

Mass Timber Construction Management: Economics, Logistics & Risk Analysis



June 2, 2026

Presented by:
Kate Carrigg, PE
WoodWorks



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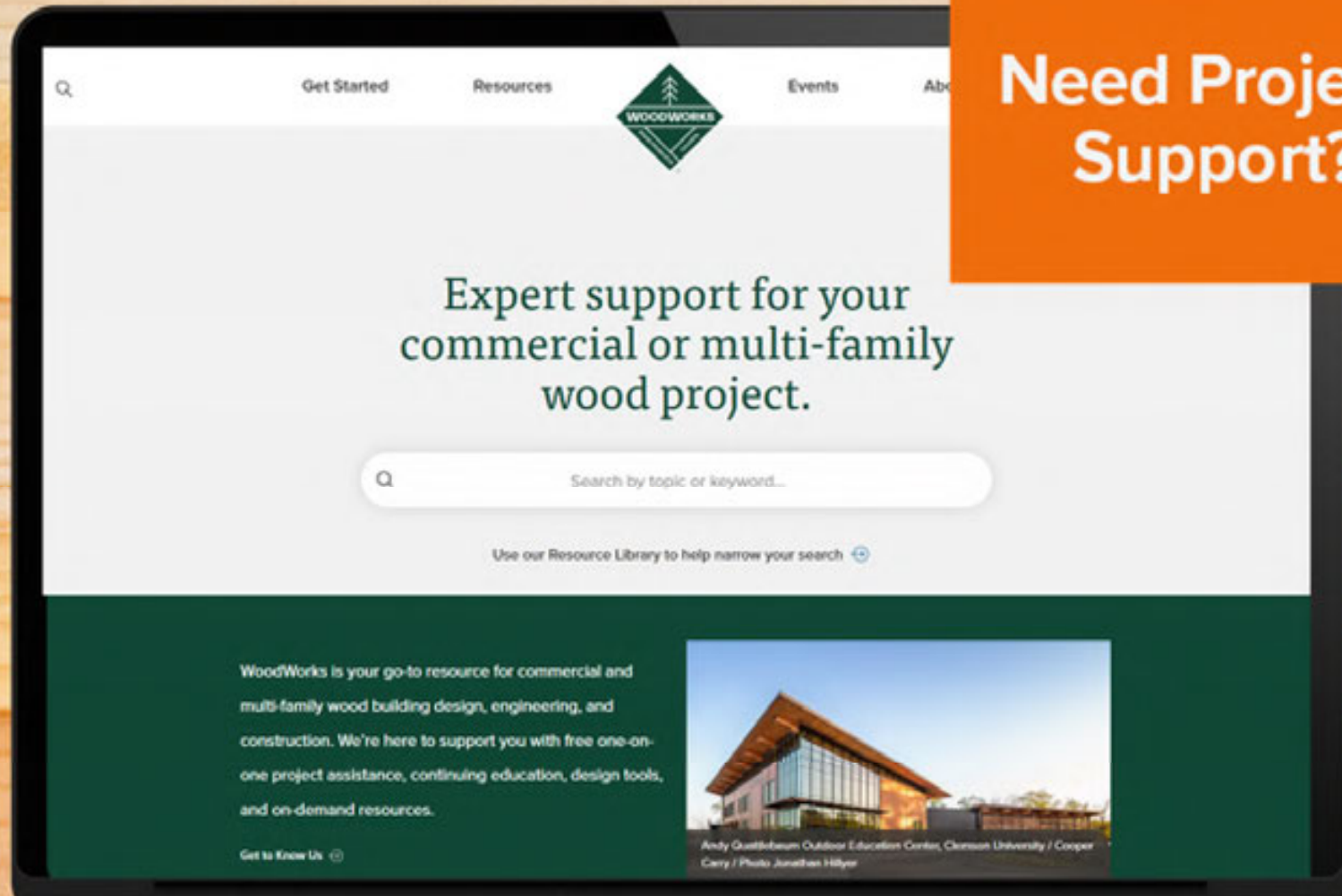
- » Preconstruction
- » Delegated design
- » Moisture management
- » Procurement
- » Connections
- » Project education
- » Cost drivers
- » Scheduling
- » Protection and remediation
- » Installer training
- » MEPF Integration
- » Hybrid details
- » Case studies



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Attendee Notes

1. To receive a certificate of completion, stay on for the duration of the webinar.
2. Certificates will be sent via email within a few days.
3. The PDF of today's presentation can be found on WoodWorks.org under the *Events* tab—then *Presentation Archives*.





Agenda

Mass Timber Construction Management: Economics, Logistics & Risk Analysis

11:00 – 11:05 am	Welcome
11:05 – 12:05 pm	<i>Mass Timber Construction Management: Economics, Logistics & Risk Analysis</i>
12:05 – 12:10 pm	Break
12:10 – 1:10 pm	<i>Mass Timber Construction Management: Economics, Logistics & Risk Analysis</i>
1:10 – 1:30 pm	Optional Q&A

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



Course Description

How do contractors answer the increasing demand for mass timber buildings from architects and ownership groups? Growing this budding industry requires an understanding from both designers and seasoned construction professionals of how to construct efficiently, navigate jurisdictions new to mass timber, and manage the procurement risks to deliver the dream of a new and optimized building system. This session will introduce mass timber products and building systems then consider why some mass timber projects never pass the concept stage, what can mitigate risk and improve financial feasibility, and how the development, architectural, engineering, and construction community can achieve success with mass timber projects of various scales and typologies. Particular emphasis will be given to preconstruction coordination, holistic approaches to costing and scheduling studies, project delivery methods, and how to achieve the highest level of cost efficiency.

Learning Objectives

1. Understand the preconstruction manager's role in material procurement and MEP coordination of code-compliant mass timber projects.
2. Highlight effective methods of early design-phase cost estimation that keeps mass timber options on the table.
3. Discuss potential construction schedule savings realized through the use of prefabricated mass timber elements.
4. Explore best practices for interaction between manufacturer, design team and preconstruction manager that can lead to cost efficiency and safety on site.

Mass Timber Construction Management

ECONOMICS

Anatomy of a mass timber package
Holistic project estimating

LOGISTICS

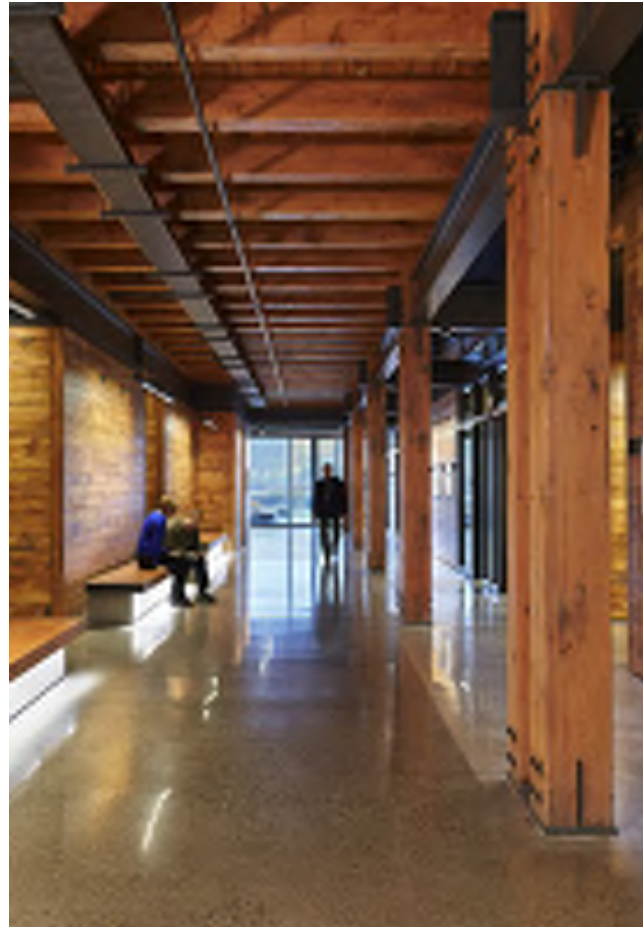
Design Engagement
Schedule
Site Planning

RISK ANALYSIS

Threats to mass timber projects
Strategic project delivery

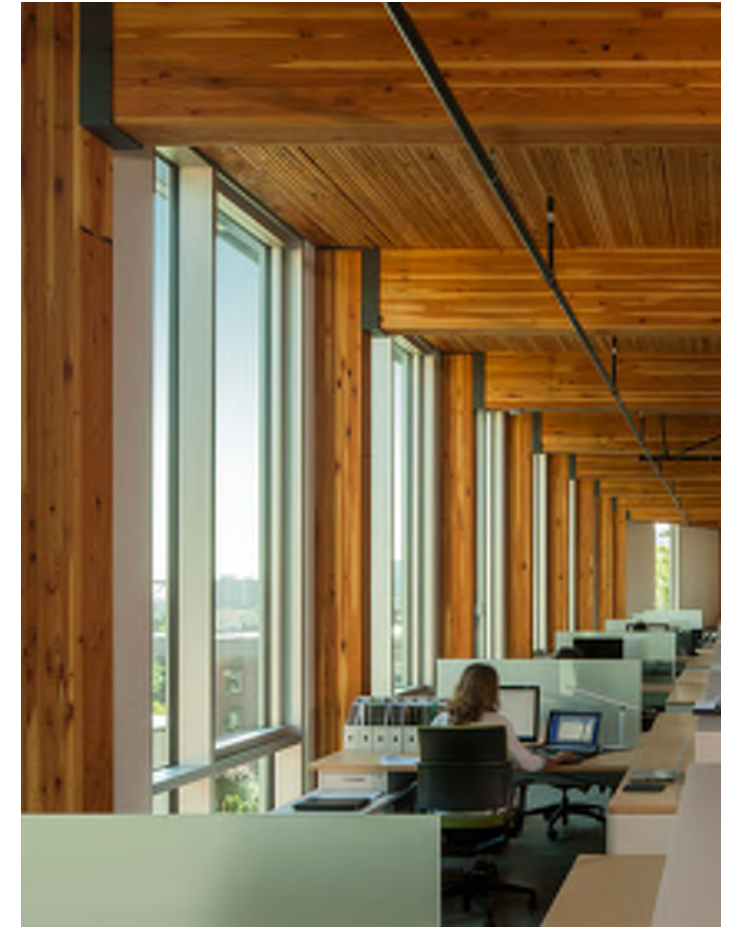
Mass Timber: What is it?

Small wood members formed into large, solid members.



Heavy Timber

Photo: Benjamin Benschneider



Mass Timber

Photo: John Stamets

Mass Timber Products

Columns and Beams

- » Glue-Laminated Timber / **Glulam**
- » Structural Composite Lumber / **SCL**



Boise Cascade



Weyerhaeuser



Panels

- » Cross-Laminated Timber / **CLT**
- » Nail-Laminated Timber / **NLT**
- » Glue-Laminated Timber / **GLT**
- » Dowel-Laminated Timber / **DLT**

Cross-Laminated Timber (CLT)



Nail-Laminated Timber (NLT)



Glue-Laminated Timber (GLT)

Plank orientation

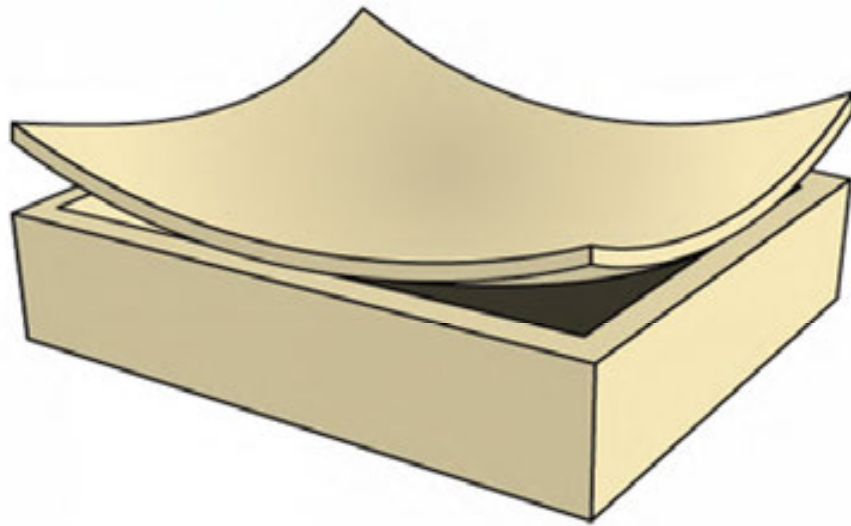


Dowel-Laminated Timber (DLT)



CLT

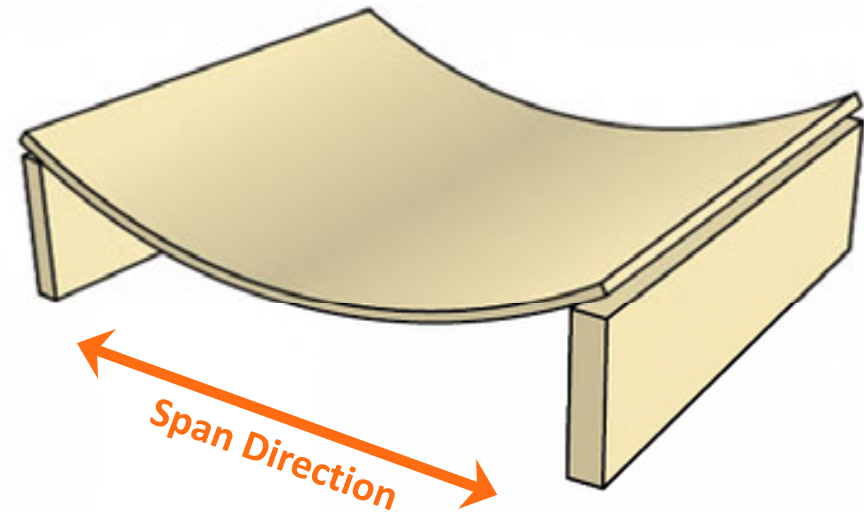
bends in two directions



Deformation of two-way slab

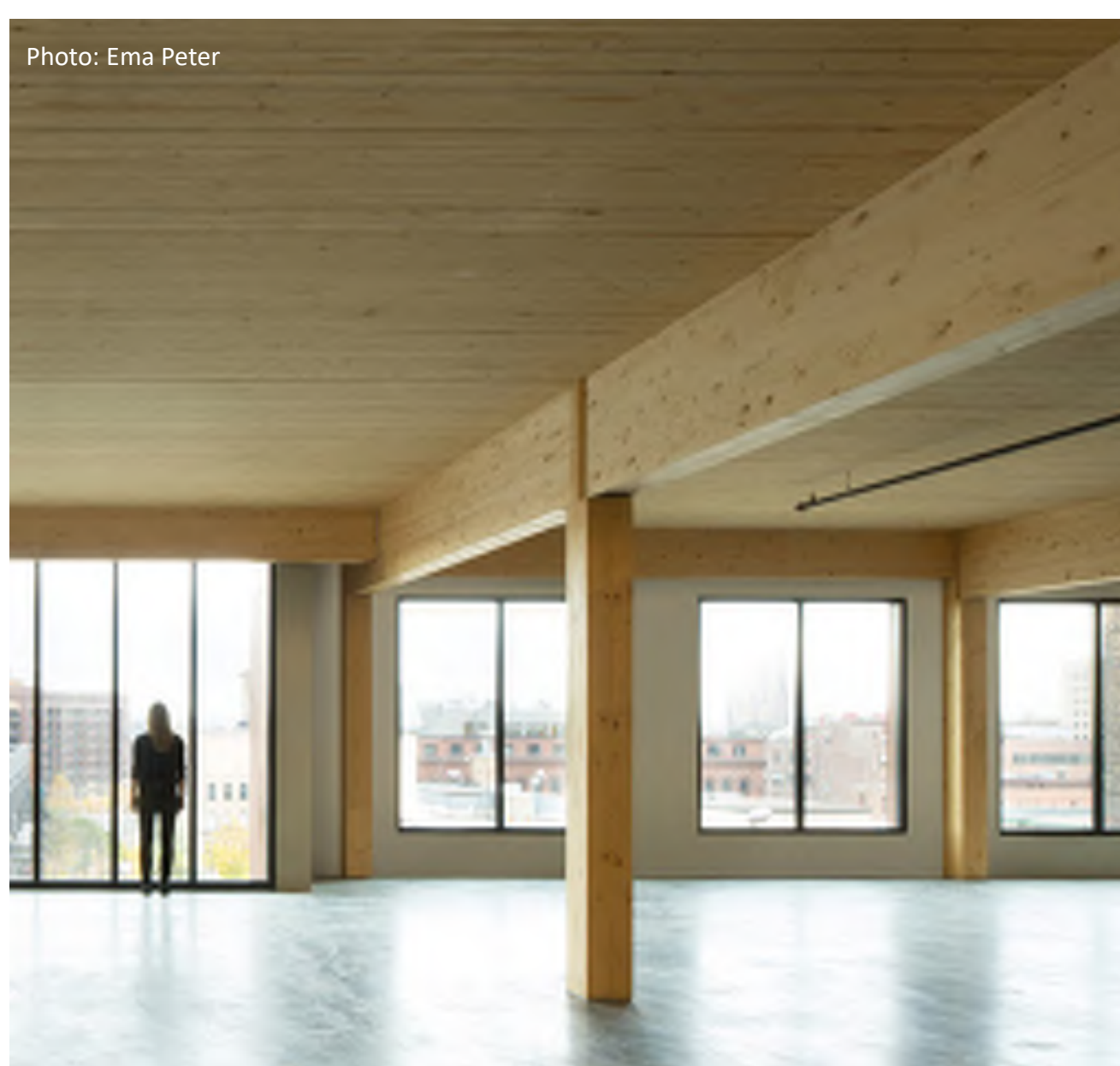
GLT, DLT and NLT

bend in one direction only



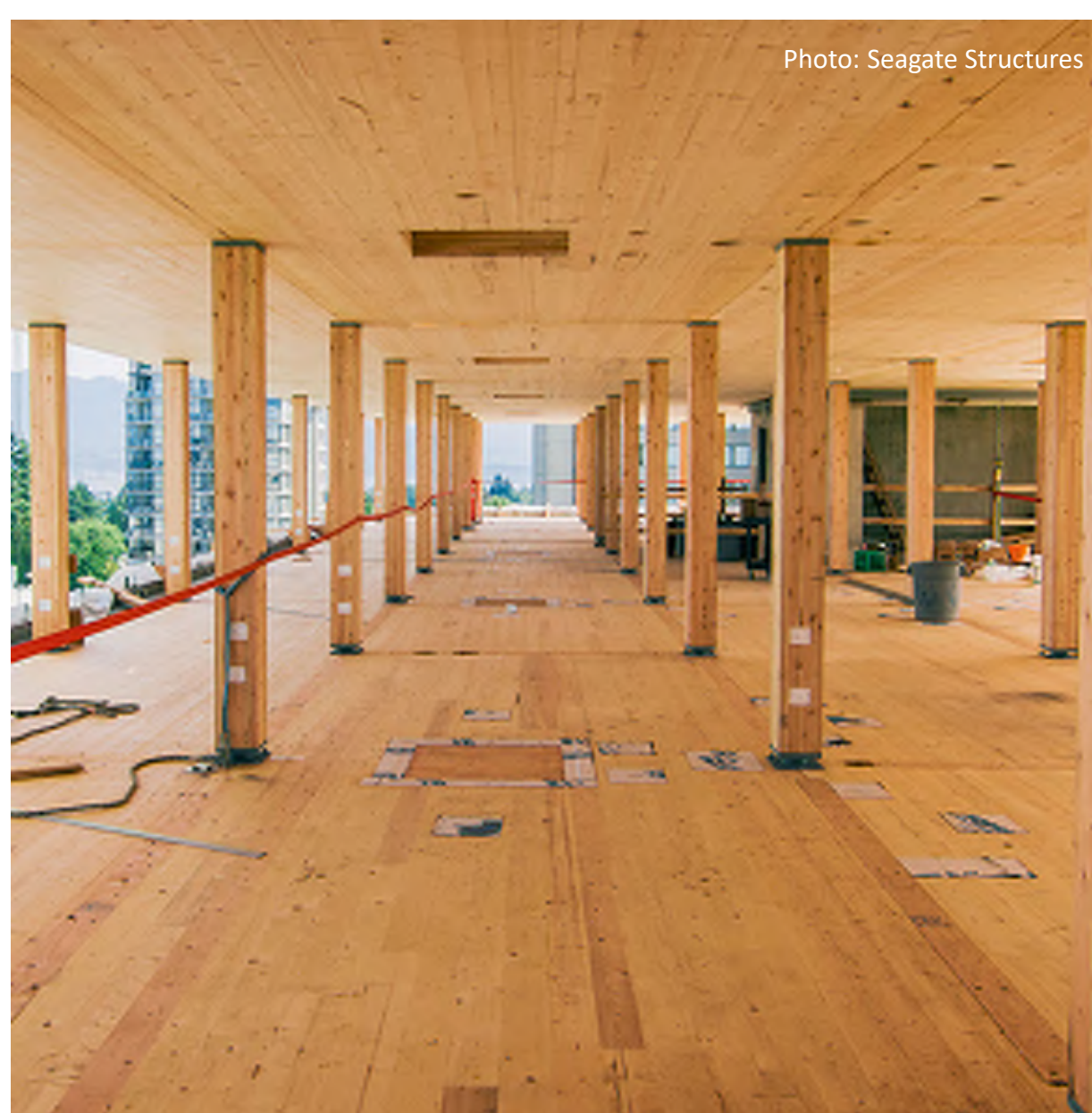
Deformation of one-way slab

Photo: Ema Peter



POST, BEAM + PLATE

Photo: Seagate Structures



POST + PLATE



Photo: Lendlease

HONEYCOMB

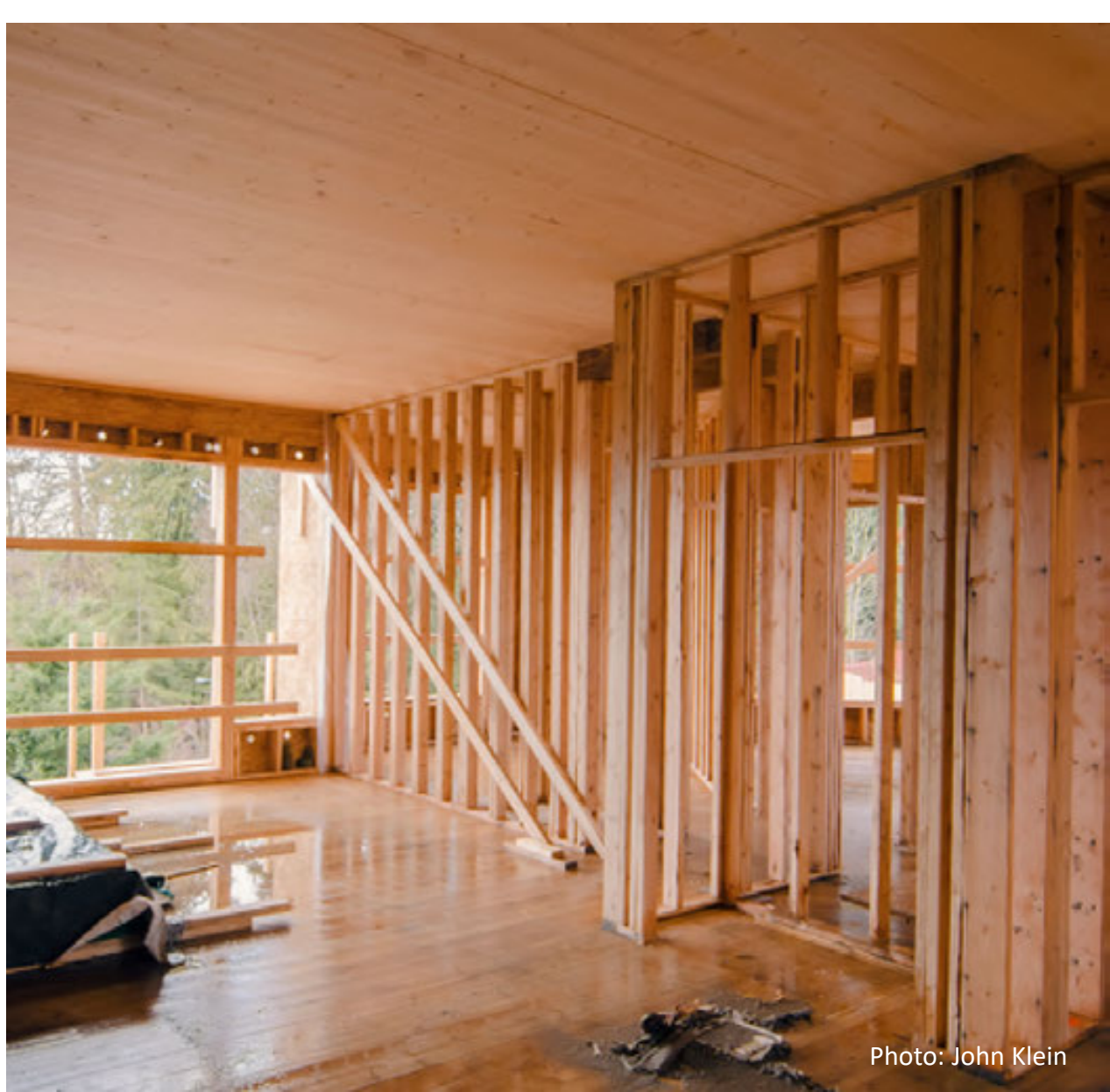


Photo: John Klein

HYBRID LIGHT-FRAME + MASS TIMBER



LEVER Architecture, photo Jeremy Bittermann

HYBRID CONCRETE + MASS TIMBER



HYBRID STEEL + MASS TIMBER

Lateral Systems

Prescriptive Code Compliance:

- ✓ Wood Sheathed Shear Walls (65 ft max)
- ✓ CLT Shear Walls (65 ft max)
- ✓ Concrete Shear Walls
- ✓ Steel Braced Frames



Site Built

Prefabricated Offsite

Site Built (Light-Frame)



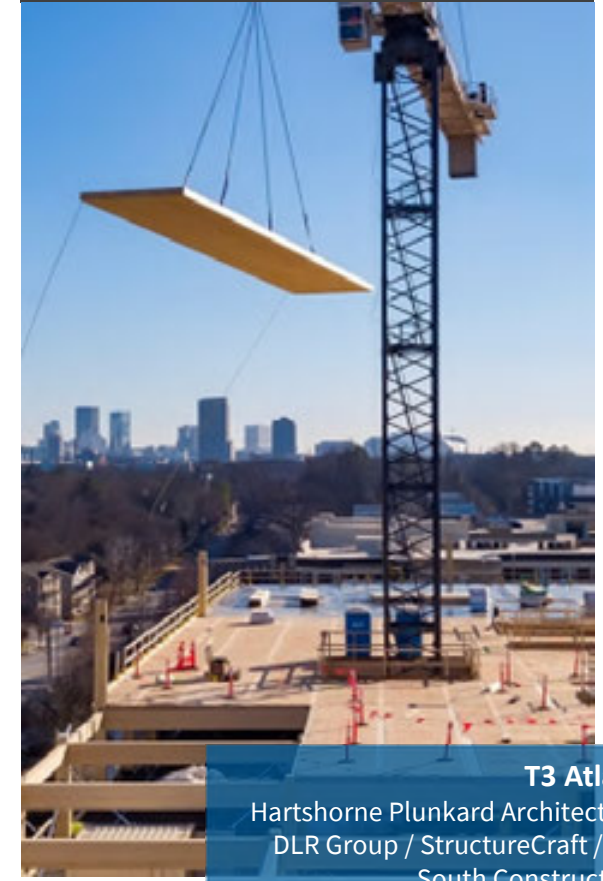
Panelized (Light-frame)



Volumetric Modular (Light-frame)



Mass Timber



Computer Numerically Controlled (CNC) fabrication



Photo credit: naturally:wood



Photo: Structurlam

Mass Timber: Structure is often Finish



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



Julie Goheen, PE, Envtl 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.

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 bedrooms, mechanical rooms, and other spaces with significant MEPF systems.

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, looping slabs, soffits, chases, and within walls):

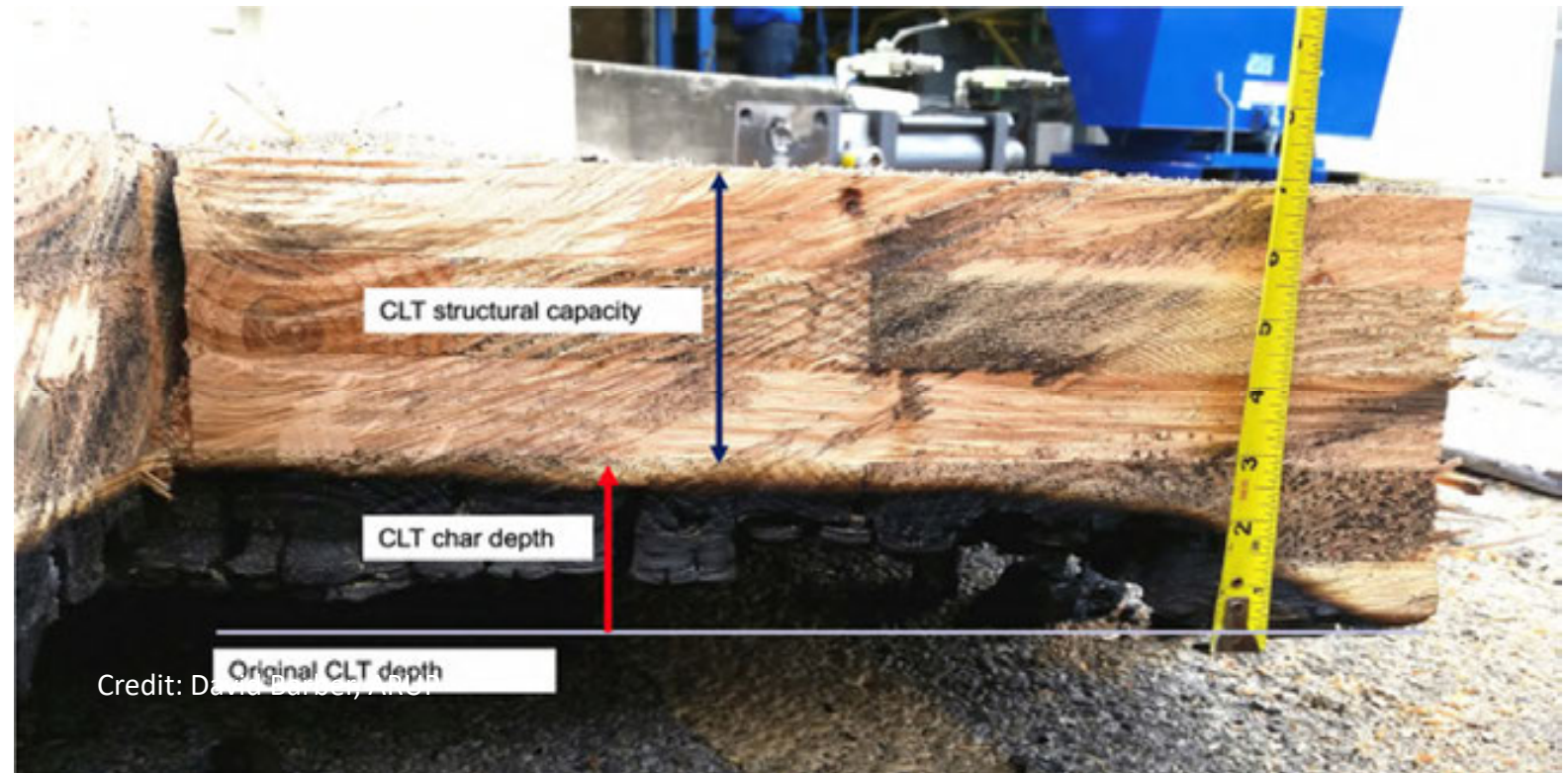
- Plumbing supply and drain lines
 - Dropped ceilings common in bedrooms and kitchens, which are often stacked story to story
- Data and low-voltage cabling
- Hydraulic piping
- Electrical conduit



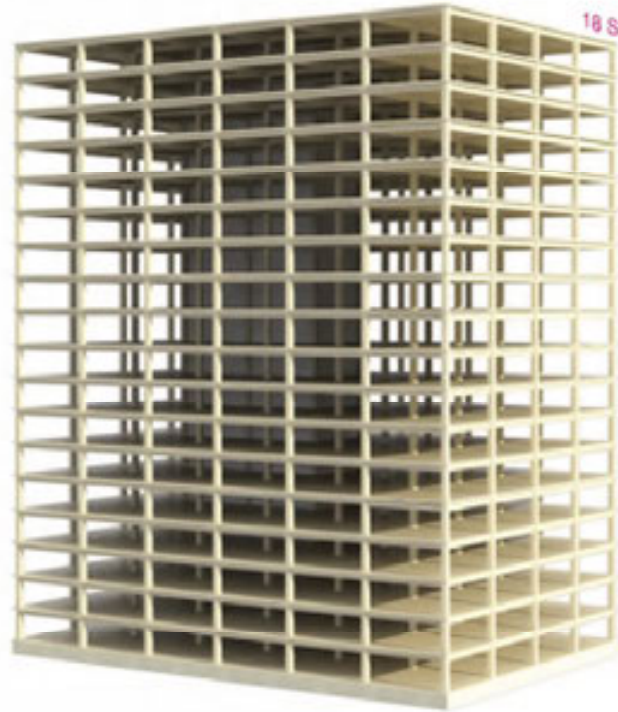
©MGA Office of Spacecraft Architecture Engineering

Fire Resistance

- » Mass Timber's Fire-Resistive Performance is well-tested, documented and recognized



Tall Mass Timber:



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



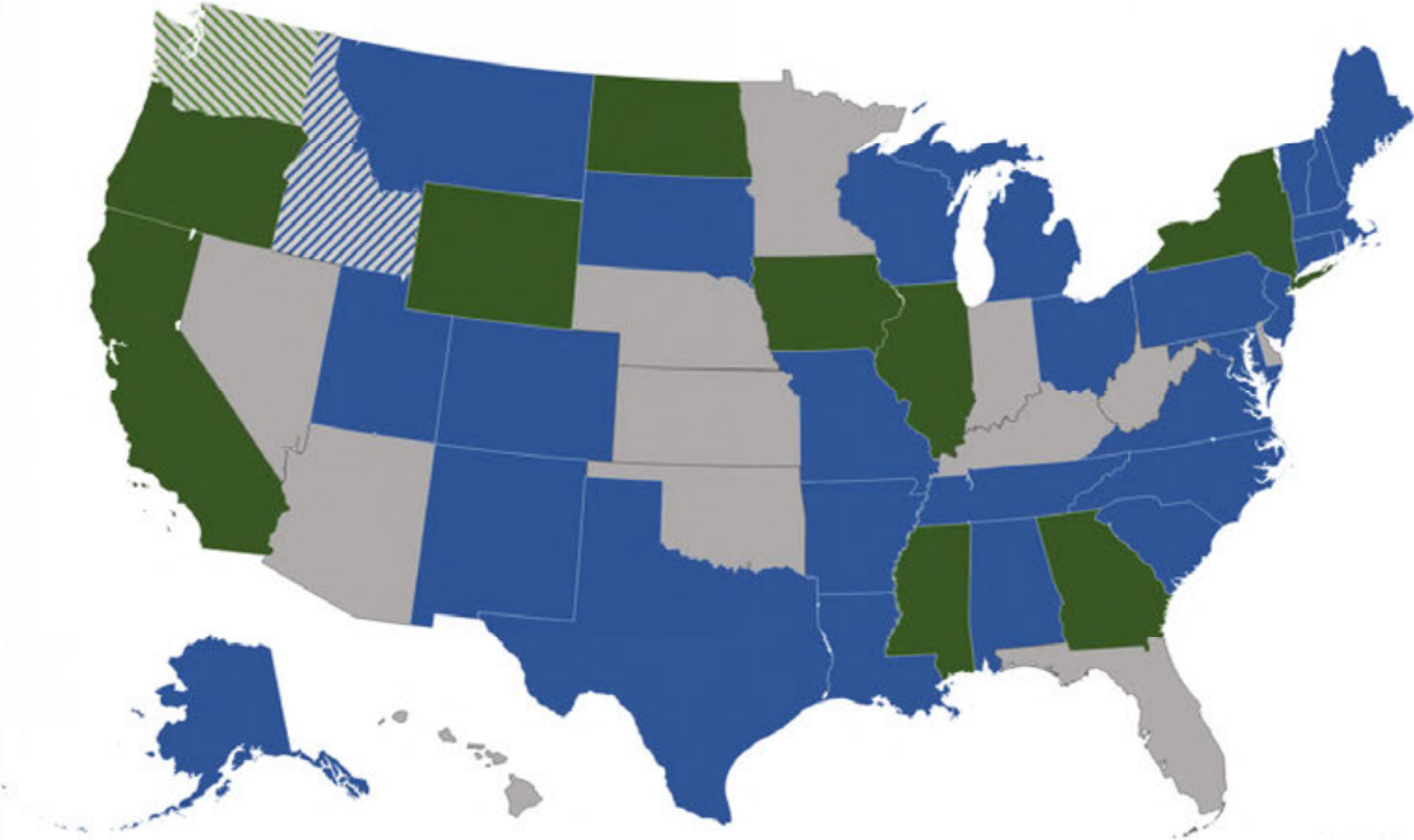
9 STORIES
BUILDING HEIGHT 85'
ALLOWABLE BUILDING AREA 405,000 SF
AVERAGE AREA PER STORY 45,000 SF

TYPE IV-C

IBC 2021

Tall Mass Timber Code Adoptions by State

- No Tall Mass Timber Code Provisions
- ▨ 2021 IBC TMT Provisions
- 2021 IBC
- ▨ 2024 IBC TMT Provisions
- 2024 IBC



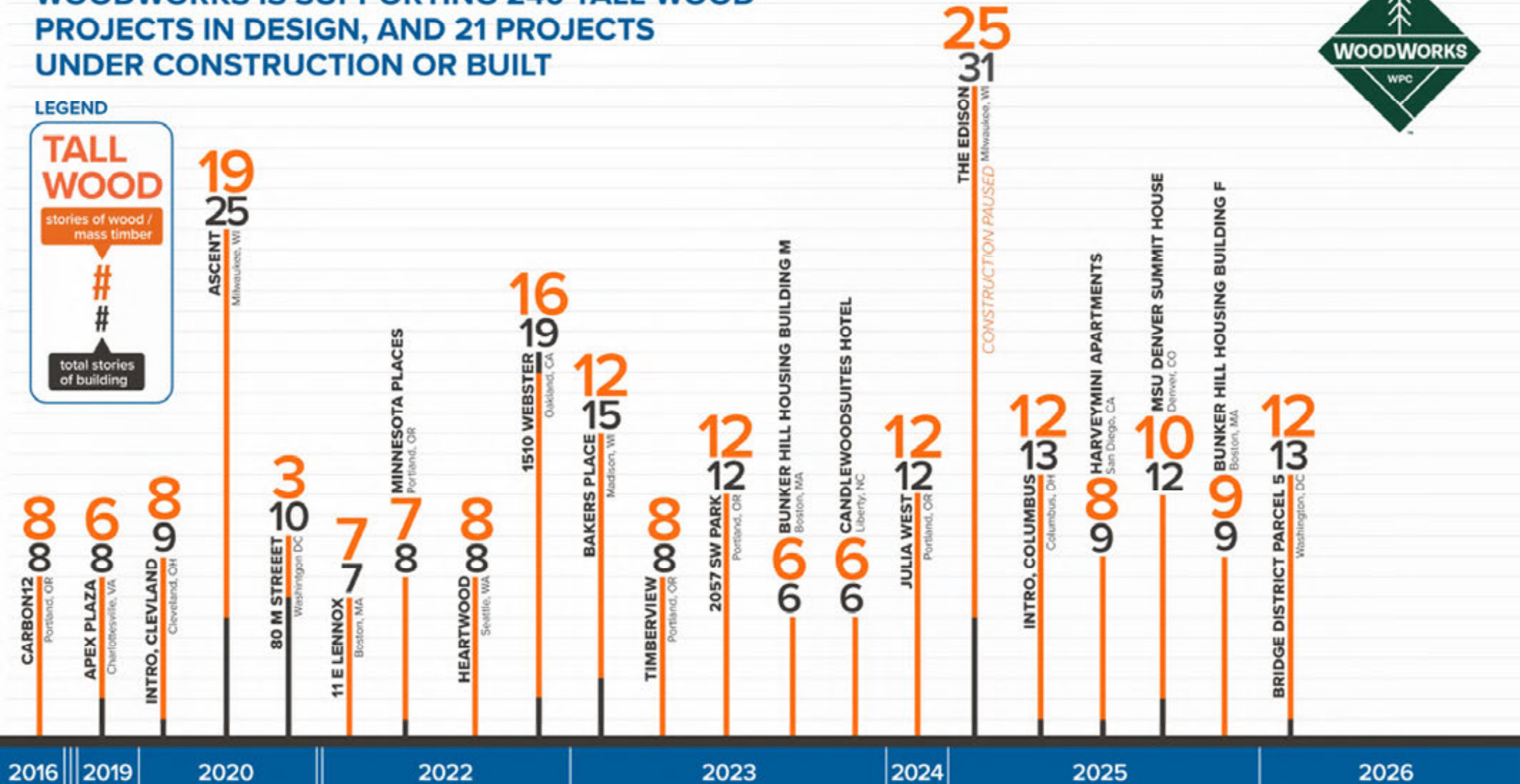
WOODWORKS IS SUPPORTING 240 TALL WOOD PROJECTS IN DESIGN, AND 21 PROJECTS UNDER CONSTRUCTION OR BUILT



LEGEND

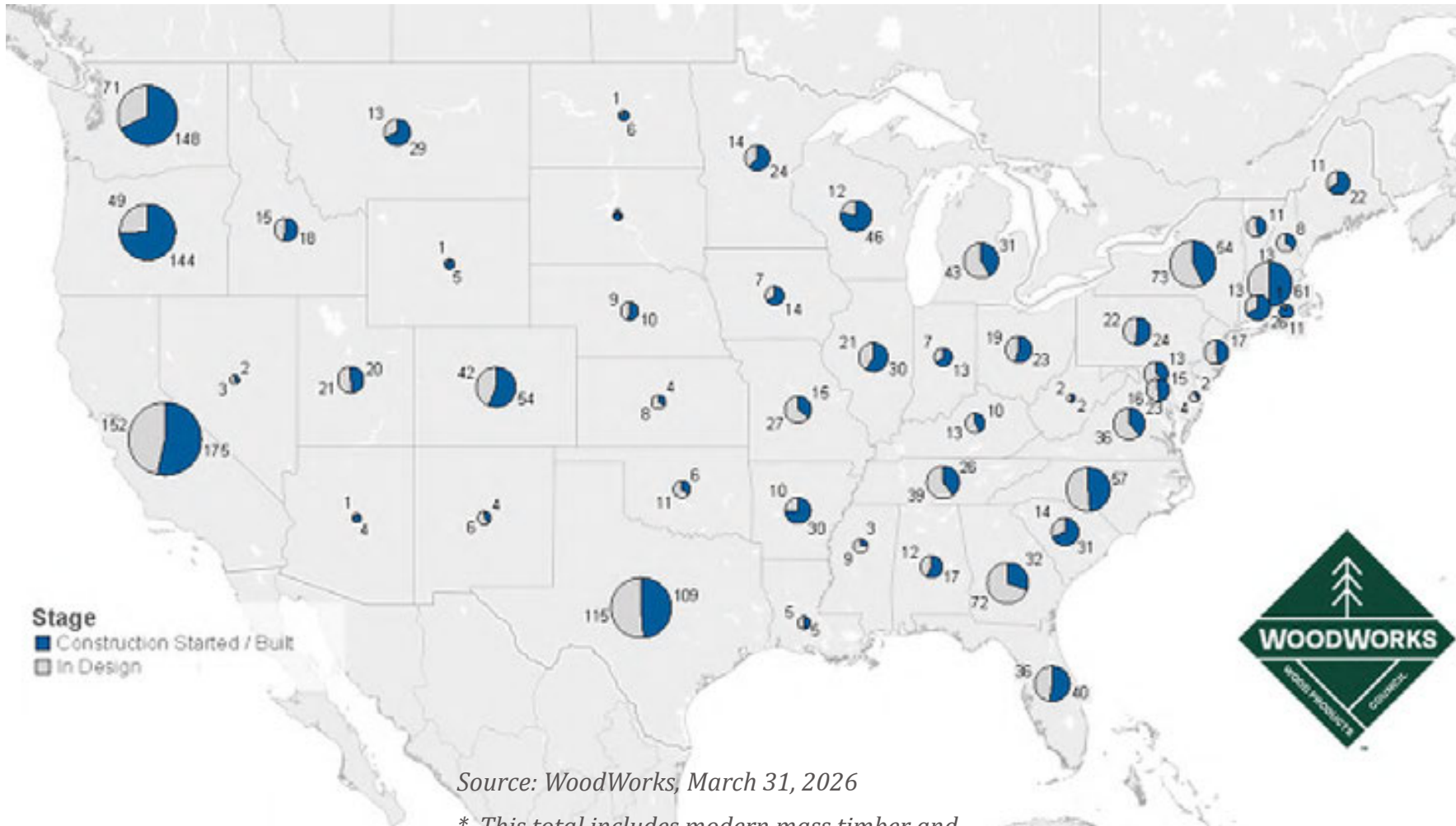
TALL WOOD
stories of wood / mass timber

total stories of building



Current State of Mass Timber Projects

As of Q1 2026, **2,746** multi-family, commercial, or institutional projects have been constructed with, or are in design with, mass timber.



Source: WoodWorks, March 31, 2026

* 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.



www.woodworks.org/resources/mapping-mass-timber/





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Membership Type

Individuals Verified by Project Experience 239	Companies Verified by Project Experience 143
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Primary Industry

- Architect 100
- Contractor / Installer 81
- Developer 19
- Engineer 138
- Insurance Broker 5
- Manufacturer / Fabricator 39
- Other 32

Additional Services / Specialities

People & Companies

	Rothoblaas Fastener and connectors, building envelope and acoustics WoodWorks Partner 81 View Save
	Sansin Manufactures industrial and factory finishes and coatings. WoodWorks Partner 75 View Save
	Western Archrib Over 70+ years experience in Glulam and GLT manufacturing WoodWorks Partner 73 View Save
	Kalesnikoff Mass Timber From Seedlings to Solutions Our Mass Timber Inspires WoodWorks Partner 68 View Save
	Fast + Epp - Vancouver, BC Fast + Epp is an internationally recognized structural engineer.. 64 View Save
	SmartLam NA Manufactures CLT and glulam building building products WoodWorks Partner 61 View Save
	Simpson Strong-Tie 81 View Save



**I don't have any
historic cost data
for this structural
system.**

**Who makes this
stuff? How do
you procure it?**

Problem:

Most GCs don't have access to enough benchmarking data to reliably provide a generic per square foot cost in the structure line item of a conceptual trade package build-up



How to Successfully Cost Manage a Mass Timber Project

Cost-Estimating Considerations for General Contractors



Apex Place
William McDonough + Partners / Housgan

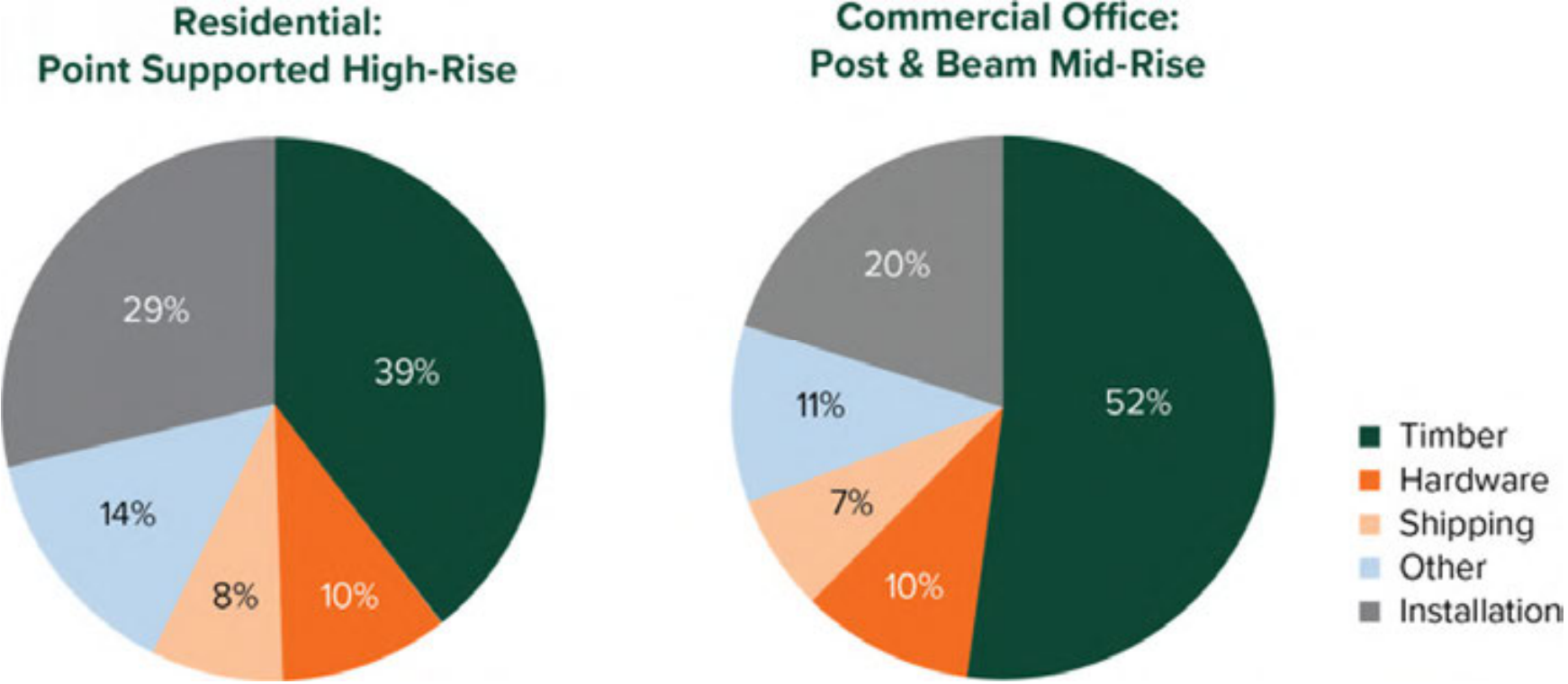
A determining factor in the success of a mass timber project—and whether it goes forward at all—is the general contractor's ability to provide informed cost estimates from the earliest stage of design. However, unlike other materials, there isn't a hundred years of tradition and shared experience to guide budgeting, cost management, and competitive procurement, or readily available cost benchmarking.

This paper is intended to bridge that gap with guidance for minimizing whole project costs and maximizing the value of mass timber projects. It has been written with an emphasis on cross-laminated timber (CLT) and glue-laminated timber (glulam), but applies generally to all mass timber materials. Follow these steps to more confidently cost plan your next wood building.

This paper was developed collaboratively with a design and construction professional who specializes in mass timber construction and has worked on multiple projects for general contractors. Costs, percentages and other values are based on their experience and may differ for other projects.



Establishing a Reliable Pre-Design Budget

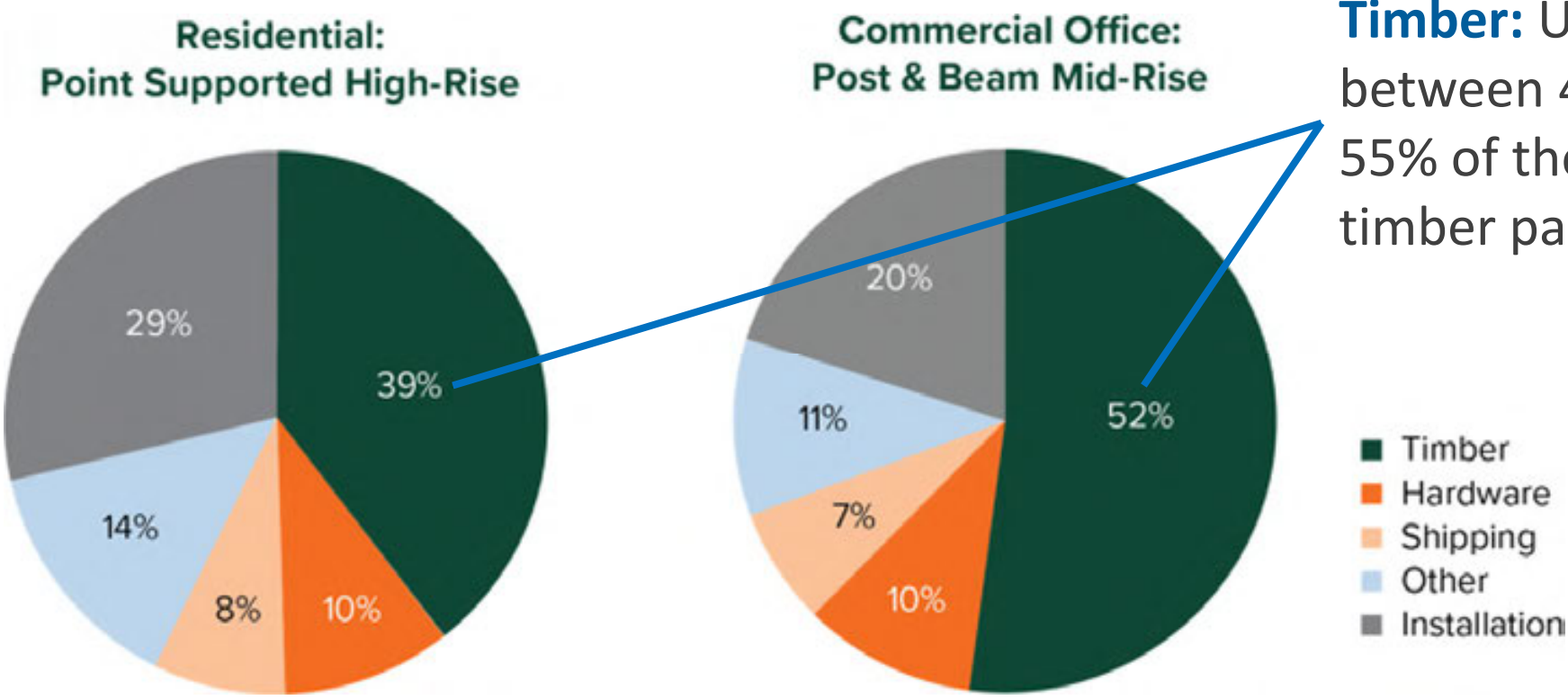


Build up costs using first principles based on an informed set of assumptions.

Factors Influencing Cost

- » **Design Complexity:** High impact on material and labor costs
- » **Material Availability:**
 - Regional differences in availability and pricing
 - Suppliers and subcontractors appropriate for your project
- » **Procurement Model:** Can impact the timber package price by as much as 30%—or more than 5% of total project hard costs

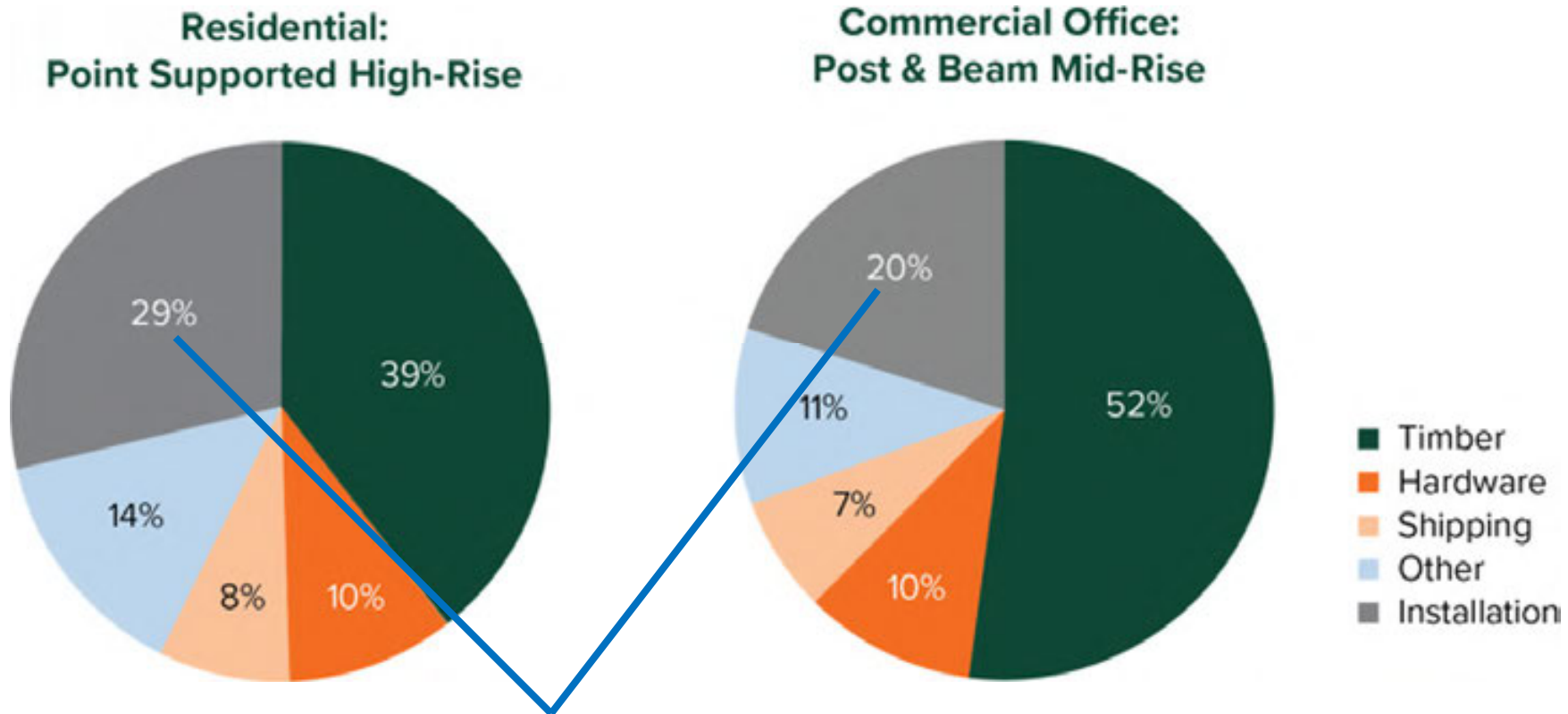
Establishing a Reliable Pre-Design Budget



Timber: Usually between 40% and 55% of the installed timber package cost

Panels are the biggest part of the biggest piece of the cost pie.

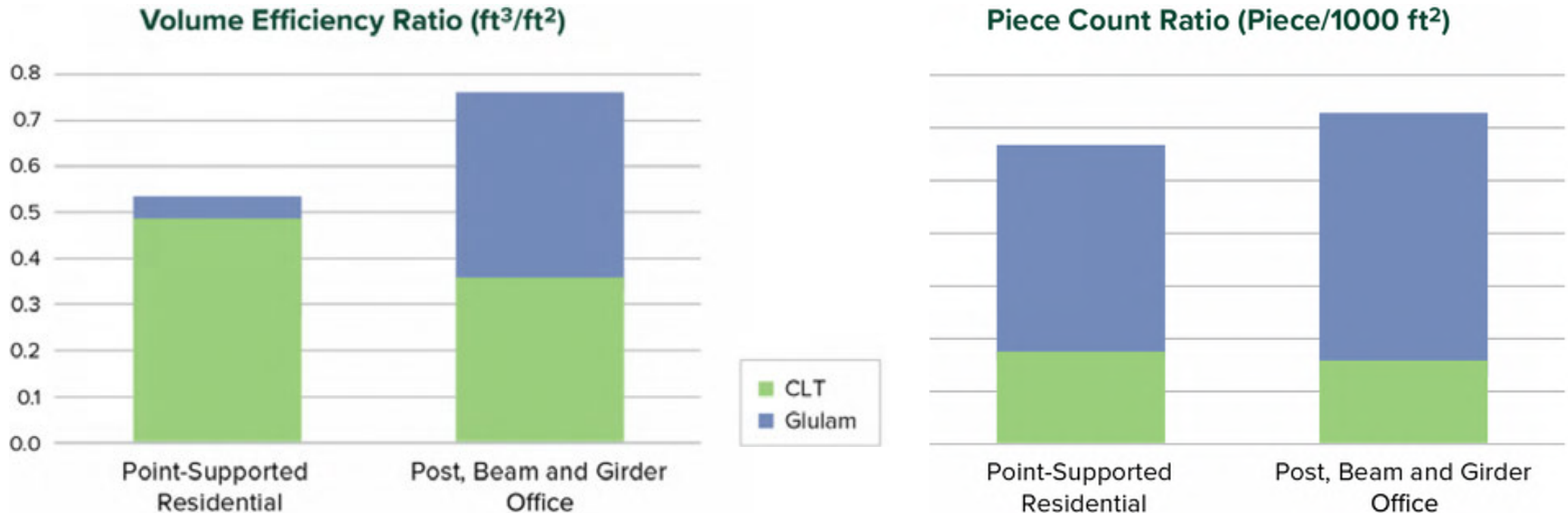
Establishing a Reliable Pre-Design Budget



Installation: 15 to 30%. The cost of installation is a direct result of the number of pieces and how fast they can go together

Cost Benchmarking


- **Volume efficiency ratio:** ft^3/ft^2 – provides a simple rule of thumb for estimating future projects
- **Piece count:** cost/piece and piece count/1000 ft^2 – What is the estimated number of pieces in relation to the installation cost?




Insights For Better Budgeting for Panels and Glulam

- » Commodity lumber pricing is an adequate benchmark *to a degree*
 - Costs are impacted by structural grade, species, appearance, and sourcing.
- » Raw material often makes up over 70% of a panel's cost
 - Most material-efficient solution isn't always the best or most cost-effective solution

Cross Laminated Timber (CLT) Common Layups

3-ply 3-layer 

5-ply 5-layer 

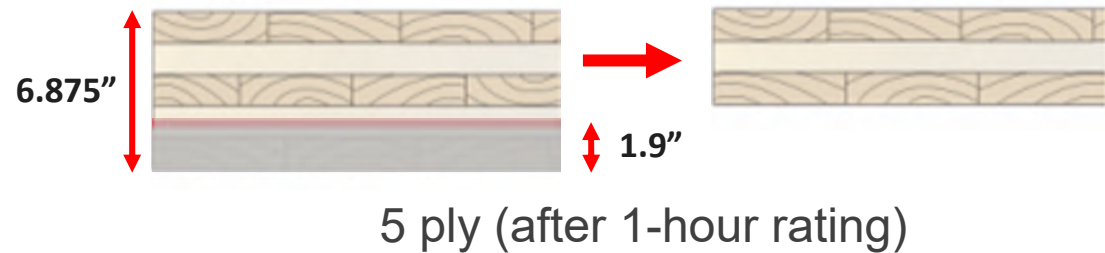
7-ply 7-layer



9-ply 9-layer



Fire Design of Mass Timber



- » Thinner panels (i.e. 3-ply) can be difficult to achieve 1+ hour rating
- » 5-ply CLT panels can usually achieve 1- or 2-hour rating

Two structural capacity checks performed:

1. On entire cross section neglecting fire effects
2. On post-fire remaining section, with stress increases

Panel	Common Floor Span Ranges*	
	Single Span	Multi-Span
3-ply CLT (4-1/8")	10 to 13 ft	12 to 15 ft
5-ply CLT (6-7/8")	15 to 18 ft	18 to 21 ft
3" SCL CLT	8 to 10 ft	10 to 13 ft
4" SCL CLT	10 to 13 ft	12 to 15 ft
5" SCL CLT	13 to 15 ft	15 to 18 ft
2x4 NLT/DLT (3-1/2")	10 to 12 ft	12 to 14 ft
2x6 NLT/DLT (5-1/2")	15 to 17 ft	17 to 20 ft
3-1/8" GLT	9 to 11 ft	10 to 13 ft
5-1/8" GLT	14 to 16 ft	16 to 19 ft

**Examples from efficient framing layouts, NOT for final design. Allowable spans depend on loading, panel grade and lay-up, and performance criteria.*

Construction Types and Fire Protection

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	HT	A	B	C	A	B			
Primary structural frame ^f (see Section 202)					1 ^b	0	HT	3	2	2	1 ^b	0			
Bearing walls Exterior ^{e,f} Interior					1	0	2 1/HT	3	2	2	1	0	1	0	
Nonbearing walls and partitions Exterior					See Table 602										
Nonbearing walls and partitions Interior ^d					0	0	See Section 2304.11.2	0*	0*	0*	0	0			
Floor construction and associated secondary members (see Section 202)					1	0	HT	2	2	2	1	0			
Roof construction and associated secondary members (see Section 202)					1 ^{b,c}	1 ^{b,c}	0 ^c	1 ^{b,c}	0	HT	1-1/2	1	1	1 ^{b,c}	0

**Nonbearing interior wall partitions in Types IV-A, IV-B and IV-C must be of mass timber construction or of noncombustible materials per IBC 602.4*

Source: 2021 IBC Table 601 / See IBC for footnotes

Construction Type Resources for Mass Timber

Free to Download at
www.woodworks.org



Fire Requirements for Mass Timber Elements

Code Applications, Construction Types, and Fire Ratings

For many years, exposed heavy timber framing elements have been permitted in U.S. buildings due to their inherent fire-resistance properties. The predictability of wood's char rate has been well-established for decades and has long been recognized in building codes and standards.

Today, one of the exciting trends is the growing use of mass timber—panel products such as cross-laminated timber (CLT) and nail-laminated timber (NLT)—in construction. Like heavy timber, mass timber has inherent fire resistance that is exposed and still achieve a fire-resistance rating. Because of their strength and durability, mass timber products also offer an alternative to masonry for many applications, but have a lower carbon impact. 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, often for projects that go beyond traditional norms.

This paper has been written to support architects and engineers exploring the use of mass timber for commercial and multi-family construction. It introduces fire-related requirements in the International Building Code (IBC) applicable to all mass timber buildings, and serves as a foundation for other fire design resources available at woodworks.org. Unless otherwise noted, references refer to the 2024 IBC.

Mass Timber & Construction Type

Before demonstrating FRRs of exposed mass timber elements, it is important to understand under what circumstances the IBC currently allows the use of mass

Updated May 2022



Concealed Spaces in Mass Timber and Heavy Timber Structures

Concealed spaces, such as those created by a dropped ceiling in a floor/ceiling assembly or by a stud wall assembly, have unique requirements in the International Building Code (IBC) to address the potential of fire spread in non-visible areas of a building. Section 718 of the 2018 IBC includes prescriptive requirements for protection and/or compartmentalization of concealed spaces through the use of draft stopping, fire blocking, sprinklers and other means. For information on these requirements, see the WoodWorks expert tip, *Sprinkler Requirements for Concealed Spaces in Light-Frame Projects*.¹

For mass timber building elements, the choice of construction type can have a significant impact on concealed space requirements. Because mass timber products such as cross-laminated timber (CLT) are prescriptively recognized

Allowances and Requirements for Concealed Spaces

Low-Rise and Mid-Rise Structures

For low-rise and mid-rise buildings, mass timber is typically used in Type III, IV or V construction. Up to and including the 2018 IBC, Type IV buildings were not allowed to have concealed spaces:

2018 IBC Section 602.4 Type IV. Type IV construction is that type of construction in which the exterior walls are of noncombustible materials and the interior building elements are of solid wood, laminated wood, heavy timber (HT) or structural composite lumber (SCL) without concealed spaces.

Although several Type IV buildings have received alternate methods approval for concealed spaces, the lack of prescriptive

Acoustics & Sound Control

Common mass timber floor assembly:

- » Finish floor (if applicable)
- » Underlayment (if finish floor)
- » 1.5" to 4" thick concrete/gypcrete topping
- » Acoustical mat
- » WSP (if applicable)
- » Mass timber floor panels



Mass Timber Fire & Acoustic Database

Search tested and approved assemblies

<https://www.woodworks.org/mass-timber-fire-acoustic-database/>

< Back to Mass Timber Fire & Acoustic Database

Assembly Type

- Floor/Roof 532
- Wall 147

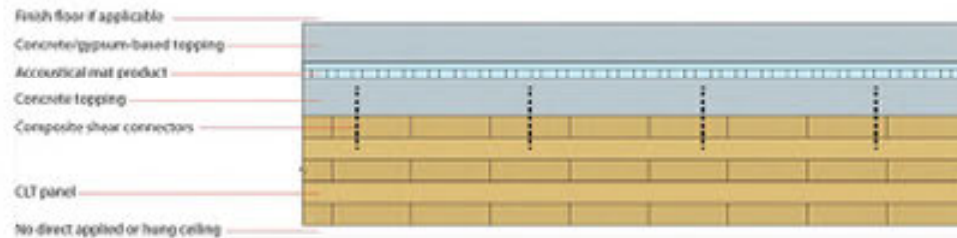
Application Type

- CLT/Concrete Composite 7
- Concealed Ceiling 201
- Concrete/Gypsum Topping 138
- Other 108
- Raised Access Floor or Wood Sleepers 78

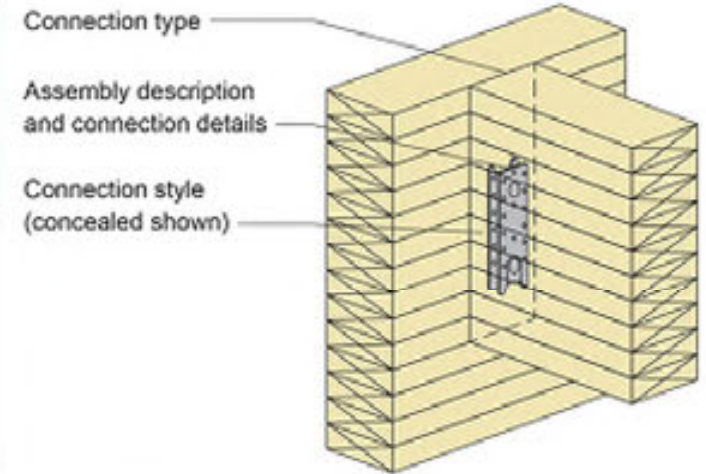
Mass Timber Panel

- CLT 507
- CLT (SCL) 56
- NLT 72
- DLT 22

CLT-Concrete Composite Floor Assemblies, Ceiling Side Exposed



This illustration is for specific construction	Mass Timber Panel	Topping	Acoustical Mat Products Between Concrete Composite and Upper Topping	Upper Topping	Finish Floor	Sound Rating	Impact Rating	Method of Compliance
	5-layer 5.40" CLT	2.25" Concrete	Maxxon Acousti-Mat® 3/8	1" Gyp-Crete®	52	STC ●	50 IIC ●	Maxxon / Intertek Report # K3094.97-113-11-R0 Contact Product Manufacturer for More Information
	5-layer 5.40" CLT	2.25" Concrete	Maxxon Acousti-Mat® 3/8	1" Gyp-Crete®	53	STC ●	52 IIC ●	Maxxon / Intertek Report # K3094.69-113-11-R0 Contact Product Manufacturer for More Information
	5-layer 5.40" CLT	2.25" Concrete	Maxxon Acousti-Mat® SBR over Maxxon Acousti-Mat® 3/4 Premium	1.5" Gyp-Crete®	56	STC ●	57 IIC ●	Maxxon / Intertek Report # K3094.98-113-11-R0 Contact Product Manufacturer for More Information
	5-layer 5.40" CLT	2.25" Concrete	Maxxon Acousti-Mat® SBR over Maxxon Acousti-Mat® 3/4 Premium	1.5" Gyp-Crete®	57	STC ●	61 IIC ●	Maxxon / Intertek Report # K4507.06-113-11-R0 Contact Product Manufacturer for More Information
	5-layer 5.40" CLT	2.25" Concrete	Maxxon Acousti-Mat® SBR over Maxxon Acousti-Mat® 3/4 Premium	2" Gyp-Crete®	60	STC ●	61 IIC ●	Maxxon / Intertek Report # K3094.86-113-11-R0 Contact Product Manufacturer for More Information
	5-layer 5.40" CLT	2.25" Concrete	Maxxon Acousti-Mat® SBR over Maxxon Acousti-Mat® 3/4 Premium	2" Gyp-Crete®	58	STC ●	63 IIC ●	Maxxon / Intertek Report # K3094.86-113-11-R0 Contact Product Manufacturer for More Information
	5-layer 5.40" CLT	2.25" Concrete	5/8" OSB on 5/8" Georgia Pacific Dens Deck® on Kinetics® Ultra Quiet SR	None	60	STC ●	62 IIC ●	Veneklasen Associates / Intertek Report # K3094.19-113-11-R0 Contact Product Manufacturer for More Information



Insights For Better Budgeting for Panels and Glulam

- » Commodity lumber pricing is an adequate benchmark *to a degree*
 - Costs are impacted by structural grade, species, appearance, and sourcing.
- » Raw material often makes up over 70% of a panel's cost
 - Most material-efficient solution isn't always the best or most cost-effective solution
- » Understand the volumes of glulam and CLT separately as the project evolves, as glulam can cost up to 200% more per ft³/m³ than CLT
 - Glulam members that exceed “standard” sizing will come at a premium

Glulam Specs

Typical Widths

- » 3-1/8", 3-1/2", 5-1/8", 5-1/2", 6-3/4", 8-3/4", 10-3/4", 12-1/4"

Typical Depths

- » Based on number of lams: 6" to 60"+
- » Western species lams: Typically 1-1/2" thick
- » Southern pine lams: Typically 1-3/8" thick

Typical Species

- » Douglas-Fir, Southern Pine, Spruce
- » Also available in Cedar & others

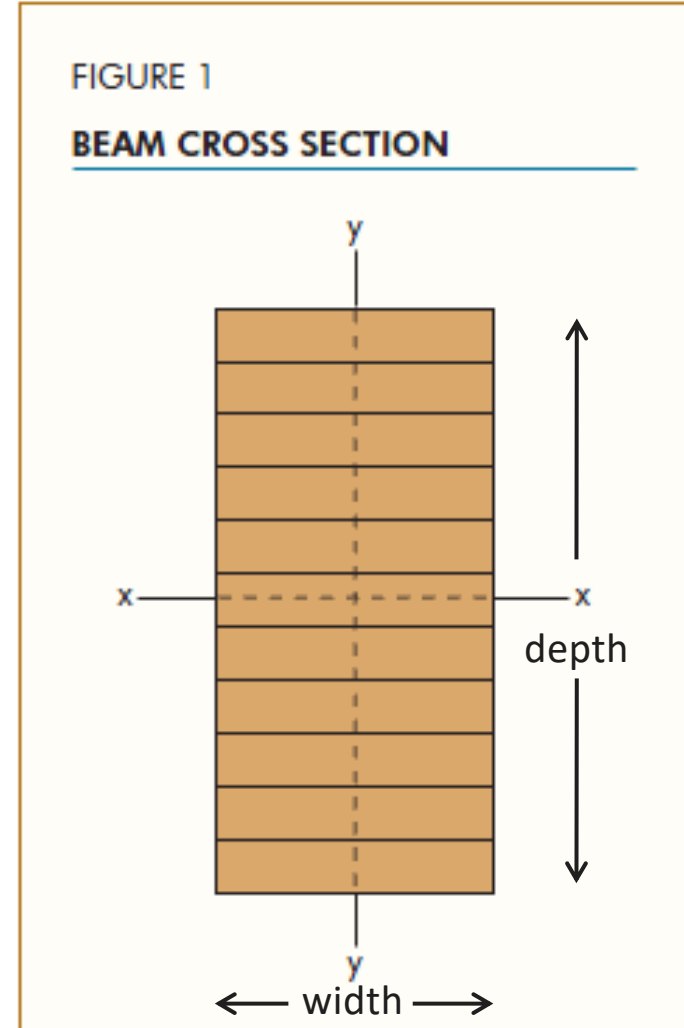


Image: APA Glulam Product Guide

Glulam Built-Up Sections

Built-Up Sections:

- » Available from some manufacturers
- » Widths of 24"+ available



Photo: Unalam

Material (Direct Cost)



or



Labor and Equipment (Direct Costs)



Photos: Swinerton

Connection Fabrication and Constructability

- » Factory vs. field
- » Connection “class”
- » Tolerances
- » Fire Ratings
- » Inspections
- » Cost



**John W. Olver Design
Building at UMass Amherst**

Leers Weinzapfel Associates / Equilibrium
Consulting / Simpson Gumpertz & Heger
(EOR) / Suffolk Construction
Photo Alex Schreyer



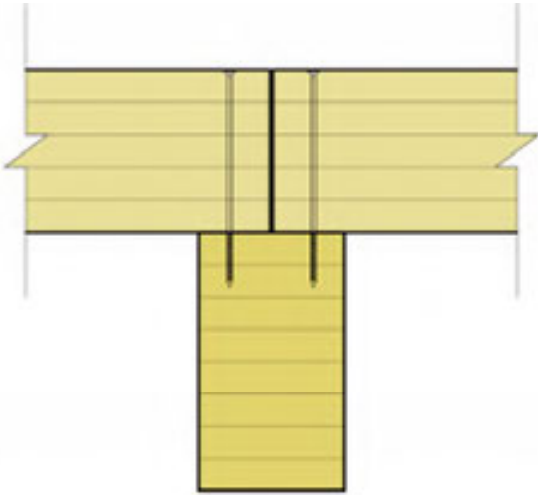
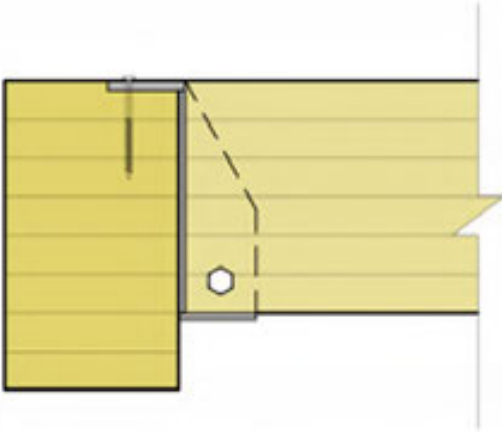
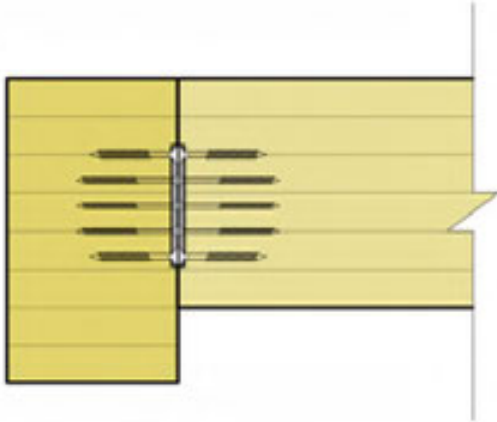
WoodWorks Index of Mass Timber Connections

*A compilation of connections
used in mass timber construction*

Platte Fifteen / OZ Architecture / KL&A Engineers & Builders
Photo Alan Ferrin

<https://www.woodworks.org/resources/index-of-mass-timber-connections/>

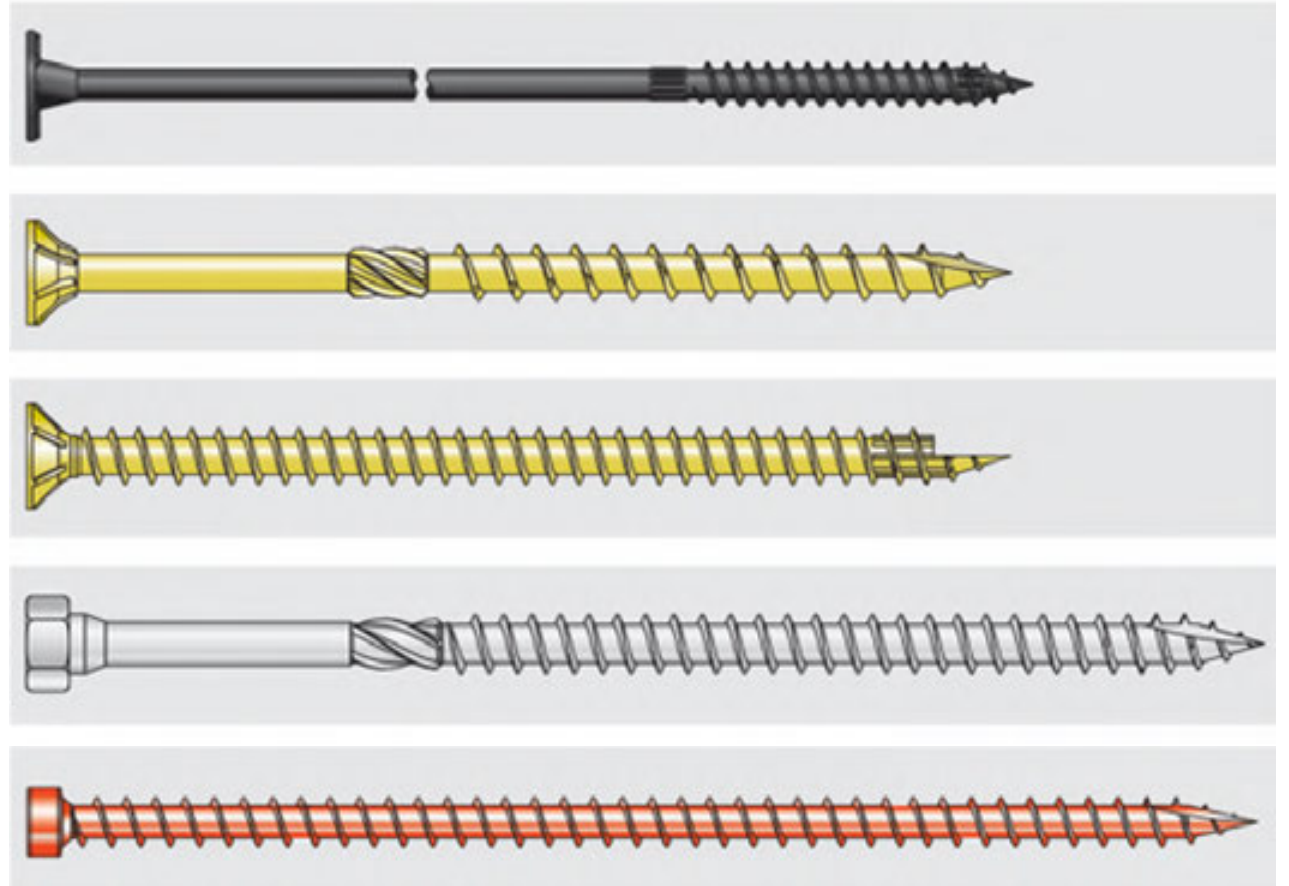
“Connection Class”

Connection class	Class 1	Class 2	Class 3
Class description	Requires only mass timber elements and fasteners	Utilizes steel fabricated elements, with components such as angles and plates, and includes fasteners	Prefabricated proprietary connectors
Connection example			
	Beam Bears on Girder*	Beam Bears on Steel Bearing Seat with Knife Plate*	Beam Connected to Girder with Proprietary Concealed Connector*

*Table 8 in the *Index of Mass Timber Connections*

Screws are the most common fastener type in mass timber construction.

- » Lag or proprietary
- » Partially or fully threaded
- » Fabricators may have preferred screw manufacturers
- » Proprietary screws usually self-tapping
- » Diameter typically 1/4" or greater; wide range of lengths



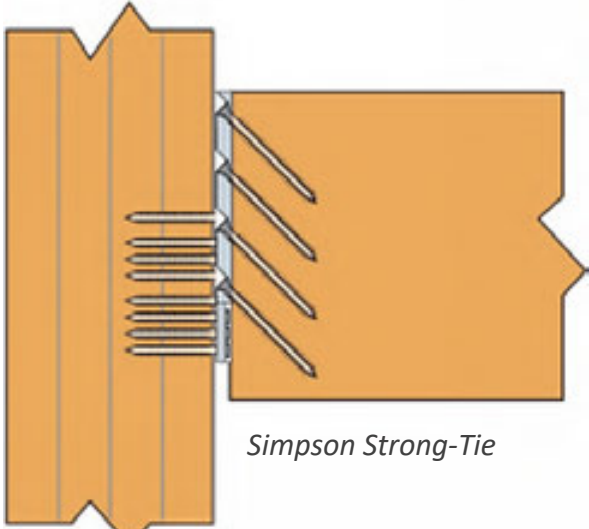
Hardware

Wide range of:

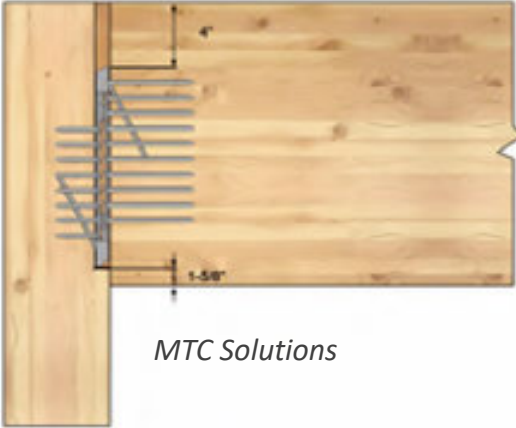
- » plates
- » hangers
- » straps
- » angle brackets
- » tie-rod systems
- » concealed connectors
- » lifting hardware
- » and more



Example: Concealed Hanger Connectors



Simpson Strong-Tie



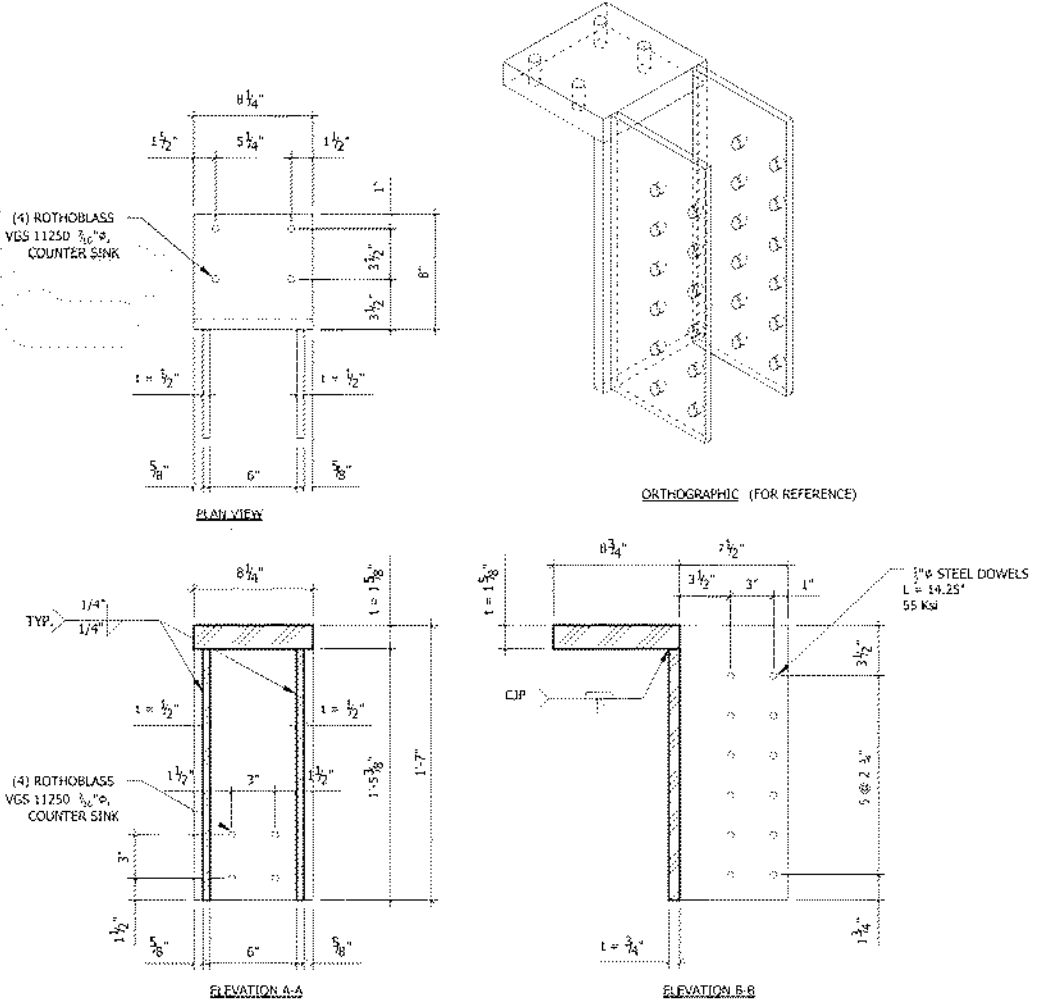
MTC Solutions



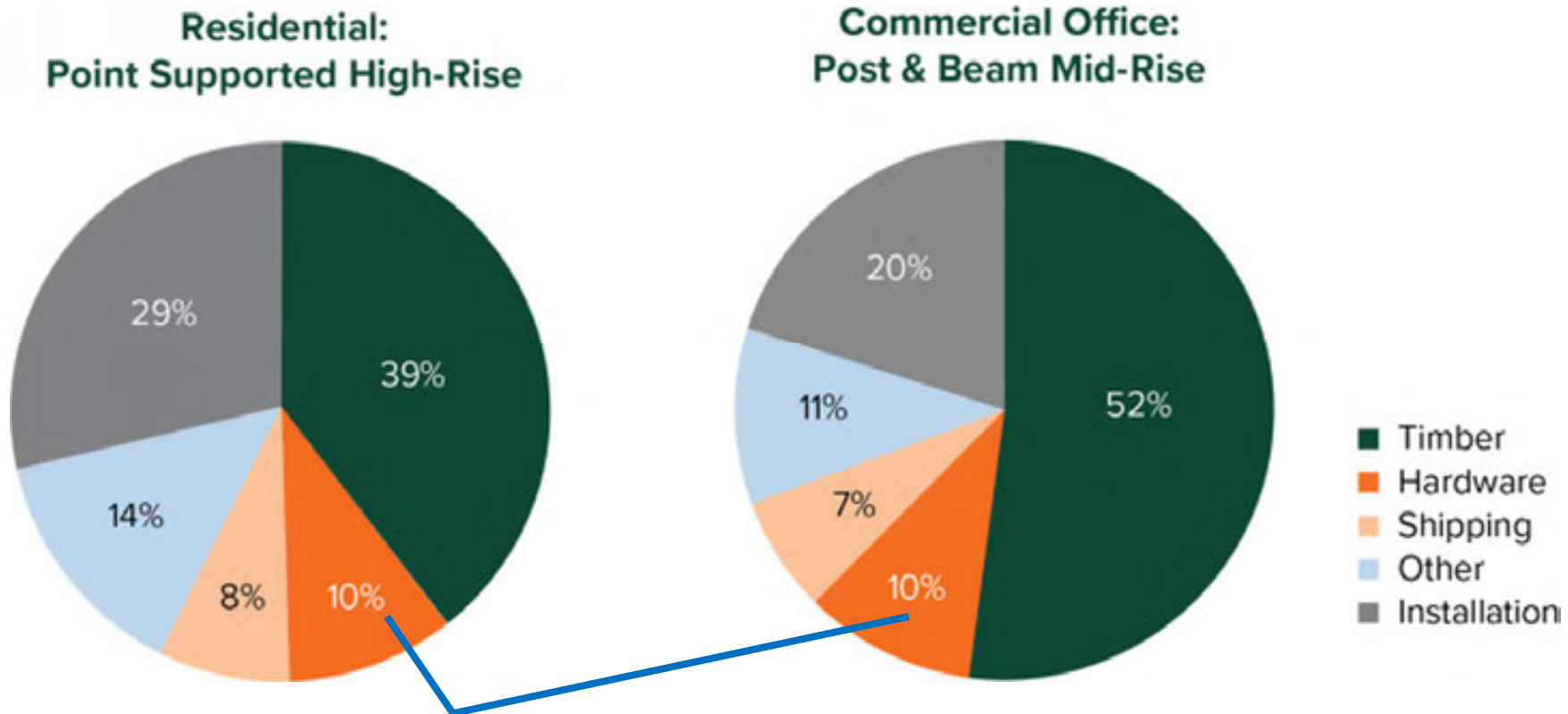
MTC Solutions

Example: Concealed Knife Plate with Holes

Image Foust Fabrication, T3 Timbers



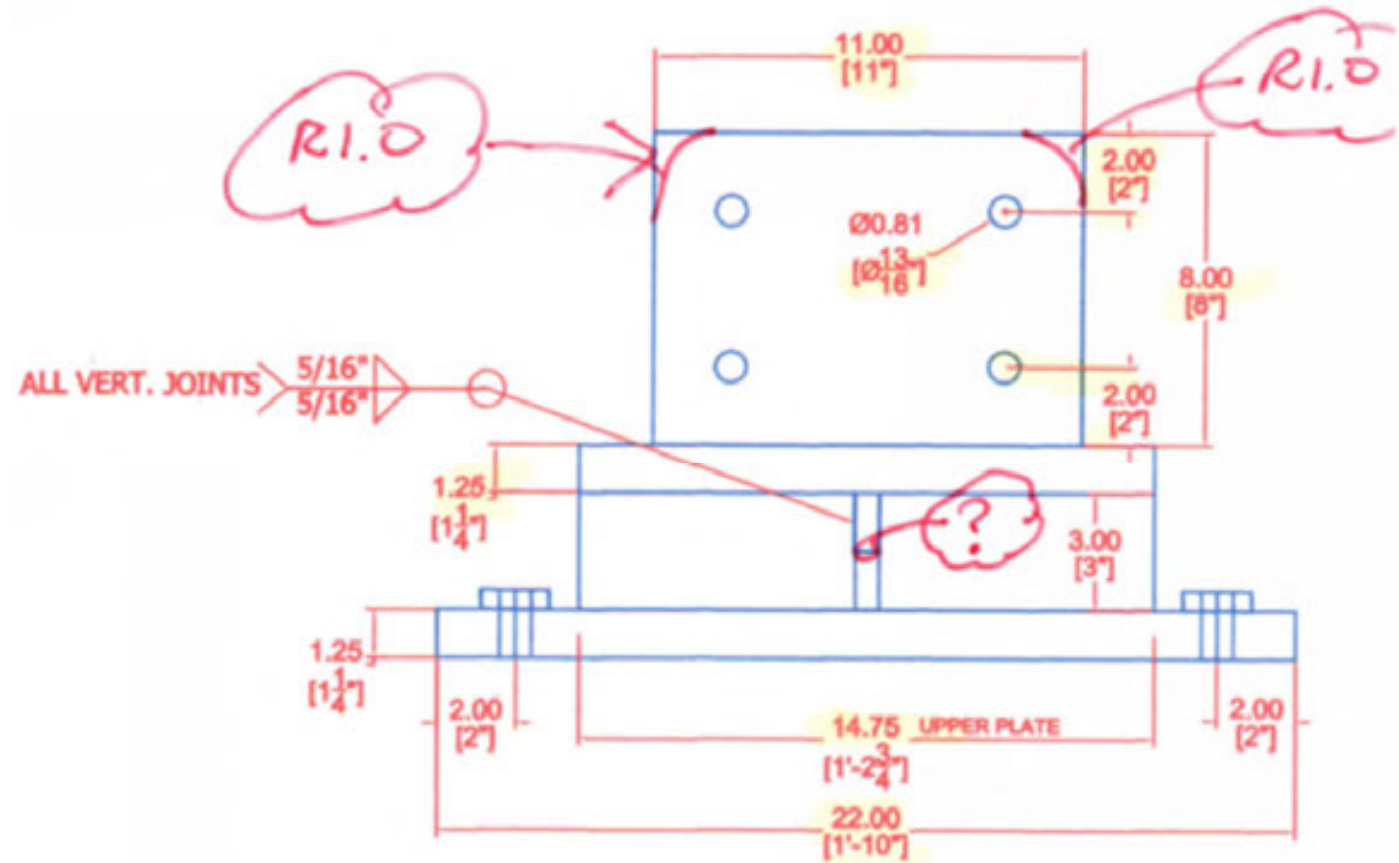
Establishing a Reliable Pre-Design Budget



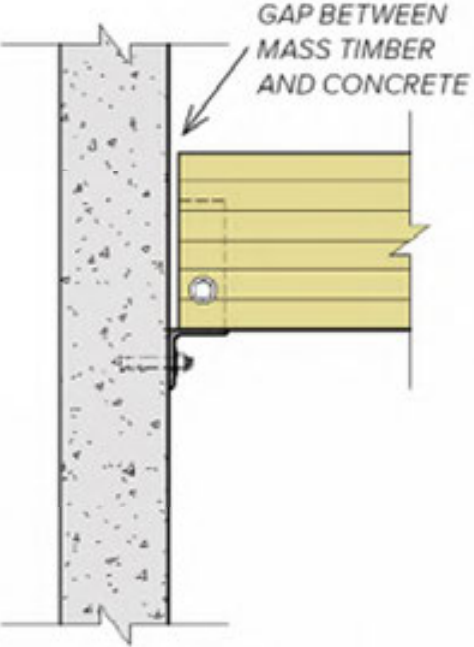
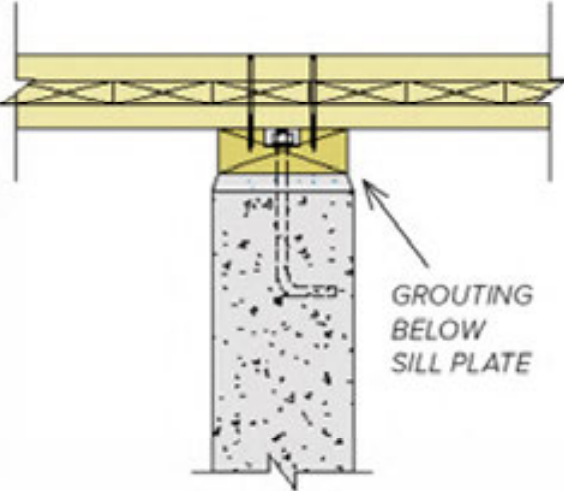
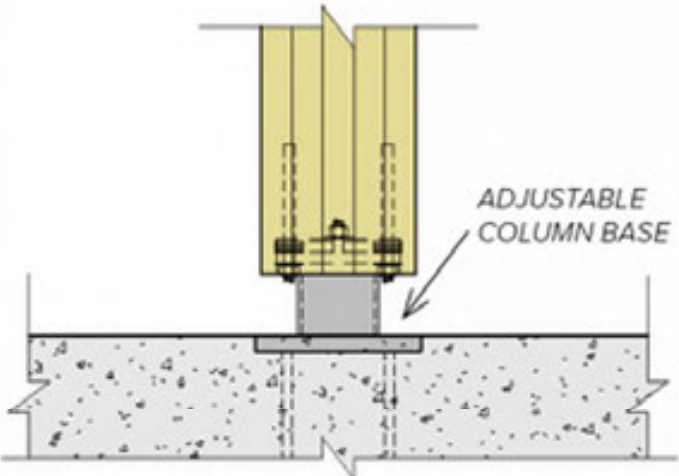
Hardware: Beam and column connectors usually largest contributor. When building a budget from scratch, worthwhile to assume a proprietary connector

Example: Shop Drawing from Fabricator

Revisions to the shop drawings were made to allow easier mass timber installation



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	 <p>GAP BETWEEN MASS TIMBER AND CONCRETE</p>	 <p>GROUTING BELOW SILL PLATE</p>	 <p>ADJUSTABLE COLUMN BASE</p>
	Beam Perpendicular to Wall Connected to Face of Wall	Panel Bears at Top of Wall	Column Bears on Concrete with Adjustable Standoff Base

Fire Resistance Rated Connections

Connection Fire Resistance Rating and beam reactions could impact required beam/column sizes



Photos: Simpson Strong-Tie



Photo: ARUP/SLB

Factors Influencing Cost

- » **Design Complexity:** High impact on material and labor costs
- » **Material Availability:**
 - Regional differences in availability and pricing
 - Suppliers and subcontractors appropriate for your project

Risk: Perception of a Commoditized Material



Cross-Laminated Timber (CLT)



Nail-Laminated Timber (NLT)



Glue-Laminated Timber (GLT)

Plank orientation



Dowel-Laminated Timber (DLT)



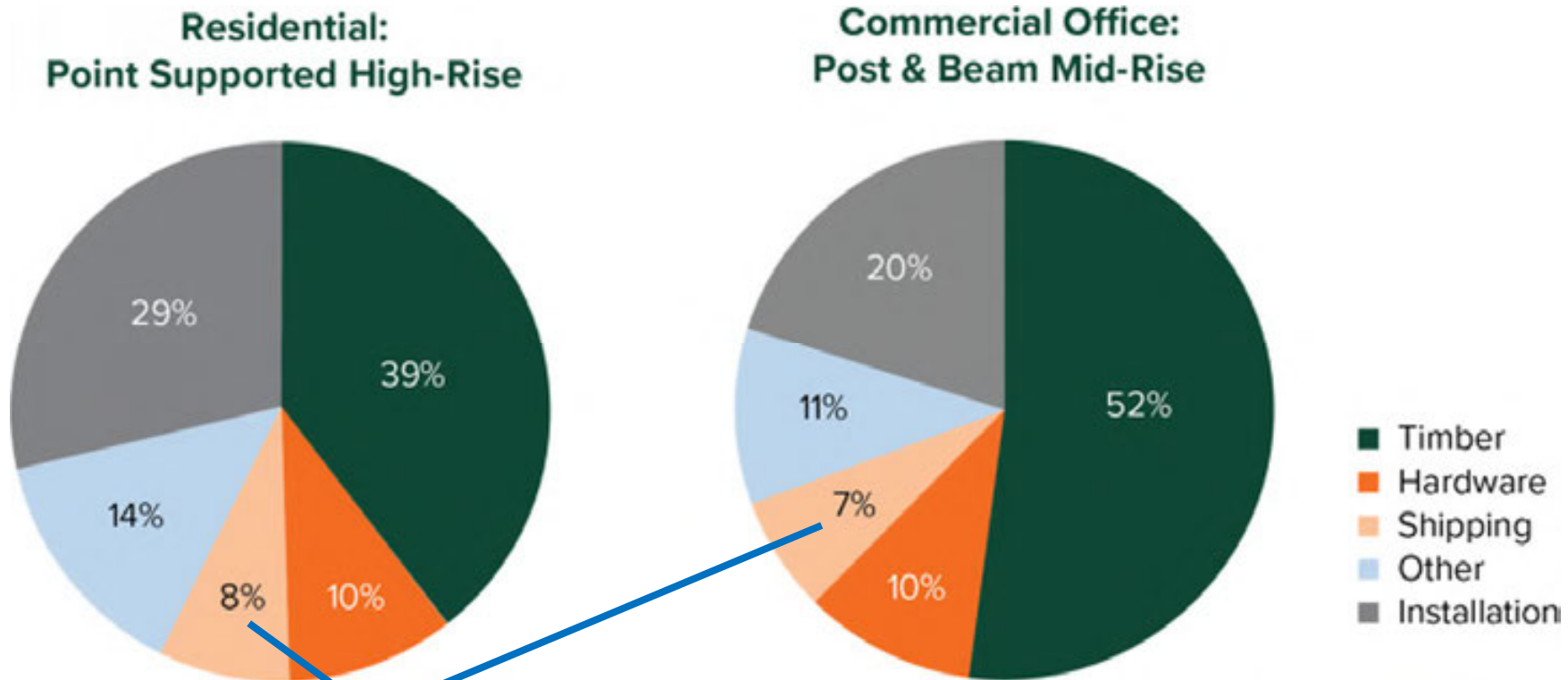
Know Your Supply Chain



Photo: DR Johnson

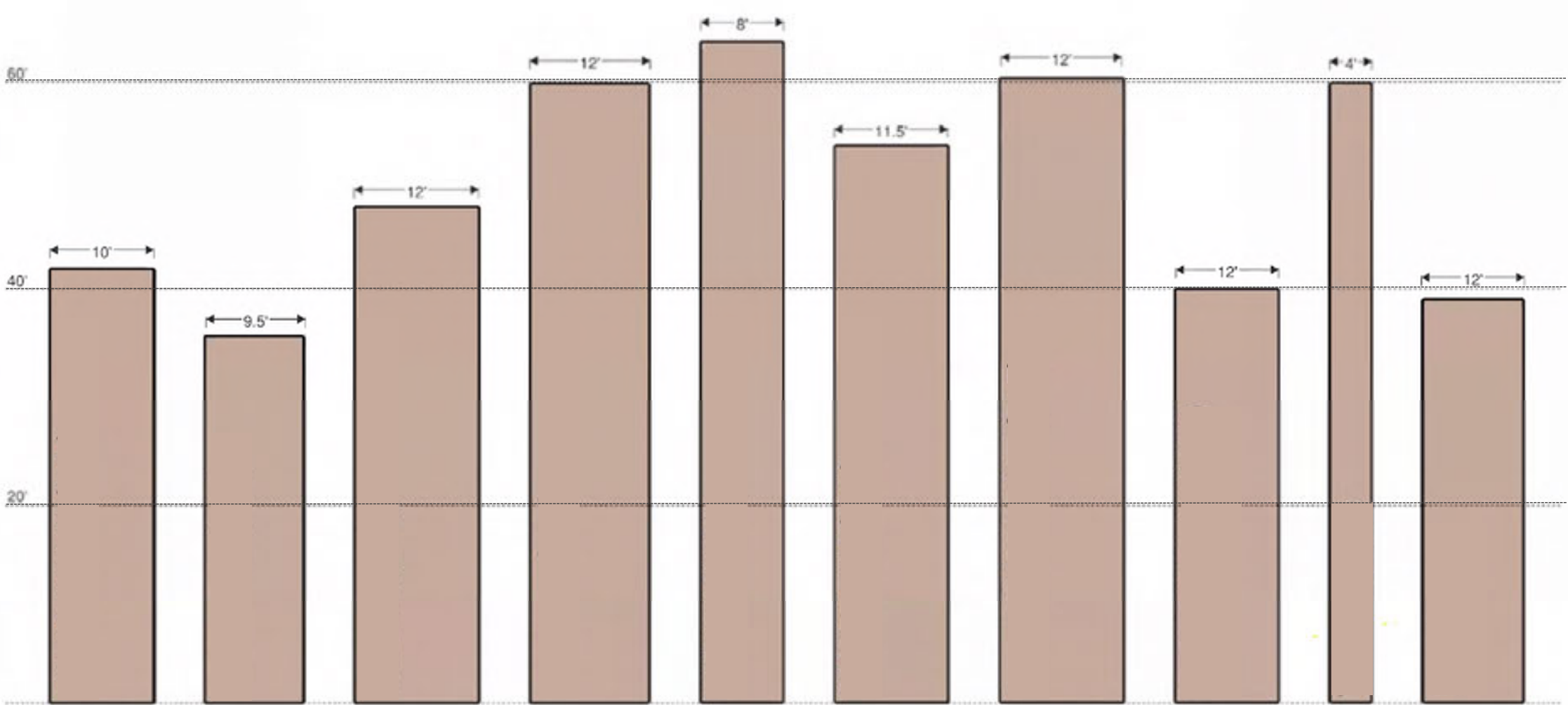
- » Manufacturers offer different species, grades and maximum panel/beam sizes
- » Manufacturer specific CNC capabilities
- » 3rd party fabricators can have additional CNC capabilities
- » Trucking logistics and cost

Establishing a Reliable Pre-Design Budget



Shipping: Roughly 4%-8%:
lower end when trucked from nearby, higher
end when shipped overseas by container

Understand Manufacturer's Capabilities

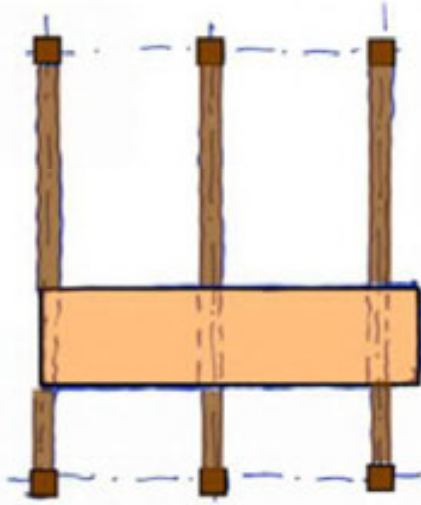
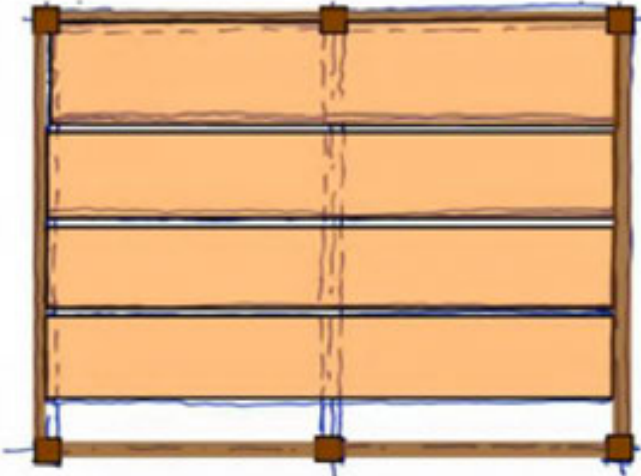
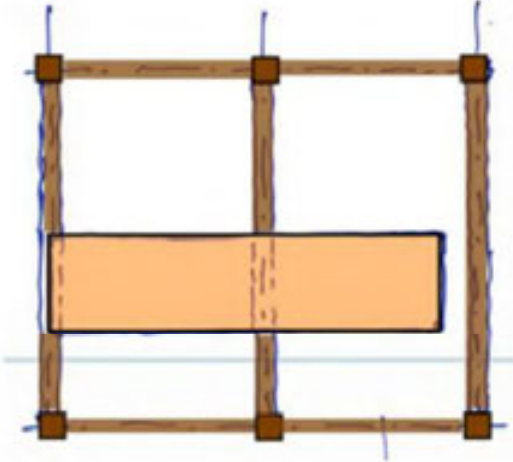
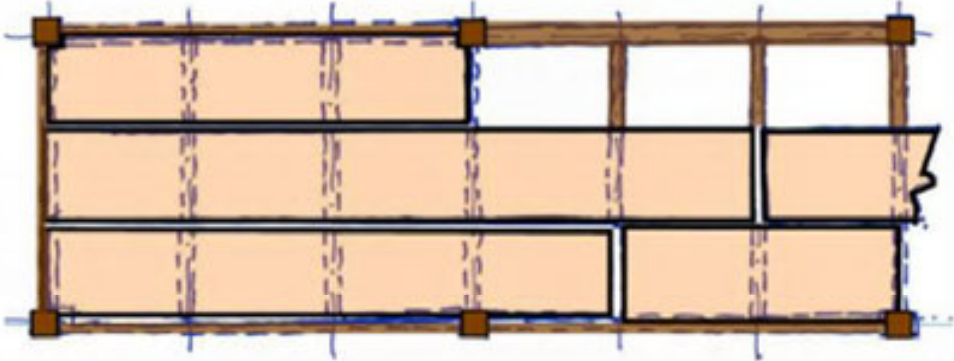


Mass Timber Construction

- » Staging areas
- » Cranes



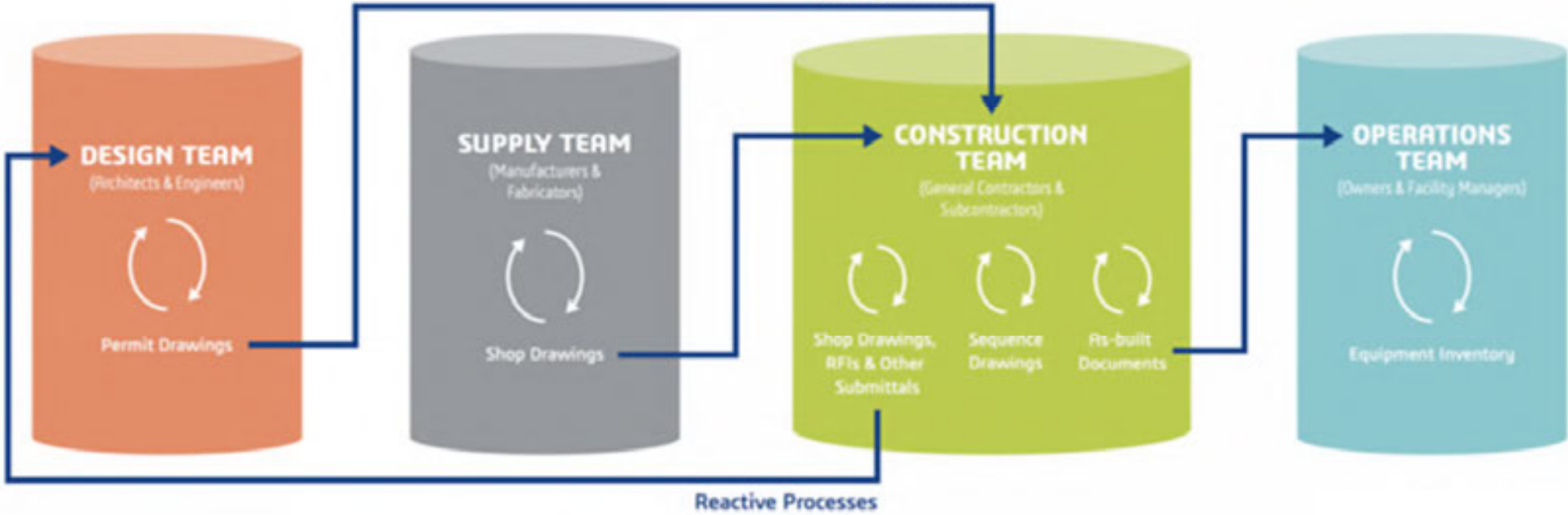
Understand Manufacturer's Capabilities



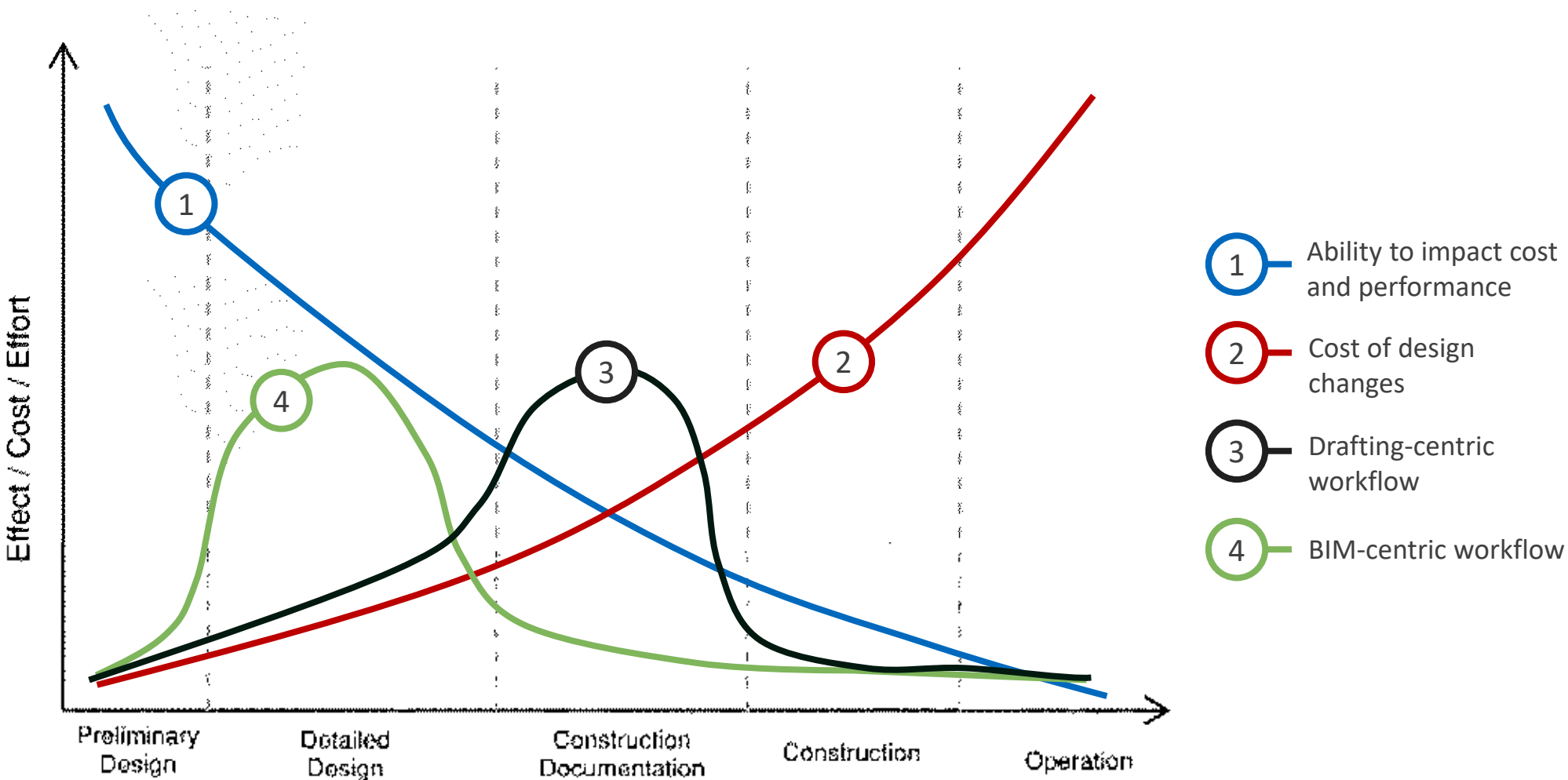
Factors Influencing Cost

- » **Design Complexity:** High impact on material and labor costs
- » **Material Availability:**
 - Regional differences in availability and pricing
 - Suppliers and subcontractors appropriate for your project
- » **Procurement Model:** Can impact the timber package price by as much as 30%—or more than 5% of total project hard costs

Risk: Design-Bid-Build Procurement



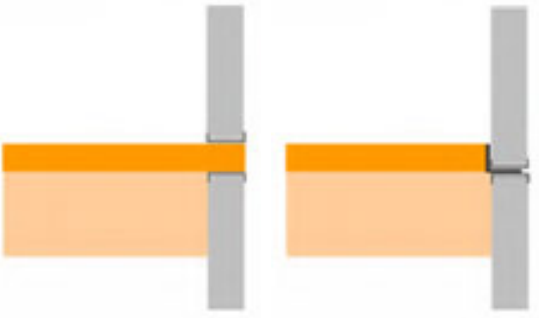
Factors Influencing Cost



Project Overhead



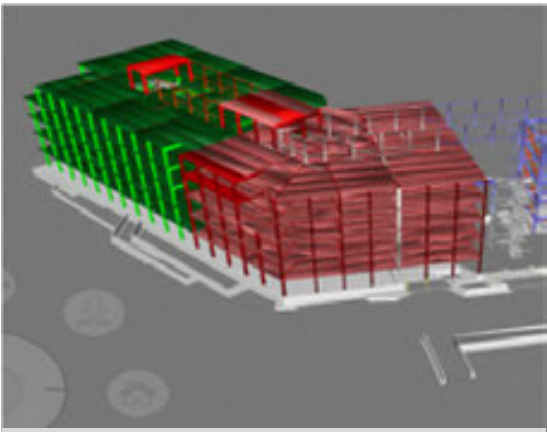
Cost Analysis



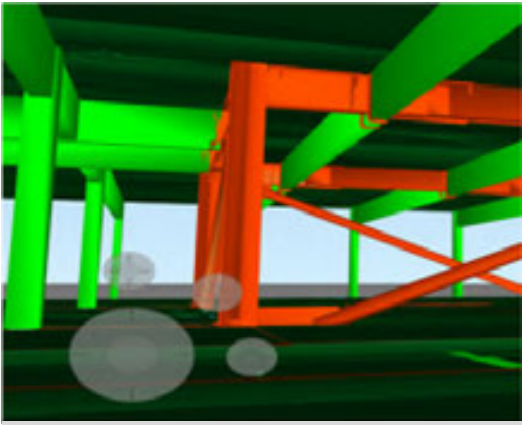
Design Refinement



System Integration



VD&C

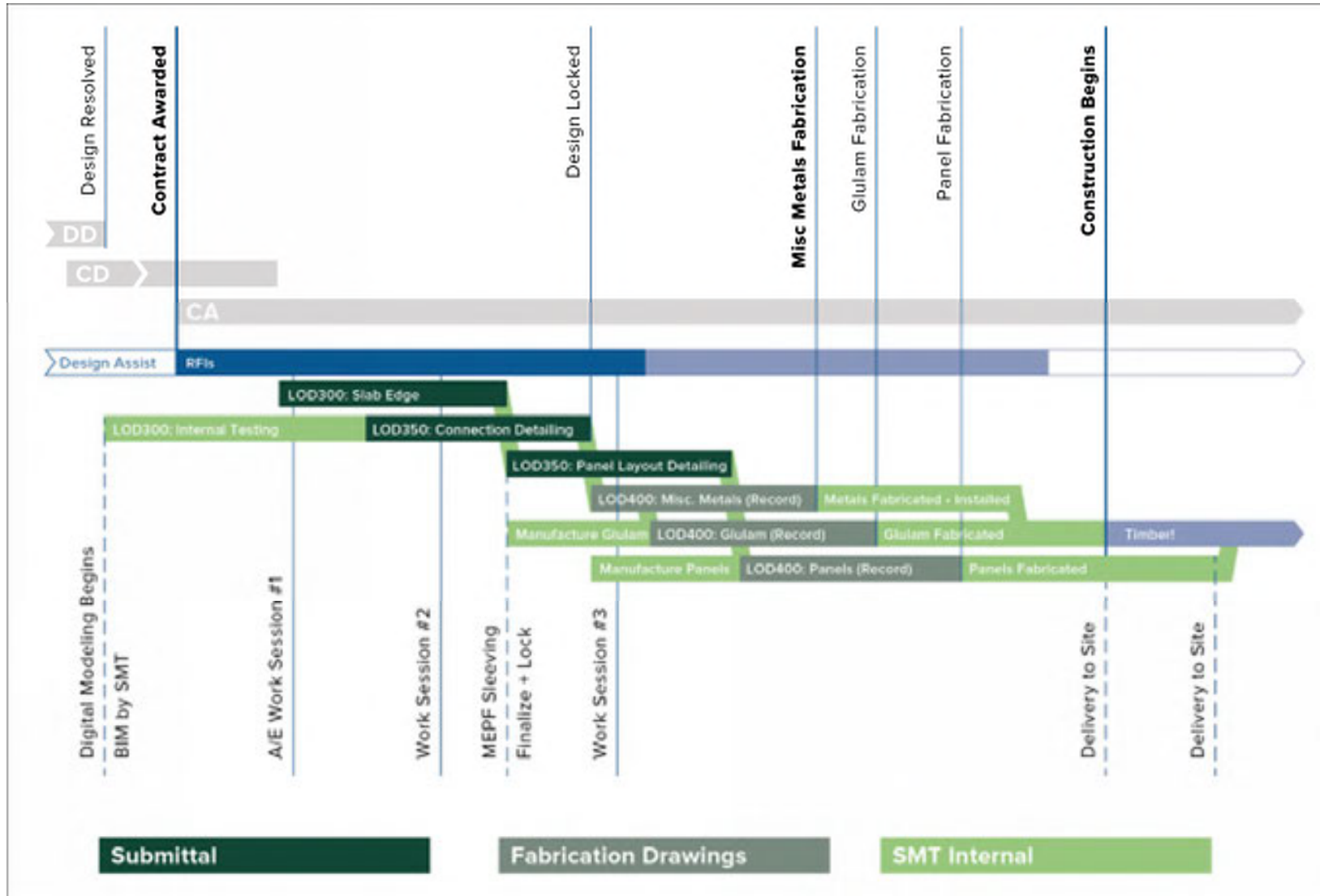


Detail Optimization



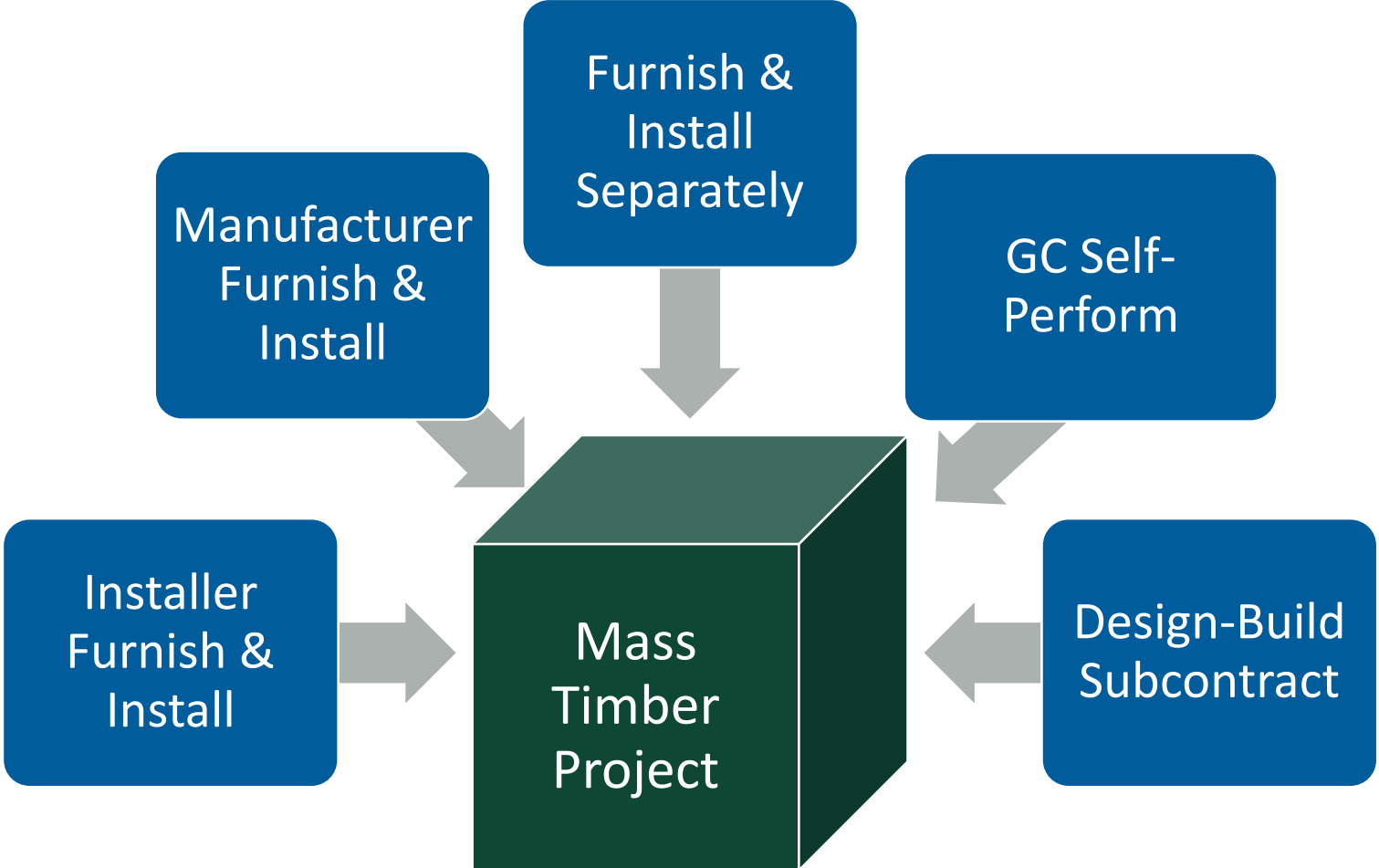
Logistics Planning

Modeling/Fabrication Schedule



Determine the Procurement Model

Analysis of (a few) Mass Timber Procurement Models



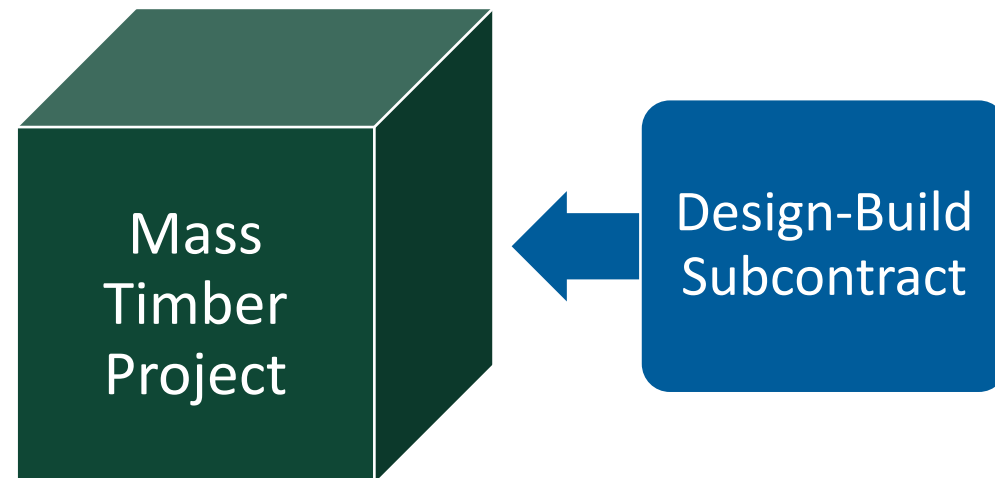
Determine the Procurement Model

ADVANTAGES

- » Good for elaborate, complex projects requiring a high degree of fabrication or a design team without timber experience
- » Effectively coordinates design and fabrication efficiency

DISADVANTAGES

- » May limit the number of interested/qualified bidders
- » Requires a more coordinated bidding process and longer bidding timeframe



Determine the Procurement Model

ADVANTAGES

- » Recommended for GCs and Project teams with little mass timber experience and for complicated projects
- » Opportunity for improving design efficiency or complicated sequencing/logistics (may contribute to overall savings)
- » Reduces GC Risk

DISADVANTAGES

- » Can be more expensive (for material)
- » Often requires longer bidding time
- » Less detail provided on supply cost
- » Less ability for GC to control cost



Determine the Procurement Model

ADVANTAGES

- » Recommended for all-timber, straight-forward structures and projects delivered under a design-bid-build contract
- » Can be less expensive for material; manufacturer may charge for installation management

DISADVANTAGES

- » Risk of prioritizing efficiency in the factory at the expense of on-site efficiencies
- » Creates separation between GC and installer

Single contract
between GC and
manufacturer
(manufacturer *may*
subcontract to installer)

Manufacturer
Furnish &
Install

VARIATION

Contracts are separately held
but the bid is a joint proposal

Mass
Timber
Project

Determine the Procurement Model

**GC procures material
direct from manufacturer,
separate contract with
installer**

**Furnish &
Install
Separately**



ADVANTAGES

- » Typically yields competitive pricing
- » Gives GC the flexibility to choose best fit bidders for each scope

DISADVANTAGES

- » Requires more coordination by GC
- » Increases GC's risk/liability for scheduling issues (but offers more control)
- » Requires GC to have prior supply chain experience and established relationships

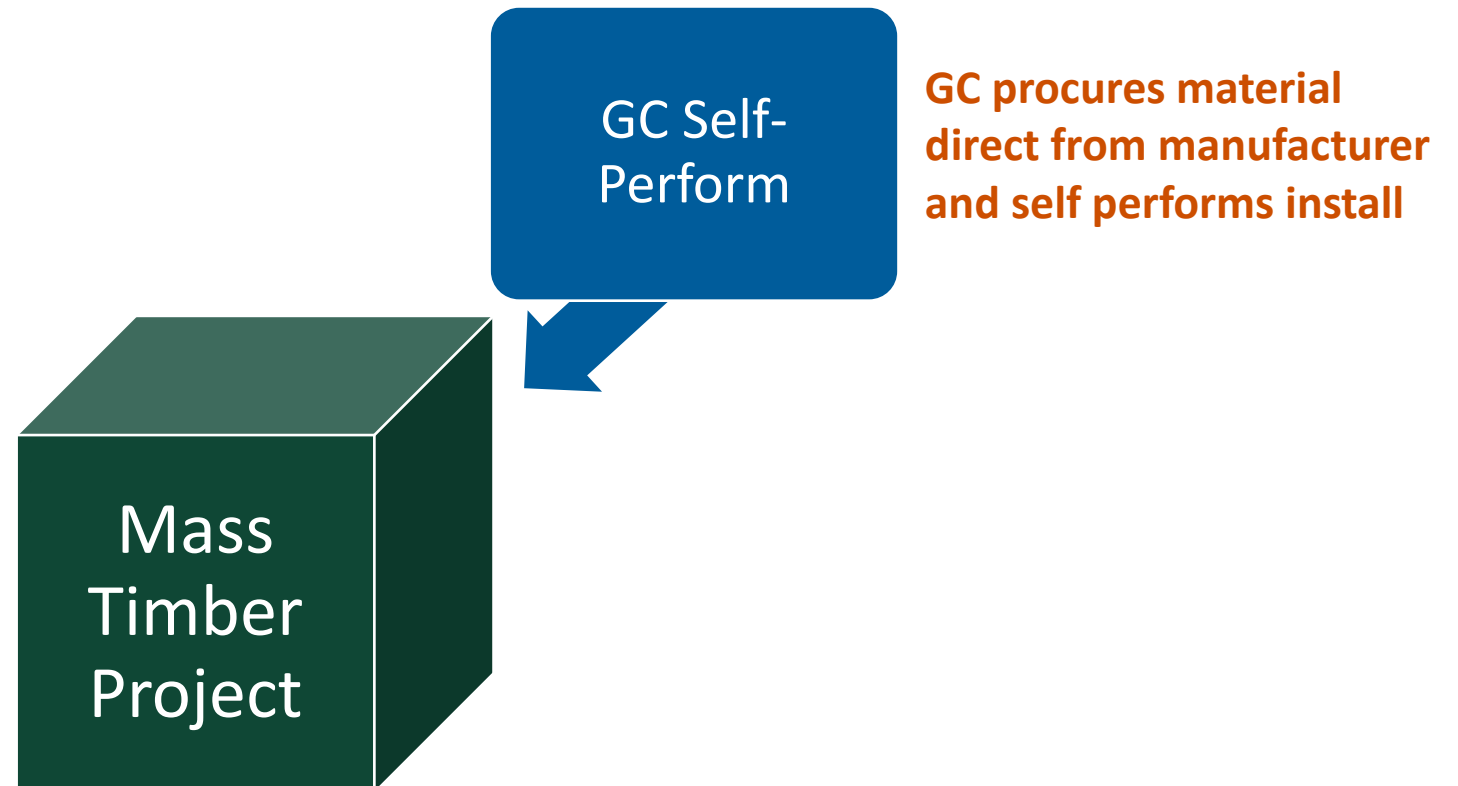
Determine the Procurement Model

ADVANTAGES

- » Offers opportunity for best cost and schedule control (owner may not see savings if the GC uses this model for fee uplift)

DISADVANTAGES

- » Increases GC's risk/liability for scheduling issues
- » GC must have prior supply chain experience, know the differences between manufacturers/suppliers, and have established relationships



Choose your List of Bidders

- » Good to have three or four qualified/interested bidders to cover both supply and installation scopes if not being bid together
- » Not every project is the right fit for every supplier or installer and producing a good bid takes time
- » Choosing panel characteristics (size, species, grade, etc.) that do not limit your choice of manufacturer will help mitigate pricing volatility

Risk: Cost Analysis of Structure Only



\$/SF

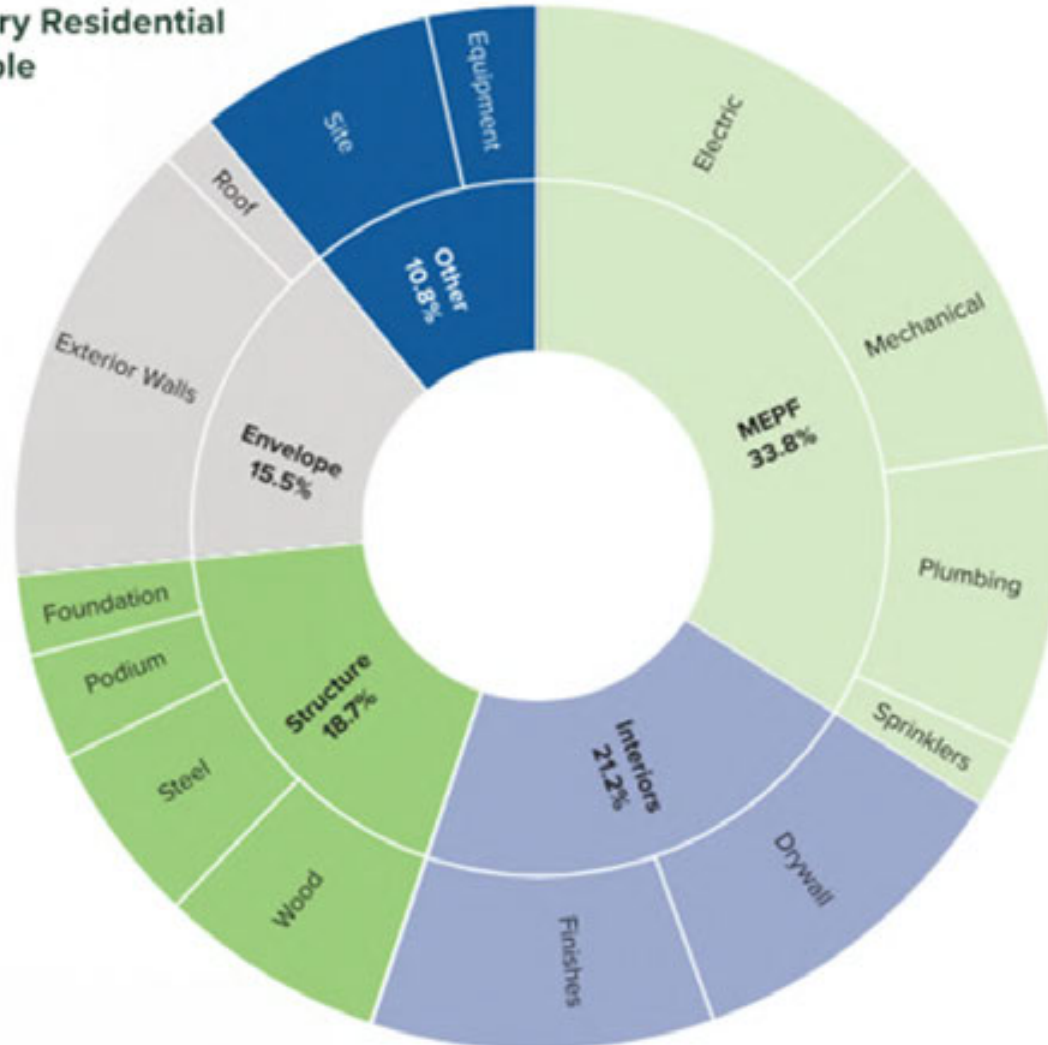


\$/SF

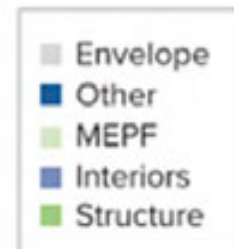
Manage Project Costs

12-Story Residential Example

12-Story Residential Example



- » Type IV-B construction
- » Point-supported project
- » Encapsulated glulam columns
- » Steel buckling-restrained brace core
- » Single-story podium



Tall Mass Timber Resource

Free to Download at
www.woodworks.org

Scott Breneman, PhD, SE
WoodWorks – Wood Products Council
Matt Timmers, SE
John A. Martin & Associates
Dennis Richardson, PE, CBO, CA5p
American Wood Council

Tall Wood Buildings in the 2021 IBC

Up to 18 Stories of Mass Timber

In January 2019, the International Code Council (ICC) approved a set of proposals to allow tall wood buildings as part of the 2021 International Building Code (IBC). Based on these proposals, the 2021 IBC includes 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 (FRRs) and levels of required noncombustible protection. The code includes 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 (SEAC) 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 are now dozens of timber buildings constructed above eight stories tall. Some international examples include:

Building Name	Location	Stories	Completion Date
Stedhaus at Murray Grove	London, UK	8-over-1	2008
Forst	Melbourne, Australia	8-over-1	2012
Via Cerrini	Milan, Italy	9	2013

Carbon12
Portland, Oregon | Eight stories of mass timber
Kaiser Group and Path Architecture
Munzing Structural Engineering

Sprinklers in High Rises

Two Water Mains Required if:

- » Building Height Exceeds 420 ft, or
- » Type IV-A and IV-B buildings that exceed 120 ft in height



Fire Safety During Construction

International Fire Code Section 3303.5: 3308.4 Fire safety requirements for buildings of Types IV-A, IV-B, and IV-C construction.

...shall meet the following requirements during construction:

1. Standpipes shall be provided in accordance with Section 3313.
 - Installed prior to construction exceeding 40ft
 - Extended as construction progresses to within one floor of the highest point... having secured decking or flooring
2. A water supply for fire department operations, as approved by the fire chief.



Photo: Structurlam

Construction Types and Fire Protection

Fire-Resistance Rating Requirements for Building Elements (Hours)

Building Element	Type I		Type II		Type III		HT	Type IV			Type V	
	A	B	A	B	A	B		A	B	C	A	B
Primary structural frame ^f (see Section 202)	3 ^{a,b}	2 ^{a,b}	1 ^b	0	1 ^b	0	HT	3	2	2	1 ^b	0
Bearing walls Exterior ^{e,f} Interior	3 3 ^a	2 2 ^a	1 1	0 0	2 1	2 0	2 1/HT	3	2	2	1 1	0 0
Nonbearing walls and partitions Exterior	See						See Table 602					
Nonbearing walls and partitions Interior ^d	0	0	0	0	0	0	See Section 2304.11.2	0*	0*	0*	0	0
Floor construction and associated secondary members (see Section 202)	2	2	1	0	1	0	HT	2	2	2	1	0
Roof construction and associated secondary members (see Section 202)	1-1/2 ^b	1 ^{b,c}	1 ^{b,c}	0 ^c	1 ^{b,c}	0	HT	1-1/2	1	1	1 ^{b,c}	0

**Nonbearing interior wall partitions in Types IV-A, IV-B and IV-C must be of mass timber construction or of noncombustible materials per IBC 602.4*

Source: 2021 IBC Table 601 / See IBC for footnotes

IV-A

No timber surfaces may be exposed



IV-B

Some timber surfaces may be exposed



IV-C

All timber surfaces may be exposed



2021 IBC: 20% of ceilings or
40% of walls

2024 IBC: 100% of ceilings or
40% of walls

Noncombustible Protection – Types IVA, B, C

Where timber is required to be protected, NC must contribute at least 2/3 of the Fire Resistance Rating

Required Noncombustible Contribution to FRR

FRR of Building Element (hours)	Minimum from Noncombustible Protection (minutes)
1	40
2	80
3 or more	120

Source: 2021 IBC Section 722.7

Prescriptive Noncombustible Contributions to FRR

Type of Protection	Contribution per Layer (minutes)
1/2" Type X gypsum board	25
5/8" Type X gypsum board	40

Source: 2021 IBC Section 722.7.1

Concealed Spaces

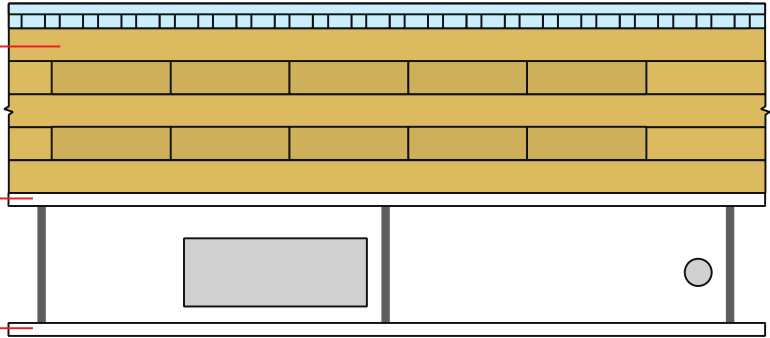
Type IV-C

Noncombustible material not required

Mass timber floor panel

One layer 5/8" Type X gypsum covering all mass timber surfaces within concealed space

Dropped ceiling



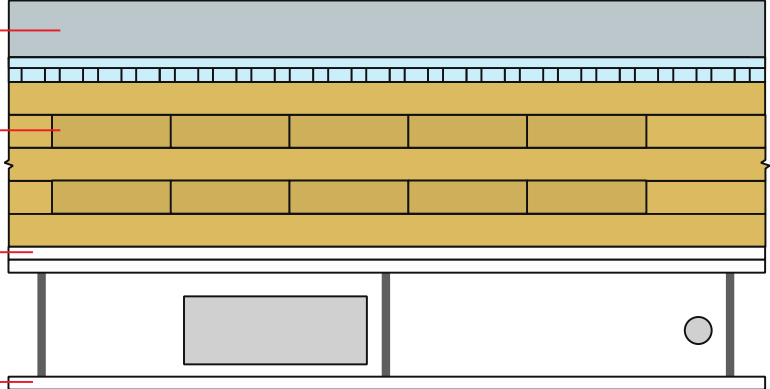
Type IV-A,B

Minimum 1" noncombustible material

Mass timber floor panel

Two layers 5/8" Type X gypsum

Dropped ceiling



Fire Safety During Construction – Types IVA, B, C

International Fire Code Section 3303.5, Continued:

Where building construction exceeds six stories above grade plane...

3. ... at least one layer of noncombustible protection where required...
4. ... required exterior wall coverings ...

...shall be installed on all building elements more than 4 floor levels, including mezzanines, below active mass timber construction before erecting additional floor levels.

Exception: Shafts and vertical exit enclosures

Change to 2024 IBC: noncombustible material on the top of mass timber floor assemblies shall not be required before erecting additional floor levels



Photo: Urban One

Brock Commons

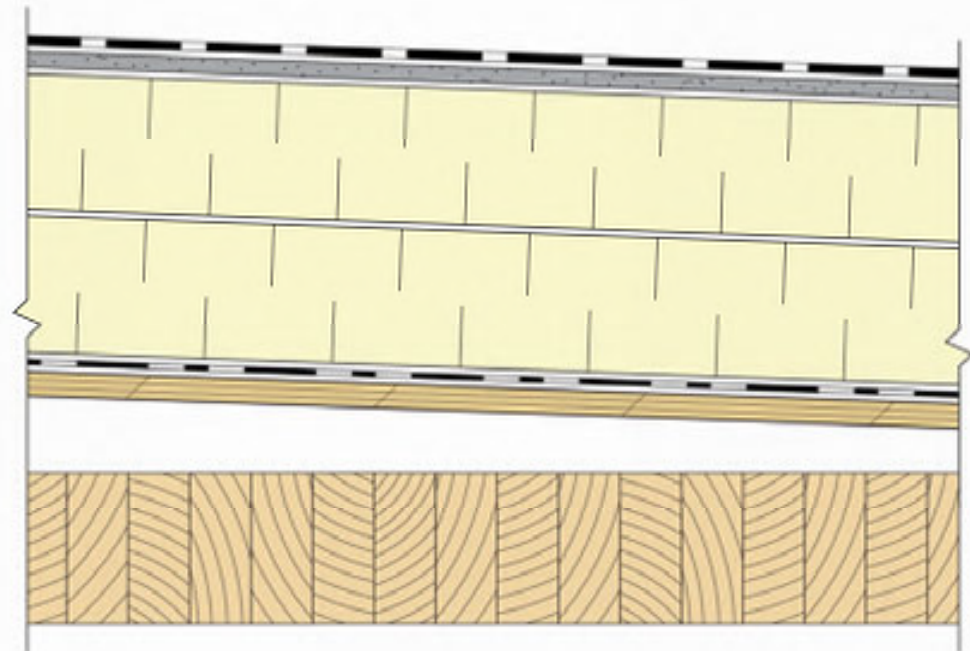
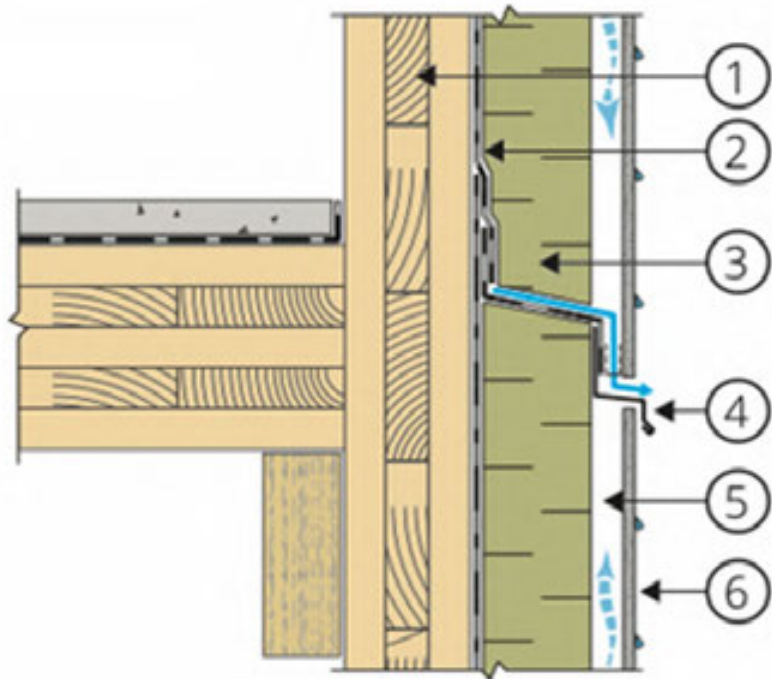
(Vancouver, BC)



Architect: Acton Ostry | Images Courtesy
naturallywood

Mass Timber Project Risk Mitigation

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

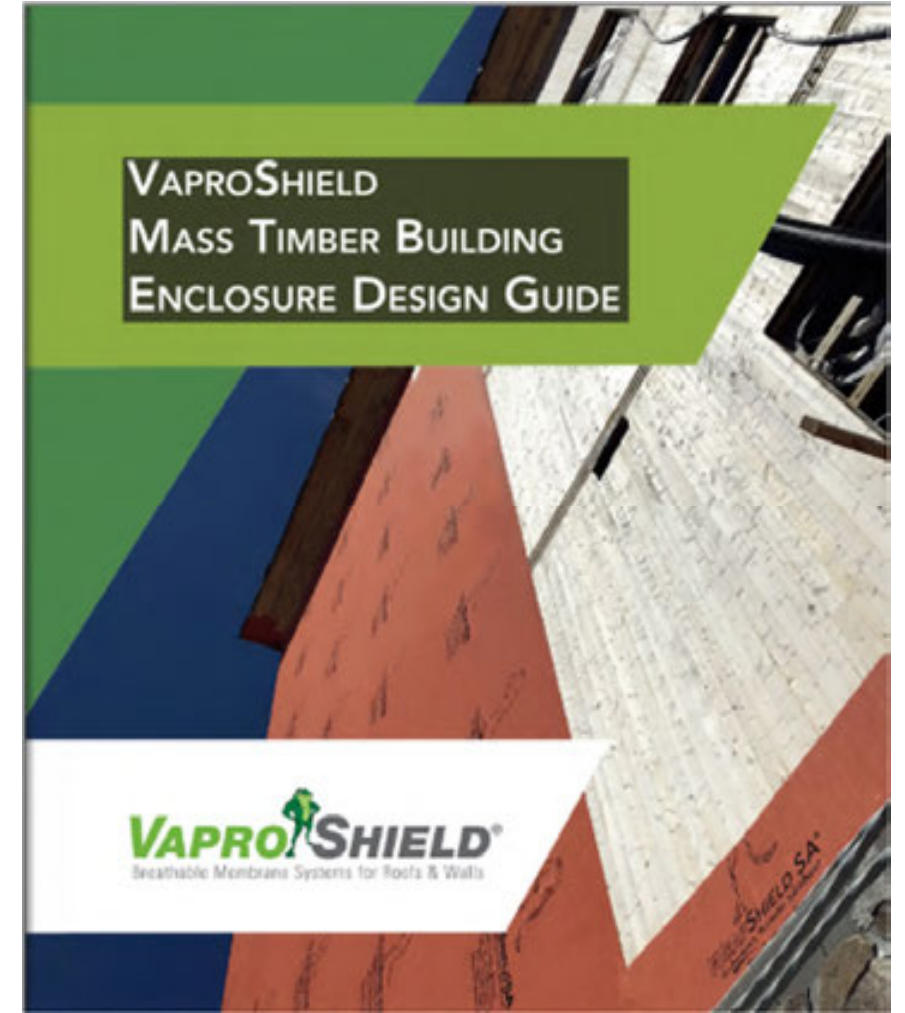


Photos: RDH Building Science

Building Envelope: Mass Timber Detailing Guides

WoodWorks provides structural details on our website. However, those don't consider control layers of the building envelope.

These are two great guides with example building envelope details for mass timber.



Concrete vs. CLT Slab



Concrete Slab:

6" Thick

80 PSF

STC 53

CLT Slab:

6-7/8" Thick

18 PSF

STC 41



Mass Timber Construction Cost Balancing



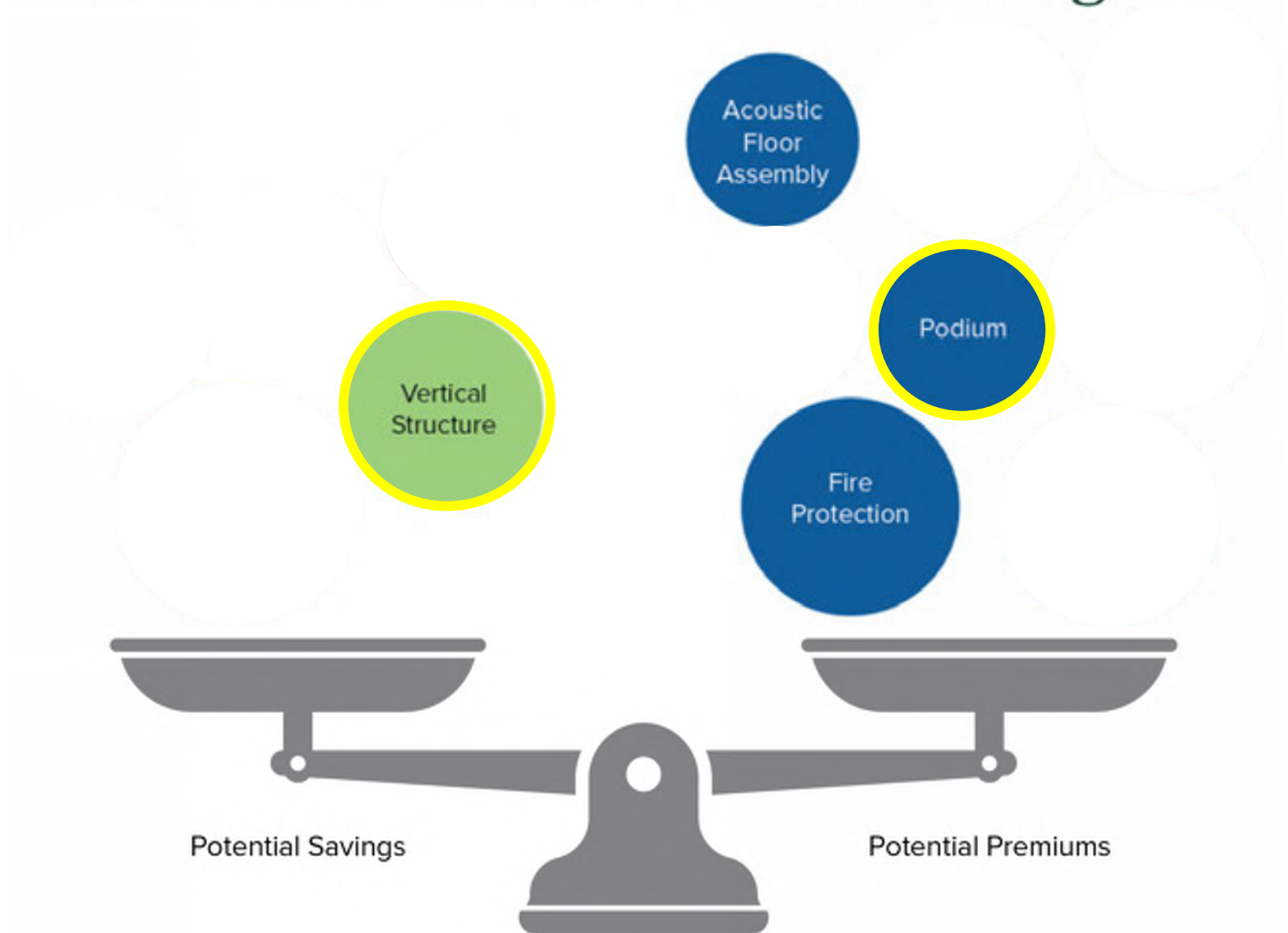
Mass Timber Construction Cost Balancing



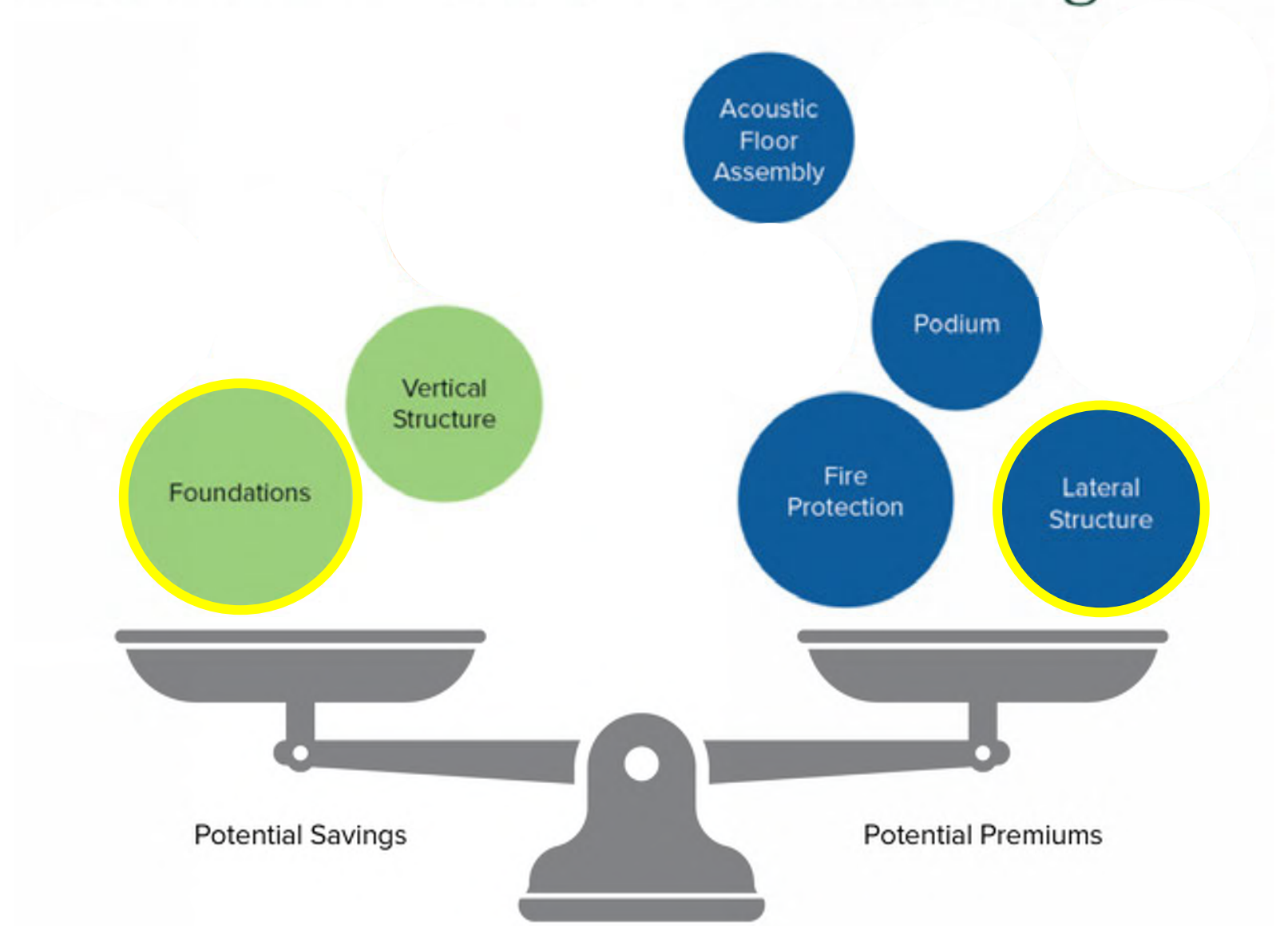
Mass Timber Construction Cost Balancing



Mass Timber Construction Cost Balancing



Mass Timber Construction Cost Balancing

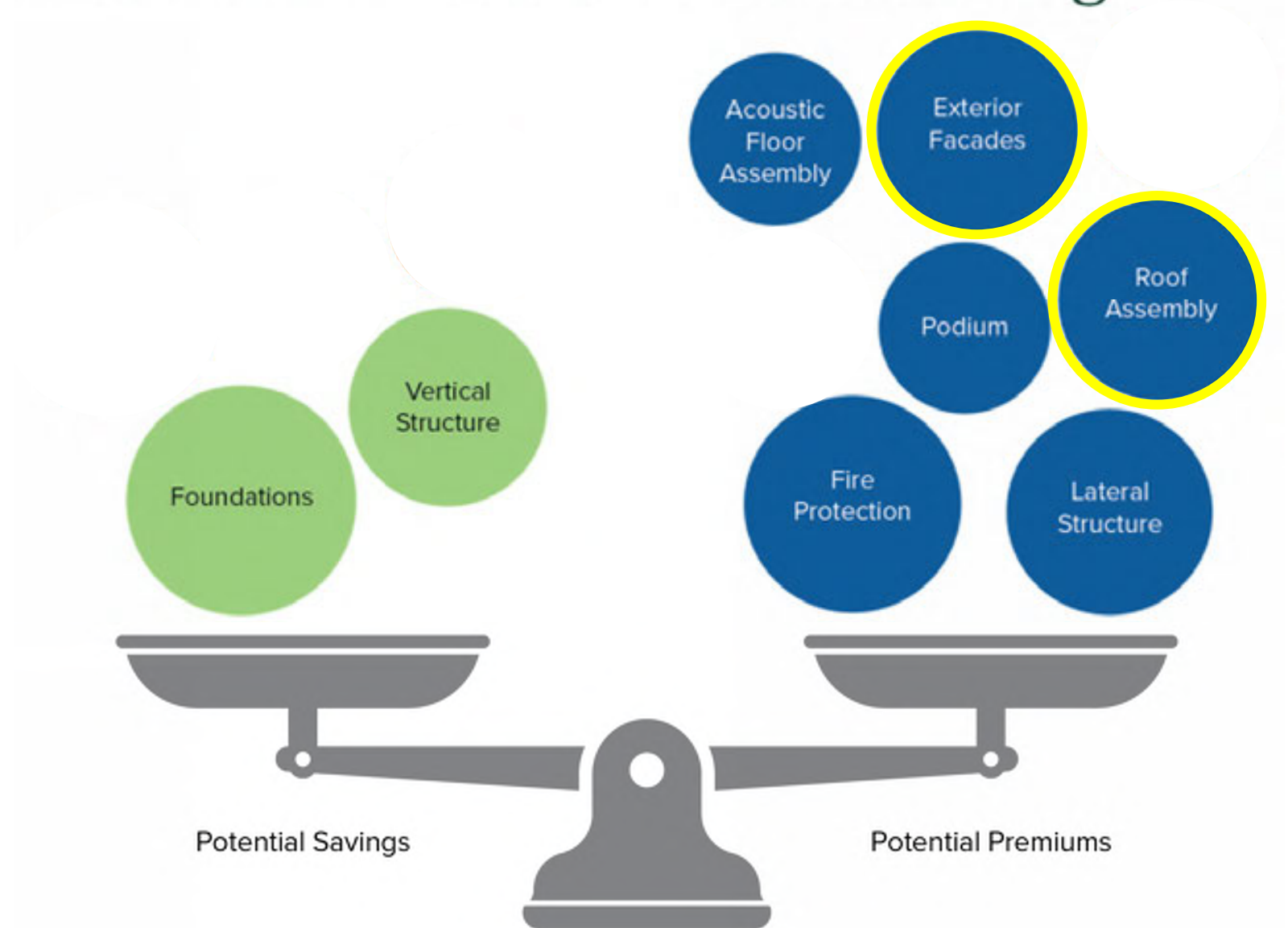


1510 Webster - Oakland, CA

Owner/General Contractor/Architect: oWow
Structural Engineer: DCI Engineers
Photo: Flor Projects



Mass Timber Construction Cost Balancing



MEPF Layout & Integration

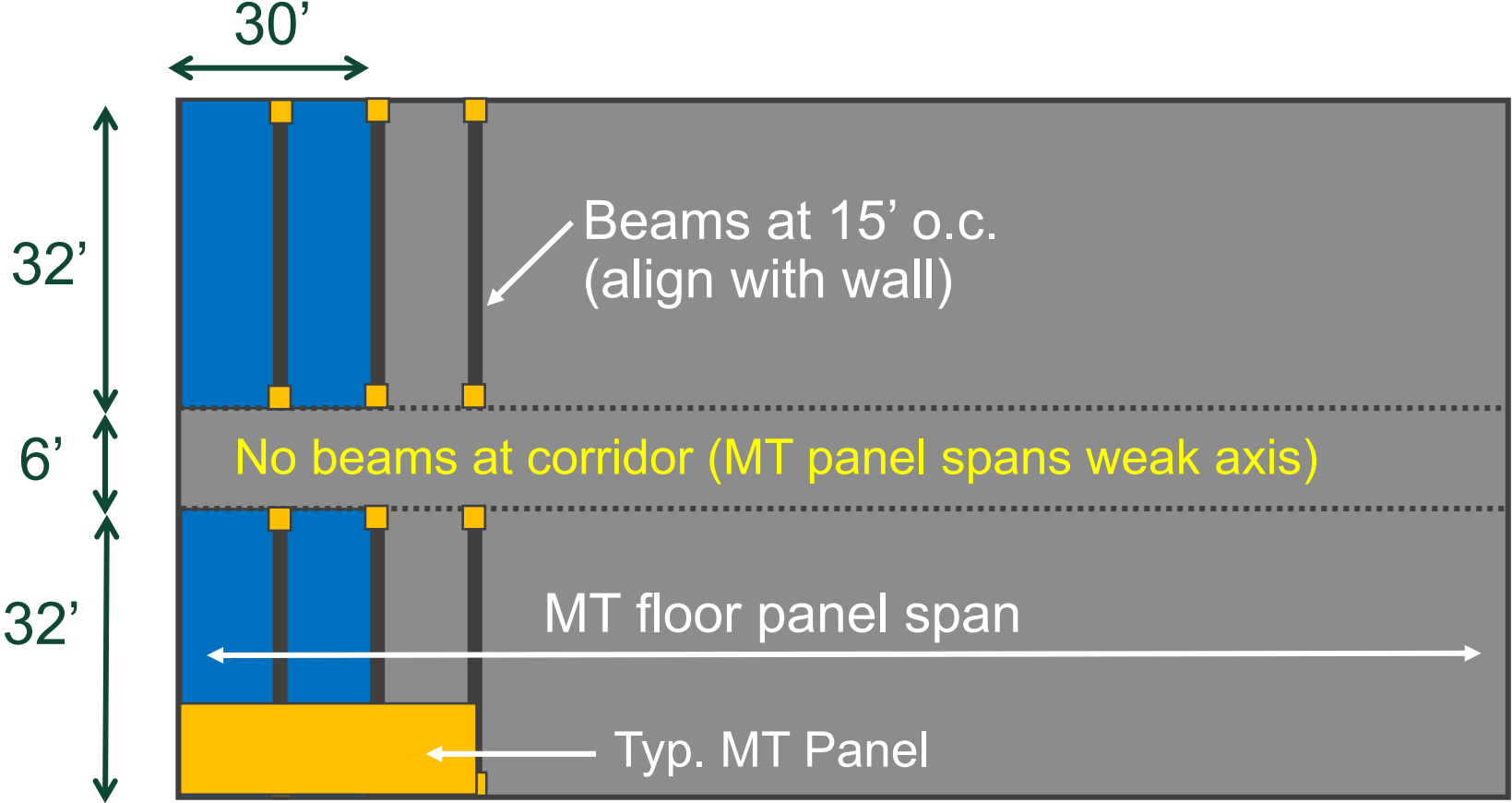


Credit: Alex Schreyer

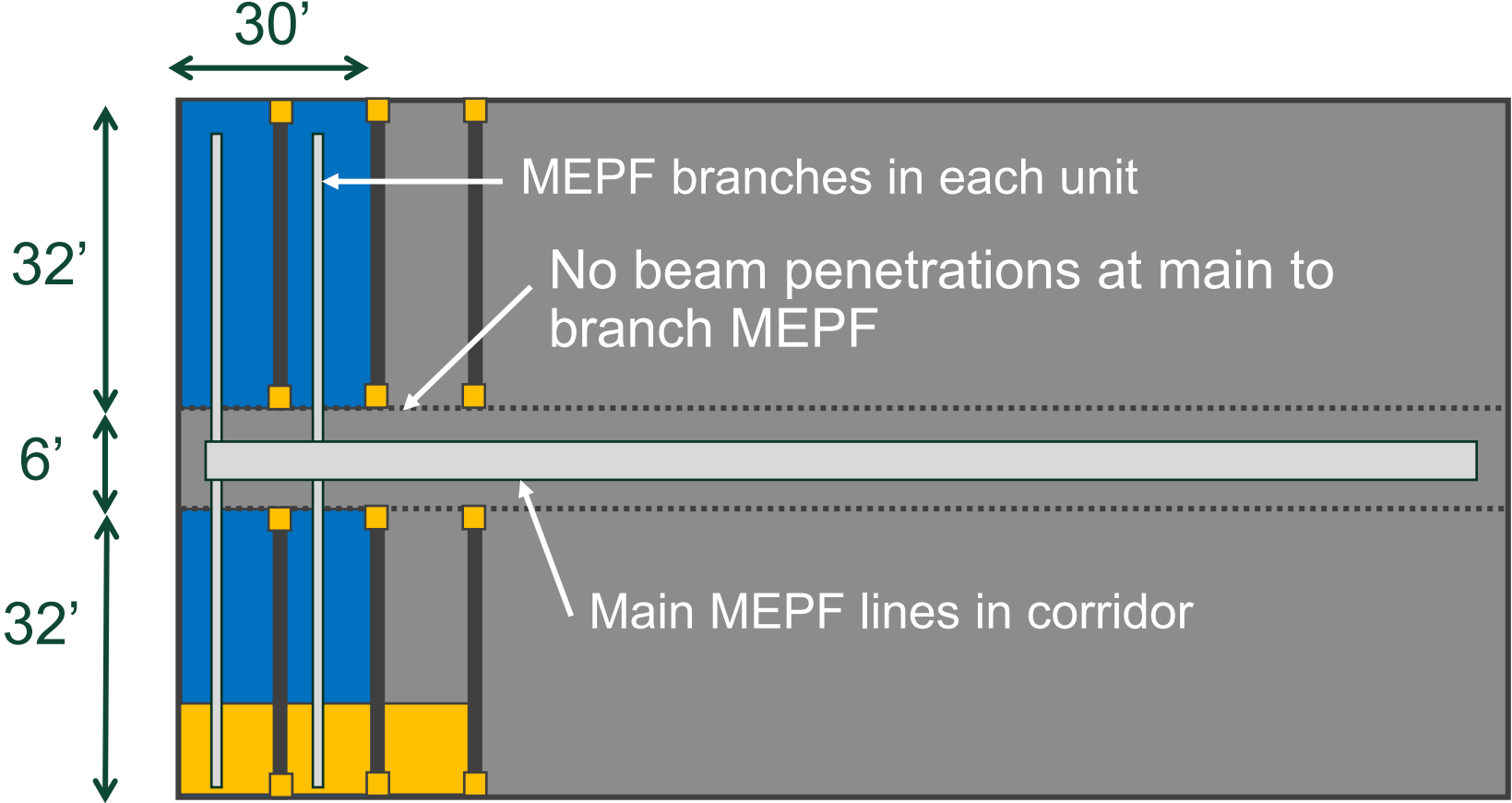


Credit: WoodWorks

Early Design Decisions Example – Grid Option



Early Design Decisions Example – Grid Option

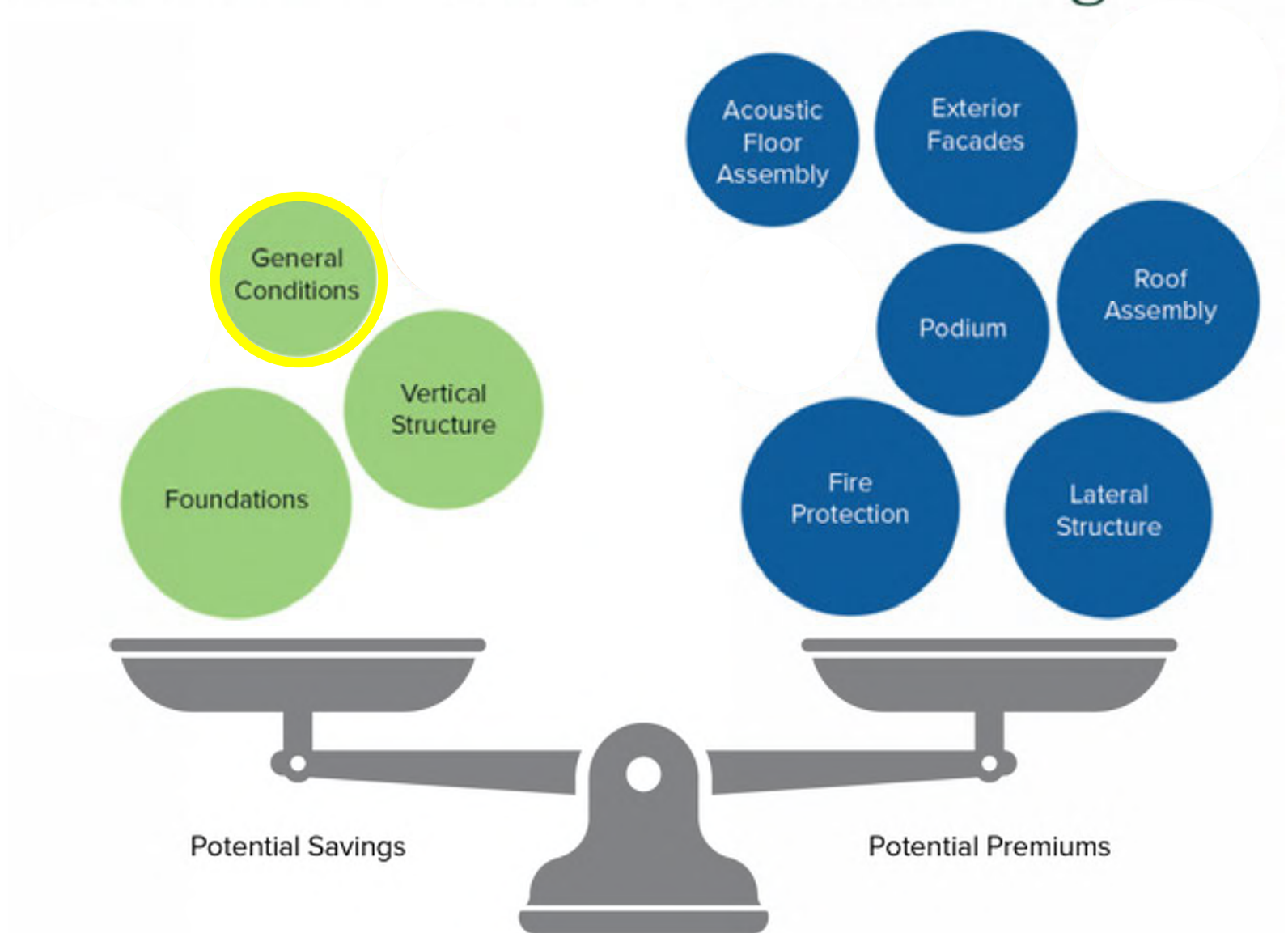


Floor to Ceiling Glazing Possibilities

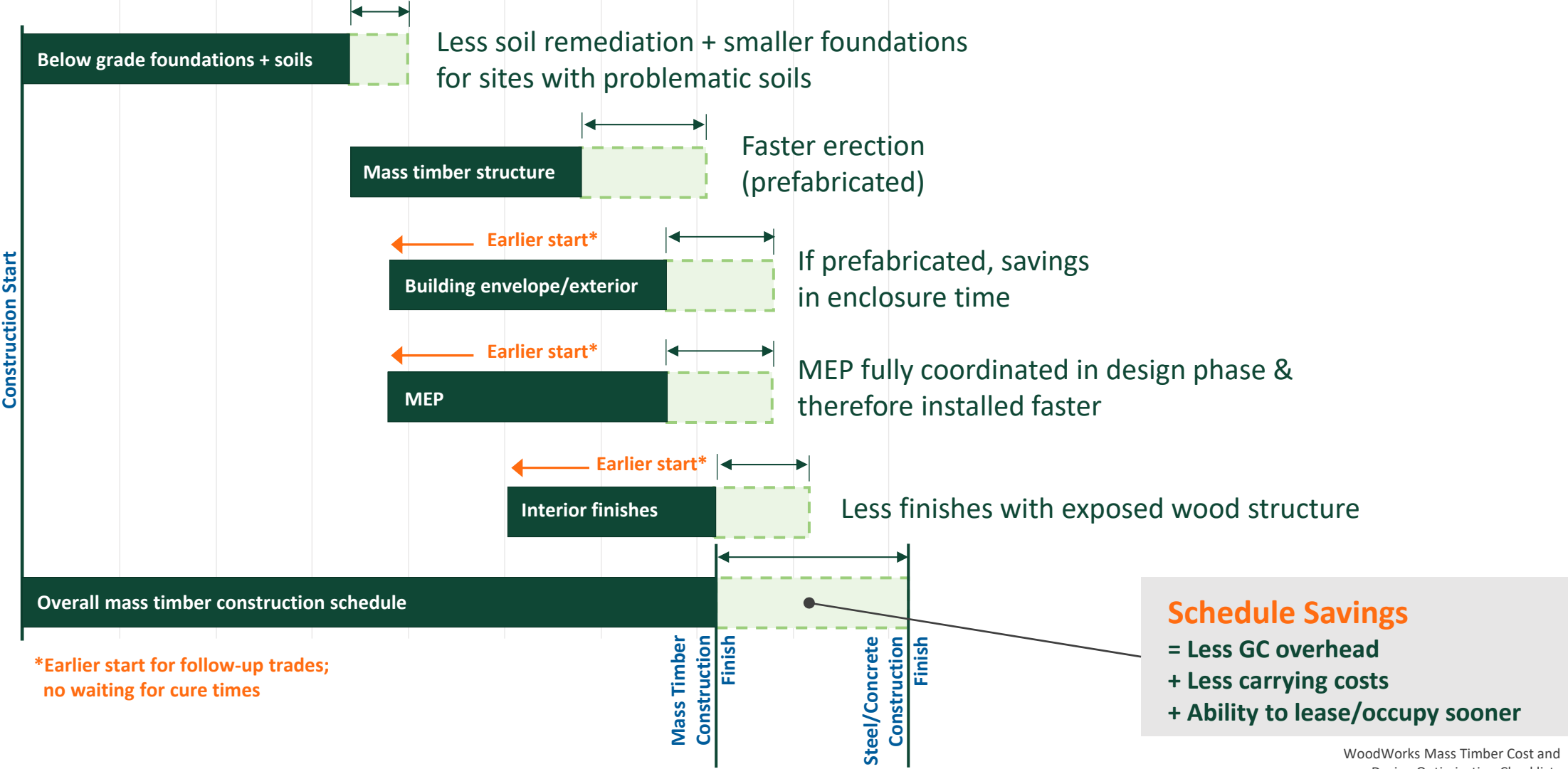


Photos: Mark Bitterman

Mass Timber Construction Cost Balancing



Construction Impacts: Compressing the Typical Construction Schedule



Schedule Impacts: Hybrid Structures



Photo: Stantec Architecture



Photo: Swinerton

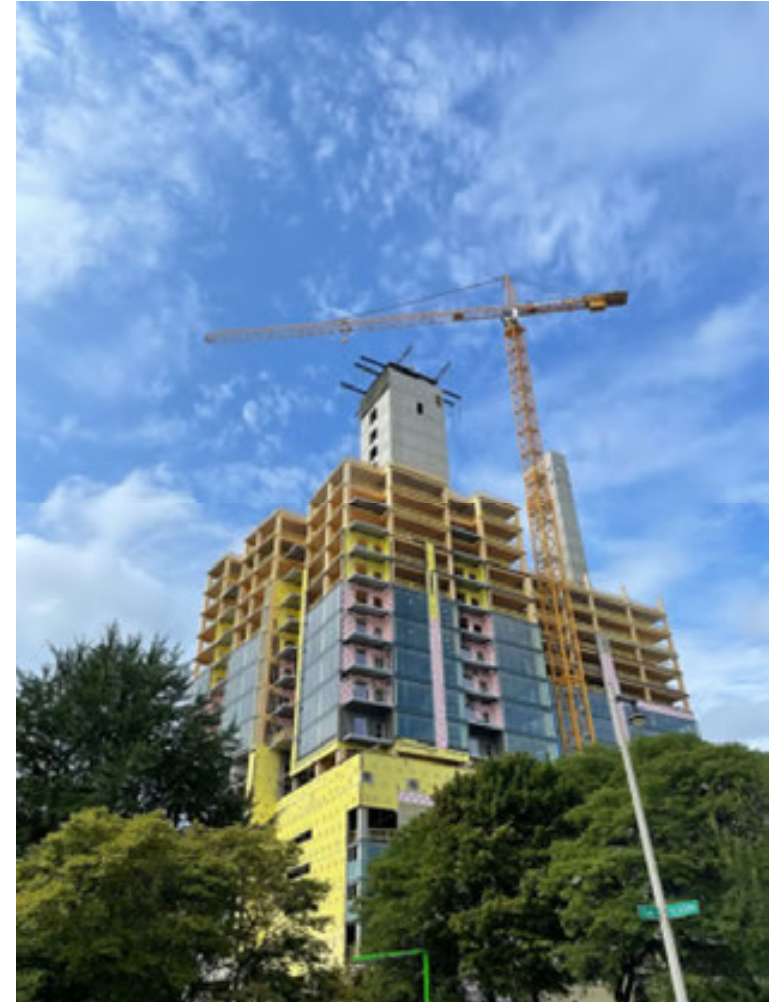


Photo: Korb & Associates Architects |
Architect: Korb & Associates Architects

Reduced Construction Time

Ascent (Milwaukee, WI)

Faster construction:

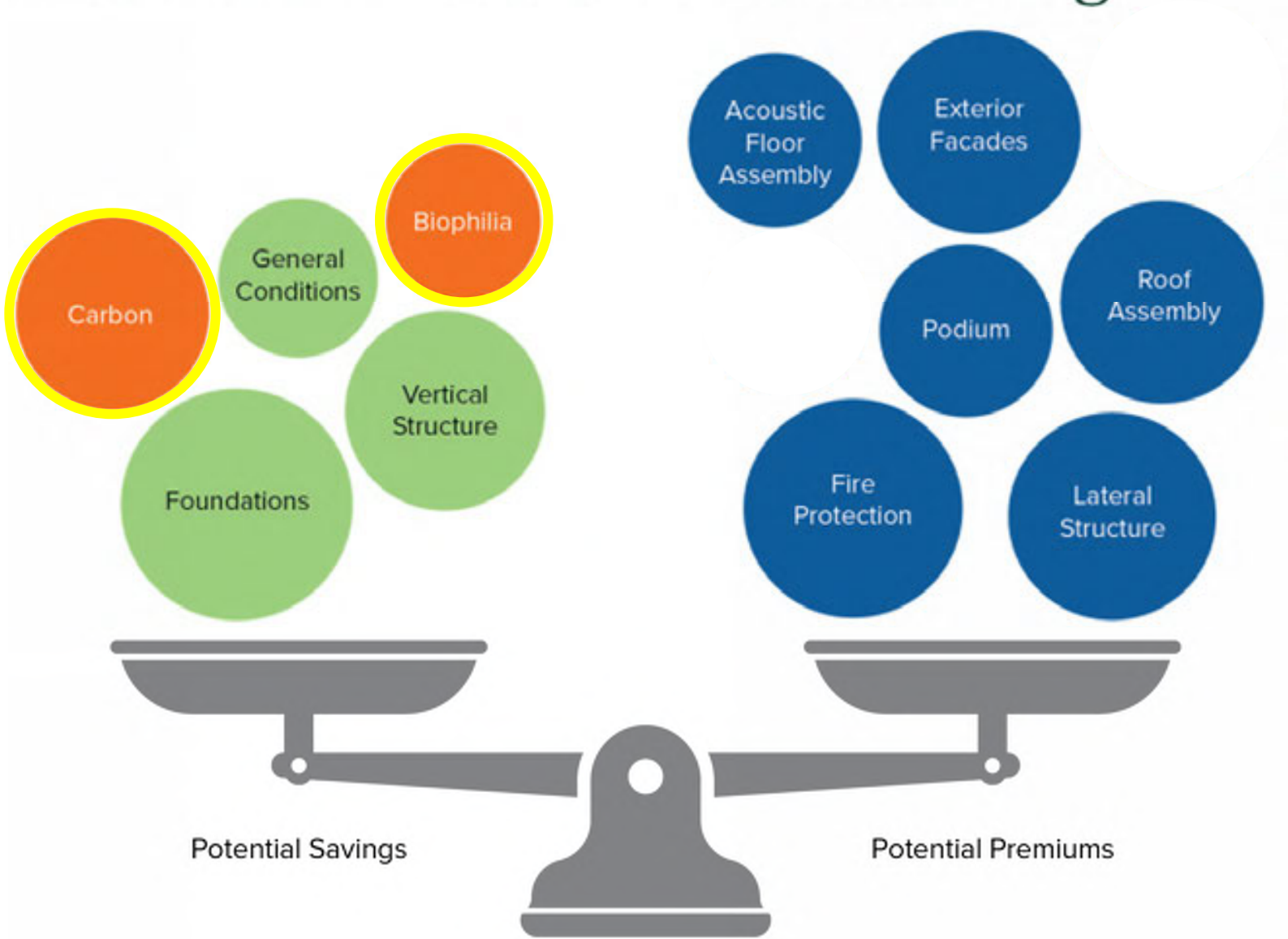
- » Saved approximately 4 months

Smaller crews:

- » 12-person mass timber crew



Mass Timber Construction Cost Balancing



Biophilia & Healthy Buildings



ULI Reports:

“Certified healthy buildings transact 4.4% to 7.7% higher rent per SF than noncertified buildings”



“Building with mass timber provides a host of benefits to stakeholders across the real estate value chain.”

<https://knowledge.uli.org/reports/research-reports/2023/the-materials-movement-creating-value-with-better-building-materials>



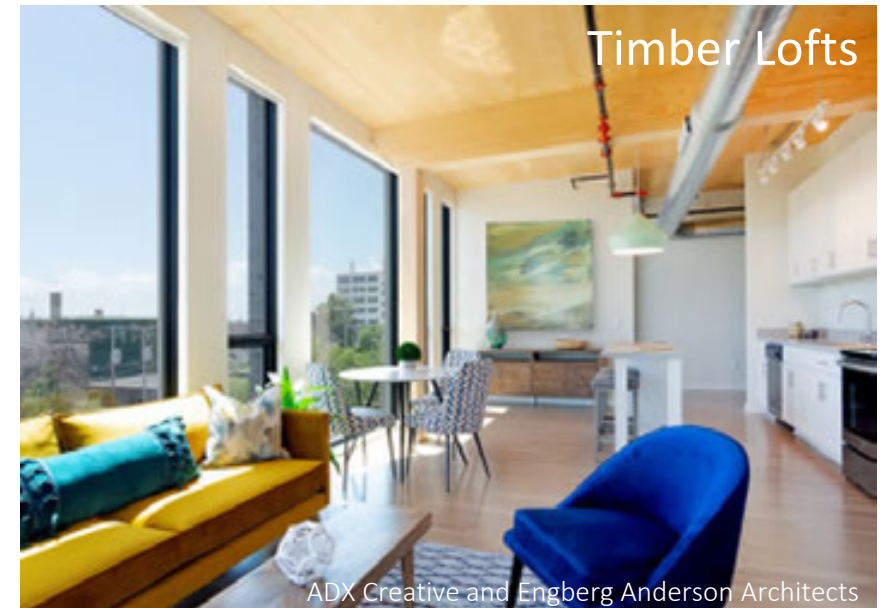
Office & Multifamily Tend to:

Lease up faster than submarket norms

- Higher net income
- Lower income volatility
- Better internal rate of return
- Lower risk via quicker to refinance/ sell

Attract quality tenants

- Better rent collection
- Lower cap rates
- More stable occupancy



Whole Building GWP vs. Construction Cost



Rendering tres birds



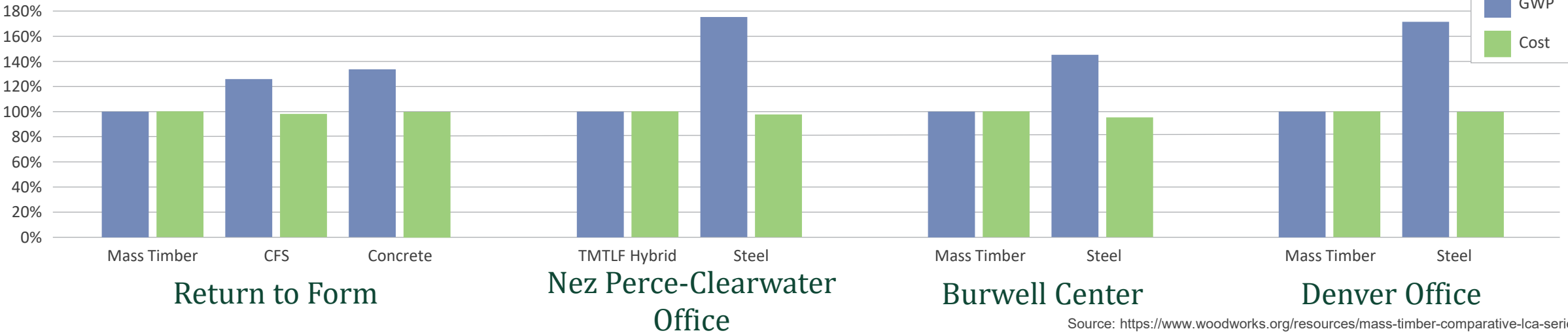
Mosaic Architecture / Morrison-Maierle / Photo Heidi Long, Longview Studios



University of Denver Burwell Center for Career Achievement / Lake|Flato Architects / Shears Adkins Rockmore / KL&A Engineers and Builders / Photo © Frank Ooms



Rendering Shears Adkins Rockmore



Source: <https://www.woodworks.org/resources/mass-timber-comparative-lca-series/>

Mass Timber as a Sustainable Investment

Research Commentary by |

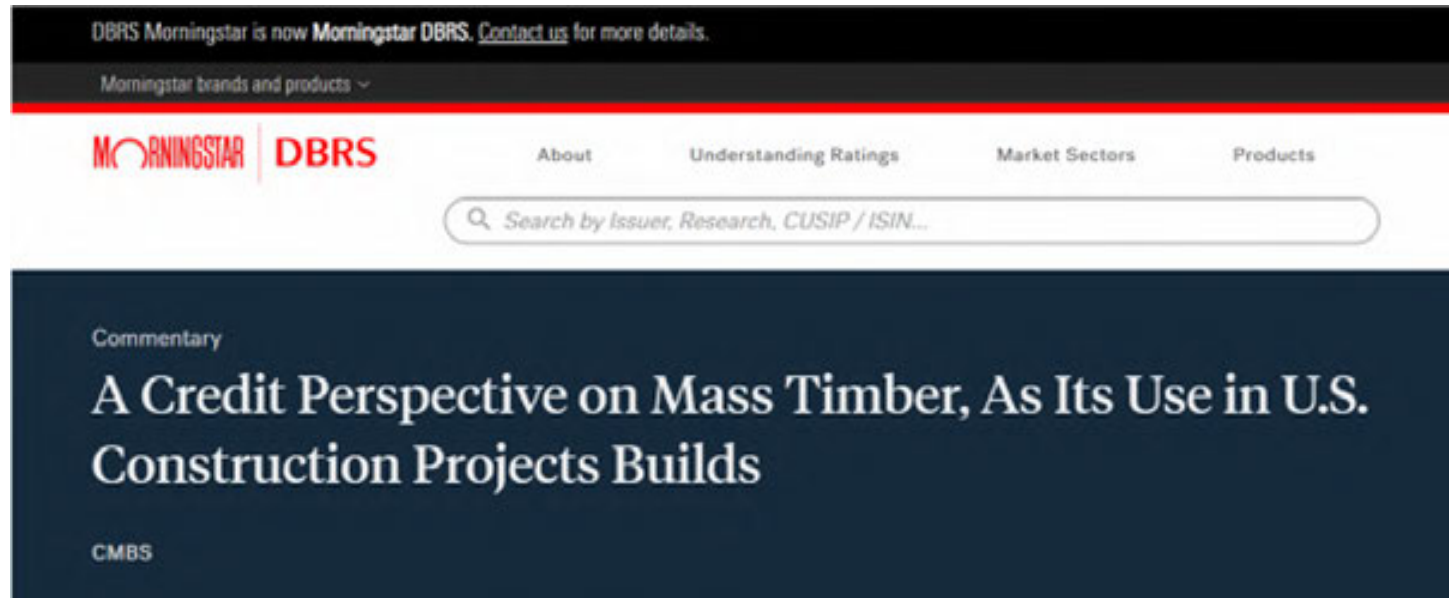
Traditional Investment Considerations:

- » Can mass timber outperform market? Achieve higher rents & faster lease up?
Lower cap rates?
- » If so, rating agencies & investors can modify net cash flow projections & cap rates.
- » Expect this could happen over time

Environmental & Social impact:



- » E: Low carbon
- » S: healthy/ well & labor benefits

<https://dbrs.morningstar.com/research/427032/a-credit-perspective-on-mass-timber-as-its-use-in-us-construction-projects-builds>



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About Understanding Ratings Market Sectors Products

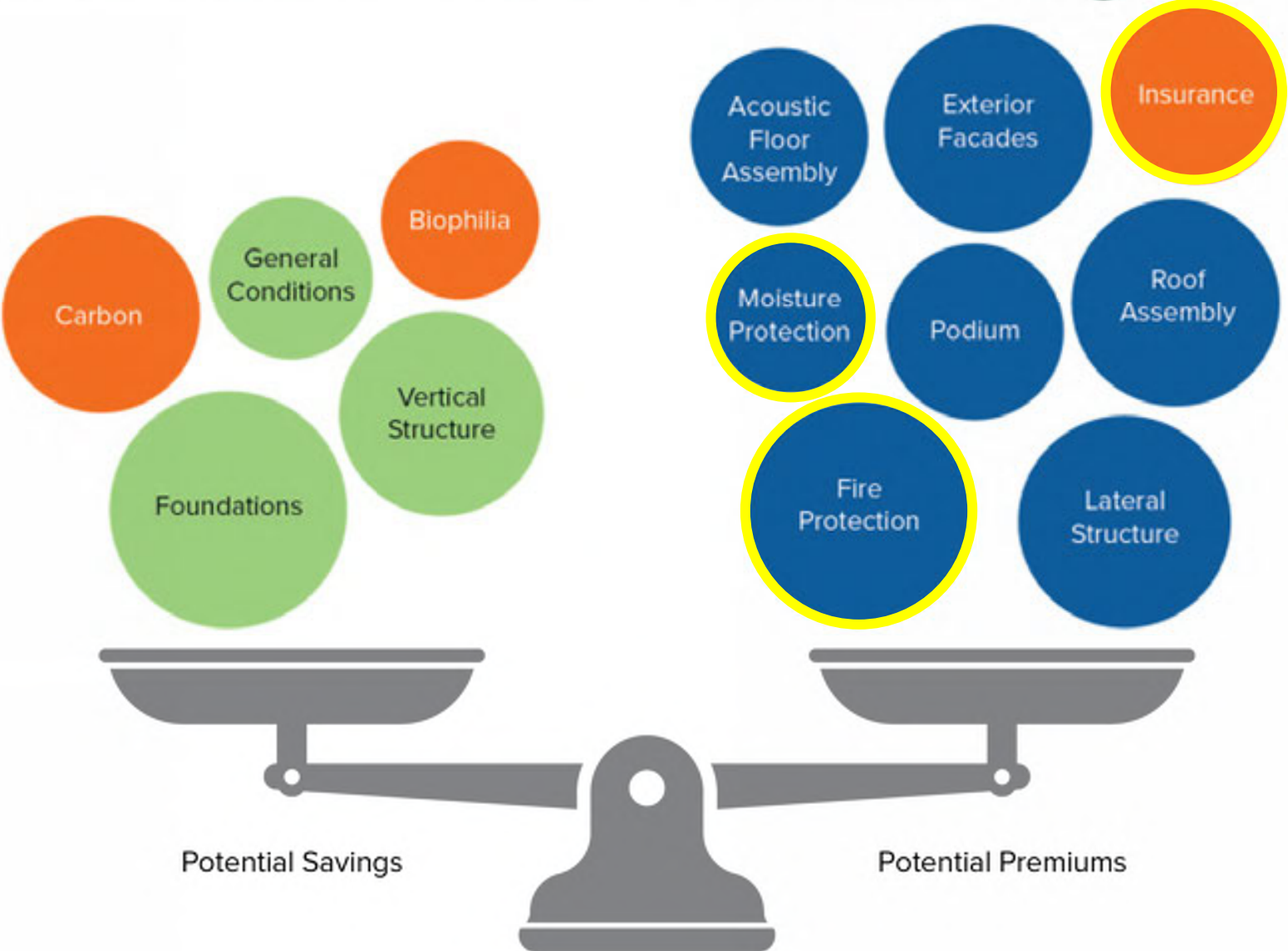
🔍 Search by Issuer, Research, CUSIP / ISIN...

Commentary

A Credit Perspective on Mass Timber, As Its Use in U.S. Construction Projects Builds

CMBS

Mass Timber Construction Cost Balancing





The Mass Timber Insurance Playbook

U.S. Edition



A guide to insuring mass timber buildings

Co-authored by Philip Collow and Jim Stocking
Adapted for the United States by Mike Hastings in collaboration with WoodWorks - Wood Products Council
U.S. Edition published by WoodWorks



Insurance Roles – Agent vs. Broker

- » **Agent**: Representative of an insurance company
- obligated to the insurance company

- » **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



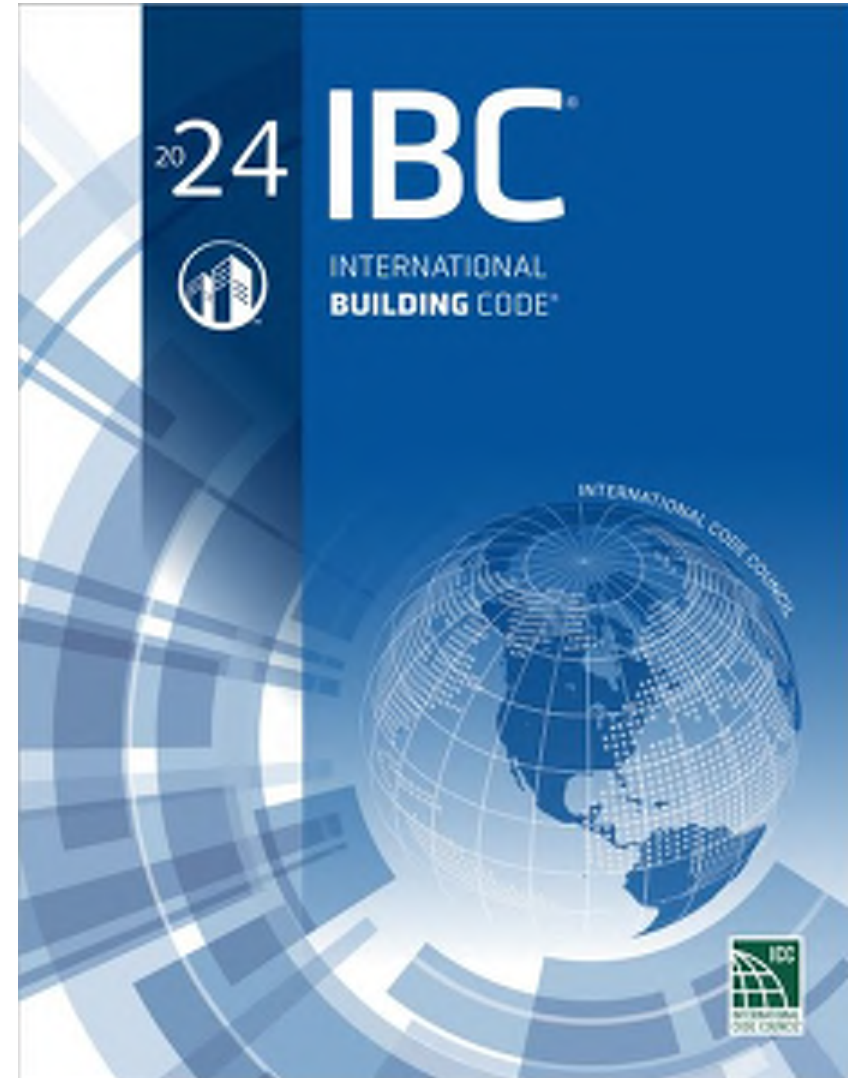
Insurance Roles – Underwriter & Risk Engineer

- » **Underwriter:** Reviews submission from broker, researches submitted data, examines qualities of the policyholder related to risk mitigation efforts, and declines or advances request within company
- » **Risk Engineer:** Brings an understanding of the construction risks to the table so that the underwriter can use this info to accurately understand the risks
 - Helps insureds to continue to improve their risk management practices



Insurance vs. Building Codes

- » Building codes primarily concerned with **occupant safety**
- » **Insurance** primarily concerned with **property loss**



What Determines Insurance Premiums?

- » In a loss event 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?



What Determines Insurance Premiums?

- » ISO building classifications
- » Historic loss data
- » Market
- » Insured history
- » Project valuation



ed, pursuant to the provi
above policy number,
urance Company] of [C

Insurance Challenges

- » ISO building classifications
(none specific to mass timber)
- » Lack of historic loss data
- » Insurance industry volatility & hard market
- » 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 frame is damaged. Please provide comments in the construction details of SOV for this type of construction.

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



DRJ Cross-Laminated Timber
D.R. Johnson Wood Innovations

PR-L320
Revised February 14, 2019

Products: DRJ Cross-Laminated Timber
D.R. Johnson Wood Innovations, 1991 Pruner Road, P.O. Box 66, Riddle, OR 97468
(541) 874-8267
www.drjtimber.com

1. Basis of the product report:
 - 2018 and 2015 International Building Code (IBC): Section 2303.1.4 Structural Glued Cross-Laminated Timber
 - 2012 IBC: Section 104.11 Alternative materials
 - 2018 and 2015 International Residential Code (IRC): Sections R502.1.6, R602.1.6, and R802.1.6 Cross-Laminated Timber
 - 2012 IRC: Section R104.11 Alternative materials
 - ANSI/APA PRG 320-2018 Performance Rated Cross-Laminated Timber
 - ANSI/APA PRG 320-2017, PRG 320-2012, and PRG 320-2011 Performance Rated Cross-Laminated Timber, recognized in the 2018 IBC and IRC, 2015 IRC, and 2015 IBC, respectively
 - APA Reports T2015P-27 and T2017P-01, and other qualification data



Photo Credit: US Forest Products Laboratory

Insurance Resource for Mass Timber

Free to Download at
www.woodworks.org

Mass Timber Project Questionnaire for Builder's Risk Insurance



This document is an editable form that construction, development and design teams can fill out to aid in collecting mass timber project-specific information to share with their insurance team. The goal is to answer some of the common questions and concerns that insurers may have specific to the mass timber aspects of the project. This document is not intended to address all topics nor be a universally accepted form providing all necessary information to insurers. However, by utilizing this form as a means of providing project-specific information on many critical items, it has the potential to preemptively address concerns and demonstrate that thorough processes for safety and property protection are in place.

General Project Information

1. Project Overview

Project name _____
Address _____
Total number of stories _____
Number of stories of timber _____
Number of stories below grade _____
Height in feet _____
Total area (square feet) _____
Occupancy(ies) _____

2. Total insured value of project (\$ USD) _____

3. What mass timber products are being used on the project (select all that apply)?

- Glue-Laminated Timber (Glulam) – beam/column application
- Cross-Laminated Timber (CLT)
- Dowel-Laminated Timber (DLT)
- Nail-Laminated Timber (NLT)
- Glue-Laminated Timber (GLT) – floor/roof/wall application
- Structural Composite Lumber (SCL)
- Heavy Timber – beams/columns/decking application
- Other (describe) _____

Mass Timber Project Risk Mitigation

- » Create a project-specific risk mitigation plan that addresses items such as:
 - » Construction schedule impacts
 - » Construction site fire safety & other safety measures
 - » Construction phase moisture protection
 - » Long term moisture protection

Sample Safety Plan

Address & Location

Site Specific Safety Plan – Con’t.

Table of Contents

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i) Safety Discipline.....	14
3) General Safety	
a) PPE.....	15

Mass Timber Prefabrication

- » Reduced schedule
- » Smaller crew size
- » Clean site
 - (Fewer On-Site Material Stockpiles)



Photo: Swinerton

Safety and Site Security

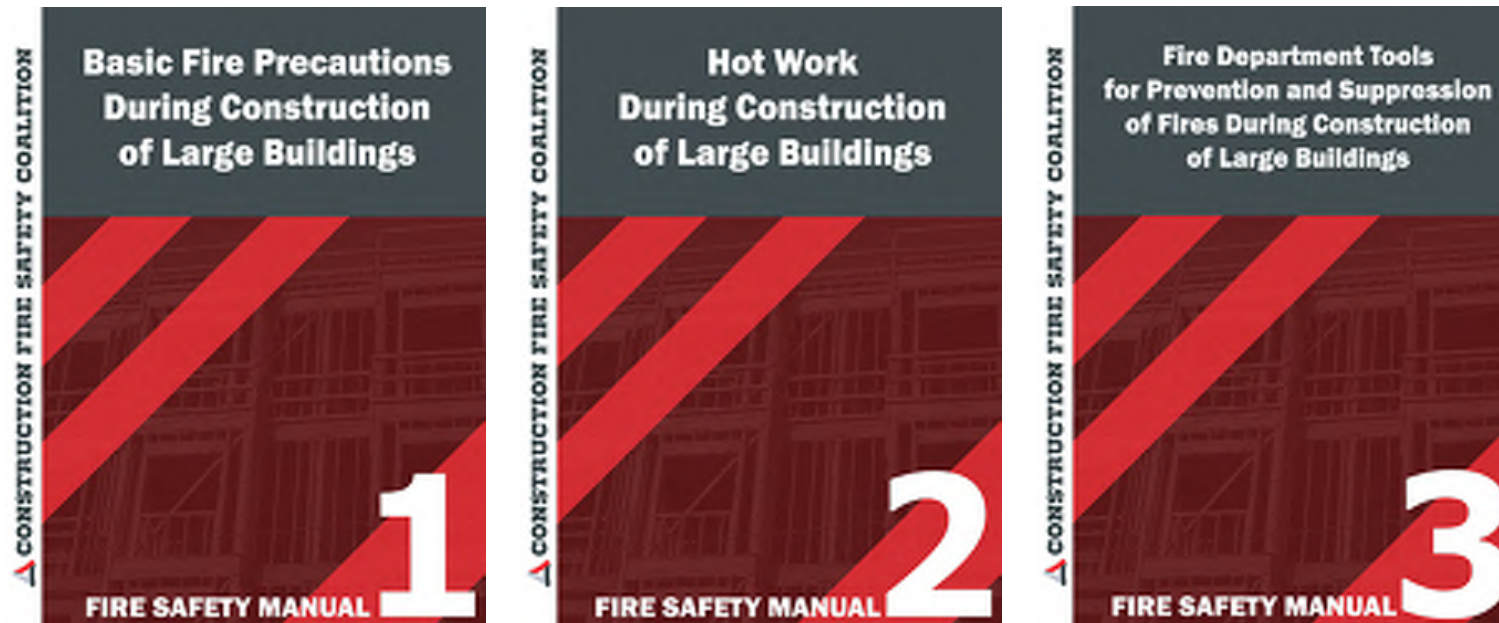


Mass Timber Project Risk Mitigation

» Construction site fire safety – Resources: [ConstructionFireSafety.org](https://www.constructionfiresafety.org)

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

The screenshot shows the WoodAware.org website. At the top left is the WoodAware logo, a red Maltese cross with a black silhouette of a house inside, and the text "WOODAWARE" across it. To the right of the logo is the tagline "Fighting Fire with Facts" in a cursive font. Further right is a photograph of three firefighters in full gear. Below these elements is a red navigation bar with white text for "Tall Mass Timber", "News & Events", "Codes & Standards", "Construction & Products", and "About".

Below the navigation bar is a dark blue banner with the WoodAware logo on the left, the text "Understanding the Tall Mass Timber Code Changes" in the center, and a red button with white text that says "DOWNLOAD TODAY!" on the right. Below the banner, the text "A Toolkit for Fire Officials" is visible.

Below the banner are two main content areas. The first is titled "Wood Products" and contains eight categories with small images: "Products Primer", "Adhesives", "Fire Performance", "Panels", "Lumber", "Glulam/SCL", "I-Joists", and "Trusses". The second area is titled "Pictorial Guide" and contains two images showing interior wood framing. Below the images is the text "WoodAware offers a visual guide to Floor, Roof, and Wall systems." and a "More" button with a right-pointing arrow.

Material Protection

- » UV rays
- » Damage
- » Moisture



Ascent

New Land Enterprises /
Korb + Associates Architects /
Thornton Tomasetti /
C.D. Smith Construction
Photo C.D. Smith

Moisture Management

Keep wood as dry as possible to avoid:

- » Stains and dirt
- » Shrinkage and swelling
- » Damage from prolonged moisture exposure

Mass timber can get wet—and will get wet on most projects. That is not a problem, provided an effective moisture management plan is in place.



**John W. Olver Design
Building at UMass Amherst**

Leers Weinzapfel Associates / Equilibrium
Consulting / Simpson Gumpertz & Heger
(EOR) / Suffolk Construction

Photo Alex Schreyer

Moisture Management Plan

Planning starts at the earliest stage and is collaborative.

Construction team responsibilities include:

- » Construction phase plan; on-site strategies based on risk evaluation
 - » Coverings
 - » Deflection/diversion
 - » Ventilation/drying
- » Anticipating and troubleshoots issues
- » Monitoring

Type and Extent of Protection

- Decision by architect/contractor
- Appearance requirements
- Extent and cost of protection methods
- Protection in fabrication plant and/or on jobsite
- Capability of fabricator
- Capability of installer/moisture protection subcontractor
- Schedule protection plan
- Protection prior to installation
- Protection during installation
- Protection after installation

Moisture Management Responsibility and Risk

- Responsibility for managing and cost of the plan
- Contractor and/or fabricator
- Conditions to be considered
- Schedule delays and revisions
- Construction weather conditions (worst case)

Monitoring Moisture Before, During and After Construction

- Coordination with concrete topping activities
- Roofing material
- Columns, beams and floor/wall panels

Factory-Applied Sealants & Coatings

Protective treatments vs. finishes

- » Protective undercoat typically applied in shop
- » Additional coats for protection and beauty



Expert Tips

Architectural Finishes and Mass Timber: A Primer

Covers coatings and how to choose them, protective treatments vs. finishes, best practices for protecting wood in situ, and maintenance cycles



Adidas North American Headquarters / LEVER Architecture / photo Jeremy

Factory-Applied Membranes

Can be spray-applied, sheet product (adhesive or non), or board/sheathing product.



Transportation & Storage

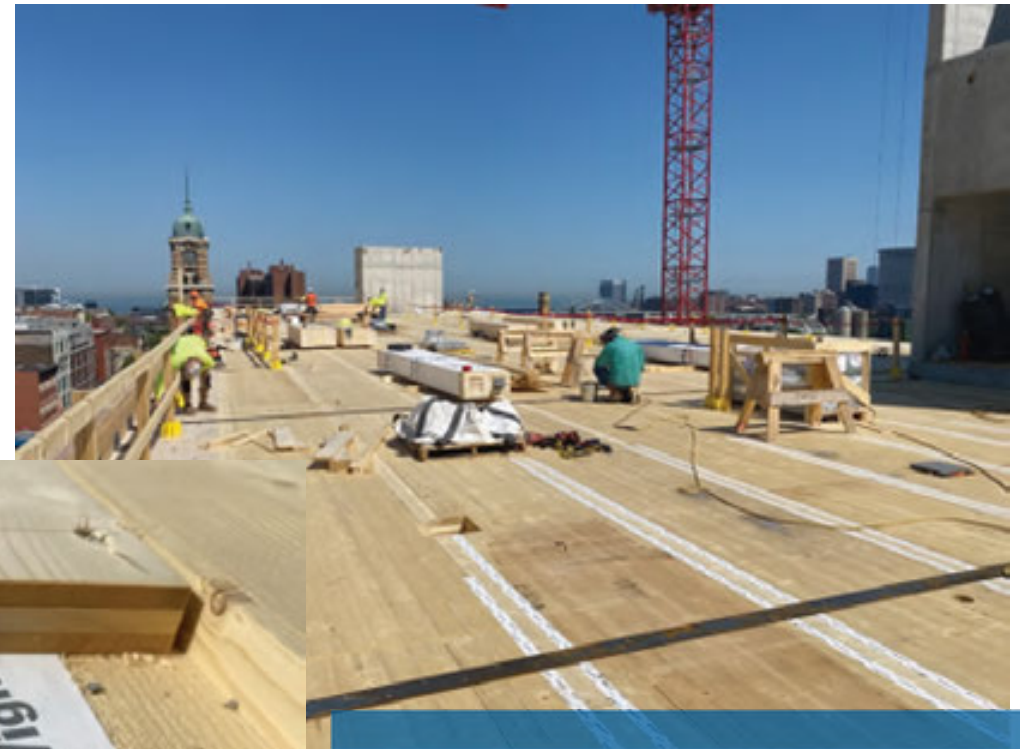


Photos Paul Alberts / Ardor Media / naturallywood.com

Joint Treatment



Photo: Andersen Construction



INTRO

Harbor Bay Ventures / Hartshorne Plunkard
Architecture / Forefront Structural Engineers /
Fast + Epp / Panzica Construction
Photos WoodWorks

Deflection & Diversion

Platte Fifteen

Oz Architecture / KL&A Engineers & Builders /
Adolfson & Peterson Construction
Photo WoodWorks



*From Moisture Risk Management Strategies for Mass Timber Buildings,
© 2020 RDH Building Science Inc.*

The best way to minimize exposure to moisture is to close in the project quickly.



Moisture Monitoring

Monitor the moisture content (MC) of wood materials throughout construction.

- » When materials are received
- » Regular intervals
- » After rainfall
- » Before drying in

Product	MC at Manufacture	Desired MC at Project Close-in with Direct-Applied Concrete Toppings
CLT	12% +/- 3% ^a	<16%
GLT	12-16% ^b	<16%
NLT	<19% ^c	<16%
DLT	15-19% ^d	<16%

Sources: ^aPRG-320 standard, ^bANSI A190.1, ^cNail-Laminated Timber Design Guide – U.S. Edition, and ^dDLT Design and Profile Guide

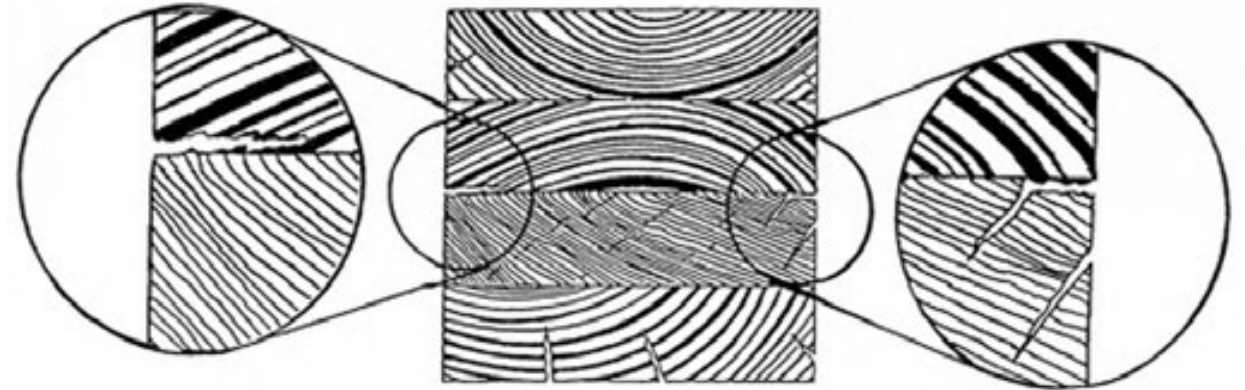
Splitting and Checking

What causes splits and checks?

- » Rapid drying rate = Larger shrinkage differential

When does checking occur?

- » Usually complete within first full cycle of environmental conditioning of the space
- » Changes in the end use of structure may cause future checking



Mass Timber Moisture Management for Construction



*Strategies for
managing the
unique moisture
risks of mass timber
building projects*

Photo RDH Building Science

Managing Moisture: Mass Timber Guide



MOISTURE RISK MANAGEMENT STRATEGIES FOR MASS TIMBER BUILDINGS

A guide for designers, construction professionals,
and building developers

RDH BUILDING
SCIENCE

OCTOBER 2022 | V2.1

Questions? Ask us anything.



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Please take our survey!

