A New Path for Mass Timber Construction: Code Provisions & Design Steps

September 24, 2025

Presented by

Shannon A. Williams, PE
WoodWorks

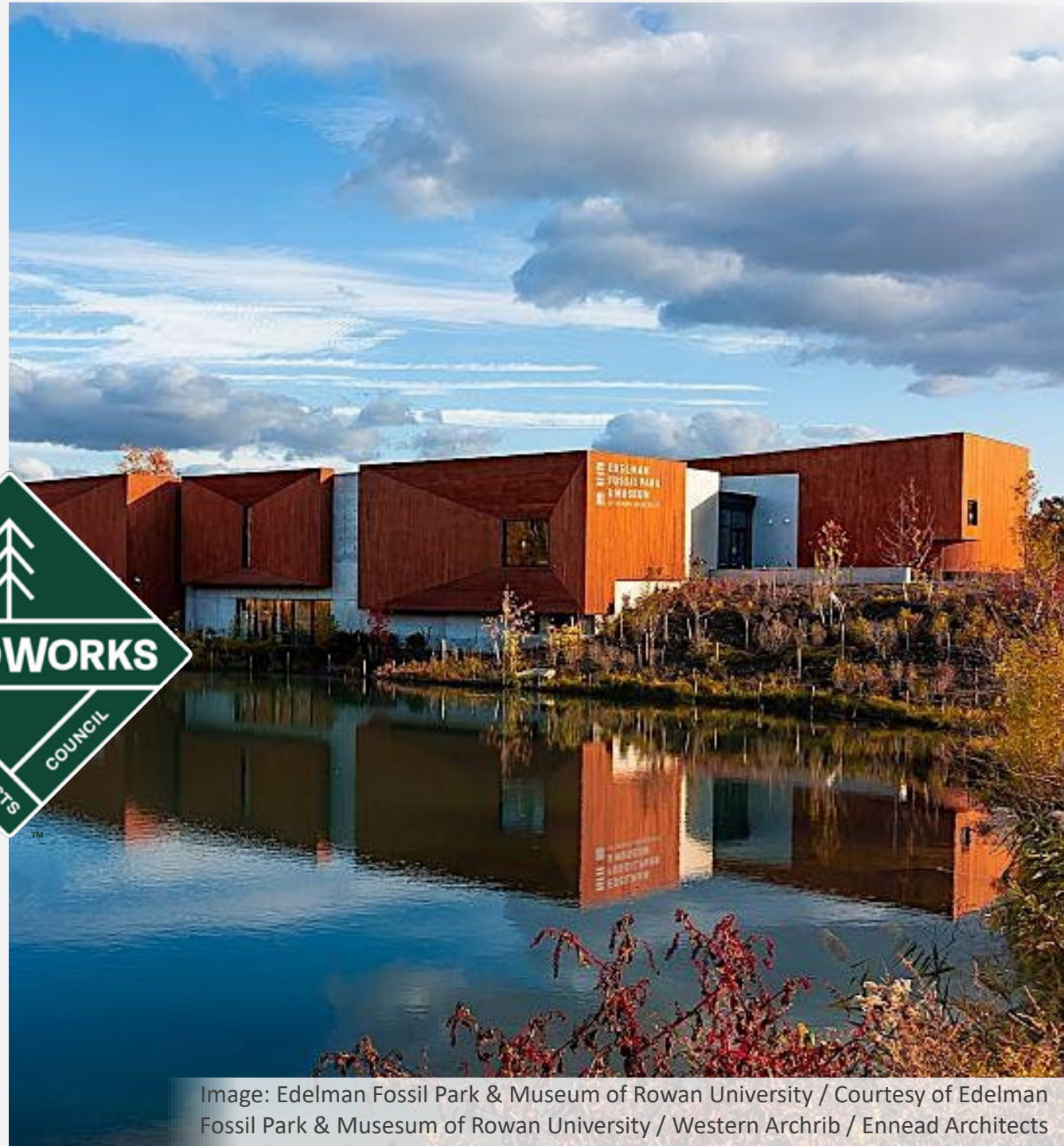


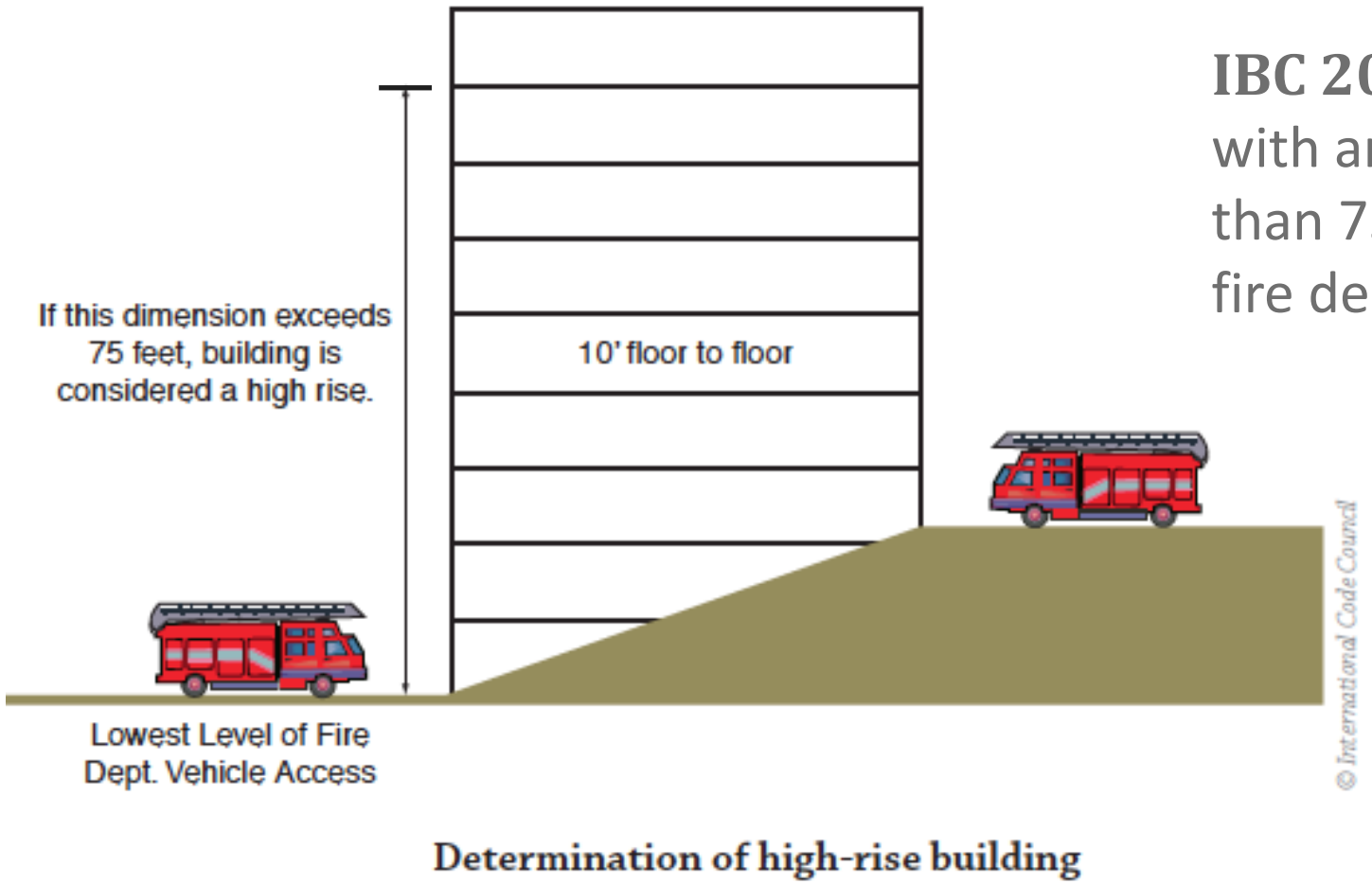
Image: Edelman Fossil Park & Museum of Rowan University / Courtesy of Edelman Fossil Park & Museum of Rowan University / Western Archrib / Ennead Architects

What is Tall Mass Timber?

Photo: WoodWorks
Architect/Developer: oWOW

Does Tall Wood = High Rise?

Mid-Rise vs. High-Rise Definition – 2018/2021 IBC 202



Determination of high-rise building

IBC 202: High-Rise Building: A building with an occupied floor located more than 75 feet above the lowest level of fire department vehicle access.

Tall Mass Timber

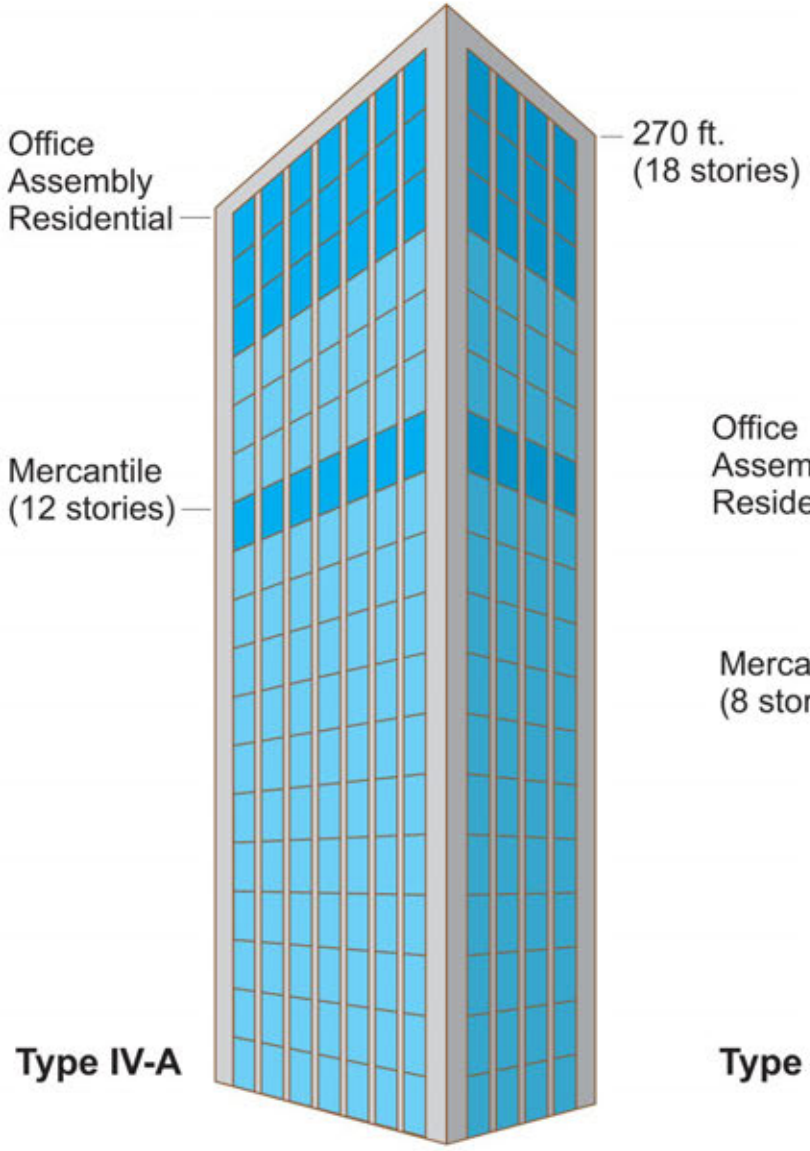
2021 IBC Introduces 3 new tall wood construction types:

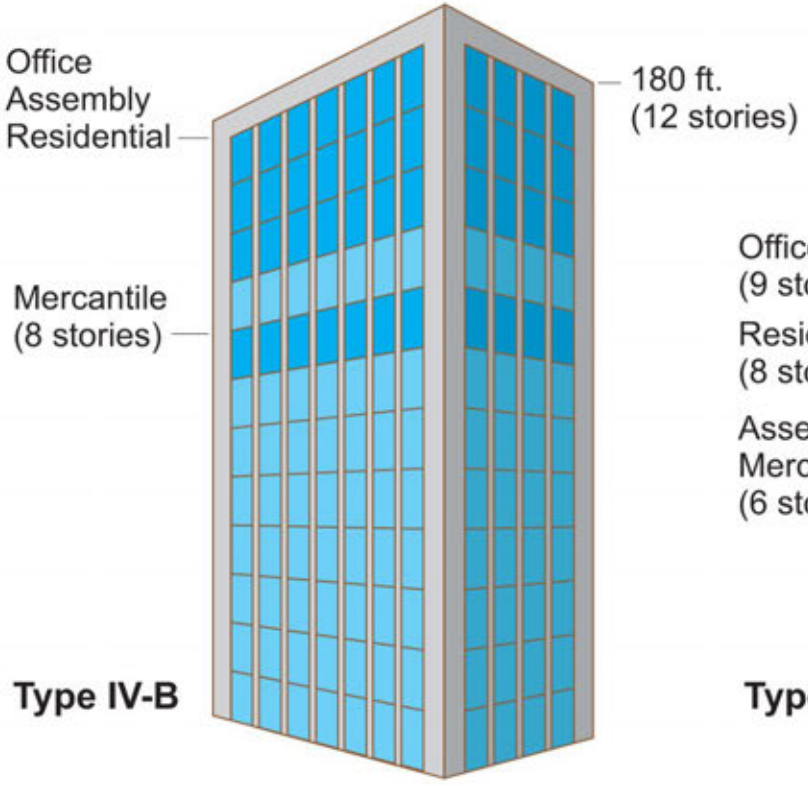
- IV-A
- IV-B
- IV-C
- Previous type IV renamed type IV-HT

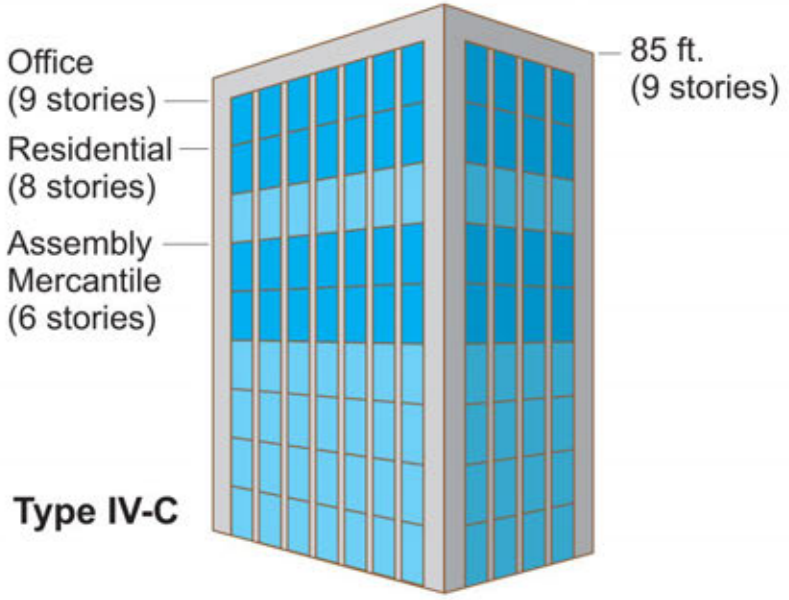
BUILDING ELEMENT	TYPE I		TYPE II		TYPE III		TYPE IV				TYPE V	
	A	B	A	B	A	B	A	B	C	HT	A	B

Tall Mass Timber

2021 IBC: 3 New Tall Mass Timber Construction Types







Tall Mass Timber in the U.S.

How Did We Arrive Here?

INTRO, Cleveland, OH | Architect: Hartshorne Plunkard Architecture | Image Courtesy Harbor Bay Real Estate Advisors, Image Fiction

2008 – 2015: International Inspiration

8-18-Story Projects in Europe, Canada, Australia

Photos: Waugh Thisleton Architects | Bygg Mesteren | Voll Arkitekter | Michael Elkan | Naturally Wood | UBC

2015-2018: Domestic Innovation

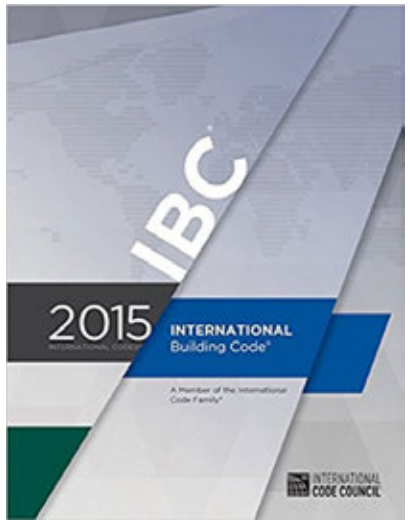
Tall Wood Building Competition, 8-Story Carbon 12 in Portland, OR

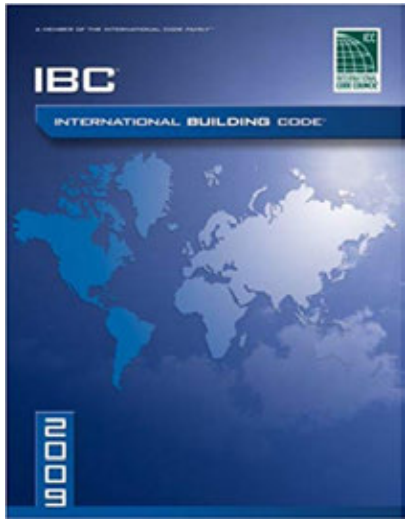
Photos: SHoP Architects | LEVER Architecture | Baumberger Studio/PATH Architecture

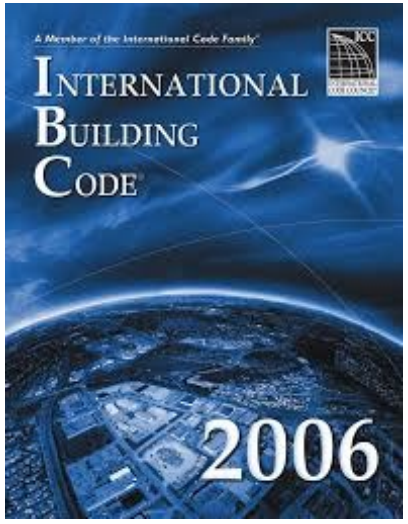
2015-2018: Building a Code Roadmap

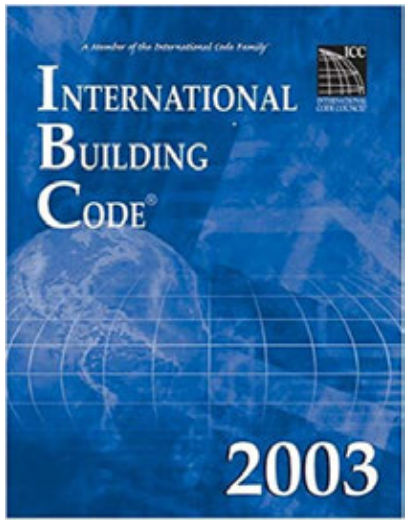
Photos: ICC

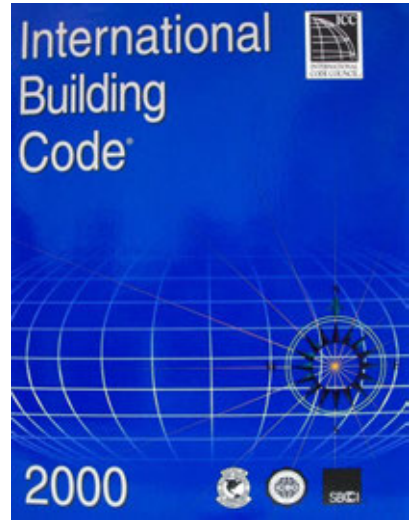
2015-2018: Building a Code Roadmap











Images: ICC

2015-2018: Building a Code Roadmap

Photo: Lendlease

2015-2018: Building a Code Roadmap

Photo: Lendlease

2015-2018: Building a Code Roadmap

Photo: Lendlease

2015-2018: Building a Code Roadmap

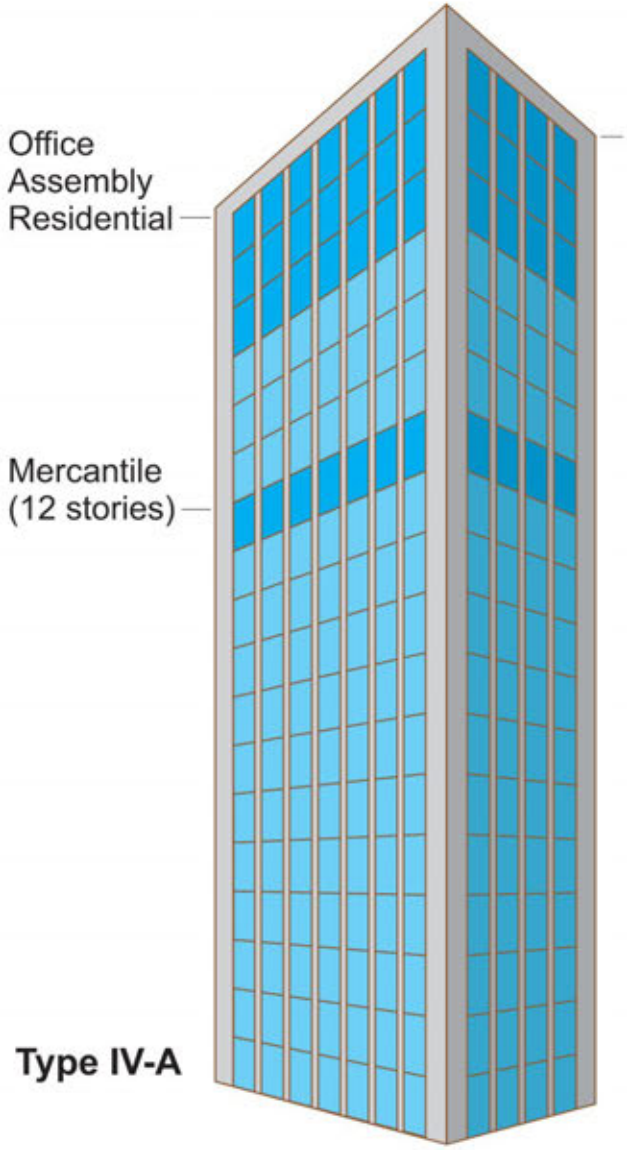
Photo: Lendlease

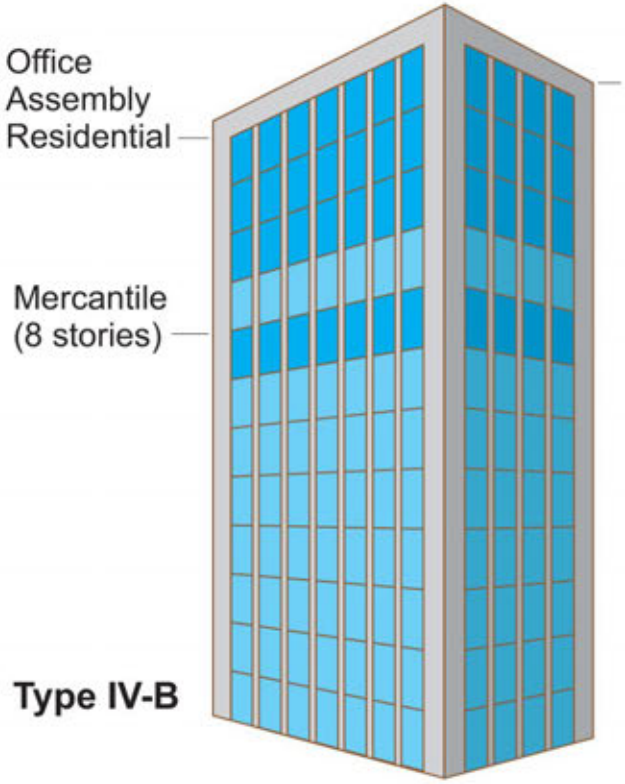
2015-2018: Building a Code Roadmap

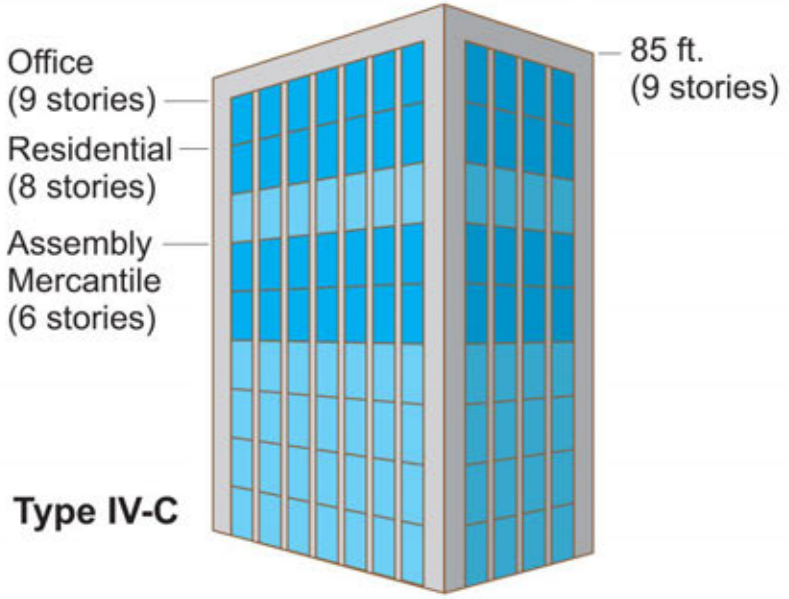
Photo: Lendlease

2018-2021: Rollout of a New Code Path

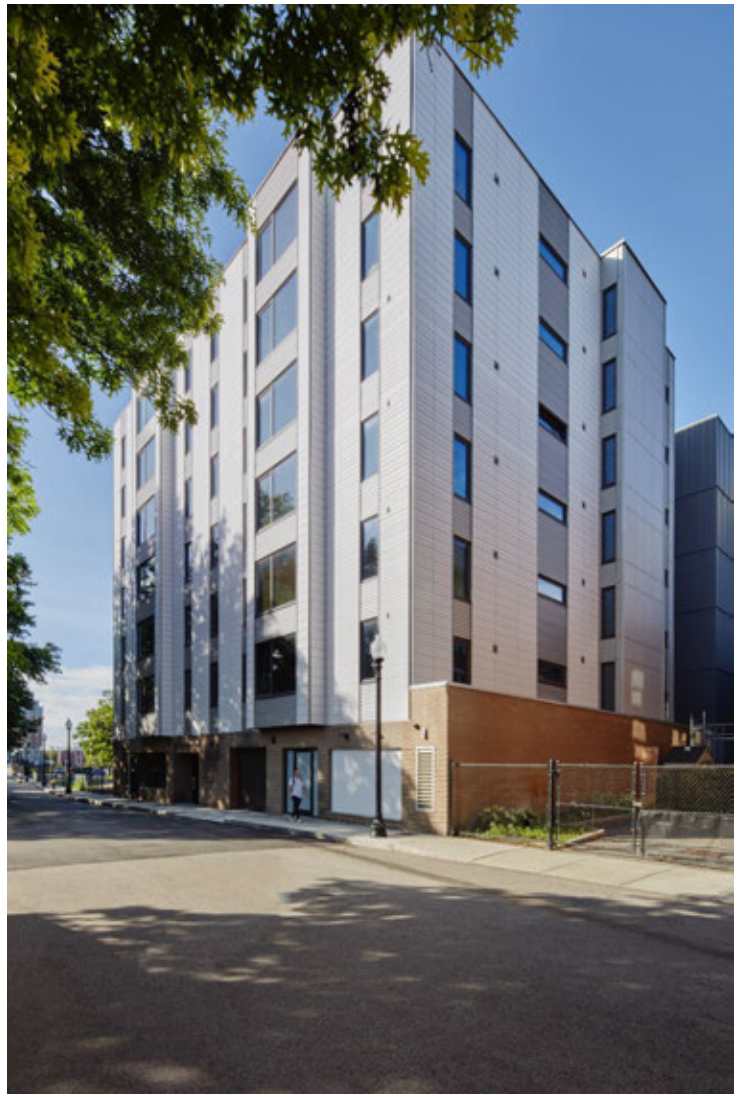
2021 IBC



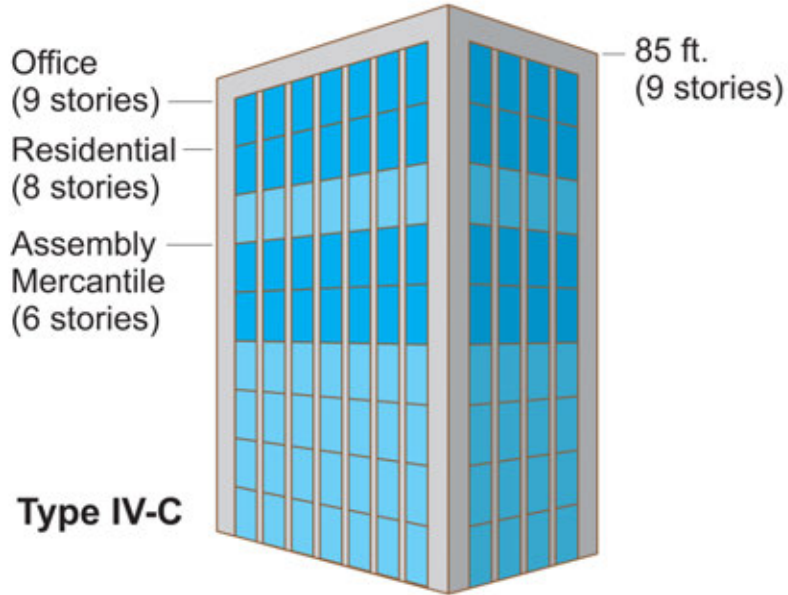




Type IV-C



Monte French Design Studio
Photos: Jane Messinger

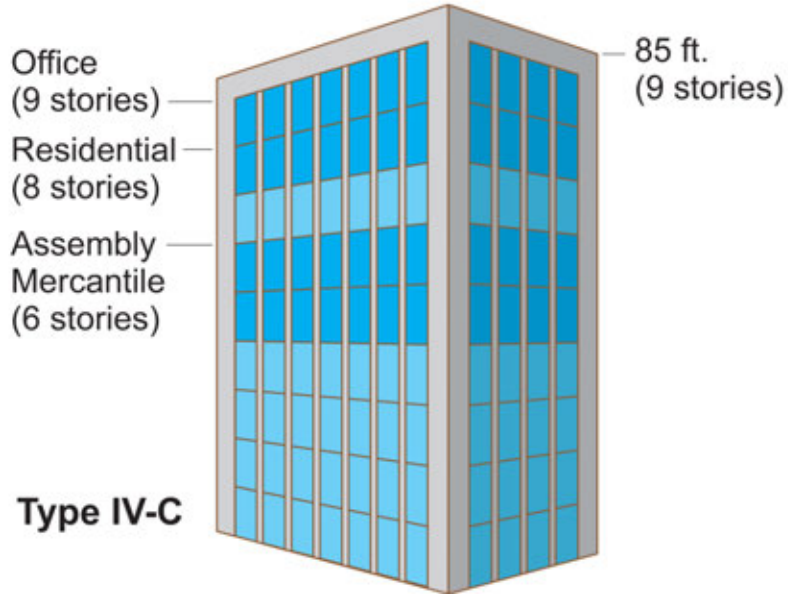


Type IV-C Exposure Limits

All Mass Timber surfaces may be exposed

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

Monte French Design Studio
Photo: Jane Messinger



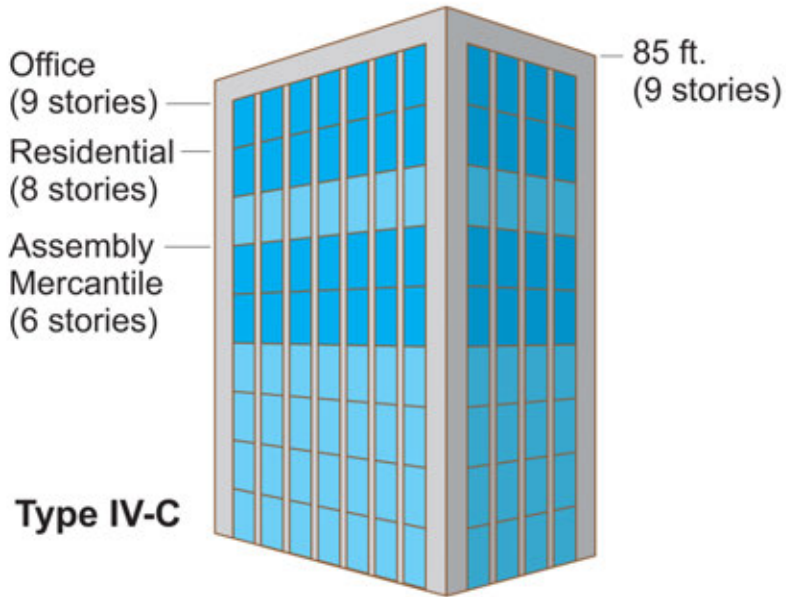
Type IV-C Building Size Limits

In most cases, Type IV-C height allowances = Type IV-HT height allowances, but additional stories permitted due to enhanced FRR

Type IV-C area = 1.25 * Type IV-HT area

Occupancy	# of Stories	Height	Area per Story	Building Area
A-2	6	85 ft	56,250 SF	168,750 SF
B	9	85 ft	135,000 SF	405,000 SF
M	6	85 ft	76,875 SF	230,625 SF
R-2	8	85 ft	76,875 SF	230,625 SF

Areas exclude potential frontage increase



Carbon12

PORTLAND, OR

Kaiser + Path
Munzing Structural Engineering
Photo Andrew Pogue

CARBON12

PORTLAND, OR

First Modern Tall Mass Timber Building

in the US

8 stories

42,000 sqft

1st floor retail, 7 stories of condos

above

Completed in 2017

BUSINESS CASE STUDY

WN PROFILE

Kaiser + Path
Munzing Structural Engineering
Photo Andrew Pogue

Type IV-B

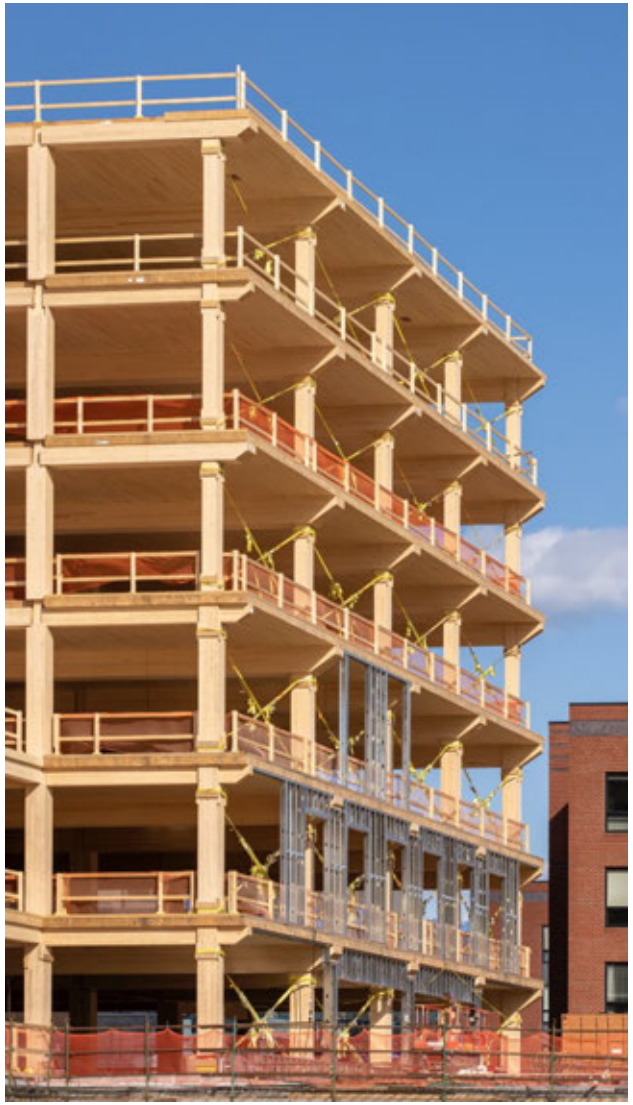
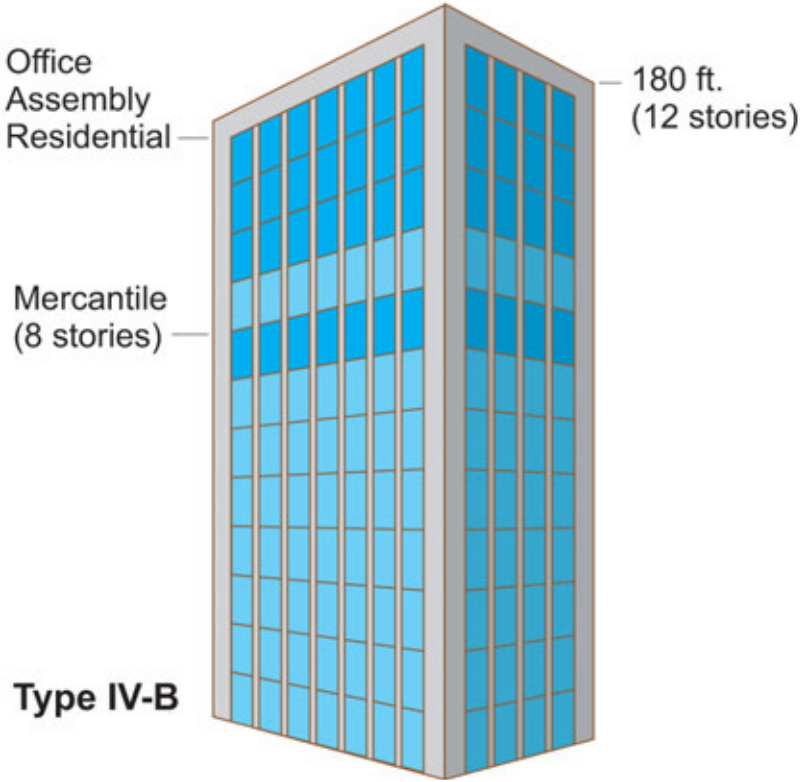


Photo: ©Prakash Patel

Photos: Nick Johnson, Tour D Space



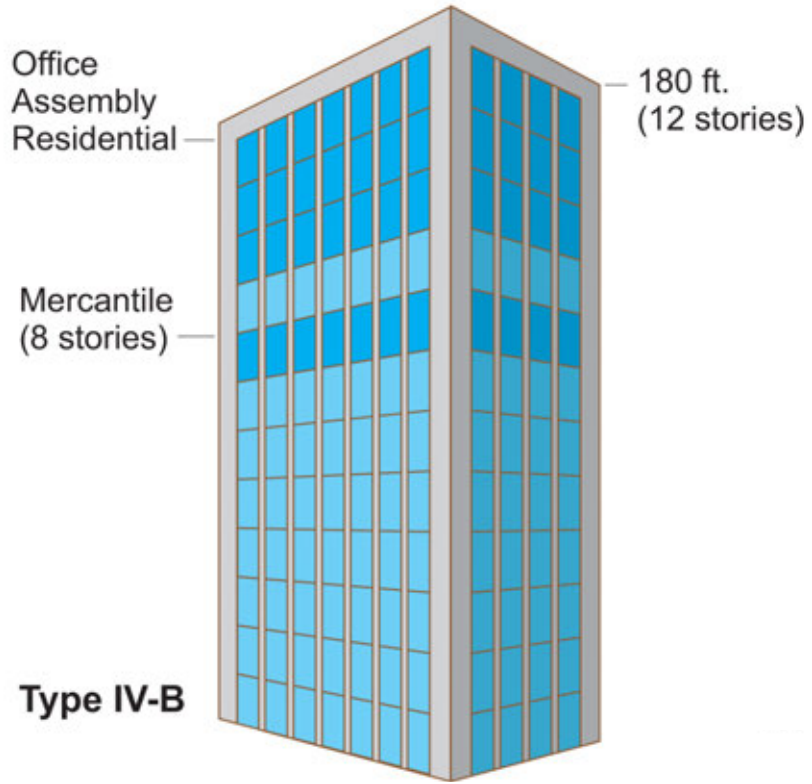
Type IV-B Exposure Limits

NC protection on some surfaces of Mass Timber

2021 IBC: 20% of ceilings or 40% of walls can be exposed

2024 IBC: 100% of ceilings or 40% of walls can be exposed

Photo: Nick Johnson, Tour D Space



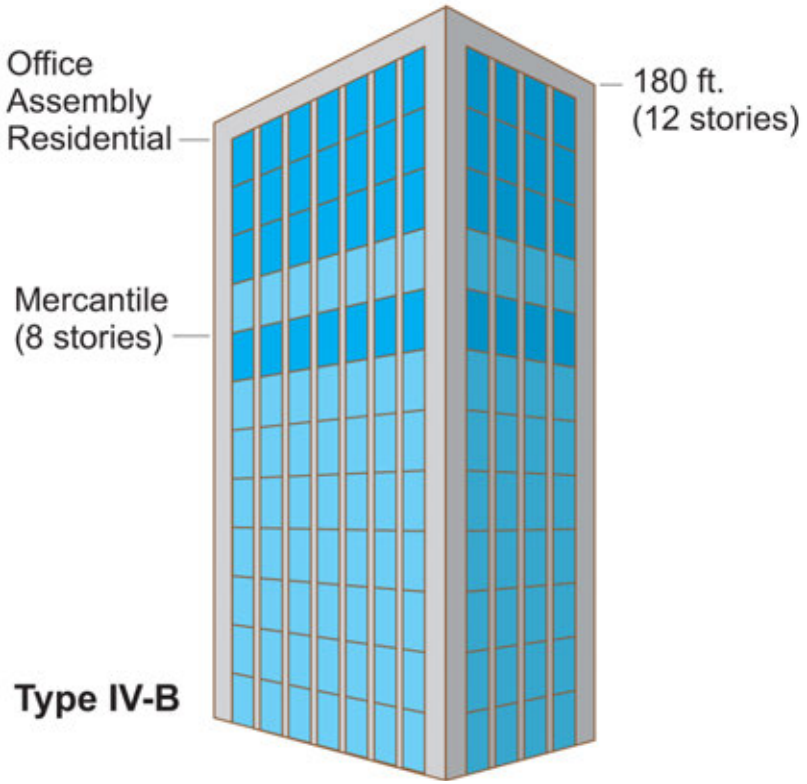
Type IV-B Building Size Limits

In most cases, Type IV-B height & story allowances = Type I-B height & story allowances

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

Occupancy	# of Stories	Height	Area per Story	Building Area
A-2	12	180 ft	90,000 SF	270,000 SF
B	12	180 ft	216,000 SF	648,000 SF
M	8	180 ft	123,000 SF	369,000 SF
R-2	12	180 ft	123,000 SF	369,000 SF

Areas exclude potential frontage increase



INTRO

CLEVELAND, OH

Hartshorne Plunkard Architecture
Forefront Structural Engineers
Fast + Epp
Photo Nick Johnson, Tour D Space

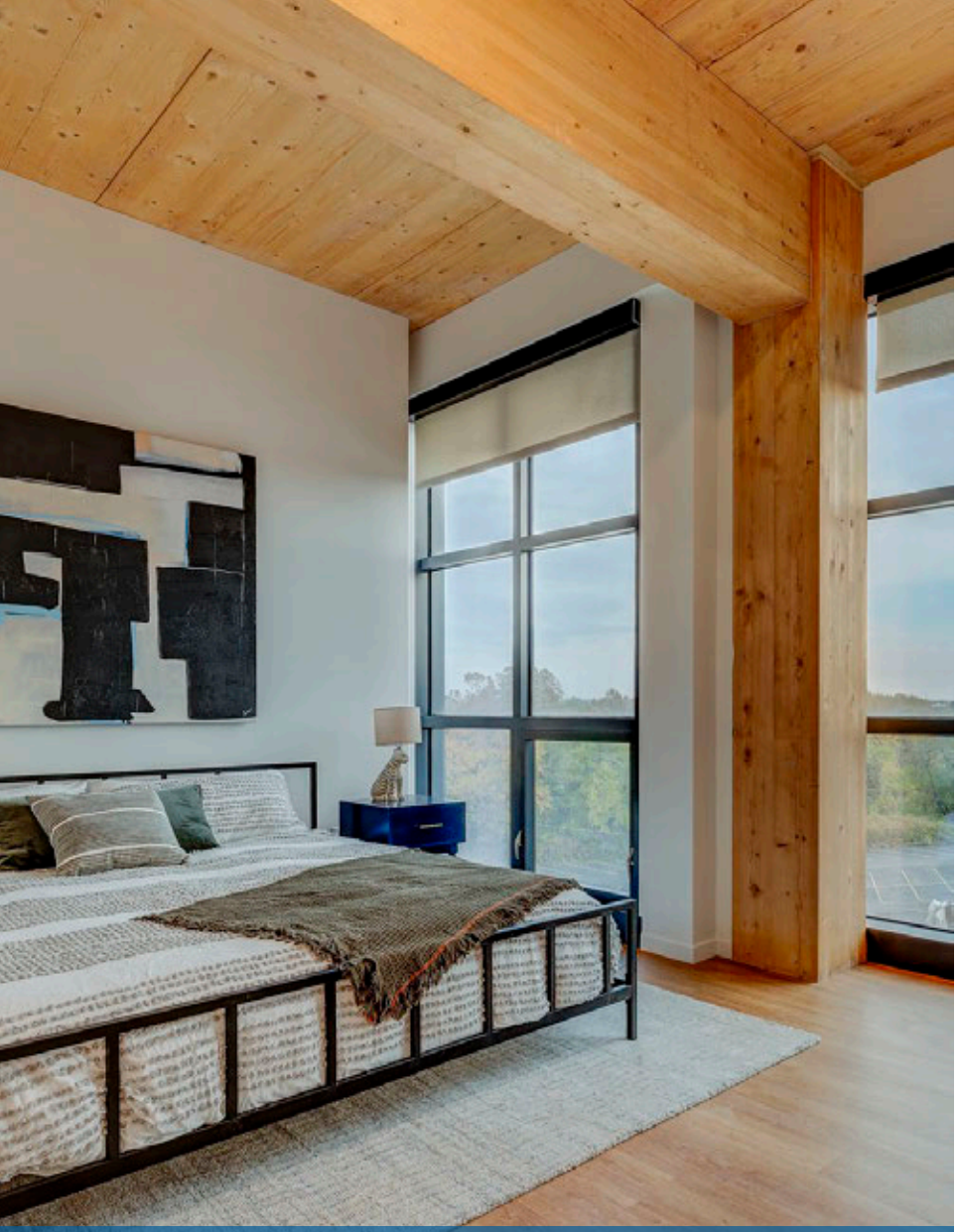


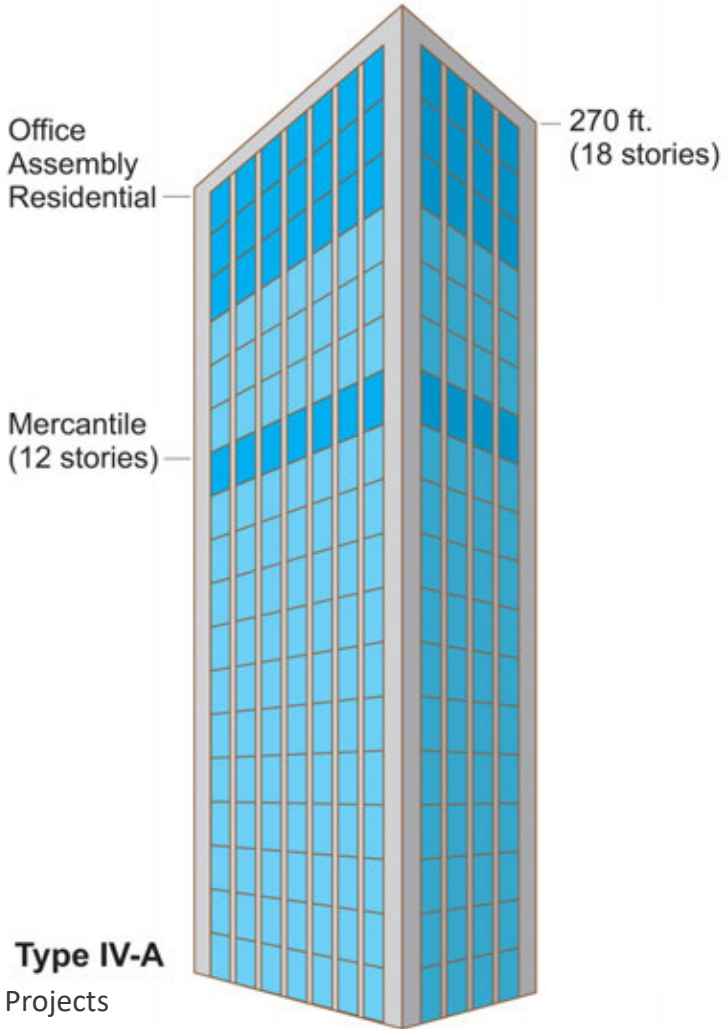
Photo Nick Johnson, Tour D Space

INTRO

Cleveland, OH

Building Facts	115 ft tall, 9 stories total (8 mass timber) Type IV-B Multi-Family Mixed-Use Completed 2022
Developer	Harbor Bay Ventures
Architect	Hartshorne Plunkard Architecture
Engineer	Forefront Engineering, Fast + Epp
General Contractor	Panzica Construction

Type IV-A

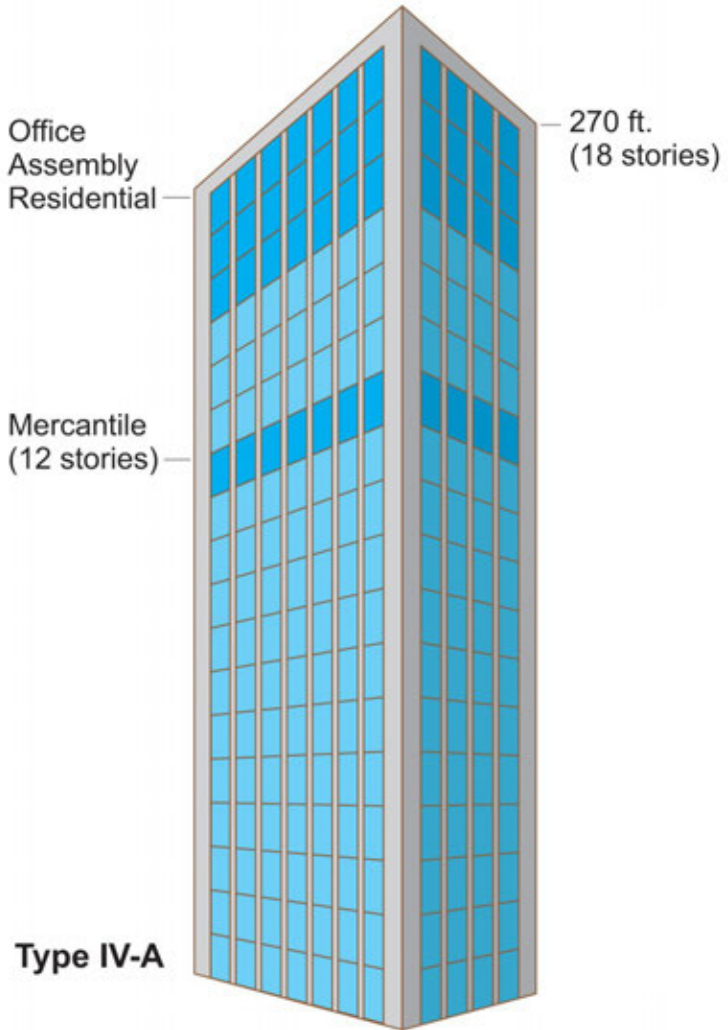


Photos: Flor Projects

Type IV-A Exposure Limits

100% NC protection on all surfaces of Mass Timber

Photo: Flor Projects



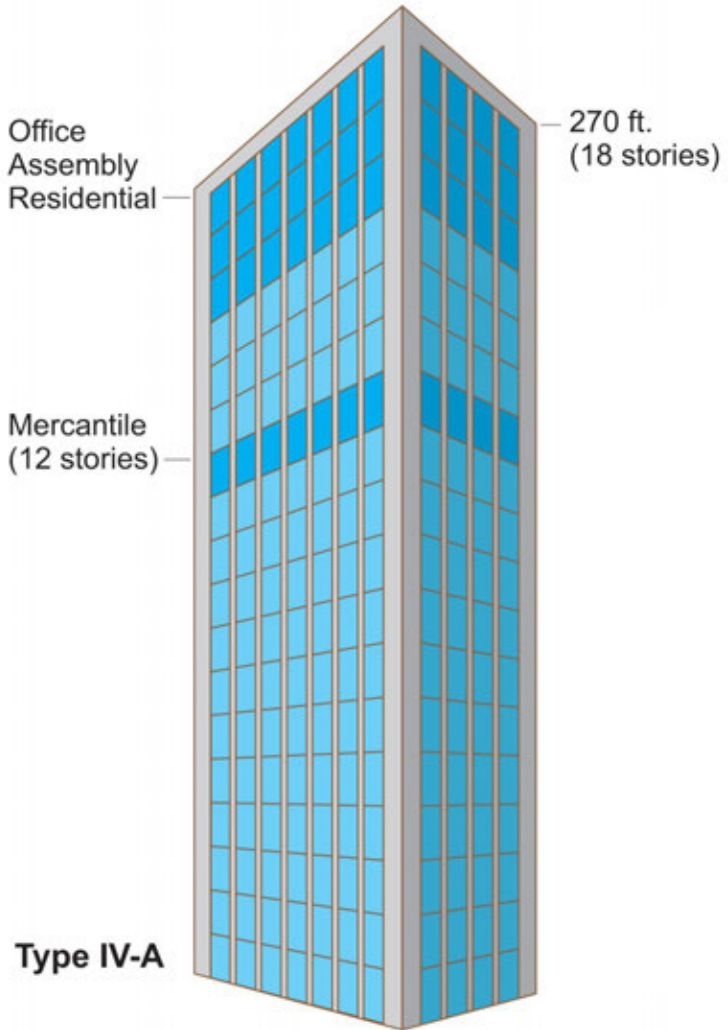
Type IV-A Building Size Limits

In most cases, Type IV-A height & story allowances = 1.5 * Type I-B height & story allowances

Type IV-A area = 3 * Type IV-HT area

Occupancy	# of Stories	Height	Area per Story	Building Area
A-2	18	270 ft	135,000 SF	405,000 SF
B	18	270 ft	324,000 SF	972,000 SF
M	12	270 ft	184,500 SF	553,500 SF
R-2	18	270 ft	184,500 SF	553,500 SF

Areas exclude potential frontage increase



1510 Webster

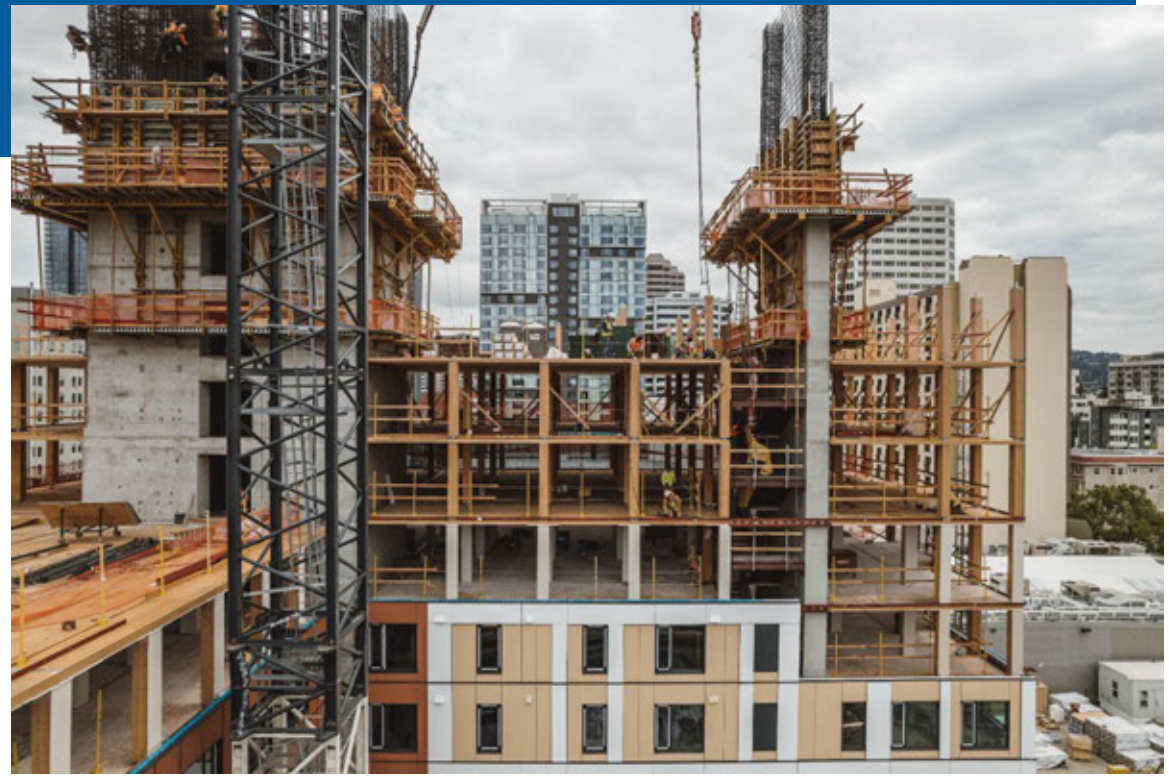
Oakland, CA

oWow
DCI Engineers
Photo: Flor Projects

1510 Webster

Oakland, CA

- 16 stories mass timber, 1 level steel over two-level concrete
- Designed with Tall Wood code provisions in the 2021 CBC
- Mass timber with concrete cores and staircases



Photos: Flor Projects

oWow
DCI Engineers

2019-2022: REFINING THE CODE ROADMAP

Fire Safe Implementation of Mass Timber In Tall Buildings

Research of the fire performance of CLT and Glued Laminated Timber buildings, with visible wood surfaces.

The main aim of this research project was to identify safe limits of exposed mass timber surface areas that correspond with performance criteria used for previous U.S. Building Code Changes.

Source: RISE

2019-2022: REFINING THE CODE ROADMAP


USDA
United States Department of Agriculture

Compartment Fire Testing of a Two-Story Mass Timber Building

Samuel L. Zelinka
Laura E. Hasburgh
Keith J. Bourne
David R. Tucholski
Jason P. Ouellette

Forest Service | Forest Products Laboratory | General Technical Report FPL–GTR–247 | May 2018

Conservatism: ATF lab tests based on older generation CLT adhesives

2018 ATF tests were initiated before the 2018 version of ANSI/APA PRG 320 was published and the tested CLT was not compliant with the new product standard.

Source: RISE, USDA FS FPL & AWC

2019-2022: REFINING THE CODE ROADMAP

In tall buildings, preventing fire re-growth is key.
Fire re-growth is a phenomenon in which the heat-release rate of a fire intensifies following a decay phase. Fire re-growth can be initiated when delamination occurs, as this exposes un-charred wood surfaces, thereby resulting in an influx of fuel available for consumption by the fire.


Photo: Urban One


Photo: ARUP

2019-2022: REFINING THE CODE ROADMAP

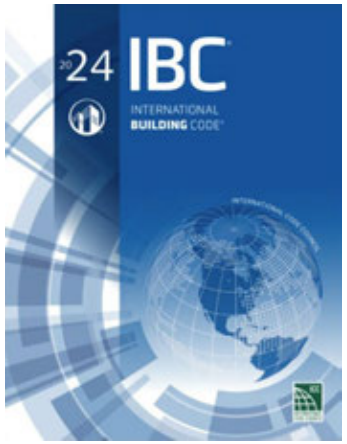
PRG 320 is manufacturing & performance standard for CLT

2019 edition (referenced in 2021 IBC) added new elevated temperature adhesive performance requirements validated by full-scale and medium-scale qualification testing to ensure CLT does not exhibit fire re-growth

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

2019-2022: REFINING THE CODE ROADMAP

Change to 2024 IBC: IV-B Ceiling Exposure



602.4.2.2.2 Protected area.

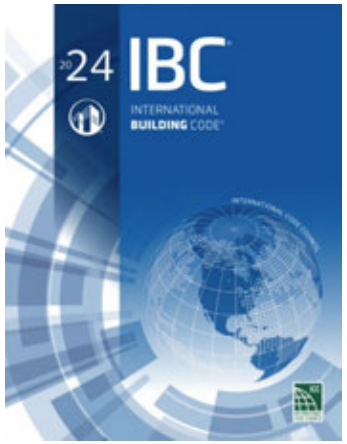
Interior faces of *mass timber* elements, including the inside face of exterior *mass timber walls* and *mass timber roofs*, shall be protected in accordance with Section 602.4.2.2.1.

Exceptions: Unprotected portions of *mass timber* ceilings and walls complying with Section 602.4.2.2.4 and the following:

1. Unprotected portions of *mass timber* ceilings and walls complying with one of the following:
   1.1. Unprotected portions of *mass timber* ceilings, including attached beams, limited to an area less than or equal to 100 percent of the floor area in any *dwelling unit* within a *story* or fire area within a *story*.
   1.2. Unprotected portions of *mass timber* walls, including attached columns, limited to an area less than or equal to 40 percent of the floor area in any *dwelling unit* within a *story* or fire area within a *story*.
   1.3. Unprotected portions of both walls and ceilings of *mass timber*, including attached columns and beams, in any *dwelling unit* or fire area and in compliance with Section 602.4.2.2.3.
2. *Mass timber* columns and beams that are not an integral portion of walls or ceilings, respectively, without restriction of either aggregate area or separation from one another.

2019-2022: REFINING THE CODE ROADMAP

Change to 2024 IBC: IV-B Exposure Separation



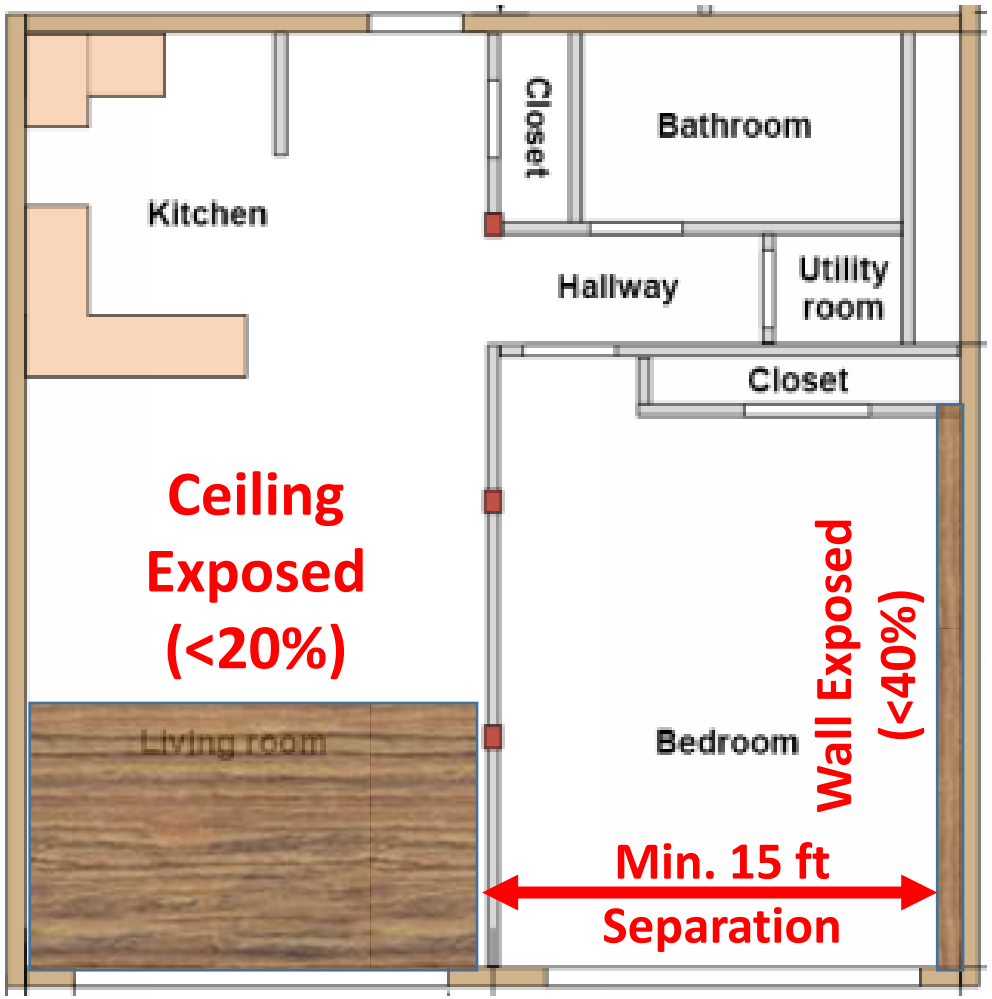
602.4.2.2.4 Separation distance between unprotected *mass timber* elements.

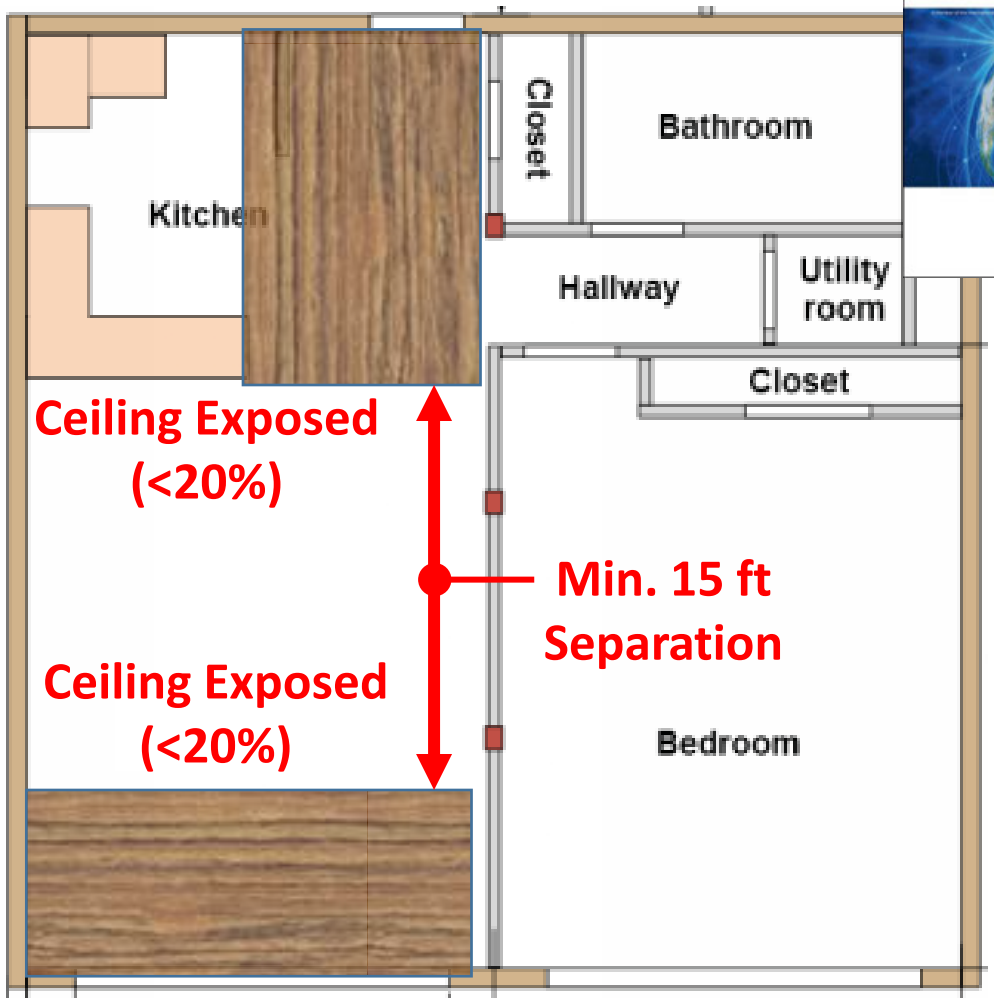
In each *dwelling unit* or *fire area*, unprotected portions of *mass timber* walls shall be not less than 15 feet (4572 mm) from unprotected portions of other walls measured horizontally along the floor.

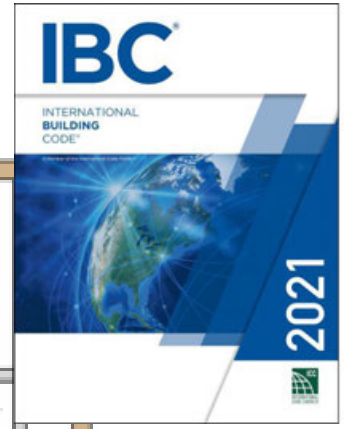
2024 IBC eliminates need for 15 ft separation between exposed walls and ceilings, and between portions of exposed ceilings

2019-2022: REFINING THE CODE ROADMAP

2021 IBC Allowances



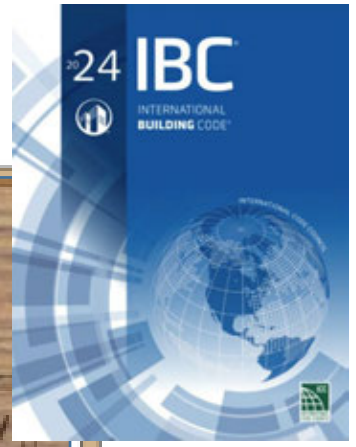


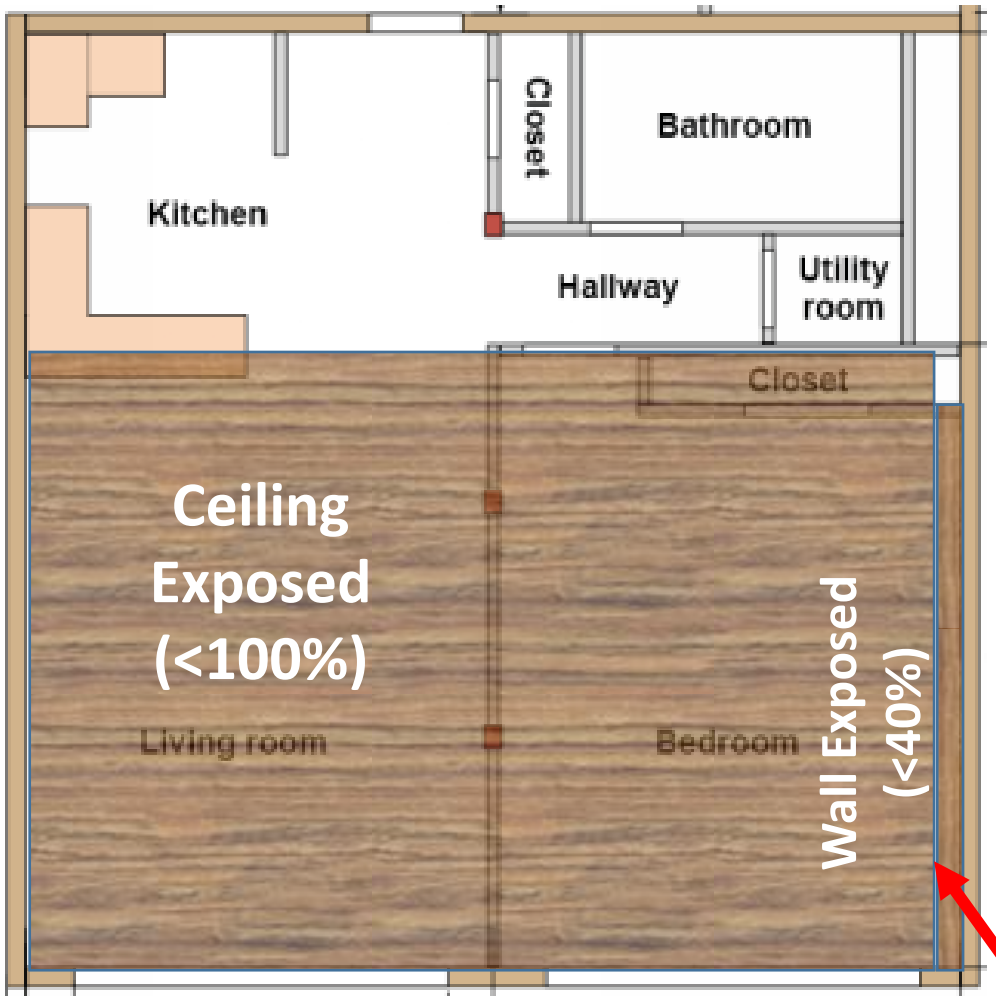


Credit: AWC

2019-2022: REFINING THE CODE ROADMAP

2024 IBC Allowances

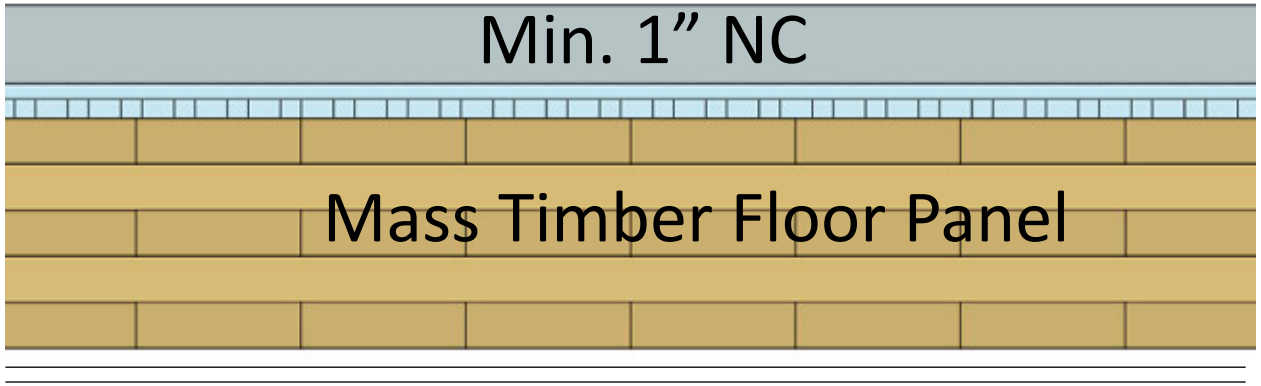




Credit: AWC

No separation req'd between wall & ceiling

2019-2022: REFINING THE CODE ROADMAP



Min. 1” thick NC protection required on mass timber floors in IV-A and IV-B. Not required in IV-C

2019-2022: REFINING THE CODE ROADMAP

Change to 2024 IBC: Sequencing of NC topping install

F174-21
IFC: 3303.5

Proponents: David Tyree, representing AWC (dtyree@awc.org); Raymond O'Brocki, AWC, representing AWC (robrocki@awc.org)

2021 International Fire Code

Revise as follows:

3303.5 Fire safety requirements for buildings of Types IV-A, IV-B and IV-C construction. Buildings of Types IV-A, IV-B and IV-C construction designed to be greater than six stories above *grade plane* shall comply with the following requirements during construction unless otherwise *approved* by the *fire code official*:

1. Standpipes shall be provided in accordance with Section 3313.
2. A water supply for fire department operations, as *approved* by the *fire code official* and the *fire chief*.
3. Where building construction exceeds six stories above *grade plane* and noncombustible protection is required by Section 602.4 of the *International Building Code*, at least one layer of noncombustible protection shall be installed on all building elements on floor levels, including mezzanines, more than four levels below active mass timber construction before additional floor levels can be erected.

   ~~**Exception**~~ **Exceptions:**

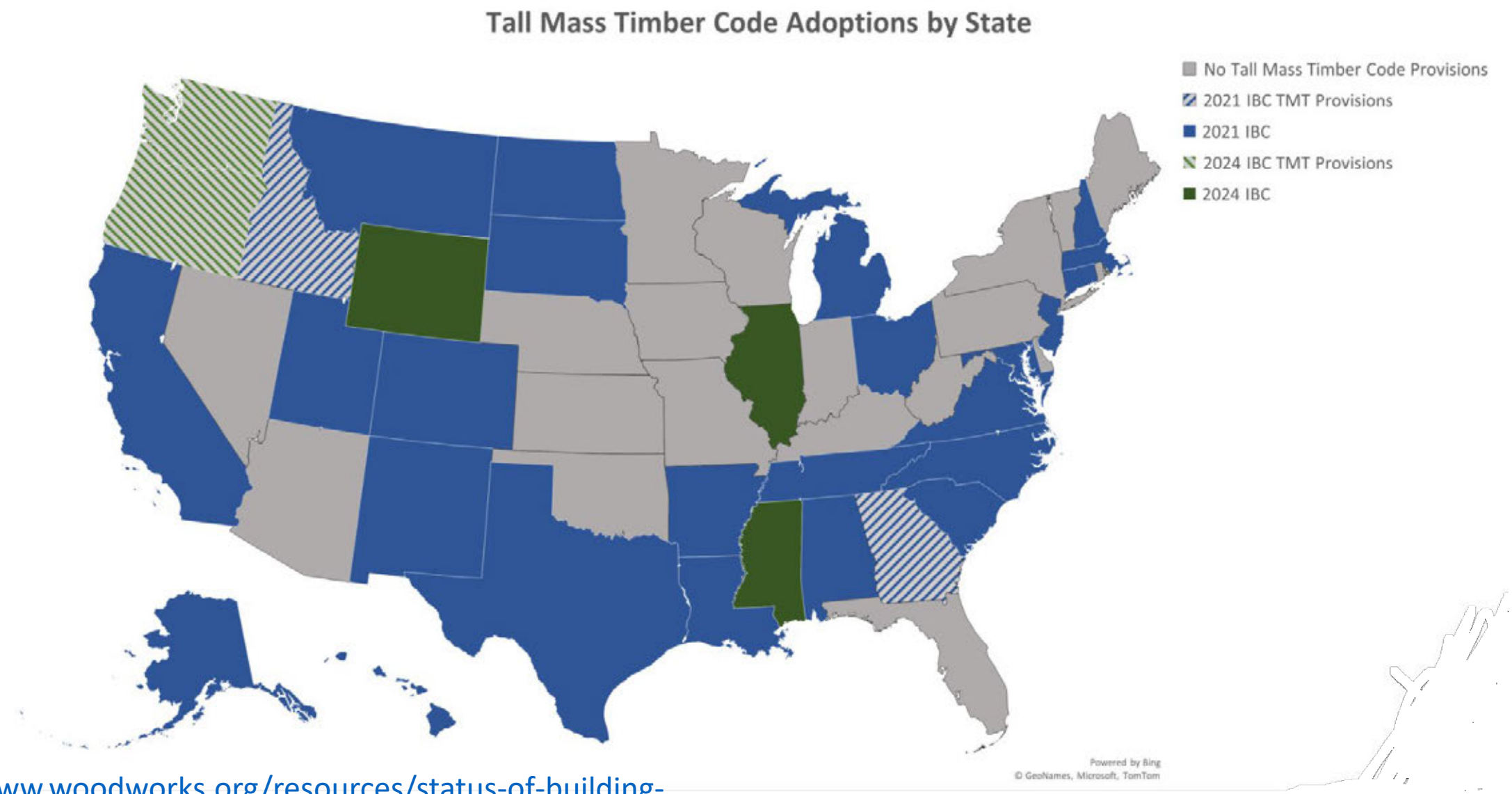
   1. Shafts and vertical exit enclosures shall not be considered part of the active mass timber construction.
   2. Noncombustible material on the top of mass timber floor assemblies shall not be required before erecting additional floor levels.

4. Where building construction exceeds six stories above *grade plane*, required exterior wall coverings shall be installed on floor levels, including mezzanines, more than four levels below active mass timber construction before additional floor levels can be erected.

   Exception: Shafts and vertical exit enclosures shall not be considered part of the active mass timber construction.

Credit: ICC

TALL MASS TIMBER CODE ADOPTIONS



https://www.woodworks.org/resources/status-of-building-code-allowances-for-tall-mass-timber-in-the-ibc/

WHY ALL OF THE INTEREST?

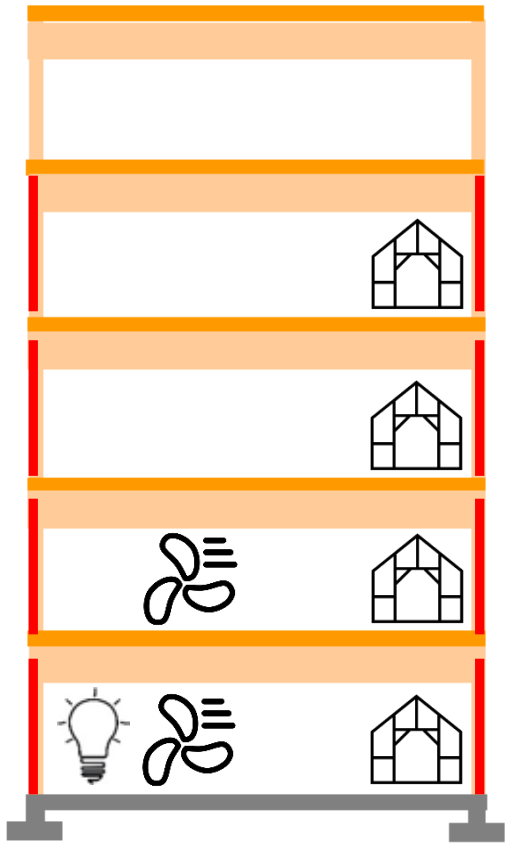
Photo: WoodWorks
Architect/Developer: oWOW

Mass Timber: Structural Warmth is a Value-Add

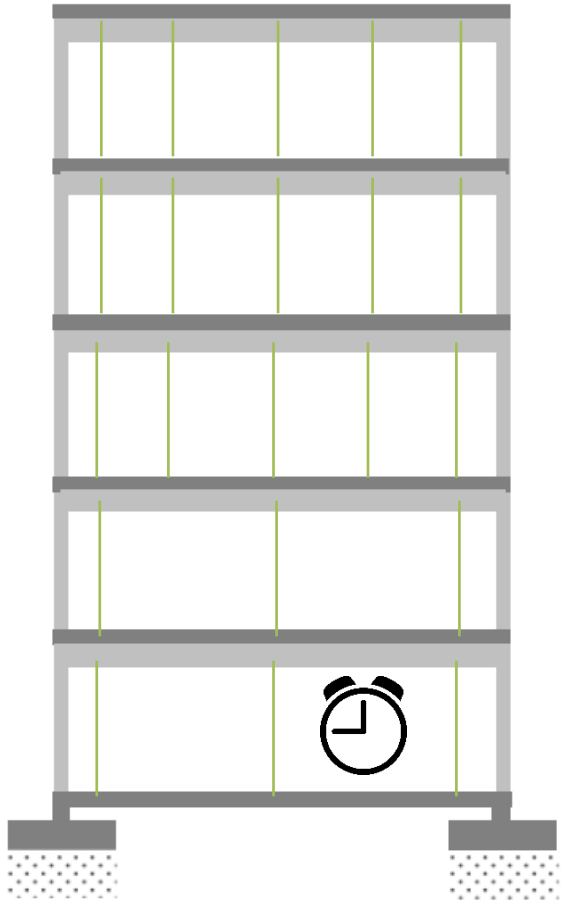
TMBR (unbuilt) Minneapolis, MN | Images: D/O Architects

Schedule Savings for Rough-In Trades

Fast Construction



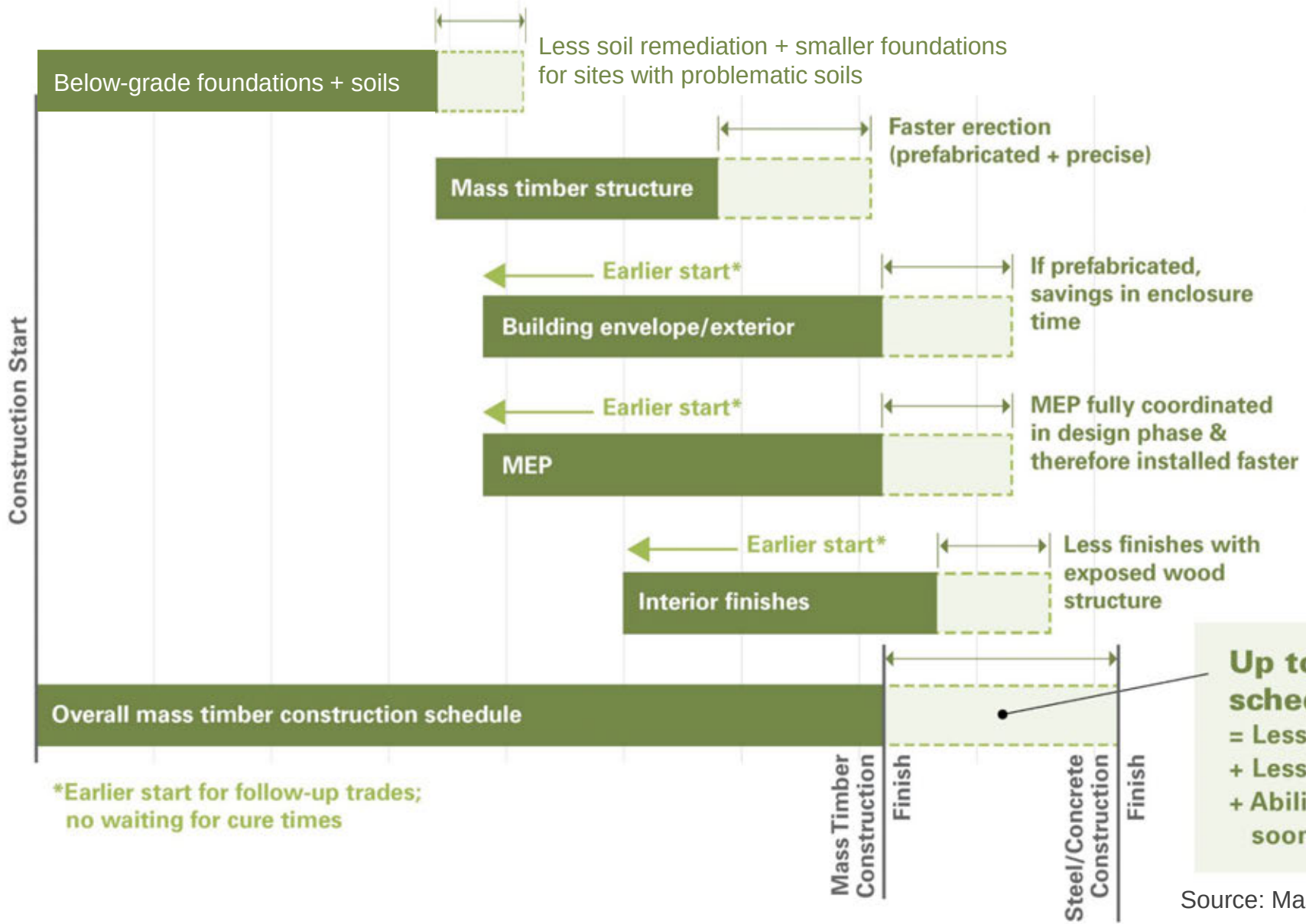
NO curing
(mass timber)



Curing & maze of shores (concrete)

Photo: WoodWorks

Compressing the Typical Schedule



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

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

Source: Mass Timber Cost & Design Optimization, WoodWorks[2]

Construction Impacts: Labor Availability

But is it cost competitive?

Need to Consider Holistic Costs, Not Structure Only

$/SF

$/SF

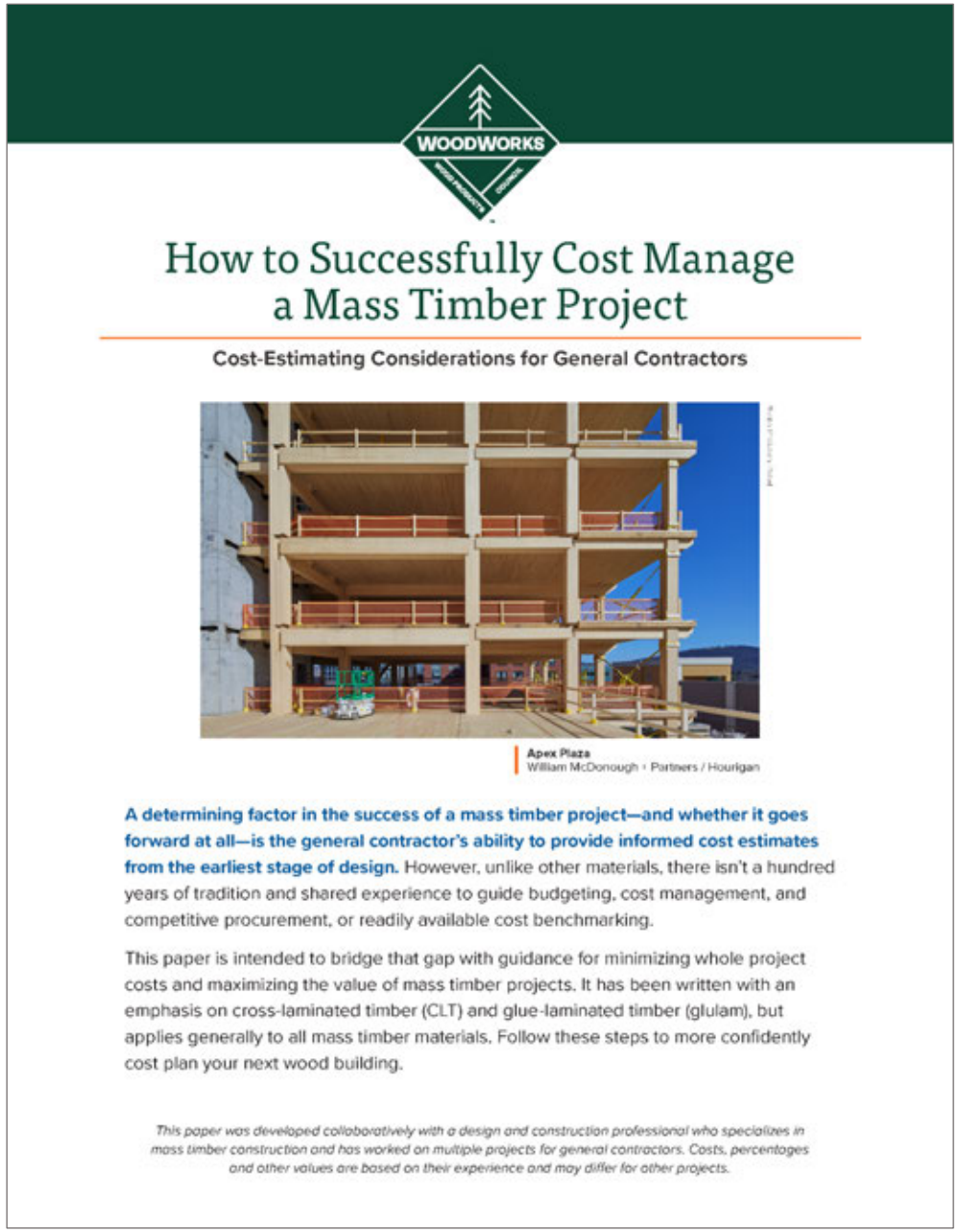
Image: GBD Architects

Risk Mitigation: Total Project Cost Analysis

CONSIDERATIONS:

- Ceiling Treatment
- Floor Topping
- HVAC System & Route
- Foundation Size
- Soil Improvements
- Exterior Skin Coordination
- Value of Time

Credit: Hacker Architects



WOODWORKS

How to Successfully Cost Manage a Mass Timber Project

Cost-Estimating Considerations for General Contractors

Apex Plaza
William McDonough + Partners / Hourigan

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.

Step 1: Do Your Homework

•Vetting potential subcontractors

•Determining the procurement model (with details on common models used in the U.S.)

Step 2: Establish a Reliable Pre-Design Budget

•Basic timber pricing dynamics

- Example of increasing detail recommended at different phases of project planning
- Information to supply for better pricing
- Insights for better budgeting

•Choosing your list of bidders

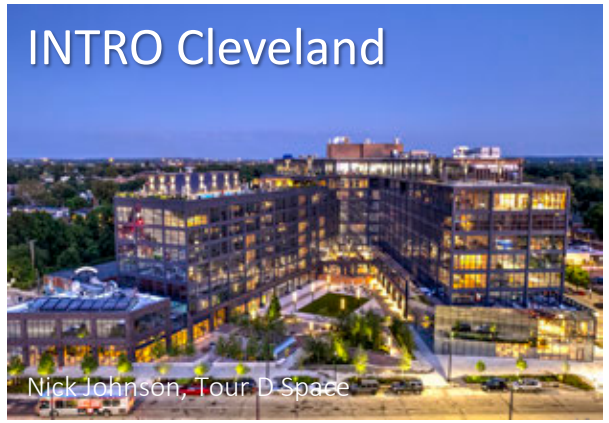
•Adjusting budgets for trades impacted by timber

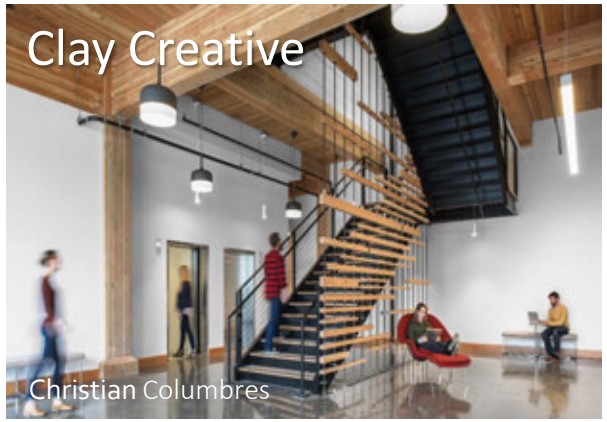
Step 3: Manage Project Costs

•Establishing cost benchmarking

•Understanding the largest non-timber design cost levers

Mass Timber Business Case Studies





WOODWORKS
WOOD PRODUCTS COUNCIL

$ Costs + $ Returns
Challenges,
Lessons Learned, Successes

Scan code here
to download the
current package

Development Overview

- 9-story, 115’ tall building
- 8 stories of CLT & glulam construction over a podium
- Strategy:
  - Create Cleveland's best, most distinctive urban living experience; a new level and bespoke brand
  - Combine best-in-city amenity package and contemporary interiors to appeal to health/ wellness & entertainment-focused young professionals

Property Information	
Property timing	Completed Feb 2022
Submarket	Cleveland’s Ohio City neighborhood
Construction Type	4-B over 1-A retail & parking
Site size	2.1 acres (FAR 5.5)
Gross building area	512,000 SF
Net rentable area (total)	279,000 SF


Nick Johnson, Tour D Space

Quantitative Overview

Costs				
Total project cost		$147,000,000		
		$494,950/ unit		
Land Cost		$10,450,000	@ appraised value	
		Market Standard*	**Pro Forma**	**Realized****
Construction costs		$212 / GSF	$200 / GSF	$215 / GSF

NOI				
Apartment		**Market**	**Realized**	
Rental rates				
	Studio	$1,279	$1,500 -$1,750 (P.H. $2,000)	~26% higher
	1-BR	$1,631	$1,675 -$2,500 (P.H. $5,700)	~28% higher
	2-BR	$2,301	$2,500 -$5,200 (P.H. $7,800)	~67% higher
	3-BR	$3,334	$8,800 -$19,500 P.H.	~324% higher
Occupancy at stabilization		91%	98%	~7% higher
Parking Revenue		**Market**	**Pro Forma**	**Realized****
Included or in addition to lease?		Additional	Additional	Additional
Rate		$175 / lot / month	$185 -$200 / lot / month	$225 -$375 / lot / month
Retail		**Market**	**Pro Forma**	**Realized****
Retail rental rates		$30 -$40 / RSF/YR	$45 / RSF/YR	$45 / RSF/YR
Rent type (e.g., NNN)		NNN & Gross	NNN	NNN
Expenses		$7 -$10 / RSF/YR	$8 / RSF/YR	$8 / RSF/YR
Tenant improvement allowance		$40 -$50 / RSF	$150 / RSF	$150 / RSF
Occupancy after 12 months		60% -70%	90%	75%

**Market standard costs refer to normal cost to build for subject's use, irrespective of structural approach.*
***Realized metrics at stabilization*
****Conversations with local building officials were held concurrent to land use entitlement approvals processes such that the overall building code review process was only slightly longer. This concurrent approach was essential given that Ohio was not adopting the 2021 IBC, so the Type 4 code path was performance-based, albeit a mirror of what other states have adopted.*

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

Timeline		
	Date	**Context/Comment**
Date of conception (first dollar spent)	Mid 2018	Mid-cycle
Date underwriting finalized (go/no-go decision)	Mid 2019	Mid-cycle
Date equity capital secured	N/A	Developer is equity
Permitting duration***	3 + 6 mo.	Demolition permit first, then building permit
GMP in place	Feb/March 2020	COVID
Construction start	April 2020	
Duration of construction	24 months	Faster by about 2 months
Construction completed	April 2022	Early-cycle
Date stabilized (80% occupancy, NOI, or at pro forma or refinanced)	June 2022	Faster

Project Context

Unparalleled leasing velocities at significant premiums

- The project was 90% leased 4 months after completion
- The premium product drives both velocity and rates with rents significantly higher than market counterparts
- Leasing velocity allowed refinancing activities to start 3 months after completion

Unparalleled leasing velocities at significant premiums

What's the 'Sweet Spot' for Tall Mass Timber?

Depends on many factors:

- Project Use
- Site Constraints
- Local Zoning & FAR Limitations
- Budget
- Client Objectives for Sustainability, Exposed Timber
- And More…

But Some General Trends Could Be:

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

Type IV-C Tall Mass Timber

Example R-2, Type IV-C Building

Not Likely to Utilize Podium Due to Overall Building Height Limit (85 ft) Relative to # of Timber Stories (8)

Same Overall Building Height Limit as IV-HT (85 ft) but higher Fire-Resistance Ratings Requiredd

3 Additional Stories Permitted Compared to IV-HT

All Timber Exposed

Type IV-B Tall Mass Timber

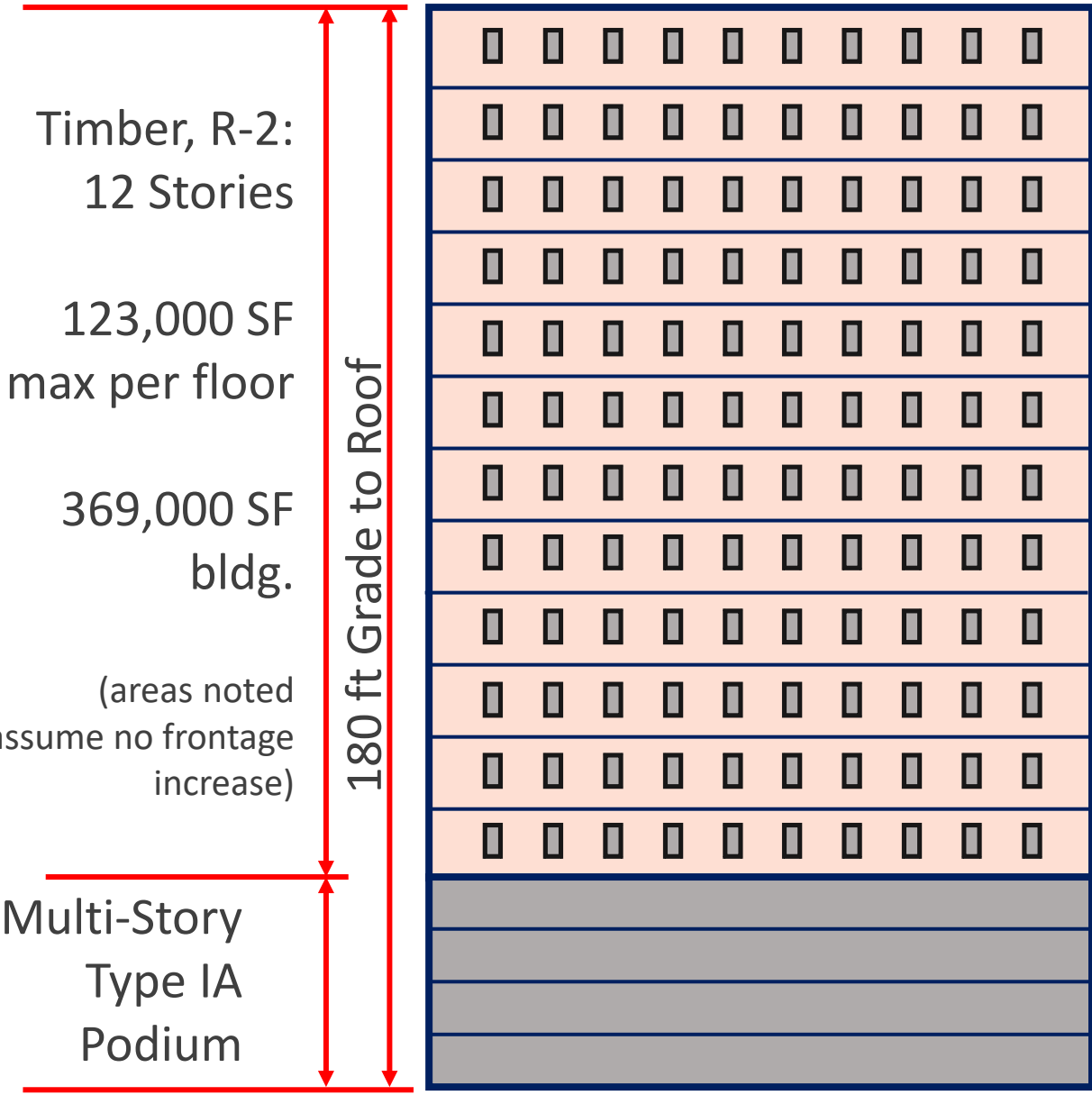
Example Mixed-Use, Type IV-B Building

Likely to Utilize Podium Due to Overall Building Height Limit (180 ft) Relative to # of Timber Stories (12)

Same Fire-Resistance Ratings Required as IV-C But Limitations on Timber Exposed

4 Additional Stories Permitted Compared to IV-C

Limited Timber Exposed



Type IV-A Tall Mass Timber

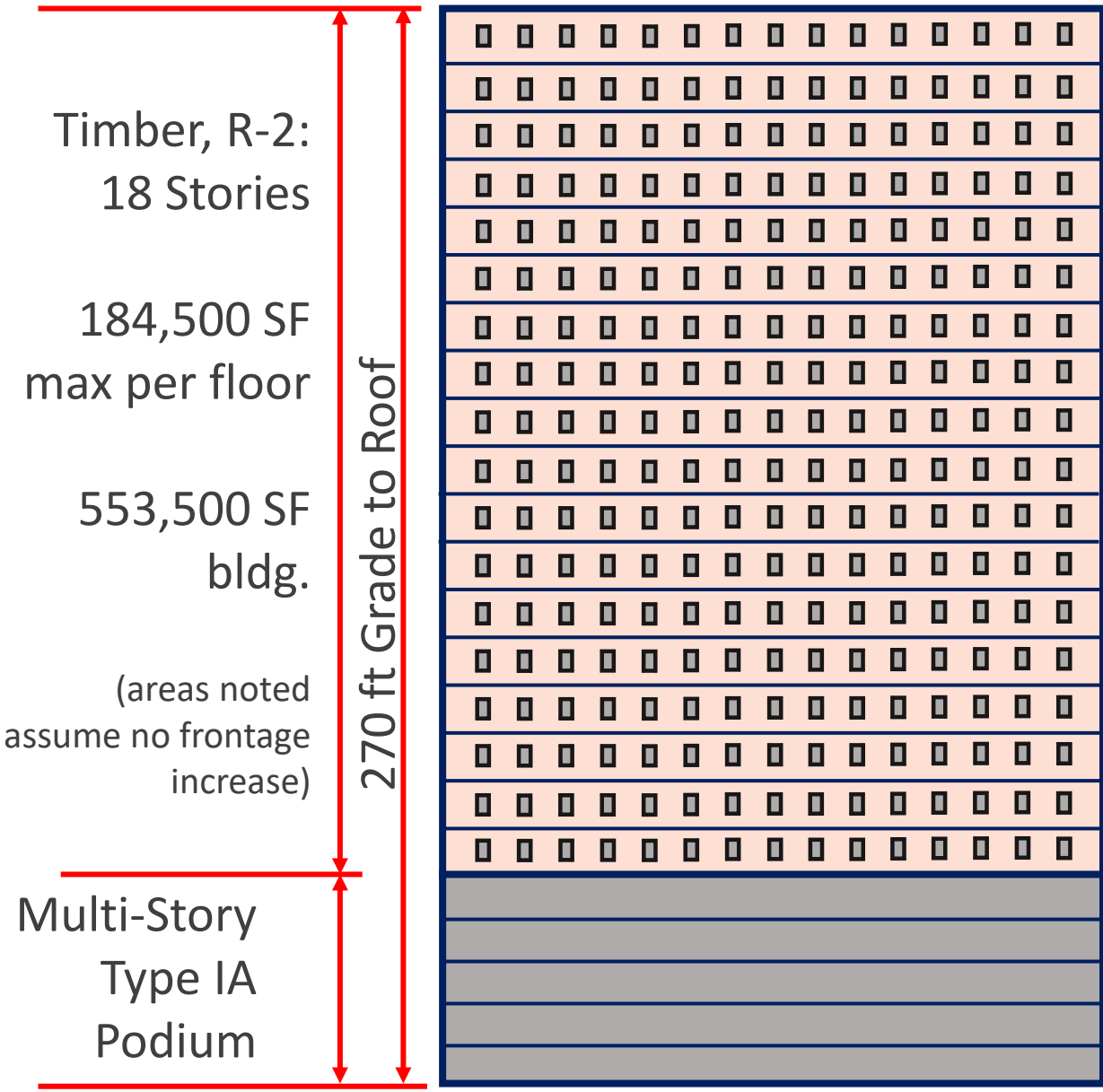
Example Mixed-Use, Type IV-A Building

Likely to Utilize Podium Due to Overall Building Height Limit (270 ft) Relative to # of Timber Stories (18)

Higher Fire-Resistance Ratings Required than IV-B For Primary Frame

6 Additional Stories Permitted Compared to IV-B

No Exposed Timber Permitted



Tall Wood Building Size Limits

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

Tall Wood Building Size Limits

	Construction Type (Unsprinklered Values)					
	I-A	I-B	IV-A	IV-B	IV-C	IV-HT
Occupancies	**Allowable Building Height above Grade Plane, Feet (IBC Table 504.3)**					
A, B, R	Unlimited	160	**65**	**65**	**65**	**65**
	Allowable Number of Stories above Grade Plane (IBC Table 505.4)					
A-2, A-3, A-4	Unlimited	11	**3**	**3**	**3**	**3**
B	Unlimited	11	**5**	**5**	**5**	**5**
R-2	Unlimited	11	**4**	**4**	**4**	**4**
	Allowable Area Factor (At) for SM, Feet^2 (IBC Table 506.2)					
A-2, A-3, A-4	Unlimited	Unlimited	**45,000**	**30,000**	**18,750**	**15,000**
B	Unlimited	Unlimited	**108,000**	**72,000**	**45,000**	**36,000**
R-2	Unlimited	Unlimited	**61,500**	**41,000**	**25,625**	**20,500**

Even so, Sprinklers may be required by 903.2 (all occupancies) and definitely for residential (420.4)

Tall Wood Building Size Limits

	Construction Type (Unsprinklered Values)					
	I-A	I-B	IV-A	IV-B	IV-C	IV-HT
Occupancies	**Allowable Building Height above Grade Plane, Feet (IBC Table 504.3)**					
A, B, R	Unlimited	160	65	65	65	65
	Allowable Number of Stories above Grade Plane (IBC Table 505.4)					
A-2, A-3, A-4	Unlimited	11	3	3	3	3
B	Unlimited	11	5	5	5	5
R-2	Unlimited	11	4	4	4	4
	Allowable Area Factor (At) for SM, Feet^2 (IBC Table 506.2)					
A-2, A-3, A-4	Unlimited	Unlimited	45,000	30,000	18,750	15,000
B	Unlimited	Unlimited	108,000	72,000	45,000	36,000
R-2	Unlimited	Unlimited	61,500	41,000	25,625	20,500
Even so, Sprinklers may be required by 903.2 (all occupancies) and definitely for residential (420.4)						

In almost all cases, sprinklers will be required

Non-Tall Opportunities – Large Area

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

2022 AND BEYOND: PROJECTS RISING

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

TALL WOOD

LEGEND :

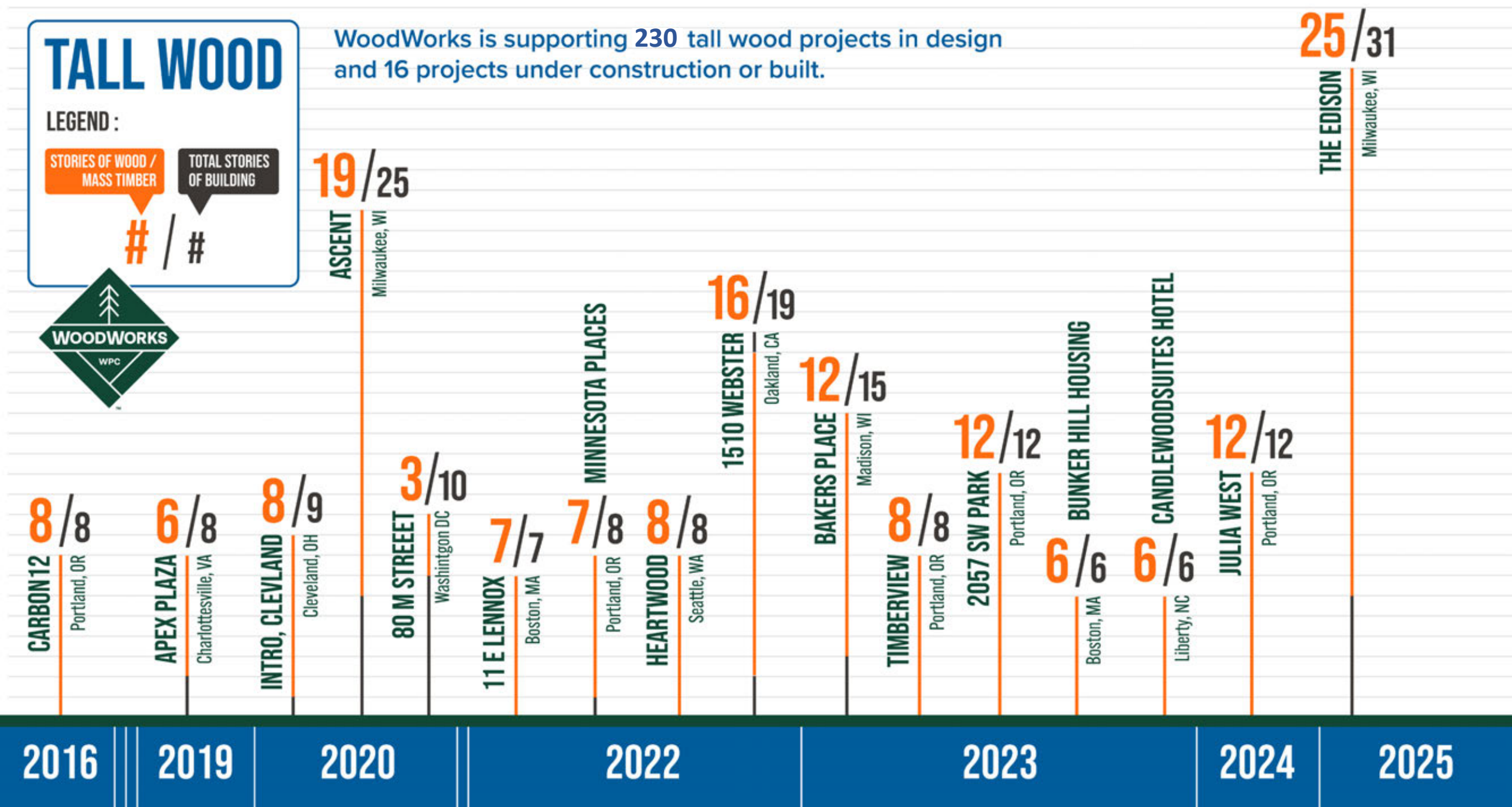
STORIES OF WOOD / MASS TIMBER

TOTAL STORIES OF BUILDING

/

WOODWORKS
WPC

WoodWorks is supporting 230 tall wood projects in design and 16 projects under construction or built.



BAKER'S PLACE

MADISON, WI

Angus-Young
Michael Green Architecture
Equilibrium Consulting
Photo Michael Green Architecture

Baker's Place

Madison, WI

304,800 sf,

15 stories total (12 mass timber)

Type IV-B

Multi-Family

Passive House

WN PROFILE

Angus-Young
Michael Green Architecture
Equilibrium Consulting
Photo Michael Green Architecture

80M

WASHINGTON, DC

Hickok Cole
Arup
Photo Ron Blunt

80M

WASHINGTON, DC

3 story MT vertical addition on top of existing 7 story building

CLT panels / glulam frame

108,000 sqft

16 ft floor to floor

WN PROFILE

Hickok Cole
Arup
Photo Maurice Harrington

Ascent

Milwaukee, WI

Korb + Associates Architects
Thronton Tomasetti
Photo: C.D. Smith Construction

Ascent

Milwaukee, WI

493,000 sf, 25 stories total (19 mass timber)

Type IV-HT with code modifications

Multi-Family

Completed 2022

WN PROFILE

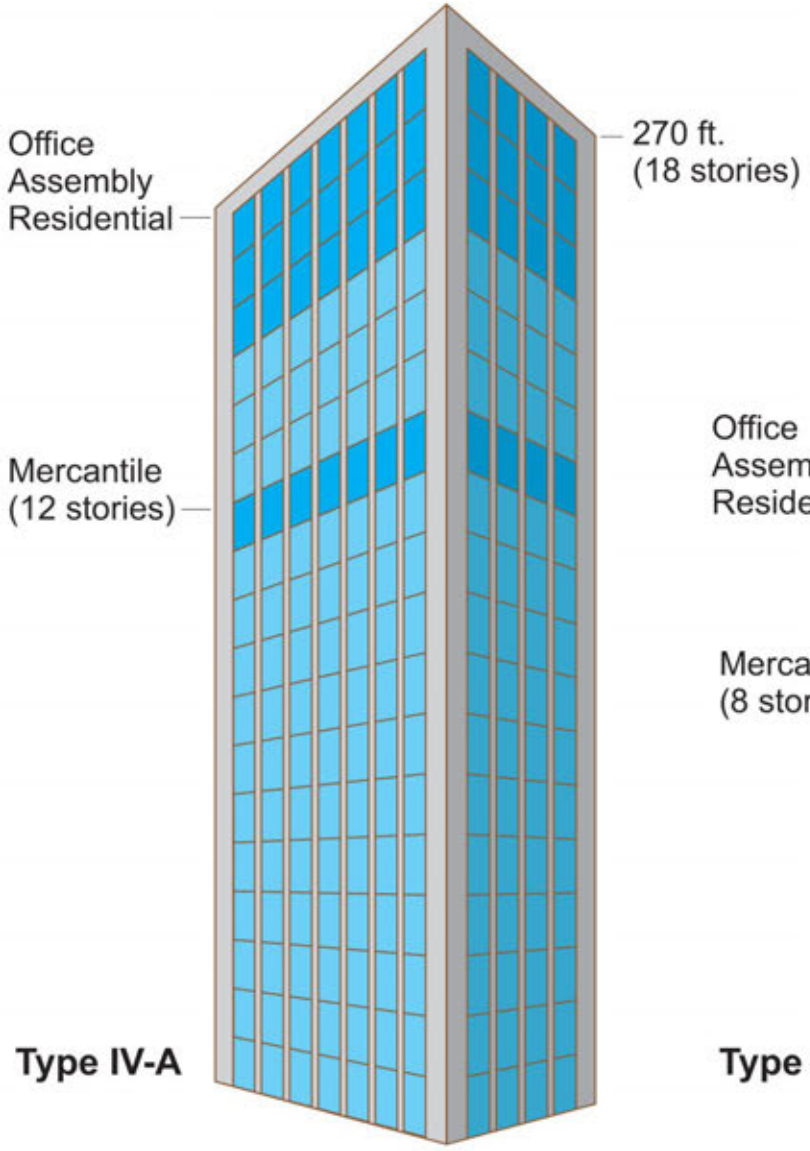
BUSINESS CASE STUDY

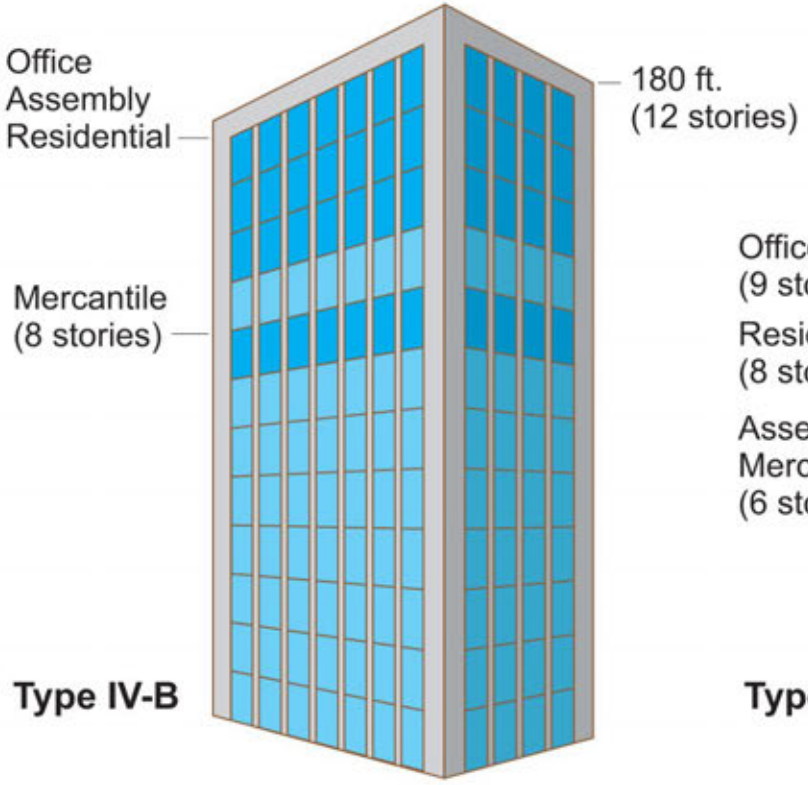
WOOD DESIGN AWARD WINNER

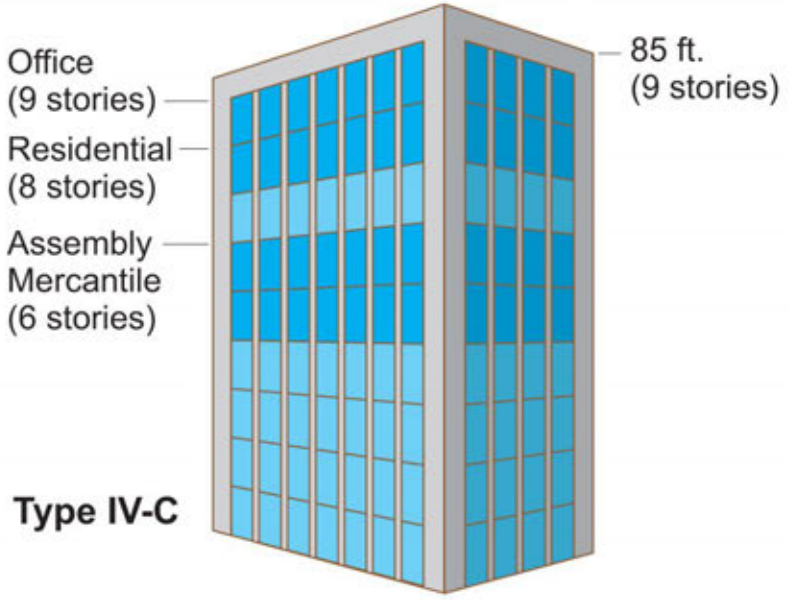
Korb + Associates Architects
Thronton Tomasetti
Photo: VRX Media Group

Tall Mass Timber

2021 IBC: 3 New Tall Mass Timber Construction Types







Tall Wood Fire Resistance Ratings (FRR)

FRR Requirements for Tall Mass Timber Structures (hours)

Building Element	IV-A	IV-B	IV-C
Primary Frame	3	2	2
Exterior Bearing Walls	3	2	2
Interior Bearing Walls	3	2	2
Roof Construction	1.5	1	1
Primary Frame at Roof	2	1	1
Floor Construction	2	2	2

Source: 2021 IBC Table 601

MT Type IV Minimum Sizes

In addition to meeting FRR, all MT elements must also meet minimum sizes

These minimum sizes have been in place for old type IV (current type IV-HT) construction and the same minimums sizes also apply to MT used in new types IV-A, IV-B and IV-C

Contained in IBC 2304.11

Photo:: Ema Peter

Type IV Minimum Sizes - Framing

Minimum Width by Depth in Inches

See IBC 2018 2304.11 or IBC 2015 602.4 for Details

Framing		Solid Sawn (nominal)	Glulam (actual)	SCL (actual)
Floor	Columns	8 x 8	$6^{3}/_{4}$ x 8¼	7 x 7½
	Beams	6 x 10	5 x 10½	5¼ x 9½
Roof	Columns	6 x 8	5 x 8¼	5¼ x 7½
	Beams*	4 x 6	3 X $6^{7}/_{8}$	3½ X 5½

*3” nominal width allowed where sprinklered

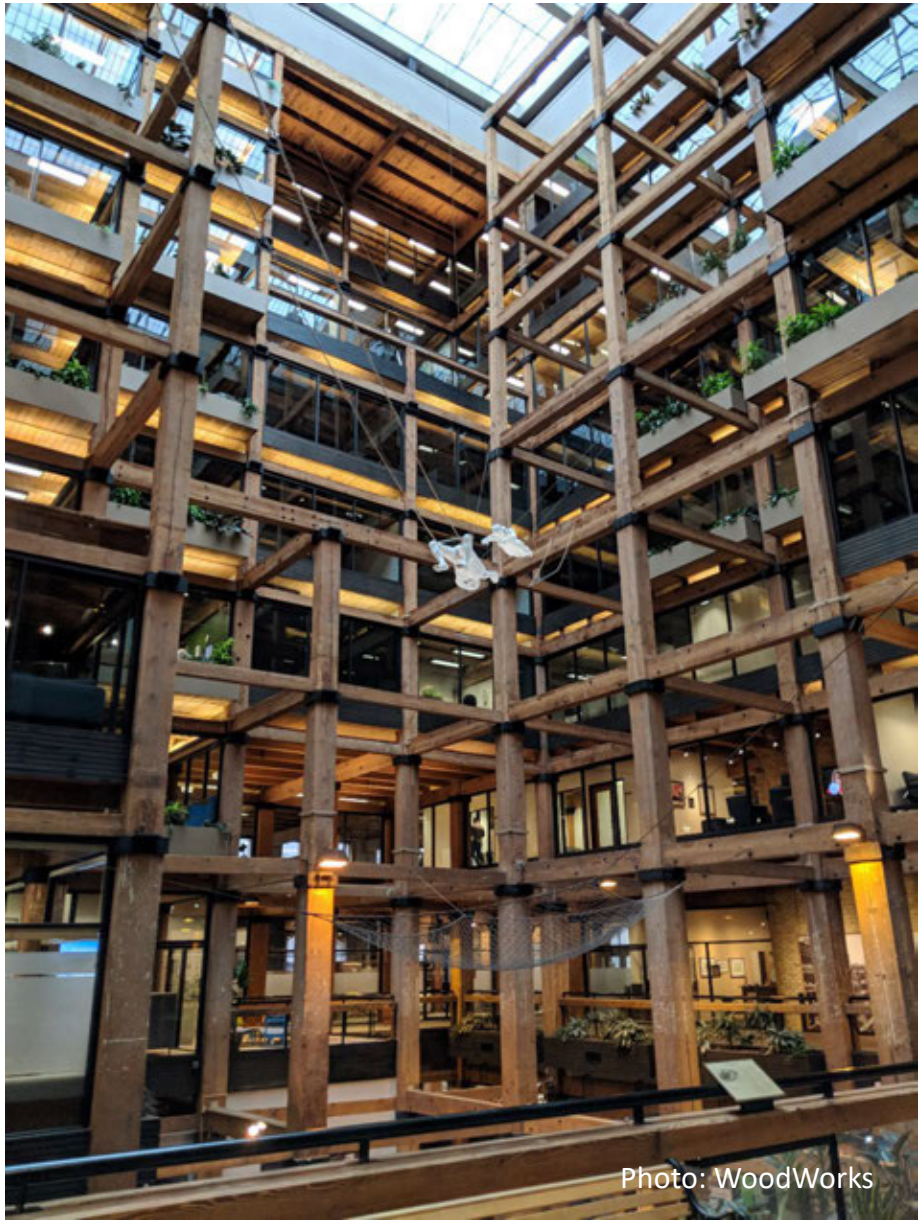


Photo: WoodWorks

Type IV Minimum Sizes – Floor/Roof Panels

Floor Panels/Decking:

- 4” thick CLT (actual thickness)
- 4” NLT/DLT/GLT (nominal thickness)
- 3” thick (nominal) decking covered with: 1” decking or 15/32” WSP or ½” particleboard

Roof Panels/Decking:

- 3” thick CLT (nominal thickness)
- 3” NLT/DLT/GLT (nominal thickness)
- 2” decking (nominal thickness)
- 1-1/8” WSP

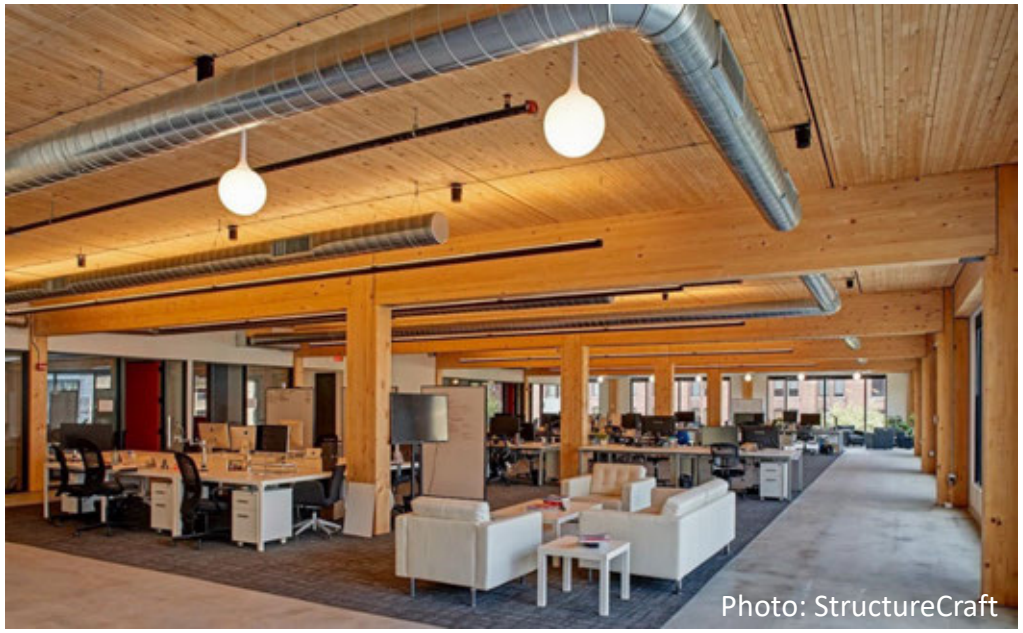


Photo: StructureCraft


Photos: Aitor Sanchez/ Ewing Cole


Photo: LEVER Architecture

Type IV Minimum Sizes - Walls

Exterior Walls for Type IV-A B C

- CLT or Non-combustible

Exterior Walls for Type IV-HT

- CLT or FRTW or Non-combustible
- IBC 2018 - 6” Thick Wall (FRTW or CLT)
- IBC 2021 - 4” Thick CLT

MT Type IV Minimum Sizes - Walls

MT Interior Walls in all Type IV:

- Laminated construction 4” thick
- Solid wood construction min. 2 layers of 1” matched boards

Other Interior Walls in Type IV A,B,C

- Non-combustible (0 hr for nonbearing)

Other Interior Walls in Type IV HT

- Non-combustible (1 hr min)
- Wood stud wall (1 hr min)

Verify other code requirements for FRR

(eg. interior bearing wall; occupancy separation)

Exterior Wall Construction Recap

	IV-A, IV-B, IV-C			IV-HT	IV-HT
				IBC 2021	IBC 2018
Fire Rating (bearing wall)	3 Hr	2 Hr	2 Hr	2 Hr	2 Hr
Mass Timber	Mass Timber / CLT			4” min thick CLT*	6” Wall*
Exterior NC Protection	40 Min NC & No Exterior Combustible Coverings			FRT Sheathing, Gyp, or other NC	
Interior NC Protection	Per Interior Requirements			Not Required	
Light-Frame FRTW	No			Yes*	6” Wall*

*Changes in IBC 2015, 2018, and 2021 editions

Interior Wall Construction Recap

	IV-A	IV-B	IV-C	IV-HT
Fire Rating (bearing wall)	3 Hr	2 Hr	2 Hr	1 Hr or HT*
Construction – MT	Laminated construction 4” thick (CLT, NLT, etc) Solid wood construction min. 2 layers of 1” matched boards			
NC Protection	Per Interior Requirements			No
Noncombustible non-bearing wall	0 Hr			1 Hr
Wood Stud Wall	No			1 Hr

*IBC 2021 requires at least 1 Hr FRR for HT walls supporting 2 levels

Tall Wood Fire Resistance Ratings (FRR)

FRR Requirements for Tall Mass Timber Structures (hours)

Building Element	IV-A	IV-B	IV-C
Primary Frame	3	2	2
Exterior Bearing Walls	3	2	2
Interior Bearing Walls	3	2	2
Roof Construction	1.5	1	1
Primary Frame at Roof	2	1	1
Floor Construction	2	2	2

Source: 2021 IBC Table 601

Noncombustible Protection (NC)

The definition of “Noncombustible Protection (For Mass Timber)” is created to address the passive fire protection of mass timber.

Mass timber is permitted to have its own fire-resistance rating (e.g., Mass Timber only) or have a fire resistance rating based on the fire resistance through a combination of the mass timber fire-resistance plus protection by non-combustible materials as defined in Section 703.6 (e.g., additional materials that delay the combustion of mass timber, such as gypsum board).

Credit: Urban One

MT Fire Resistance Ratings (FRR)

IBC 722.7

The fire resistance rating of the mass timber elements shall consist of the fire resistance of the unprotected element (MT) added to the protection time of the noncombustible (NC) protection.

+

= **FRR**

Credit: Urban One

MT Fire Resistance Ratings (FRR)

However, FRR Doesn't always need to be from a combination of MT + NC. In some cases, just NC can be used, in other cases, just MT can be used:

IBC 602.4

Mass timber elements shall meet the fire resistance rating requirements of this section based on either the fire resistance rating of the noncombustible protection, the mass timber, or a combination of both.

Credit: Urban One

Noncombustible Protection (NC)

Where timber is required to be protected, NC must contribute at least 2/3 FRR

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

Noncombustible Protection (NC)

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

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

1 layer 5/8 Type X

2 layers 5/8 Type X

3 layers 5/8 Type X

Noncombustible Protection

Noncombustible Protection Required

	IV-A	IV-B	IV-C	IV-HT
Roof Below Mass Timber	60 min	40 min*	Not Req.	Not Req.
Primary Frame @ Roof	80 min	40 min*	Not Req.	Not Req.
Primary Frame	120 min	80 min*	Not Req.	Not Req.
Below Mass Timber Floor	80 min	80 min*	Not Req.	Not Req.
Above Mass Timber Floor	1” Min NC Material	1” Min NC Material	Not Req.	Not Req.

Requirements Per new 602.4. * Some MT permitted to be exposed.

Type IV-A Fire Resistance Ratings (FRR)

Primary Frame (3-hr) + Floor Panel Example (2-hr):

Minimum 1" noncombustible material

Mass timber floor panel

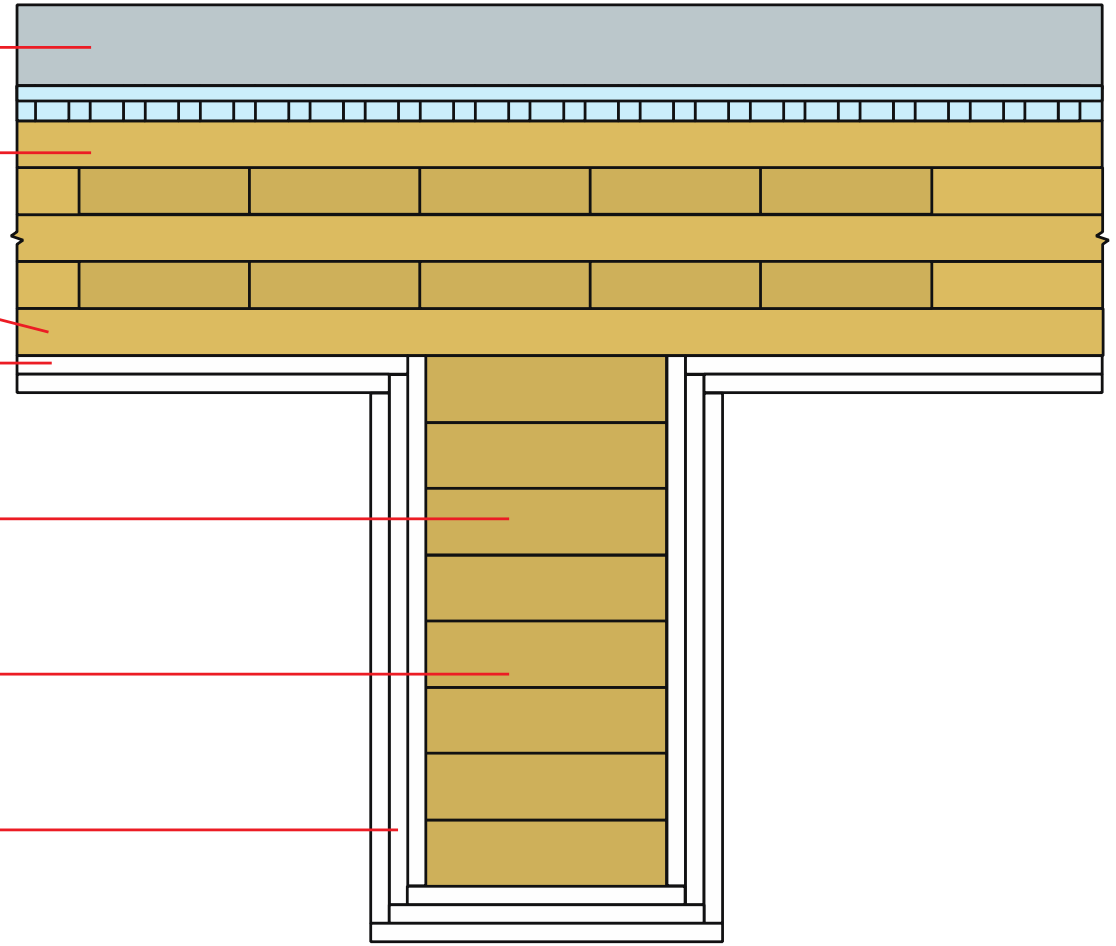
40 minutes of MT FRR

Two layers 5/8" Type X gypsum

Glulam beam (primary structural frame)

60 minutes of MT FRR

Three layers 5/8" Type X gypsum



Type IV-B Fire Resistance Ratings (FRR)

Primary Frame (2-hr) + Floor Panel (2-hr)

Minimum 1" noncombustible material

Mass timber floor panel

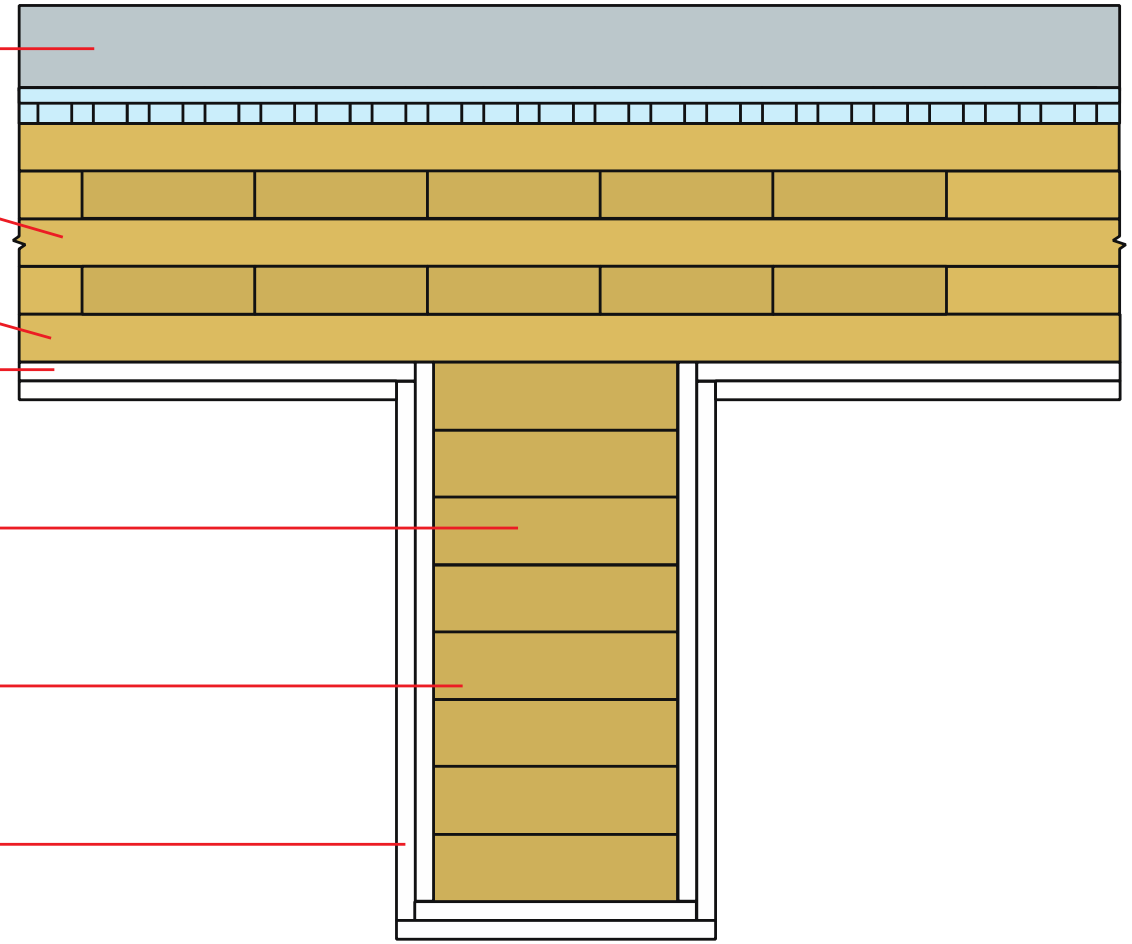
40 minutes of MT FRR

2 layers 5/8" Type X gypsum

Glulam beam (primary structural frame)

40 minutes of MT FRR

Two layers 5/8" Type X gypsum



Type IV-B Fire Resistance Ratings (FRR)

Primary Frame (2-hr) + Floor Panel Example (2-hr)

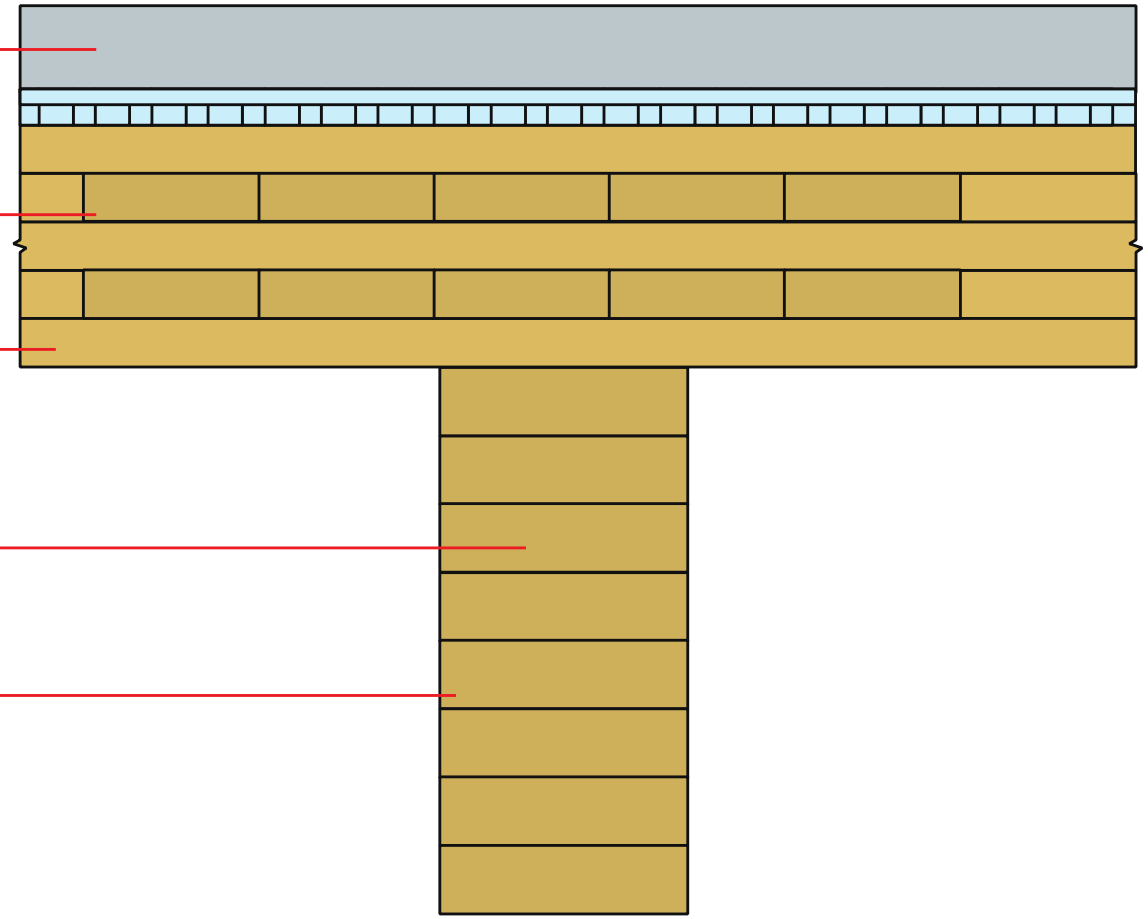
Minimum 1" noncombustible material

Mass timber floor panel

2-hr of MT FRR;
noncombustible material not required

Glulam beam (primary structural frame)

2-hr of MT FRR;
Noncombustible material not required



Type IV-C Fire Resistance Ratings (FRR)

Primary Frame (2-hr) + Floor Panel Example (2-hr)

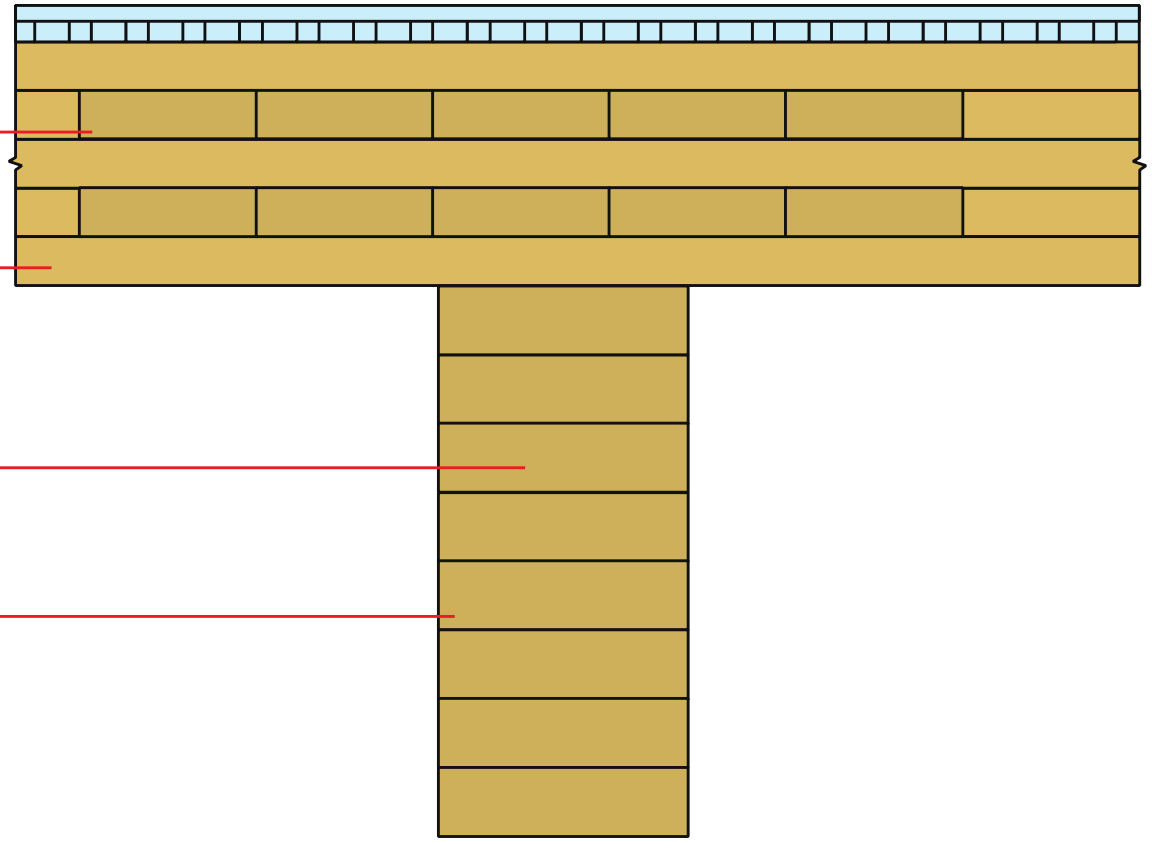
Noncombustible material not required

Mass timber floor panel

2-hr of MT FRR;
noncombustible material not required

Glulam beam (primary structural frame)

2-hr of MT FRR;
Noncombustible material not required



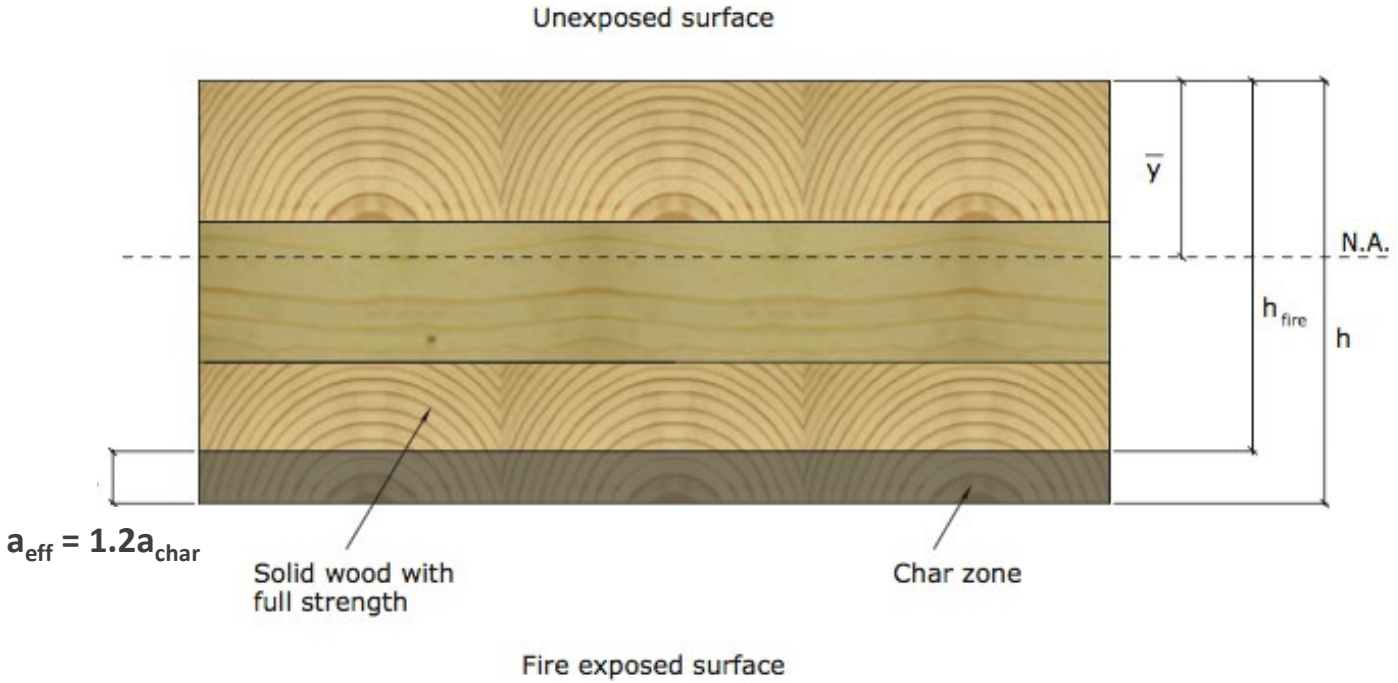
MT Fire Resistance Ratings (FRR)

How do you determine FRR of MT?

2 Options:

1. Calculations in Accordance with IBC 722 → NDS Chapter 16
2. Tests in Accordance with ASTM E119


Credit: Urban One



MT Fire Resistance Ratings (FRR)

NDS Chapter 16 includes calculation of fire resistance of NLT, CLT, Glulam, Solid Sawn and SCL wood products

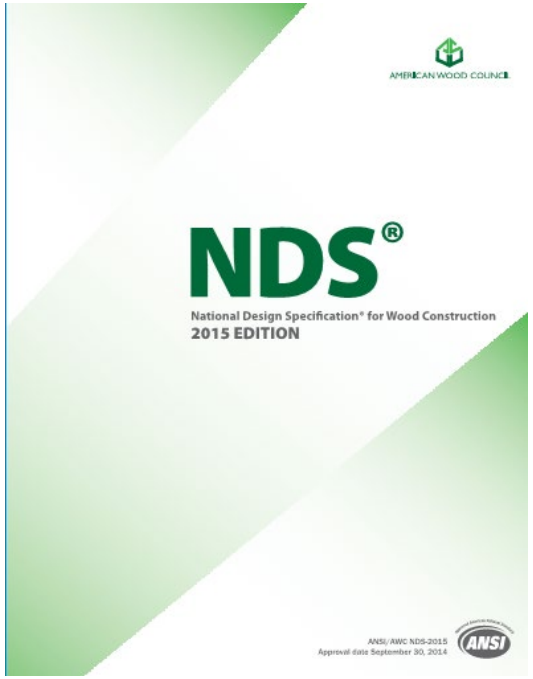


Table 16.2.1B Effective Char Depths (for CLT with β_n=1.5in./hr.)

Required Fire Endurance (hr.)	Effective Char Depths, a_{char} (in.) lamination thicknesses, h_{lam} (in.)								
	5/8	3/4	7/8	1	1-1/4	1-3/8	1-1/2	1-3/4	2
1-Hour	2.2	2.2	2.1	2.0	2.0	1.9	1.8	1.8	1.8
1½-Hour	3.4	3.2	3.1	3.0	2.9	2.8	2.8	2.8	2.6
2-Hour	4.4	4.3	4.1	4.0	3.9	3.8	3.6	3.6	3.6

MT Fire Resistance Ratings (FRR)

Nominal char rate of 1.5”/HR is recognized in NDS. Effective char depth calculated to account for duration, structural reduction in heat-affected zone

Credit: ARUP

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

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

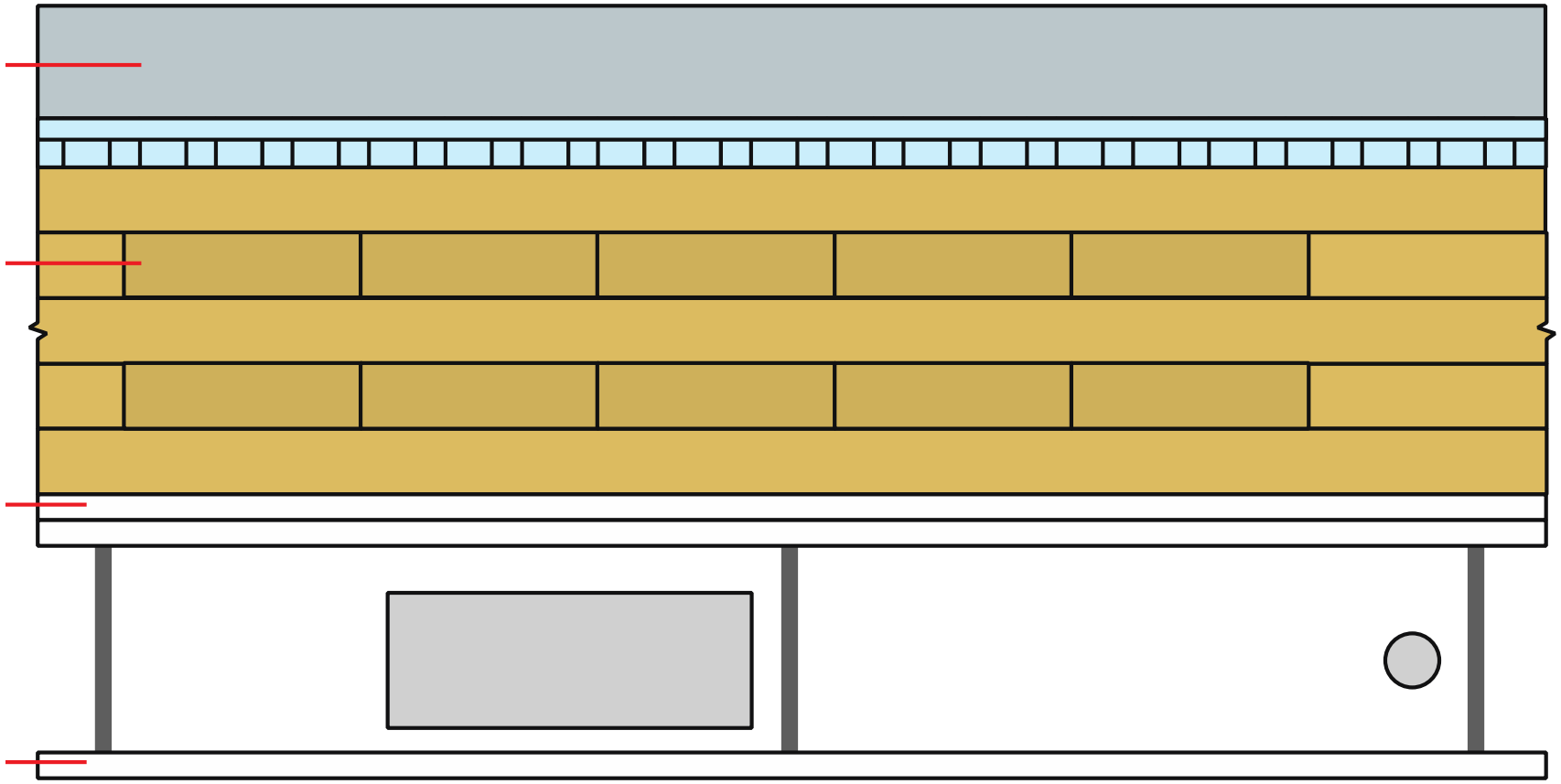
Table 16.2.1B Effective Char Depths (for CLT with β_n=1.5in./hr.)

Required Fire Endurance (hr.)	Effective Char Depths, a_{char} (in.)								
	lamination thicknesses, h_{lam} (in.)								
	5/8	3/4	7/8	1	1-1/4	1-3/8	1-1/2	1-3/4	2
1-Hour	2.2	2.2	2.1	2.0	2.0	1.9	1.8	1.8	1.8
1½-Hour	3.4	3.2	3.1	3.0	2.9	2.8	2.8	2.8	2.6
2-Hour	4.4	4.3	4.1	4.0	3.9	3.8	3.6	3.6	3.6

Concealed Spaces in Type IV

What if I have a dropped ceiling? Can I have a dropped ceiling?

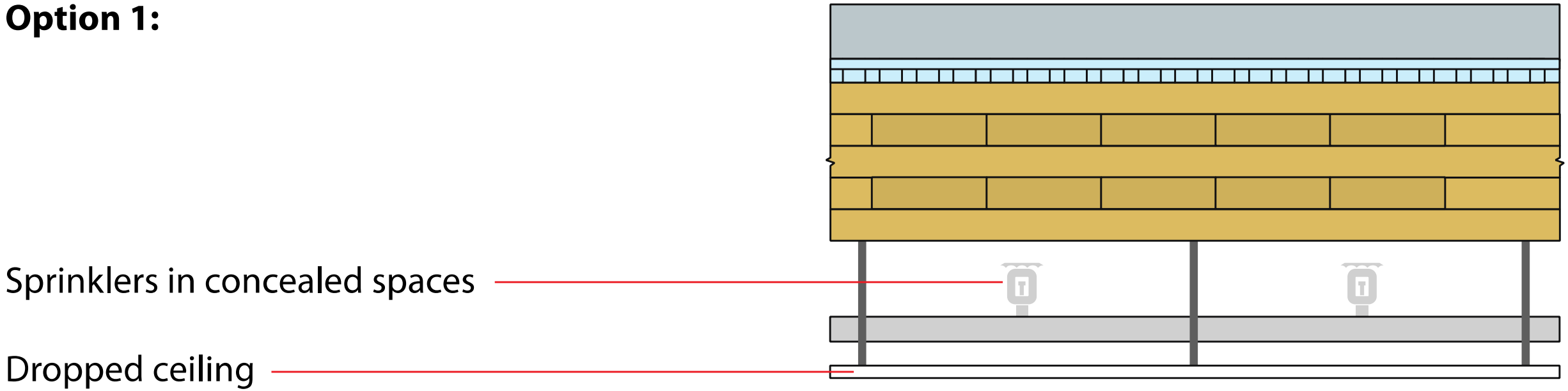
- Impact on FRR, NC placement, sprinkler requirements



Concealed Spaces in Type IV-HT – 2021 IBC

CONCEALED SPACES: TYPE IV-HT

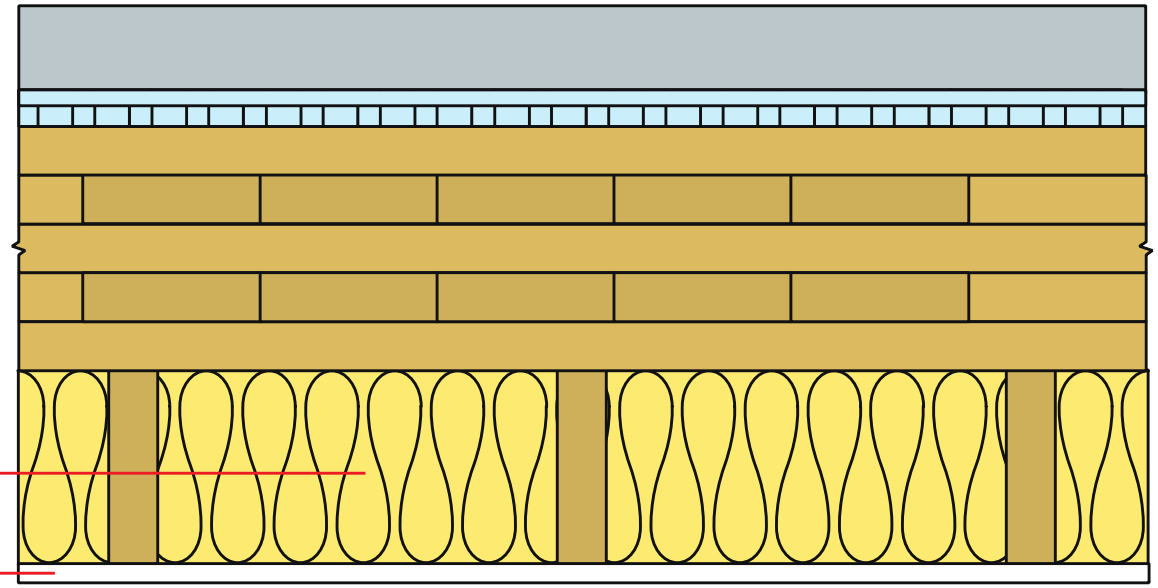
Option 1:



Concealed Spaces in Type IV-HT – 2021 IBC

CONCEALED SPACES: TYPE IV-HT

Option 2:



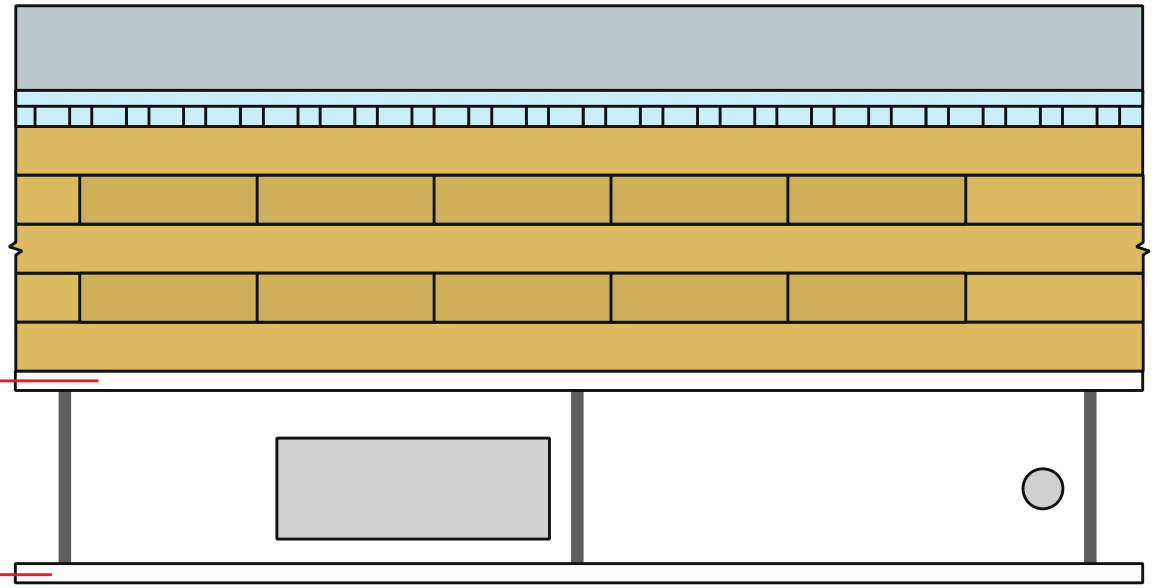
Concealed Spaces in Type IV-HT – 2021 IBC

CONCEALED SPACES: TYPE IV-HT

Option 3:

5/8" Type X gypsum on all mass timber surfaces within concealed space

Dropped ceiling



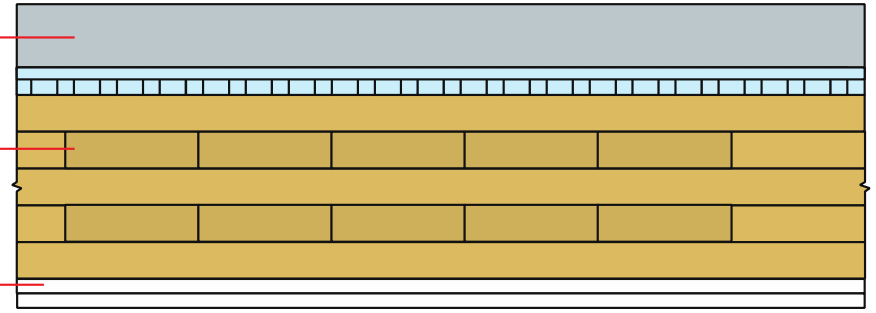
Concealed Spaces in Type IV-A and IV-B

Without Dropped Ceiling

Minimum 1" noncombustible material

Mass timber floor panel

Two layers 5/8" Type X gypsum*



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

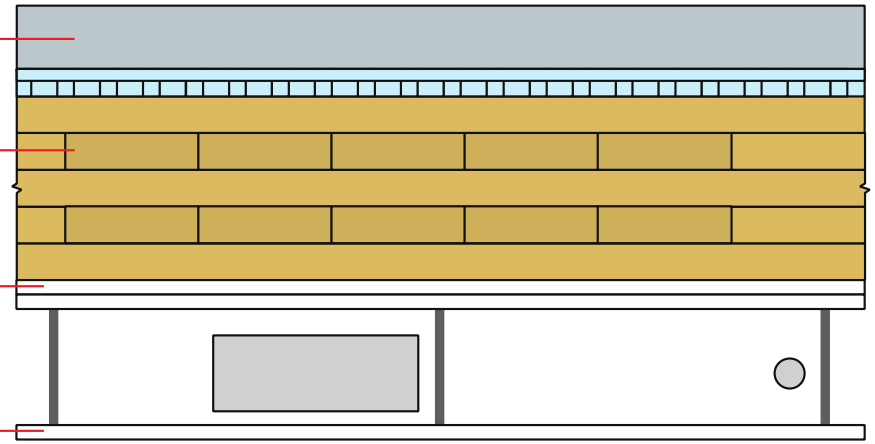
With Dropped Ceiling

Minimum 1" noncombustible material

Mass timber floor panel

Two layers 5/8" Type X gypsum

Dropped ceiling



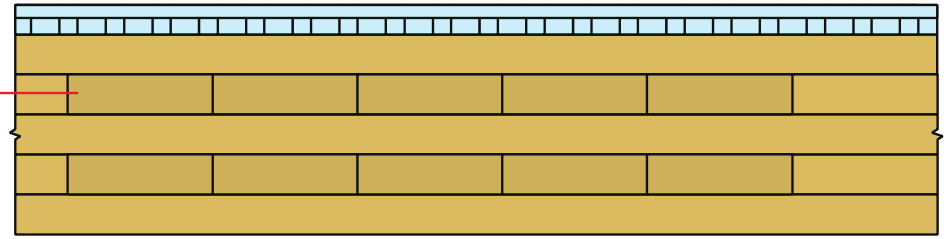
Concealed Spaces in Type IV-C

Without Dropped Ceiling

Noncombustible material not required

Mass timber floor panel

Noncombustible material not required



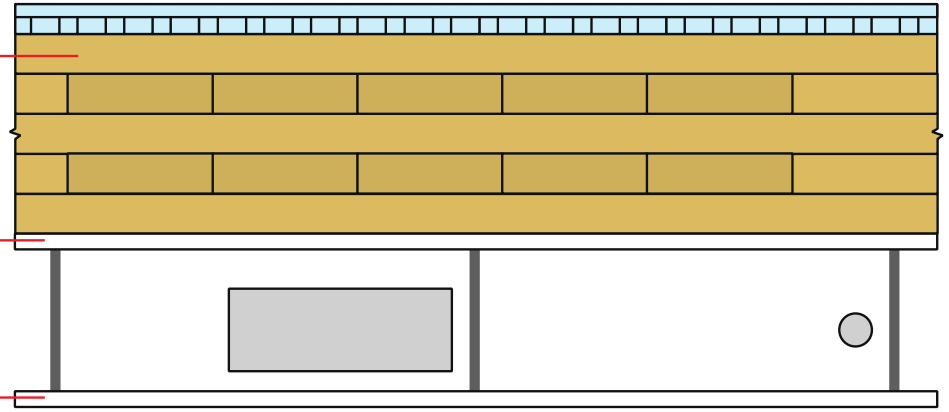
With Dropped Ceiling

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



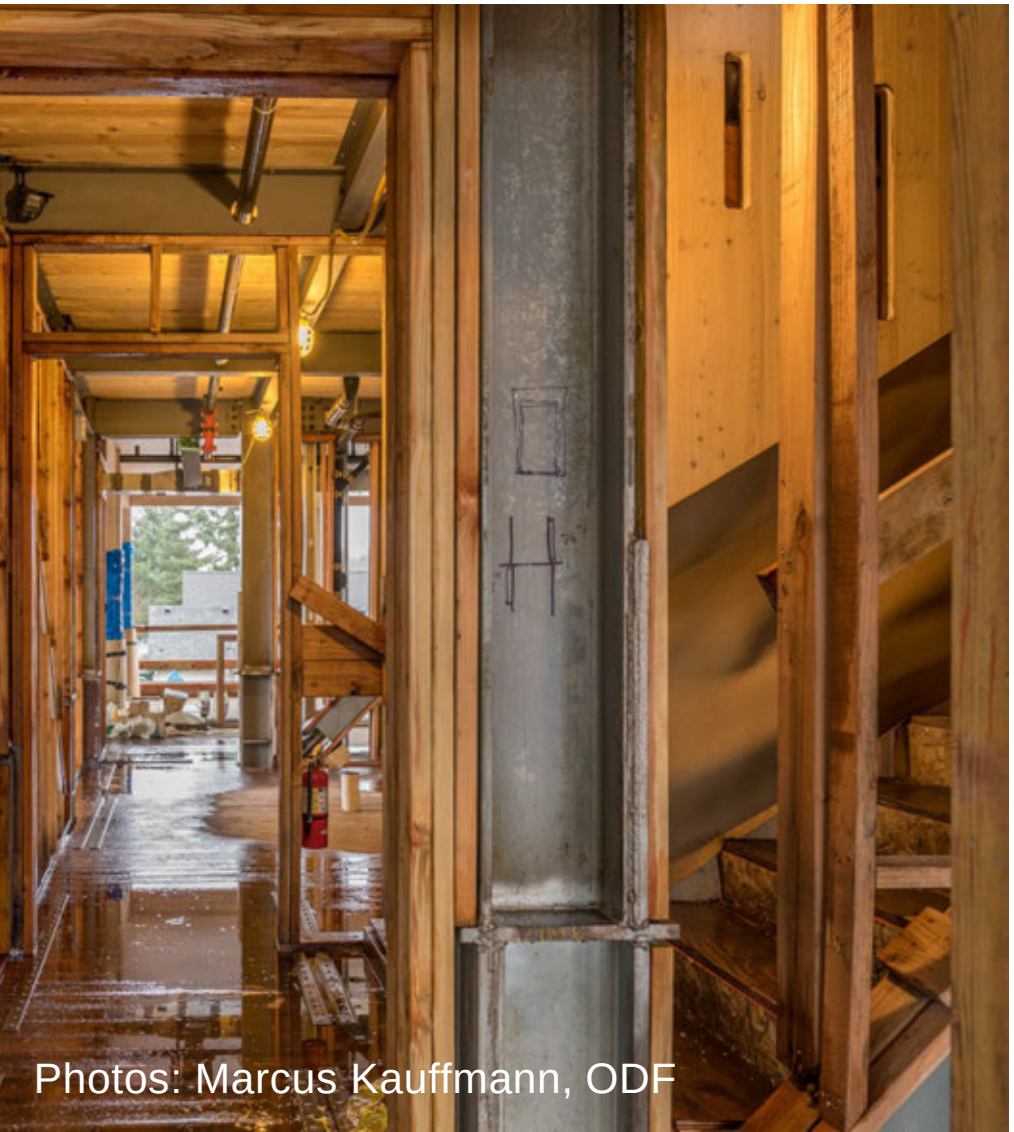
Lateral System Choices

Lateral System Choices

Concrete Shearwalls

Lateral System Choices

Steel Braced Frame



Photos: Marcus Kauffmann, ODF

Lateral System Choices

Wood-Framed Shearwalls

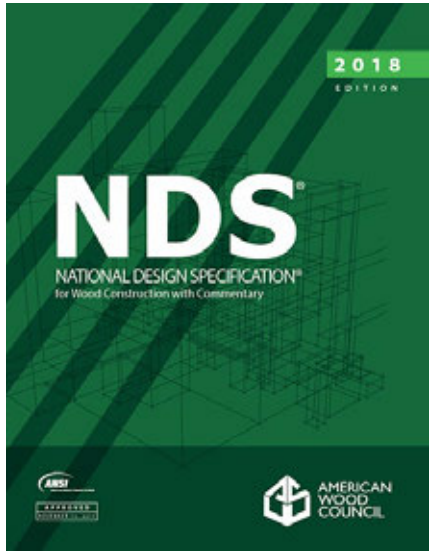
Lateral System Choices

MT Shearwalls

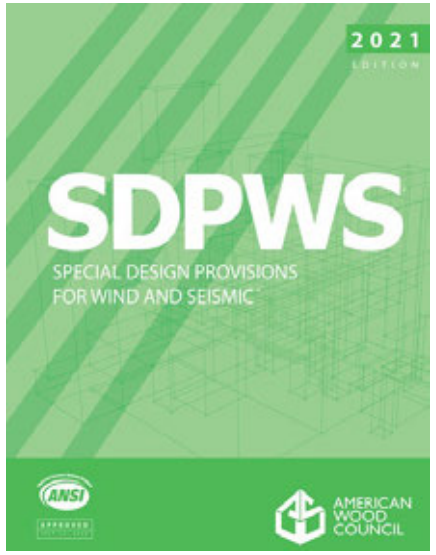
Photo: Alex Schreyer

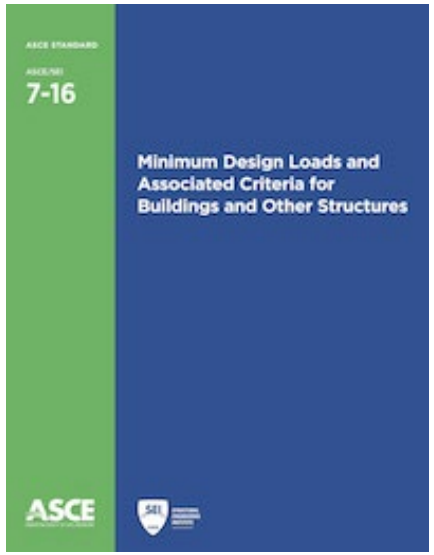
2021 IBC

2018 NDS



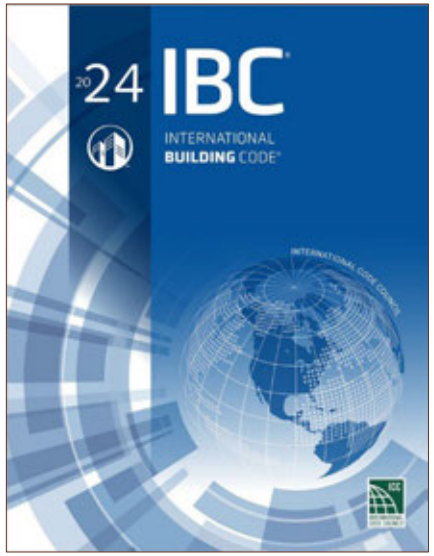
2021 SDPWS



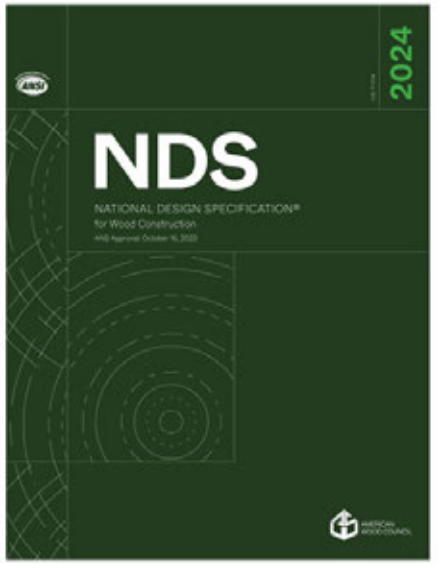


ASCE 7-16
(2016)

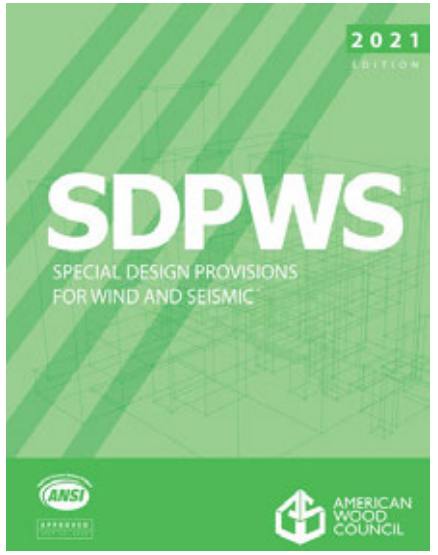
2024 IBC

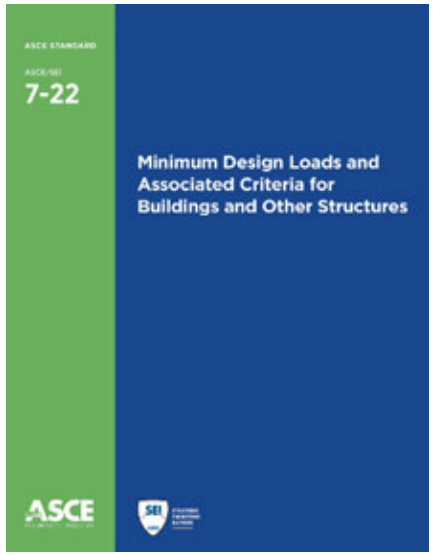


2024 NDS



2021 SDPWS





ASCE 7-22
(2022)

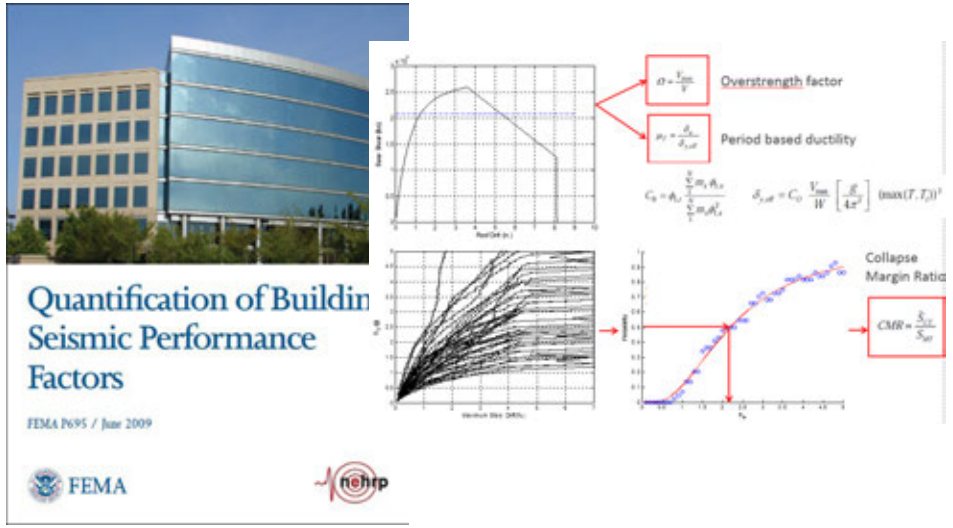
CLT Shearwalls

IBC 2021 → 2021 SDPWS Update

- Platform Frame CLT Shear Walls
- Prescribed nailed metal plate connectors
- *Panel* aspect ratio, h:b_p from 2:1 to 4:1

IBC 2024 → 2022 ASCE 7 Update

- Include Platform Frame CLT Shear Walls
- R = 2, Omega = 3, Cd = 3.
- 65 ft height limit – all Seismic Design Categories
- Panel aspect ratio, h:bp from 2:1 to 4:1



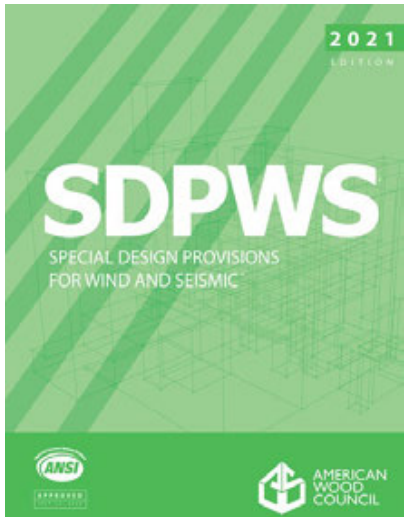
Lateral System Choices

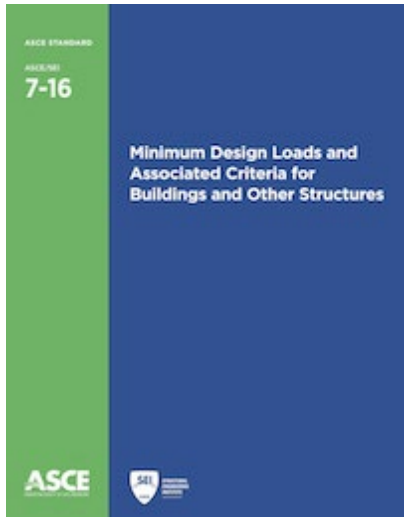
Prescriptive Code Compliance

Concrete Shearwalls ✓
Steel Braced Frames ✓
Light Wood-Frame Shearwalls ✓
CLT Shearwalls ✓
CLT Rocking Walls ✗
Timber Braced Frames ✗

2021 SDPWS
ASCE 7-22


Photo: WoodWorks

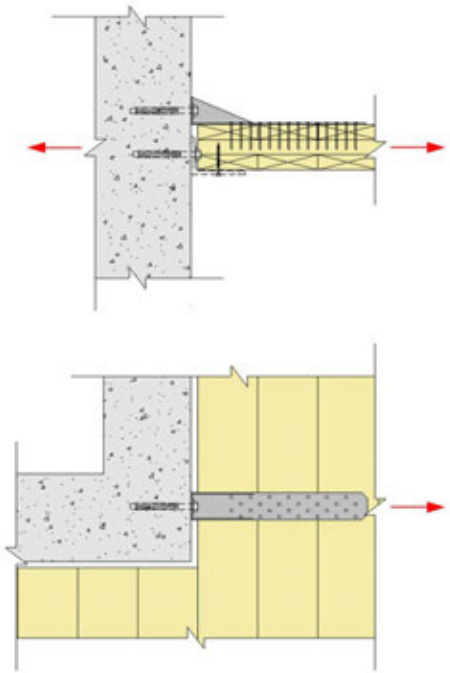




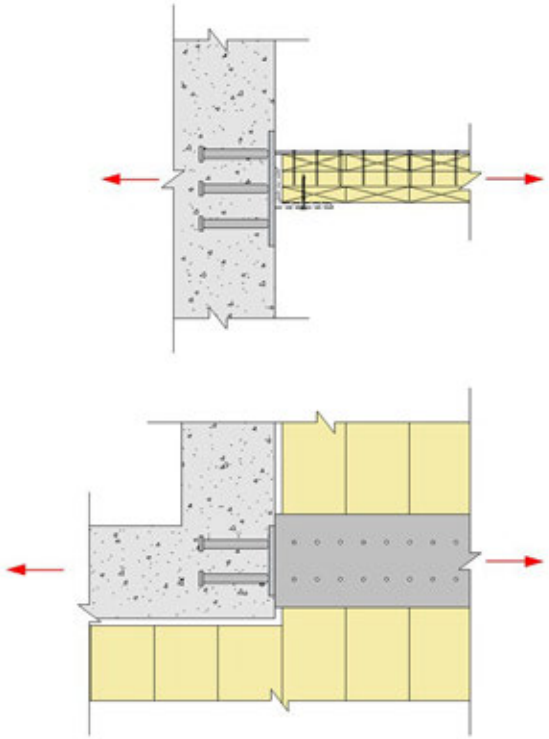
Considerations for Lateral Systems

Connections to concrete core

- Tolerances & adjustability
- Drag/collector forces

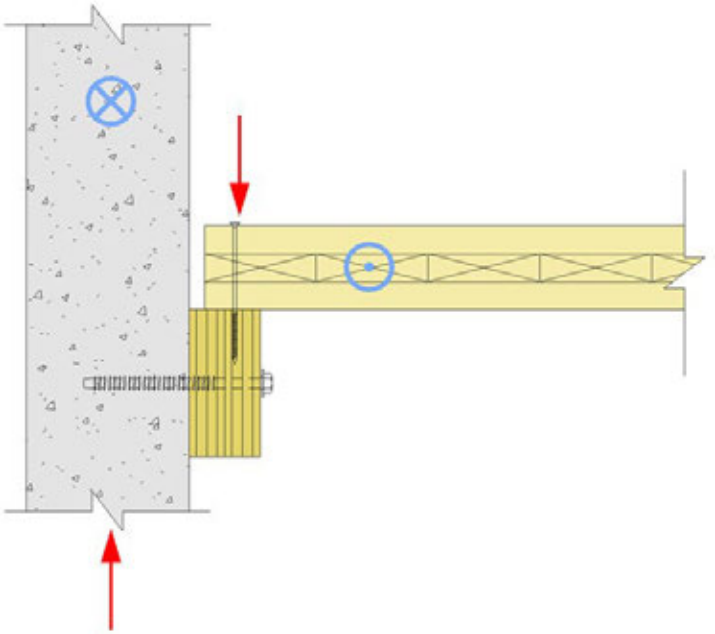


PLAN VIEW



PLAN VIEW

Photo: Acton Ostry Architects



Considerations for Lateral Systems

Connections to steel frame

- Tolerances & adjustability
- Ease of installation

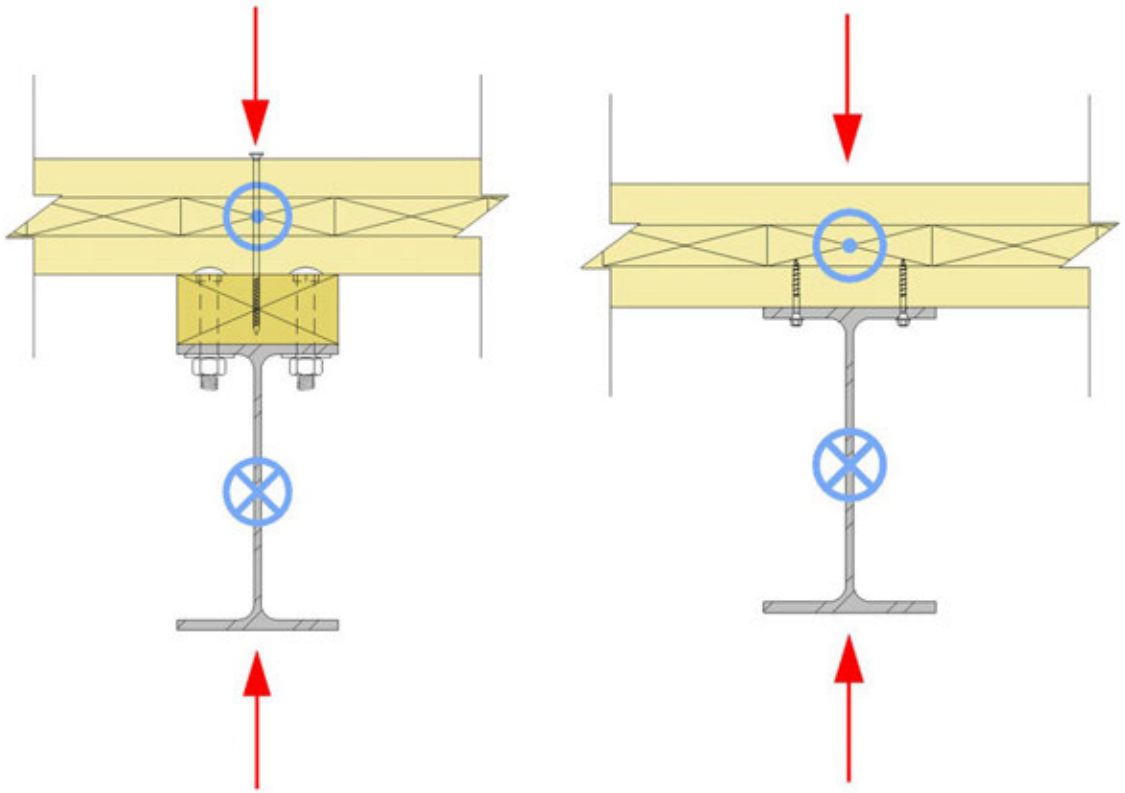


Photo: Marcus Kauffmann, ODF

Shaft Enclosures in Tall Timber

- When can shaft enclosures be MT?
- What FRR requirements exist?
- If shaft enclosure is MT, is NC required?

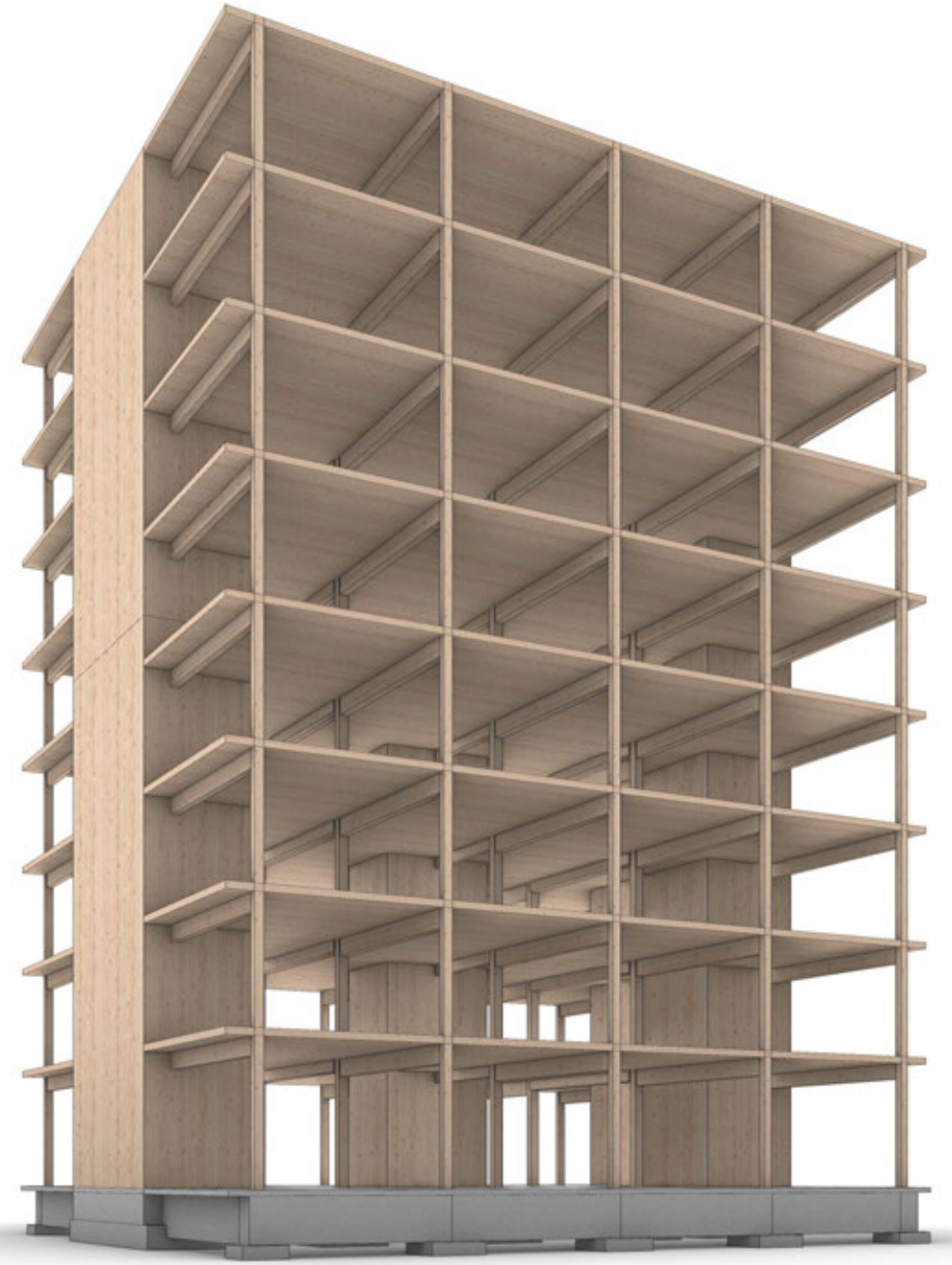


Image: Generate Architecture and Technologies + MIT – John Klein

Tall Wood Shaft Enclosures

	IV-A	IV-B	IV-C
Exit & Hoistway Enclosures	Up to 12 Stories or 180 ft: MT protected with 2 layers 5/8” type X gyp (if 2 HR req’d) or 3 layers 5/8” type X gyp (if 3 HR req’d) both sides Above 12 Stories or 180 ft: Noncombustible shafts (IBC 2021 602.4)	NC or MT protected with 2 layers 5/8” type X gyp (IBC 2021 602.4.2.6) both sides	NC or MT protected with 1 layer 5/8” type X gyp (IBC 602.4.3.6) both sides
E&H Enclosures FRR	2 HR (not less than FRR of floor assembly penetrated, IBC 713.4)		

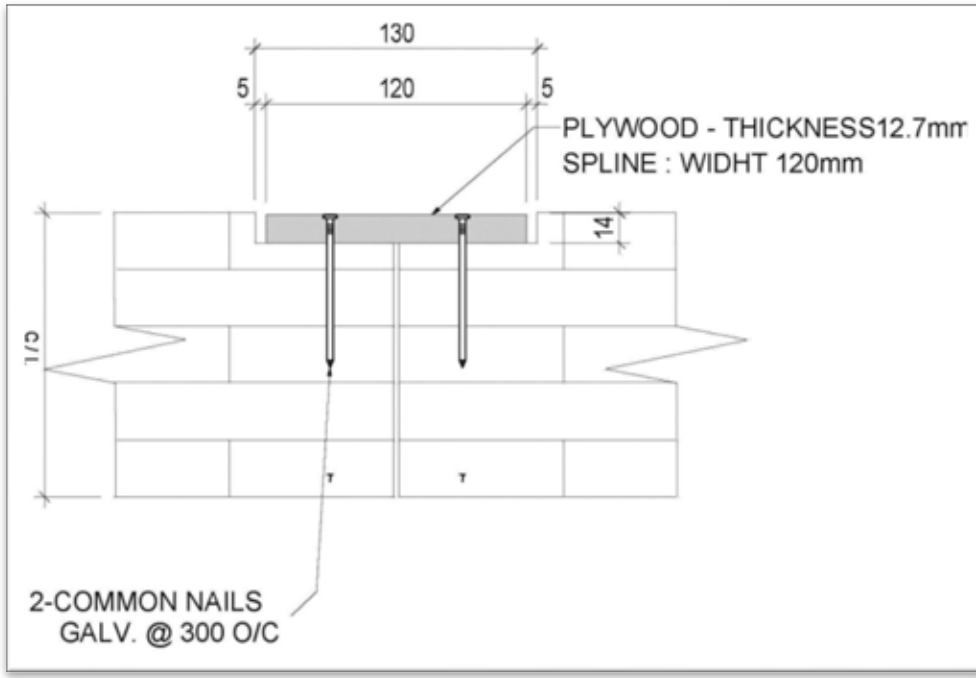
Sealants at MT Panel Edges

Photos: ARUP

Sealants at MT Panel Edges

703.7 Sealing of adjacent mass timber elements.
In buildings of Type IVA, IVB, and IVC construction, sealant or adhesive shall be provided to resist the passage of air in the following locations:

1. At abutting edges and intersections of mass timber building elements required to be fire resistance-rated
2. At abutting intersections of mass timber building elements and building elements of other materials where both are required to be fire resistance-rated.



Sealants at MT Panel Edges

Sealants shall meet the requirements of ASTM C920 (elastomeric joint sealants). Adhesives shall meet the requirements of ASTM D3498 (gap filling construction adhesives, i.e. not fire caulk).

Exception: Sealants or adhesives need not be provided where they are not a required component of a fire resistance- rated assembly.


Photo: NRCAN


Photo: Charles


Photo: ARUP

Sealants at MT Panel Edges

Several MT fire tested assemblies have successfully been completed w/o adhesives/sealants at abutting panel edges

2021 IBC will require periodic special inspections of adhesive/sealant installation (when required to be installed)


Photo: NRCAN


Photo: Fast + Epp


Photo: ARUP

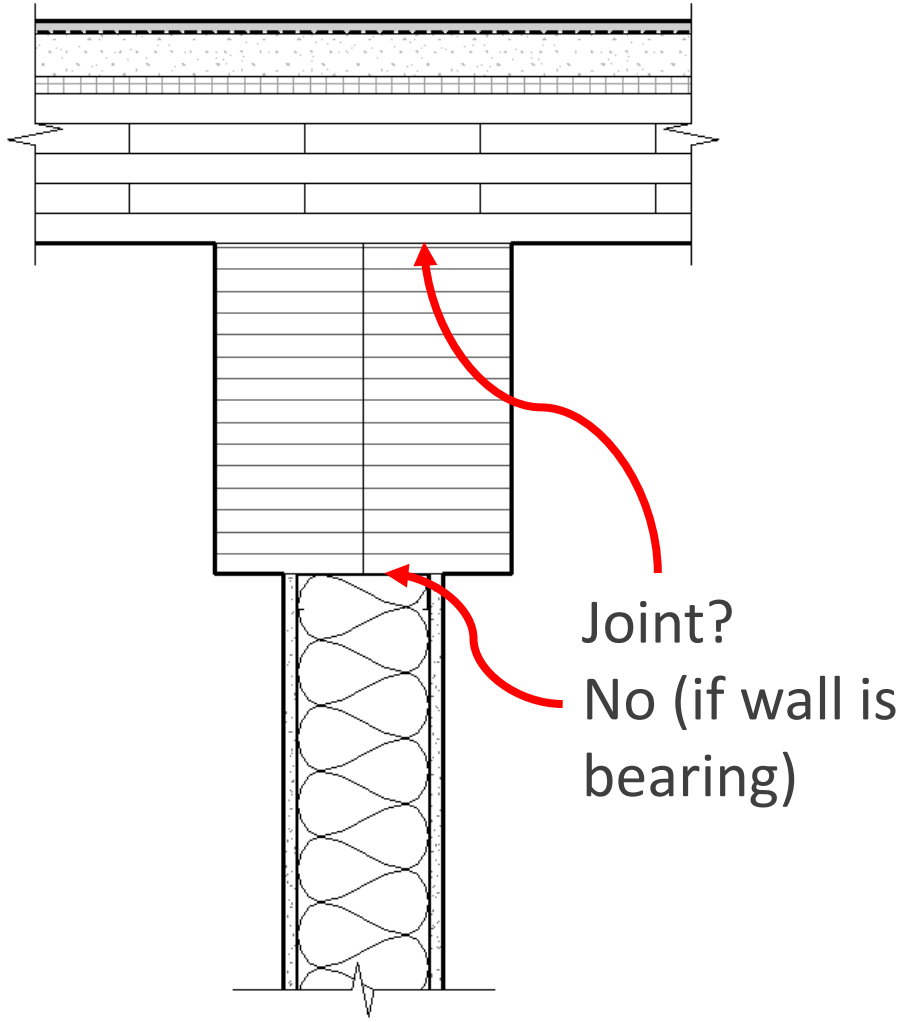
Joints & Intersecting Elements

Section 202 Definitions

Joint. The opening in or between adjacent assemblies that is created due to building tolerances, or is designed to allow independent movement of the building in any plane caused by thermal, seismic, wind or any other loading.

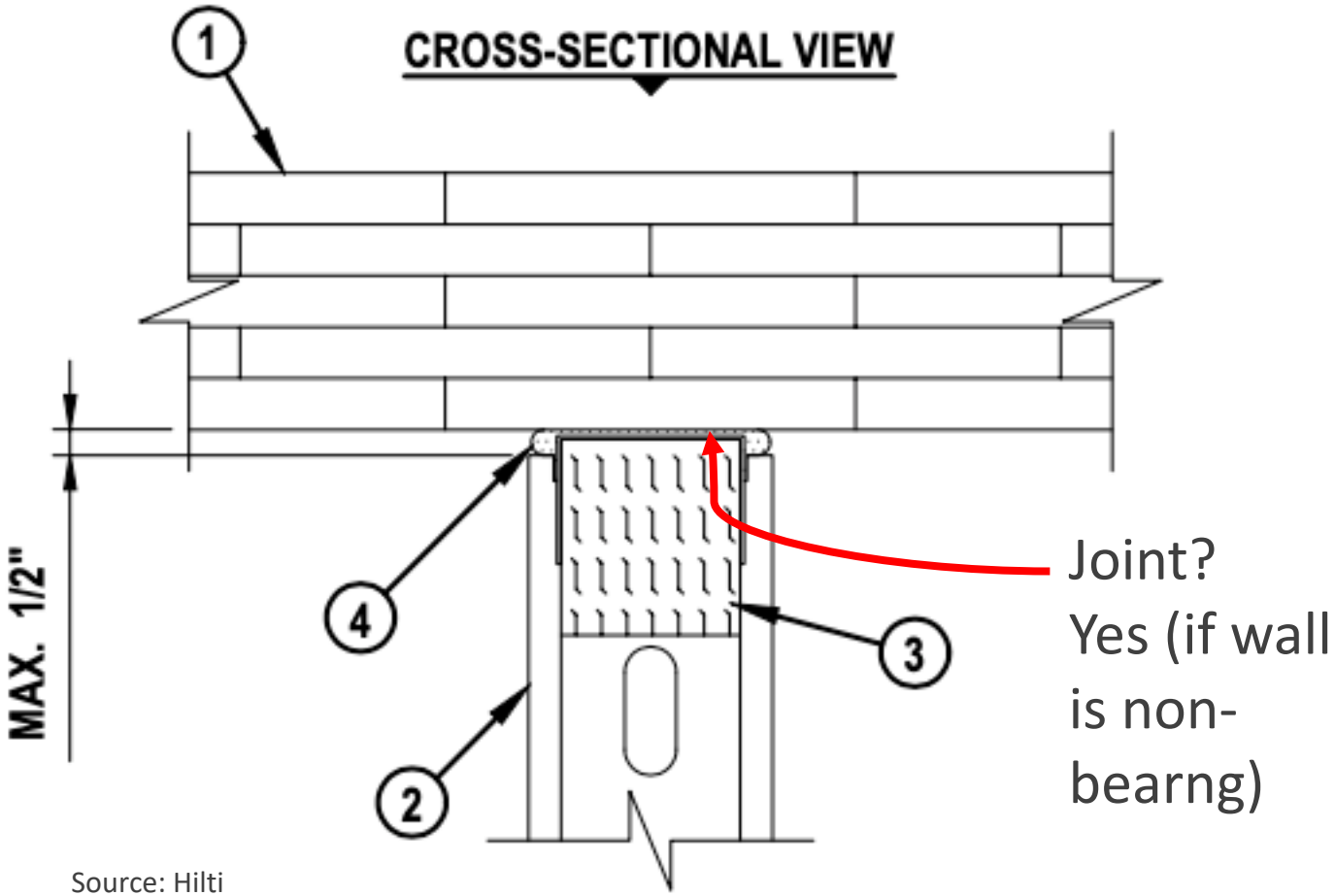
Considerations:

- Is wall, beam and slab rated?
- Required to prevent smoke passage?
- Not a tall timber specific item, applicable to all mass timber construction



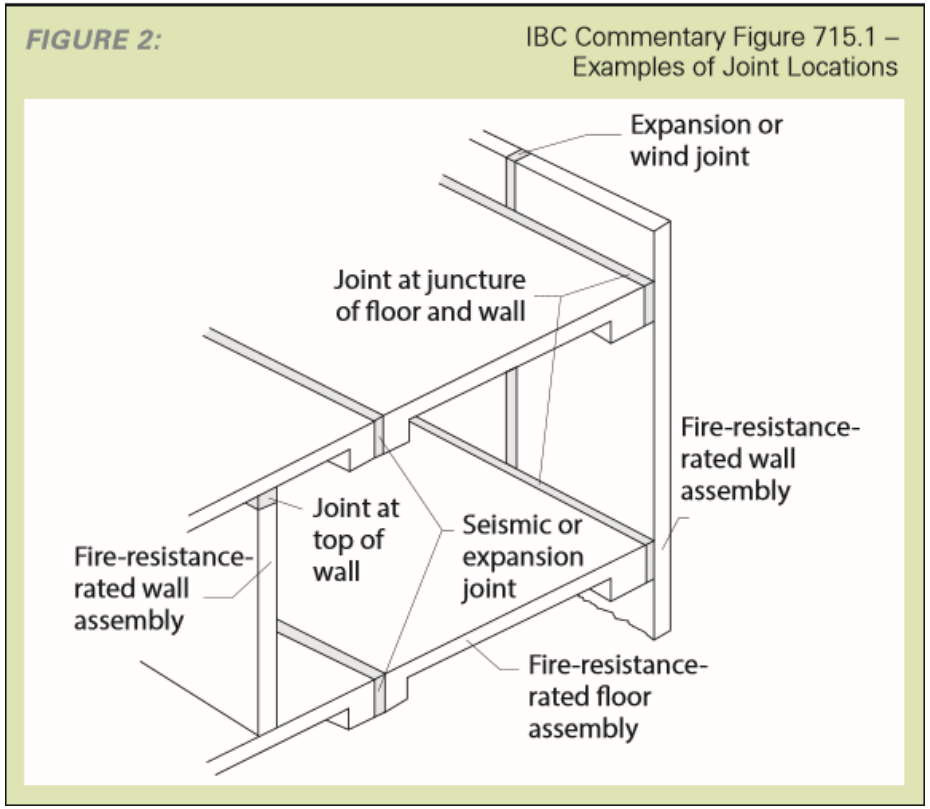
Joints & Intersecting Elements

Not a tall timber specific item, applicable to all mass timber construction



Joint?
Yes (if wall is non-bearng)

Source: Hilti



Source: International Building Code

Joints & Intersecting Elements

Section 715 Joints and Voids

715.3 Fire-resistance-rated assembly intersections.

Joints installed in or between fire-resistance-rated walls, floors or floor/ceiling assemblies and roofs or roof/ceiling assemblies shall be protected by an approved fire-resistant joint system designed to resist the passage of fire for a time period not less than the required fire-resistance rating of the wall, floor or roof in or between which the system is installed.

715.3.1 Fire test criteria.

Fire-resistant joint systems shall be tested in accordance with the requirements of either ASTM E1966 or UL 2079.

Not a tall timber specific item, applicable to all mass timber construction. Firestop manufacturers should be consulted for specific solutions.

Source: International Building Code

Occupancy Separation

Protection of MT used for occupancy separation

Addition to IBC 508.4.4.1 requires:

Mass timber elements serving as fire barriers or horizontal assemblies to separate occupancies in Type IV-B or IV-C construction shall be separated from the interior of the building with a minimum of ½” gypsum board or a noncombustible equivalent.

Photo: MIT | John Klein

Incidental Use Separation

Protection of MT used for incidental use separation

New section 509.4.1.1 requires:

Where Table 509 specifies a fire- resistance-rated separation, mass timber elements serving as fire barriers or a horizontal assembly in Type IV-B or IV-C construction shall be separated from the interior of the incidental use with a minimum of ½” gypsum board or a noncombustible equivalent.

Photo: MIT | John Klein

Fire Safety During Construction

New code provisions in International Fire Code (IFC) address construction fire safety of tall wood buildings

3308.4 Fire safety requirements for buildings of Types IV-A, IV-B, and IV-C construction. Buildings of Types IV-A, IV-B, and IV-C construction designed to be greater than six stories above grade plane shall meet the following requirements during construction unless otherwise approved by the fire code official.

1. Standpipes shall be provided in accordance with Section 3313.
2. A water supply for fire department operations, as approved by the fire chief.

Photo: Structurlam

Fire Safety During Construction

IFC 3308.4 Cont'd

3. Where building construction exceeds six stories above grade plane, at least one layer of noncombustible protection where required by Section 602.4 of the International Building Code shall be installed on all building elements more than 4 floor levels, including mezzanines, below active mass timber construction before erecting additional floor levels.
4. Where building construction exceeds six stories above grade plane required exterior wall coverings shall be installed on all floor levels more than 4 floor levels, including mezzanines, below active mass timber construction before erecting additional floor level.

Exception: Shafts and vertical exit enclosures

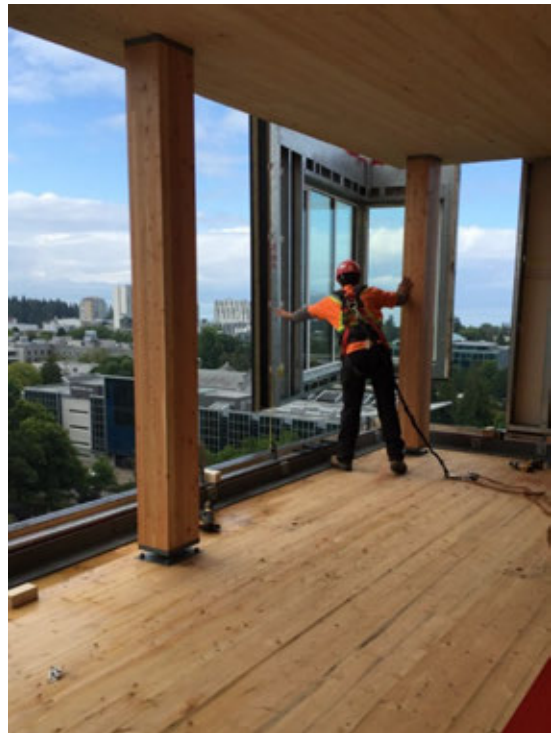


Photo: Urban One

Fire Safety During Construction

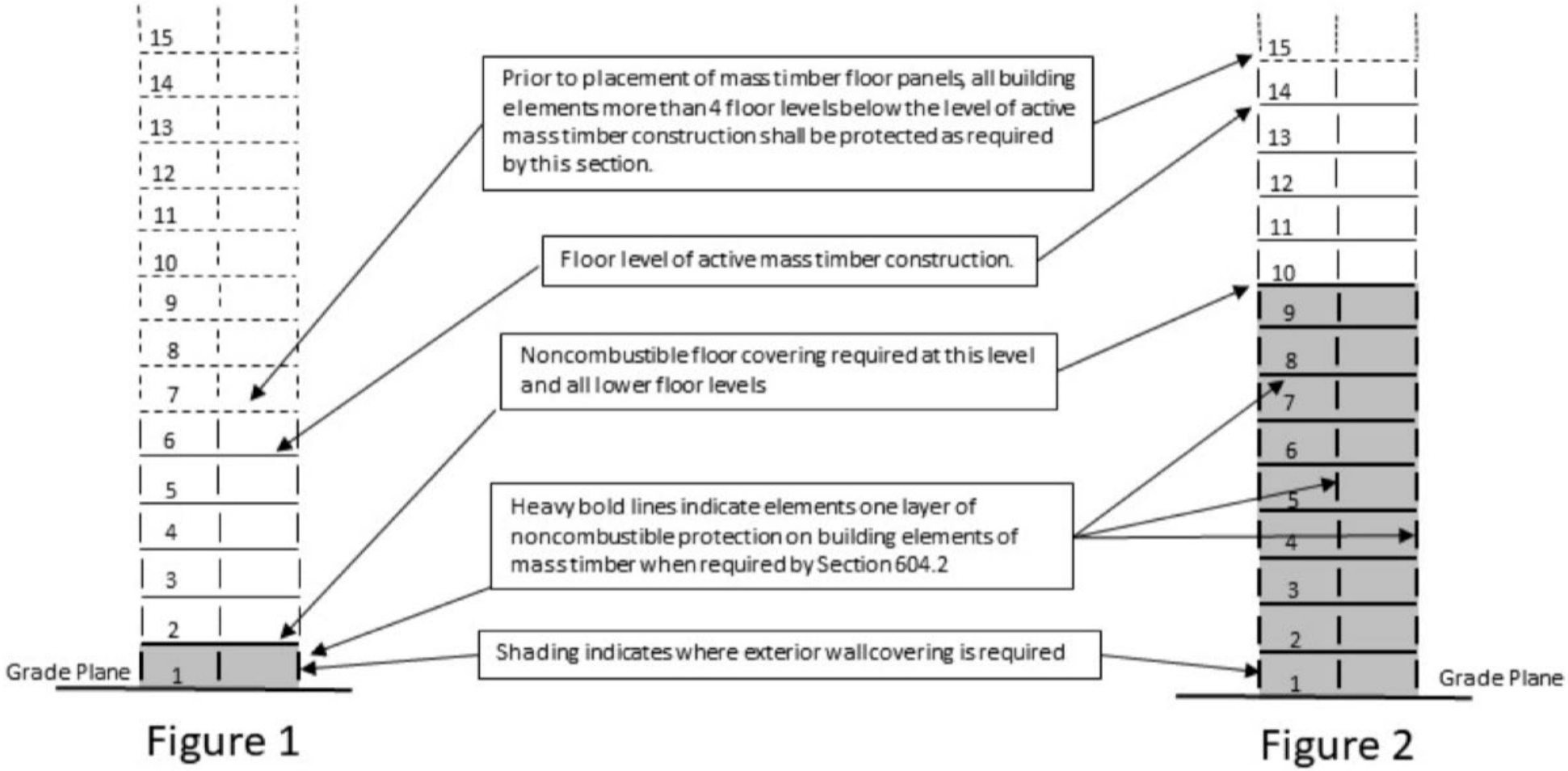


Figure 1

Figure 2

Examples of Protection During Construction For Mass Timber Buildings Greater Than 6 Stories Above Grade Plane

Credit: ICC

Connection Fire Protection

In Construction Types IV-A, IV-B & IV-C, building elements are required to be FRR as specified in IBC Tables 601 and 602.

Connections between these building elements must be able to maintain FRR no less than that required of the connected members.

Photo: MyTiCon

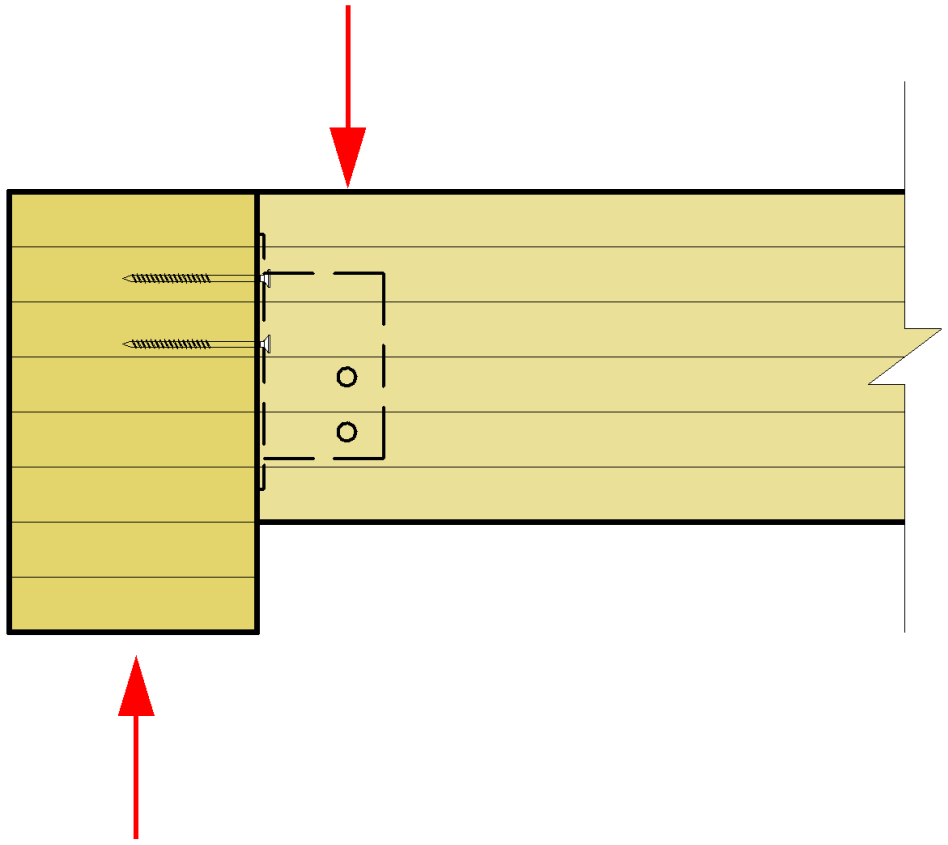
16.3 Wood Connections

Wood connections, including connectors, fasteners, and portions of wood members included in the connection design, shall be protected from fire exposure for the required fire resistance time. Protection shall be provided by wood, fire-rated gypsum board, other approved materials, or a combination thereof.

Source: NDS

Connection Fire Protection

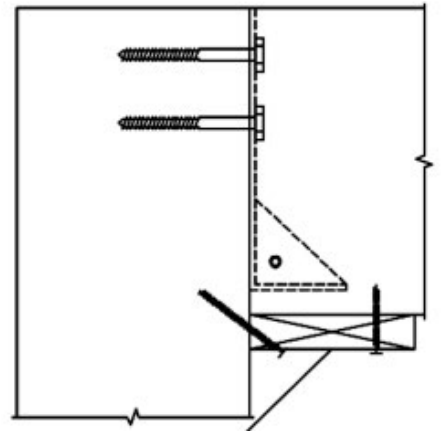
Steel hangers/hardware fully concealed within a timber-to-timber connection is a common method of fire protection

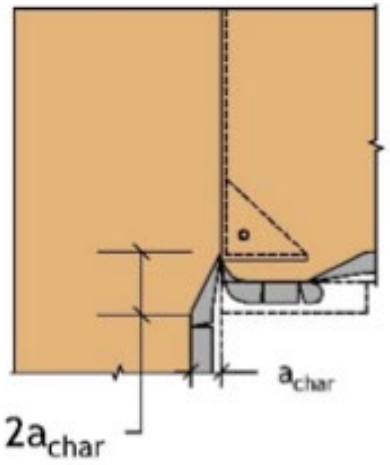


Connection Fire Protection

2304.10.1 Connection fire resistance rating. Fire resistance ratings in Type IV-A, IV-B, or IV-C construction shall be determined by one of the following:

1. Testing in accordance with Section 703.2 where the connection is part of the fire resistance test.
2. Engineering analysis that demonstrates that the temperature rise at any portion of the connection is limited to an average temperature rise of 250o F (139o C), and a maximum temperature rise of 325o F (181o C), for a time corresponding to the required fire resistance rating of the structural element being connected. For the purposes of this analysis, the connection includes connectors, fasteners, and portions of wood members included in the structural design of the connection.





Source: AWC's TR 10

Tall Mass Timber Special Inspections

Table is only required for Type IV-A, IV-B, and IV-C

TABLE 1705.5.3
REQUIRED SPECIAL INSPECTIONS OF MASS TIMBER CONSTRUCTION

Type	Continuous Special Inspection	Periodic Special Inspection
1. Inspection of anchorage and connections of mass timber construction to timber deep foundation systems.		X
2. Inspect erection of mass timber construction		X
3. Inspection of connections where installation methods are required to meet design loads		
3.1. Threaded fasteners		
3.1.1. Verify use of proper installation equipment.		X
3.1.2. Verify use of pre-drilled holes where required.		X
3.1.3. Inspect screws, including diameter, length, head type, spacing, installation angle, and depth.		X
3.2. Adhesive anchors installed in horizontal or upwardly inclined orientation to resist sustained tension loads	X	
3.3. Adhesive anchors not defined in 3.2.		X
3.4. Bolted connections		X
3.5. Concealed connections		X

Source: International Building Code

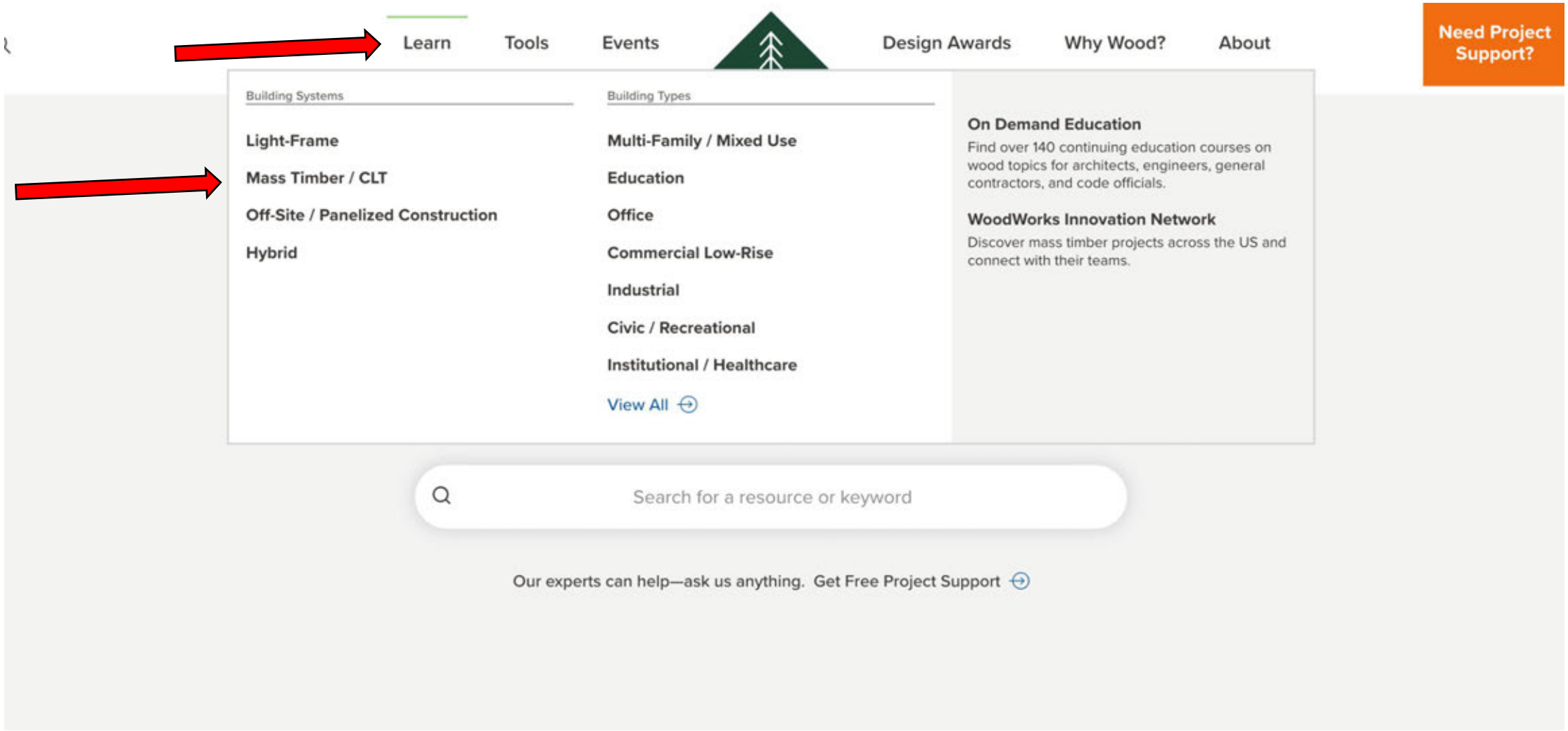
Tall Mass Timber Inspections

Wood Connection Coverings for Fire-Resistance

110.3.5 Type IV-A, IV-B, and IV-C connection protection inspection. In buildings of Type IV-A, IV-B, and IV-C Construction, where connection fire resistance ratings are provided by wood cover calculated to meet the requirements of Section 2304.10.1, inspection of the wood cover shall be made after the cover is installed, but before any other coverings or finishes are installed.

Inspection of Wood Coverings

TALL MASS TIMBER RESOURCES



Woodworks.org > Learn > Mass Timber / CLT > Tall Mass Timber

TALL MASS TIMBER RESOURCES

Technical Design Guidance from WoodWorks

Carbon12 / Kaiser+Path / photo Andrew Pogue

Solution Papers

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

Looking for information on the tall wood provisions in the 2021 International Building Code? This paper summarizes the provisions as well as the background and research that supported their adoption.

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

Solution Papers

Shaft Wall Requirements in Tall Mass Timber Buildings

Solution Papers

Concealed Spaces in Mass Timber and Heavy Timber Structures

Solution Papers

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

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Fire Design of Mass Timber Members: Code Applications, Construction Types and Fire Ratings

Solution Papers

Questions? Ask us anything.

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

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