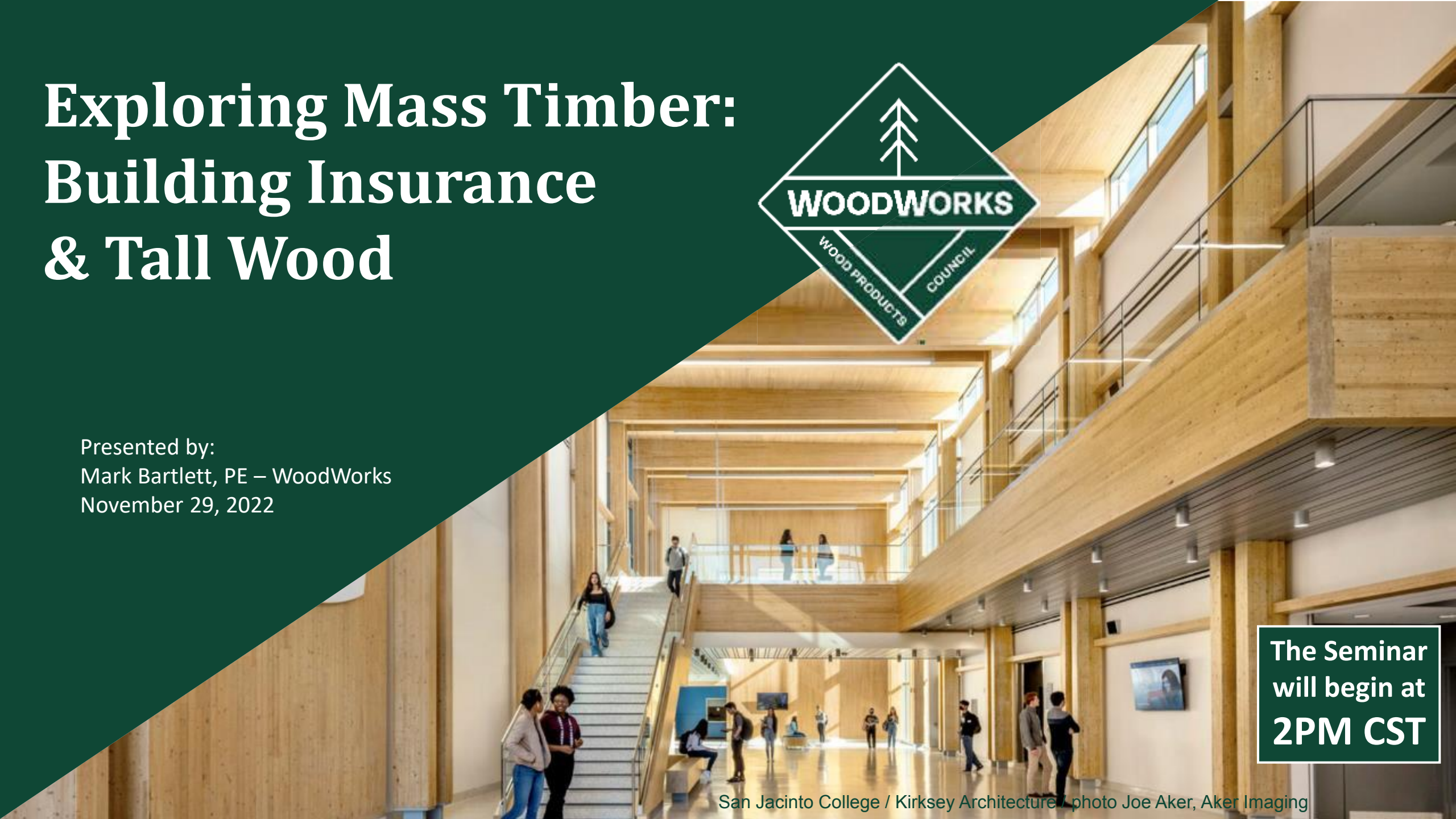
Exploring Mass Timber: Building Insurance & Tall Wood

Presented by:
Mark Bartlett, PE – WoodWorks
November 29, 2022

The Seminar will begin at 2PM CST



San Jacinto College / Kirksey Architecture / photo Joe Aker, Aker Imaging

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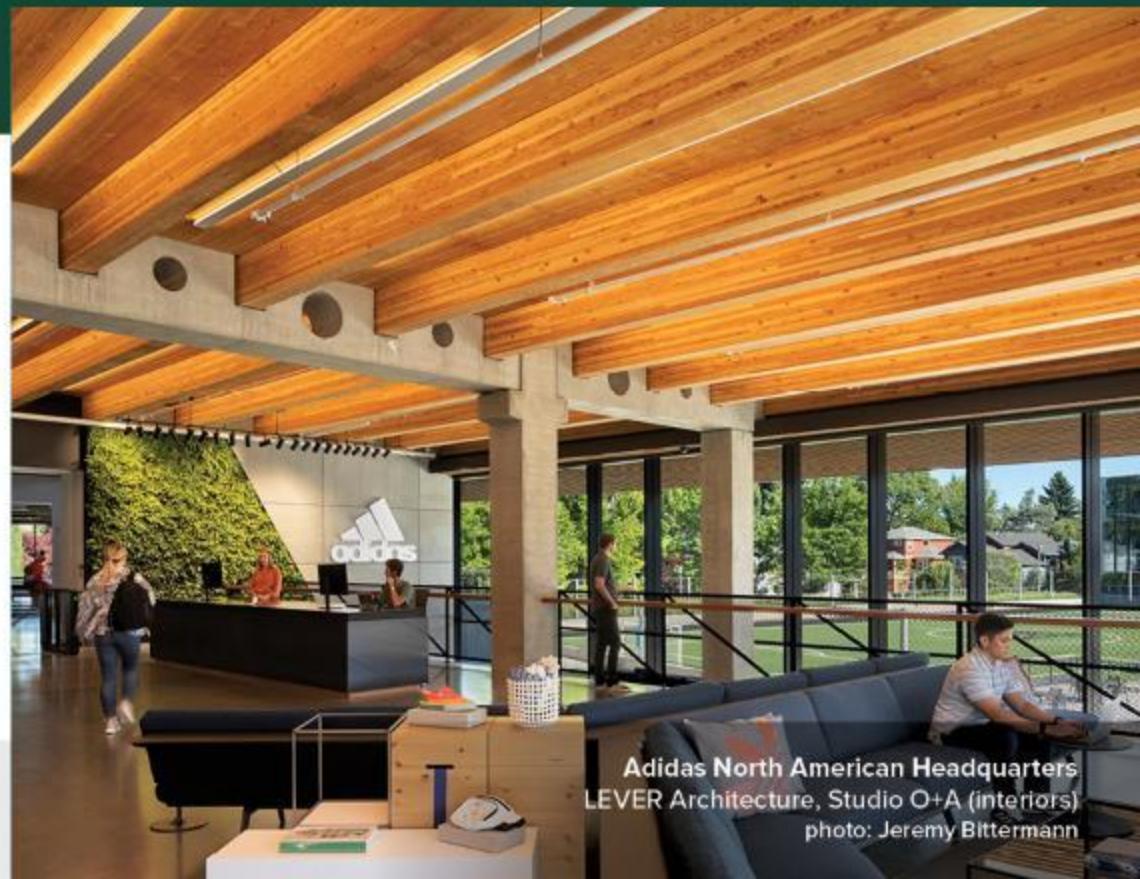

Adidas North American Headquarters
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photo: Jeremy Bittermann

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Resources

WOOD SOLUTION PAPERS

Insurance for Mass Timber Construction: Assessing Risk and Providing Answers

Intended for developer/owners seeking insurance for mass timber buildings, design/construction teams looking to make their projects more insurable, and insurance professionals looking for information on safety and performance.

Mass Timber Cost and Design Optimization Checklists

Guides coordination between designers and builders (GCs, construction managers, estimators, fabricators, installers, etc.) as they estimate and make cost-related decisions on mass timber projects

Visit woodworks.org/tools-guides/ for many more resources.

Upcoming Events

NATIONAL ONLINE

Light Wood-Frame Shaft Wall Detailing for Code Compliance and Constructability | December 13

1.5 AIA/CES HSW LUs, 1.5 PDH credits, 0.15 ICC credits

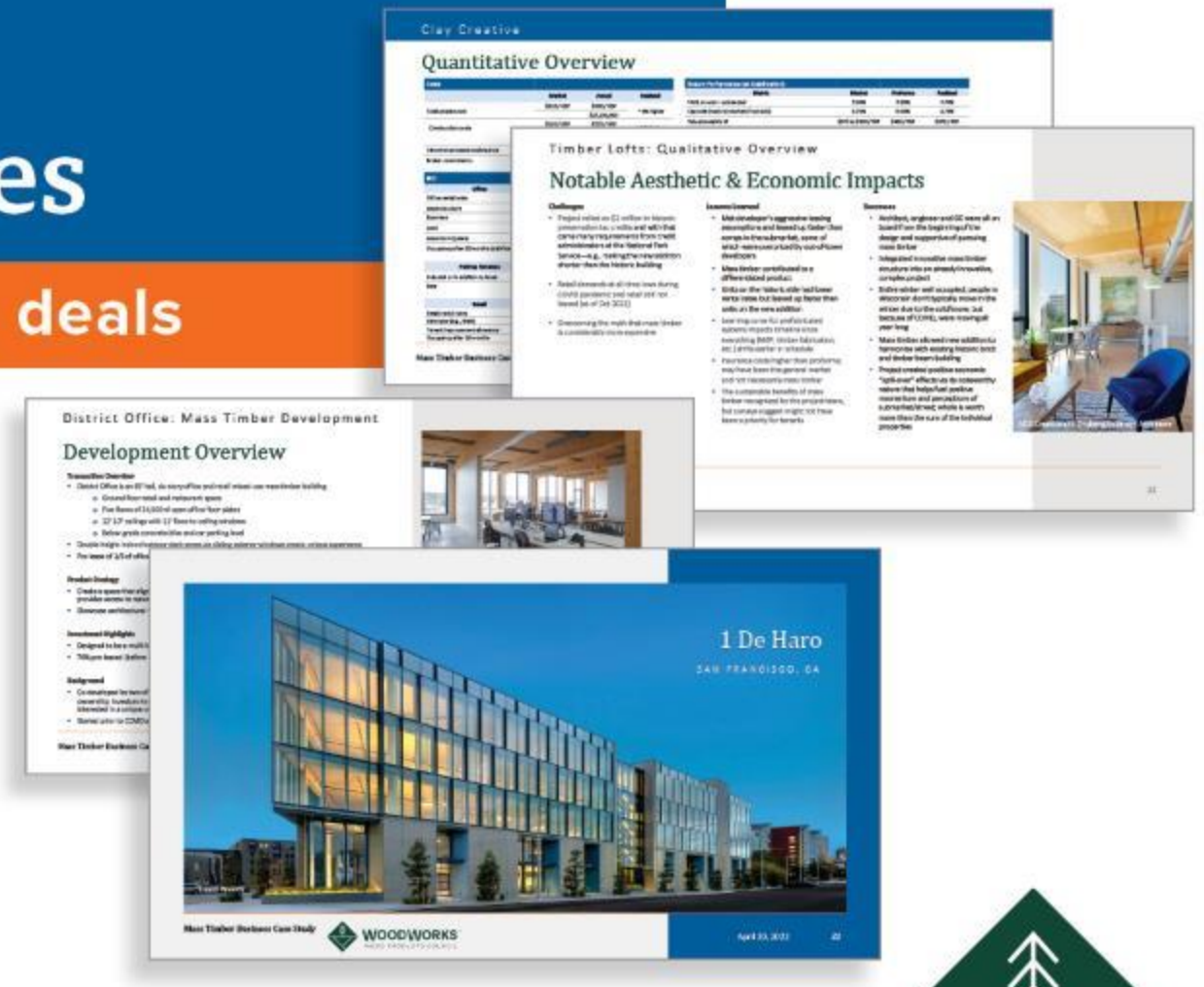
Mass Timber Shafts and Shaft Wall Solutions for Mass Timber Buildings | December 15

1.5 AIA/CES HSW LUs, 1.5 PDH credits, 0.15 ICC credits

Visit woodworks.org/events/

Mass Timber Business Case Studies

Real financial information on real deals



- Prepared by WoodWorks and Conrad Investment Management
- Include qualitative influences + quantitative data to examine investment success

PROPERTY SUB-TYPES:

For-Rent Institutional Housing • Institutional Offices • Industrial Buildings • Redevelopment/Additions • Purpose-Built Owner/Occupied (Student Housing)

« Scan the code to download the current package.

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New for GCs and installers:

U.S. Mass Timber Construction Manual

PHOTO: MARCUS KAUFFMAN

Download free at woodworks.org

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Choose building materials based on their true sustainability.

Learn about whole building life cycle assessment, biogenic carbon and EPDs at woodworks.org

Photos: Catalyst, MGA|Michael Green Architecture, photo Ben Benschneider; Plum Creek

Resources from WoodWorks

Whole Building Life Cycle Assessment (WBLCA)

- Introduction to Whole Building Life Cycle Assessment: The Basics

Biogenic Carbon and Carbon Storage

- When to Include Biogenic Carbon in an LCA
- How to Include Biogenic Carbon in an LCA
- Biogenic Carbon Accounting in WBLCA Tools
- Long-Term Biogenic Carbon Storage
- Calculating the Carbon Stored in Wood Products

Environmental Product Declarations (EPDs)

- Current EPDs for Wood Products
- How to Use Environmental Product Declarations

Scan to view

Photo: DPR Office, SmithGroup, photo Chad Davies

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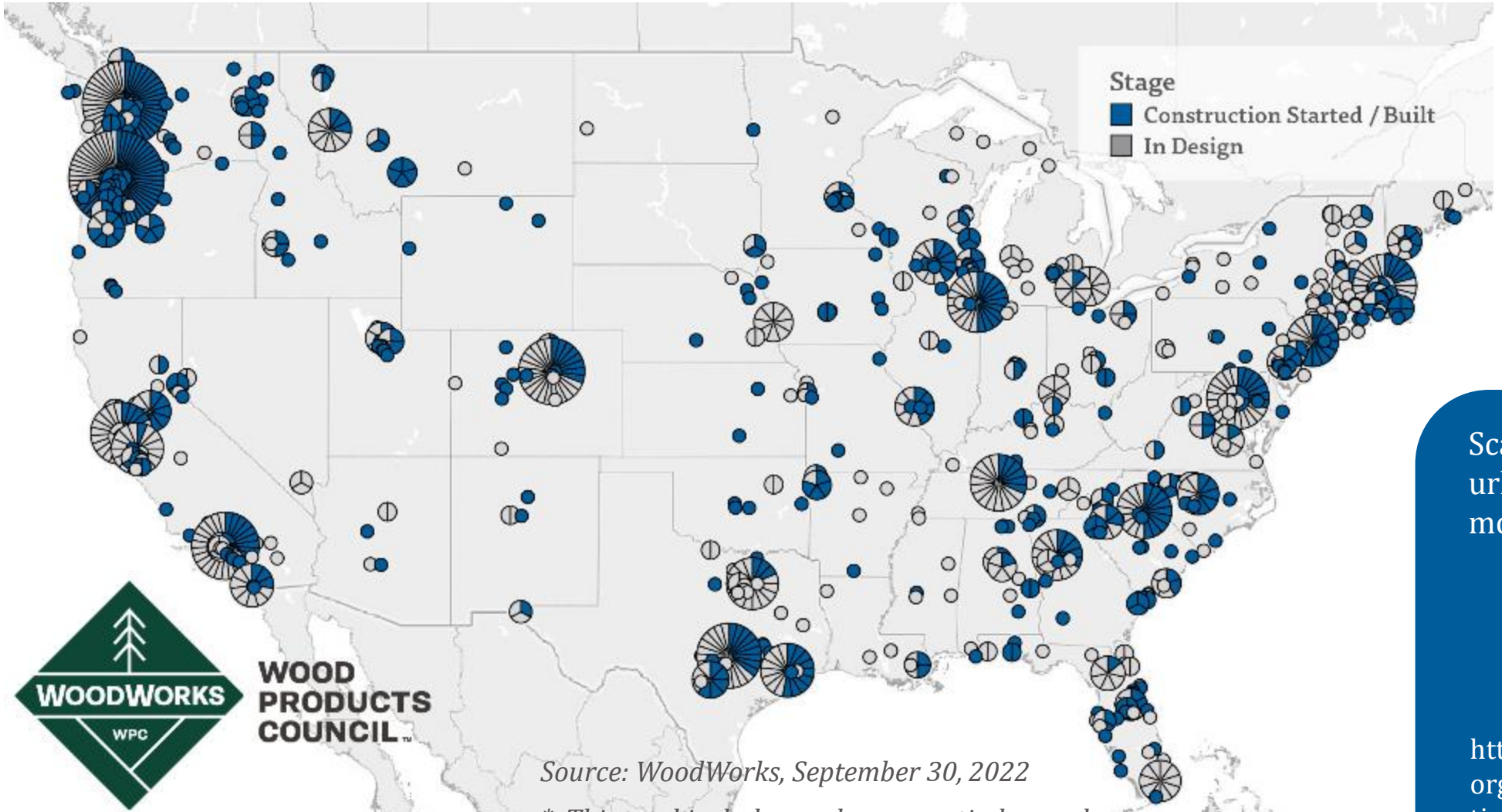
Current State of Mass Timber Projects

As of September 2022, in the US, **1,571** multi-family, commercial, or institutional projects have been constructed with, or are in design with, mass timber.



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Source: WoodWorks, September 30, 2022

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

Scan this code or use the url to find the map and more details online.

https://www.woodworks.org/resources/u-s-mass-timber-projects/

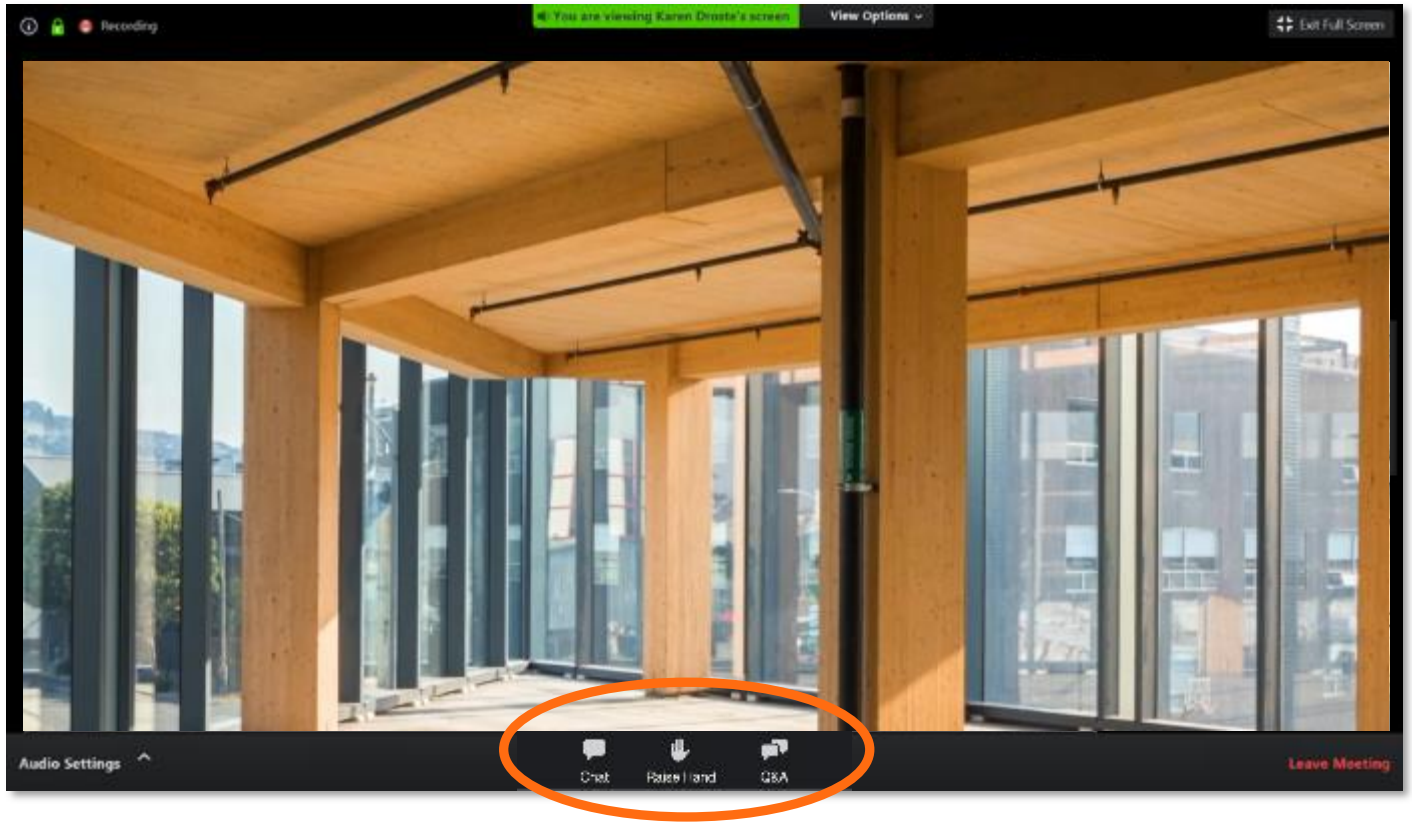
Continuing Education Credits

- Participants will receive a certificate of completion via email
- AIA credits will be processed by WoodWorks

- To receive credit and a certificate, attendees must stay on for the duration of the seminar.
- Group attendee form can be found at www.woodworks.org/webinar

Ask Questions through the Q&A Box

- Submit online questions in the Q&A box at the bottom of your screen as they come up in the presentation. We will get to as many questions as possible.



WHAT IS MASS TIMBER?

80 M Street SE, Washington, DC | Photo: Hickok Cole | Architect: Hickok Cole

Glue Laminated Timber (Glulam)
Beams & columns

Cross-Laminated Timber (CLT)
Solid sawn laminations

Cross-Laminated Timber (CLT)
SCL laminations

Photo: Freres Lumber

Photo: StructureCraft

Photo: LendLease

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

Office

Wythe Ave Buildings, NY | Flank Architecture + Development

Hospitality

Lark Hotel, Bozeman | Thinktank Design | Photo: Dan Armstrong

Multi-family

Carbon 12, Portland | Path Architecture | Photo: Andrew Pogue

Industrial

StructureCraft Plant, Abbotsford, BC

Photo: Ema Peter

STRUCTURAL SOLUTIONS | POST, BEAM + PLATE

Photo: Seagate Structures

STRUCTURAL SOLUTIONS | POST + PLATE

Photo: Lendlease

STRUCTURAL SOLUTIONS | HYBRID LIGHT-FRAME + MASS TIMBER

STRUCTURAL SOLUTIONS | HYBRID STEEL + MASS TIMBER

FRAMING OPTIONS | MASS TIMBER WALLS

Concealed Connectors

Self Tapping Screws

Photos: Rothoblaas

Beam to Column

Photo: StructureCraft

Photo: Structurlam

Column to Foundation

Photo: Alex Schreyer

Panel to Panel & Supports

Photo: Charles Judd

Photo: Alex Schreyer

UNDERSTANDING INSURANCE

INSURANCE ROLES | AGENT

- Representative of an insurance company, often an employee. Personal lines insurance (e.g., a homeowner policy) is typically sold by agents
- Obligated to the insurance company

INSURANCE ROLES | BROKER

- Hired by policyholders to negotiate on their behalf with underwriters
- Legally obligated to policyholder
- Important that policyholder and broker agree on expectations, roles and responsibilities
- Broker submits unique package of information to underwriter for negotiation

INSURANCE ROLES | UNDERWRITER

- Review submission from broker, look for historical policies and submissions from the policyholder
- Research submitted data to gain additional insight, consult reference material about potential losses from similar operations
- Examine qualities of the policyholder related to risk mitigation efforts
- Underwriter then either declines or advances request within company

INSURANCE ROLES | RISK ENGINEER

- Bring an understanding of the construction risks to the table so that the underwriter can use this info to accurately understand the risks
- May be direct employee of underwriter, or independent consultant
- Help insureds to continue to improve their risk management practices

INSURANCE & MASS TIMBER

INSURANCE CHALLENGES

What is causing the challenges with insurance for mass timber projects?

- Insurance industry volatility & hard market
- Lack of loss data
- ISO (Insurance Services Office) building classifications (none specific to mass timber)
- Variation of mass timber knowledge among insurance industry

ISO Types 1-6: Construction Code Descriptions

ISO 1 – Frame (combustible walls and/or roof)
Typically RMS Class 1
Wood frame walls, floors, and roof deck
Brick Veneer, wood/hardiplank siding, stucco cladding
Wood frame roof with wood decking and typical roof covers below:
- *Shingles
- *Clay/concrete tiles
- *BUR (built up roof with gravel or modified bitumen)
- *Single-ply membrane
- *Less Likely metal sheathing covering
- *May be gable, hip, flat or combination of geometries

Roof anchorage
- *Toe nailed
- *Clips
- *Single Wraps
- *Double Wraps

Examples: Primarily Habitational, max 3-4 stories

ISO 2 – Joisted Masonry (JM) (noncombustible masonry walls with wood frame roof)
Typically RMS Class 2
Concrete block, masonry, or reinforced masonry load bearing exterior walls
- *if reported as CB walls only, verify if wood frame (ISO 2) or steel/noncombustible frame roof (ISO 4)
- *verify if wood frame walls (Frame ISO 1) or wood framing in roof only (JM ISO 2)

Stucco, brick veneer, painted CB, or EIFS exterior cladding
Floors in multi-story buildings are wood framed/wood deck or can be concrete on wood or steel deck.
Wood frame roof with wood decking and typical roof covers below:
- *Shingles
- *Clay/concrete tiles
- *BUR (built up roof with gravel or modified bitumen)
- *Single-ply membrane
- *Less Likely metal sheathing covering
- *May be gable, hip, flat or combination of geometries

Roof anchorage
- *Toe nailed
- *Clips
- *Single Wraps
- *Double Wraps

Examples: Primarily Habitational, small office/retail, max 3-4 stories
If "tunnel form" construction meaning there is a concrete deck above the top floor ceiling with wood frame roof over the top concrete deck, this will react to wind forces much the same way as typical JM construction. It is slightly better from a fire rating standpoint and from a wind standpoint in terms of potential damage if the wood

INSURANCE PERSPECTIVE ON MASS TIMBER

- Lack of historic loss data = Unknowns
- Unknowns = Risk
- Risk = Higher Premiums
- Some take a ‘wood is wood’ approach

- Important to understand the significant differences in how mass timber performs in the event of a fire, etc. when compared to light wood-frame and all other building materials

Photo Credit: StructureCraft

Photo Credit: GLI Partners

INSURANCE VS. BUILDING CODES

- It is important to note the distinct difference between the primary concerns of insurers vs. primary concerns of building codes
- **Insurance** primarily concerned with **property loss**
- **Building codes** primarily concerned with **occupant safety**

- As such, code acceptance and associated testing may be helpful to insurers in evaluating a new product like mass timber, but it will not address all concerns

WHAT DETERMINES INSURANCE PREMIUMS?

- Primary concern of insurance is property loss
- In a loss event (fire, flood, earthquake, etc.) how much damage will the building incur?
- How much will it cost to repair/restore the building?
- How long will it take to do these repairs?
- How likely is the building to experience a loss claim?
  - This depends on factors ranging from experience and track record of design and construction team, to construction materials used, project locale, and more

MASS TIMBER TESTING AND RESEARCH

- Mass timber has undergone extensive fire testing and evaluation. Elements, assemblies, connections, penetrations, compartments & more

Photo: AWC/FPInnovations

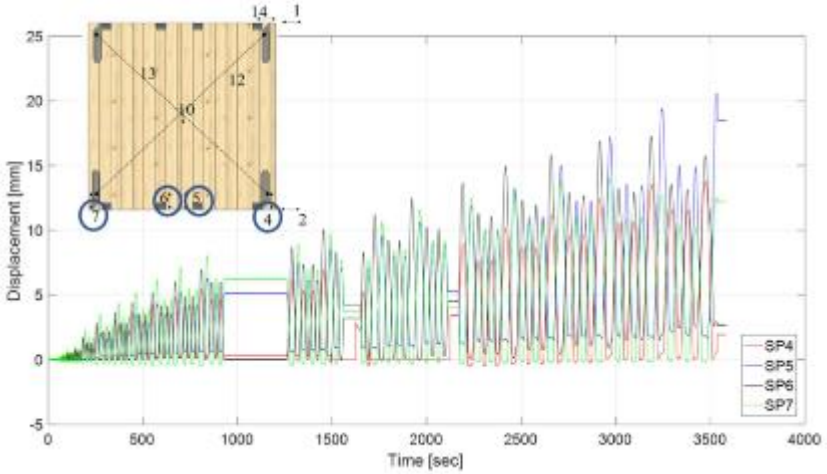
Photo: LendLease

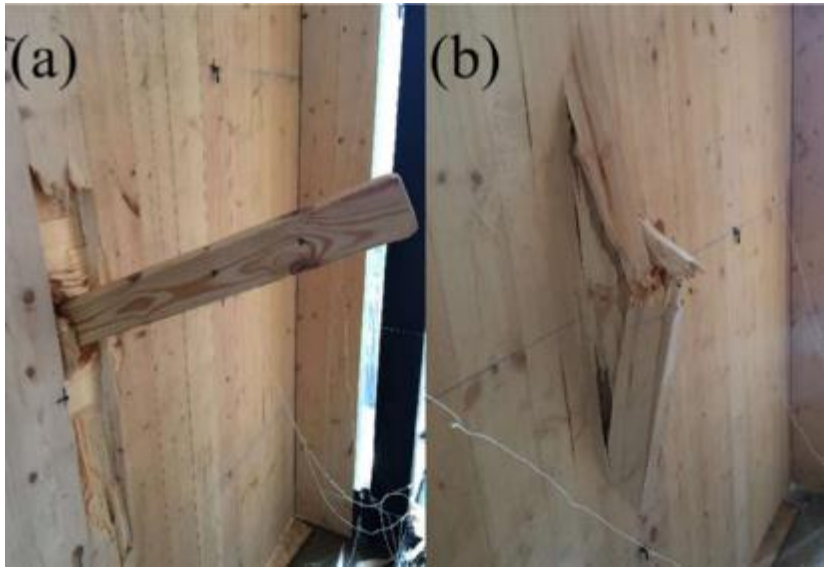
Photo: SLB/ARUP

MASS TIMBER TESTING AND RESEARCH

- Mass timber has been evaluated for wind loading, cyclic pressure, uplift, debris impact and more. Results used to justify uses in areas such as Miami's High Velocity Hurricane Zone

Photos: Clemson University / Michael Stoner





MASS TIMBER TESTING AND RESEARCH

- Mass timber has undergone seismic testing and evaluation – shearwalls, diaphragms, shake table testing and more

Photo: CLT Diaphragm Testing, Credit: AWC

Photo: UCSD Shake Table Testing

MASS TIMBER TESTING AND RESEARCH

- Construction phase and long-term moisture monitoring on mass timber structures. Demonstrates MT's ability to dry after initial wetting

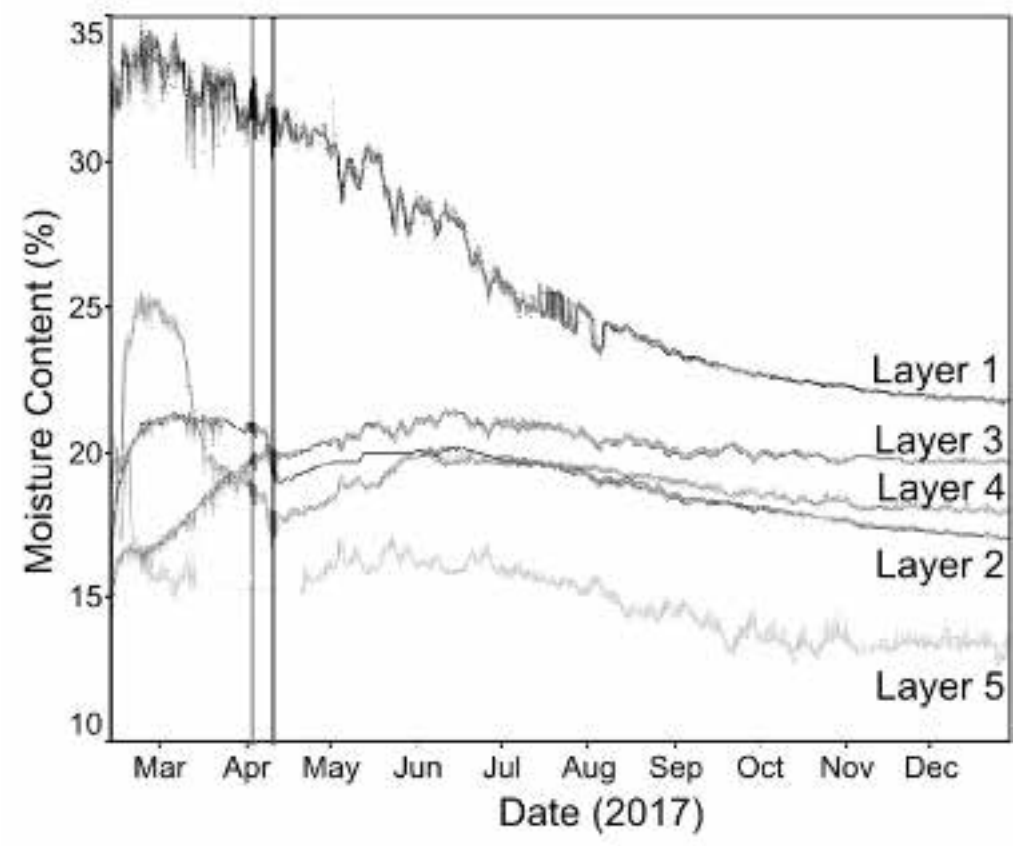


Photo: US Forest Service / Colorado School of Mines

Photo: US Forest Service / Colorado School of Mines

Photo: Oregon State University

MASS TIMBER COMMONLY MISUNDERSTOOD TOPICS

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.

Photo: Urban One

Photo: ARUP

MASS TIMBER COMMONLY MISUNDERSTOOD TOPICS

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.


Photo: Urban One


Photo: ARUP

MASS TIMBER COMMONLY MISUNDERSTOOD TOPICS

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)

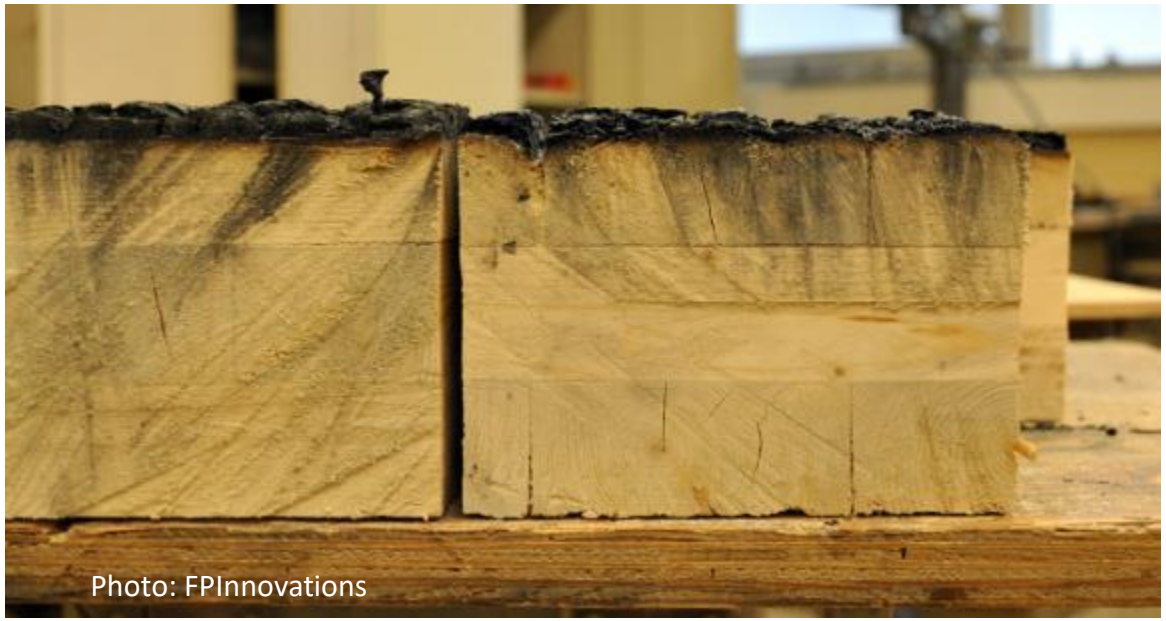
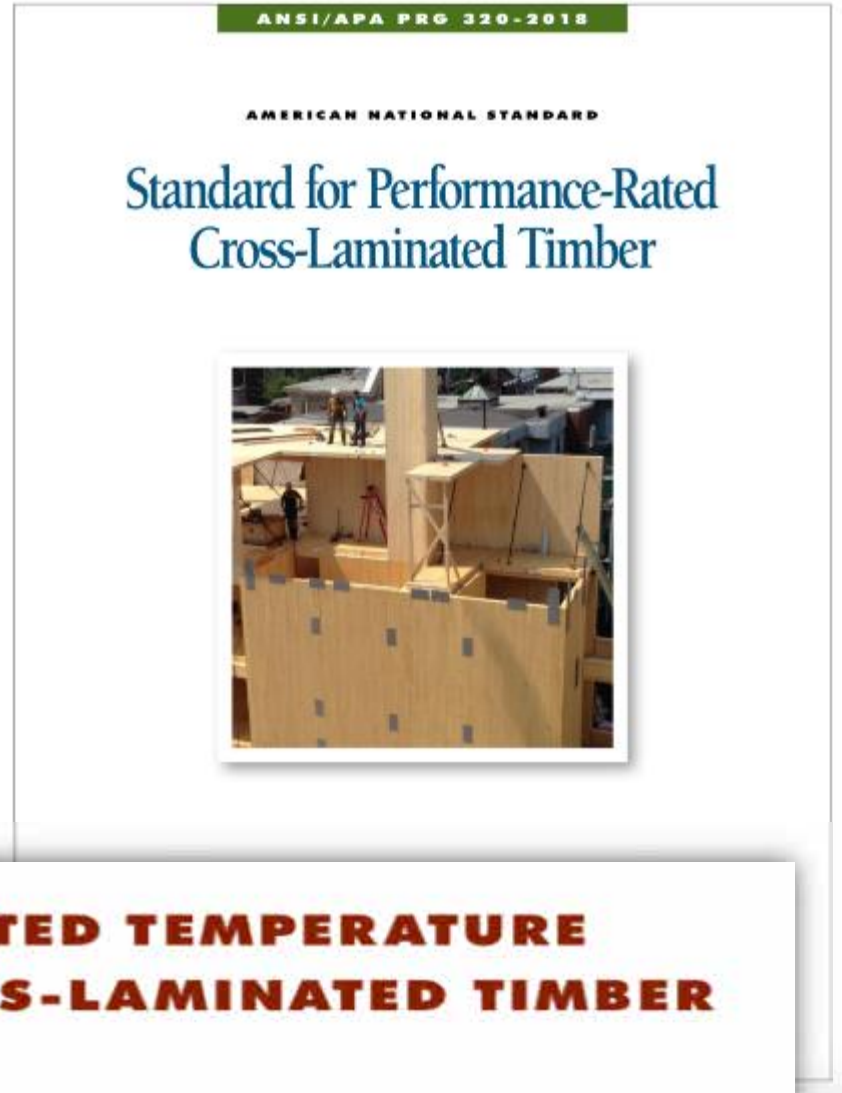


Photo: FPInnovations

MASS TIMBER COMMONLY MISUNDERSTOOD TOPICS

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)

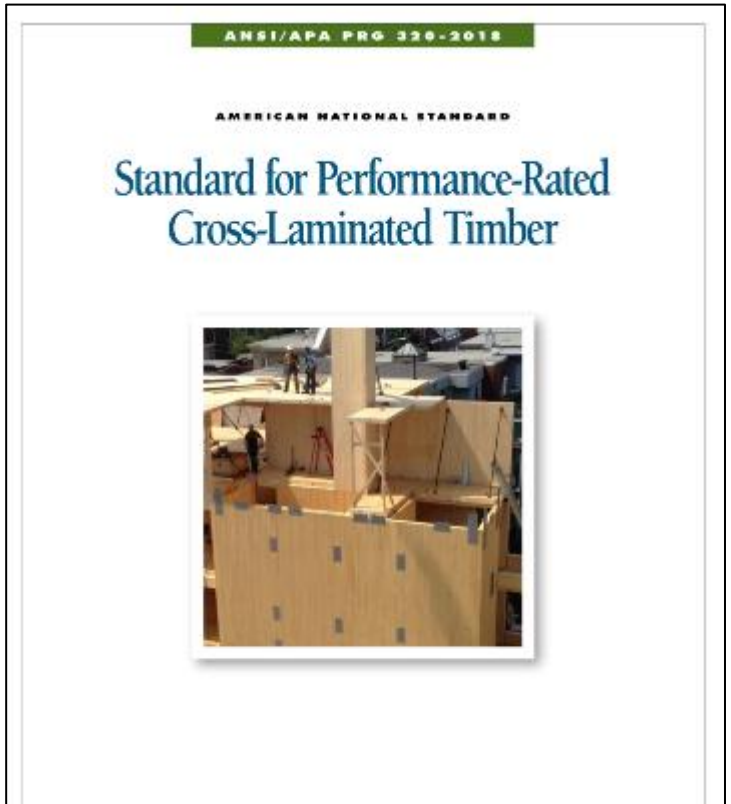


ANNEX B. PRACTICE FOR EVALUATING ELEVATED TEMPERATURE PERFORMANCE OF ADHESIVES USED IN CROSS-LAMINATED TIMBER (MANDATORY)

MASS TIMBER COMMONLY MISUNDERSTOOD TOPICS

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.


Photo: ARUP



MASS TIMBER COMMONLY MISUNDERSTOOD TOPICS

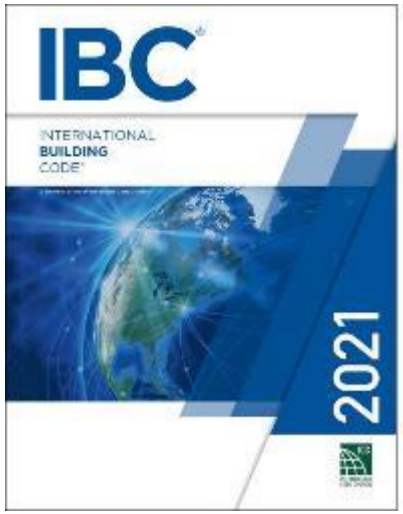
Exterior walls and claddings

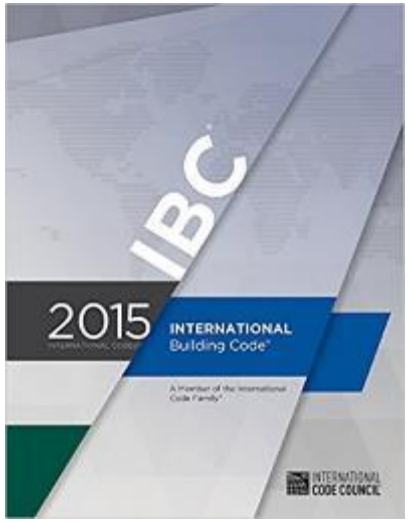
- Use of wood claddings limited to 40 feet above grade in most Construction Types (I through IV)
- Use of mass timber exterior wall framing permitted in Construction Type IV and V
- It is very common for mass timber buildings to have noncombustible claddings and exterior wall framing

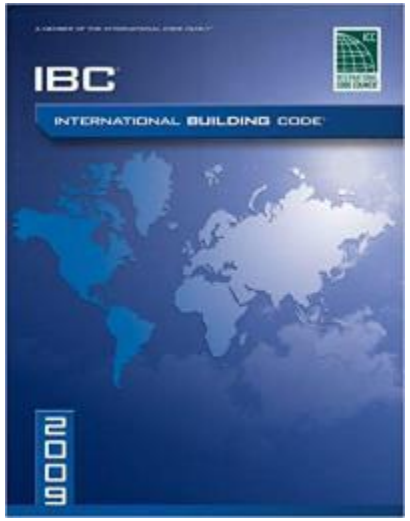
INTRO, Cleveland, OH. Photo: WoodWorks

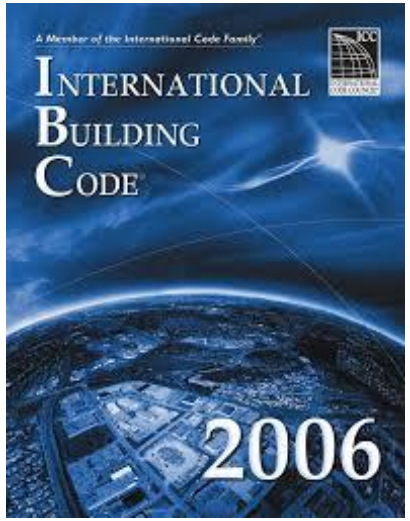

Image Courtesy naturallywood

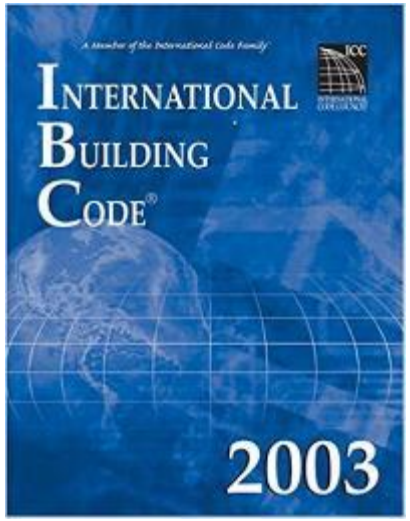
MASS TIMBER IN THE BUILDING CODE

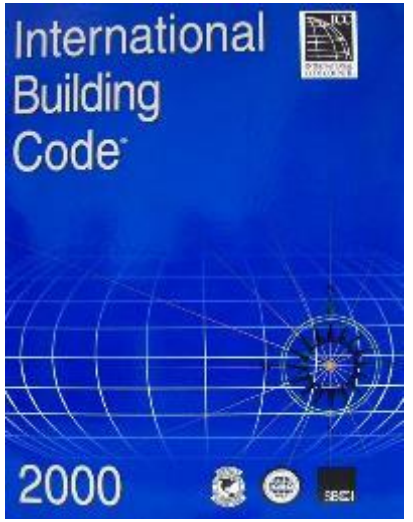








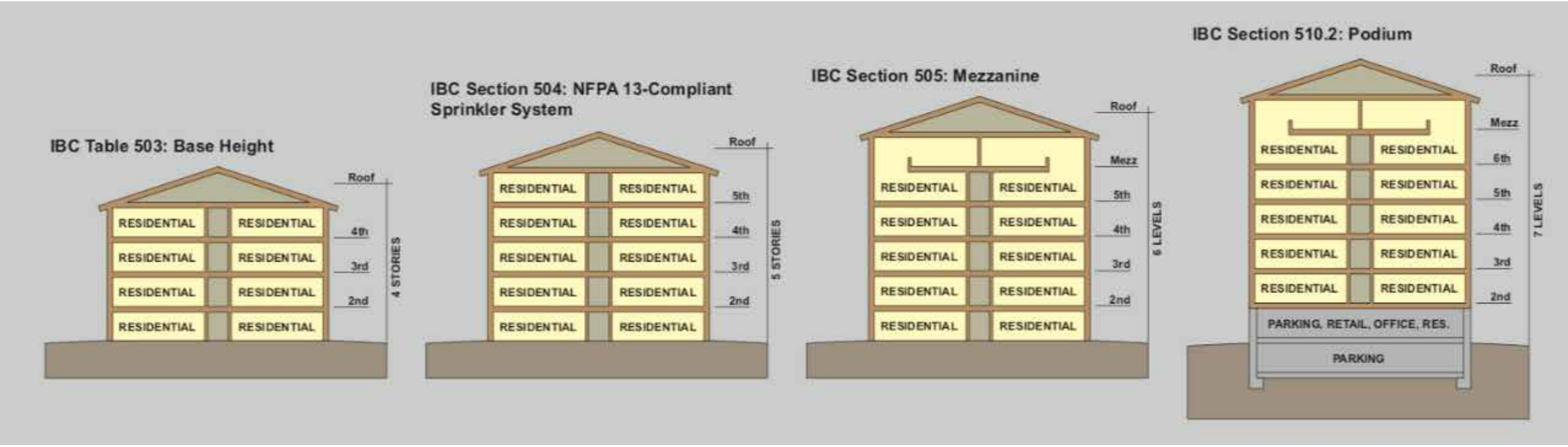




MASS TIMBER IN THE BUILDING CODE

IBC 2018 & Previous Editions:

Mass Timber in Low- to Mid-Rise: 1-6 Stories in Construction Types III, IV or V



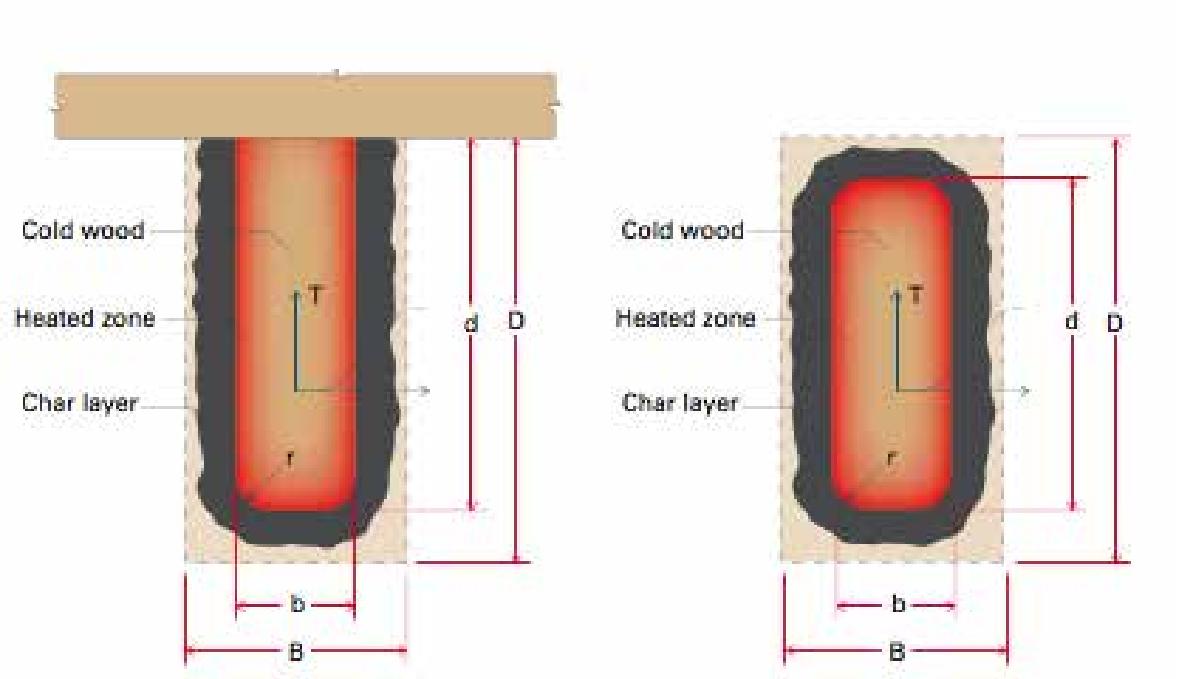
MASS TIMBER IN THE BUILDING CODE

Mass Timber's Fire-Resistive Performance is Well-Tested, Documented and Recognized via Code Acceptance

Table 16.2.1A Char Depth and Effective Char Depth (for β_n = 1.5 in./hr.)

Required Fire Resistance (hr.)	Char Depth, a_{char} (in.)	Effective Char Depth, a_{eff} (in.)
1-Hour	1.5	1.8
1½-Hour	2.1	2.5
2-Hour	2.6	3.2

Source: AWC's NDS



Source: AWC's TR 10

MASS TIMBER IN THE BUILDING CODE

Index of Fire Tested Assemblies and Penetrations

Fire-Resistance-Tested Mass Timber Assemblies & Penetratio

Following is a list of mass timber assemblies and penetration fire stopping
resistance as of March 11, 2019. Sources are noted at the end of this doc
fire-resistance design of mass timber assemblies, or free technical assista
of a commercial or multi-family wood building in the U.S., email help@wo
you: http://www.woodworks.org/project-assistance

Contents:

Table 1: North American Fire Resistance Tests of Mass Timber Floor / Roof Assemblies

CLT Panel	Manufacturer	CLT Grade or Major x Minor Grade	Ceiling Protection	Panel Connection in Test	Floor Topping	Load Rating
3-ply CLT (114mm 4.488 in)	Nordic	SPF 1650 Fb 1.5E MSR x SPF #3	2 layers 1/2" Type X gypsum	Half-Lap	None	Reduced 36% Moment Capacity
3-ply CLT (105mm 4.133 in)	Structurlam	SPF #1/#2 x SPF #1/#2	1 layer 5/8" Type X gypsum	Half-Lap	None	Reduced 75% Moment Capacity
5-ply CLT (175mm 6.875")	Nordic	E1	None	Topside Spline	2 staggered layers of 1/2" cement boards	Loaded, See Manufacturer
5-ply CLT (175mm 6.875")	Nordic	E1	1 layer of 5/8" Type X gypsum under Z-channels and furring strips with 3 5/8" fiberglass batts	Topside Spline	2 staggered layers of 1/2" cement boards	Loaded, See Manufacturer
5-ply CLT (175mm 6.875")	Nordic	E1	None	Topside Spline	3/4 in. proprietary gypcrete over Maxxon acoustical mat	Reduced 50% Moment Capacity
5-ply CLT (175mm 6.875")	Nordic	E1	1 layer 5/8" normal gypsum	Topside Spline	3/4 in. proprietary gypcrete over Maxxon acoustical mat or proprietary sound board	Reduced 50% Moment Capacity
5-ply CLT (175mm 6.875")	Nordic	E1	1 layer 5/8" Type X Gyp under Resilient Channel under 7 7/8" I-Joists with 3 1/2" Mineral Wool between Joists	Half-Lap	None	Loaded, See Manufacturer
5-ply CLT (175mm 6.875")	Structurlam	E1/M5 MSR 2100 x SPF #2	None	Topside Spline	1-1/2" Maxxon Cyp-Grete 2000 over Maxxon Reinforcing Mesh	Loaded, See Manufacturer
5-ply CLT (175mm 6.875")	DR Johnson	V1	None	Half-Lap & Topside Spline	2" gypsum topping	Loaded, See Manufacturer
5-ply CLT (175mm 6.875")	Nordic	SPF 1950 Fb MSR x SPF #3	None	Half-Lap	None	Reduced 59% Moment Capacity
5-ply CLT (175mm 6.875")	Structurlam	SPF #1/#2 x SPF #1/#2	1 layer 5/8" Type X gypsum	Half-Lap	None	Unreduced 101% Moment Capacity
7-ply CLT (245mm 9.65")	Structurlam	SPF #1/#2 x SPF #1/#2	None	Half-Lap	None	Unreduced 101% Moment Capacity
5-ply CLT	SmartLam	SI-V4	None	Half-Lap	nominal 1/2" plywood with 8d nails	Loaded,

MASS TIMBER IN THE BUILDING CODE

Index of Acoustically Tested Assemblies

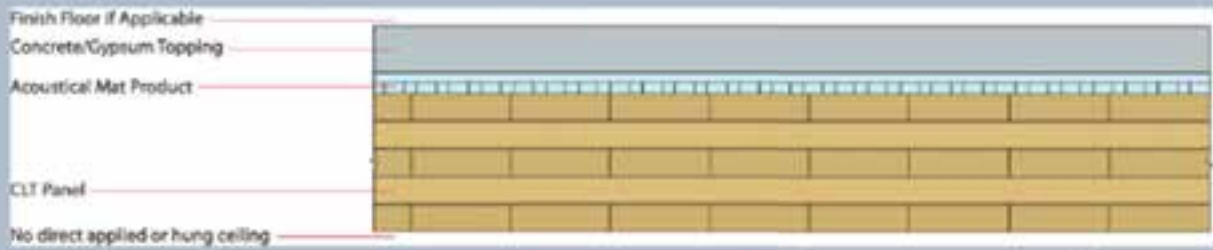
Acoustically-Tested Mass Timber Assem

Following is a list of mass timber assemblies thi
document. For free technical assistance on any
assistance related to any aspect of the design,
help@woodworks.org or contact the WoodWo

Contents:

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

WoodWorks
WOOD PRODUCTS COUNCIL

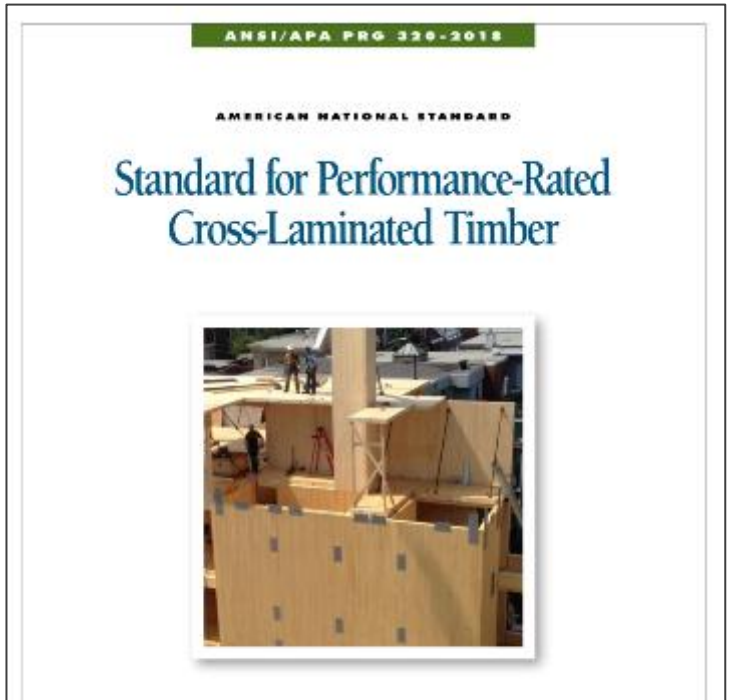


CLT Panel	Concrete/Gypsum Topping	Acoustical Mat Product Between CLT and Topping	Finish Floor	STC[1]	IIC[1]	Source
CLT 3-ply (3.5")	3" concrete	Maxxon Acousti-Mat® 3/4	None	53[2] ASTC	45[2] FIIC	72
	2" concrete	Pliteq GenieMat™ FF25	None	54	44	89
			LVT on GenieMat RST05	53	48	90
			Eng Wood on GenieMat RST05	53	46	91
			Carpet Tile	52	50	92
			None	57	45	103
			LVT	-	58	104

MASS TIMBER PRODUCT REPORTS & EVALUATION

- Standards for manufacturing, testing, 3rd party auditing and more exist to provide standardized methods of product certification/validation. Performed by 3rd party to maintain neutrality
- Building code requires that products used be certified in accordance with these standards

Mass Timber Product	Manufacturing Standard
CLT	ANSI APA PRG 320
Glulam	ANSI 190.1 and ASTM D3737
SCL	ASTM D5456

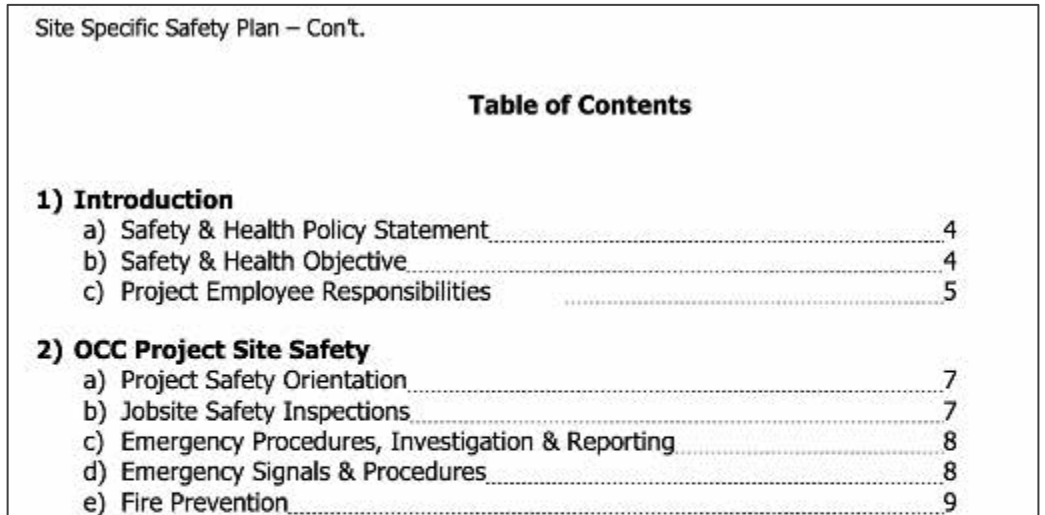


MASS TIMBER PROJECT RISK MITIGATION

- Each project should evaluate its specific conditions and constraints and create a project-specific risk mitigation plan that addresses items such as:
  - Construction phase moisture protection
  - Long term moisture protection
  - Construction site fire safety & other safety measures
  - Construction schedule impacts

Sample Safety Plan

Address & Location



Site Specific Safety Plan – Con't.

Table of Contents

MASS TIMBER PROJECT RISK MITIGATION

- Construction phase moisture protection strategies
  - Sealers: factory applied, site applied? Type, application strategies
  - Stain control, remediation strategies
  - What to do at joints, intersections, connections
  - Plans for finishing, drying

Photo: Swinerton Mass Timber

Photo: Andersen Construction

Credit: Andersen Construction

Andersen Construction
MASS TIMBER Construction Moisture Management Plan

Plan Components:

1. **Sealers**
2. **Stain Prevention**
3. **Moisture Control**
4. **Dry out**

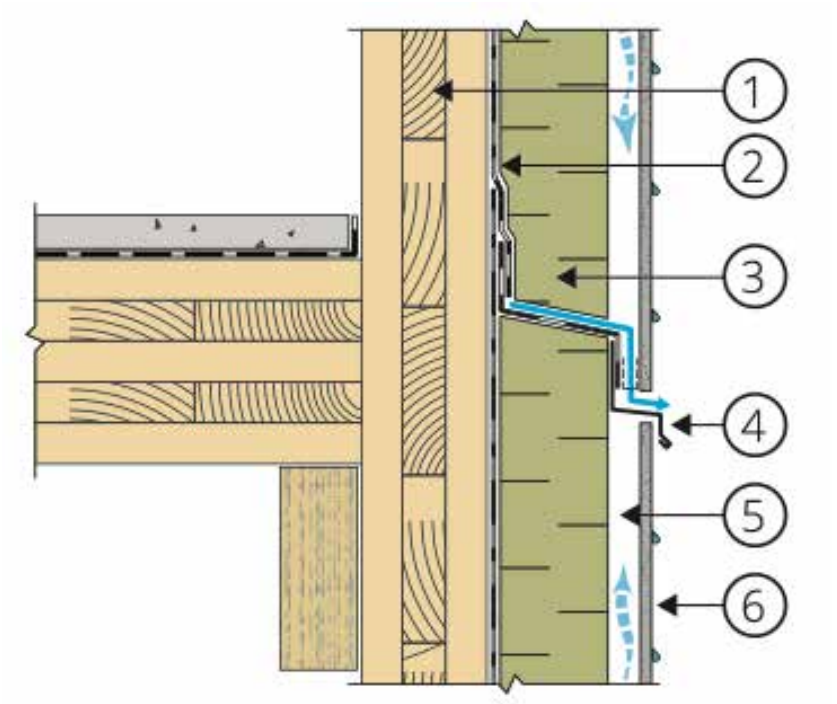
1. **Sealers at Timber Elements:**
   a. Shop Sealer will be applied to the following elements and surfaces (all sealers hand rolled, not sprayed):
      - CLT ends, edges, cuts
      - Clear sacrificial sealer on top sides of CLT floor panels
      - Glulam Columns and Beams (Sansin KP12-UVW)
   b. NO Shop applied sealer will be applied to the bottom faces of CLT floor panels.
2. **Staining Prevention Measures:**
   a. All CLT and Glulam elements will be wrapped during transportation.
   b. Wrap at timber elements will be removed as soon as they are set in place. (To prevent the trapping of moisture.
   c. Only galvanized steel or painted connectors will be used. No raw steel will be allowed on site (except rebar) once the timber structure is going up.
   d. NO cutting of steel allowed within the wood structure portion of the building. (Cutting in basement is acceptable.)
   e. On site storage:
      - Timber members will be wrapped until installed and be stored off the ground with a secondary cover.
      - Wood stickers will be used between the layers of stacked elements.
3. **Moisture Control:**
   a. Rothoblaas adhesive tape will be installed at all deck seams (CLT to CLT and CLT to plywood) during the course of installation. Tape to also be installed at penetrations in floor panels to prevent water transfer and staining.
   b. Concrete topping slabs will be placed deck by deck closely behind the timber erection. No concrete will

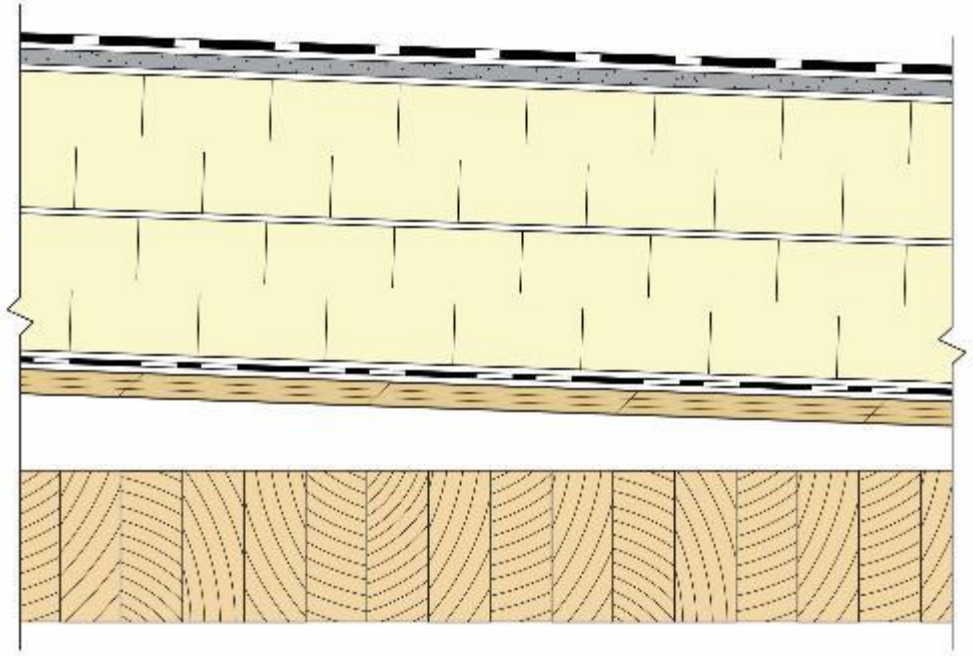
MASS TIMBER PROJECT RISK MITIGATION

- Detailing
  - Which detail is better?

MASS TIMBER PROJECT RISK MITIGATION

- Long term moisture protection achieved through good building enclosure assemblies and details
- Enclosure installation as soon as possible also aids in construction phase moisture protection of interior elements

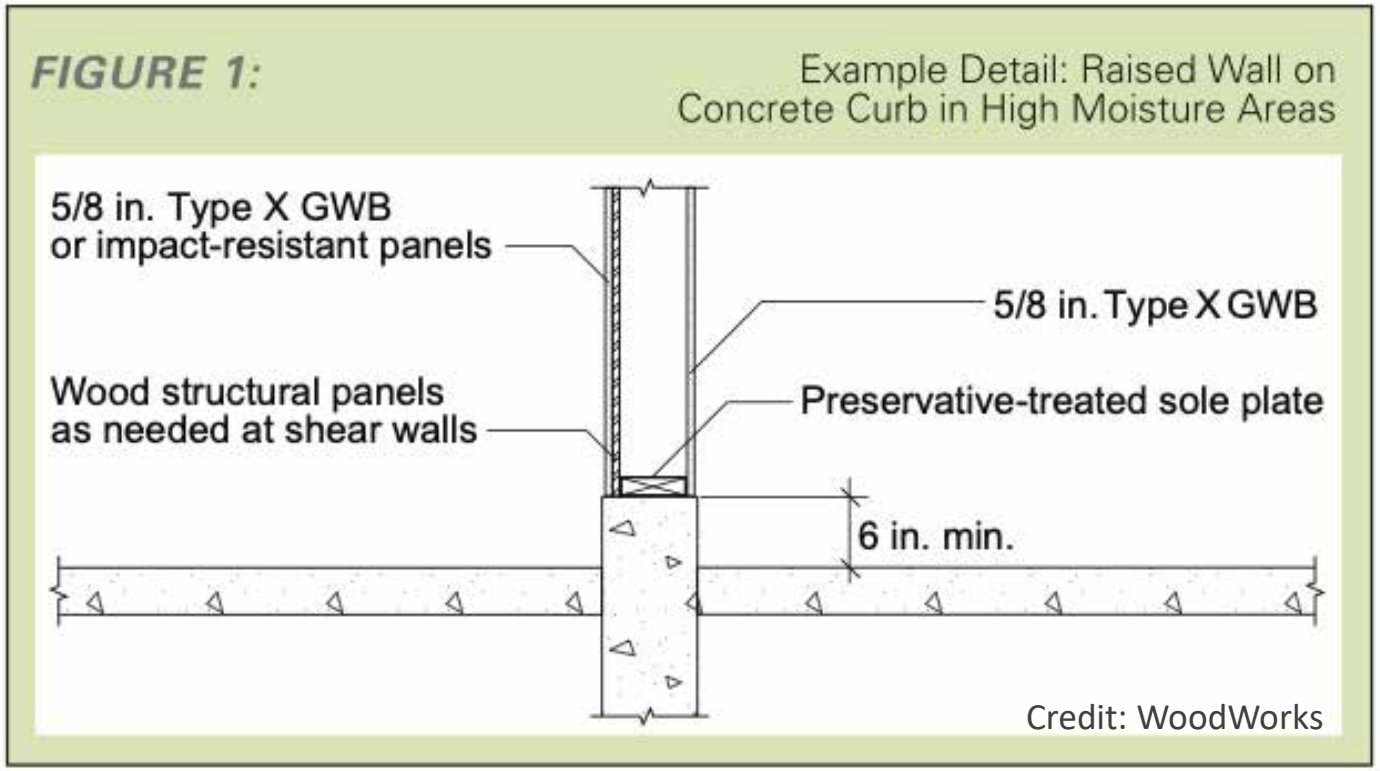




Photos: RDH Building Science

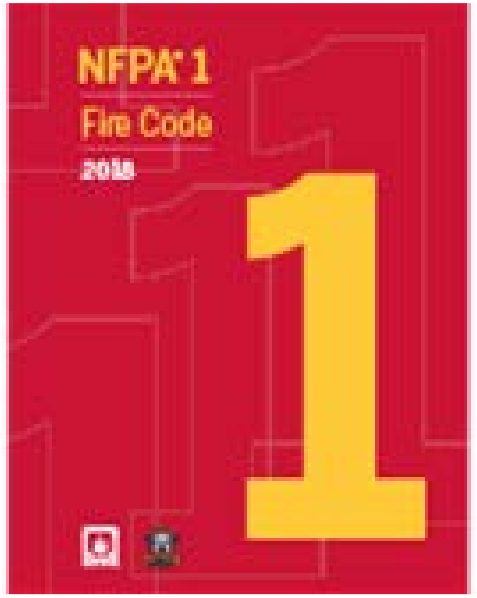
MASS TIMBER PROJECT RISK MITIGATION

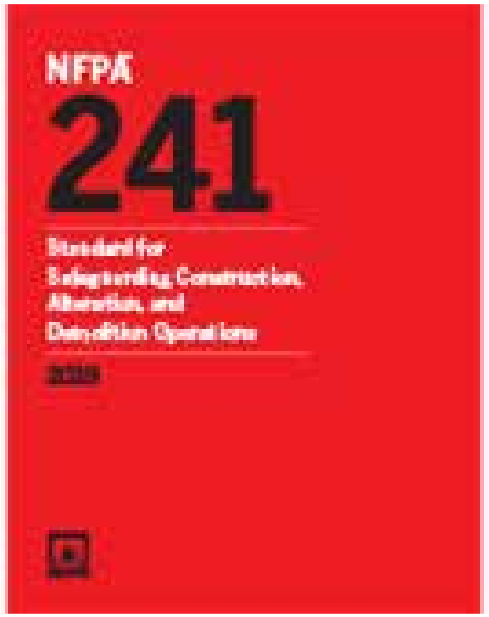
- Other moisture protection strategies can be employed for areas more susceptibe to moisture infiltration, i.e. in bathrooms & kitchens
  - Floor drains, curbs, standoff bases



MASS TIMBER PROJECT RISK MITIGATION

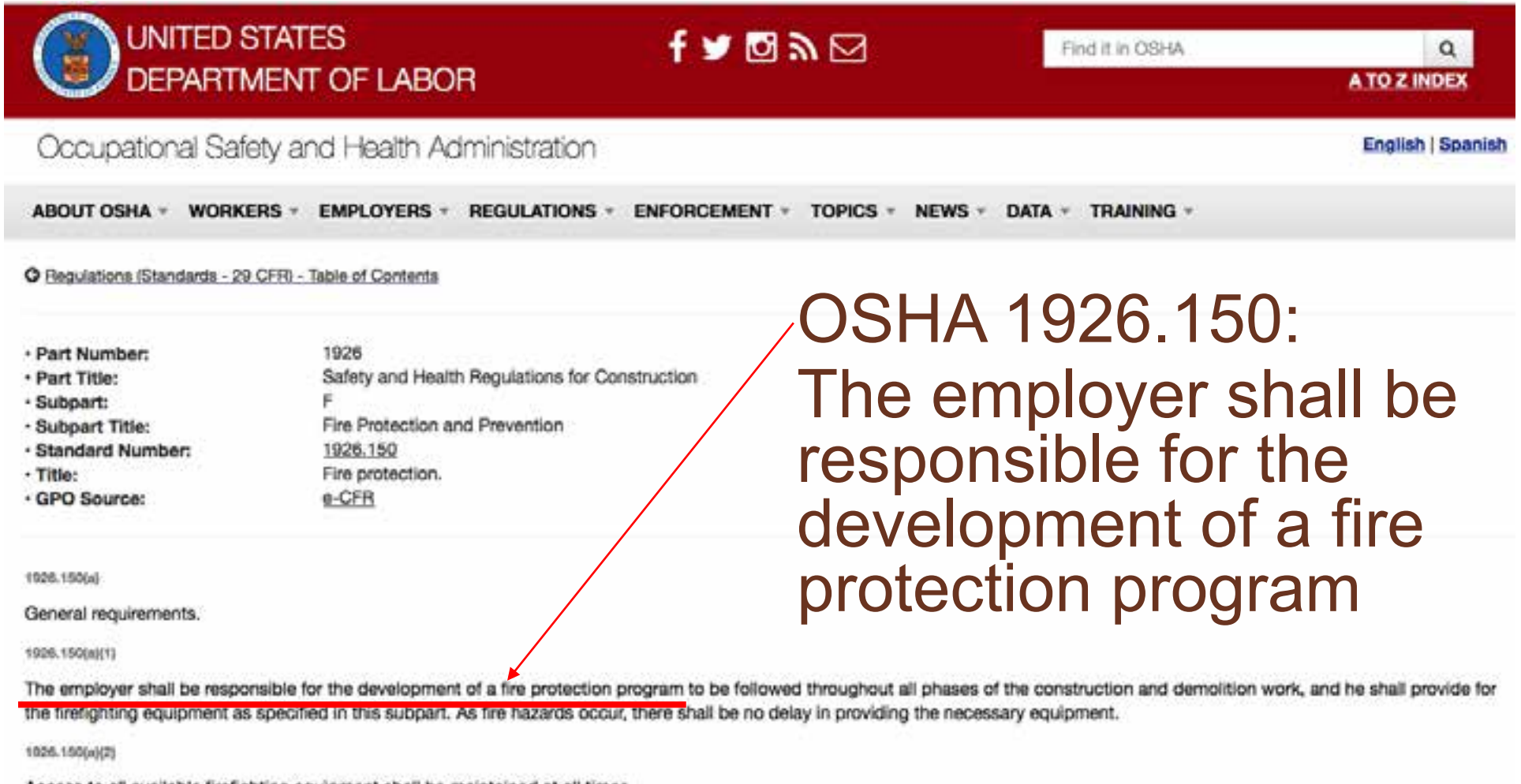
- Construction site fire safety – code requirements
  - E.G., placement of portable fire extinguishers, installation of standpipe





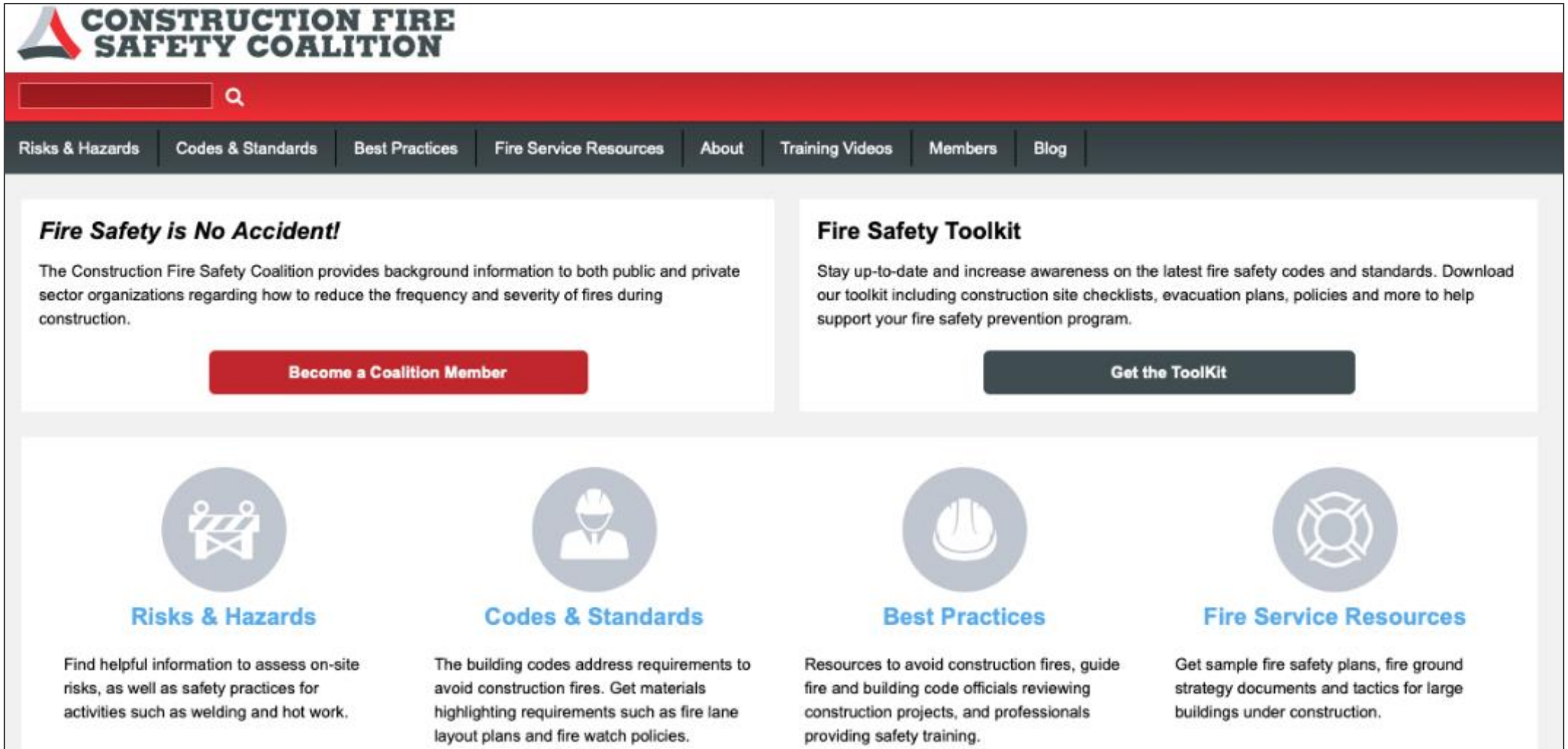
MASS TIMBER PROJECT RISK MITIGATION

- Construction site fire safety – OSHA requirements



MASS TIMBER PROJECT RISK MITIGATION

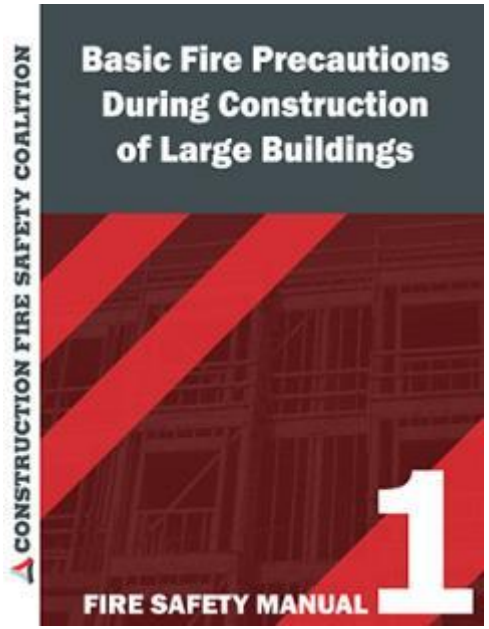
- Construction site fire safety – Resources: ConstructionFireSafety.org

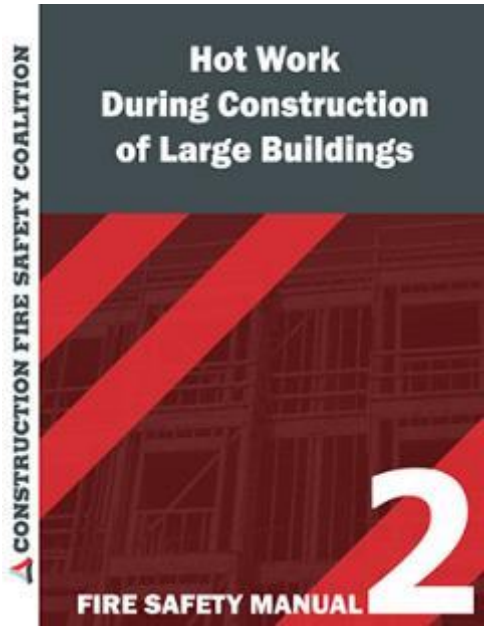


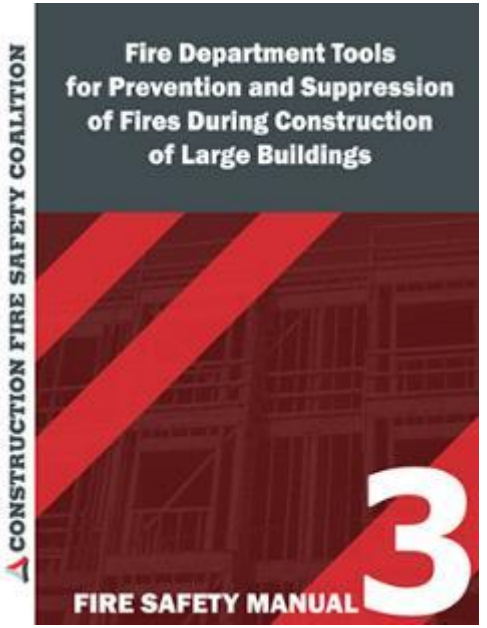
MASS TIMBER PROJECT RISK MITIGATION

3 Manuals:

- Basic Fire Precautions During Construction
- Hot Work During Construction
- FD Tools for Prevention and Suppression of Fires During Construction

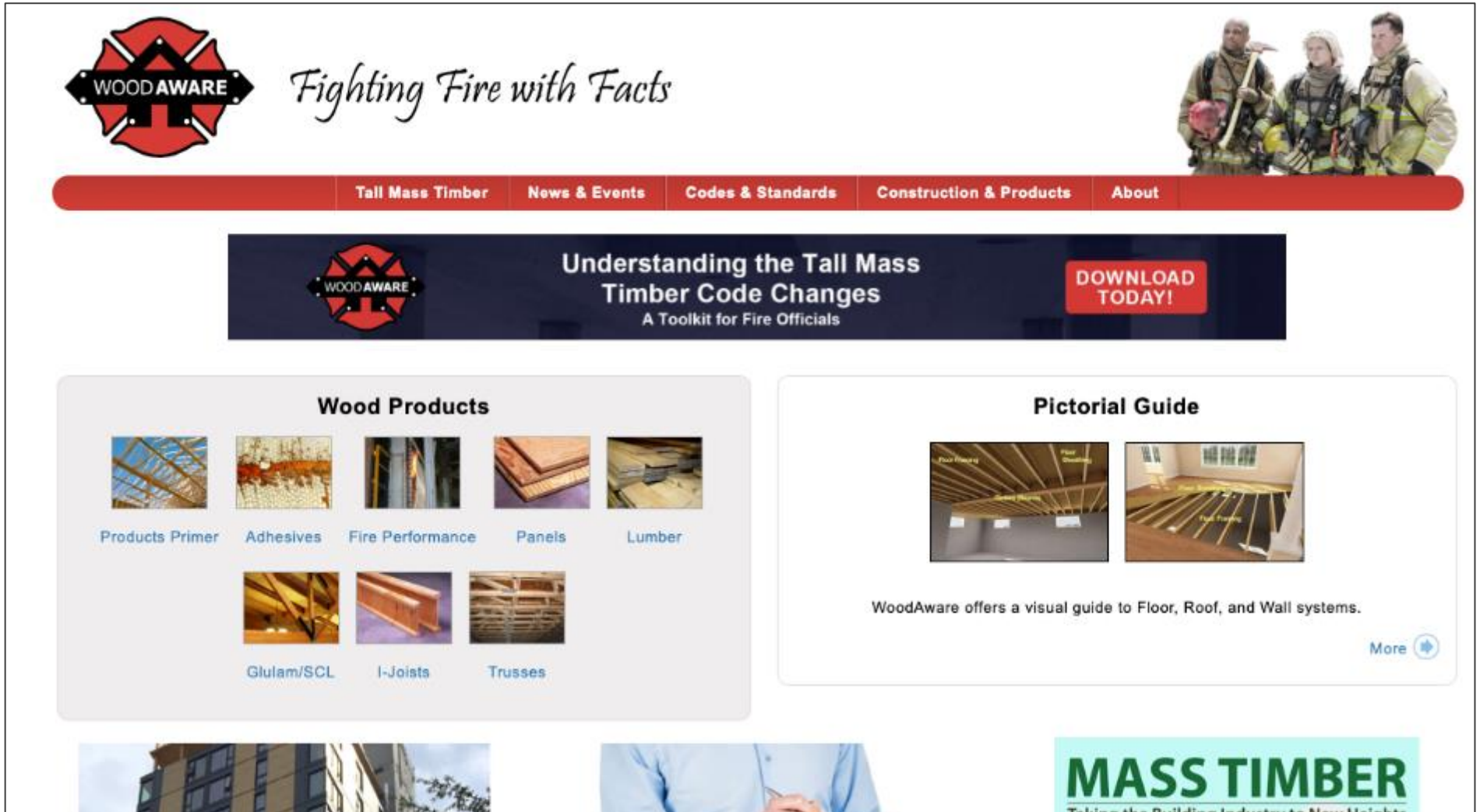






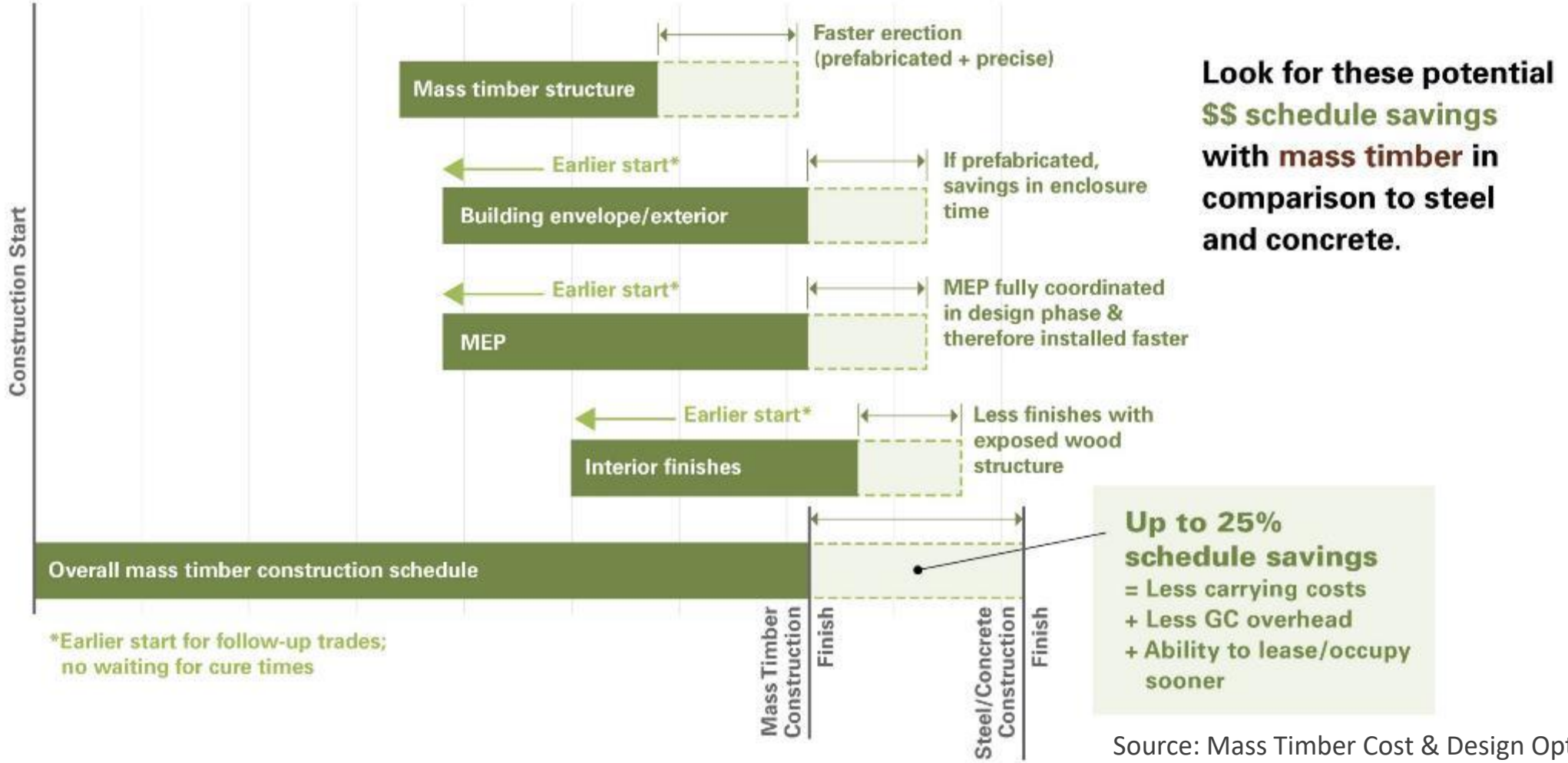
MASS TIMBER PROJECT RISK MITIGATION

- Construction site fire safety – Resources: WoodAware.org



MASS TIMBER PROJECT RISK MITIGATION

- Compressed construction schedule impacts



Source: Mass Timber Cost & Design Optimization, WoodWorks

MASS TIMBER PREFABRICATION

CLEAN SITE CREW SIZE SCHEDULE

Photo: Swinerton

Beam to Column

Photo: StructureCraft

Photo: Structurlam

1 Floor = 3 Days

17 Floors Erected in 9.5 Weeks

Brock Commons, Vancouver, BC
Source: Naturally: Wood

Schedule Savings for Rough-In Trades

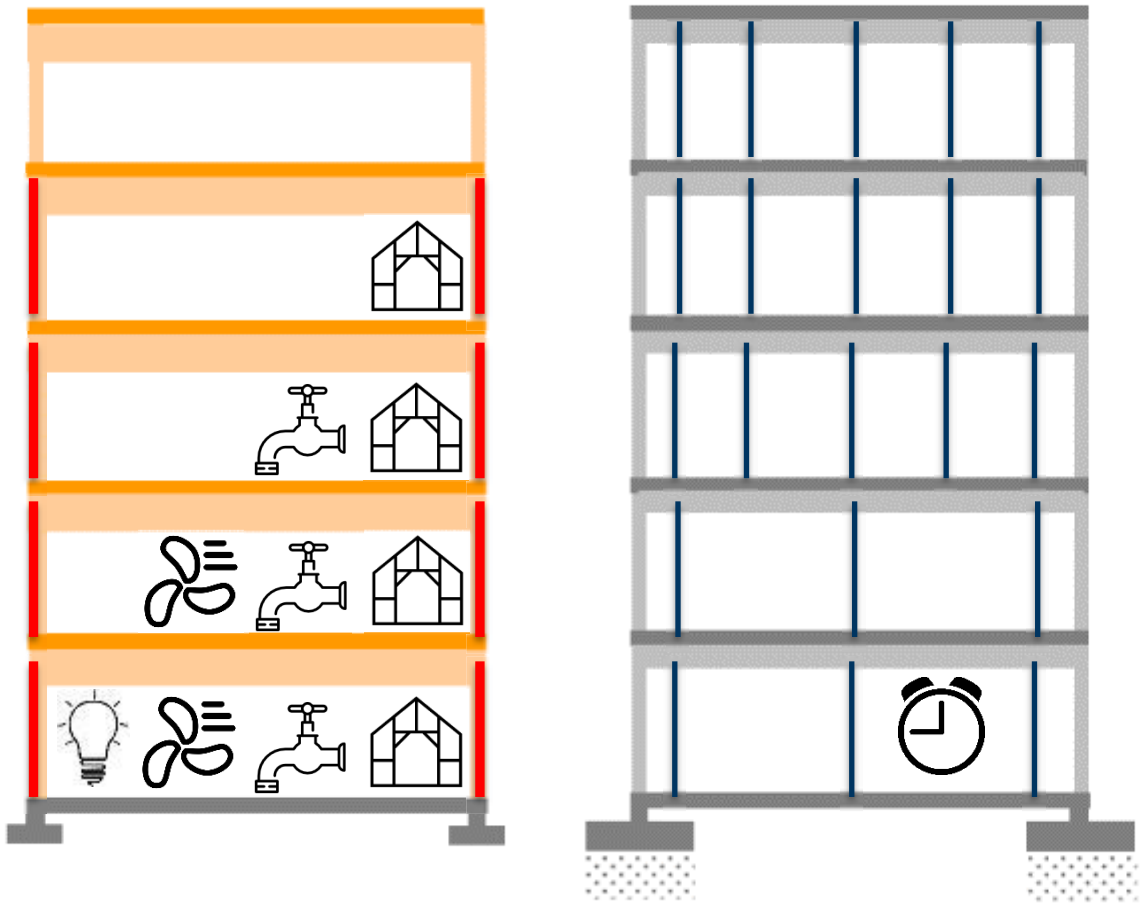
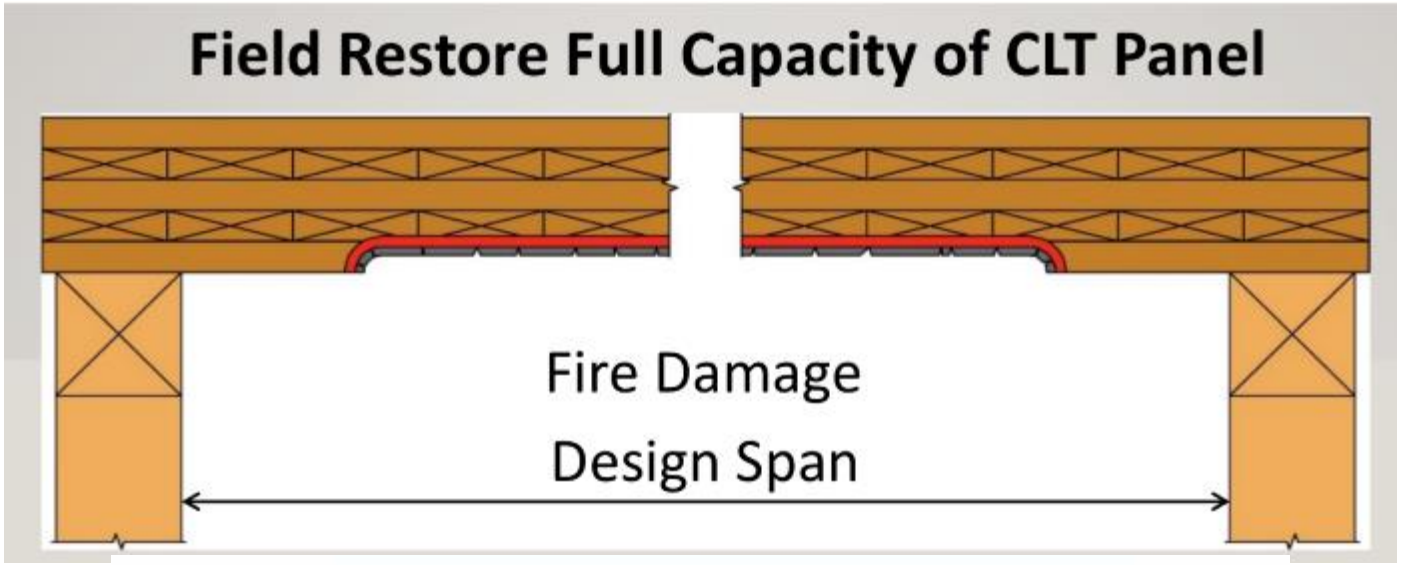


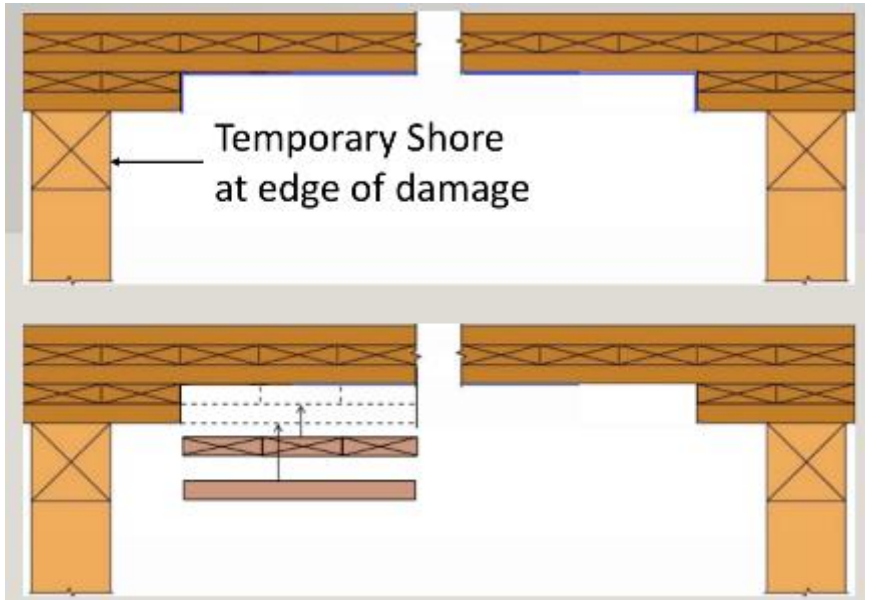
Photo: WoodWorks

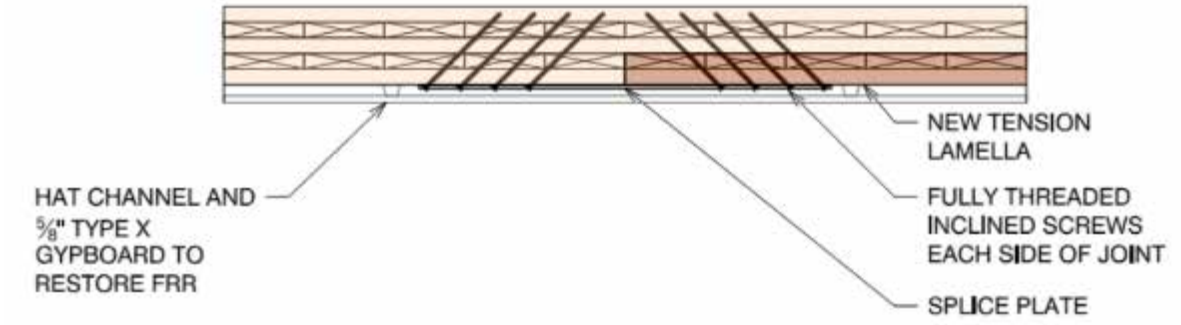
Shorter On-Site Schedule
Fewer On-Site Material Stockpiles

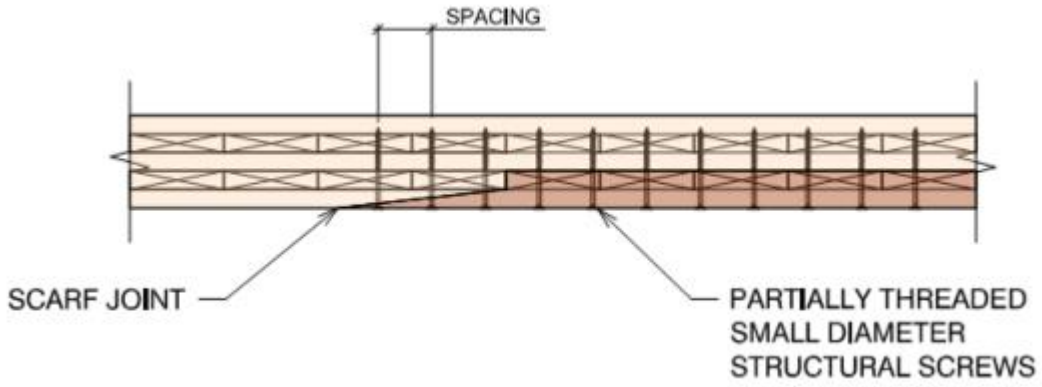
MASS TIMBER PROJECT RISK MITIGATION

- Post-fire repair strategies, depends on extent of damage, fire-resistance requirements









https://cdn-web.iccsafe.org/wp-content/uploads/Post-fire-restoration-of-CLT.pdf

MASS TIMBER PROJECT RISK MITIGATION

- Mass timber project that experienced a fire: Arbora, Montreal, QC
- Fire confined to balcony, interior damage isolated
- Section of concrete topping removed for inspection, mass timber floor panel found to be at typical MC and ambient temperatures

MASS TIMBER INSURANCE

- Mass timber insurance resource for insurers, developers, contractors & designers
- Free download at woodworks.org

Some mass timber projects have been classified as Modified Fire Resistive, but there is often pressure for underwriters to use more expensive classification codes. There is also interest in exploring a seventh classification specific to mass timber. Working with a broker experienced with mass timber is very helpful in terms of negotiating an appropriate classification. The broker can speak to its performance capabilities, advantages for the project at hand, and historical use in similar buildings.

While there are many types of insurance coverage for buildings, this paper is focused on general liability and property coverage for a building owner.

General liability coverage insures your legal liability to third parties for bodily injury and/or property damage. It covers both defense costs and any indemnity payments. There are exclusions for intentional acts, coverage that can be purchased under another policy, illegal acts and acts of government. General liability policy premiums are calculated based on employee payroll, revenue and the cost of subcontracted work, including materials. Rates vary based on specific tasks performed, location of the work, past claims history of the entity, breadth of coverage, the insurer providing the policy and negotiation skills of the insurance broker. Typical general liability limits are $1,000,000 for each occurrence, $2,000,000 general aggregate and $2,000,000 products/completed operations aggregate. This is considered a one million limit policy, as the occurrence limits are referenced in conversations about coverage. Aggregate refers to the maximum the policy will pay regardless of the number

General Liability Insurance Structure Options

For a developer of a mass timber project, there are two types of general liability insurance available.

The first covers just the developer's operations. This can be an annual renewable policy that is part of a larger program covering all of the firm's projects or a standalone policy covering a single project for its duration. In this scenario, the general contractor and each of the trade subcontractors purchase their own annual renewable policies. Annual renewable policies are called "practice" policies. A typical construction project has over forty applicable general liability practice policies, most of which include at least $5,000,000 in excess liability policies. Contractors and subcontractors are usually contractually obligated to name the developer as an additional insured on their policies.

The second option is a Controlled Insurance Program, which is called either an Owner Controlled Insurance Policy (OCIP) or Contractor Controlled Insurance Policy (CCIP), depending on whether the owner or general contractor is named first. These types of policies are issued for a specific project for all parties working at the site. They cover the term of construction through the statute of ultimate repose for the state where the project is located. Due to the depth and breadth of coverage, OCIPs and CCIPs are more expensive than practice policies. They're typically used when the owner wants to assign the liability coverage for a project to the insurance company, in order to end their liability when the project is sold. Sometimes a lender will require this type of insurance to provide clear liability pathways away from the

WoodWorks™
WOOD PRODUCTS COUNCIL

Insurance for Mass Timber Construction: Assessing Risk and Providing Answers

Richard McLain, PE, SE • Senior Technical Director – Tall Wood • WoodWorks – Wood Products Council
Susan G. Brodahl • Senior Vice President • Hellerman Insurance Brokers

One of the exciting trends in building design is the growing use of mass timber—i.e., large solid wood panel products such as cross-laminated timber (CLT) and nail-laminated timber (NLT)—for floor, wall and roof construction. Mass timber products have inherent fire resistance and can be left exposed in many applicaions and building sizes, achieving the triple function of structure, finish and fire resistance. Because of their strength and dimensional stability, these products offer an alternative to steel, concrete and masonry for many applications, but have a much lighter carbon footprint. It is this combination of exposed structure and strength that developers and designers across the country are leveraging to create innovative designs with a warm yet modern aesthetic.

As mass timber construction has proliferated across the U.S., a number of project teams have run into the same issue: insurance companies unfamiliar with these types of buildings can be reluctant to provide insurance.

The challenge has presented itself in two forms: builder's risk insurance (or course of construction) and property insurance (after building is complete and occupied). Relative risks are assessed differently for each, and each requires a unique approach. For example:

- Construction-phase risks associated with fire are different in mass timber buildings than with most other framing systems. Since the timber elements have inherent fire-resistance capabilities, a building can have a certain level of passive fire resistance after the frame is erected. Protection doesn't rely on (and wait for installation of) materials such as spray-applied
- In addition to safety, property insurance for mass timber buildings requires an understanding of performance related to things like moisture, durability and building enclosure detailing. Much of the property insurance discussion is also site-specific—e.g., Is the area prone to flooding, earthquakes or high winds? Mass timber has been tested against potential natural disasters, and numerous test and research reports are available.

This paper is intended for developers and owners seeking to purchase insurance for mass timber buildings, for design/construction teams looking to make their designs and installation processes more insurable, and for insurance industry professionals looking to alleviate their concerns about safety and performance.

For developers, owners and design/construction teams, it provides an overview of the insurance industry, including its history, what affects premiums, how risks are analyzed, and how project teams can navigate coverage for mass timber buildings. Insurance in general can seem like a mystery—what determines premium fluctuations, impacts of a

WoodWorks Online Event

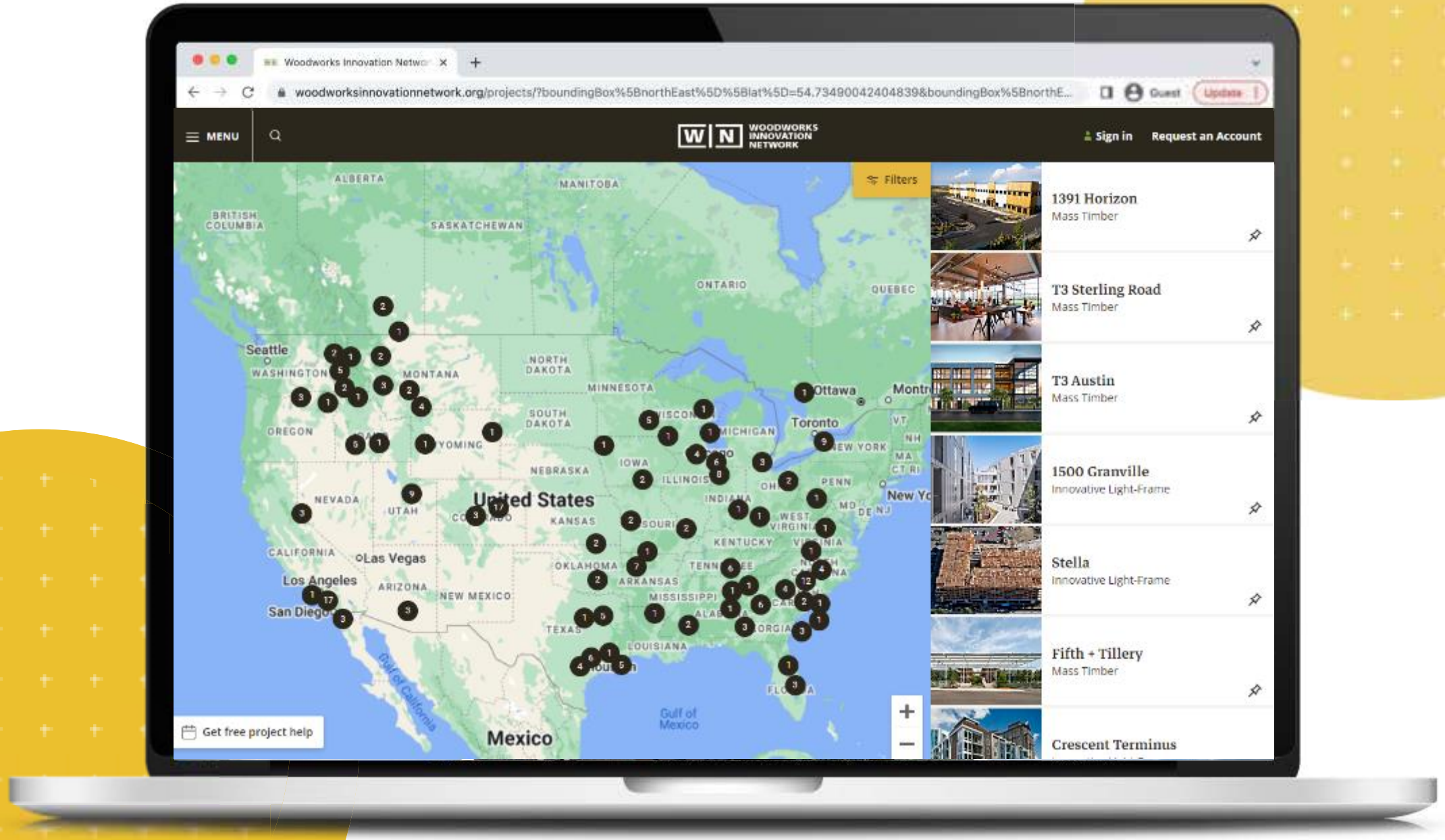
Kendeda Building for Innovataive Sustainable Design, The Miller Hull Partnership with Lord Aeck Sargent, photo Jonathan Hillyer

1430 Q, The HR Group Architects, Buehler Engineering, Greg Folkins Photography

T3 Minneapolis, MGA, DLR Group, Magnusson Klemencic Associates, StructureCraft, photo Ema Peter

WOODWORKS INNOVATION NETWORK.ORG

111 East Grand / Neumann Monson Architects photo Mike Sinclair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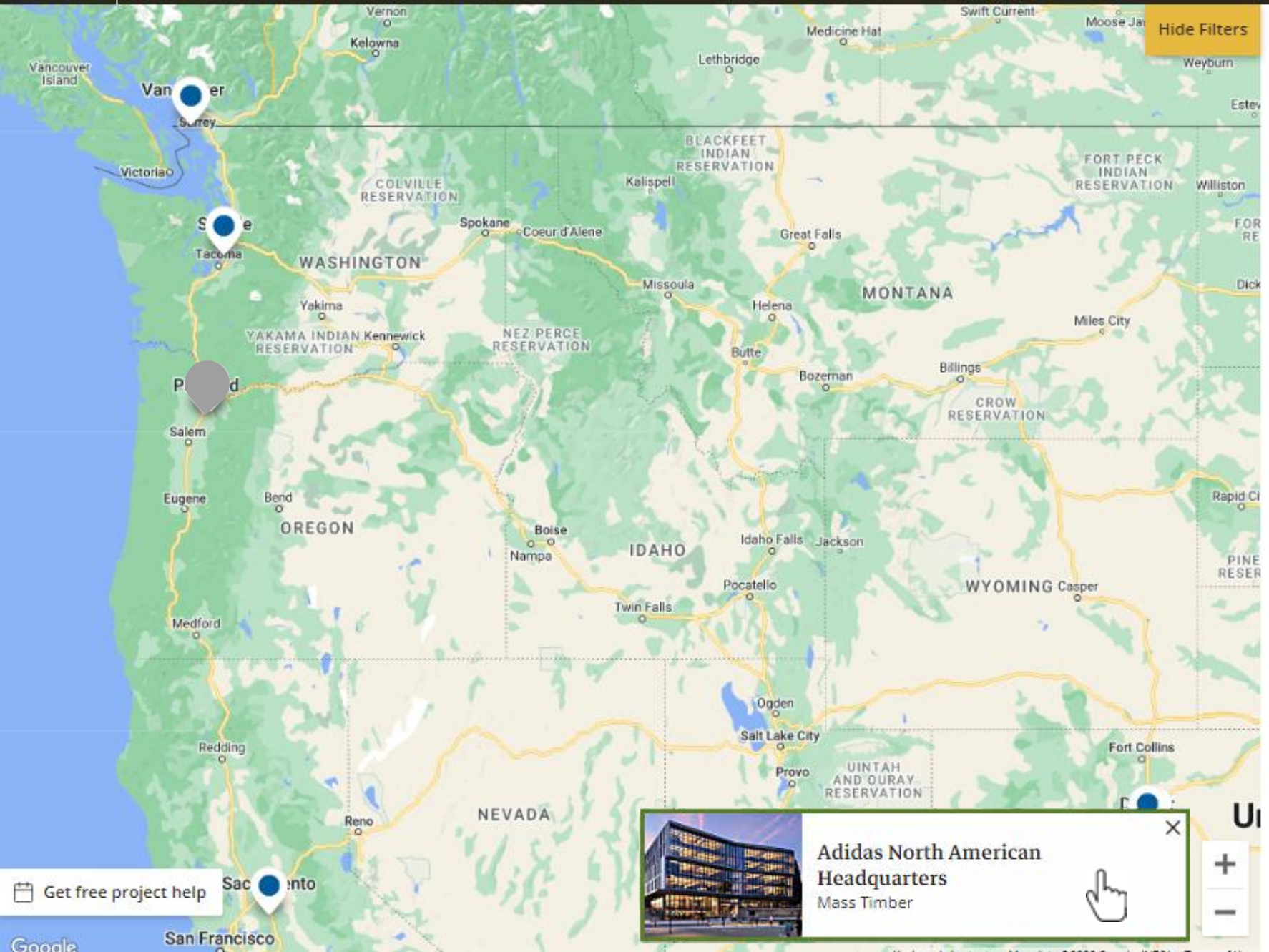
Crescent Terminus



- [ ] Structural Composite Lumber (e.g. LVL and LSL) 0
- [ ] Timber-Frame / Post and Beam 2
- [ ] Wood structural panels 0
- [ ] Wood-Concrete Composite Systems 0

Other Properties

- [ ] Wood Design Award Winner 2
- [ ] Affordable Housing 1
- [ ] Business Case Study Available 0
- [ ] Spec Office 1
- [ ] Technical Case Study Available 1

Number of Stories

1 — 12

Year Built

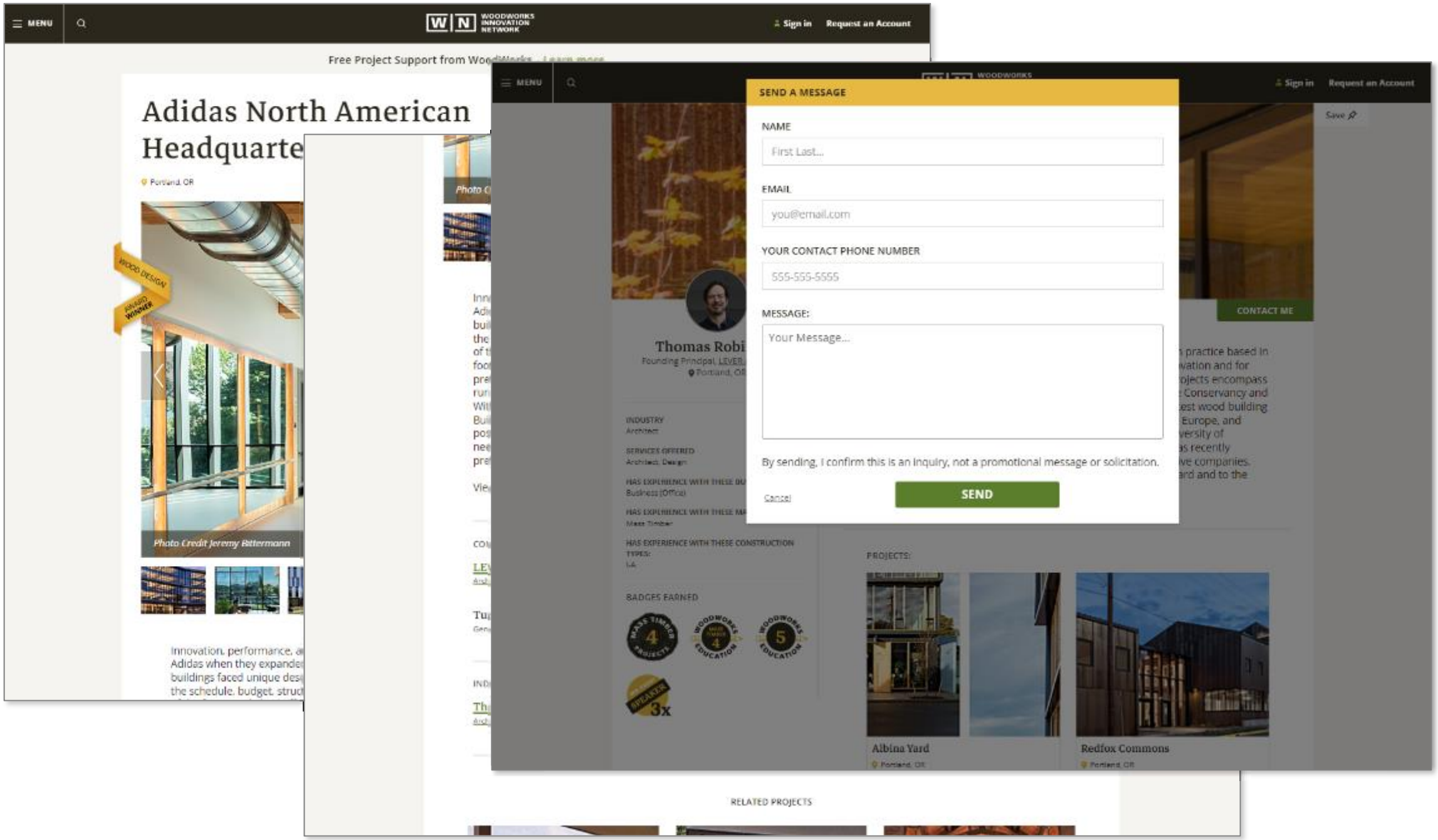
Select...

Construction Types

- [ ] I-A 0
- [ ] I-B 0
- [ ] II-A 0
- [ ] II-B 0
- [ ] III-A 3
- [ ] III-B 1
- [ ] IV-A 0
- [ ] IV-B 1
- [ ] IV-C 0
- [ ] IV-HT 2
- [ ] Unknown 0
- [ ] V-A 0
- [ ] V-B 1

Square Footage

- [ ] < 10,000 18
- [ ] 10,000 - 50,000 72
- [ ] 50,000 - 200,000 74
- [x] 200,000 + 8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HAS EXPERIENCE WITH THESE MA
Mass Timber
HAS EXPERIENCE WITH THESE CONSTRUCTION TYPES:
LA
BADGES EARNED
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MESSAGE:
Your Message...
By sending, I confirm this is an inquiry, not a promotional message or solicitation.
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PROJECTS:
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Portland, OR
Redfox Commons
Portland, OR

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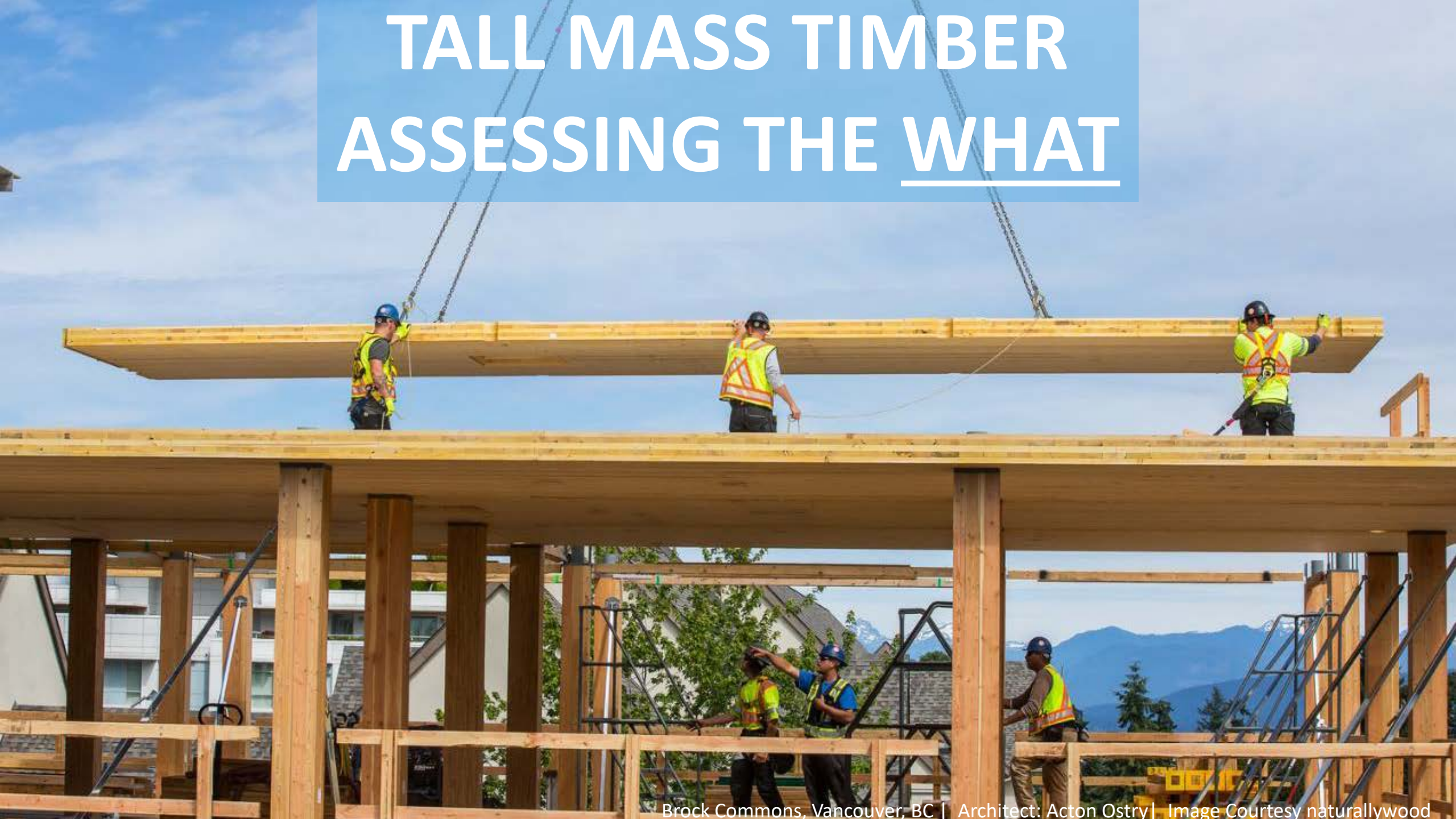
The What, Why and How of Tall Mass Timber

Photo: Michael Green Architecture

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

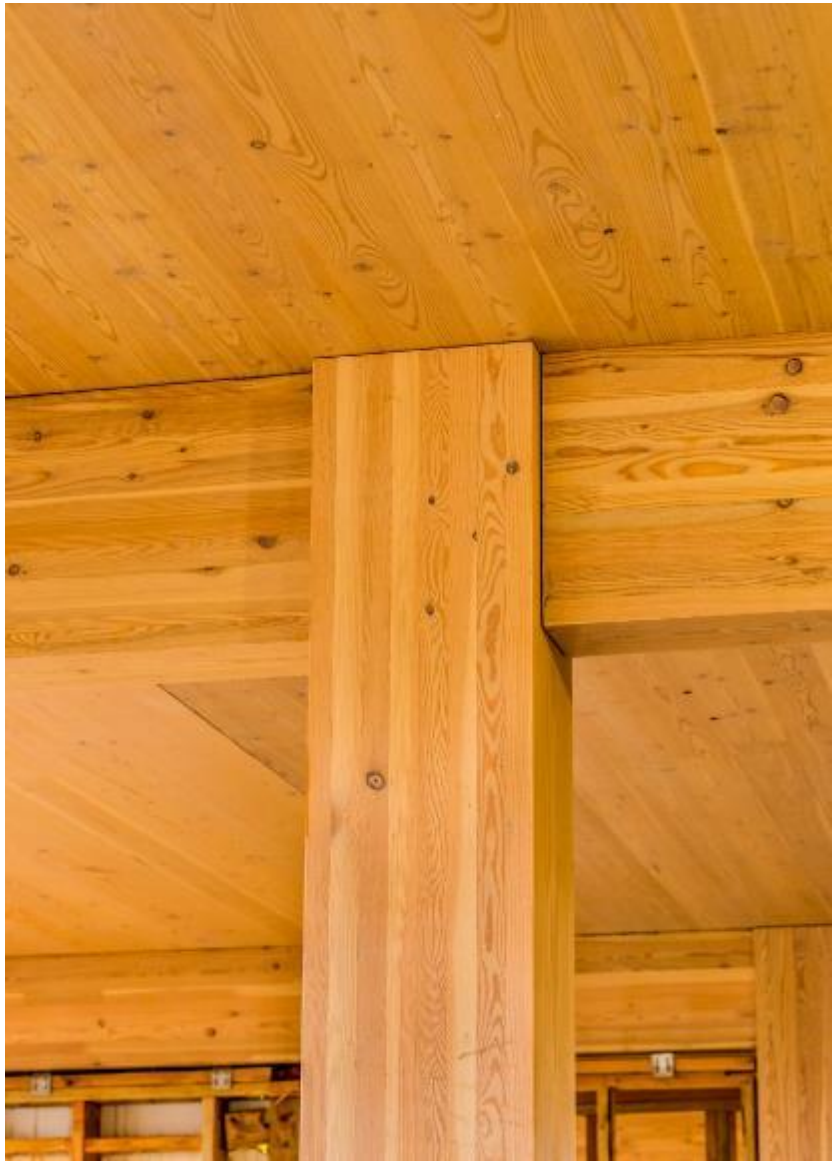
MJOSTARNET, NORWAY

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

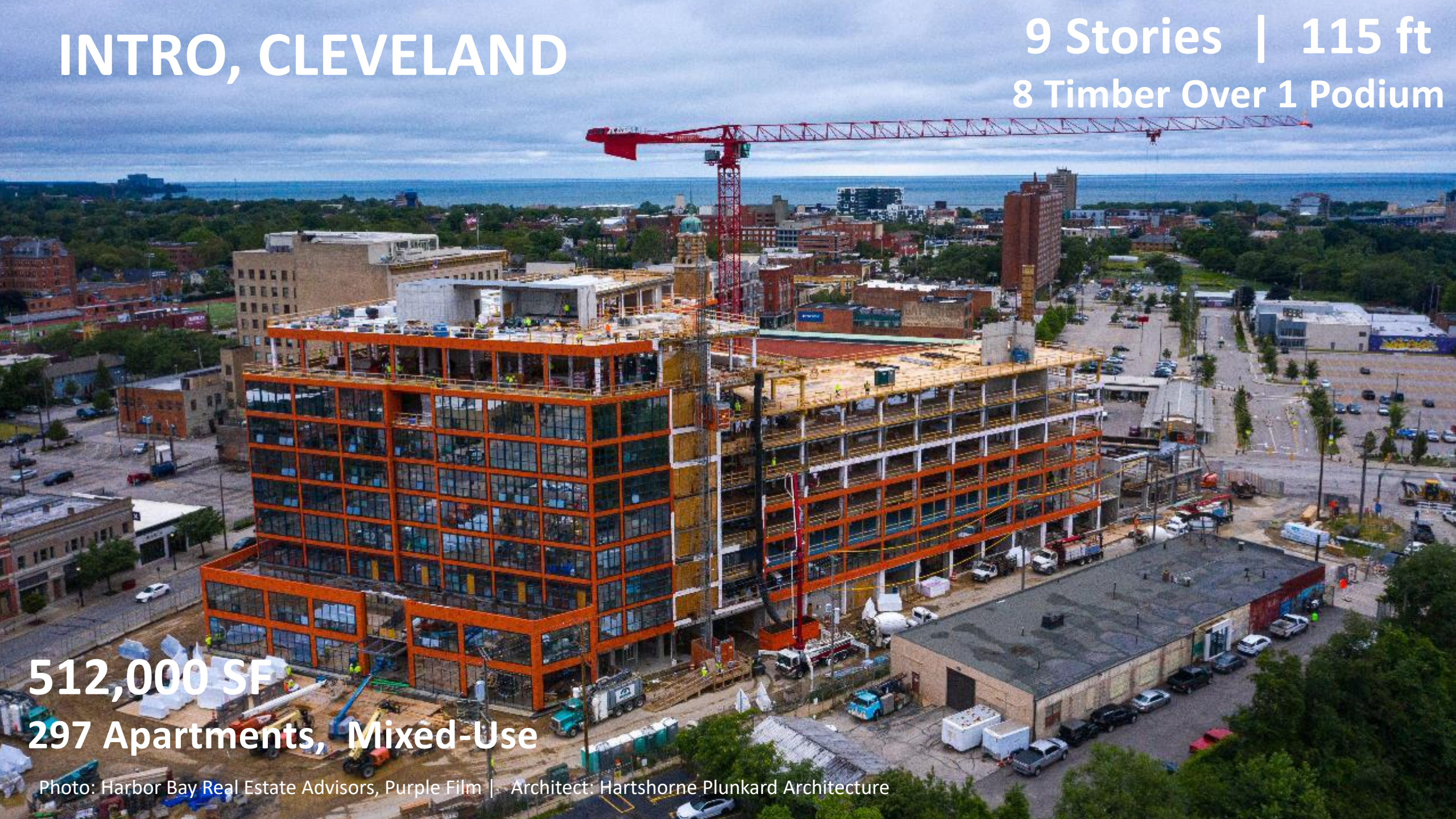
CARBON12, PORTLAND, OR

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, Purple Film | Architect: Hartshorne Plunkard Architecture

INTRO, CLEVELAND

9 Stories | 115 ft

8 Timber Over 1 Podium

Type IV-B

Variance to expose ~50% ceilings

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

ASCENT, MILWAUKEE

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

493,000 SF

259 APARTMENTS, MIXED-USE

ASCENT, MILWAUKEE

Tallest Mass Timber Building in the World

Photo: CD Smith Construction |
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
7 STORY EXISTING BUILDING

Photo: WoodWorks | Architect: Hickok Cole

80 M ST, WASHINGTON, DC

100,000 SF

2 NEW LEVELS OF CLASS A OFFICE SPACE
OCCUPIED PENTHOUSE
17’-0” CEILING HEIGHTS

APEX PLAZA
CHARLOTTESVILLE, VA

8 STORIES
6 TIMBER OVER 2 PODIUM, 100 FT

PRIMARILY OFFICE SPACE

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

APEX PLAZA
CHARLOTTESVILLE, VA

187,000 SF

Photo: WoodWorks | Architect: William McDonough + Partners

11 E LENOX, BOSTON, MA

7 STORIES

70 FT

Passive House

Multi-Family

Credit: H + O Structural Engineering

Credit: Monte French Design Studio

11 E LENOX, BOSTON, MA

Credit: H + O Structural Engineering

11 E LENOX, BOSTON, MA

Credit: H+O Structural Engineering

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

NIR CENTER, PORTLAND, OR

~400,000 SF

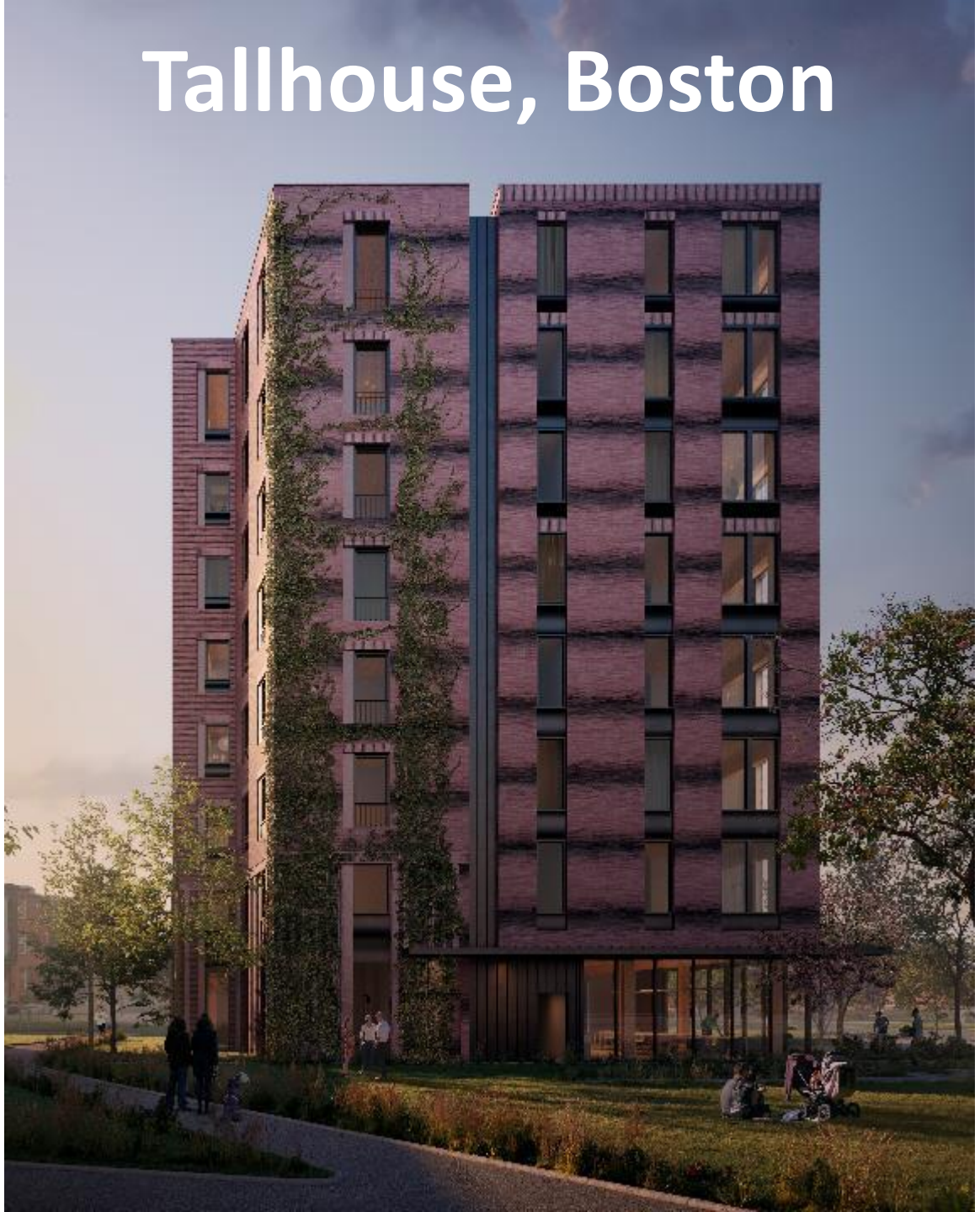
235,000 SF Laboratory Space
25,000 SF Office Space
Ground Floor Retail

Photo: Hennebery Eddy Architects | Architect: Hennebery Eddy Architects

Hennebery Eddy Architects

Tallhouse, Boston

Source: Generate Architecture



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 induced slab podiums to accommodate the ground floor programs. Timber Use 3 shows how a typical approach with light gauge metal yields GWP savings in structural walls and exterior walls, despite the addition of the podium. Finally, Timber Use 4 emphasizes how a complete cellular CLT

TALL MASS TIMBER
UNDERSTANDING THE WHY

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

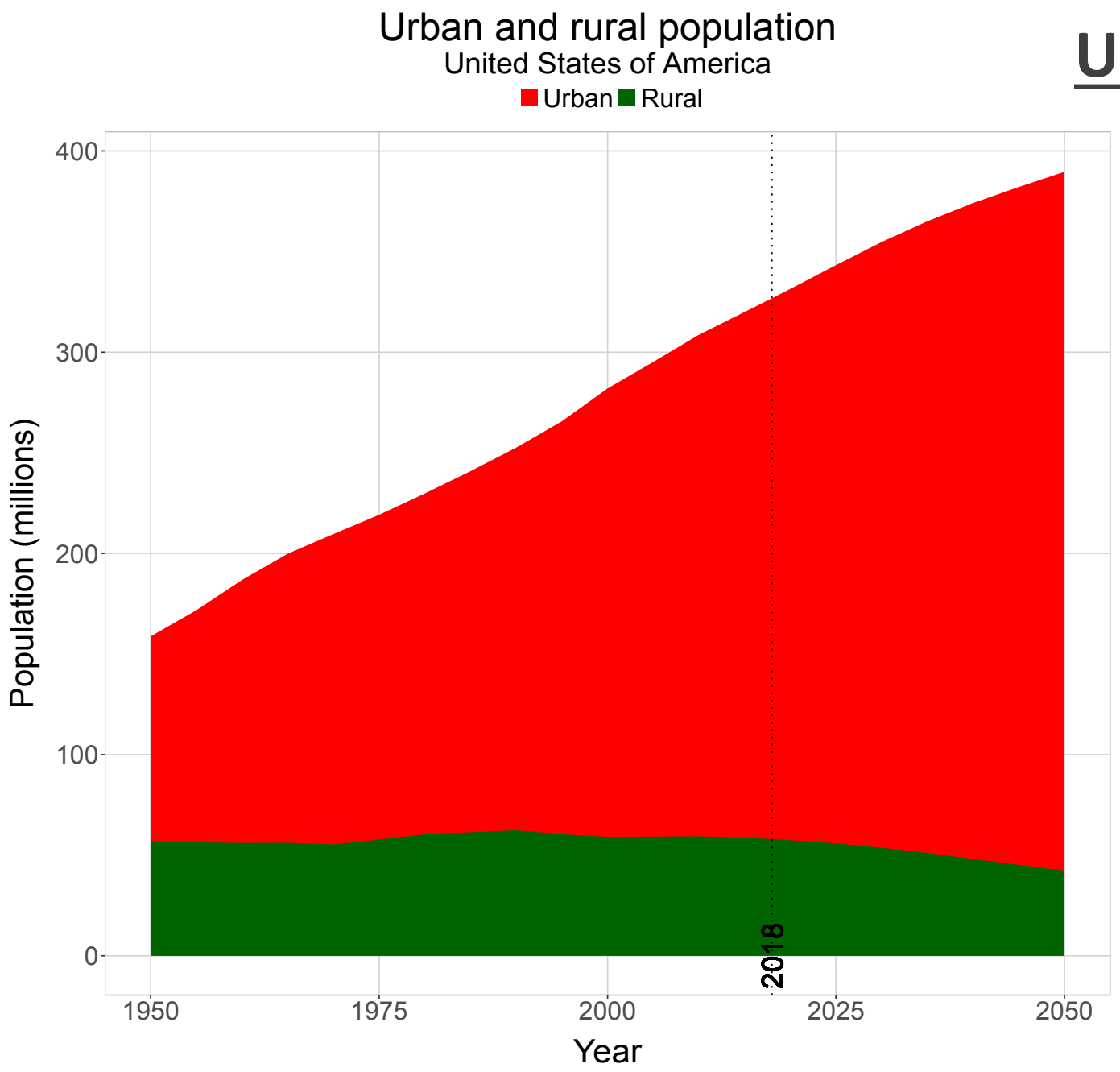
Global Population Increase

2019 = 7.7 billion people

2050 = 11.2 billion people

Source: https://ourworldindata.org/future-population-growth

US URBAN POPULATION BOOM



	URBAN	RURAL
2019	271.4 M	57.7 M
2030	301 M	53.7 M
2050	347.3 M	42.2 M

New Buildings & Greenhouse Gasses

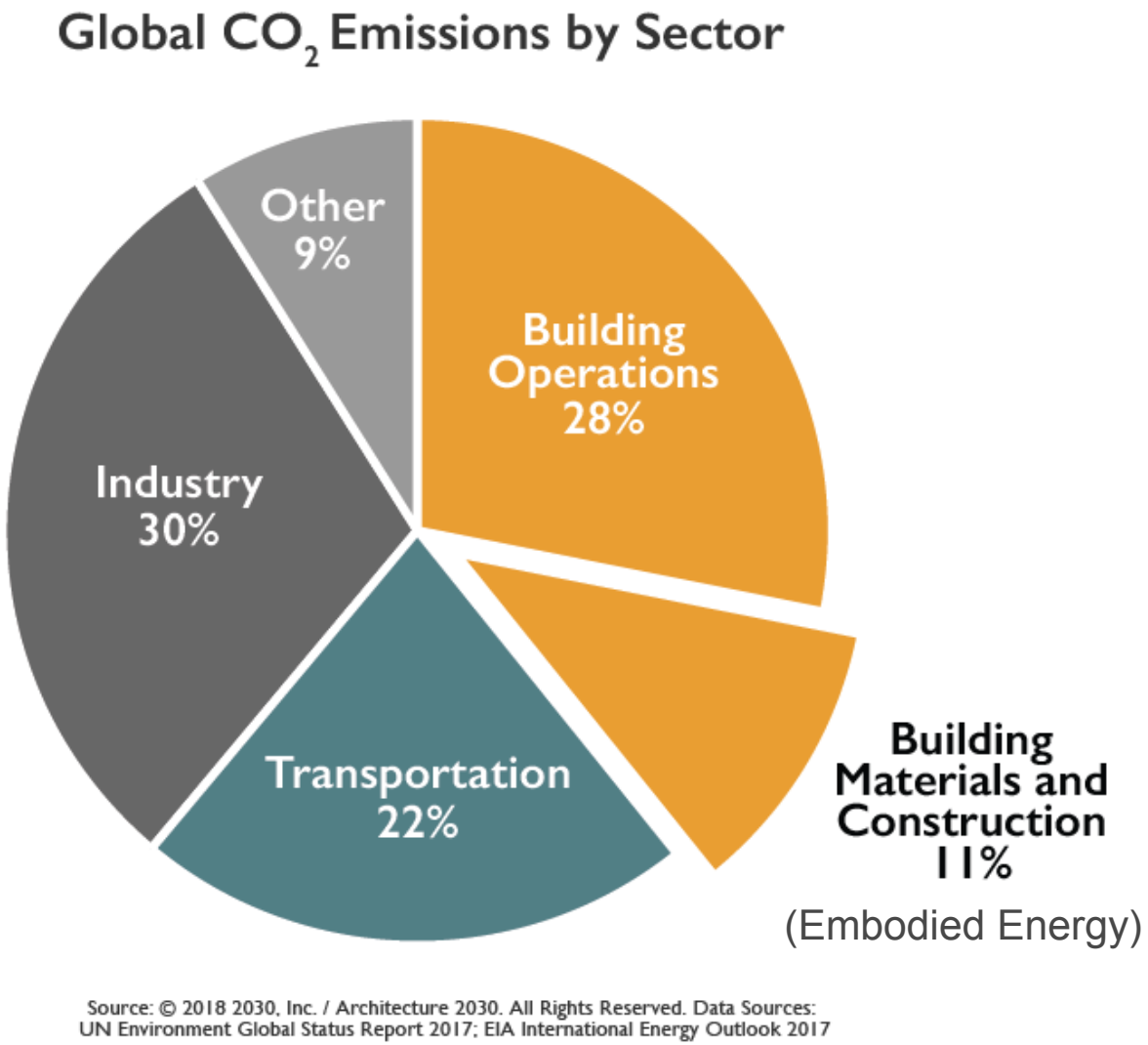


Image: Architecture 2030

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

Embodied Energy (11%): Concrete, iron + steel produce approximately 9% of this (Architecture 2030)

Carbon Storage

Wood ≈ 50% Carbon (dry weight)

Image: Kaiser + Path

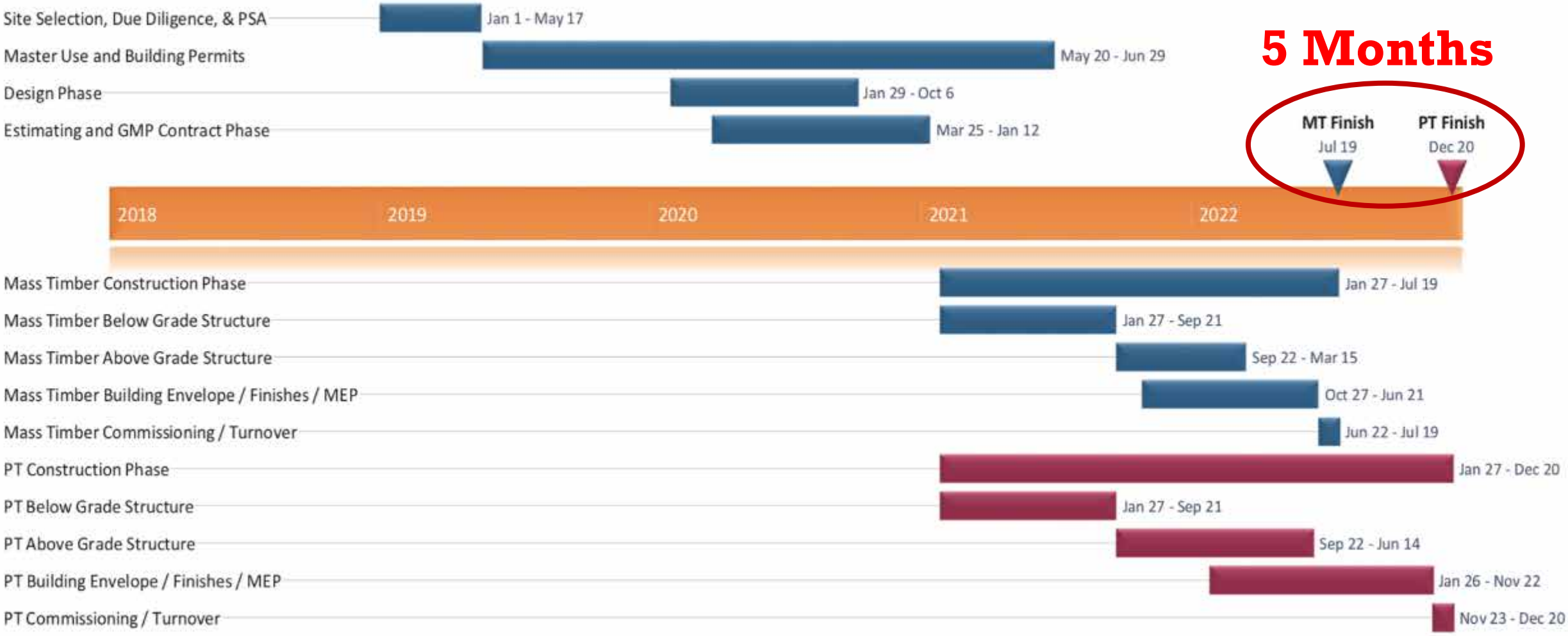
Image: Lever Architecture

Biophilic Design, Connection to Forests

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

Construction Impacts: Labor Availability

Construction Impacts: Schedule



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

Tall Mass Timber: Structural Warmth is a Value-Add

TMBR (unbuilt) Minneapolis, MN | Images: D/O Architects

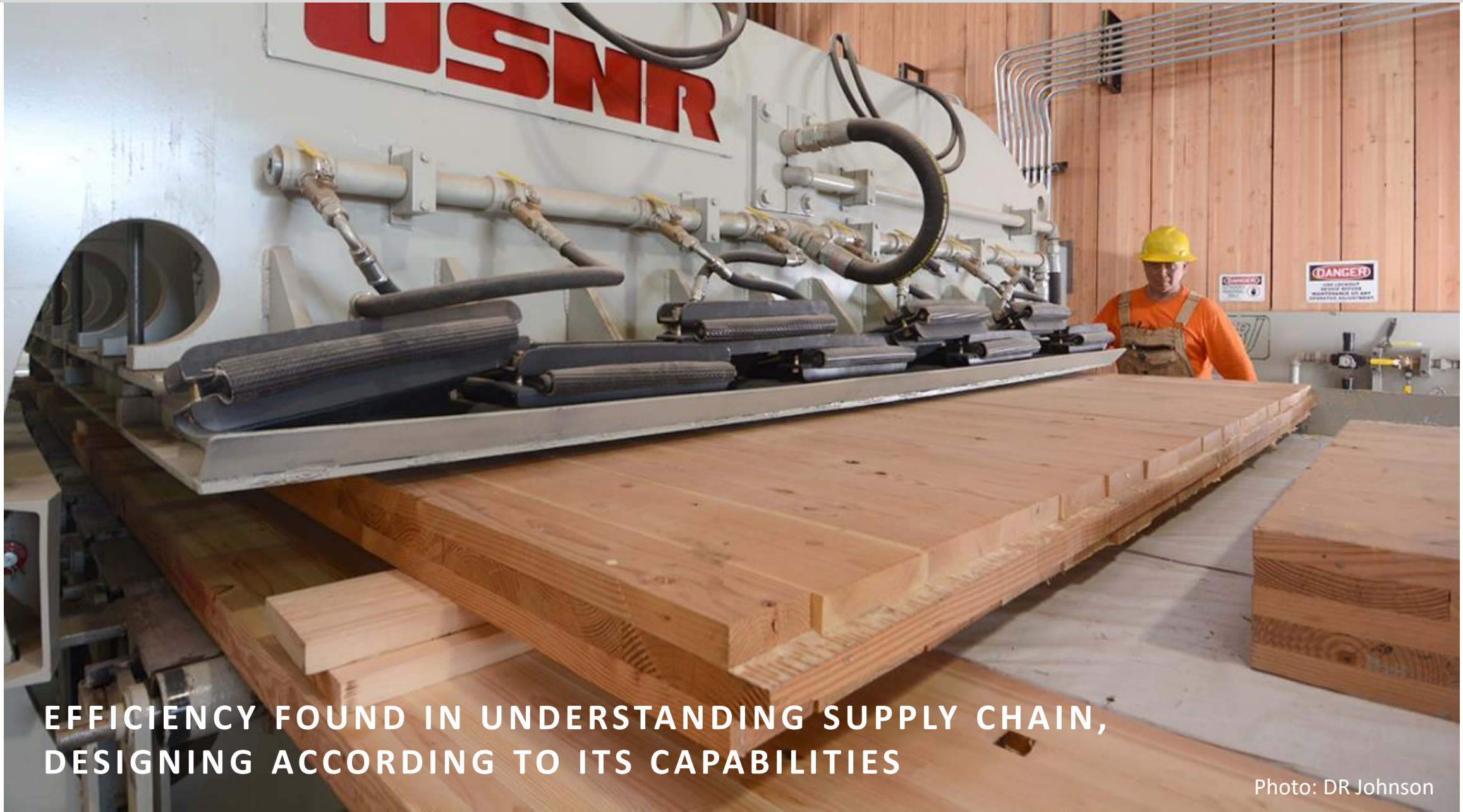
TALL MASS TIMBER DEMONSTRATING THE HOW

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

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

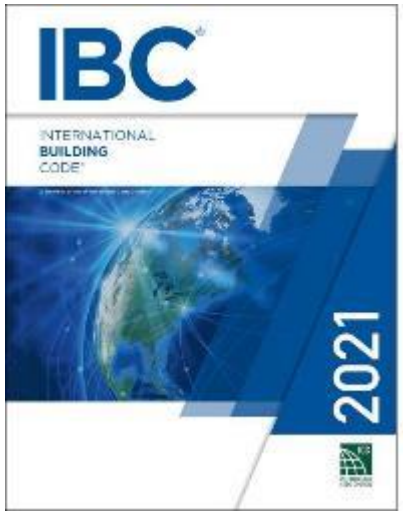
Photo: Blaine Brownell

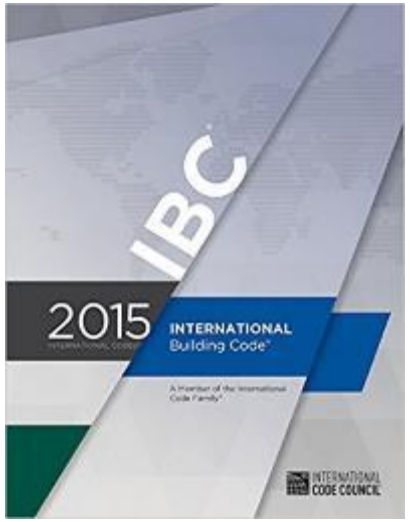
Photo: Christian Columbres

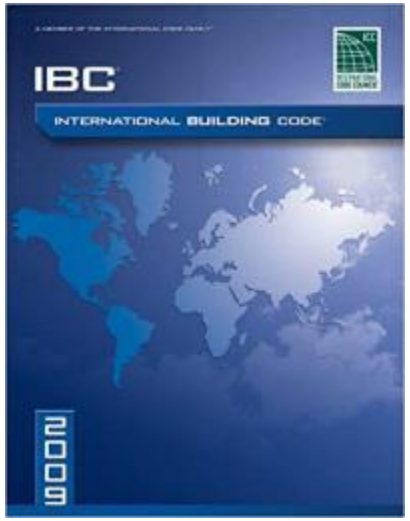
ICE Block I, RMW Architecture & Interiors, Buehler Engineering, Bernard André Photography

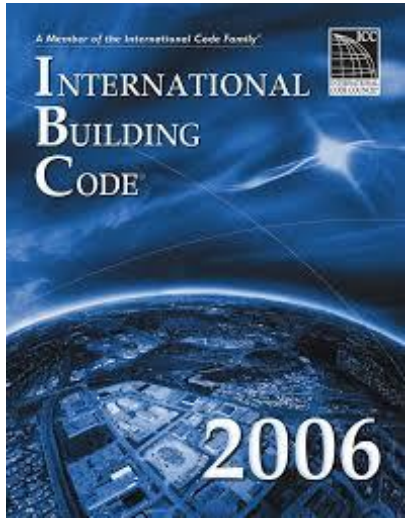
Photo: Swinerton

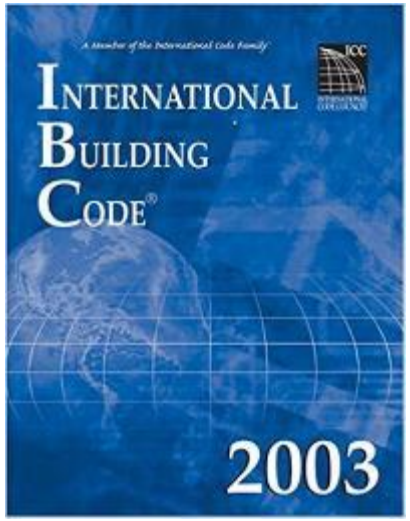
3 YEAR CODE CYCLE

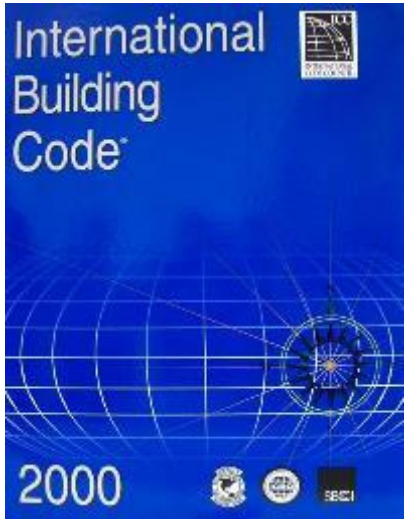












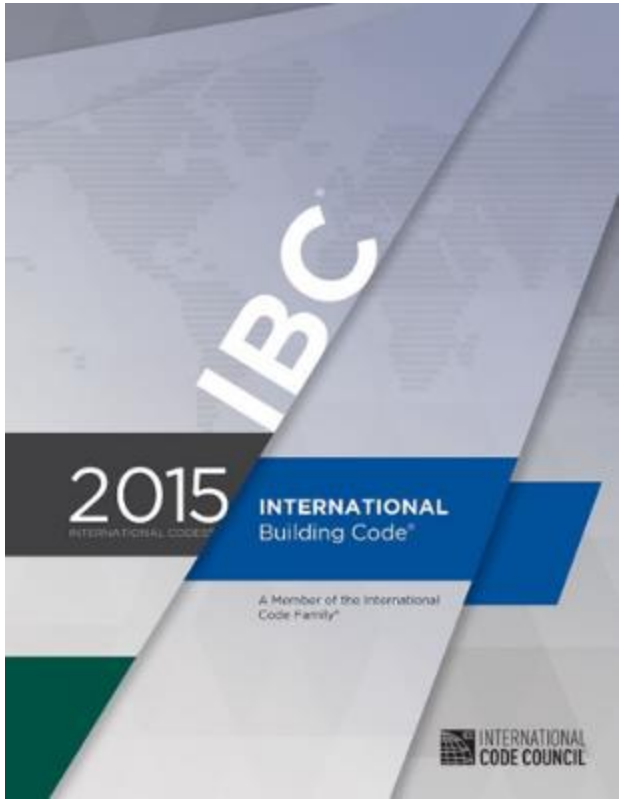
Source: ICC

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

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

Photo: Seagate Mass Timber Inc
Pollux Chang photographer

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.

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.

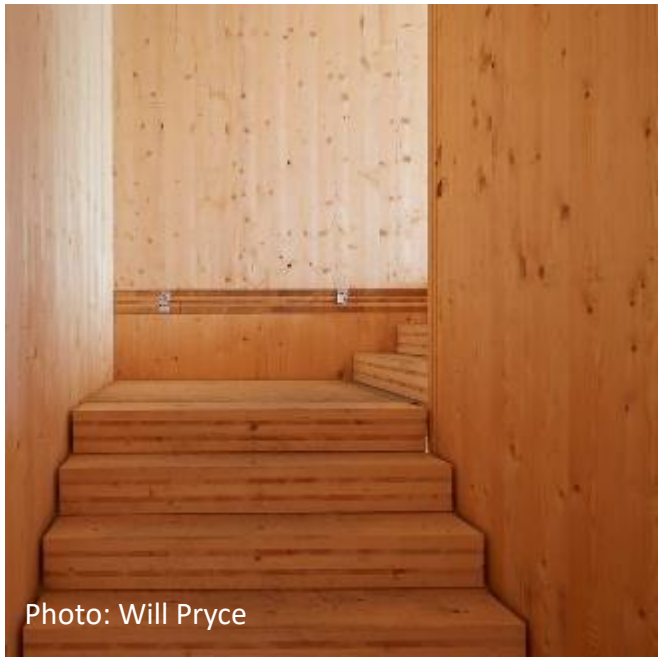


Photo: Will Pryce

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

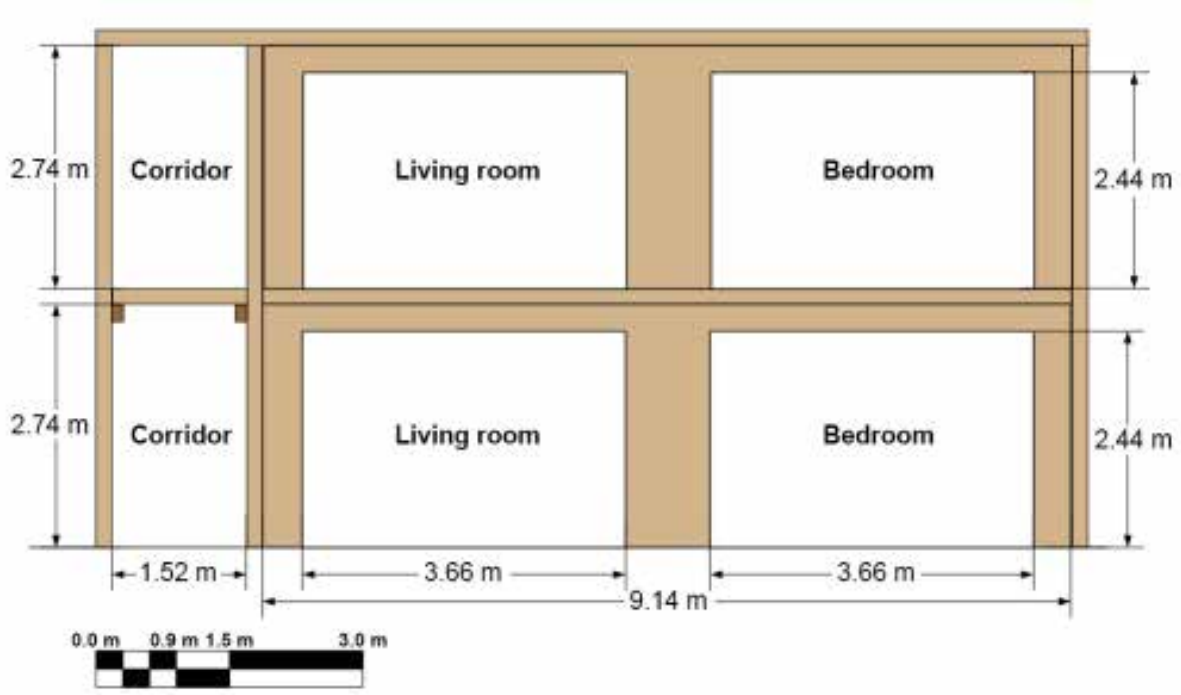


Figure 2. Elevation view of the front of the cross-laminated timber test structure.

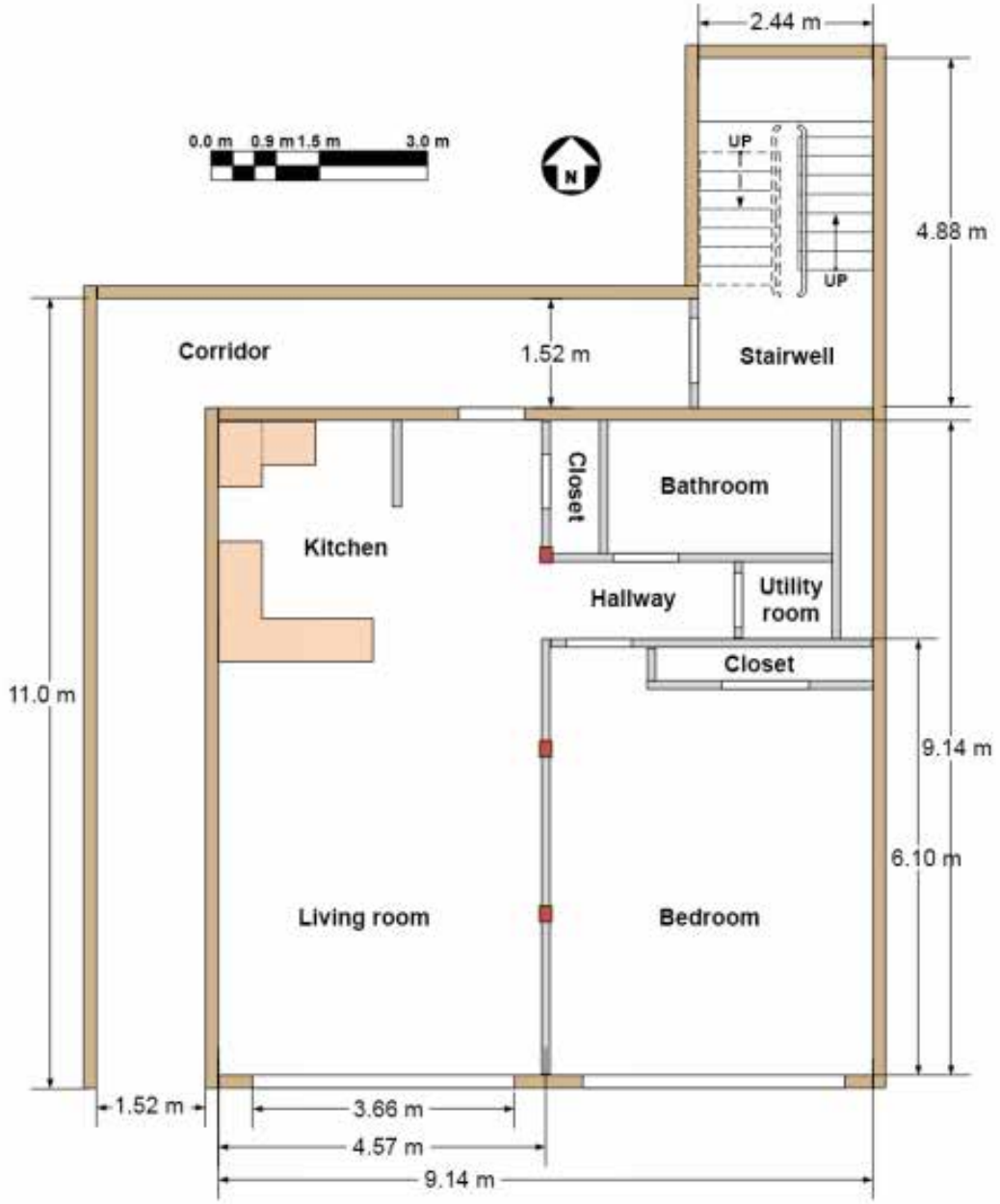


Figure 1. General plan view of cross-laminated timber test structure.

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

TEST 1

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

Source: AWC

TEST 2

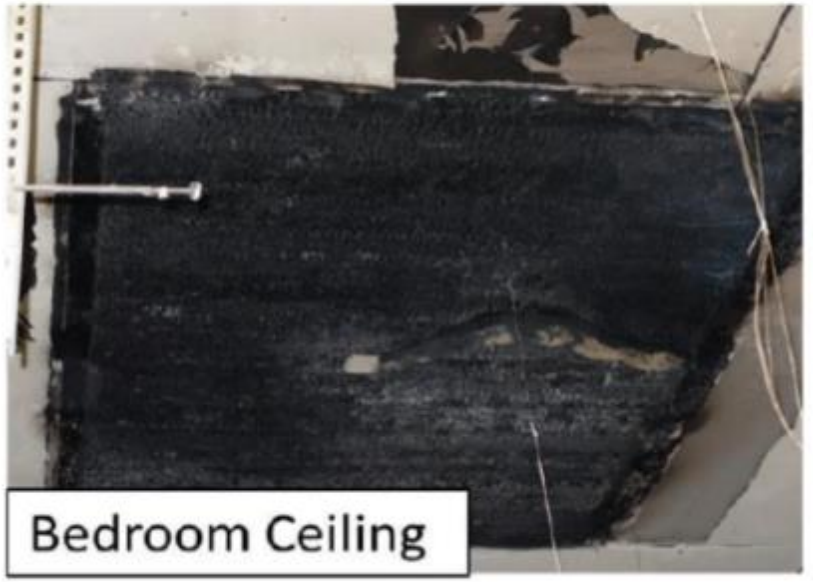

Ignition


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

TEST 4

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

TEST 5

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

Source: AWC

Photo: LendLease

Photo: LendLease

Photo: LendLease

Photo: LendLease

Photo: LendLease

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

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

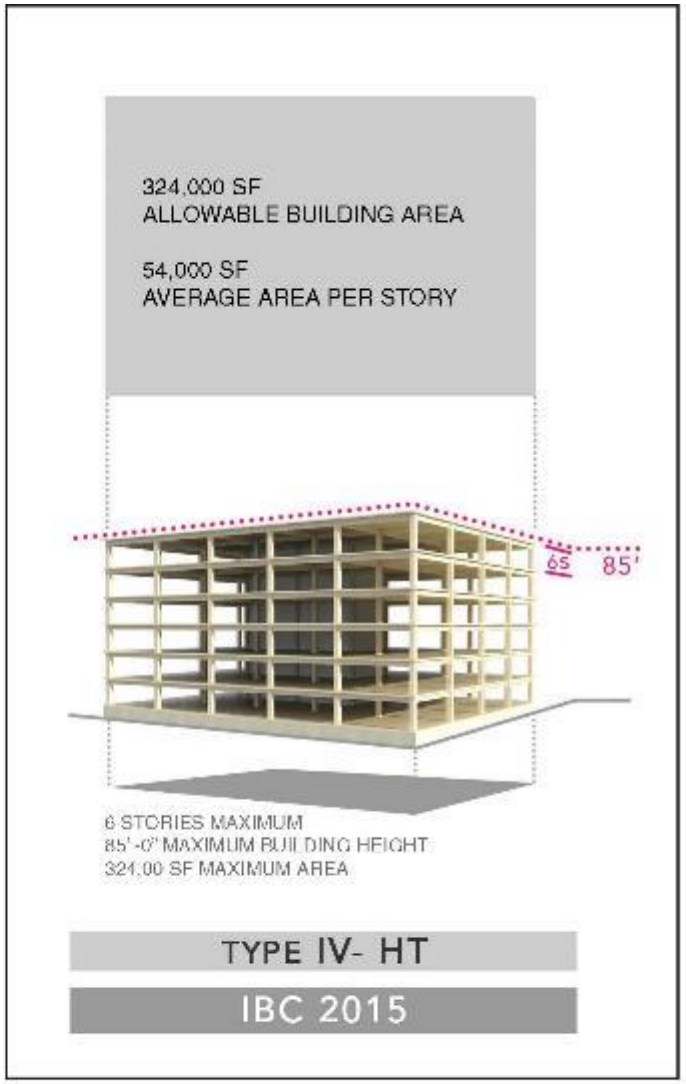
12 STORIES
BUILDING HEIGHT 180 FT
ALLOWABLE BUILDING AREA 648,000 SF
AVERAGE AREA PER STORY 54,000SF

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-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

Type IV-B

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

TYPE IV-B

Credit: Susan Jones, atelierjones

Credit: LEVER Architecture

Type IV-B Protection vs. Exposed

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

TYPE IV-B

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 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

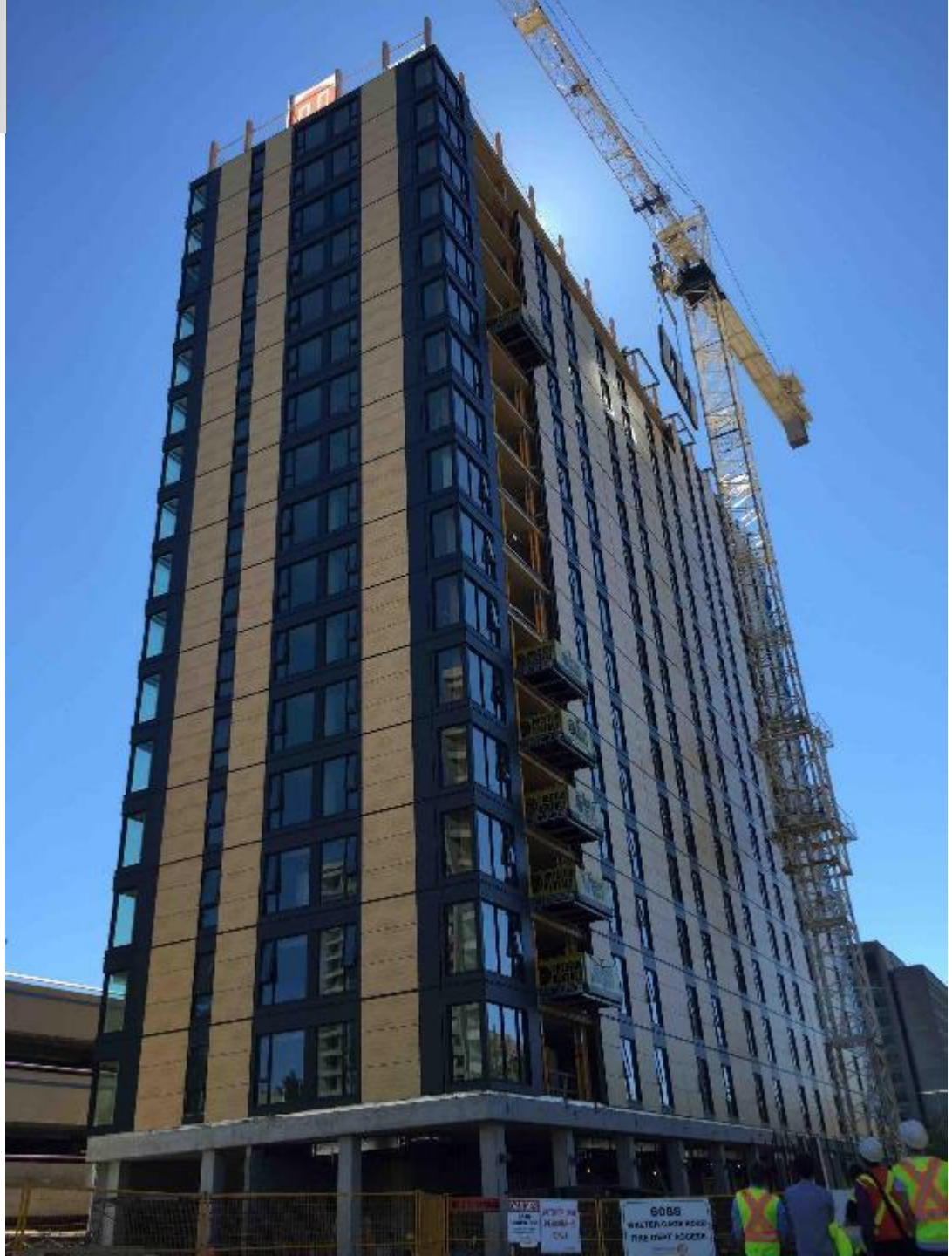
Type IV-B area = 2 * Type IV-HT area

Type IV-A

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

TYPE IV-A

Credit: Susan Jones, atelierjones



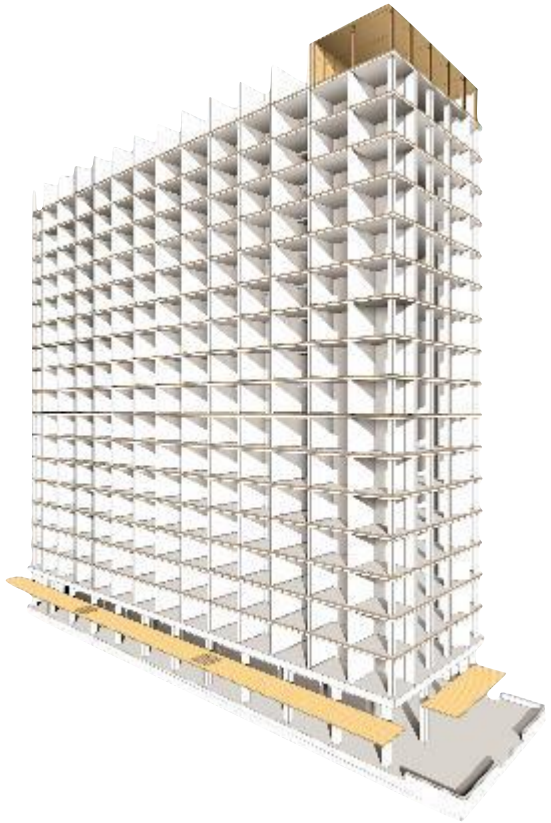
Photos: Structurlam, naturally:wood, Fast + Epp, Urban One

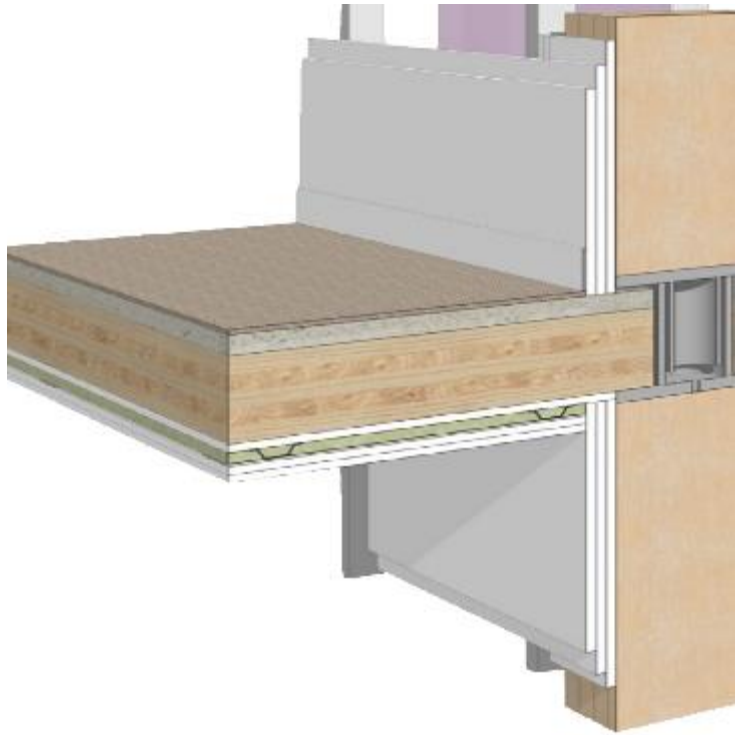
Type IV-A Protection vs. Exposed

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

TYPE IV-A

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

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

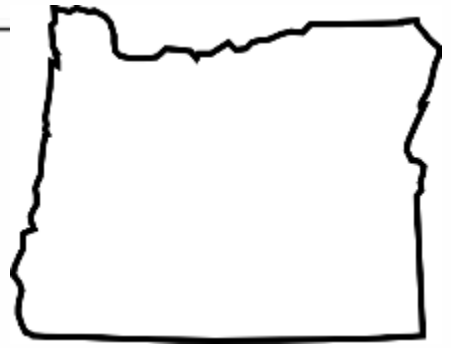
Via Cenni	Milan, Italy	9	2013

WoodWorks Tall Wood Design Resource

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

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

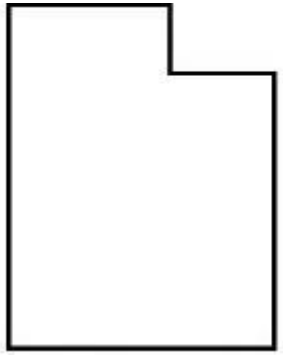
U101.1 Purpose. The purpose of this appendix is to provide criteria for three new mass timber construction types: Type IV-A, Type IV-B, and Type IV-C. These building types expand the allowable use of mass timber construction to larger areas and greater heights than allowed for Type IV-HT construction.

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:

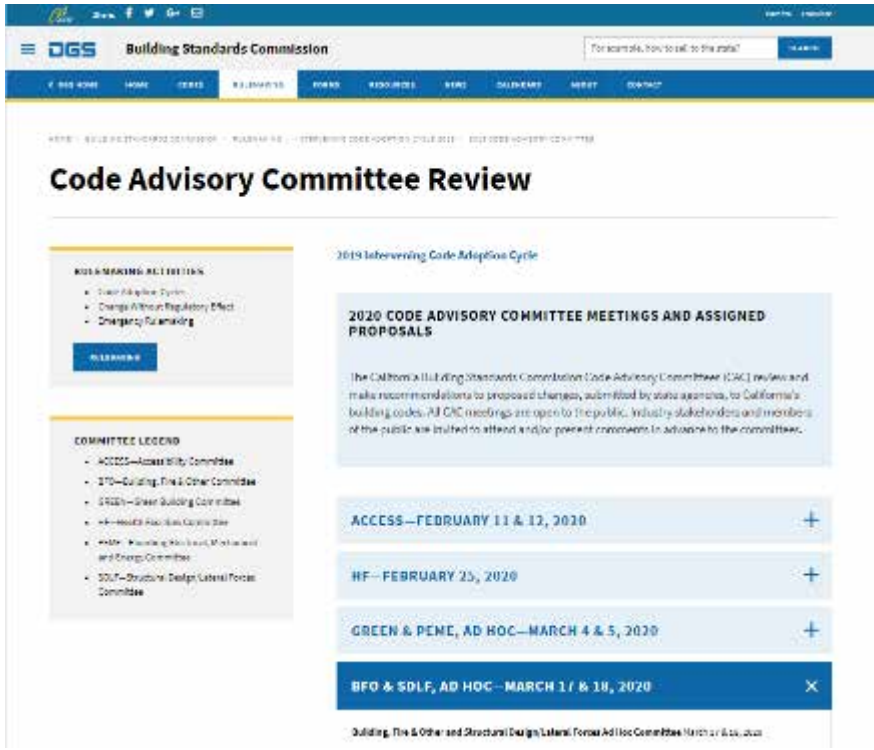
Credit: State of Utah

California Building Standards Commission Passes Tall Wood Code Change Proposals

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

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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.

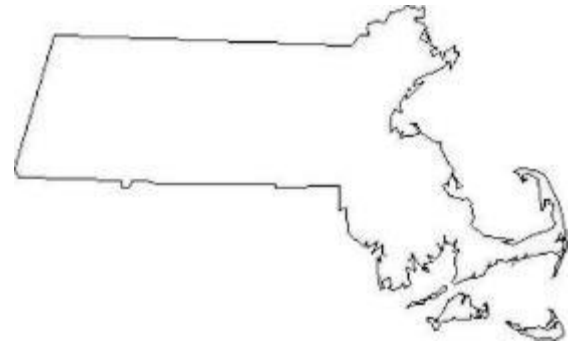
Status History

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

Early adoption review underway, final decision by July 2021

Credit: State of Georgia

Commonwealth of Massachusetts
Division of Professional Licensure
Office of Public Safety & Inspections
1000 Washington Street, Suite 710- Boston MA 02118



Proposed Tenth Edition Building Code

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Ladies and Gentlemen -

This message is sent to inform you that members of the Board of Building Regulations and Standards (BBRS) have decided to take a different path with regard to the tenth edition building code.

Initially, BBRS members intended to use the 2018 International Codes as the basis for the tenth edition, targeting an implementation date of January, 2020. For numerous reasons, they have decided to redirect efforts and, instead, plan to develop the tenth edition code using the 2021 International Codes as a template, with an effective date of January 1, 2021.

This effort ***does not*** affect promulgation of new energy code requirements based on the 2018 International Energy Conservation Code (IECC) scheduled to become effective on January 1, 2020. *(Massachusetts General Law Chapter 143, Section 94(o) requires BBRS members to advance energy provisions on a particular cycle.)*

IBC 2021 Adoption in Texas

- Dallas
  - Includes upcoming IBC 2024 allowance for 100% mass timber ceiling exposure in Type IV-B construction
- Austin
- Fort Worth
- Bryan
- Plano
- Allen
- Carrollton
- Grand Prairie

Mass Timber Construction Insurance

Tall Wood/IBC 2021

Credit: D/O Architects

Mass Timber Construction Insurance

Tall Wood/IBC 2021

INTRO, Cleveland, OH. Credit: Harbor Bay Real Estate Advisors

Questions? Ask us anything.

Mark Bartlett, PE
Regional Director | TX
(214) 679-1874
mark.bartlett@woodworks.org

901 East Sixth, Thoughtbarn-Delineate Studio, Leap!Structures, photo Casey Dunn