

Cost Dialogues: The Contractor Perspective on Mass Timber Buildings

Presented by: Ankit Sanghvi - Preconstruction Manager
PCL Construction



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

“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

Innovation isn't necessarily new, but it should always be better—and that's certainly been the case for mass timber. Environmental performance, lighter weight, speed of construction and aesthetics are all cited as reasons for its use over traditional materials. However, one of the hurdles left before mass timber can become mainstream is cost. Cost of materials, manufacturer capabilities and efficiencies, erection processes, pre-planning and the level of prefabrication all play a role in the final cost of a mass timber project, and yet there is little widespread knowledge of these topics. This panel of three experienced installers and contractors will provide insight on the cost of real mass timber buildings in the US. Preconstruction planning, construction phasing, erection techniques and lessons learned will all be covered to help building designers assess the viability of their own mass timber projects.

Learning Objectives

1. Discuss the role of the contractor and installer in optimizing mass timber cost efficiency while meeting local code and occupational safety requirements.
2. Highlight how an understanding of manufacturer capabilities can improve the cost-effectiveness of mass timber designs.
3. Review recently completed mass timber projects in Colorado, emphasizing lessons learned related to code and building department approval and project budget.
4. Explore methods of efficient communication unique to the designer-contractor interface on mass timber projects and discuss how this communication during construction translates to code-compliant buildings that are resilient and energy efficient.

Wood Innovation & Design Center



The Arbour Tall Wood Building



The Pavilion at Laurel Village



Project Team

Owner: Colorado State University

Architect: 4240 Architecture

Structural: KL&A Engineers & Builders

General Contractor: PCL Construction

Mass Timber Supplier: Structurlam

Mass Timber Erection: Timmerhus

Highlights

1st CLT project in Colorado

LEED Platinum

2015 ENR Mountain States – Best Green Project

2016 AIA Colorado Award of Merit – Institutional



The Pavilion at Laurel Village

Construction Type

2-stories, 11,500 SF

Type V-B – unprotected wood frame

Hybrid Structure

Floor Panels – 5-ply CLT

Roof Panels – 7-ply CLT

Frame – Glulam beams & HSS Columns

Lateral System – CMU Walls

Cost Drivers

Unique geometry

Asymmetrical column grid

Limited full size CLT panels

Long roof spans – thicker CLT panels

Superstructure Cost

\$82/SF (2019 dollars)



The Pavilion at Laurel Village

Lessons Learned / Experience Gained

Construction Tolerances

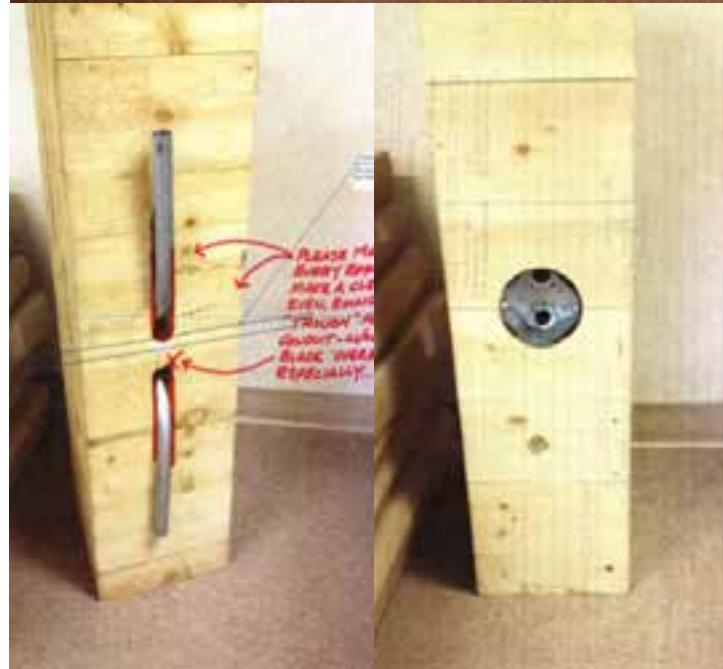
- Interface of dissimilar materials
- Dapped / recessed connections
- Exposed connection details

Moisture & Stain Mitigation

- Protection during construction
- Finish of exposed steel – raw vs. primed
- CLT exposed to exterior

MEP Coordination

- 3D modeling of ALL conduit
- Seek innovative ideas
- Mockups, mockups, mockups!



Pioneer Career Achievement Center



Project Team

Owner: University of Denver

Architect: Lake Flato / SA+R

Structural: KL&A Engineers & Builders

General Contractor: PCL Construction

Mass Timber Supplier: Nordic Structures

Mass Timber Erection: PCL Construction

Highlights

Showcase facility for DU alumni & students

Tallest CLT core walls in Colorado

LEED Platinum (targeted)

WELL Building Standard (targeted)

Construction Start: June 2019



Pioneer Career Achievement Center

Construction Type

3-stories – 23,300 SF

Type III-B – Unprotected Combustible

Mass Timber Structure

Floor Panels – 3-ply CLT w/ 3" concrete topping

Roof Panels – 3-ply CLT

Frame – Glulam beams & columns

Lateral System – 5-ply CLT wall panels

Cost Drivers

Unique geometry – radiused perimeter edge

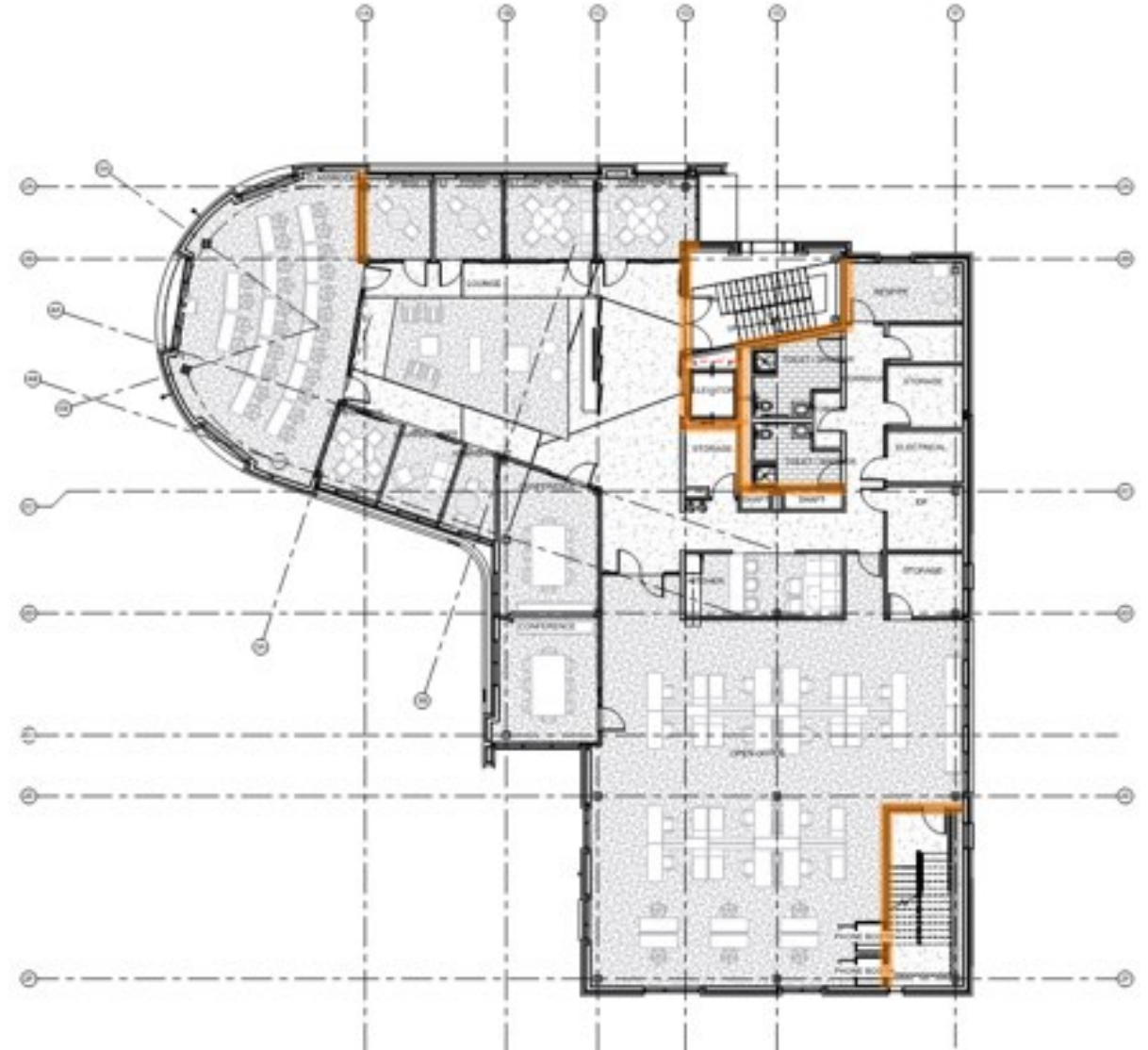
Optimized column grid & beam sizes

Exposed connections

Small footprint w/ limited repetition

Superstructure Cost

\$53/SF



Pioneer Career Achievement Center

Cost Study – Relocation of Event Space (Assembly Group A-3)

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



Total Cost Analysis – Beyond the Structure

Superstructure Costs	Mass Timber	Concrete	Structural Steel
Low Range	\$35/SF	\$38/SF	\$30/SF
High Range	\$65/SF	\$52/SF	\$45/SF

Cost Drivers

- Size & Geometry of Building
- Column Grid
- CLT Panel Spans & Thickness
- Panel Size & Shapes
- Depth of Glulam Beams
- Construction Type & Fire Rating
- Connection Details

Offsetting Factors

- Schedule Reduction – up to 20% faster
- Enhanced Trade Flow
- Smaller Foundations
- Reduction in Finishes – highlight exposed wood



> QUESTIONS?

This concludes The American Institute
of Architects Continuing Education
Systems Course

Ankit Sanghvi

PCL Construction Services

asanghvi@pcl.com