, lessons learned from designing a project amid evolving codes and testing reports, and know-how from the design team on one of the first tall mass timber buildings in Oregon.

Learning Objectives

- 1. Highlight the project motivators for TimberView, including benefits of using exposed mass timber in tall buildings, such as sustainability and occupant comfort.
- 2. Explore the code approval process, fire and life safety design, and permitting aspects of an 8-story mass timber project in Portland, OR.
- 3. Discuss code-compliant options for exposing mass timber where up to 2-hour fire-resistance ratings are required and demonstrate design methodologies for achieving these ratings.
- 4. Review pre-construction logistics associated with building a mass timber tower, such as MEP integration, grid layout and manufacturer coordination.

2015-2018: BUILDING A CODE ROADMAP

















Source: ICC

2015-2018: DOMESTIC INNOVATION



Framework: An Urban + Rural Ecology



USDA/SLB TALL WOOD BUILDING COMPETITION

2015-2018: BUILDING A CODE ROADMAP





2015-2018: BUILDING A CODE ROADMAP

Tests on exposed mass timber, gypsum-covered mass timber; normal sprinkler protection, delayed sprinkler protection

Majority of flames seen are from contents, not structure



2018-2021: ROLLOUT OF A NEW CODE PATH



Type IV-B Protection vs. Exposed

2021 IBC Allowances

IV-B



Credit: AWC

Type IV-B Protection vs. Exposed

2021 IBC Allowances





IV-B

Credit: AWC

CLT Fire Performance – Char Fall-off



- Largely a function of adhesive performance under high temps
- Has been addressed in PRG 320-18 (required for all CLT under 2021 IBC, not just tall wood)



2021 IBC Section 602.4 added:

Cross-laminated timber shall be labeled as conforming to PRG 320 - 18 as referenced in Section 2303.1.4.

2019-2022: REFINING THE CODE ROADMAP

USDA United States Department of Agriculture

Compartment Fire Testing of a Two-Story Mass Timber Building

Samuel L. Zelinka Laura E. Hasburgh Keith J. Bourne David R. Tucholski Jason P. Ouellette









Forest Products Laboratory General Technical Report FPL-GTR-247

t May 2018

Source: RISE, USDA FS FPL & AWC

2019-2022: REFINING THE CODE ROADMAP





Fire Safe Implementation of Mass Timber In Tall Buildings

Research of the fire performance of CLT and Glued Laminated Timber buildings, with visible wood surfaces.

The main aim of this research project was to identify safe limits of exposed mass timber surface areas that correspond with performance criteria used for previous U.S. Building Code Changes.

2019-2022: REFINING THE CODE ROADMAP

2024 IBC Allowances



100% Timber Ceiling Exposure Up to 12 Stories

TALL MASS TIMBER RESOURCES



Current State of Mass Timber Projects

As of December 2022, in the US, **1,677** multi-family, commercial, or institutional projects have been constructed with, or are in design with, mass timber.



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12% of All Mass Timber Projects are Tall



Scan this code or use the url to find the map and more details online.



www.woodworks.org /resources/mappingmass-timber/

Current State of Mass Timber Projects

As of December 2022, in the US, **1,677** multi-family, commercial, or institutional projects have been constructed with, or are in design with, mass timber.



44% of Tall Mass Timber Projects 'Started' in 2022



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STORIES OF MASS TIMBER





STORIES OF MASS TIMBER



87% of Tall Mass Timber Projects are 12 Stories of Timber or Less









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