



Mass Timber Cost Optimization: How the Details Influence the Big Picture

Bruce Lindsey, Regional Director, WoodWorks – Wood Products Council

Photo: Texas Timber Frames



WHAT'S UNIQUE ABOUT MASS TIMBER?

The image shows the interior of a modern building under construction. The walls and ceiling are made of light-colored wood. A large window on the left side offers a view of a forested landscape. The right side of the image shows the wooden framing for a staircase and other interior walls. The floor is made of polished wood. A semi-transparent grey banner is overlaid across the bottom of the image, containing the text "IT'S (RELATIVELY) NEW" in a bold, dark brown, sans-serif font.

IT'S (RELATIVELY) NEW

Photo: John Klein





Photo: John Stamets



Photo: Alex Schreyer

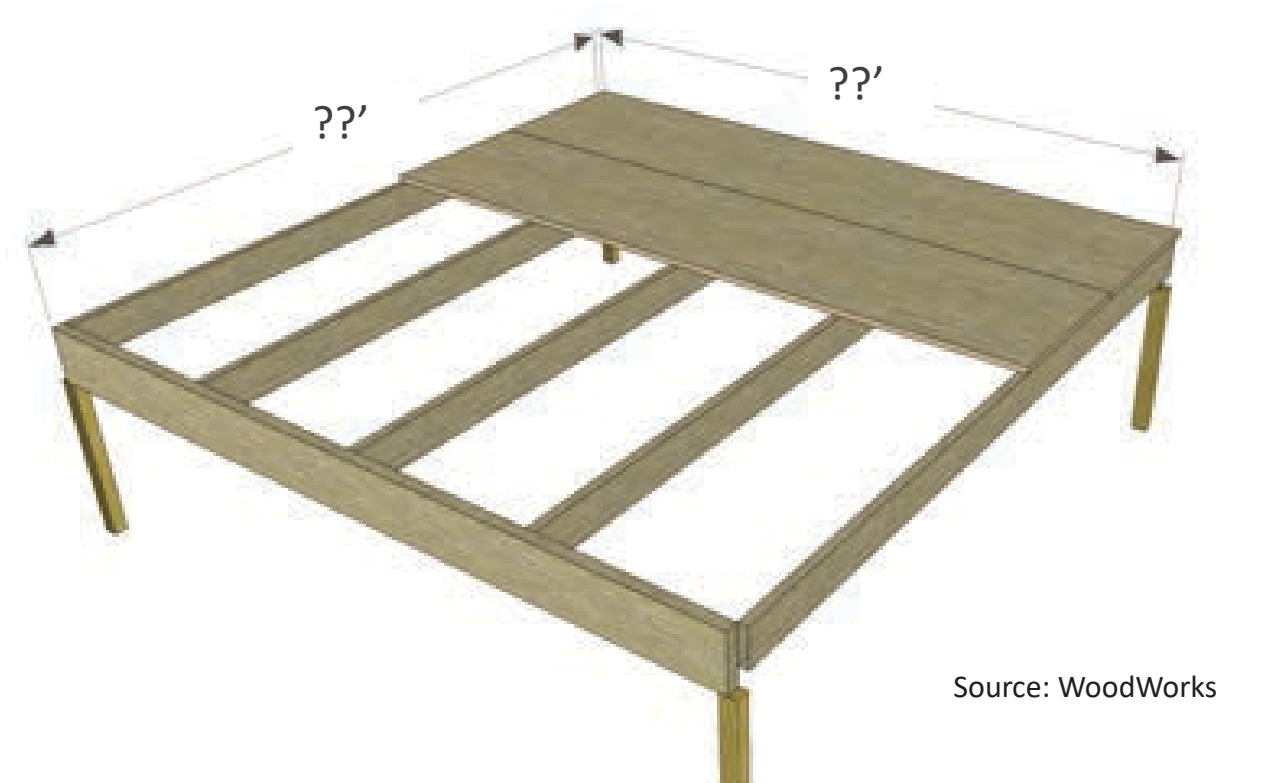


NOT A COMMODITY PRODUCT

Photo: Marcus Kauffman



Photo: DR Johnson



Source: WoodWorks



Photo: Sauter Timber

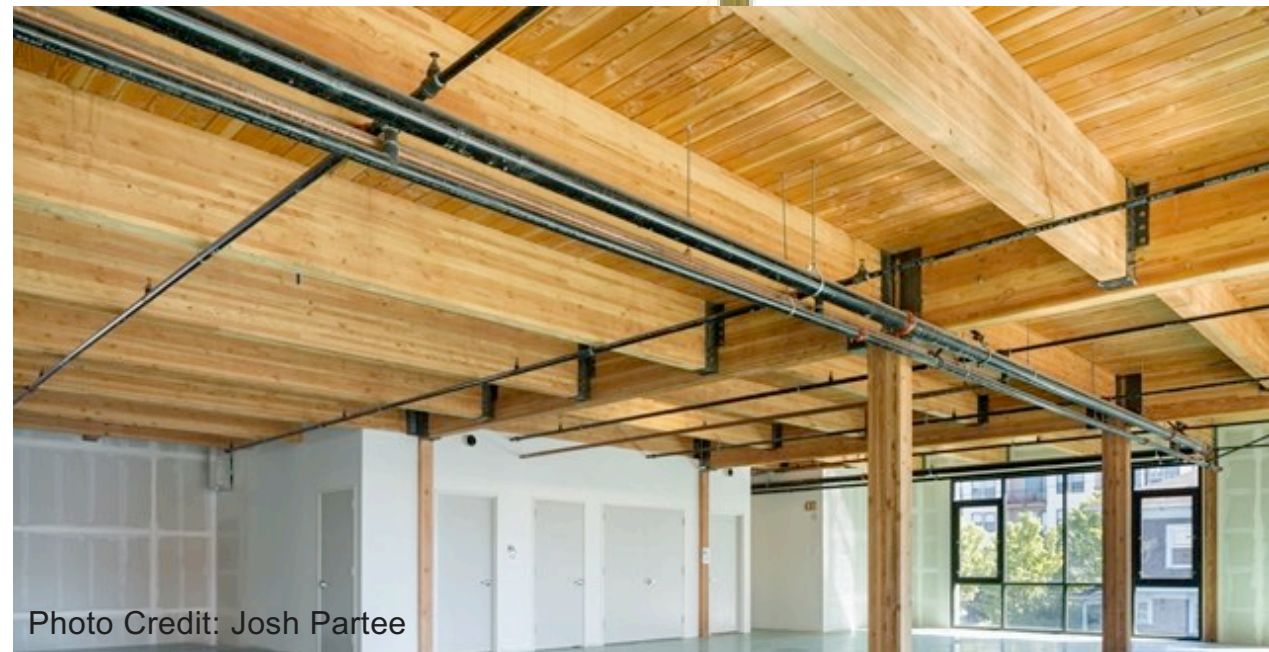


Photo Credit: Josh Partee



STRUCTURE = FINISH = FIRE PROTECTION



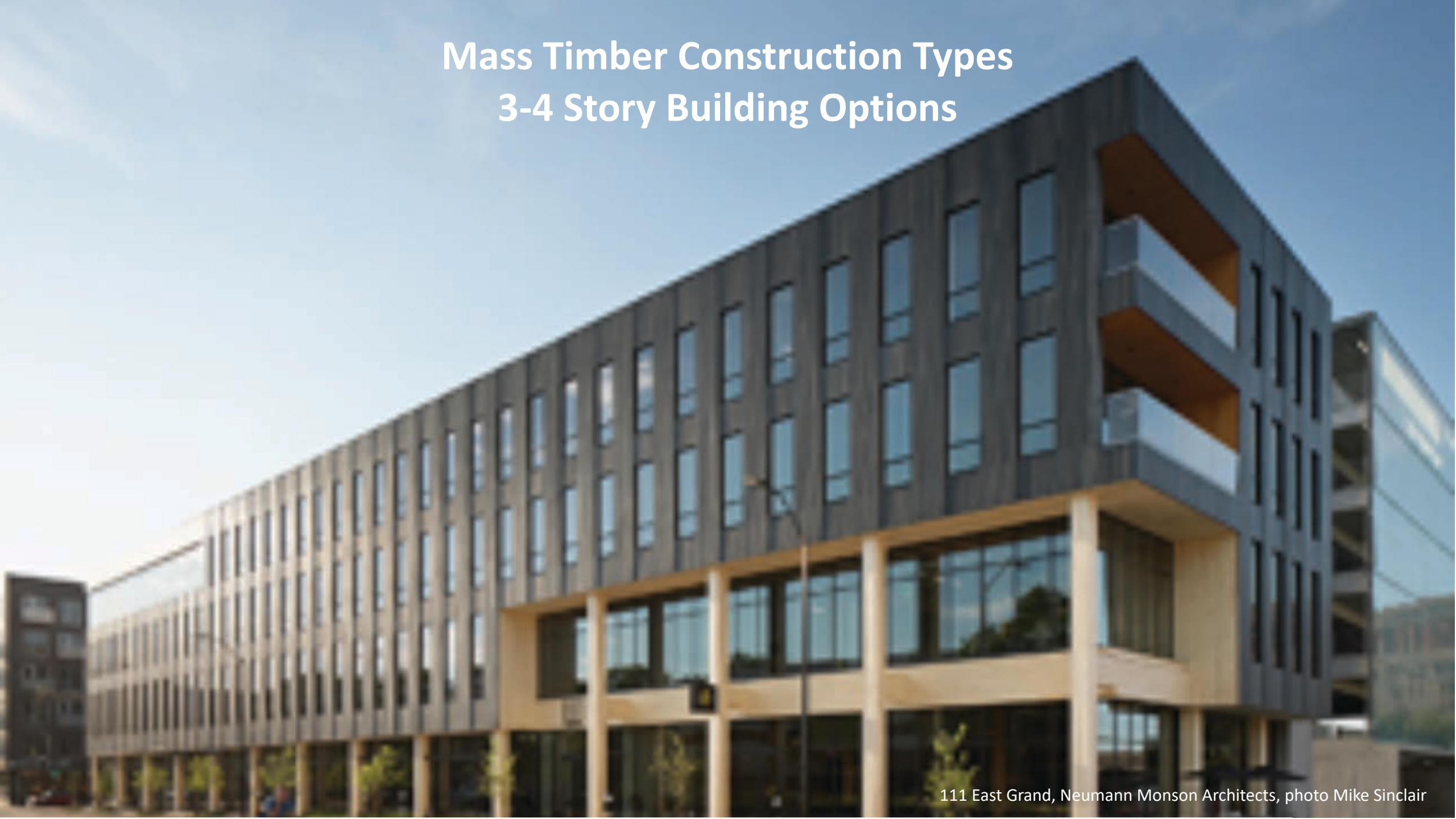
Photo: Ema Peter Photography



**COST OPTIMIZATION MUST ACCOUNT
FOR MORE THAN COST (OF TIMBER)**

Mass Timber Construction Types

3-4 Story Building Options



Mass Timber Construction Types

3-4 Story Building Options

	Type IIIB	Type VA
Allowable Building Height	4 stories / 75 ft	4 stories / 70 ft
Allowable Area	57k SF / 171k SF	54k SF / 162k SF
Interior FRR	0 HR	1 HR
Interior materials	Any material	Any material
Interior partitions	0 HR non-brng	0 HR non-brng
Exterior Bearing Walls	FRTW or Non-com, 2 HR	Any material, 1 HR
Concealed Spaces	Permitted	Permitted

3-ply Floors

No CLT ext. walls

**Connections/Penetrations
not rated**

5-ply Floors

CLT ext. walls

**Connections/Penetrations
rated**



20x25 Grid No Intermediate Beams
5-ply CLT
VA or IIIB

20x20 Grid w/1 Intermediate Beam per Bay
3-ply CLT
IIIB





**Rated Connections
VA or IIIB**



**Non-rated Connections
IIIB**

MT Fire Resistance Ratings (FRR)



Fire-Resistive Design of Mass Timber Members

Code Applications, Construction Types and Fire Ratings

Robert J. Lujan, P.E., S.E. • Senior Technical Director • WoodWorks
Scott Steinhilber, P.E., P.E., S.E. • Senior Technical Director • WoodWorks

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 in building design is the growing use of mass timber—i.e., large solid wood panel products such as cross-laminated timber (CLT) and nail-laminated timber (NLT)—for floor, wall and roof construction. Like heavy timber, mass timber products have inherent fire resistance that allows them to be left exposed and still achieve a fire-resistance rating. Because of their strength and dimensional stability, these products also offer a low-carbon alternative to steel, concrete, and masonry for many applications. 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 of wood design.

This paper has been written to support architects and engineers exploring the use of mass timber for commercial and multi-family construction. It focuses on how to meet fire-resistance requirements in the International Building Code (IBC), including calculation and testing-based methods. Unless otherwise noted, references refer to the 2018 IBC.

Mass Timber & Construction Type

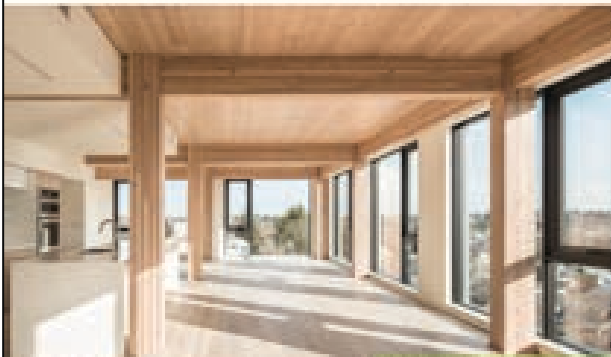
Before demonstrating fire-resistance ratings of exposed mass timber elements, it's important to understand under what circumstances the code currently allows the use of mass timber in commercial and multi-family construction.

A building's assigned construction type is the main indicator of where and when all wood systems can be used. IBC Section 602 defines five main options (Type I through V) with all but Type IV having subcategories A and B. Types III and V permit the use of wood framing throughout much of the structure and both are used extensively for modern mass timber buildings.

Type III IBC 602.3 – Timber elements can be used in floors, roofs and interior walls. Fire-retardant-treated wood (FRTW) framing is permitted in exterior walls with a fire-resistance rating of 2 hours or less.

Type V IBC 602.5 – Timber elements can be used throughout the structure, including floors, roofs and both interior and exterior walls.

Type IV IBC 602.4 – Commonly referred to as "Heavy Timber" construction, this option



Carlentz | Portland, Oregon
Riser Group | Feb Architecture
Manning Structural Engineering

Mass Timber Fire Design Resource

- Code compliance options for demonstrating FRR
- Construction type considerations
- Free download at woodworks.org

Credit: WoodWorks

MT Fire Resistance Ratings (FRR)

Inventory of Fire Tested MT Assemblies

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



CLT Panel	Manufacturer	CLT Grade or Major & Minor Grade	Ceiling Protection	Panel Connection in Test	Floor Topping	Load Rating	Fire Resistance Achieved (Hours)	Source	Testing Lab
8-ply CLT (114mm x 4000 mm)	Nordic	SPP 16/50/36 x 130 MMB x SPP 40	2 layers 1/2" Type X gypsum	Half-Lap	None	Ballasted 100% Moment Capacity	1	1 (Test 1)	NBC Fire Laboratory
8-ply CLT (100mm x 4000 mm)	Sveinbjörn	SPP 40/102 x SPP 40/102	1 layer 1/2" Type X gypsum	Half-Lap	None	Ballasted 100% Moment Capacity	1	1 (Test 3)	NBC Fire Laboratory
8-ply CLT (173mm x 4000 mm)	Nordic	EL	None	Top-side Splice	2 staggered layers of 1/2" cement boards	Loaded, See Manufacturer	2	2	NBC Fire Laboratory March 2016
8-ply CLT (173mm x 4000 mm)	Nordic	EL	1 layer of 1/2" Type X gypsum under 2 channels and flooring strips with 3 5/8" dimension boards	Top-side Splice	2 staggered layers of 1/2" cement boards	Loaded, See Manufacturer	2	2	NBC Fire Laboratory Nov 2014
8-ply CLT (173mm x 4000 mm)	Nordic	EL	None	Top-side Splice	3/4 in. proprietary gypsum over Mass on acoustic feel mat	Ballasted 100% Moment Capacity	1.5	3	UL
8-ply CLT (173mm x 4000 mm)	Nordic	EL	1 layer 5/8" normal gypsum	Top-side Splice	3/4 in. proprietary gypsum over Mass on acoustic feel mat or proprietary coated board	Ballasted 100% Moment Capacity	2	4	UL
8-ply CLT (173mm x 4000 mm)	Nordic	EL	2 layers 5/8" Type X Gypsum under Redken/Board under 3 7/8" 4 layers with 1 1/2" Insulated Wood between Joists	Half-Lap	None	Loaded, See Manufacturer	2	21	Intertek 8/24/2012
8-ply CLT (173mm x 4000 mm)	Sveinbjörn	ELMS MSR 2100 x SPP 42	None	Top-side Splice	1 x 1/2" Maximum Gypsum 2000 or as Maximum Reinforcing Mark	Loaded, See Manufacturer	2.5	4	Intertek, 2/22/2016
8-ply CLT (173mm x 4000 mm)	DR Johnson	VI	None	Half-Lap & Top-side Splice	2" gypsum topping	Loaded, See Manufacturer	2	7	SwRI (May 2016)
8-ply CLT (173mm x 4000 mm)	Nordic	SPP 16/50/36 MMB x SPP 40	None	Half-Lap	None	Ballasted 100% Moment Capacity	1.5	1 (Test 3)	NBC Fire Laboratory
8-ply CLT (173mm x 4000 mm)	Sveinbjörn	SPP 40/102 x SPP 40/102	1 layer 5/8" Type X gypsum	Half-Lap	None	Unballasted 100% Moment Capacity	2	1 (Test 6)	NBC Fire Laboratory
8-ply CLT (143mm x 4000 mm)	Sveinbjörn	SPP 40/102 x SPP 40/102	None	Half-Lap	None	Unballasted 100% Moment Capacity	2.5	1 (Test 7)	NBC Fire Laboratory
8-ply CLT (173mm x 4000 mm)	SmartLam	SL-V4	None	Half-Lap	nominal 1/2" plywood with 3/4" sub.	Loaded, See Manufacturer	2	12 (Test 4)	Western Fire Center 10/26/2016
8-ply CLT (173mm x 4000 mm)	SmartLam	VI	None	Half-Lap	nominal 1/2" plywood with 3/4" sub.	Loaded, See Manufacturer	2	12 (Test 3)	Western Fire Center 10/26/2016
8-ply CLT (173mm x 4000 mm)	DR Johnson	VI	None	Half-Lap	nominal 1/2" plywood with 3/4" sub.	Loaded, See Manufacturer	2	12 (Test 6)	Western Fire Center 11/01/2016
8-ply CLT (114mm x 4000 mm)	KTH	(VIM)	None	Half-Lap & Top-side Splice	None	Loaded, See Manufacturer	1	16	SwRI

New Tall Mass Timber Types



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

TYPE IV-A



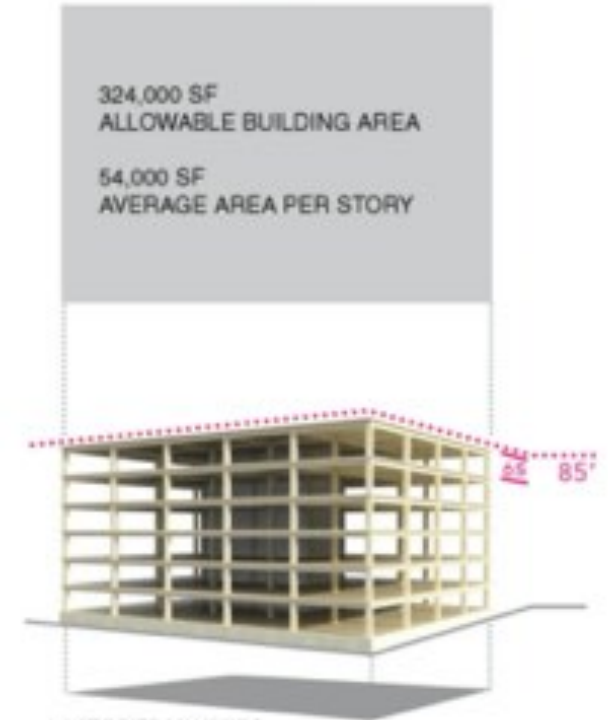
12 STORIES
BUILDING HEIGHT 180 FT
ALLOWABLE BUILDING AREA 648,000 SF
AVERAGE AREA PER STORY 54,000SF

TYPE IV-B



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

TYPE IV-C



6 STORIES MAXIMUM
85'-0" MAXIMUM BUILDING HEIGHT
324,00 SF MAXIMUM AREA

TYPE IV- HT

IBC 2015

IBC 2021

BUSINESS OCCUPANCY [GROUP B]

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

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

By: Benjamin, PhD, PE, WoodWorks • Wood Products Council • Matt Timmers, SE, John A. Martin & Associates
• Dennis Richardson, PE, CBC, CMAA, American Wood Council

In January 2019, the International Code Council (ICC) approved a set of proposals to allow tall wood buildings as part of the 2021 International Building Code (IBC). Based on these proposals, the 2021 IBC will include three new construction types—Type IV-A, IV-B and IV-C—allowing the use of mass timber or noncombustible materials. These new types are based on the previous Heavy Timber construction type (renamed Type IV-HT) but with additional fire-resistance ratings and levels of required noncombustible protection. The code will include provisions for up to 18 stories of Type IV-A construction for Business and Residential Occupancies.

Based on information first published in the Structural Engineers Association of California (SEAOC) 2018 Conference Proceedings, this paper summarizes the background to these proposals, technical research that supported their adoption, and resulting changes to the IBC and product-specific standards.

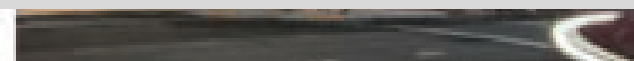
Background: ICC Tall Wood Building Ad Hoc Committee

Over the past 10 years, there has been a growing interest in tall buildings constructed from mass timber materials (Beneman 2013, Timmers 2016). Around the world there



WoodWorks Tall Wood Design Resource

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



TECHNICAL BRIEF

Demonstrating Fire-Resistance Ratings for Mass Timber Elements in Tall Wood Structures

Richard McLain, PE, SE • Senior Technical Director – Tall Wood, WoodWorks

Changes to the 2021 International Building Code (IBC) have created opportunities for wood buildings that are much larger and taller than prescriptively allowed in past versions of the code. Occupant safety, and the need to ensure fire performance in particular, was a fundamental consideration as the changes were developed and approved. The result is three new construction types—Type IV-A, IV-B and IV-C—which are based on the previous Heavy Timber construction type (renamed Type IV-HT), but with additional fire protection requirements.

One of the main ways to demonstrate that a building will meet the required level of passive fire protection, regardless of structural materials, is through hourly fire-resistance ratings (FRRs) of its elements and assemblies. The IBC defines an FRR as *the period of time a building element, component or assembly maintains the ability to confine a fire, continues to perform a given structural function, or both, as determined by the tests, or the methods based on tests, prescribed in Section 703.*

FRRs for the new construction types are similar to those required for Type I construction, which is primarily steel and concrete.¹ (See Table 1.) They are found in IBC Table 601, which includes FRR requirements for all construction types and building elements; however, other code sections should be checked for overriding provisions (e.g., occupancy separation, shaft enclosures, etc.) that may alter the requirement.



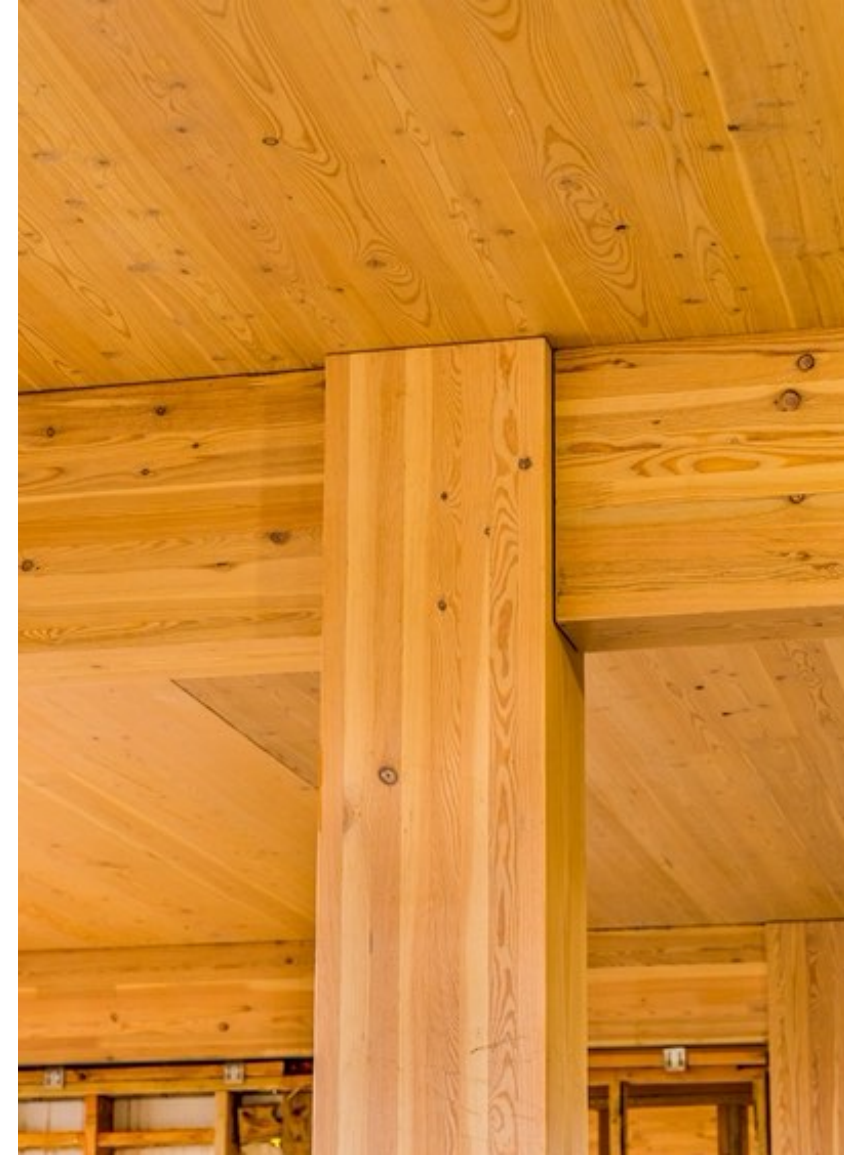
Image: Korb + Associates Architects

TABLE 1:
FRR Requirements (Hours) for Tall Mass Timber Construction Types and Existing Type I

Building Element	I-A Unlimited stories, max. 12 ft. clear height	IV-A Max. 18 stories, max. 12 ft. clear height	I-B Max. 12 stories, max. 12 ft. clear height	IV-B Max. 12 stories, max. 12 ft. clear height	IV-C Max. 9 stories, max. 12 ft. clear height
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Tall Timber Fire-Resistance Design

Mass Timber: Structure Often is Finish



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

But by Itself, Not Adequate for Acoustics



Mass Timber Acoustics

TABLE 1:
Examples of Acoustically-Tested Mass Timber Panels

Mass Timber Panel	Thickness	STC Rating	IIC Rating
3-ply CLT wall ⁴	3.07"	33	N/A
5-ply CLT wall ⁴	6.875"	38	N/A
5-ply CLT floor ⁶	5.1875"	39	22
5-ply CLT floor ⁴	6.875"	41	25
7-ply CLT floor ⁴	9.65"	44	30
2x4 NLT wall ⁶	3-1/2" bare NLT 4-1/4" with 3/4" plywood	24 bare NLT 29 with 3/4" plywood	N/A
2x6 NLT wall ⁶	5-1/2" bare NLT 6-1/4" with 3/4" plywood	22 bare NLT 31 with 3/4" plywood	N/A
2x6 NLT floor + 1/2" plywood ²	6" with 1/2" plywood	34	33

Source: Inventory of Acoustically-Tested Mass Timber Assemblies, WoodWorks⁷

Mass Timber Acoustics

One of the main reasons is “mass”

Recall the three ways to increase acoustical performance:

1. **Add Mass**
2. Add noise barriers
3. Add decouplers



Image credit: Christian Columbres

Mass Timber Acoustics



Concrete Slab:

6" Thick

80 PSF

STC 53



CLT Slab:

6-7/8" Thick

18 PSF

STC 41



Mass Timber Acoustics

There are three main ways to improve an assembly's acoustical performance:

1. Add mass
2. Add noise barriers
3. Add decouplers



Solutions Paper

Mass Timber Acoustics



Acoustics and Mass Timber: Room-to-Room Noise Control

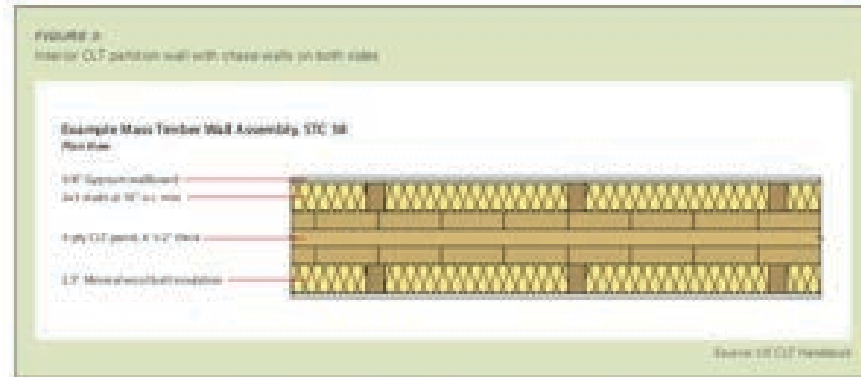
Perford McCann, P.E., SE • Senior Technical Director • WoodWorks



TS Minnesota
Assistant: MJJ / Michael Owen Architecture, CLT Core
Structural Engineer: Magnusson Klemencic Associates
Design Team: + Burt (Shawcraft)

The growing availability and code acceptance of mass timber—a large solid wood panel product such as pre-laminated timber (CLT) and nail-laminated timber (NLT)—for floor, wall and roof construction has given designers a low-carbon alternative to steel, concrete, and masonry for many applications. However, the use of mass timber in multi-family and commercial buildings presents unique acoustic challenges.

While laboratory measurements of the impact and airborne sound isolation of traditional building assemblies such as light wood frame, steel and concrete are widely available, fewer resources exist that quantify the acoustic performance of mass timber assemblies. Additionally, one of the most desired aspects of mass timber construction is the ability to leave a building's structure exposed as finish, which creates the need for appropriate assemblies. With careful design and detailing, mass timber buildings can meet the acoustic performance expectations of most building types.



Mass Timber Assembly Options: Walls

Mass timber panels can also be used for interior and exterior walls—both bearing and non-bearing. For interior walls, the need to conceal services such as electrical and plumbing is an added consideration. Common approaches include building a chase wall in front of the mass timber wall or installing gypsum wallboard on resilient channels that are attached to the mass timber wall. As with bare mass timber floor panels, bare mass timber walls don't typically provide adequate noise control, and chase walls also function as acoustical improvements. For example, a 3-ply CLT wall panel with a thickness of 3.07" has an STC rating of 33⁺. In contrast, Figure 3 shows an interior CLT partition wall with chase walls on both sides. This assembly achieves an STC rating of 58, exceeding the IBC's acoustical requirements for multi-family construction. Other examples are included in the inventory of tested assemblies noted above.

Acoustical Differences between Mass Timber Panel Options

The majority of acoustically-tested mass timber assemblies include CLT. However, tests have also been done on other mass timber panel options such as NLT and dowel-laminated timber (DLT), as well as traditional heavy timber options such as tongue and groove decking. Most tests have concluded that CLT acoustical performance is slightly better than that of other mass timber options, largely because the cross-orientation of laminations in a CLT panel limits sound flanking.

For those interested in comparing similar assemblies and mass timber panel types and thicknesses, the inventory noted above contains tested assemblies using CLT, NLT, glued-laminated timber panels (GLT), and tongue and groove decking.

Improving Performance by Minimizing Flanking

Even when the assemblies in a building are carefully designed and installed for high acoustical performance, consideration of flanking paths—in areas such as assembly intersections, beam-to-column/wall connections, and NRP penetrations—is necessary for a building to meet overall acoustical performance objectives.

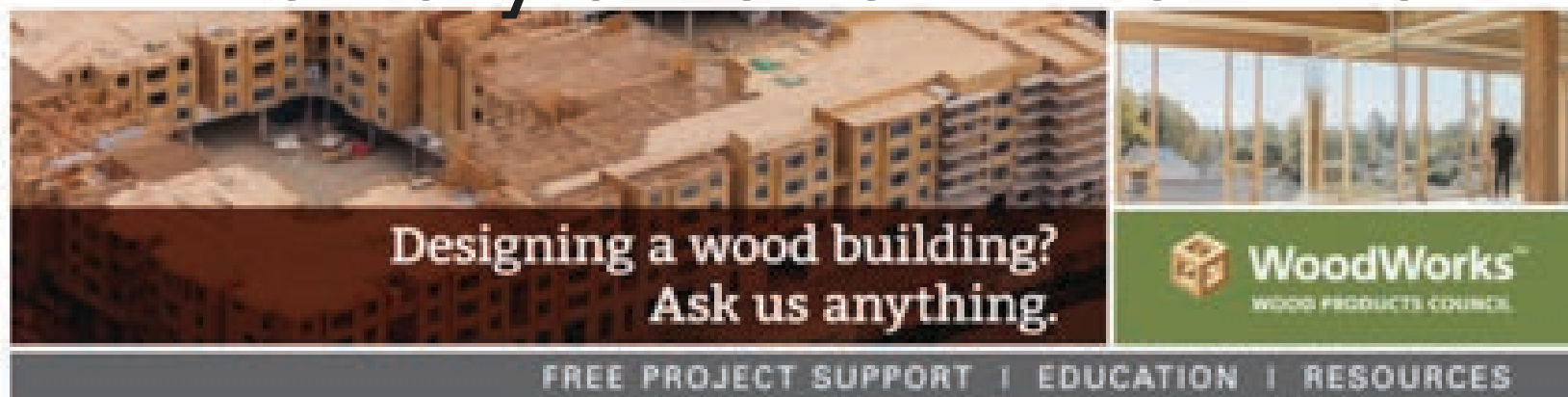
One way to minimize flanking paths at these connections and interfaces is to use resilient connection isolation and resilient strips. These products are capable of resisting structural loads in compression between structural members and connections while providing isolation and breaking hard, direct connections between members. In the context of the three methods for improving acoustical performance noted above, these strips act as decouplers. With resilient connections, interfaces and penetrations, there is a much greater chance that the acoustical performance of a mass timber building will meet expectations.



Acoustical isolation strips

Photo: Woodworks

Inventory of Tested Assemblies



Acoustically-Tested Mass Timber Assemblies

Following is a list of mass timber assemblies that have been acoustically tested as of January 23, 2019. Sources are noted at the end of this document. For free technical assistance on any questions related to the acoustical design of mass timber assemblies, or free technical assistance related to any aspect of the design, engineering or construction of a commercial or multi-family wood building in the U.S., email help@woodworks.org or contact the WoodWorks Regional Director nearest you: <http://www.woodworks.org/project-assistance>

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<http://bit.ly/mass-timber-assemblies>

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

(4)



CLT Panel	Concrete/Gypsum Topping	Acoustical Mat Product Between CLT and Topping	Finish Floor	STC ¹	IC ²	Source
CLT 5-ply (6.875")	1-1/2" Gyp-Crete [®]	Maxxon Acousti-Mat [®] 3/4	None	47 ¹ ASTC	47 ¹ AHC	1
			LVT	-	49 ¹ AHC	
			Carpet + Pad	-	75 ¹ AHC	
			LVT on Acousti-Top [®]	-	52 ¹ AHC	
			Eng Wood on Acousti-Top [®]	-	51 ¹ AHC	
		Maxxon Acousti-Mat [®] N Premium	None	49 ¹ ASTC	45 ¹ AHC	
			LVT	-	47 ¹ AHC	
			LVT on Acousti-Top [®]	-	49 ¹ AHC	
	1-1/2" Levelock [®] Brand 2500	USG SAM N25 Ultra	None	45 ¹	39 ¹	15
			LVT	48 ¹	47 ¹	16
			LVT Plus	48 ¹	49 ¹	58
			Eng Wood	47 ¹	47 ¹	59
			Carpet + Pad	45 ¹	67 ¹	60
			Ceramic Tile	50 ¹	46 ¹	61
		Soprema [®] Innomat	None	45 ¹	42 ¹	15
			LVT	48 ¹	44 ¹	16
			LVT Plus	48 ¹	47 ¹	58
			Eng Wood	47 ¹	45 ¹	59
						60
						61
						62
						63
						64
						65
						66
						67
			Eng Wood	47 ¹	49 ¹	59

A Few Notes About the Inventory

LVT on 2" Concrete

Mass Timber Assemblies

Effect of Timber Thickness

Without Dropped Ceiling

Minimum 1" noncombustible material

Mass timber floor panel



3-ply CLT

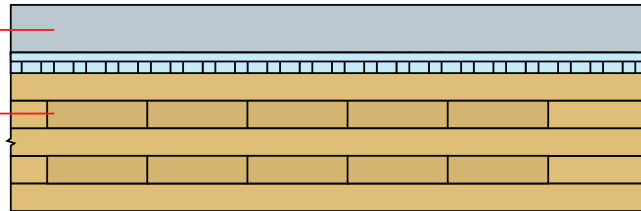
STC 53

IIC 48

Without Dropped Ceiling

Minimum 1" noncombustible material

Mass timber floor panel



5-ply CLT

STC 53

IIC 52

LVT on 1" Gypsum

Mass Timber Assemblies

Effect of Gypsum Ceiling

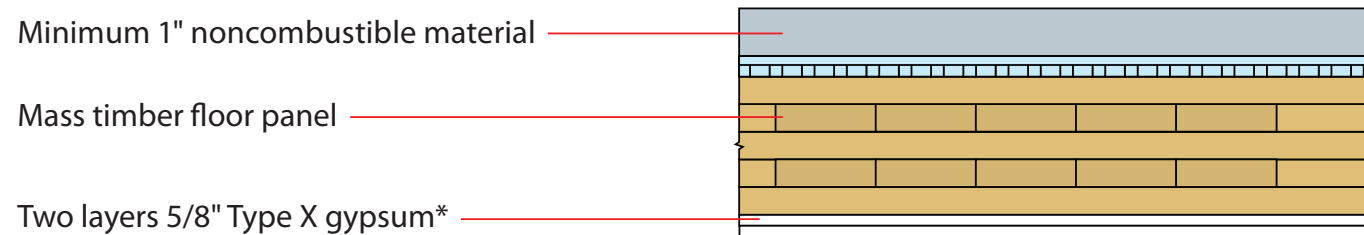
Without Dropped Ceiling



STC 51

IIC 43

Without Dropped Ceiling

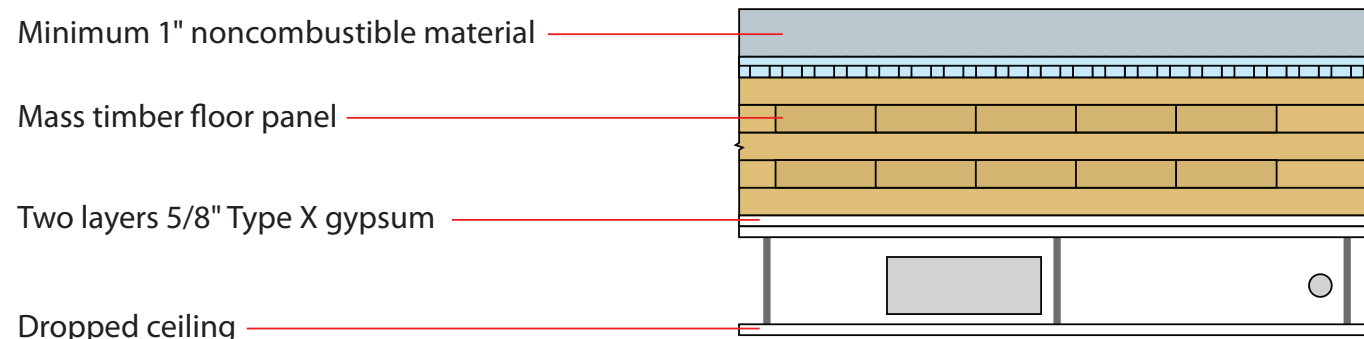


STC 52

IIC 48

**Applicable to most locations; limited exposed mass timber permitted in IV-B*

With Dropped Ceiling



STC 63

IIC 63

MASS TIMBER WHY'S

Innovation and Aesthetic Appeal

Speed of Construction

Construction Site Constraints –
Urban Infill

Labor Shortages

Structural Performance - Lightweight

Business Case for Healthy Buildings



Tremblay Laliberté Building, Structure Fusion, Photo Stephane Groleau

KNOW YOUR WHY



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		

Reduce Risk

Optimize Costs

- For the entire project team, not just builders
- Lots of reference documents

Mass Timber Cost and Design Optimization Checklists

WoodWorks has developed the following checklists to assist in the design and cost optimization of mass timber projects.

The *design optimization* checklists are intended for building designers (architects and engineers), but many of the topics should also be discussed with the fabricators and builders. The *cost optimization* checklists will help guide coordination between designers and builders (general contractors, construction managers, estimators, fabricators, installers, etc.) as they are estimating and making cost-related decisions on a mass timber project.

Most resources listed in this paper can be found on the WoodWorks website. Please see the end notes for URLs.

First Tech Federal Credit Union – Hillsboro, OR
ARCHITECT:
Hacker
ENGINEERS:
Kramer Gehlen & Associates,
Equilibrium Consulting
CONTRACTOR:
Swinerton



Download Checklists at
www.woodworks.org

www.woodworks.org/wp-content/uploads/wood_solution_paper-Mass-Timber-Design-Cost-Optimization-Checklists.pdf



Photo Credit: Swinerton Builders



Photo Credit: Alexander Schreyer

Is Mass Timber Cost Competitive?



Photo Credit: Structurecraft Builders



Photo Credit: Structurlam



Source: GBD Architects

Risk: Cost Analysis of Structure Only

Seattle Mass Timber Tower: Detailed Cost Comparison

Fast Construction



- Textbook example done by industry experts
- Mass timber vs. PT conc
- Detailed cost, material takeoff & schedule comparisons

“The initial advantage of Mass Timber office projects in Seattle will come through the

leasing velocity

that developers will experience.”

- Connor McClain, Colliers¹

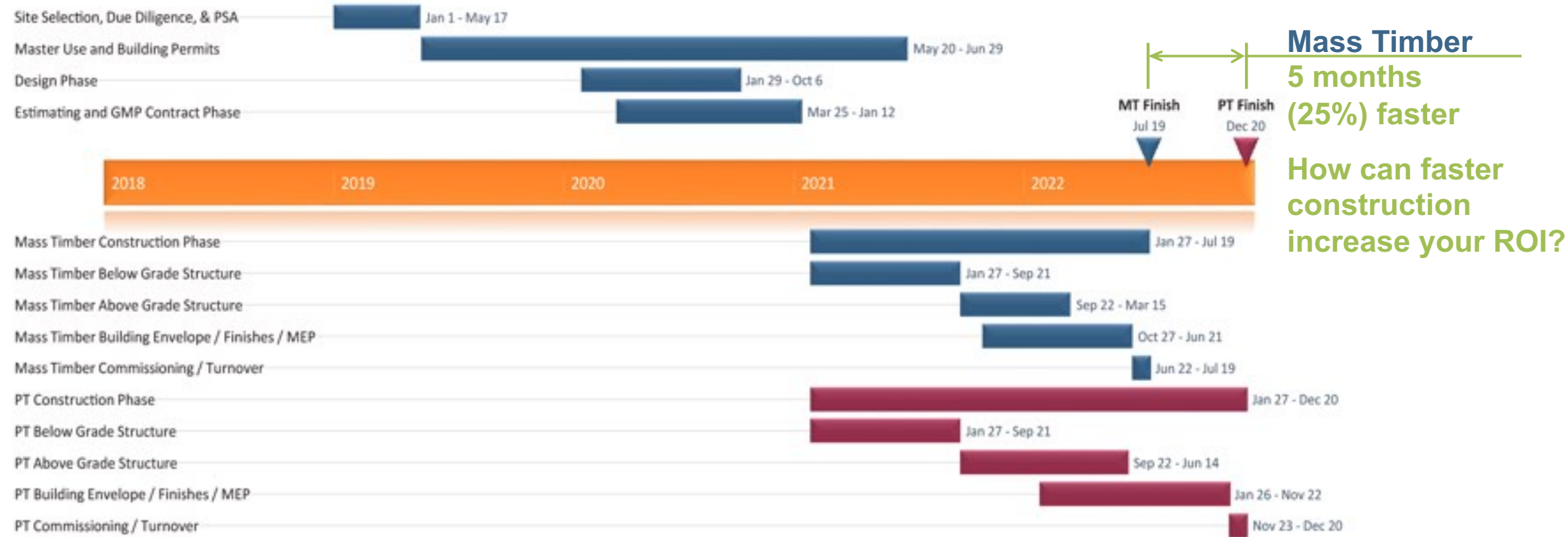
Download Case Study:

<http://www.fastcpp.com/wp-content/uploads/181109-Seattle-Mass-Timber-Tower-Book.pdf>

Seattle Mass Timber Tower

Fast Construction

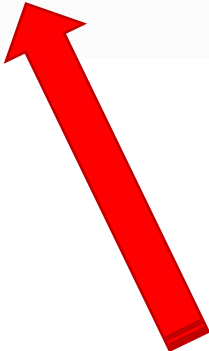
Construction Schedule:



Seattle Mass Timber Tower

Faster Construction + Higher Material Costs = Cost Competitive

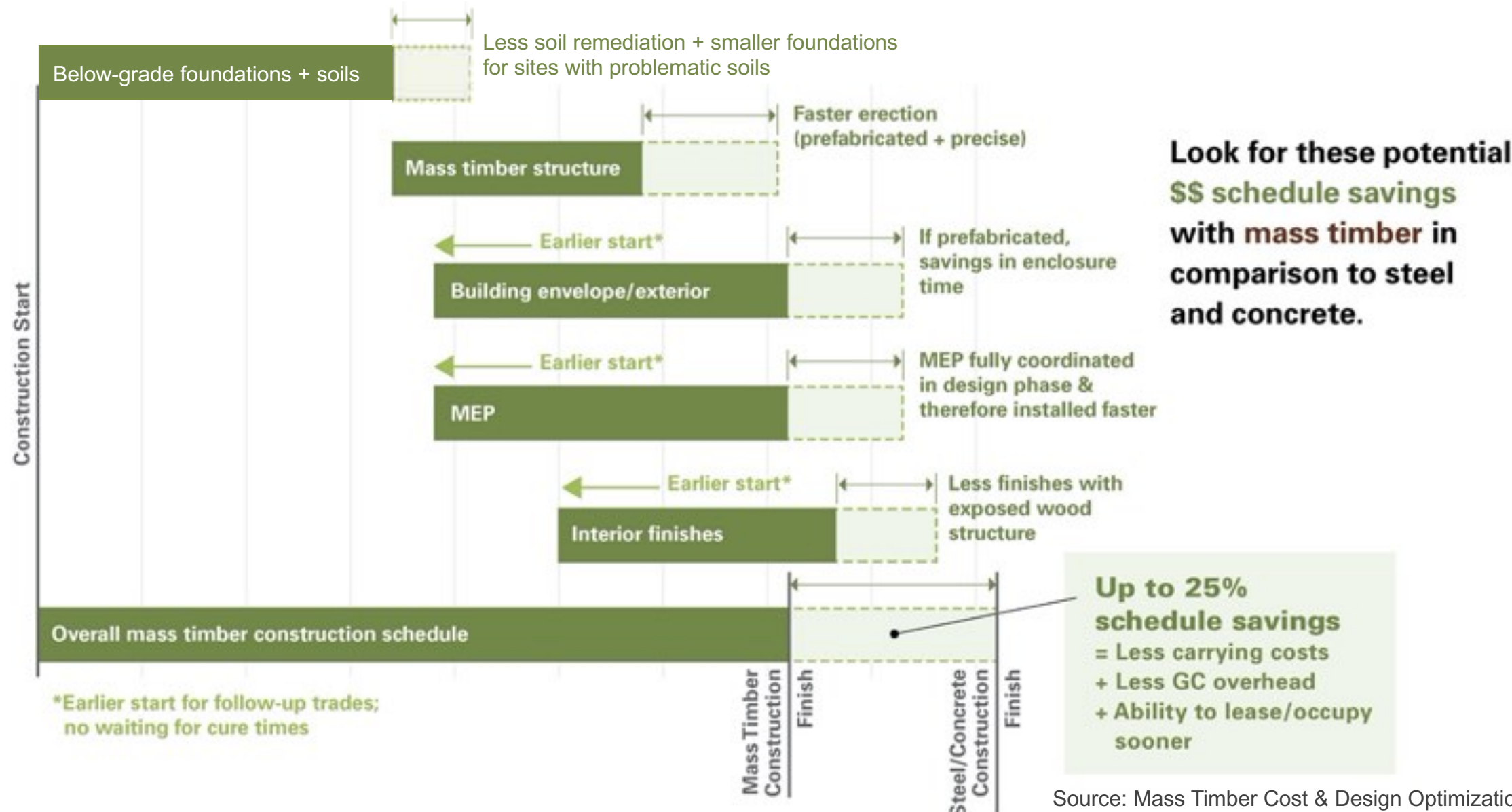
System	Mass Timber Design	PT Concrete Design	Mass Timber Savings
Direct Cost of Work	\$86,997,136	\$85,105,091	2.2%
Project Overhead	\$ 9,393,750	\$11,768,750	-20.2%
Add-Ons	\$ 8,387,345	\$ 8,429,368	-0.5%
Total	\$104,778,231	\$105,303,209	-0.5%



Source: DLR Group | Fast + Epp | Swinerton Builders

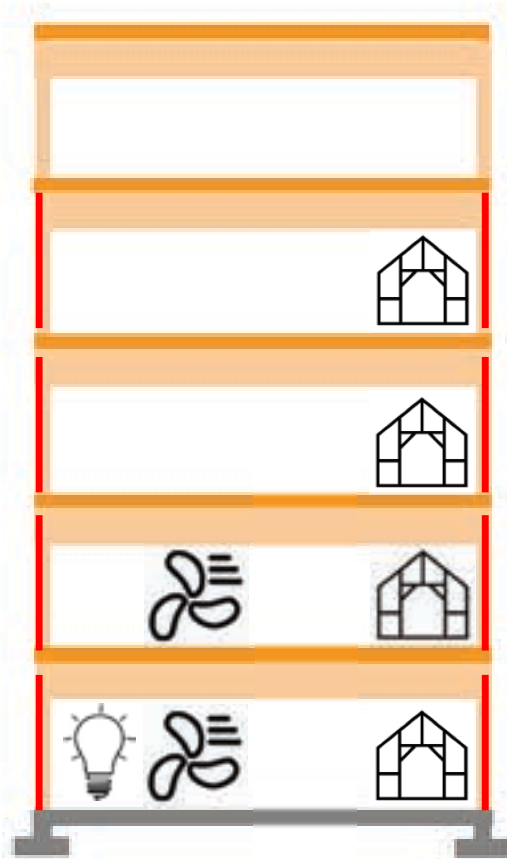
Compressing the Typical Schedule

Fast Construction

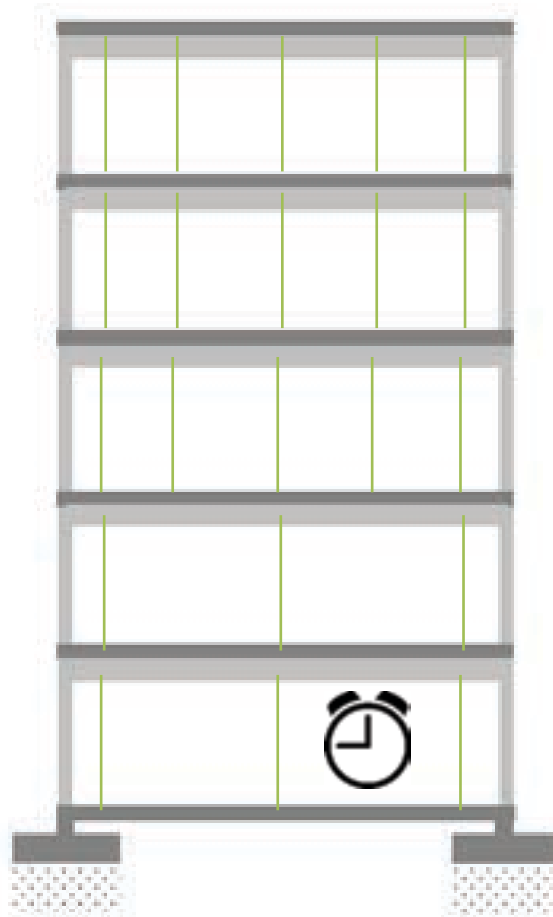


Schedule Savings for Rough-In Trades

Fast Construction



NO curing
(mass timber)



Curing & maze of
shores (concrete)



Photo: WoodWorks



PREFABRICATION & COORDINATION



ARCHITECT: HACKER
IMAGE CREDIT: STRUCTURLAM



Keys to Mass Timber Success:

Know Your WHY

Design it as Mass Timber From the Start

Leverage Manufacturer Capabilities

Understand Supply Chain

Optimize Grid

Take Advantage of Prefabrication & Coordination

Expose the Timber

Discuss Early with AHJ

Work with Experienced People

Let WoodWorks Help for Free

Create Your Market Distinction

QUESTIONS?

This concludes The American Institute
of Architects Continuing Education
Systems Course

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