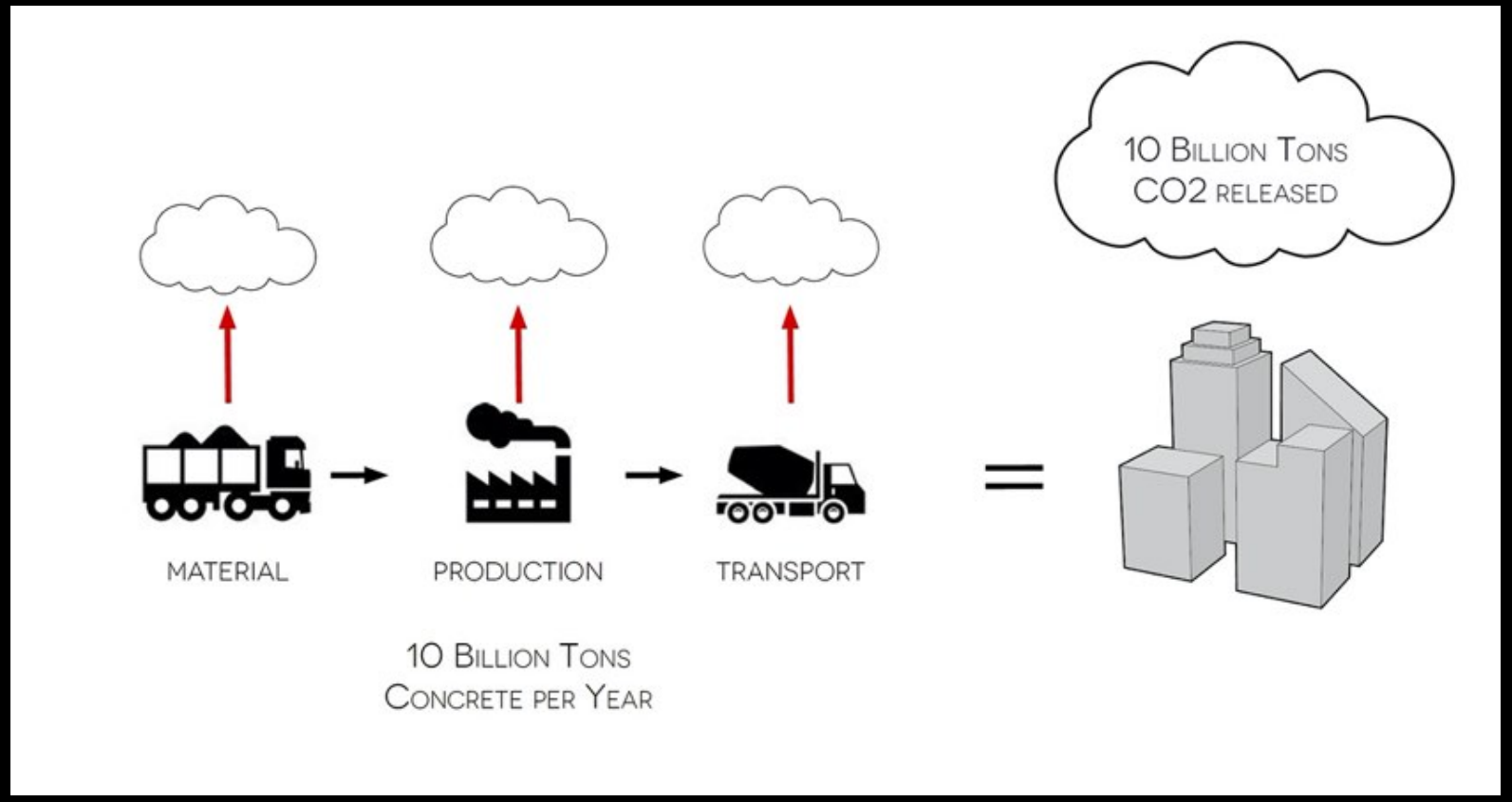
TMBR | PUSHING THE BOUNDARIES OF MASS TIMBER CONSTRUCTION

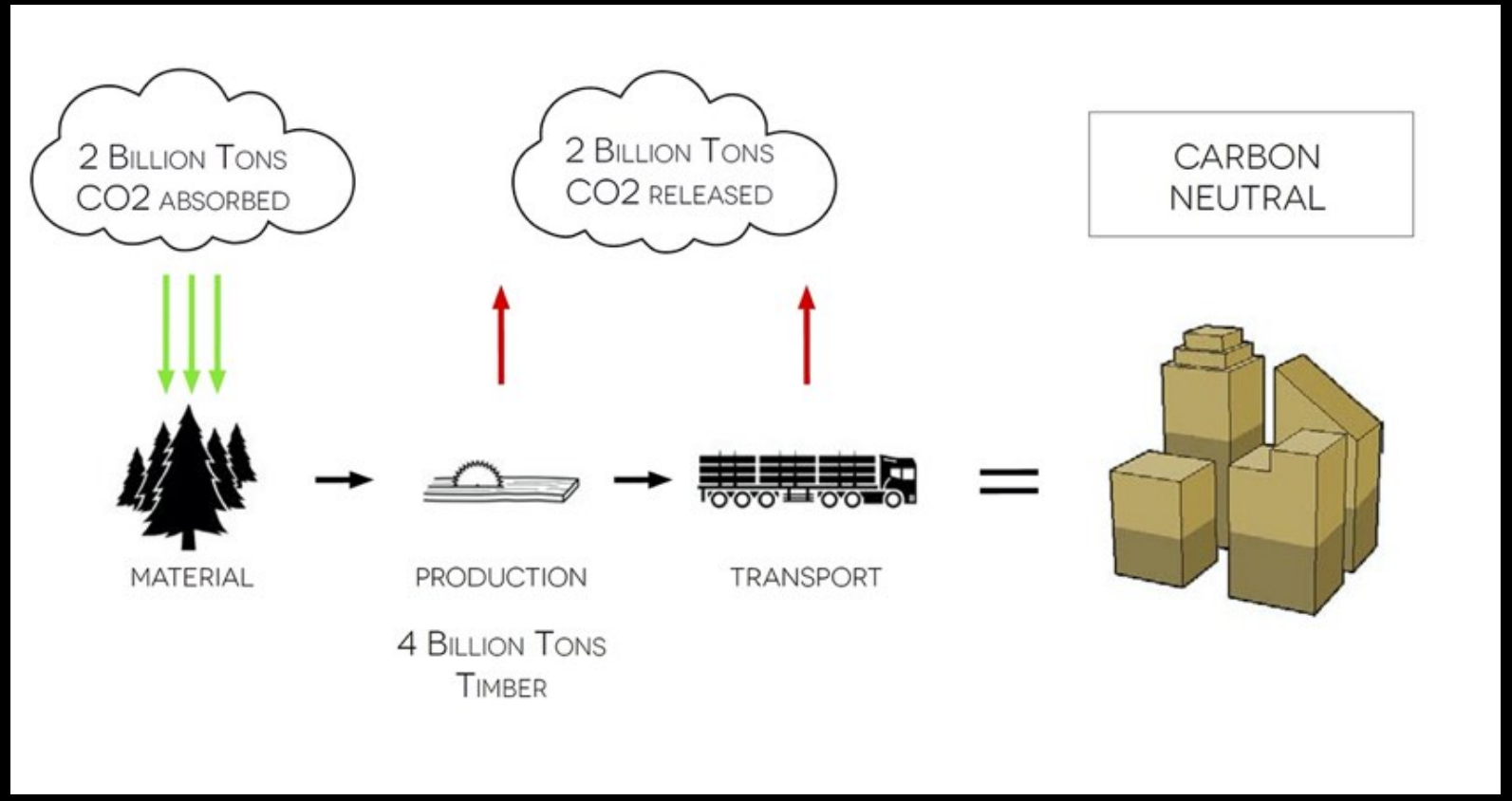
Disclaimer: This presentation was developed by a third party and is not funded by WoodWorks or the Softwood Lumber Board.

D/O Architects

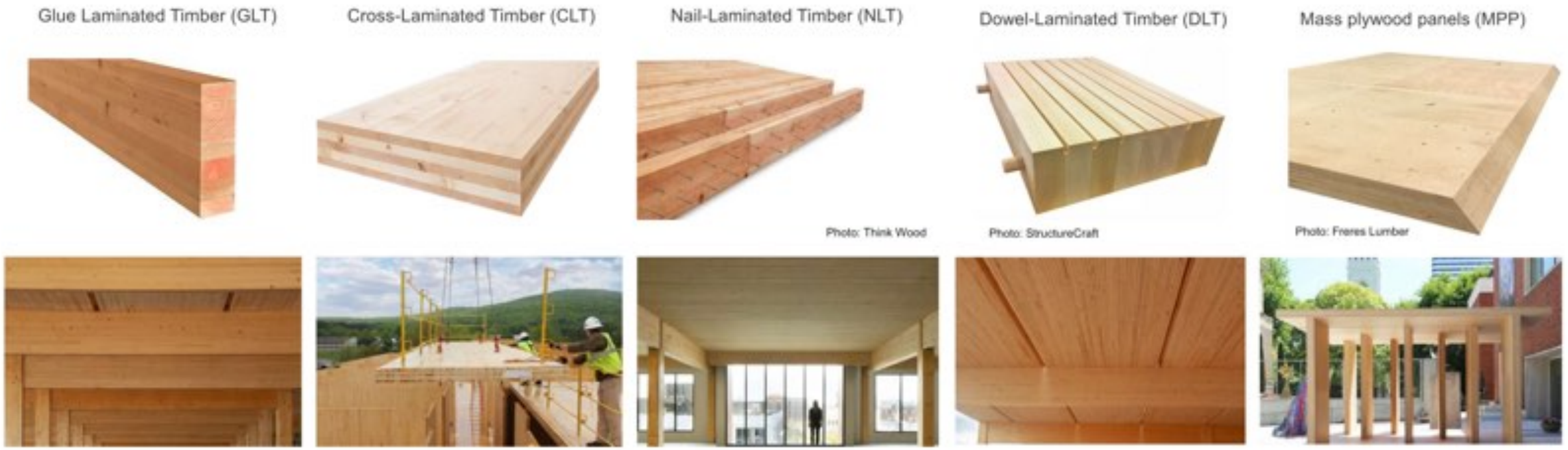
TMBR | BACKGROUND



TMBR | BACKGROUND



TMBR | MASS TIMBER TECHNOLOGIES



Source: WoodWorks

TMBR | CLT PANEL

Source: WoodWorks

TMBR | CLT STRUCTURAL – FLAT, P&B, HONEY

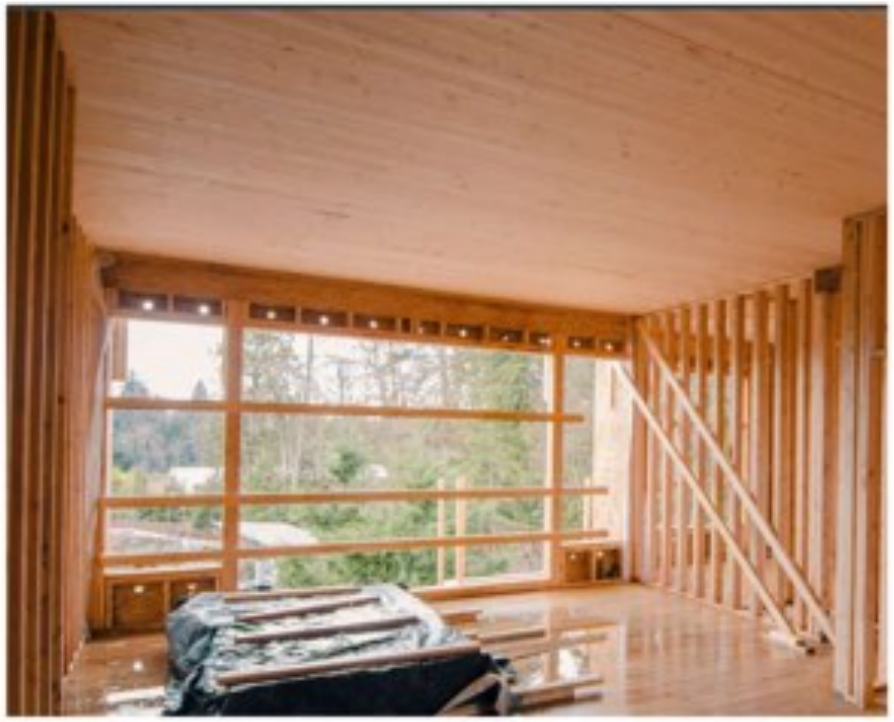
STRUCTURAL SOLUTIONS | POST + PLATE

STRUCTURAL SOLUTIONS | POST, BEAM + PLATE

STRUCTURAL SOLUTIONS | HONEYCOMB

Source: WoodWorks

TMBR | CLT STRUCTURAL – LIGHT FRAME + STEEL

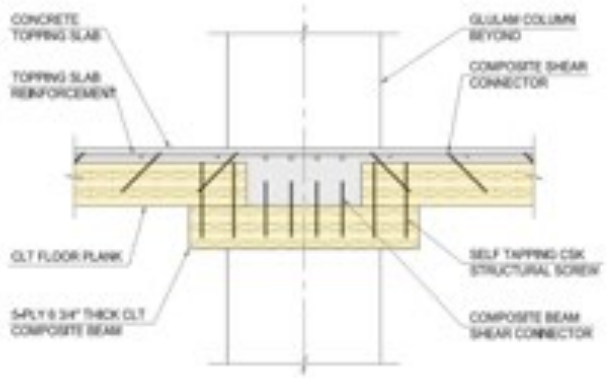


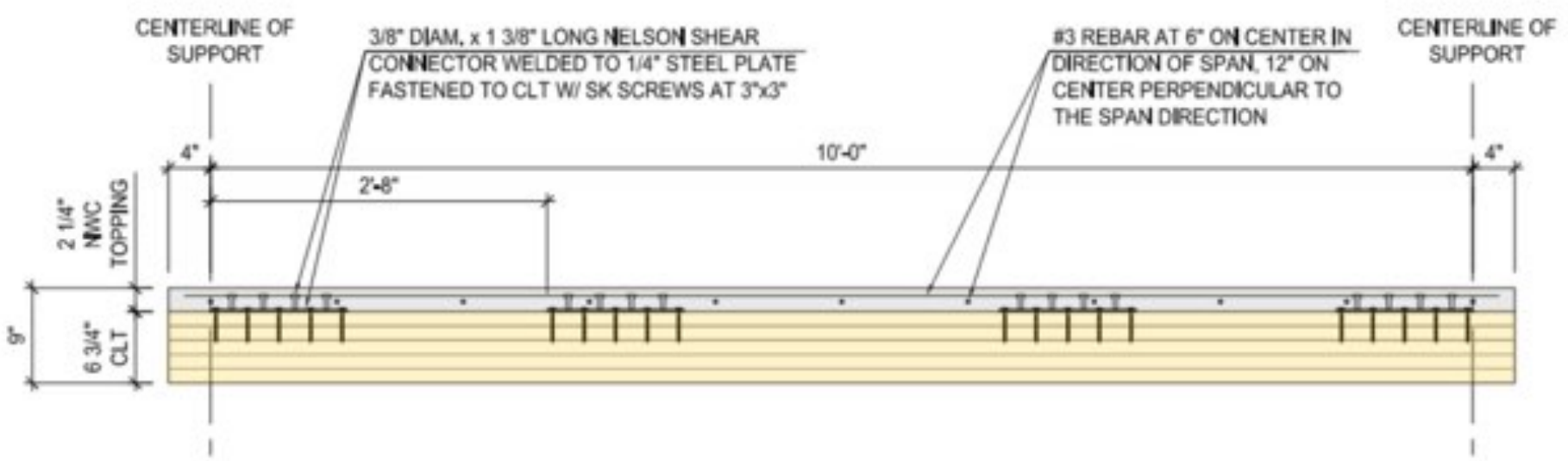
STRUCTURAL SOLUTIONS | HYBRID LIGHT-FRAME + MASS TIMBER

STRUCTURAL SOLUTIONS | HYBRID STEEL + MASS TIMBER

Source: WoodWorks

TMBR | CLT COMPOSITE SECTION

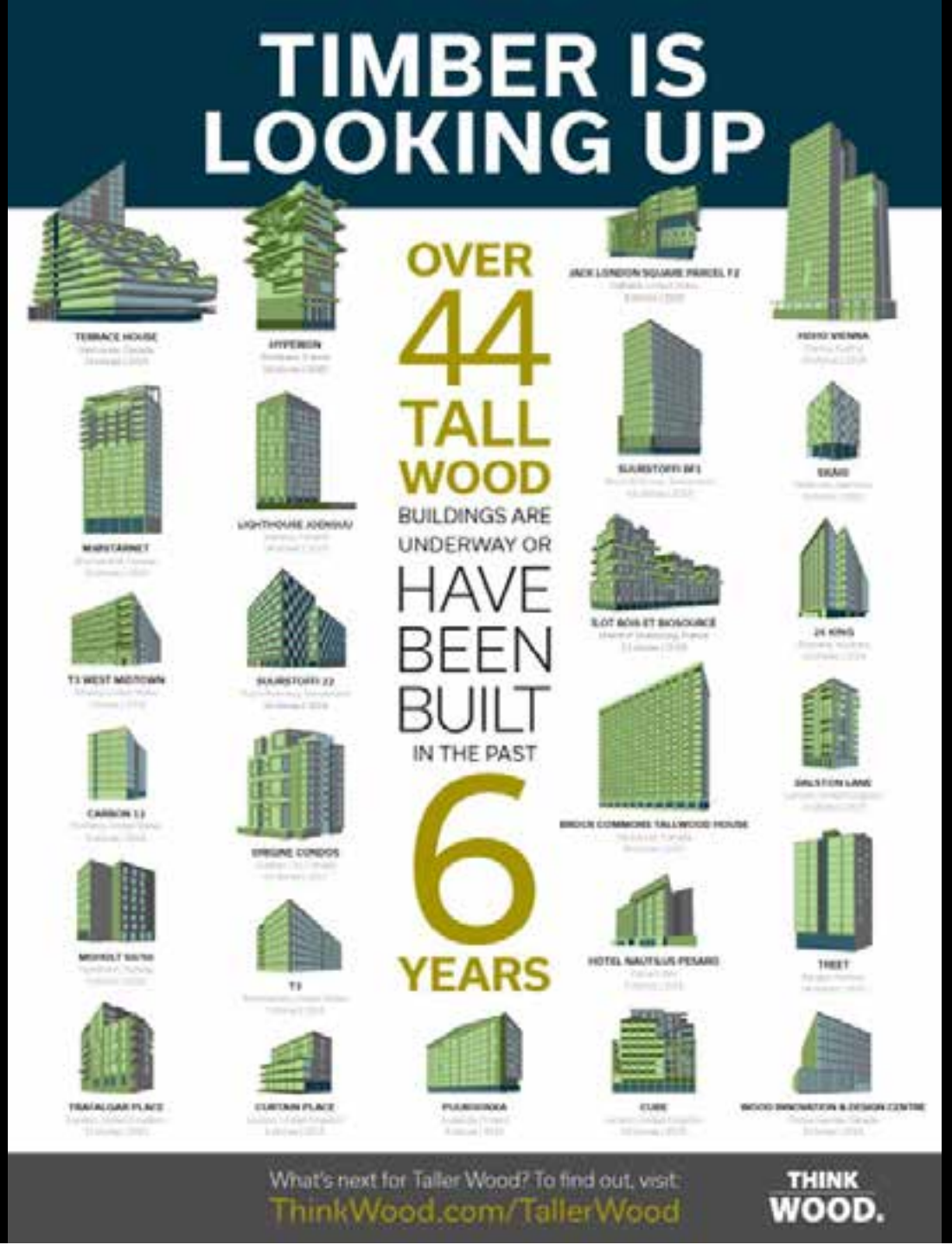




TMBR | SITE


Nicollet Island
CEDAR LAKE TRAIL
N 3rd AVE
Target Field
Google My Maps

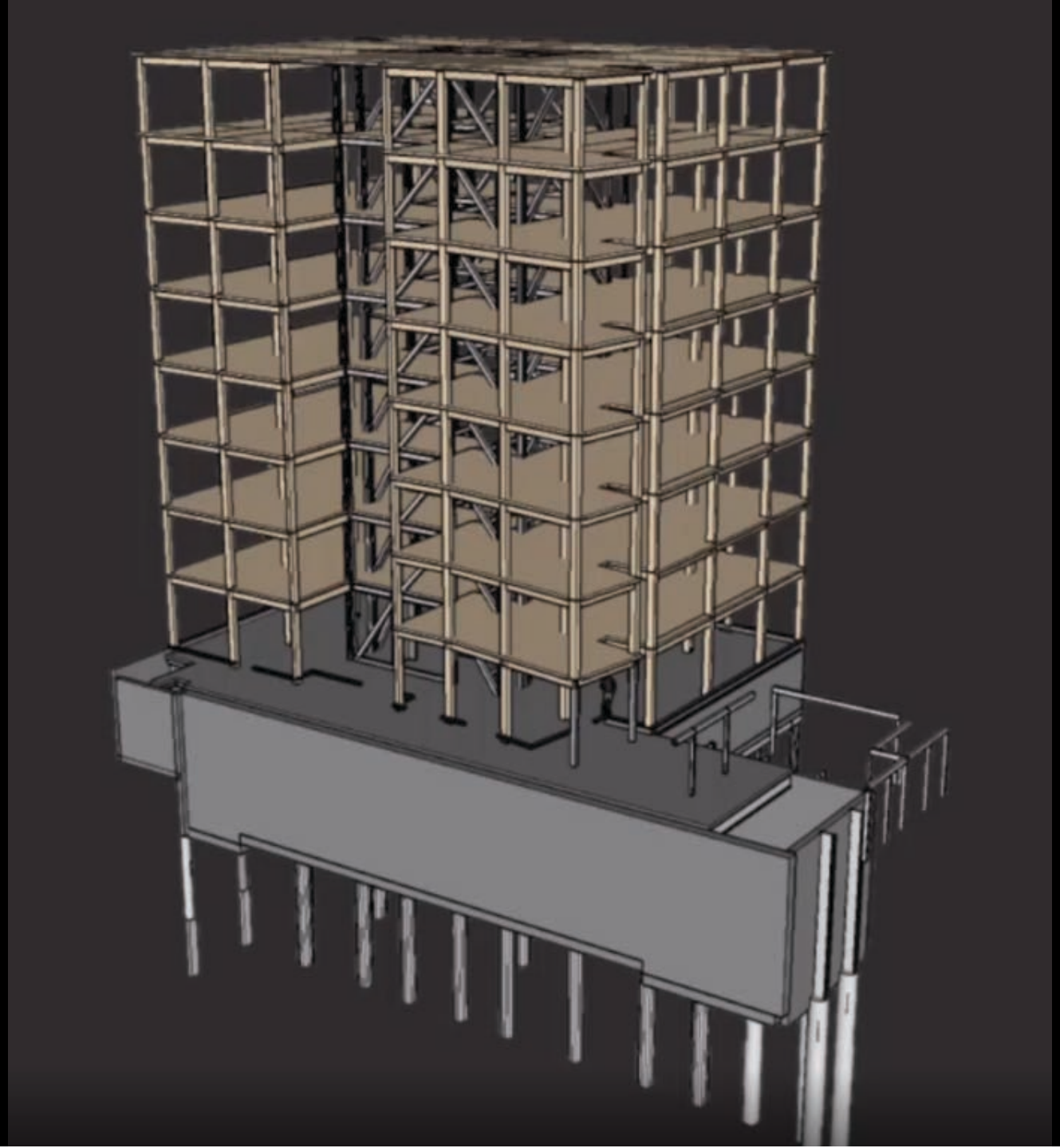
MASS TIMBER | PROJECTS



CARBON 12 | PORTLAND, OR

CARBON 12 | CONSTRUCTION

CARBON 12 | STRUCTURE

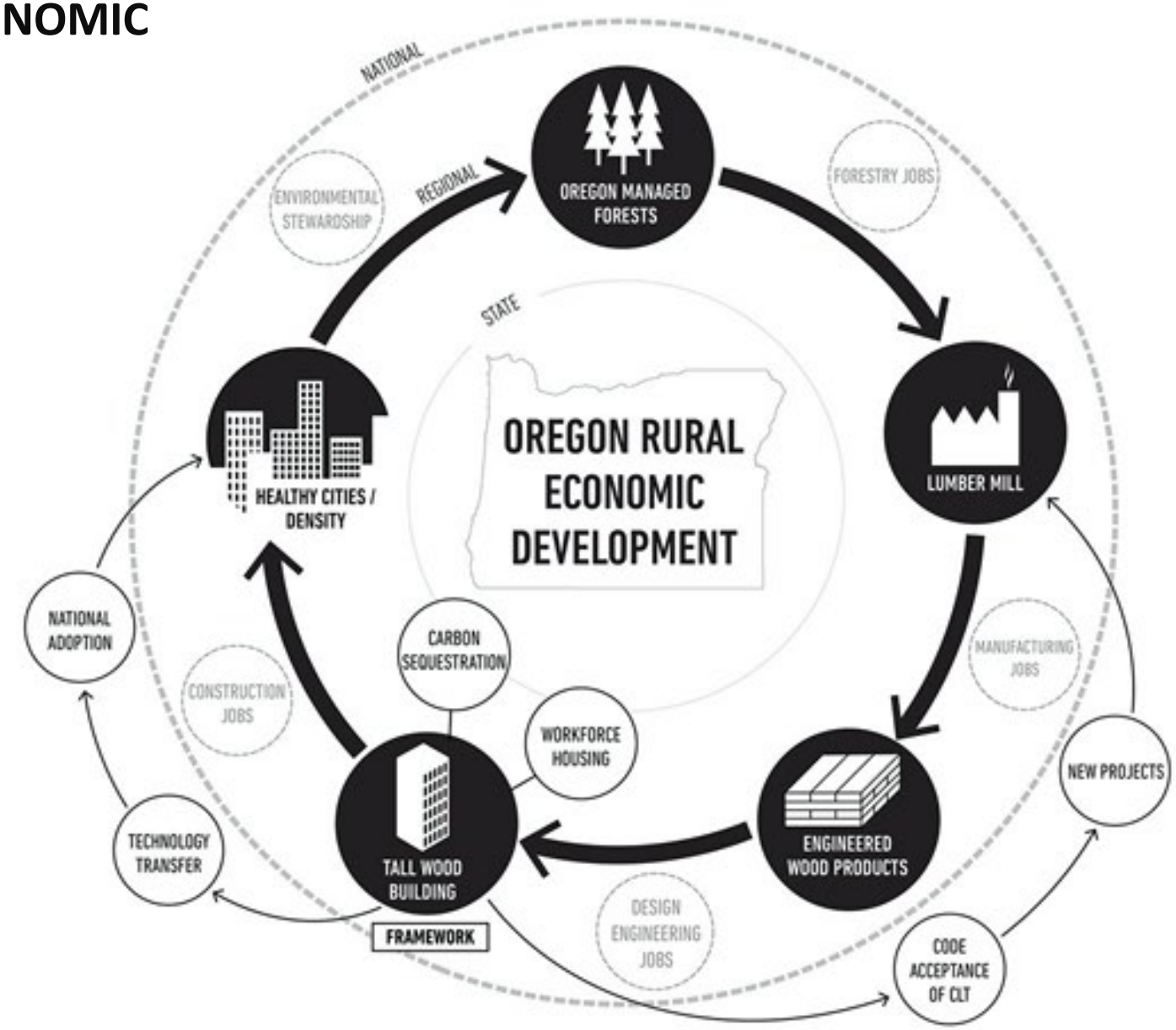


CARBON 12 | INTERIORS

CARBON 12 | PLANS

Source: Kaiser+Path

CARBON 12 | ECONOMIC



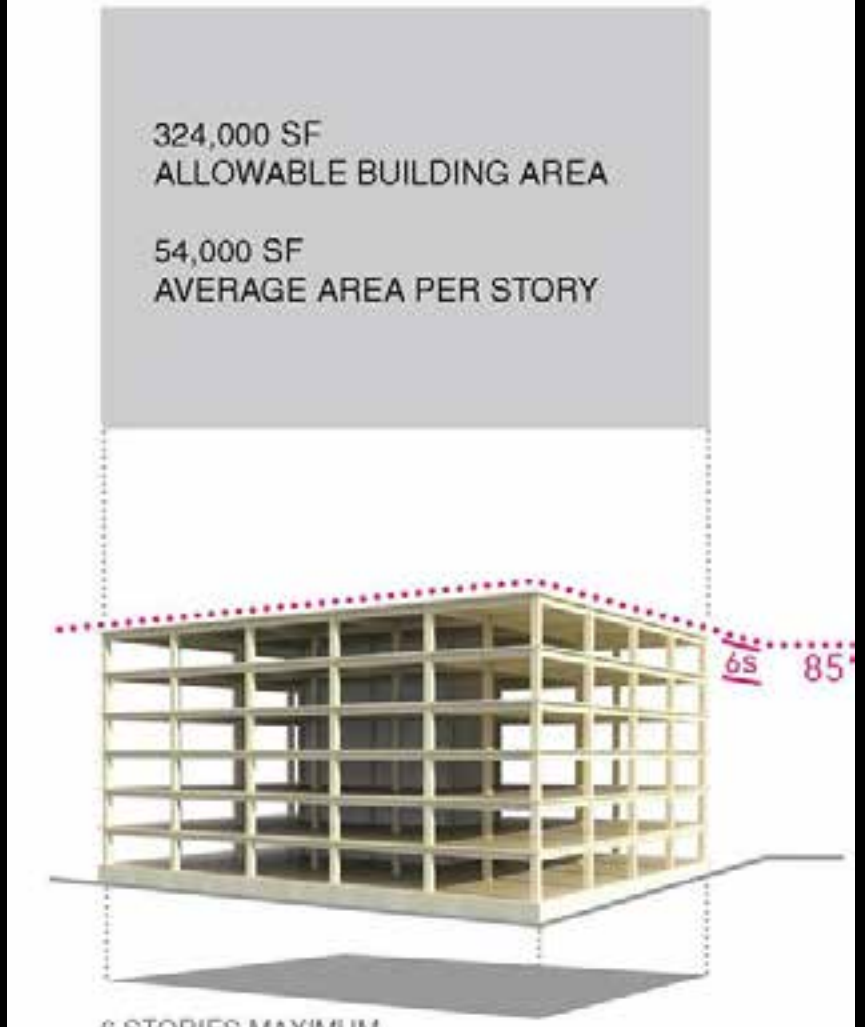
MASS TIMBER | MANUFACTURER LOCATIONS

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**

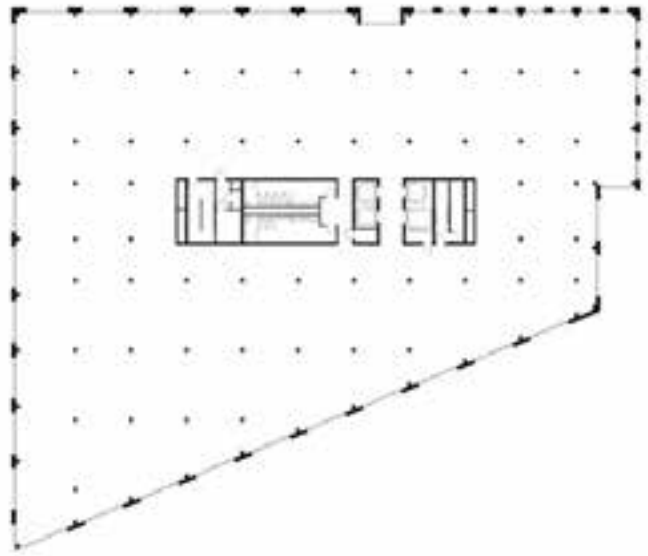
T-3 | MINNEAPOLIS, MN

T-3 | CONSTRUCTION TYPE



T-3 | INTERIOR

T-3 | PLAN GRID + INTERIOR PICTURE



T3 | PLAN LEVELS 3-7

T-3 | CONSTRUCTION

T-3 | MANUFACTURE+TRANSPORT+CONSTRUCTION

TMBR | TEAM


NYIL


BKBM
ENGINEERS
EVERY RELATIONSHIP. EVERY DAY.


KATERRA


ADŌR
BESPOKE HOMES


Kimley»Horn


PARSONS
ELECTRIC


D/O
Architects


WJE


STUDIO BV

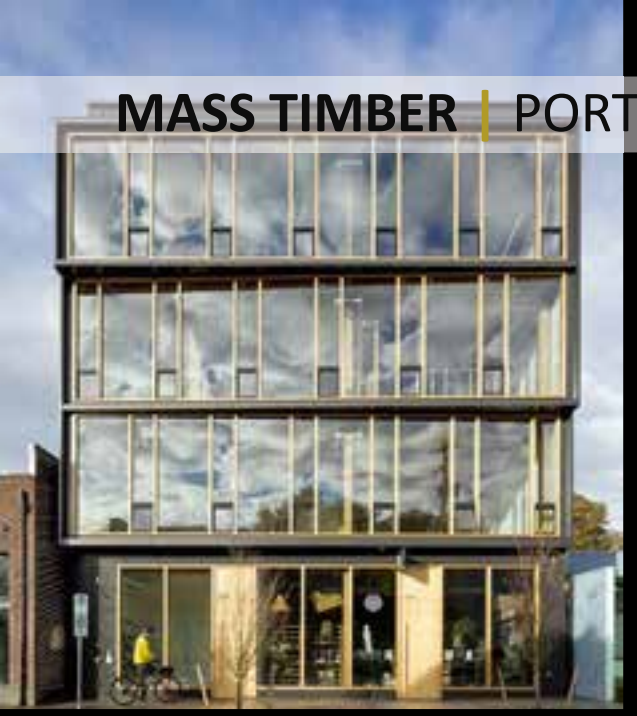

Veneklasen Associates

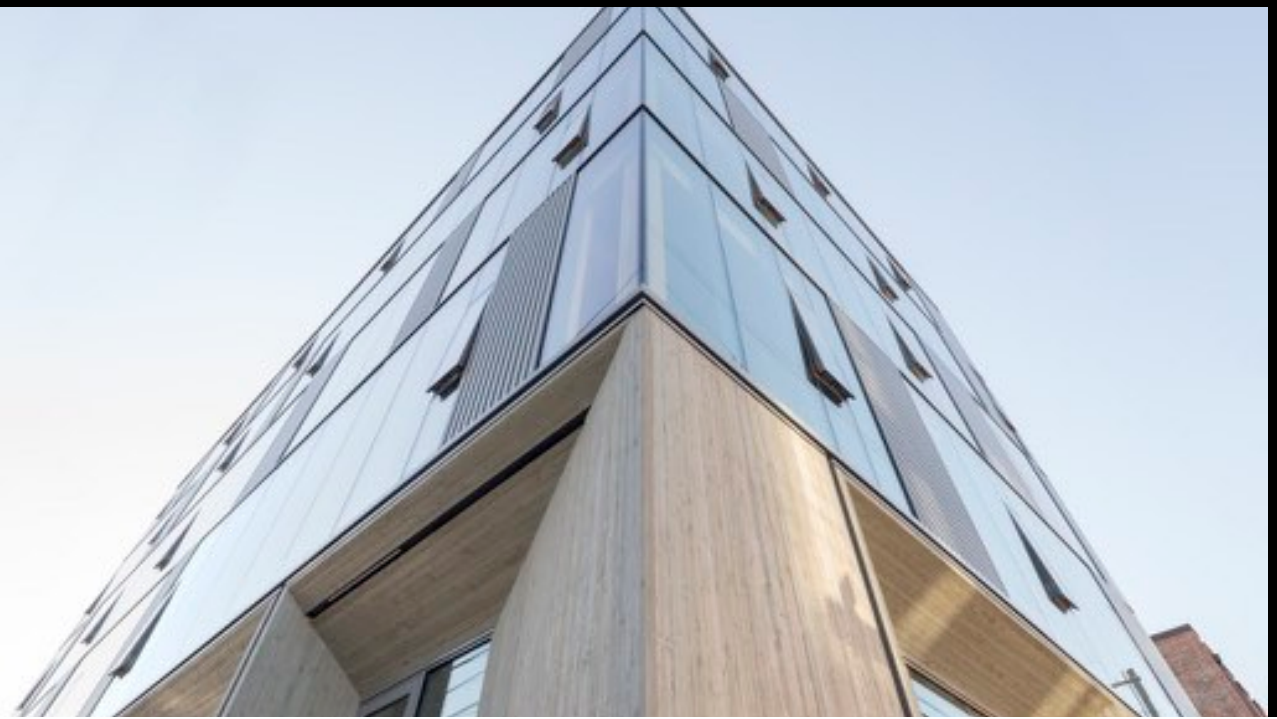

PCL


DRG


SOM

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

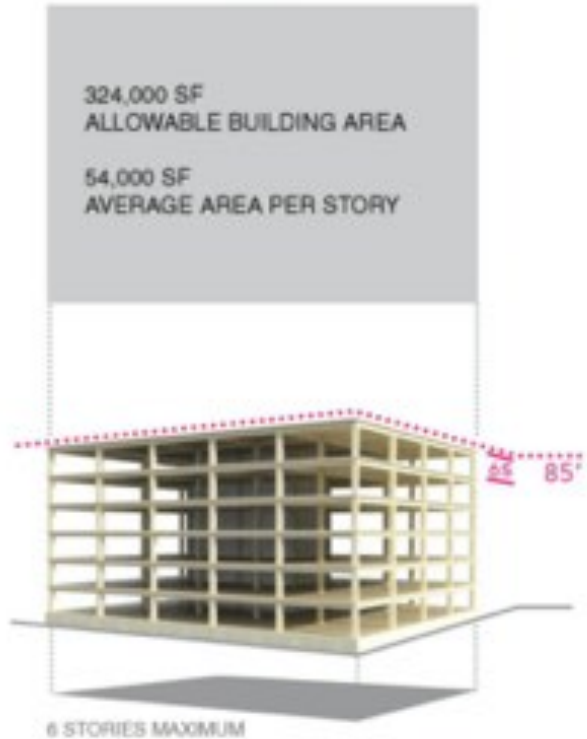
12 STORIES
BUILDING HEIGHT 180 FT
ALLOWABLE BUILDING AREA 648,000 SF
AVERAGE AREA PER STORY 54,000SF

TYPE IV-B

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

TYPE IV-C

IBC 2021



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

TYPE IV- HT

IBC 2015

BUSINESS OCCUPANCY [GROUP B]

atelierjones, llc
architecture | ecodesign | planning

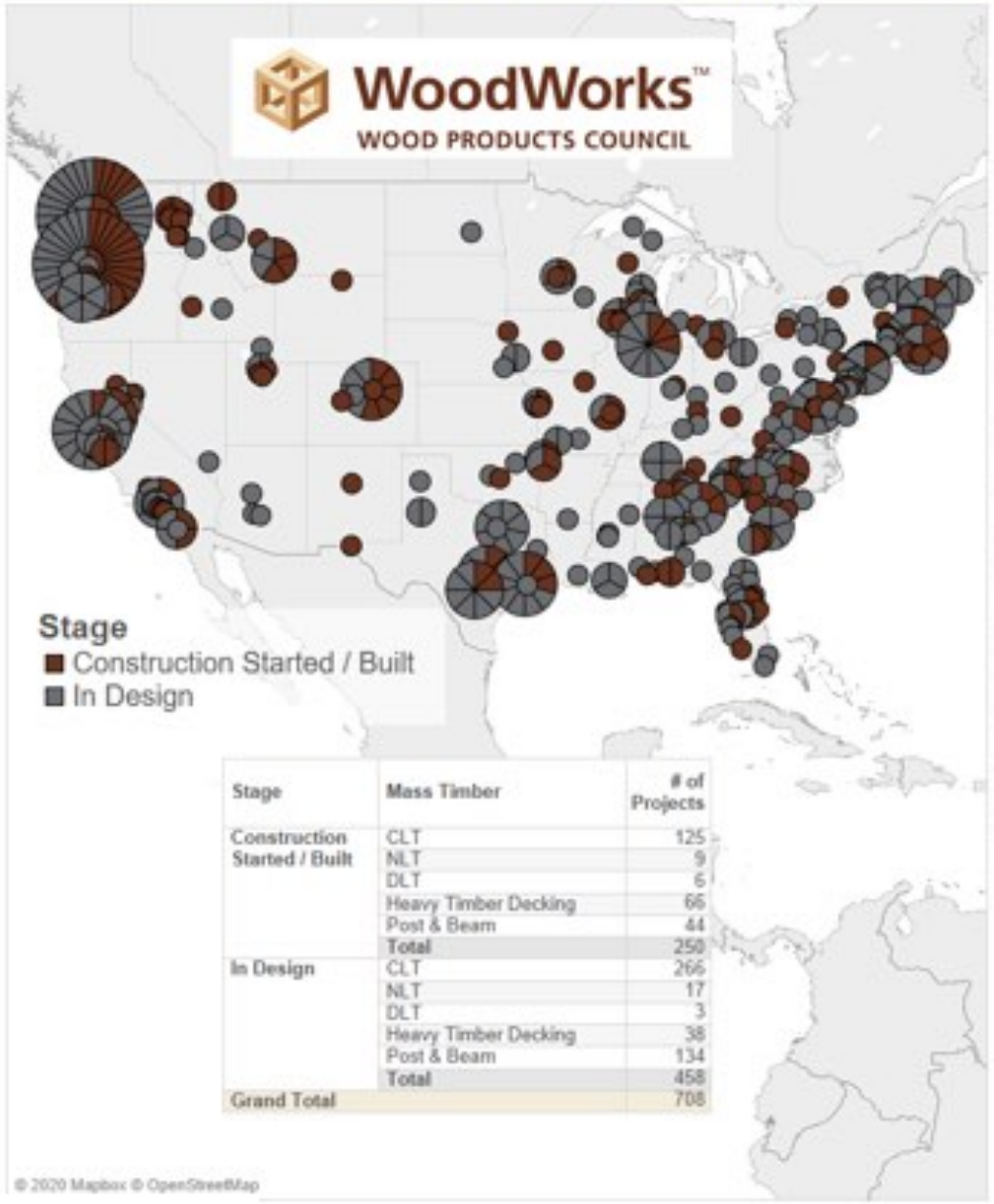
*BUILDING FLOOR-TO-FLOOR HEIGHTS ARE SHOWN AT 12'-0" FOR ALL EXAMPLES FOR CLARITY IN COMPARISON BETWEEN 2015 TO 2021 IBC CODES.

BROCK COMMONS | EXTERIOR / INTERIOR

ARBORA | CEILING TESTING

MGA | WOOD INNOVATION & DESIGN CENTER

MASS TIMBER PROJECTS | DESIGNED & CONSTRUCTED (dec 2019)



Stage	Mass Timber	# of Projects
Construction Started / Built	CLT	125
	NLT	9
	DLT	6
	Heavy Timber Decking	66
	Post & Beam	44
	Total	250
In Design	CLT	266
	NLT	17
	DLT	3
	Heavy Timber Decking	38
	Post & Beam	134
	Total	458
Grand Total		708

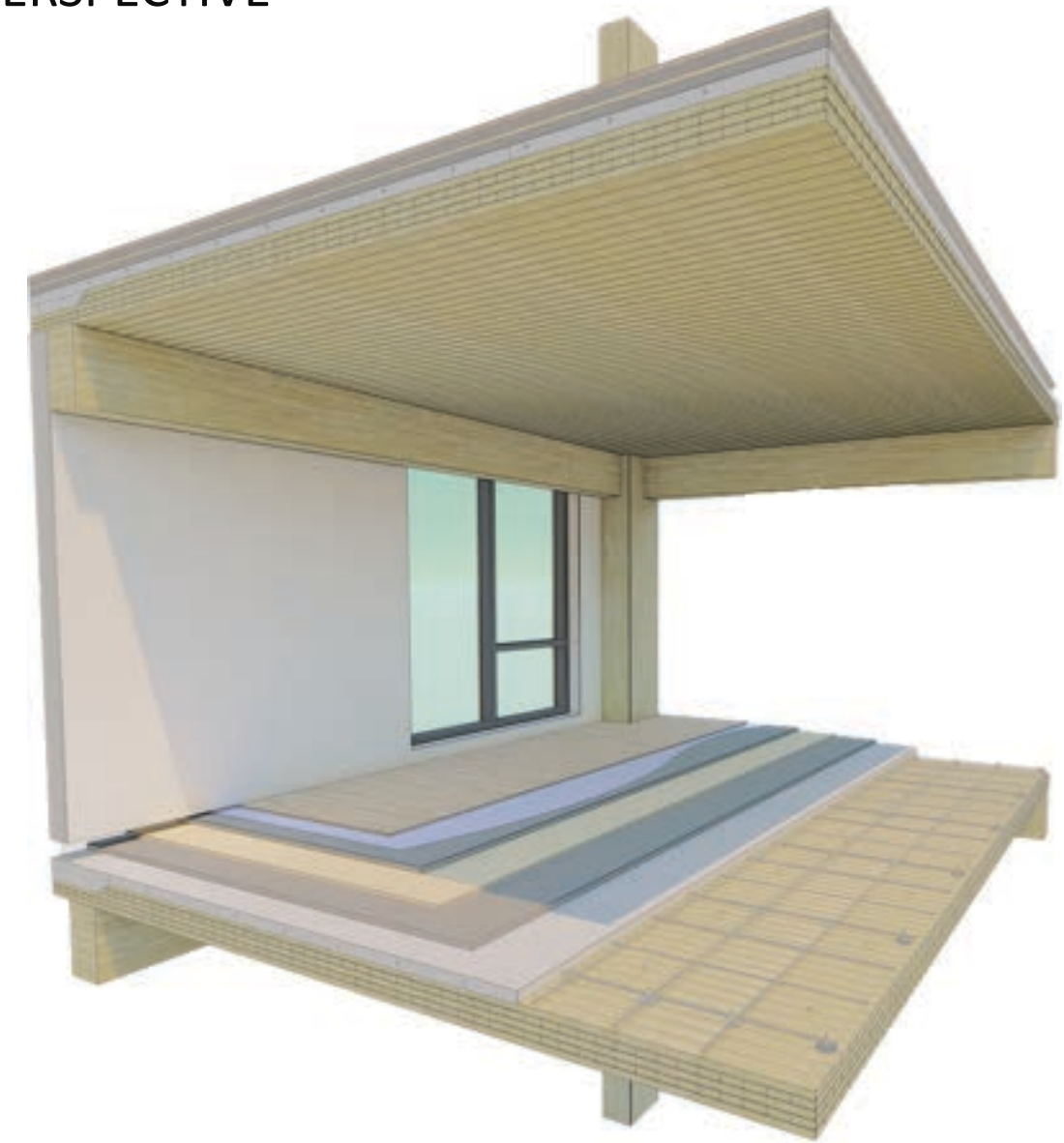
State	Stage		State	Stage	
AK	In Design	1	MS	In Design	4
AL	Construction Started / Built	3	MT	Construction Started / Built	6
	In Design	8		In Design	5
AR	Construction Started / Built	3	NC	Construction Started / Built	13
	In Design	5		In Design	22
AZ	In Design	3	ND	In Design	1
CA	Construction Started / Built	32	NE	Construction Started / Built	1
	In Design	68		In Design	3
CO	Construction Started / Built	14	NH	Construction Started / Built	1
	In Design	11		In Design	1
CT	Construction Started / Built	3	NJ	Construction Started / Built	1
	In Design	6		In Design	6
DC	Construction Started / Built	2	NM	Construction Started / Built	1
	In Design	5	NV	In Design	2
DE	In Design	2	NY	Construction Started / Built	6
FL	Construction Started / Built	15		In Design	24
	In Design	18	OH	Construction Started / Built	1
GA	Construction Started / Built	4		In Design	5
	In Design	13	OK	Construction Started / Built	1
HI	In Design	3		In Design	2
IA	Construction Started / Built	1	OR	Construction Started / Built	25
ID	Construction Started / Built	3		In Design	23
	In Design	3	PA	Construction Started / Built	3
IL	Construction Started / Built	5		In Design	5
	In Design	11	RI	Construction Started / Built	2
IN	Construction Started / Built	1		In Design	1
	In Design	1	SC	Construction Started / Built	9
KS	In Design	2		In Design	11
KY	Construction Started / Built	1	TN	Construction Started / Built	3
	In Design	2		In Design	4
LA	In Design	5	TX	Construction Started / Built	17
MA	Construction Started / Built	13		In Design	37
	In Design	25	UT	Construction Started / Built	3
MD	Construction Started / Built	1		In Design	3
	In Design	7	VA	Construction Started / Built	6
ME	Construction Started / Built	1		In Design	7
	In Design	14	VT	Construction Started / Built	1
MI	Construction Started / Built	2		In Design	8
	In Design	6	WA	Construction Started / Built	28
MN	Construction Started / Built	2		In Design	44
	In Design	4	WI	Construction Started / Built	8
MO	Construction Started / Built	5		In Design	12
	In Design	5	WV	Construction Started / Built	2
			WY	Construction Started / Built	1

Considering mass timber for a project?
Ask us anything.

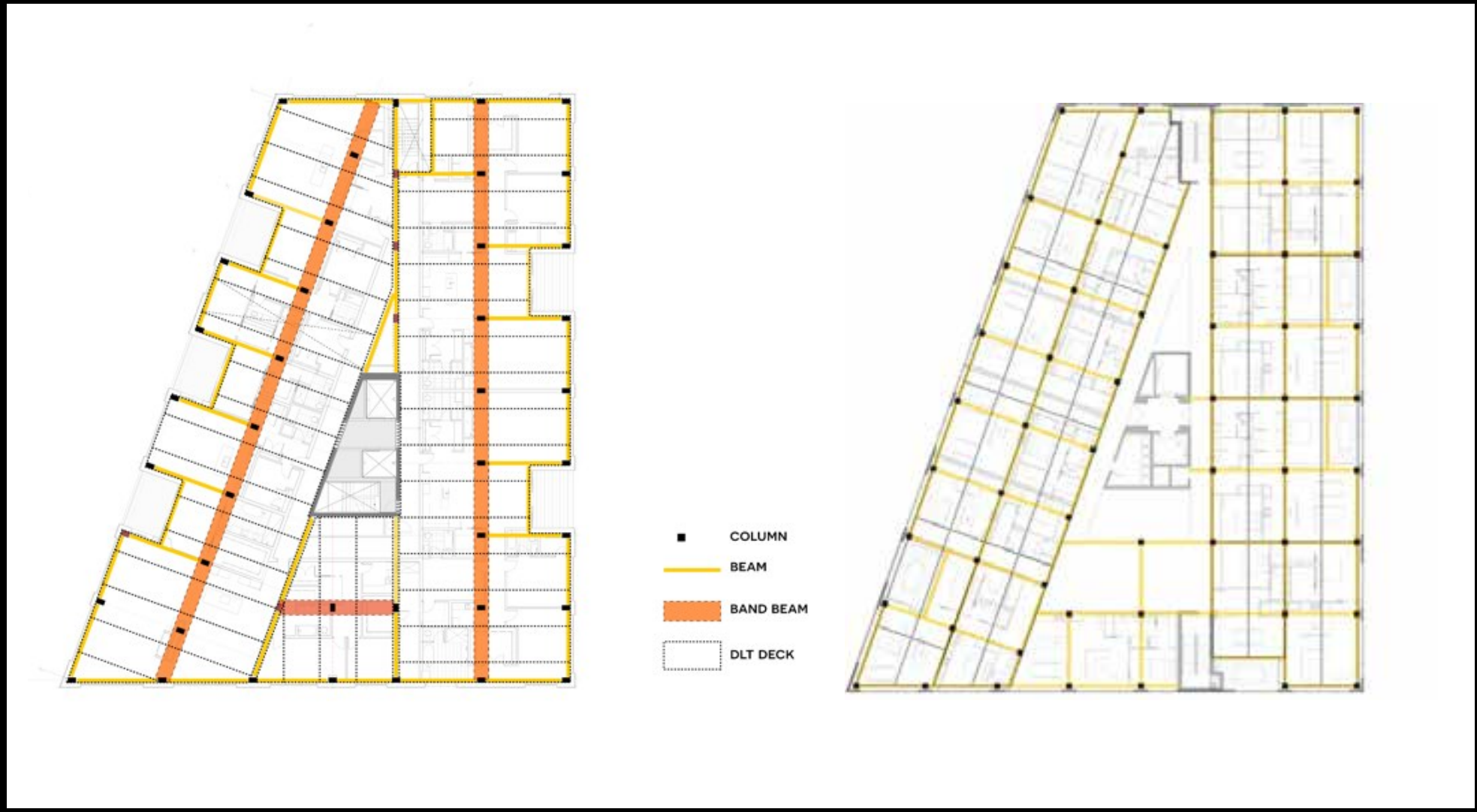
For free project support, contact:
help@woodworks.org
woodworks.org/project-assistance

TMBR | T-3 SECTION PERSPECTIVE

TMBR | TMBR SECTION PERSPECTIVE



TMBR | STRUCTURAL GRID ROTATION



TMBR | FRONT RENDER

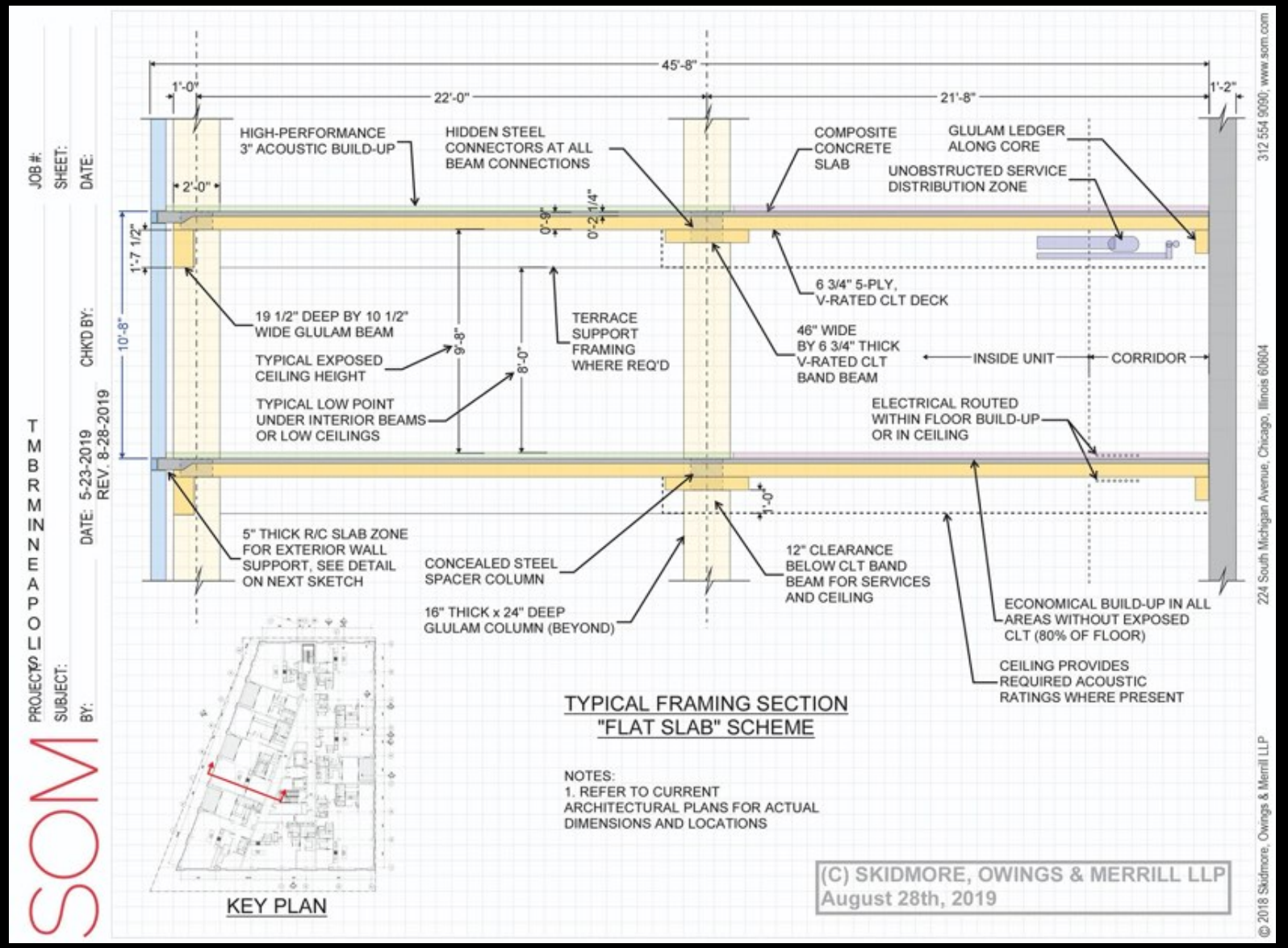
TMBR | BACK RENDER

TMBR | INTERIOR RENDER

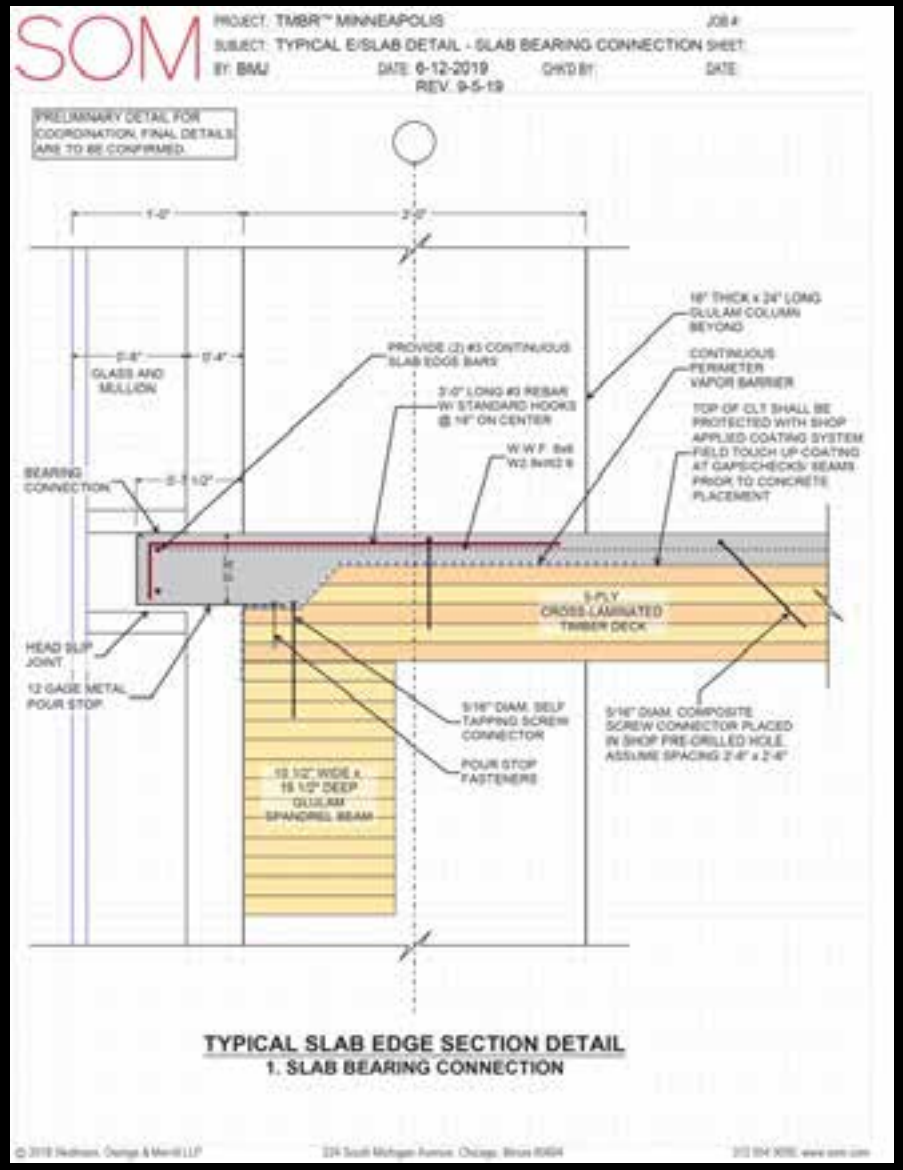
TMBR | INTERIOR RENDER

TMBR | ROOF DECK RENDER

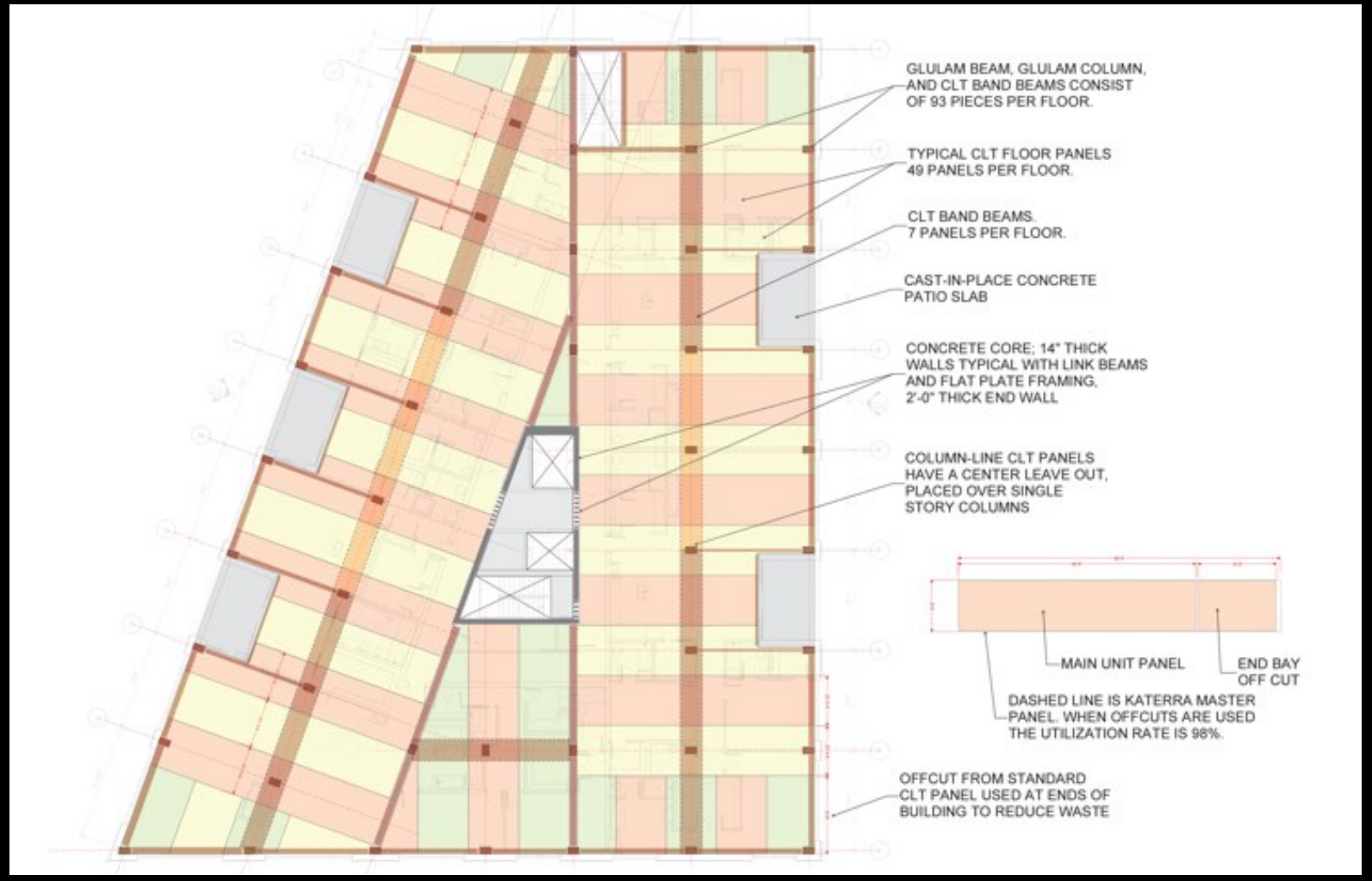
TMBR | FLAT SLAB SECTION – SOM



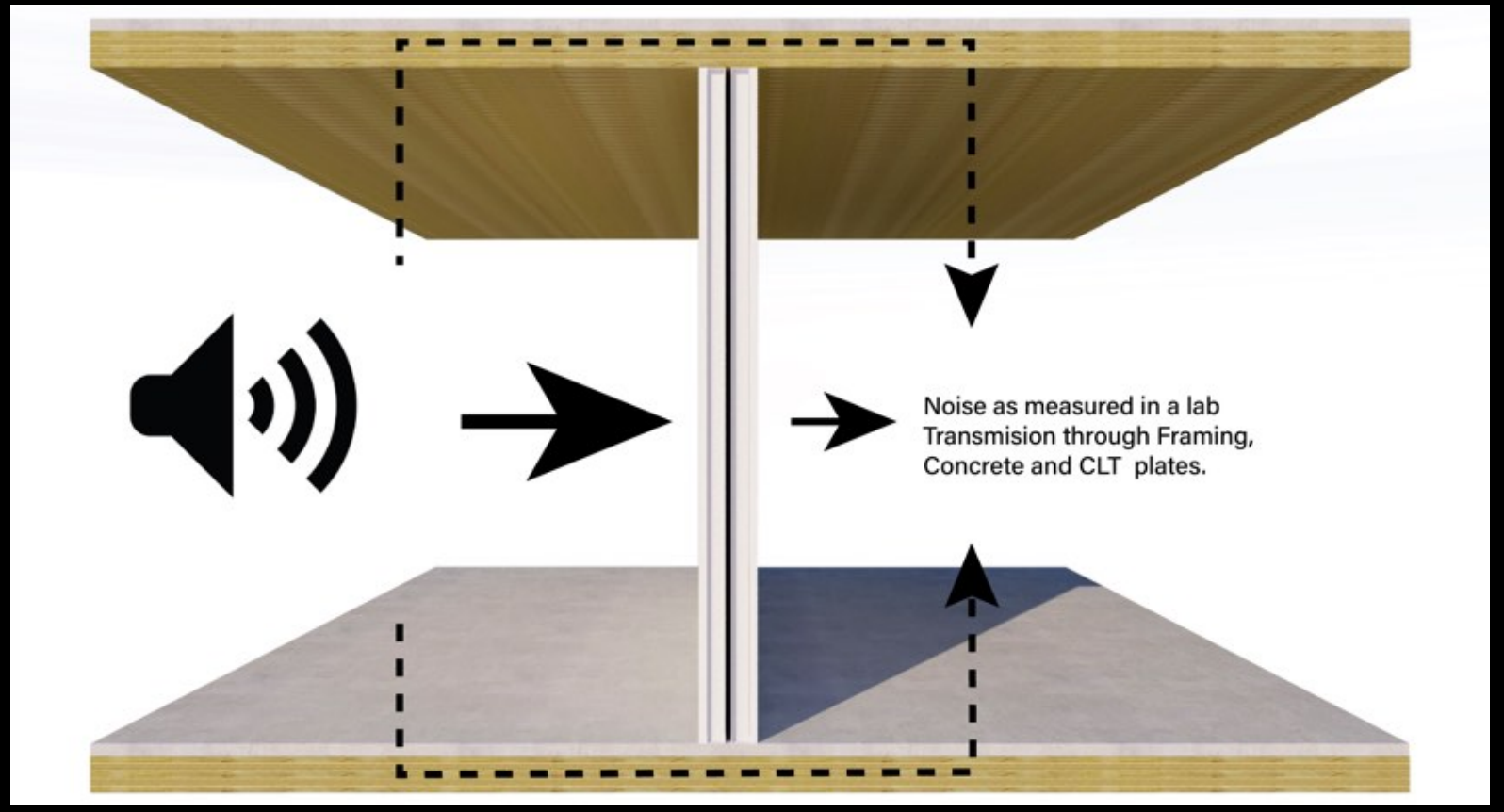
TMBR | SLAB EDGE DETAIL – SOM



TMBR | FLOOR PANELIZATION PLAN



TMBR | ACOUSTIC FLANKING

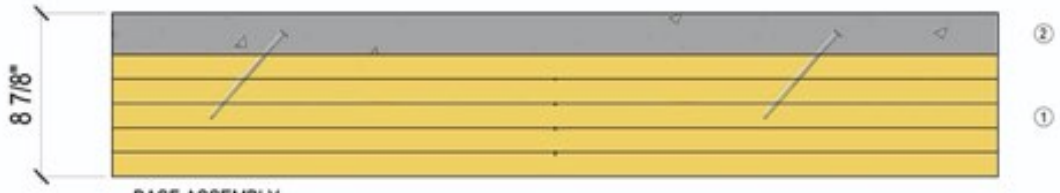


TMBR | CLT ACOUSTIC PROPERTIES

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[3]	39[3]	15
			LVT	48[3]	47[3]	16
			LVT Plus	48[3]	49[3]	58
			Eng Wood	47[3]	47[3]	59
			Carpet + Pad	45[3]	67[3]	60
			Ceramic Tile	50[3]	46[3]	61
		Soprema® Insonomat	None	45[3]	42[3]	15
			LVT	48[3]	44[3]	16
			LVT Plus	48[3]	47[3]	58
			Eng Wood	47[3]	45[3]	59
			Carpet + Pad	45[3]	71[3]	60
			Ceramic Tile	50[3]	46[3]	61
		USG SAM N75 Ultra	None	45[3]	38[3]	15
			LVT	48[3]	47[3]	16
			LVT Plus	48[3]	49[3]	58

Source: WoodWorks

TMBR | COMPOSITE SLAB ACOUSTIC PROPERTIES

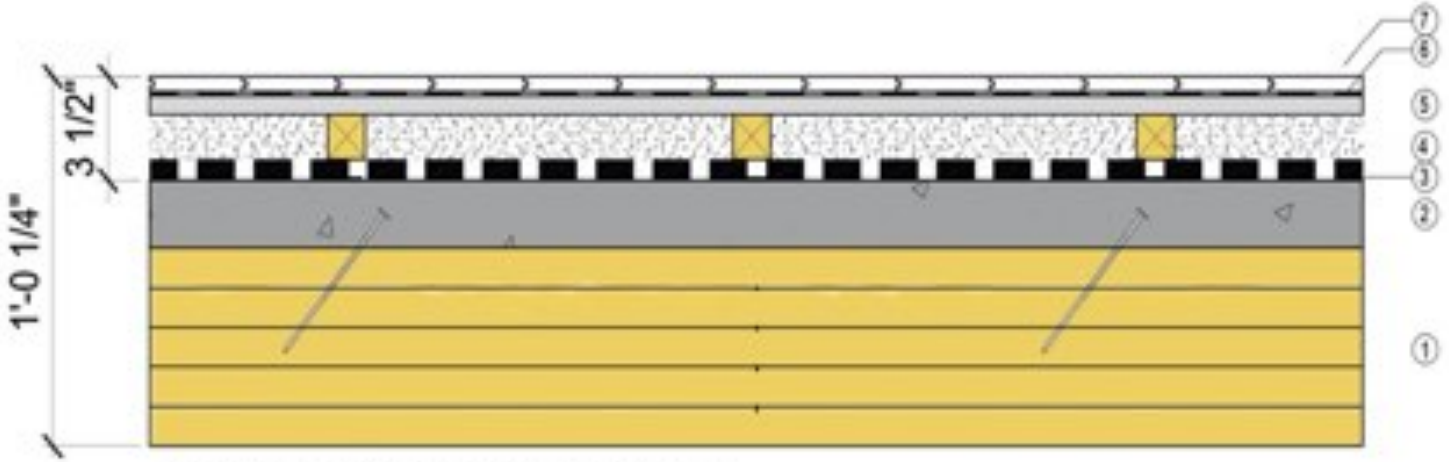


BASE ASSEMBLY
1 6.60" 5-PLY CLT
2 2.25" NORMAL WEIGHT CONCRETE W/ $\frac{5}{16}$" DIA. COMPOSITE SCREW CONNECTOR (2'-6" SPACING)

CLT Panel	Concrete/Gypsum Topping	Acoustical Mat Product Between CLT and Topping	Finish Floor	STC[1]	IIC[1]	Source
CLT 5-ply (3.5")	2-1/4" concrete		None	49[2] ASTC	22[2] FIIC	72

Source: WoodWorks

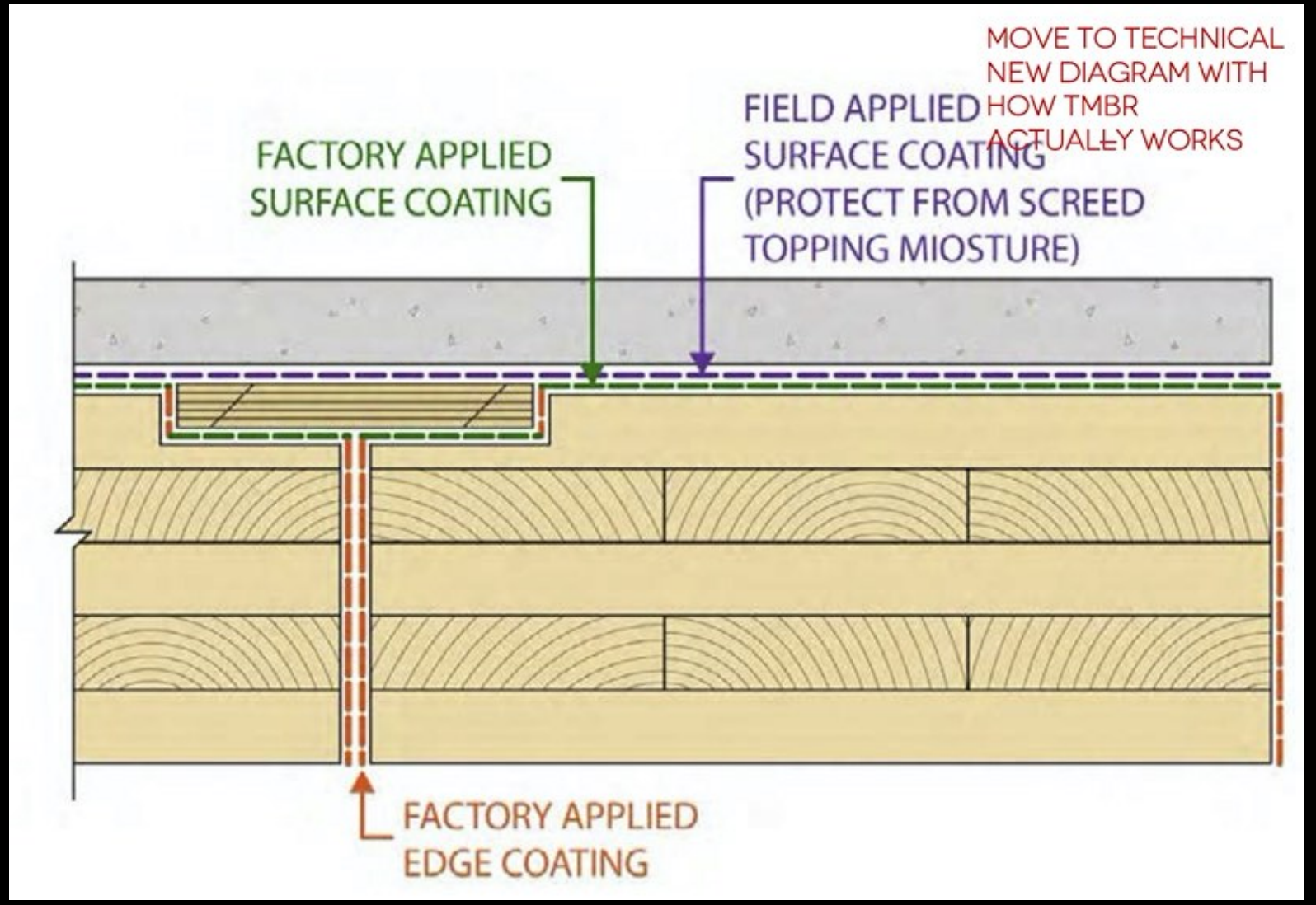
TMBR | CLT ACOUSTIC PROPERTIES



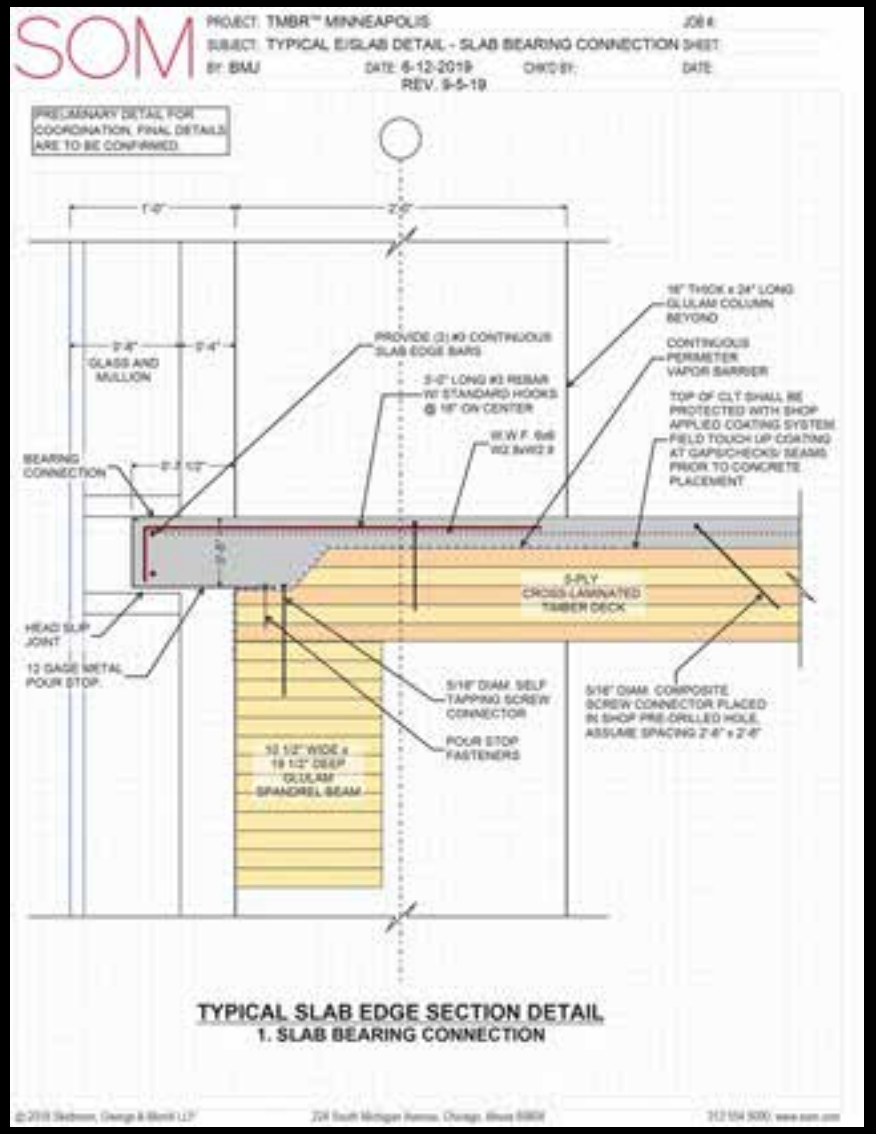
TEST H: SLEEPER SHALLOW SAND ASSEMBLY

1	6.60" 5-PLY CLT
2	2.25" NORMAL WEIGHT CONCRETE W/ $\frac{5}{16}$" DIA. COMPOSITE SCREW CONNECTOR (2'-6" SPACING)
3	17mm PLITEQ GENIEMAT FF17
4	WOOD 2X2 WOOD SLEEPERS W/ SAND (1.5")
5	$\frac{5}{8}$" OSB SHEATHING
6	$\frac{3}{16}$" QTSCU 4005 SOUND INSULATION MAT
7	$\frac{1}{2}$" ENGINEERED WOOD FLOOR

TMBR | MOISTURE DIAGRAM



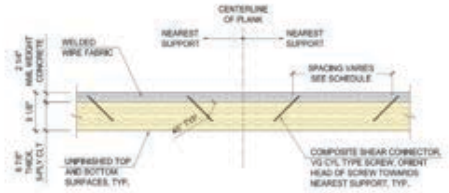
TMBR | SLAB EDGE DETAIL – FIRE



TMBR | ALTERNATE CODE – 20% VS 40%

Rationale for Increased Exposed Mass Timber Surfaces

Enhanced Fire Protection Features



1 TYPICAL COMPOSITE FLOOR DETAIL

Timber-Concrete Deck System

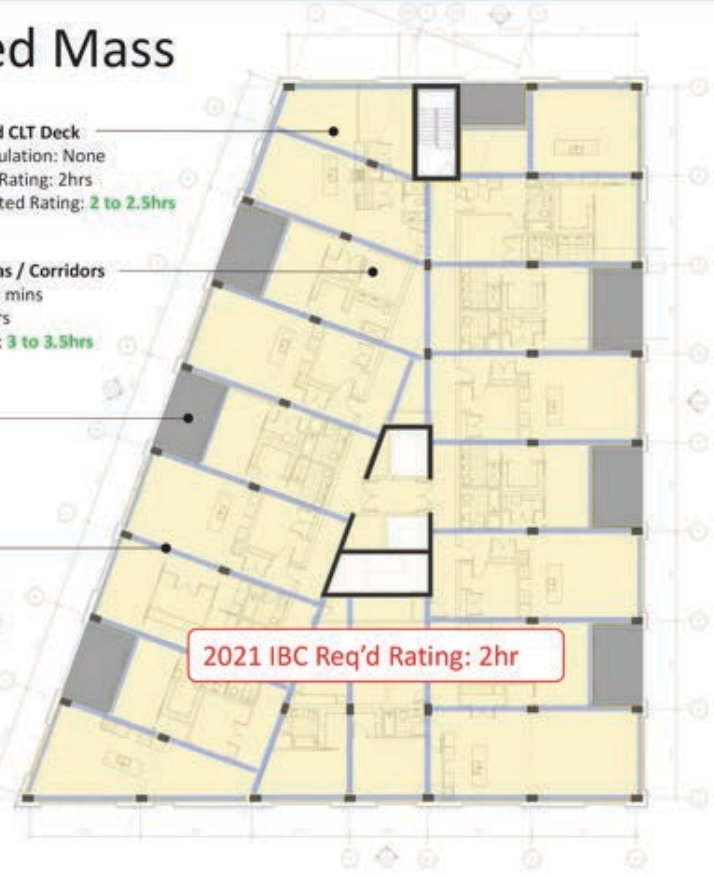
Notes:
1. All steel connectors are concealed
2. Concrete topping creates continuous non-combustible barrier between levels
3. Fire-stopping at concrete slabs

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

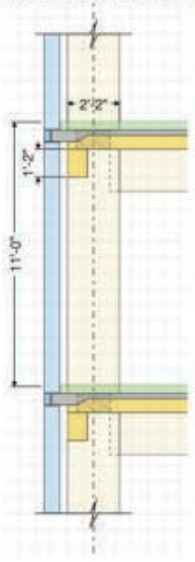
Concrete Terrace Deck
-Non-Combustible
-Tested Rating: 3.0hrs

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



Rationale for Increased Exposed Mass Timber Surfaces

Enhanced Fire Protection Features



Exterior Wall Section

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

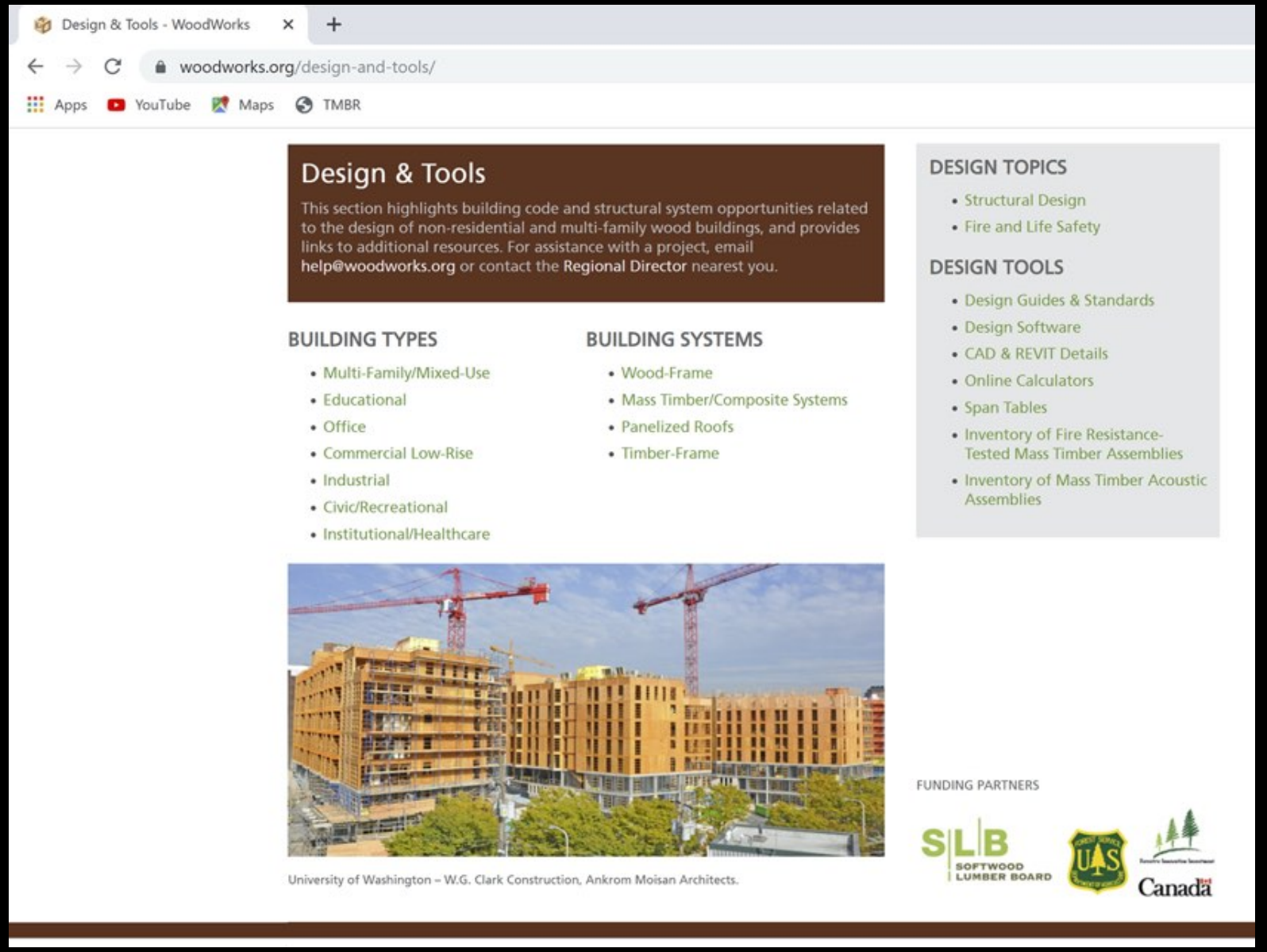
Exterior Wall System
-Non-combustible materials
-Support and attachments of system are non-combustible

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

Notes:
1. Concrete topping slabs are extended to support exterior wall and create non-combustible barrier between levels

TMBR | CHARRING

TMBR | WOODWORKS

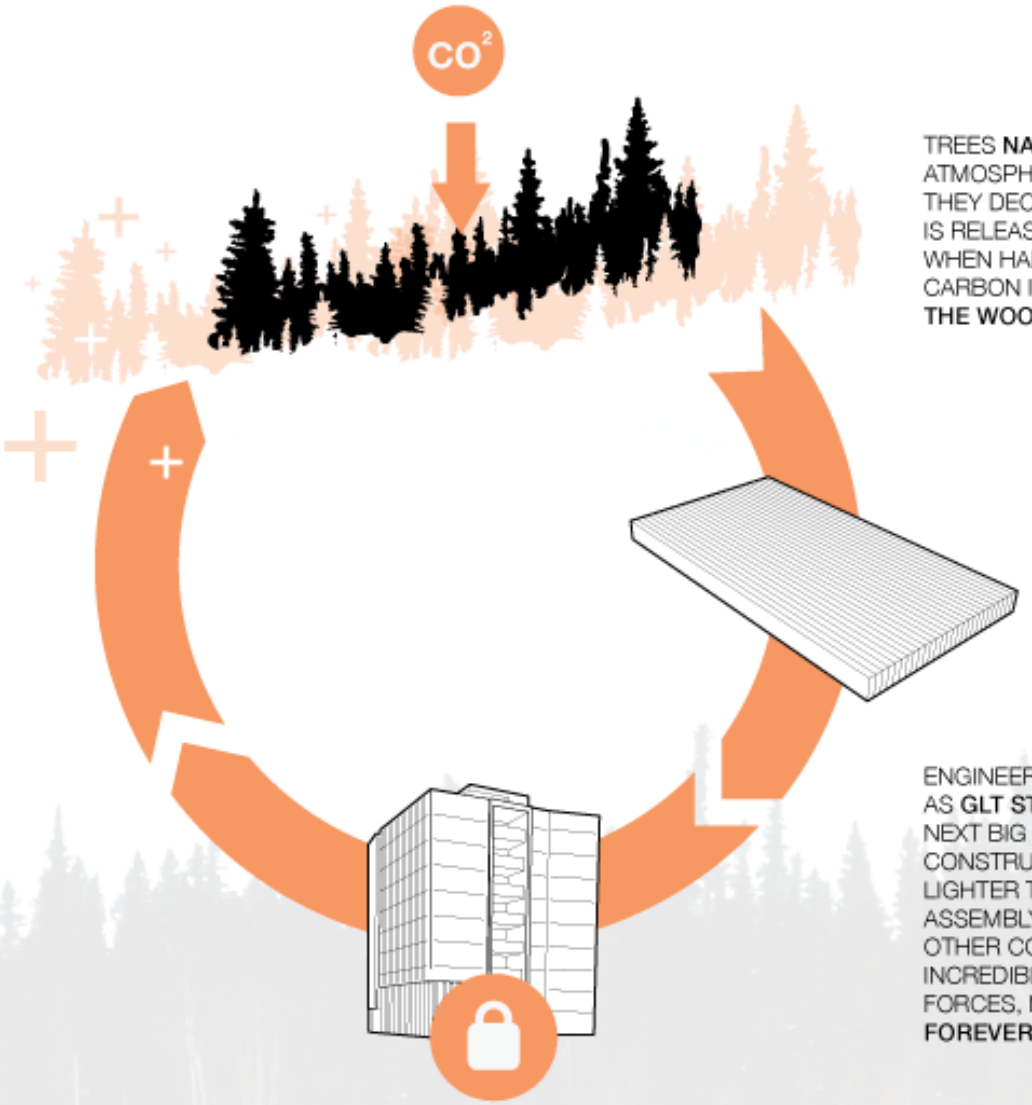


TMBR | INSURANCE COMPARISON TO ELEVEN

CARBON SEQUESTRATION | CYCLE

CARBON12'S PIONEERING MASS TIMBER CONSTRUCTION, THE TALLEST IN THE UNITED STATES AT **85 FEET**, WILL BE A PRECEDENT, INSPIRATION, AND CATALYST FOR BUILDERS AND ARCHITECTS IN THE UNITED STATES.

THE INCREASED DEMAND FOR THESE WOOD PRODUCTS WILL IN TURN LEAD TO **A RESURGENCE** OF THE SUSTAINABLE TIMBER INDUSTRY IN THE US, MEANING MORE TREES PLANTED, MORE JOBS CREATED, AND MORE ATMOSPHERIC CO2 **SEQUESTERED** IN OUR LIVING CITIES.



TREES **NATURALLY SEQUESTER** ATMOSPHERIC CO2 AS THEY GROW. WHEN THEY DECOMPOSE OR BURN, THAT CARBON IS RELEASED BACK INTO THE ATMOSPHERE. WHEN HARVESTED FOR TIMBER, THE CARBON IS **FOREVER LOCKED AWAY INTO THE WOOD.**

ENGINEERED WOOD PRODUCTS, SUCH AS **GLT STRUCTURAL PANELS** ARE THE NEXT BIG REVOLUTION IN CONSTRUCTION. STRONG AS STEEL, LIGHTER THAN CONCRETE, WITH ASSEMBLY TIMES A BARE FRACTION OF OTHER CONSTRUCTION METHODS, AND INCREDIBLY RESILIENT TO SEISMIC FORCES, MODERN MASS TIMBER WILL **FOREVER CHANGE THE WAY WE BUILD.**

D/O Architects

1621 HENNEPIN AVE | STE. 100

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612.259.8623