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

Kate Carrigg
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. *This total includes modern mass timber and post-and-beam structures built since 2013*

Source: WoodWorks, June 22, 2022

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.

This total includes modern mass timber and post-and-beam structures built since 2013.

Current State of Mass Timber Projects

Of these 1,502 projects:
415 are Multi-Family (28%)
The challenge is not in learning how to accept change, but in how to orchestrate the most efficient change.
3 YEAR CODE CYCLE

Source: ICC
## Construction Types

### Table 601

<table>
<thead>
<tr>
<th>Building Element</th>
<th>Type I</th>
<th>Type II</th>
<th>Type III</th>
<th>Type IV</th>
<th>Type V</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
<td>A</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>Primary structural frame&lt;sup&gt;f&lt;/sup&gt; (see Section 202)</td>
<td>3&lt;sup&gt;a, b&lt;/sup&gt;</td>
<td>2&lt;sup&gt;a, b, c&lt;/sup&gt;</td>
<td>1&lt;sup&gt;b, c&lt;/sup&gt;</td>
<td>0&lt;sup&gt;c&lt;/sup&gt;</td>
<td>1&lt;sup&gt;b, c&lt;/sup&gt;</td>
</tr>
<tr>
<td>Bearing walls</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exterior&lt;sup&gt;e&lt;/sup&gt;</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Interior</td>
<td>3&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1</td>
<td>0</td>
<td>1</td>
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<tr>
<td>Nonbearing walls and partitions Exterior</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nonbearing walls and partitions Interior&lt;sup&gt;d&lt;/sup&gt;</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Floor construction and associated secondary structural members (see Section 202)</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Roof construction and associated secondary structural members (see Section 202)</td>
<td>1&lt;sup&gt;1/2&lt;/sup&gt;</td>
<td>1&lt;sup&gt;b, c&lt;/sup&gt;</td>
<td>1&lt;sup&gt;b, c&lt;/sup&gt;</td>
<td>0&lt;sup&gt;c&lt;/sup&gt;</td>
<td>1&lt;sup&gt;b, c&lt;/sup&gt;</td>
</tr>
</tbody>
</table>
PRESCRIPTIVE BUILDING CODES
Tall Mass Timber Code Adoptions

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, here.

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

- Oregon – Appendix P Tall Wood Buildings within the 2019 Oregon Structural Specialty 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
- 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 – Appendix P to the 2018 IBC
- Idaho – Amendments to the Idaho Building Code
- 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
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:...”
Wood Within Podium Level(s)

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
PRESCRIPTIVE BUILDING CODES
Special Provisions

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

![Diagram of Group R-2 building with 2-hour fire walls and 3-hour horizontal assembly.](Image Credit: IBC Code Commentary)
Multi-Housing Typologies

MT Floors & Roofs on LWF Bearing Walls

MT Floors & Roofs on Post & Beam Framing

MT Floors & Roofs on MT Bearing Walls

Credit: KL&A Engineers & Builders
Credit: ADX Creative and Engberg Anderson
Credit: Grey Organschi Architecture and Spiritos Properties
MASS TIMBER BEARING WALLS
HYBRID LIGHT-FRAME + MASS TIMBER

Photo: John Klein
THE KIND PROJECT, SACRAMENTO, CA

Credit: Kalesnikoff Mass Timber
PROJECT ONE, OAKLAND, CA

Credit: Gurnet Point
CIRRUS, DENVER, CO

Credit: KL&A Engineers & Builders
CANYONS, PORTLAND, OR

Credit: Jeremy Bittermann & Kaiser + Path
The Canyons
PORTLAND, OR

Mass Timber Business Case Study
The Canyons: Project Team

Developer
Kaiser Group

Development Partner
Hoosiers Corporation,
Japan

Architect
Path Architecture

Structural Engineer
Catena Consulting
Engineers

Contractor
R&H Construction

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

<table>
<thead>
<tr>
<th>Timing</th>
<th>Completed November 2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Submarket</td>
<td>Close-in North Portland</td>
</tr>
<tr>
<td>Construction Type</td>
<td>3-A over 1-A</td>
</tr>
<tr>
<td>Site Size</td>
<td>23,676 sf</td>
</tr>
<tr>
<td>Gross Building Area</td>
<td>113,314 sf</td>
</tr>
<tr>
<td>Total Units</td>
<td>70 apartments over 6 retail suites</td>
</tr>
<tr>
<td>Net Rentable Area</td>
<td>60,417 sf (resi) + 15,409 sf (retail)</td>
</tr>
</tbody>
</table>
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.
THE DUKE, AUSTIN, TX

Credit: WGI
THE DUKE, AUSTIN, TX
Questions? Ask me anything.

Kate Carrigg, PE
Regional Director | OR, ID-South, HI
(303) 902-3151
kate.carrigg@woodworks.org
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