WoodWorks Webinar 2023-02-09

C. Gerald Lucey Building 226 Main Street Brockton MA

Addressing Material Tolerances at the Timber to Steel Spine

Department of Unemployment Assistance

Massasoit Community College

DESIGN AND CONSTRUCTION TEAM

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Project Manager BOND
Building Construction

OWNER Division of Capital Asset Management and Maintenance

ARCHITECT Jones Architecture

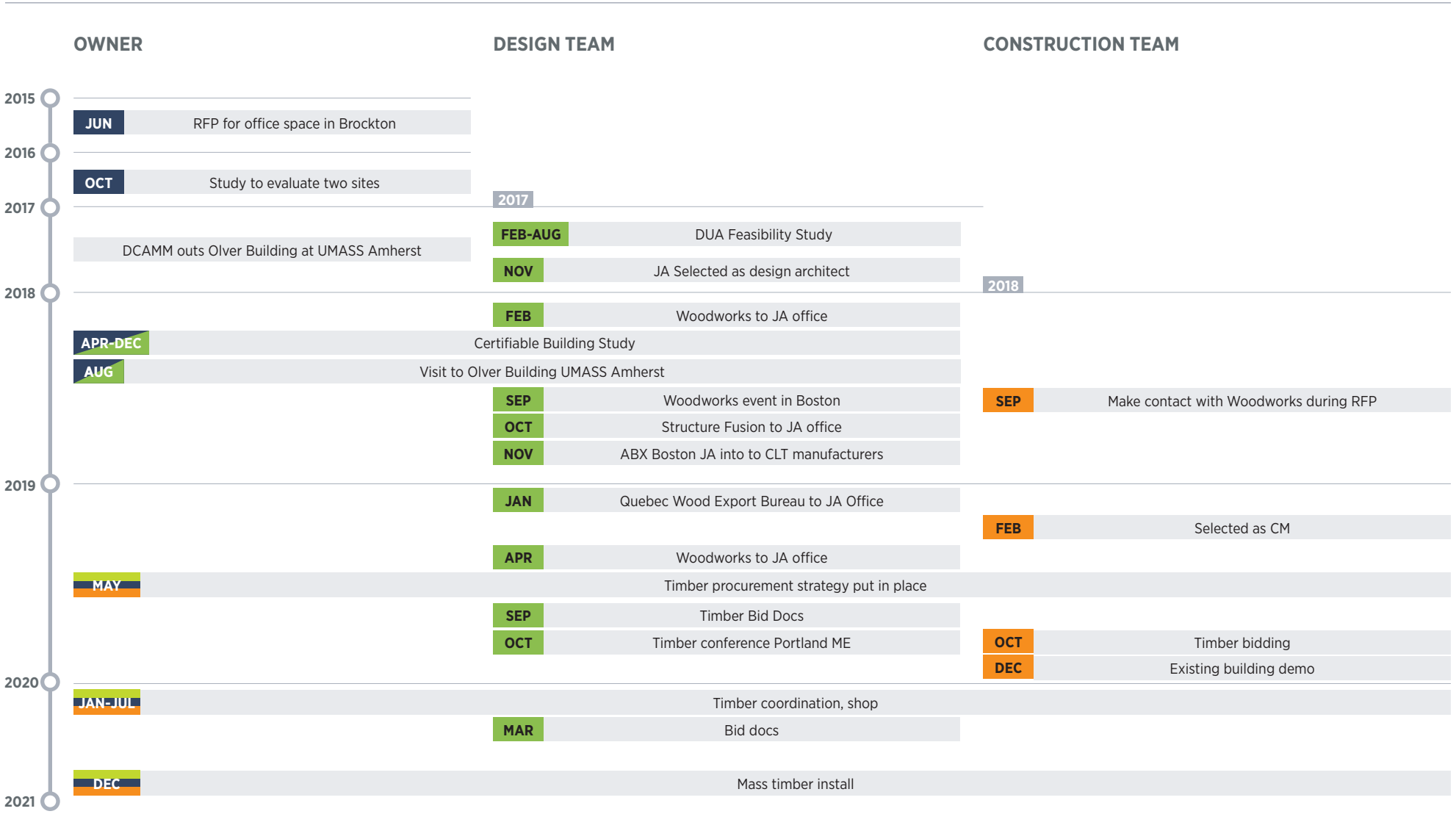
STRUCTURAL ENGINEER RSE Associates

CONSTRUCTION MANAGER Bond Building Construction

TIMBER SUPPLIER/INSTALLER South County Post and Beam

CIVIL ENGINEER Samiotes Consultants, Inc.
LANDSCAPE ARCHITECT Crowley Cottrell Landscape Architecture, LCC
HVAC, FP, PLUMBING ENGINEER BVH Integrated Services
ELECTRICAL, FA, TELECOM ENGINEER ART Engineering Corporation
BUILDING CODE Code Red Consultants
COST ESTIMATION Ellana, Inc.
SUSTAINABLE DESIGN The Green Engineer
LIGHTING DESIGN Available Light
HAZMAT CONSULTANT ATC Environmental, LLC

PROJECT TIMELINE



Agenda

01 Why Hybrid?

02 Design, Procurement & Coordination

03 In the Field

04 Lessons Learned

Why Hybrid?

01 02 03 04

A. Cost
B. Code
C. Program
D. Distribution of Services

MANAGING VALUE

1. Client was focused on using CLT, however, budget constraints remained.

2. Design team explored full CLT for an add of $225K

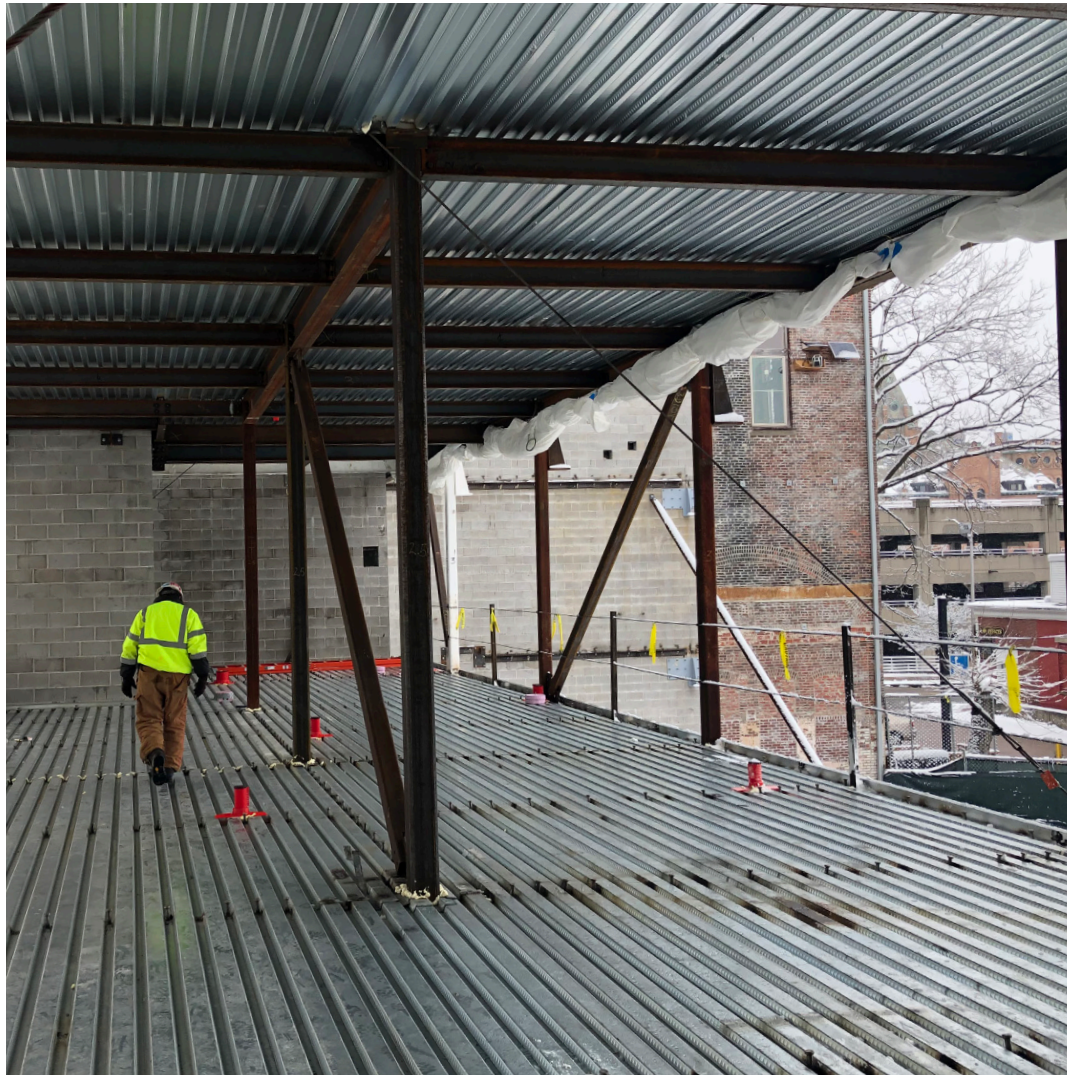
3. $80K savings to go to all steel frame, as opposed to a Glulam Frame. This was not adopted as the value of wood to the client was much greater than this number.

LATERAL BRACING

1. The building code at the time of design did now allow for lateral bracing using timber.

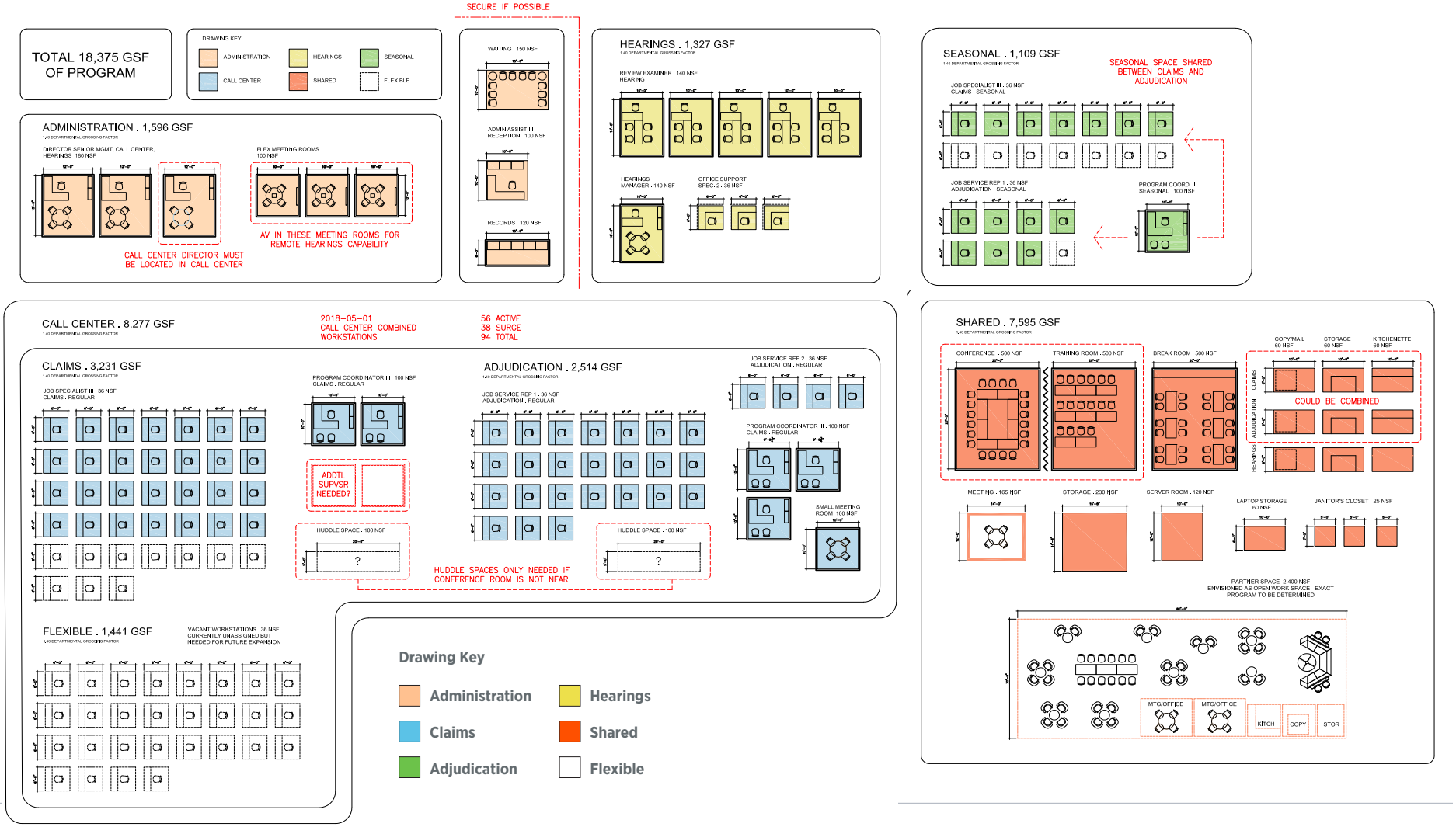
2. The project timeline would not allow pursuing a variance for Glulam bracing.

3. This may not be an issue in future code adaptations.



WHY HYBRID? - Program as a Factor for CLT

Department of Unemployment Assistance - Call Center

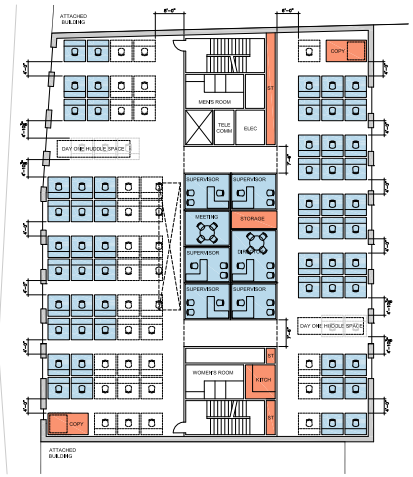


WHY HYBRID? - Program as a Factor for CLT

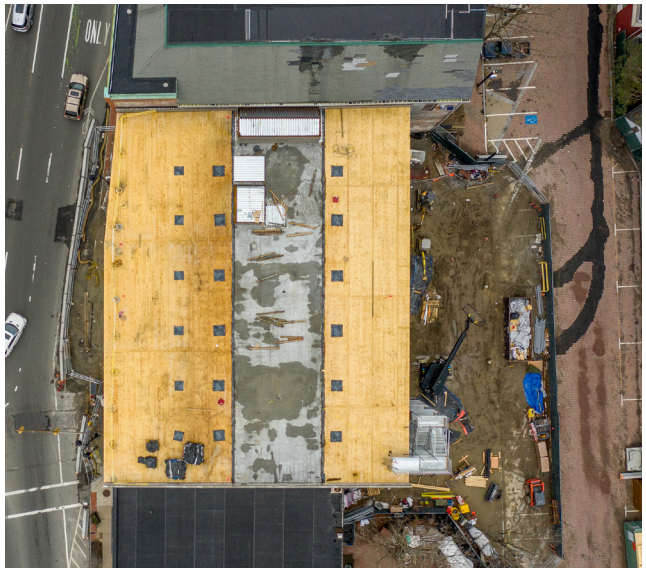
Flexible Office Space with Center Spine

L1

L2

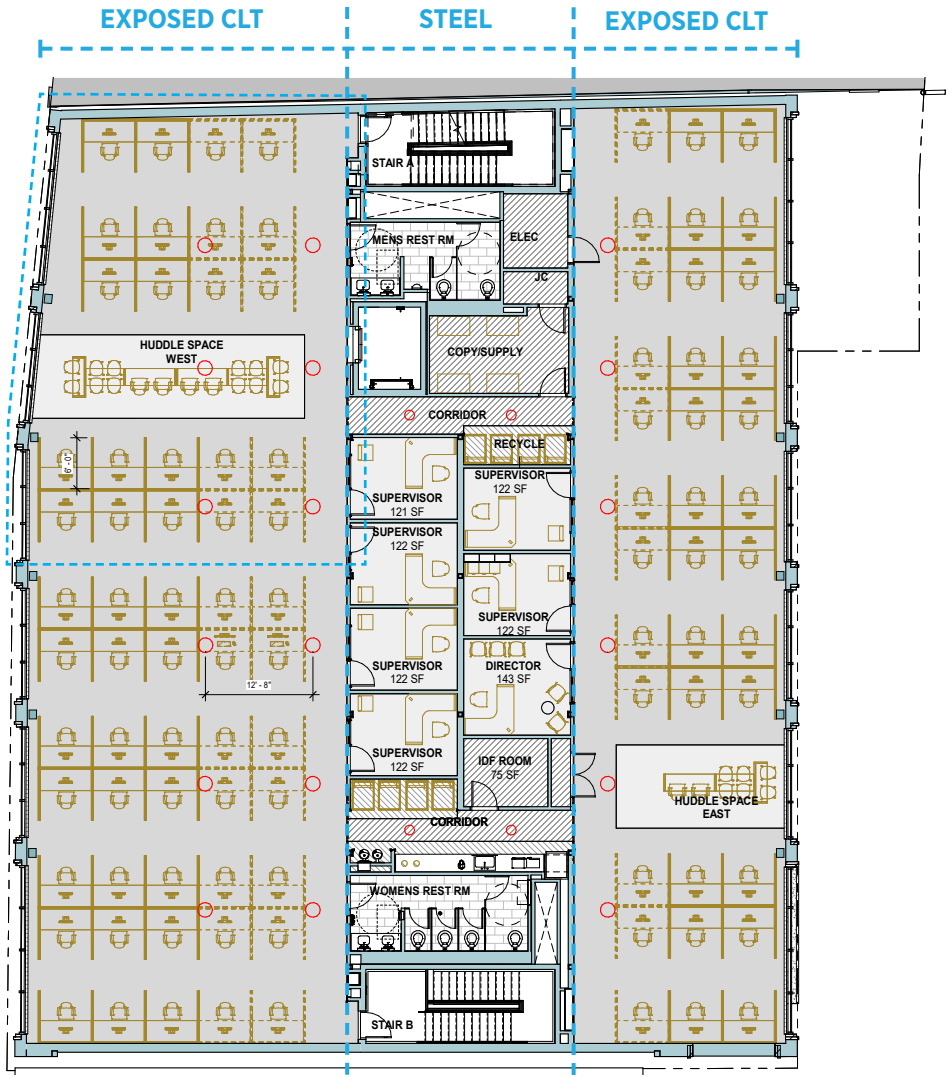


L3



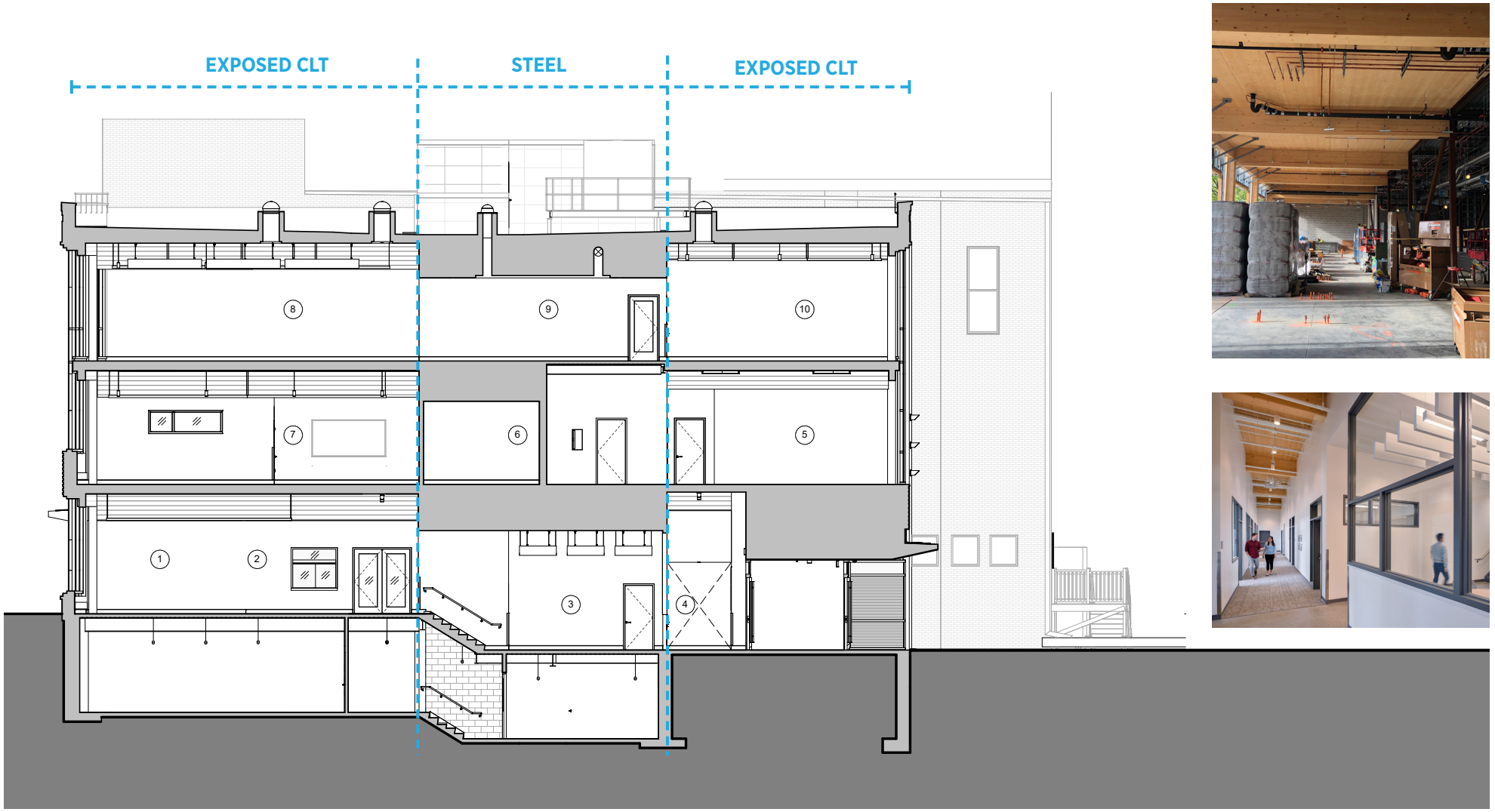
WHY HYBRID? - Distribution of Services

Steel Spine - Level 3 Plan, Views



WHY HYBRID - Distribution of Services

Steel Spine - Building Section, Level 1 Views



Design, Procurement, & Coordination

01 02 03 04

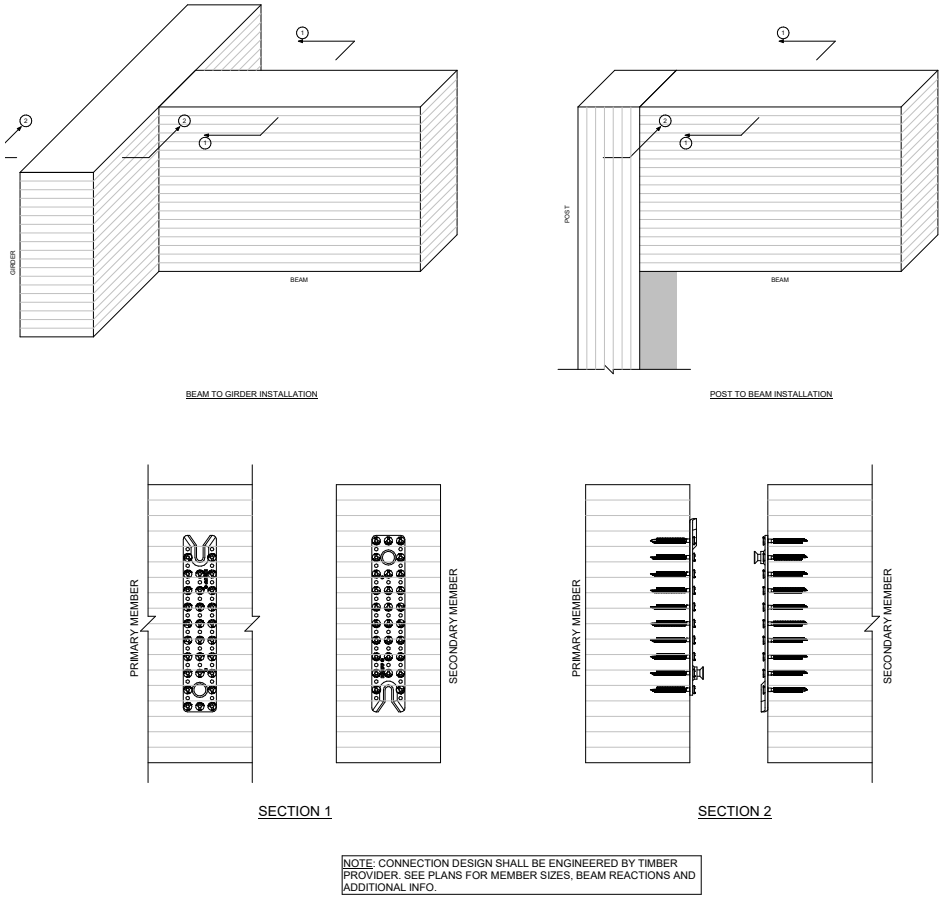
A. Early Bid Package(s)
B. Procurement & Team Structure
C. Coordination Reviews
D. Material Tolerances

DESIGN, PROCUREMENT, & COORDINATION - Early Timber Package

AT 100% DD / September 2019

WOOD TO WOOD CONNECTIONS

The design intent was to hide all wood to wood connections to express highlight the timber as much as possible.



BEAM TO GIRDER INSTALLATION

POST TO BEAM INSTALLATION

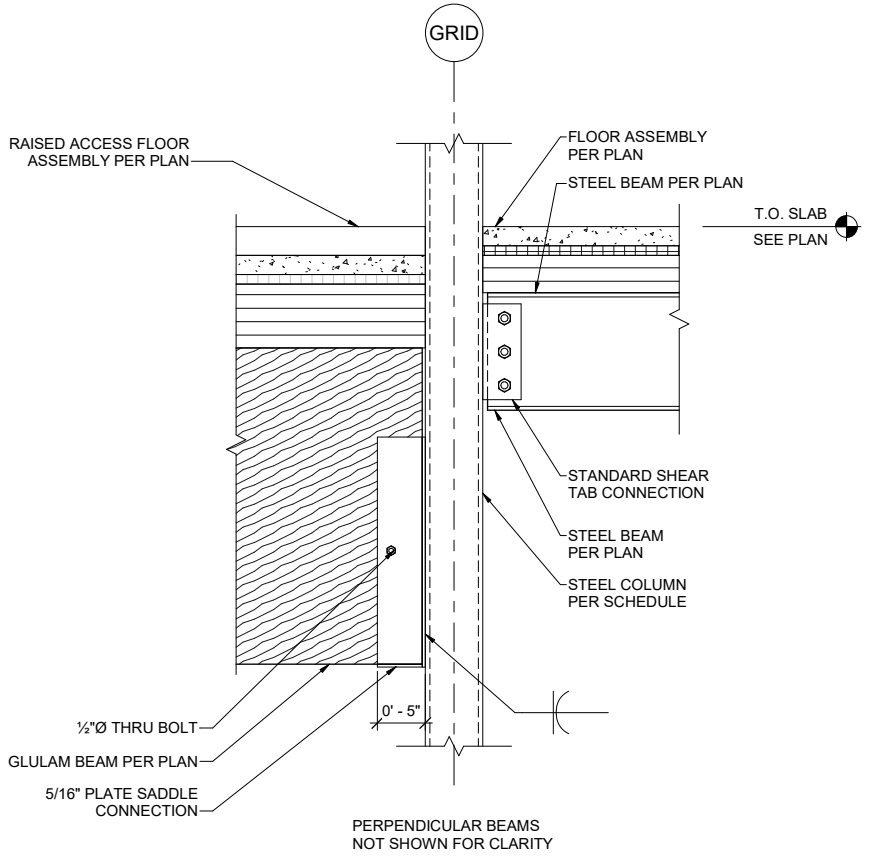
SECTION 1

SECTION 2

NOTE: CONNECTION DESIGN SHALL BE ENGINEERED BY TIMBER PROVIDER. SEE PLANS FOR MEMBER SIZES, BEAM REACTIONS AND ADDITIONAL INFO.

WOOD TO STEEL COLUMN CONNECTION

Some preliminary steel connections were carried in the early timber package, but needed more design once proprietary info became available. NOTE steel deck was eventually used in the core, not CLT.

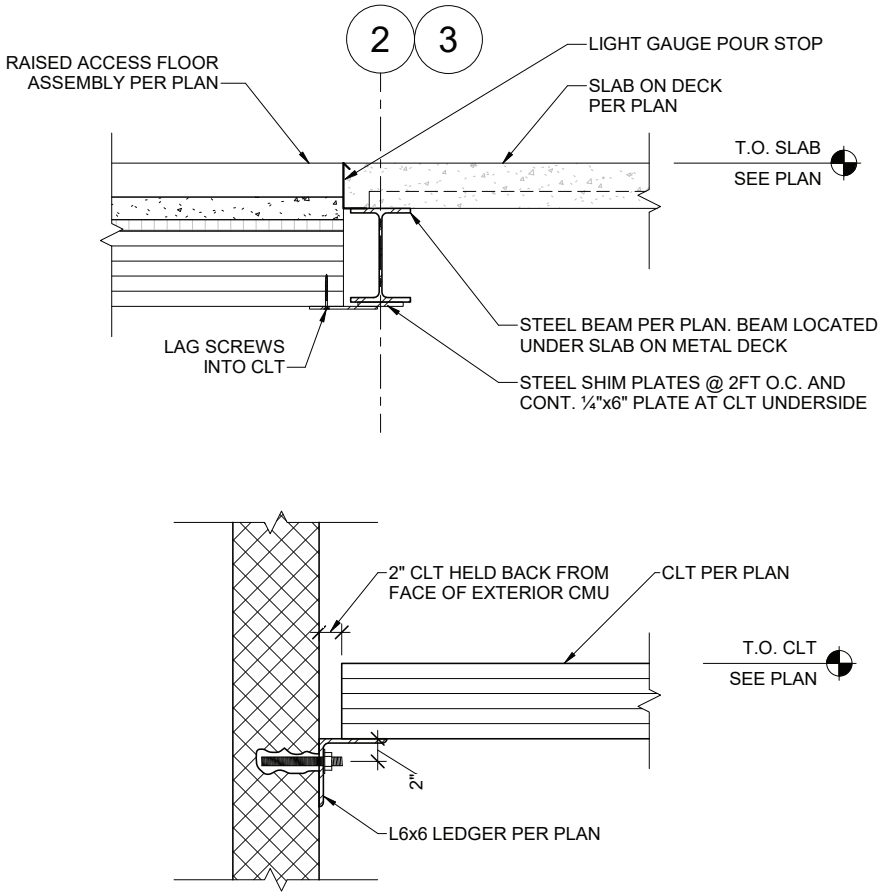


DESIGN, PROCUREMENT, & COORDINATION - Early Steel Package

At 50% CD / December 2019

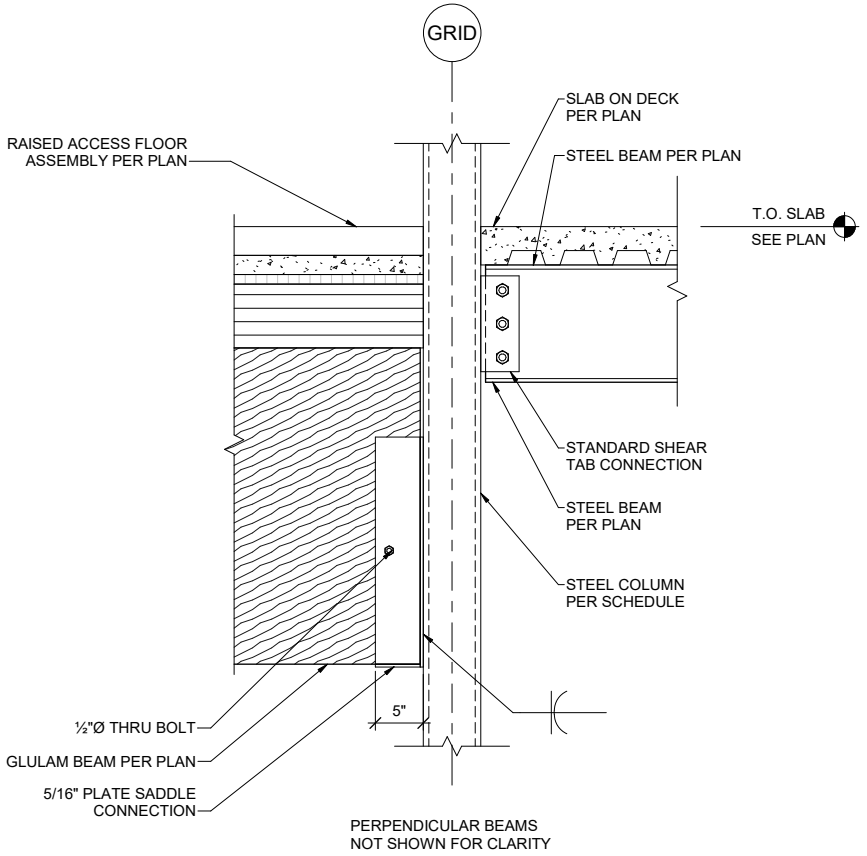
STEEL LEDGERS TO SUPPORT CLT

The steel package included detail on the steel ledgers, plates, bolts, etc. needed to hold CLT slabs at the CMU walls, steel beams, and elsewhere.



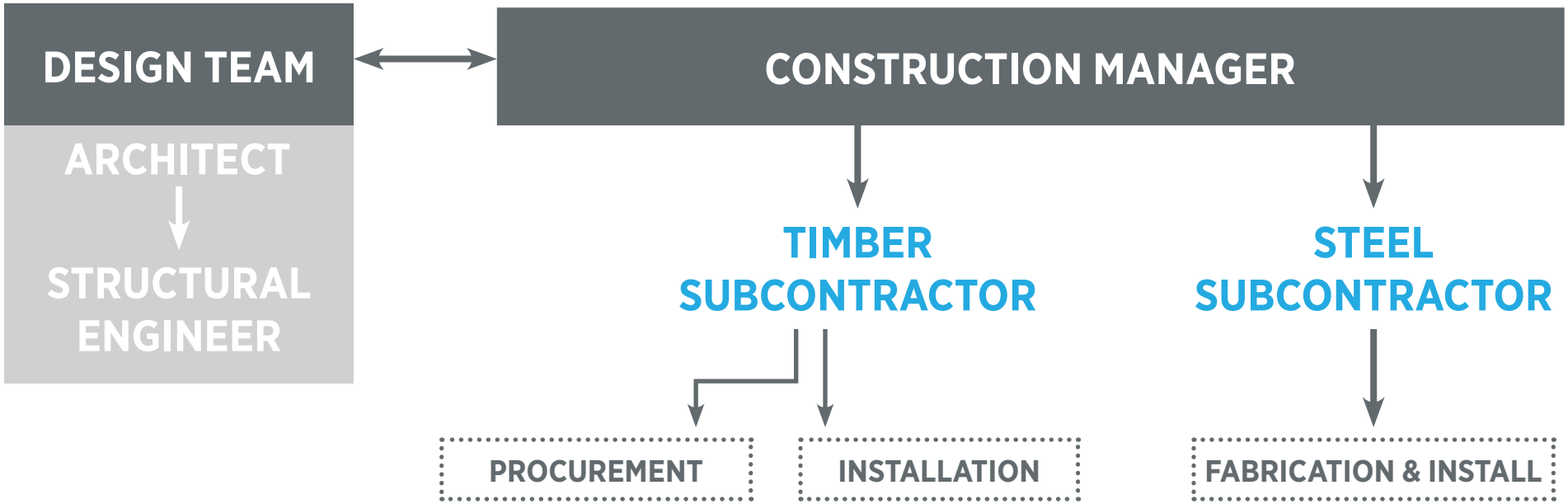
WOOD TO STEEL COLUMN CONNECTIONS

This detail was developed further, however the final steel connection at the wood beam was not yet determined.



DESIGN, PROCUREMENT, & COORDINATION - Team Structure

Many Players



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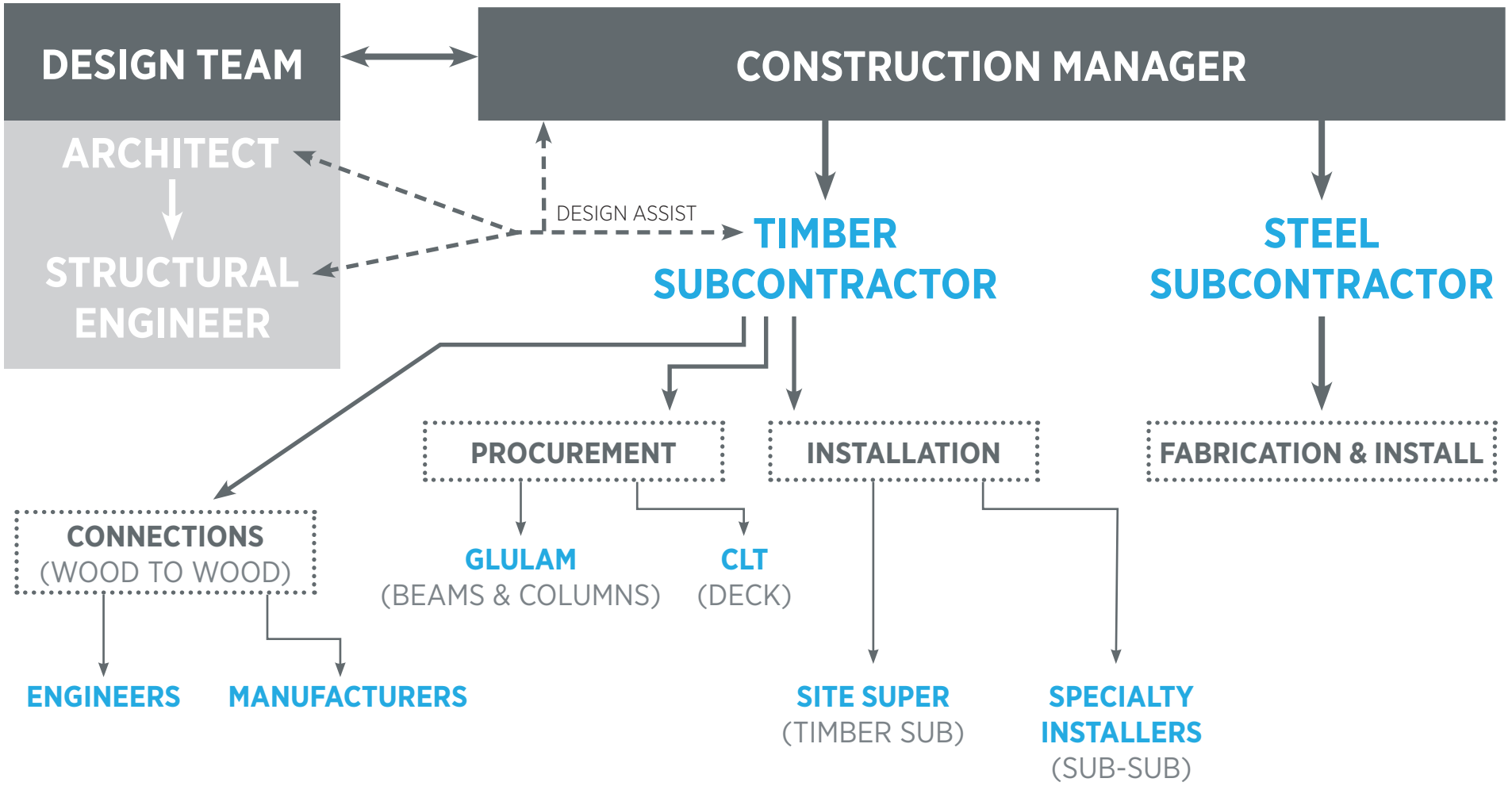
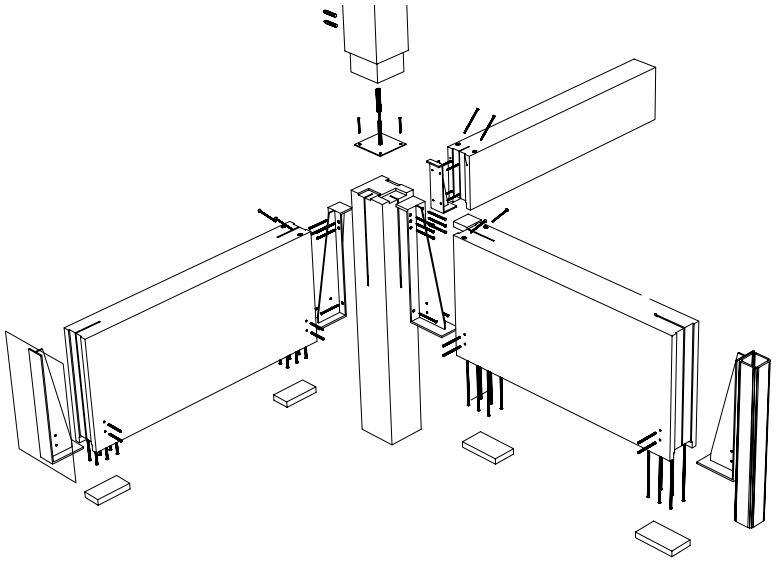
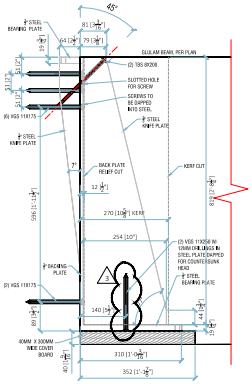


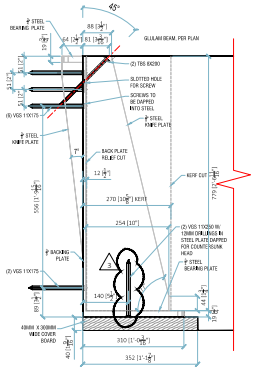
DESIGN, PROCUREMENT, & COORDINATION - Coordination Reviews

Wood to Wood Connections

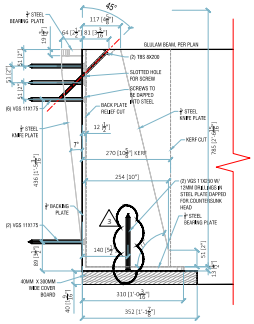




02 Hanger - 300x880
CLT-003 SCALE: 1 1/2"=1'-0"



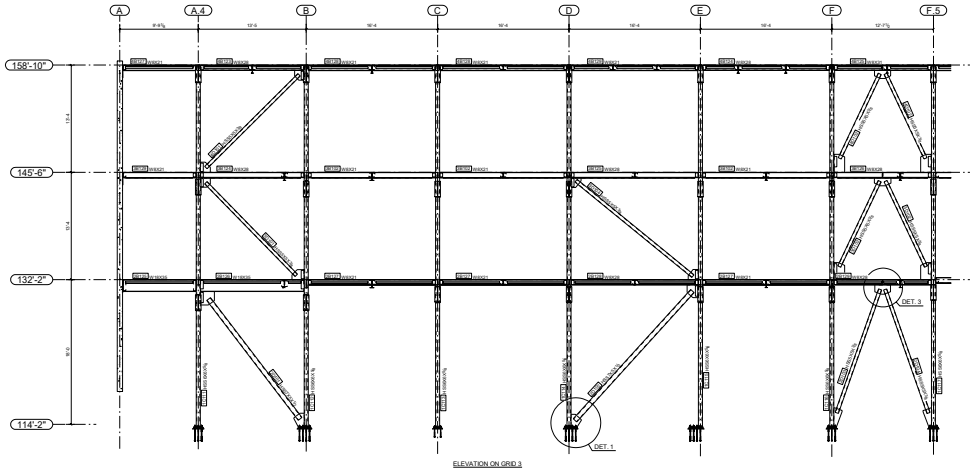
03 Hanger - 300x840
CLT-003 SCALE: 1 1/2"=1'-0"



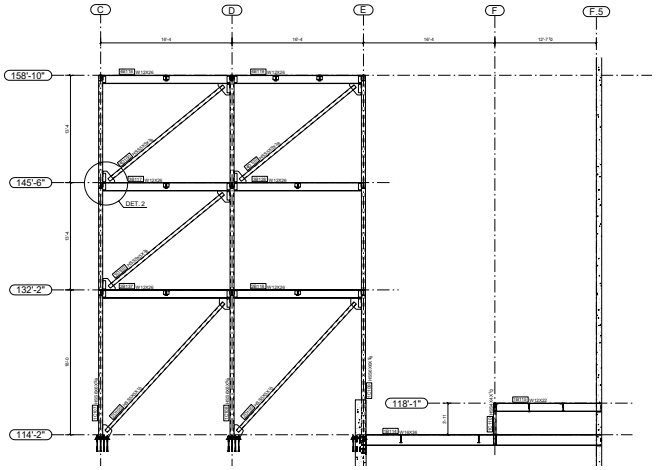
04 Hanger - 260x720
CLT-003 SCALE: 1 1/2"=1'-0"

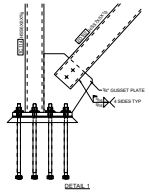
DESIGN, PROCUREMENT, & COORDINATION - Coordination Reviews

Steel Shop Drawings

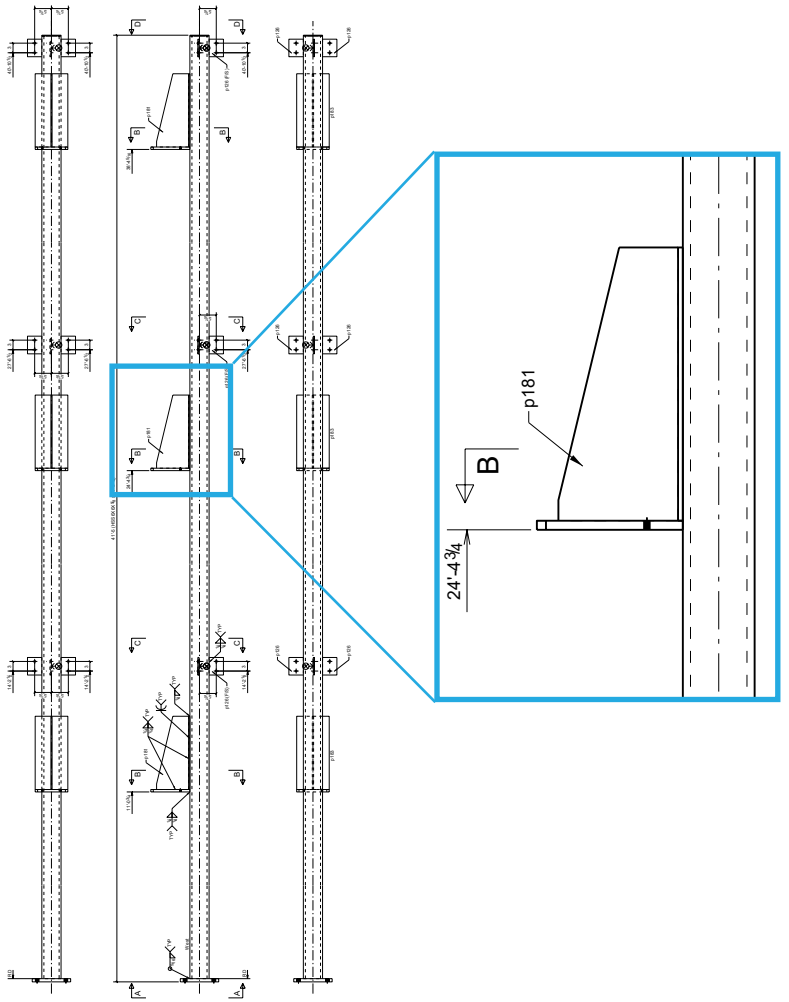


ELEVATION ON GRID 3



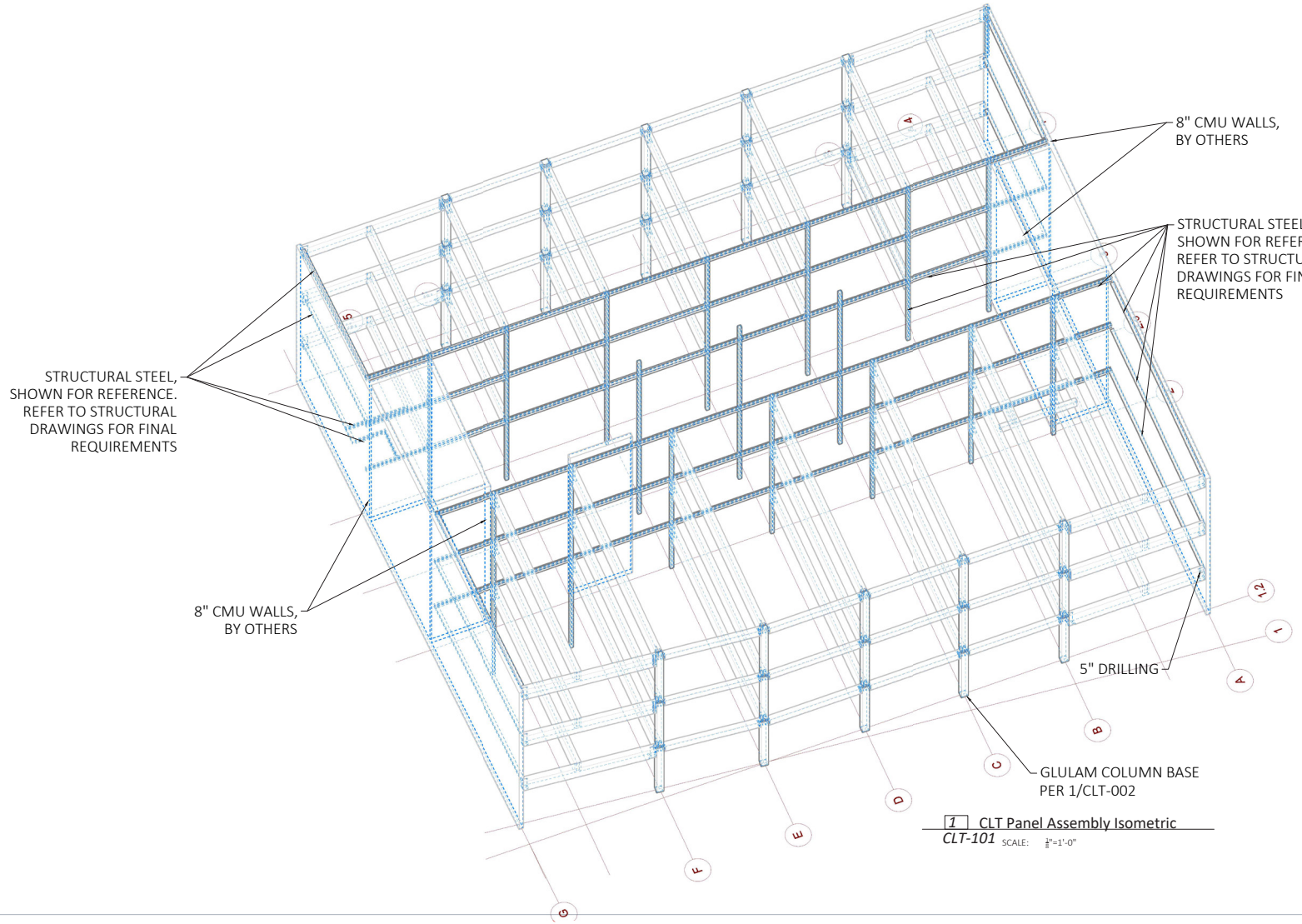


TYP VERTICAL BRACE DETAIL AT COLUMN BASE



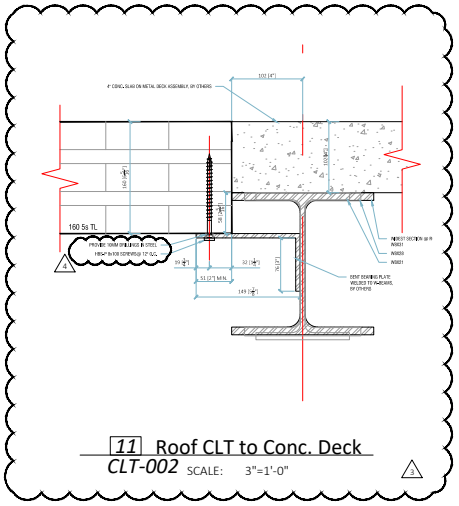
DESIGN, PROCUREMENT, & COORDINATION - Coordination Reviews

Wood Shop Drawings

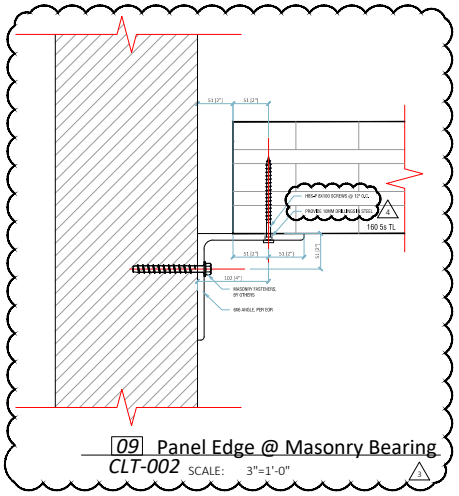


DESIGN, PROCUREMENT, & COORDINATION - Coordination Reviews

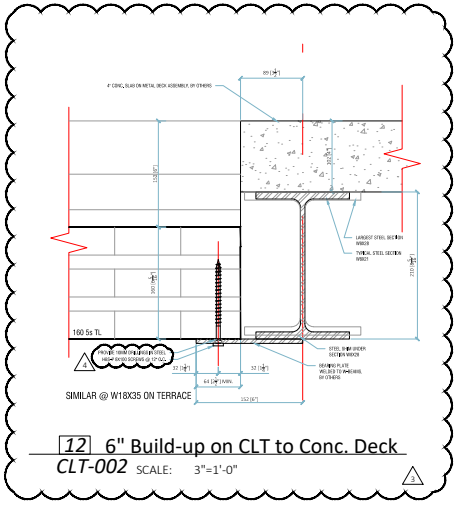
Wood Shop Drawings



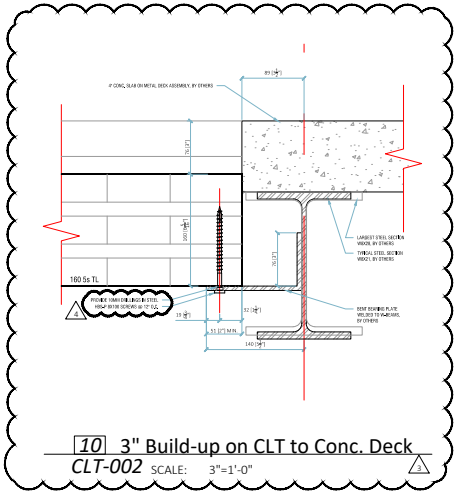
11 Roof CLT to Conc. Deck
CLT-002 SCALE: 3"=1'-0"



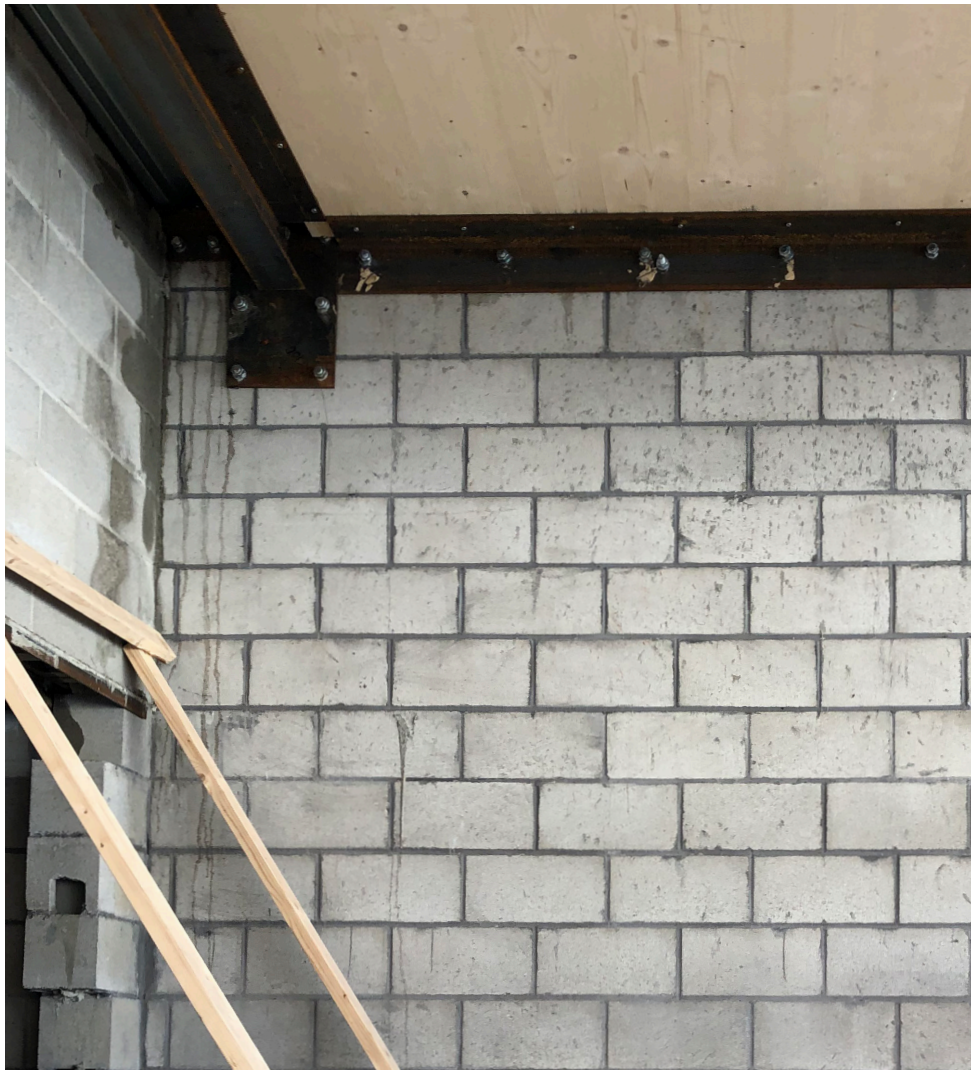
09 Panel Edge @ Masonry Bearing
CLT-002 SCALE: 3"=1'-0"



12 6" Build-up on CLT to Conc. Deck
CLT-002 SCALE: 3"=1'-0"

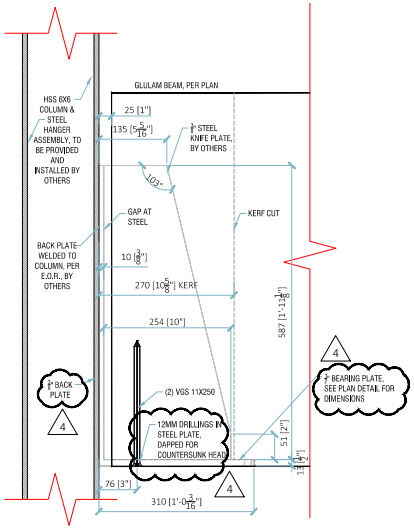


10 3" Build-up on CLT to Conc. Deck
CLT-002 SCALE: 3"=1'-0"



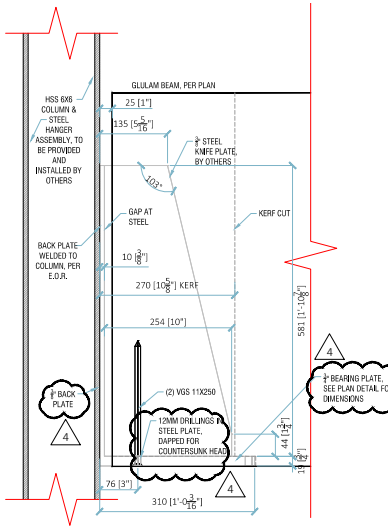
DESIGN, PROCUREMENT, & COORDINATION - Coordination Reviews

Wood Shop Drawings



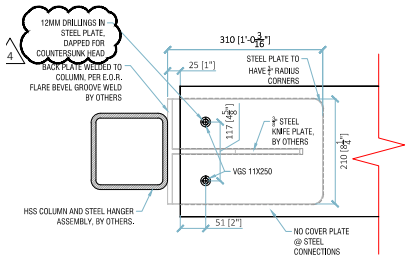
13 Hanger to Steel - 260

CLT-003 SCALE: 1 1/2"=1'-0"

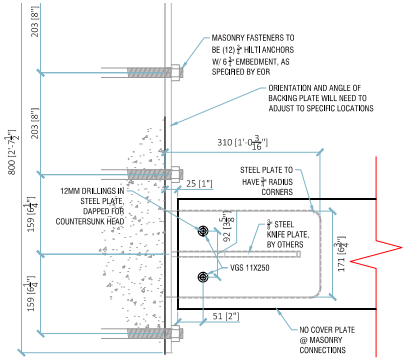


14 Hanger to Steel - 300

CLT-003 SCALE: 1 1/2"=1'-0"



Plan Detail - 260 Width



Plan Detail - 220 Width

Per spec 061880 Glued-Laminated Construction:
All glue-laminated wood shall be fabricated in conformance with ANSI/AITC A190.1-1983 Structural Glued Laminated Timber, and AITC 117.84 - Design and Manufacturing for structural glue laminated timber of softwood species.

Per ANSI 190.1 4.1 length - Plus or minus **1/16" per foot**

Per spec 051200 Structural Steel Framing:
Conform to AISC's Code of Standard Practice for Steel Buildings and Bridges.

Per ASTM A6 mill tolerances are - Typically **1/8" per foot**

Over the height of the building, 41'-5" that could account for 2.5" of discrepancy between the materials.

In the Field

01 02 03 04 05

A. Sequence of Operations
B. Identifying the Locations
C. Adjustments Made

IN THE FIELD - Sequence of Operations

October 2020

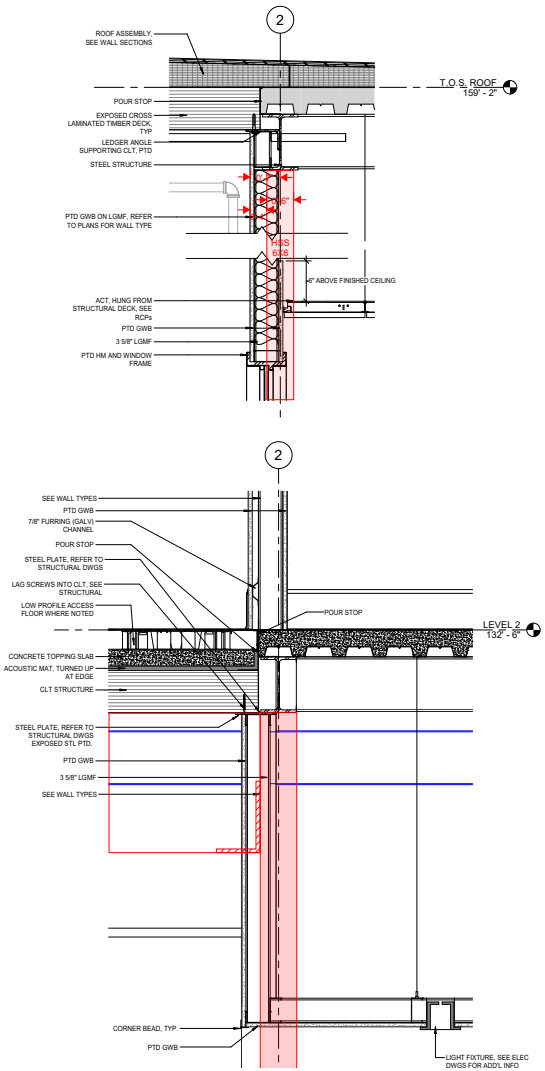
December 2020

January 2021

April 2021

IN THE FIELD - Identifying the Locations

Tolerances Between Timber and Steel



IN THE FIELD - Identifying the Locations

Tolerances Between Timber and Steel

IN THE FIELD - Adjustments Made

Tolerances Between Timber and Steel

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Tolerances Between Timber and Steel

IN THE FIELD - Adjustments Made

Tolerances Between Timber and Steel

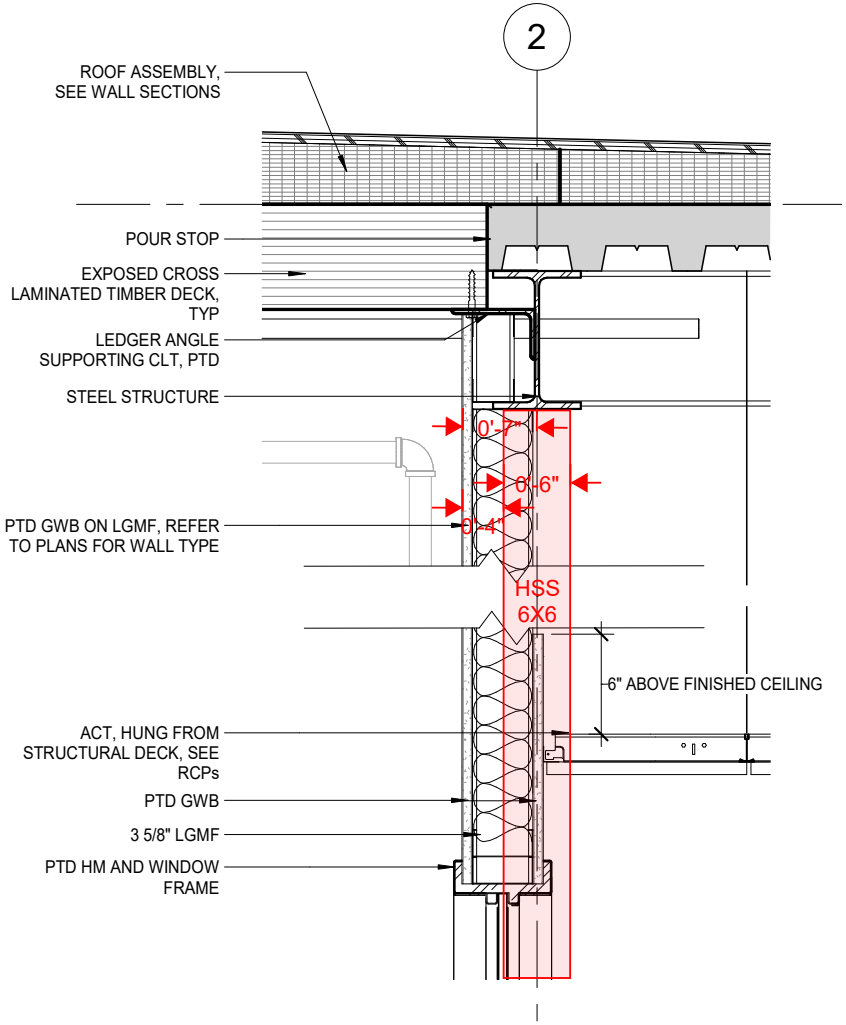
Lessons Learned

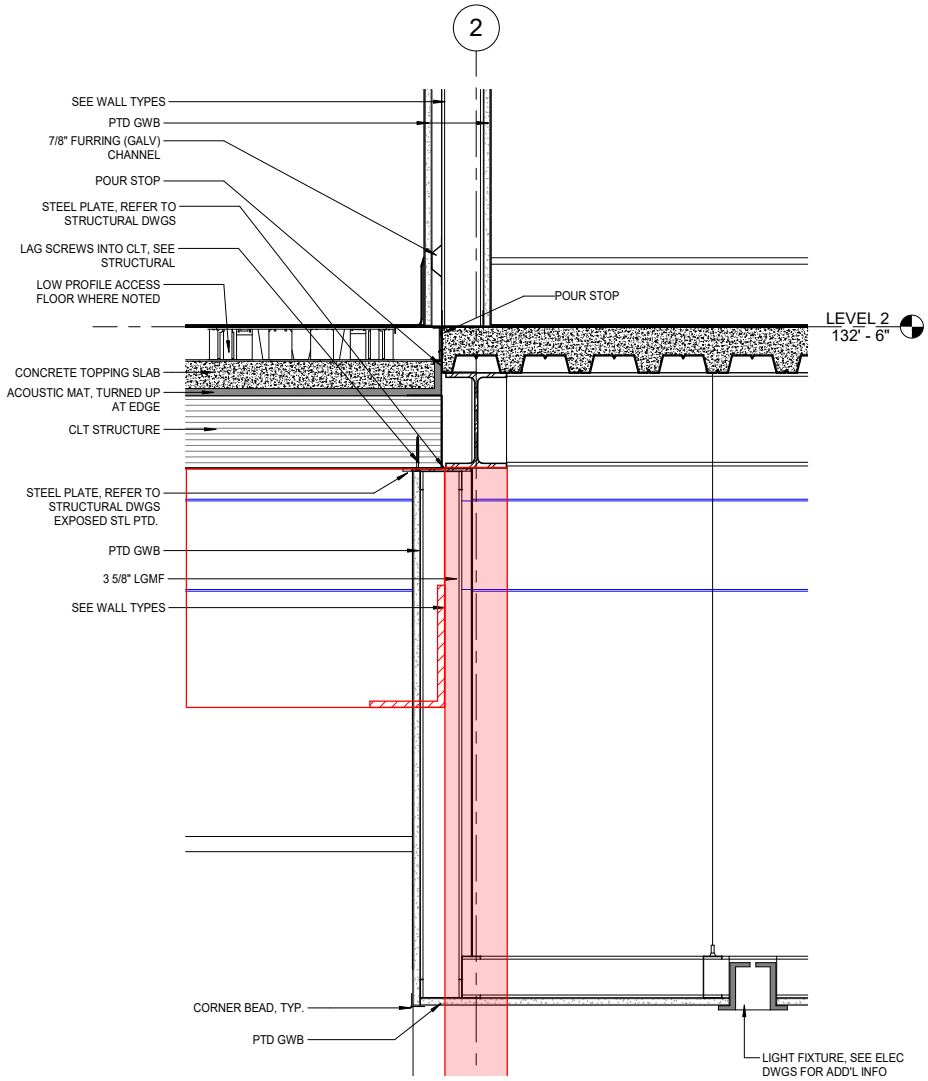
01 02 03 04

A. **Building in Tolerance**
B. **Working with a Larger Team**

LESSONS LEARNED - Building in Tolerance

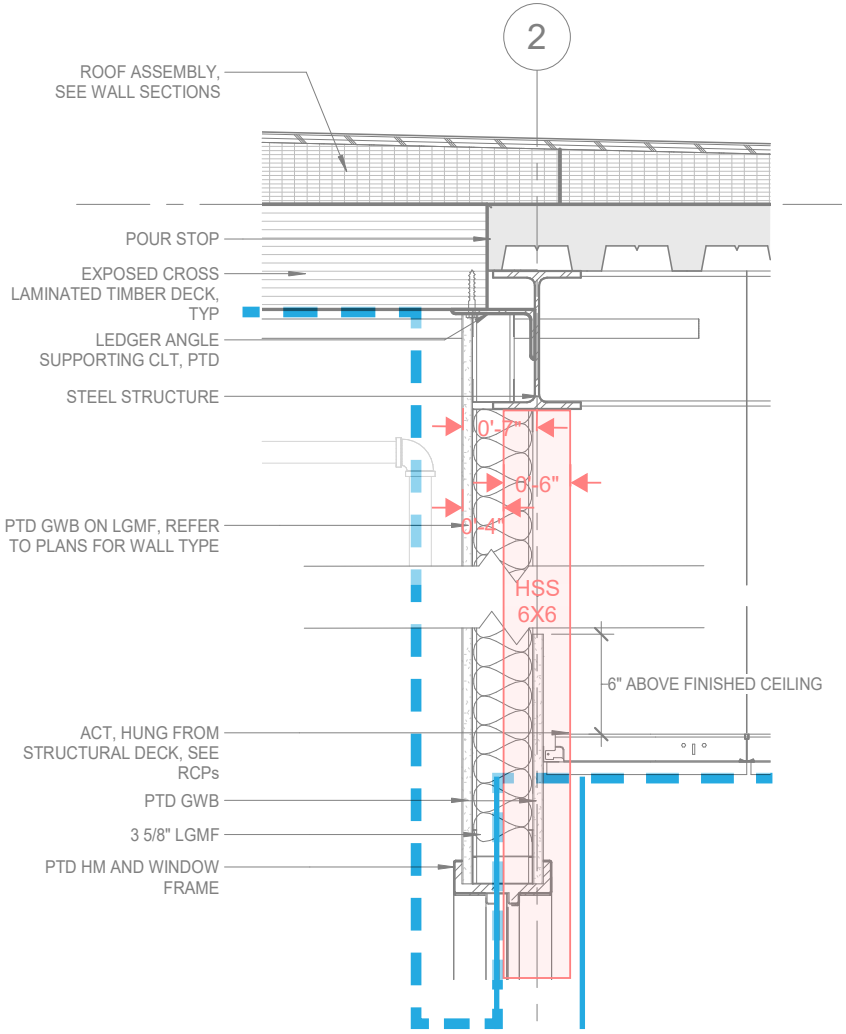
Tolerances Between Timber and Steel

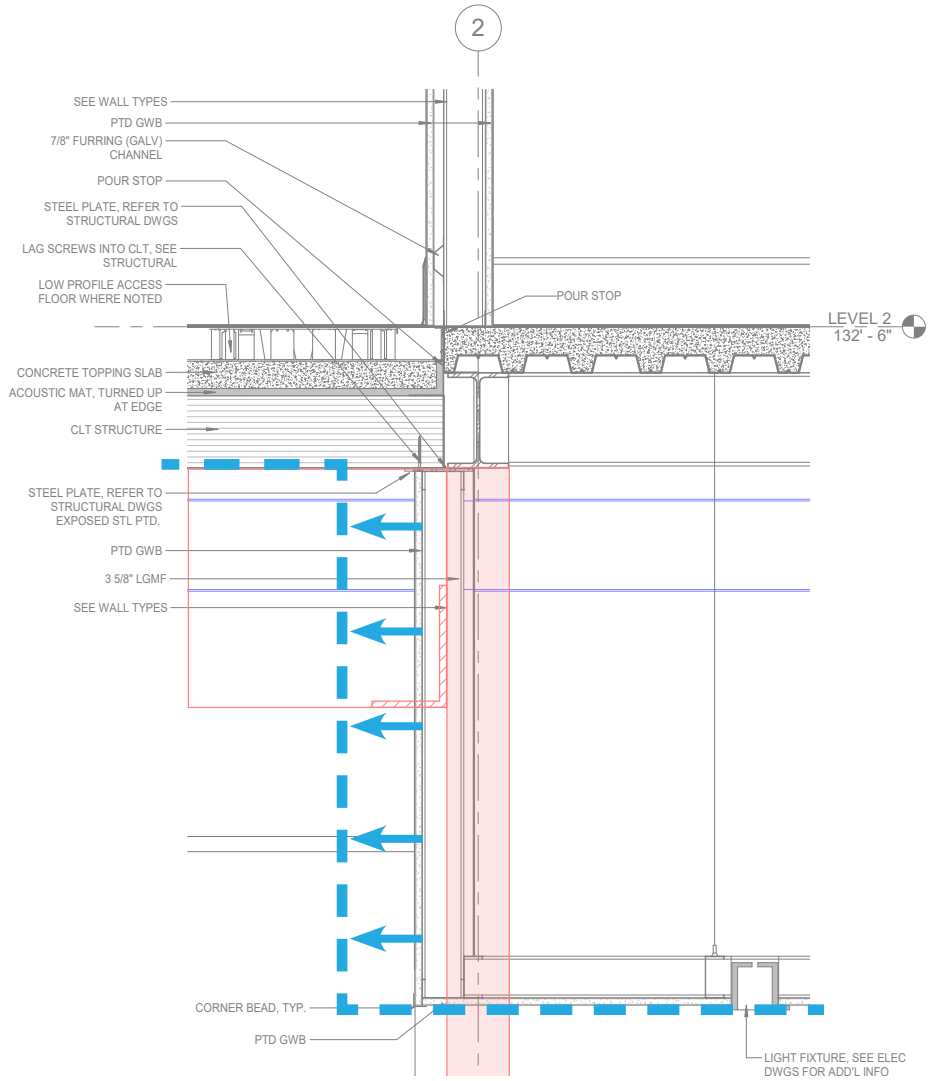




LESSONS LEARNED - Building in Tolerance

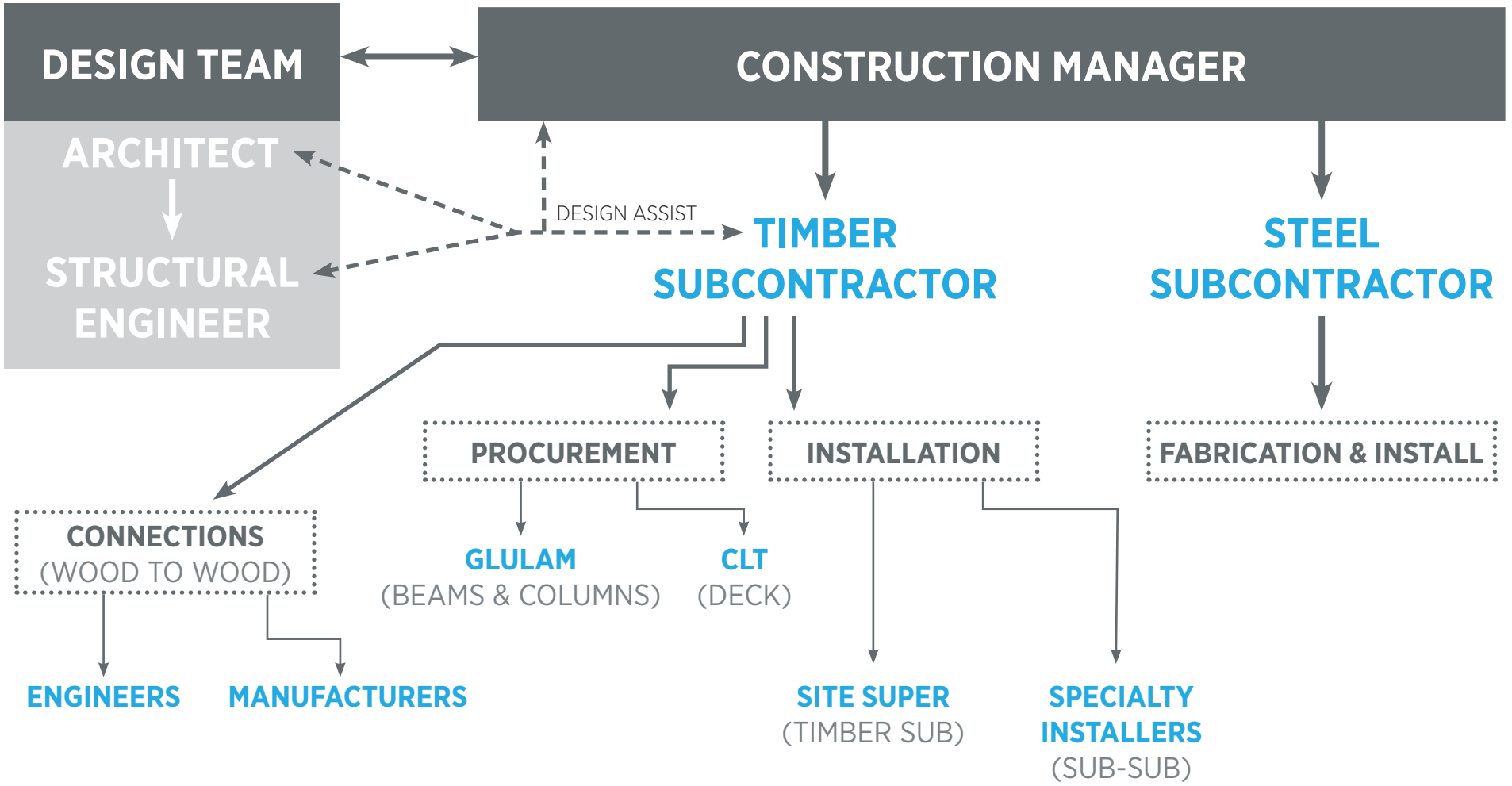
Tolerances Between Timber and Steel





LESSONS LEARNED - Working with a Larger Team

Many Players



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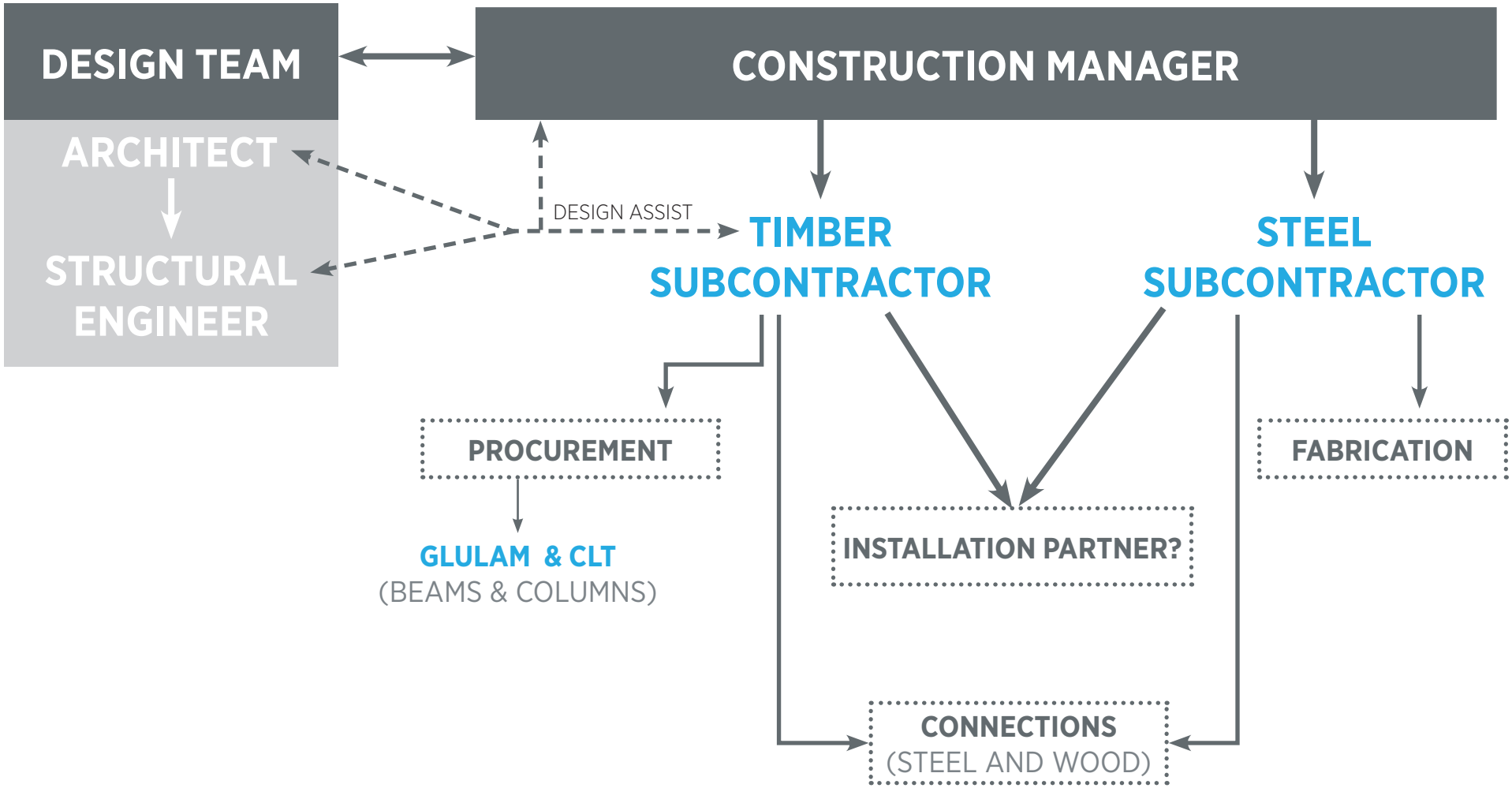

Thank you!

The End.