Adding Value: Commonly Overlooked Areas for Wood-Framing and Mass Timber

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Kate Carrigg

Current State of Mass Timber Projects

As of June 2022, in the US, **1,502** commercial, institutional, and multi-family projects have been constructed with, or are in design with, mass timber.



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The challenge is not in learning how to accept change, but in how to orchestrate the most efficient change



Carbon12, Portland, OR Credit: Kaiser + Path



IBC.







3 YEAR CODE CYCLE



2003





Source: ICC

Construction Types

BUILDING ELEMENT	TYPEI		TYPE II		TYPE III		TYPE IV				TYPE V	
	A	B	A	В	A	В	A	В	C	HT	Α	8
Primary structural frame ⁴ (see Section 202)	34.0	2ª, b, c	16,0	0°	1 ^{b, c}	0	3*	2ª	2ª	HT	1 ^{b, c}	0
Bearing walls		<u> </u>			6. S.							6
Exterior* f	3	2	1	0	2	2	3	2	2	2	1	0
Interior	3*	2ª	1	0	1	0	3	2	2	1/HT [#]	1	0
Nonbearing walls and partitions Exterior						See 1	Table 70	5.5				
Nonbearing walls and partitions Interior ⁴	0	0	0	0	0	0	0	0	0	See Section 2304.11.2	0	0
Floor construction and associated secondary structural members (see Section 202)	2	2	1	0	1	0	2	2	2	HT	1	0
Roof construction and associated secondary structural members (see Section 202)	11/2 b	1 ^{b,c}	1 ^{b,c}	0°	1 ^{b,c}	0	11/2	1	1	HT	1 ^{b,c}	0

TABLE 601 FIRE-RESISTANCE RATING REQUIREMENTS FOR BUILDING ELEMENTS (HOURS)

PRESCRIPTIVE BUILDING CODES



Tall Mass Timber Code Adoptions

Learn Tools

WOODWORKS

Award Gallery

Why Wood?

Status as of July 2022

The 2021 International Building Code (IBC) has been published and is available for purchase through the International Code Council. This version of the code includes three new construction types—IV-A, IV-B and IV-C—that allow the use of mass timber or noncombustible materials in buildings up to 18, 12 and nine stories (respectively). Additionally, Group A changes to be incorporated in the 2024 IBC have been voted on and results ratified by ICC. One significant change relative to construction type IV-B is the allowance for exposure of mass timber ceilings and integral beams. The 2021 IBC permitted these areas to have 20% exposure while the 2024 IBC will permit 100% exposure. See the full code change language, which was approved as submitted, <u>here</u>.

The following jurisdictions have adopted the tall mass timber provisions in the 2021 and/or 2024 IBC, either whole or with local amendments.

- Oregon <u>Appendix P Tall Wood Buildings</u> within the 2019 Oregon Structural Specialty Code
- Washington Washington State Building Code
- City of Denver, Colorado Appendix U Tall Wood Buildings (page 187) within the 2019 Denver Building Code
- Utah Chapter 2a: Tall Wood Buildings of Mass Timber Construction, incorporated as part of the State Construction Code

Events

- California Supplement to the 2019 California Building Code
- Virginia Supplement 2021 IBC Mass Timber Provisions within the 2018 state building code
- Maine Emergency Rule 3, amendments to the Maine Uniform Building and Energy Code (Section 5, item 25)
- Georgia <u>Appendix P</u> to the 2018 IBC
- Idaho <u>Amendments to the Idaho Building Code</u>
- Howard County, Maryland adoption of the 2021 IBC
- · Texas Jurisdictions:
 - City of Dallas Ordinance 32198 which incorporates some 2021 and 2024 IBC allowances for tall mass timber
 - City of Austin adoption of the 2021 IBC
 - City of Bryan adoption of the 2021 IBC
 - City of Carrollton adoption of the 2021 IBC.
 - City of Plano adoption of the 2021 IBC
 - City of Grand Prairie adoption of the 2021 IBC
 - City of Fort Worth adoption of the 2021 IBC



About

Stair, Elevator & MEP Shafts

If the building can be framed with wood, the shafts can be framed with wood.





Shaft Wall Savings – Case Study

Switch to Wood Framed Shaft Walls Saves Project \$176,000

Gala at Oakcrest, Euless, TX

- 4 Story, 135,000 sf multi-family building
- 2 Elevator Shafts, 3 Stair Shafts, all originally designed in masonry – project was otherwise all wood framed
- Initial estimates were total of \$266,000 for all 5 shafts
- Team switched to wood shafts, cut \$176,000 from cost and at least 3 weeks from schedule

Source: Gardner Capital Construction, project General Contractor & Developer



Wood Within Podium Level(s)



2018 IBC 510.2:

"The building below the horizontal assembly is of Type IA construction."

2021 IBC 510.2:

"Interior exit stairways located within the Type IA building are permitted to be of combustible materials where the following requirements are met:.."

Credit: WoodWorks

Wood Within Podium Level(s)



Credit: WoodWorks

FRTW is permitted in non-bearing, non-rated exterior walls in types I & II (IBC 603.1)

Thermal/building envelope benefits, as well as consistent exterior wall detailing



Source: Mahlum Architects

PRESCRIPTIVE BUILDING CODES





Parking Beneath Group R

• Unique application similar to podium provision but more flexibility

Special provisions: IBC 510.4

Parking Beneath Group R

Single story above grade, S-2 parking:

- Type I (enclosed or open) or
- Type IV (open)
- Group R occupancy above
- # of stories measured from floor above parking
- Floor separating parking & group R:
 - Same construction type as parking
 - Hourly rating per table 508.4



Special provisions: IBC 510.5

Group R-1 & R-2, Type IIIA Buildings

- Height limitation increased to 6 stories & 75 ft
- First floor assembly above the basement has a fire-resistance rating of not less than 3 hours
- Floor area is subdivided by 2-hour fire- resistance-rated fire walls into areas of not more than 3,000 square feet



Multi-Housing Typologies

MT Floors & Roofs on LWF Bearing Walls



Credit: KL&A Engineers & Builders

MT Floors & Roofs on Post & Beam Framing

Credit: ADX Creative and Engberg Anderson

MT Floors & Roofs on MT Bearing Walls



Credit: Grey Organschi Architecture and Spiritos Properties



MASS TIMBER BEARING WALLS



HYBRID LIGHT-FRAME + MASS TIMBER

THE KIND PROJECT, SACRAMENTO, CA



PROJECT ONE, OAKLAND, CA



Credit: Gurnet Point

CIRRUS, DENVER, CO



Credit: KL&A Engineers & Builders

CANYONS, PORTLAND, OR



Credit: Jeremy Bittermann & Kaiser + Path





Mass Timber Business Case Study

The Canyons: Project Team



Mass Timber Business Case Study

The Canyons

Development Overview

- 70 units (808 sf to 1,090 sf)
- Hybrid multi-family residential target market of both active older adults and younger residents
- Rental rates priced below independent living, but above typical apartment

Timing	Completed November 2020	
Submarket	Close-in North Portland	
Construction Type	3-A over 1-A	
Site Size	23,676 sf	
Gross Building Area	113,314 sf	
Total Units	70 apartments over 6 retail suites	
Net Rentable Area	60,417 sf (resi) + 15,409 sf (retail)	



Mass Timber Business Case Study

The Canyons: Market Context

Design Innovative Cluster

- The Canyons continues innovative, progressive, and design-oriented new building node
- The Canyons' adjacency helped sell remaining units at C12.

Innovative Design Node on N. Williams Corridor





Mass Timber Business Case Study

THE DUKE, AUSTIN, TX



Credit: WGI

THE DUKE, AUSTIN, TX



Photo: WoodWorks

Questions? Ask me anything.



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