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Principal

Hybrid Mass Timber + Steel RISD Quad

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

RISD Quad New Residence Hall

Key Project Challenges

- Schedule and speed
- Aggressive institution wide sustainability goals
- Adjacent concrete flat plate dormitories
- Design goal to create artist loft experience
- Interest in mass timber



Glued Laminated Timber



Panelized Wood Products



Cross Laminated Timber



Dowel Laminated Timber

Structural Composite Lumber

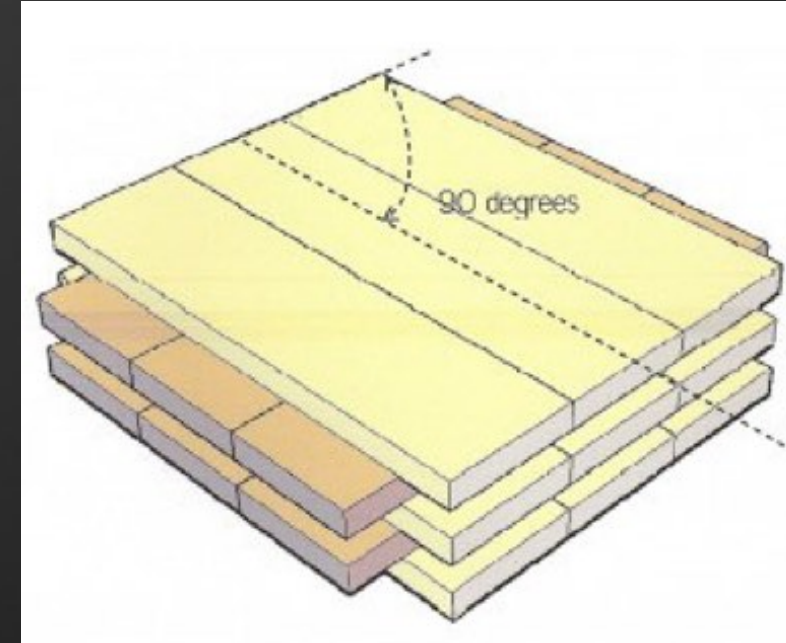


Solid Lumber

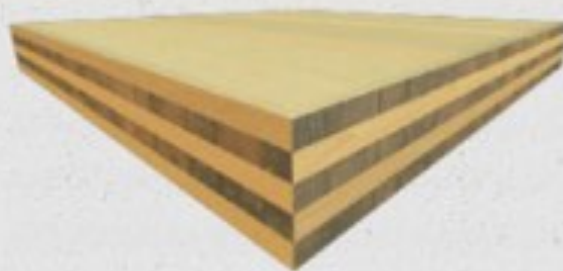


Cross Laminated Timber

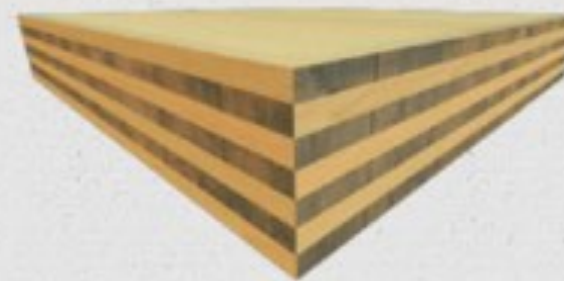
- Made with sapling lumber
- Manufactured in up to 65' lengths
- Two-way action possible
- Sequestered carbon



3 Ply ALT
4.125"
105mm



5 Ply ALT
6.875"
175mm



7 Ply ALT
9.625"
245mm



9 Ply ALT
12.375"
315mm

All heights
assume
NFPA 13
sprinkler
system

IBC2015 Construction Types

Can use
Mass
Timber in
ALL types

Occupancy	Type 1 Noncombustible		Type 3 Noncombustible/ Combustible		Type 4 Heavy Timber	Type 5 Combustible	
	A	B	A	B		A	B
A,B,R	None	180'	85'	75'	85'	70'	60'
A-2, A-3 A-4	None	12	4	4	4	3	2
B	None	12	6	4	6	4	3
R-2	None	12	5	5	5	4	3

Height
Limit

of
Stories

A: Interior
structure
fire rated

B: Interior
mostly
unrated

Height Limits – Type 3 and Type 4



Residential Dormitory (R-2)

Minimum Heavy Timber Sizes (Type 4)

Member Type	Floor Framing	Roof Framing
Column	8x8	6x6
Beam	6x10	6" minimum thickness
Floor Deck (solid or glu-lam)	4" nominal	2" nominal
Cross laminated timber	4" actual	3" nominal

TABLE 602.4 WOOD MEMBER SIZE EQUIVALENCIES					
MINIMUM NOMINAL SOLID SAWN SIZE		MINIMUM GLUED-LAMINATED NET SIZE		MINIMUM STRUCTURAL COMPOSITE LUMBER NET SIZE	
Width, inch	Depth, inch	Width, inch	Depth, inch	Width, inch	Depth, inch
8	8	6 ³ / ₄	8 ¹ / ₄	7	7 ¹ / ₂
6	10	5	10 ³ / ₂	5 ³ / ₄	9 ³ / ₂
6	8	5	8 ³ / ₄	5 ³ / ₄	7 ³ / ₂
6	6	5	6	5 ³ / ₄	5 ³ / ₂
4	6	3	6 ⁷ / ₈	3 ³ / ₂	5 ³ / ₂

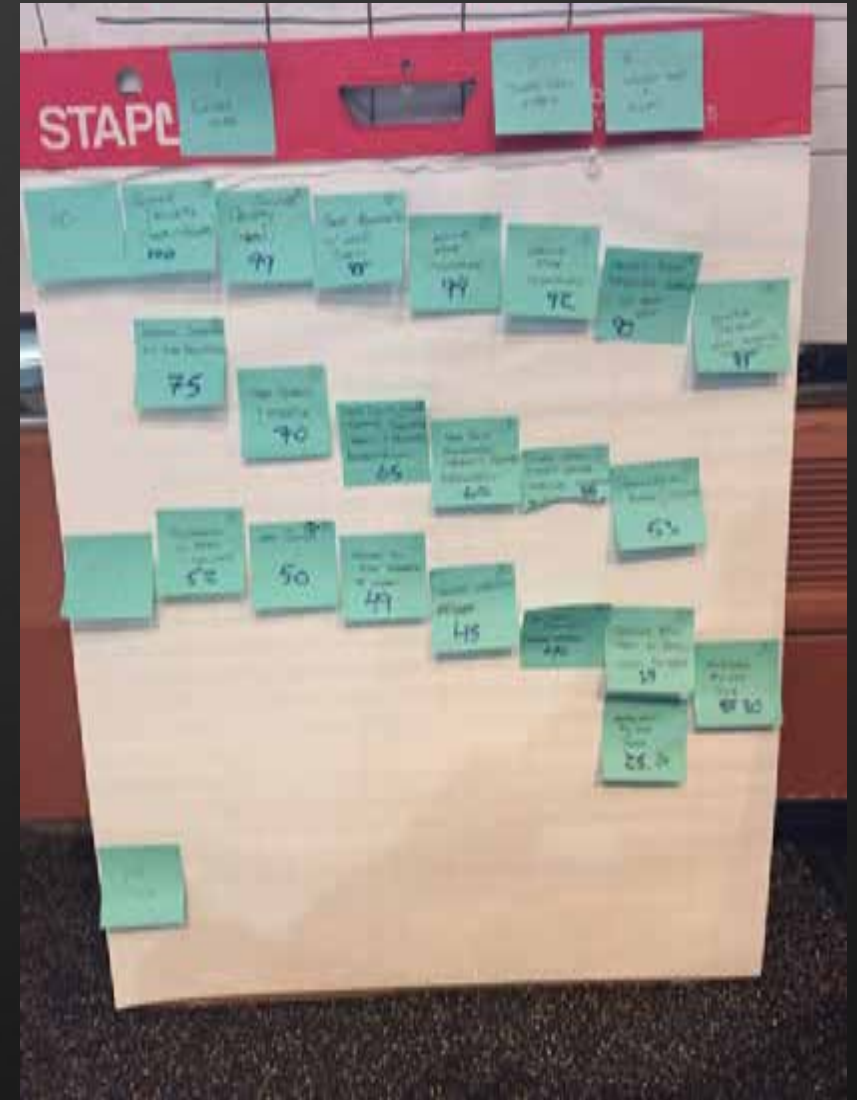
Choosing by Advantages

Options

- Girder-slab (precast concrete with steel)
- All glued laminated timber frame and decking
- Steel-CLT hybrid

Key Factors

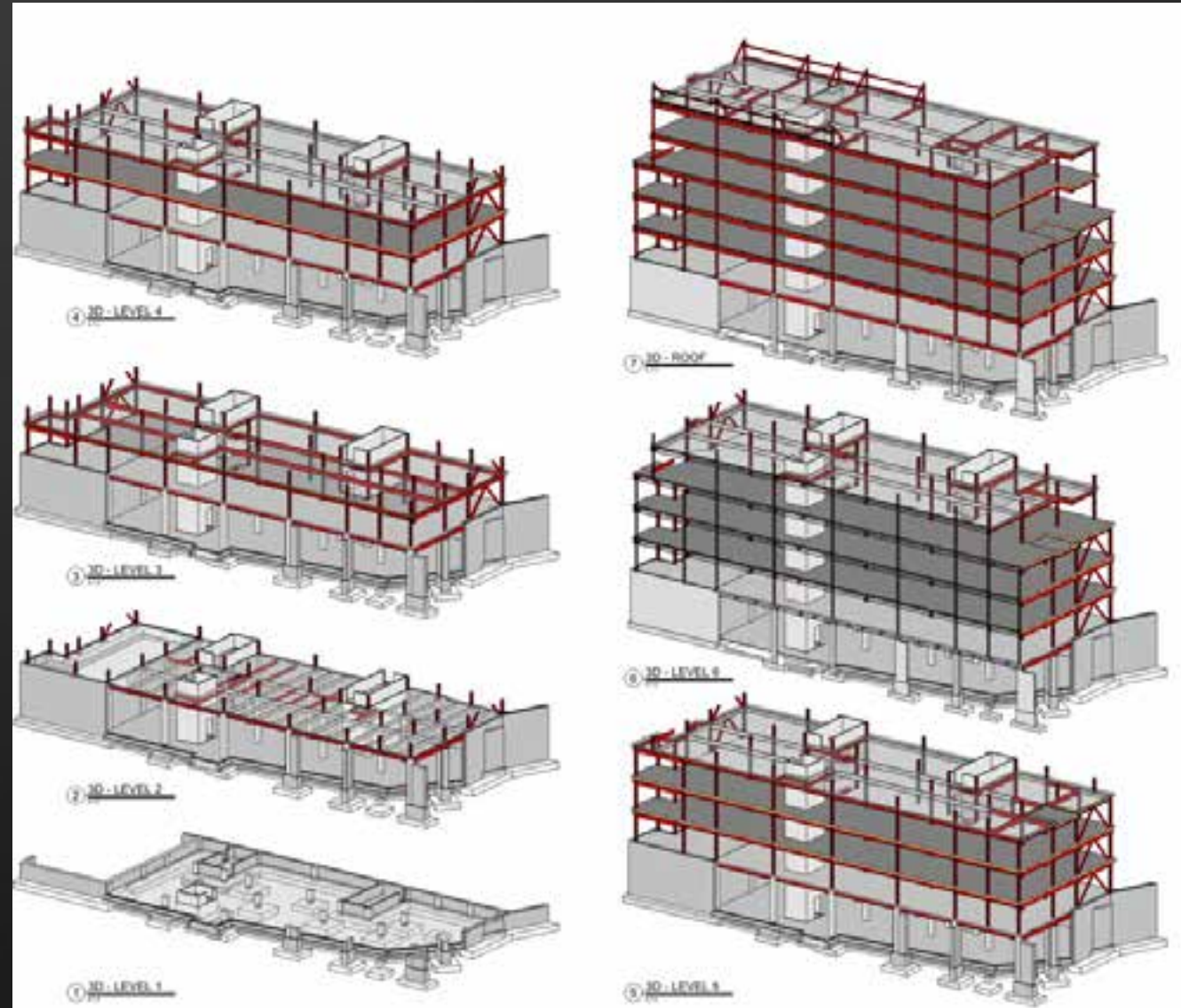
- Speed of construction
- Sustainability
- Aesthetic “look and feel”
- Cost
- Span and depth of members



Overview: Hybrid CLT-Steel Construction

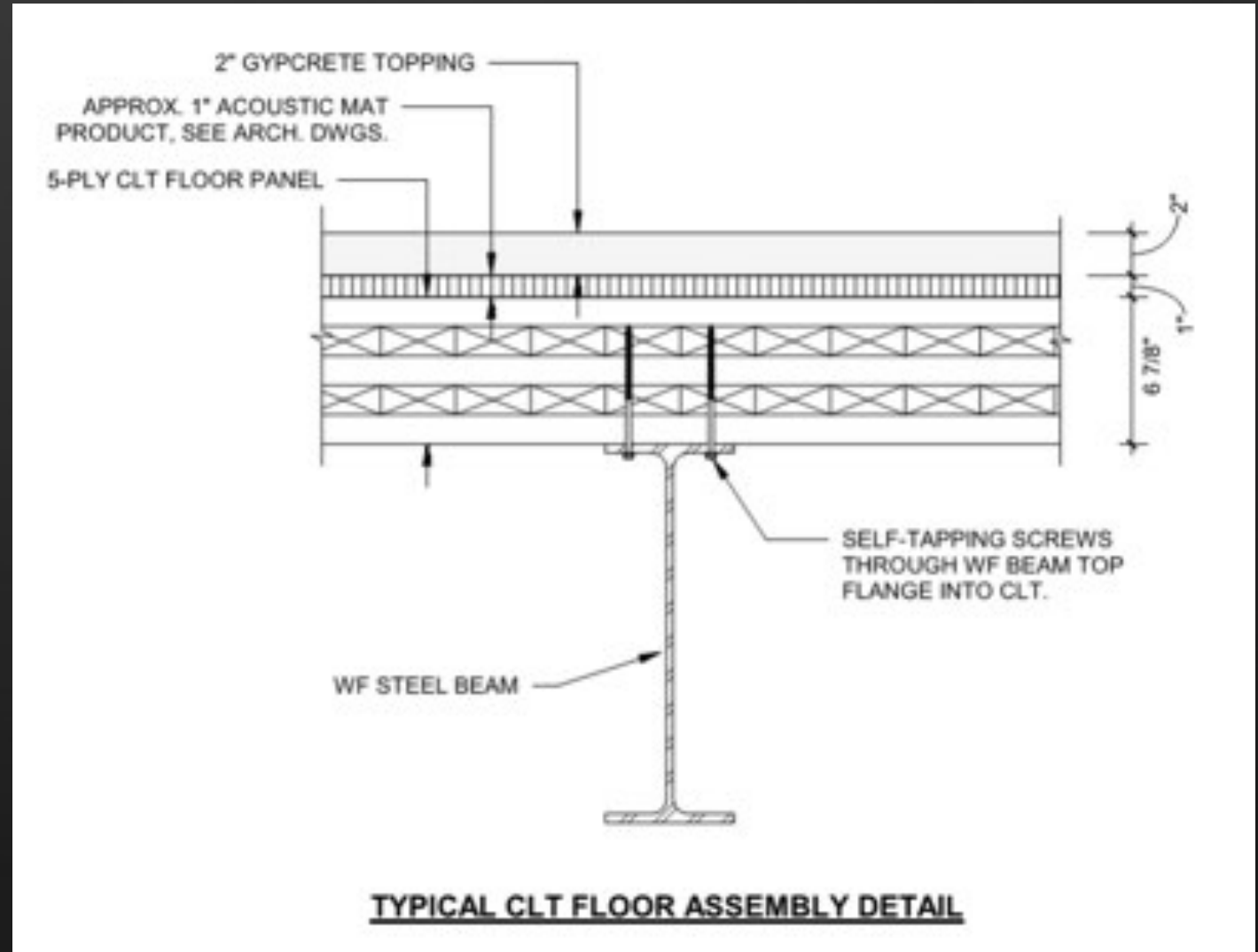
Features

- Steel frame with CLT slabs
- One-way CLT panels – entire building width
- Construction Type
 - Type 1A construction – Below Lvl 2
 - Type 3B construction – Above Lvl 2
- Exposed CLT ceilings
- Topping slab and acoustic isolation mat for sound isolation



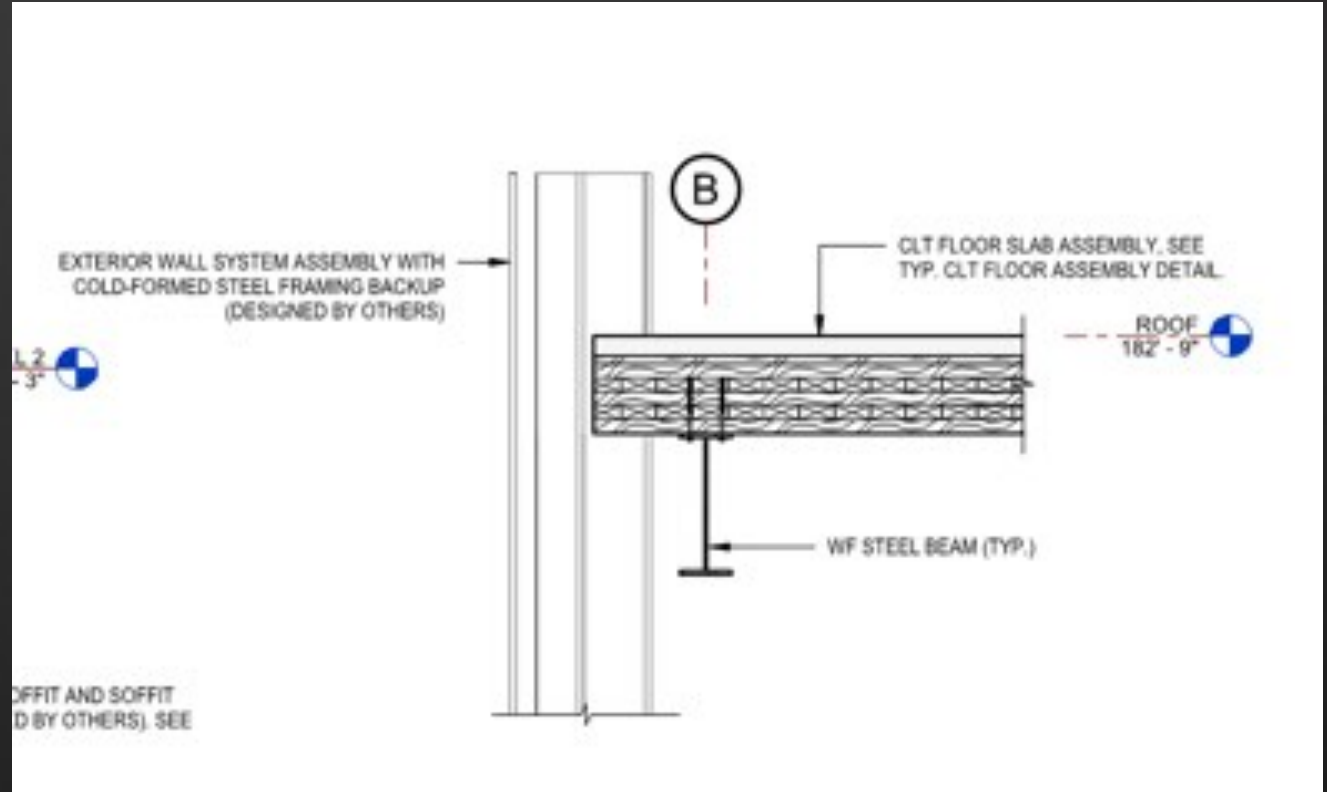
Floor Assembly – Acoustic Separation

- IBC 2015 Sound Transmission (1207)
 - Sound Transmission Class ≥ 50
 - Impact Insulation Class ≥ 50
- Final Assembly (USG Products):
 - USG Levelrock SAM-N25 Ultra – Sound Attenuation Mat
 - USG Levelrock Sound Reduction Board
 - USG Levelrock 3500 Floor Underlayment (2" min thickness)



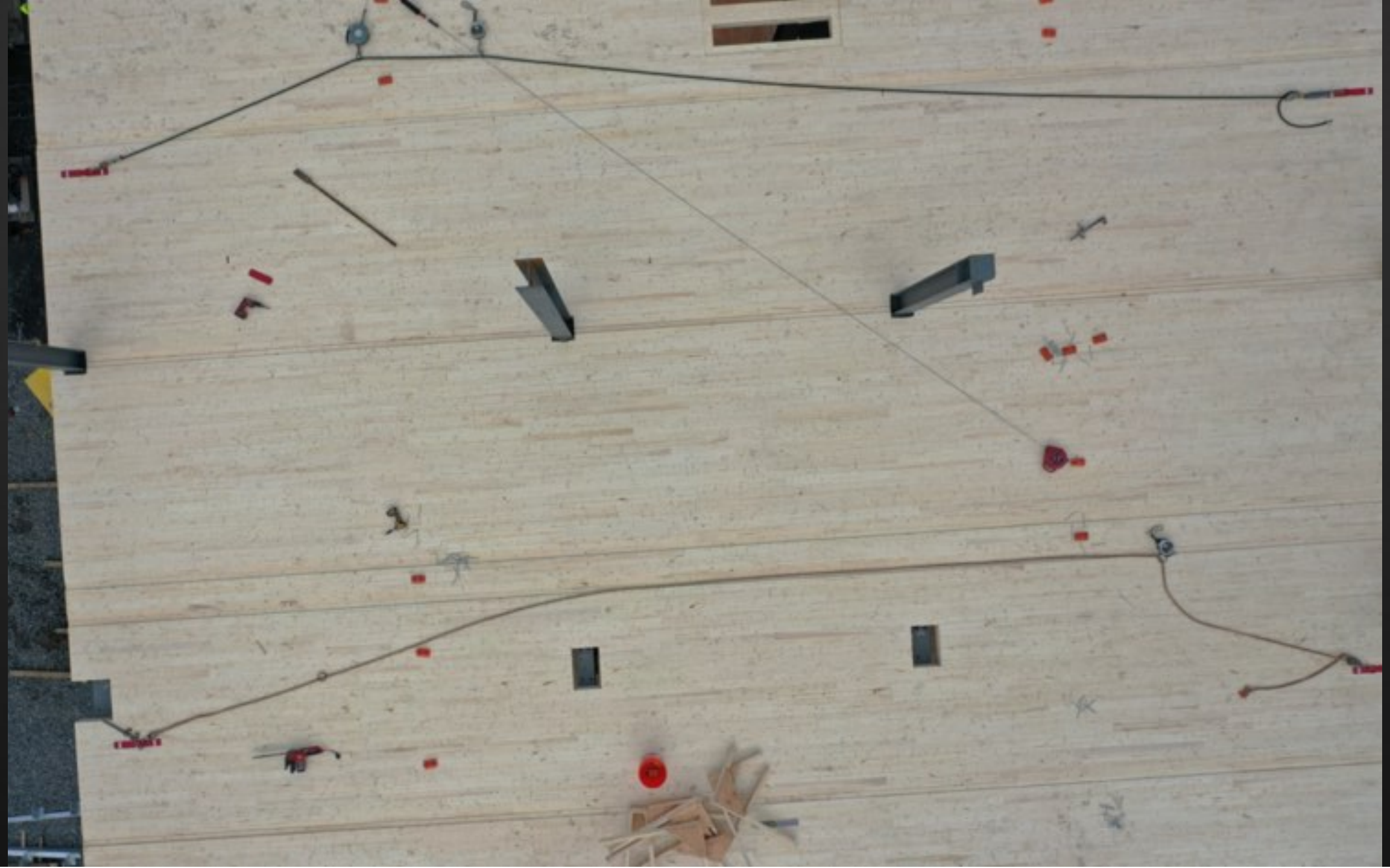
CLT in Exterior Wall Assembly

- IBC 2015 Requirements (602.4)
 - Allowed in walls with 2 hour rating or less
 - Must be protected on exterior surface













Constructability Considerations

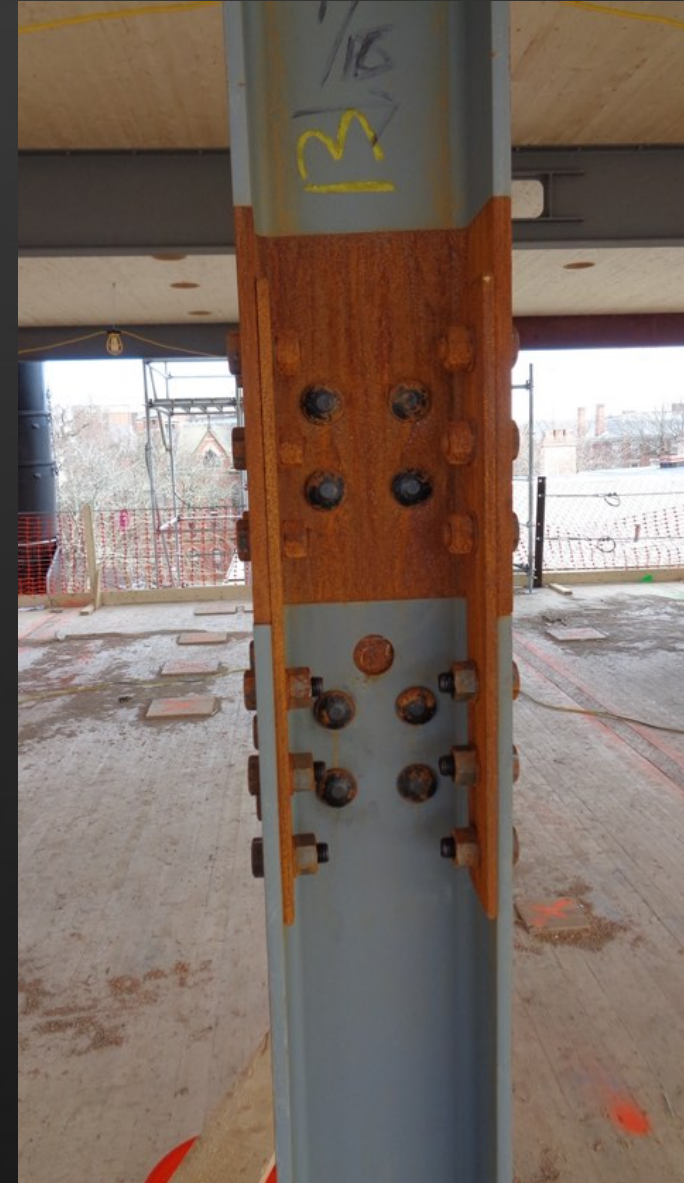
Key Issues

- Mix of trades – wood and steel erector
- Fasteners chosen for speed
- Most holes field drilled – simplifies coordination
- Diaphragm design using spline connectors





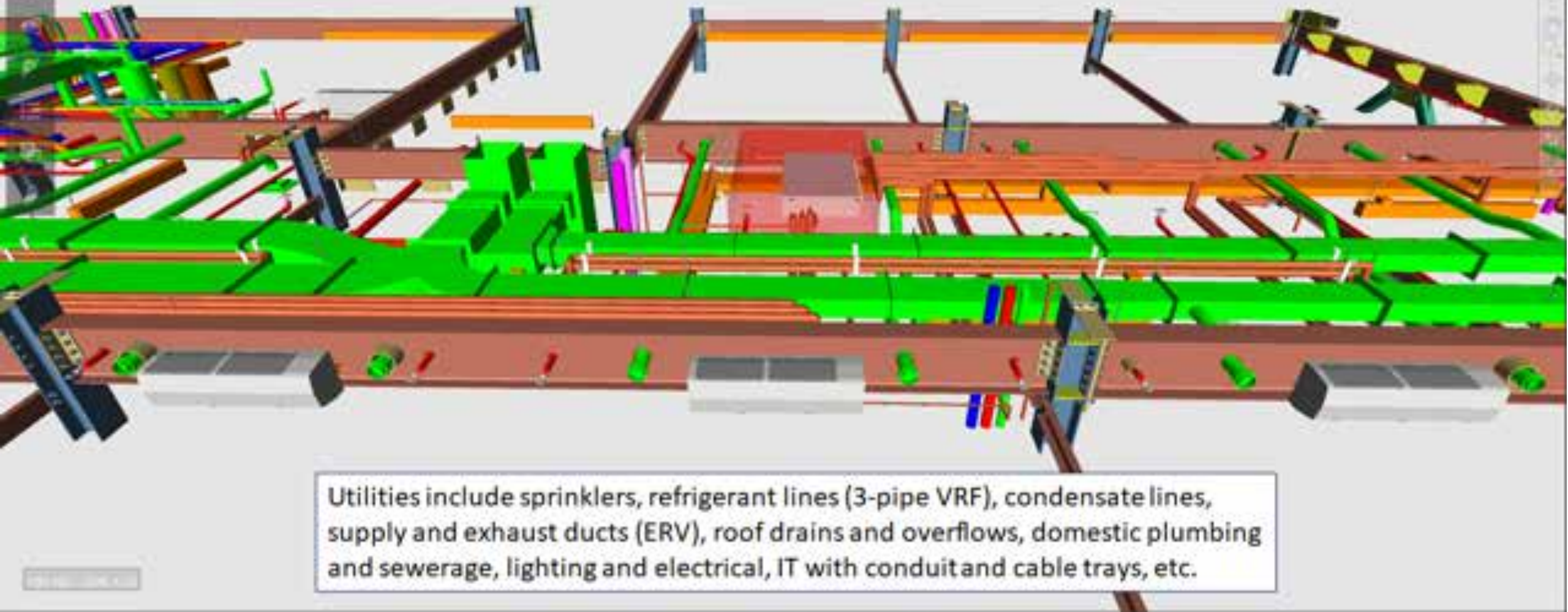
All field connections bolted



Unframed openings in floors



Early steel release (10/18), all utilities exposed in corridors with no ceilings, > 400 beam penetrations, **0 penetrations added in the field.**

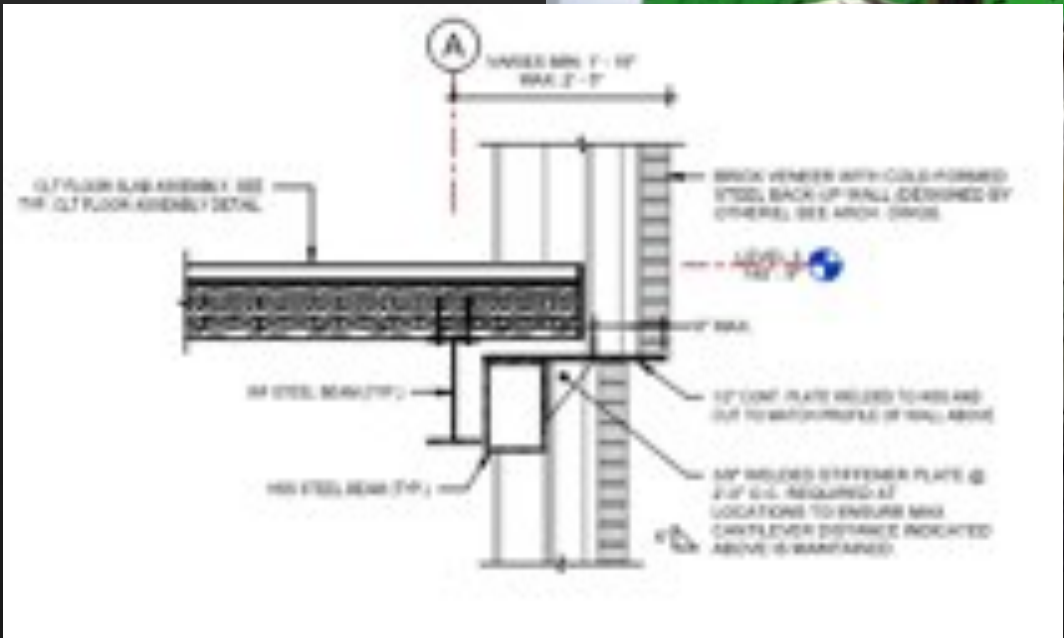


Utilities include sprinklers, refrigerant lines (3-pipe VRF), condensate lines, supply and exhaust ducts (ERV), roof drains and overflows, domestic plumbing and sewerage, lighting and electrical, IT with conduit and cable trays, etc.

Exterior Skin Construction



Exterior Skin Construction



Exterior Skin Construction





Photo by John Horner



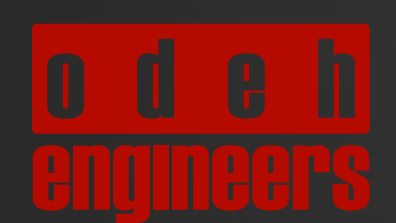
Photos by John Horner



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Questions?

Rendering courtesy of NADAAA, Inc.

This concludes The American Institute of Architects
Continuing Education Systems Course

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