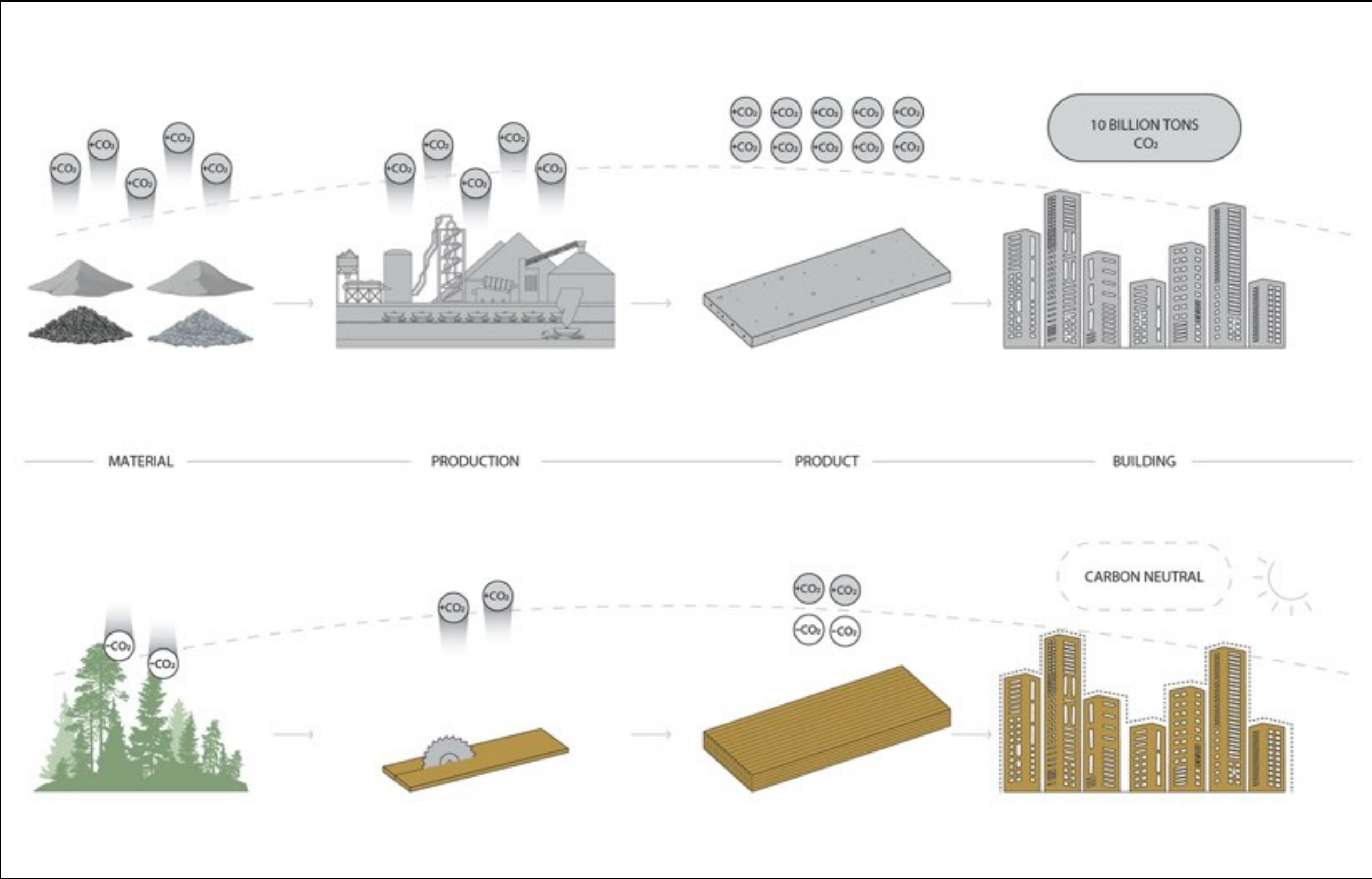


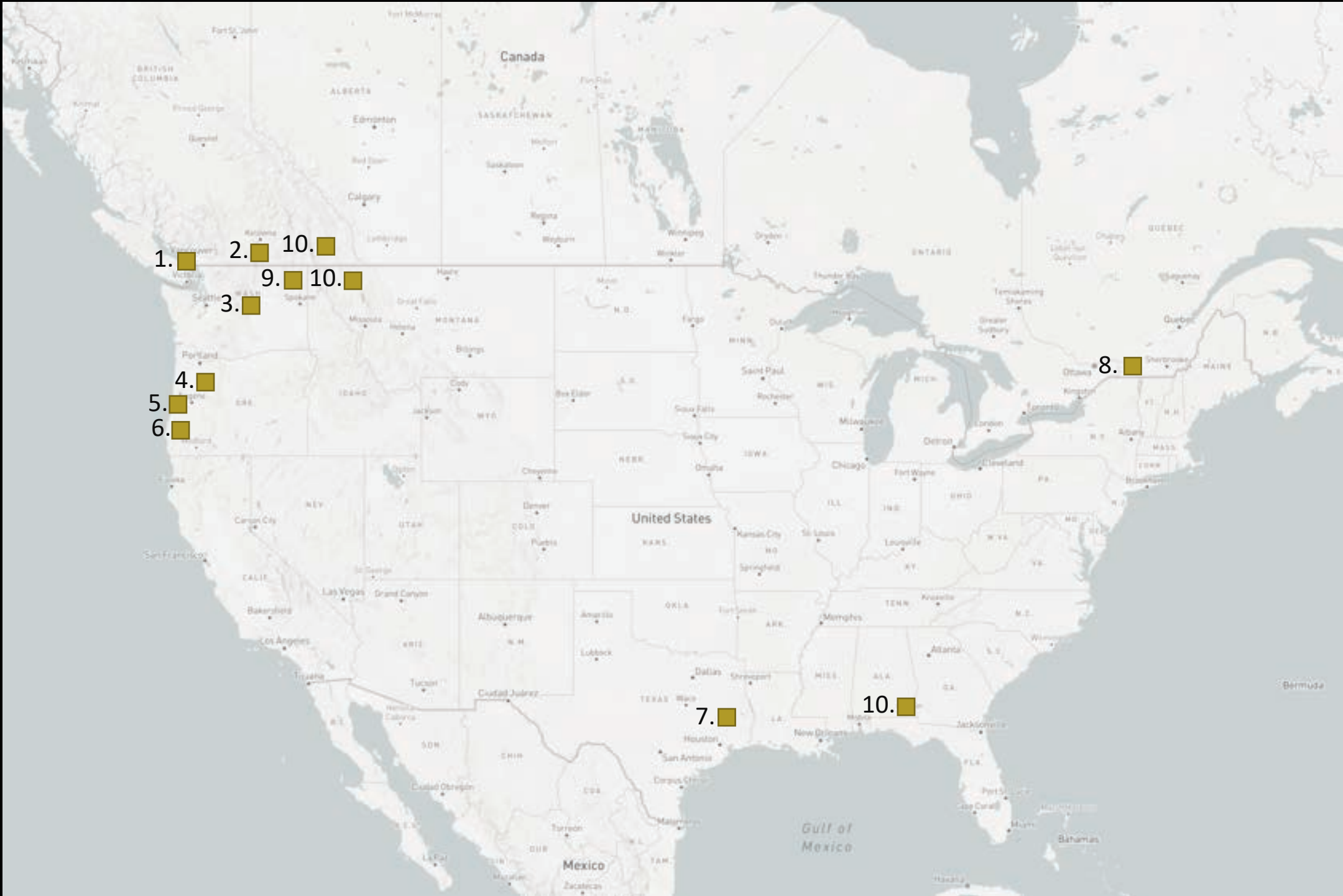
TMBR | PUSHING THE BOUNDARIES OF MASS TIMBER CONSTRUCTION

*Disclaimer: This presentation was developed by a third party and is not funded
by WoodWorks or the Softwood Lumber Board.*

TMBR | BACKGROUND

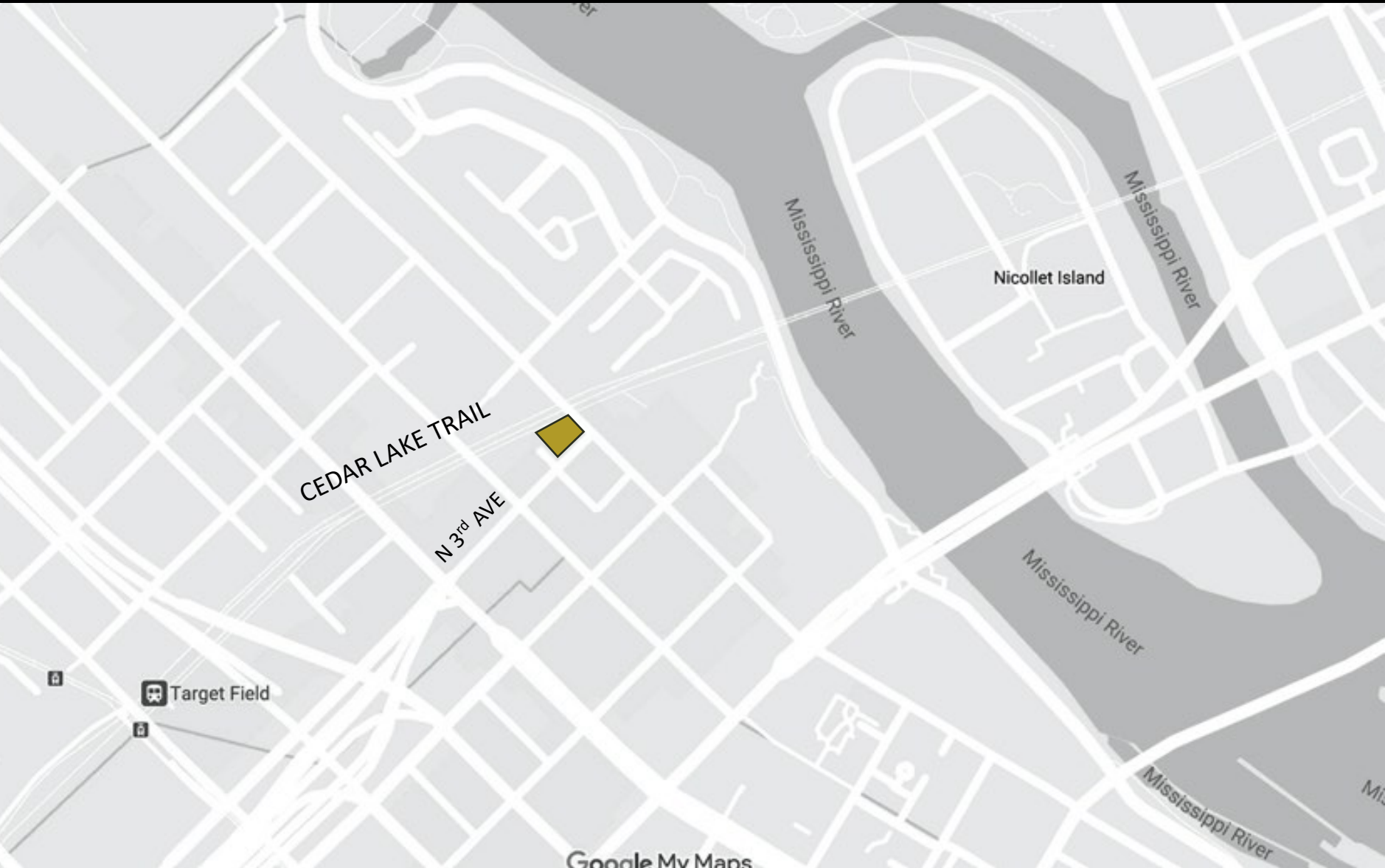


MASS TIMBER | MANUFACTURER LOCATIONS

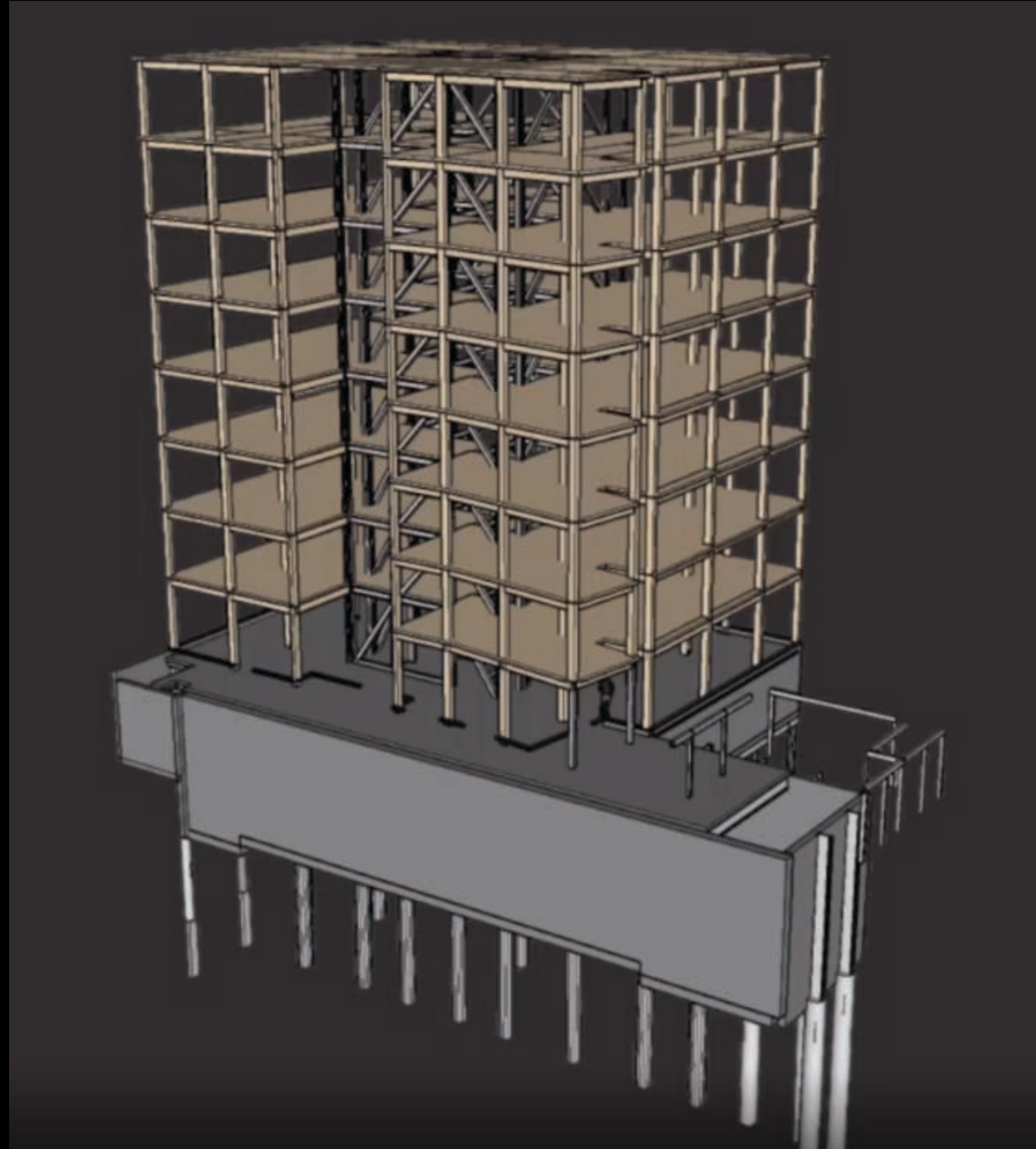


NORTH AMERICAN CLT/nlt/dlt MANUFACTURERS

- 1. STRUCTURE CRAFT, ABBOTSFORD, BC (nlt, dlt)
- 2. STRUCTURELAM, BC, CANADA
- 3. KATERRA, SPOKANE, WA
- 4. FRERES LUMBER CO, LYONS, OR
- 5. WESTERN STRUCTURES, VENETA, OR (glulam)
- 6. DR JOHNSON WOOD, RIDDLE, OR
- 7. TERRALAM CLT, LUFKIN, TX
- 8. NORDIC, MONTREAL, CANADA
- 9. Vaagan timbers, colville, wa
- 10. Smartlam, Galloway, b.c. | Columbia falls, mo | Dothan, al



CARBON 12 | PORTLAND, OR

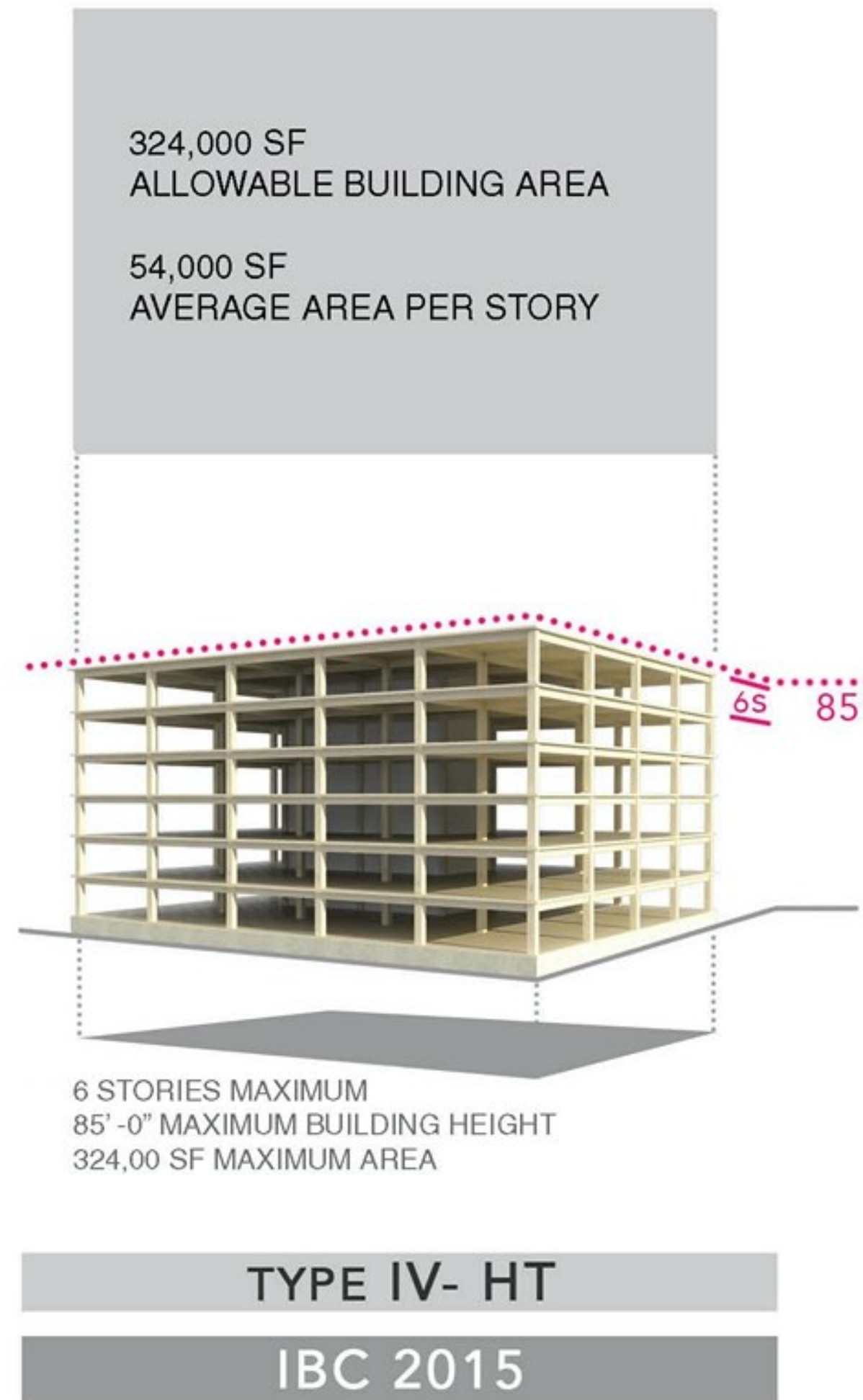


CARBON 12 | INTERIORS

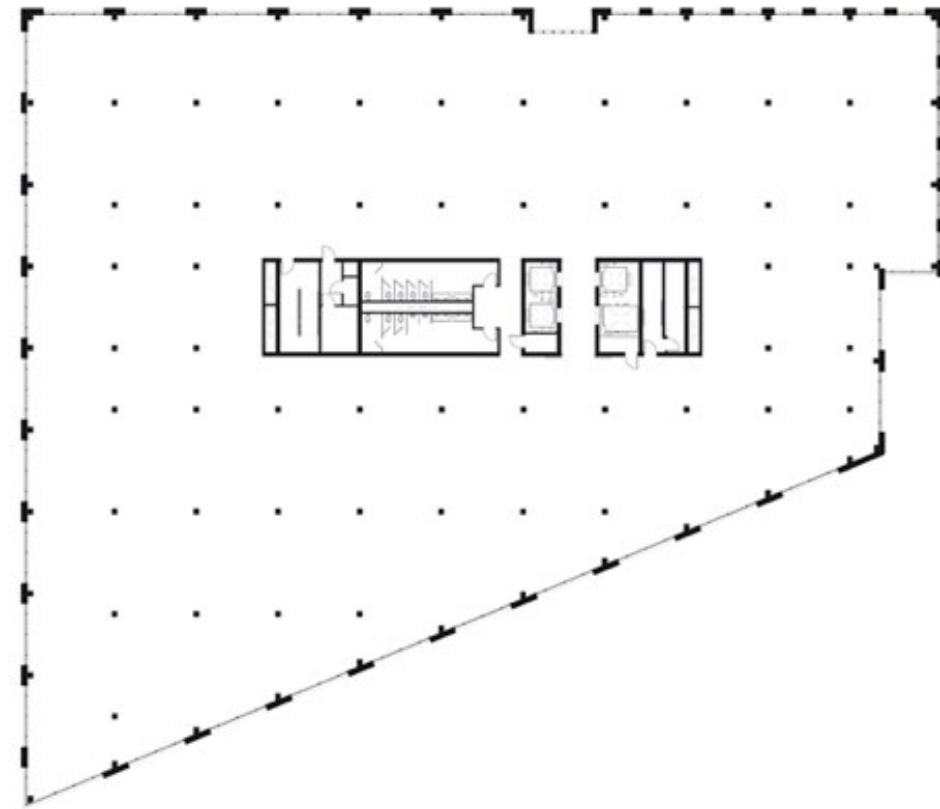




T-3 | CONSTRUCTION TYPE



T-3 | PLAN GRID + INTERIOR PICTURE



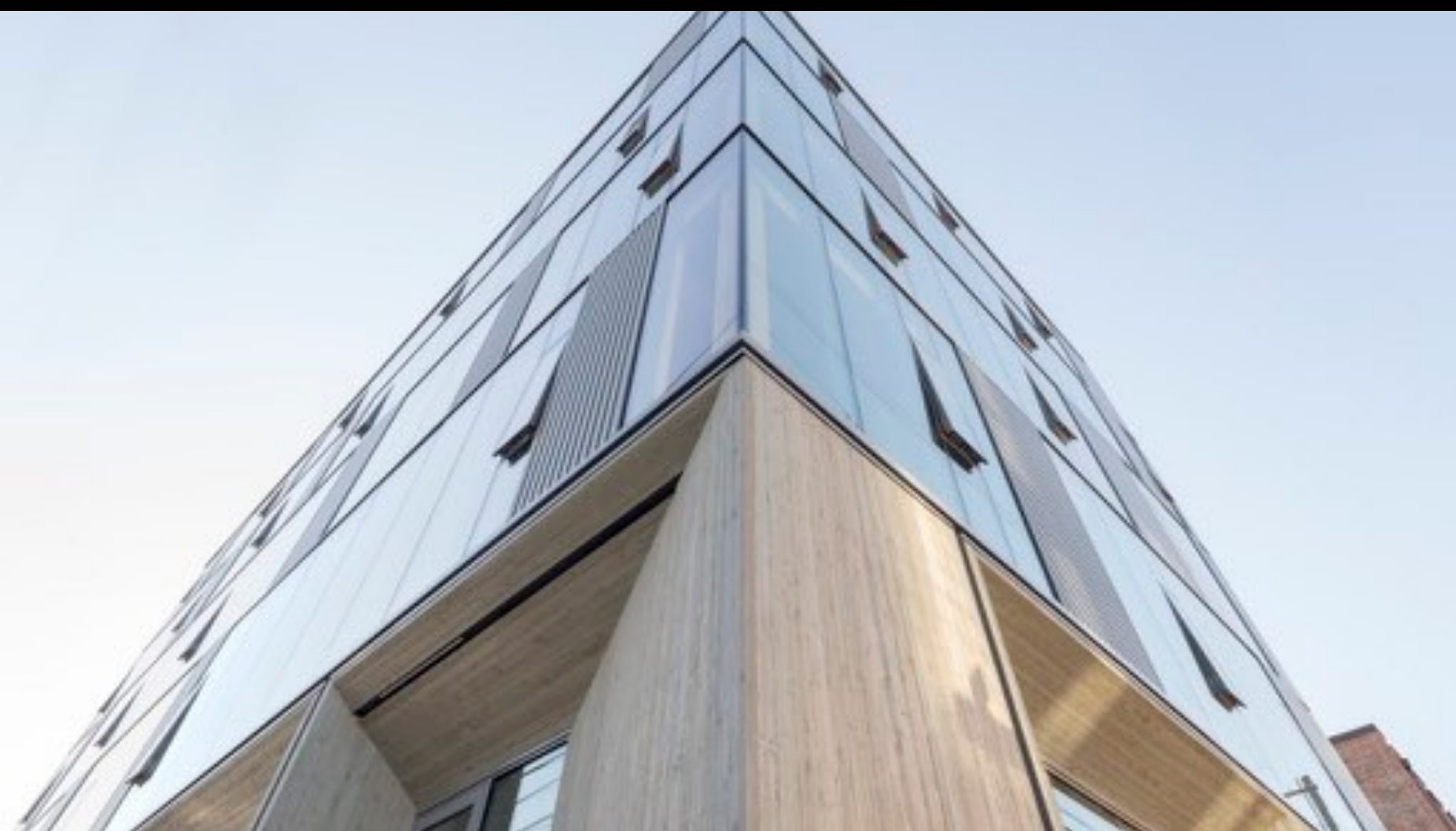
T3 | PLAN LEVELS 3-7



TMBR | TEAM



MASS TIMBER | PORTLAND PROJECTS



MASS TIMBER | ICC TYPE iv CLASSIFICATIONS 2021



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

TYPE IV-A



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

TYPE IV-B



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

TYPE IV-C



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

TYPE IV- HT

IBC 2015

IBC 2021

BUSINESS OCCUPANCY [GROUP B]

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

BROCK COMMONS | EXTERIOR / INTERIOR



ARBORA | CEILING TESTING



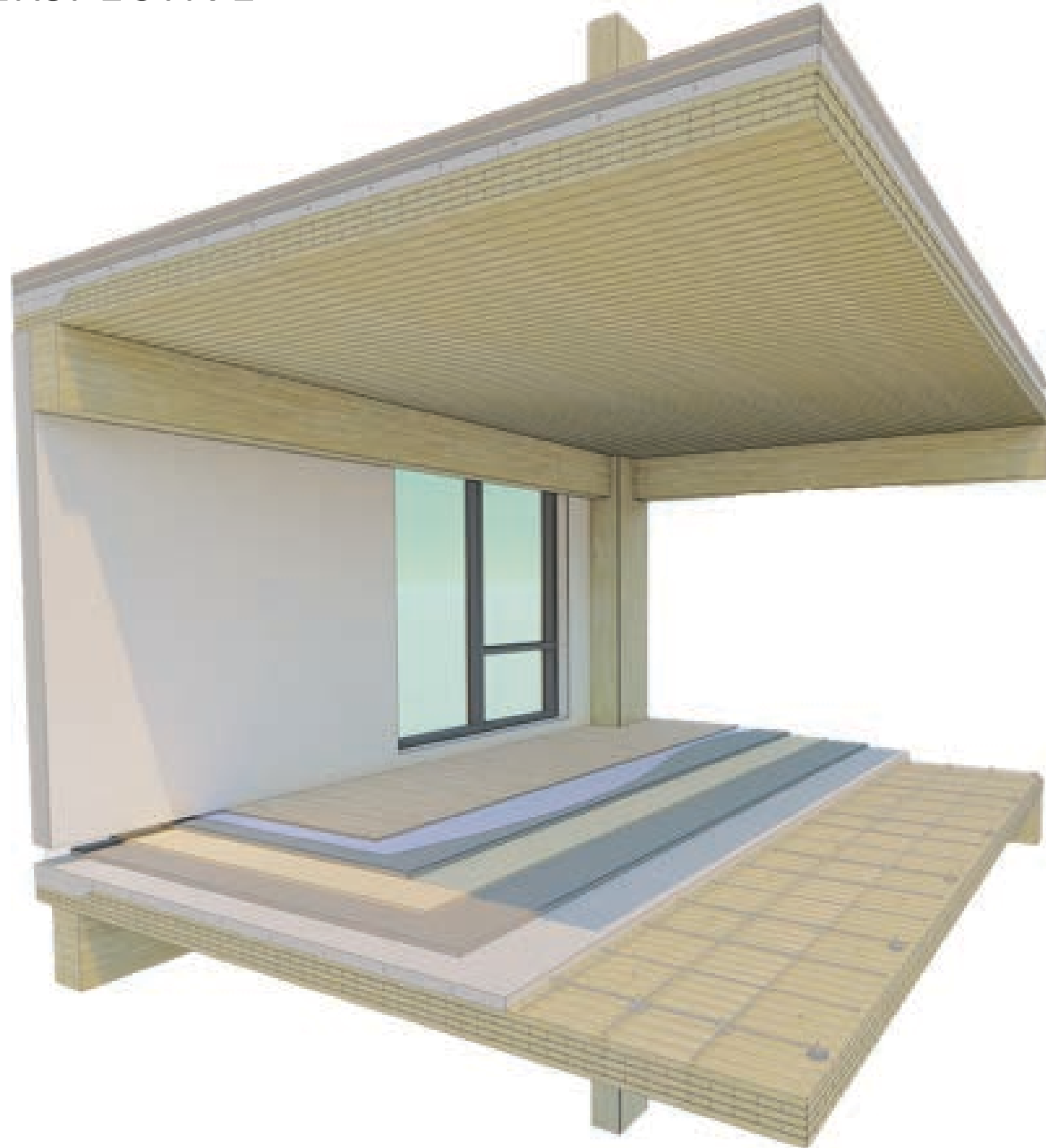
MGA | WOOD INNOVATION & DESIGN CENTER



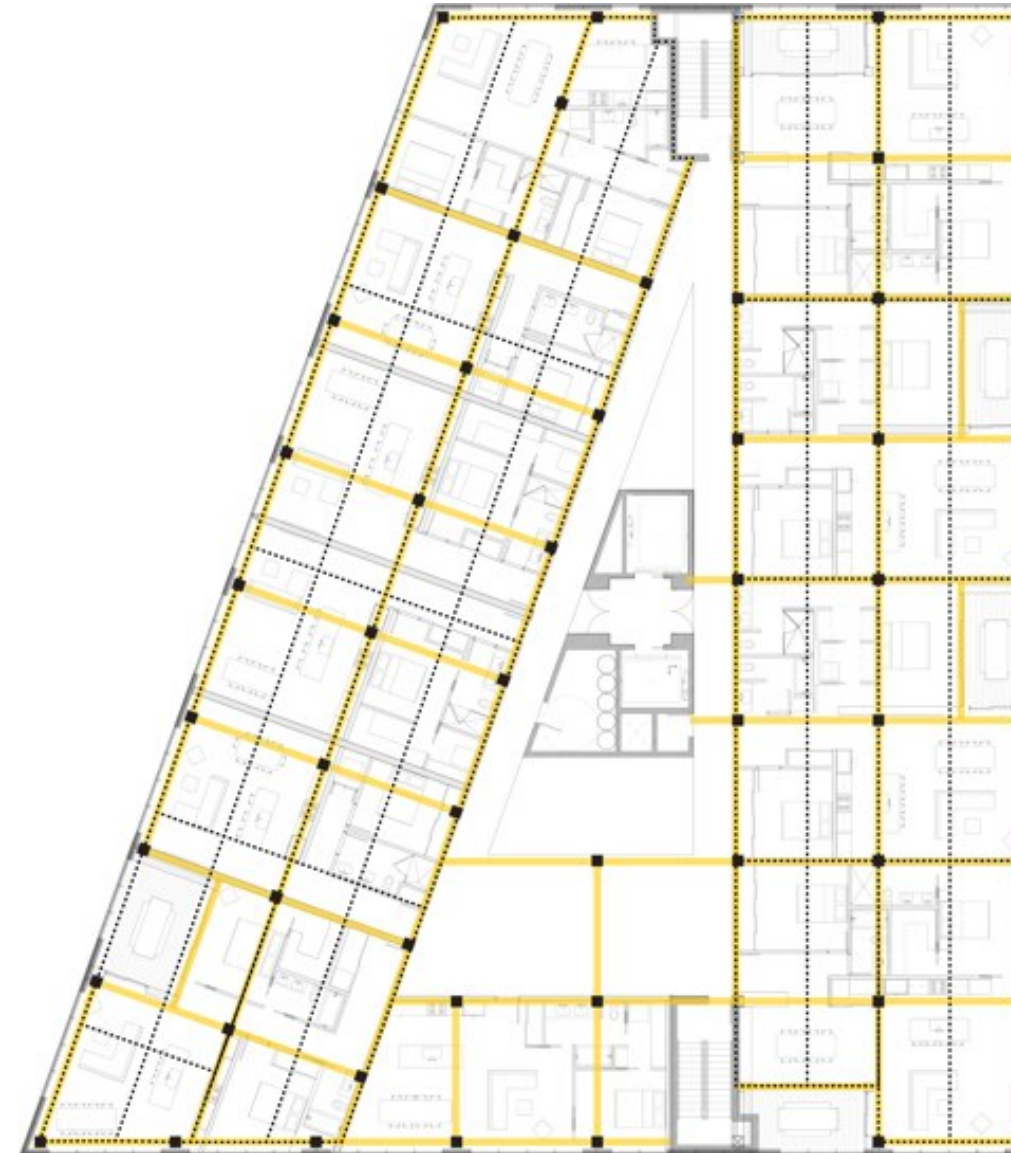
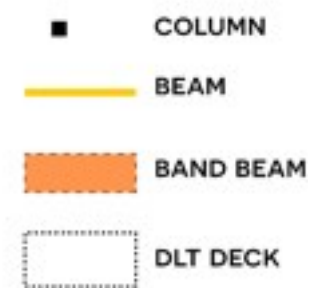
TMBR | T-3 SECTION PERSPECTIVE



TMBR | TMBR SECTION PERSPECTIVE



TMBR | STRUCTURAL GRID ROTATION



TMBR | FRONT RENDER



TMBR | BACK RENDER





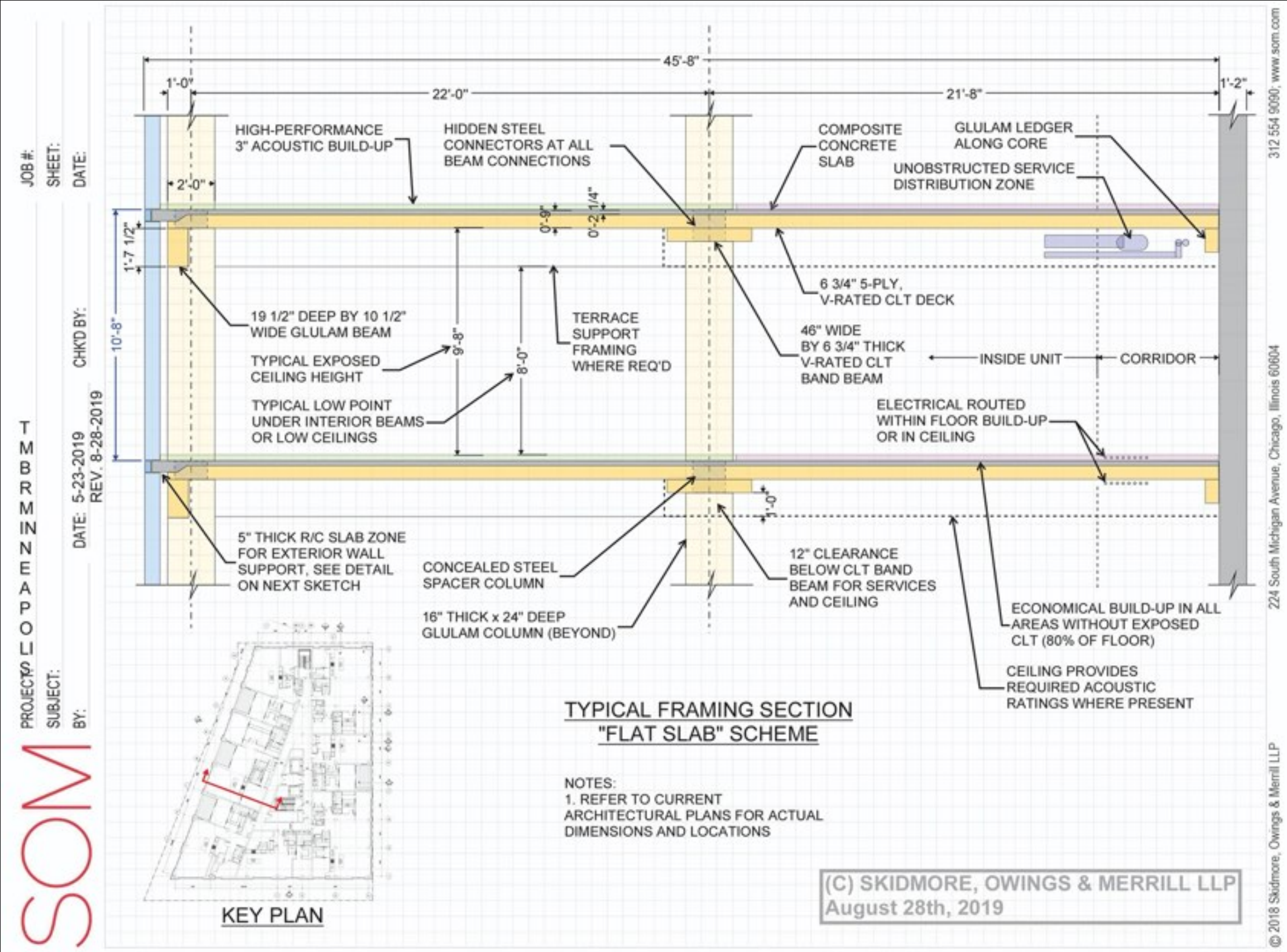
TMBR | INTERIOR RENDER



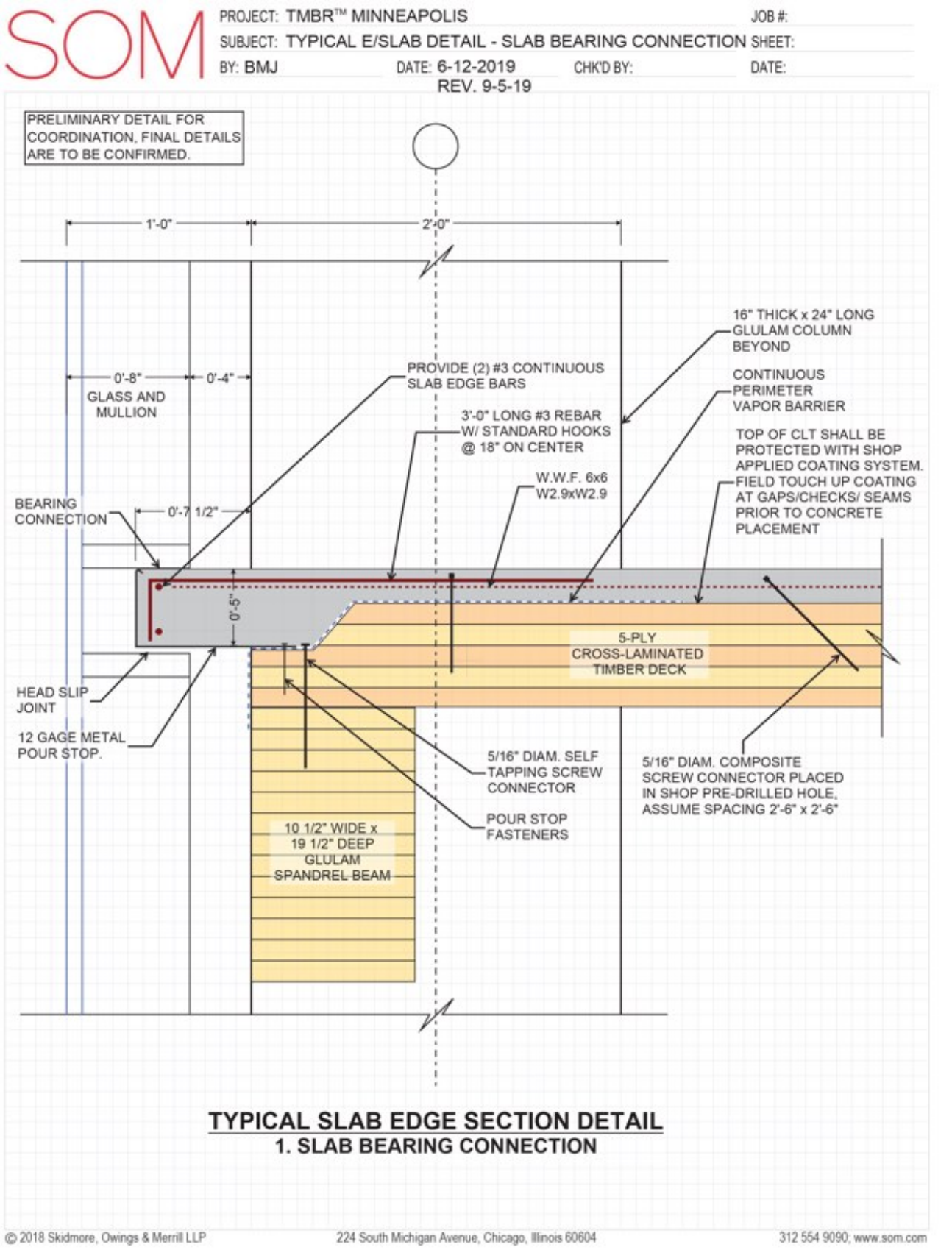
TMBR | ROOF DECK RENDER



TMBR | FLAT SLAB SECTION – SOM



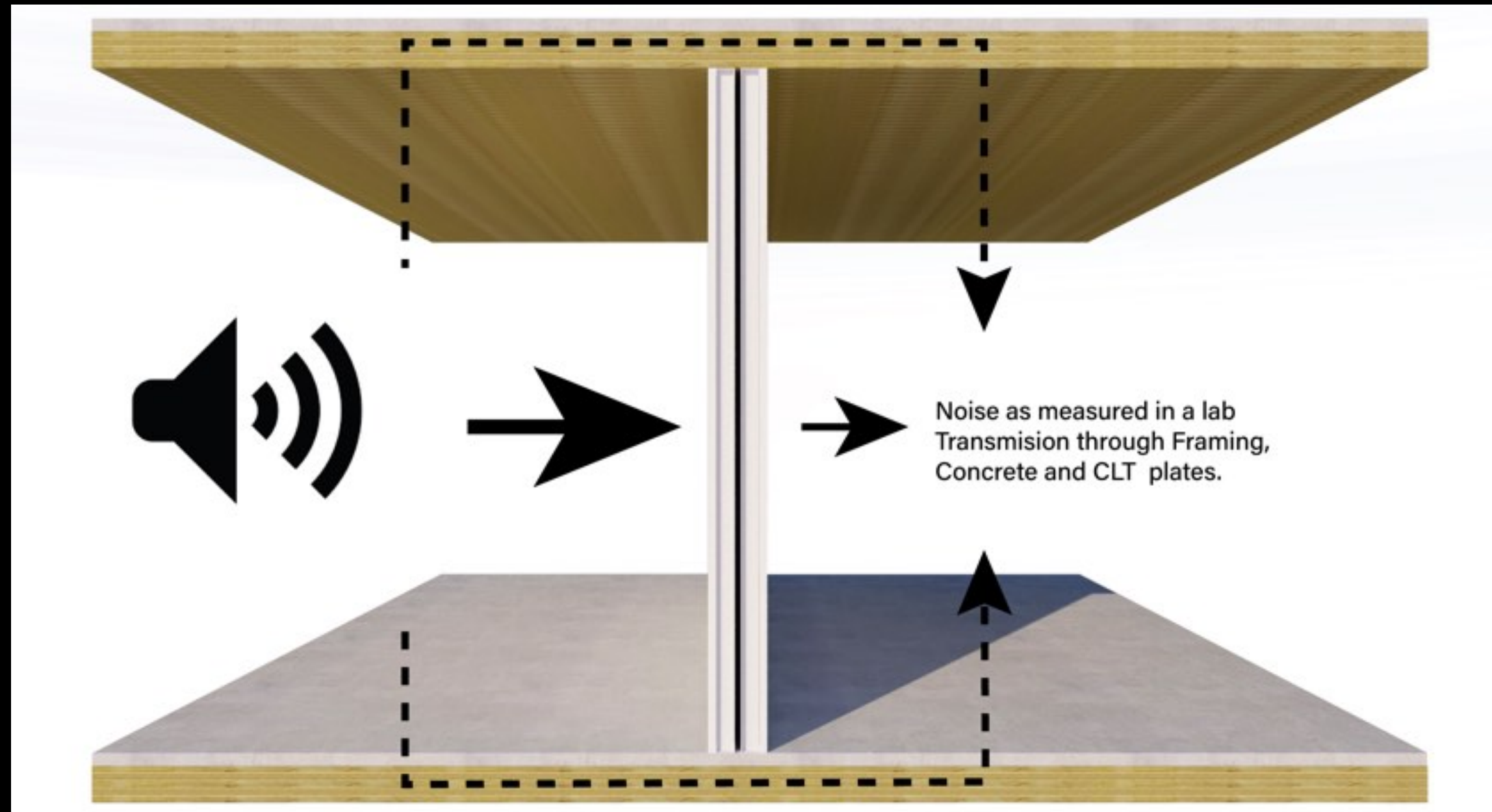
TMBR | SLAB EDGE DETAIL – SOM



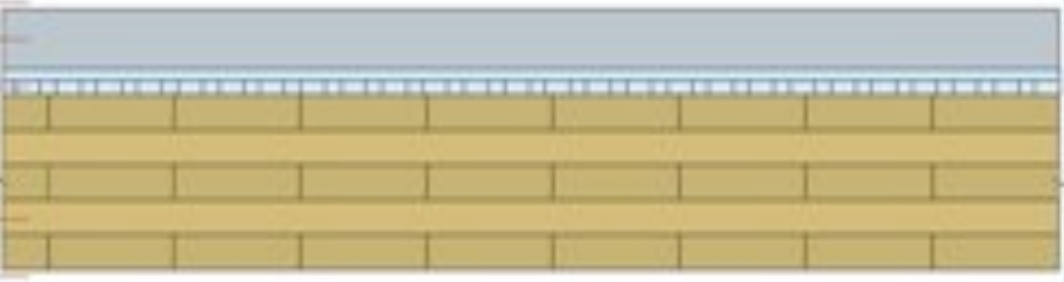
TMBR | FLOOR PANELIZATION PLAN



TMBR | ACOUSTIC FLANKING

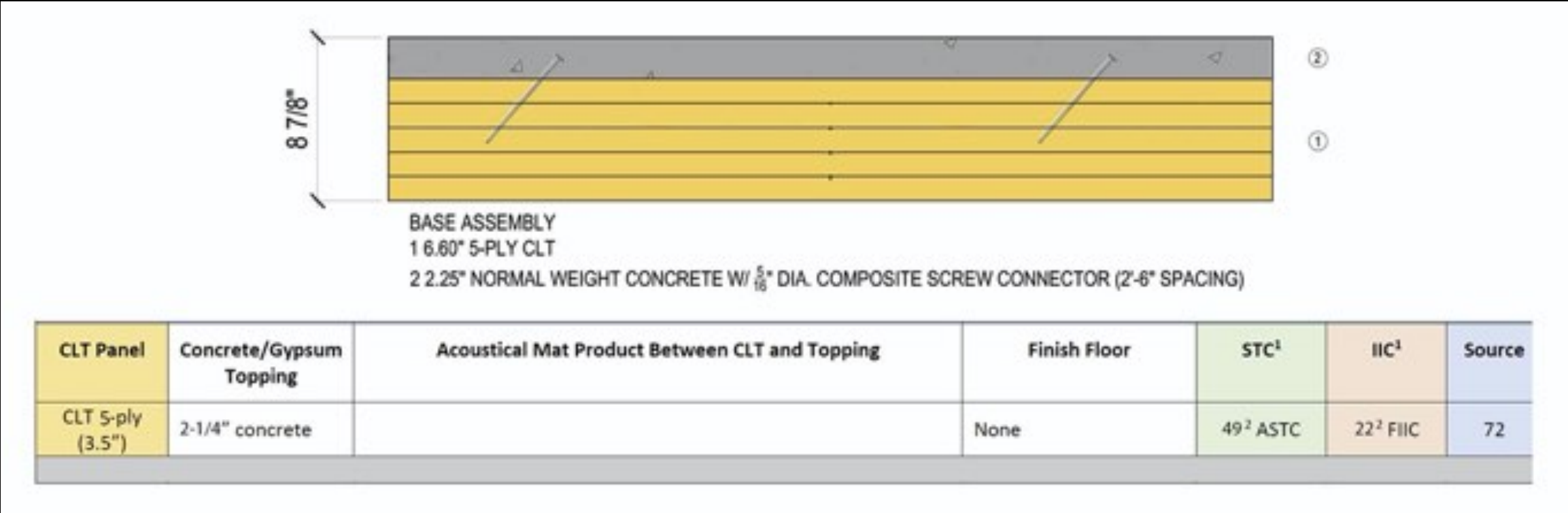


TMBR | CLT ACOUSTIC PROPERTIES

<div><div>Finish Floor if Applicable</div><div>Concrete/Gypsum Topping</div><div>Acoustical Mat Product</div><div>CLT Panel</div><div>No direct applied or hung ceiling</div></div> 						
CLT Panel	Concrete/Gypsum Topping	Acoustical Mat Product Between CLT and Topping	Finish Floor	STC ¹	IIC ¹	Source
CLT 3-ply (3.5")	3" concrete	Maxxon Acousti-Mat® 3/4	None	53 ² ASTC	45 ² FIIC	72
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® Brand 2500	USG SAM N25 Ultra	None	45 ⁵	39 ⁵	15
			LVT	48 ⁵	47 ⁵	16
			LVT Plus	48 ⁵	49 ⁵	58
			Eng Wood	47 ⁵	47 ⁵	59
			Carpet + Pad	45 ⁵	67 ⁵	60
			Ceramic Tile	50 ⁵	46 ⁵	61
		Soprema® Insonomat	None	45 ⁵	42 ⁵	15
			LVT	48 ⁵	44 ⁵	16
			LVT Plus	48 ⁵	47 ⁵	58
			Eng Wood	47 ⁵	45 ⁵	59
			Carpet + Pad	45 ⁵	71 ⁵	60
			Ceramic Tile	50 ⁵	46 ⁵	61
		USG SAM N75 Ultra	None	45 ⁵	38 ⁵	15
			LVT	48 ⁵	47 ⁵	16
			LVT Plus	48 ⁵	49 ⁵	58

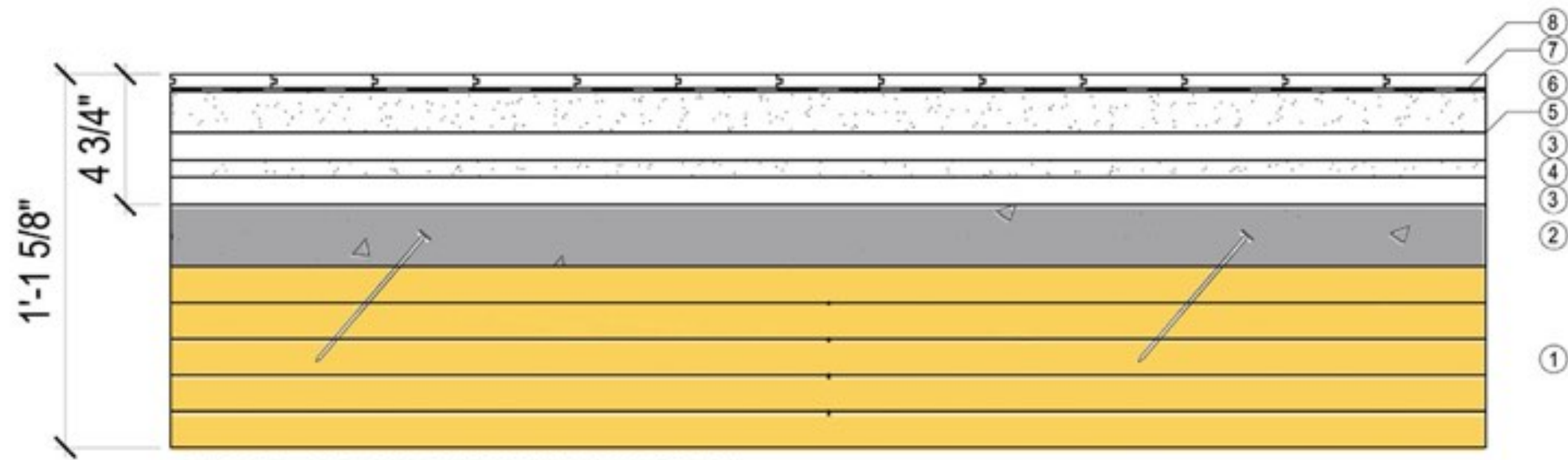
Source: WoodWorks

TMBR | COMPOSITE SLAB ACOUSTIC PROPERTIES



Source: WoodWorks

TMBR | CLT ACOUSTIC PROPERTIES

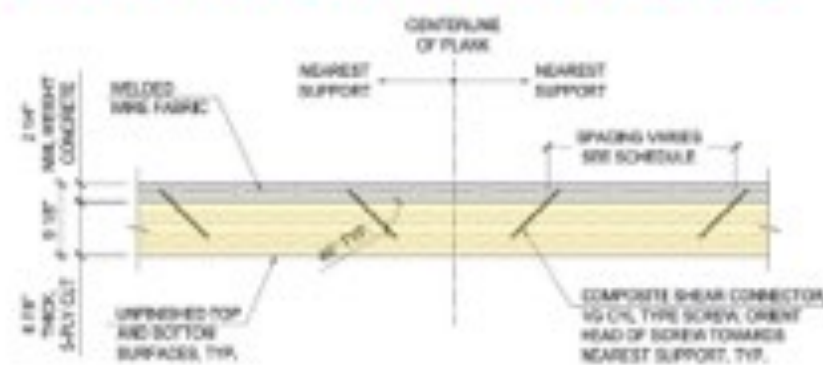


TEST E: CARBON 12 MODIFIED ASSEMBLY

- 1 6.60" 5-PLY CLT
- 2 2.25" NORMAL WEIGHT CONCRETE W/ $\frac{5}{16}$ " DIA. COMPOSITE SCREW CONNECTOR (2'-6" SPACING)
- 3 1" FIBERGLASS INSULATION BOARD
- 4 $\frac{5}{8}$ " DENSDECK ROOF BOARD
- 5 (2) 6 MIL POLYETHYLENE FILM LAYERS
- 6 1.5" GYPCRETE
- 7 $\frac{3}{16}$ " QTSCU 4005 SOUND INSULATION MAT
- 8 $\frac{1}{2}$ " ENGINEERED WOOD FLOOR

Rationale for Increased Exposed Mass Timber Surfaces

Enhanced Fire Protection Features



1 TYPICAL COMPOSITE FLOOR DETAIL



Timber-Concrete Deck System

Notes:

1. All steel connectors are concealed
2. Concrete topping creates continuous non-combustible barrier between levels
3. Fire-stopping at concrete slabs



Exterior Wall Section

Exit Stair Systems
 -Non-combustible materials or encapsulated shaft surfaces
 -Non-combustible attachments

Exposed CLT Deck
 -Encapsulation: None
 -Tested Rating: 2hrs
 -Calculated Rating: 2 to 2.5hrs

Encapsulated Areas / Corridors
 -Encapsulation: 80 mins
 -Tested Rating: 2hrs
 -Calculated Rating: 3 to 3.5hrs

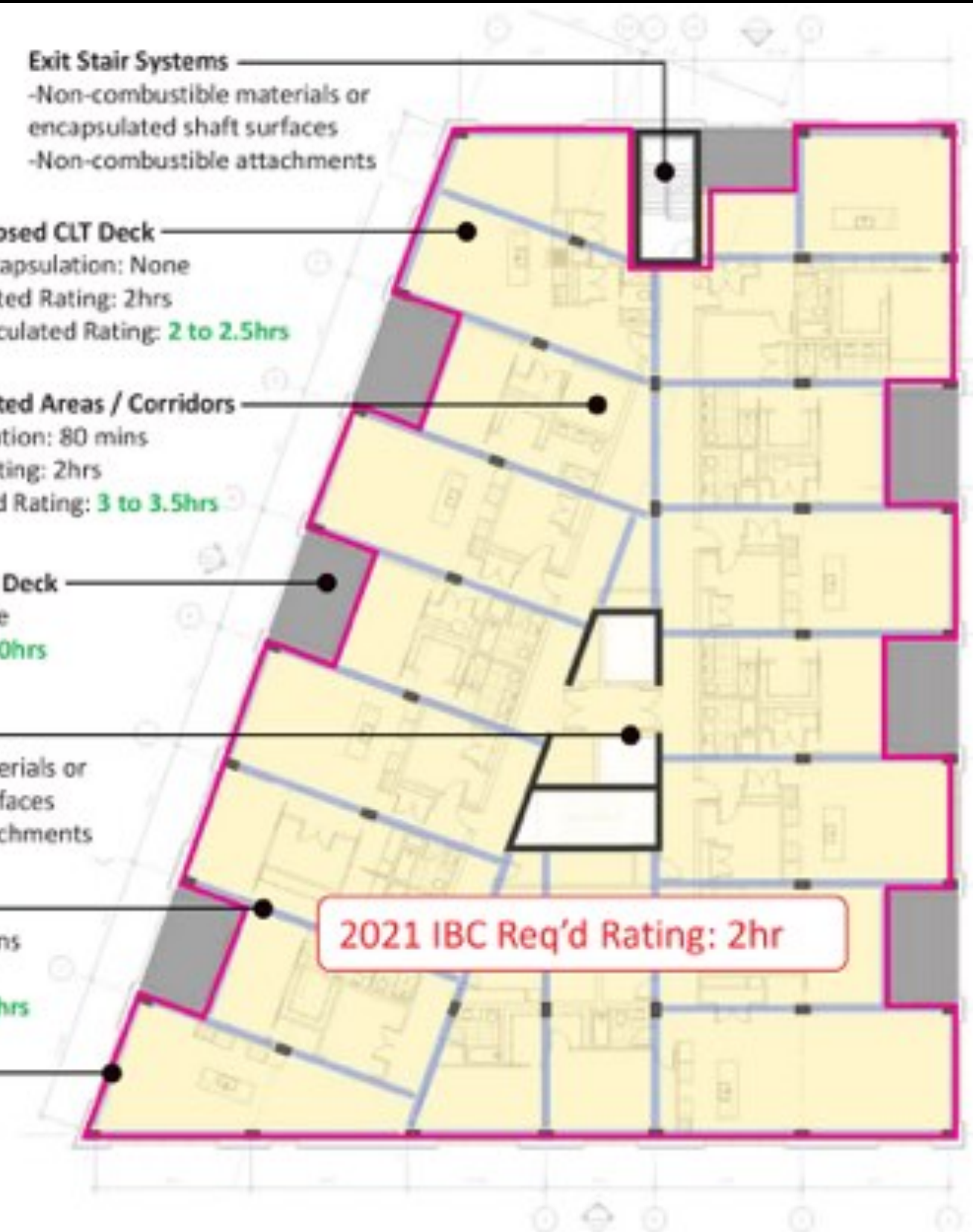
Concrete Terrace Deck
 -Non-Combustible
 -Tested Rating: 3.0hrs

Elevator Shafts
 -Non-combustible materials or encapsulated shaft surfaces
 -Non-combustible attachments

Glulam Framing
 -Encapsulation: None / 80 mins
 -Tested Rating: 2hrs
 -Calculated Rating: 2.5 to 3.5hrs

Exterior Wall System
 -Non-combustible materials
 -Support and attachments of system are non-combustible

2021 IBC Req'd Rating: 2hr



TMBR | CHARRING



Design & Tools - WoodWorks

woodworks.org/design-and-tools/

Apps YouTube Maps TMBR

Design & Tools

This section highlights building code and structural system opportunities related to the design of non-residential and multi-family wood buildings, and provides links to additional resources. For assistance with a project, email help@woodworks.org or contact the Regional Director nearest you.

BUILDING TYPES

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

BUILDING SYSTEMS


- Wood-Frame
- Mass Timber/Composite Systems
- Panelized Roofs
- Timber-Frame

DESIGN TOPICS

- Structural Design
- Fire and Life Safety




DESIGN TOOLS

- Design Guides & Standards
- Design Software
- CAD & REVIT Details
- Online Calculators
- Span Tables
- Inventory of Fire Resistance-Tested Mass Timber Assemblies
- Inventory of Mass Timber Acoustic Assemblies



University of Washington – W.G. Clark Construction, Ankrom Moisan Architects.

FUNDING PARTNERS



CARBON ECONOMY | CYCLE



D/O

Architects

1621 HENNEPIN AVE | STE. 100

MINNEAPOLIS MINN | 55403

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