Exploring Tall Wood:
New Code Provisions for Tall Timber Structures

Presented by Janelle Leafblad, PE

Photo: Kaiser+Path

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

Course Description

As interest in and use of mass timber in the U.S. has grown, so too has interest in pushing these timber structures to greater heights. Using international examples of successful tall wood buildings as precedent, some designers have proposed tall wood projects in the states using a project-specific performance-based design approach. In order to provide a uniform set of code provisions for these tall wood buildings, the International Code Council established an ad hoc committee on tall wood buildings that proposed a set of code changes allowing up to 18 stories of mass timber construction. Those code changes were announced as approved in January 2019 and will become part of the 2021 International Building Code. Following a brief discussion of history and motivators, this presentation will introduce the new tall wood code provisions and construction types, as well as the technical research and testing that supported their adoption.

Learning Objectives

1. Review the global history of tall wood construction and highlight the mass timber products used in these structures.

2. Explore the work and conclusions of the ICC Ad Hoc Committee on Tall Wood Buildings in establishing 14 new code provisions for the 2021 IBC that address tall wood construction.

3. Discuss differences between the new tall wood mass timber construction types and existing construction types.

4. Identify the key passive fire-resistance construction requirements and active systems that enable taller wood buildings to be built safely.

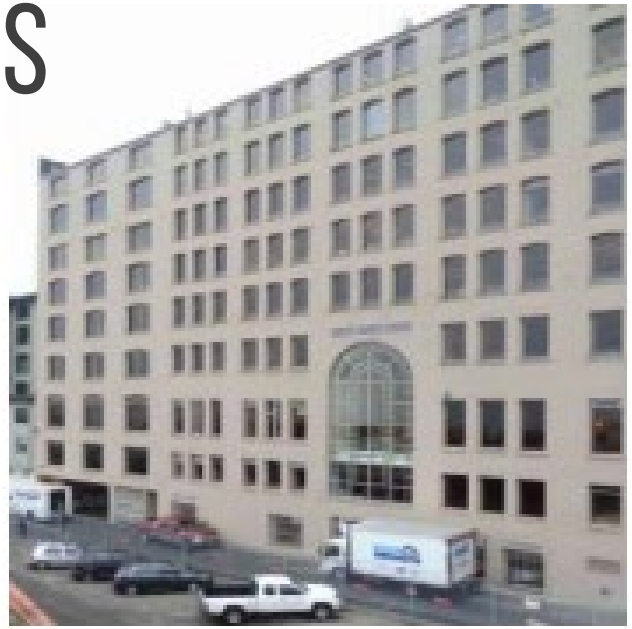
Questions we'll answer:

- What is tall wood?
- How tall is tall?
- What has been done?
- What wood products are used in tall wood?
- What does the code allow now?
- How did we arrive at the proposed tall wood code changes?
- What are the new tall wood code provisions?

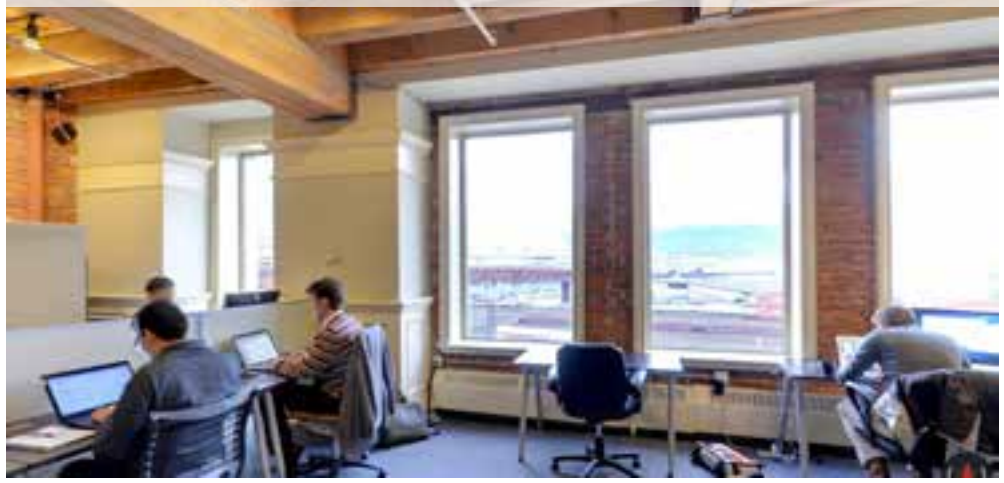
Photo: Michael Green Architecture

TALL WOOD IN NORTH AMERICA CIRCA 1906

9 STORIES



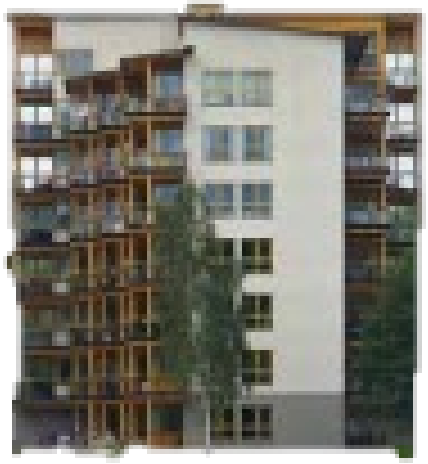
THE LANDING, VANCOUVER



BUTLER SQUARE, MINNEAPOLIS

GLOBAL TALL WOOD CIRCA 2015

7-14 STORIES



GLOBAL TALL WOOD CIRCA 2019

18-24 STORIES

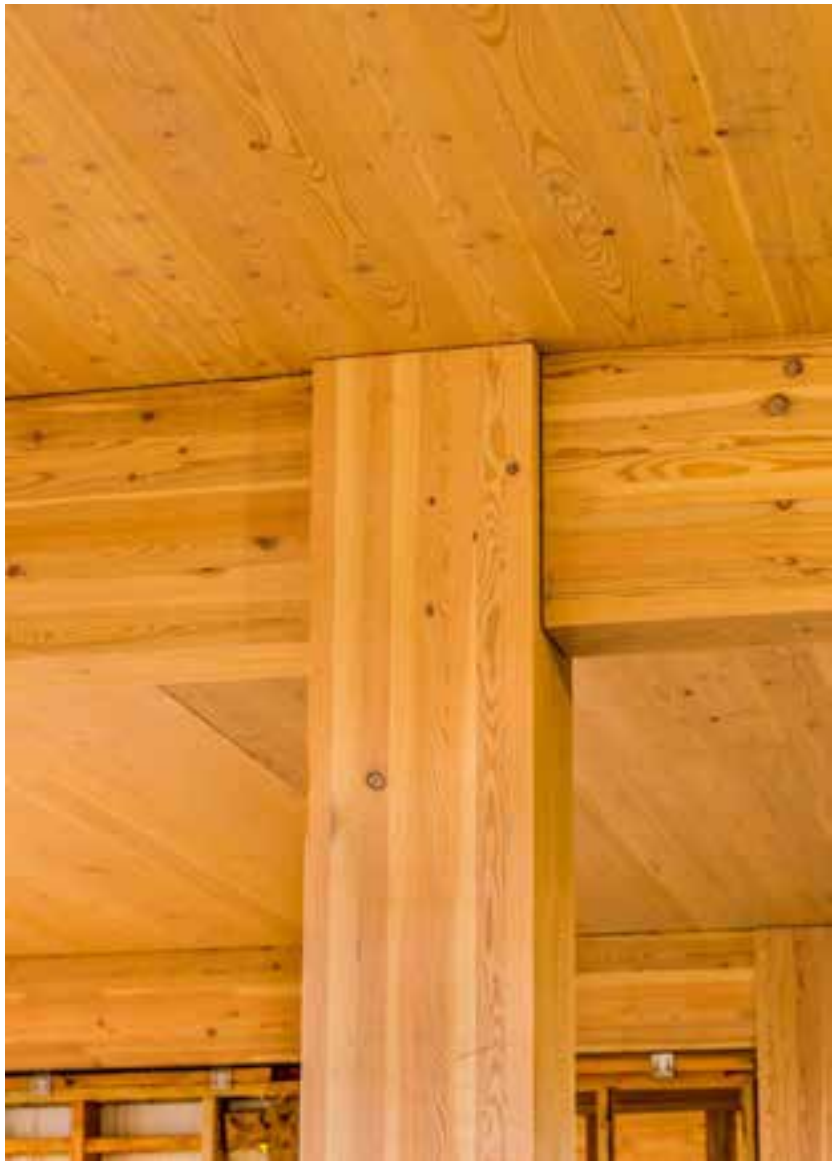

Photo: Moelven Limtre


Photo: naturally:wood


Photo: Rudiger Lainer + Partner

TALL WOOD IN THE US CIRCA 2019

8 STORIES



Photos: Baumberger Studio/PATH Architecture/Marcus Kauffman | Architect: PATH Architecture

HEAVY TIMBER

Federal Center South, Seattle, WA
Photo: Benjamin Benschneider

MASS TIMBER

Bullitt Center, Seattle, WA
Photo: John Stamets

GLULAM

Photo: StructureCraft

CROSS-LAMINATED TIMBER (CLT)

Photo: LendLease

NAIL-LAMINATED TIMBER (NLT)

Photo: Think Wood

Photo: Ema Peter

DOWEL-LAMINATED TIMBER (DLT)

Photo: StructureCraft

Photo: StructureCraft

MASS PLYWOOD PANELS (MPP)

Photo: LEVER Architecture

DECKING

Photo: Bernard André Photography

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Photo: JC Buck


Photo: William Horne


Photo: LEVER Architecture


Photo: David Sundberg and Gray Organschi Architecture


Photo: Christian Columbres

WoodWorks Resources
INTERACTIVE MAP

Credit: Curtis Miller Architecture

WoodWorks Resources
INTERACTIVE MAP

Credit: Francisco Kjolseth, The Salt Lake Tribune

WoodWorks Resources

BUILDING TRENDS: MASS TIMBER MAP

90 TALL WOOD PROJECTS IN DESIGN

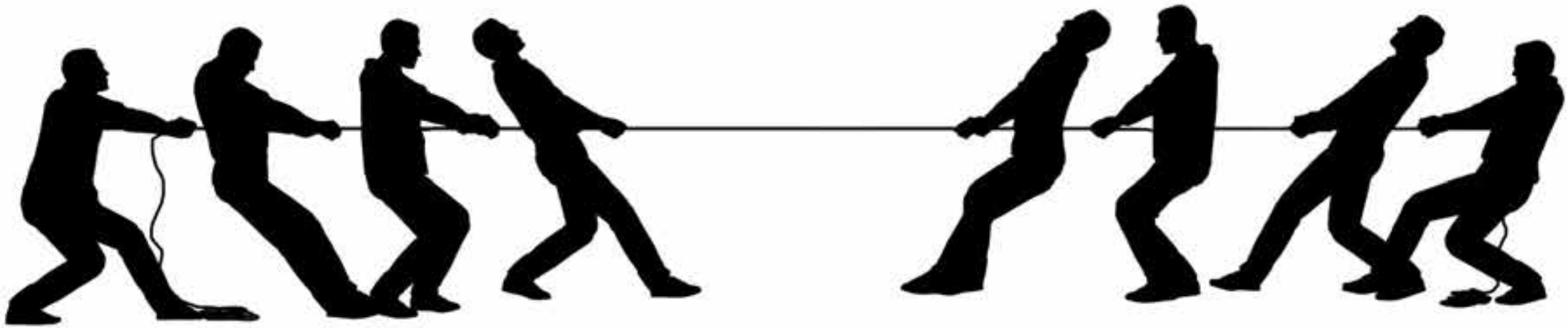
Stage	Mass Timber	# of Projects
Construction Started / Built	CLT	163
	DLT	7
	Heavy Timber Decking	82
	NLT	16
	Post & Beam	116
	Total	384
In Design	CLT	312
	DLT	4
	Heavy Timber Decking	54
	NLT	12
	Post & Beam	155
	Total	537
Grand Total		921

https://www.woodworks.org/publications-media/building-trends-mass-timber/

WHY TALL WOOD?

Construction Traffic & Noise
Material Stockpiles
Labor Costs
Labor Availability
Weather Risks

Resiliency
Sustainability
Fire & Life Safety



MARKET DRIVERS FOR MASS TIMBER

PRIMARY DRIVERS

- Construction Efficiency & Speed
- Construction site constraints – Urban Infill
- Innovation/Aesthetic

SECONDARY DRIVERS

- Carbon Reductions
- Structural Performance – lightweight

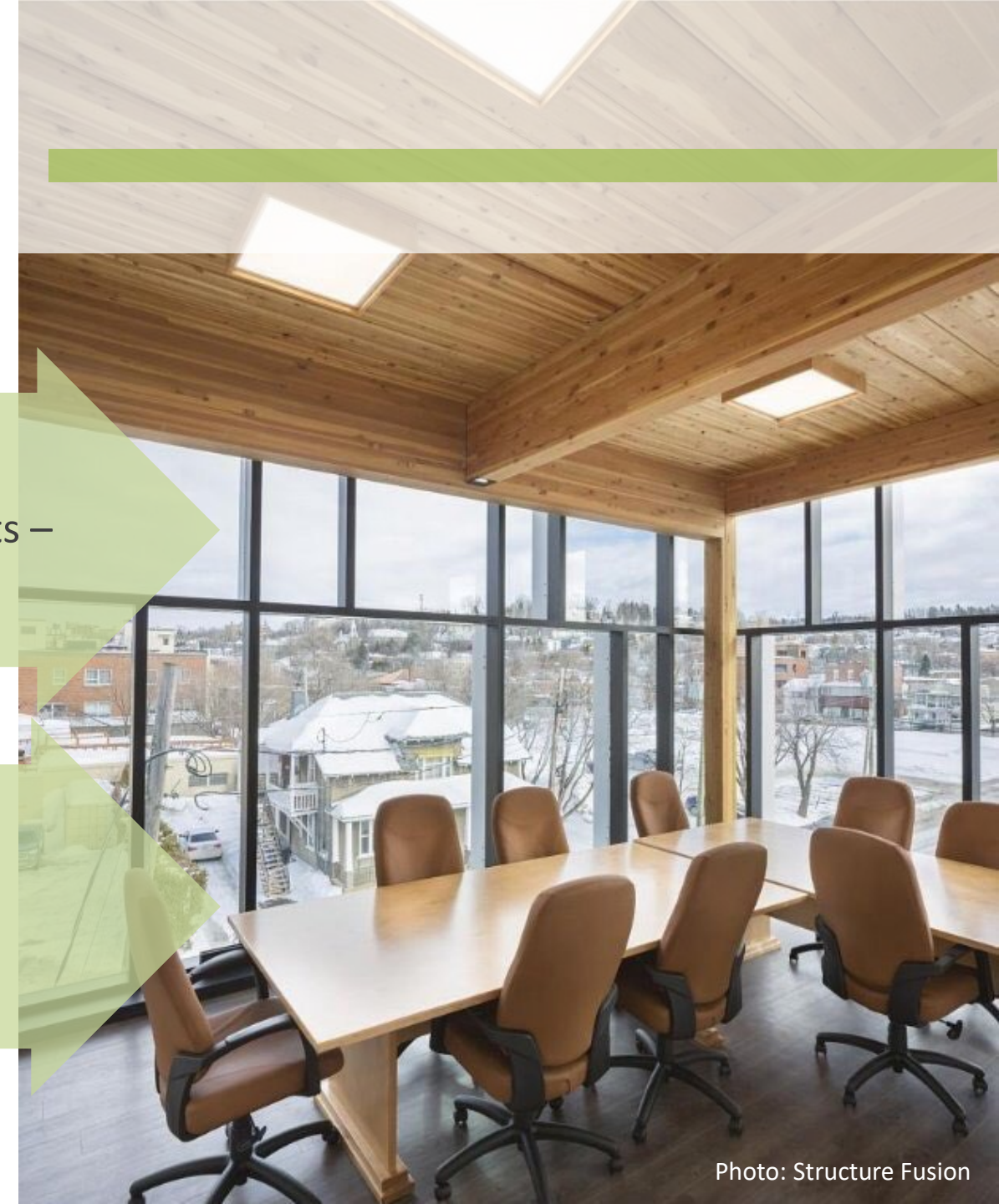


Photo: Structure Fusion

ESTIMATED ENVIRONMENTAL IMPACT OF WOOD USE

Volume of wood products used:
2,233 cubic meters of CLT and Glulam

U.S. and Canadian forests grow this much wood in:
6 minutes

Carbon stored in the wood:
1,753 metric tons of CO_2

Avoided greenhouse gas emissions:
679 metric tons of CO_2

Total potential carbon benefit:
2,432 metric tons of CO_2

THE ABOVE GHG EMISSIONS ARE EQUIVALENT

511 cars off the road for a year

Energy to operate a home for 222 years

**Estimated by the Wood Carbon Calculator for Buildings, based on research by Sathre, R. and J. O'Connor, 2010, A Synthesis of Research on Wood Products and Greenhouse Gas Impacts, FPInnovations (this relates to carbon stored and avoided GHG).*

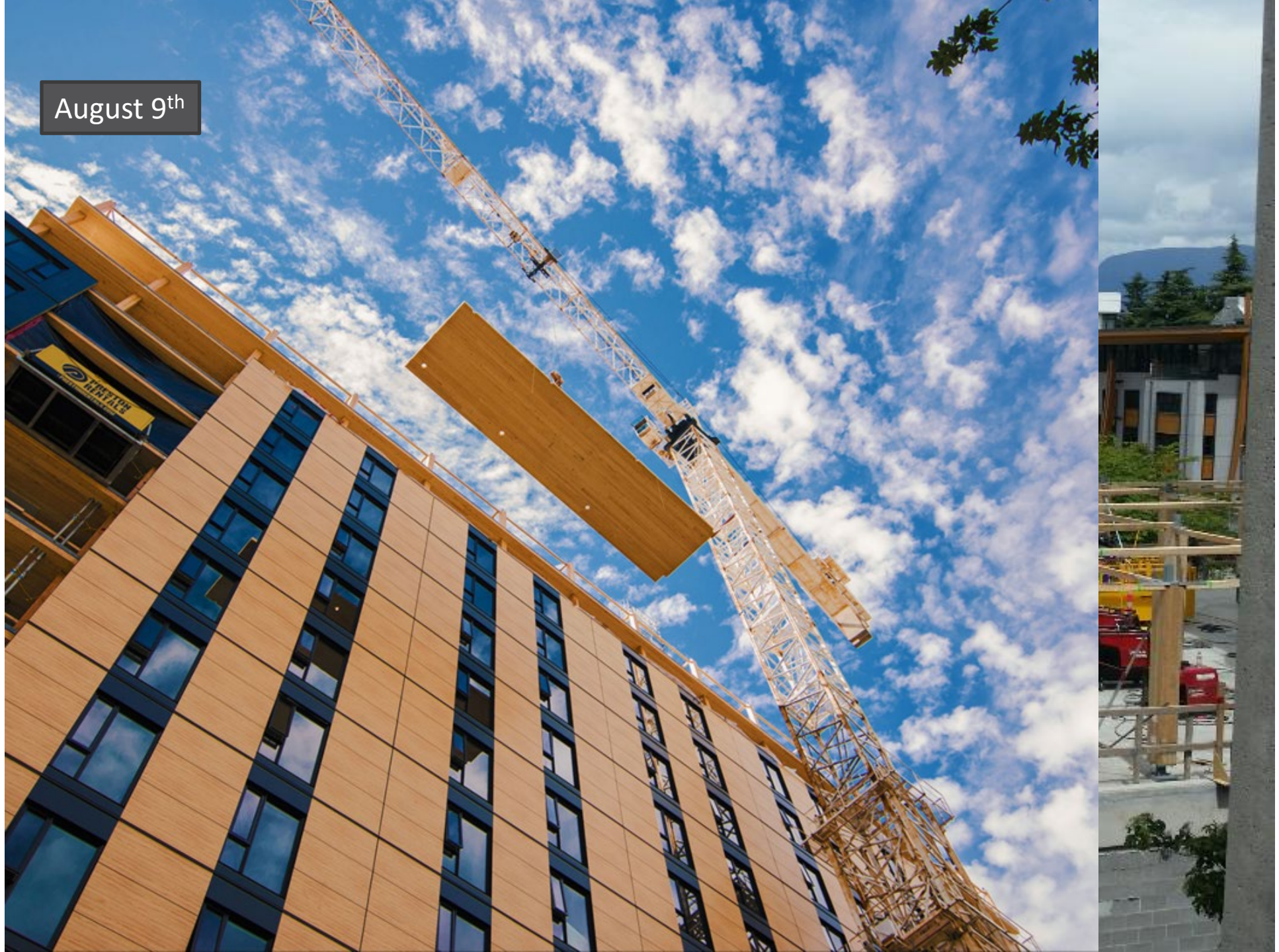
**CO2 in this case study refers to CO2 equivalent*

Source: Naturally:Wood9

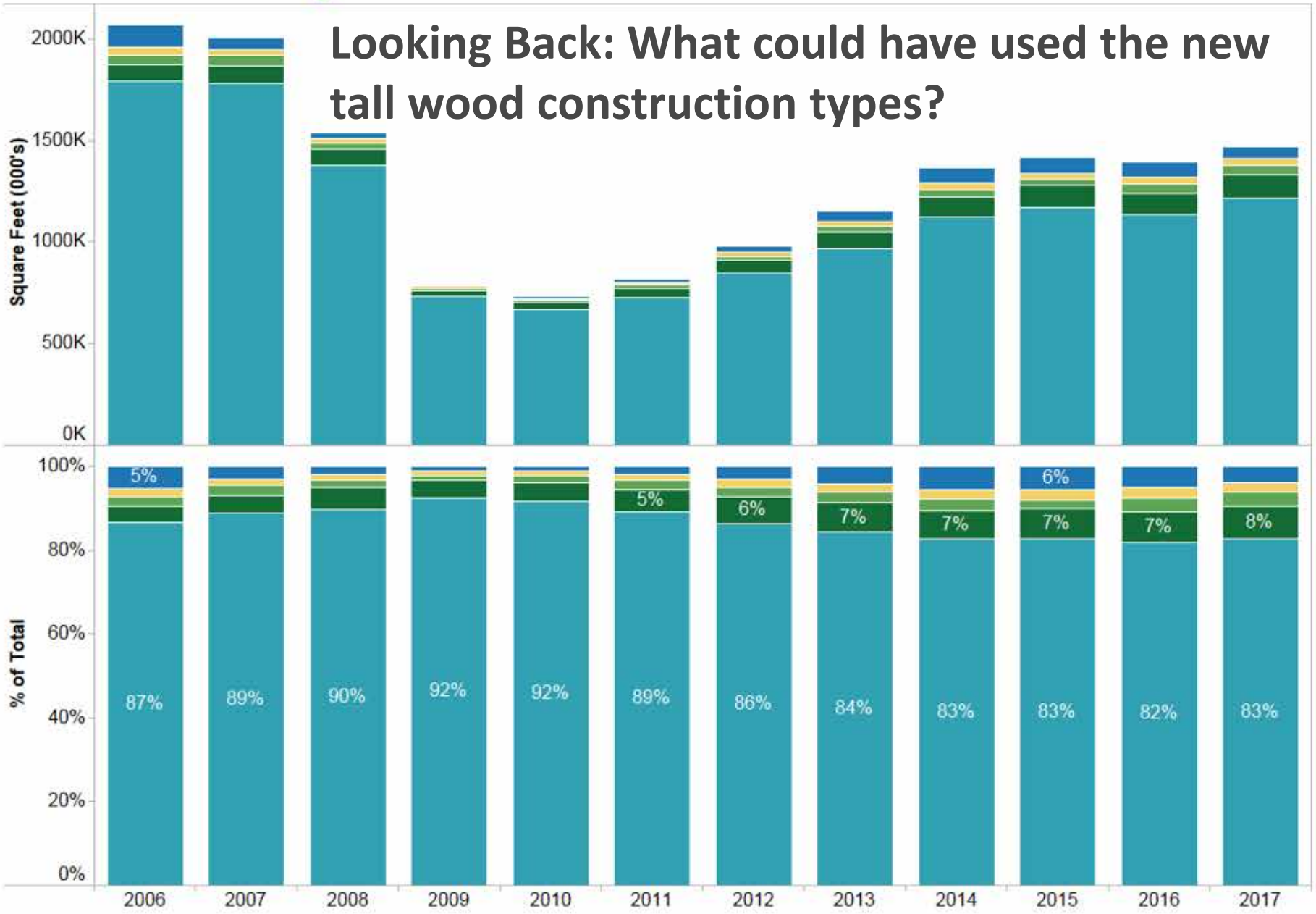
Reduced Embodied Carbon

Brock Commons, Vancouver, BC

Photo Credit: UBC


August 9th

All Multifamily and Non-residential

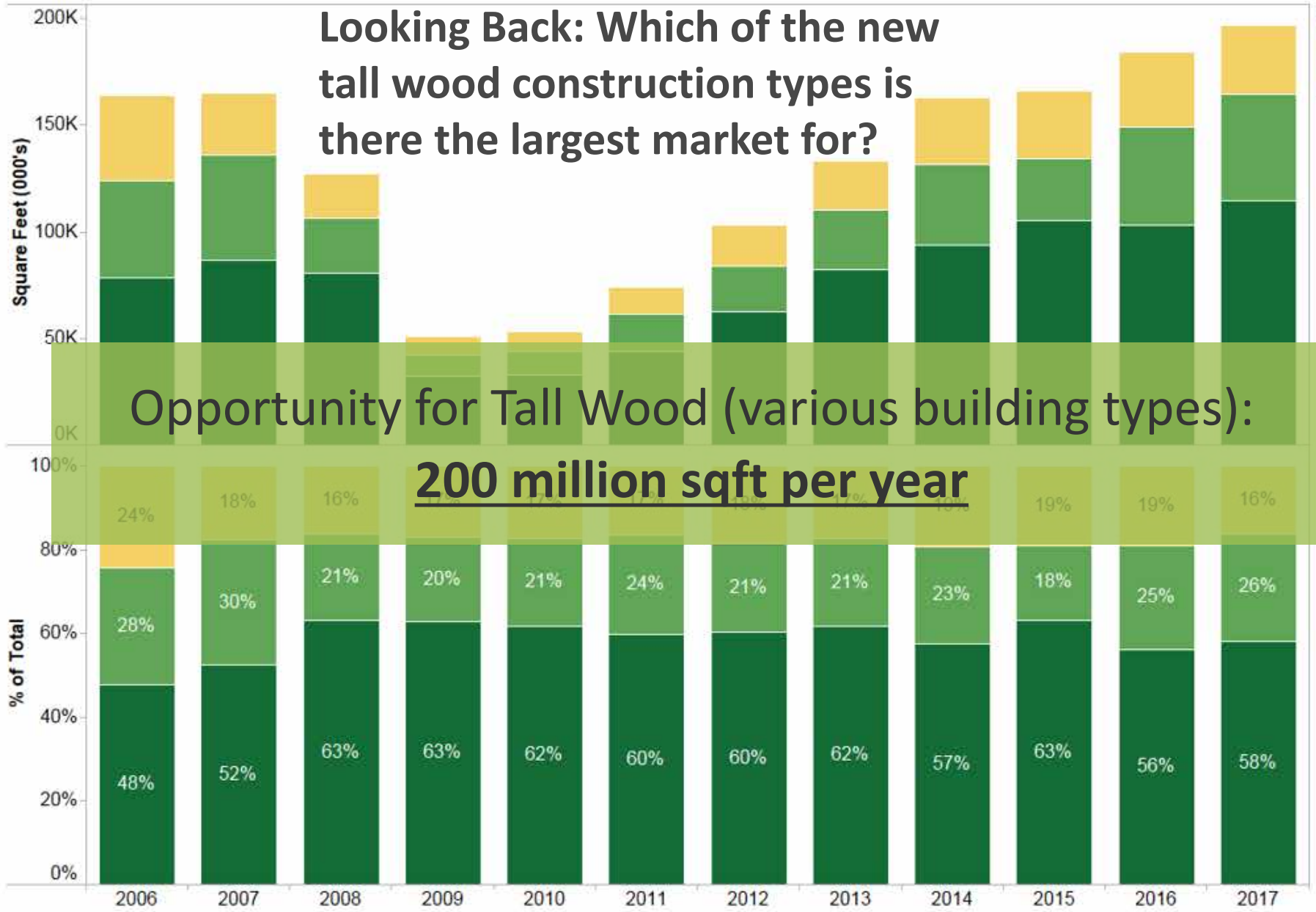


2021 IBC Construction Types

- 19+
- IV-A
- IV-B
- IV-C
- III, IV, V

Estimated construction types calculated using building stories and occupancy

Type IV-A,B,C – MF and Non-residential



Opportunity for Tall Wood (various building types):

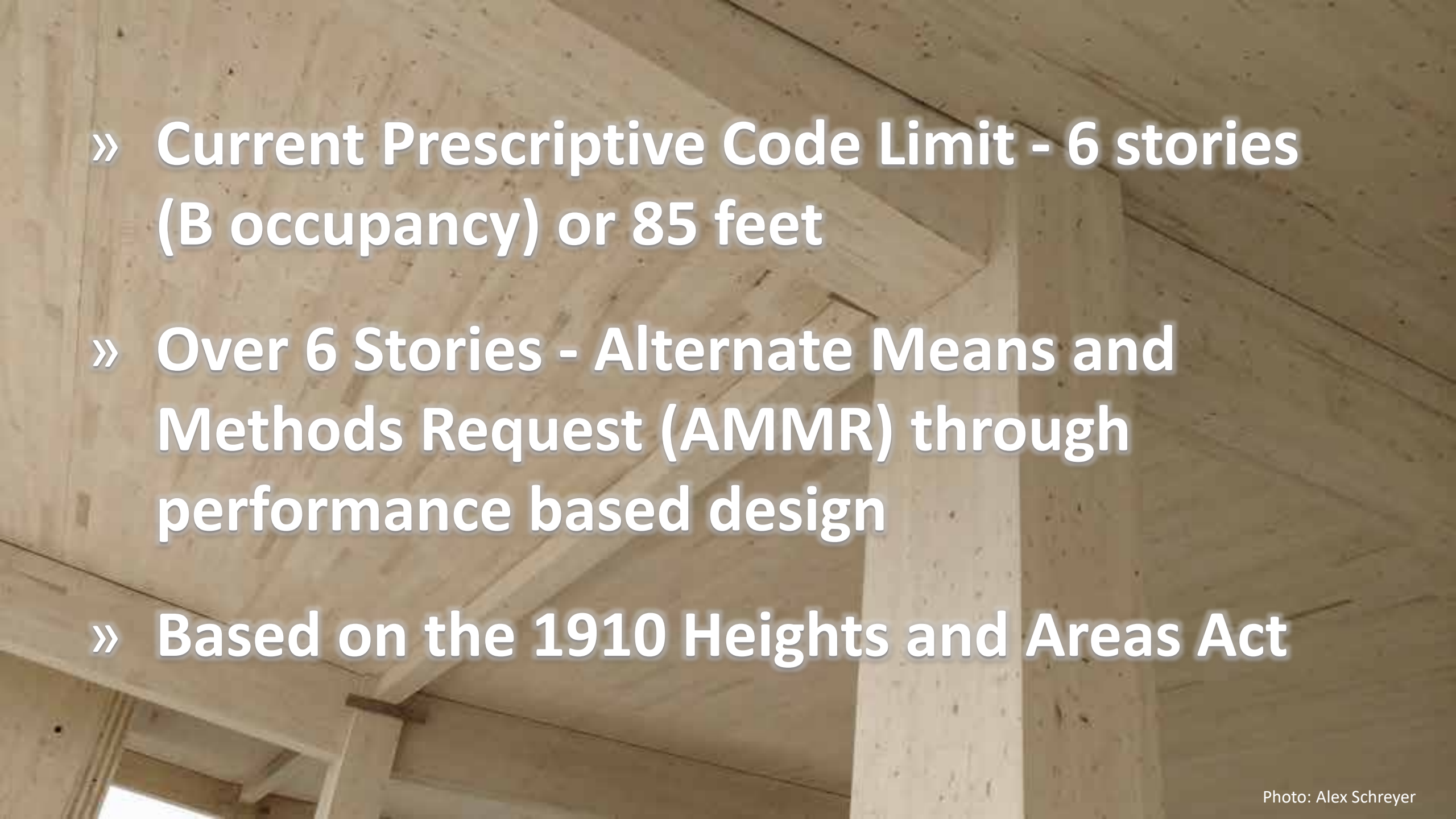
200 million sqft per year

2021 IBC Construction Types

- IV-A
- IV-B
- IV-C

Estimated construction types calculated using building stories and occupancy

TALL WOOD IN THE U.S.



- 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

Photo: Alex Schreyer

Photo: Blaine Brownell

Photo: Christian Columbres

ICE Block I, RMW Architecture & Interiors, Buehler Engineering, Bernard André Photography

Photo: Swinerton

TYPE III CONSTRUCTION, RESIDENTIAL OCCUPANCY: 5 STORIES

Photo: Leers Weinzapfel Associates

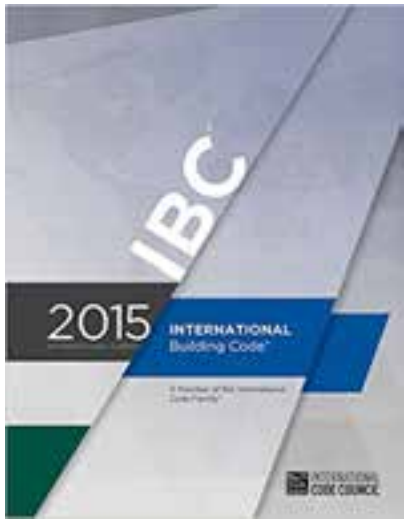
LIGHT-FRAME WOOD
MASS TIMBER

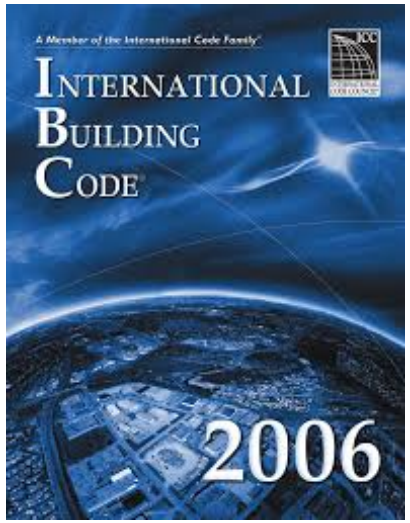
U.S. BUILDING CODE STATUS

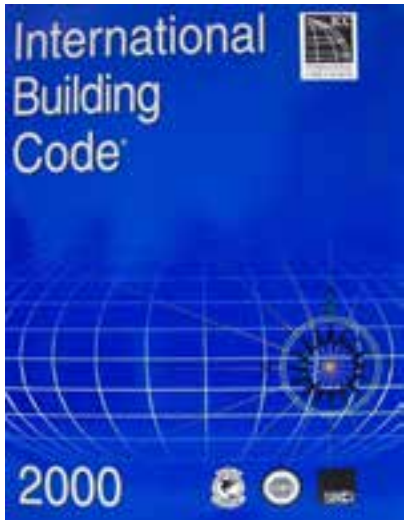
Photo: Ema Peter

ICC INTERNATIONAL CODE COUNCIL®

3 YEAR CODE CYCLE





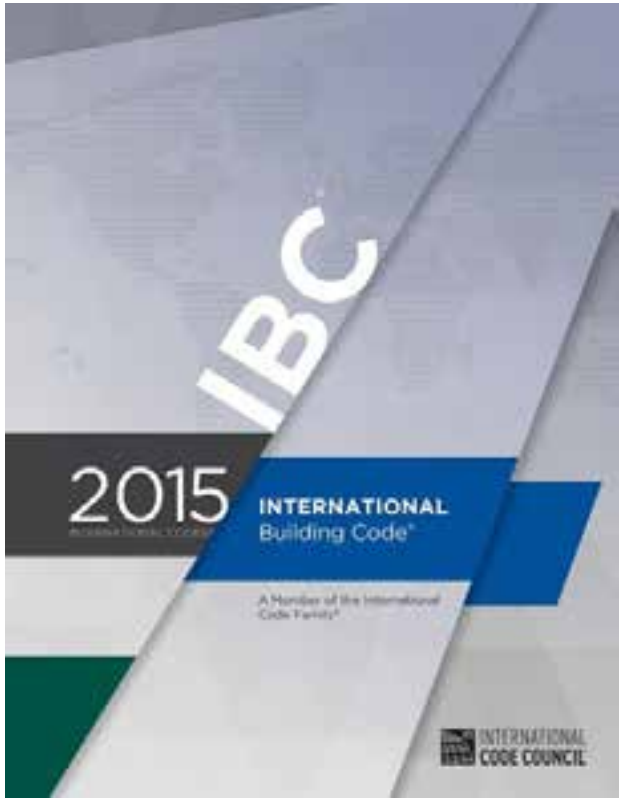


U.S. TALL WOOD
DEVELOPMENT AND CHANGES

Seen as the catalyst for the mass timber revolution, CLT first recognized in US codes in the 2015 IBC

[BS] CROSS-LAMINATED TIMBER. A prefabricated engineered wood product consisting of not less than three layers of solid-sawn lumber or *structural composite lumber* where the adjacent layers are cross oriented and bonded with structural adhesive to form a solid wood element.

2303.1.4 Structural glued cross-laminated timber. Cross-laminated timbers shall be manufactured and identified in accordance with ANSI/APA PRG 320.



U.S. TALL WOOD
DEVELOPMENT AND CHANGES

Interest in tall wood projects in the US was rapidly increasing. Some building officials were reluctant to approved proposed plans, primarily due to lack of code direction and precedent

Empire State Bulding, New York City, New York, 1931

Photo: Seagate Structures

UBC Brock Commons Student Residence, Vancouver, British Columbia, 2016

U.S. TALL WOOD
DEVELOPMENT AND CHANGES

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.

U.S. BUILDING CODES
DEVELOPMENT AND CHANGES

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**

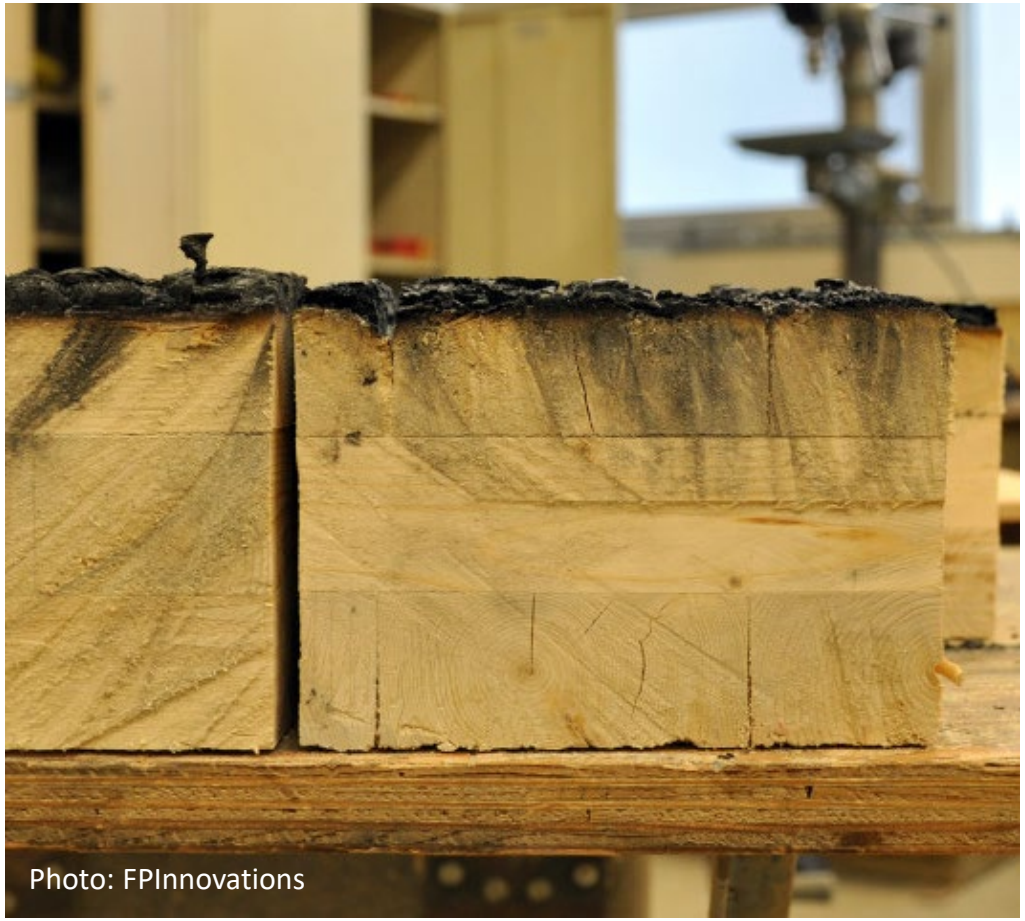
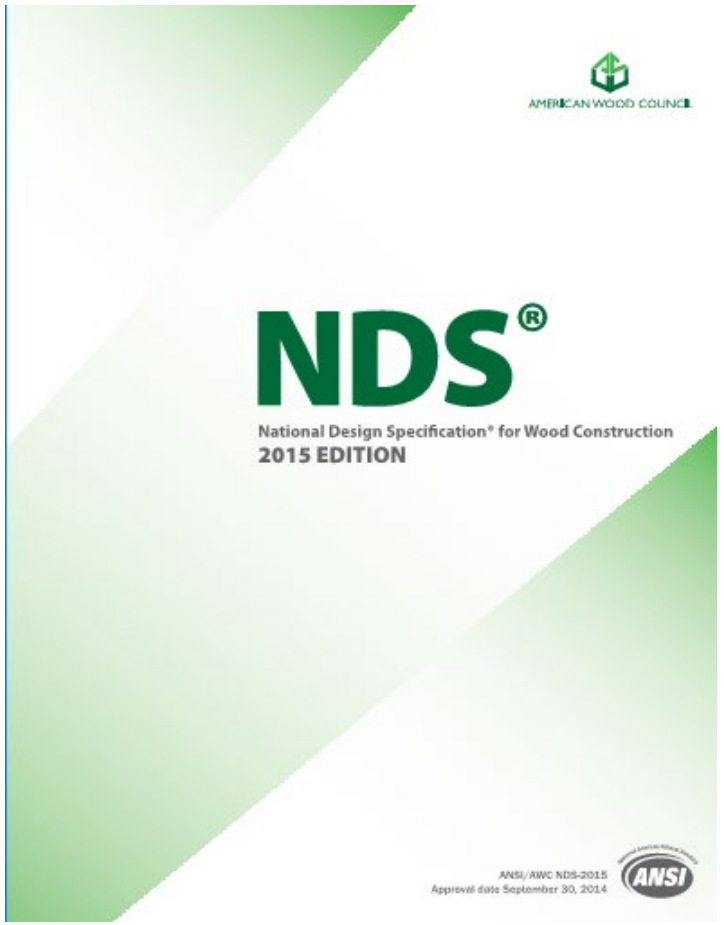
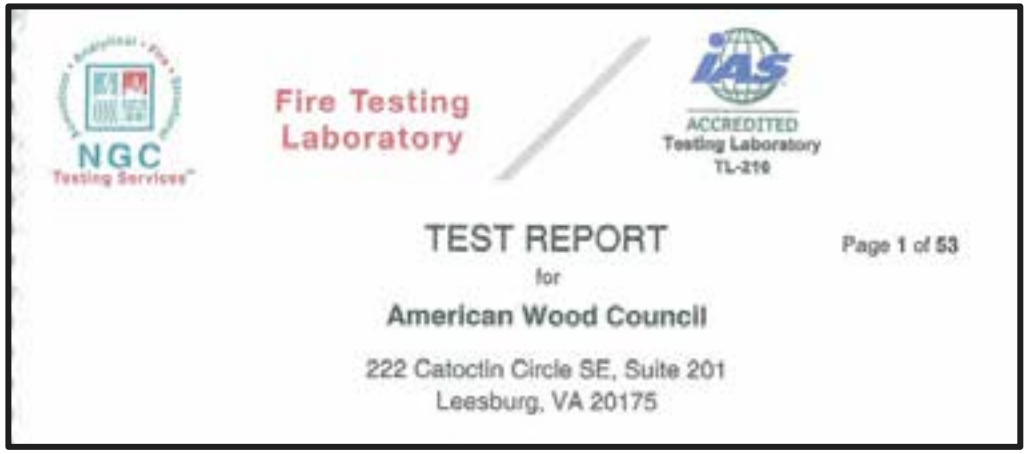


Photo: FPInnovations




NGC Testing Services

Fire Testing Laboratory

IAS ACCREDITED Testing Laboratory TL-216

TEST REPORT

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for

American Wood Council

222 Catoctin Circle SE, Suite 201
Leesburg, VA 20175

Fire resistance of mass timber for low- to mid-rise structures well understood, codified

Taller wood buildings create new set of challenges to address:

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.


Photo: LEVER Architecture

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.

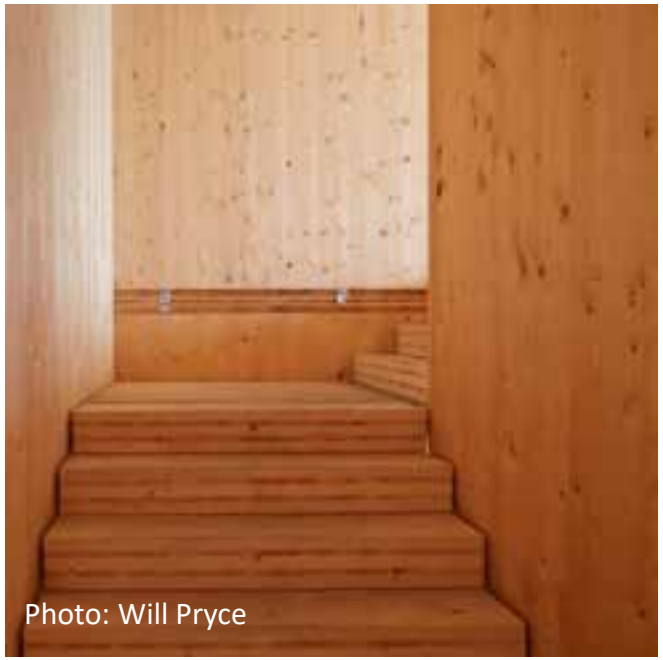


Photo: Will Pryce

U.S. BUILDING CODES
Tall Wood Ad Hoc Committee

Commissioned series of 5 full-scale tests on 2-story mass timber structure at ATF lab in MD, May-June 2017

Figure 2. Elevation view of the front of the cross-laminated timber test structure.

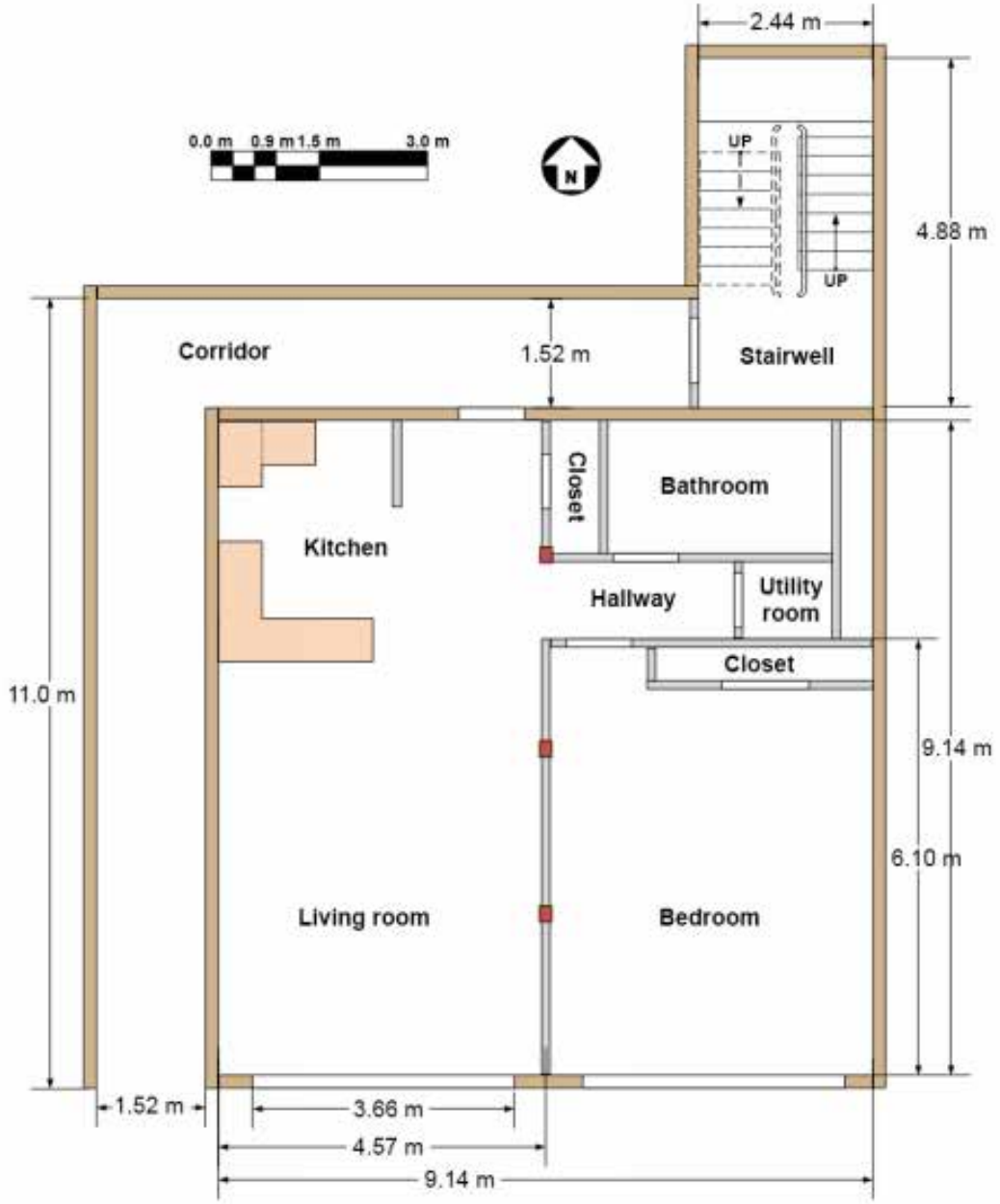


Figure 1. General plan view of cross-laminated timber test structure.

Images: AWC

U.S. BUILDING CODES
Tall Wood Ad Hoc Committee

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

Majority of flames seen are from contents, not structure

U.S. BUILDING CODES
Tall Wood Ad Hoc Committee

Test	Description	Construction Type
Test 1	All mass timber surfaces protected with 2 layers of 5/8” Type X Gypsum. No Sprinklers.	IV-A
Test 2	30% of CLT ceiling area in living room and bedroom exposed. No Sprinklers.	IV-B
Test 3	Two opposing CLT walls exposed – one in bedroom and one in living room. No Sprinklers.	IV-B
Test 4	All mass timber surfaces fully exposed in bedroom and living room. Sprinklered – normal activation	IV-C
Test 5	All mass timber surfaces fully exposed in bedroom and living room. Sprinklered – 20 minute delayed activation	IV-C

Photo: LendLease

Photo: LendLease

Photo: LendLease

Photo: LendLease

Photo: LendLease

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

NFPA RESEARCH FOUNDATION

RESEARCH FOR THE NFPA MISSION

Fire Safety Challenges of Tall Wood Buildings – Phase 2: Task 5 – Experimental Study of Delamination of Cross Laminated (CLT) Timber in Fire

SOUTHWEST RESEARCH INSTITUTE

6220 CULEBRA ROAD 78238-5166 • P.O. DRAWER 28510 78228-0510 • SAN ANTONIO, TEXAS, USA • (210) 684-5111 • WWW.SWRI.ORG

CHEMISTRY AND CHEMICAL ENGINEERING DIVISION

FIRE TECHNOLOGY DEPARTMENT
WWW.FIRE.SWRI.ORG
FAX (210) 522-3377

NSF

DEVELOPMENT OF A FIRE PERFORMANCE ASSESSMENT METHODOLOGY FOR QUALIFYING CROSS-LAMINATED TIMBER ADHESIVES

WFCI

WESTERN FIRE CENTER, INC.

2204 Parrott Way, Kelso, Washington 98626
Phone: 360-423-1400 | Fax: 360-423-5003

Fire Resistance Testing of CLT Floor/Ceiling Assemblies to Establish Contribution of Gypsum Protection

U.S. BUILDING CODES
DEVELOPMENT AND CHANGES

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)

U.S. BUILDING CODES
DEVELOPMENT AND CHANGES

ICC INTERNATIONAL CODE COUNCIL®

2018 (& BEYOND) TIMELINE:

Step 4: May 30 – Committee Action Hearing results posted

Step 5: June 1 - July 16 – Public Comments Sought on Committee Action Hearing Results

Step 6: August 31 – Public Comments Posted

Step 7: October 24-31 – Public Comment Hearing and Vote

Step 8: November 19 – December 7 Final Online Vote

Step 9: Fall 2020 – New Edition is Published

ICC Online Governmental Consensus Voting Results, Ratified January 2019

Tall Wood Code Changes as submitted by TWB Ad Hoc Committee

Code Change	Final Action	CAH Results	PCH Results	OGCV Results/Final Action										Required Majority
					PCH	OGCV	TOTAL			PCH	OGCV	TOTAL		
FS5-18	**AS**	AS	AS	**AS**	186	479	665	88.8%	D	23	61	84	11.2%	Simple Majority
FS6-18	**AMPC 1**	AS	AMPC 1	**AMPC 1**	219	479	698	91.4%	D	6	60	66	8.6%	2/3 Majority
FS73-18	**AS**	AS	AS	**AS**	214	480	694	91.2%	D	8	59	67	8.8%	Simple Majority
FS81-18	**AM**	AM	AM	**AM**	183	485	668	91.6%	D	5	56	61	8.4%	Simple Majority
F266-18	**AMPC 1**	AM	AMPC 1	**AMPC 1**	211	455	666	89.9%	D	13	62	75	10.1%	Simple Majority
G28-18	**AS**	AS	AS	**AS**	215	514	729	94.1%	D	6	40	46	5.9%	Simple Majority
G75-18	**AM**	AM	AM	**AM**	161	386	547	69.0%	D	40	206	246	31.0%	Simple Majority
G80-18	**AS**	AS	AS	**AS**	160	382	542	67.9%	D	62	194	256	32.1%	Simple Majority
G84-18	**AS**	AS	AS	**AS**	172	383	555	71.8%	D	30	188	218	28.2%	Simple Majority
G89-18	**AM**	AM	AM	**AM**	177	482	659	88.7%	D	9	75	84	11.3%	Simple Majority
G108-18	**AM**	AM	AM	**AM**	219	471	690	70.6%	D	103	184	287	29.4%	Simple Majority

% of Vote in Favor of Code Change

% of Vote Req'd for Code Change Approval

SO WHAT'S CHANGED??

INTERNATIONAL CODE COUNCIL®

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

TYPE I		TYPE II		TYPE III		TYPE IV	TYPE V	
A	B	A	B	A	B	HT	A	B

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

BUILDING ELEMENT	TYPE I		TYPE II		TYPE III		TYPE IV				TYPE V	
	A	B	A	B	A	B	A	B	C	HT	A	B

New Building Types

18 STORIES
BUILDING HEIGHT 270'
ALLOWABLE BUILDING AREA 972,000 SF
AVERAGE AREA PER STORY 54,000SF

TYPE IV-A

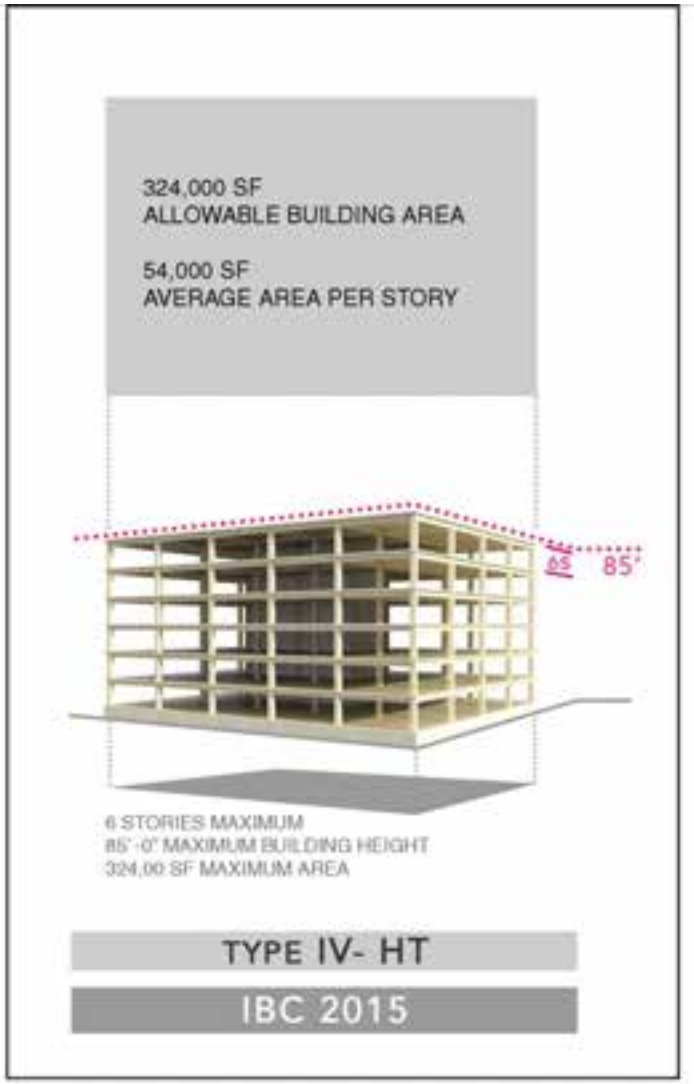
12 STORIES
BUILDING HEIGHT 180 FT
ALLOWABLE BUILDING AREA 648,000 SF
AVERAGE AREA PER STORY 54,000SF

TYPE IV-B

9 STORIES
BUILDING HEIGHT 85'
ALLOWABLE BUILDING AREA 405,000 SF
AVERAGE AREA PER STORY 45,000 SF

TYPE IV-C

IBC 2021



TYPE IV- HT

IBC 2015

BUSINESS OCCUPANCY [GROUP B]

*BUILDING FLOOR-TO-FLOOR HEIGHTS ARE SHOWN AT 12'-0" FOR ALL EXAMPLES FOR CLARITY IN COMPARISON BETWEEN 2015 TO 2021 IBC CODES.

Credit: Susan Jones, atelierjones

Type IV-A

18 STORIES	
BUILDING HEIGHT	270'
ALLOWABLE BUILDING AREA	972,000 SF
AVERAGE AREA PER STORY	54,000SF

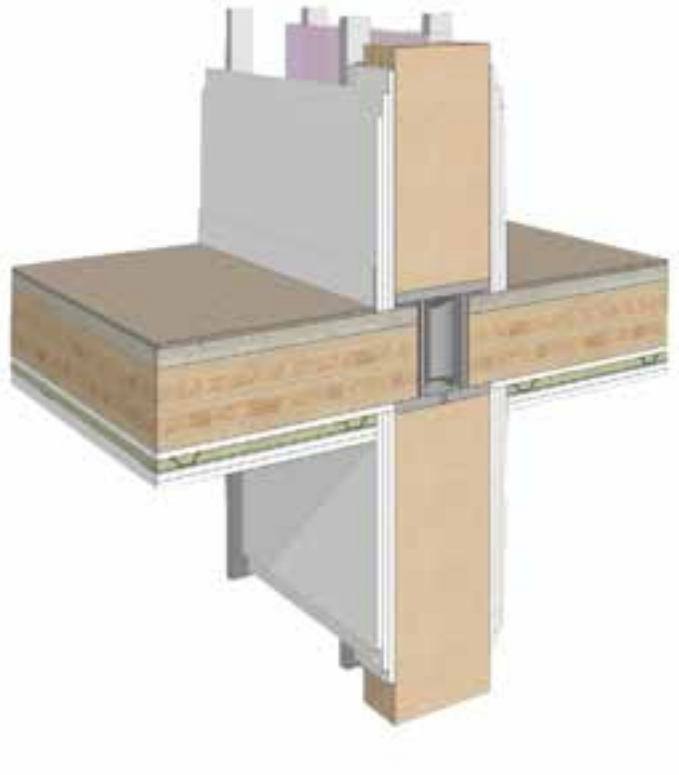
TYPE IV-A

Credit: Susan Jones, atelierjones

Photos: Structurlam, naturally:wood, Fast + Epp, Urban One

Type IV-A Protection vs. Exposed

Credit: Susan Jones, atelierjones



Credit: Acton Ostry Architects, Fast + Epp

100% NC protection on all surfaces of Mass Timber

Type IV-A Height and Area Limits

Occupancy	# of Stories	Height	Area per Story	Building Area
A-2	18	270 ft	135,000 SF	405,000 SF
B	18	270 ft	324,000 SF	972,000 SF
M	12	270 ft	184,500 SF	553,500 SF
R-2	18	270 ft	184,500 SF	553,500 SF

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

Credit: Susan Jones, atelierjones

Credit: Kaiser+Path

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

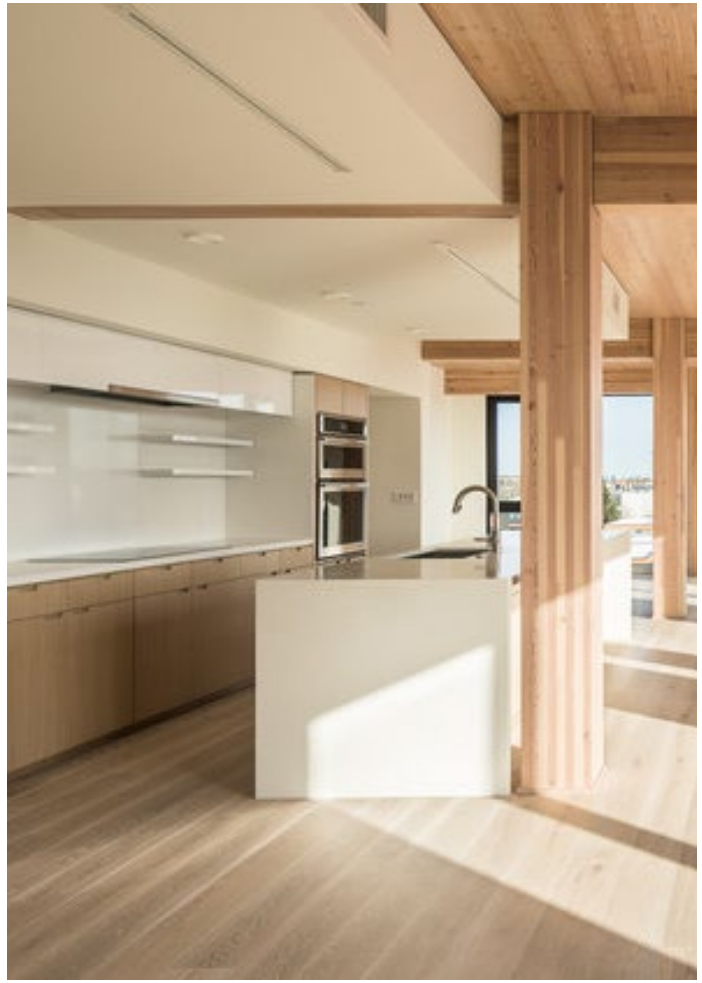
~20% of Ceiling or ~40% of Wall can be exposed, see code for requirements

Type IV-B Protection vs. Exposed

IV-B

Limited Exposed MT allowed in Type IV-B for:

- **MT beams and columns which are not integral part of walls or ceilings, no area limitation applies**
- **MT ceilings and beams up to 20% of floor area in dwelling unit or fire area, or**
- **MT walls and columns up to 40% of floor area in dwelling unit or fire area, or**
- **Combination of ceilings/beams and walls/columns, calculated as follows:**



Credit: Kaiser+Path

Type IV-B Protection vs. Exposed

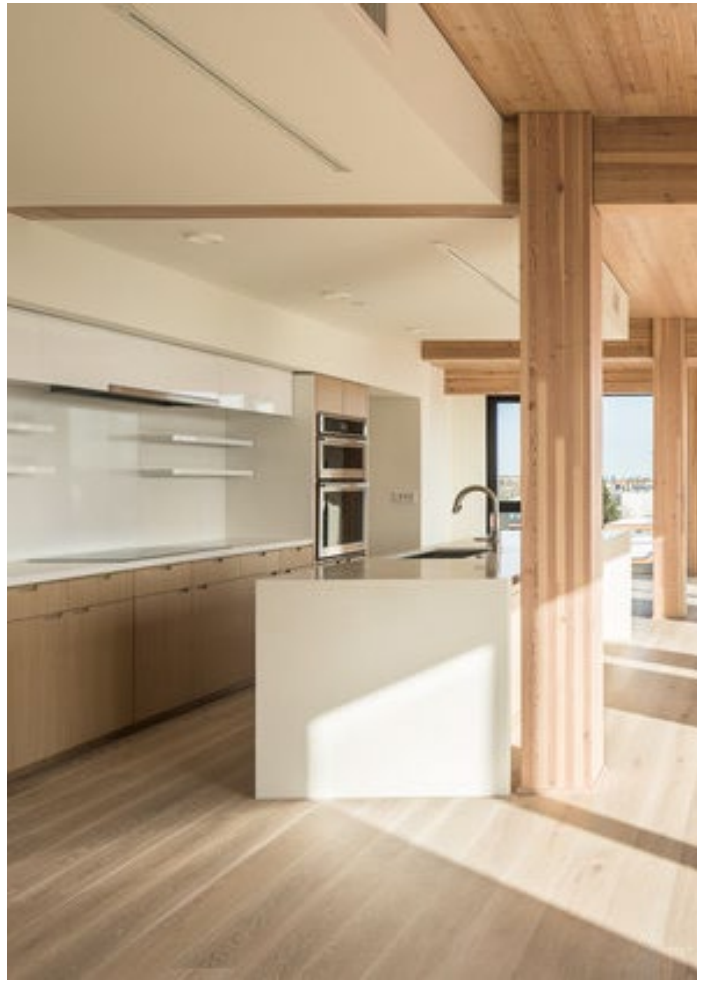
IV-B

Mixed unprotected areas, exposing both ceilings and walls:

- **In each dwelling unit or fire area, max. unprotected area =**

$$(U_{tc}/U_{ac}) + (U_{tw}/U_{aw}) \leq 1.0$$

- **U_{tc} = Total unprotected MT ceiling areas**
- **U_{ac} = Allowable unprotected MT ceiling areas**
- **U_{tw} = Total unprotected MT wall areas**
- **U_{aw} = Allowable unprotected MT wall areas**



Credit: Kaiser+Path

Type IV-B Protection vs. Exposed

IV-B

Design Example: Mixing unprotected MT walls & ceilings

Credit: AWC

800 SF dwelling unit

- U_{ac} = (800 SF)*(0.20) = 160 SF
- U_{aw} = (800 SF)*(0.40) = 320 SF
- Could expose 160 SF of MT ceiling, OR 320 SF of MT Wall, OR
- If desire to expose 100 SF of MT ceiling in Living Room, determine max. area of MT walls that can be exposed

Type IV-B Protection vs. Exposed

IV-B

Design Example: Mixing unprotected MT walls & ceilings

Credit: AWC

$(U_{tc}/U_{ac}) + (U_{tw}/U_{aw}) \leq 1.0$

$(100/160) + (U_{tw}/320) \leq 1.0$

$U_{tw} = 120$ SF

- Can expose 120 SF of MT walls in dwelling unit in combination with exposing 100 SF of MT ceiling

Type IV-B Height and Area Limits

Credit: Susan Jones, atelierjones

Occupancy	# of Stories	Height	Area per Story	Building Area
A-2	12	180 ft	90,000 SF	270,000 SF
B	12	180 ft	216,000 SF	648,000 SF
M	8	180 ft	123,000 SF	369,000 SF
R-2	12	180 ft	123,000 SF	369,000 SF

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

Type IV-C

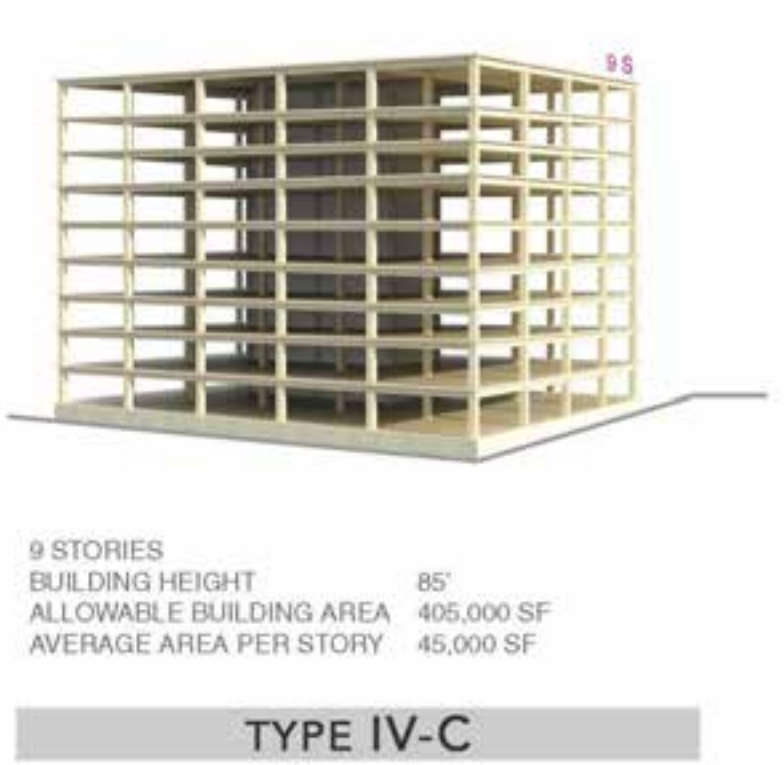
9 STORIES	
BUILDING HEIGHT	85'
ALLOWABLE BUILDING AREA	405,000 SF
AVERAGE AREA PER STORY	45,000 SF

TYPE IV-C

Credit: Susan Jones, atelierjones

Photos: Baumberger Studio/PATH Architecture/Marcus Kauffman

Type IV-C Protection vs. Exposed



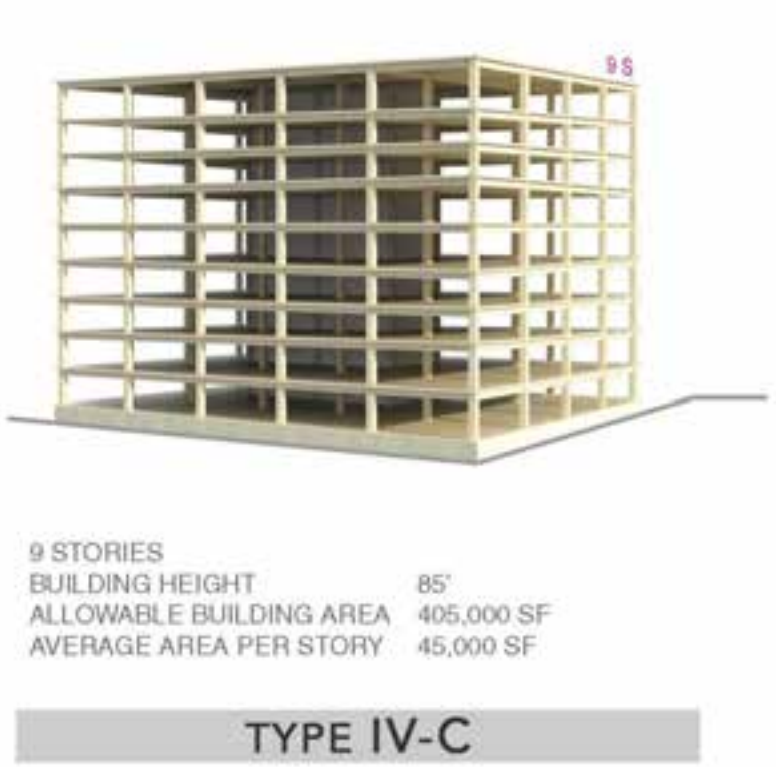
Credit: Susan Jones, atelierjones

Credit: Kaiser+Path, Ema Peter

All Mass Timber surfaces may be exposed

Exceptions: Shafts, concealed spaces, outside face of exterior walls

Type IV-C Height and Area Limits



Occupancy	# of Stories	Height	Area per Story	Building Area
A-2	6	85 ft	56,250 SF	168,750 SF
B	9	85 ft	135,000 SF	405,000 SF
M	6	85 ft	76,875 SF	230,625 SF
R-2	8	85 ft	76,875 SF	230,625 SF

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

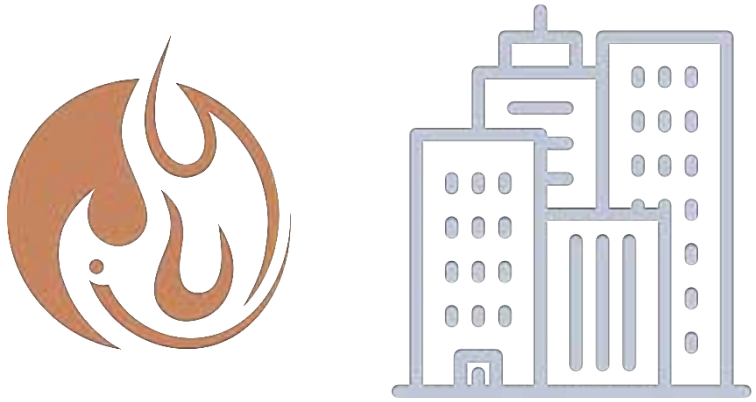
Credit: Susan Jones, atelierjones

Tall Wood Building Size Limits

Utah Title 15A, Chapter 2A, H.B. 54

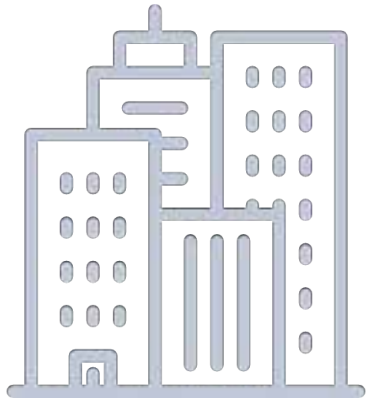
	Construction Type (All Sprinklered Values)						
	I-A	I-B	**IV-A**	**IV-B**	**IV-C**	IV-HT	III-A
Occupancies	**Allowable Building Height above Grade Plane, Feet (IBC Table 504.3)**						
A, B, R	Unlimited	180	**270** 180	**180** 120	**85**	85	85
	Allowable Number of Stories above Grade Plane (IBC Table 505.4)						
A-2, A-3, A-4	Unlimited	12	**18**	**12**	**6**	4	4
B	Unlimited	12	**18**	**12**	**9**	6	6
R-2	Unlimited	12	**18**	**12**	**8**	5	5
	Allowable Area Factor (At) for SM, Feet^2 (IBC Table 506.2)						
A-2, A-3, A-4	Unlimited	Unlimited	**135,000**	**90,000**	**56,250**	45,000	42,000
B	Unlimited	Unlimited	**324,000**	**216,000**	**135,000**	108,000	85,500
R-2	Unlimited	Unlimited	**184,500**	**123,000**	**76,875**	61,500	72,000

Tall Wood Fire Resistance Ratings (FRR)



	IV-A	IV-B	IV-C
Primary Frame or Brng Wall FRR	3 HR (2 HR at Roof)	2 HR (1 HR at Roof)	2 HR (1 HR at Roof)
Floor Construction FRR	2 HR	2 HR	2 HR
Roof Construction FRR	1.5 HR	1 HR	1 HR
Floor Surface Protection	1 inch of NC protection	1 inch of NC protection	No protection req'd
Roof Construction Protection	2 layers 5/8" type X gyp on inside face	2 layers 5/8" type X gyp on inside face	No protection req'd unless concealed space

Tall Wood Materials & Protection



	IV-A	IV-B	IV-C
Exterior Walls	Mass Timber, exterior surface protected with 1 layer 5/8” type X gyp		
Structural Materials	Mass Timber or NC		
Concealed Spaces	Permitted, requires NC protection on MT surfaces		
Gypsum Protection	All MT is protected 3 HR: 3 layers 5/8” type X gyp 2 HR or less: 2 layers 5/8” type X gyp	Same as IV-A for protected MT. Limited exposed MT permitted, FRR still applies	All MT permitted may be exposed except as noted

WoodWorks
WOOD PRODUCTS COUNCIL

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

Scott Breneman, PhD, SE, WoodWorks – Wood Products Council • Matt Timmers, SE, John A. Martin & Associates • Dennis Richardson, PE, CBO, CASp, American Wood Council

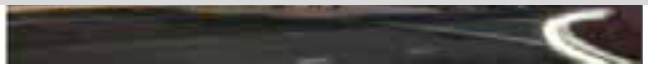
In January 2019, the International Code Council (ICC) approved a set of proposals to allow tall wood buildings as part of the 2021 International Building Code (IBC). Based on these proposals, the 2021 IBC will include three new construction types—Type IV-A, IV-B and IV-C—allowing the use of mass timber 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 (SEAOC) 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

Via Cenni	Milan, Italy	9	2013

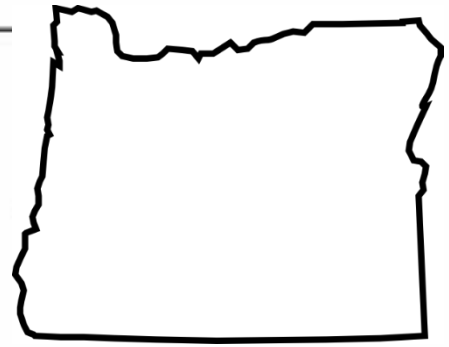


WoodWorks Tall Wood Design Resources

https://www.woodworks.org/publications-media/solution-papers/

EARLY TALL WOOD CODE ADOPTION

State of Oregon
Building Codes Division
Better Buildings for Oregon



Statewide Alternate Method No. 18-01 Tall Wood Buildings – Background

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.

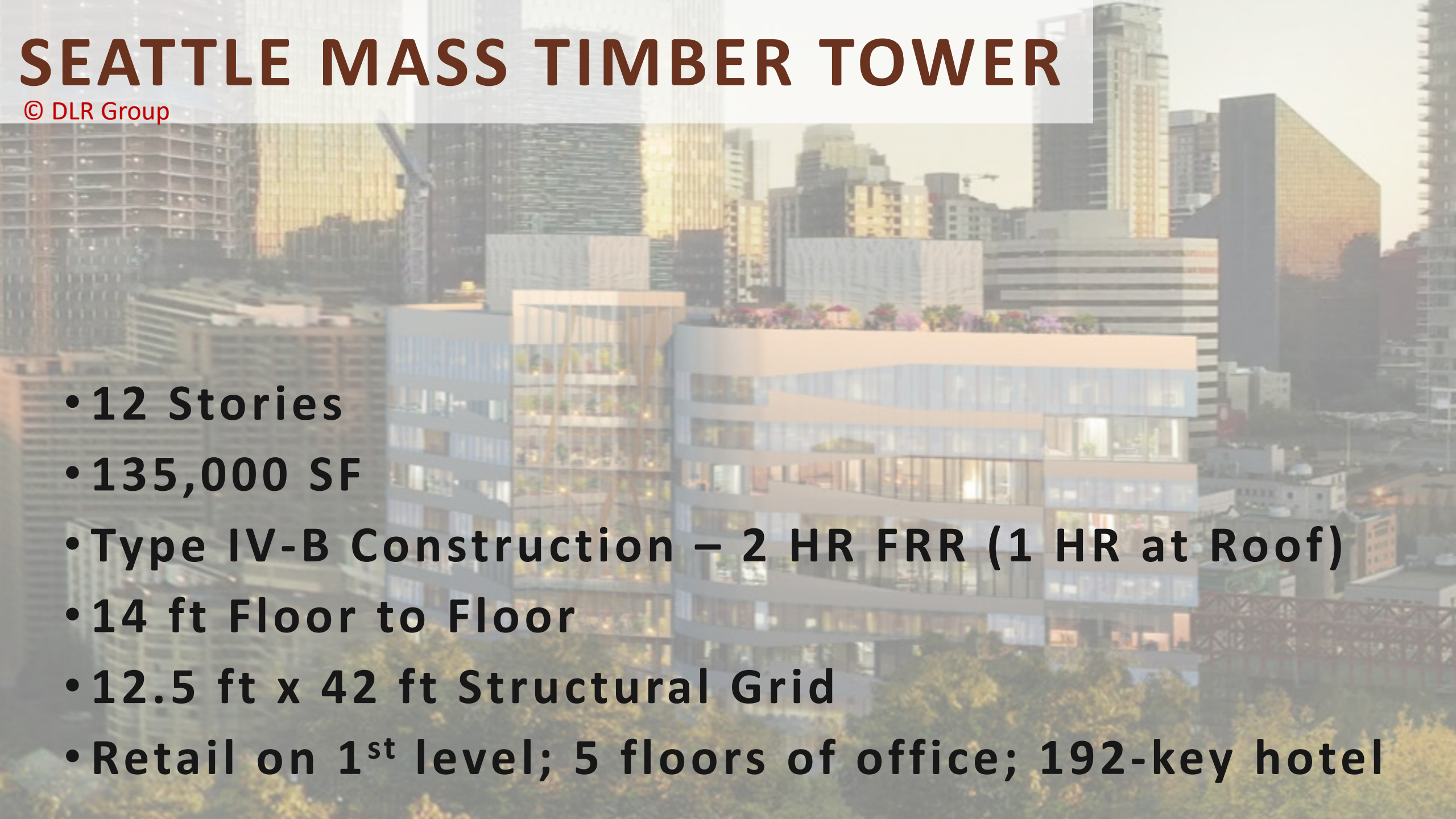
NEWS PROVIDED BY
Washington Forest Protection Association →,
Forterra →
Dec 05, 2018, 10:07 ET

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.

SEATTLE MASS TIMBER TOWER

DLR Group

SEATTLE MASS TIMBER TOWER



- 12 Stories
- 135,000 SF
- Type IV-B Construction – 2 HR FRR (1 HR at Roof)
- 14 ft Floor to Floor
- 12.5 ft x 42 ft Structural Grid
- Retail on 1st level; 5 floors of office; 192-key hotel

QUESTIONS?

This concludes The American Institute of Architects Continuing Education Systems Course

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