Mass Timber for Developers and Owners

January 22, 2026

Presented by

Chelsea Drenick, SE
WoodWorks

Image: Kresge College Expansion at the University of California, Studio Gang, Magnusson Klemencic Associates / Jason O'Rear Photography

MULTI-FAMILY/MIXED-USE | EDUCATION | OFFICE | RETAIL | INDUSTRIAL | CIVIC | INSTITUTIONAL

WOODWORKS
WOOD PRODUCTS COUNCIL
TM

Designing a wood building?

Ask us anything.

FREE PROJECT SUPPORT / EDUCATION / RESOURCES

Nationwide support for the code-compliant design, engineering and construction of non-residential and multi-family wood buildings.

- Allowable Heights/Areas
- Construction Types
- Structural Detailing
- Wood-Framed & Hybrid Systems
- Fire/Acoustic Assemblies
- Lateral System Design
- Alternate Means of Compliance
- Energy-Efficient Detailing
- Building Systems & Technologies

River Edge, Kitchen & Associates
photo courtesy of McAlvain Construction

woodworks.org/project-assistance | help@woodworks.org

Questions? Ask me anything.

Chelsea Drenick, SE

Regional Director | CA-North, NV, UT

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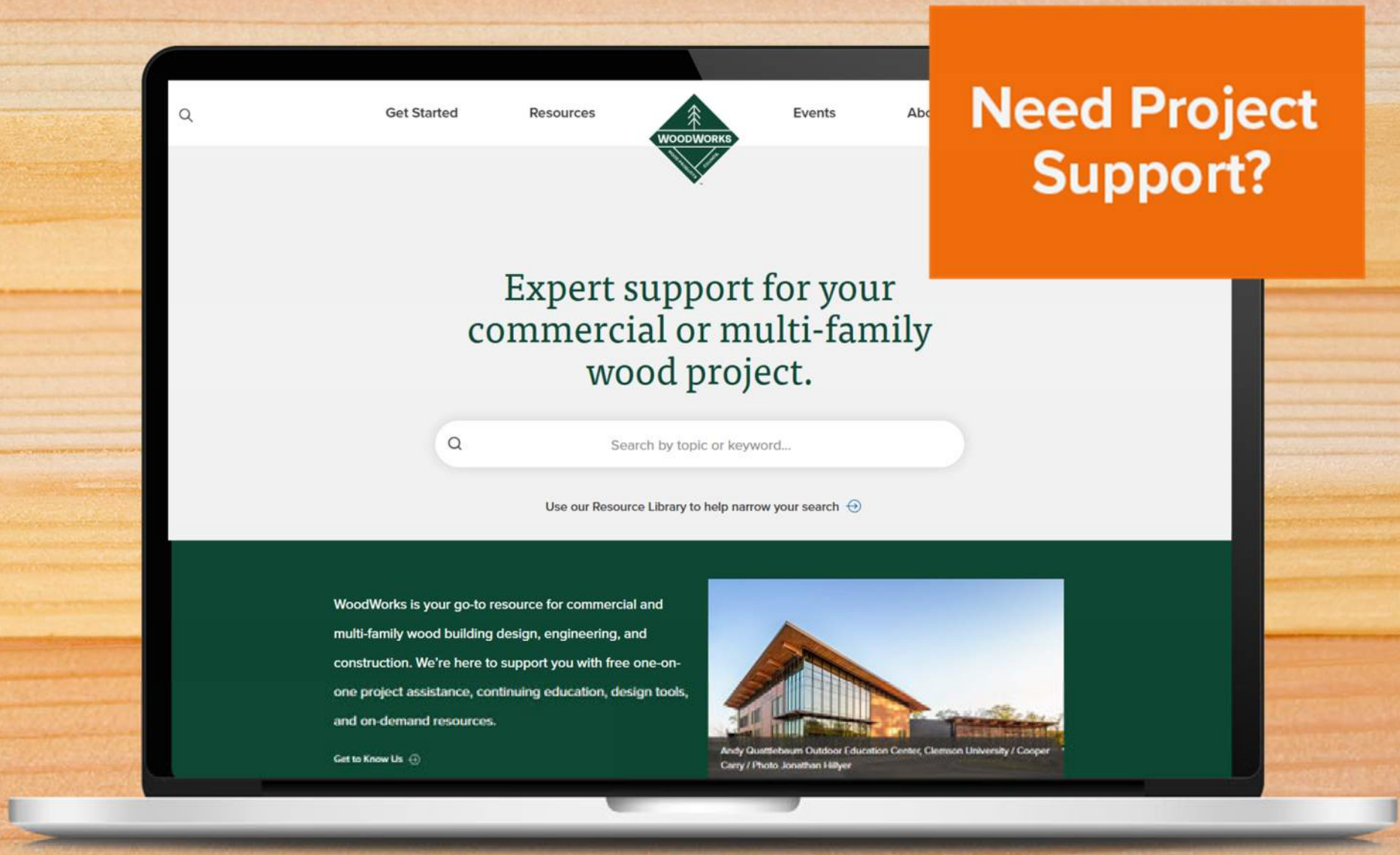
chelsea.drenick@woodworks.org

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

Regional Directors: **One-on-One Project Support**

woodworks.org



BUILDING SYSTEMS

- Mass Timber / CLT
- Light-Frame
- Hybrid
- Off-Site / Panelized Construction

BUILDING TYPES

- Multi-Family / Mixed Use
- Education
- Institutional / Healthcare
- Civic / Recreational
- Industrial
- Office
- Commercial Low-Rise

WHY WOOD?

- Sustainability
- Forests, Wildfire & Rural Communities
- Evolving Codes
- Cost Effectiveness

Get help penciling it out. **Free Project Support**

Type III

Building Systems

- Light-Frame 37
- Mass Timber / CLT 29
- Hybrid 16
- Panelized Construction 13

Building Types

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- Commercial Low-Rise 20
- Institutional / Healthcare 19
- Civic / Recreational 16
- Industrial 15

Project Roles

- Architect 32
- Structural Engineer 25
- Contractor/Installer 16
- Developer/Owner 16

Resource Types

- Expert Tips 31
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Type III Exterior Walls: Practical Design Approaches from an Engineer's Perspective

May 7, 2025 - National Online Event. This educational session will focus on the unique design requirements of Type III construction related to required fire resistance and practical constructability for code compliance. Topics will include fire-resistance-rating requirements for the interior and exterior, the impact of fire separation distance, implications of intersecting fire walls, and primary structural frame protection within exterior walls.

Online Events

Type III Fire-Resistant Design & Detailing for Exterior Walls, Shafts

February 27, 2025 - Regional In-Person Event (Kansas City, MO) This presentation will focus on common detailing issues and areas of misunderstanding related to exterior walls and their intersection with rated floor assemblies, followed by discussion of detailing code requirements, code compliance, and rationale for approval with an emphasis on constructability and practicality.

In Person Events

Detailing Floor-to-Exterior Wall Conditions in Type III Projects

Exterior walls in Type III construction are required to be framed with fire retardant-treated wood, while the floor and roof framing can be standard, untreated wood framing.

Expert Tips

Stella – Unique 5-over-1 Mixed-Use in Marina Del Rey

The use of both Type III-A and V-A construction on one podium and prefabrication make this mixed-use, multi-family project's construction unique.

Case Studies

Marselle Condominiums – Maximizing View and Value With Wood Frame Construction in Seattle

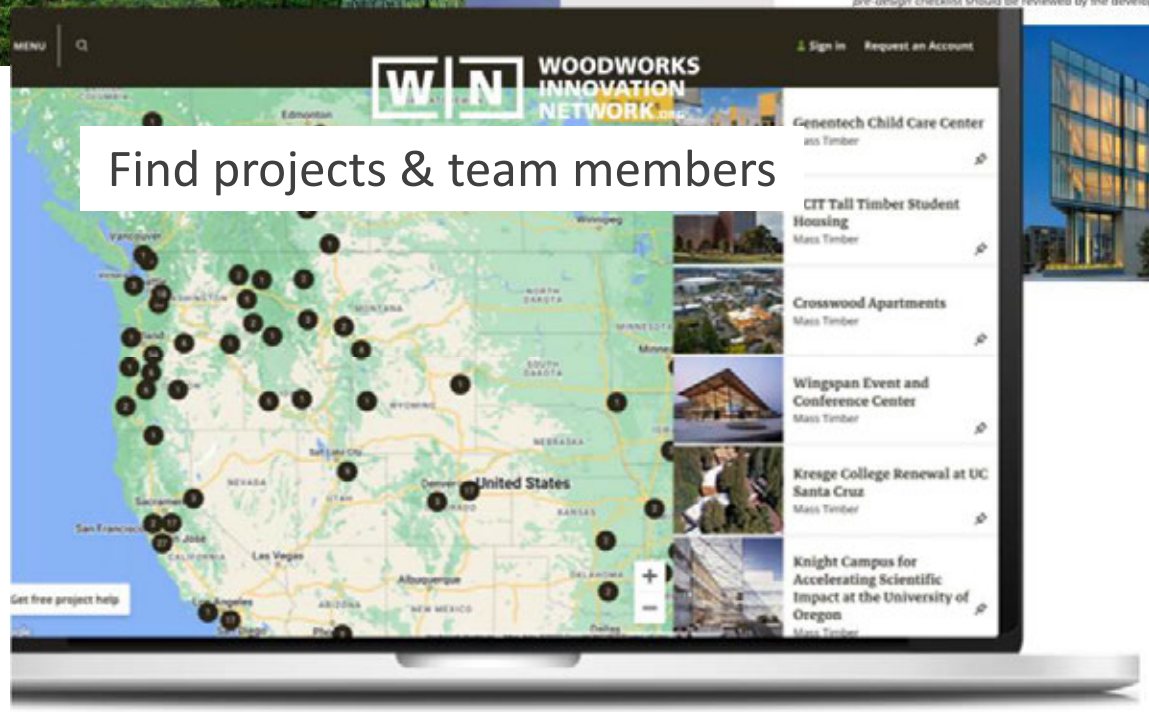
An extra half-story mezzanine on a Type III-A condominium

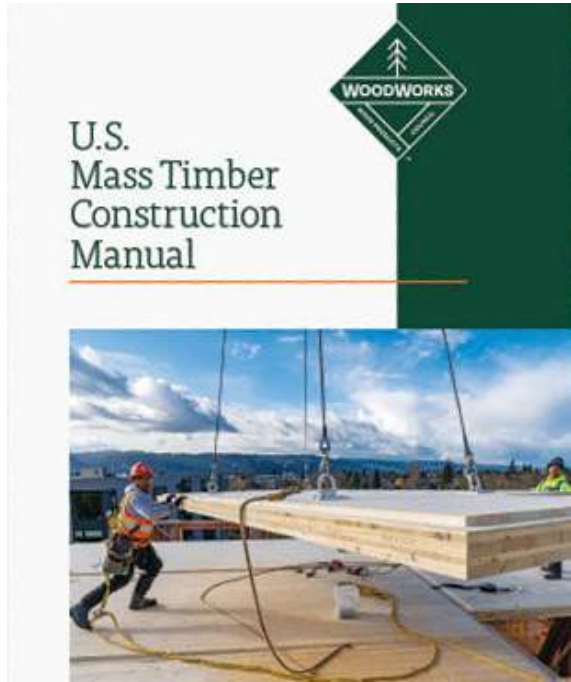
Mercer International Middle School Tour: A Firsthand Look at Mass Timber

November 14, 2025 - Regional In-Person Tour (Seattle, WA) Join

Resources for Developers/Owners

Scan for website





Funding Partners

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INTERNATIONAL MassTimber℠ CONFERENCE

10 EST. 2016

Portland, OR | Oregon Convention Center

MARCH 31 – APRIL 2, 2026

Produced by

WOODWORKS WPC WOOD PRODUCTS COUNCIL℠

TRIFECTA COLLECTIVE

International Mass Timber Conference, Marcus Kauffman Photography

Attendee Notes

1. To receive a certificate of completion, stay on for the duration of the webinar.

2. GROUP ATTENDEES: Go to woodworks.org/webinar to find the *Group Sign-In Form.* Add each attendee and submit the form immediately following the webinar.

3. The PDF of today's presentation can be found on WoodWorks.org under the *Events* tab—then *Presentation Archives*.

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

AIA Approved Continuing Education

Course Description

Developers and owners are increasingly interested in exploring mass timber for their projects. This presentation provides an overview of mass timber structural systems. Prefabricated mass timber construction can help reduce schedules and labor while increasing safety. Wood has many environmental benefits for occupants, communities, project teams and investors. The aesthetics of wood are broadly appealing to a wide range of occupants. Its natural beauty can help attract tenants. The unique appearance helps differentiate mass timber buildings from competitors in the market. We'll discuss how all these factors can contribute value to mass timber developments. We’ll also explore challenges unique to mass timber and resources available to address them. Attendees will learn where to look for mass timber opportunities in their future projects.

Learning Objectives

1. Understand how the aesthetic and biophilic benefits of wood can contribute to occupant health, tenant appeal and the financial value of a real estate development.

2. Through case study examples, explore code-compliant design of mass timber structures.

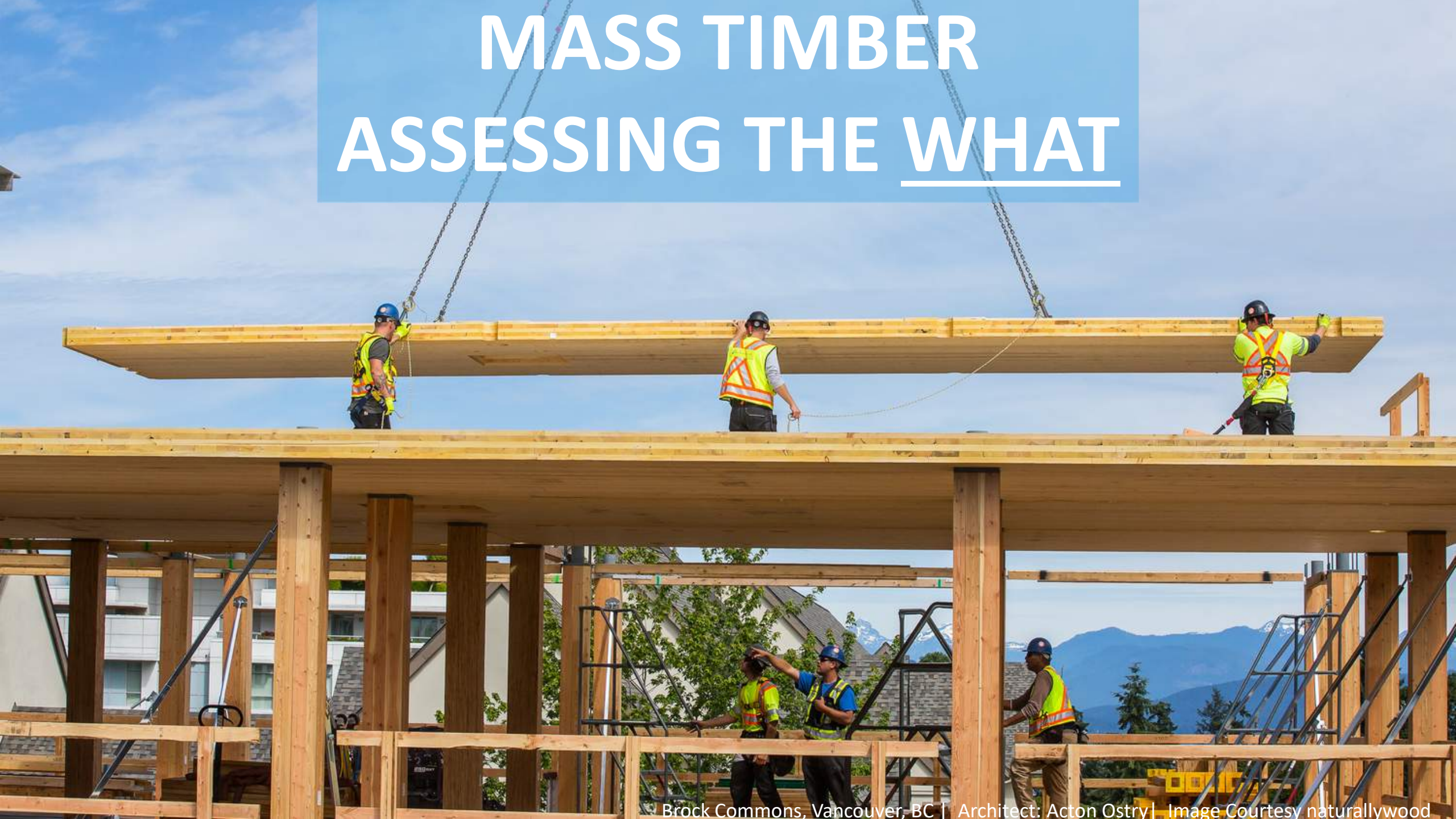
3. Discuss the environmental benefits of mass timber including a low embodied carbon footprint, carbon storage, and contributions to forest health and carbon.

4. Learn how prefabricated mass timber structural systems can have a positive impact on construction schedules and increase jobsite safety for workers.

Agenda: The What, Why and How of Mass Timber

Photo: Michael Green Architecture

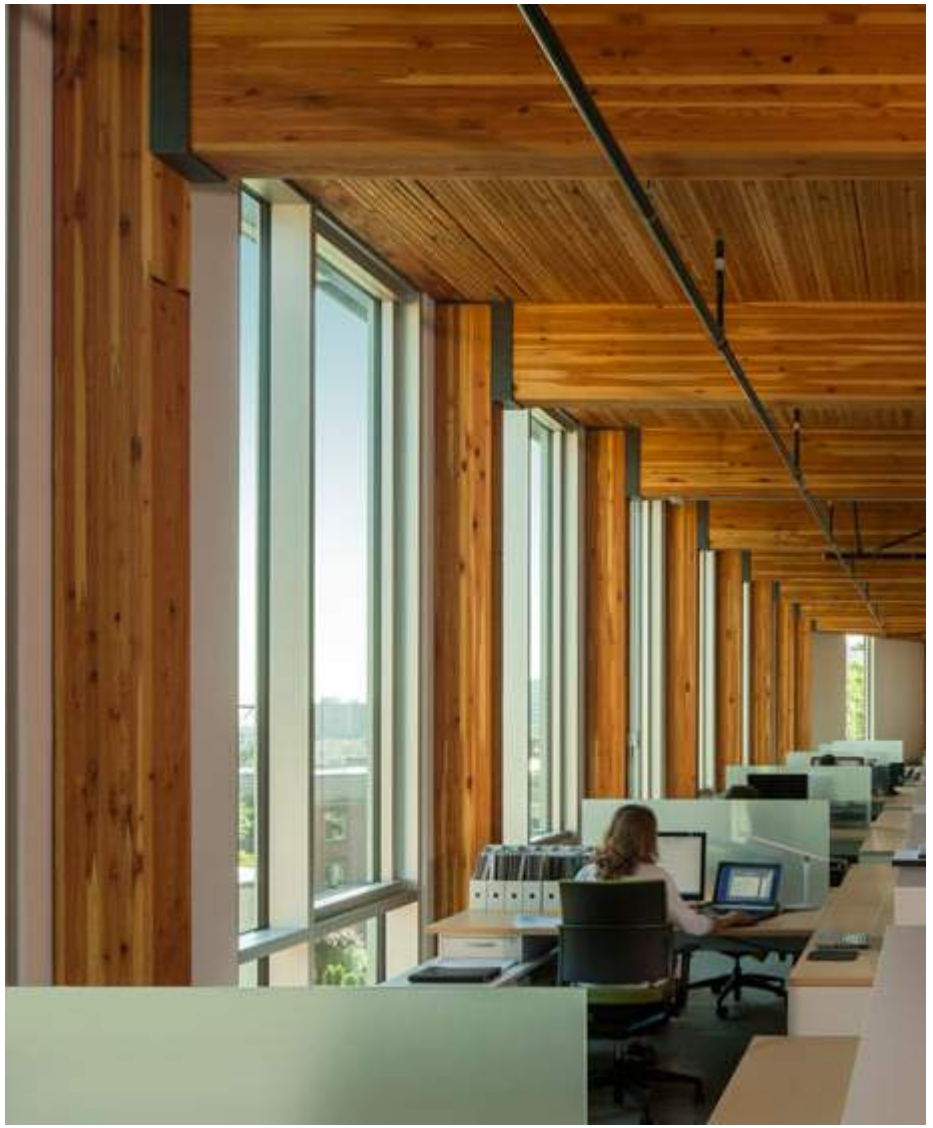
MASS TIMBER
ASSESSING THE WHAT



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

Light-Frame Wood
Photo: WoodWorks

Heavy Timber
Photo: Benjamin Benschneider



Mass Timber
Photo: John Stamets

Modern Types of Wood Construction

Prefabricated Offsite

Site Built (Light-Frame)

Panelized (Light-frame)

Volumetric Modular (Light-frame)

Mass Timber

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

Mass Timber Building Options


Photo: Blaine Brownell

Post and Beam

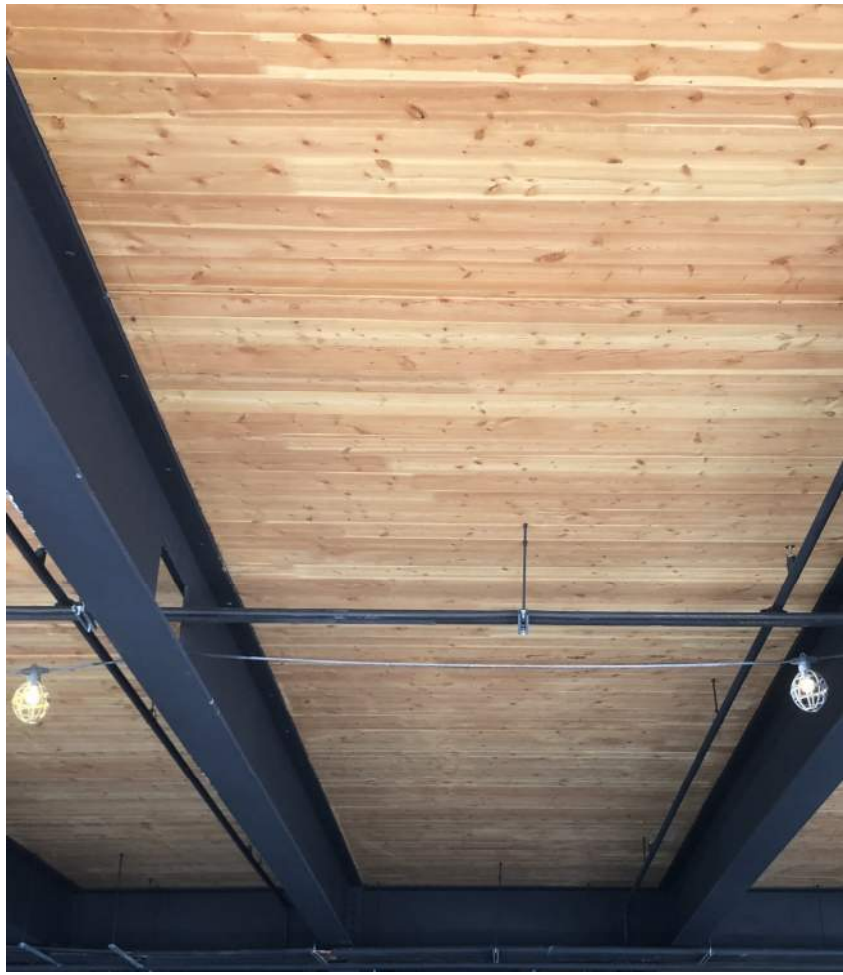

Photo: acton ostry architects

Flat Plate


Photo: : LendLease

Honeycomb

Mass Timber Building Options



Hybrid: Light-Frame

Hybrid: Steel Framing

Common CLT Layups

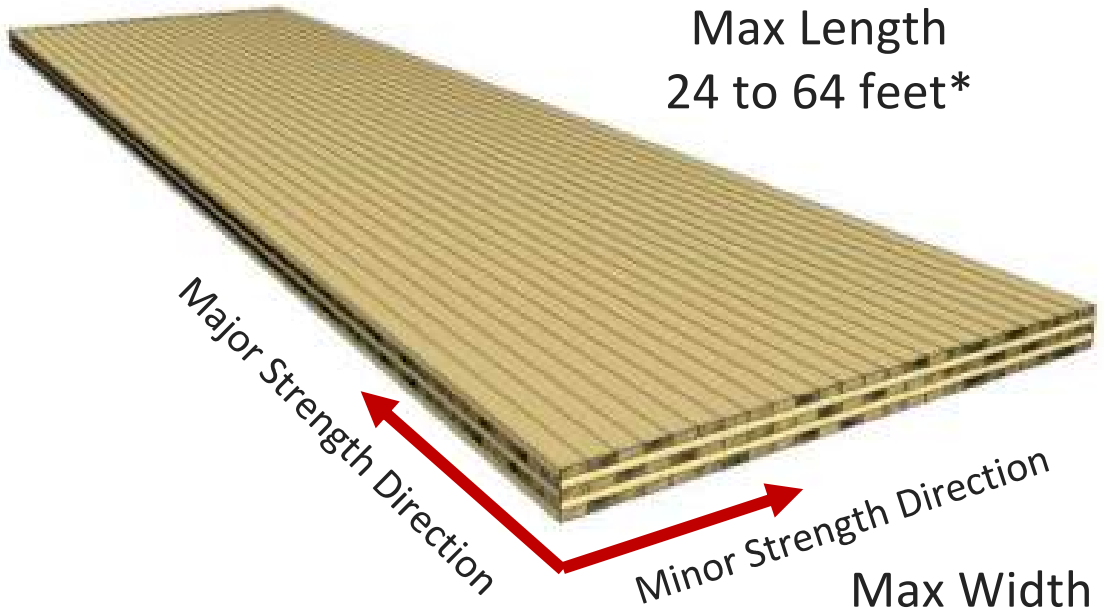
Most Designs
Least $/sf

3-ply 3-layer  *4 1/8" (common)*

5-ply 5-layer  *6 7/8" (common)*

7-ply 7-layer 

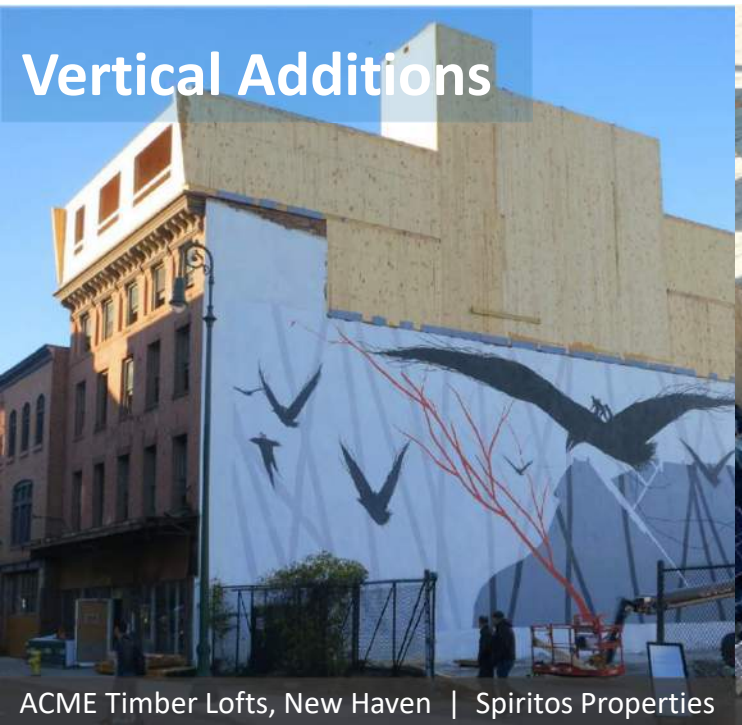
9-ply 9-layer 



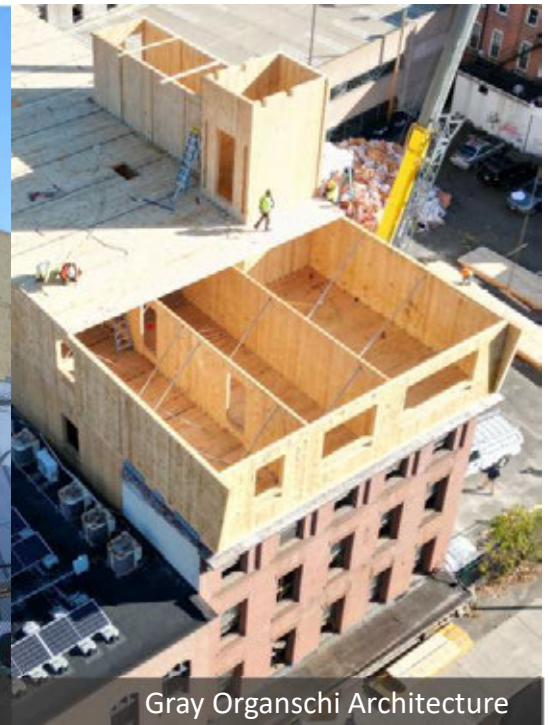
*All dimensions are approximate.
Consult with manufacturers.

District Office, Portland | Urban Development + Partners | Hacker Architects

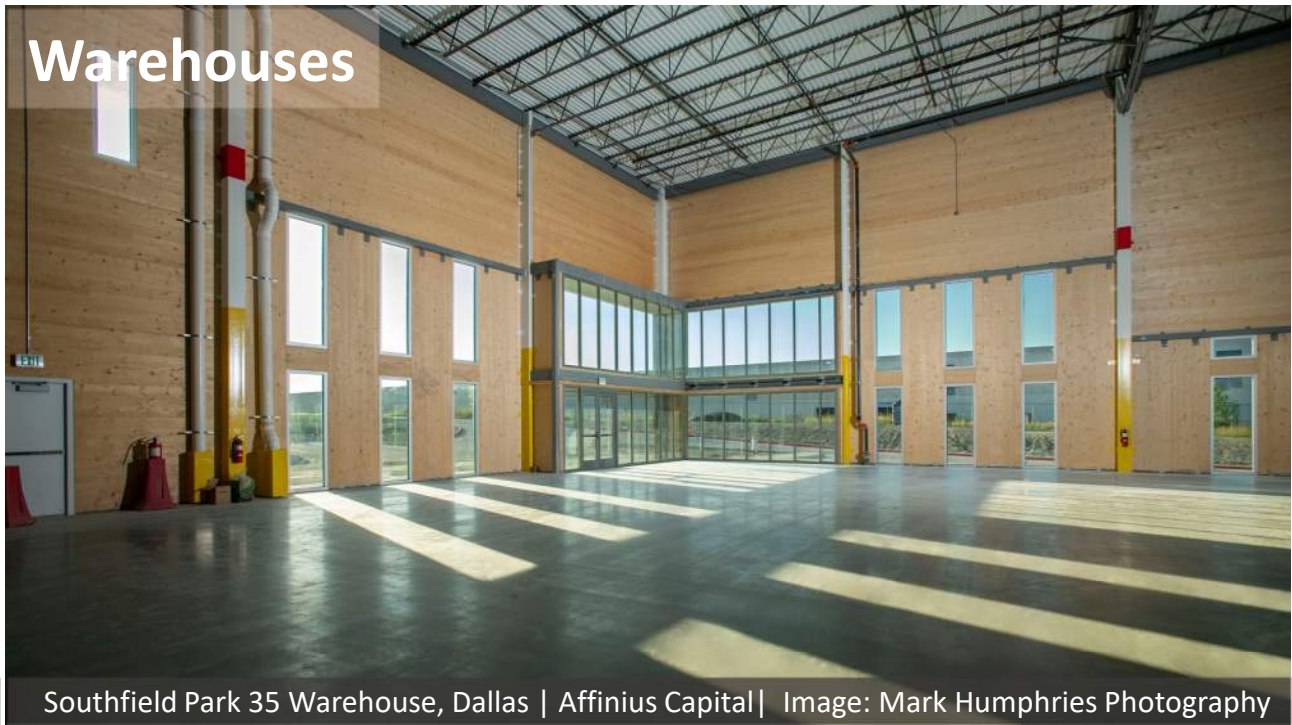
Timber House, Brooklyn | Brooklyn Home Company | Mesh Architectures | Photo: Travis Mark



ACME Timber Lofts, New Haven | Spiritos Properties



Gray Organschi Architecture



Southfield Park 35 Warehouse, Dallas | Affinius Capital| Image: Mark Humphries Photography

Student Housing/ Learning

Adohi Hall | University of Arkansas | LWA & Modus Studio | Photo: Timothy Hursley

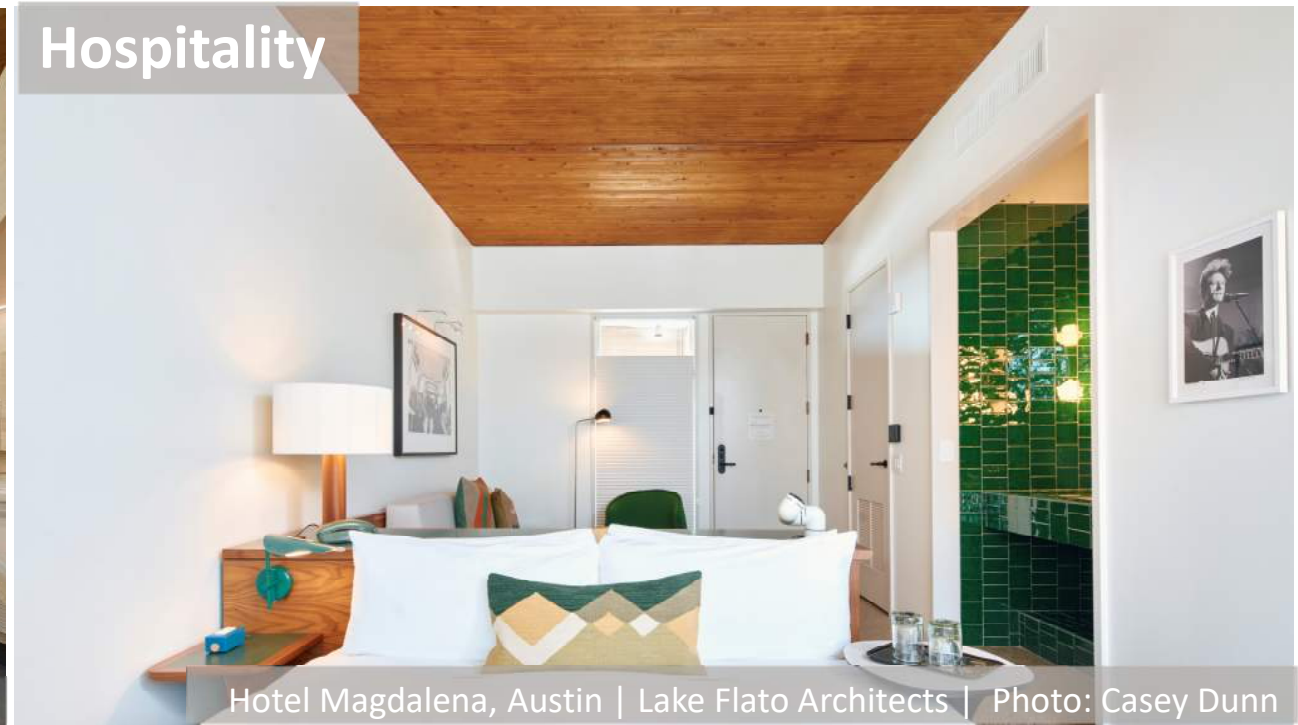
Affordable/ Workforce Housing

Heartwood, Seattle | Atelier Jones

Healthcare

Blue Ridge Orthodontics | Photo: Mark Herboth

Hospitality

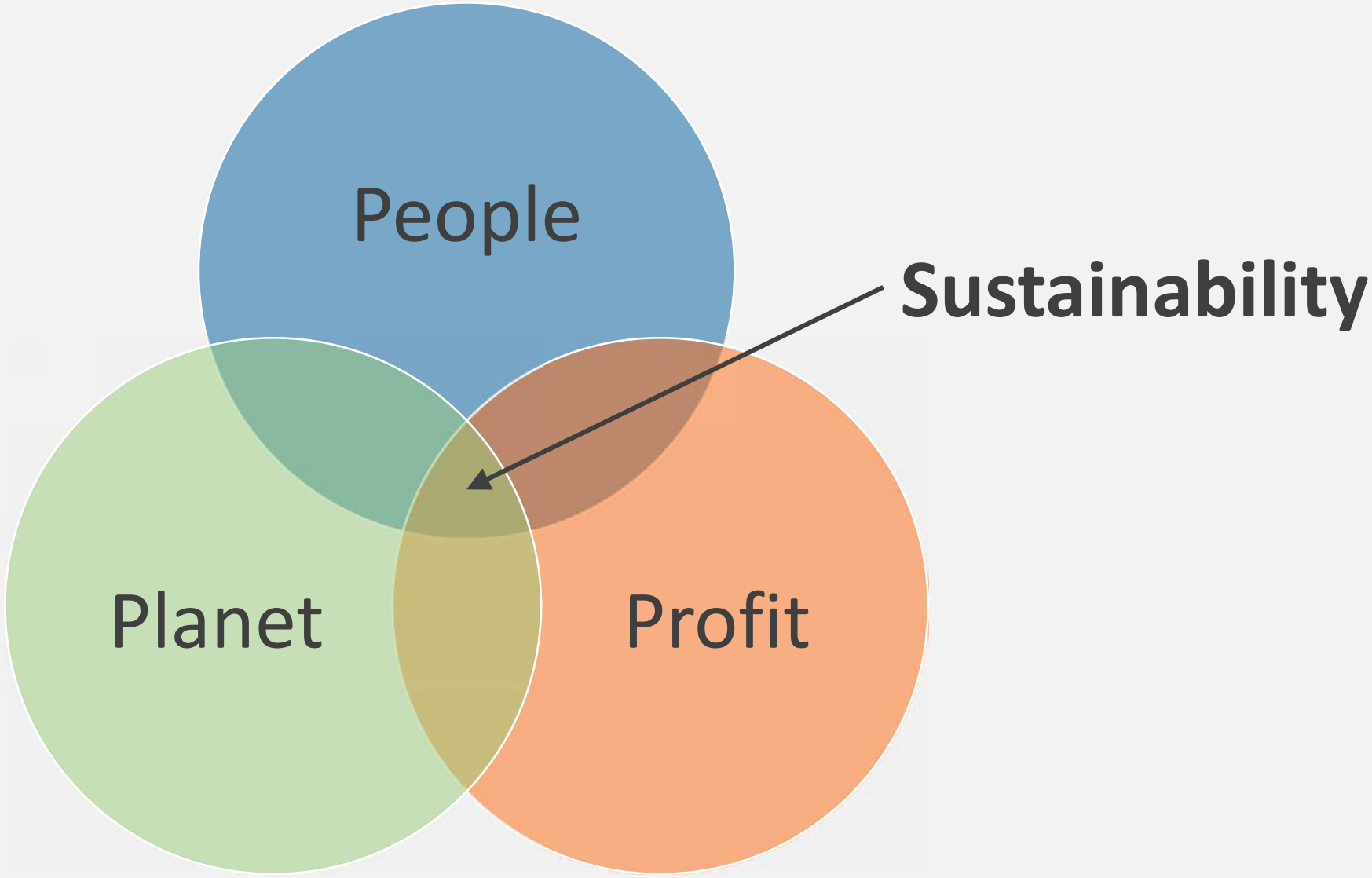


Hotel Magdalena, Austin | Lake Flato Architects | Photo: Casey Dunn

MASS TIMBER
UNDERSTANDING THE WHY

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

The Triple Bottom Line



New Buildings & Greenhouse Gases

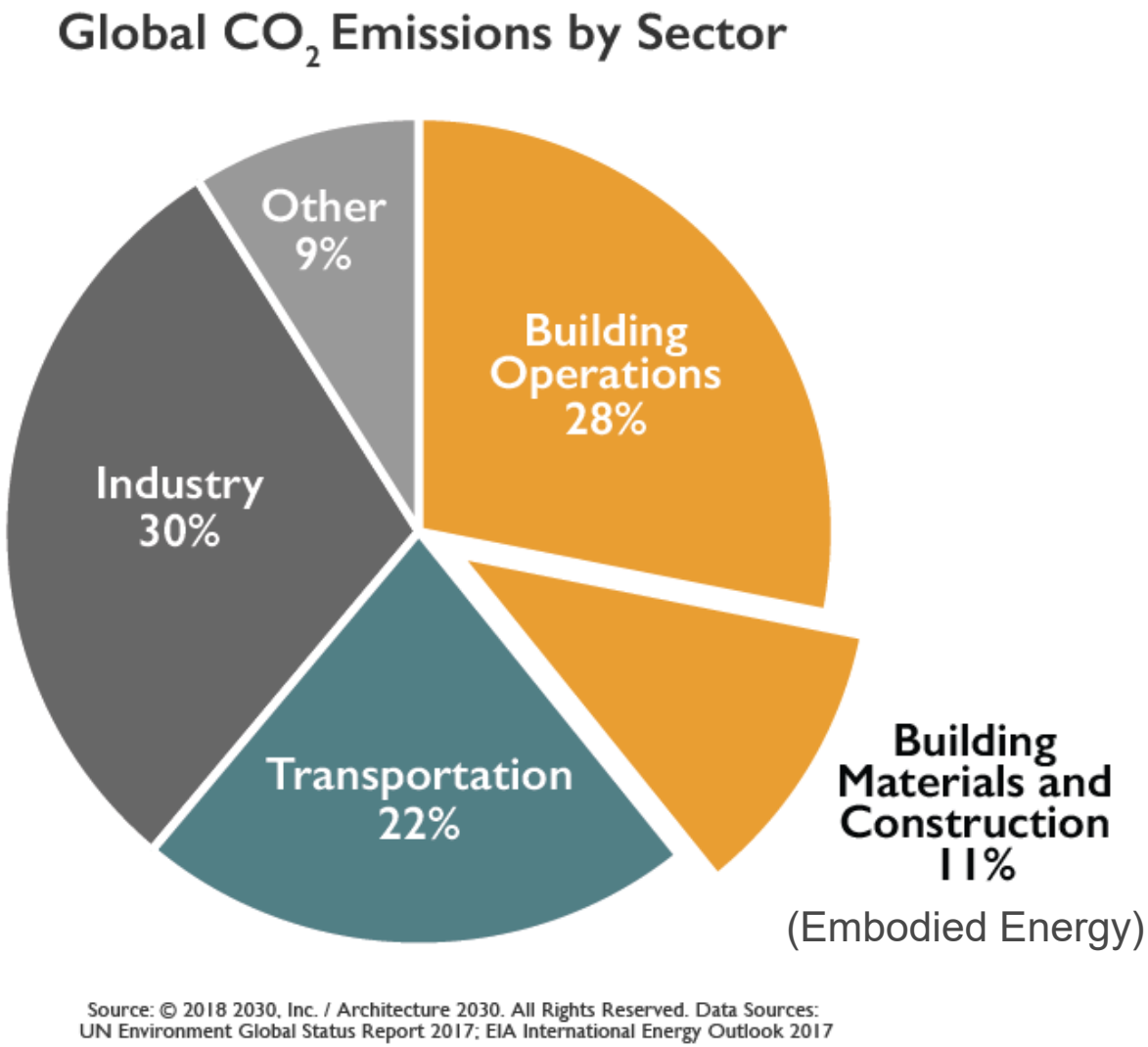


Image: Architecture 2030

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

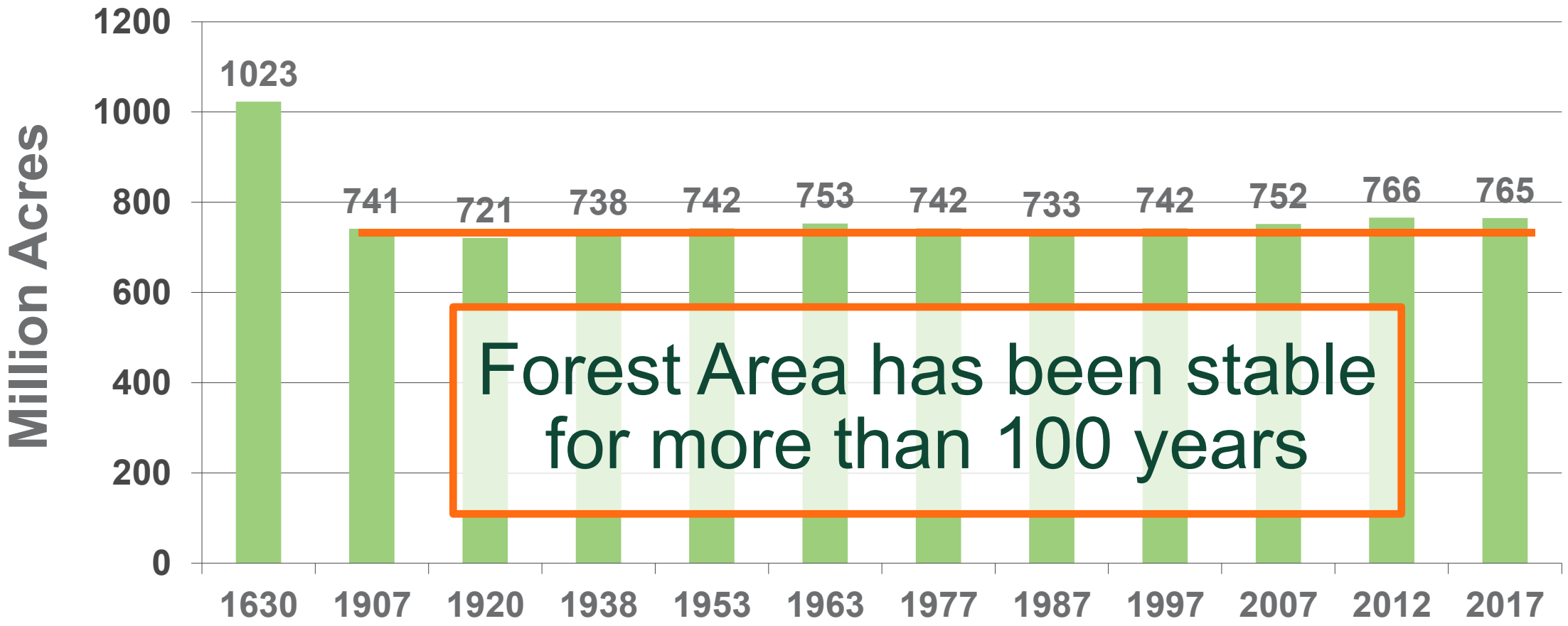
WoodWorks Carbon Calculator

- 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

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

U.S. Forest Land:

Forest **Area** in the United States 1630 – 2017

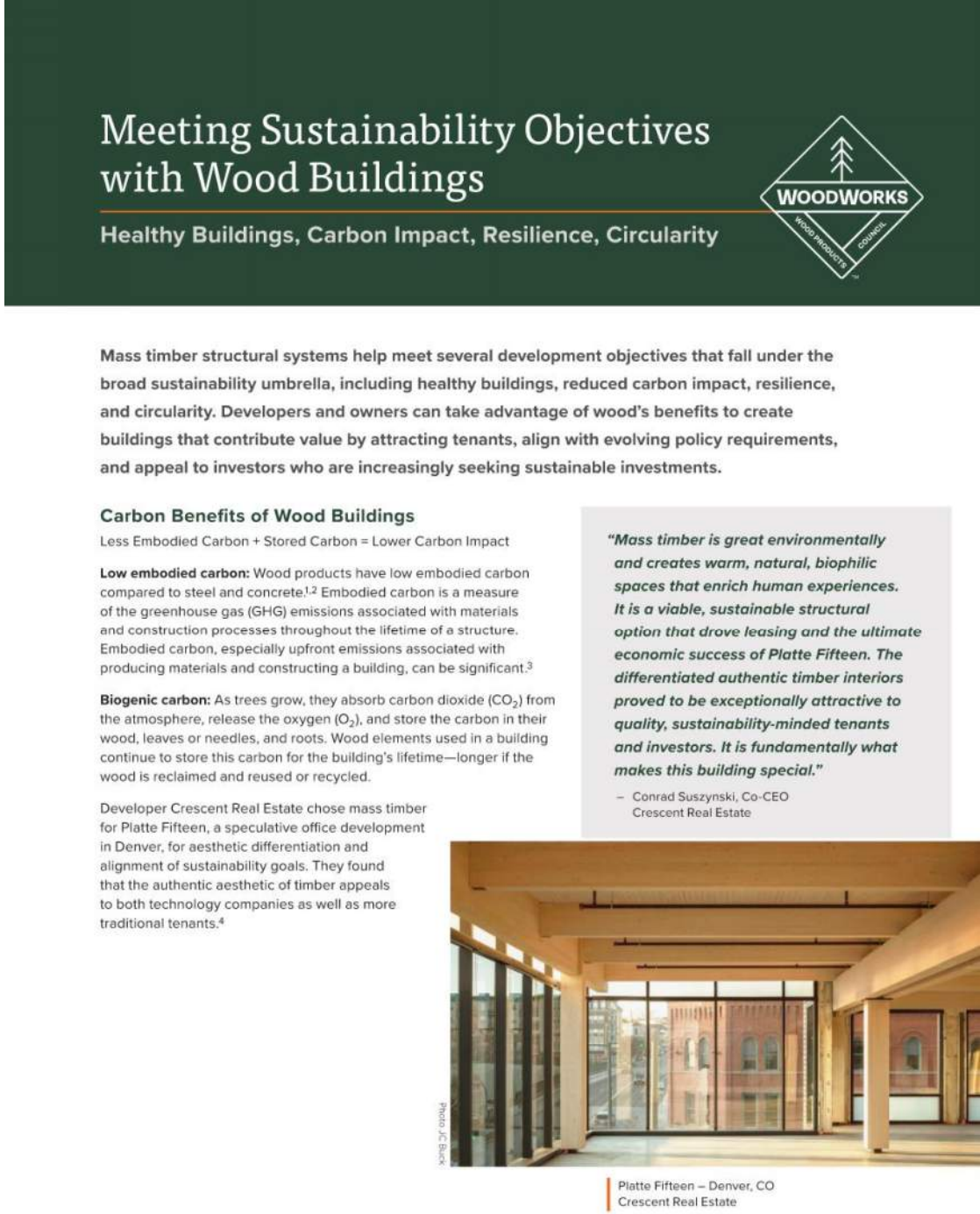


Source: USDA-Forest Service, Forest Resources of the United States, 2017 (2018)

Sustainability Brief

- High level overview of sustainability benefits of mass timber
  - Carbon benefits
  - Forest health & wildfire resilience
  - Healthy buildings & biophilia
  - Energy efficiency & insulation
  - Circular economy
- Short read - great for developers, their capital partners, and anyone who just needs a brief intro to topic

https://www.woodworks.org/resources/meeting-sustainability-objectives-with-wood-buildings/



Meeting Sustainability Objectives with Wood Buildings

Healthy Buildings, Carbon Impact, Resilience, Circularity

WOODWORKS

Mass timber structural systems help meet several development objectives that fall under the broad sustainability umbrella, including healthy buildings, reduced carbon impact, resilience, and circularity. Developers and owners can take advantage of wood's benefits to create buildings that contribute value by attracting tenants, align with evolving policy requirements, and appeal to investors who are increasingly seeking sustainable investments.

Carbon Benefits of Wood Buildings

Less Embodied Carbon + Stored Carbon = Lower Carbon Impact

Low embodied carbon: Wood products have low embodied carbon compared to steel and concrete.[1,2] Embodied carbon is a measure of the greenhouse gas (GHG) emissions associated with materials and construction processes throughout the lifetime of a structure. Embodied carbon, especially upfront emissions associated with producing materials and constructing a building, can be significant.[3]

Biogenic carbon: As trees grow, they absorb carbon dioxide (CO_2) from the atmosphere, release the oxygen (O_2), and store the carbon in their wood, leaves or needles, and roots. Wood elements used in a building continue to store this carbon for the building's lifetime—longer if the wood is reclaimed and reused or recycled.

Developer Crescent Real Estate chose mass timber for Platte Fifteen, a speculative office development in Denver, for aesthetic differentiation and alignment of sustainability goals. They found that the authentic aesthetic of timber appeals to both technology companies as well as more traditional tenants.[4]

"Mass timber is great environmentally and creates warm, natural, biophilic spaces that enrich human experiences. It is a viable, sustainable structural option that drove leasing and the ultimate economic success of Platte Fifteen. The differentiated authentic timber interiors proved to be exceptionally attractive to quality, sustainability-minded tenants and investors. It is fundamentally what makes this building special."

– Conrad Suszynski, Co-CEO
Crescent Real Estate

Photo JC Buck

Platte Fifteen – Denver, CO
Crescent Real Estate

Healthy Buildings & Biophilia

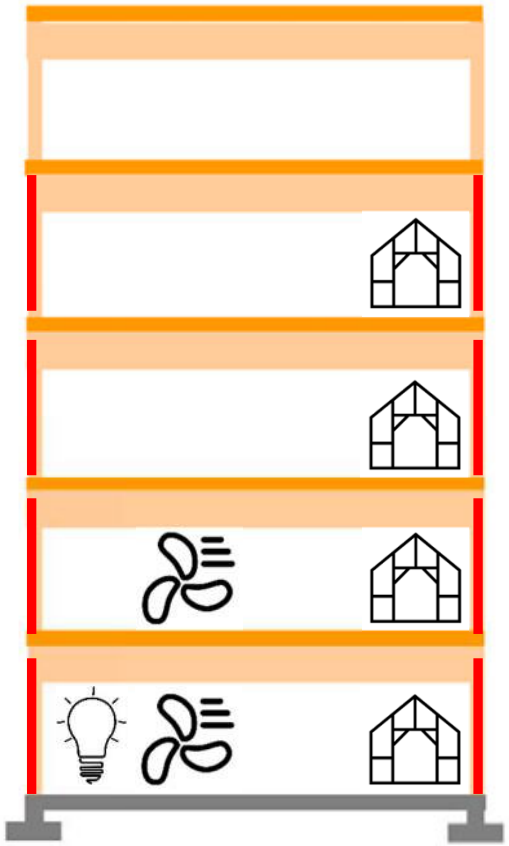
George Fox University – Canyon Commons | Hacker | Photo: Jeremy Bittermann

Labor Benefits

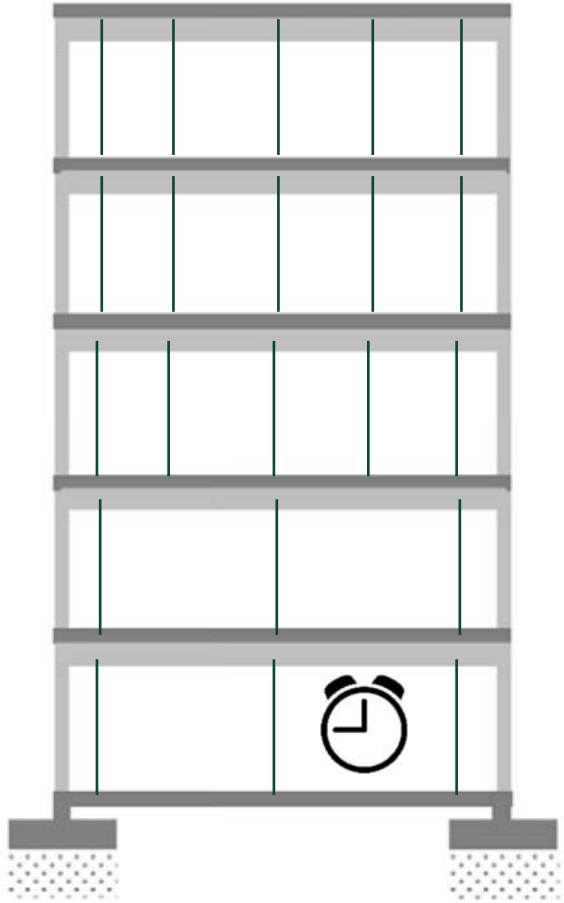
- Labor Shortage Solution
- Small crews for timber frame installation
- Utilize more entry-level laborers when MEPF systems fully designed, coordinated & pre-planned
- Safer construction sites

T3 Atlanta
Hartshorne Plunkard Architecture / DLR Group / StructureCraft / New South Construction / *Photo StructureCraft*

Schedule Savings for Rough-In Trades
Fast Construction



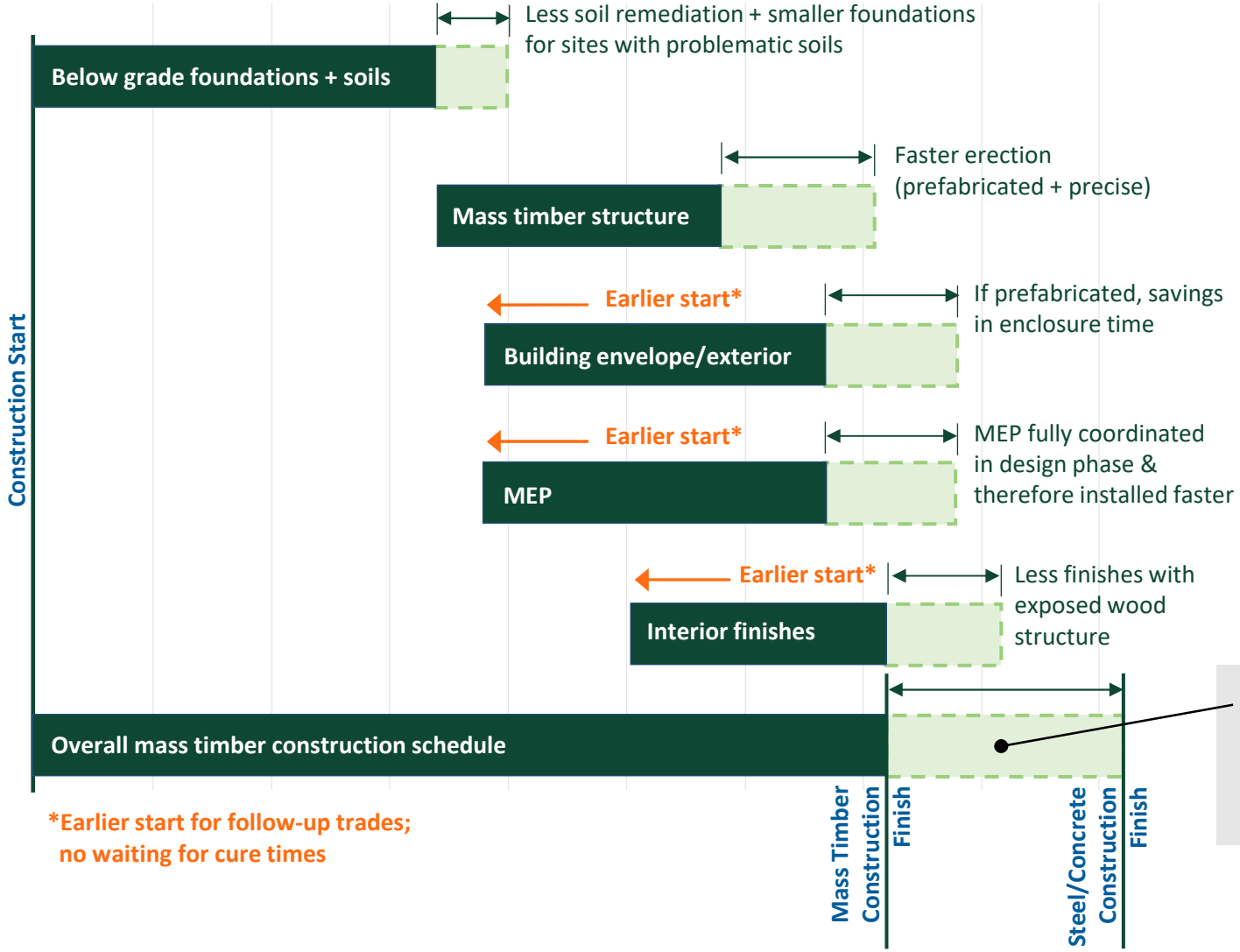
NO curing
(mass timber)



Curing & maze of
shores (concrete)

Photo: WoodWorks

Compressing the Typical Construction Schedule



Look for these potential $$ schedule savings with mass timber in comparison to steel and concrete.

Up to 25% schedule savings
= Less carrying costs
+ Less GC overhead
+ Ability to lease/occupy sooner

Prefabrication: Other systems
Keep up with Fast Pace of Mass Timber

Prefab Assemblies:

- Bathroom Pods
- MEP Racks
- Panelized Walls

Other systems:

- Enclose building asap
- Lateral system needs to be compatible with fast pace of mass timber

Developer, Asset Manager, Design Builder: Lendlease
Locations: Redstone Arsenal, Huntsville, Alabama

Photos: Lendlease

Potential Benefits	Project Goal ✓	Value Add ✓
Fast construction		
Aesthetic Value (Leasing velocity/ premiums) Healthy Building / Biophilia		
Lightweight structure		
Labor shortage solution • small crews • entry level workers		
Just-in-time delivery (ideal for dense urban sites)		
Environmentally friendly (low carbon footprint)		
Healthy forests/ wildfire resiliency & support rural economies		

MASS TIMBER
DEMONSTRATING THE HOW

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

Mass Timber in the IBC: Cross-Laminated Timber (CLT)

- CLT was first recognized in the 2016 CBC /2015 IBC
- CLT in the Code:
  - Chapter 2: Definitions

[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.

  - Chapter 23: Wood

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

Which Construction Type?

- Many buildings use higher construction type than necessary
  - Traditional practice
  - Fire ratings
  - Materials
  - Cost!

Construction Types – Allowable Materials

IBC/CBC defines 5 construction types: I, II, III, IV, V
A building must be classified as one of these

	TYPE I		TYPE II		TYPE III		TYPE IV				TYPE V	
	A	B	A	B	A	B	A	B	C	HT	A	B
Exterior Wall Material	Non-combustible		Non-combustible		FRTW		CLT (protected)			FRTW (LF, MT), CLT (protected)	Any wood	
Interior Elements	Non-combustible		Non-combustible		Any wood		Heavy Timber			Heavy Timber	Any wood	

Construction Type IB, IIA, IIB (IBC Table 601 footnote c)

c. In all occupancies, heavy timber complying with Section 2304.11 shall be allowed for roof construction, including primary structural frame members, where a 1-hour or less fire-resistance rating is required.

Airport

Portland International Airport - Portland, OR

Image: Timberlab

Civic Building

Millcreek City Hall – Millcreek, UT

Image: WoodWorks

Event Center

Locust Grove – Louisville, KY

Photo:
de Leon & Primmer Architecture Workshop

Construction Types – Allowable Materials

	TYPE I		TYPE II		TYPE III		TYPE IV				TYPE V	
	A	B	A	B	A	B	A	B	C	HT	A	B
Exterior Wall Material	Non-combustible		Non-combustible		FRTW		CLT (protected)			FRTW (LF, MT), CLT (protected)	Any wood	
Interior Elements	Non-combustible		Non-combustible		Any wood		Heavy Timber			Heavy Timber	Any wood	

Construction Types V-A, V-B

Residential
Star Lofts
Des Moines, IA

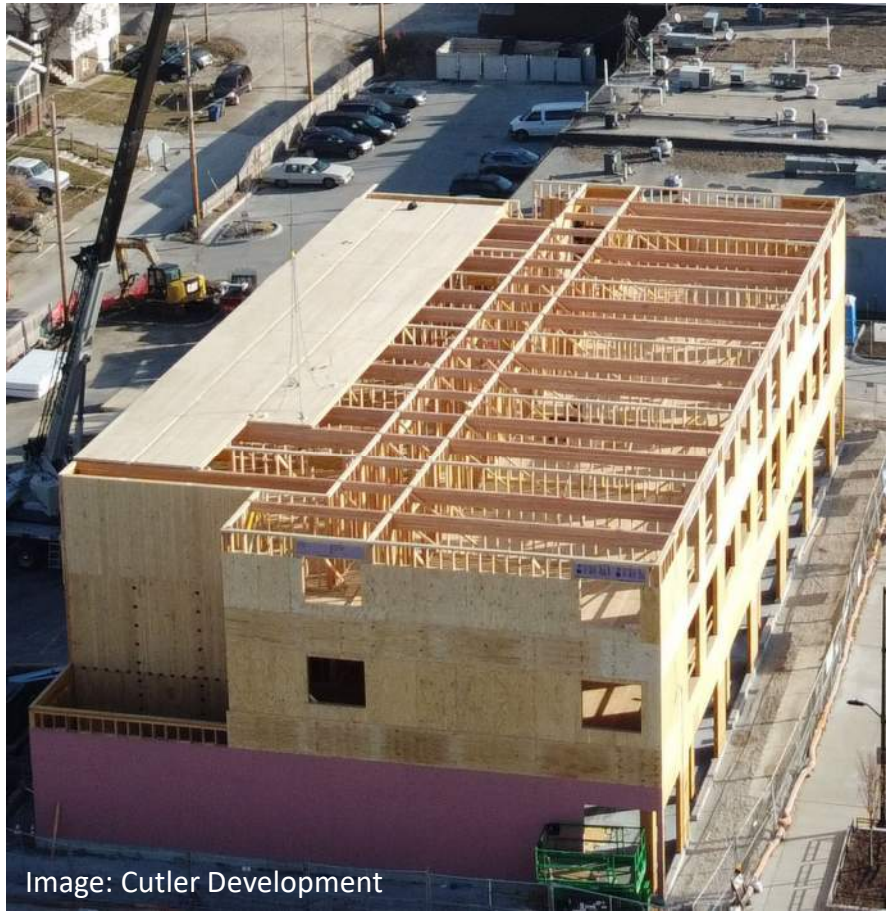


Image: Cutler Development

Educational
Cooley Landing Education Center
East Palo Alto, CA


Image: Michael O'Callahan

Office
First United Bank
Moore, OK


Image: WoodWorks

Construction Types – Allowable Materials

	TYPE I		TYPE II		TYPE III		TYPE IV				TYPE V	
	A	B	A	B	A	B	A	B	C	HT	A	B
Exterior Wall Material	Non-combustible		Non-combustible		FRTW (fire retardant treated wood)		CLT (protected)			FRTW (LF, MT), CLT (protected)	Any wood	
Interior Elements	Non-combustible		Non-combustible		Any wood		Heavy Timber			Heavy Timber	Any wood	

Construction Types III-A, III-B

Residential
Canyons
Portland, OR


Image: Jeremy Bittermann & Kaiser + Path

Student Housing
UCSC Kresge College
Santa Cruz, CA

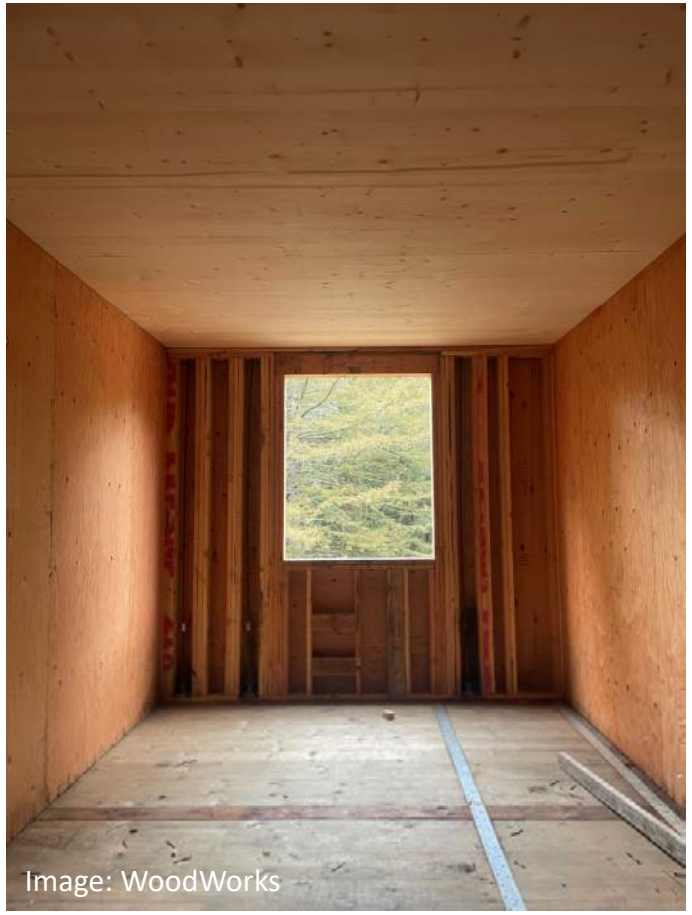


Image: WoodWorks

Office
Platte 15
Denver, CO

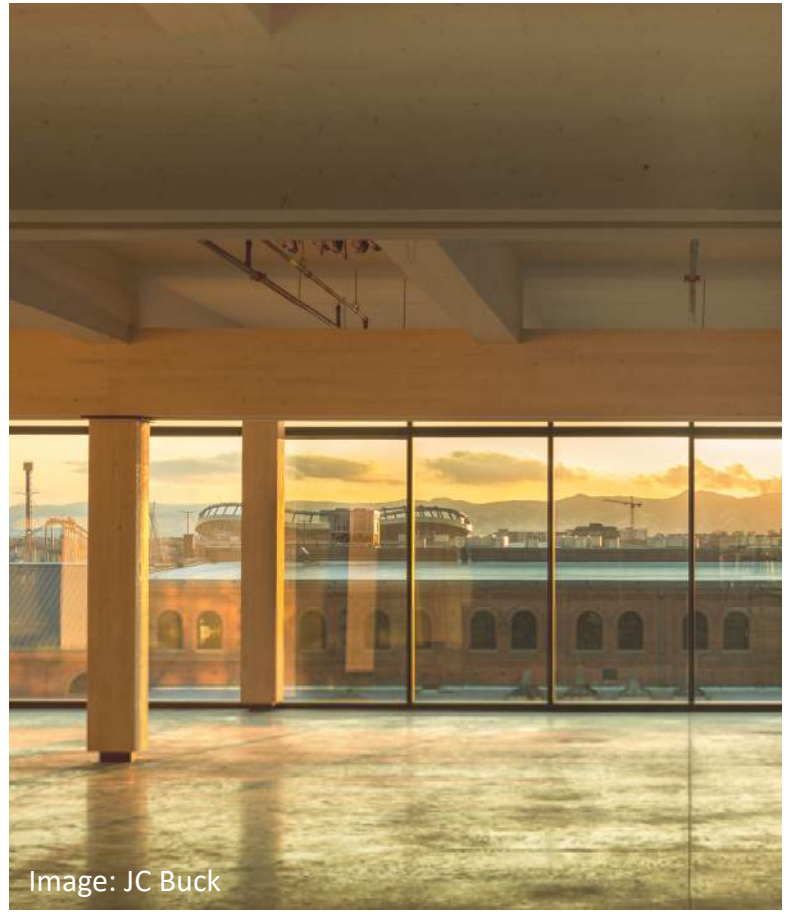


Image: JC Buck

Construction Types – Allowable Materials

	TYPE I		TYPE II		TYPE III		TYPE IV				TYPE V	
	A	B	A	B	A	B	A	B	C	HT	A	B
Exterior Wall Material	Non-combustible		Non-combustible		FRTW		CLT (protected)			FRTW (LF), CLT (protected)	Any wood	
Interior Elements	Non-combustible		Non-combustible		Any wood		Heavy Timber			Heavy Timber	Any wood	

Construction Types IV-HT

Office
1 De Haro
San Francisco, CA


Image: David Wakley

Office
San Mateo County Office Building
Redwood City, CA

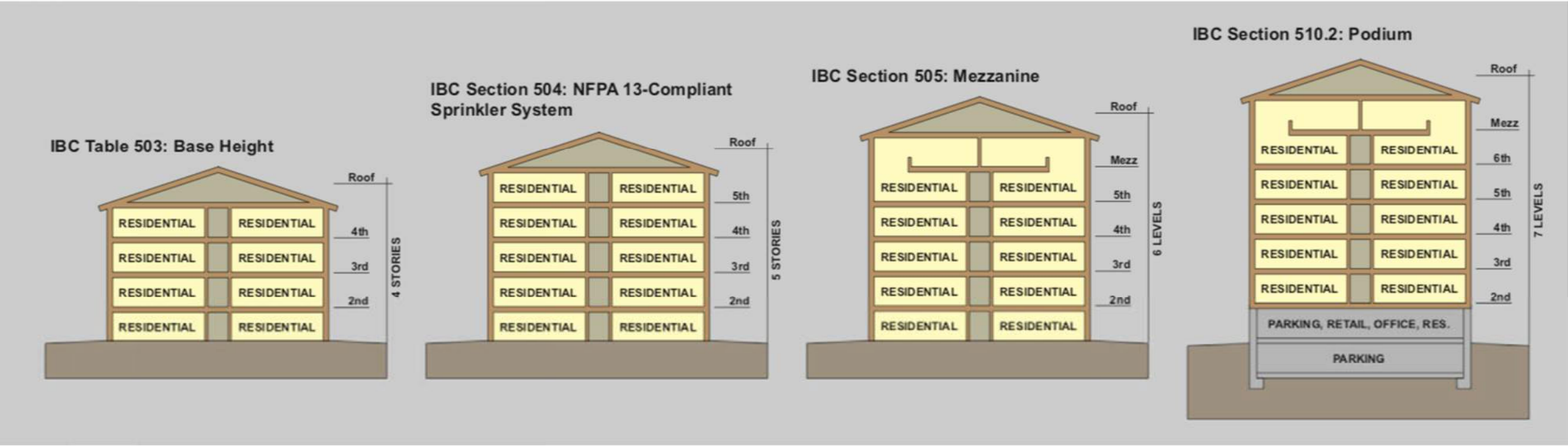
Image: WoodWorks

Educational
John W. Olver Building at U. Mass
Amherst, MA


Image: Albert Vecerka / Esto

BEFORE 2021 IBC Code Limit for wood - 6 stories (business) 5 stories (residential) and 85 feet

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



Source: WoodWorks

Type V → Type III / Type IV (HT) → + Mezzanines → + Podiums

Construction Type IV-A, B, and C

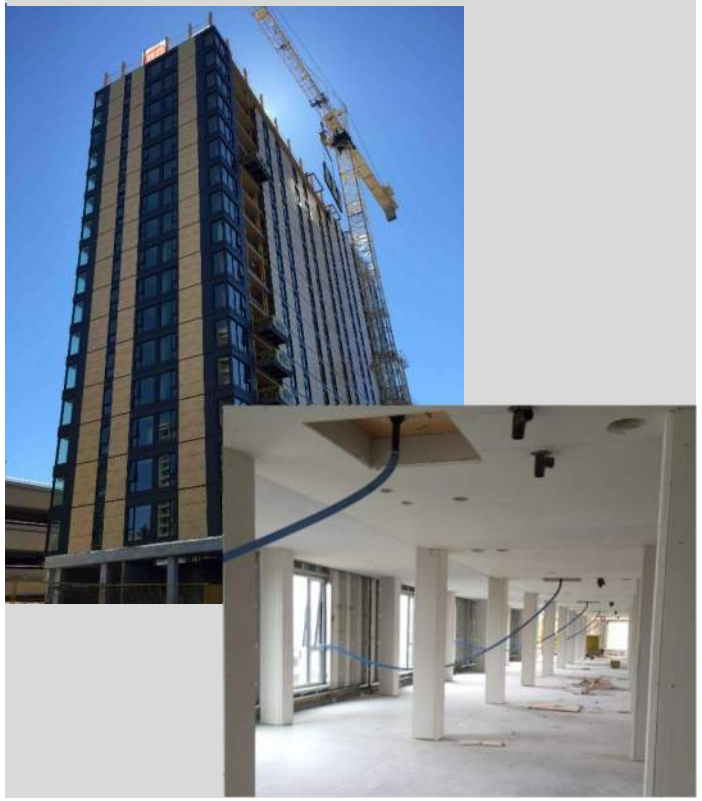
U.S. Building Codes, Tall Wood Ad Hoc Committee (2016-2018)

» Development of code change proposal for prescriptive code allowance of tall wood buildings.

Mass Timber Fire Testing at ATF Lab (2017)

Construction Types IV-A, B, and C

Type IV-A

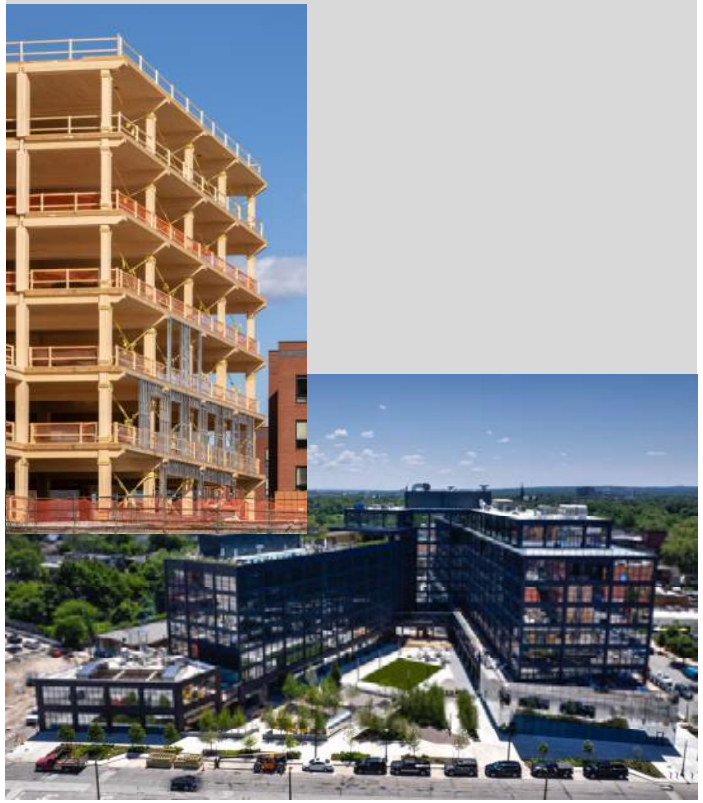


Photos: Flor Projects

18 STORIES

BUILDING HEIGHT	270’
PER STORY AREA	324,000 SF
BUILDING AREA	972,000 SF

Type IV-B

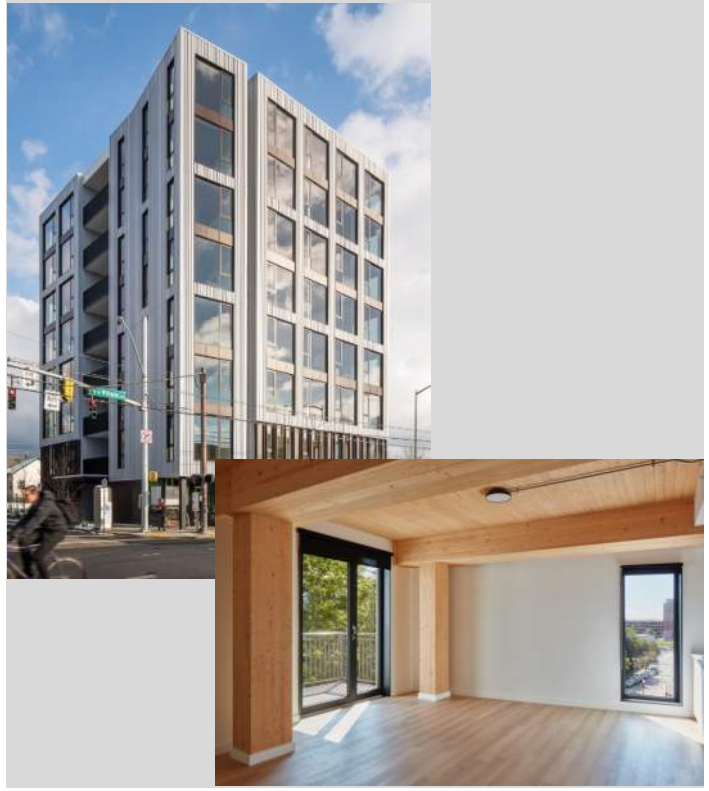


Photos: ©Prakash Patel

12 STORIES

BUILDING HEIGHT	180’
PER STORY AREA	216,000 SF
BUILDING AREA	648,000 SF

Type IV-C



Monte French Design Studio, Photos: Jane Messinger

9 STORIES

BUILDING HEIGHT	85’
PER STORY AREA	135,000 SF
BUILDING AREA	405,000 SF

Type IV-C

Image: Susan Jones, atelierjones

8 Stories
Height = 85’
Wood fully exposed

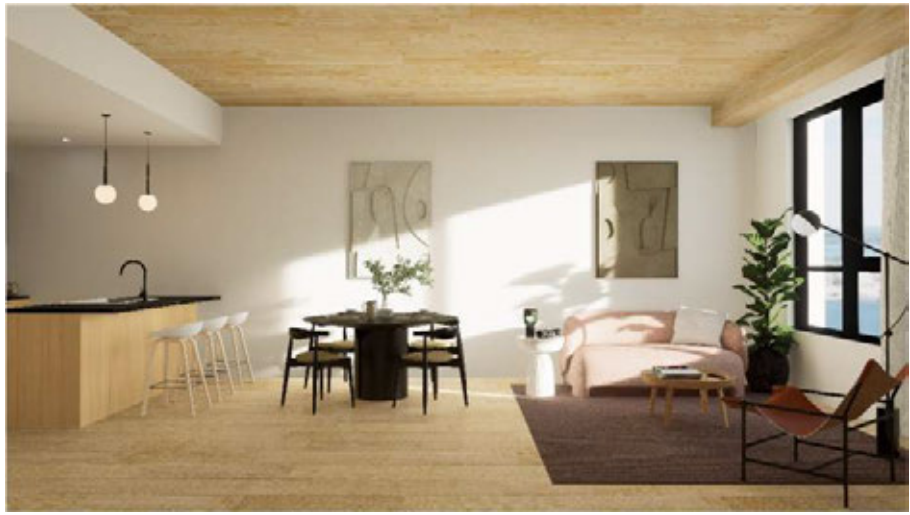
Heartwood
Seattle, WA
Community Roots Housing | Skipstone

Images: Susan Jones, atelierjones

Type IV-B

Image: Susan Jones, atelierjones

12 Stories
Height = 180’
2024 IBC / 2025 CBC
Fully Exposed Timber



Baker’s Place
Madison, WI
Developer: The Neutral Project

Images: Michael Green Architecture

Type IV-A

Image: Susan Jones, atelierjones

18 Stories
Height = 270’
Wood covered/ not exposed

1510 Webster
Oakland, CA
Developer/Architect/Builder: oWOW

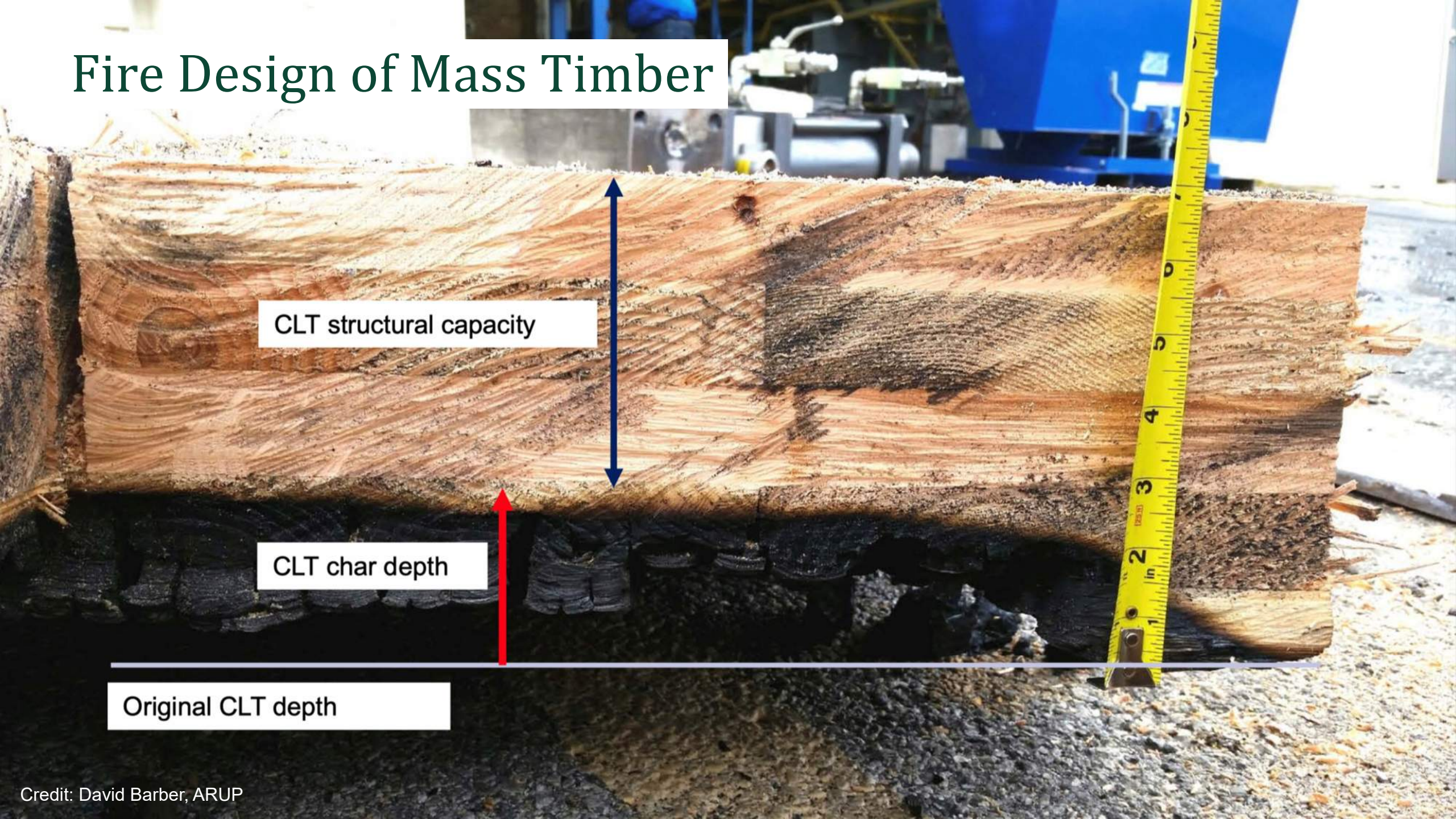
Images: Andrew Nelson

Construction Type – Primarily based on building size & occupancy

	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	75	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

For low- to mid-rise mass timber buildings, there may be multiple options for construction type. There are pros and cons of each, don't assume that one type is always best.

Fire Design of Mass Timber



Credit: David Barber, ARUP

Fire Design of Mass Timber

Mass Timber

+

Noncombustible

=

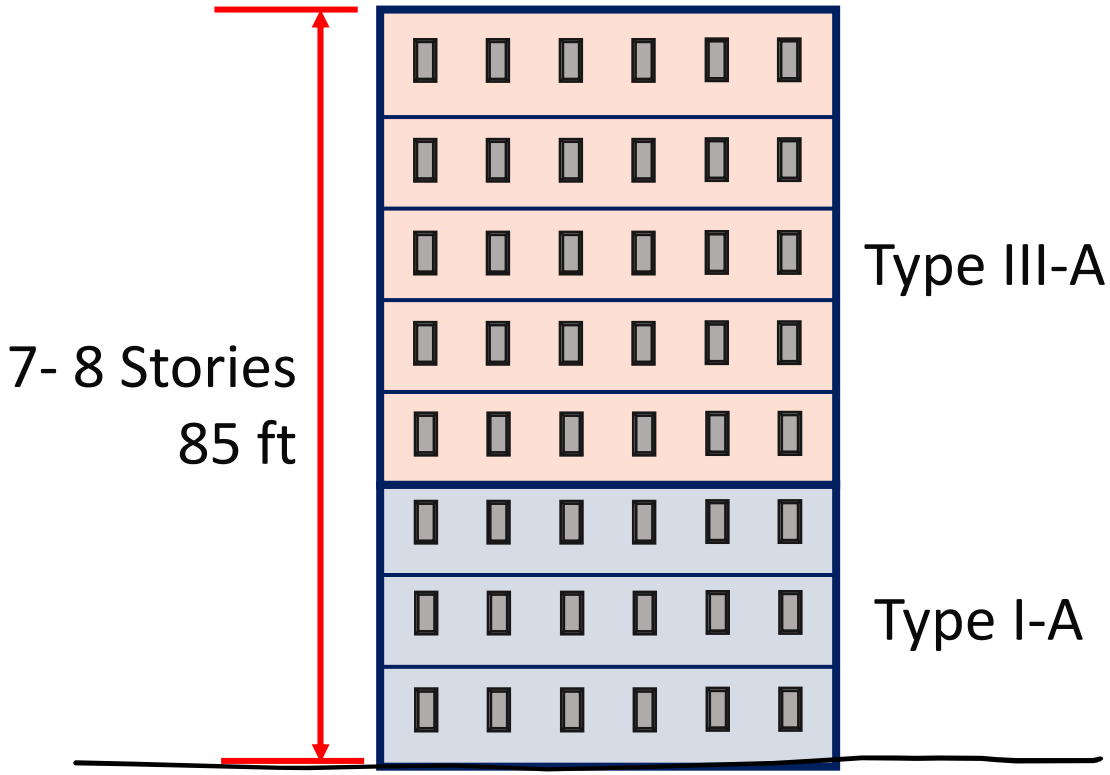
Fire Resistance Rating

Fire-Resistance Ratings
Driven primarily by construction type

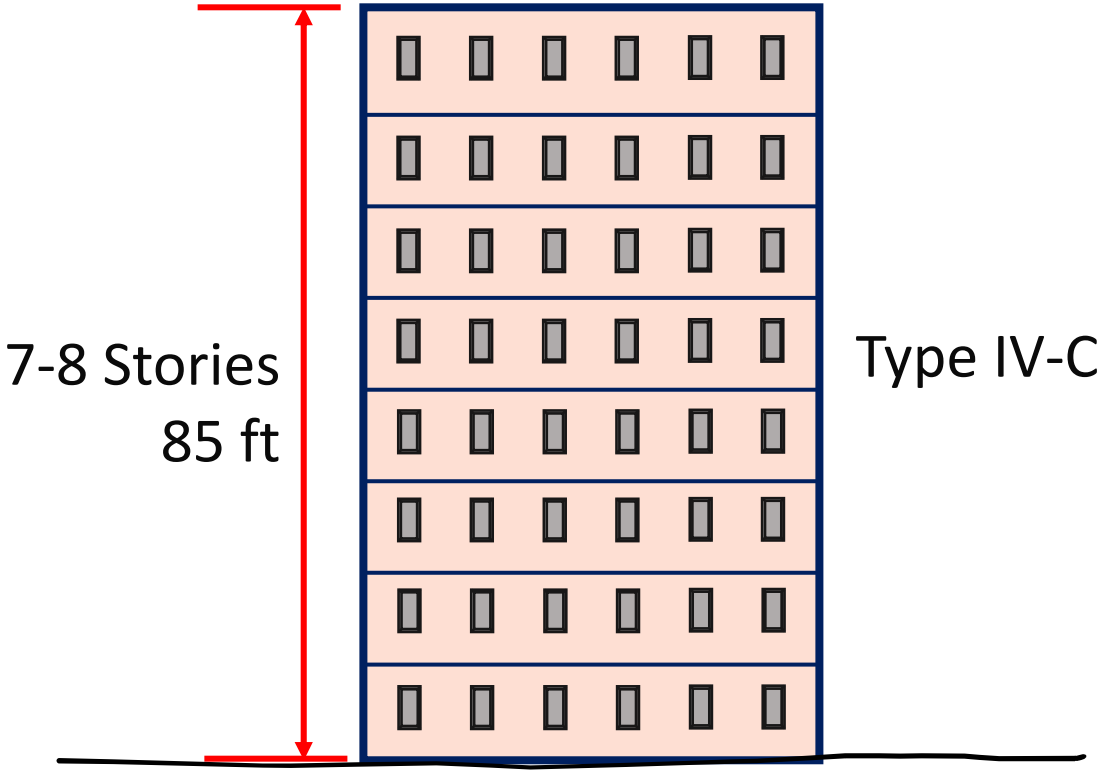
TABLE 601
FIRE-RESISTANCE RATING REQUIREMENTS FOR BUILDING ELEMENTS (HOURS)

BUILDING ELEMENT	TYPE I		TYPE II		TYPE III		TYPE IV				TYPE V	
	A	B	A	B	A	B	A	B	C	HT	A	B
Primary structural frame[f] (see Section 202)	3[a, b]	2[a, b, c]	1[b, c]	0[c]	1[b, c]	0	3[a]	2[a]	2[a]	HT	1[b, c]	0
Bearing walls												
Exterior[a, f]	3	2	1	0	2	2	3	2	2	2	1	0
Interior	3[a]	2[a]	1	0	1	0	3	2	2	1/HT[g]	1	0
Nonbearing walls and partitions Exterior	See Table 705.5											
Nonbearing walls and partitions Interior[d]	0	0	0	0	0	0	0	0	0	See Section 2304.11.2	0	0
Floor construction and associated secondary structural members (see Section 202)	2	2	1	0	1	0	2	2	2	HT	1	0
Roof construction and associated secondary structural members (see Section 202)	1½[b]	1[b, c]	1[b, c]	0[c]	1[b, c]	0	1½	1	1	HT	1[b, c]	0

R-2 Occupancy, Type III-A vs Type IV-C



Type III-A

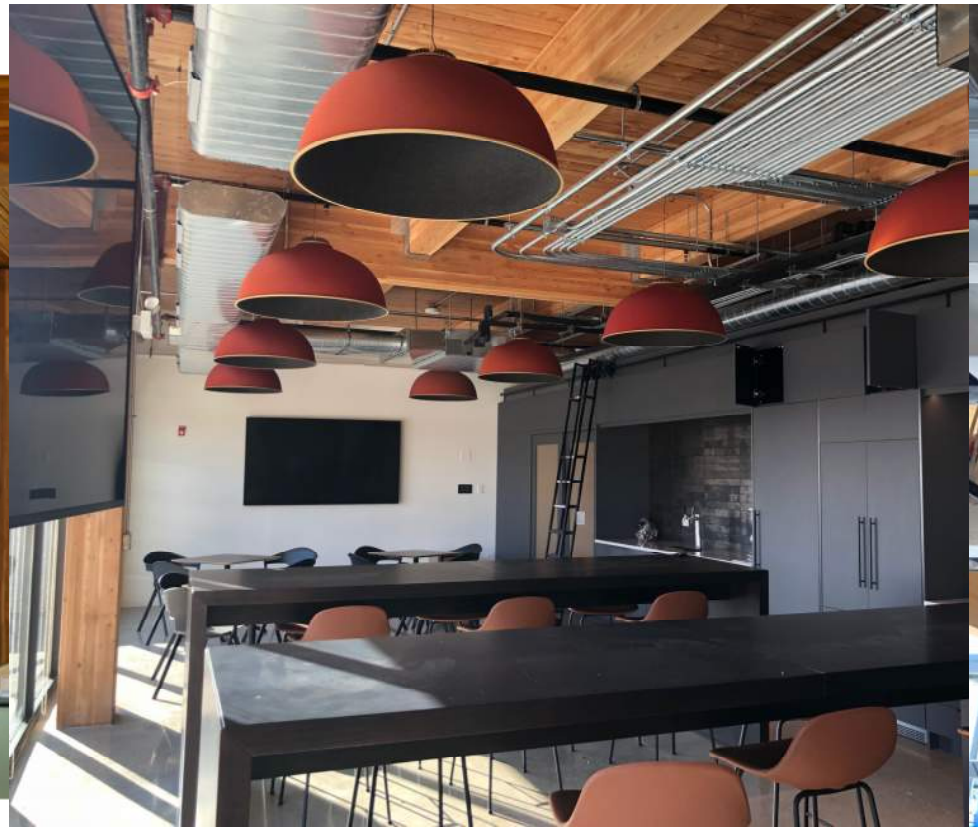


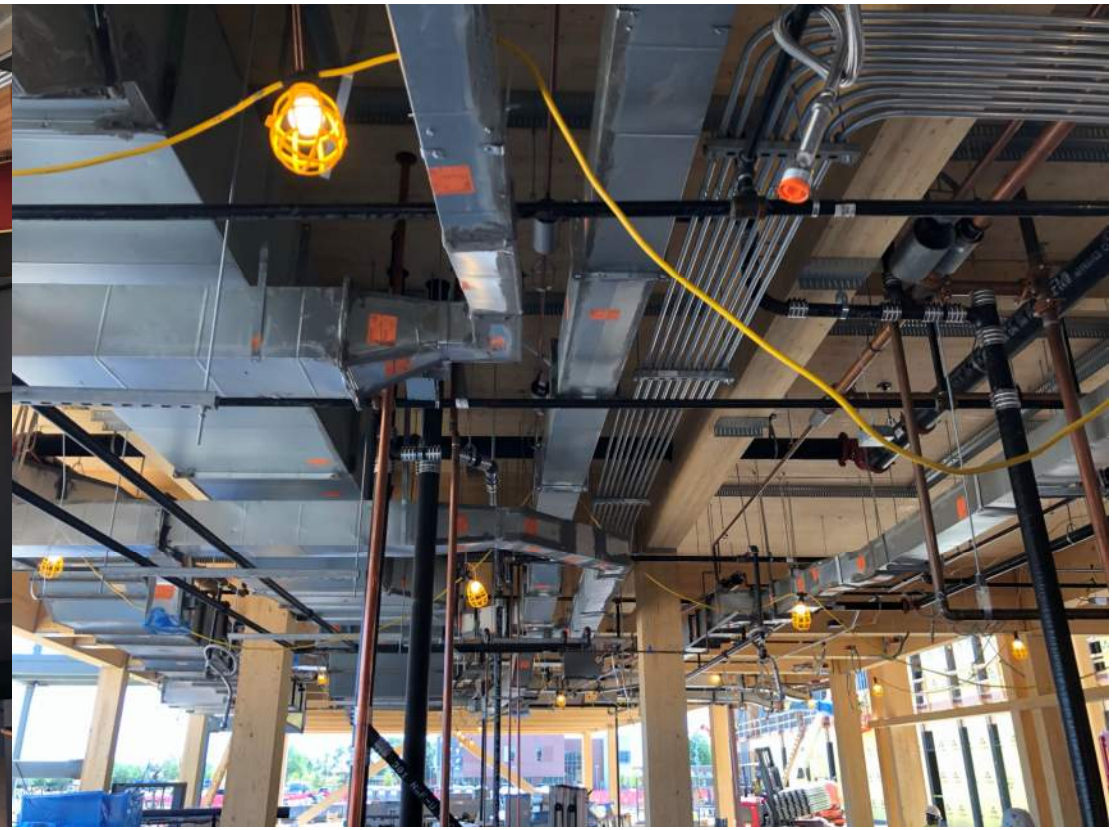
Type IV-C

MEP Layout & Integration

Set Realistic Owner Expectations About Aesthetics

- MEP fully exposed with MT structure, or limited exposure?

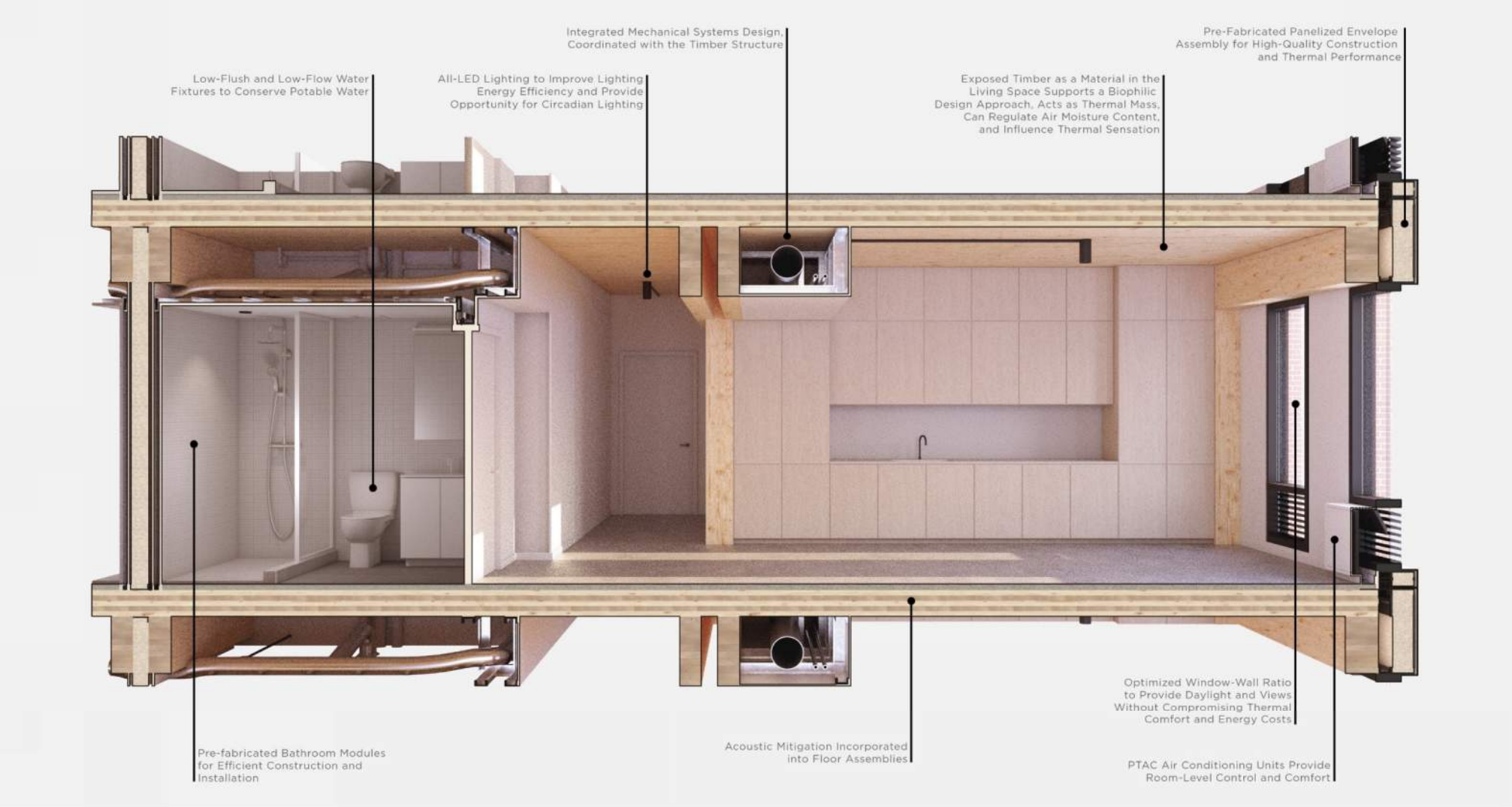




11 E LENOX, BOSTON, MA

Credit: H + O Structural Engineering

MEP Systems, Routing and Integration



INTEGRATED SYSTEMS

Credit: John Klein, Generate Architecture

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.

T3 Minneapolis
MGA | Michael Green Architecture / DLR Group
Magnusson Klemencic Associates / StructureCraft

Julie Gorham, PE, *Excel Engineering*
in collaboration with
WoodWorks – Wood Products Council

Integrating MEPF in Mass Timber Buildings

Techniques for Incorporating Building Infrastructure Systems in Exposed Wood Structures

The opportunity to leave structural elements exposed in a mass timber building offers tremendous design possibilities. It also brings creative challenges not seen with other building types, such as how to expose as much of a mass timber ceiling as possible and keep it relatively uncluttered to emphasize the beauty and biophilic properties of the natural wood panels. This requires careful attention to mechanical, electrical, plumbing, and fire suppression systems (MEPF), either to hide them in concealed areas or incorporate them in a way that suits the architectural design.

This paper explores strategies being used to incorporate MEPF in U.S. mass timber buildings. While there is no "best" approach, effective integration considers the impacts of services on all aspects of the project, including aesthetics, structural performance, fire protection requirements, grid utilization, reconfigurability, and cost. MEPF options should be considered early and often during the design of a mass timber building to avoid issues later.

Elements commonly left exposed:

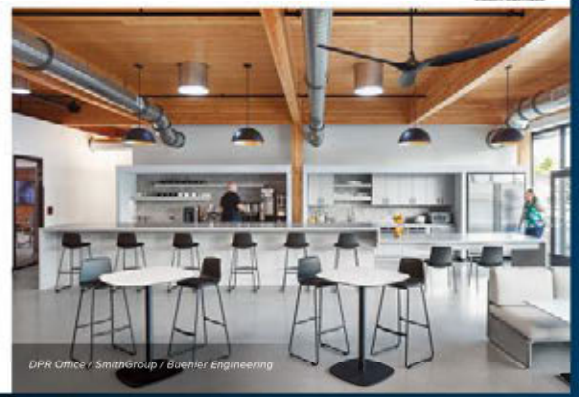
- Ducting for forced air distribution and exhaust
- Sprinklers (piping and heads)
  - Easier to meet requirements for distribution, density, and coverage of sprinkler lines and heads
- Electrical conduit
  - Exposed more frequently in office and institutional buildings

Elements commonly concealed (e.g., with dropped ceilings, topping slabs, soffits, chases, and within walls):

- Plumbing supply and drain lines
  - Dropped ceilings common in bathrooms and kitchens, which are often stacked story-to-story
- Data and low-voltage cabling
- Hydronic piping
- Electrical conduit

Common Approaches to MEPF in Exposed Wood Structures

In a multi-family building, designers often expose mass timber ceilings in living rooms, bedrooms, dining areas, and hallways of dwelling units, and use dropped ceilings in kitchens, bathrooms, and corridors to conceal the heavier concentration of MEPF systems. In office, retail, assembly, and institutional buildings, it is common to expose mass timber ceilings in all areas except bathrooms, mechanical rooms, and other spaces with significant MEPF systems.



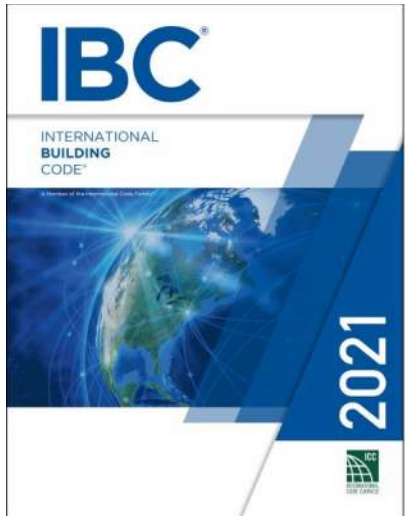
DPR Office / SmithGroup / Buehler Engineering

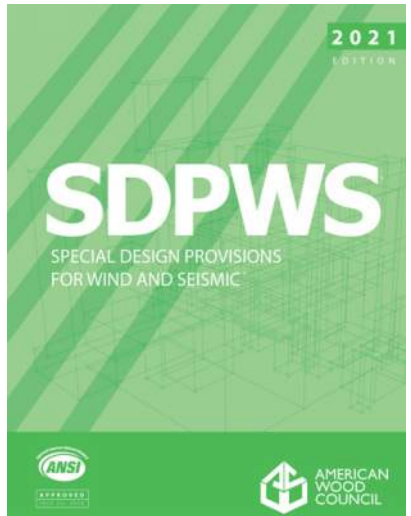
Considerations for Lateral Systems

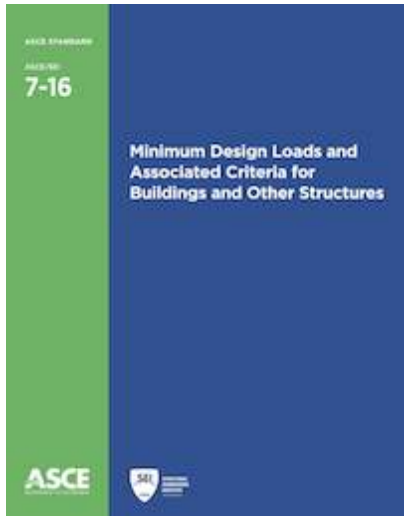
Prescriptive Code Compliance:

- ☑ Concrete Shear Walls
- ☑ Steel Braced Frames
- ☑ Light Frame Wood Shear Walls (65 ft max)
- ☑ Cold Formed Steel Shear Walls (65 ft max)
- ☑ CLT Shear Walls (65 ft max) — 2021 SDPWS, ASCE 7-22
- ☒ CLT Rocking Walls — Currently in development!

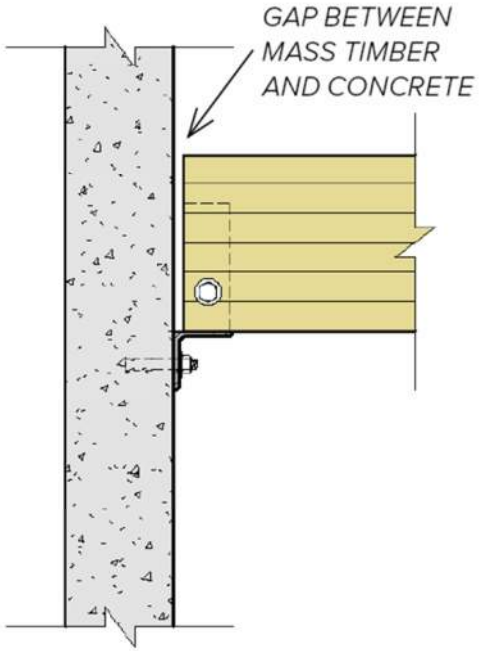
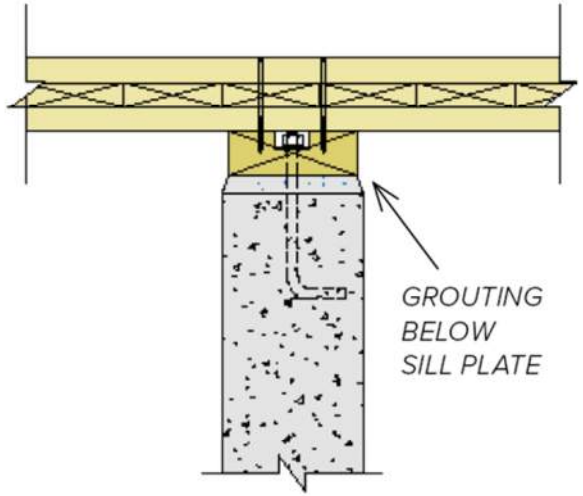
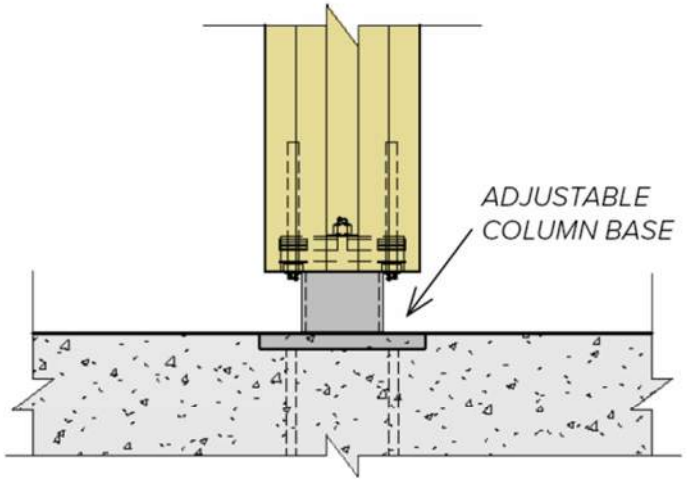

Photo: WoodWorks







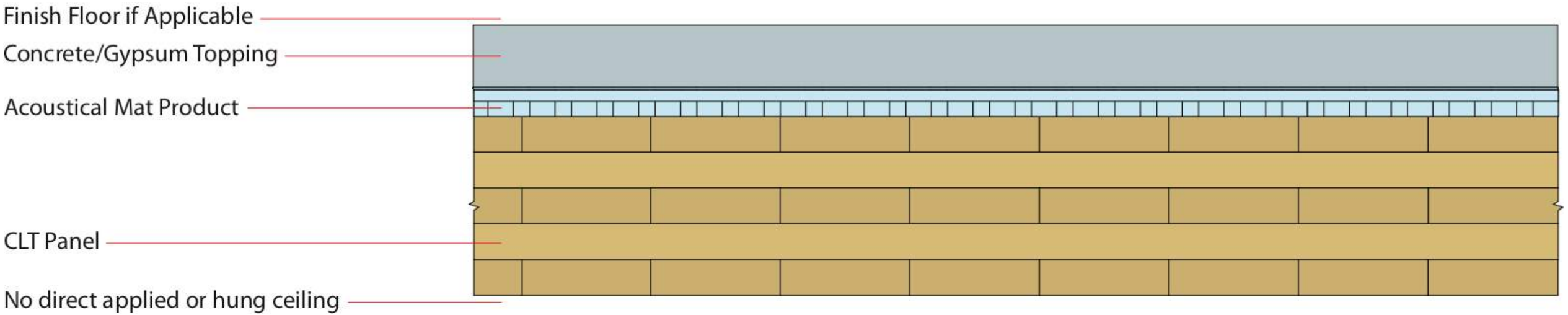
Connection to other materials - Tolerance Solutions

Solution	**Gap Between Mass Timber Beam and Concrete Wall**	**Grouting Below Sill Plate at Mass Timber Panel to Concrete Wall**	**Adjustable Column Base at Mass Timber Column to Concrete**
Connection example			
	Beam Perpendicular to Wall Connected to Face of Wall	Panel Bears at Top of Wall	Column Bears on Concrete with Adjustable Standoff Base

Acoustics & Sound Control

Concrete Slab:		CLT Slab:
6” Thick		6-7/8” Thick
80 PSF	⟷	18 PSF
STC 53	⟷	STC 41

Acoustics & Sound Control



Insurance Resources

WoodWorks resources for mass timber insurance:

- Video series on MT Builder's Risk insurance challenges
- Mass Timber Project Questionnaire for Builder's Risk Insurance – download & fill it out!
- Insurance for Mass Timber Construction: Assessing Risk and Providing Answers (white paper)
- Discuss with WoodWorks Regional Director:
  - Lists of experienced insurance brokers
  - Help answering questions from brokers & insurers

www.woodworks.org/learn/mass-timber-clt/mass-timber-building-insurance/

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 Perspective on Mass Timber
How do we address the perceived unknowns?

- Demonstrate extensive testing, research and use
- Provide clarification on commonly misunderstood topics
- Highlight building code recognition and approvals
- Reference product reports, evaluations and 3rd party verifications
- Generate project-specific mitigation strategies


Photo: ARUP


Photo: AWC/FPInnovations


Photo Credit: US Forest Products Laboratory

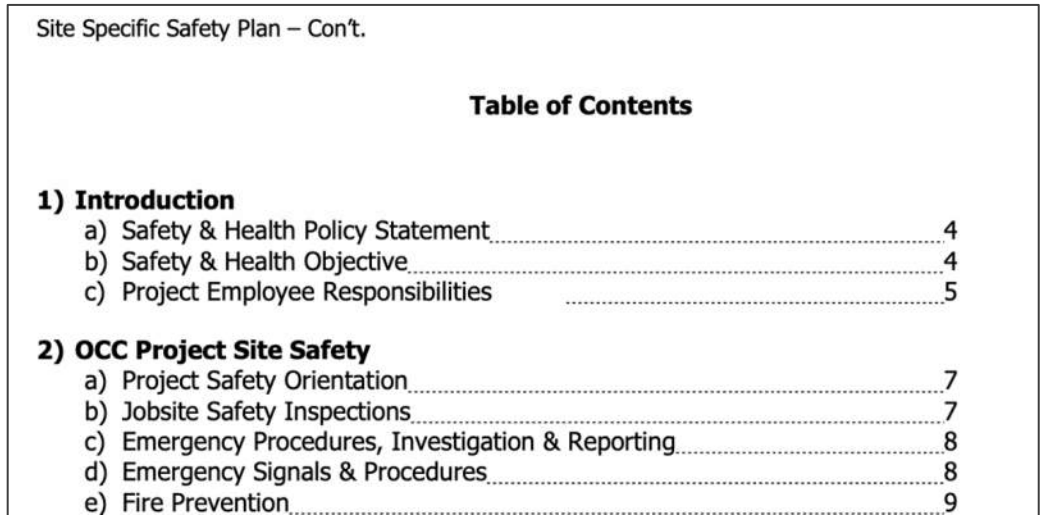
Mass Timber Project Risk Mitigation

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 – have a plan
- Long term moisture protection – traditional building envelope
- Construction site fire safety & other safety measures – have a plan
- Construction schedule impacts – shorter schedules help reduce risk

Sample Safety Plan

Address & Location



Site Specific Safety Plan – Con't.

Table of Contents

Pre-design
for developers/ owners

Builder input during pre-design is essential to optimizing costs.

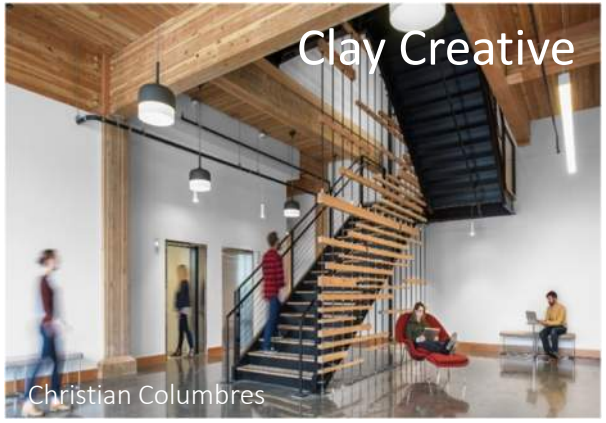
- Assemble Design & Builder Team
- Contract model: consider CM at risk, design-assist, IPD, or design-build
- Establish project goals through discussions with owner, designer and builder.
- Cost estimating considerations
- 3D modeling & coordination of structural, MEPF & architectural systems

Design
for developers/ owners

- Acoustics – set expectations
- If it hasn’t already been done, decide whether the GC or subcontractor will install the framing.
- Ensure safety policies are in place to protect against construction fires.
- Determine “shop or field” for connectors and finishes.
- Decide how wood will be protected during transportation and construction.

Plan for early conversations with building & fire departments

Mass Timber Business Case Studies: Value Creation Analysis



Scan to download

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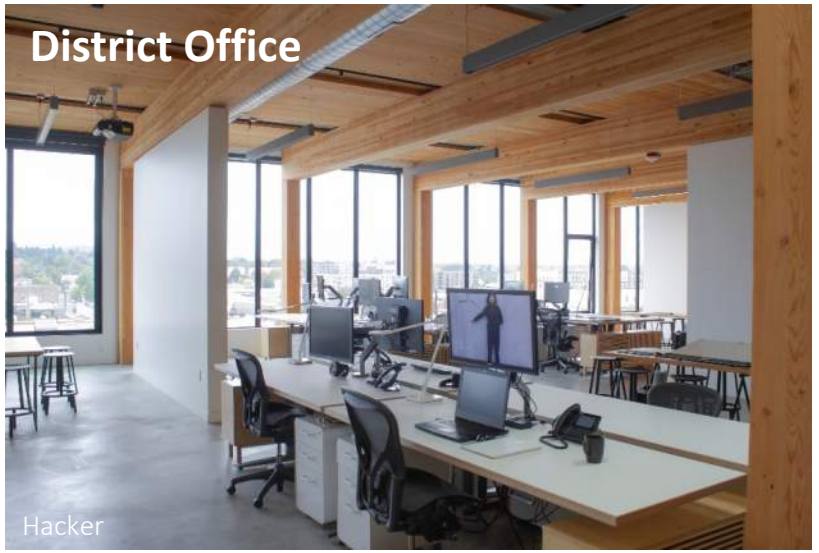
CONRAD INVESTMENT MANAGEMENT

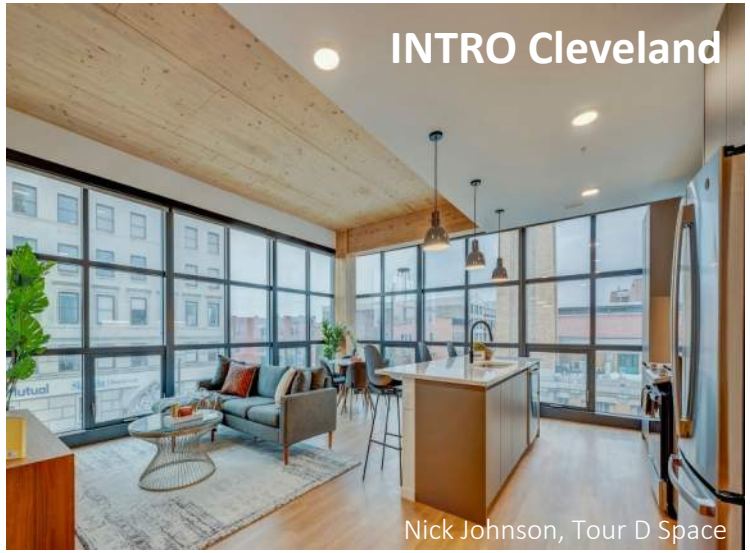
Mass Timber Business Case Studies: Value Creation Analysis

Development Overview
- Property Information
- Product Strategy
- Investment Highlights

Qualitative Discussion
- Challenges
- Lessons Learned
- Successes

Quantitative Overview
- Development Timeline
- Costs
- Rents
- Lease up





Comparative Return Analysis

	Market	Pro Forma	Realized
Yield on cost	6.25%	7.00%	7.35%
Cap rate	4.75%	4.50%	TBD
Value/rentable SF	$550/ RSF	$717/ RSF	TBD ($800+/ RSF)
Leverage	65%	65%	N/A

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CONRAD INVESTMENT MANAGEMENT

Multifamily | Office | Industrial | Student Housing

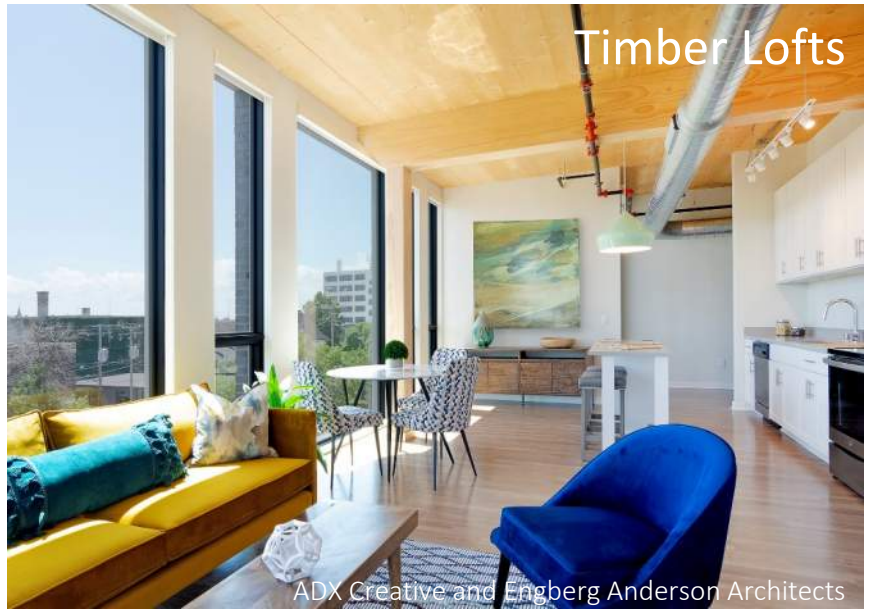
Office & Multifamily Tend to:

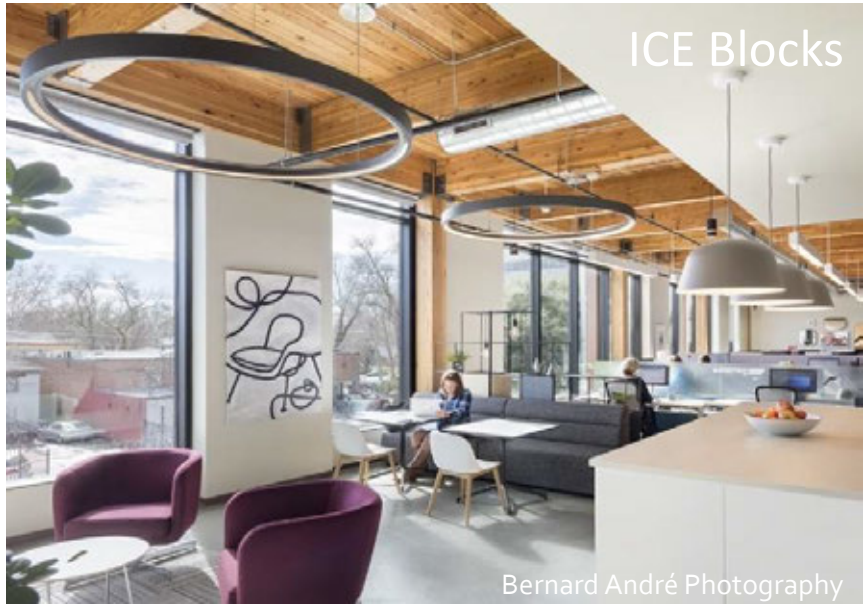
Lease up faster than submarket norms; which translates to:

- Higher net income
- Lower income volatility
- Better IRR
- Lower risk via quicker to refinance/ sell

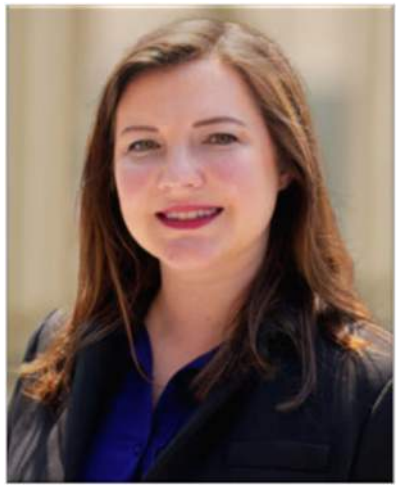
Attract quality tenants; which translates to:

- Better rent collection
- Better (lower) cap rates
- Better (stable) occupancy





Questions? Ask us anything.



Please take our survey!

Chelsea Drenick, SE
Regional Director | CA-North, NV, UT
(303) 588-1300

chelsea.drenick@woodworks.org

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

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