Mass Timber in Multi-Family Housing: Is it a Good Fit for Your Project?

Ricky McLain, PE, SE
Senior Technical Director – Tall Wood
WoodWorks – Wood Products Council

WoodWorks™
WOOD PRODUCTS COUNCIL

Credit: D/O Architects

"The Wood Products Council" is a Registered Provider with The American Institute of Architects Continuing Education Systems (AIA/CES), Provider #G516.

Credit(s) earned on completion of this course will be reported to AIA CES for AIA members. Certificates of Completion for both AIA members and non-AIA members are available upon request.

This course is registered with AIA CES for continuing professional education. As such, it does not include content that may be deemed or construed to be an approval or endorsement by the AIA of any material of construction or any method or manner of handling, using, distributing, or dealing in any material or product.

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

Course Description

Mass timber is often attached to the stigma of being more expensive than other building materials. Because of this, some people assume it only makes sense for one-off projects where innovation is celebrated but repeatability is not. Is this true, or do its other benefits result in overall cost efficiency? If it is true, how can we expect to build the number of new housing units needed across our country in a sustainable and affordable manner? Typical multi-family housing developments are in the range of 4-6 stories, often utilizing podium or pedestal construction with 1-2 stories of steel and concrete topped with 3-5 stories of light wood framing. Beyond these heights, building codes have historically required steel or concrete framing and, to justify the added costs of these materials, projects often go much taller. This has created a critical gap in housing developments in the range of 6-12 stories. Can mass timber multi-family projects make financial sense in the 4-6 story range, used in conjunction with light wood-frame systems? What new opportunities will the 2021 International Building Code create for mass timber housing in the 6-18 story range? Tune into this webinar, where we'll answer these questions and much more.

Learning Objectives

1. Evaluate the code opportunities for cost-effective wood-frame structures in residential mid-rise projects.

2. Discuss code-compliant options for exposing mass timber, where up to 2-hour fire-resistance ratings are required, and demonstrate design methodologies for achieving these ratings.

3. Review code requirements unique to hybrid mass timber and light-frame housing projects, and emphasize solutions for criteria such as construction type, fire-resistance ratings and acoustics design.

4. Highlight the unique benefits of using exposed mass timber in taller multi-family buildings.

Heavy Timber
Photo: Benjamin Benschneider

Mass Timber
Photo: John Stamets

Glue Laminated Timber (Glulam)
Beams & columns

Cross-Laminated Timber (CLT)
Solid sawn laminations

Cross-Laminated Timber (CLT)
SCL laminations

Photo: Freres Lumber

Photo: StructureCraft

Photo: LendLease

Photo: LEVER Architecture

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

Is Mass Timber a Good Fit for Your Multi-Family Project?

Ascent, Milwaukee, WI
Source: Korb & Associates Architects

Speed of Construction

Market Distinction

KNOW YOUR WHY

Sustainability

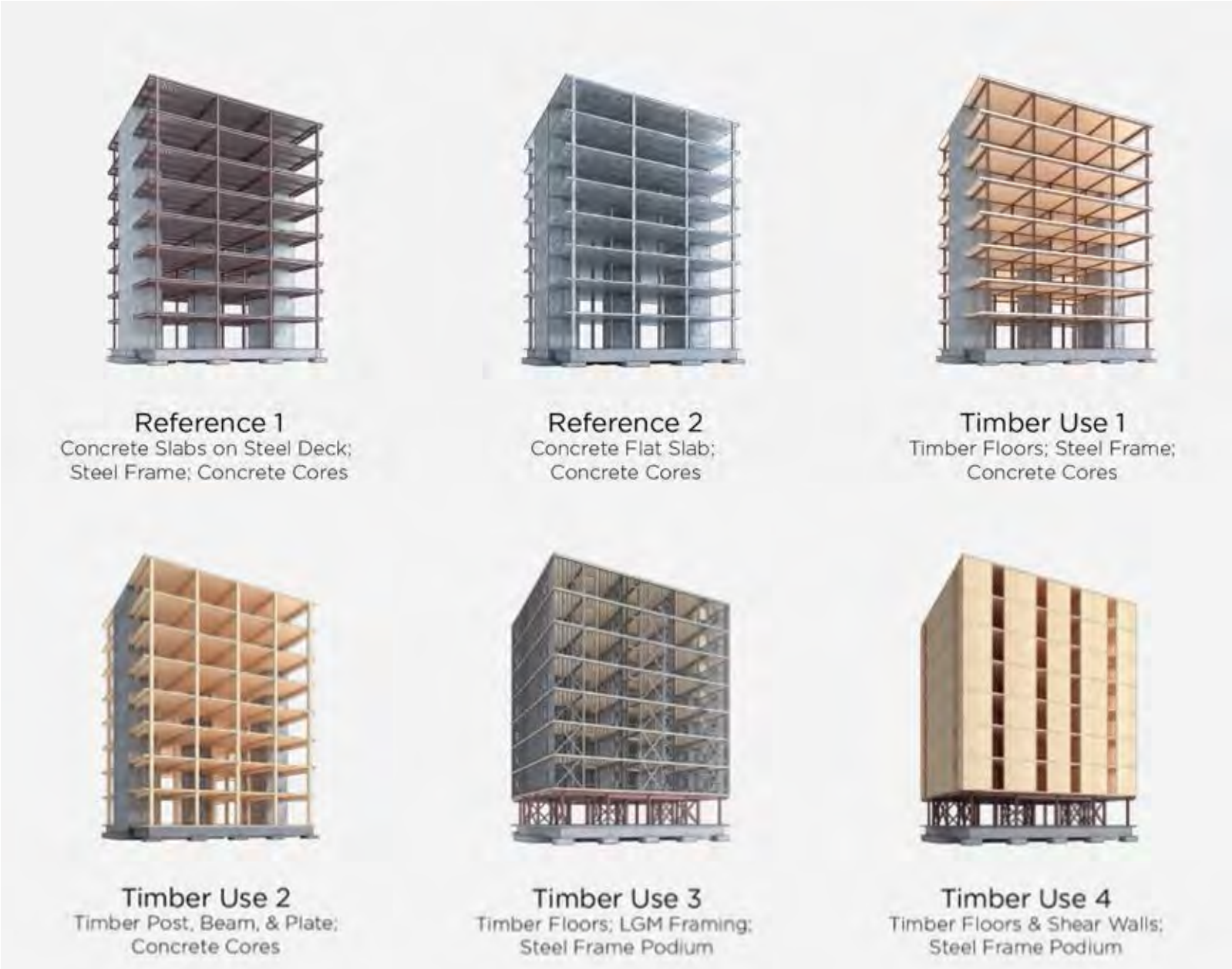
Lightweight

Leasing Velocity

Cost

Urban Density

Risk: Cost Analysis of Structure Only



Source: Generate Architecture + Technologies

Source: Generate Architecture + Technologies

Seattle Mass Timber Tower: Detailed Cost Comparison

Fast Construction

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

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

leasing velocity

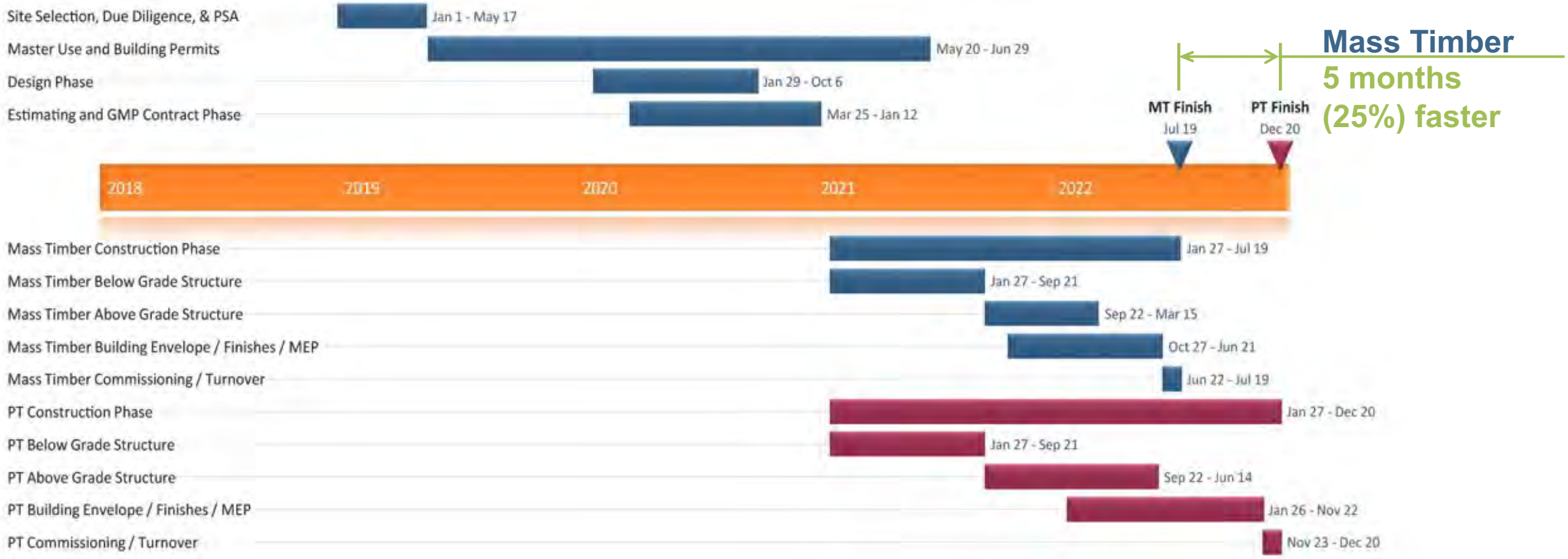
that developers will experience.”

- Connor Mclain, Colliers

Seattle Mass Timber Tower

Fast Construction

Construction Schedule:

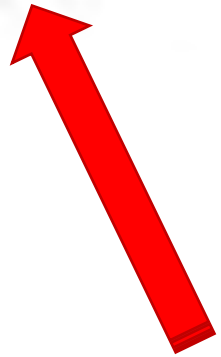


Source: Tall With Timber
A Seattle Mass Timber Tower Case Study by DLR Group[1]

Seattle Mass Timber Tower

Faster Construction + Higher Material Costs = Cost Competitive

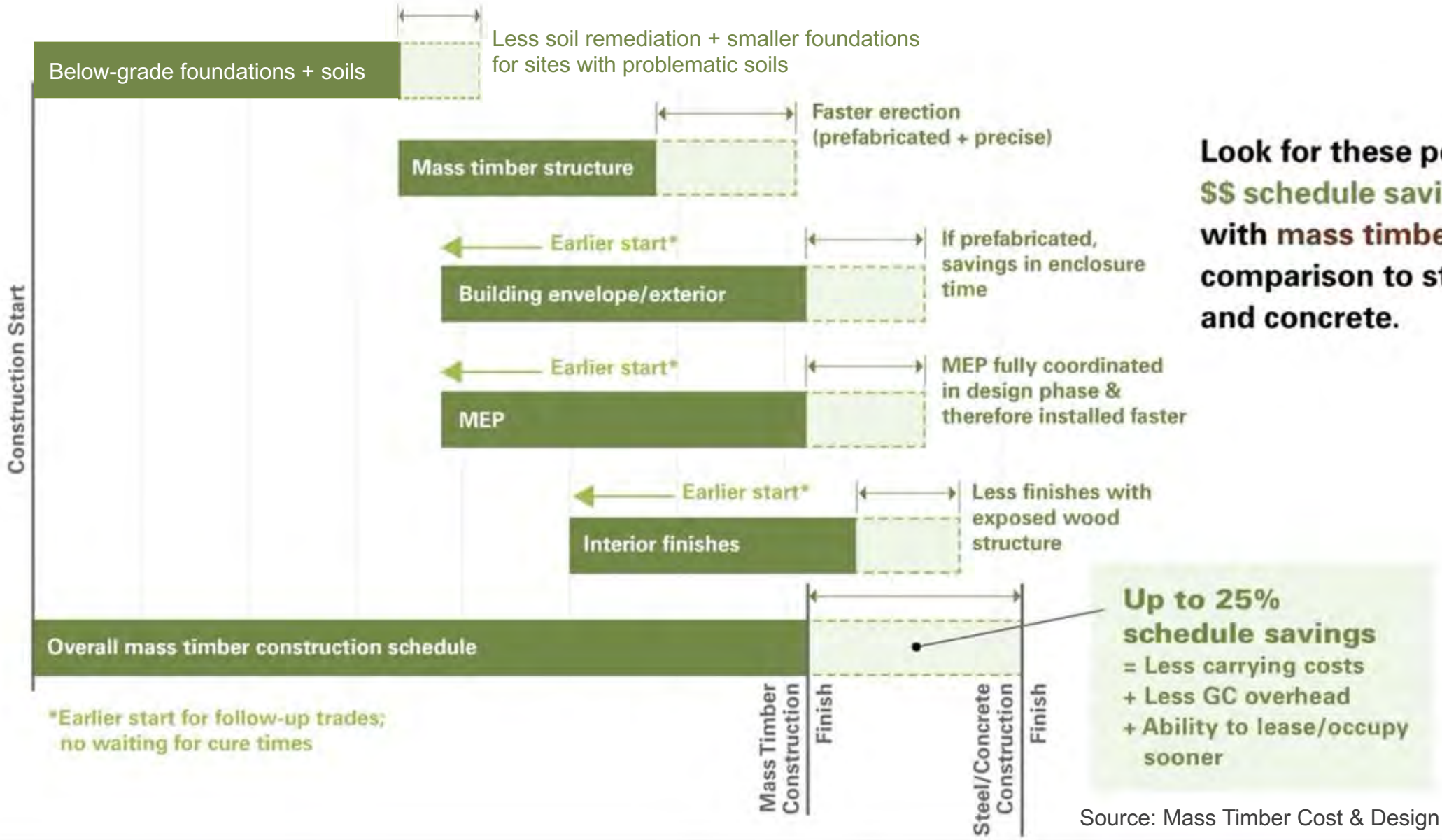
System	Mass Timber Design	PT Concrete Design	Mass Timber Savings
Direct Cost of Work	$86,997,136	$85,105,091	2.2%
Project Overhead	$ 9,393,750	$11,768,750	-20.2%
Add-Ons	$ 8,387,345	$ 8,429,368	-0.5%
Total	**$104,778,231**	**$105,303,209**	**-0.5%**



Source: DLR Group | Fast + Epp | Swinerton Builders

Compressing the Typical Schedule

Fast Construction

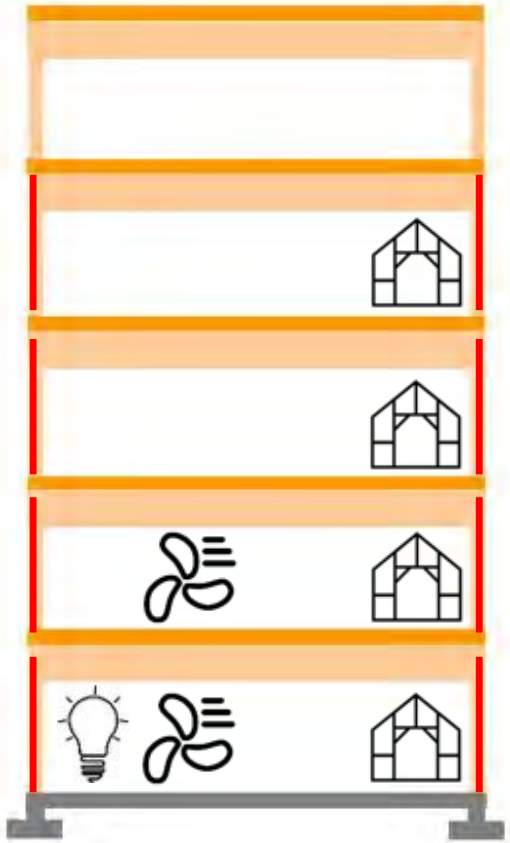


Look for these potential $$ schedule savings with mass timber in comparison to steel and concrete.

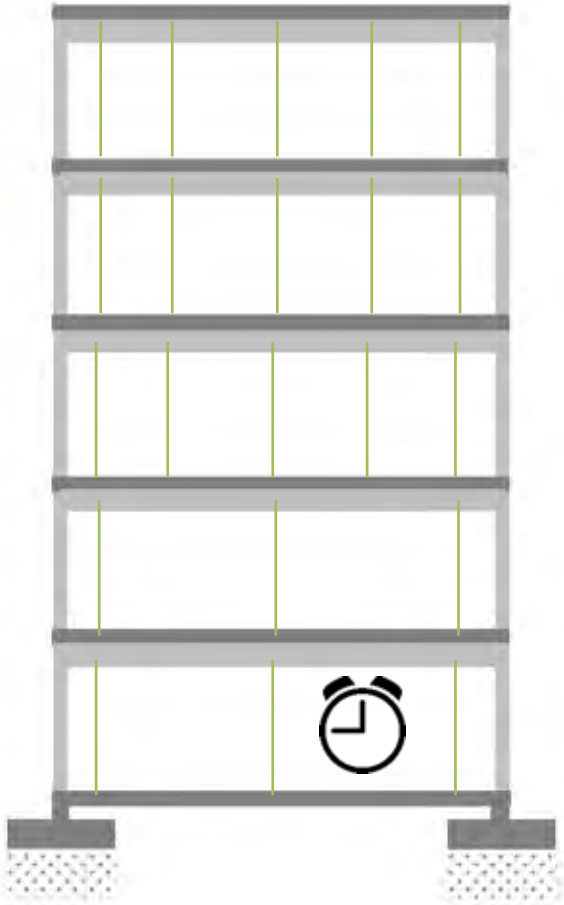
Source: Mass Timber Cost & Design Optimization, WoodWorks[2]

Schedule Savings for Rough-In Trades

Fast Construction



NO curing
(mass timber)



Curing & maze of shores (concrete)

Photo: WoodWorks

Sustainability Impacts

GLOBAL WARMING POTENTIAL & MATERIAL MASS
(PER BUILDING ASSEMBLY)

The total global warming potential (GWP) of each option is shown with a breakdown by building assembly. The Concrete With Steel Frame and Concrete Flat Slab options have the highest GWP, with the bulk of the impact embedded in the floor slabs. The Timber Use 1 (Floor Slabs; Steel Frame) option offers a slight reduction in GWP, with the most of the savings also embedded in the floor slabs. The Timber Use 2 (Post, Beam, and Plate) option offers a relatively typical approach to building with timber, showing savings in floor slabs, beams and columns. Since Timber Use 3 and 4 are cellular approaches with load-bearing walls, these options included steel podiums to accommodate the ground floor program. Timber Use 3 shows how a hybrid approach with light gauge metal yields GWP savings in structural walls and exterior walls, despite the addition of the podium. Lastly, Timber Use 4 emphasizes how a completely cellular CLT timber approach yields impressive reductions in nearly every category.

Source: Generate Architecture + Technologies

Mass Timber Projects In Design and Constructed in the US (March 2021)

Stage	Mass Timber	# of Projects
Construction Started / Built	CLT	229
	DLT	14
	Heavy Timber Decking	101
	NLT	17
	Post & Beam	153
	Total	514
In Design	CLT	358
	DLT	5
	Heavy Timber Decking	49
	NLT	12
	Post & Beam	177
	Total	600
Grand Total		1,114

510+ Built

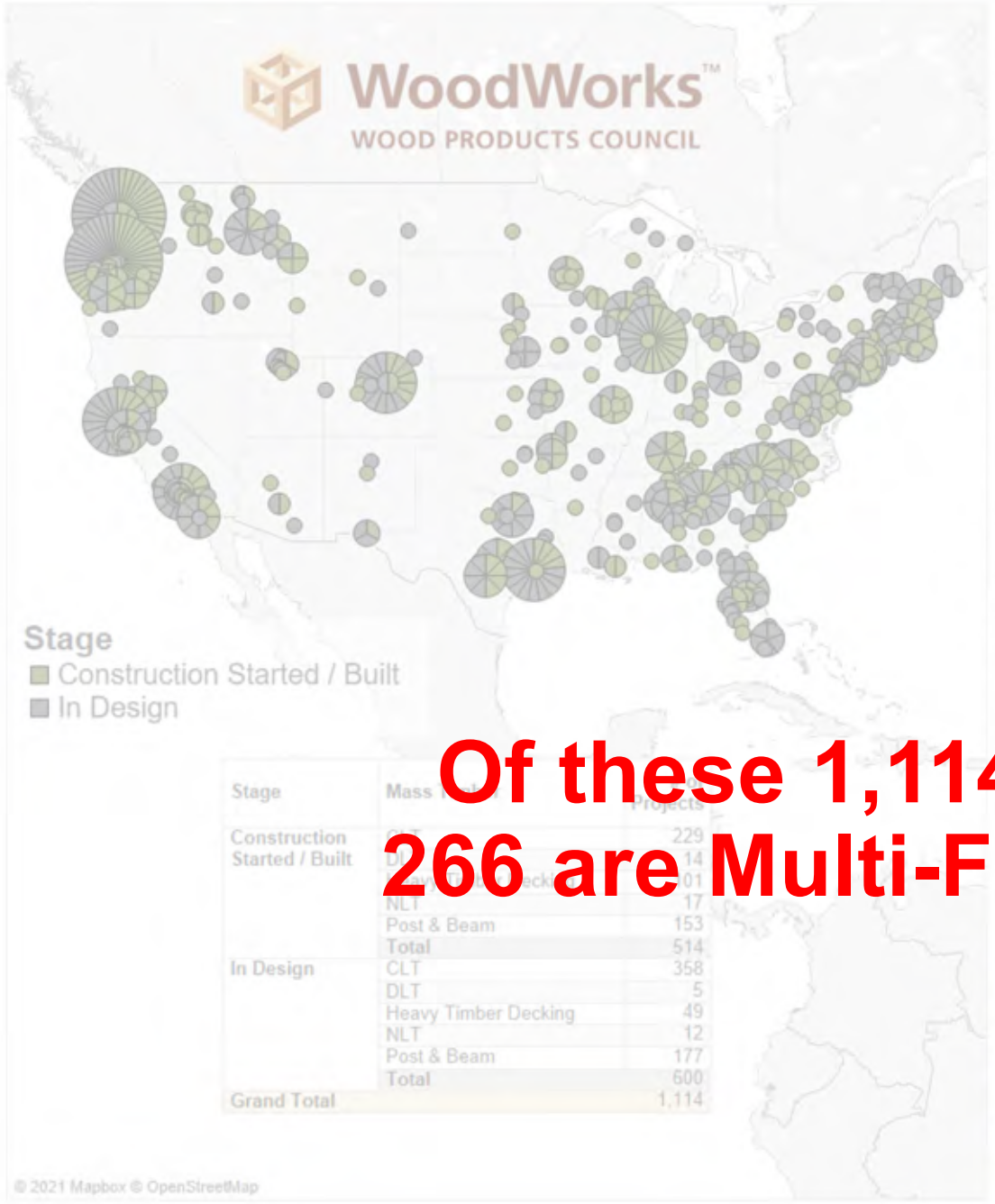
600 In Design

State	Stage	
AK	In Design	2
AL	Construction Started / Built	7
	In Design	13
AR	Construction Started / Built	6
	In Design	7
AZ	Construction Started / Built	2
	In Design	2
CA	Construction Started / Built	67
	In Design	106
CO	Construction Started / Built	18
	In Design	20
CT	Construction Started / Built	6
	In Design	7
DC	Construction Started / Built	5
	In Design	6
DE	Construction Started / Built	1
FL	Construction Started / Built	19
	In Design	36
GA	Construction Started / Built	10
	In Design	22
HI	Construction Started / Built	2
	In Design	1
IA	Construction Started / Built	3
	In Design	4
ID	Construction Started / Built	5
	In Design	5
IL	Construction Started / Built	15
	In Design	14
IN	Construction Started / Built	3
	In Design	1
KS	Construction Started / Built	2
	In Design	3
KY	Construction Started / Built	4
	In Design	1
LA	Construction Started / Built	2
	In Design	2
MA	Construction Started / Built	23
	In Design	34
MD	Construction Started / Built	4
	In Design	5
ME	Construction Started / Built	3
	In Design	15
MI	Construction Started / Built	3
	In Design	9
MN	Construction Started / Built	11
	In Design	3
MO	Construction Started / Built	8
	In Design	8
MS	Construction Started / Built	1
	In Design	3
MT	Construction Started / Built	10
	In Design	12
NC	Construction Started / Built	25
	In Design	27
ND	In Design	1
NE	Construction Started / Built	3
	In Design	5
NH	Construction Started / Built	1
	In Design	3
NJ	Construction Started / Built	1
	In Design	10
NM	Construction Started / Built	1
	In Design	1
NV	In Design	1
NY	Construction Started / Built	12
	In Design	31
OH	Construction Started / Built	7
	In Design	9
OK	Construction Started / Built	2
	In Design	2
OR	Construction Started / Built	57
	In Design	21
PA	Construction Started / Built	6
	In Design	6
RI	Construction Started / Built	2
	In Design	2
SC	Construction Started / Built	18
	In Design	7
SD	Construction Started / Built	1
	In Design	1
TN	Construction Started / Built	8
	In Design	2
TX	Construction Started / Built	30
	In Design	42
UT	Construction Started / Built	5
	In Design	8
VA	Construction Started / Built	7
	In Design	8
VT	Construction Started / Built	2
	In Design	10
WA	Construction Started / Built	63
	In Design	47
WI	Construction Started / Built	19
	In Design	15
WV	Construction Started / Built	2
WY	Construction Started / Built	2
	In Design	1

Considering mass timber for a project? Ask us anything.

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

Mass Timber Projects In Design and Constructed in the US (March 2021)



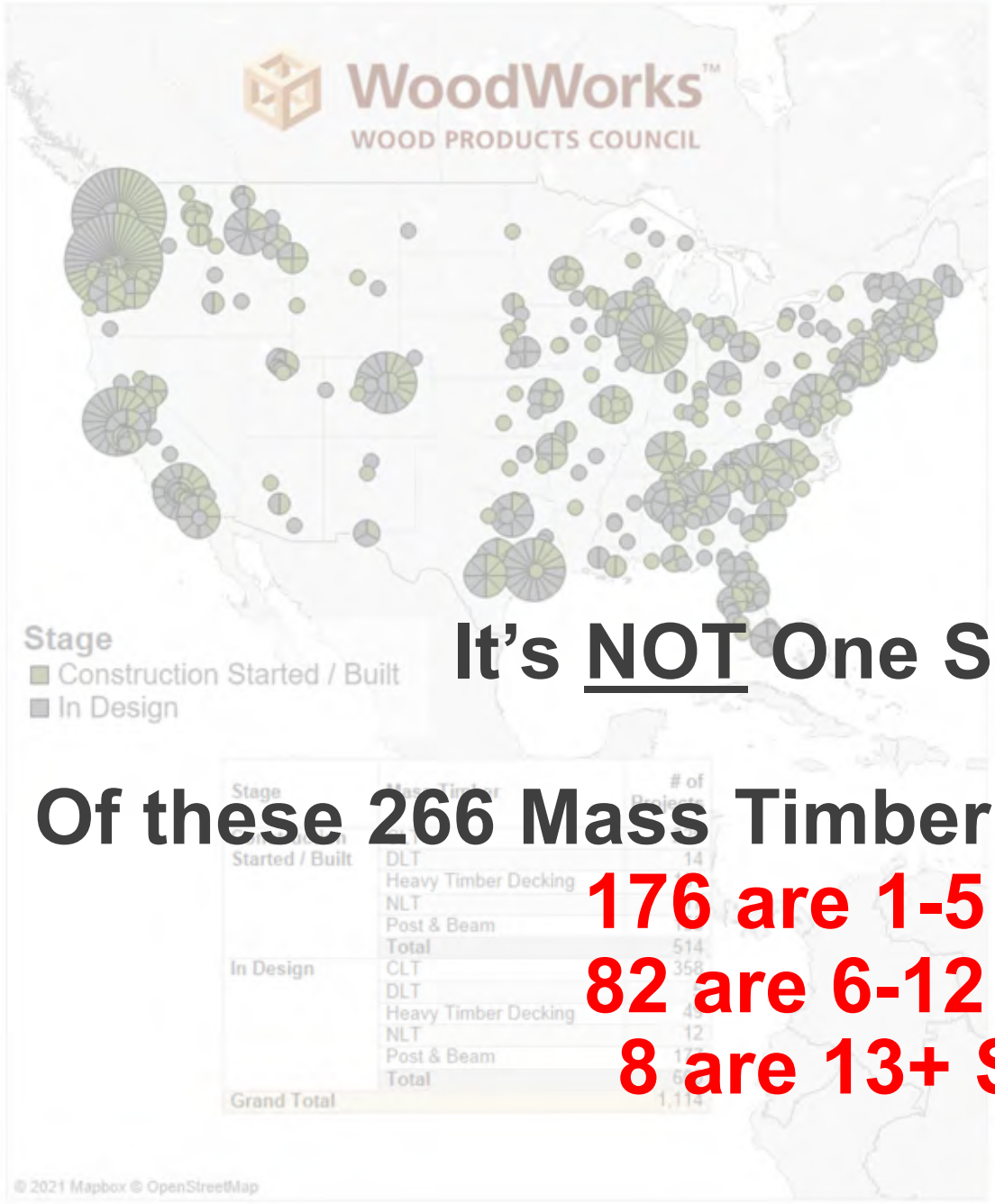
Stage	Mass Timber	Projects
Construction Started / Built	CLT	229
	DLT	14
	Heavy Timber Decking	101
	NLT	17
	Post & Beam	153
	Total	514
In Design	CLT	358
	DLT	5
	Heavy Timber Decking	49
	NLT	12
	Post & Beam	177
	Total	600
Grand Total		1,114

State	Stage		State	Stage	
AK	In Design	2	MS	Construction Started / Built	1
AL	Construction Started / Built	7		In Design	3
	In Design	13	MT	Construction Started / Built	10
AR	Construction Started / Built	6		In Design	12
	In Design	7	NC	Construction Started / Built	25
AZ	Construction Started / Built	2		In Design	27
	In Design	2	ND	In Design	1
CA	Construction Started / Built	67	NE	Construction Started / Built	3
	In Design	106		In Design	5
CO	Construction Started / Built	18	NH	Construction Started / Built	1
	In Design	20		In Design	3
CT	Construction Started / Built	6	NJ	Construction Started / Built	1
	In Design	7		In Design	10
DC	Construction Started / Built	5	NM	Construction Started / Built	1
	In Design	6		In Design	1
DE	Construction Started / Built	1	NV	In Design	1
FL	Construction Started / Built	19	NY	Construction Started / Built	12
	In Design	36		In Design	31
GA	Construction Started / Built	10	OH	Construction Started / Built	7
	In Design	22		In Design	9
HI	Construction Started / Built	2	OK	Construction Started / Built	2
	In Design	1		In Design	2
IA	Construction Started / Built	3	OR	Construction Started / Built	57
	In Design	4		In Design	21
ID	Construction Started / Built	5	PA	Construction Started / Built	6
	In Design	5		In Design	6
IL	Construction Started / Built	15	RI	Construction Started / Built	2
	In Design	14		In Design	2
IN	Construction Started / Built	3	SC	Construction Started / Built	18
	In Design	1		In Design	7
KS	Construction Started / Built	2	SD	Construction Started / Built	1
	In Design	3		In Design	1
KY	Construction Started / Built	4	TN	Construction Started / Built	8
	In Design	1		In Design	2
LA	Construction Started / Built	2	TX	Construction Started / Built	30
	In Design	2		In Design	42
MA	Construction Started / Built	23	UT	Construction Started / Built	5
	In Design	24		In Design	8
MD	Construction Started / Built	4	VA	Construction Started / Built	7
	In Design	5		In Design	8
ME	Construction Started / Built	3	VT	Construction Started / Built	2
	In Design	15		In Design	10
MI	Construction Started / Built	8	WA	Construction Started / Built	63
	In Design	3		In Design	47
MN	Construction Started / Built	8	WI	Construction Started / Built	19
	In Design	3		In Design	15
MO	Construction Started / Built	8	WV	Construction Started / Built	2
	In Design	8	WY	Construction Started / Built	2
				In Design	1

Of these 1,114 projects:
266 are Multi-Family (24%)

Considering mass timber for a project?
Ask us anything.

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



State	Stage	
AK	In Design	2
AL	Construction Started / Built	7
	In Design	13
AR	Construction Started / Built	6
	In Design	7
AZ	Construction Started / Built	2
	In Design	2
CA	Construction Started / Built	67
	In Design	106
CO	Construction Started / Built	18
	In Design	20
CT	Construction Started / Built	6
	In Design	7
DC	Construction Started / Built	5
	In Design	6
DE	Construction Started / Built	1
FL	Construction Started / Built	19
	In Design	36
GA	Construction Started / Built	10
	In Design	22
HI	Construction Started / Built	2
	In Design	1
IA	Construction Started / Built	3
	In Design	4
ID	Construction Started / Built	5
	In Design	5
IL	Construction Started / Built	15
	In Design	14
IN	Construction Started / Built	3
	In Design	1
KS	Construction Started / Built	2
	In Design	3
KY	Construction Started / Built	4
	In Design	1
LA	Construction Started / Built	2
	In Design	2
MA	Construction Started / Built	23
	In Design	34
MD	Construction Started / Built	4
	In Design	5
ME	Construction Started / Built	1
MI	Construction Started / Built	5
	In Design	9
MN	Construction Started / Built	11
	In Design	3
MO	Construction Started / Built	8
	In Design	8

State	Stage	
MS	Construction Started / Built	1
	In Design	3
MT	Construction Started / Built	10
	In Design	12
NC	Construction Started / Built	25
	In Design	27
ND	In Design	1
NE	Construction Started / Built	3
	In Design	5
NH	Construction Started / Built	1
	In Design	3
NJ	Construction Started / Built	1
	In Design	10
NM	Construction Started / Built	1
	In Design	1
NV	In Design	1
NY	Construction Started / Built	12
	In Design	31
OH	Construction Started / Built	7
	In Design	9
OK	Construction Started / Built	2
	In Design	2
OR	Construction Started / Built	57
	In Design	21
PA	Construction Started / Built	6
	In Design	6
RI	Construction Started / Built	2
	In Design	2
SC	Construction Started / Built	18
	In Design	7
SD	Construction Started / Built	1
	In Design	1
TN	Construction Started / Built	8
	In Design	2
TX	Construction Started / Built	30
	In Design	42
UT	Construction Started / Built	5
	In Design	8
VA	Construction Started / Built	7
	In Design	8
VT	Construction Started / Built	2
	In Design	10
WA	Construction Started / Built	63
	In Design	47
WI	Construction Started / Built	19
	In Design	15
WV	Construction Started / Built	2
WY	Construction Started / Built	2
	In Design	1

Stage	Mass Timber	# of Projects
Started / Built	DLT	14
	Heavy Timber Decking	
	NLT	
	Post & Beam	
	Total	514
In Design	CLT	358
	DLT	
	Heavy Timber Decking	4
	NLT	12
	Post & Beam	1
	Total	6
Grand Total		1,114

It's NOT One Size Fits All:

Of these 266 Mass Timber Multi-Family Projects:

176 are 1-5 Stories
82 are 6-12 Stories
8 are 13+ Stories

mass timber for a project?
Ask us anything.
support, contact:
help@woodworks.org
woodworks.org/project-assistance

MASS TIMBER IN MULTI-FAMILY

EVOLUTION OR REVOLUTION?

EVOLUTION

INCREMENTAL CHANGE

REVOLUTION

TRANSFORMATIONAL CHANGE

HYBRID LIGHT-FRAME + MASS TIMBER

CONDOS AT LOST RABBIT, MS

Lost Rabbit, MS
Credit: Everett Consulting Group

THE POSTMARK APARTMENTS, SHORELINE, WA

Credit: Katerra, Hans-Erik Blomgren

CIRRUS, DENVER, CO

Credit: KL&A Engineers & Builders

CANYONS, PORTLAND, OR

Credit: Jeremy Bittermann & Kaiser + Path

PROJECT ONE, OAKLAND, CA

Credit: Gurnet Point

WESSEX WOODS, PORTLAND, ME

Credit: Avesta Housing

Photo: Ema Peter

POST, BEAM + PLATE

360 WYTHE AVENUE, BROOKLYN, NY

Credit: Flank

BARRACUDA CONDOS, MADISON, WI

Credit: Populance Architecture and Development

11 E LENOX, BOSTON, MA

Credit: Monte French Design Studio

CARBON 12, PORTLAND, OR

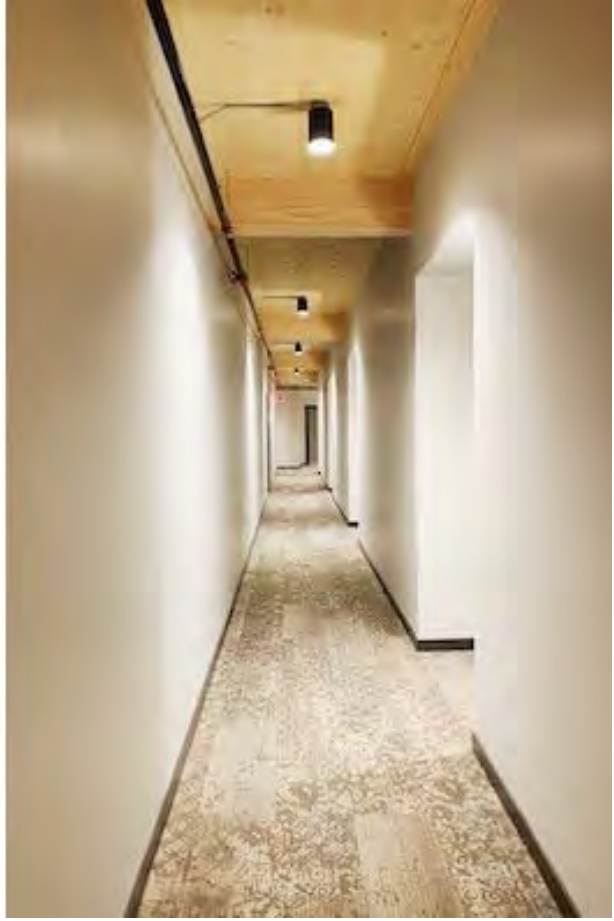
Credit: Baumberger Studio/PATH Architecture

Photo: Lendlease

MASS TIMBER BEARING WALLS

Model C, Roxbury, MA

Credit: John Klein, Generate Architecture



Left: 69 A Street, Boston, MA Credit: Greg Folkins
Above: Timber Lofts, Milwaukee, WI
Credit: ADX Creative and Engberg Anderson Architects

VERTICAL ADDITIONS AND ADAPTIVE REUSE

BREWERY LOFTS, TACOMA, WA

Brewery Lofts, Flynn Architecture, Eclipse Engineering, photos: Brewery Blocks Tacoma, SmartLam

TIMBER LOFTS
MILWAUKEE, WI

ANN PIEPER EISENBROWN
OWNER/PRESIDENT | PIPER PROPERTIES
TIMBER LOFTS

"Mass timber shaved 20% off our construction schedule. It's a renewable resource and also creates that warm look."

Source: Think Wood

Source: ADX Creative and Engberg Anderson Architects

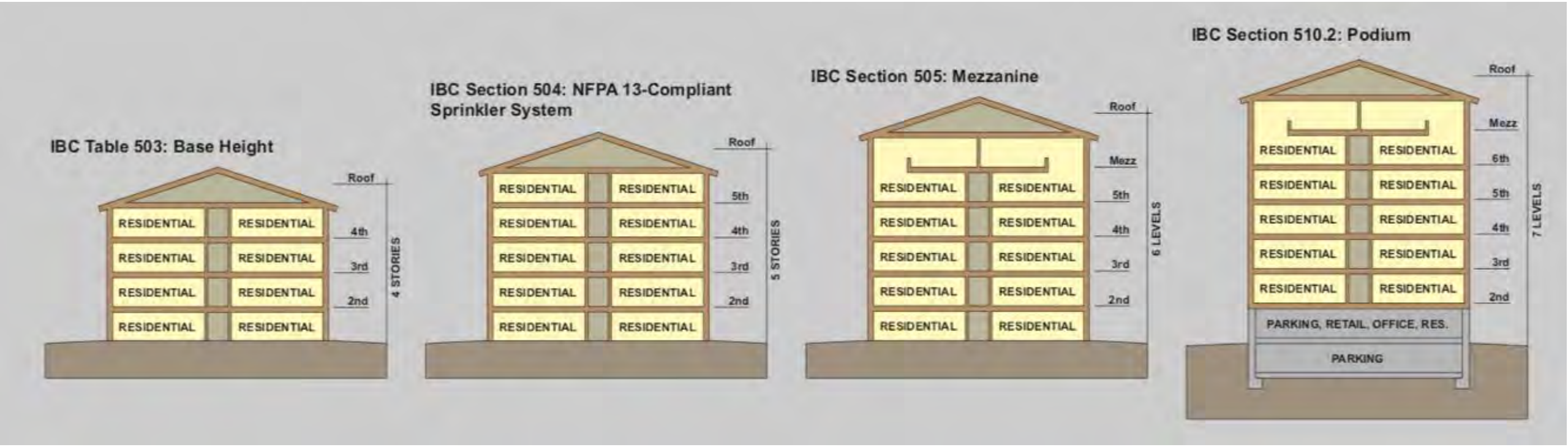
EVOLUTION

INCREMENTAL CHANGE

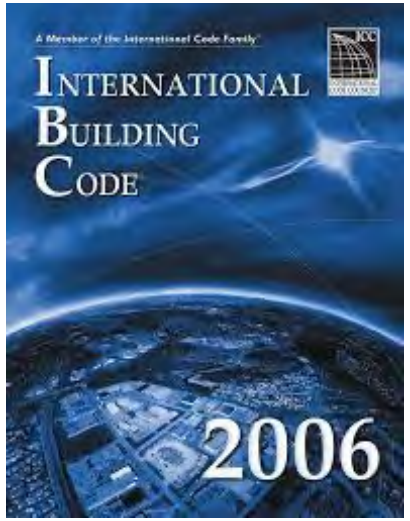
REVOLUTION

TRANSFORMATIONAL CHANGE

PRESCRIPTIVE BUILDING CODES



3 YEAR CODE CYCLE



Source: ICC

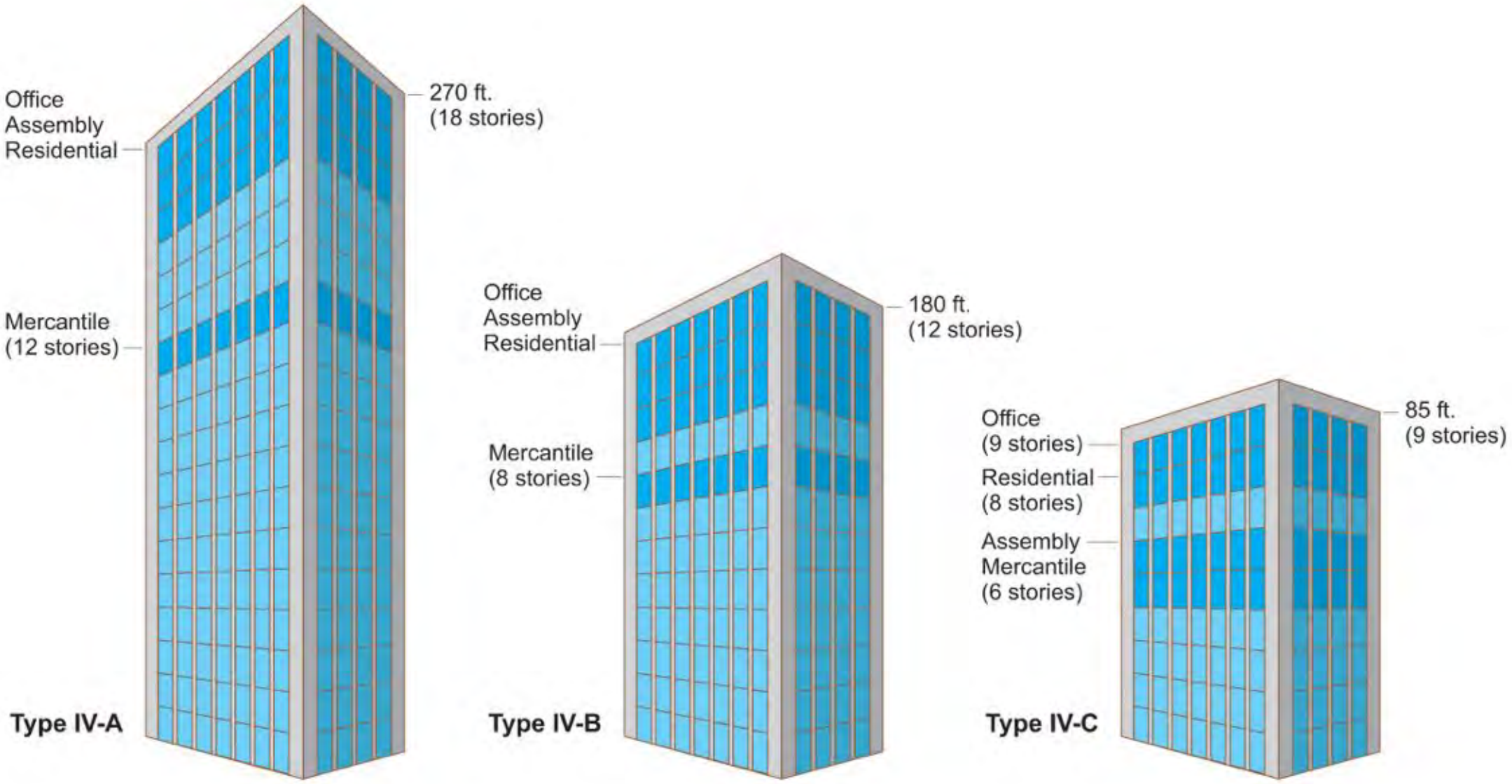
ATF Lab Tests, 2017
Photo: LendLease

ATF Lab Tests, 2017
Photo: LendLease

ATF Lab Tests, 2017
Photo: LendLease

ATF Lab Tests, 2017
Photo: LendLease

PRESCRIPTIVE BUILDING CODES

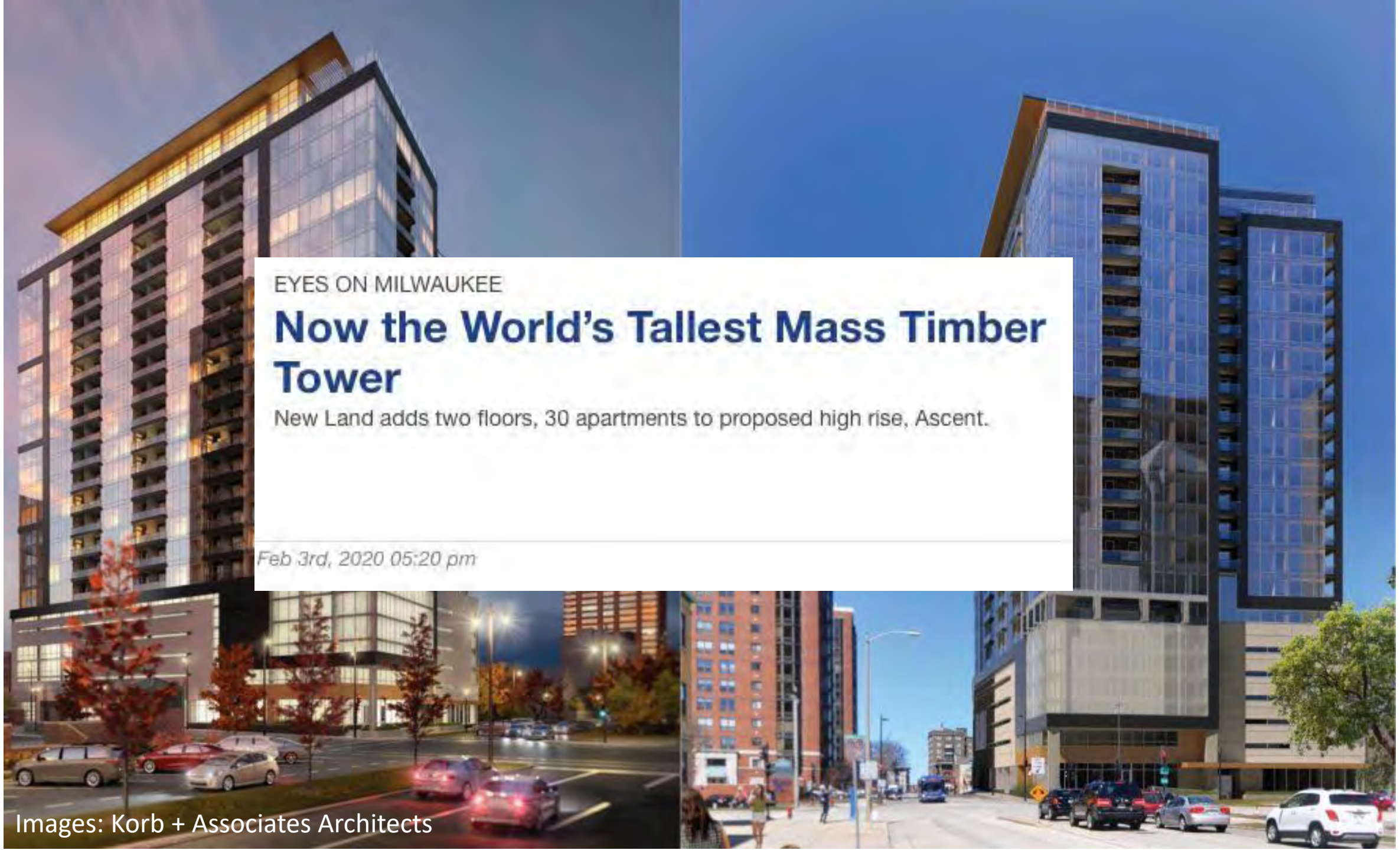


INTRO, CLEVELAND

9 Stories | 115 ft
8 Timber Over 1 Podium

512,000 SF
297 Apartments, Mixed-Use

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



EYES ON MILWAUKEE

Now the World's Tallest Mass Timber Tower

New Land adds two floors, 30 apartments to proposed high rise, Ascent.

Feb 3rd, 2020 05:20 pm

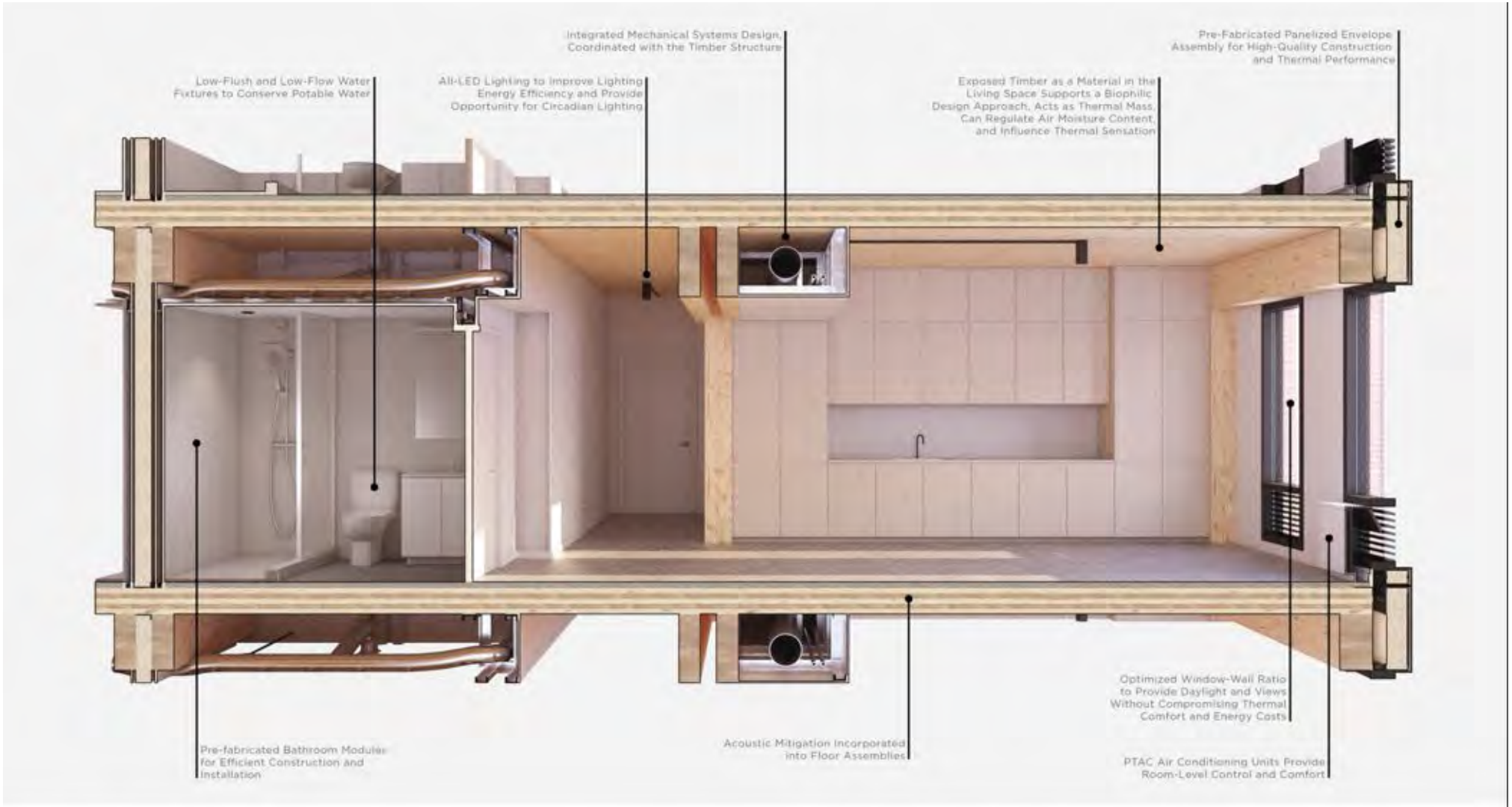
Images: Korb + Associates Architects

RISE Tests, 2020
Photo: RISE

KEY DESIGN CONSTRAINTS

ACME Timber, New Haven, CT Credit: Grey Organschi Architecture

MEP SYSTEMS, ROUTING, INTEGRATION



INTEGRATED SYSTEMS

The Tallhouse building system prioritizes the integration of design, engineering, and construction. This results in a high performance building finely tuned to meet energy, comfort, acoustic, and design criteria that has been vetted by constructability experts to ensure fast, efficient production.

Utilizing Pre-Fabricated Facade Panels and Bathroom Modules that are manufactured off-site in factories allows for reducing construction time on-site, higher quality control practices, and safer labor conditions for construction workers. Efficient routing of duct-work conserves material and associated embodied carbon, allowing more exposed timber all while providing the air quality needed for healthy living. Water conserving fixtures reduce potable water use as a precious resource, while maintaining reliable performance.

Credit: John Klein, Generate Architecture

ACOUSTICS

Railyard Flats, Sioux Falls, SD Credit: WoodWorks

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

WoodWorks

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[c] ASTC	47[c] AIIC	1
			LVT	-	49[c] AIIC	
			Carpet + Pad	-	75[c] AIIC	
			LVT on Acousti-Top®	-	52[c] AIIC	
			Eng Wood on Acousti-Top®	-	51[c] AIIC	
		Maxxon Acousti-Mat® ¾ Premium	None	49[c] ASTC	45[c] AIIC	
			LVT	-	47[c] AIIC	
			LVT on Acousti-Top®	-	49[c] AIIC	
	1-1/2" Levelrock® Brand 2500	USG SAM N2S Ultra	None	45[b]	39[b]	15
			LVT	48[b]	47[b]	16
			LVT Plus	48[b]	49[b]	58
			Eng Wood	47[b]	47[b]	59
			Carpet + Pad	45[b]	67[b]	60
			Ceramic Tile	50[b]	46[b]	61
		Soprema® Insonomat	None	45[b]	42[b]	15
			LVT	48[b]	44[b]	16
			LVT Plus	48[b]	47[b]	58
			Eng Wood	47[b]	45[b]	59
			Carpet + Pad	45[b]	71[b]	60
			Ceramic Tile	50[b]	46[b]	61
		USG SAM N7S Ultra	None	45[b]	38[b]	15
			LVT	48[b]	47[b]	16
			LVT Plus	48[b]	49[b]	58
			Eng Wood	47[b]	49[b]	59

FIRE RESISTANCE, CONSTRUCTION TYPE, GRID

	Construction Type (All Sprinklered Values)							
	IV-A	IV-B	IV-C	IV-HT	III-A	III-B	V-A	V-B
Occupancies	Allowable Building Height above Grade Plane, Feet (IBC Table 504.3)							
A, B, R	270	180	85	85	85	85	70	60
	Allowable Number of Stories above Grade Plane (IBC Table 505.4)							
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 Factor (At) for SM, Feet^2 (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

Panel	Example Floor Span Ranges
3-ply CLT (4-1/8" thick)	Up to 12 ft
5-ply CLT (6-7/8" thick)	14 to 17 ft
7-ply CLT (9-5/8")	17 to 21 ft
2x4 NLT	Up to 12 ft
2x6 NLT	10 to 17 ft
2x8 NLT	14 to 21 ft
5" MPP	10 to 15 ft


Credit: David Barber, ARUP


Carbon 12, Portland, OR Credit: Kaiser+Path

The challenge is not in learning how to accept change, but in how to orchestrate the most efficient change

Carbon12, Portland, OR Credit: Kaiser + Path

Mass Timber in Multi-Family Housing: Is it a Good Fit for Your Project?

There's a good chance it is…Let's talk about it!

Credit: D/O Architects

QUESTIONS?

This concludes The American Institute of Architects Continuing Education Systems Course

Ricky McLain, PE, SE

WoodWorks – The Wood Product Council

Ricky.Mclain@woodworks.org

Copyright Materials

in Mass Timber and Light-Frame Hybrid Systems in Multi-Family Buildings: **THE CANYONS**

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

Scott Noble, AIA Kaiser + Path
scott@kaiserpath.com
July 14, 2021

The Radiator

Kaiser + Path

2015

Carbon 12

Kaiser + Path
2018

buildingcarbon12.com

Tallest Mass Timber Structure
in the United States.
…as of now

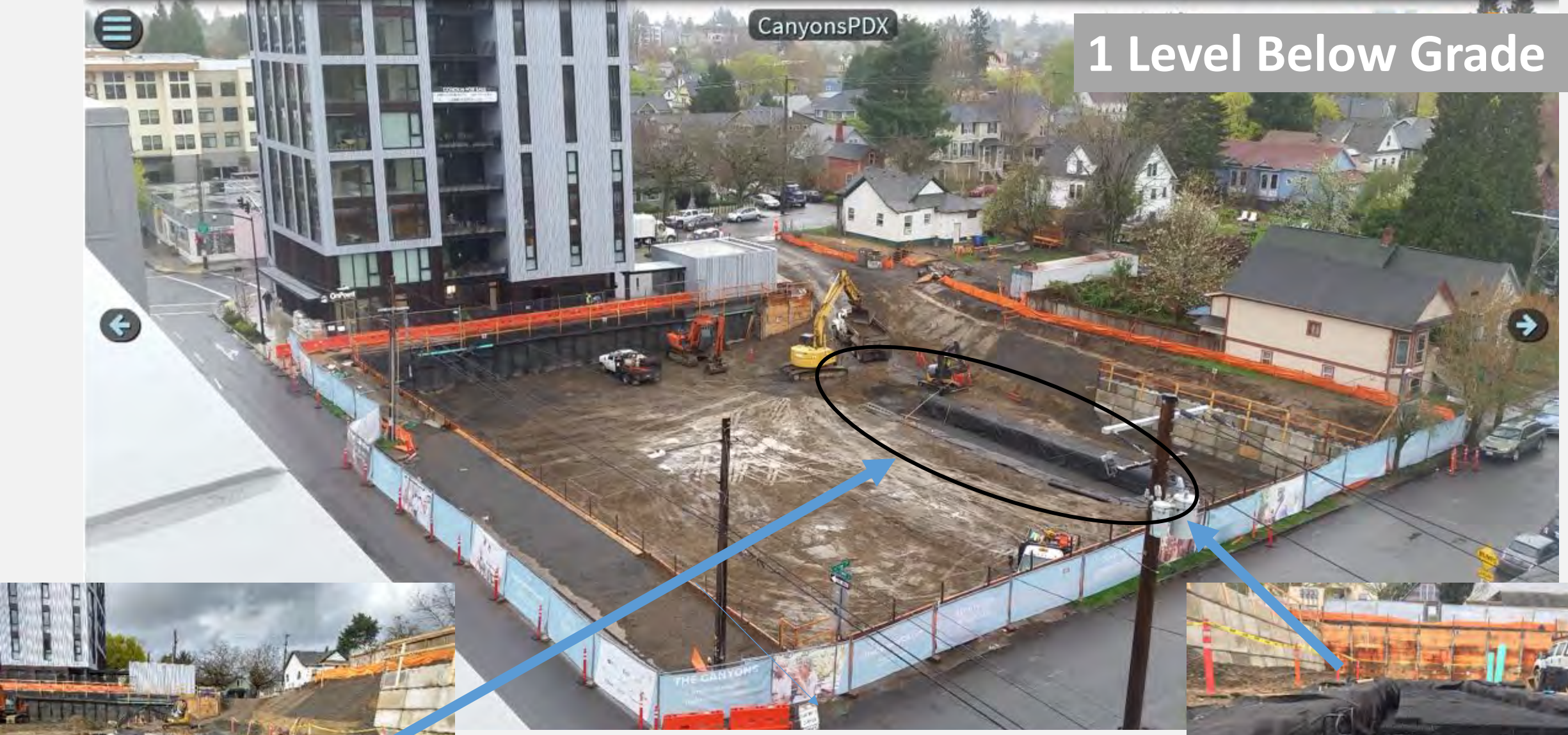
The Canyons

Kaiser + Path

2020

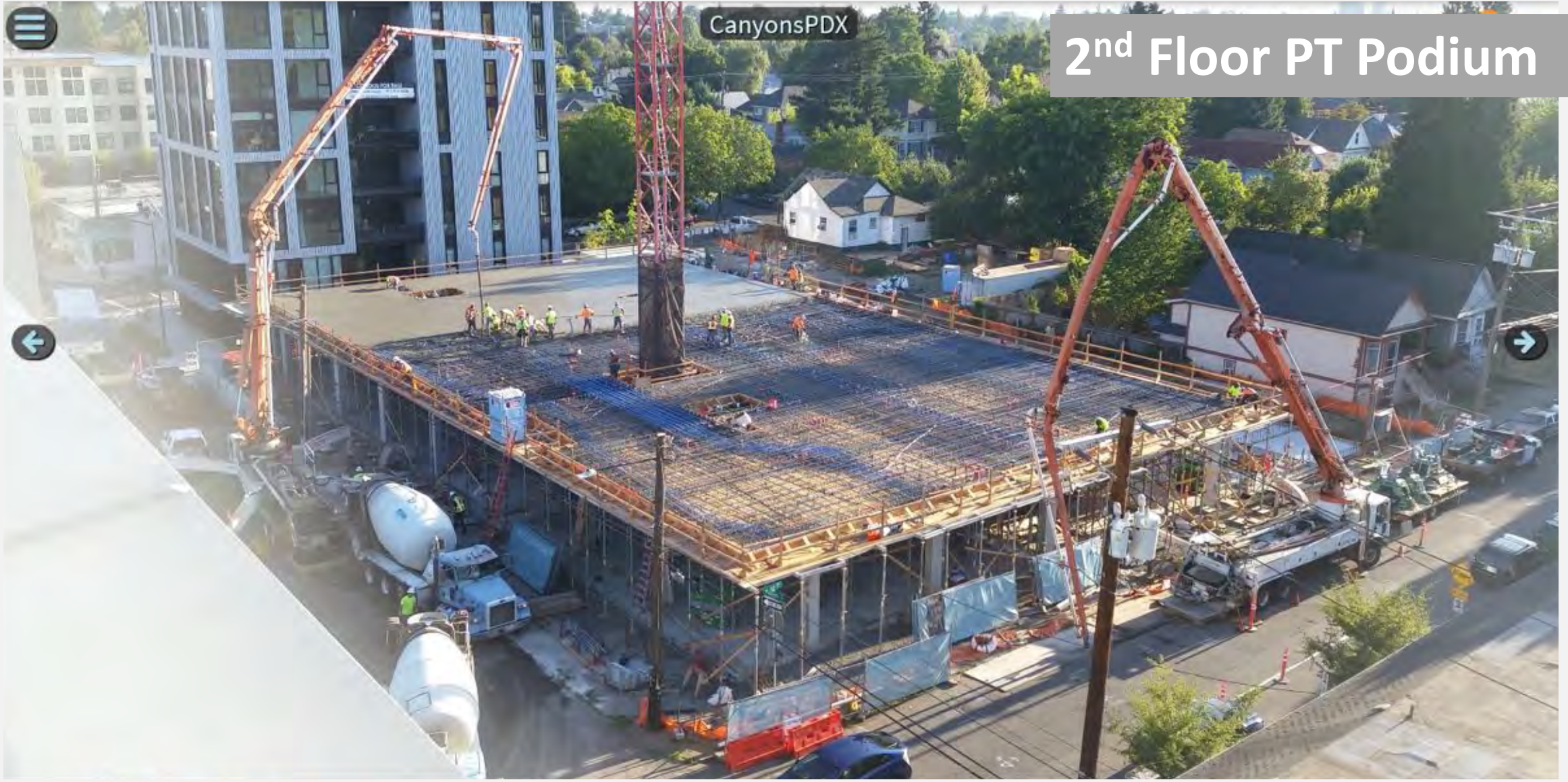
THE BIG PICTURE

1 Level Below Grade



Ground Level PT Slab

2nd Floor PT Podium



2nd Floor Wall Framing

First Canyons CLT Flies In

3rd Floor CLT

3rd Floor Wall Framing


CanyonsPDX
4th Floor CLT


CanyonsPDX
5th Floor CLT
SLOW

6th Floor CLT

Roof CLT

Scaffold and Wrap

Full Wrap

The Unveiling

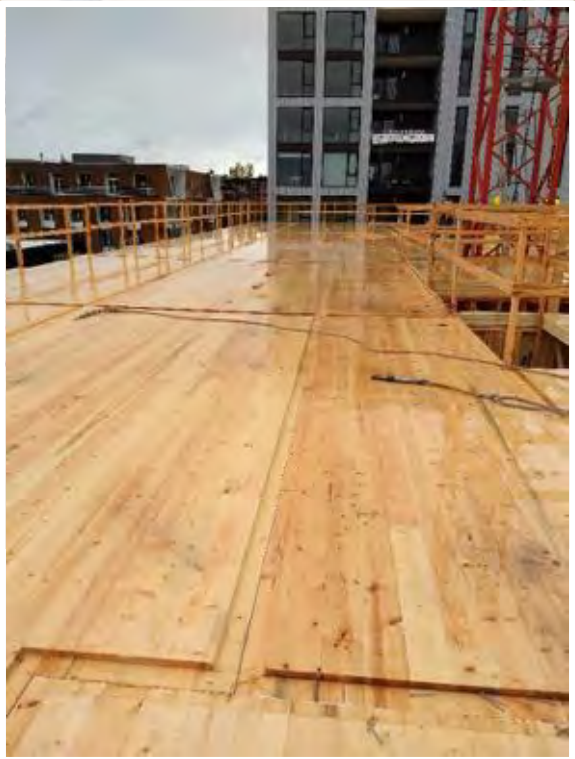
Completion

The Canyons
A FEW DETAILS

Framing

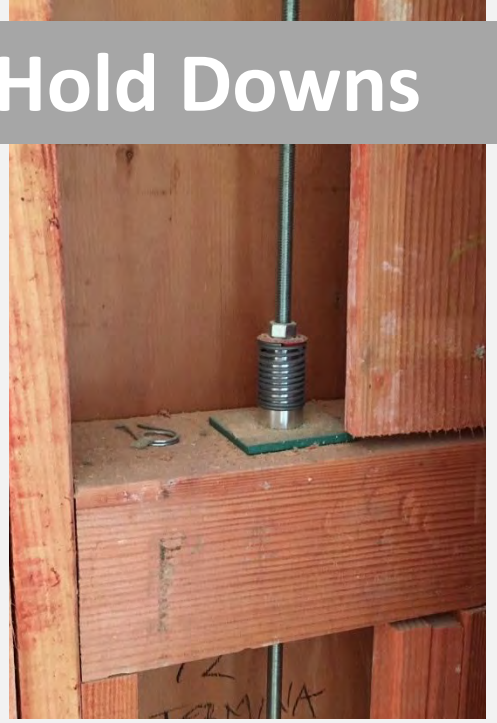
Photo: Marcus Kauffman

Moisture Concerns



Prefabrication of Stud Packs

Anchor Bolts and Full Height Hold Downs



The Atrium

Photo: Jeremy Bitterman

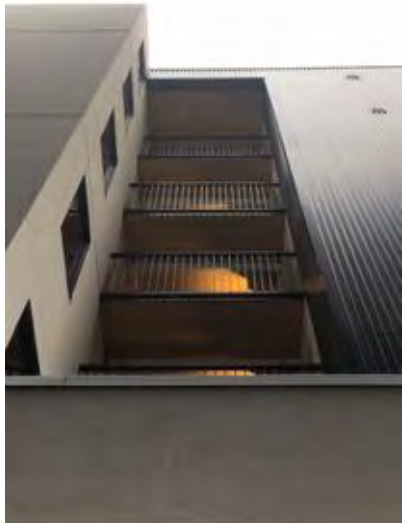
Unit Finishes

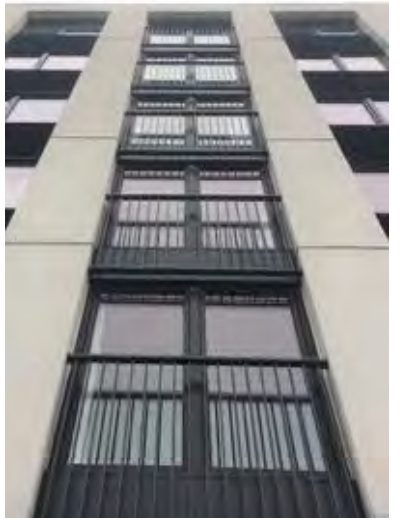
Photo: Jeremy Bitterman

Exterior Spaces

Photo: Jeremy Bitterman

Photo: Jeremy Bitterm





The Canyons
THE MONEY

Photo: Jeremy Bitterman

COST

Material
Labor
General Conditions
Overhead
Contingency
Escalation

VALUE

Construction Duration
Loan Rates
Leasability
Leasing Rates
Value at Sale
Market Differentiation

Building Value vs Building Cost.

The Canyons – CLT vs Light Framing

Base Design – All CLT floor

- 5 ply 139V CLT panels at 10’ spans
- 5 ply 175E CLT panels at 20’ spans
- Drywall soffits where required to provide horizontal MEP chases (highlighted areas)

Building Value vs Building Cost.

The Canyons – CLT vs Light Framing

Partial Change to Light Framing

• Delete 139V CLT at 10’ spans	save $320,000
• Savings in Plumbing	save $49,600
• I-Joist framing at all 10’ spans	add $223,200
• Additional soffits (frame/gwb/paint)	add $179,200
• 3 weeks added general conditions	add $48,800
• SUB TOTAL ADD	$81,600
• 3 weeks added carrying costs	add $60,000
• TOTAL BUILDING COST ADD	$141,600

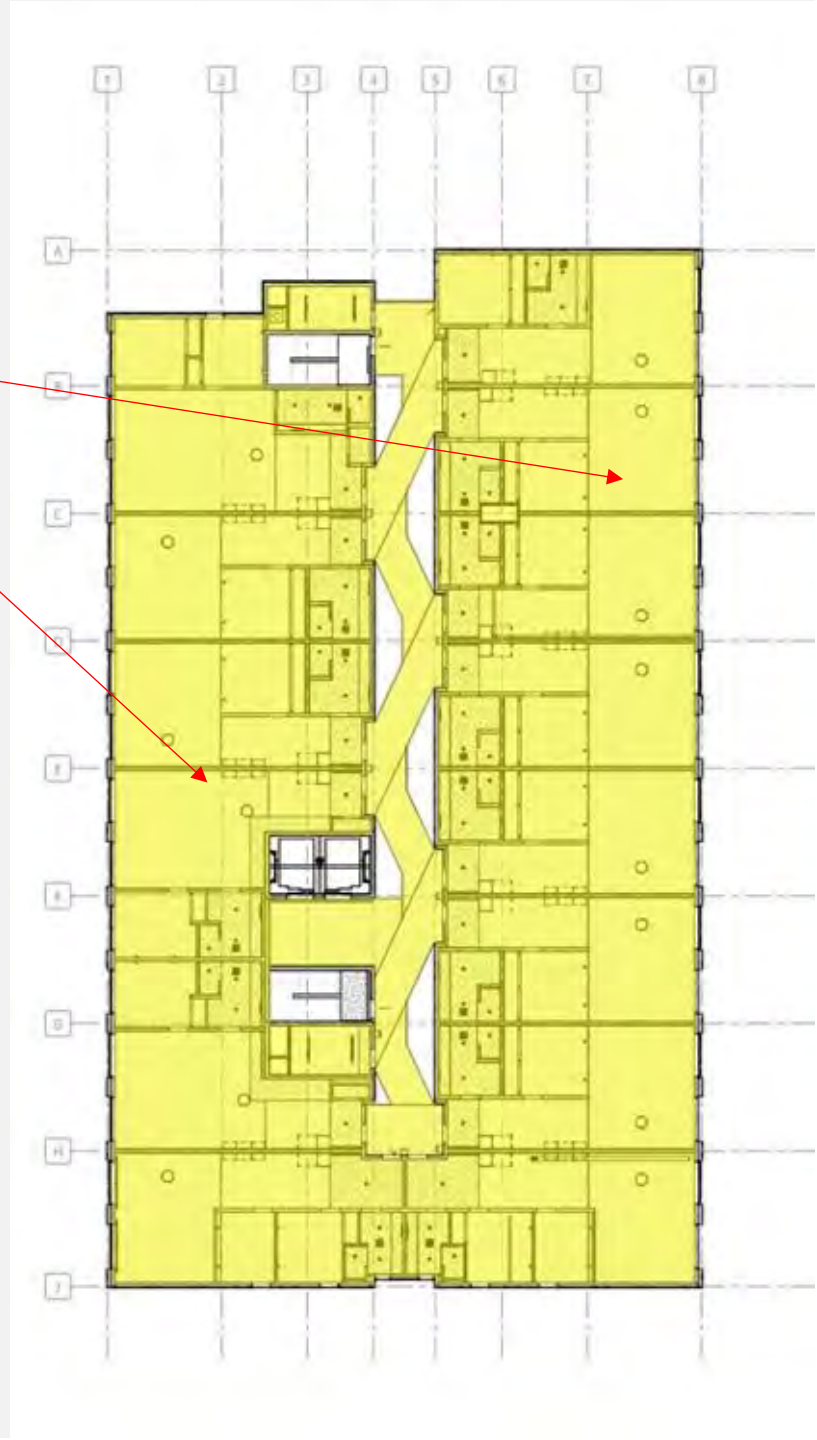
Building Value vs Building Cost.

The Canyons – CLT vs Light Framing

SOURCE: KGI Internal

Total Change to Light Framing

• Delete all CLT	save $1,194,500
• Savings in Plumbing	save $49,600
• I-Joist framing throughout	add $440,500
• Additional soffits (frame/gwb/paint)	add $344,000
• 5 weeks added general conditions	add $81,000
• SUB TOTAL BUILDING COST SAVINGS	$378,600
• 5 weeks added carrying cost	add $100,000
• TOTAL BUILDING COST SAVINGS	$278,600



Building Value vs Building Cost.

The Canyons – CLT vs Light Framing

SOURCE: KGI Internal

Total Change to Light Framing

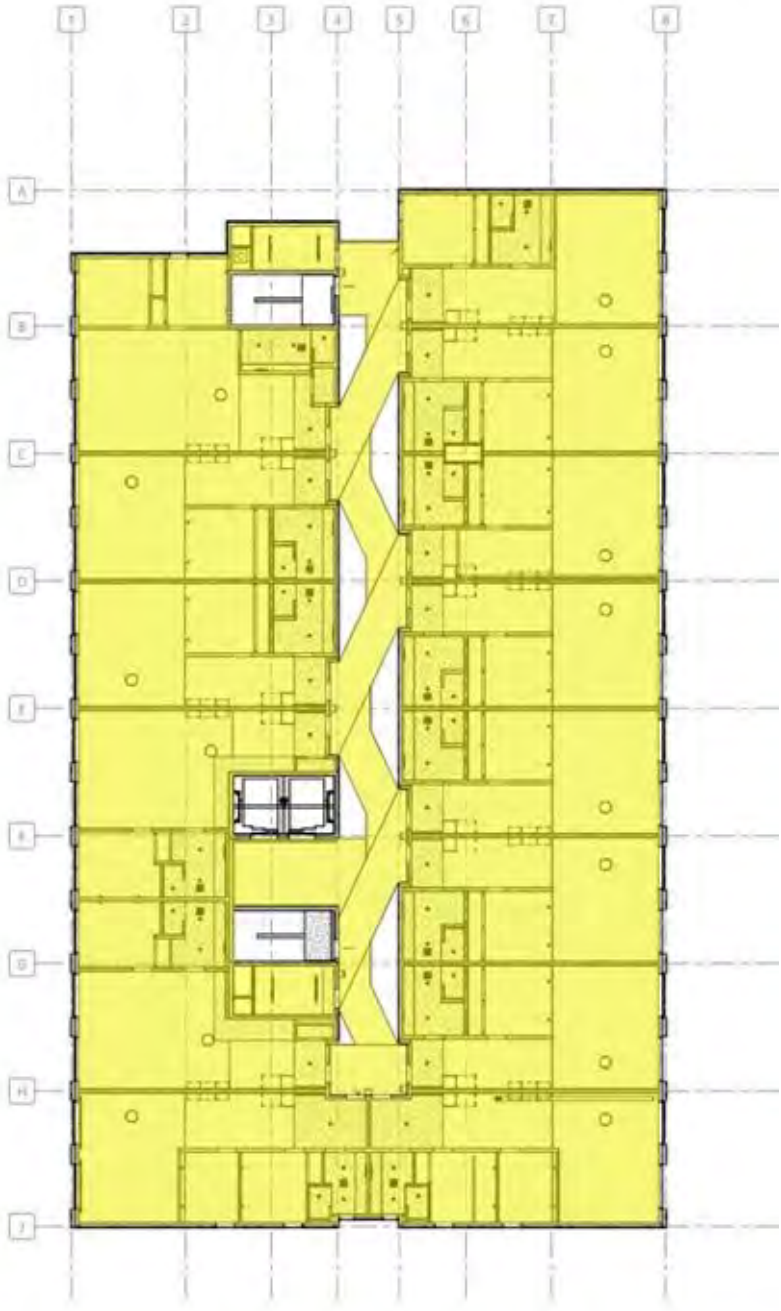
- **TOTAL BUILDING COST SAVINGS save $278,600**

Value Lost

- Ceiling height reduced 6” or building height decreased by 30”
- Potential to loose a floor. We are at max height limit.
- Loss of exposed wood ceilings.
- Lower lease rates
- Market differentiation

Building Value vs Building Cost.

The Canyons – CLT vs Light Framing



Total Change to Light Framing

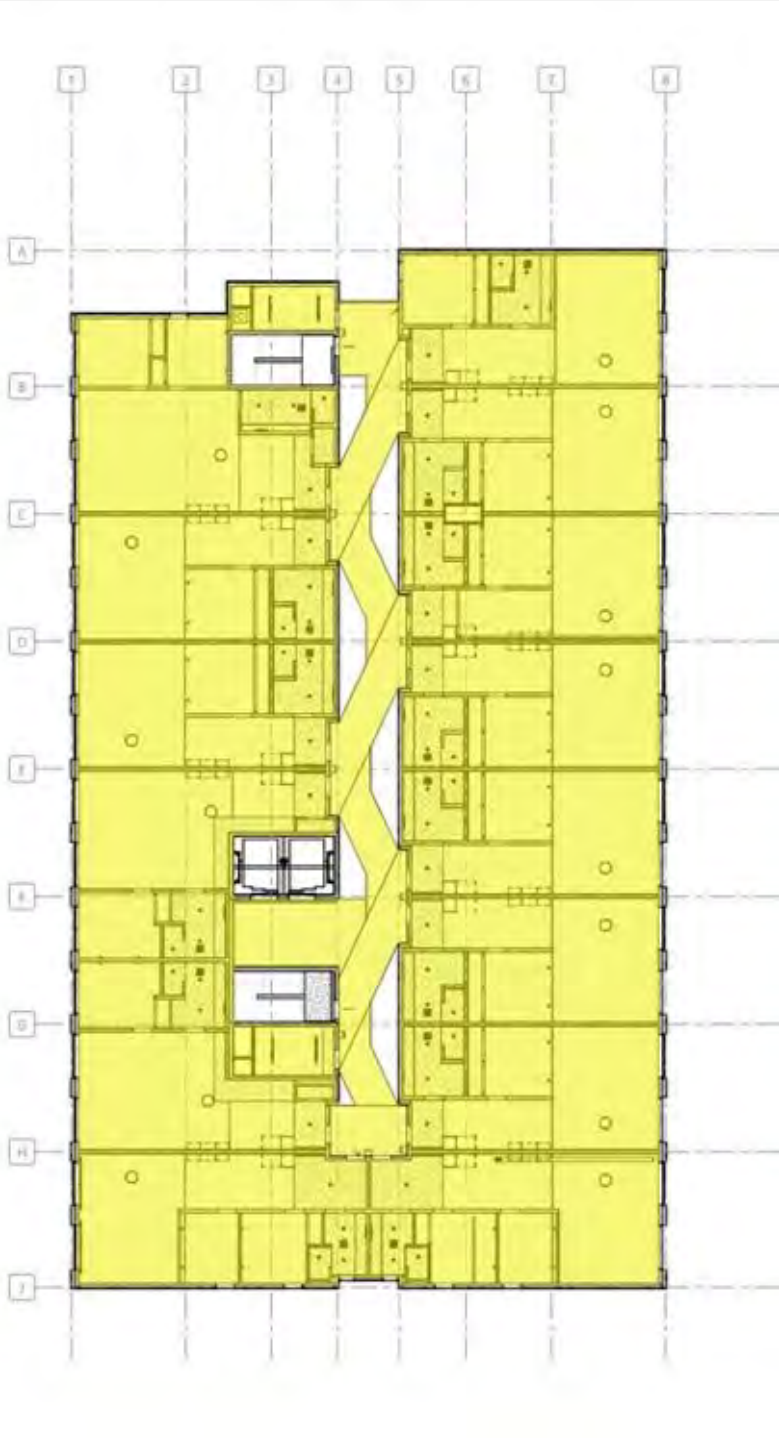
- **TOTAL BUILDING COST SAVINGS** **save $278,600**

Value Lost

- **$0.12** / sf apartment lease reduction (3 ½%)
- **$7,668** / monthly gross rental income reduction
- **$92,255** / year gross rental income reduction

Building Value vs Building Cost.

The Canyons – CLT vs Light Framing



SOURCE: KGI Internal

Total Change to Light Framing

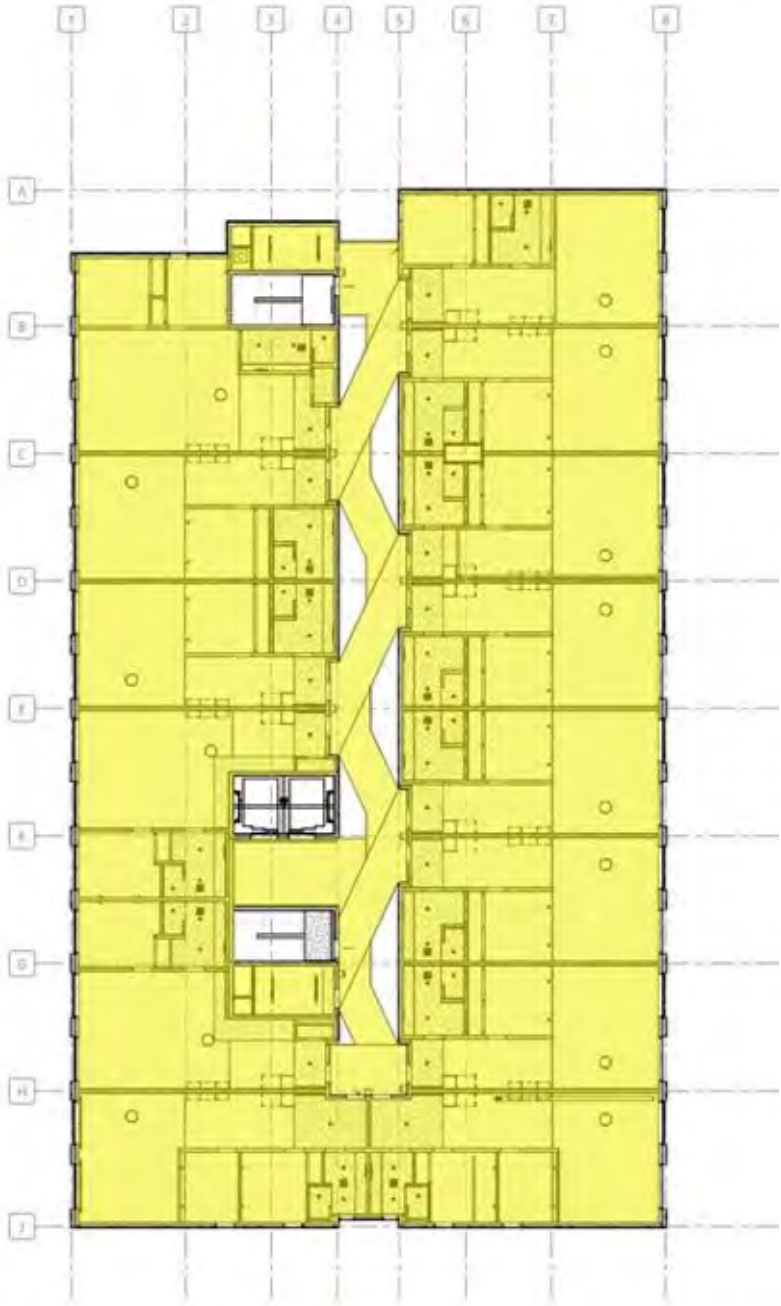
- TOTAL BUILDING COST SAVINGS save $278,600

Value Lost

- $0.12 / sf apartment lease reduction (3 ½%)
- $7,668 / monthly gross rental income reduction
- $92,225 / year gross rental income reduction
- **$1,752,843 value loss at sale** (5.0% cap, year 0)

Building Value vs Building Cost.

The Canyons – CLT vs Light Framing



SOURCE: KGI Internal

Building Value vs Building Cost.

The Canyons – CLT WINS !!

A Drag Race: CLT vs PT Concrete

L2 Post-Tension Concrete Slab
Day 1

L4 Cross-Laminated Timber Panels & Light Frame Walls
Day 1

The Canyons
Portland, OR

Kaiser+PATH

thank you

Come Build With Us
www.kaiserpath.com

Interested in The Canyons
www.thecanyonspdx.com

Scott Noble, AIA
Kaiser + Path
scott@kaiserpath.com

It’s Built for Speed . . .
Watch the Concrete vs CLT Drag Race:
www.kaiserpath.com/why-wood