

A Mass Timber Breakthrough?

Aligning the Pieces for Timber Construction in the Northeast



Photo: William Horne



Photo: ©Albert Vecerka/Esto

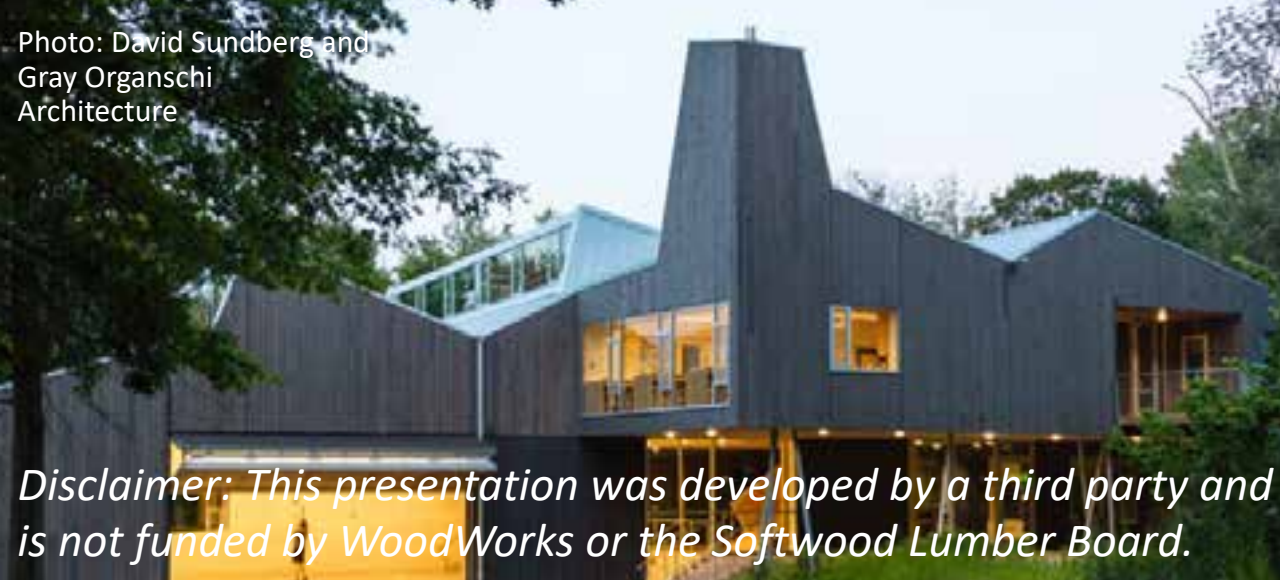


Photo: David Sundberg and
Gray Organschi
Architecture



Photo: Robert Benson Photography

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Closing Panel:
Dan Burne, Thornton Tomasetti
Matt Tonello, Consigli Construction
Naomi Beal, passivhausMAINE
Noel Johnson, Cairn Pacific
Scott Barton-Smith, Hacker Architects



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



Course Description

There has been no lack of interest in using innovative mass timber products and technologies in the northeast. The combination of environmentally-minded designers, sustainably managed forests, timber framing pedigree, and desire to create structures that connect with nature has pushed the northeast closer and closer to a mass timber breakthrough. Any yet, while several mass timber projects have been built, others have advanced through phases of design only to be switched in the end to more traditional construction materials. This dynamic panel of speakers, including design and construction professionals from both Portlands (Maine and Oregon), will explore factors that have caused some mass timber projects to be built in other materials, what led to the success of others, and what we can collectively do to advance the use of mass timber in the northeast and beyond.

Learning Objectives

1. Discuss available forest resources in the state of Maine and highlight the potential for sustainably utilizing these resources in mass timber production.
2. Assess the benefits of mass timber construction, including those related to occupant health, carbon reduction, schedule, labor, and waste reduction.
3. Review aspects of mass timber design, including fire resistance and energy efficiency, and explore applications for its use under current building codes.
4. Examine factors behind the success of some mass timber projects with an emphasis on cost, design team experience, building official/plan reviewer interaction, and code interpretation/compliance.

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in the Northeast

Dan Burne, PE

Vice President, Thornton Tomasetti / Becker Structural Engineers

dan@beckerstructural.com

Thornton Tomasetti

Dan Burne, PE

Thornton Tomasetti



Photo: Robert Benson


$$\frac{1}{10} \approx 0.1$$
 $10^2 \times 10^3$

GIRDER SLAB

BASE DESIGN
(8" PRECAST PLANK W/2" CONC TOPPING)

PLANK WITH DROPPED BEAMS

(8" PRECAST PLANK W/2" CONC TOPPING)

PEDESTAL SLAB

(4 1/2" CONC SLAB ON 3" STL DECK
(7 1/2" TOTAL), W/CLT BRD WALLS &
CLT SLABS)

STEEL FRAME COMP BEAMS

(3 1/2" CONC SLAB ON 2" STL DECK
(5 1/2" TOTAL))

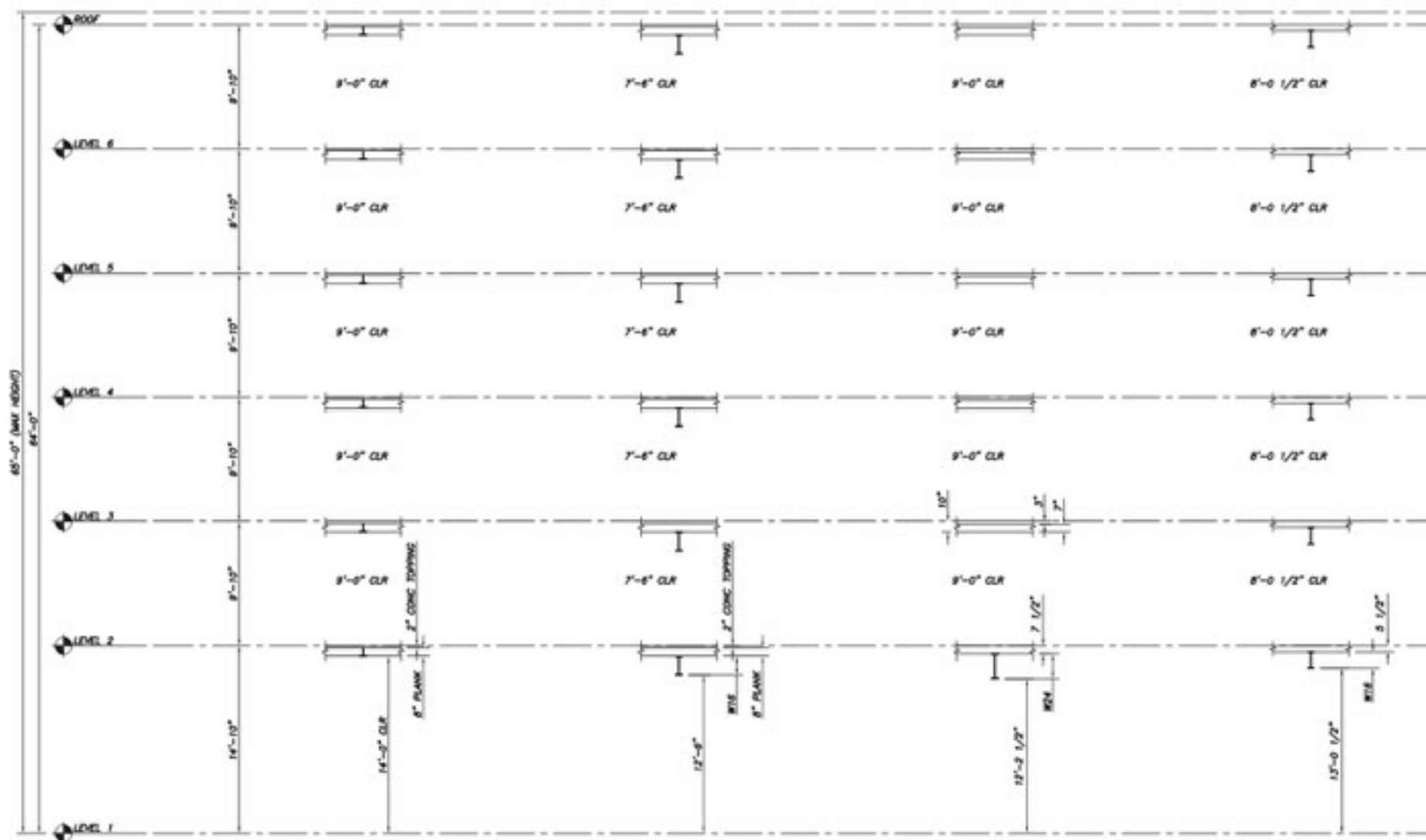






Photo Credit: myficon



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> A MASS TIMBER BREAKTHROUGH?

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Matt Tonello

Consigli Construction

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A CONSTRUCTION MANAGER'S ONE BIG THING FOR MASS TIMBER



EXPERIENCE WITH MASS TIMBER BATES COLLEGE BOATHOUSE



EXPERIENCE WITH MASS TIMBER SHAILIN LIU PERFORMANCE CENTER



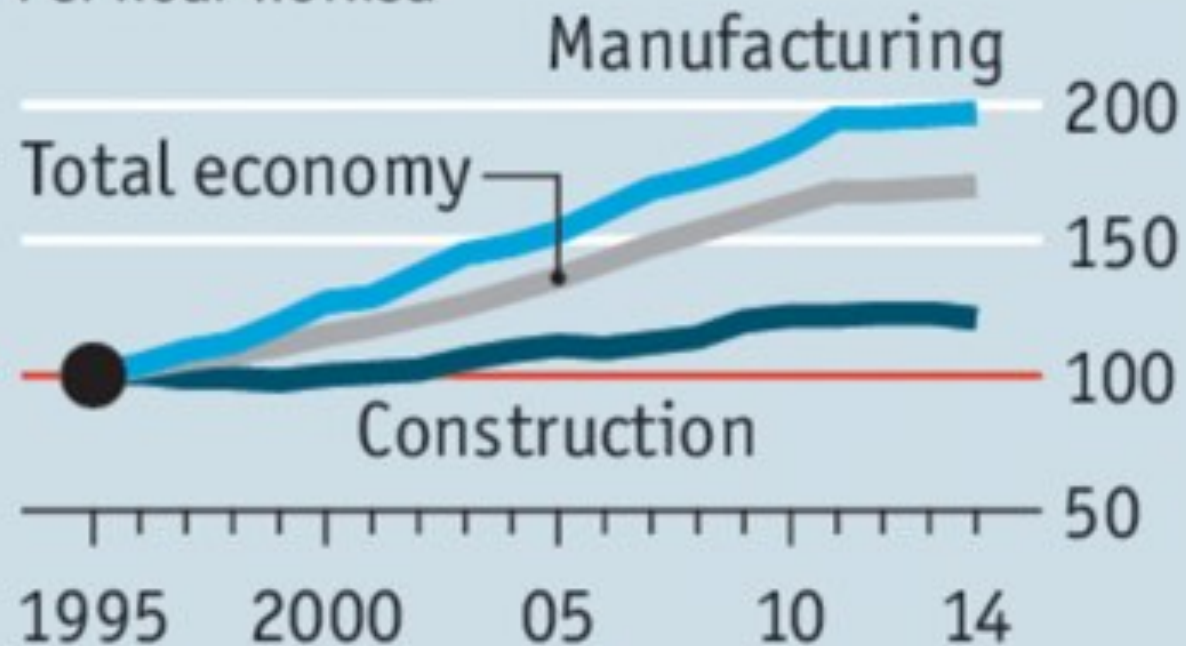
EXPERIENCE WITH MASS TIMBER SUMMER STAR WILDLIFE SANCTUARY



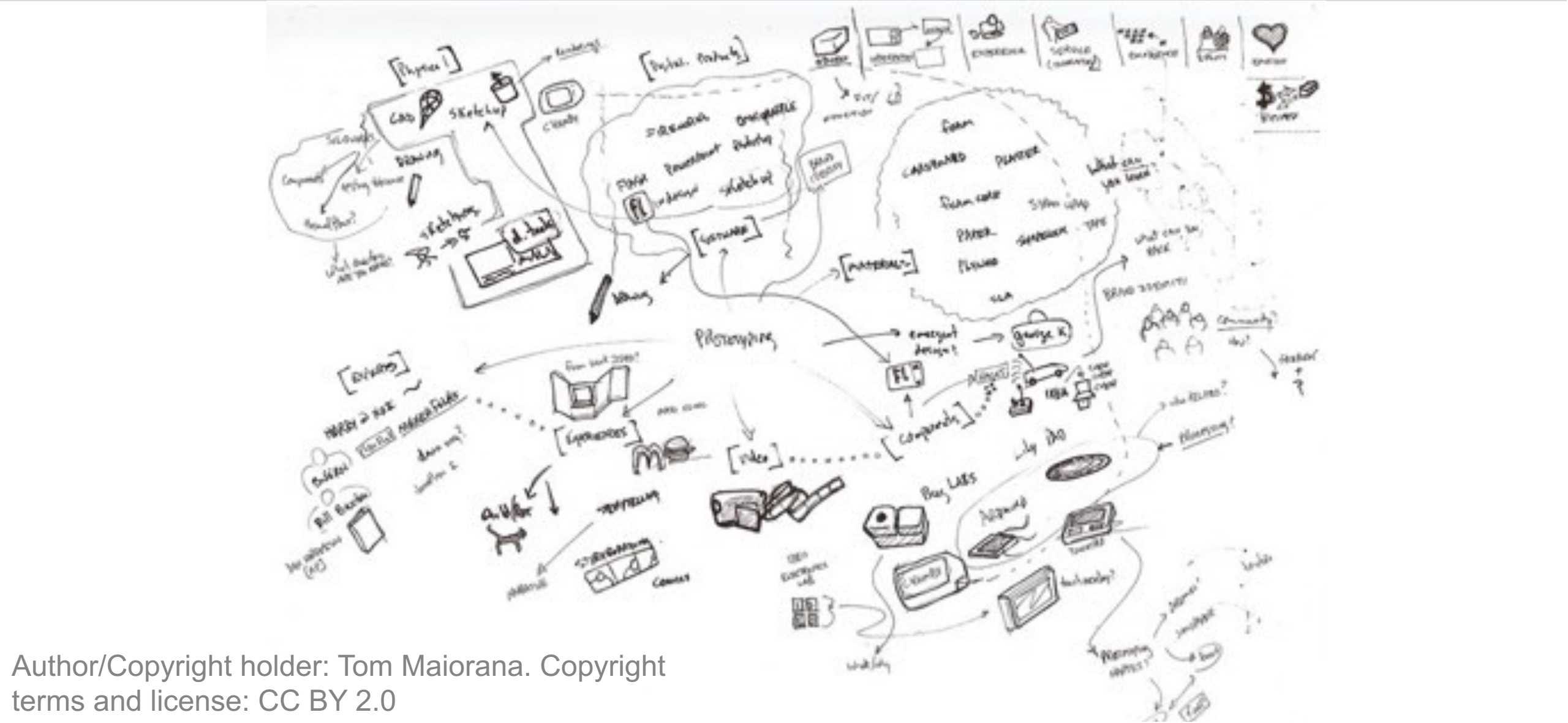
BUILDING INDUSTRY PRODUCTIVITY

Global productivity

Real gross value added, 1995=100
Per hour worked



PROTOTYPES



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CUSTOM DESIGNED BUILDINGS & MASS TIMBER

- IF YOU MUST DESIGN A CUSTOM STRUCTURE
 - SET GOALS AT THE START
 - ESTABLISH FAIR COMPARISONS EARLY
 - PREPARE A PROPER BUDGET
 - GET HELP FROM AN EXPERT WHO HAS 10X EXPERIENCE

EFFICIENCY OF MATERIAL & INDUSTRIALIZED CONSTRUCTION

BE PART BENDING THE PRODUCTIVITY CURVE

- **UTILIZE STRUCTURAL MATERIALS WHERE THEY
ARE MOST EFFICIENT**
- **USE MASS TIMBER TO DRIVE TOWARD
INDUSTRIALIZED CONSTRUCTION**

WHERE WE COULD GO – INDUSTRIALIZED



WHERE WE COULD GO – INDUSTRIALIZED









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Naomi Beal

Executive Director, passivhausMAINE

naomi@passivhausmaine.org





WoodWorks October 16, 2019



Naomi C.O. Beal
naomi@passivhausMAINE.org

Founding Member + current Executive Director: passivhausMAINE
www.passivhausMAINE.org

Founding and current Board Member: North American Passive House Network
www.naphnetwork.org

THERMAL BRIDGING + SPEED

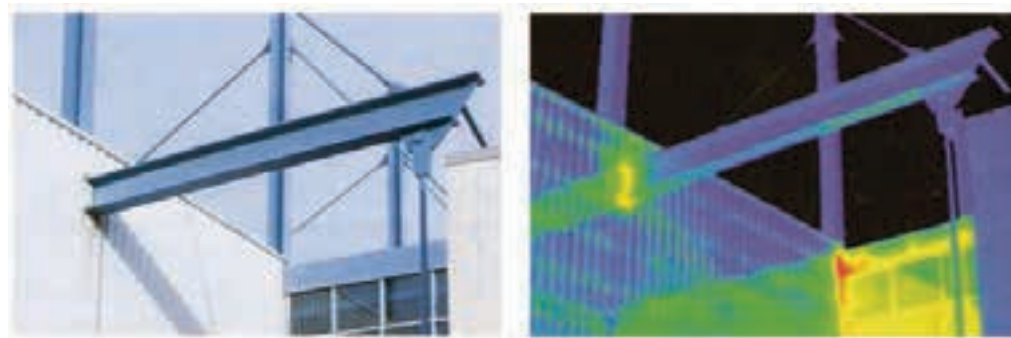


Image: from a talk given by Jacinda Collins, AIADC

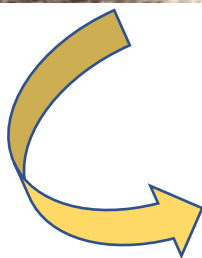


Image by LEVER



Renovation is our current greatest technical and financial challenge. New England's aging building stock creates a potential gap in achieving our carbon goals and expose residents to fuel poverty and unhealthy interiors and compromised envelopes in extreme weather.

Can CLT –with wood chip fiberboard –
and panelised renovation help solve this critical issue?



As we are developing expertise in panelised *construction*- how quickly can we follow German and Austrian paths in panelised *renovation*.



CLT panel construction on the line

How quickly can we gain expertise?

What's holding us back?



Between layer for utilities installation



Layer attaching to exterior wall

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Noel Johnson

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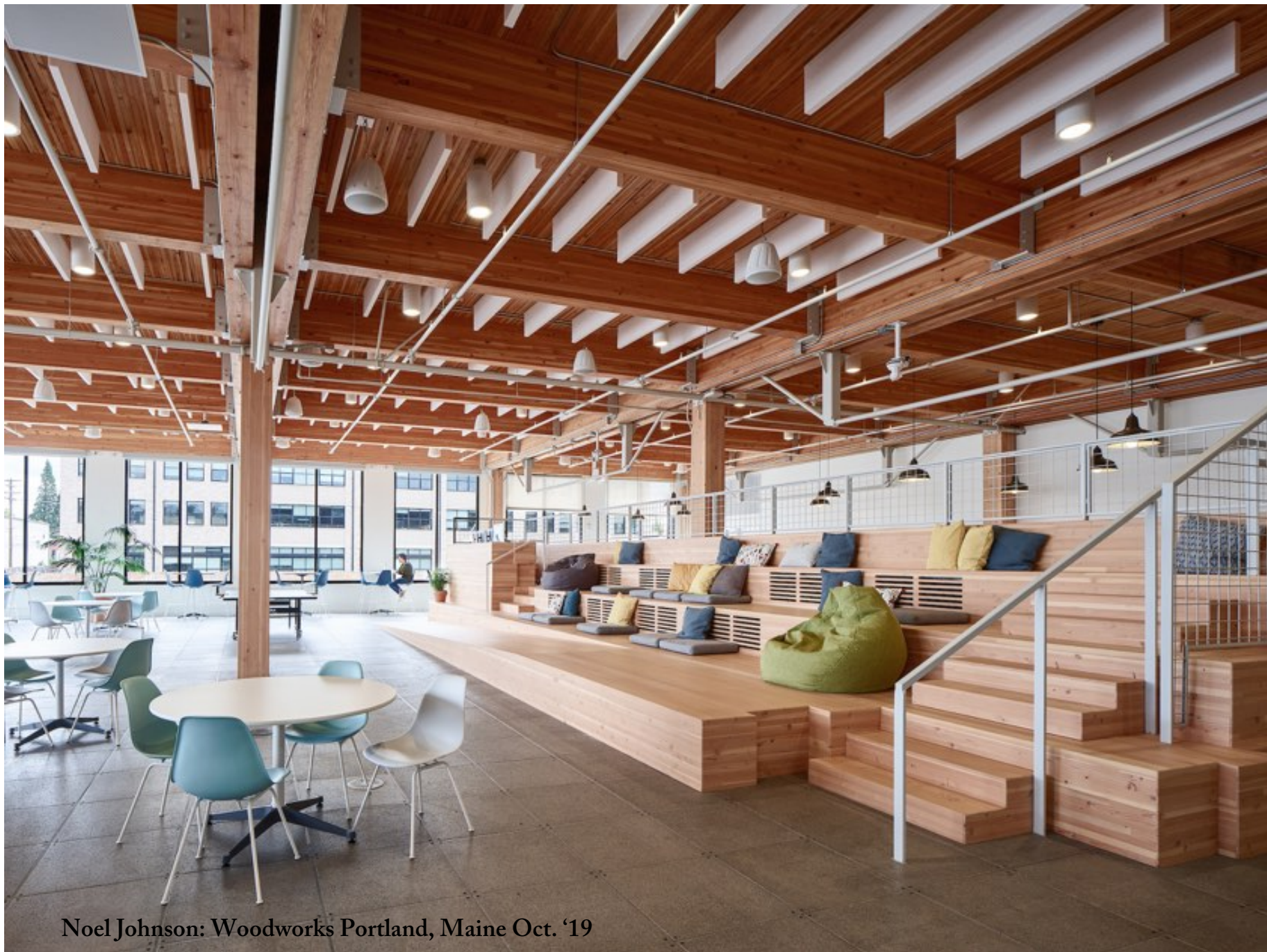
Noel Johnson: Woodworks Portland, Maine Oct. '19



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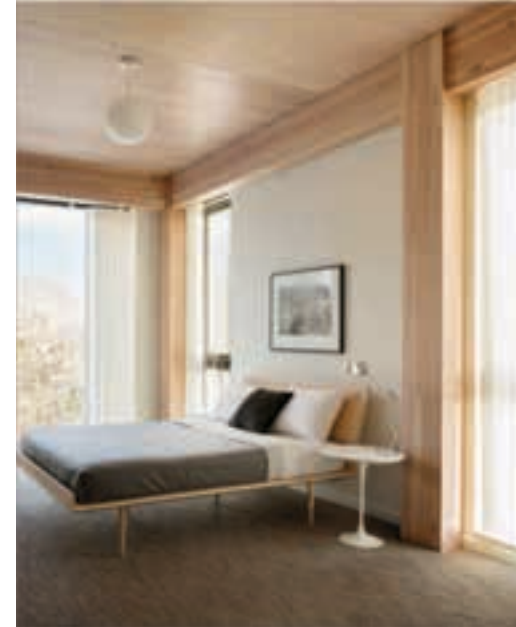
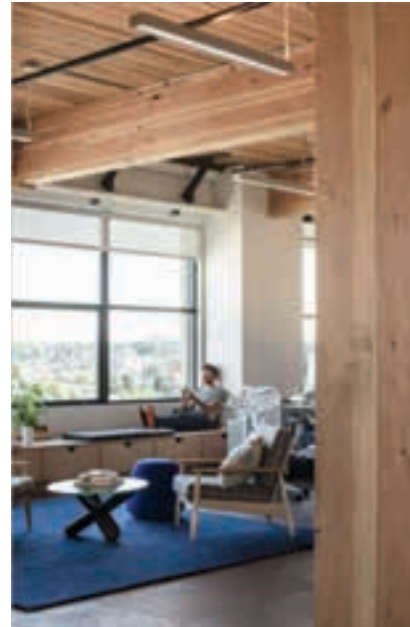
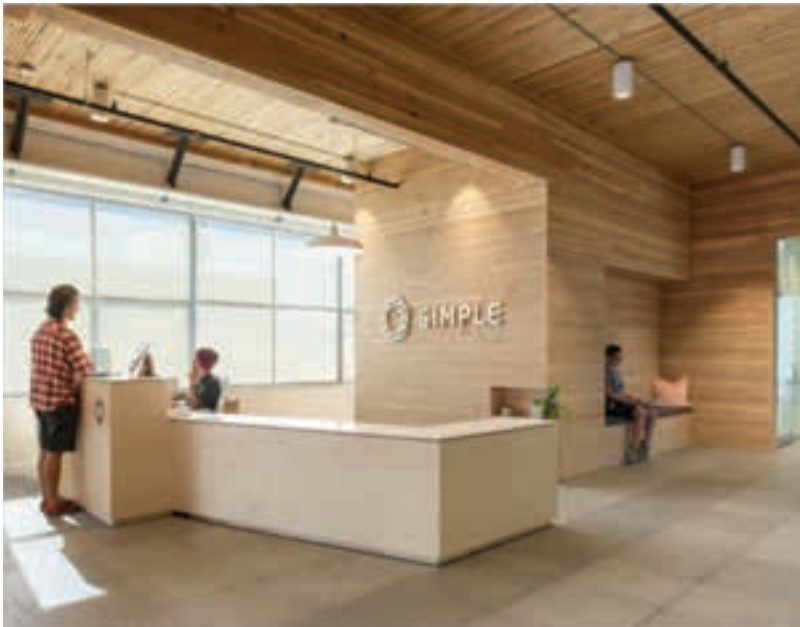
One Big Thing... KNOW YOUR AUDIENCE

Mass Timber buildings use wood as a primary structural solution to create an architecture responsive to **investor, occupant & social** desires.

Occupant: a socially-responsible, healthy, beautiful **experience**

Investor: an ESG, lower-volatility, differentiated cash flowing **asset**

Society: a locally-sourced, low-carbon, proven, job-creation **policy**

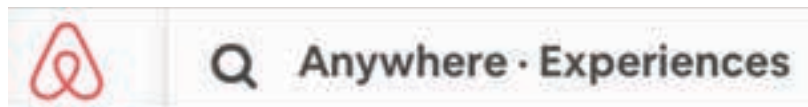


Occupant: a socially-responsible, healthy, beautiful experience

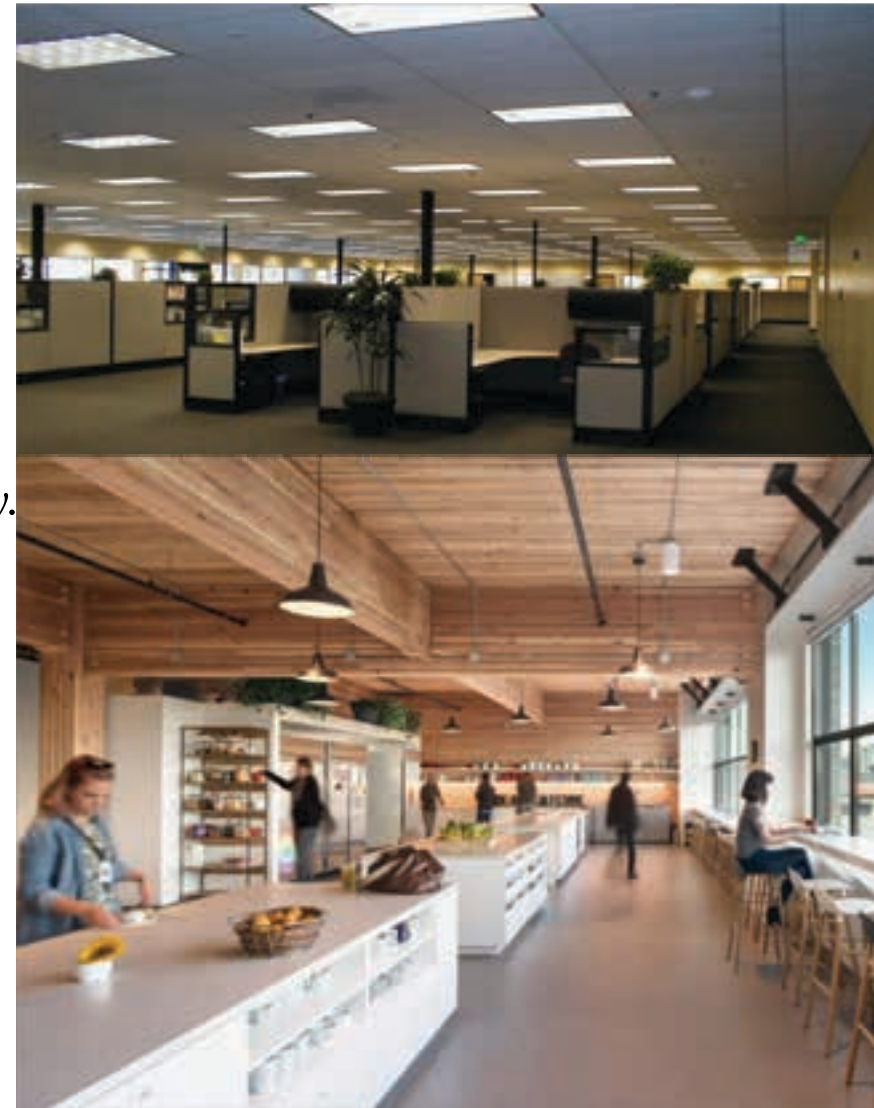
How can buildings create durable value? By responding to unidentified, unmet user-needs.

Individuals seeking authenticity, heritage and belonging as a reaction to their digital existence (socially & work product.)

Firm's "buy" identity and legitimacy via adaptive reuse and historical building occupancy.



Noel Johnson: Woodworks Portland, Maine Oct. '19

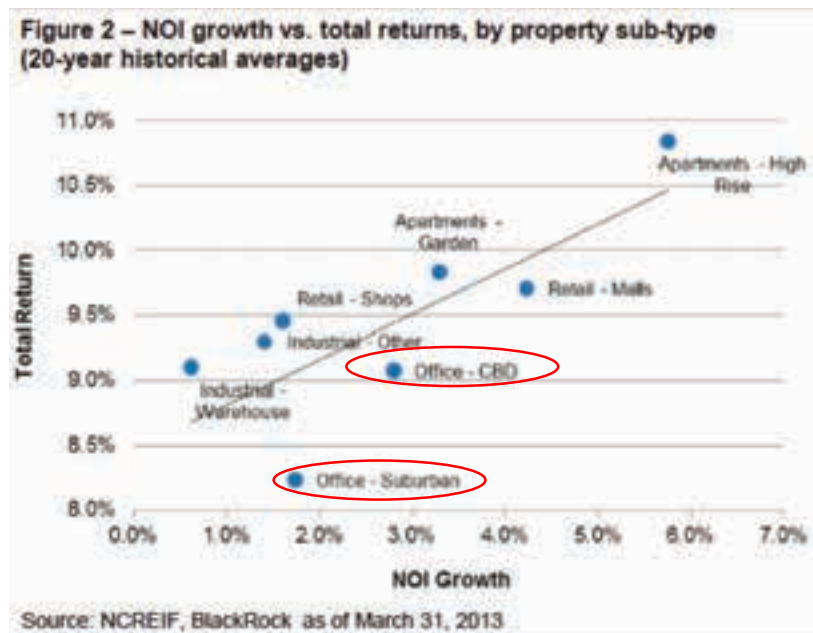


Investor: an ESG, differentiated, lower-volatility cash flowing asset

How to find alpha with office investment?

Differentiate to respond to existing commoditized office market, shorter terms & prisoner's dilemma behaviors

Accommodate mixed-use requirements



Noel Johnson: Woodworks Portland, Maine Oct. '19



Society: a locally-sourced, low-carbon, proven, job-creation policy

Mass Timber equals or exceeds steel and concrete structures with respect to factors of building quality, such as fire, earthquake or water



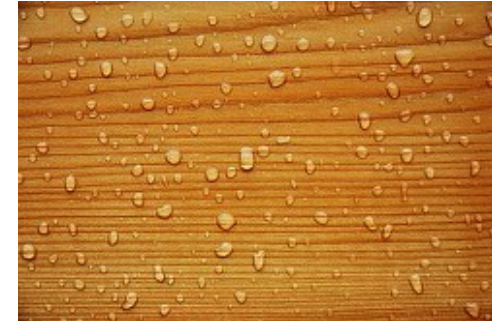
Fire Resistance

- Mass timber benefits from the insulating properties of charring, becoming self-extinguishing.
- Unlike steel, mass timber remains structurally stable when subjected to extreme heat. It does not melt.



Earthquake Resistance

- Mass timber construction has a high strength-to-weight ratio, providing unique opportunities for geotechnically challenged sites.
- More ductile than masonry or concrete structures
- Often used in combination with steel or concrete to optimize shear systems where required



Water Resilience

- Wood tolerates high humidity and is capable of absorbing and releasing water vapor without compromising its structural integrity. It does not rust.
- Utilizes similar exterior envelope industry best-practices that steel or concrete rely upon today.

Society: a locally-sourced, sustainable, proven, job-creation policy

Lower Carbon Option

- **Carbon Avoidance:** The production of concrete and steel requires more energy and raw materials. Concrete production generates 8x as much carbon emissions, while Steel production generates 21x as much carbon emissions
- **Carbon Sequestration:** Each building acts as a carbon reservoir, doubling its impact each timber growing “rotation” (~50 years)
- **Carbon Emissions:** Better insulative qualities act to reduce thermal bridging, improving exterior envelope energy performance



Noel Johnson: Woodworks Portland, Maine Oct. '19

One Big Thing... KNOW YOUR AUDIENCE

(why it matters to you?)

Occupant: a socially-responsible, healthy, beautiful experience

To get your deal pre-leased, they move-in, pay good lease rates.

Investor: an ESG, differentiated, lower-volatility cash flowing asset

To get your deal's equity (debt?), to be profitable, to live another day...

Society: a locally-sourced, low-carbon, proven, job-creation **policy**

To get you deal entitled, or get a great team, get public subsidy, etc.



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Scott Barton-Smith, AIA, LEED BD+C

Hacker Architects

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HACKER



Scott Barton-Smith AIA LEED BD+C

Associate Principal at Hacker Architects
Portland, Oregon

- Hacker - Mass timber since the 1980s
- Registered Architect in Oregon
- First mass timber project in 1998
- Designed a timber home for family
- Designed several timber buildings including:
- First Tech Oregon Corporate Office, one of the largest CLT building in US (156,000 sf)
- First of kind in Northern Virginia
- Pier 70 Parcel A which will be the largest CLT building in US (290,000 sf)

The background of the image is a close-up, high-resolution photograph of a wood surface. It features a prominent, circular wood grain pattern, likely from a tree trunk, with concentric rings of varying shades of brown and tan. The texture is smooth but shows natural wood grain variations. The lighting is even, highlighting the fine details of the wood's growth rings.

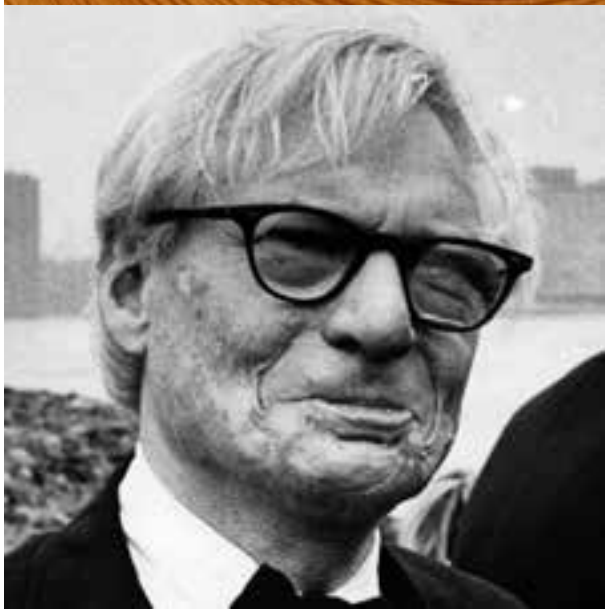
mass timber
architect's one big thought

The background of the image is a close-up, high-resolution photograph of a wood surface. It features a prominent, swirling wood grain pattern with concentric rings of varying shades of brown, from light tan to deep, dark chocolate and near-black tones. The texture is organic and detailed, with visible growth rings and a central knot-like structure on the left side. The lighting is even, highlighting the natural grain of the wood.

design a wood building!

“You say to a brick, ‘What do you want, brick?’
And brick says to you, ‘I like an arch.’”

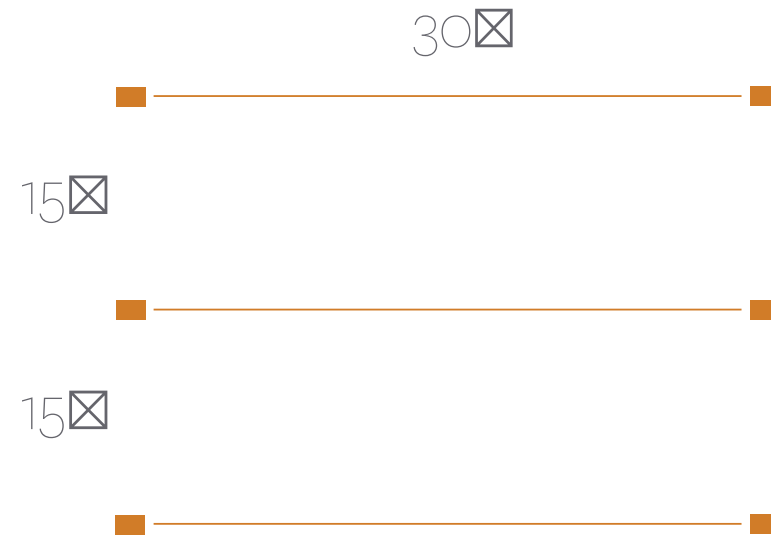
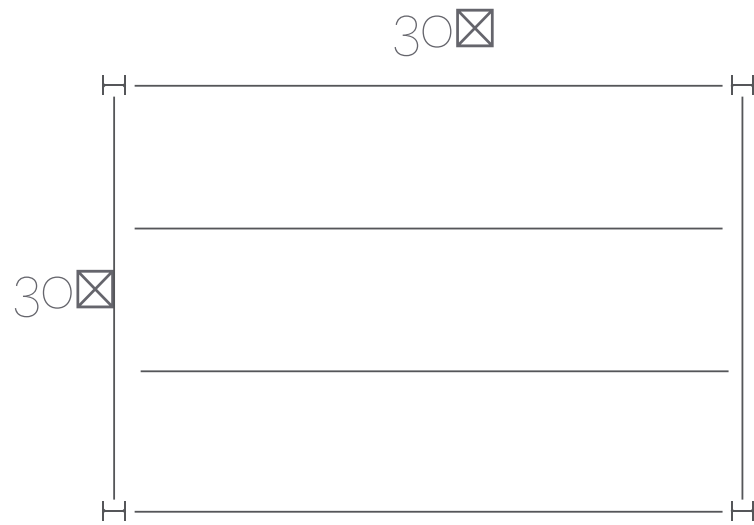
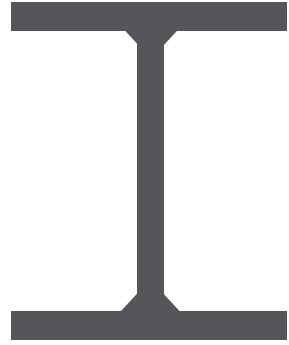
Louis Kahn



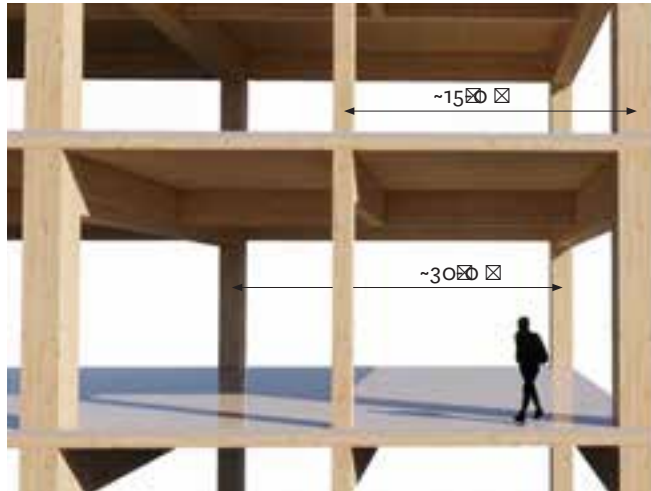
The background of the image is a close-up, high-resolution photograph of a wood surface. It features a prominent, swirling wood grain pattern in shades of brown and tan. The grain lines are concentric and circular, creating a sense of depth and texture. The lighting is soft, highlighting the natural variations in the wood's color and grain.

You say to **wood**, ‘What do you want, **wood**?’
And **wood** says to you, ‘**I like ...**

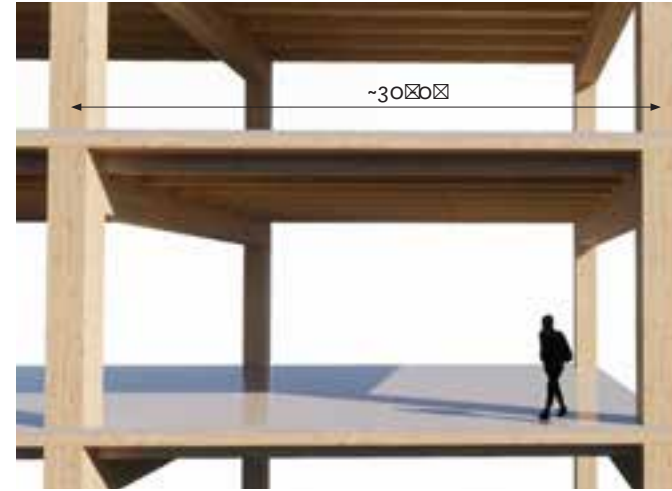
Wood likes One-way Structure



Most Wood Fiber



30'x30'x15' Perimeter



30'x30' Integral Joists



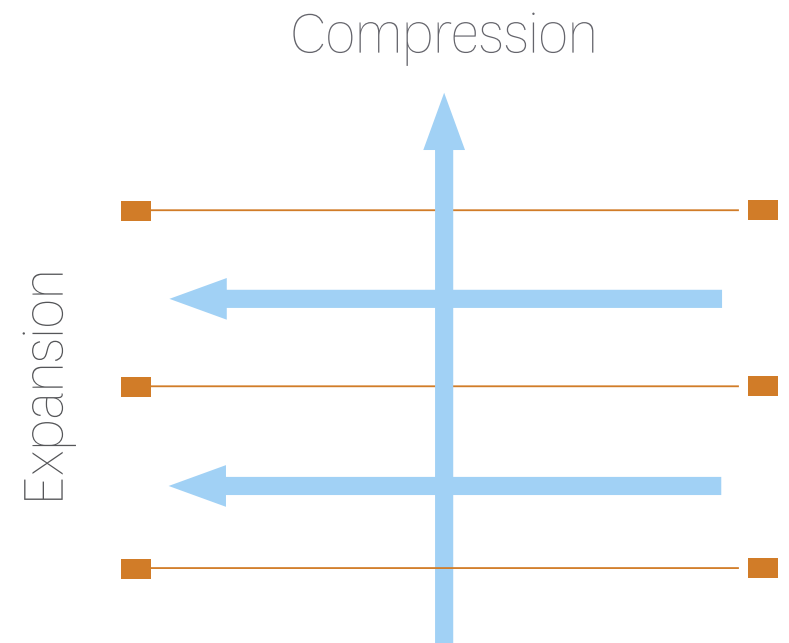
38'x12' e-way



30'x15' e-way

Least Wood Fiber





Wood likes to be Uncluttered



Pairs well with access floor

Wood likes to be Uncluttered



Think through distribution of utilities

A close-up, high-resolution image of a wood surface, showing concentric growth rings in a warm, golden-brown hue. The texture is smooth and organic, with the rings curving and swirling across the frame. The lighting is even, highlighting the natural grain of the wood.

ask wood what it wants

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Photo: William Horne

This concludes The American Institute of Architects Continuing Education Systems Course

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Architecture



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