Mid-Rise Wood Design: Light-Frame and Mass Timber Strategies



October 27, 2026

Presented by:
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Image: Water Marq, Kelly Grossman Architects, Greg Folkins Photography

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

AIA Approved Continuing Education

Course Description

Mid-rise wood construction offers designers multiple pathways to create code-compliant, efficient buildings using light-frame and mass timber systems. This course compares these approaches and examines how construction type, occupancy, building height and area, and project goals influence system selection. For light-frame buildings, discussion focuses on maximizing the allowable building size using strategies such as sprinklers, open frontage, sloping sites, podiums, and mezzanines. For mass timber buildings, the course highlights the impact of construction type selection and other early design decisions such as grid layout, fire-resistance ratings, and lateral systems. Built examples will illustrate how these decisions can support safe, efficient, and cost-effective mid-rise design.

Learning Objectives

1. Identify different wood systems that can be used for mid-rise construction and how construction type, occupancy, height, and area influence the selection of a safe and code-compliant wood structural system.

2. Apply code provisions for construction type, allowable height and area, sprinklers, open frontage, sloping sites, podiums, and mezzanines to maximize the potential of light-frame wood construction while maintaining required life-safety protections.

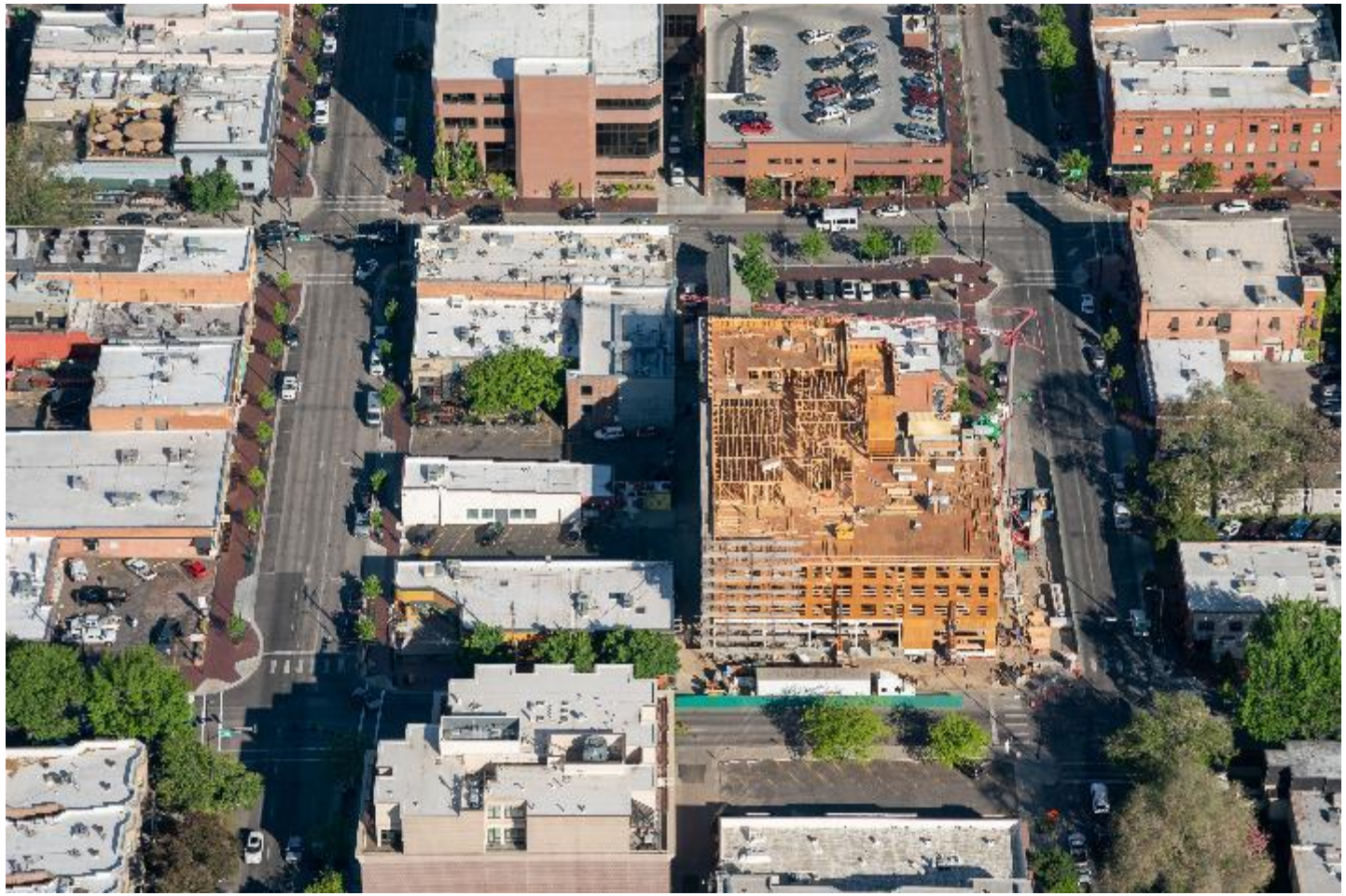
3. Evaluate key mass timber design considerations including structural grid, fire-resistance ratings, and lateral-force-resisting systems and their influence on structural performance, fire safety, and occupant welfare.

4. Review built projects to understand how code provisions and early design decisions can be integrated to achieve safe, efficient, and cost-effective mid-rise buildings.

Mid-Rise Construction

Where **wood** is a viable option,
it's likely the most appropriate choice.

- Senior Living
- Apartments/Condos
- Mixed Use
- Student Housing
- Affordable Housing
- Hotels
- Business
- Institutional



The Gibson, Hummel Architects, KPFF Consulting Engineers, photo Leo A. Geis

Why Wood?

Using wood helps reduce environmental impact.

Wood products play a significant role in the modern economy.

- Wood Costs Less
- Wood is Versatile
- Wood Meets Code
- Wood is Durable
- Wood is Renewable



Photo courtesy OFRI



The Gibson, Hummel Architects, KPFF Consulting Engineers, photo Leo A. Geis

Wood Mid-Rise Construction

How many stories can be wood framed in the IBC?

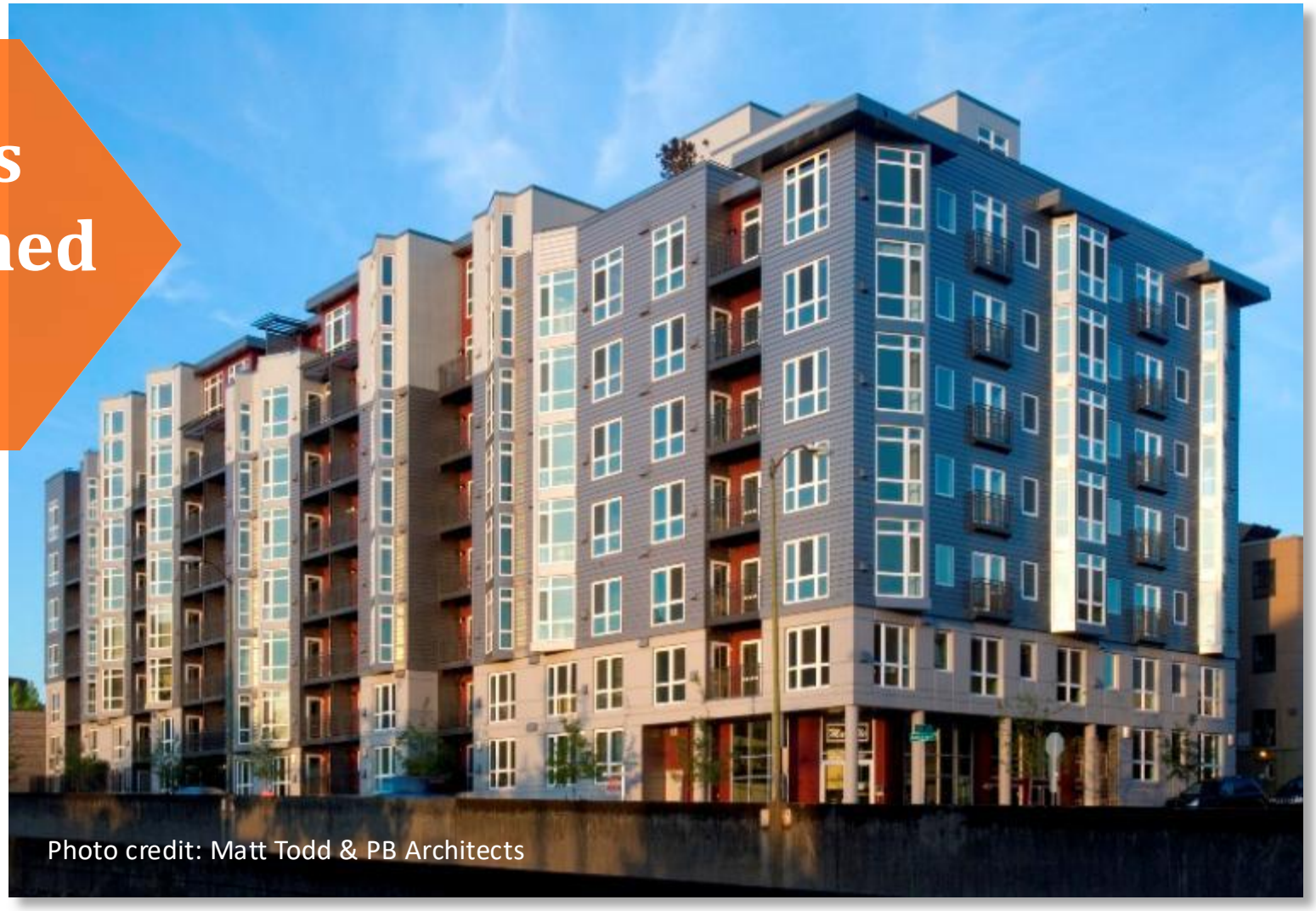


Photo credit: Matt Todd & PB Architects

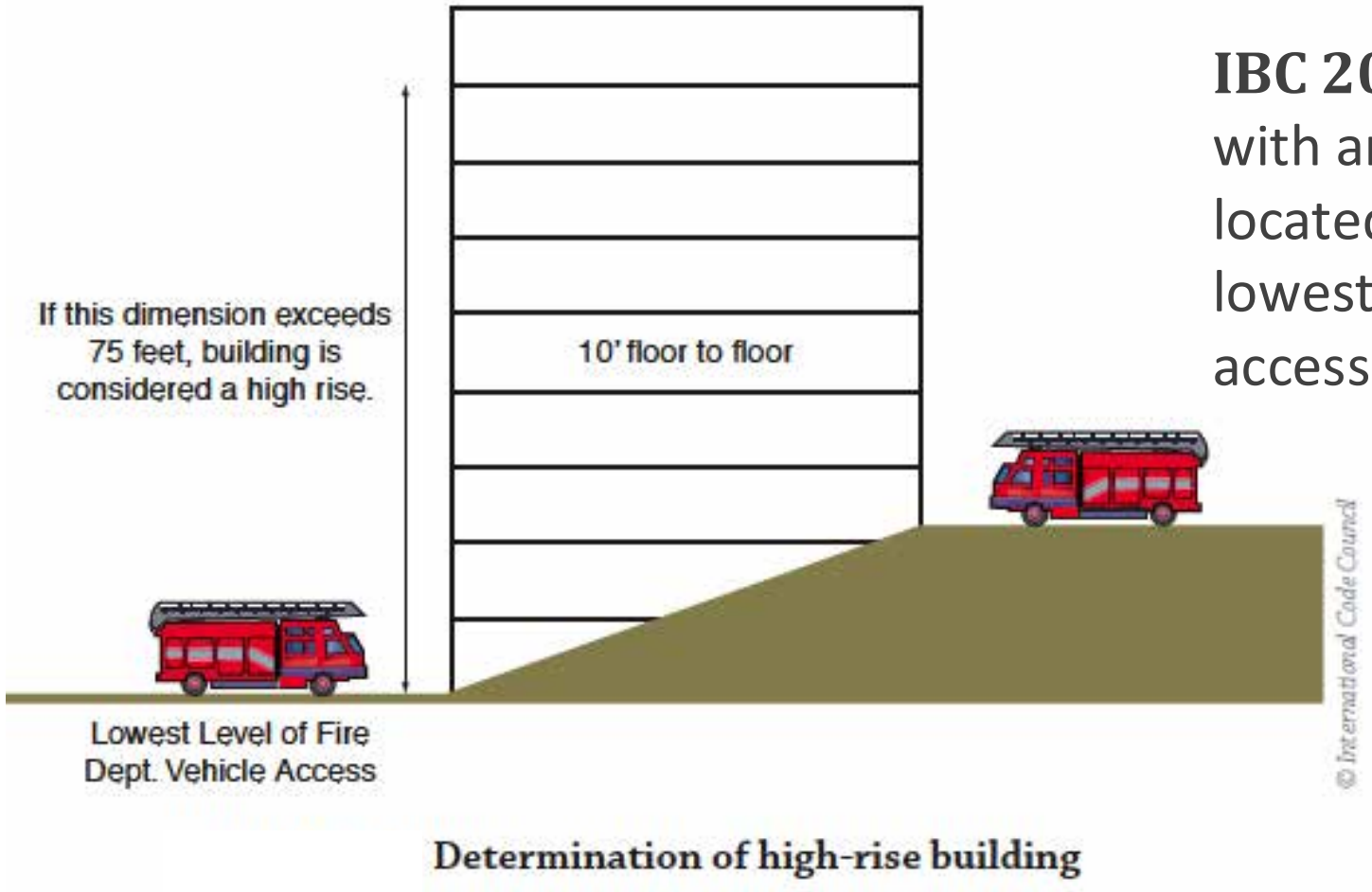
Wood Mid-Rise Construction

6 stories for Offices,
5 stories for Residential
+ Mezzanine
+ Multi-Story Podium



Photo credit: Matt Todd & PB Architects

Mid-Rise vs. High-Rise Definition – 2024 IBC 202



Determination of high-rise building

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

Sloped Sites – Chapter 2 Definitions

HEIGHT, BUILDING. The vertical distance from *grade plane* to the average height of the highest roof surface.

GRADE PLANE. A reference plane representing the average of finished ground level adjoining the building at *exterior walls*. Where the finished ground level slopes away from the *exterior walls*, the reference plane shall be established by the lowest points within the area between the building and the *lot line* or, where the *lot line* is more than 6 feet (1829 mm) from the building, between the building and a point 6 feet (1829 mm) from the building.



626 Dekalb Avenue, Atlanta, GA
Matt Church - Davis Church Structural Engineers

Basements –IBC 506.1.3

A basement is not included in the total allowable building area if it doesn't exceed the area permitted for a building with no more than one story above grade plane.

"Basement" is defined as "not a story above grade plane" and has a finished floor surface of the next floor above:

- Less than 6 feet above grade plane; or
- Less than 12 feet above the finished ground level at any point



Fashion Valley, CA
AvalonBay Communities

Basements –IBC 506.1.3

To qualify as a basement (and therefore not be included in building area):



Walk-up / Tuck Under

First floor walk up units with private garage

Benefits:

- Eliminates need for S-2 parking garage
- Can be all wood
- Least expensive overall but lowest densification rates (20-35 units/acre)



Wrap-Around





Walk up units surround parking structure

Benefits:

- Enhanced security
- Centralized access to parking
- Visual appeal from street
- More expensive than walk/up tuck-under
- 5 story yields 60-80 units/acre

Podium

Multiple stories of wood over an elevated concrete deck

Benefits:

- Increased number of stories
- Accommodates Mixed-use occupancies
- Most expensive but can allow increased density



Podium

4 stories of residential over podium (parking or retail)

- 60–80 units/acre



Inman Park Condos, Atlanta, GA
Davis & Church

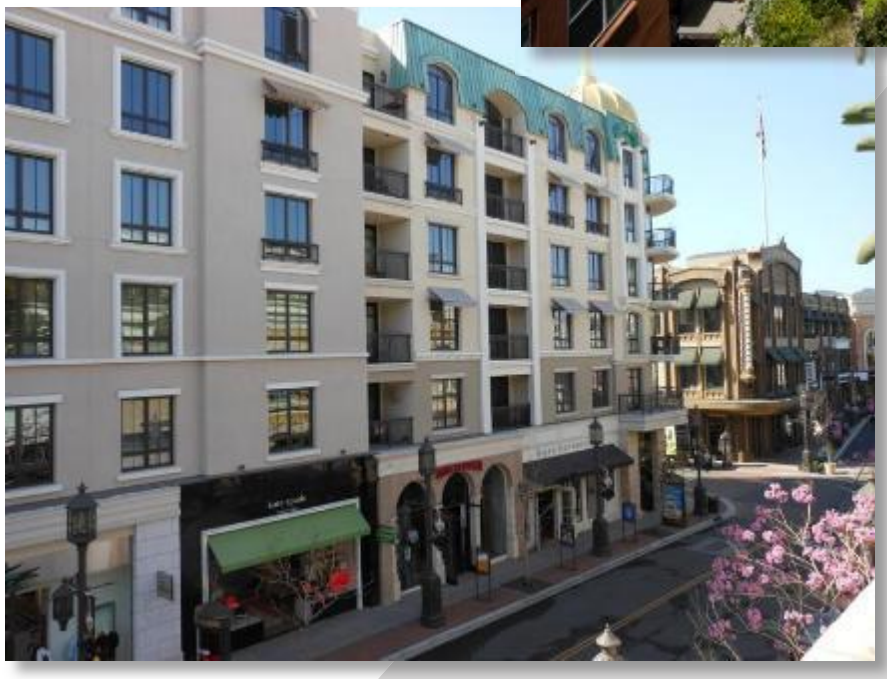
Podium

5 stories over retail

» 100–120 units/acre



AvalonBay Stadium, Anaheim, CA
VanDorpe Chou Associates



Inman Park Condos, Atlanta, GA
Davis & Church

Mezzanine & Podium

5 stories with mezzanine + residential podium

» 125–145 units/acre



120 Union, San Diego, CA
Togawa Smith Martin

Which Construction Type?

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



Which Construction Type?

- Start with lowest common denominator and work up
- Don’t assume construction type, occupancy separation, etc. required simply because of materials or occupancies



Image: Neo Studio

Construction Types

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

Construction Types I-B, II-A, II-B

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

Construction Types I-B, II-A, II-B

Where does the code allow wood to be used?

- Mass Timber Roof Construction
- IBC Table 601, Footnote c:
  - In all occupancies, heavy timber complying with Section 2304.11 shall be allowed for roof construction, including primary structural frame members, where a 1-hour or less fire-resistance rating is required.

Wellesley College, Wellesley, MA



Wellesley College Science Complex / Skidmore, Owings & Merrill / Le Messurier / Photo Dave Burk © SOM

Mid-Rise Construction Types

Type III

- Exterior walls non-combustible (may be light frame FRTW)
- Interior elements any allowed by code

Type V

- All building elements any allowed by code

Types III and V can be subdivided:

- A (protected)
- B (unprotected)

Type IV (C & HT)

- All building elements mass timber or non-combustible
  - For IV-HT, interior elements may also be 1-hour FRR light frame
  - For IV-HT, exterior walls may also be FRTW, including light frame

Construction Types V-A, V-B

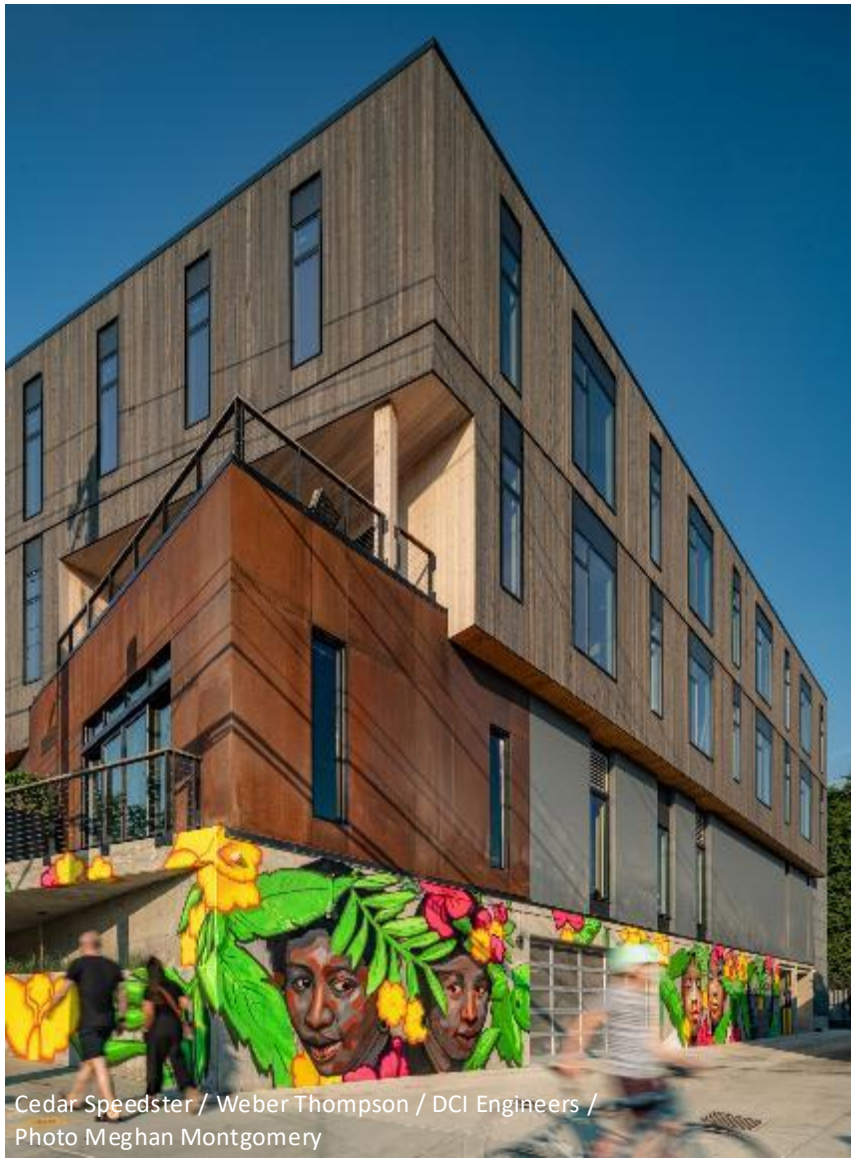
	TYPE I		TYPE II		TYPE III		TYPE IV				TYPE V	
	A	B	A	B	A	B	A	B	C	HT	A	B
Exterior Wall Material	Non-combustible		Non-combustible		FRTW		CLT (protected)			FRTW (LF, MT), CLT (protected)	Any wood	
Interior Elements	Non-combustible		Non-combustible		Any wood		Heavy Timber			Heavy Timber	Any wood	

Construction Types V-A, V-B

IBC Section 602.5:

- Structural Elements, Exterior Walls, and Interior Walls
  - Any material permitted by code

Cedar Speedster, Seattle, WA



Cedar Speedster / Weber Thompson / DCI Engineers / Photo Meghan Montgomery

Construction Types V-A, V-B

Type V Construction:

- Interior Elements (Floors, Roofs, Partitions/Shafts, Etc.)
  - Any material permitted by code, including light frame and mass timber
- Exterior Walls
  - Light-frame walls
  - Mass Timber
  - Non-combustible walls: light-gauge steel, curtainwall systems

Star Lofts, Des Moines, IA



Image: Cutler Development

Construction Types III-A, III-B

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

Construction Types III-A, III-B

IBC Section 602.3:

- Interior elements
  - Any material permitted by code
- Exterior walls
  - Noncombustible materials
  - Fire-retardant-treated wood (FRTW) framing and sheathing shall be permitted within exterior wall assemblies
  - Note: CLT not allowed

Adidas Headquarters, Portland, OR



Adidas East Village Expansion / LEVER Architecture / KPFF Consulting Engineers / Photo Jeremy Bittermann

Construction Types III-A, III-B

Type III Construction:

- Interior Elements (Floors, Roofs, Partitions/Shafts, Etc.)
  - Any material permitted by code, including light frame and mass timber
- Exterior Walls
  - Non-combustible walls: light-gauge steel, curtainwall systems
  - FRTW light-frame walls
  - FRTW mass timber (NLT, DLT)
    - Note: CLT not allowed

The Canyons, Portland, OR



The Canyons, Kaiser+Path, Cantena Consulting Engineers, Photo Jeremy Bittermann

Construction Types IV-HT and IV-A, B, and C

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

Construction Type IV-A, B, and C

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

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



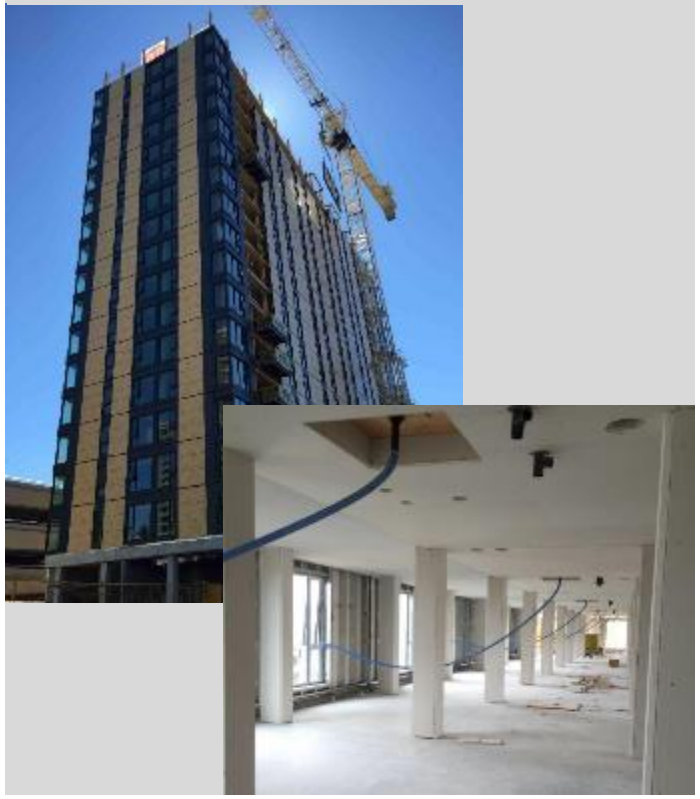


Mass Timber Fire Testing at ATF Lab (2017)

Construction Types IV-A, B, and C

» Business Occupancy (Group B) Size Limits:

Type IV-A



Photos: Flor Projects

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

Type IV-B



Photos: ©Prakash Patel

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

Type IV-C



Monte French Design Studio, Photos: Jane Messinger

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

Construction Types IV-HT and IV-A, B, and C

IBC Section 602.4:

- Building elements are mass timber or noncombustible materials
  - No light frame walls in Types IV-A, B, or C
  - Light frame only allowed in Type IV-HT for FRTW exterior walls or 1-hour FRR interior walls
  - Allowable mass timber types at exterior walls vary
- Minimum mass timber dimensions per Section 2304.11

1030 Music Row, Nashville, TN



1030 Music Row / Anecdote Architectural Experiences / StructureCraft / Photo Andrew Keithly

Construction Types IV-HT and IV-A, B, and C

Type IV-HT Construction:

- Interior Elements
  - Mass timber, non-combustible, or 1-hour FRR light frame
- Exterior Walls
  - Non-combustible
  - CLT covered at exterior face with FRTW or noncombustible sheathing
  - FRTW (light frame or mass timber)

The Soto, San Antonio, TX



The Soto, Hixon Properties, Lake|Flato, BOKA Powell, StructureCraft, Photo Erika Brown Edwards

Construction Types IV-HT and IV-A, B, and C

Type IV-A, B, and C Construction:

- Interior Elements
  - Mass timber or non-combustible
  - No light frame
- Exterior Walls
  - Non-combustible
  - CLT covered at exterior face with noncombustible sheathing
  - No light frame

Heartwood, Seattle, WA



Heartwood, Atelier Jones, DCI Engineers, rendering Atelier Jones

Construction Types IV-HT and IV-A, B, and C

FRR Requirements

- Type IV-HT
  - Minimum Dimensions
- Type IV-A, B, and C
  - Minimum Dimensions
  - FRRs per IBC Table 601

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

BUILDING ELEMENT	TYPE IV			
	A	B	C	HT
Primary structural frame[f] (see Section 202)	3[a]	2[a]	2[a]	HT
Bearing walls				
Exterior[e, f]	3	2	2	2
Interior	3	2	2	1/HT[g]
Nonbearing walls and partitions Exterior	See Table 705.5			
Nonbearing walls and partitions Interior[d]	0	0	0	See Section 2304.11.2
Floor construction and associated secondary structural members (see Section 202)	2	2	2	HT
Roof construction and associated secondary structural members (see Section 202)	$1^1/_2$	1	1	HT

Construction Types IV-HT and IV-A, B, and C

Type IV Minimum Dimensions (IBC Section 2304.11):

TABLE 2304.11
MINIMUM DIMENSIONS OF HEAVY TIMBER STRUCTURAL MEMBERS

		MINIMUM NOMINAL SOLID SAWN SIZE		MINIMUM GLUED-LAMINATED NET SIZE		MINIMUM STRUCTURAL COMPOSITE LUMBER NET SIZE	
SUPPORTING	HEAVY TIMBER STRUCTURAL ELEMENTS	Width, inch	Depth, inch	Width, inch	Depth, inch	Width, inch	Depth, inch
Floor loads only or combined floor and roof loads	Columns; Framed sawn or glued-laminated timber arches that spring from the floor line; Framed timber trusses	8	8	$6^{3}/_{4}$	$8^{1}/_{4}$	7	$7^{1}/_{2}$
	Wood beams and girders	6	10	5	$10^{1}/_{2}$	$5^{1}/_{4}$	$9^{1}/_{2}$
Roof loads only	Columns (roof and ceiling loads); Lower half of: wood-frame or glued-laminated arches that spring from the floor line or from grade	6	8	5	$8^{1}/_{4}$	$5^{1}/_{4}$	$7^{1}/_{2}$
	Upper half of: wood-frame or glued-laminated arches that spring from the floor line or from grade	6	6	5	6	$5^{1}/_{4}$	$5^{1}/_{2}$
	Framed timber trusses and other roof framing;[a] Framed or glued-laminated arches that spring from the top of walls or wall abutments	4[b]	6	3[b]	$6^{7}/_{8}$	$3^{1}/_{2}$[b]	$5^{1}/_{2}$

Construction Types IV-HT

Type IV Minimum Dimensions (IBC Section 2304.11):

Floor Panels / Decking

- CLT: 4” thick (actual)
- NLT/DLT/GLT: 4” thick (nominal) or Decking: 3” thick (nominal)
  - Covered with: 1” tongue-and-groove or 15/32” WSP or 1/2“ particleboard

Roof Panels/Decking:

- 3” thick CLT (actual thickness)
- 3” NLT/DLT/GLT (nominal thickness)
- 2” thick (nominal) decking


Photo: StructureCraft


Photo: Aitor Sanchez/ Ewing Cole


Photo: WoodWorks

Construction Types IV-HT and IV-A, B, and C

Type IV Minimum Dimensions
(IBC Section 2304.11)

- Interior Walls
  - Laminated construction: 4” thick
  - Solid wood construction: Min (2) layers of 1” matched boards
  - Wood stud walls, 1-hour min (IV-HT only)
  - Non-combustible, 1-hour min

Verify other code requirements for FRR (e.g. interior bearing walls, occupancy separation, etc.)

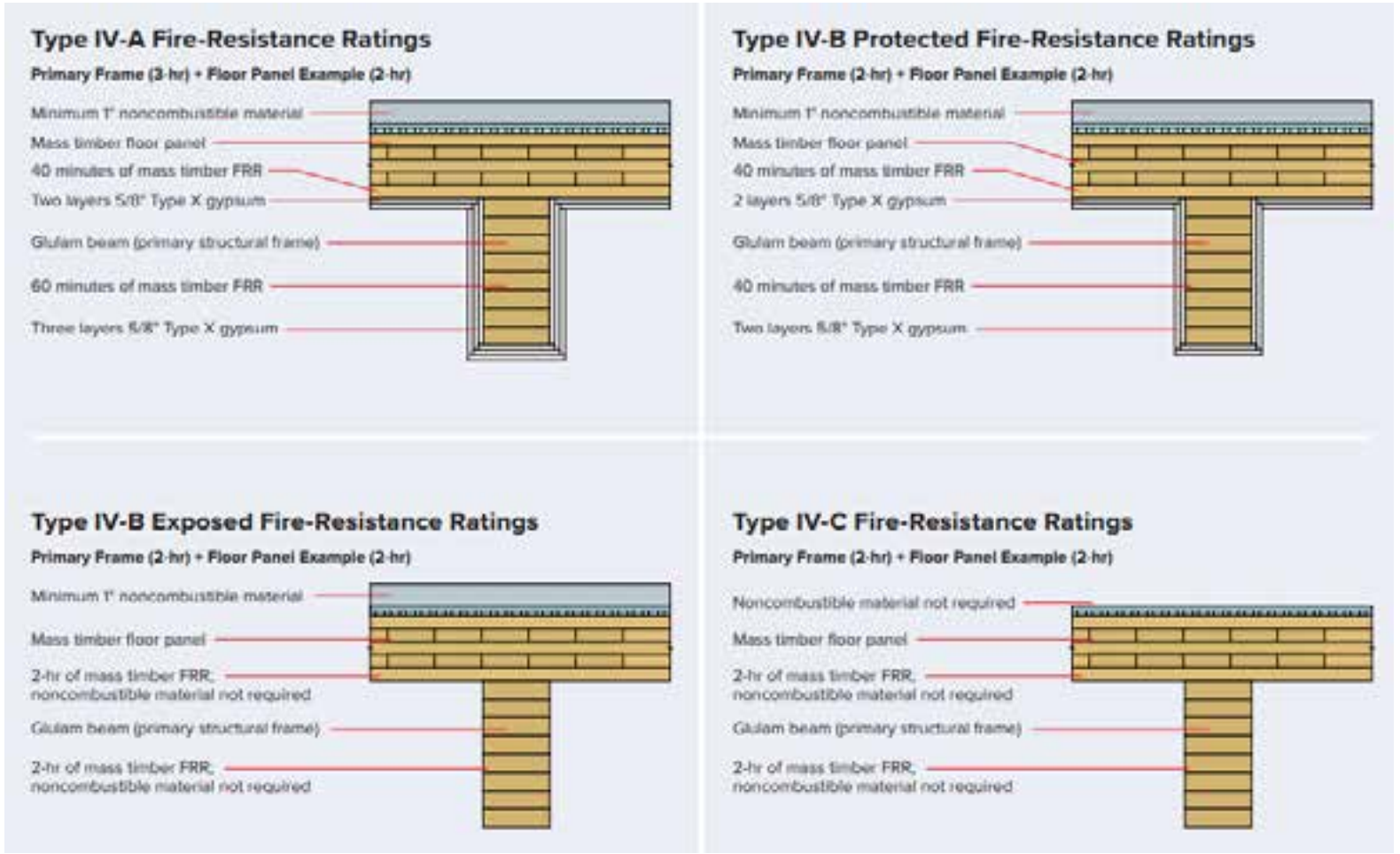




Construction Types IV-HT and IV-A, B, and C

Type IV exposure

- Type IV-A: No exposed timber
- Type IV-B: Partial exposed timber
- Type IV-C: Fully exposed timber permitted
- Type IV-HT: Fully exposed timber permitted



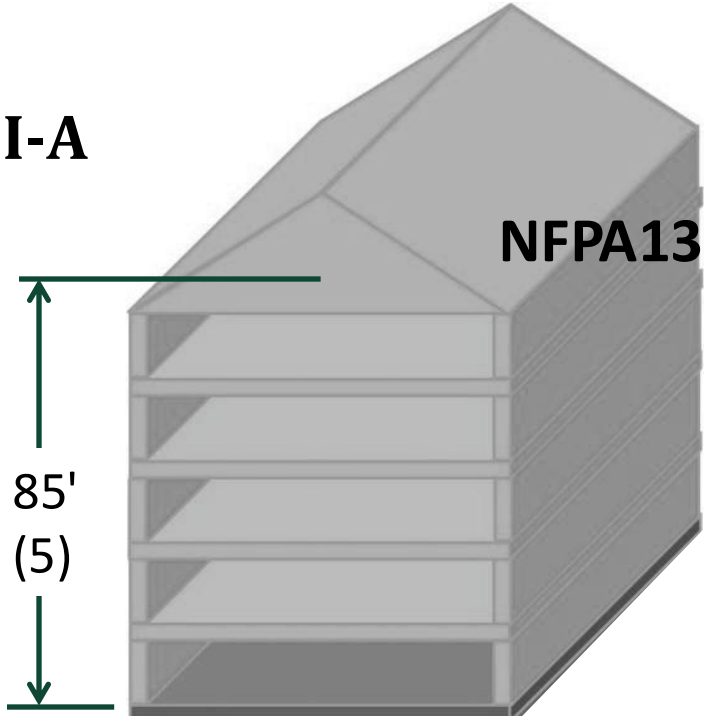
https://www.woodworks.org/wp-content/uploads/wood_solution_paper-demonstrating-frrs-in-tall-wood-buildings-woodworks.pdf

Which Construction Type?

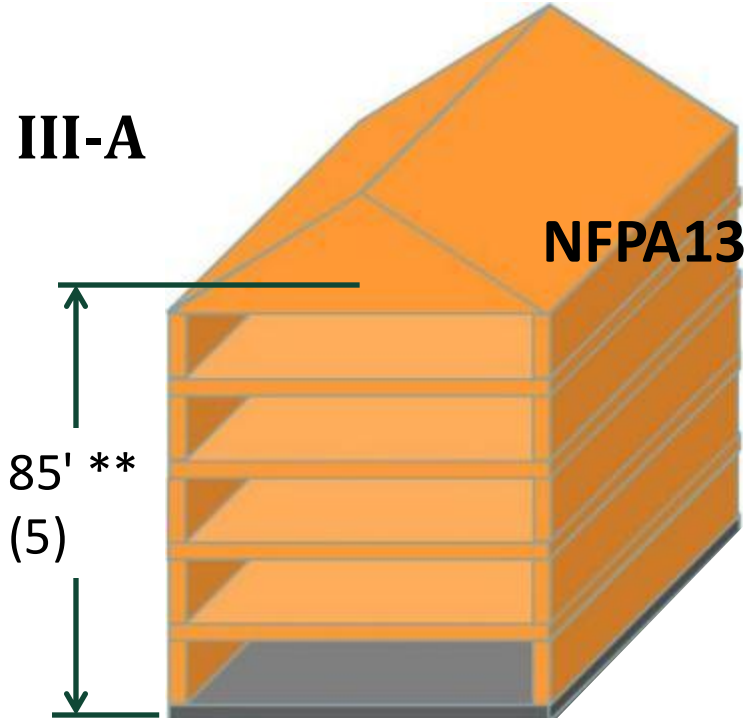
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Increased Height & Story Area: Residential Occupancy

Type II-A



Type III-A



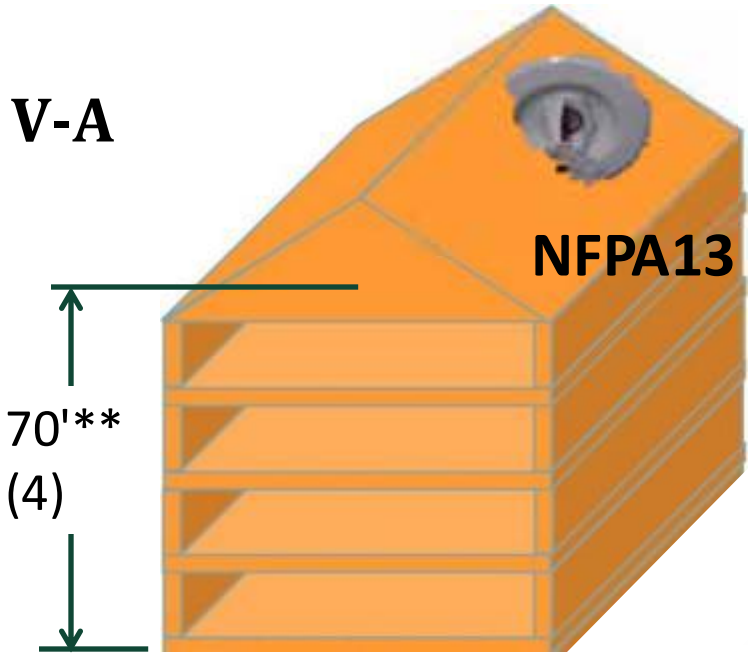
Occupancy	II-A (ft^2)*	III-A (ft^2)*
R-1	72,000 +18,000 (max frontage)	72,000 +18,000 (max frontage)
R-2	72,000 +18,000 (max frontage)	72,000 +18,000 (max frontage)

* Areas reflect PER STORY max. Total building max may limit area further.

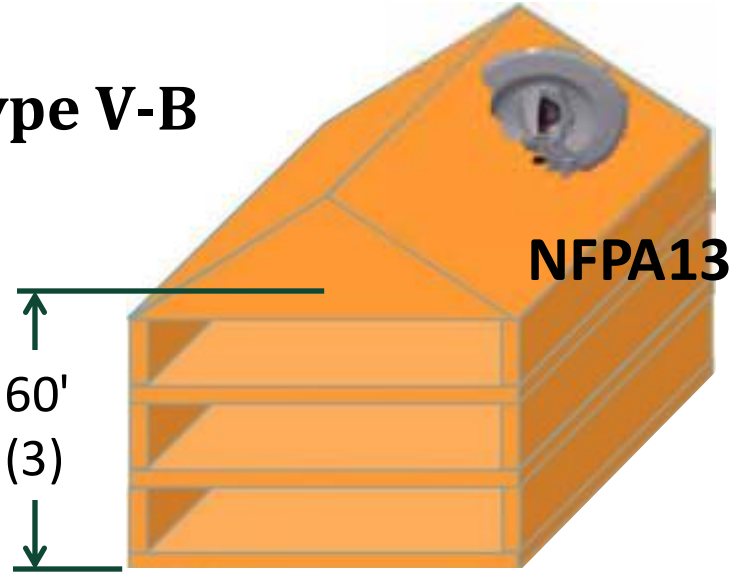
** ASCE7-16 Table 12.2-1 limits wood shear wall seismic systems to 65' in height in SDC D,E,F

Increased Height & Story Area: Residential Occupancy

Type V-A



Type V-B

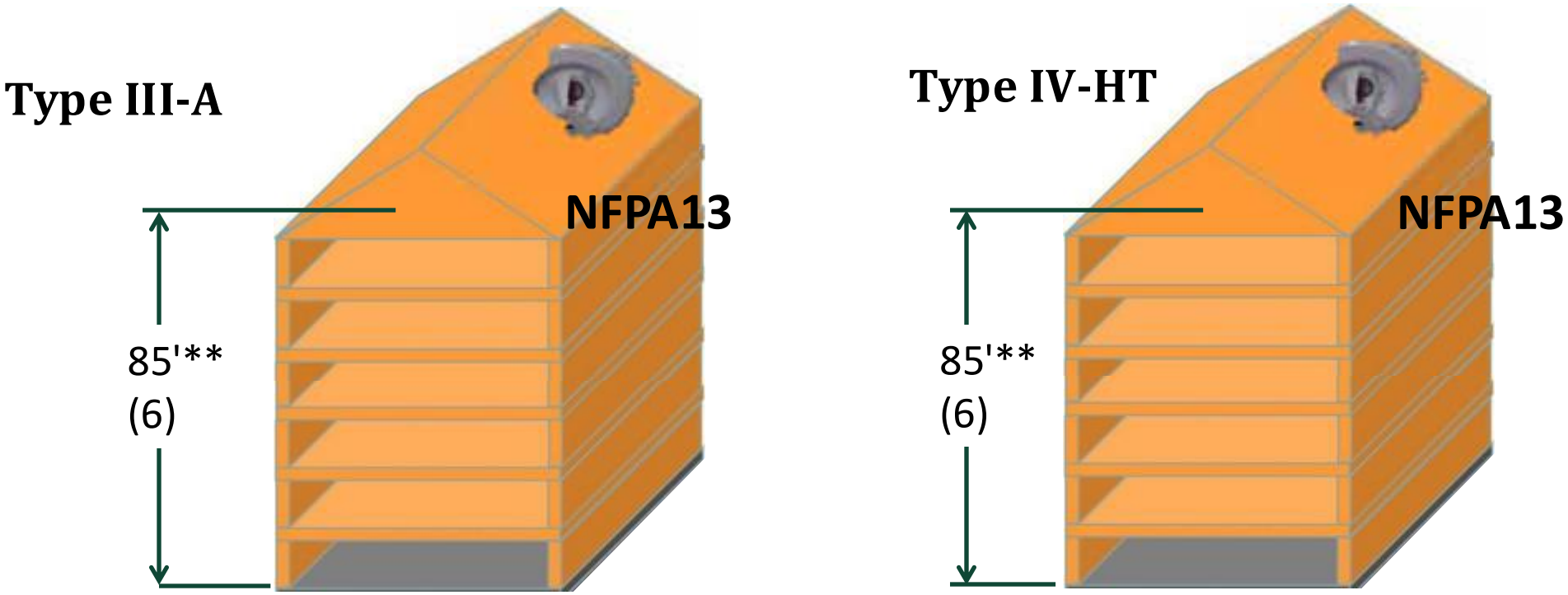


Occupancy	V-A (ft^2)*	V-B (ft^2)
R-1	36,000 +9,000 (max frontage)	21,000 +5,250 (max frontage)
R-2	36,000 +9,000 (max frontage)	21,000 +5,250 (max frontage)

* Areas reflect PER STORY max. Total building max may limit area further.

** ASCE7-16 Table 12.2-1 limits wood shear wall seismic systems to 65' in height in SDC D,E,F

Increased Height & Story Area: Office Occupancy



Occupancy	III-A (ft^2)*	IV-HT (ft^2)*
B	85,500 +21,375 (max frontage)	108,000 +27,000 (max frontage)

* Areas reflect PER STORY max. Total building max may limit area further.

** ASCE7-16 Table 12.2-1 limits wood shear wall seismic systems to 65' in height in SDC D,E,F

Area Increases – 2021/2024 IBC Table 506.2

TABLE 506.2
ALLOWABLE AREA FACTOR (A_t = NS, S1, S13R, S13D or SM, as applicable) IN SQUARE FEET[a, b]

OCCUPANCY CLASSIFICATION	SEE FOOTNOTES	TYPE OF CONSTRUCTION											
		Type I		Type II		Type III		Type IV				Type V	
		A	B	A	B	A	B	A	B	C	HT	A	B
R-1[h]	NS[d]	UL	UL	24,000	16,000	24,000	16,000	61,500	41,000	25,625	20,500	12,000	7,000
	S13R												
	S1	UL	UL	96,000	64,000	96,000	64,000	246,000	164,000	102,500	82,000	48,000	28,000
	SM	UL	UL	72,000	48,000	72,000	48,000	184,500	123,000	76,875	61,500	36,000	21,000

**Can still increase these areas by the Frontage Factor of Section 506.3

NS = Buildings not equipped throughout with an automatic sprinkler system

S1 = Buildings a maximum of one story above grade plane equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1 (NFPA 13)

SM = Buildings two or more stories above grade plane equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1 (NFPA 13)

S13R = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.2 (NFPA 13R)

Sprinkler Systems: IBC 903.2

In some cases, sprinklers are required by code depending on occupancy

- Most new Group R fire areas
- Group A, E, M, S-1, I fire areas exceeding 1-12k sf





Stella Apartments, DesignARC, Taylor and Syfan, photo Lawrence Anderson

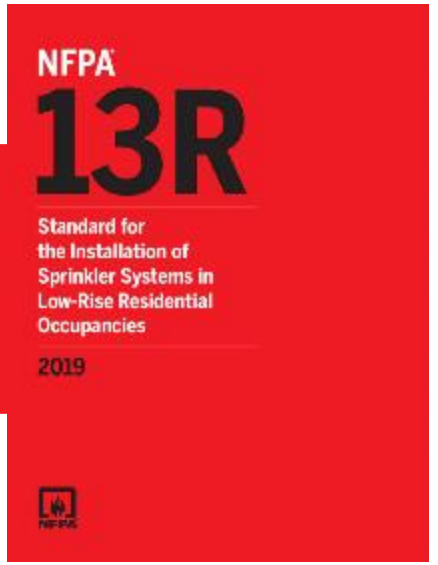
Commercial Sprinkler Systems – IBC 903.3.1

- NFPA 13
  Standard for Commercial Construction 903.3.1.1
- NFPA 13R
  Residential Occupancies (One- and Two-Family or Low-Rise Multi-Family and Commercial) 903.3.1.2
- NFPA 13D
  Standard for One- and Two-Family Residences (but allowed in a few commercial occupancies) 903.3.1.3









NFPA 13 vs. NFPA 13R





NFPA 13	NFPA 13R
Goal: Provide life safety and property protection	Goal: Provide life safety and limited property protection (to a lesser degree than NFPA 13)
Fully sprinklered system throughout entire building even in unoccupied spaces (closets, attics)	Partially sprinklered system; unoccupied spaces often don't require sprinklers
Can cost more	Lower levels of water discharge, shorter water supply time can result in smaller pipe sizes, reduce need for storage & pumps
Permitted for many occupancies, buildings of many sizes, allows greater building size increases	Limited applications, mainly for multi-family up to 4 stories, 60 feet

Single Occupancy – IBC 506.2.1

$$A_a = A_t + [NS \times I_f]$$

(Equation 5-1)

A_a = Allowable area per story (sq. ft.)

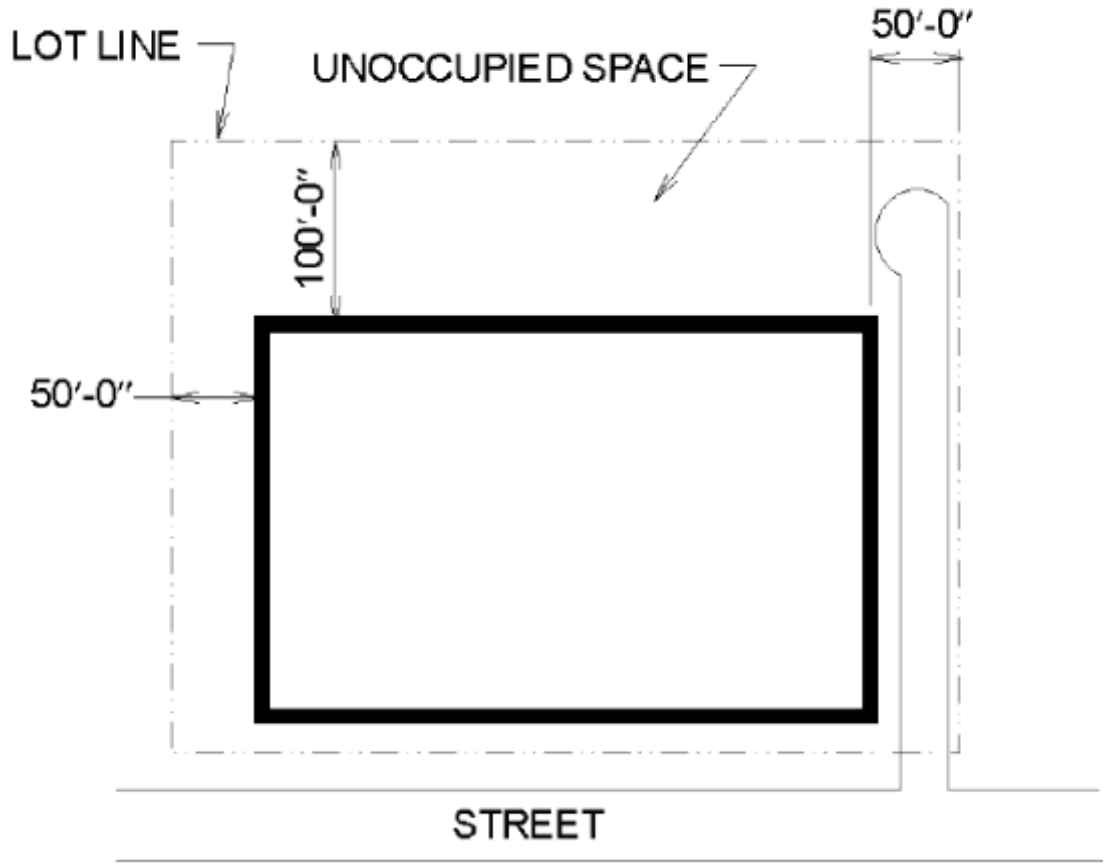
A_t = Tabular allowable area per story per Table 506.2 for NS, S1 or S13R (sq. ft.)

NS = Tabular allowable area per story per Table 506.2 for non-sprinklered building (sprinklered or not)

I_f = Area increase factor due to frontage per 506.3
$I_{f,\ max} = 0.75$

Area Modification – Frontage IBC 506.3

- Allowable area increase for frontage
  - Streets (public ways)
  - Open Spaces
- Frontage provides:
  - Access by fire service personnel
  - Temporary refuge for occupants
  - Reduced exposure to/from adjacent structures



Frontage Increases – 2021/2024 IBC 506.3.3

I_f = Area factor increase due to frontage

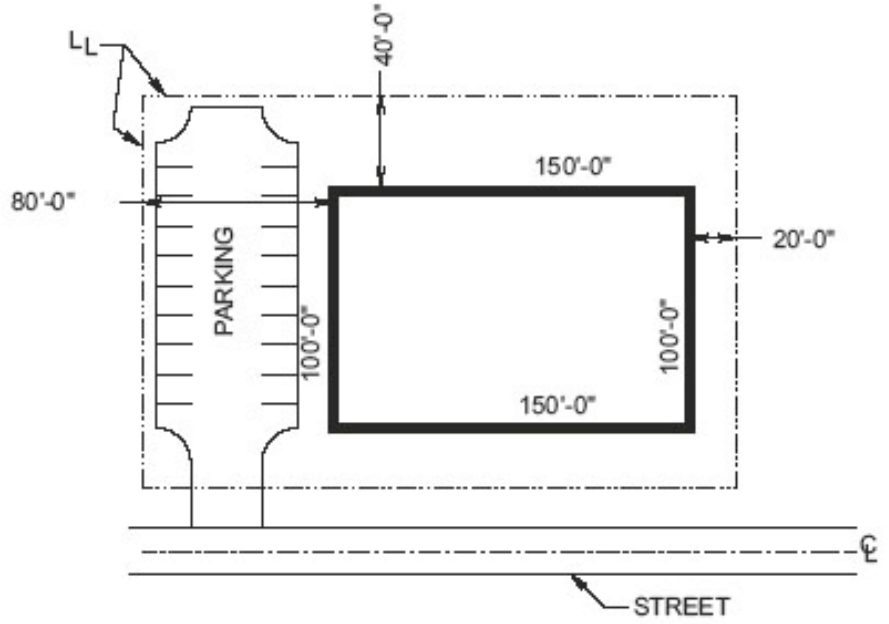


TABLE 506.3.3
FRONTAGE INCREASE FACTOR[a]

PERCENTAGE OF BUILDING PERIMETER	OPEN SPACE (feet)			
	0 to less than 20	20 to less than 25	25 to less than 30	30 or greater
0 to less than 25	0	0	0	0
25 to less than 50	0	0.17	0.21	0.25
50 to less than 75	0	0.33	0.42	0.50
75 to 100	0	0.50	0.63	0.75

Area Modification – Frontage IBC 506.3

MINIMUM QUALIFICATIONS

25% min of building perimeter is on a public way or open space 20' min distance from building face to:

- Closest interior lot line
- Entire width of street, alley, or public way
- Exterior face of adjacent building

EXCEPTIONS

Where building meets Unlimited requirements of IBC 507

And W > 30'

W_{max} = 60'

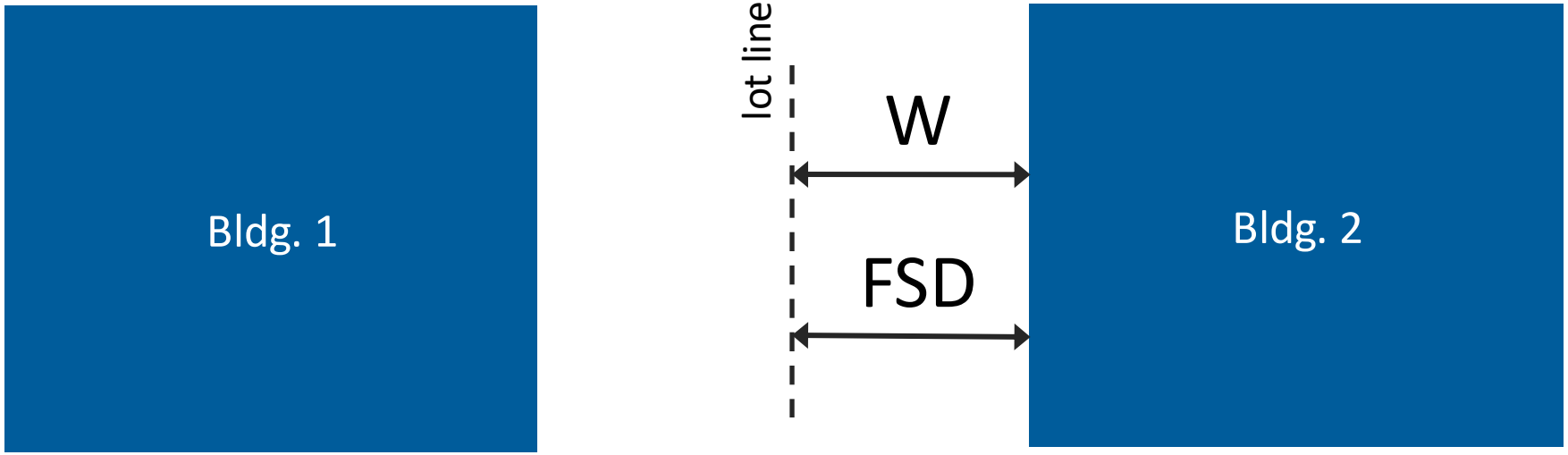
Frontage Increases – IBC 506.3

"W" for area increases NOT always the same as Fire Separation Distance (FSD) for purposes of fire resistance ratings of walls and openings



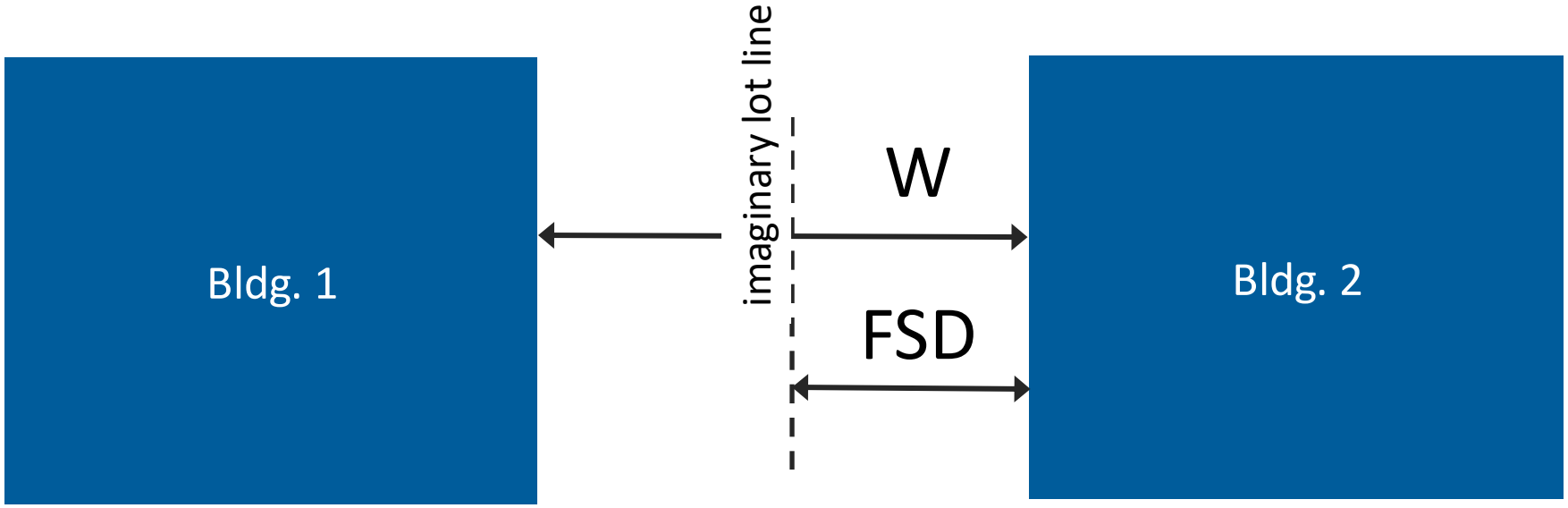
Frontage Increases – IBC 506.3

Two buildings on DIFFERENT lots



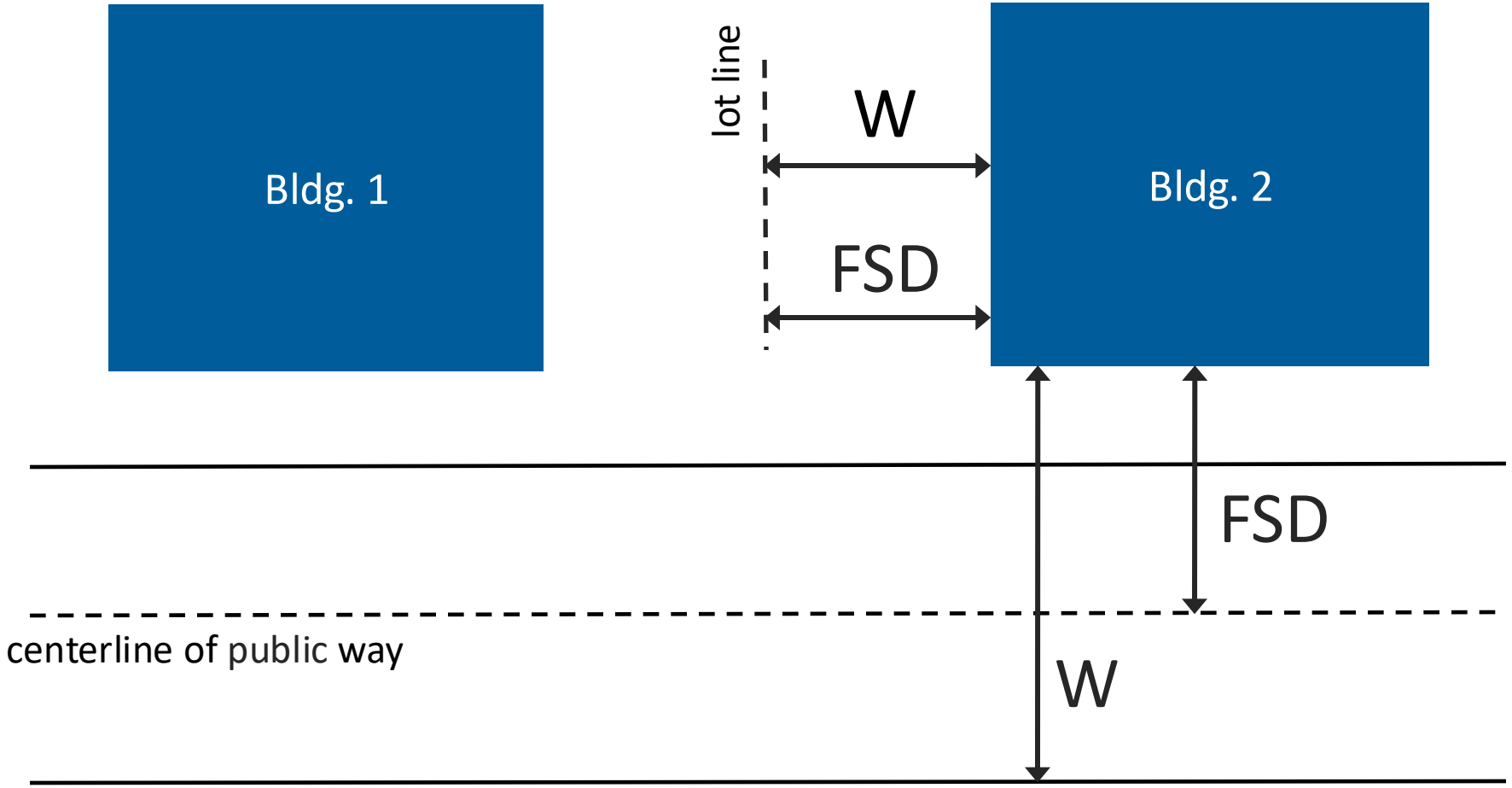
Frontage Increases – IBC 506.3

Two buildings on SAME lot



Frontage Increases – IBC 506.3

Buildings near public right of ways:



Total Building Area – IBC 506.2

$$A_a = [A_t + (NS \times I_f)] \times S_a$$

(Equation 5-2)

A_a = Allowable area, total (sq. ft.)

A_t = Tabular allowable area per story per Table 506.2 for NS, S1, SM or S13R (sq. ft.)

NS = Tabular allowable area per story per Table 506.2 for non-sprinklered building (sprinklered or not)

I_f = Area increase factor due to frontage per 506.3
I_f, max = 0.75

S_a = Actual number of building stories above grade

$S_{a,\,max}$ = 3 for non-sprinklered buildings and those w/ NFPA13

$S_{a,\,max}$ = 4 for buildings w/ NFPA 13R

Total Building Area –IBC 506.2

1 story building (Type III-A)

» Total Area is 1 x A_a

R-2
S13R



Max Area =
24,000 sf total

R-2
S1



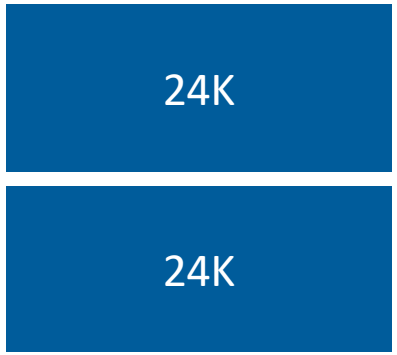
Max Area =
96,000 sf total

Total Building Area – IBC 506.2

2 story building (Type III-A)

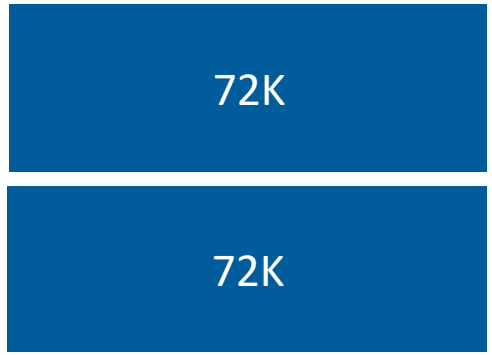
- Total Area is 2 x A_a
- No frontage increase shown

R-2
S13R



Max Area =
48,000 sf total

R-2
SM



Max Area =
144,000 sf total

Total Building Area – IBC 506.2

3 story building (Type III-A)

- Total Area is 3 x A_a
- Includes maximum frontage increase

R-2
S13R + I_f (NS)

24K +	.75(24K)
24K +	.75(24K)
24K +	.75(24K)

Max Area =
126,000 sf total

R-2
SM + I_f (NS)

72K +	.75(24K)
72K +	.75(24K)
72K +	.75(24K)

Max Area =
270,000 sf total

Mezzanines – IBC 505

Not counted toward building area* or number of stories if:

- Maximum 1/3 floor area of *room* or *space* where located
- Special egress provisions apply
- Must be open and unobstructed to room in which it's located (walls ≤ 42" allowed)
  - Several exceptions
- Slightly different for equipment platforms

*Does count toward fire area with regard to fire protection in Chapter 9

Case Study Maximizing View and Value With Wood

Marselle Condominiums

Seattle, WA

- Type III-A condo complex
- 5-1/2 stories of wood over 2 stories of concrete
- Mezzanine added $250K cost but $1M in value
- 30% cost saving over concrete
- Time savings over steel



Architect: PB Architects

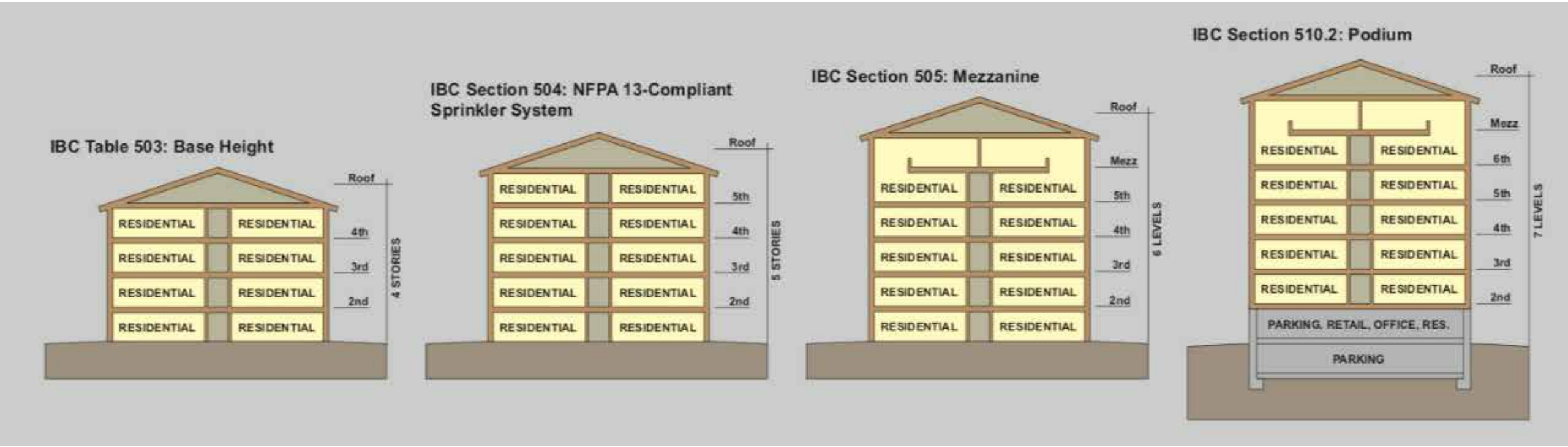
Engineer: Yu & Trochalakis

Contractor: Norcon, NW

Completed: 2009

Photo Credit: Matt Todd Photography

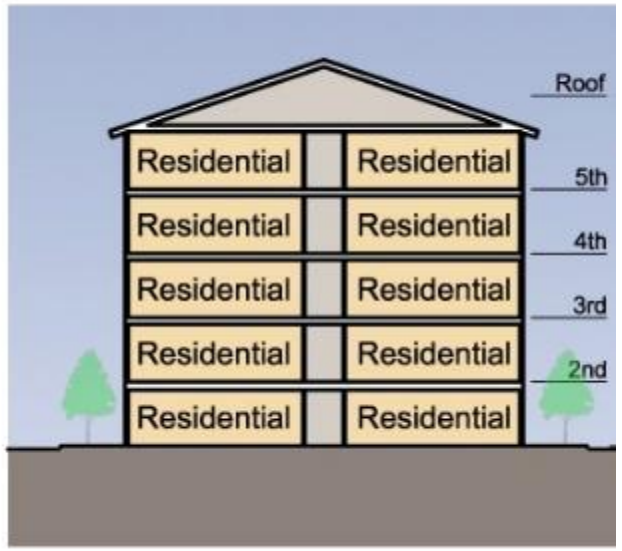
Which Construction Type? - Height & Story Limits



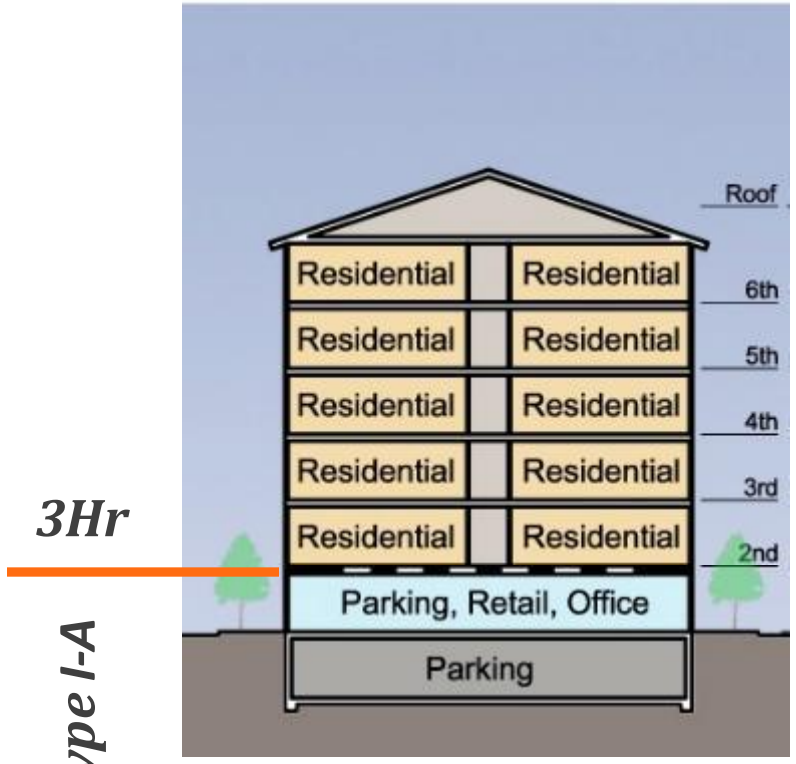
Source: WoodWorks

Type V → Type III
Type IV-HT → + Mezzanines → + Podiums

IBC Podium Provisions



5 story Type III Building



5 story Type III Building
On Top of a Type I-A Podium

Special Provisions for Podiums in IBC 510.2
Increases allowable stories… not allowable building height

Horizontal Building Separation – 510.2

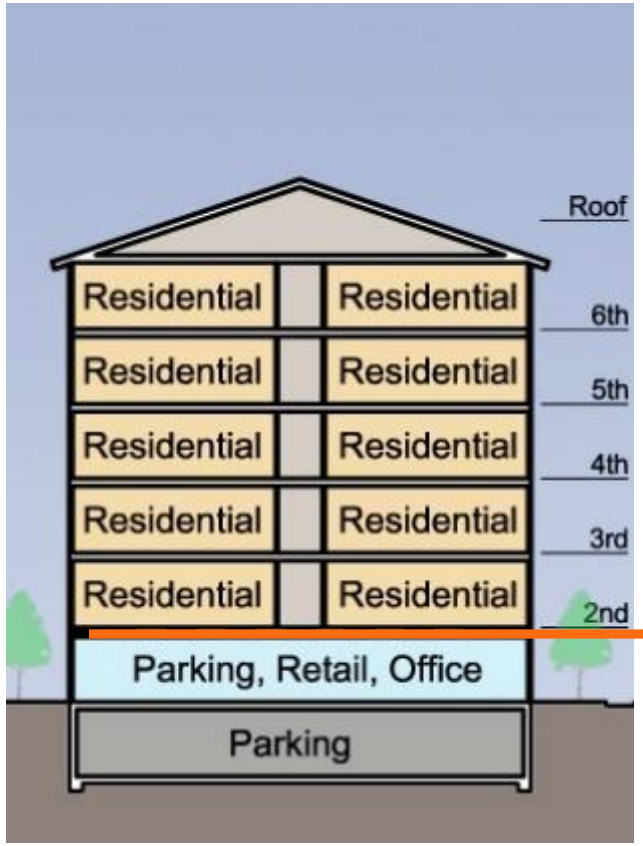
Considered separate buildings above and below for purposes of area calculations if:

- Overall height is still limited to min of either building
- 3-hr rated horizontal assembly
- Building below is Type I-A with sprinklers
- Enclosures penetrating horizontal assembly are 2-hr rated
- Occupancy above is A, B, M, R or S
- Occupancy below is any except H



The Flats at ISU, Normal, IL
OKW Architects
Precision Builders & Associates

Evolution of IBC Mixed-Use Podium



IBC	2006	2009	2012	2015	2018	2021	2024
Section	509.2	509.2	510.2	510.2	510.2	510.2	510.2
Upper Occupancy	A, B, M, R or S						
3Hr							
Lower Occupancy	S-2 Parking	A, B, M, R or S-2 Parking		Any Except H			
Type IA							
Podium Height	1 Story			No Restriction			

IBC Provisions for mixed-use podiums have been evolving.

Starting in 2015, IBC allows multiple podium stories above grade.

MASS TIMBER OVERVIEW



Ascent / New Land Enterprises / Korb + Associates Architects / Thorton Tomasetti / photo New Land Enterprises

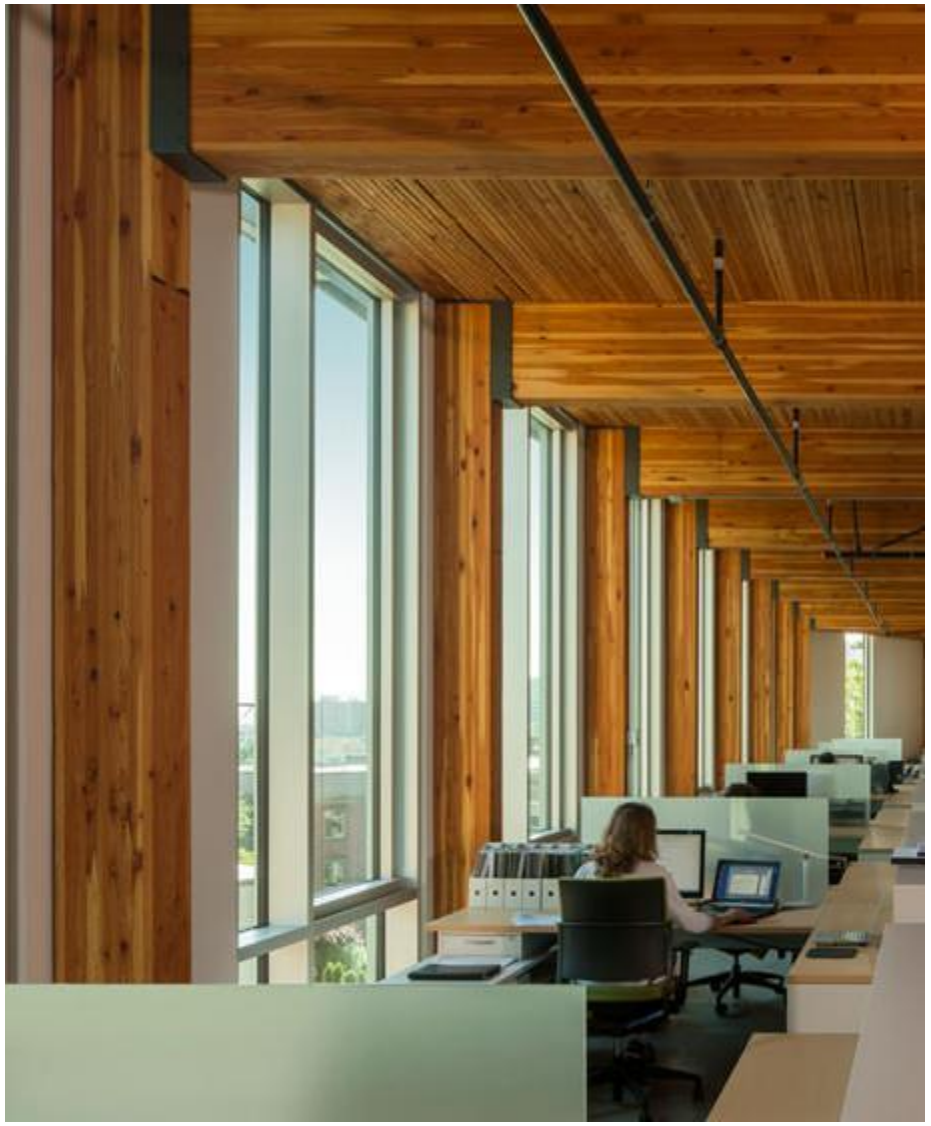
Wood Construction Terminology



Light-Frame Wood
Photo: WoodWorks



Heavy Timber
Photo: Benjamin Benschneider



Mass Timber
Photo: John Stamets

Wood Construction Terminology

Glue Laminated Timber (Glulam)
Beams & columns





Cross-Laminated Timber (CLT)
Solid sawn laminations





Cross-Laminated Timber (CLT)
SCL laminations



Photo:
Freres Lumber



Wood Construction Terminology

Dowel-Laminated Timber (DLT)



Photo: StructureCraft

Nail-Laminated Timber (NLT)



Photo: Think Wood

Glue-Laminated Timber (GLT)

Plank orientation



Photo: StructureCraft



Photo: StructureCraft



Photo: Ema Peter



Photo: Manasc Isaac Architects/Fast + Epp

Mass Timber Building Options


Photo: Blaine Brownell

Post and Beam


Photo: acton ostry architects

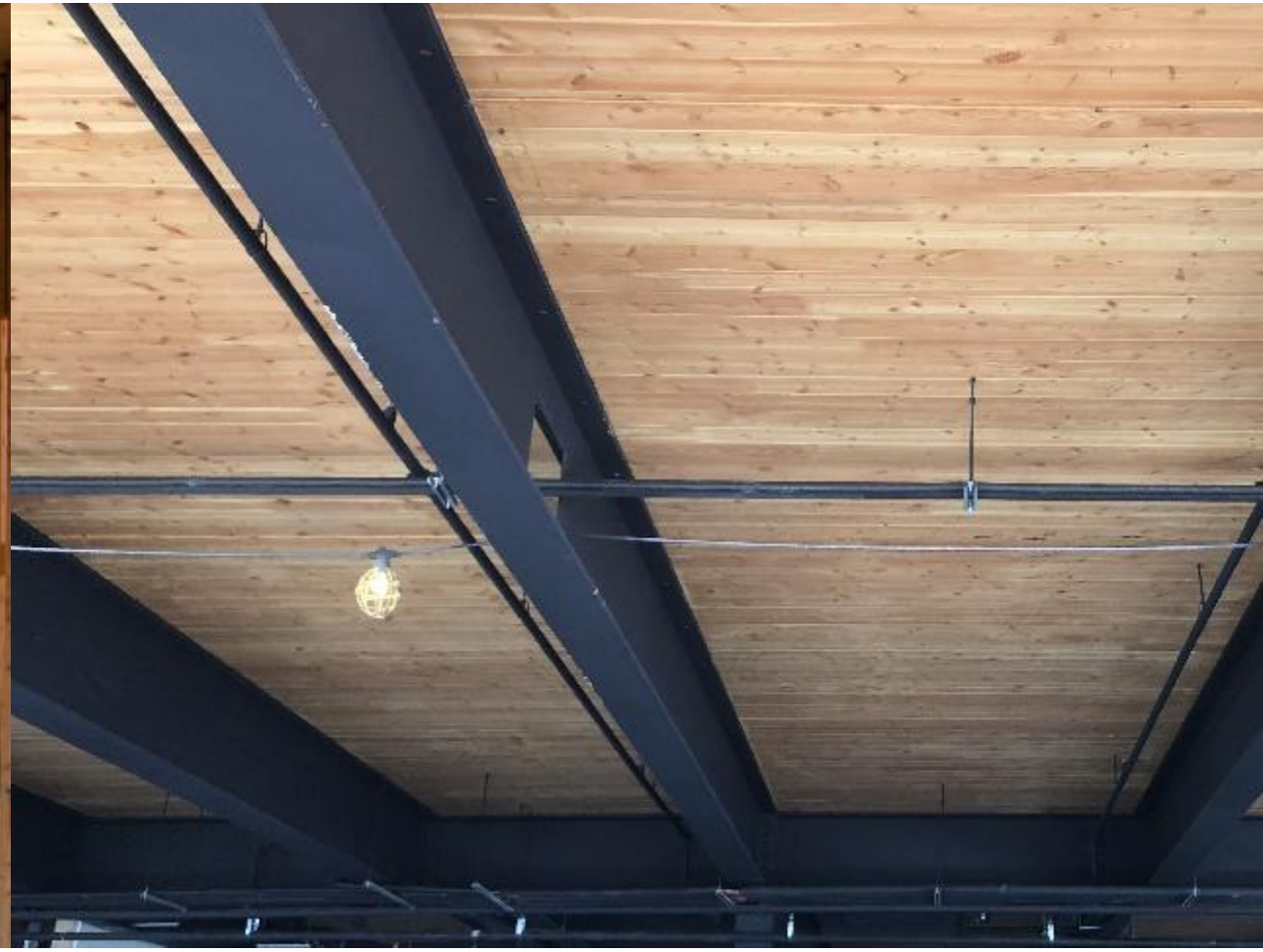
Flat Plate


Photo: : LendLease

Honeycomb

Mass Timber Building Options





Hybrid: Light-frame

Hybrid: Steel framing

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

MASS TIMBER IN THE CODE



Central Lofts / Jones Architecture / Froelich Engineers / Photo Jones Architecture

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

- CLT was first recognized in the 2015 IBC
- CLT in the 2021 IBC:
  - Chapter 2: Definitions

    [BS] CROSS-LAMINATED TIMBER. A prefabricated engineered wood product consisting of not less than three layers of solid-sawn lumber or *structural composite lumber* where the adjacent layers are cross oriented and bonded with structural adhesive to form a solid wood element.

  - Chapter 23: Wood

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



Which Construction Type?



Type III-A: 6 stories

Allowable mass timber building size:
Group B occupancy with NFPA 13 Sprinkler



Type IV-HT: 6 stories



Type V-A: 4 stories

Which Construction Type? – Building Size & Occupancy

- Building size by construction type (sprinklered construction)

	IV-A	IV-B	IV-C	IV-HT	III-A	III-B	V-A	V-B
Occupancies	**Allowable Height (IBC Table 504.3)**							
A, B, R	270	180	85	85	85	75	70	60
	Allowable Stories (IBC Table 504.4)							
A-2, A-3, A-4	18	12	6	4	4	3	3	2
B	18	12	9	6	6	4	4	3
R-2	18	12	8	5	5	5	4	3
	Allowable Area per Story (IBC Table 506.2)							
A-2, A-3, A-4	135,000	90,000	56,250	45,000	42,000	28,500	34,500	18,000
B	324,000	216,000	135,000	108,000	85,500	57,000	54,000	27,000
R-2	184,500	123,000	76,875	61,500	72,000	48,000	36,000	21,000

Which Construction Type? – Fire Rating

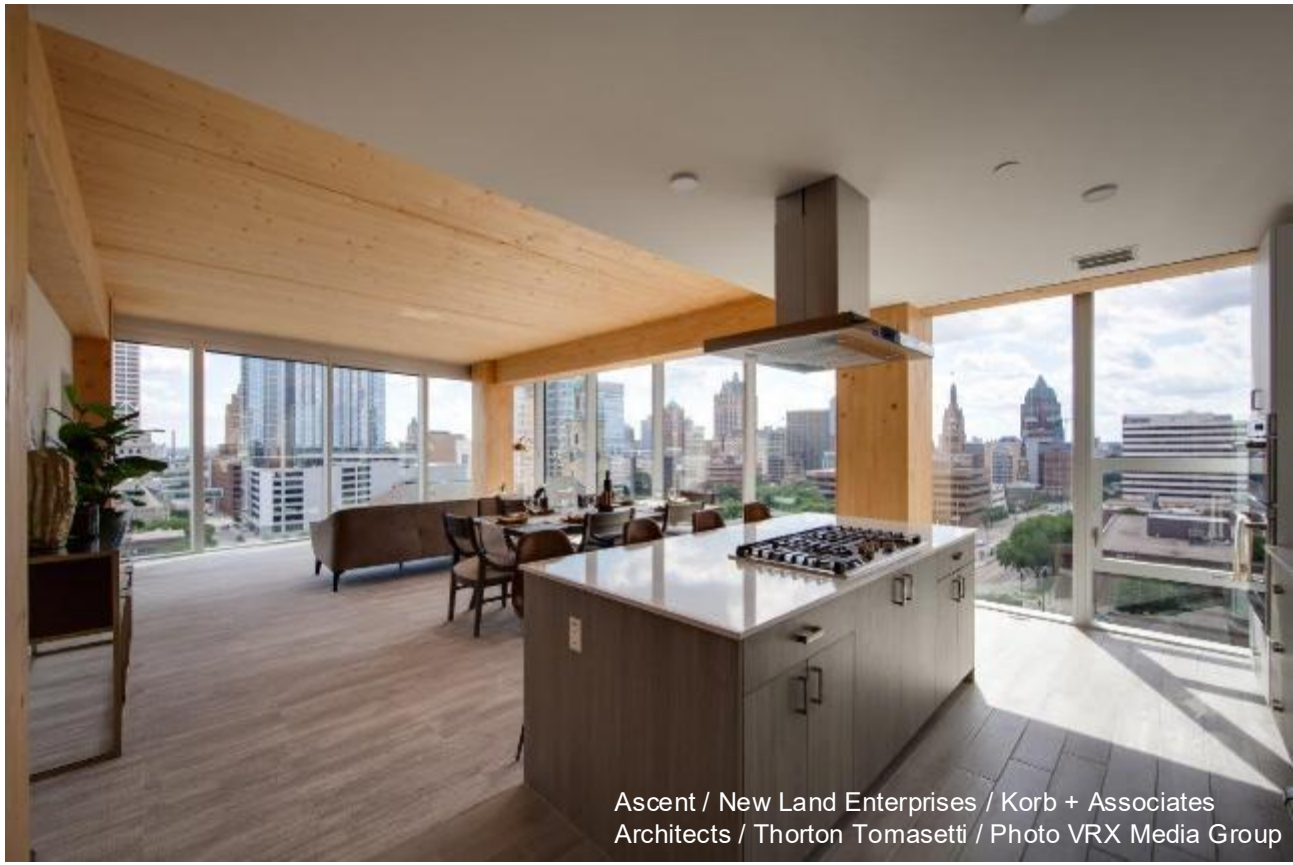
Business (B) Occupancy with NFPA 13 sprinklers		**IV-C**	**IV-HT**	**III-A**	**III-B**	**V-A**	**V-B**
Heights & areas	Area per story (ft^2)	135,000	108,000	85,500	57,000	54,000	27,000
	Max stories	9	6	6	4	4	3
	Max height (ft)	85	85	85	75	70	60
Rating Requirements	Primary structural frame	2-hr	HT	1-hr	0-hr	1-hr	0-hr
	Exterior bearing walls	2-hr	2-hr	2-hr	2-hr	1-hr	0-hr
	Interior bearing walls	2-hr	1-hr / HT	1-hr	0-hr	1-hr	0-hr
	Nonbearing exterior walls	Table 705.5					
	Nonbearing interior walls	0-hr	1-hr or Sect. 2304.11.2.2	0-hr	0-hr	0-hr	0-hr
	Floor construction	2-hr	HT	1-hr	0-hr	1-hr	0-hr
	Roof construction	1-hr	HT	1-hr	0-hr	1-hr	0-hr

Which Construction Type? – Fire Rating

Residential (R-2) Occupancy with NFPA 13 sprinklers		**IV-C**	**IV-HT**	**III-A**	**III-B**	**V-A**	**V-B**
Heights & areas	Area per story (ft^2)	76,875	61,500	72,000	48,000	36,000	21,000
	Max stories	8	5	5	5	4	3
	Max height (ft)	85	85	85	75	70	60
Rating Requirements	Primary structural frame	2-hr	HT	1-hr	0-hr	1-hr	0-hr
	Exterior bearing walls	2-hr	2-hr	2-hr	2-hr	1-hr	0-hr
	Interior bearing walls	2-hr	1-hr / HT	1-hr	0-hr	1-hr	0-hr
	Nonbearing exterior walls	Table 705.5					
	Nonbearing interior walls	0-hr	1-hr or Sect. 2304.11.2.2	0-hr	0-hr	0-hr	0-hr
	Floor construction	2-hr	HT	1-hr	0-hr	1-hr	0-hr
	Roof construction	1-hr	HT	1-hr	0-hr	1-hr	0-hr

Dwelling Unit Separation Requirements

- IBC 708.3 & 711.2.4.3
  - 1-hour FRR for walls and floors between dwelling or sleeping units
  - Some allowances for 1/2-hour
    - Types II-B, III-B, V-B when equipped with NFPA 13 sprinkler
    - Corridor walls per Table 1020.1 when equipped with NFPA 13 sprinkler



Ascent / New Land Enterprises / Korb + Associates Architects / Thorton Tomasetti / Photo VRX Media Group

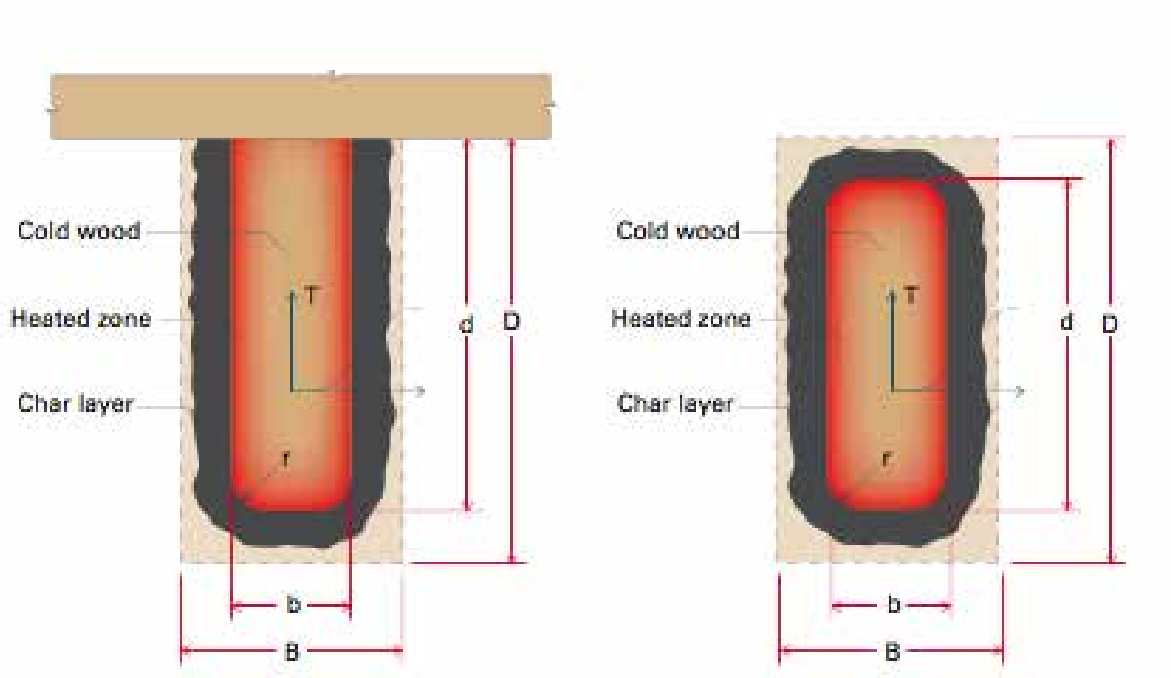
MASS TIMBER FIRE RESISTANCE



Chemeketa Community College Agricultural Complex / FFA Architecture and Interiors / KPFF Consulting Engineers / Photo Christian Columbres

Fire Design of Mass Timber

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



Source: AWC's TR 10



Fire Design of Mass Timber

- Mass Timber char depths

- Sawn lumber, glulam, LVL, LSL, PSL

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

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

Source: AWC's NDS

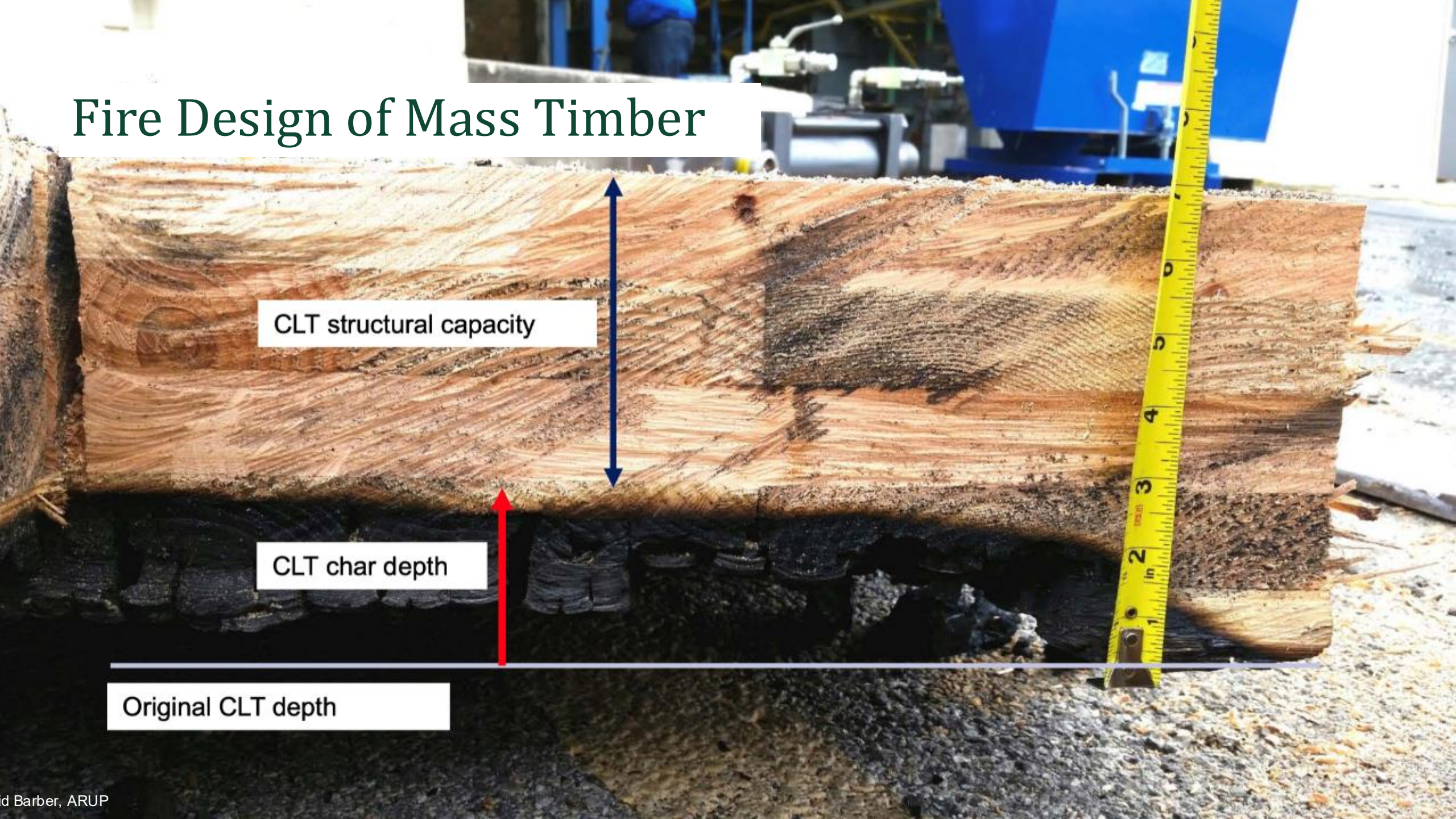
- CLT

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

Required Fire Resistance (hr.)	Effective Char Depths, a_{eff} (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

Source: AWC's NDS

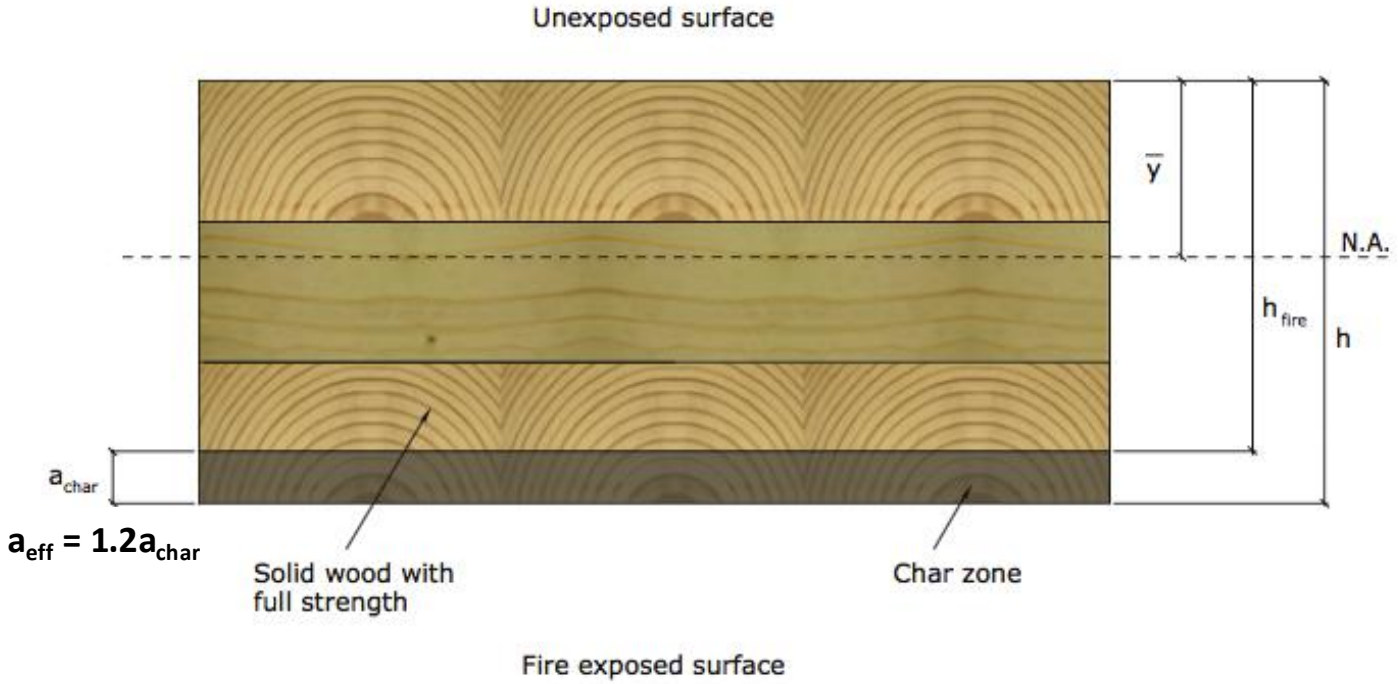
Fire Design of Mass Timber



Fire Design of Mass Timber

- Demonstrating FRR of mass timber:
  - 1. Calculations in accordance with IBC 722 (NDS Chapter 16)
  - 2. Tests in accordance with ASTM E119



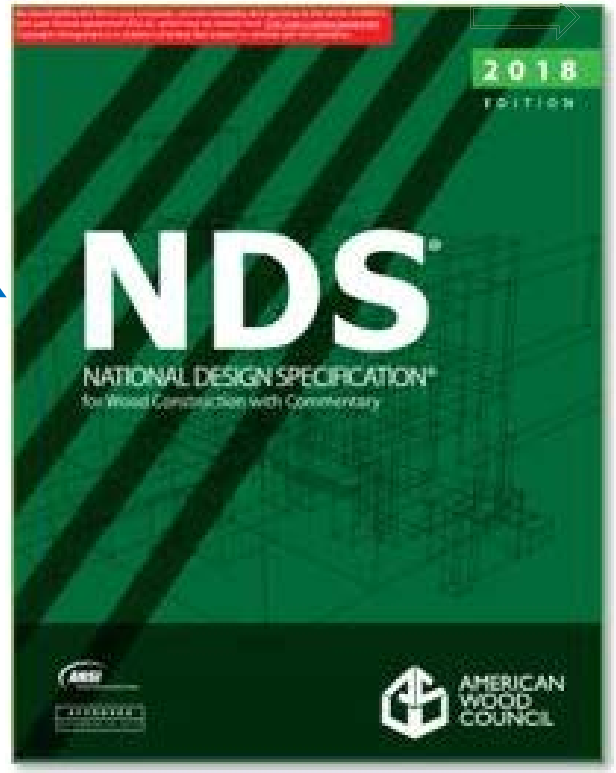


Fire Design of Mass Timber

Calculated FRR of Exposed MT:

» IBC to NDS code compliance path





Code Path for Exposed Wood Fire-Resistance Calculations

IBC 703.2.2
Methods for determining fire resistance

- Prescriptive designs per IBC 721.1
- ***Calculations in accordance with IBC 722***
- Fire-resistance designs documented in sources
- Engineering analysis based on a comparison
- Alternate protection methods as allowed by 104.11

IBC 722
Calculated Fire Resistance

"The calculated *fire resistance* of exposed wood members and wood decking shall be permitted in accordance with **Chapter 16 of ANSI/AWC National Design Specification for Wood Construction (NDS)**

NDS Chapter 16
Fire Design of Wood Members

- Limited to calculating fire resistance up to 2 hours
- Char depth varies based on exposure time (i.e., fire-resistance rating), product type and lamination thickness. Equations and tables are provided.
- TR 10 and NDS commentary are helpful in implementing permitted calculations.

Fire Design of Mass Timber

WoodWorks Inventory of Fire Tested Mass Timber Assemblies

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

WoodWorks WOOD PRODUCTS COUNCIL

CLT Panel	Manufacturer	CLT Grade or Major x Minor Grade	Ceiling Protection	Panel Connection in Test	Floor Topping	Load Rating	Fire Resistance Achieved (Hours)	Source	Testing Lab
3-ply CLT (114mm 4.488 in)	Nordic	SPF 1650 Fb 1.5E MSR x SPF #3	2 layers 1/2" Type X gypsum	Half-Lap	None	Reduced 36% Moment Capacity	1	1 (Test 1)	NRC Fire Laboratory
3-ply CLT (105mm 4.133 in)	Structurlam	SPF #1/#2 x SPF #1/#2	1 layer 5/8" Type X gypsum	Half-Lap	None	Reduced 75% Moment Capacity	1	1 (Test 5)	NRC Fire Laboratory
5-ply CLT (175mm 6.875")	Nordic	E1	None	Topside Spline	2 staggered layers of 1/2" cement boards	Loaded, See Manufacturer	2	2	NRC Fire Laboratory March 2016
5-ply CLT (175mm 6.875")	Nordic	E1	1 layer of 5/8" Type X gypsum under Z-channels and furring strips with 3 5/8" fiberglass batts	Topside Spline	2 staggered layers of 1/2" cement boards	Loaded, See Manufacturer	2	5	NRC Fire Laboratory Nov 2014
5-ply CLT (175mm 6.875")	Nordic	E1	None	Topside Spline	3/4 in. proprietary gypcrete over Maxxon acoustical mat	Reduced 50% Moment Capacity	1.5	3	UL
5-ply CLT (175mm 6.875")	Nordic	E1	1 layer 5/8" normal gypsum	Topside Spline	3/4 in. proprietary gypcrete over Maxxon acoustical mat or proprietary sound board	Reduced 50% Moment Capacity	2	4	UL
5-ply CLT (175mm 6.875")	Nordic	E1	1 layer 5/8" Type X Gyp under Resilient Channel under 7 7/8" I-Joists with 3 1/2" Mineral Wool between Joists	Half-Lap	None	Loaded, See Manufacturer	2	21	Intertek 8/24/2012
5-ply CLT (175mm 6.875")	Structurlam	E1 M5 MSR 2100 x SPF #2	None	Topside Spline	1-1/2" Maxxon Cyp-Crete 2000 over Maxxon Reinforcing Mesh	Loaded, See Manufacturer	2.5	6	Intertek, 2/22/2016
5-ply CLT (175mm 6.875")	DR Johnson	V1	None	Half-Lap & Topside Spline	2" gypsum topping	Loaded, See Manufacturer	2	7	SwRI (May 2016)
5-ply CLT (175mm 6.875")	Nordic	SPF 1950 Fb MSR x SPF #3	None	Half-Lap	None	Reduced 59% Moment Capacity	1.5	1 (Test 3)	NRC Fire Laboratory
5-ply CLT (175mm 6.875")	Structurlam	SPF #1/#2 x SPF #1/#2	1 layer 5/8" Type X gypsum	Half-Lap	None	Unreduced 101% Moment Capacity	2	1 (Test 6)	NRC Fire Laboratory
7-ply CLT (245mm 9.65")	Structurlam	SPF #1/#2 x SPF #1/#2	None	Half-Lap	None	Unreduced 101% Moment Capacity	2.5	1 (Test 7)	NRC Fire Laboratory
5-ply CLT (175mm 6.875")	SmartLam	SL-V4	None	Half-Lap	nominal 1/2" plywood with 8d nails.	Loaded, See Manufacturer	2	12 (Test 4)	Western Fire Center 10/26/2016
5-ply CLT (175mm 6.875")	SmartLam	V1	None	Half-Lap	nominal 1/2" plywood with 8d nails.	Loaded, See Manufacturer	2	12 (Test 5)	Western Fire Center 10/28/2016

Fire Design of Mass Timber

- Fire Resistance Ratings (FRR)
  - Thinner panels (i.e. 3-ply) can be difficult to achieve 1+ hour FRR
  - 5-ply CLT panels can usually achieve 1- or 2-hour FRR
  - Construction Type -> FRR -> Member size -> Grid (order as needed)

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

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



3 ply (after 1-hour rating)



5 ply (after 1-hour rating)

STRUCTURAL GRID



Structural Grid

- 0-Hour FRR: Consider 3-ply panel
  - Efficient spans: 10-12 feet
  - Efficient grids:
    - **20’ x 20’ (1 purlin)**
    - to 30’ x 30’ (2 purlins)



Albina Yard, Portland, OR
Type III-B Construction
20x20 Grid, 1 purlin per bay
3-ply CLT
Image: Lever Architecture

Structural Grid

- 0-Hour FRR: Consider 3-ply panel
  - Efficient spans: 10-12 feet
  - Efficient grids:
    - 20’ x 20’ (1 purlin)
    - to **30’ x 30’ (2 purlins)**



Platte Fifteen, Denver, CO
Type III-B Construction
30x30 Grid, 2 purlins per bay
3-ply CLT
Image: JC Buck

Structural Grid

- 1- or 2-Hour FRR: Likely 5-ply panel
  - Efficient spans: 14-17 feet
  - Efficient grids:
    - **15’ x 30’ (no purlins)**
    - to 30’ x 30’ (1 purlin)



First Tech Credit Union, Hillsboro, OR
Type III-A Construction
12x32 Grid, One-Way Beams
5-ply (5.5”) CLT
Image: Swinerton

Structural Grid

- 1- or 2-Hour FRR: Likely 5-ply panel
  - Efficient spans: 14-17 feet
  - Efficient grids:
    - 15’ x 30’ (no purlins)
    - to **30’ x 30’ (1 purlin)**



Clay Creative, Portland, OR
Type III-A Construction
30x30 Grid, 1 purlin per bay
2x6 NLT
Image: Mackenzie

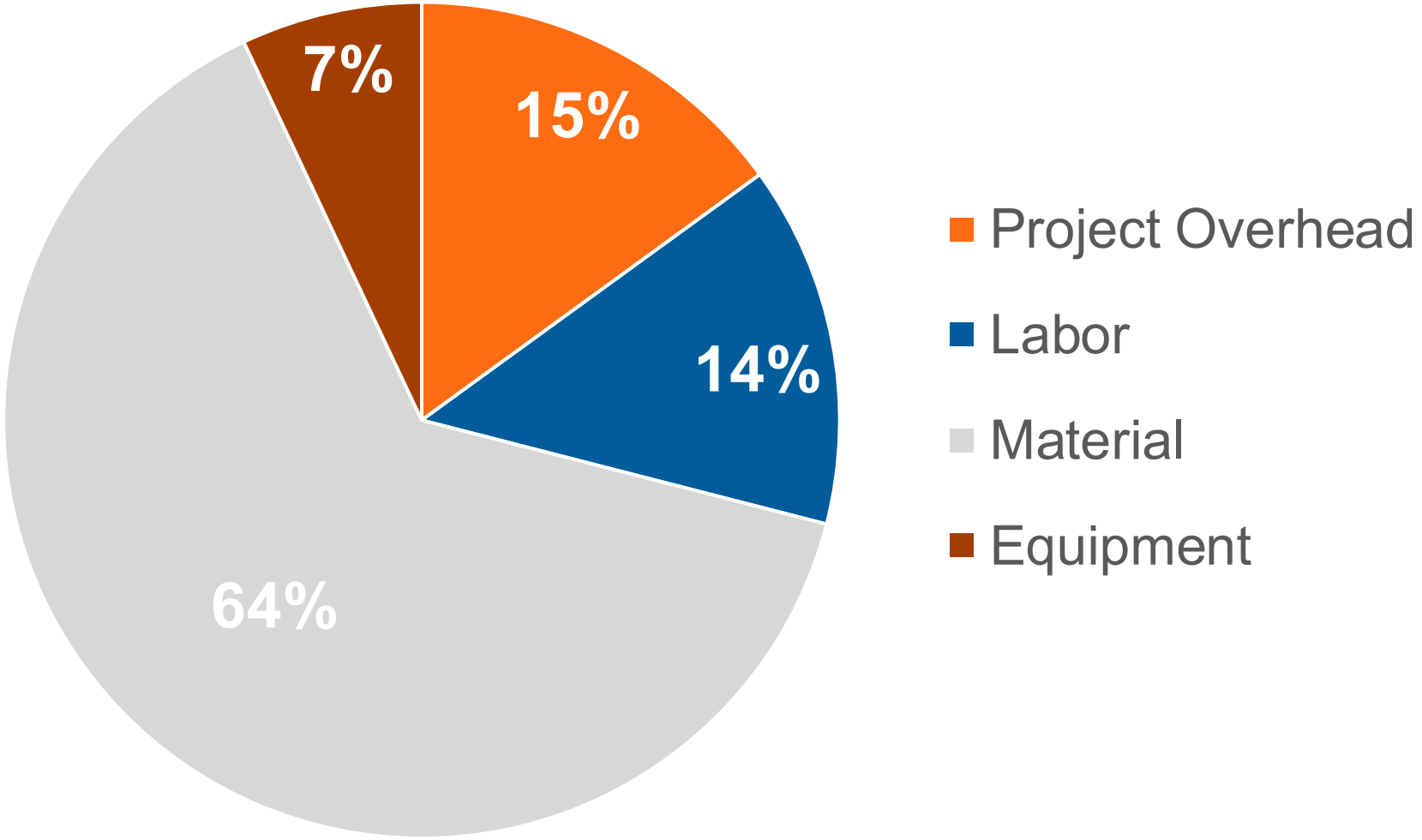
Structural Grid - Panels

- Why so much focus on panel thickness?



Structural Grid - Panels

» Typical Mass Timber Package Costs

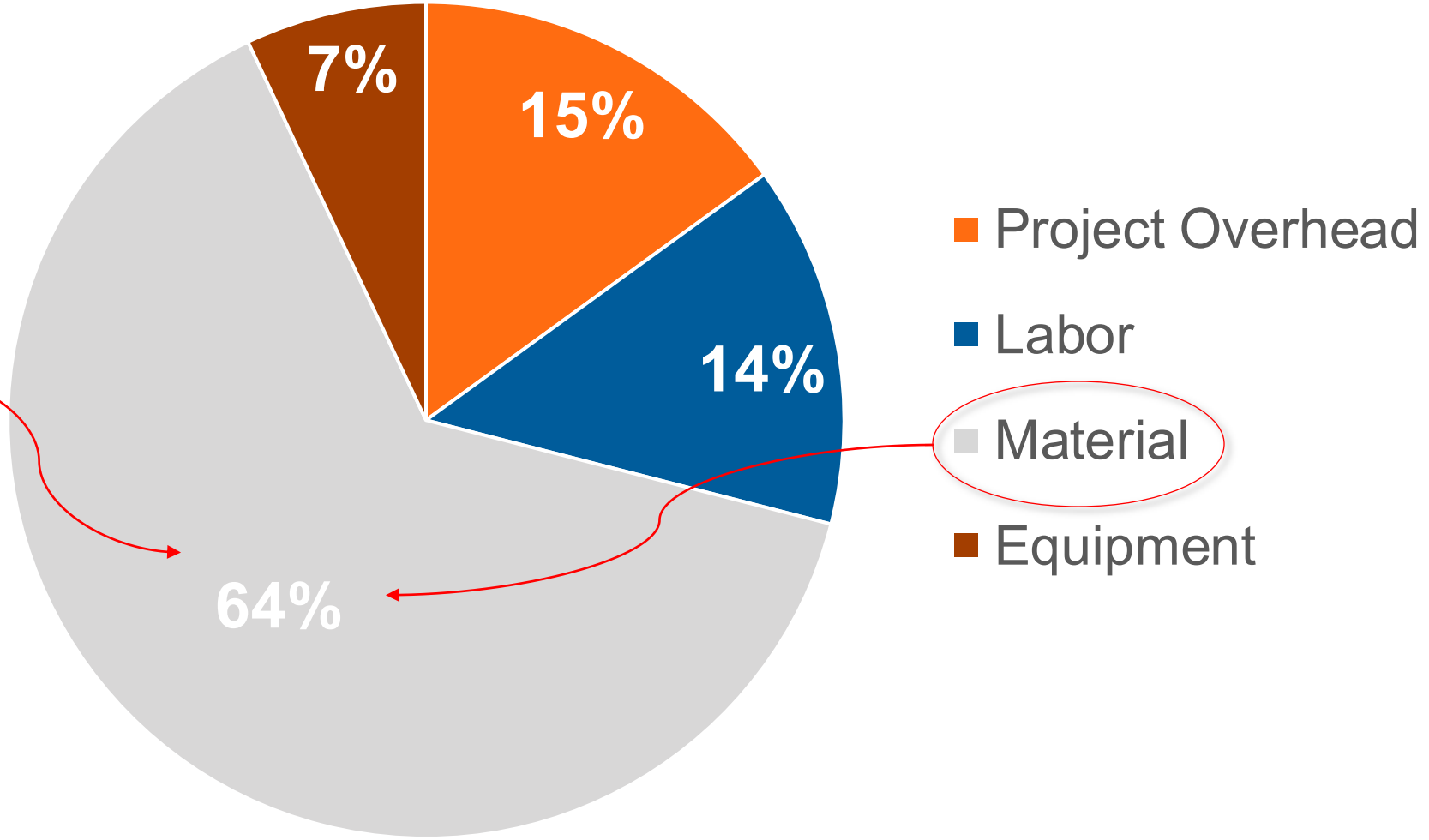


Source: Swinerton

Structural Grid - Panels

» Typical Mass Timber Package Costs

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



Source: Swinerton

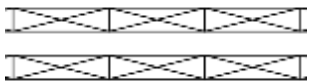
Structural Grid - Panels

» Cost and Construction Type – Panel selection

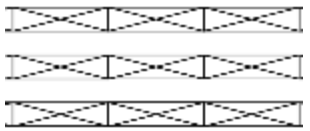
TABLE 601: Fire Resistance Rating Requirements for Building Elements (Hours)

Building Element	I-A	I-B	III-A	III-B	IV-A	IV-B	IV-C	IV-HT	V-A	V-B
Primary Structural Frame	3*	2*	1	0	3*	2	2	HT	1	0
Ext. Bearing Walls	3*	2*	2	2	3*	2	2	2	1	0
Int. Bearing Walls	3*	2*	1	0	3*	2	2	1/HT	1	0
Floor Construction	2	2*	1	0	2	2	2	HT	1	0
Roof Construction	1.5*	1*	1	0	1.5	1	1	HT	1	0
Exposed Mass Timber Elements					None	20-40%	Most	All		

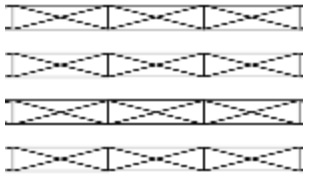
Baseline
0hr & HT



+$10/SF over 3-ply
1hr & maybe 2hr



+$12-15/SF over 5-ply
2hr FRR



Cost Source: Swinerton

*These values can be reduced based on certain conditions in IBC 403.2.1, which do not apply to Type IV buildings.

Structural Grid - Panels



4-story building on college campus

- Mostly Group B occupancy (some assembly / events spaces)
- NFPA 13 sprinklers throughout
- Floor plate = 7,700 ft^2
- Total Building Area = 23,100 ft^2

Impact of Assembly Occupancy placement:

- Owner originally desires events space on top floor (4th floor)
  - Type III-A
- If owner permits moving events space to 1st, 2nd or 3rd floor
  - Type III-B

Structural Grid - Panels



4-story building on college campus

- Cost Impact of Assembly Occupancy placement

Location of Event Space	4th Floor	1st Floor
Construction Type	III-A	III-B
Assembly Group	A-3	A-3
Fire Resistive Rating	1-Hr	0-Hr
Connections	Concealed	Exposed
CLT Panel Thickness	5-Ply	3-Ply
Superstructure Cost/SF	**$65/SF**	**$53/SF**



Source: PCL Construction

LATERAL DESIGN OPTIONS



Mass Timber Lateral Systems



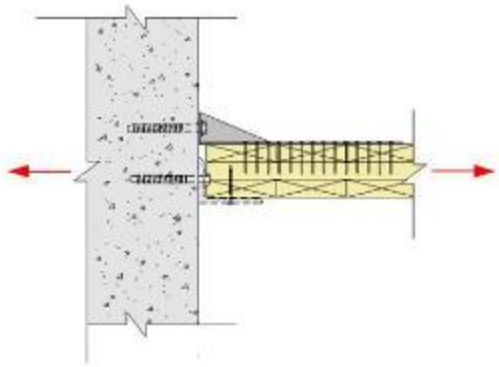
Mass Timber Lateral Systems

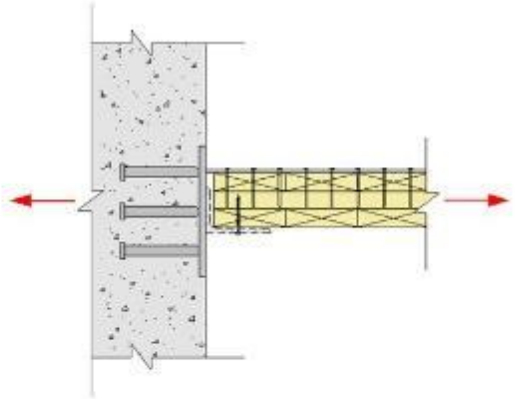
- Connection to concrete core

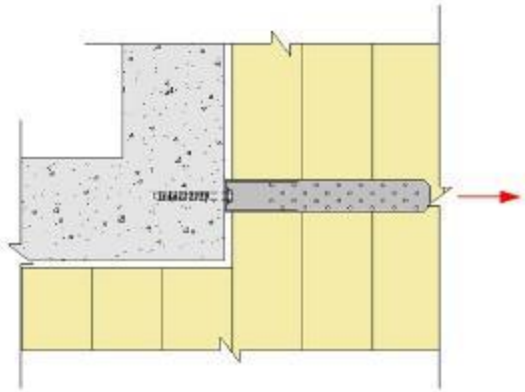


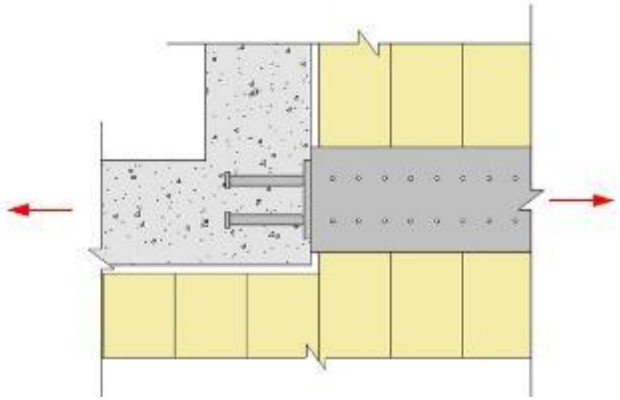
Mass Timber Lateral Systems

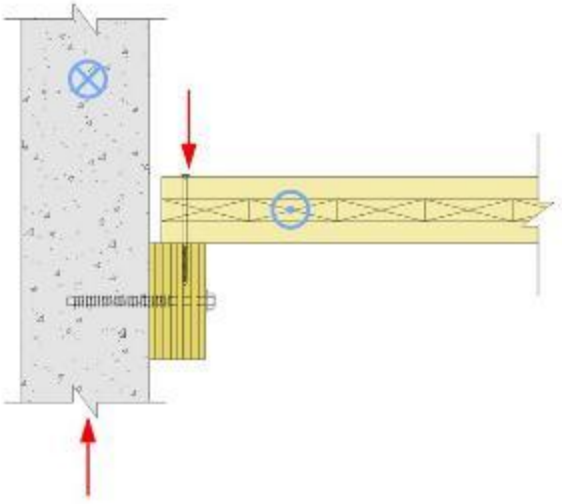
- Connections to concrete core
  - Tolerances & adjustability
  - Drag / collector forces







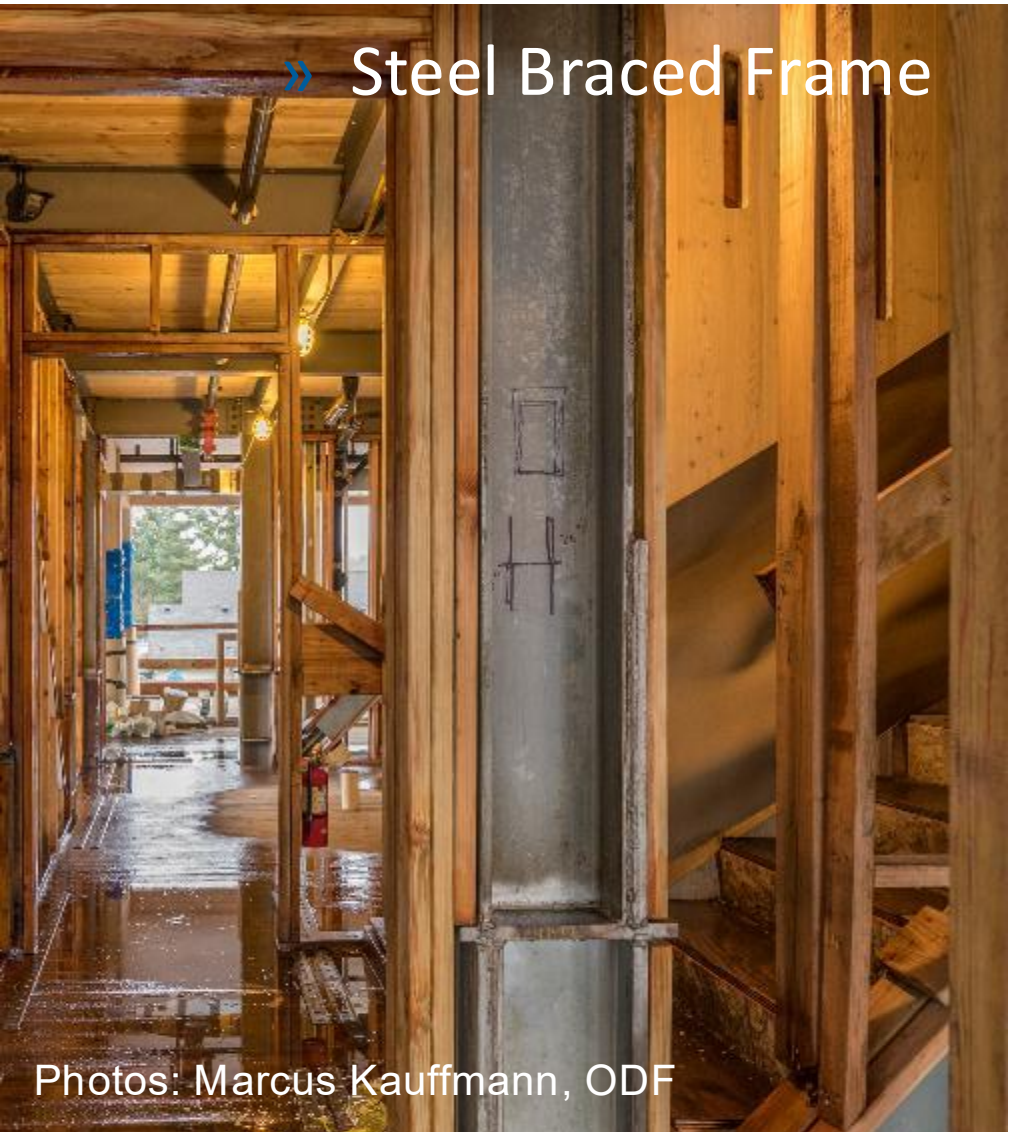






Mass Timber Lateral Systems

- Steel Braced Frame

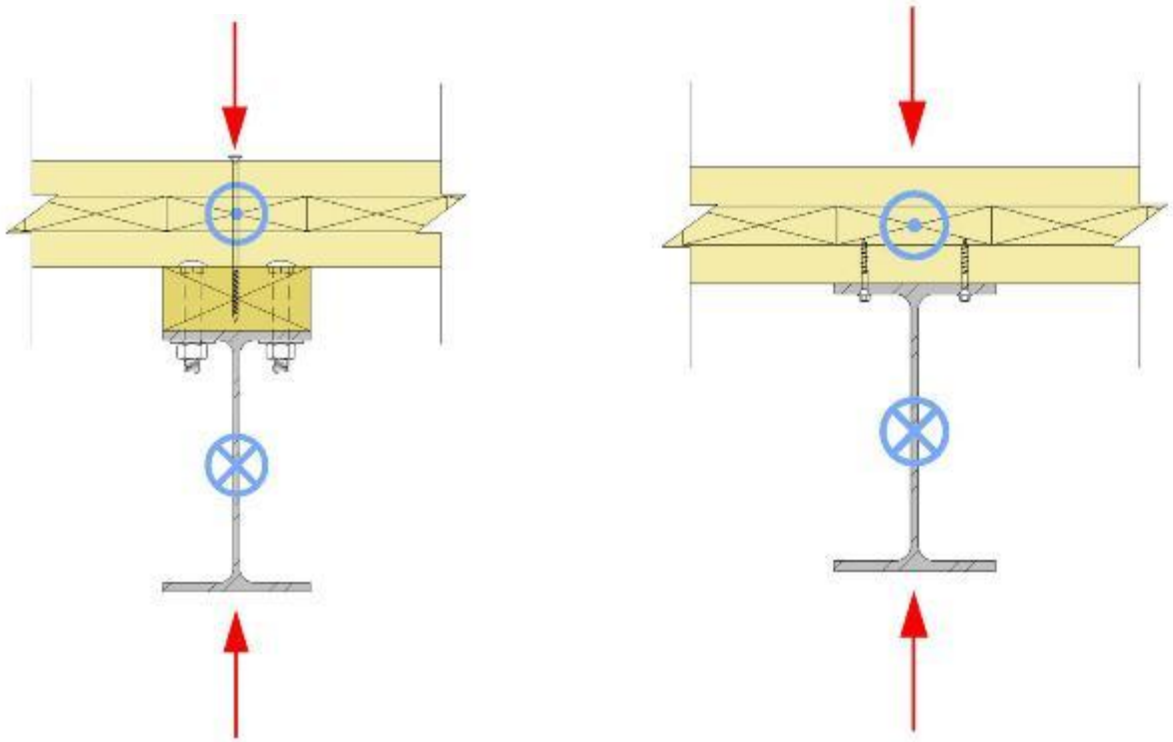


Photos: Marcus Kauffmann, ODF



Mass Timber Lateral Systems

- Connections to steel frame
  - Tolerances & adjustability
  - Consider temperature fluctuations
  - East of installation





Mass Timber Lateral Systems

- Light Frame Wood Shear Walls



Credit: KL&A Engineers & Builders

Mass Timber Lateral Systems

- Light frame wood Shear Walls:
  - Code compliance
  - Standard of construction practice well know
  - Limited to 65’ shear wall height, 85’ overall building height (Type III-A)





Mass Timber Lateral Systems

- Mass Timber Shear Walls



Photo: Alex Schreyer



Mass Timber Lateral Systems



Mass Timber Lateral Systems – Code Permitted Options

	Max Height	Lateral Systems Permitted by Construction Type			
		Type IV-C	Type IV-HT	Type III (A & B)	Type V (A & B)
Concrete Shear Wall	> 85’	✓	✓	✓	✓
Steel Braced Frame	> 85’	✓	✓	✓	✓
Light Frame Wood Shear Wall	≤ 65’ (SDC D,E,F) 85’ (SDC B,C)	✗	✓ (FRTW at exterior, ≥1-hr FRR at interior)	✓ (FRTW at exterior)	✓
Mass Timber (CLT) Shear Wall	≤ 65’ (SDPWS 2021, ASCE 7-22, IBC 2024)	✓ (shafts require noncombustible covering)	✓	✓ (interior only)	✓

ACOUSTICS & SOUND CONTROL



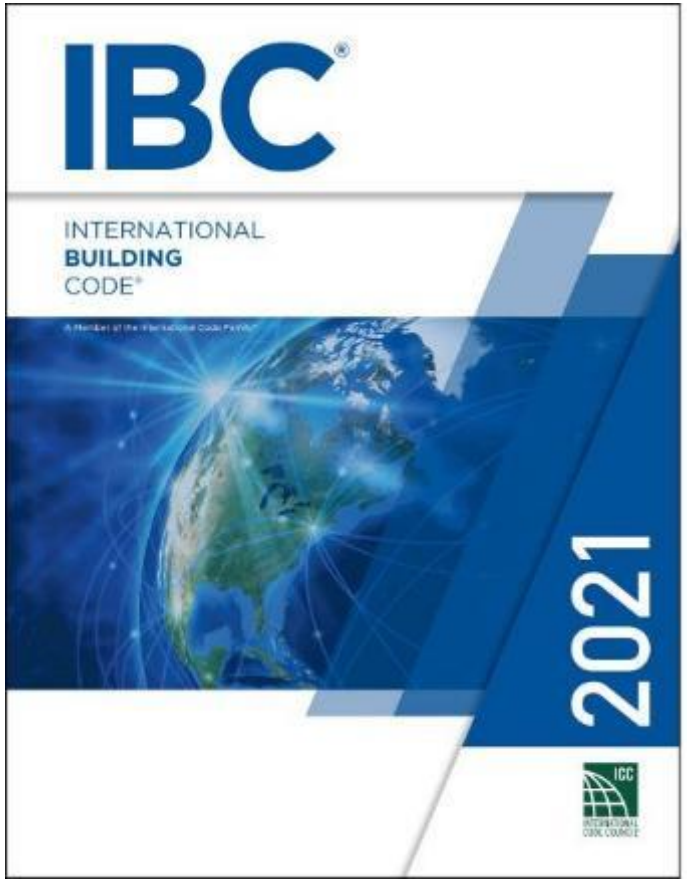
Acoustics & Sound Control: IBC 1206

Code requirements only address residential occupancies:

For unit to unit or unit to public or service areas:

- **Min. STC of 50 (45 if field tested) for:**
  - Walls, Partitions, and Floor/Ceiling Assemblies

- **Min. IIC of 50 (45 if field tested) for:**
  - Floor/Ceiling Assemblies



Acoustics & Sound Control

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[5]	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, WoodWorks[7]

Acoustics & Sound Control: Acoustical Detailing

Common mass timber floor assembly:

- Finish floor (if applicable)
- Underlayment (if finish floor)
- 1.5” to 3” thick concrete/gypcrete topping
- Acoustical mat
- WSP (if applicable)
- Mass timber floor panels

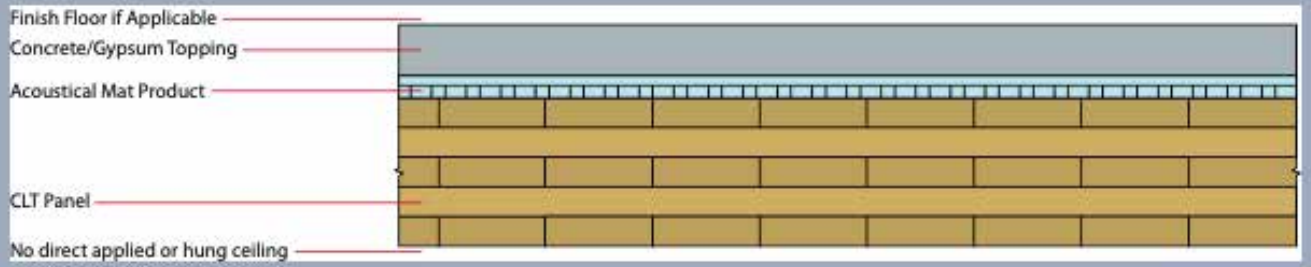


Image: AcoustiTECH

Acoustics & Sound Control: Inventory of Tested Assemblies

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

WoodWorks WOOD PRODUCTS COUNCIL



CLT Panel	Concrete/Gypsum Topping	Acoustical Mat Product Between CLT and Topping	Finish Floor	STC[1]	IIC[1]	Source
CLT 5-ply (6.875")	1-1/2" Gyp-Crete®	Maxxon Acousti-Mat® 3/4	None	47[2] ASTC	47[2] AIIC	1
			LVT	-	49[2] AIIC	
			Carpet + Pad	-	75[2] AIIC	
			LVT on Acousti-Top®	-	52[2] AIIC	
			Eng Wood on Acousti-Top®	-	51[2] AIIC	
		Maxxon Acousti-Mat® ¾ Premium	None	49[2] ASTC	45[2] AIIC	
			LVT	-	47[2] AIIC	
			LVT on Acousti-Top®	-	49[2] AIIC	
	1-1/2" Levelrock®	USG SAM N25 Ultra	None	45[6]	39[6]	15
			LVT	48[6]	47[6]	16
			LVT Plus	48[6]	49[6]	58
			Eng Wood	47[6]	47[6]	59
			Carpet + Pad	45[6]	67[6]	60
			Ceramic Tile	50[6]	46[6]	61
			None	45[6]	42[6]	15
			LVT	48[6]	44[6]	16

CASE STUDIES



Hotel Magdalena

Austin, TX



Lake|Flato Architects
StructureCraft
Photo: Casey Dunn



Hotel Magdalena

Austin, TX

100,000 sf

3 buildings: 5, 4, and 3 stories

Type V-A for MT structures

Hotel

Completed 2020

WN PROFILE

WOOD DESIGN AWARD WINNER

Lake|Flato Architecta
StructureCraft
Photo: Casey Dunn

Bunker Hill Housing Redevelopment – Stellata

Boston, MA



Architect: Stantec
Engineer: McNamara • Salvia
Photo: Bryan Maltais with McNamara • Salvia



Bunker Hill Housing Redevelopment – Stellata

Boston, MA

119,600 sf, 6 stories

Type IV-C

Multi-Family

Completed 2025

WN PROFILE

Architect: Stantec
Engineer: McNamara • Salvia
Photo: Courtesy Stantec

Offices at Southstone Yards

Frisco, TX



Duda|Paine Architects
Thornton Tomasetti
Photo: WoodWorks



Photo: WoodWorks

Offices at Southstone Yards

Frisco, TX

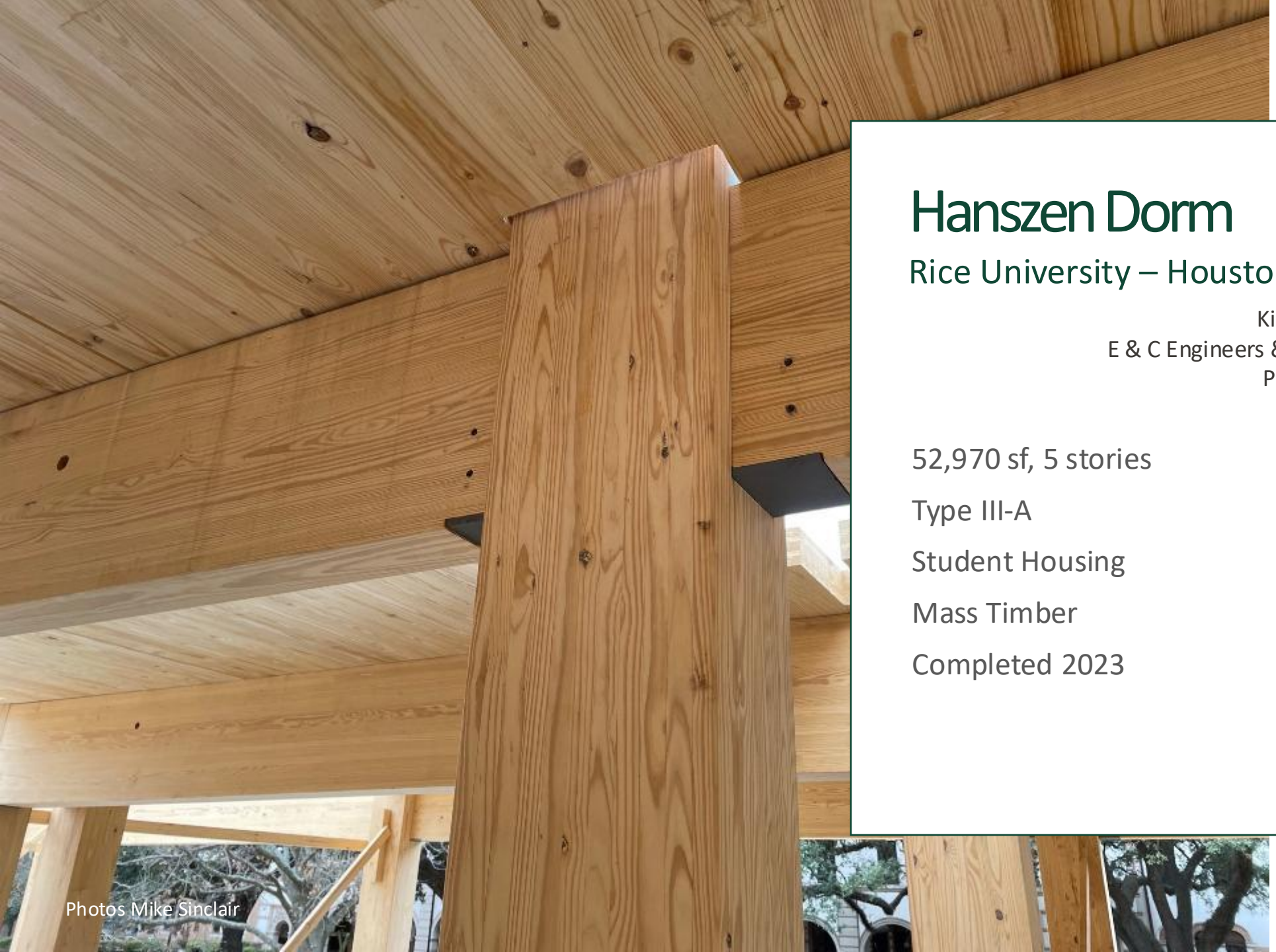
Building Facts	242,000 sf, 7 stories
	Type III-A
	Office
	Completed 2023
Developer	Crow Holdings Development
Architect	Duda|Paine Architects & Gensler
Engineer	Thornton Tomasetti



Hanszen Dorm

Rice University – Houston, TX

Kirksey Architecture
E & C Engineers & Consultants, Inc.
Photo: WoodWorks



Photos Mike Sinclair

Hanszen Dorm

Rice University – Houston, TX

Kirksey Architecture
E & C Engineers & Consultants, Inc.
Photo: WoodWorks

52,970 sf, 5 stories

Type III-A

Student Housing

Mass Timber

Completed 2023

WN PROFILE

Questions? Ask me anything.



Mark Bartlett, PE
Senior Regional Director

(214) 679-1874

mark.barlett@woodworks.org

Please take our survey!



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