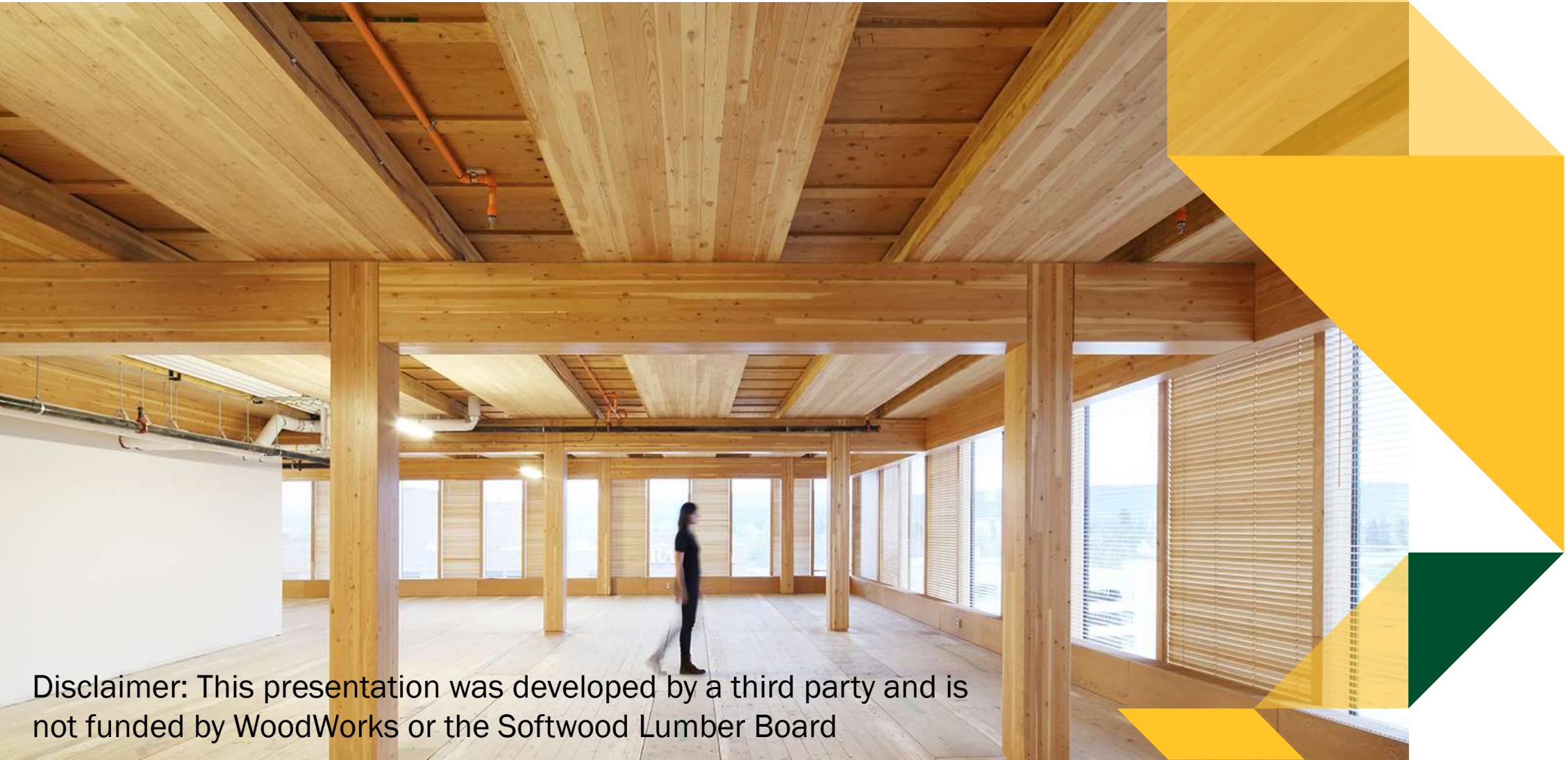
MASS TIMBER CONSTRUCTION MANAGEMENT

DESIGN ENGAGEMENT & SITE PLANNING



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

Building the Team

Considerations:

- ❑ Procurement method
- ❑ Design phase
- ❑ Team experience with mass timber
- ❑ Understanding of current code
- ❑ Has a decision on the use of mass timber been made?

Design-Assist Subcontractors:

- ❑ Mass timber supplier
- ❑ Mass timber erector
- ❑ MEP subcontractors

Cost Drivers

Superstructure Costs	Mass Timber	Concrete	Structural Steel
Low Range	$42/SF	$40/SF	$38/SF
High Range	$75/SF	$54/SF	$48/SF

* Based on 2021 dollars in Denver, CO

Superstructure Cost Drivers

- Construction type & fire rating
- Size & geometry of building
- Structural column grid
- CLT panel spans & thickness
- Panel size & shapes
- Depth of glulam beams
- Connection details
- Acoustic floor assembly
- Shear wall / core layout

Offsetting Factors – Beyond Superstructure

- Schedule reduction – up to 40% faster on superstructure work
- Enhanced trade flow – no re-shores
- Smaller foundations
- Reduced floor to floor height
- Reduction in ceiling finishes
- Smaller crane size
- Reduce temp heating costs (in cold climates)

Structure Comparison

Concept Pricing Considerations:

- ❑ Floor-to-floor height
- ❑ Structural grid & column spacing
- ❑ Footing/column quantity
- ❑ Foundation sizing & type
- ❑ Transfer slab/beams (i.e. U/G parking)
- ❑ Lateral resistance frame & shear walls
- ❑ Interior finishes
- ❑ Core & shell vs. fully built-out
- ❑ LEED/sustainability requirements
- ❑ Construction duration

Impact of Construction Type

Location of Event Space	Rooftop	1st Floor
Construction Type	III-A	III-B
Assembly Group	A-3	A-3
Fire Resistive Rating	1-Hr	Not required
Connections	Concealed	Exposed
CLT Panel Thickness	5-Ply	3-Ply
Superstructure Cost/SF	**$65/SF**	**$53/SF**

Impact of Construction Type

	Office & Residential	Office Only
Floors	9-stories	8-stories
Building Height	92’-6”	80’-6”
Construction Type	IV-B	IV-C
Occupancy	B & R-2	B
Fire Resistive Rating	2-Hr	2-Hr
Exposed Ceilings	30%	100%
Connections	Concealed	Concealed
CLT Panel Thickness	5-Ply	3-Ply
Superstructure Cost/SF	**$77/SF**	**$62/SF**

Manufacturer Selection

- ❑ Domestic vs. International Sourcing
- ❑ Varying Panel Fabrication Size Limits
- ❑ Engineering Support
- ❑ Panel Width Shipping Constraints – Land vs. Sea
- ❑ Proximity to Jobsite / Shipping Costs
- ❑ Supplier Only vs. Turn-Key
- ❑ Sustainability – FSC vs. SFI Certification
- ❑ Aesthetic Considerations
- ❑ Wood Species & Stains

STRUCTURLAM MASS TIMBER CORPORATION
Intelligence In Wood

NORDIC STRUCTURES

binderholz

KLH

Freres LUMBER CO., INC.

KALESNIKOFF

StructureCraft

DR JOHNSON WOOD INNOVATIONS

VAAGEN TIMBERS

SMARTLAM

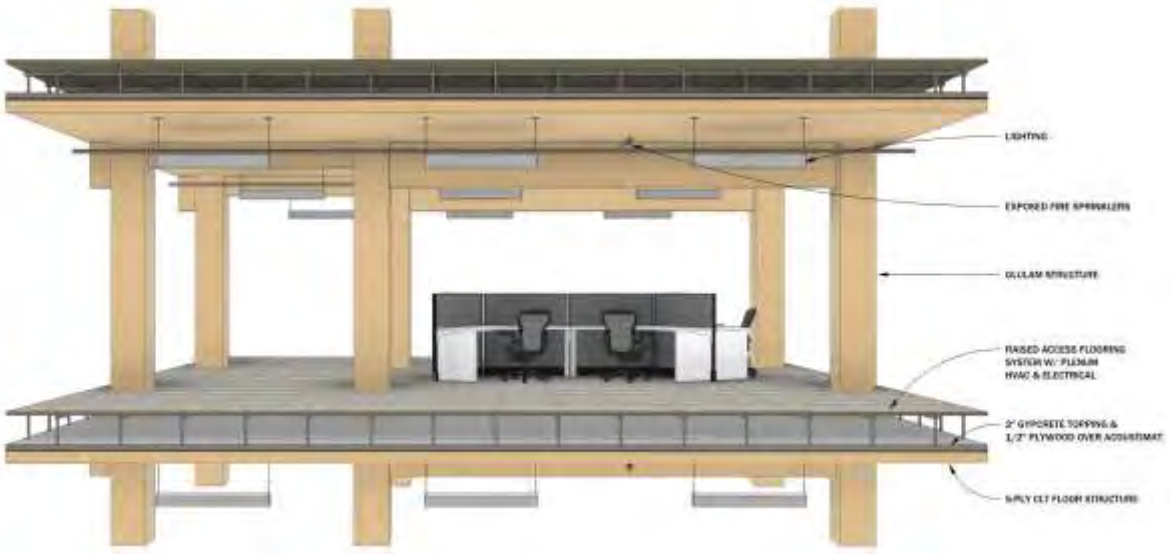
ELEMENTS

stora enso

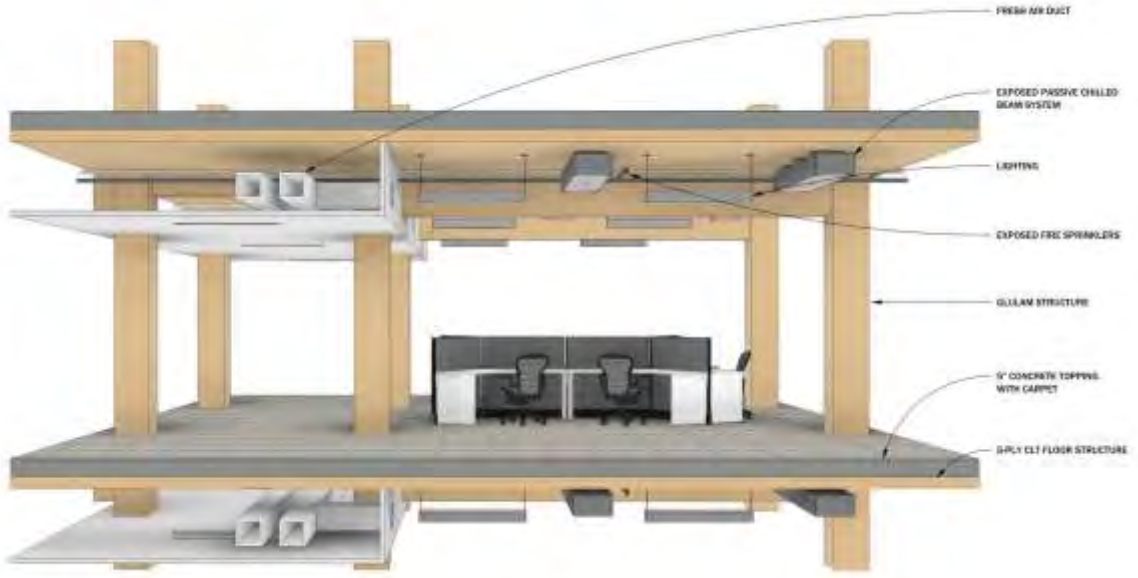
Procurement Best Practices

- ❑ Early Go/No-Go Decision on Mass Timber
- ❑ Design-assist involvement
- ❑ Early supplier selection vs. competitive bid
- ❑ Optimize structural grid with supplier input
- ❑ Maximize time for design coordination
  - ❑ Shop drawing release
  - ❑ MEP coordination
  - ❑ Fabrication lead time
  - ❑ Constructability reviews
- ❑ Transfer of Revit model to contractor

MEP Coordination

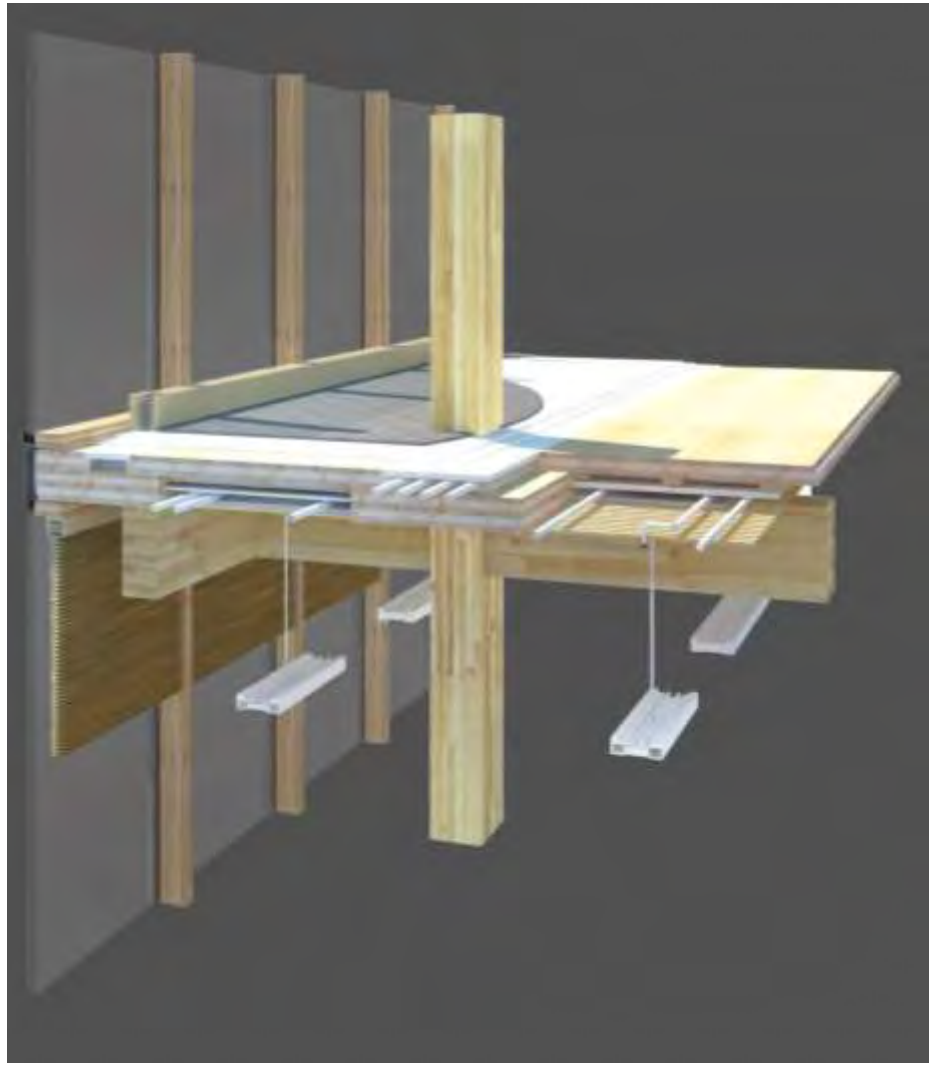


Raised Access Flooring



Overhead Routing w/ Soffits

Case Study: Wood Innovation & Design Center

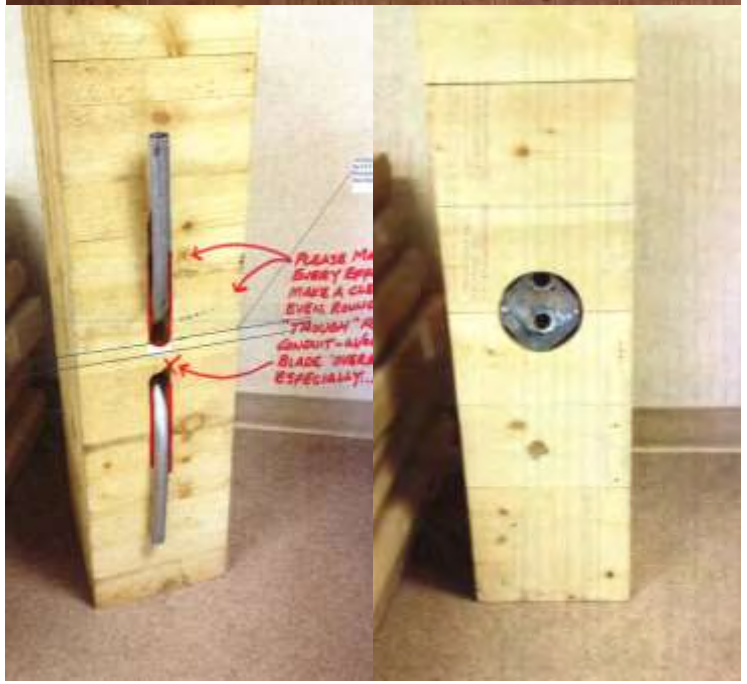


Case Study: CSU Pavilion at Laurel Village

1st CLT project in Colorado (2014)

LEED Platinum certification

- ❑No topping slabs at floor assembly
- ❑Rigid insulation at roof assembly
- ❑Long span, exposed ceilings
- ❑Extensive use of mockups



Case Study: DU Burwell Center

Challenge: No exposed conduit!

- ❑ Well defined space programming
- ❑ Originally explored access flooring
- ❑ 3” topping slabs at floor & roof assembly
- ❑ 3D model ALL conduit
- ❑ Penetration overlay with CLT shop drawings
- ❑ Strategic placement of soffits & ceilings
- ❑ Topping slab reinforcing

MEP Coordination: Best Practices

- ❑ Identify aesthetic MEP routing goals early
- ❑ Determine extent of flexibility required
- ❑ Early transfer of REVIT model
- ❑ Prioritize MEP penetration coordination
- ❑ Consolidate MEP in soffits/ceilings
- ❑ Maximize shop penetrations made with CNC machine in factory
- ❑ Minimize field penetrations

Critical Early Design Decisions

- ❑ Structure type
- ❑ Structural grid
- ❑ Select mass timber supplier
- ❑ Building height
- ❑ Construction type
- ❑ Fire Resistance Rating
- ❑ Occupancy Classification
- ❑ MEP systems
- ❑ MEP routing goals
- ❑ Floor-to-floor height

Construction Tolerances

Dissimilar structural material tolerances

- Allowable tolerances – ACI, AISC
- Steel: +/- 1/2”
- Concrete: 1/4” in 10 ft., up to 1’
- Mass Timber: 1/16”

Quality Control

- Build tolerance into the interface detail
- Base plate layout & verification
- Overlay field scan with 3D model

Erection Sequence

- Shear wall bracing plan
- Early establishment of diaphragm – lock the building in
- Coordination w/ Just-in-Time material delivery
- Ensure erection sequence aligns with details

Site Logistics

Targeted Goals:

- Pick CLT panels directly off the trailer
- Eliminate double-handling
- Eliminate onsite storage of material

Best Practices

- Align erection and fabrication sequence
- Optimize lay down area & crane placement
- Onsite vs. Offsite Marshalling Yard

Thank you!

Ankit Sanghvi
Preconstruction Manager
PCL Construction Services
asanghvi@pcl.com