Exploring Tall Wood: New Code Provisions for Tall Timber Structures
Questions we’ll answer:
• What is tall wood?
• How tall is tall?
• How did we arrive at the proposed tall wood code changes?
• What are the new tall wood code provisions?
• What is different about low to mid-rise mass timber vs. tall wood?
TALL WOOD IN NORTH AMERICA CIRCA 1906
9 STORIES

THE LANDING, VANCOUVER

BUTLER SQUARE, MINNEAPOLIS
GLOBAL TALL WOOD CIRCA 2015

7-14 STORIES
GLOBAL TALL WOOD CIRCA 2019
18-24 STORIES

Photo: Moelven Lointre

Photo: naturally:wood

Photo: Rüdiger Lainer + Partner
TALL WOOD IN THE US CIRCA 2019

8 STORIES

Current Prescriptive Code Limit - 6 stories (B occupancy) or 85 feet

Over 6 Stories - Alternate Means and Methods Request (AMMR) through performance based design

Based on the 1910 Heights and Areas Act
3 YEAR CODE CYCLE
Interest in tall wood projects in the US was rapidly increasing. Some building officials were reluctant to approve proposed plans, primarily due to lack of code direction and precedent.
In December 2015, the ICC Board established the ICC Ad Hoc Committee on Tall Wood Buildings. Objectives:
1. Explore the building science of tall wood buildings
2. Investigate the feasibility, and
3. Take action on developing code changes for tall wood buildings.
5 Working Groups Created

- July 2016 – November 2017: 5 in-person meetings, numerous conference calls
- 82 issues addressed, one primary topic was fire performance and life safety
Fire resistance of mass timber for low- to mid-rise structures well understood, codified
AHC established 6 performance objectives:

1. No collapse under reasonable scenarios of complete burn-out of fuel without automatic sprinkler protection being considered.
2. Highly reliable fire suppression systems to reduce the risk of failure during reasonably expected fire scenarios. The degree of reliability should be proportional to evacuation time (height) and the risk of collapse.
AHC established 6 performance objectives:

3. No unusually high radiation exposure from the subject building to adjoining properties to present a risk of ignition under reasonably severe fire scenarios.

4. No unusual response from typical radiation exposure from adjacent properties to present a risk of ignition of the subject building under reasonably severe fire scenarios.
AHC established 6 performance objectives:

5. No unusual fire department access issues
6. Egress systems designed to protect building occupants during the design escape time, plus a factor of safety.
Commissioned series of 5 full-scale tests on 2-story mass timber structure at ATF lab in MD, May-June 2017
Tests on exposed mass timber, gypsum-covered mass timber; normal sprinkler protection, delayed sprinkler protection
Majority of flames seen are from contents, not structure
<table>
<thead>
<tr>
<th>Test</th>
<th>Description</th>
<th>Construction Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test 1</td>
<td>All mass timber surfaces protected with 2 layers of 5/8” Type X Gypsum. No Sprinklers.</td>
<td>IV-A</td>
</tr>
<tr>
<td>Test 2</td>
<td>30% of CLT ceiling area in living room and bedroom exposed. No Sprinklers.</td>
<td>IV-B</td>
</tr>
<tr>
<td>Test 3</td>
<td>Two opposing CLT walls exposed – one in bedroom and one in living room. No Sprinklers.</td>
<td>IV-B</td>
</tr>
<tr>
<td>Test 4</td>
<td>All mass timber surfaces fully exposed in bedroom and living room. Sprinklered – normal activation</td>
<td>IV-C</td>
</tr>
<tr>
<td>Test 5</td>
<td>All mass timber surfaces fully exposed in bedroom and living room. Sprinklered – 20 minute delayed activation</td>
<td>IV-C</td>
</tr>
</tbody>
</table>
TEST 1

Photos provided by U.S. Forest Products Laboratory, USDA

Source: AWC
TEST 2

Ignition

Living Room / Kitchen Flashover

Bedroom Flashover

Decay Phase

Living Room Ceiling

Bedroom Ceiling

Photos provided by U.S. Forest Products Laboratory, USDA

Source: AWC
TEST 3

Ignition

Living Room/
Kitchen Flashover

Bedroom Flashover

Decay Phase

Wall

Wall

Photos provided by U.S. Forest Products Laboratory, USDA

Source: AWC
All mass timber surfaces fully exposed in bedroom and living room.

Sprinkler – normal activation

Source: AWC
Photos provided by U.S. Forest Products Laboratory, USDA
All mass timber surfaces fully exposed in bedroom and living room.

**Sprinkler** – activation delayed for 20 minutes after smoke detector activation...approximately 23-1/2 minutes from ignition.
Although not directly affiliated with the TWB AHC, other mass timber and tall wood testing & research was occurring, the results of which the AHC included in their final decisions.
ICC TWB Ad Hoc Committee Group A proposals consisted of the following 14 parts

**Requirements for the new Types of Construction:**

- IBC Section 602.4 – Type of Construction (G108-18)
- IBC Section 703.8 – Performance Method for Fire Resistance from Noncombustible Protection (FS5-18)
- IBC Section 722.7 – Prescriptive Fire Resistance from Noncombustible Protection (FS81-18)
- IBC Section 703.9 – Sealants at Edges (FS6-18)
- IBC Section 718.2.1 – Fire and Smoke Protection (FS73-18)
- IBC Section 403.3.2 – High-Rise Sprinkler Water Supply (G28-18)
- IBC Section 701.6 – Owners’ Responsibility (F88-18)
- IFC Section 3308.4 – Fire Safety During Construction (F266-18)

**Allowable building size limits:**

- IBC Table 504.3 – Building Height (G75-18)
- IBC Table 504.4 – Number of Stories (G80-18)
- IBC Table 506.2 – Allowable Area (G84-18)

**Housekeeping changes:**

- IBC Section 3102 – Special Construction (G146-18)
- IBC Appendix D – Fire Districts (G152-18)
- IBC Section 508.4 and 509.4 – Fire Barriers (G89-18)
2018 TIMELINE:

Step 1: January 8 – Final Proposed Language submitted to ICC
Step 2: February 28 – Changes are posted for Public Viewing
Step 3: April 15-25 – Committee Action Public Hearing – Columbus, OH
Tall Mass Timber Building Code Changes Pass First Hurdle

The highly-anticipated International Code Council (ICC) Tall Mass Timber Building code changes passed a first hurdle in April with approval by the ICC code changes committee responsible for this part of the process. By wide margins a series of 14 proposals was each approved. The Hearings brought together code and fire officials, along with engineers, architects, builders, and other construction professionals as part of the first public step in approving code change proposals for the 2021 set of ICC codes. The proposals submitted by the ICC Ad Hoc Committee on Tall Wood Buildings (TWB), once officially approved by year-end, would allow mass timber buildings to be constructed up to 18 stories in height. AWC had a significant number of staff in attendance at the Hearings who spoke in support of the Ad Hoc Committee proposals. For more information see www.awc.org/tallmasstimber.
ICC Public Comment Hearing Voting Results on Tall Wood Changes, October 2018

- **FS5-18**
  - Motion: AS
  - End: ENDED
  - Support: 89.05% (187)
  - Oppose: 10.95% (23)

- **G108-18**
  - Motion: AM
  - End: ENDED
  - Support: 68.11% (220)
  - Oppose: 31.89% (103)

- **G28-18**
  - Motion: AS
  - End: ENDED
  - Support: 97.3% (216)
  - Oppose: 2.7% (6)

- **G84-18**
  - Motion: AS
  - End: ENDED
  - Support: 85.22% (173)
  - Oppose: 14.78% (30)
TALL WOOD APPROVED!

Unofficial results posted Dec 19, 2018
Final votes ratified Jan 31, 2019

AWC: Tall Mass Timber code changes get final approval
Dec 19, 2018

LEESBURG, VA. — The International Code Council (ICC) has released the unofficial voting results on code change proposals considered in 2018, including passage of the entire package of 14 tall mass timber code change proposals. The proposals create three new types of construction (Types IV-A, IV-B and IV-C), which set fire safety requirements, and allowable heights, areas and number of stories for tall mass timber buildings. Official results are expected to be announced during the first quarter of 2019. The new provisions will be included in the 2021 International Building Code (IBC).

"Mass timber has been capturing the imagination of architects and developers, and the ICC result means they can now turn sketches into reality. ICC’s rigorous study, testing and voting process now recognizes a strong, low carbon alternative to traditional tall building materials used in the building industry, the statement said."
### Tall Wood Code Changes as submitted by TWB Ad Hoc Committee

<table>
<thead>
<tr>
<th>Code Change</th>
<th>Final Action</th>
<th>CAH Results</th>
<th>PCH Results</th>
<th>Computed Results</th>
<th>Required Majority</th>
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<tbody>
<tr>
<td>FS5-18</td>
<td>AS</td>
<td>AS</td>
<td>AS</td>
<td>AS</td>
<td>Simple Majority</td>
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<tr>
<td>FS6-18</td>
<td>AMPC 1</td>
<td>AS</td>
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<td>AM</td>
<td>AM</td>
<td>AM</td>
<td>AM</td>
<td>Simple Majority</td>
</tr>
<tr>
<td>F266-18</td>
<td>AMPC 1</td>
<td>AM</td>
<td>AMPC 1</td>
<td>AMPC 1</td>
<td>Simple Majority</td>
</tr>
<tr>
<td>G28-18</td>
<td>AS</td>
<td>AS</td>
<td>AS</td>
<td>AS</td>
<td>Simple Majority</td>
</tr>
<tr>
<td>G75-18</td>
<td>AM</td>
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<td>AM</td>
<td>AM</td>
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<tr>
<td>G80-18</td>
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<td>AS</td>
<td>AS</td>
<td>Simple Majority</td>
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<tr>
<td>G84-18</td>
<td>AS</td>
<td>AS</td>
<td>AS</td>
<td>AS</td>
<td>Simple Majority</td>
</tr>
<tr>
<td>G89-18</td>
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<td>AM</td>
<td>AM</td>
<td>AM</td>
<td>Simple Majority</td>
</tr>
<tr>
<td>G108-18</td>
<td>AM</td>
<td>AM</td>
<td>AM</td>
<td>AM</td>
<td>Simple Majority</td>
</tr>
</tbody>
</table>

#### ICC Online Governmental Consensus Voting Results

<table>
<thead>
<tr>
<th>Code Change</th>
<th>Final Action</th>
<th>CAH Results</th>
<th>PCH Results</th>
<th>Final Action</th>
<th>OGCV Results/Final Action</th>
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<td>OGCV</td>
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<td>479</td>
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<td>AS</td>
<td>AMPC 1</td>
<td>AMPC 1</td>
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<td>479</td>
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<td>AMPC 1</td>
<td>AMPC 1</td>
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<td>455</td>
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<td>514</td>
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<td>G75-18</td>
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<td>AM</td>
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<td>AM</td>
<td>161</td>
<td>386</td>
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<tr>
<td>G80-18</td>
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<td>AS</td>
<td>AS</td>
<td>AS</td>
<td>160</td>
<td>382</td>
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<td>G84-18</td>
<td>AS</td>
<td>AS</td>
<td>AS</td>
<td>AS</td>
<td>172</td>
<td>383</td>
</tr>
<tr>
<td>G89-18</td>
<td>AM</td>
<td>AM</td>
<td>AM</td>
<td>AM</td>
<td>177</td>
<td>482</td>
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<tr>
<td>G108-18</td>
<td>AM</td>
<td>AM</td>
<td>AM</td>
<td>AM</td>
<td>219</td>
<td>471</td>
</tr>
</tbody>
</table>

**% of Vote in Favor of Code Change**

**% of Vote Req’d for Code Change Approval**
Since its debut, IBC has contained 9 construction type options:

- 5 Main Types (I, II, III, IV, V) with all but IV having sub-types A and B.

<table>
<thead>
<tr>
<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>A</td>
<td>B</td>
<td>A</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>A</td>
<td>B</td>
<td>HT</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A</td>
</tr>
</tbody>
</table>
Three Main Categories:

1. Noncombustible (Types I and II)
2. Light-Frame (Types III and V)
3. Heavy/Mass Timber (Type IV)

Although use of mass timber products in low- to mid-rise in types III and V is very common.
2021 IBC Introduces 3 new tall wood construction types: IV-A, IV-B, IV-C
Previous type IV renamed type IV-HT
New Building Types

Credit: Susan Jones, atelierjones
Type IV-A

Credit: Susan Jones, atelierjones

Photos: Structurlam, naturally:wood, Fast + Epp, Urban One
Type IV-A Protection vs. Exposed

100% NC protection on all surfaces of Mass Timber

Credit: Susan Jones, atelierjones
## Type IV-A Height and Area Limits

<table>
<thead>
<tr>
<th>Occupancy</th>
<th># of Stories</th>
<th>Height</th>
<th>Area per Story</th>
<th>Building Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-2</td>
<td>18</td>
<td>270 ft</td>
<td>135,000 SF</td>
<td>405,000 SF</td>
</tr>
<tr>
<td>B</td>
<td>18</td>
<td>270 ft</td>
<td>324,000 SF</td>
<td>972,000 SF</td>
</tr>
<tr>
<td>M</td>
<td>12</td>
<td>270 ft</td>
<td>184,500 SF</td>
<td>553,500 SF</td>
</tr>
<tr>
<td>R-2</td>
<td>18</td>
<td>270 ft</td>
<td>184,500 SF</td>
<td>553,500 SF</td>
</tr>
</tbody>
</table>

Areas exclude potential frontage increase

In most cases, Type IV-A height & story allowances = 1.5 * Type I-B height & story allowances

Type IV-A area = 3 * Type IV-HT area
Type IV-B

Credit: Susan Jones, atelierjones

Credit: LEVER Architecture
Type IV-B Protection vs. Exposed

NC protection on all surfaces of Mass Timber except limited exposed areas

~20% of Ceiling or ~40% of Wall can be exposed, see code for requirements
### Type IV-B Height and Area Limits

<table>
<thead>
<tr>
<th>Occupancy</th>
<th># of Stories</th>
<th>Height</th>
<th>Area per Story</th>
<th>Building Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-2</td>
<td>12</td>
<td>180 ft</td>
<td>90,000 SF</td>
<td>270,000 SF</td>
</tr>
<tr>
<td>B</td>
<td>12</td>
<td>180 ft</td>
<td>216,000 SF</td>
<td>648,000 SF</td>
</tr>
<tr>
<td>M</td>
<td>8</td>
<td>180 ft</td>
<td>123,000 SF</td>
<td>369,000 SF</td>
</tr>
<tr>
<td>R-2</td>
<td>12</td>
<td>180 ft</td>
<td>123,000 SF</td>
<td>369,000 SF</td>
</tr>
</tbody>
</table>

Areas exclude potential frontage increase

**In most cases, Type IV-B height & story allowances = Type I-B height & story allowances**

**Type IV-B area = 2 * Type IV-HT area**

Credit: Susan Jones, atelierjones
Type IV-C

Credit: Susan Jones, atelierjones

Photos: Baumberger Studio/PATH Architecture/Marcus Kauffman
Type IV-C Protection vs. Exposed

All Mass Timber surfaces may be exposed

Exceptions: Shafts, concealed spaces, outside face of exterior walls
## Type IV-C Height and Area Limits

<table>
<thead>
<tr>
<th>Occupancy</th>
<th># of Stories</th>
<th>Height</th>
<th>Area per Story</th>
<th>Building Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-2</td>
<td>6</td>
<td>85 ft</td>
<td>56,250 SF</td>
<td>168,750 SF</td>
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<tr>
<td>B</td>
<td>9</td>
<td>85 ft</td>
<td>135,000 SF</td>
<td>405,000 SF</td>
</tr>
<tr>
<td>M</td>
<td>6</td>
<td>85 ft</td>
<td>76,875 SF</td>
<td>230,625 SF</td>
</tr>
<tr>
<td>R-2</td>
<td>8</td>
<td>85 ft</td>
<td>76,875 SF</td>
<td>230,625 SF</td>
</tr>
</tbody>
</table>

Areas exclude potential frontage increase

In most cases, Type IV-C height allowances = Type IV-HT height allowances, but add’l stories permitted due to enhanced FRR

Type IV-C area = 1.25 * Type IV-HT area

Credit: Susan Jones, atelierjones
# Tall Wood Building Size Limits

<table>
<thead>
<tr>
<th>Occupancies</th>
<th>Allowable Building Height above Grade Plane, Feet (IBC Table 504.3)</th>
<th>Allowable Number of Stories above Grade Plane (IBC Table 505.4)</th>
<th>Allowable Area Factor (At) for SM, Feet² (IBC Table 506.2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A, B, R</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A-2, A-3, A-4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R-2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A-2, A-3, A-4</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Construction Type (All Sprinklered Values)</th>
<th>I-A</th>
<th>I-B</th>
<th>IV-A</th>
<th>IV-B</th>
<th>IV-C</th>
<th>IV-HT</th>
<th>III-A</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-A</td>
<td>I-B</td>
<td>IV-A</td>
<td>IV-B</td>
<td>IV-C</td>
<td>IV-HT</td>
<td>III-A</td>
<td></td>
</tr>
<tr>
<td>A, B, R</td>
<td>Unlimited</td>
<td>180</td>
<td><strong>270</strong></td>
<td>180</td>
<td><strong>85</strong></td>
<td>85</td>
<td>85</td>
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<tr>
<td>A-2, A-3, A-4</td>
<td>Unlimited</td>
<td>12</td>
<td><strong>18</strong></td>
<td>12</td>
<td>6</td>
<td>4</td>
<td>4</td>
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<tr>
<td>B</td>
<td>Unlimited</td>
<td>12</td>
<td><strong>18</strong></td>
<td>12</td>
<td>9</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>R-2</td>
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<td><strong>18</strong></td>
<td>12</td>
<td>8</td>
<td>5</td>
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<tr>
<td>A-2, A-3, A-4</td>
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<td>85,500</td>
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<td>Unlimited</td>
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<td>123,000</td>
<td><strong>76,875</strong></td>
<td>61,500</td>
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# Tall Wood Fire Resistance Ratings (FRR)

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<thead>
<tr>
<th>Roof Construction</th>
<th>Primary Frame @ Roof</th>
<th>Floor Construction</th>
<th>Primary Frame</th>
<th>Exterior Bearing Walls</th>
<th>Interior Bearing Walls</th>
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</thead>
</table>

<table>
<thead>
<tr>
<th>Required Fire Resistance Rating in Hours (per Table 601 only)</th>
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<tbody>
<tr>
<td>1.5</td>
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<tr>
<td>2</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
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<tr>
<td>3</td>
</tr>
</tbody>
</table>

**IV-A**  
**IV-B**  
**IV-C**  
**IV-HT**
# Noncombustible Protection (NC)

## TABLE 722.7.1(a)

**PROTECTION REQUIRED FROM NONCOMBUSTIBLE COVERING MATERIAL**

<table>
<thead>
<tr>
<th>Required Fire Resistance Rating of Building Element per Tables 601 and 602 (hours)</th>
<th>Minimum Protection Required from Noncombustible Protection (minutes)</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>40</td>
<td>1 layer 5/8 Type X</td>
</tr>
<tr>
<td>2</td>
<td>80</td>
<td>2 layers 5/8 Type X</td>
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<tr>
<td>3 or more</td>
<td>120</td>
<td>3 layers 5/8 Type X</td>
</tr>
</tbody>
</table>
MT Fire Resistance Ratings (FRR)

IBC 722.7
The fire resistance rating of the mass timber elements shall consist of the fire resistance of the unprotected element (MT) added to the protection time of the noncombustible (NC) protection.

Credit: Urban One
MT Fire Resistance Ratings (FRR)

How do you determine FRR of MT?
2 Options:
1. Calculations in Accordance with IBC 722 → NDS Chapter 16
2. Tests in Accordance with ASTM E119

\[ a_{\text{eff}} = 1.2a_{\text{char}} \]
MT Type IV Minimum Sizes

In addition to meeting FRR, all MT elements must also meet minimum sizes.

These minimum sizes have been in place for old type IV (current type IV-HT) construction and the same minimums sizes also apply to MT used in new types IV-A, IV-B and IV-C.

Contained in IBC 2304.11
Tall Wood Buildings in the 2021 IBC
Up to 18 Stories of Mass Timber

In January 2019, the International Code Council (ICC) approved a set of proposals to allow tall wood buildings as part of the 2021 International Building Code (IBC). Based on these proposals, the 2021 IBC will include three new construction types—Type IV-A, IV-B and IV-C—allowing the use of mass timber or noncombustible materials. These new types are based on the previous Heavy Timber construction type (renamed Type IV-HT) but with additional fire-resistance ratings and levels of required noncombustible protection. The code will include provisions for up to 18 stories of Type IV-A construction for Business and Residential Occupancies.

Based on information first published in the Structural Engineers Association of California (SEADO) 2018 Conference Proceedings, this paper summarizes the background to these proposals, technical research that supported their adoption, and resulting changes to the IBC and product-specific standards.

Background: ICC Tall Wood Building Ad Hoc Committee
Over the past 10 years, there has been a growing interest in tall buildings constructed from mass timber materials (Breneman 2013, Timmers 2015). Around the world there

WoodWorks Tall Wood Design Resource
EARLY TALL WOOD CODE ADOPTION
Statewide Alternate Method (SAM) Number 18-01 provides prescriptive path elements for Tall Wood Buildings of mass timber construction. This alternate path includes scientific conclusions established by the International Code Council’s Ad Hoc Committee on Tall Wood Buildings that were incorporated into fourteen national proposals and utilizes concrete, steel or masonry for the vertical elements of the seismic force-resisting system.

The provisions detailed in the SAM are crafted to coincide with the 2014 Oregon Structural Specialty Code (OSSC) when selected for use.

Three new types of construction are introduced under this method, all three of which are organized under Type IV construction, typically referred to as heavy timber.

The new types of construction are:

- Type IV A
- Type IV B
- Type IV C
Washington state to allow mid and high-rise mass-timber buildings

State is first in the nation to alter building codes in support of a new generation of engineered wooden building materials with exciting properties of strength, durability and beauty. With mass timber, architects and builders acquire a new material to create with and rural areas gain the prospect of new high-skilled, high-paid jobs.

NEWS PROVIDED BY
Washington Forest Protection Association →,
Forterra →
Dec 05, 2018, 10:07 ET

SEATTLE, Dec. 5, 2018 /PRNewswire/ -- The Washington State Building Code Council (SBCC) has approved code changes that will allow for the structural use of mass timber in buildings as tall as 18 stories. This makes Washington the first state in the nation to allow tall mass timber buildings into its building code, without pursuing an alternate method.
DOES TALL WOOD = HIGH RISE?
Mid-Rise vs. High-Rise

If this dimension exceeds 75 feet, building is considered a high rise.

10' floor to floor

Lowest Level of Fire Dept. Vehicle Access

**FIGURE 6-6** Determination of high-rise building
Sprinklers in High Rises

- **Two Water Mains Required if:**
  - Building Height Exceeds 420 ft, or
  - Type IV-A and IV-B buildings that exceed 120 ft in height
ADDRESSING CLT CHAR FALL OFF
CLT char fall off or heat induced delamination occurs when laminations (or pieces thereof) fall off the underside of a CLT panel under extended fire conditions.
In tall buildings, preventing fire re-growth is key. Fire re-growth is a phenomenon in which the heat-release rate of a fire intensifies following a decay phase. Fire re-growth can be initiated when delamination occurs, as this exposes un-charred wood surfaces, thereby resulting in an influx of fuel available for consumption by the fire.
Facts about CLT char fall off:

• Only an item to consider in tall buildings. Important to avoid in high-rise construction where required performance is containment of fire within compartment of origin with no sprinkler or fire service suppression

• Not applicable when discussing mid-rise mass timber (or any building under types II, III, IV-HT or V)

• 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.
PRG 320 is manufacturing & performance standard for CLT. 
2018 edition (referenced in 2021 IBC) added new elevated temperature adhesive performance requirements validated by full-scale and medium-scale qualification testing to ensure CLT does not exhibit fire re-growth.

When designing tall wood – specify CLT per PRG 320-18 (req’d in IBC 2021 for all CLT)
Fire Safety During Construction

New code provisions in International Fire Code (IFC) address construction fire safety of tall wood buildings

3308.4 Fire safety requirements for buildings of Types IV-A, IV-B, and IV-C construction. Buildings of Types IV-A, IV-B, and IV-C construction designed to be greater than six stories above grade plane shall meet the following requirements during construction unless otherwise approved by the fire code official.
1. Standpipes shall be provided in accordance with Section 3313.
2. A water supply for fire department operations, as approved by the fire chief.
SECTION 3313
STANDPIPES

3313.1 Where required.
In buildings required to have standpipes by Section 905.3.1, not less than one standpipe shall be provided for use during construction. Such standpipes shall be installed prior to construction exceeding 40 feet (12 192 mm) in height above the lowest level of fire department vehicle access. Such standpipe shall be provided with fire department hose connections at accessible locations adjacent to usable stairways. Such standpipes shall be extended as construction progresses to within one floor of the highest point of construction having secured decking or flooring.

3313.2 Buildings being demolished.
Where a building is being demolished and a standpipe is existing within such a building, such standpipe shall be maintained in an operable condition so as to be available for use by the fire department. Such standpipe shall be demolished with the building but shall not be demolished more than one floor below the floor being demolished.

3313.3 Detailed requirements.
Standpipes shall be installed in accordance with the provisions of Section 905.

Exception: Standpipes shall be either temporary or permanent in nature, and with or without a water supply, provided that such standpipes comply with the requirements of Section 905 as to capacity, outlets and materials.
IFC 3308.4 Cont’d

3. Where building construction exceeds six stories above grade plane, at least one layer of noncombustible protection where required by Section 602.4 of the International Building Code shall be installed on all building elements more than 4 floor levels, including mezzanines, below active mass timber construction before erecting additional floor levels.

4. Where building construction exceeds six stories above grade plane required exterior wall coverings shall be installed on all floor levels more than 4 floor levels, including mezzanines, below active mass timber construction before erecting additional floor level.

Exception: Shafts and vertical exit enclosures
Fire Safety During Construction

Figure 1: Examples of Protection During Construction
For Mass Timber Buildings Greater Than
6 Stories Above Grade Plane
Proponent: Stephen DiGiovanni, representing ICC Ad Hoc Committee on Tall Wood Buildings (TWB) (TWB@iccsafe.org)

2018 International Building Code
Add new text as follows:

1705.5.3 Mass timber construction. Special inspections of Mass Timber elements in Types IV-A, IV-B and IV-C construction shall be in accordance with Table 1705.5.3.

<table>
<thead>
<tr>
<th>Type</th>
<th>Continuous Special Inspection</th>
<th>Periodic Special Inspection</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Inspection of anchorage and connections of mass timber construction to timber deep foundation systems.</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>2. Inspect erection of mass timber construction</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>3. Inspection of connections where installation methods are required to meet design loads.</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>3.1. Threaded fasteners</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>3.1.1. Verify use of proper installation equipment.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.1.2. Verify use of pre-drilled holes where required.</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>3.1.3. Inspect screws, including diameter, length, head type, spacing, installation angle, and depth.</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>3.2. Adhesive anchors installed in horizontal or upwardly inclined orientation to resist sustained tension loads</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>3.3. Adhesive anchors not defined in 3.2.</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>3.4. Bolted connections</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>3.5. Concealed connections</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
This concludes The American Institute of Architects Continuing Education Systems Course

QUESTIONS?

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