AIA Conference on Architecture 2021

TALL TIMBER BUILDINGS

Where Sustainability Meets Performance

AIA
Conference
on Architecture
2021

Ricky McLain, PE, SE

Senior Technical Director – Tall Wood

WoodWorks, Wood Products Council

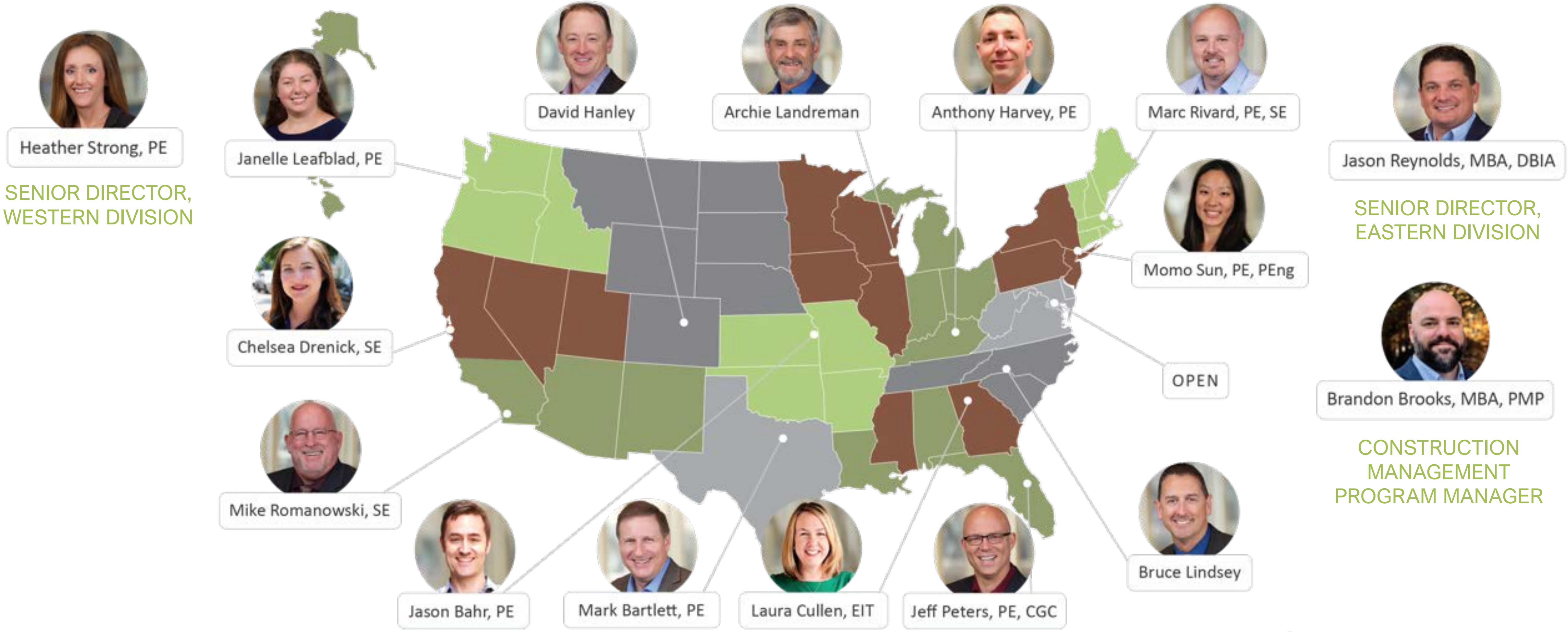
Image: Hickok Cole

Tall Timber Buildings: Where Sustainability Meets Performance

Presented by Ricky McLain, PE, SE, WoodWorks

Design Professionals: One-on-One Support and Assistance

PROJECT SUPPORT FIELD DIVISION



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Course Description

As shapers of the built environment, developers and design teams often have the opportunity—some would say responsibility—to address societal issues through their work. Globally, the groundswell of tall timber buildings has been motivated by the urgent need for housing density in urban areas, and the equally urgent need to respond to the climate crisis by reducing and offsetting carbon emissions. In this session, WoodWorks discusses the global precedent for tall mass timber buildings before exploring their relatively new but globally influential presence in the United States. While other countries have been constructing tall wood buildings for a decade, the U.S. is one of the first to include provisions in its model building code allowing them prescriptively. Topics will include aspects of mass timber's value proposition that are particularly resonant in the context of U.S. construction and market realities, affects on sustainability, forest health and rural economies, and current trends. We'll highlight projects built and in design, and cover design topics that are crucial to realizing a successful mass timber building, including fire resistance, structural layout, connections and details, occupant comfort, cost optimization, building enclosure, and prefabrication.

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 17 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.

The What, Why and How of Tall Mass Timber


Photo: Michael Green Architecture

Current State of Mass Timber Projects

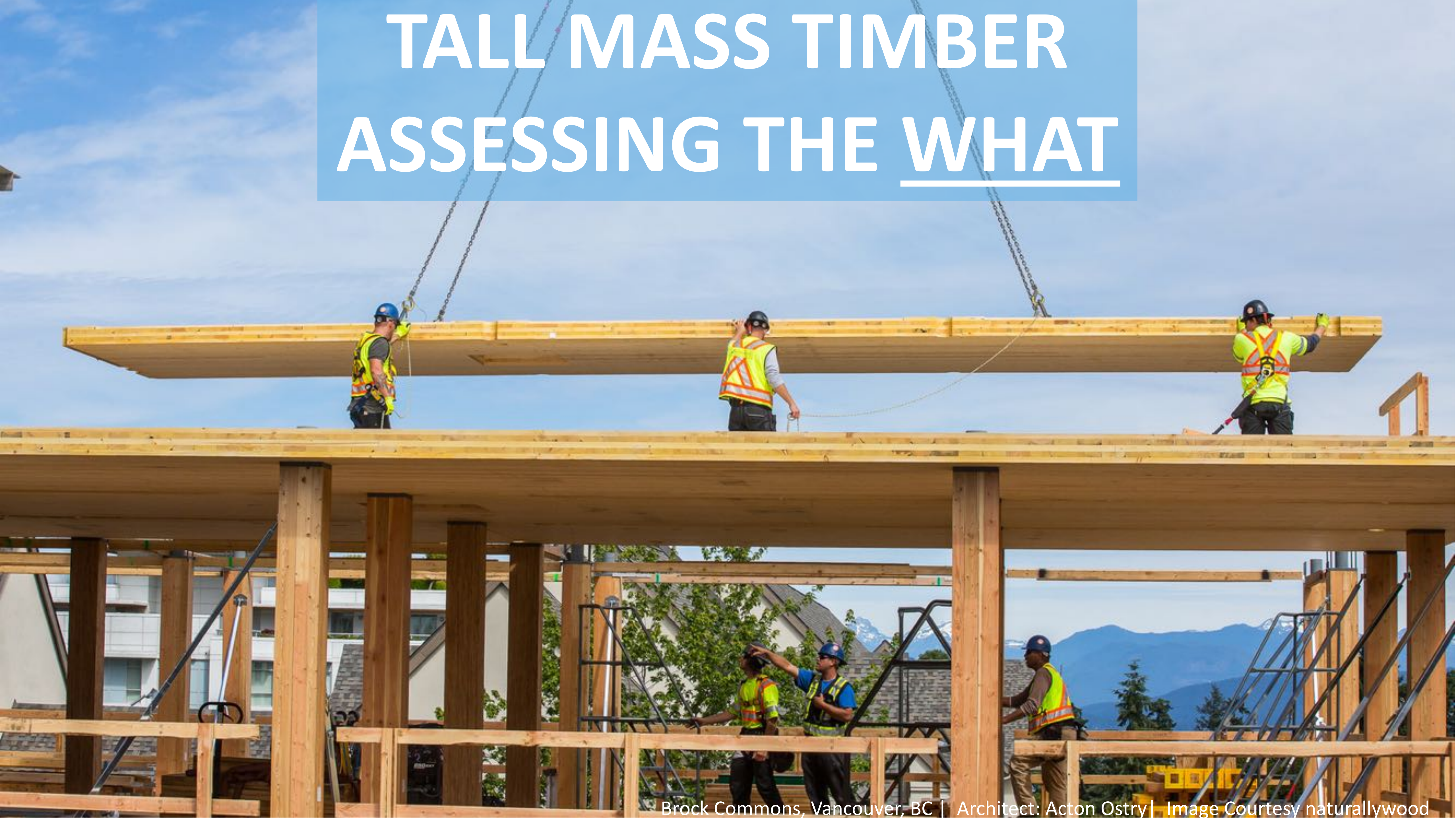
As of June 2021, in the US, **1,169** multi-family, commercial, or institutional projects have been constructed with, or are in design with, mass timber.

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

Source: WoodWorks, June 30, 2021

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

TALL MASS TIMBER
ASSESSING THE WHAT



Brock Commons, Vancouver, BC | Architect: Acton Ostry| Image Courtesy naturallywood

Photos: Michael Elkan | Naturally Wood | UBC

BROCK COMMONS, BRITISH COLUMBIA

18 STORIES | 174 FT

Photos: Bygg Mesteren | Voll Arkitekter

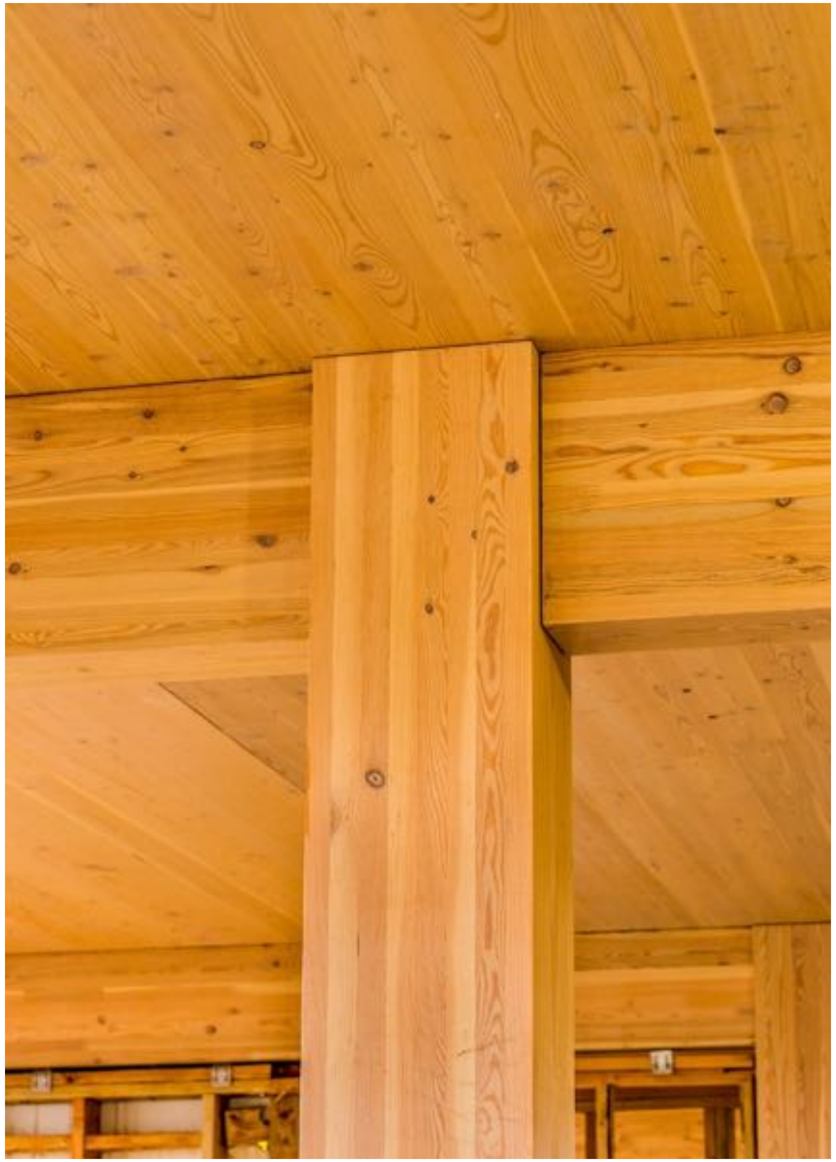
MJOSTARNET, NORWAY

18 STORIES | 280 FT

Photos: *RLP Rüdiger Lainer + Partner, RWTplus*

HOHO, AUSTRIA

24 STORIES | 275 FT



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

CARBON12, PORTLAND, OR

8 STORIES | 85 FT

INTRO, CLEVELAND

9 Stories | 115 ft

8 Timber Over 1 Podium

512,000 SF

297 Apartments, Mixed-Use

Photo: Harbor Bay Real Estate Advisors, Image Fiction | Architect: Hartshorne Plunkard Architecture

ASCENT, MILWAUKEE

Photo: Korb & Associates Architects |
Architect: Korb & Associates Architects


ASCENT, MILWAUKEE
25 STORIES
19 TIMBER OVER 6 PODIUM, 284 FT
Photo: Korb & Associates Architects | Architect: Korb & Associates Architects

80 M ST, WASHINGTON, DC

Photo: Hickok Cole | Architect: Hickok Cole

80 M ST, WASHINGTON, DC

3 STORY VERTICAL ADDITION

ON EXISTING 7 STORY BUILDING

Photo: Hickok Cole | Architect: Hickok Cole

NIR CENTER, PORTLAND, OR

Photo: Hennebery Eddy Architects| Architect: Hennebery Eddy Architects

NIR CENTER, PORTLAND, OR

10 STORIES

Type IV-B Construction
Hybrid Mass Timber + Steel

Photo: Hennebery Eddy Architects| Architect: Hennebery Eddy Architects

Photo: William McDonough + Partners | Architect: William McDonough + Partners

11 E LENOX, BOSTON, MA

Credit: Monte French Design Studio

TALL MASS TIMBER
UNDERSTANDING THE WHY

Brock Commons, Vancouver, BC | Architect: Acton Ostry | Image Courtesy naturallywood

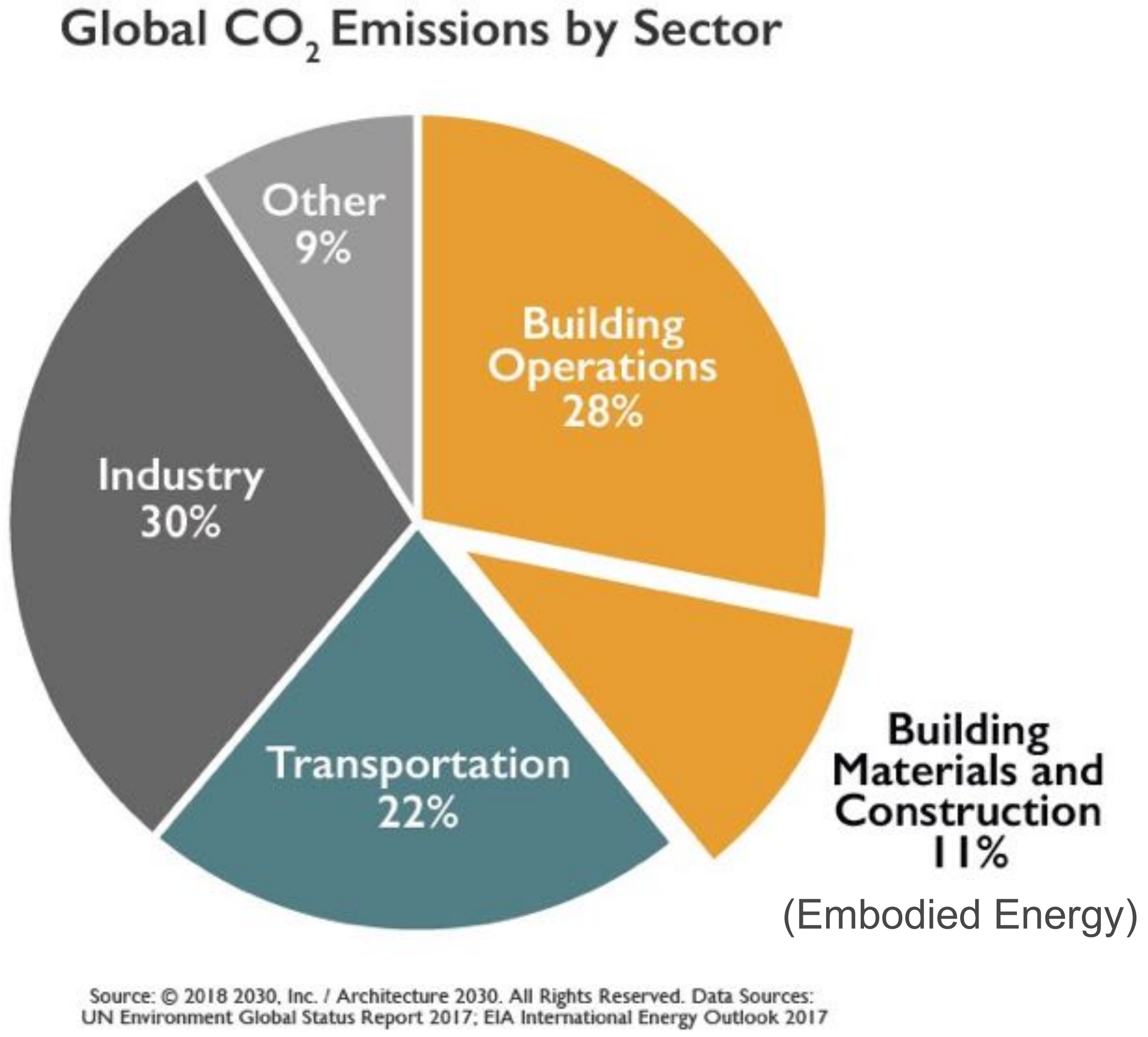
Global Population Increase

2020 = 7.8 billion people

2050 = 9.9 billion people

Source: www.prb.org

New Buildings & Greenhouse Gases



Buildings generate nearly **40%** of annual global greenhouse gas emissions (*building operations* + *embodied energy*)

Embodied energy: **11%**

Concrete, iron, steel **~9%**

Image: Architecture 2030

Carbon Terms

- **Embodied Carbon**: Carbon emissions associated with the entire life cycle of the building including harvesting, mining, manufacturing, transporting, installing, maintaining, decommissioning, and disposing/reuse of a material or product
- **Operational Carbon**: Carbon emissions associated with operating a building including power, heat, and cooling

Image: Boston Society for Architecture

Embodied Carbon

- Primarily related to **manufacturing of materials**
- More significant than many people realize, has been **historically overlooked**
- Big upfront GHG “cost” - which makes it a **good near-term target** for climate change mitigation

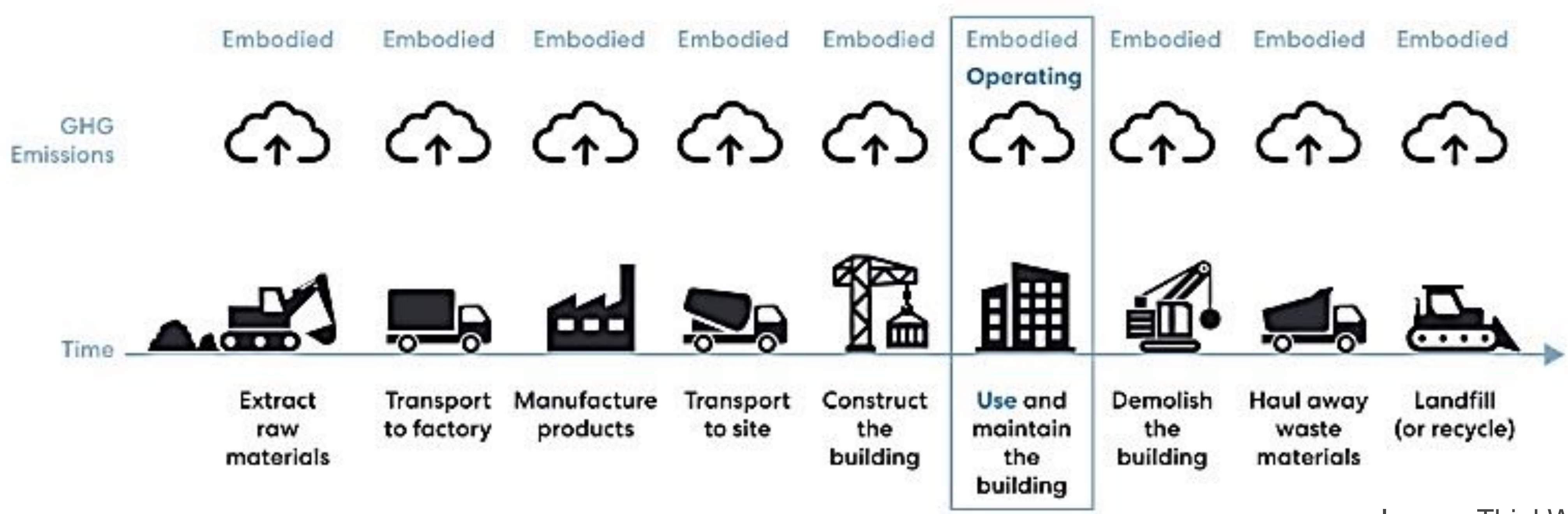


Image: ThinkWood

More Carbon Terms

Carbon Sequestration: The process by which CO_2 is **removed** from the atmosphere and deposited in solid or liquid form in oceans, living organisms, or land.

Carbon Storage: Carbon is **stored as a solid** in the form of plant material: roots, trunks, branches, stems, and leaves. It can continue to be stored in **wood building materials**.

Image: Dovetail Partners, Inc.

Carbon Benefits of Wood

- **Less energy intensive** to manufacture than steel or concrete
- **Less fossil fuel consumed** during manufacture
- **Avoid process emissions**
- Carbon **storage in forests** and **promote forest health**
- Extended carbon **storage in products**

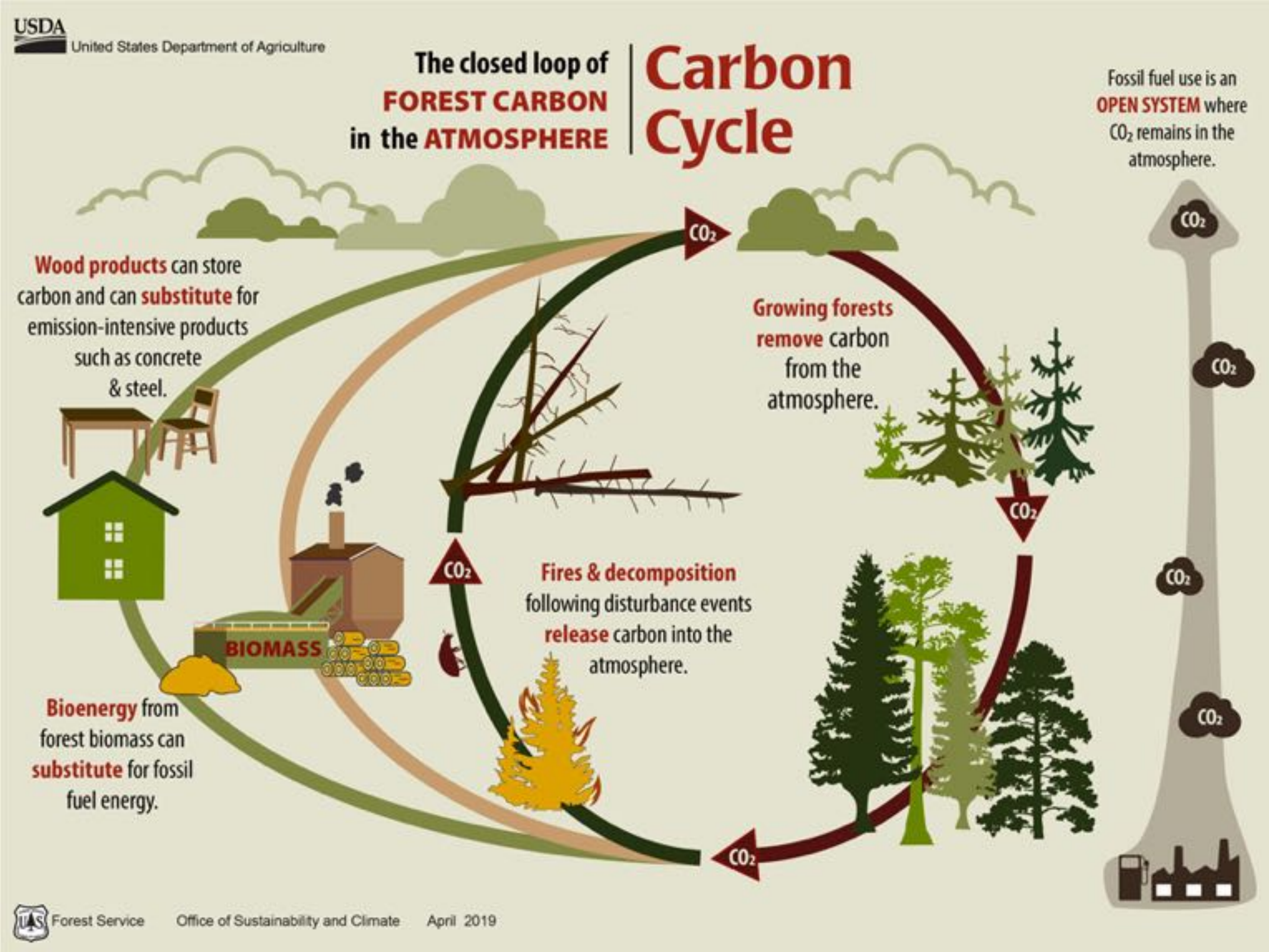


Image: USDA US Forest Service

Carbon Storage

Wood ≈ 50% Carbon (dry weight)

Image: Kaiser + Path

Image: Lever Architecture

Whole Building Life Cycle Analysis (WBLCA)

“Evaluation of the inputs, outputs, and potential environmental impacts… throughout its life cycle”

- WBLCA covers all stages in the life cycle of a building and its components
- Several tools available; various methodologies
- https://www.thinkwood.com/education/calculate-wood-carbon-footprint
- https://www.thinkwood.com/blog/understanding-the-role-of-embodied-carbon-in-climate-smart-buildings

WoodWorks Carbon Calculator

- Available at **woodworks.org**
- Estimates total wood mass in a building
- Relays **estimated** carbon impacts:
    - Amount of **carbon stored** in wood
    - Amount of **greenhouse gas emissions avoided** by choosing wood over a non-wood material

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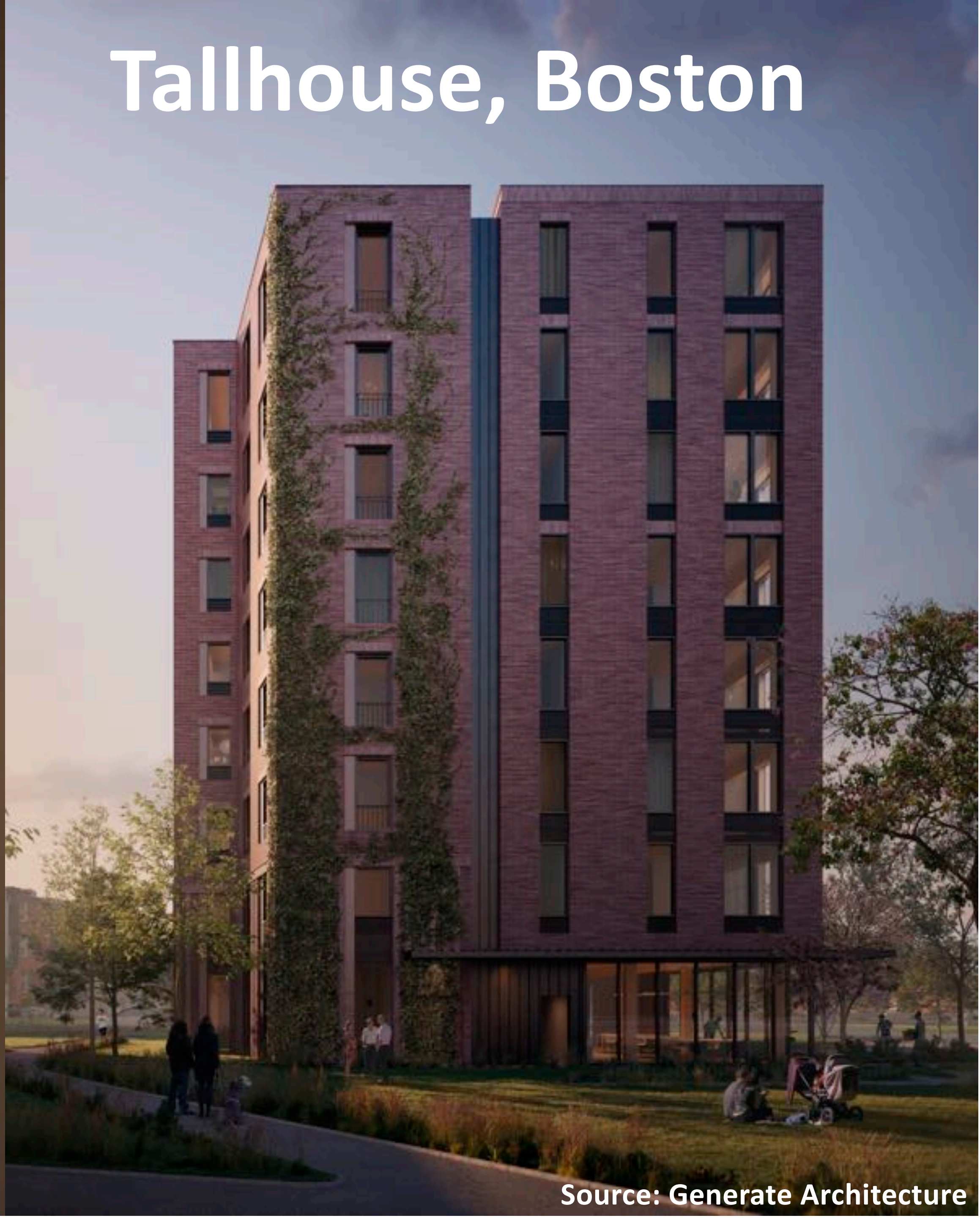
http://www.woodworks.org/carbon-calculator-download-form/

Tallhouse, Boston



Source: Generate Architecture

Tallhouse Boston

GLOBAL WARMING POTENTIAL & MATERIAL MASS

(PER BUILDING ASSEMBLY)

Source: Generate Architecture

The total global warming potential (GWP) of each option is shown with a breakdown by building assembly. The Concrete With Steel Frame and Concrete Flat Slab options have the highest GWP, with the bulk of the impact embedded in the floor slabs. The Timber Use 1 (Floor Slabs; Steel Frame) option offers a slight reduction in GWP, with the most of the savings also embedded in the floor slabs. The Timber Use 2 (Post, Beam, and Plate) option offers a relatively typical approach to building with timber, showing savings in floor slabs, beams and columns. Since Timber Use 3 and 4 are cellular approaches with load-bearing walls, these options included steel podiums to accommodate the ground floor program. Timber Use 3 shows how a hybrid approach with light gauge metal yields GWP savings in structural walls and exterior walls, despite the addition of the podium. Lastly, Timber Use 4 emphasizes how a completely cellular CLT

Is Mass Timber A Sustainable Construction Material Choice?

Common Environmental Concerns About Specifying Wood

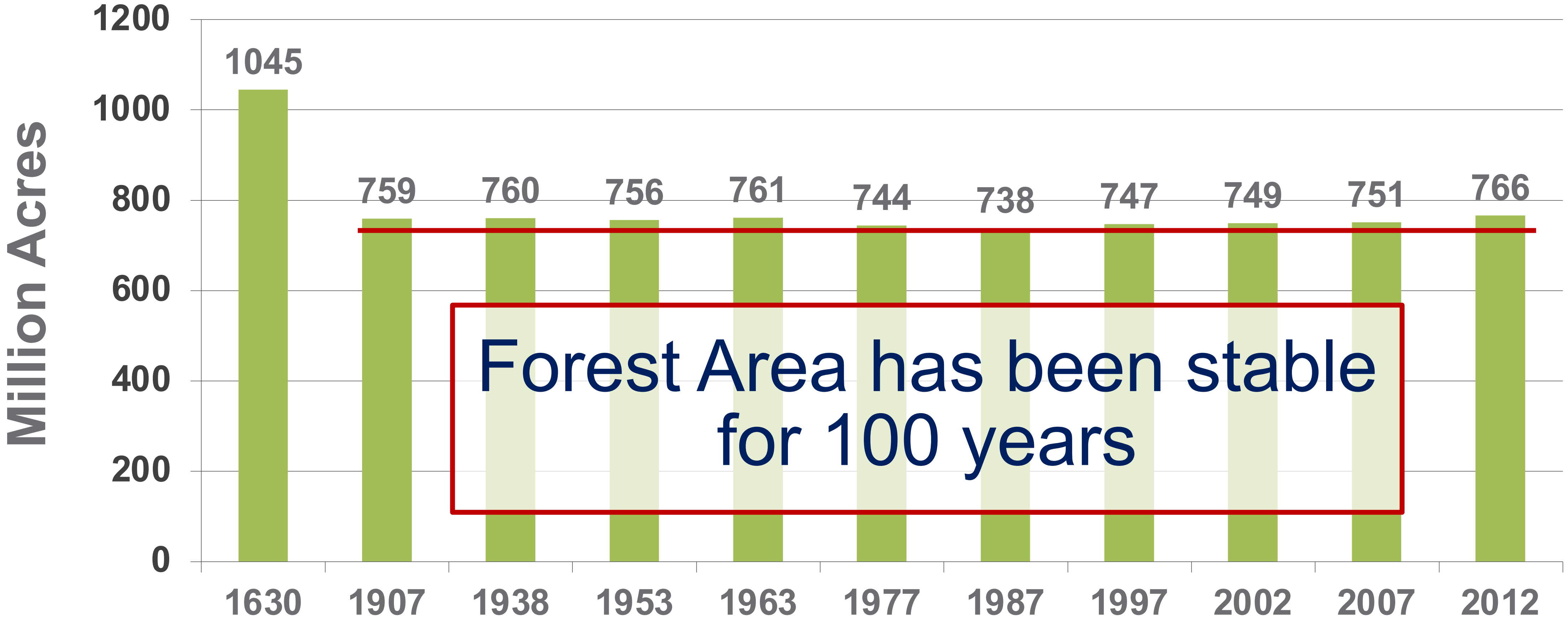
1. Is North America **running out of Forests?**

2. Does specifying wood products contribute to **deforestation?**

3. Is wood is a **renewable resource?**

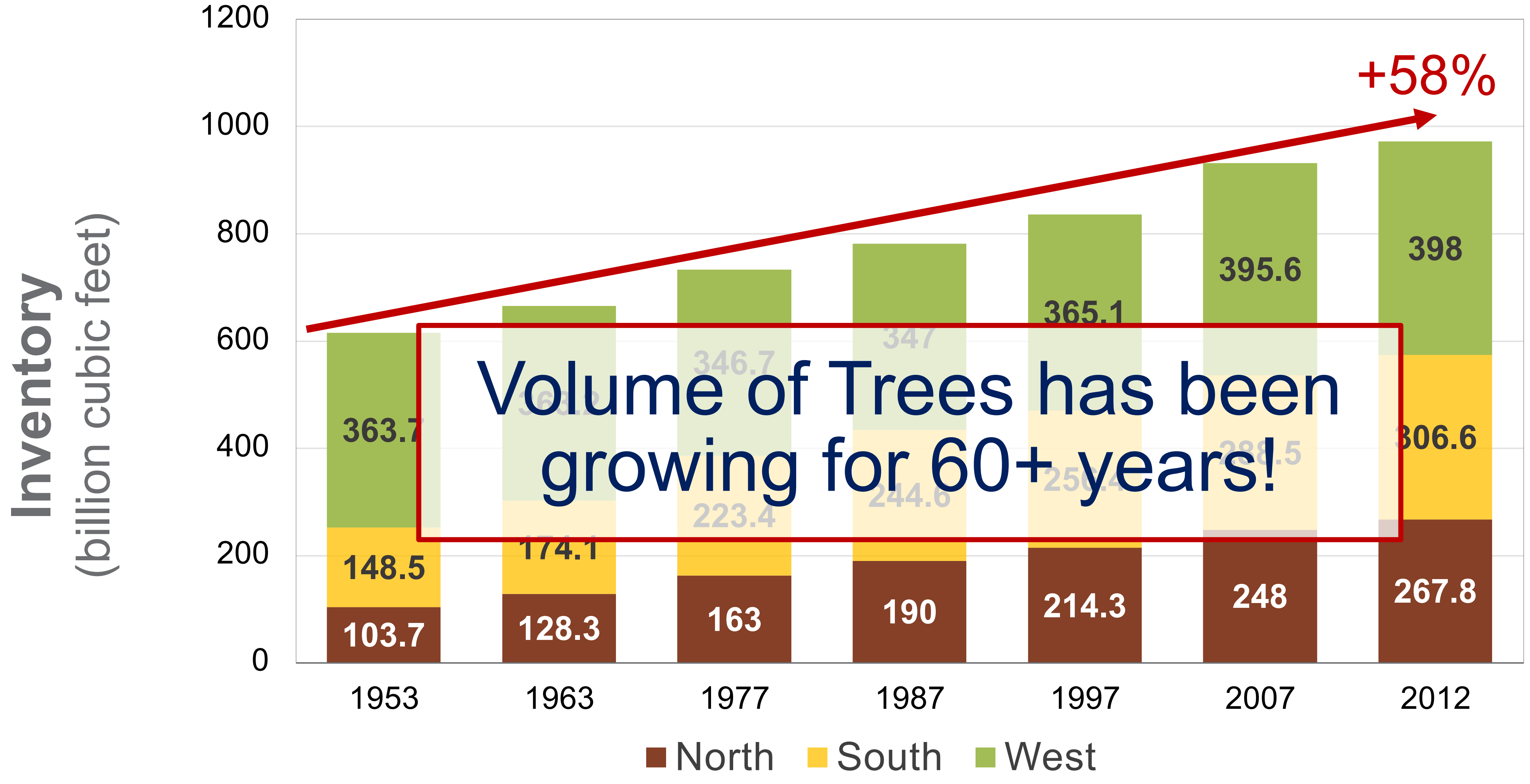
U.S. Forest Land:

Forest **Area** in the United States 1630 – 2012



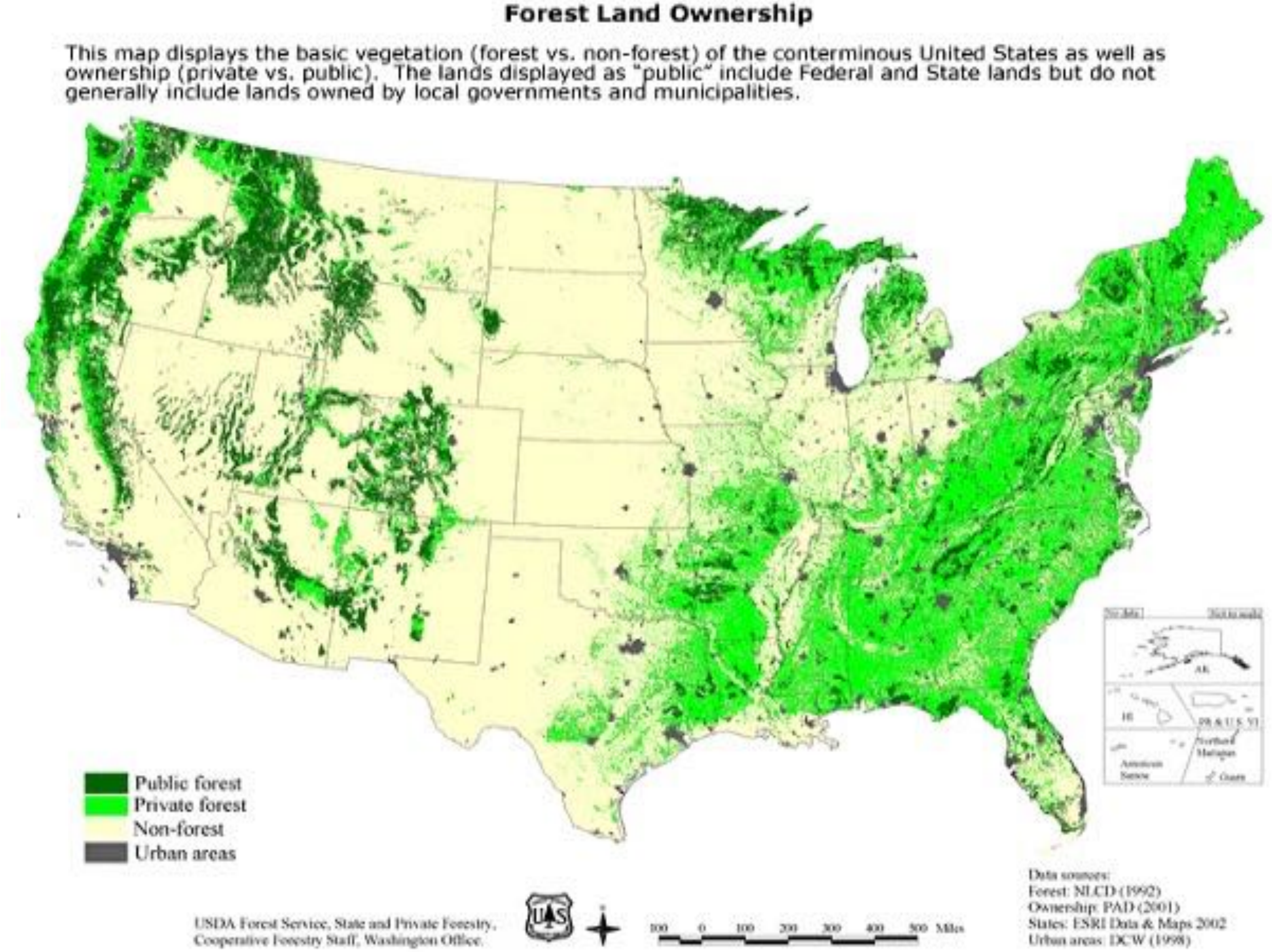
Source: USDA-Forest Service, US Forest Resource Facts and Historical Trends FS-1035. (2014).

State of our Forests: US Timber Volume on Timber Land

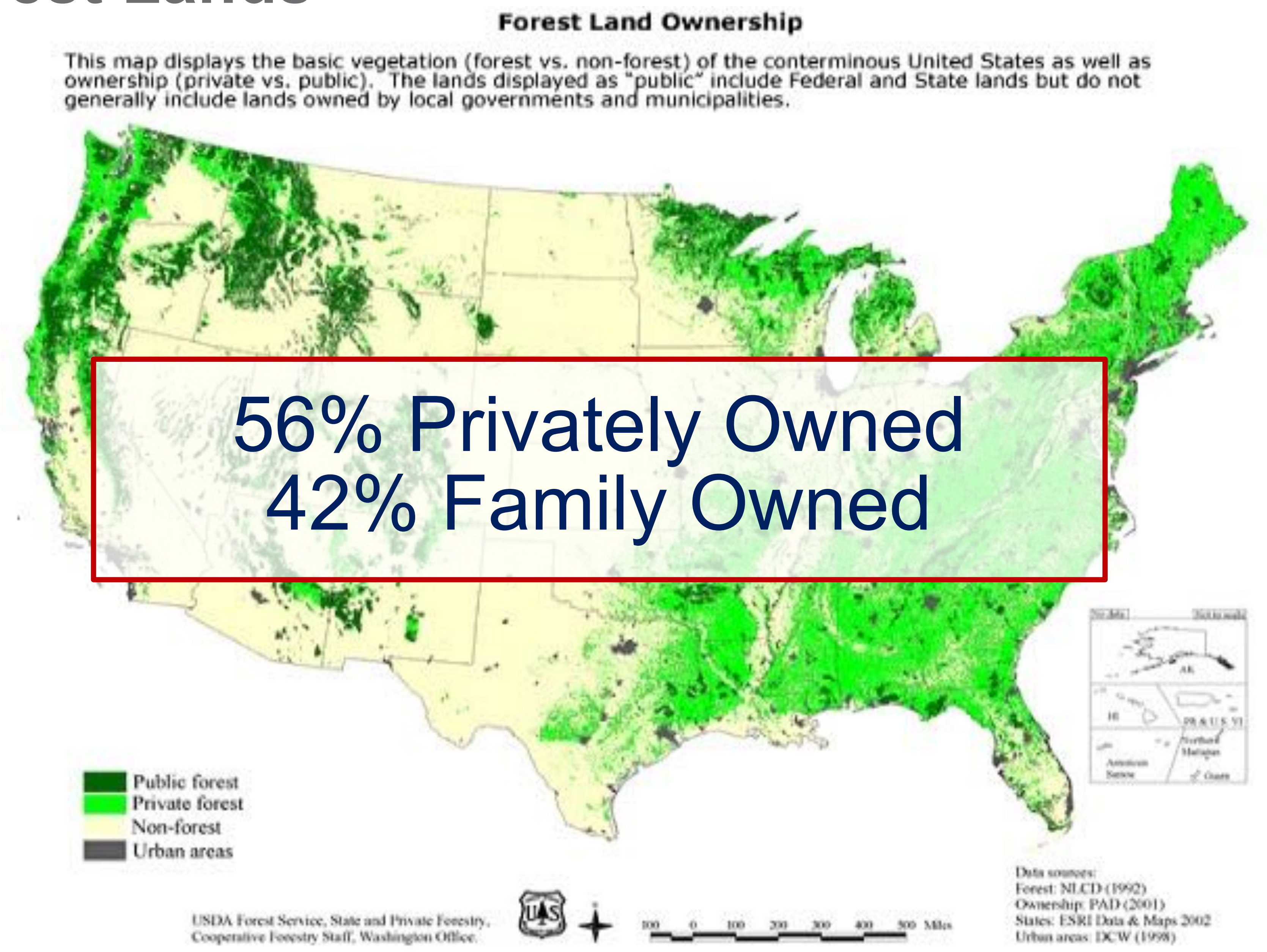


Source: USDA-Forest Service, US Forest Resource Facts and Historical Trends FS-1035. (2014).

US Forest Lands

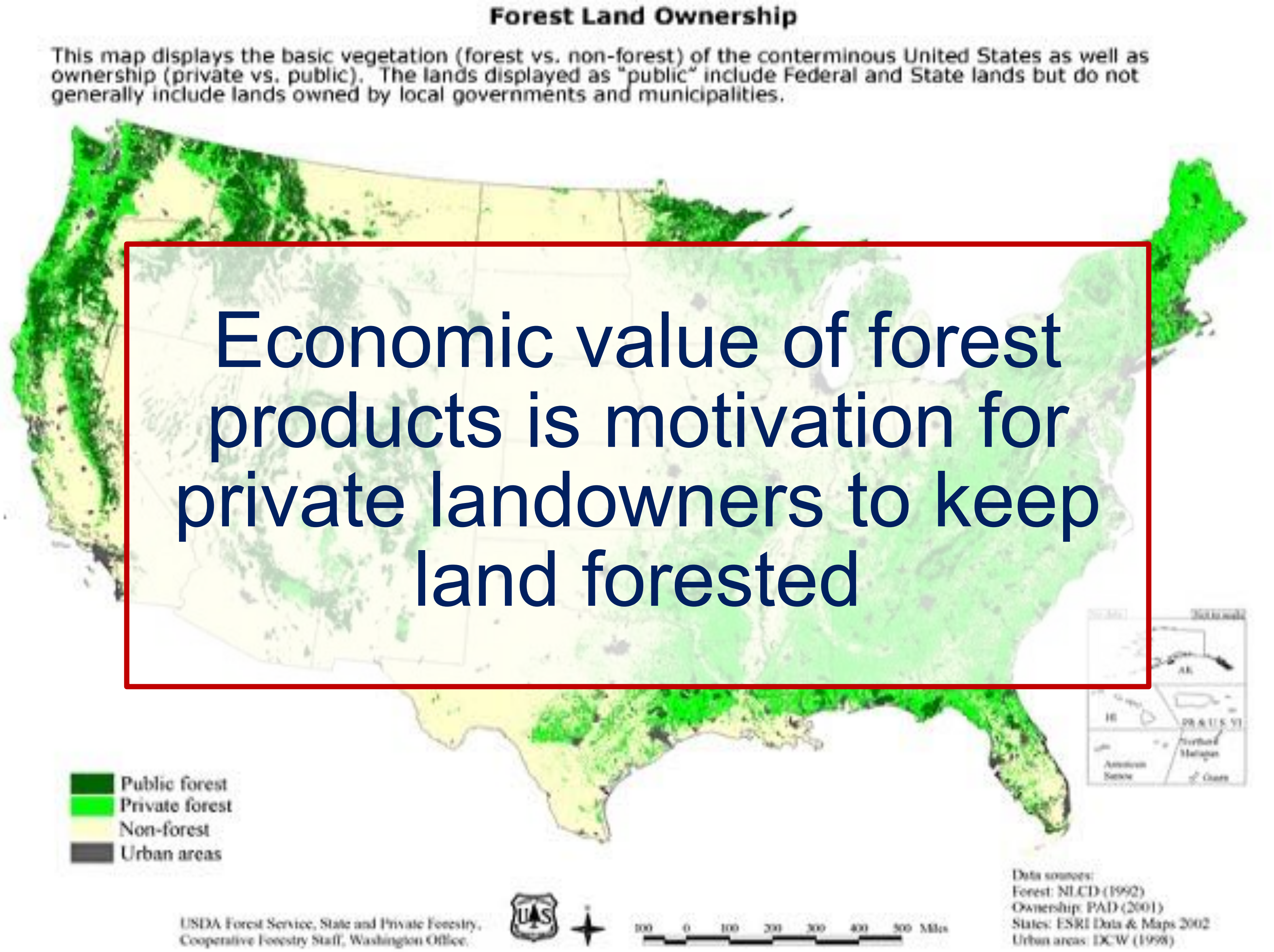


US Forest Lands



56% Privately Owned
42% Family Owned

US Forest Lands



Economic value of forest products is motivation for private landowners to keep land forested

Regeneration vs. Deforestation

Deforestation is the permanent conversion of forest land to non-forest land uses. Worldwide, agricultural expansion is the main driver of deforestation, but in the U.S., the rate of deforestation has been virtually zero for decades.

Source: State of the World's Forests—2020– FAO and UNEP, USDA Forest Service, US Forest Resource Facts and Historical Trends FS-1034 (2014)

Forest Management

Forests are more than Lumber Factories

Photo: Green Diamond Resource Company

- We can balance the long-term and short-term desires and the multiple uses through responsible forest management.
- Best Management Practices (BMPs)
- State, Federal and Provincial monitoring and forest inventory programs
- Forestry Practices and Laws
- Professional Logger Training and Certification
- Sustainable Forest Management Systems

Good Forestry = Sustainable Forestry

"Forestry is the art and science of creating, using and conserving forests. The forestry profession was a pioneer in developing techniques for sustainable management and, later, techniques for the multiple use of forests. [...] The term sustainable forest management is synonymous with good forestry".

Source: State of the World's Forests 2012. United Nations Food and Agriculture Organization

Photos: Oregon Forest Resources Institute

Sustainable Forestry Management Systems

- Wood from well-managed forests is sustainable over the long term.
- Forest certification shows that the wood comes from well-managed forests
- The major North American programs are:

FSC	SFI	CSA	ATFS

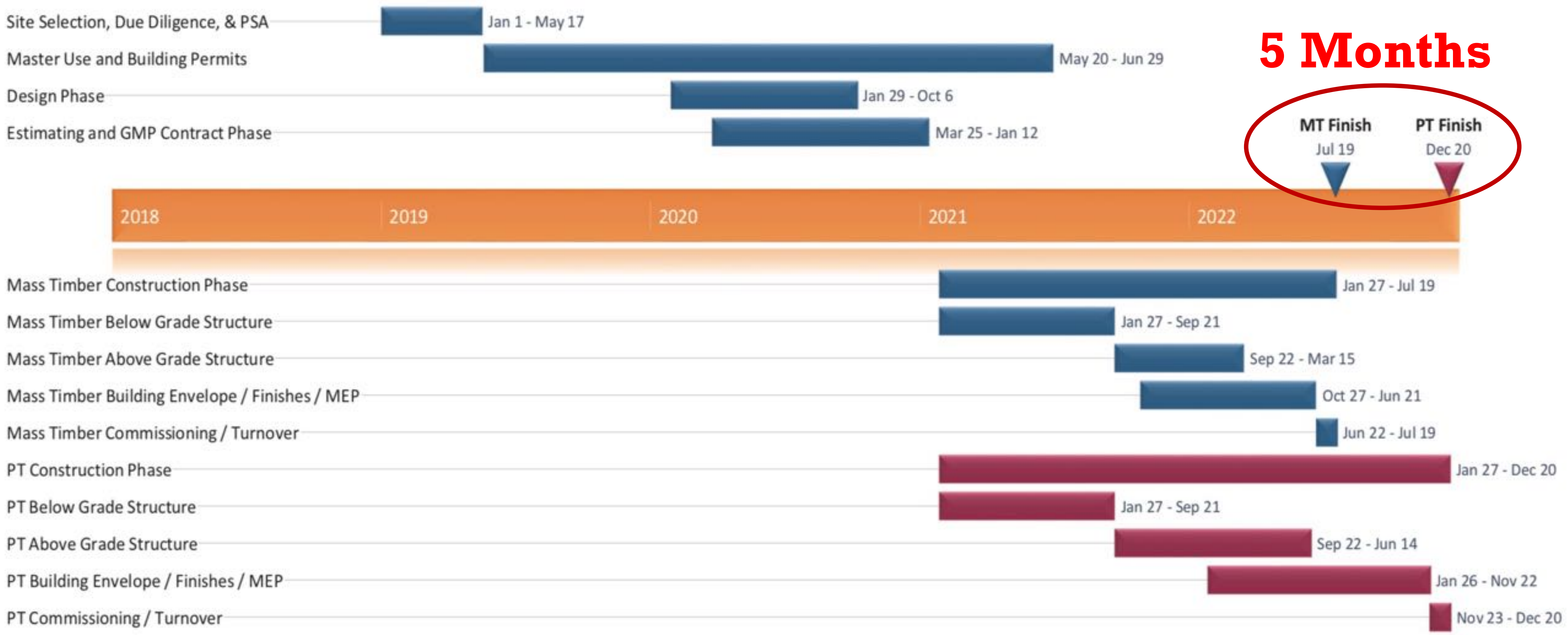
Biophilic Design, Connection to Forests

George Fox University – Canyon Commons
Hacker | Photo: Jeremy Bittermann

Construction Impacts: Labor Availability

Photo: Lendlease

Construction Impacts: Schedule



Seattle Mass Timber Tower Study, Source: DLR Group | Fast + Epp | Swinerton Builders

Tall Mass Timber: Structural Warmth is a Value-Add

TALL MASS TIMBER
DEMONSTRATING THE HOW

Brock Commons, Vancouver, BC | Architect: Acton Ostry| Image Courtesy naturallywood

Glue Laminated Timber (Glulam)
Beams & columns

Photo: StructureCraft

Cross-Laminated Timber (CLT)
Solid sawn laminations

Photo: LendLease

Cross-Laminated Timber (CLT)
SCL laminations

Photo: Freres Lumber

Photo: LEVER Architecture

Dowel-Laminated Timber (DLT)

Photo: StructureCraft

Nail-Laminated Timber (NLT)

Photo: Think Wood

Glue-Laminated Timber (GLT)

Plank orientation

Photo: StructureCraft

Photo: StructureCraft

Photo: Ema Peter

Photo: Manasc Isaac Architects/Fast + Epp

Mass Timber Connections

Concealed Connectors

Self Tapping Screws

Photos: Rothoblaas

Mass Timber Connections

Photo: StructureCraft

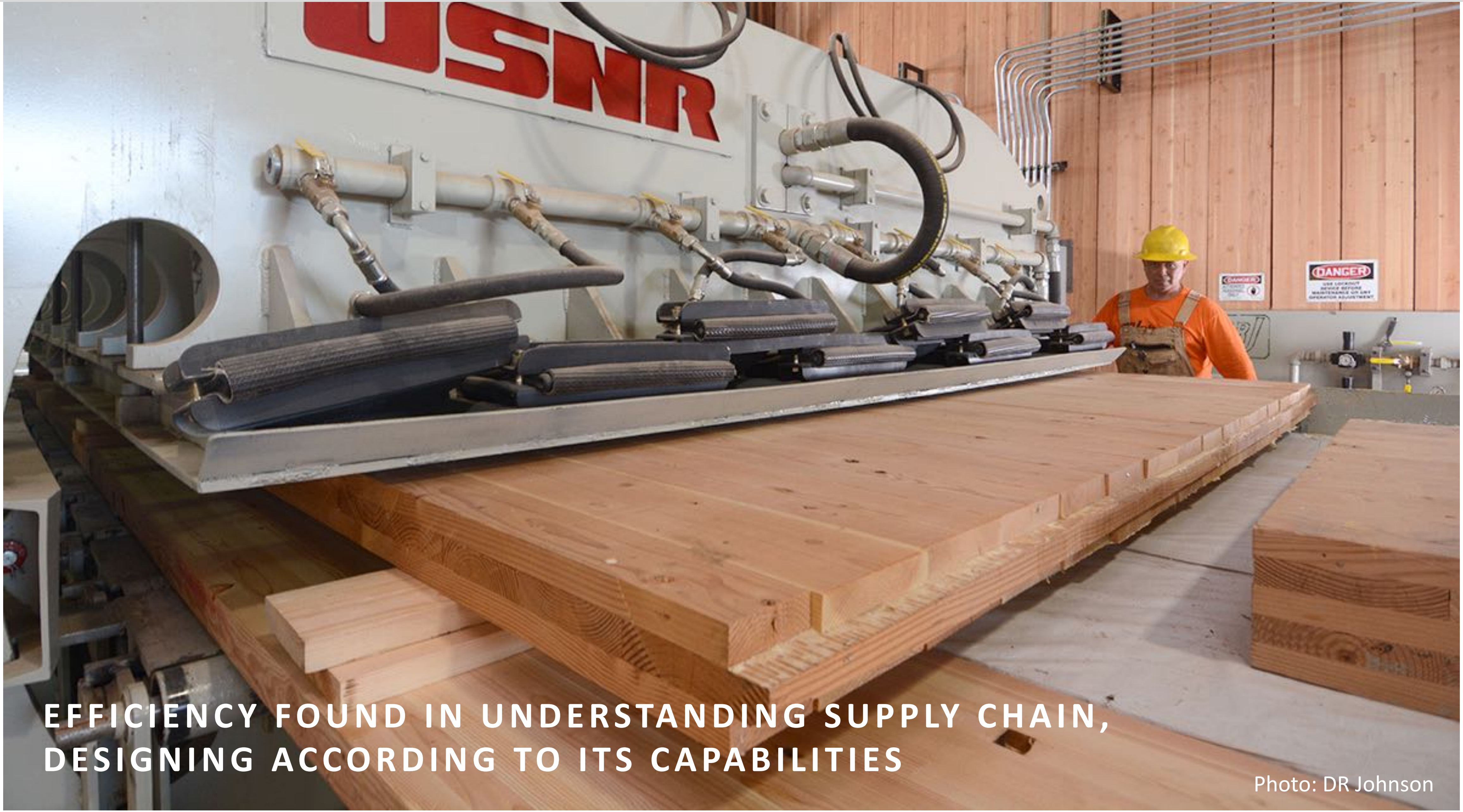
Beam to Column

Photo: Structurlam

Exterior Envelope Prefabrication

Brock Commons, Vancouver, BC | Architect: Acton Ostry| Image Courtesy naturallywood

Know The Supply Chain



EFFICIENCY FOUND IN UNDERSTANDING SUPPLY CHAIN, DESIGNING ACCORDING TO ITS CAPABILITIES

Photo: DR Johnson

TALL WOOD IN THE CODE

2018 IBC and All Previous Editions:

- 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

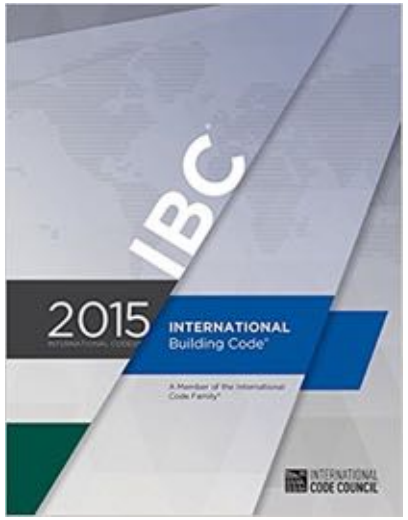
Photo: Christian Columbres

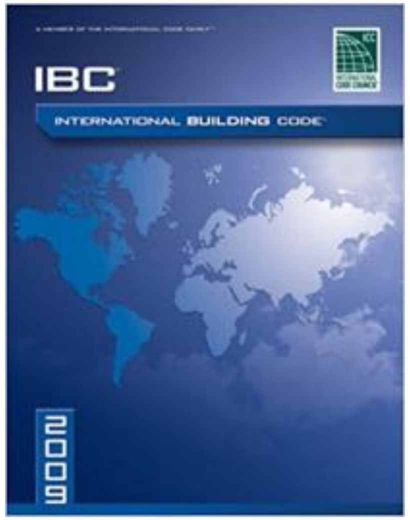
ICE Block I, RMW Architecture & Interiors, Buehler Engineering, Bernard André Photography

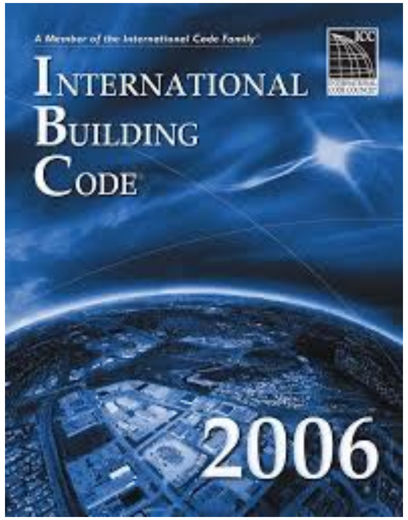
Photo: Swinerton

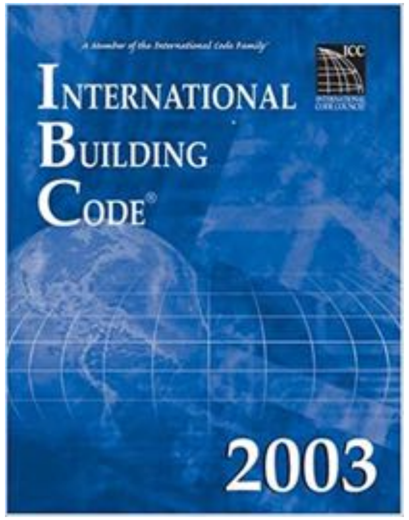
ICC INTERNATIONAL CODE COUNCIL®

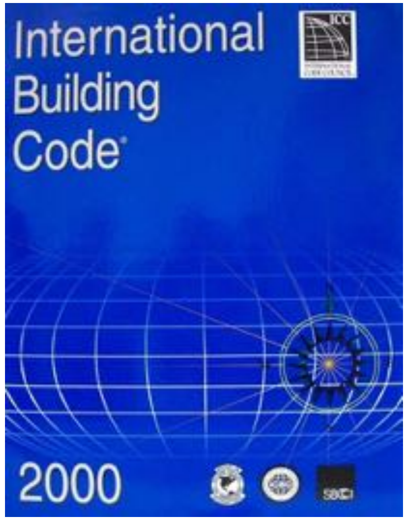
3 YEAR CODE CYCLE











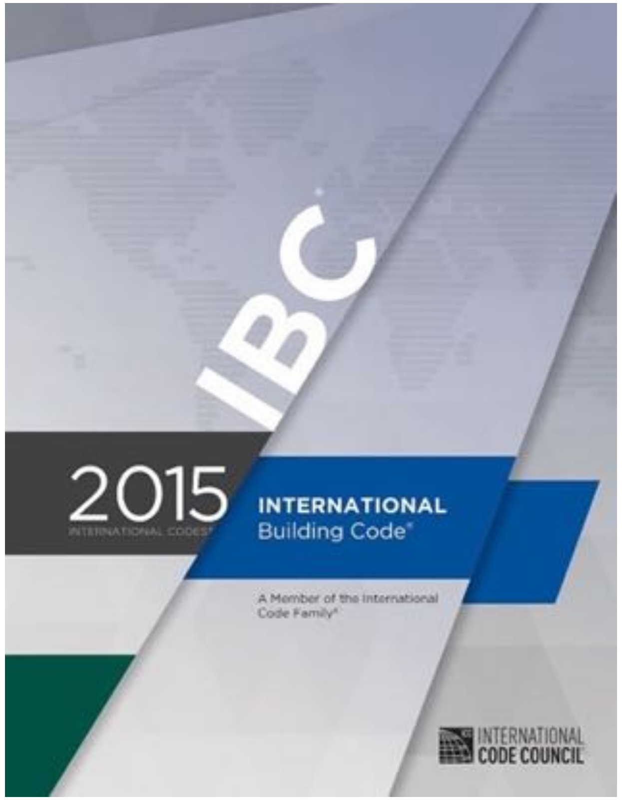
Source: ICC

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

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.

Photo: LendLease

Photo: LendLease

Photo: LendLease

Photo: LendLease

Photo: LendLease

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

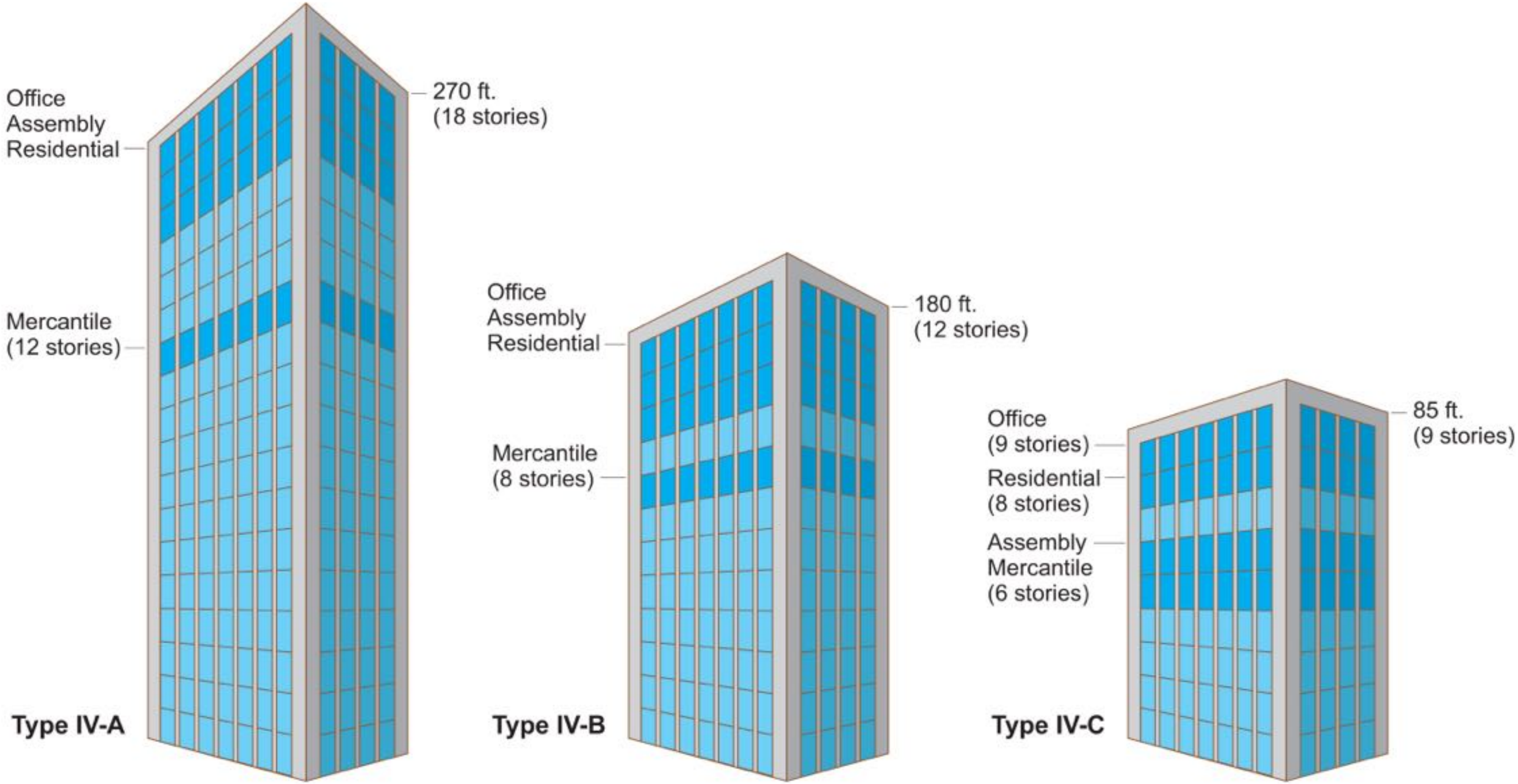
2021 IBC Introduces 3 new tall wood construction types:

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 CONSTRUCTION TYPES



Type IV-C

Credit: Susan Jones, atelierjones

Photos: Baumberger Studio/PATH Architecture/Marcus Kauffman

Type IV-C Protection vs. Exposed

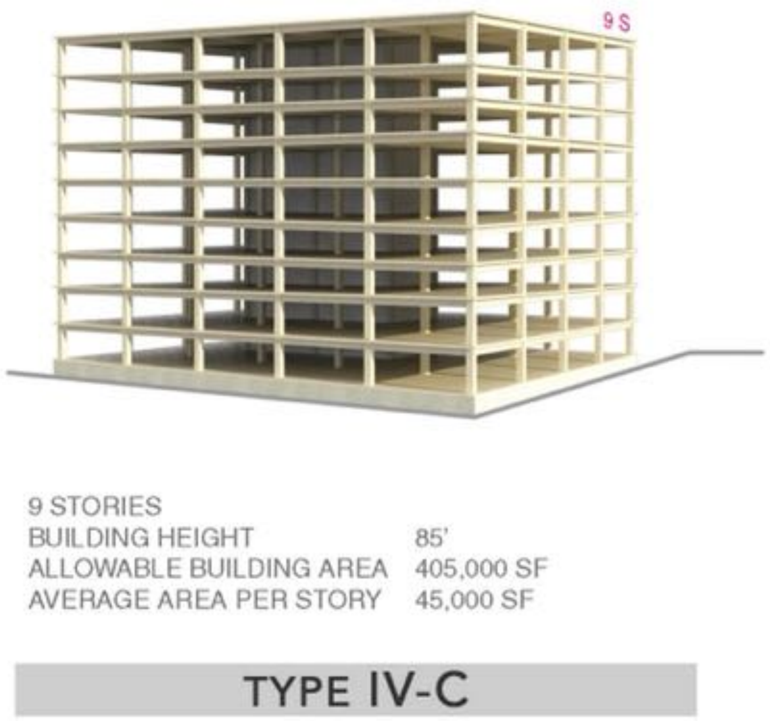
Credit: Kaiser+Path, Ema Peter

All Mass Timber surfaces may be exposed

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

Credit: Susan Jones, atelierjones

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

Type IV-B

Credit: Susan Jones, atelierjones

Credit: LEVER Architecture

Type IV-B Protection vs. Exposed

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

Credit: Susan Jones, atelierjones

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

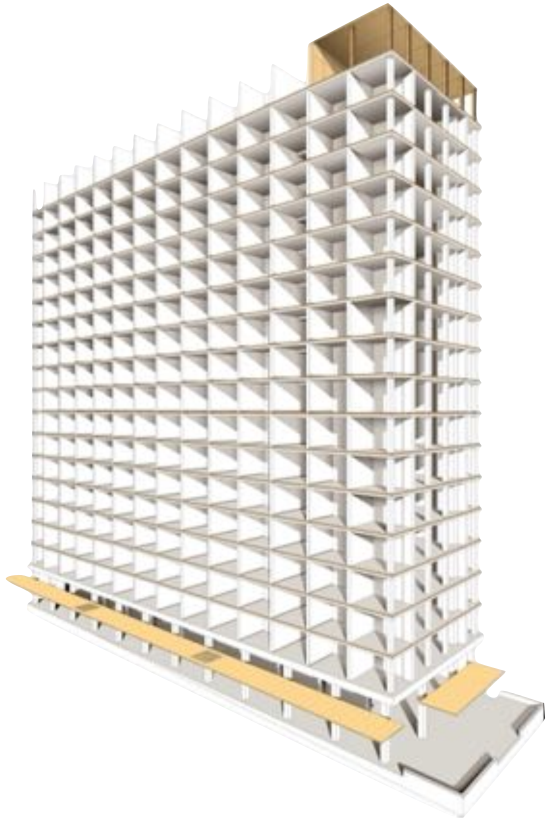
Type IV-A

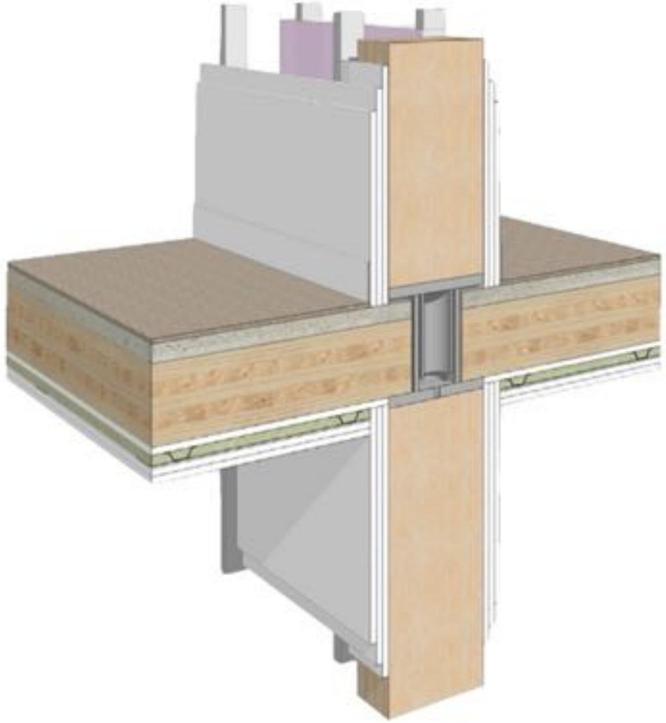
Credit: Susan Jones, atelierjones

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

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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

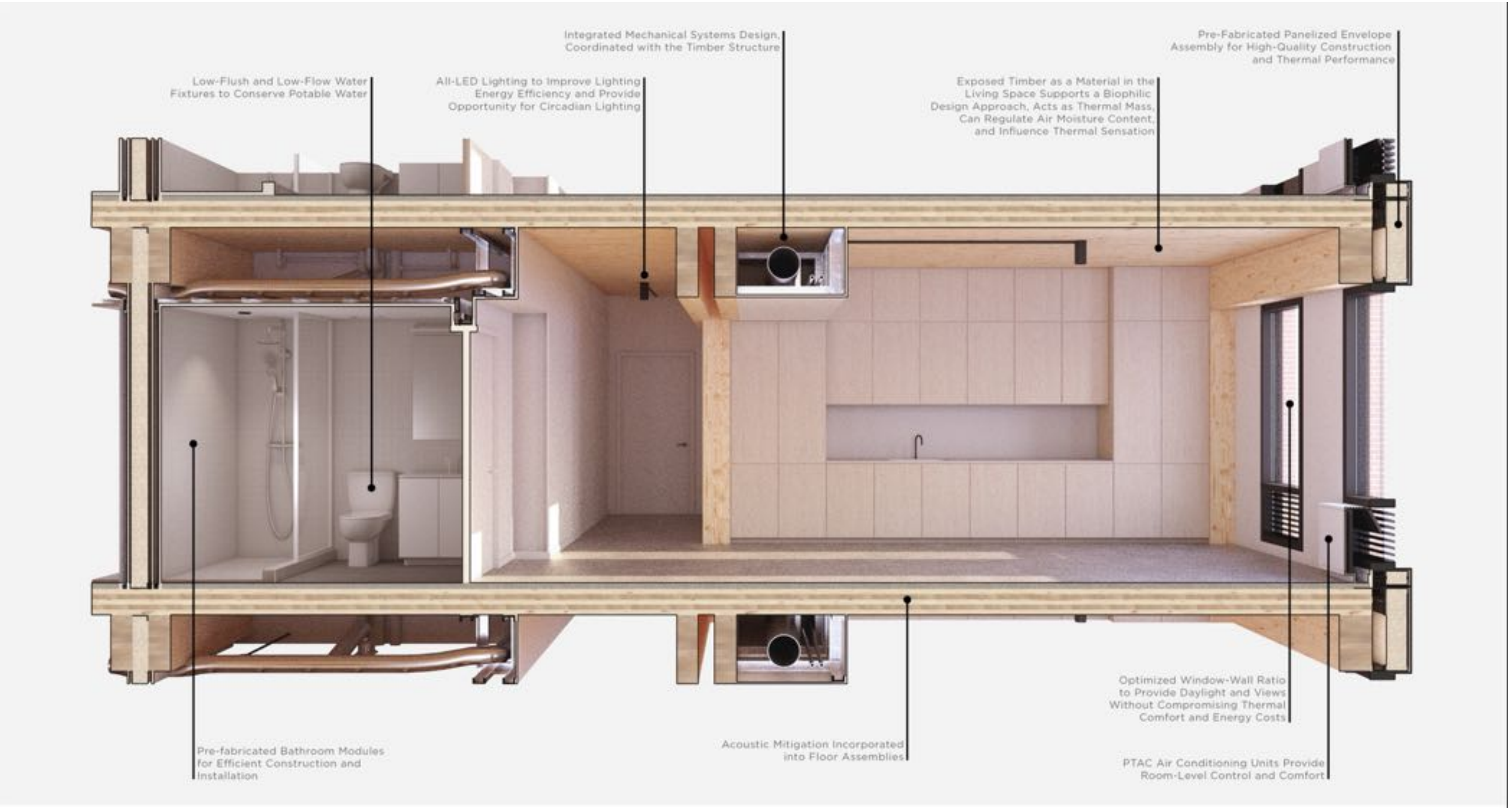
WoodWorks Tall Wood Design Resource

http://www.woodworks.org/wp-content/uploads/wood_solution_paper-TALL-WOOD.pdf

KEY DESIGN CRITERIA

ACME Timber, New Haven, CT Credit: Grey Organschi Architecture

MEP SYSTEMS, ROUTING, INTEGRATION



INTEGRATED SYSTEMS

The Tallhouse building system prioritizes the integration of design, engineering, and construction. This results in a high performance building finely tuned to meet energy, comfort, acoustic, and design criteria that has been vetted by constructability experts to ensure fast, efficient production.

Utilizing Pre-Fabricated Facade Panels and Bathroom Modules that are manufactured off-site in factories allows for reducing construction time on-site, higher quality control practices, and safer labor conditions for construction workers. Efficient routing of duct-work conserves material, and associated embodied carbon, allowing more exposed timber all while providing the air quality needed for healthy living. Water conserving fixtures reduce potable water use as a precious resource, while maintaining reliable performance.

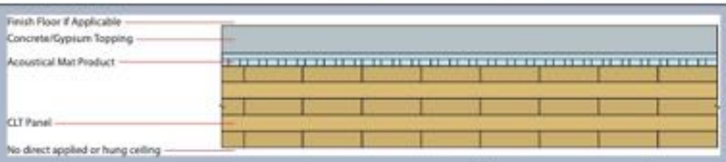
Credit: John Klein, Generate Architecture

ACOUSTICS

Railyard Flats, Sioux Falls, SD Credit: WoodWorks

Table 1: CLT Floor Assemblies with Concrete/Gypsum Topping, Ceiling Side Exposed

WoodWorks
WOOD PRODUCTS COUNCIL



CLT Panel	Concrete/Gypsum Topping	Acoustical Mat Product Between CLT and Topping	Finish Floor	STC[1]	IIC[1]	Source
CLT 5-ply (6.875")	1-1/2" Gyp-Crete®	Maxxon Acousti-Mat® 3/4	None	47[2] ASTC	47[2] AIIC	1
			LVT	-	49[2] AIIC	
			Carpet + Pad	-	75[2] AIIC	
			LVT on Acousti-Top®	-	52[2] AIIC	
			Eng Wood on Acousti-Top®	-	51[2] AIIC	
		Maxxon Acousti-Mat® ¾ Premium	None	49[2] ASTC	45[2] AIIC	
			LVT	-	47[2] AIIC	
			LVT on Acousti-Top®	-	49[2] AIIC	
	1-1/2" Levelrock® Brand 2500	USG SAM N25 Ultra	None	45[6]	39[6]	15
			LVT	48[6]	47[6]	16
			LVT Plus	48[6]	49[6]	58
			Eng Wood	47[6]	47[6]	59
			Carpet + Pad	45[6]	67[6]	60
			Ceramic Tile	50[6]	46[6]	61
		Soprema® Insonomat	None	45[6]	42[6]	15
			LVT	48[6]	44[6]	16
			LVT Plus	48[6]	47[6]	58
			Eng Wood	47[6]	45[6]	59
			Carpet + Pad	45[6]	71[6]	60
			Ceramic Tile	50[6]	46[6]	61
		USG SAM N75 Ultra	None	45[6]	38[6]	15
			LVT	48[6]	47[6]	16
			LVT Plus	48[6]	49[6]	58
			Eng Wood	47[6]	49[6]	59

FIRE RESISTANCE, CONSTRUCTION TYPE, GRID

	Construction Type (All Sprinklered Values)							
	IV-A	IV-B	IV-C	IV-HT	III-A	III-B	V-A	V-B
Occupancies	Allowable Building Height above Grade Plane, Feet (IBC Table 504.3)							
A, B, R	270	180	85	85	85	85	70	60
	Allowable Number of Stories above Grade Plane (IBC Table 505.4)							
A-2, A-3, A-4	18	12	6	4	4	3	3	2
B	18	12	9	6	6	4	4	3
R-2	18	12	8	5	5	5	4	3
	Allowable Area Factor (At) for SM, Feet^2 (IBC Table 506.2)							
A-2, A-3, A-4	135,000	90,000	56,250	45,000	42,000	28,500	34,500	18,000
B	324,000	216,000	135,000	108,000	85,500	57,000	54,000	27,000
R-2	184,500	123,000	76,875	61,500	72,000	48,000	36,000	21,000

Panel	Example Floor Span Ranges
3-ply CLT (4-1/8" thick)	Up to 12 ft
5-ply CLT (6-7/8" thick)	14 to 17 ft
7-ply CLT (9-5/8")	17 to 21 ft
2x4 NLT	Up to 12 ft
2x6 NLT	10 to 17 ft
2x8 NLT	14 to 21 ft
5" MPP	10 to 15 ft


Credit: David Barber, ARUP


Carbon 12, Portland, OR Credit: Kaiser+Path

TALL TIMBER 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

Credit: State of Oregon

WASHINGTON STATE BUILDING CODE

CHAPTER 51-50 WAC

INTERNATIONAL BUILDING CODE 2015 Edition

Includes adoption of and amendments to the 2015 International Existing Building Code and ICC/ANSI A117.1-2009

TABLE 504.3
ALLOWABLE BUILDING HEIGHT IN FEET ABOVE GRADE PLANE[a]

Occupancy Classification	See Footnotes	Type of Construction									
		Type I		Type II		Type III		Type IV			
		A	B	A	B	A	B	A	B	C	HT
A, B, E, F, M, S, U	NS[b]	UL	160	65	55	65	55	65	65	65	65
	S	UL	180	85	75	85	75	270	180	85	85
H-1, H-2, H-3, H-5	NS[c,d]	UL	160	65	55	65	55	120	90	65	65
	S										
H-4	NS[c,d]	UL	160	65	55	65	55	65	65	65	65
	S	UL	180	85	75	85	75	140	100	85	85
I-1 Condition 1, I-3	NS[d,e]	UL	160	65	55	65	55	65	65	65	65
	S	UL	180	85	75	85	75	180	120	85	85
I-1 Condition 2, I-2	NS[d,e,f]	UL	160	65	55	65	55	65	65	65	65
	S	UL	180	85							
I-4	NS[d,g]	UL	160	65	55	65	55	65	65	65	65
	S	UL	180	85	75	85	75	180	120	85	85
R	NS[d]	UL	160	65	55	65	55	65	65	65	65
	S13R	60	60	60	60	60	60	60	60	60	60
	S	UL	180	85	75	85	75	270	180	85	85

For SI: 1 foot = 304.8 mm.

Credit: State of Washington

CONSTRUCTION DEVELOPMENT SUSTAINABILITY

Denver Adopts Tall Mass Timber Codes

milehighcre — January 6, 2020

On December 23, the City of Denver voted to adopt the 2019 Denver Building Code, which includes the tall mass timber code provisions approved for the 2021 International Building Code (IBC).

As part of the adoption of the new code, there will be a four-month period where new projects can use either the 2016 Denver Building Code or the newly-adopted 2019 version. After four months, all building and fire code permits will be processed under the 2019 Denver Building Code.

"We congratulate the City of Denver on incorporating mass timber into its building codes, and recognizing the potential of this new category of wood products to revolutionize the way America builds," said American Wood Council president & CEO Robert Glowinski. "Mass timber offers the strength of historic building materials with lower weight, and, in the rare event of a fire, has inherent fire resistance. Beyond the aesthetic qualities of mass timber that building owners and designers are seeking, wood is among the most energy-efficient and environmentally friendly of all construction materials, storing carbon from the atmosphere for long periods of time."

The adopted proposal to recognize mass timber in the new code was submitted by Dr. Gregory R. Kingsley on behalf of the Structural Engineers Association of Colorado. The American Wood Council provided technical assistance to the city in support of the proposal.

The 2019 Denver Building Code will now recognize three new types of construction that also are included in the 2021 IBC:

AMENDMENTS TO THE BUILDING AND FIRE CODE FOR THE CITY AND COUNTY OF DENVER

The 2019 Denver Building and Fire Code includes the following codes except as amended herein.

APPENDIX U
TALL WOOD BUILDINGS

SECTION U101
GENERAL

U101.1 Purpose. The purpose of this appendix is to provide criteria for three new mass timber construction types: Type IV-A, Type IV-B, and Type IV-C. These building types expand the allowable use of mass timber construction to larger areas and greater heights than allowed for Type IV-HT construction.

U101.2 Scope. The provisions in this appendix are in addition to or replace the sections in the 2018 *International Building Code* where Types IV-A, IV-B, and IV-C construction are used. Where building Types IV-A, IV-B, or IV-C are not used, this appendix does not apply.

SECTION U102
AMENDMENTS TO THE INTERNATIONAL BUILDING CODE

(Under use of this appendix chapter, the following sections shall be modified or added as follows and shall supersede the corresponding sections in the International Building Code or Denver amendments to the International Building Code)

Credit: City of Denver, Mile High CRE

UTAH STATE LEGISLATURE

Legislators Bills Code Committees Audits

Home > 2020 General Session > H.B. 54

H.B. 54 Building Construction Amendments

Bill Text | **Status**

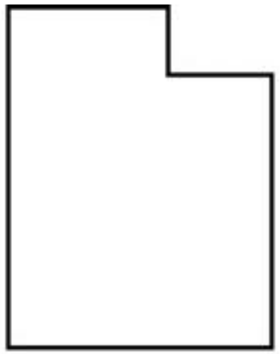
Enrolled **H.B. 54**

Printer Friendly

BUILDING CONSTRUCTION AMENDMENTS

2020 GENERAL SESSION

STATE OF UTAH



(5) "Utah Code" means the Utah Code Annotated (1953), as amended.

Section 2. Section **15A-2-101** is amended to read:

15A-2-101. Title -- Adoption of code.

(1) This chapter is known as the "Adoption of State Construction Code."

(2) In accordance with Chapter 1, Part 2, State Construction Code Administration Act, the Legislature repeals the State Construction Code in effect on July 1, 2010, and adopts the following as the State Construction Code:

(a) this chapter;

(b) Chapter 2a, Tall Wood Buildings of Mass Timber Construction Incorporated as Part of State Construction Code;

[~~(b)~~] (c) Chapter 3, Statewide Amendments Incorporated as Part of State Construction Code; [~~and~~]

[~~(c)~~] (d) Chapter 4, Local Amendments Incorporated as Part of State Construction Code[~~.~~]; and

(e) Chapter 6, Additional Construction Requirements.

Section 3. Section **15A-2-102** is amended to read:

15A-2-102. Definitions.

As used in this chapter [~~and~~], Chapter 2a, Tall Wood Buildings of Mass Timber Construction Incorporated as Part of State Construction Code, Chapter 3, Statewide Amendments Incorporated as Part of State Construction Code, and Chapter 4, Local Amendments Incorporated as Part of State Construction Code:

Credit: State of Utah

2021 Legislation

HOUSE BILL 143

Print Friendly

The status of each bill, resolution, proclamation, and memorial is updated when the offices of the Secretary of the Senate and the Chief Clerk of the House publish the un-official daily journals and should not be deemed official. The official bill actions are located in the final journal, which are maintained by the offices of the Secretary of the Senate and the Chief Clerk of the House. **The daily journals are published at the end of each legislative day.**

Full Bill Information

Individual Links:

Bill Text
Statement of Purpose / Fiscal Note

H0143 .... by BUSINESS COMMITTEE

BUILDING CODE ACT – Adds to existing law to require the Building Code Board to adopt certain International Building Code provisions allowing for the use of mass timber.

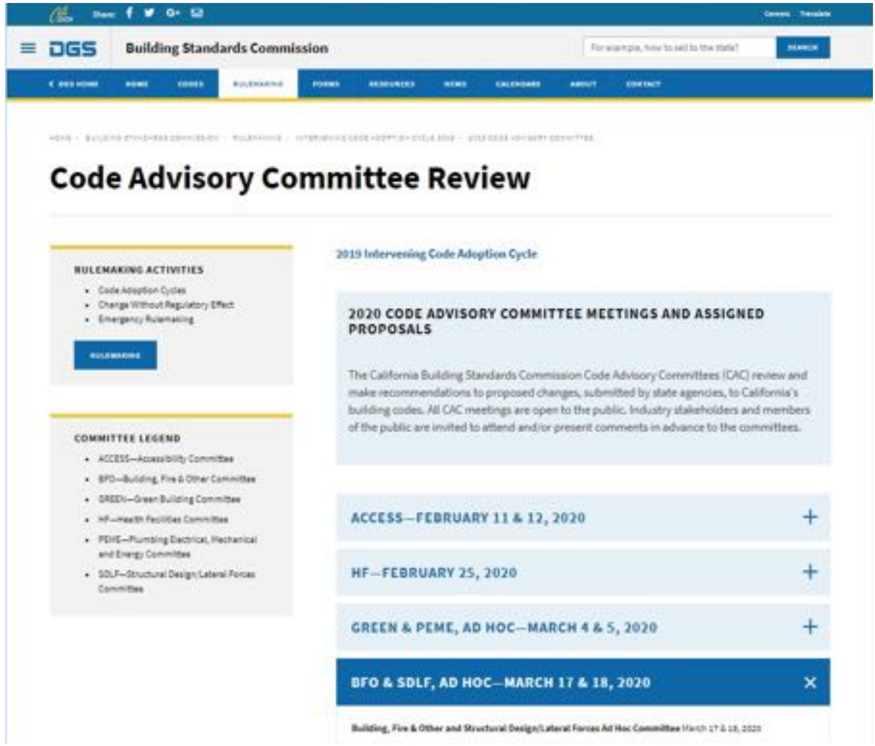
02/12	Introduced, read first time, referred to JRA for Printing
02/15	Reported Printed and Referred to Business
02/24	Reported out of Committee with Do Pass Recommendation, Filed for Second Reading
02/25	Read second time; Filed for Third Reading
02/26	U.C. to hold place on third reading calendar until Monday, March 1, 2021
03/01	Read Third Time in Full – Previously Read in Full – **PASSED - 68-0-2**
	AYES – Adams, Addis, Andrus, Armstrong, Barbieri, Berch, Blanksma, Boyle, Bundy, Cannon, Chaney, Chew, Christensen, Clow, Crane, Davis, DeMordaunt, Dixon, Ehardt, Erickson, Ferch, Furniss, Galloway, Gannon, Gestrin, Gibbs, Giddings, Hanks, Harris, Hartgen, Holtzclaw, Horman, Kauffman, Kerby, Kingsley, Lickley, Manwaring, Marshall, Mathias, McCrostie, Mendive, Mitchell, Monks, Moon, Moyle, Nash, Nate, Necochea, Nichols, Okuniewicz, Palmer, Rubel, Ruchti, Scott, Shepherd, Skaug, Syme, Toone, Troy, Vander Woude, von Ehlinger, Weber, Wisniewski, Wood, Yamamoto, Young, Youngblood, Mr. Speaker
	NAYS – None

Credit: State of Idaho

Source: Softwood Lumber Board

On August 13, 2020 the California Building Standards Commission grouped the tall wood code change proposals into one agenda item and passed them unanimously.

The changes will be published as an amendment to the 2019 CBC on January 1, 2021 and will become effective on July 1, 2021



Georgia General Assembly

Legislation

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- Senate Calendars

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- House Daily
- Senate Daily
- Senate Privileged Resolutions

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- Advanced Search
- House First Readers
- Senate First Readers
- House Prefiles
- Senate Prefiles
- Signed by Governor
- Georgia Code
- General Statutes Summary

Votes
- House Votes
- Senate Votes

2019-2020 Regular Session - HB 777

Community Affairs, Department of; consider amending the state minimum standard codes to allow tall mass timber construction types; direct

Sponsored By

(1) Corbett, John 174th
(2) Burns, Jon 159th
(3) McCall, Tom 33rd
(4) England, Terry 116th
(5) Smith, Lynn 70th
(6) LaRiccia, Dominic 169th

Sponsored In Senate By

Wilkinson, John 50th

Committees

HC: Agriculture & Consumer Affairs
SC: Agriculture and Consumer Affairs

First Reader Summary

A BILL to be entitled an Act to amend Chapter 2 of Title 8 of the Official Code of Georgia Annotated, relating to standards and requirements for construction, alteration, etc., of buildings and other structures, so as to direct the Department of Community Affairs to undertake a review of the 2021 edition of the International Building Code so as to consider amending the state minimum standard codes to allow tall mass timber construction types; to provide a date by which said review is to be completed; to provide for related matters; to repeal conflicting laws; and for other purposes.

Status History

Jul/01/2020 - Effective Date
Jun/29/2020 - Act 387

Credit: State of Georgia

RISE Tests, 2020
Photo: RISE

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

QUESTIONS?

This concludes The American Institute of Architects Continuing Education Systems Course

Ricky McLain, PE, SE

WoodWorks – The Wood Product Council

Ricky.Mclain@woodworks.org

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