Lessons Learned from USA Steel-Timber Projects

Ricky McLain, *Senior Technical Director,* WoodWorks
Jennifer Hardy, *Senior Associate,* Payette

CTBUH 2022
Steel-Timber Conference

Photo: Structurlam

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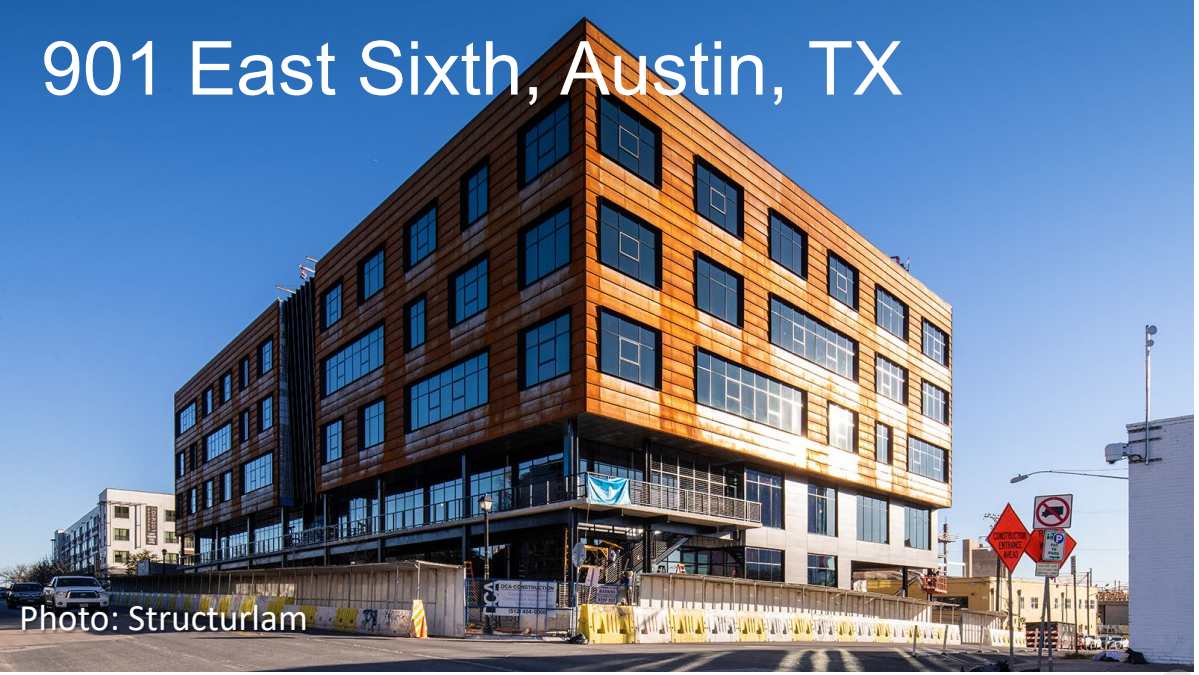
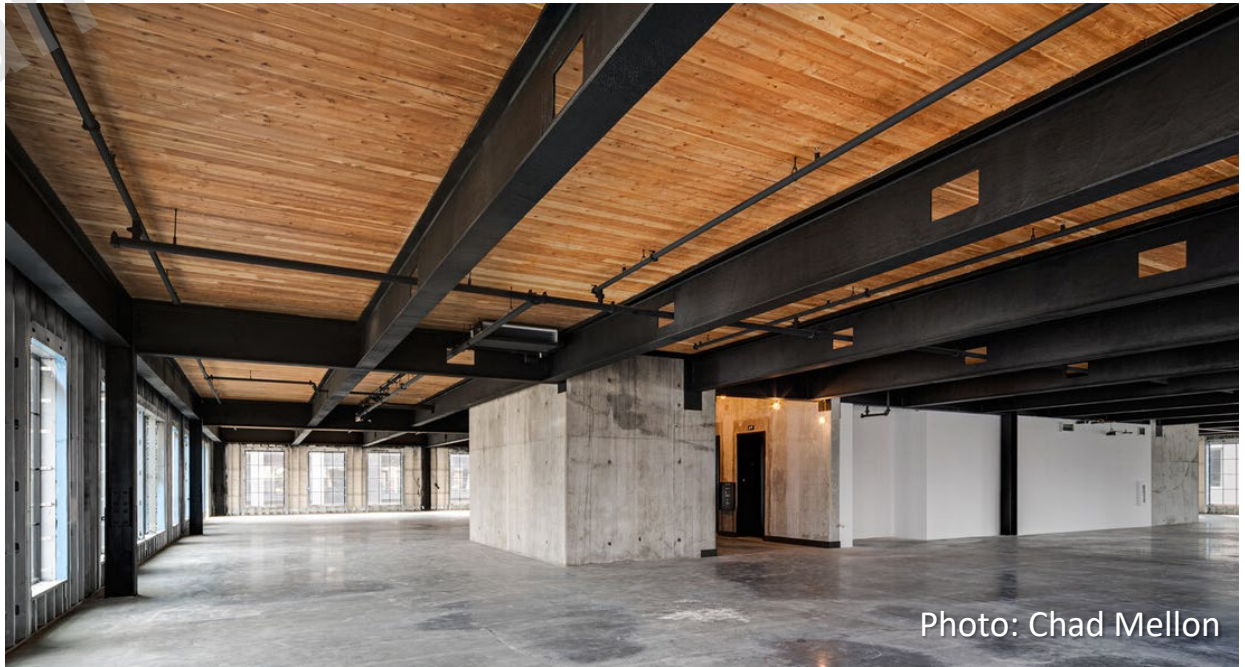
901 East Sixth, Austin, TX



5 stories | 128,000 SF | Type IIIA

Three Thirty Three The Gulch Nashville, TN

5 stories | 82,000 SF | Type IIIB



5 stories | 96,000 SF | Type IIIB

6 stories | 41,000 SF | Type IIIB

2 stories | 20,700 SF | Type VB

3 stories | 72,000 SF | Type VB

Stamford Media Village
Stamford, CT

Photo: CPG Architects

5 stories (2 story vertical addition)
135,000 SF | Type VB

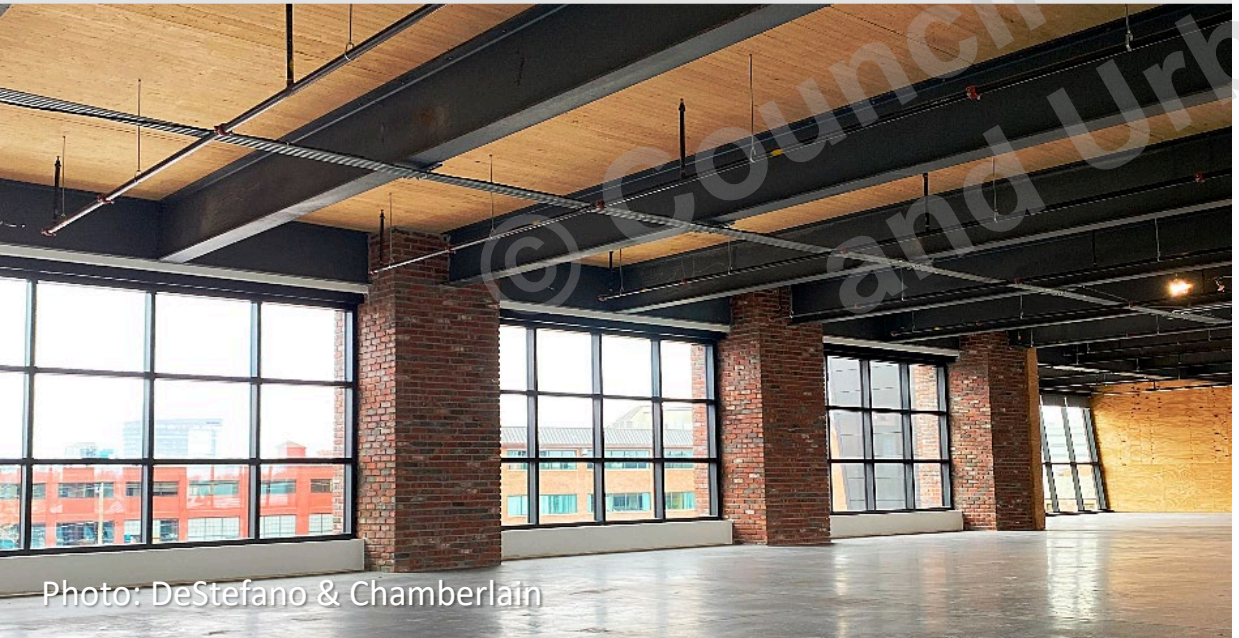


Photo: DeStefano & Chamberlain

Houston Endowment Headquarters
Houston, TX

Photo: Arup

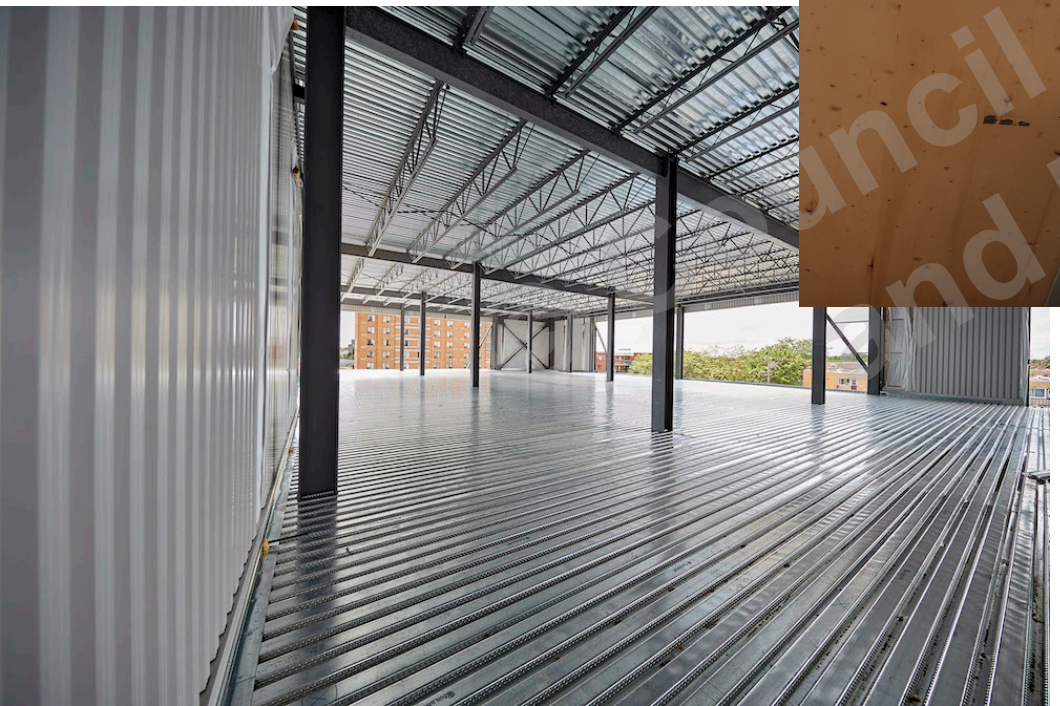
2 stories | 40,000 SF | Type VB

Photo: Arup

Pros & Cons of Hybrid Construction

Should be discussed in context: Compared to what?

Credit: LeMessurier



Timber-Steel Hybrid vs. all Steel

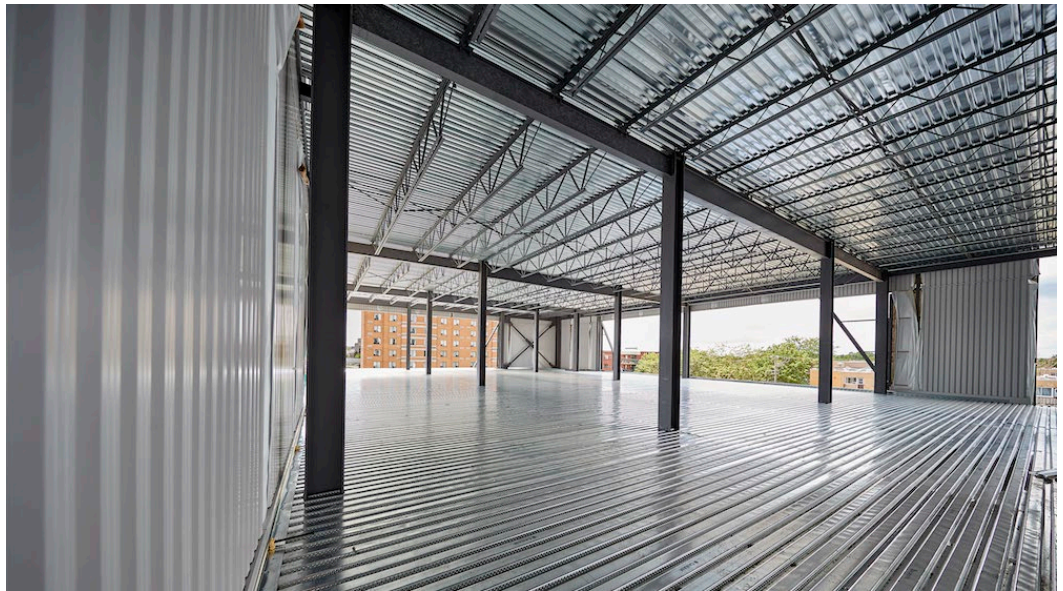
Pros

- Aesthetics
- Speed of construction, crew size, noise
- Sustainability
- Biophilia
- Lower weight
- Fire-resistance

Cons

- Dual fabricators to coordinate
- Sequencing install & logistics
- Moisture & rust staining
- Careful handling of materials

Credit: LeMessurier



Timber-Steel Hybrid vs. all Timber

Pros

- Span to depth ratios
- Impacts on MEP, head height
- Minimal material movement
- Creativity, particularly in fixed connections & cantilevers

Cons

- Dual fabricators to coordinate
- Sequencing install & logistics
- Moisture & rust staining
- Fire-resistance
- Connections

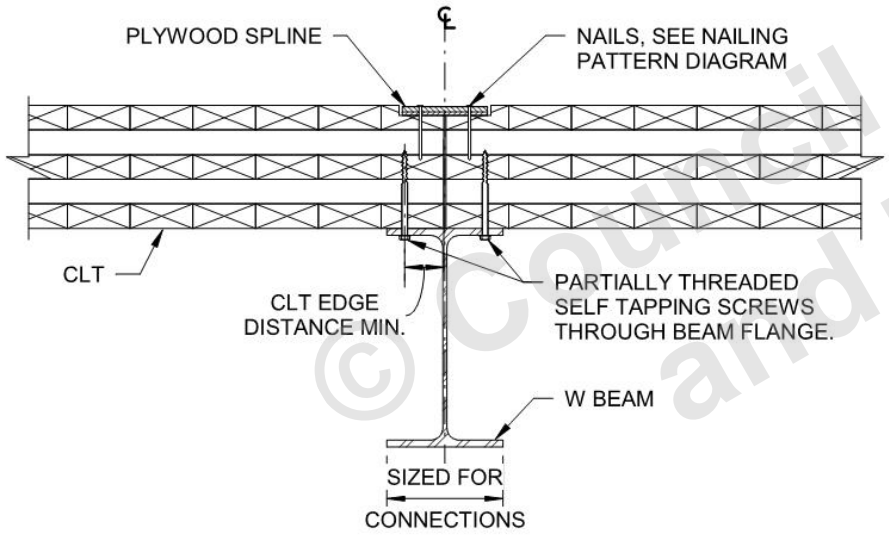
Credit: LeMessurier

Credit: Marcus Kauffman

Timber-Steel Hybrid Lessons Learned

Connections & Material Interfaces are Critical

- Careful coordination during design & shop drawings
- Differences in tolerances
- Differences in material movements (vertically and horizontally)
- Seek to minimize or eliminate on site welding



CLT SLAB EDGE SPLICE AT STEEL BEAM

Credit: Marcus Kauffman

Credit: LeMessurier

Timber-Steel Hybrid Lessons Learned

Handle with Care

- Timber is exposed, finish surface
- Moisture impacts, staining, rust
- Steel may have a primer or fire coating


Credit: LeMessurier

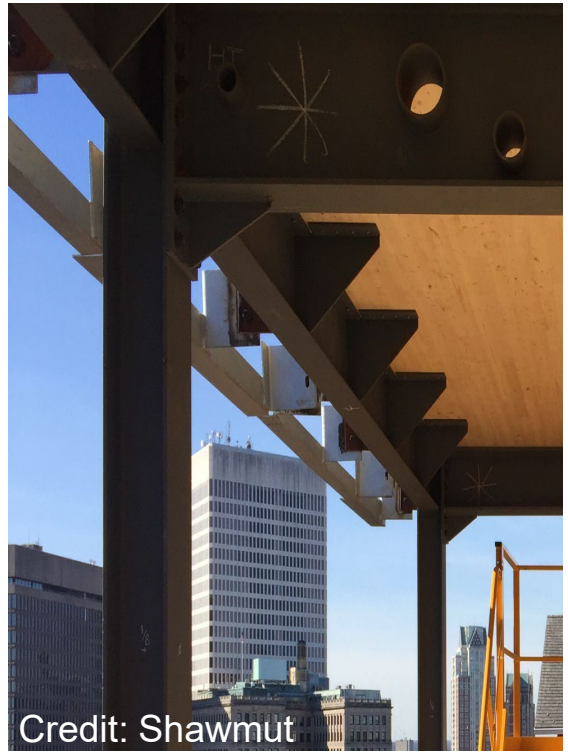

Credit: Shawmut

Timber-Steel Hybrid Lessons Learned

Logistics are Key

- Ideal to have same installer for timber & steel
- Delivery & install sequencing – keep tight schedules, may need additional material storage on site
- Don’t slow down one material’s install speed due to the nature of the other
- MEP


Credit: Holmes


Credit: Shawmut

Penn State College of Engineering West 2
The Innovation & Making Hub

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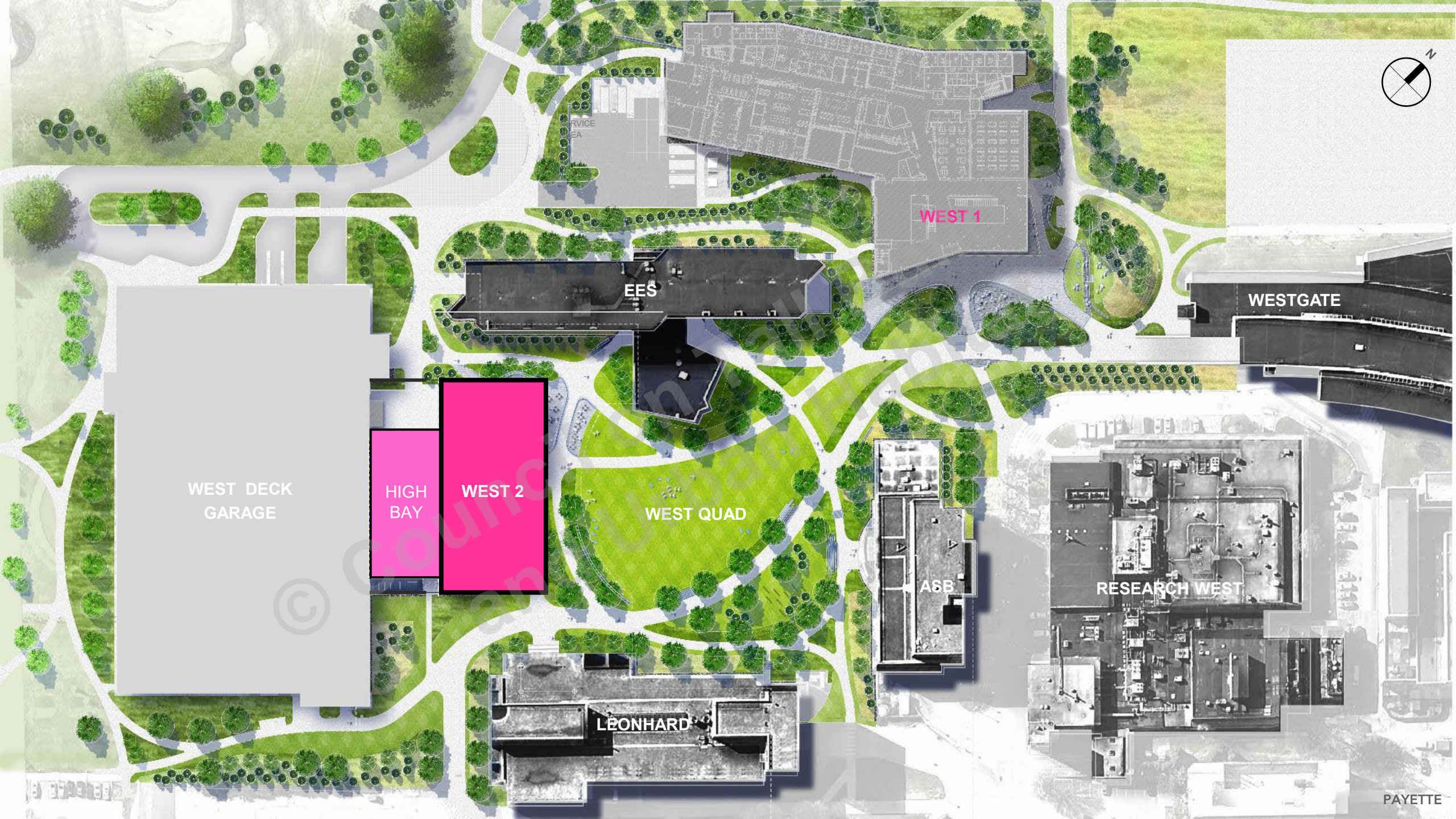
WT Whiting-Turner · LJC · HA Hope Furrer Associates · Code Red Consultants · Arup · HRG · Acentech · SGH · CPP · Vantage · SMD · ASSA ABLOY · Available Light


WEST 1
EES
WESTGATE
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GARAGE
HIGH
BAY
WEST 2
WEST QUAD
ASB
RESEARCH WEST
LEONHARD
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A Toolbox for all Scales of Making

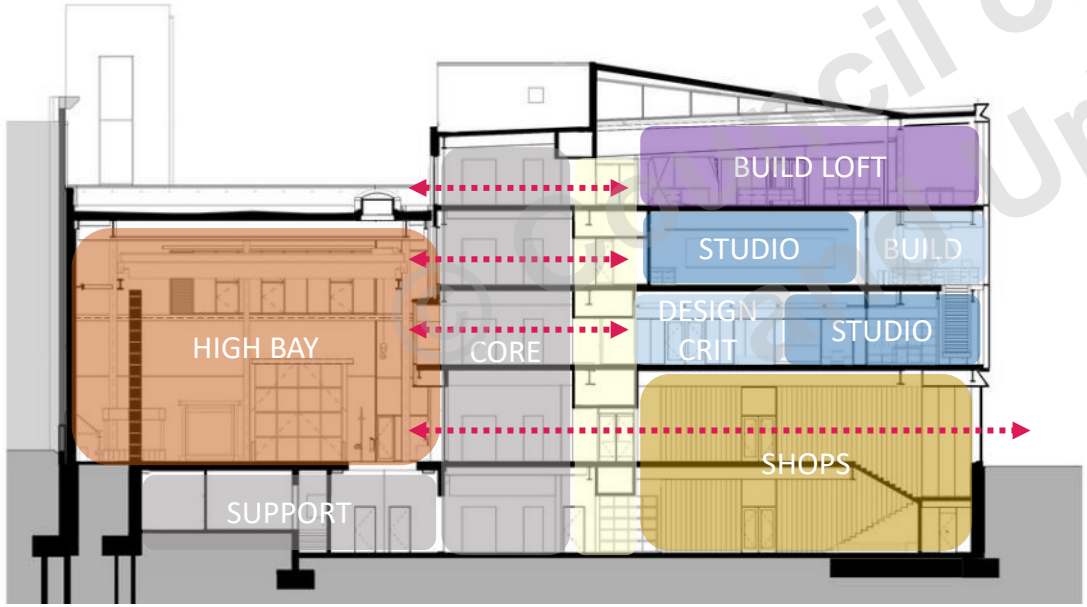
Building as a teaching tool

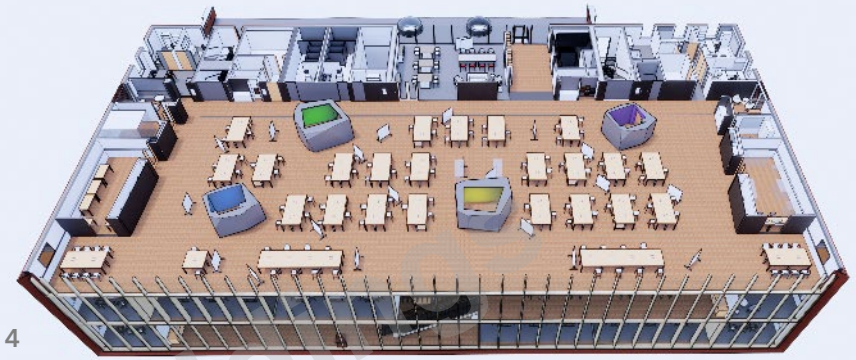
Aspirational design elements

High visibility of energy efficiency

Innovation in construction technology

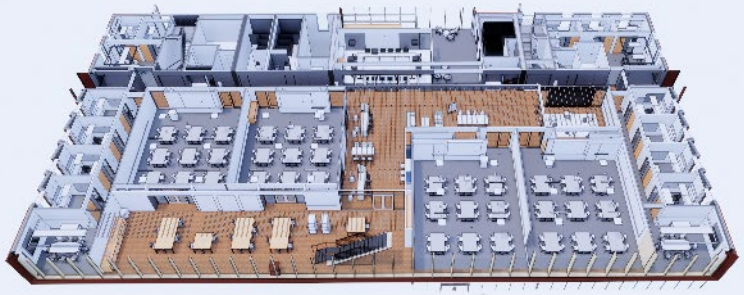
Real-life engineering problems





Level 4

Level 3



Level 2

Level 1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Wood Palette

History of Making

- Heavy timber industrial mill buildings with large open interior floor plans
- Industrial use of wood for durability & fire protection

Targeted Embodied Carbon Reduction

Health & Wellness of Occupants

Biophilic Benefits

Beauty

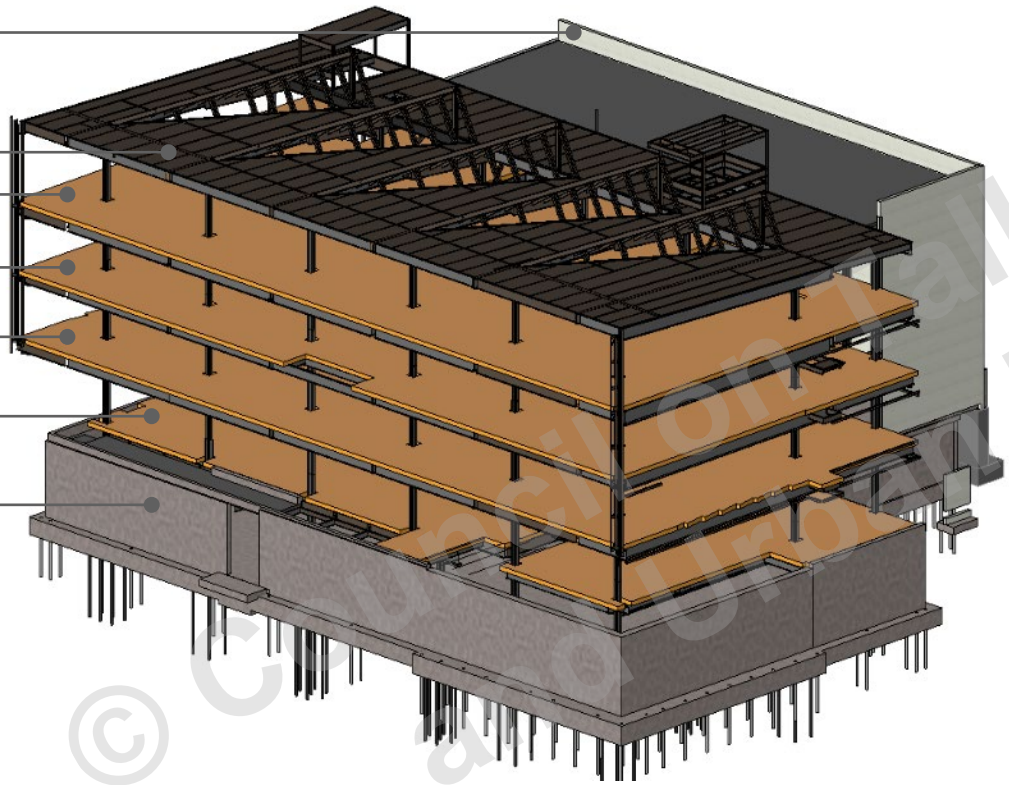
(Why?) Hybrid Structure

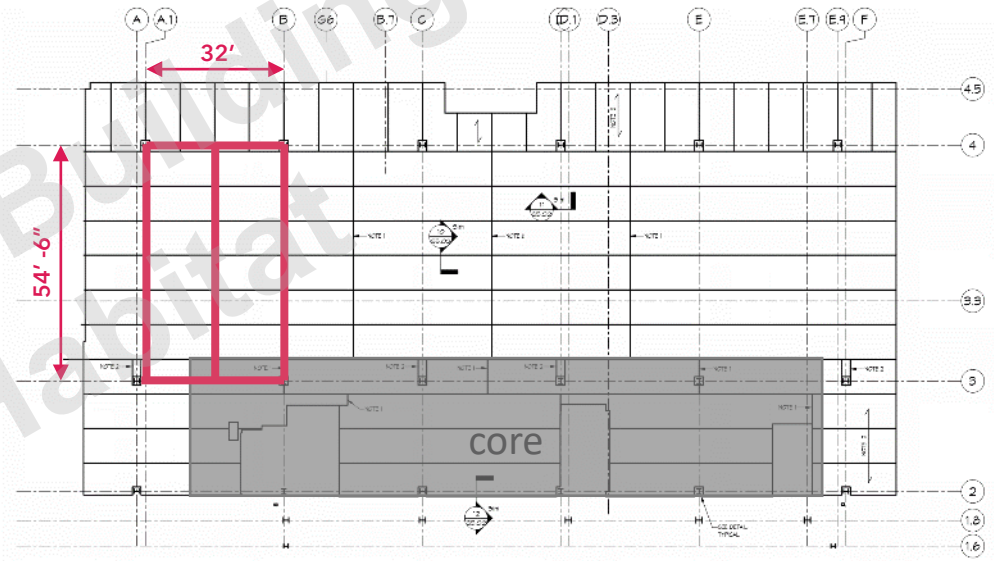
High Bay:
REINFORCED CMU & STEEL FRAMING

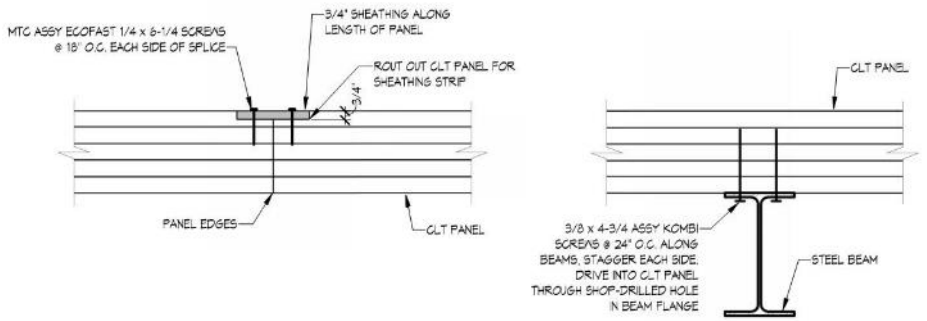
Roof:
STEEL DECK & FRAMING

Levels 1,2,3,4:
5 PLY CLT DECK ON STEEL FRAMING

Basement:
CONCRETE FOUNDATION







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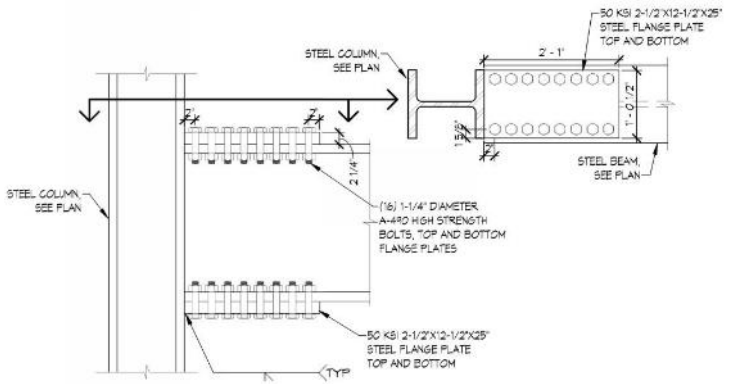
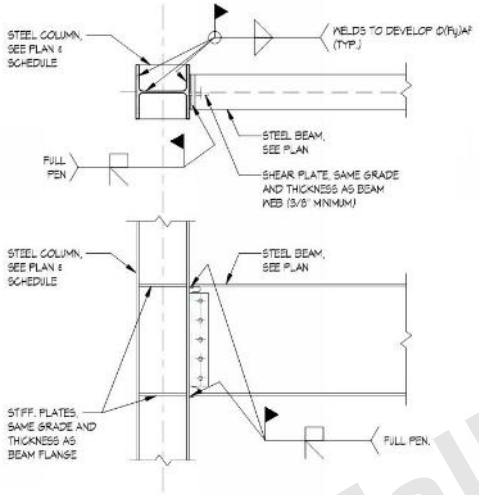
Connections & Cantilevers





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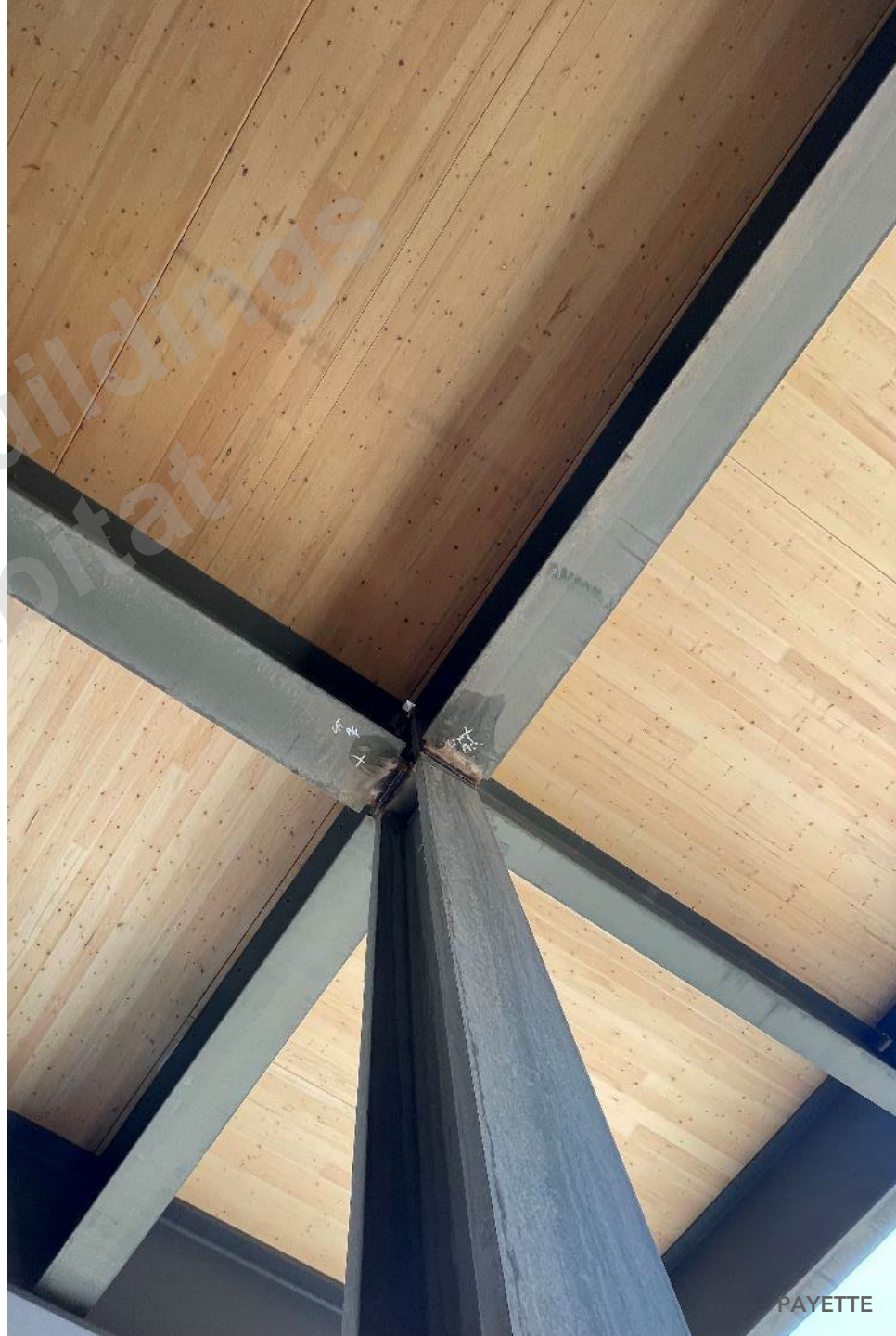

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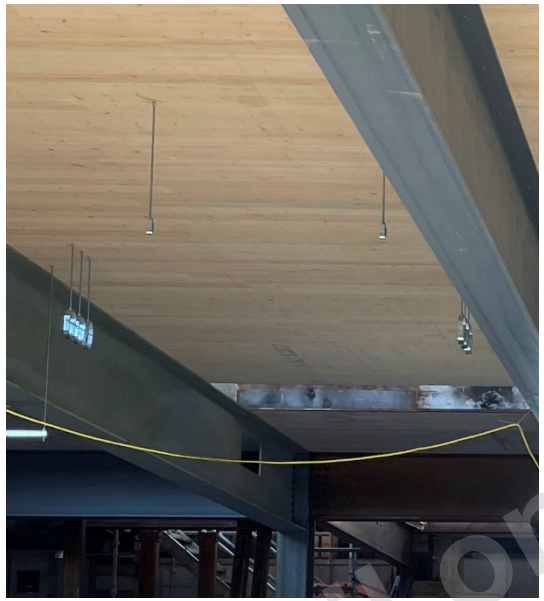
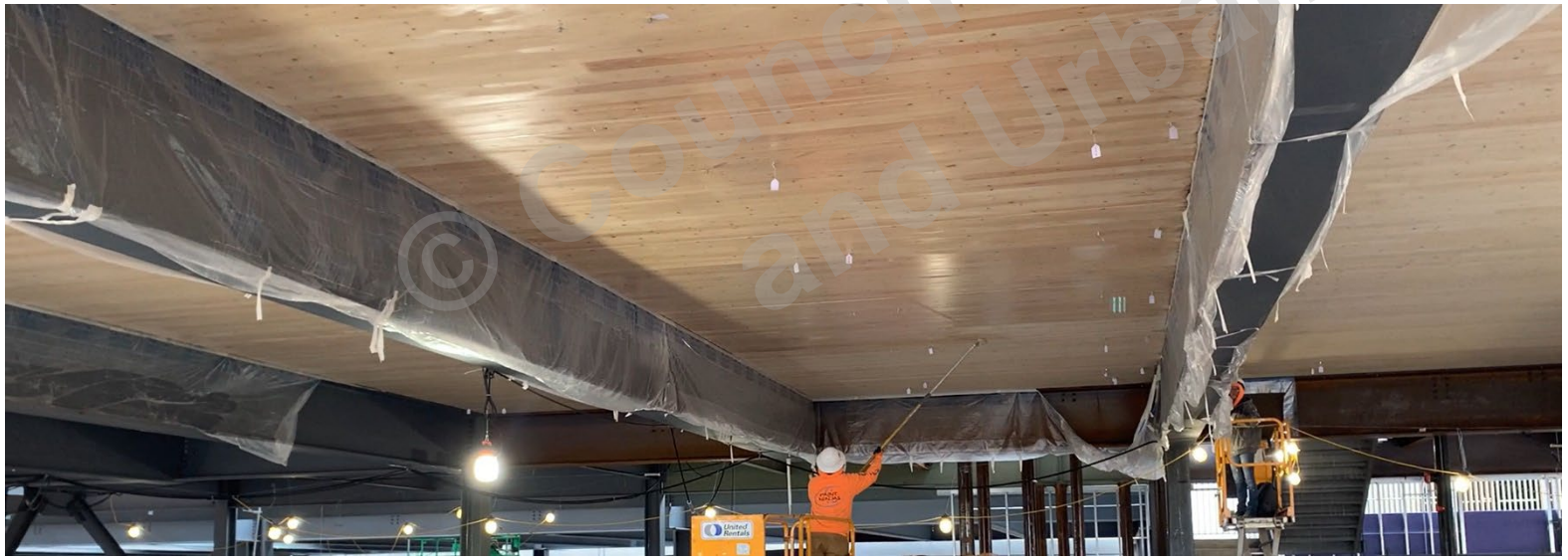
Coordination of Trades





Intersections & Infills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Questions?

Jennifer Hardy, AIA, LEED AP BD+C
Senior Associate
Payette
jhardy@payette.com
617-895-1077

Ricky McLain, PE, SE
Senior Technical Director
WoodWorks
Ricky.mclain@woodworks.org
802.498.3310

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

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