



Image Guerdon Modular

Why Timber is Changing the Way We Design and Build

Closing Panel:
Matt Laase, Jackson | Main Architecture
Ankit Sanghvi, PCL Construction
Dean Lewis, DCI Engineers



Image Zeta Design+Build



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



Course Description

Change in the construction industry is a notoriously slow process. And yet, due to a confluence of factors that include a skilled labor shortage and the need for greater energy efficiency and a lighter carbon footprint, change is happening quickly. Advancements in engineered wood products and the technologies used to create them are resulting in higher levels of precision, prefabrication, envelope efficiency, and MEP service integration. This dynamic panel will discuss the use of off-site wood and mass timber construction in the context of completed projects throughout the country. Reasons for their material selections, challenges and solutions associated with off-site techniques, and unique lessons learned throughout the design and construction processes will all be presented. Attendees will hear first-hand why designers, developers and contractors are looking to integrate off-site and mass timber methodologies, and perhaps leave with ideas on how they too can be part of the positive change.

Learning Objectives

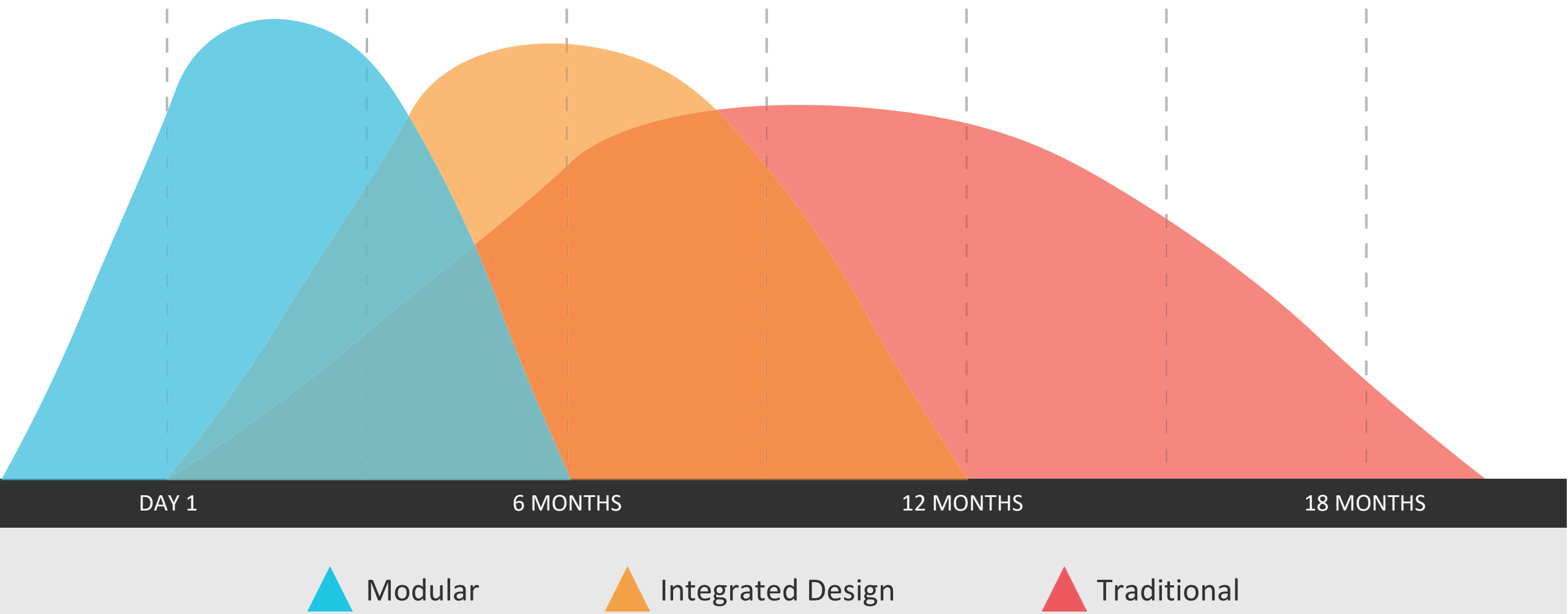
1. Discuss the role of the contractor and installer in optimizing mass timber cost efficiency while meeting local code and occupational safety requirements.
2. Discuss the cost drivers that can lead to cost-effective mass timber designs and faster schedules.
3. Review recently completed mass timber projects, emphasizing lessons learned related to material tolerances, coordination of building systems, and moisture management.
4. Highlight how an understanding of construction types and building code can improve the cost-effectiveness of mass timber designs.

Modular Wood-Frame for Multi-family: Design, Details, Delivery and Why it Makes Sense



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

Design Timeline



Modular Benefits



- Stable Pricing
- Build in controlled environment
- Excellent quality control
- Assembly line efficiency
- Pre-approved building components



Product Design Benefits



- Preset design prices
- More focus on amenities
- Design test redesign
- Unique product repetitive parts





What's Next?

Creating the Recipe Book For Modular Construction



Sharing the Knowledge of Investment

Open Source for the Design Community

*"It's not what you know that matters, it's what
You do when you don't know." -Unknown*

Industry knowledge shared for Architects, Engineers & Owners

Diagrams, details and instructions for designing modular

Made available for everyone to help ensure success

Advocating for the use of modular



> Thank You!

Questions?

Matthew Laase, AIA, NCARB
Jackson | Main Architecture
Matt.Laase@JacksonMain.com

Contractor Perspective: Why Timber is Changing the Way We Design and Build

Presented by: Ankit Sanghvi - Preconstruction Manager
PCL Construction



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Wood Innovation & Design Center

Prince George, BC



The Arbour

George Brown College – Toronto, ON



TMBR Condominiums

Minneapolis, MN



Pavilion at Laurel Village

Colorado State University – Fort Collins, CO



Pavilion at Laurel Village

Colorado State University – Fort Collins, CO

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)



Pavilion at Laurel Village

Colorado State University – Fort Collins, CO

Lessons Learned / Experience Gained

Construction Tolerances

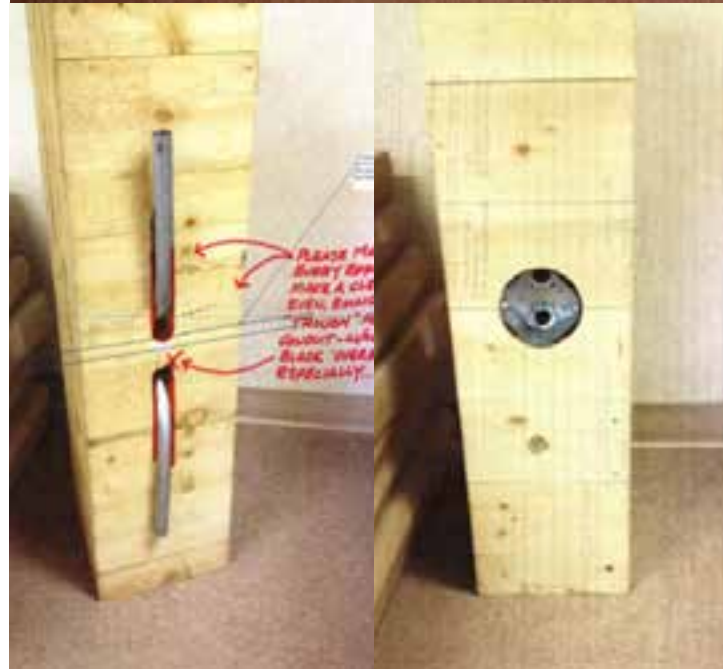
- Interface of dissimilar materials
- Dapped / recessed connections
- Exposed connection details

Moisture & Stain Mitigation

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

MEP Coordination

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



Burwell Center for Career Achievement

University of Denver – Denver, CO



Burwell Center for Career Achievement

University of Denver – Denver, CO

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

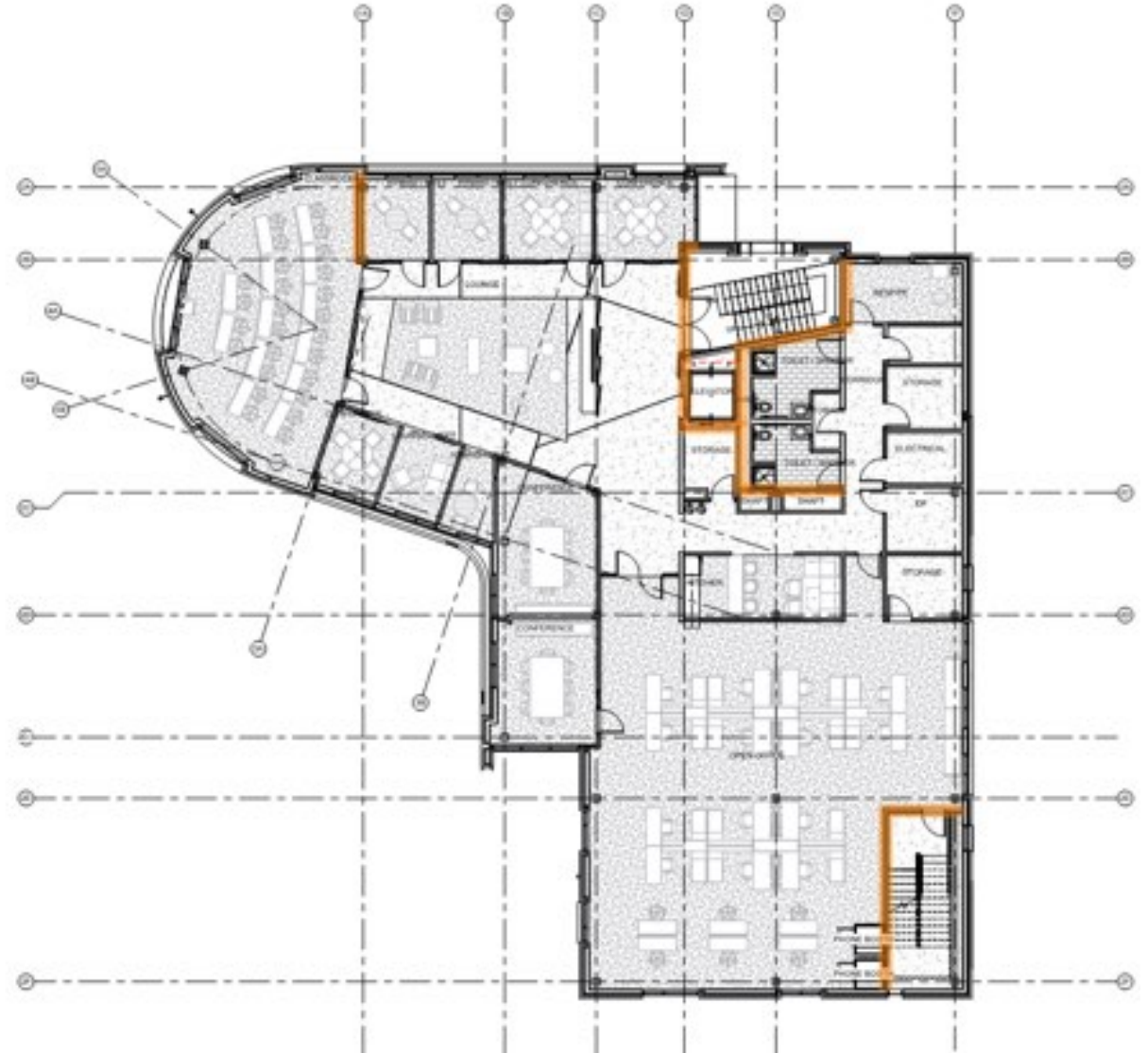
Optimized column grid & beam sizes

Exposed connections

Small footprint w/ limited repetition

Superstructure Cost

\$53/SF (2019 dollars)



Case Study: Impact of Construction Type

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

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
- Acoustic Floor Assemblies

Offsetting Factors

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



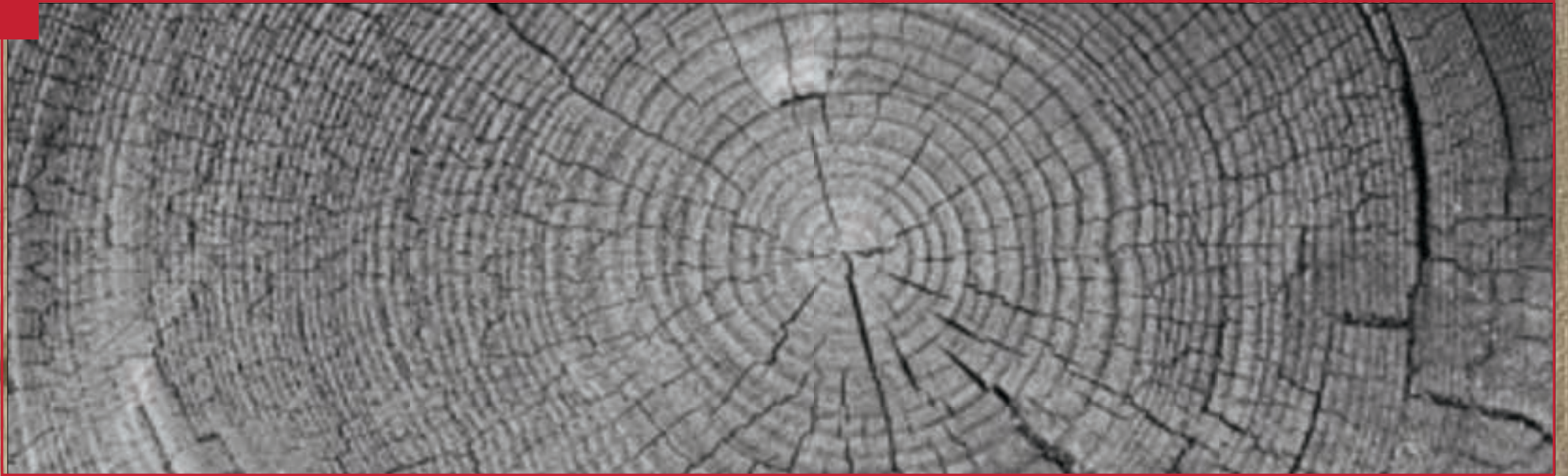
> QUESTIONS?

Ankit Sanghvi

PCL Construction Services

asanghvi@pcl.com

Why timber is changing the way we design and build



WOODWORKS SOUTHERN CALIFORNIA WOOD DESIGN SYMPOSIUM
2019-11-13

DEAN LEWIS - PE, SE - ASSOCIATE

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MODULAR & PREFAB OPTIONS



PREFAB WALLS & FLOORS











REFINING MATERIALS



REFINING MATERIALS



Full Scale Mock Ups



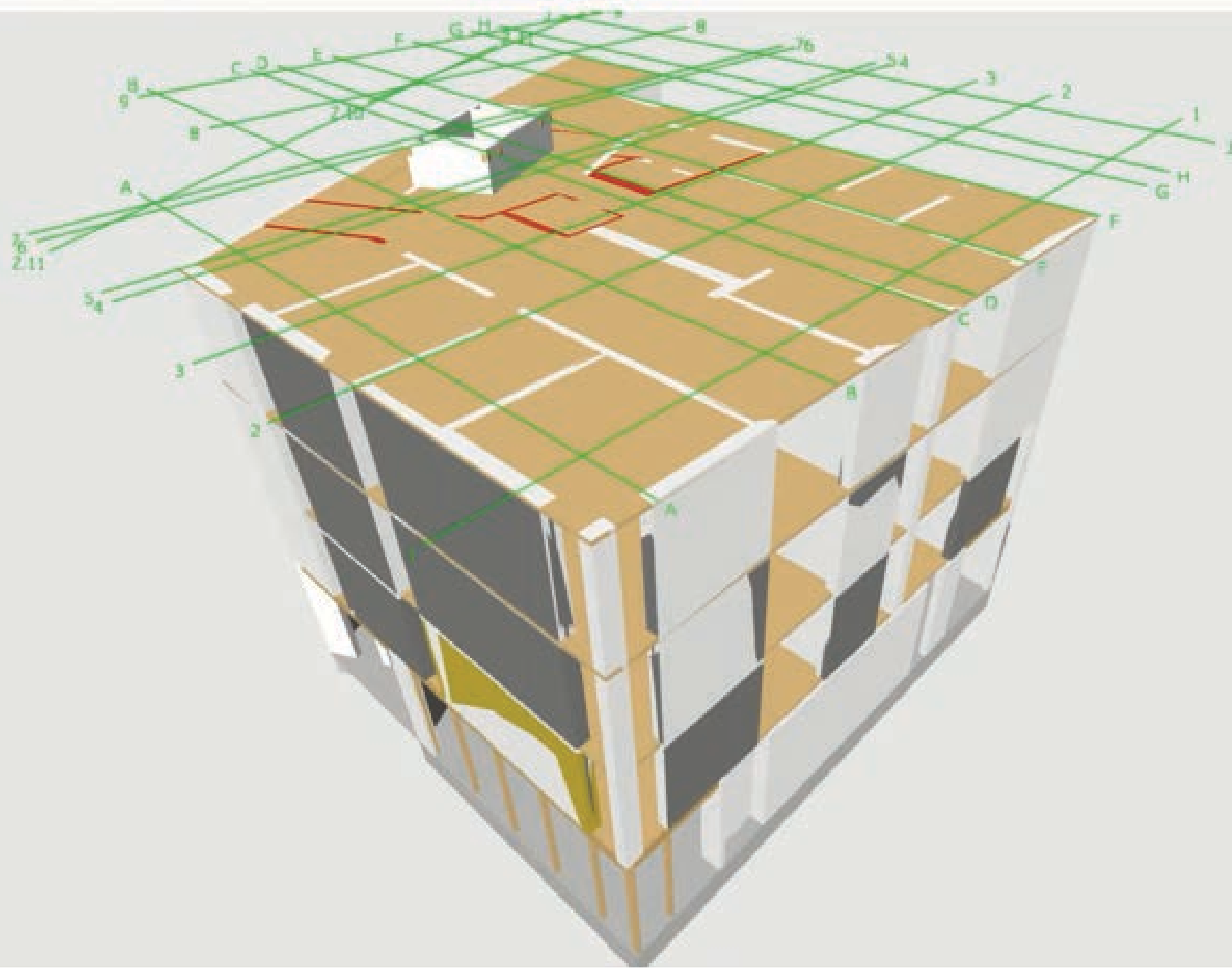
How precise can it be?



Depends on your team

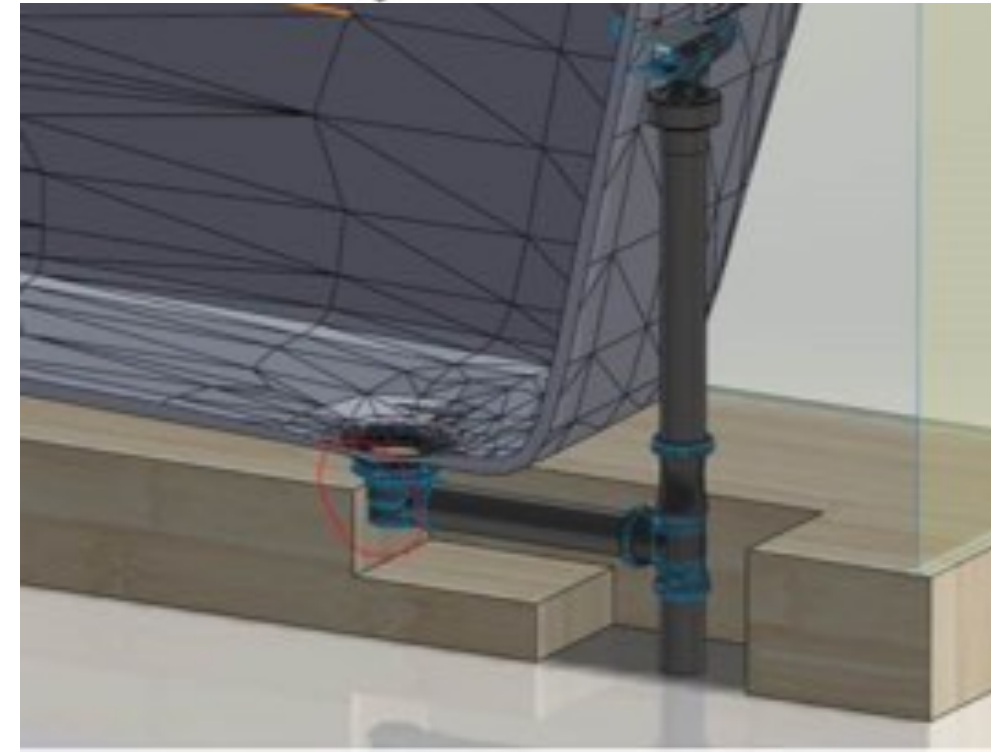
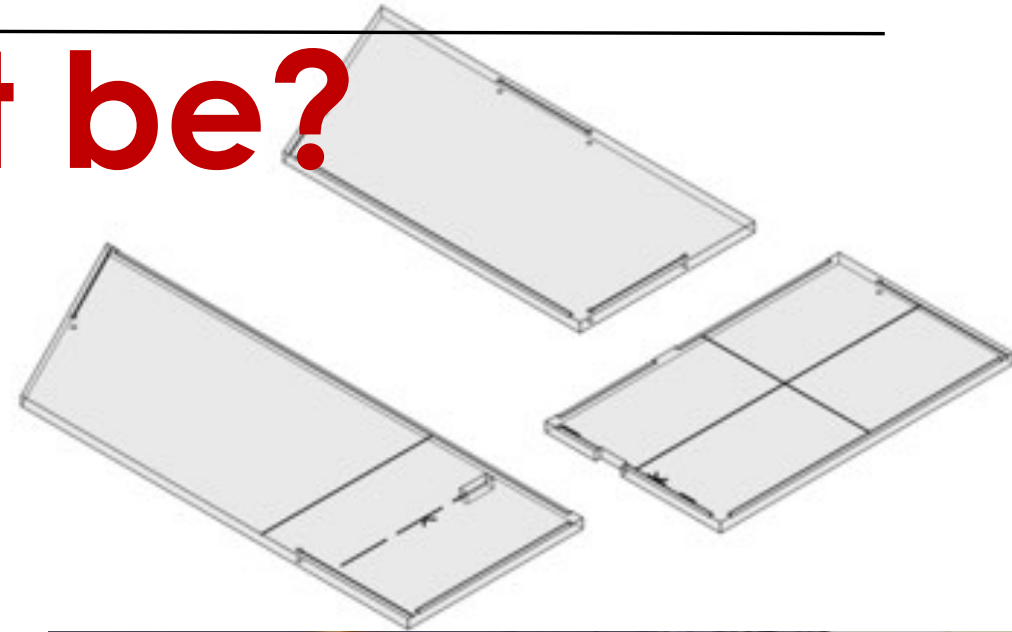
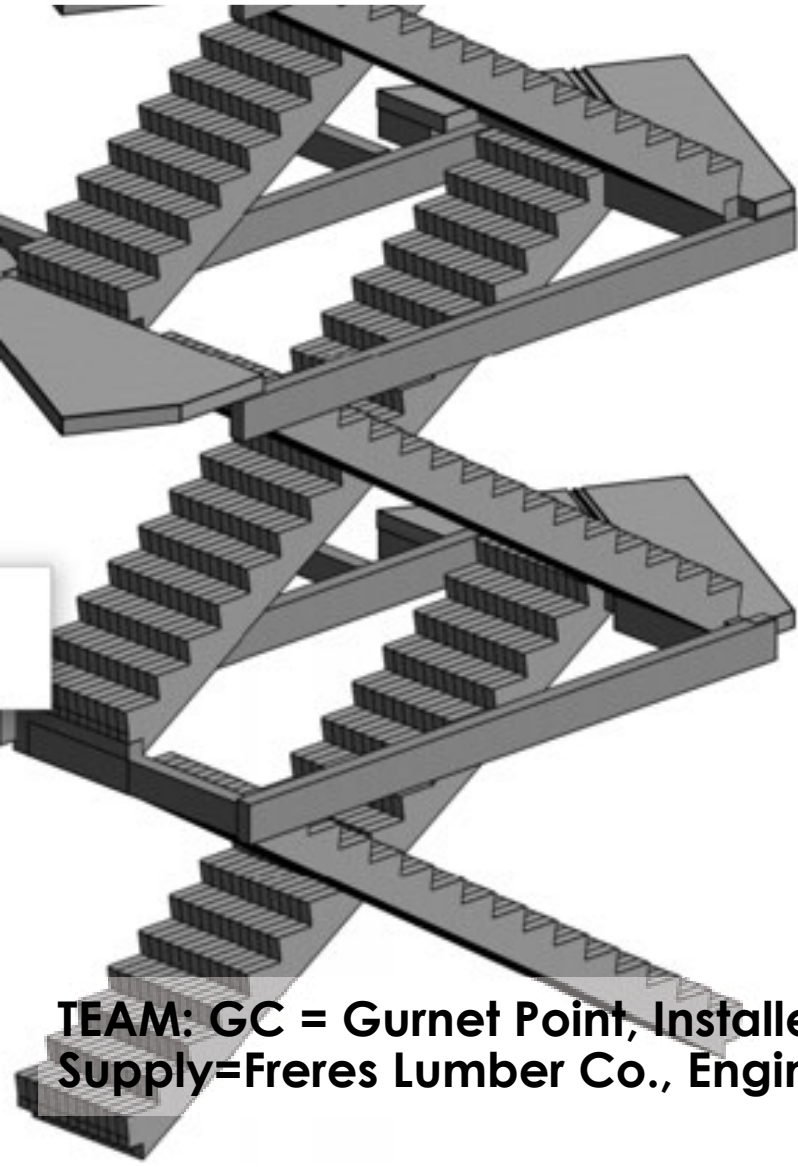


TEAM: GC = Gurnet Point, Installer=Clavalo Consturction, Timber Supply=Freres Lumber Co., Engineer=DCI Engineers

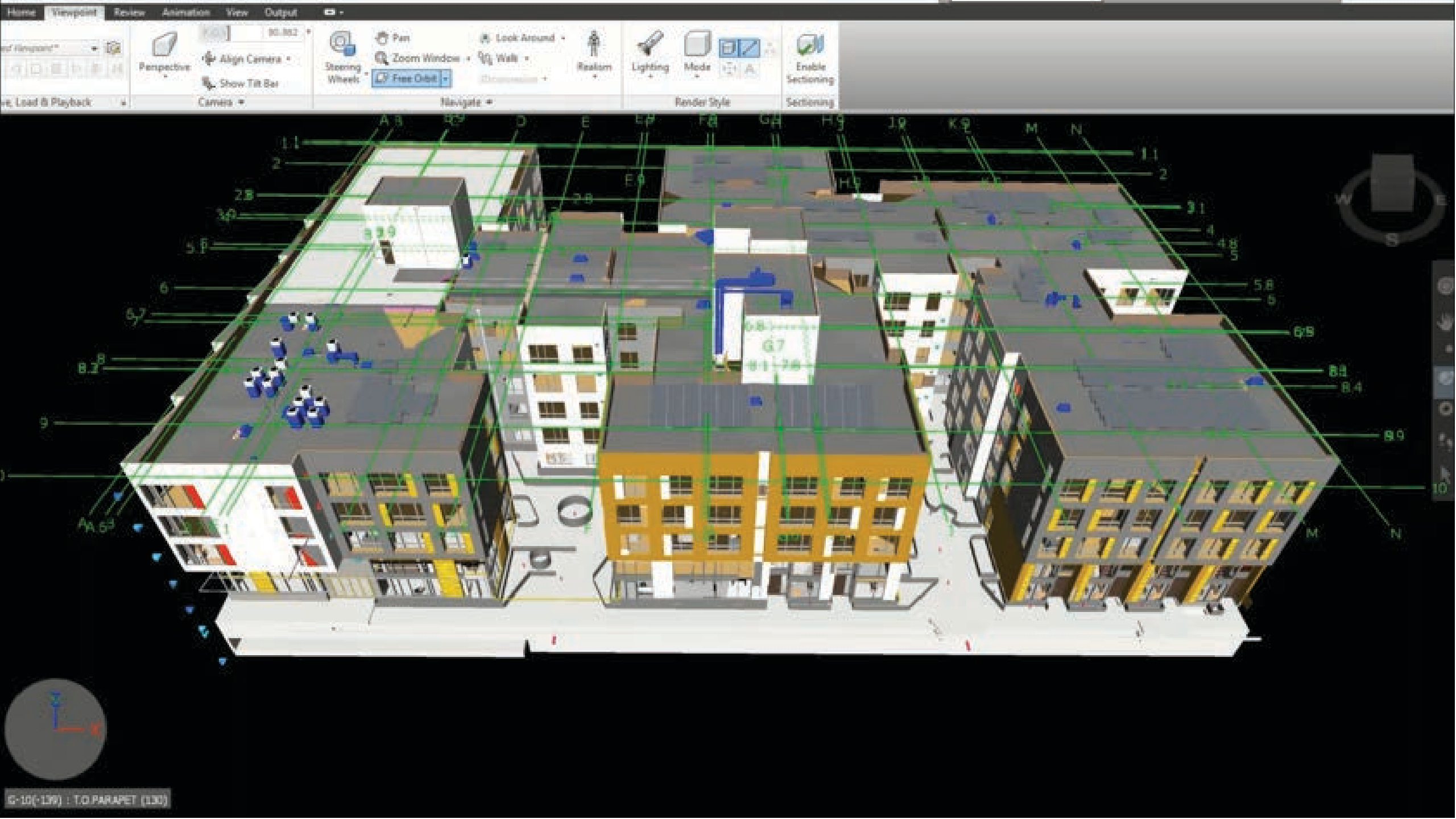




How precise can it be?



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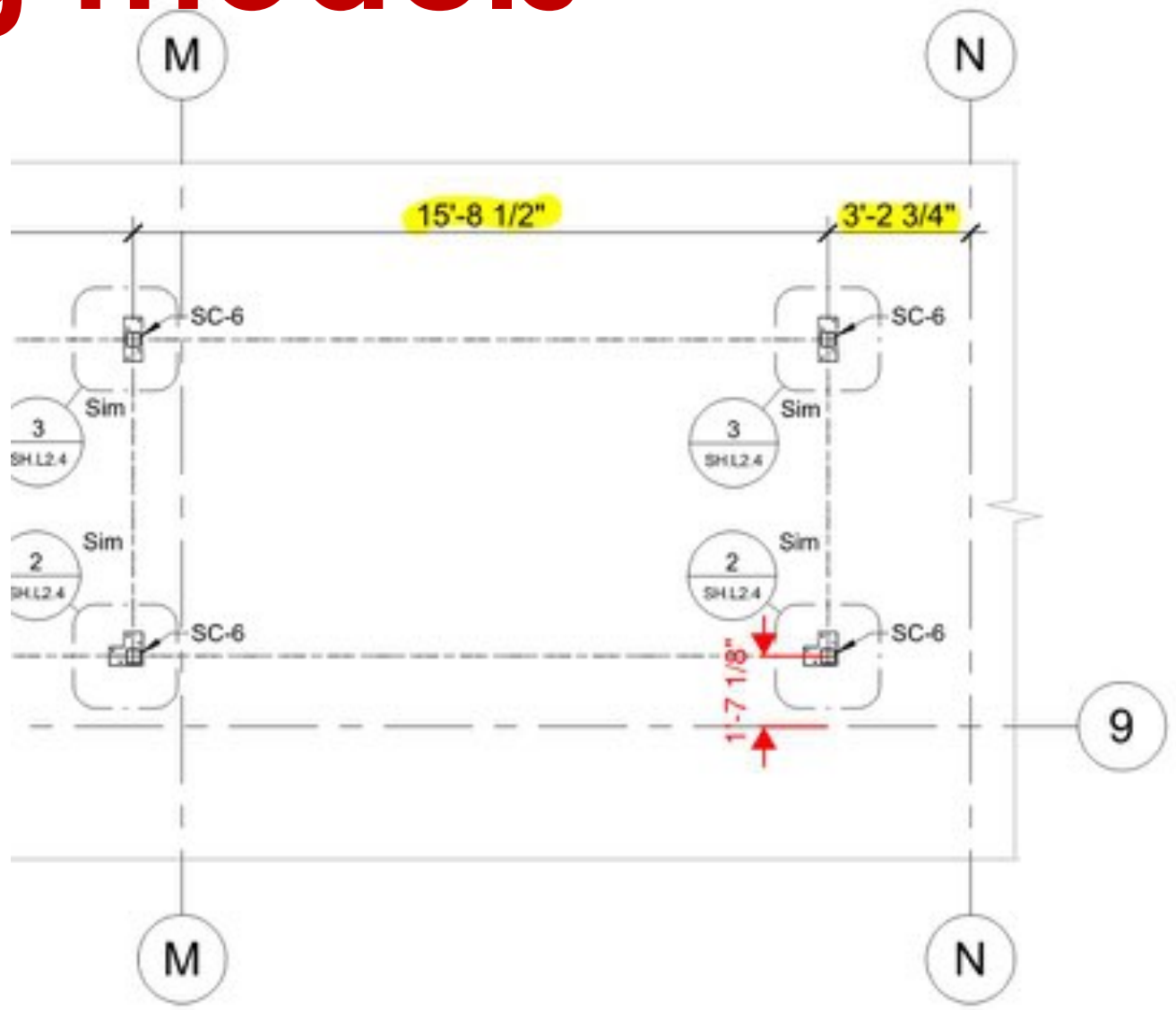
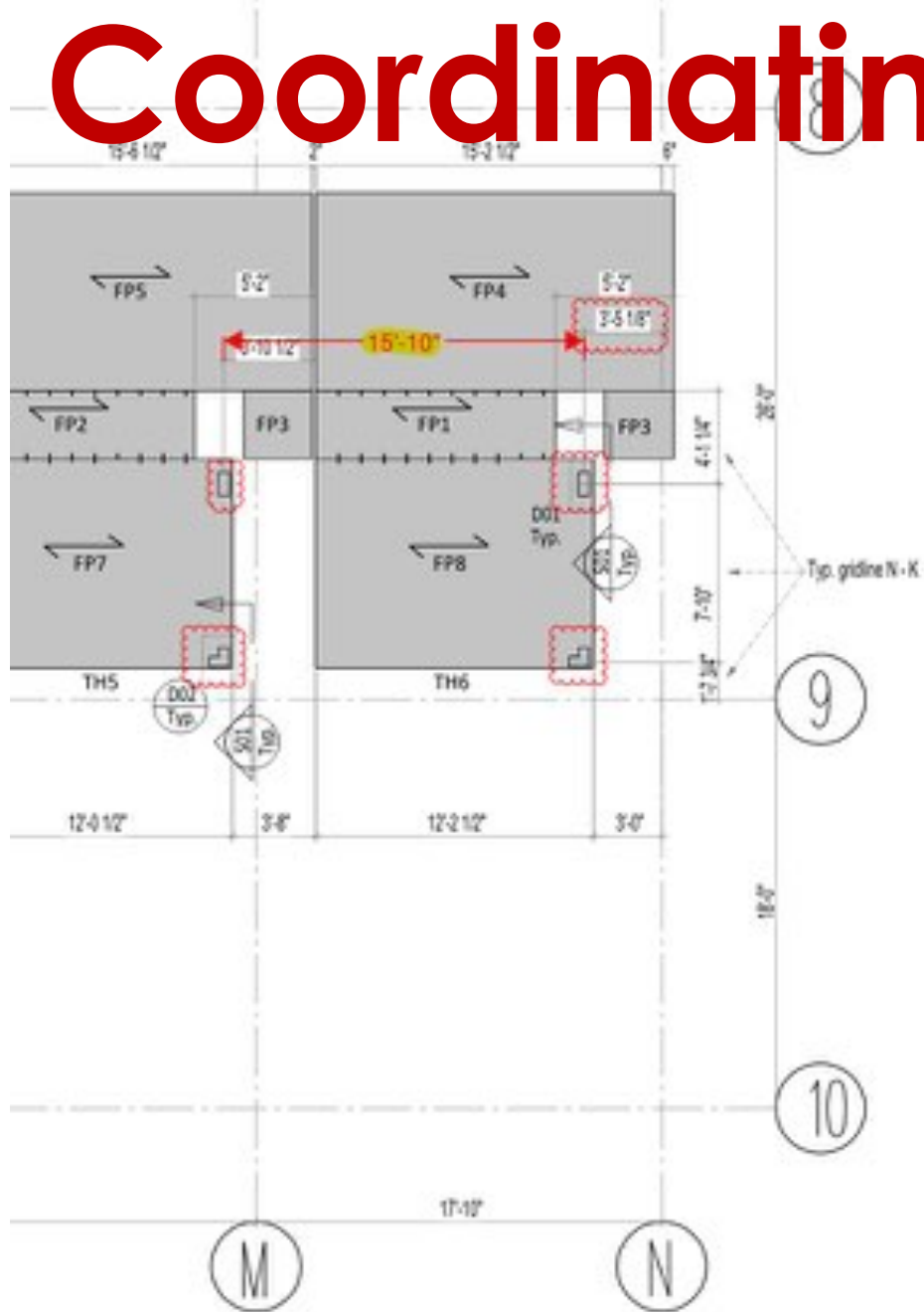


Model -> shops-> field

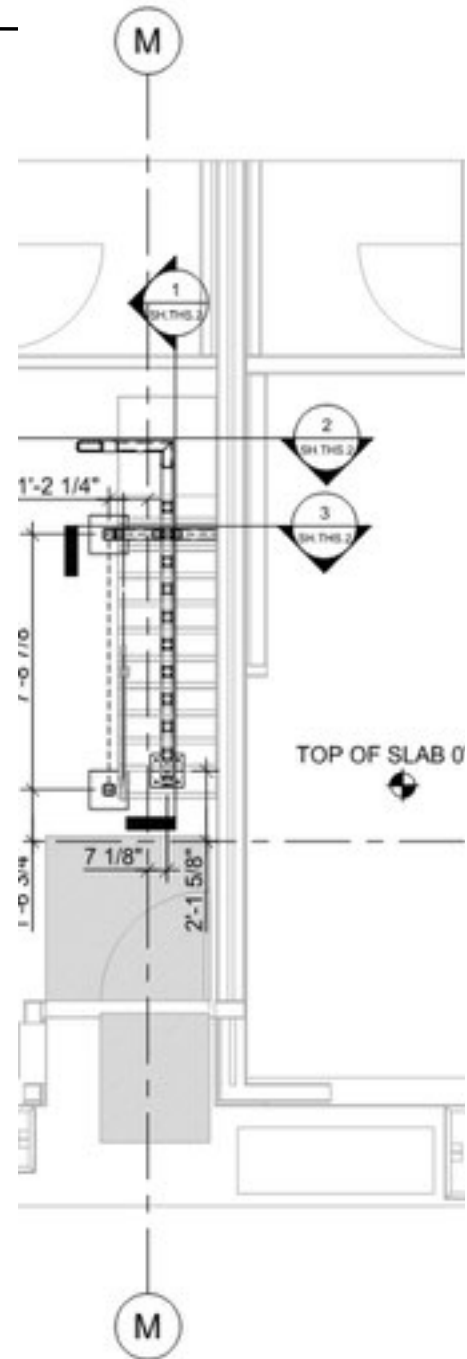
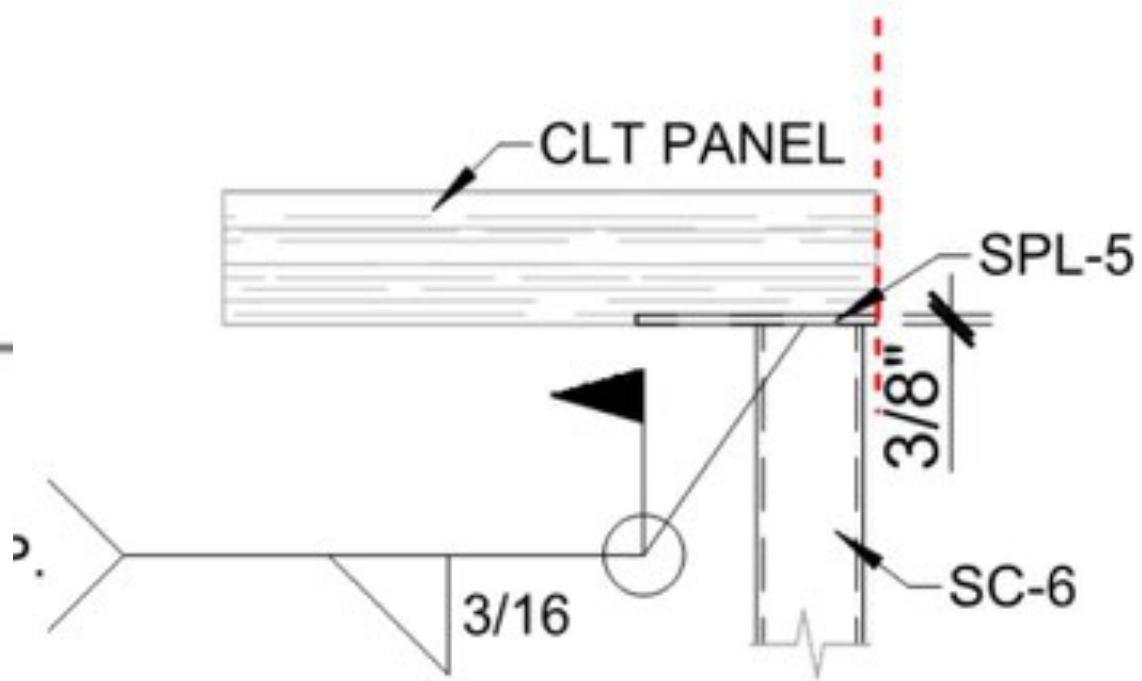
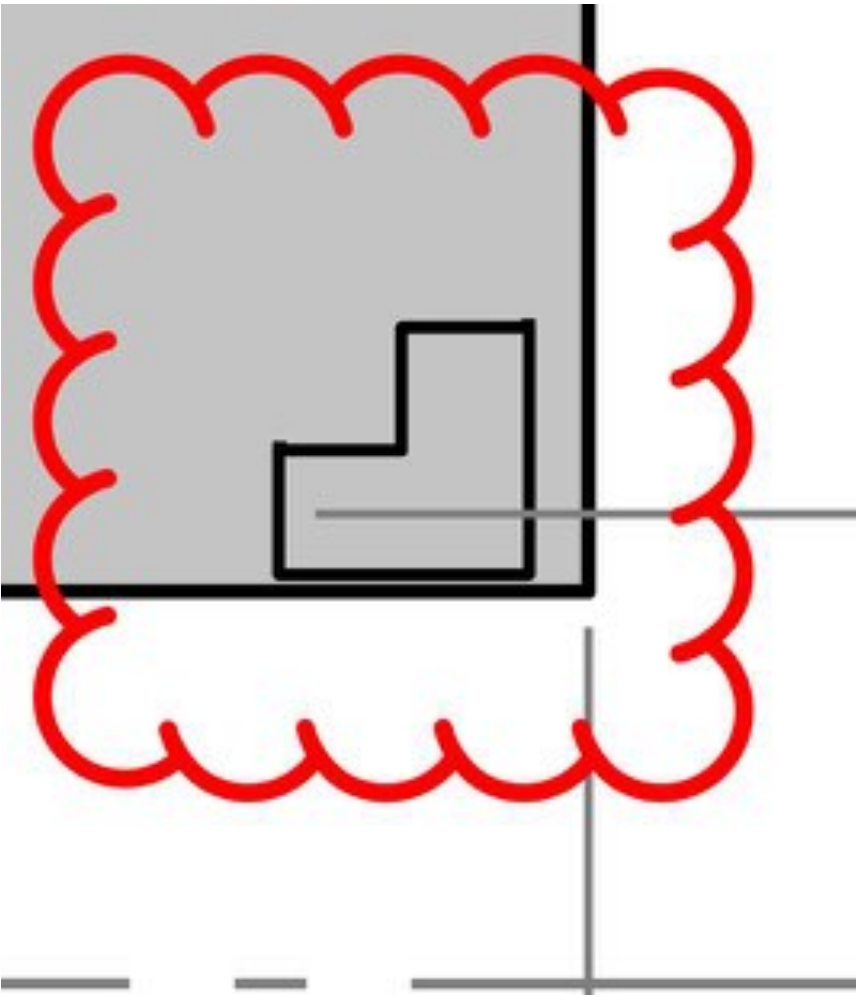




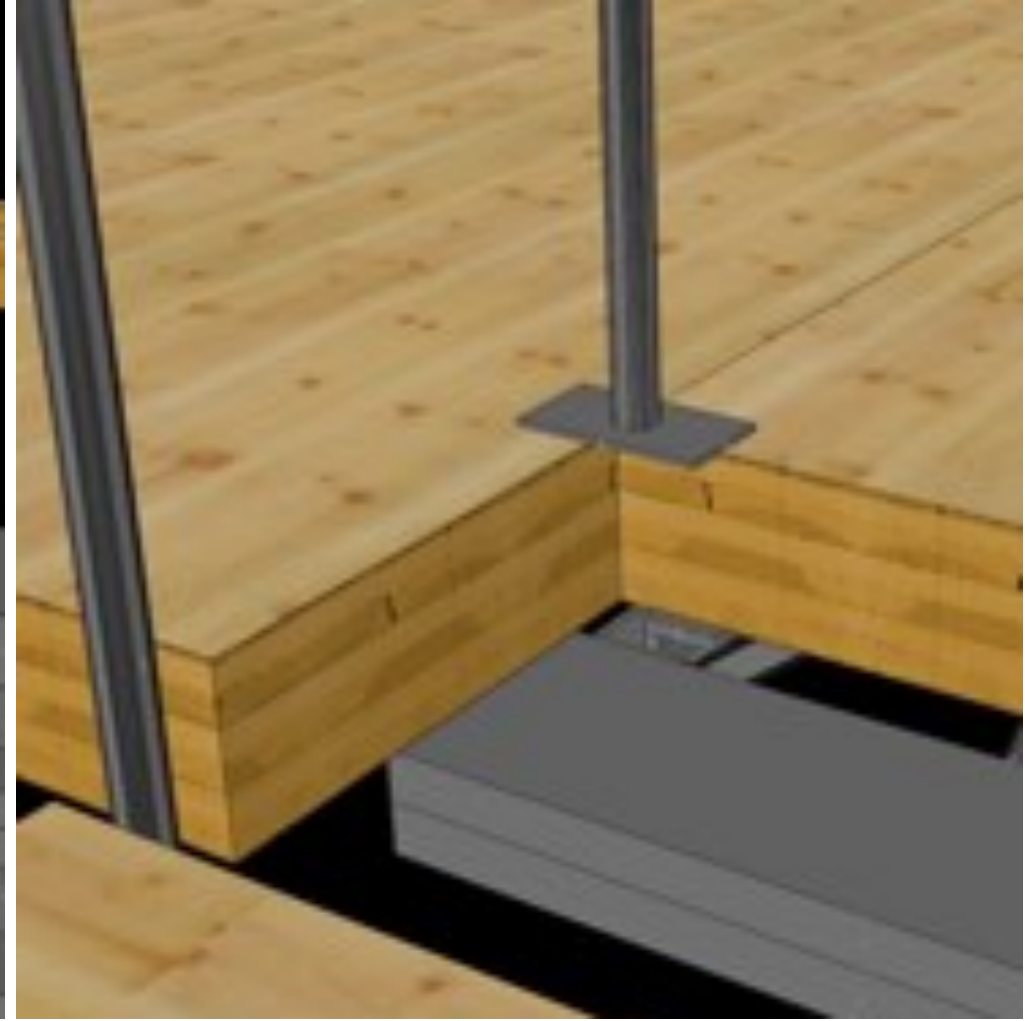
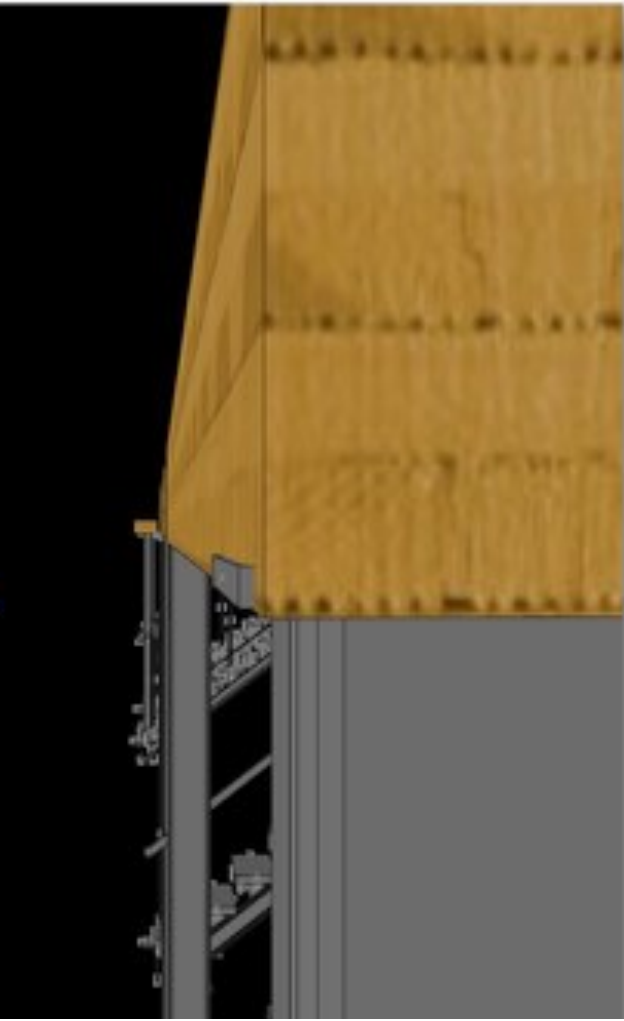
Coordinating models



Coordinating shops



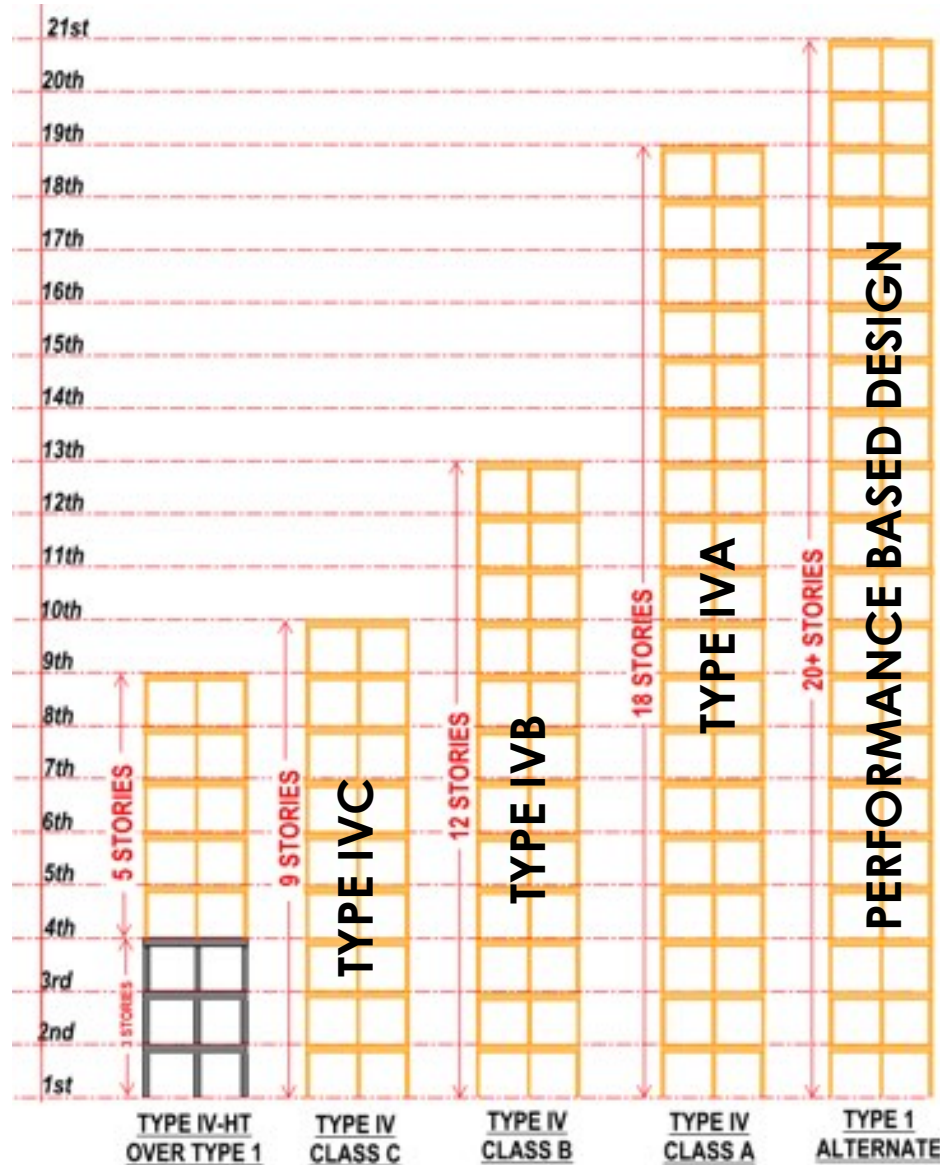
Coordinating shops







Future code implications



Type VA, VB, VC = Post & Beam or Flat Plate solution



OR.... CLT modular



Blockhouse Research - ToolBox

DIAPHRAGMS

- CLT & MPP can act as diaphragm
- NLT, DLT, GLT need wood sheathing for Diaphragms with 35 ft limit or concrete topping



WHAT ABOUT CLT SHEAR WALLS



NON-TIMBER LATERAL SYSTEMS



Credit: Structurlam



Credit: Swinerton

HYBRID STRUCTURES



HYBRID STRUCTURES



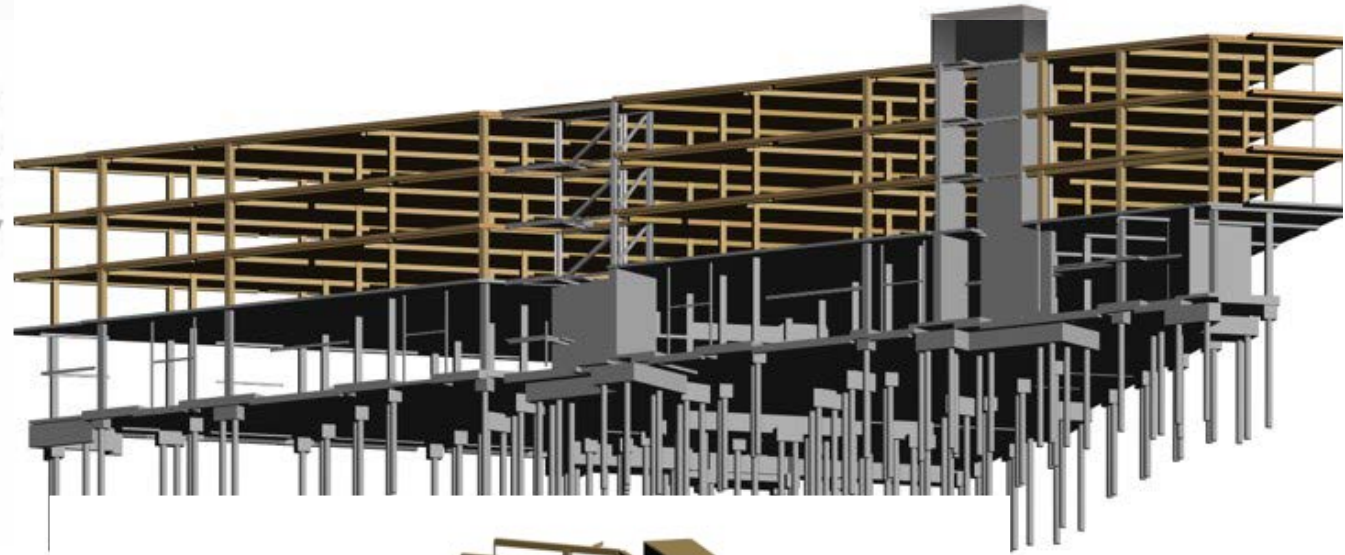
Credit: StructureCraft

Mass Timber in San Francisco



TEAM: Developer=SKS Partners, GC = Hathaway Dinwiddie, Timber Supply & Install=Nordic, Architect=Perkins&Will, Engineer=DCI Engineers

Mass Timber in San Francisco



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Questions?

- Dean Lewis
- (415) 638-8916
- DLewis@dc-engineers.com

Thank you for your time!

