

Landmark Mass Timber Projects

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Elmer Zook
Quality Buildings



WoodWorks | The Wood Products Council

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



Course Description

This session presents three case studies of successful mass timber projects located across the U.S. Attendees will hear from team members who will provide insights into the code-compliant design, detailing, and construction of the following projects:

- UP@310 Lofts integrates multiple factory-built systems: mass timber structure, insulated wall panels with factory-installed windows, and volumetric bath pods. Each system shifted labor off-site, reducing dependence on local trades while raising quality and performance. The result is a high-performing envelope, a faster schedule, and a carbon sequestering structure.
- The Monterey Regional Airport Replacement Terminal features a mass timber/steel hybrid structure system. A unique call-to-board concept consolidates passenger seating into a central gate lounge, optimizing flow and connectivity. The team is targeting LEED Platinum certification and net-zero energy readiness, with a design achieves 100% annual savings against the AIA 2030 baseline, seamlessly blending sustainability, accessibility, and regional identity into an inspiring travel destination.
- Woodward Lofts is Pennsylvania's first PHFA-funded hybrid mass timber housing project. Early alignment between architect, contractor, and mass timber fabrication teams enabled an innovative housing project to stay financially viable while advancing sustainability, constructability, and community impact goals.

Learning Objectives

1. Identify the key code-compliance, structural, and fire safety factors that influence the design of large-scale mass timber projects.
2. Describe integrated design strategies that support occupant health, safety, and environmental performance in mass timber buildings.
3. Discuss innovative detailing, material strategies, and construction approaches that enable mass timber to achieve project goals.
4. Apply lessons learned from diverse case studies to inform the design and delivery of future mass timber projects.

Monterey Regional Airport

New Terminal Facility | Tianyu Wang, HOK – Tianyu.Wang@hok.com



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Monterey Regional Airport

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Agenda

- Introduction of Project
- Why Mass Timber
- Multi Discipline Coordination - Mass Timber Airport Project
- Construction Updates

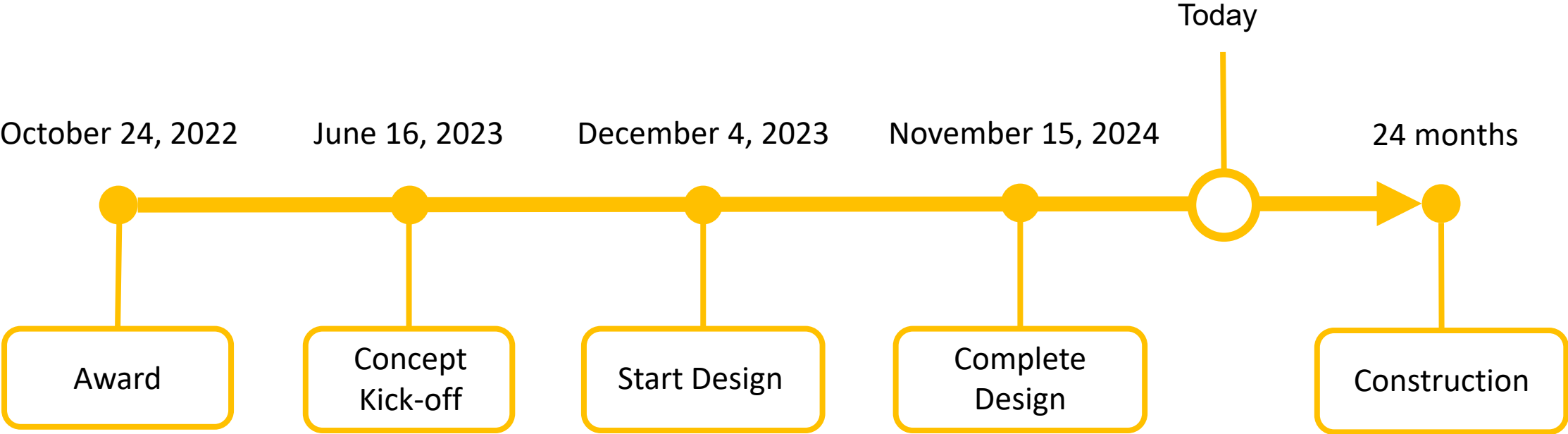
Monterey Regional Airport

New Terminal Facility | Tianyu Wang, HOK – Tianyu.Wang@hok.com

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PROJECT TIMELINE



PROJECT GOALS



PROJECT SCOPE

Terminal

62,000 sf Enclosed
24,000 sf Covered/Unenclosed
Concessions
RAC counters/offices

Airside

5 PBBs / 2 RON
Airfield Lighting
GSE charging

Landside

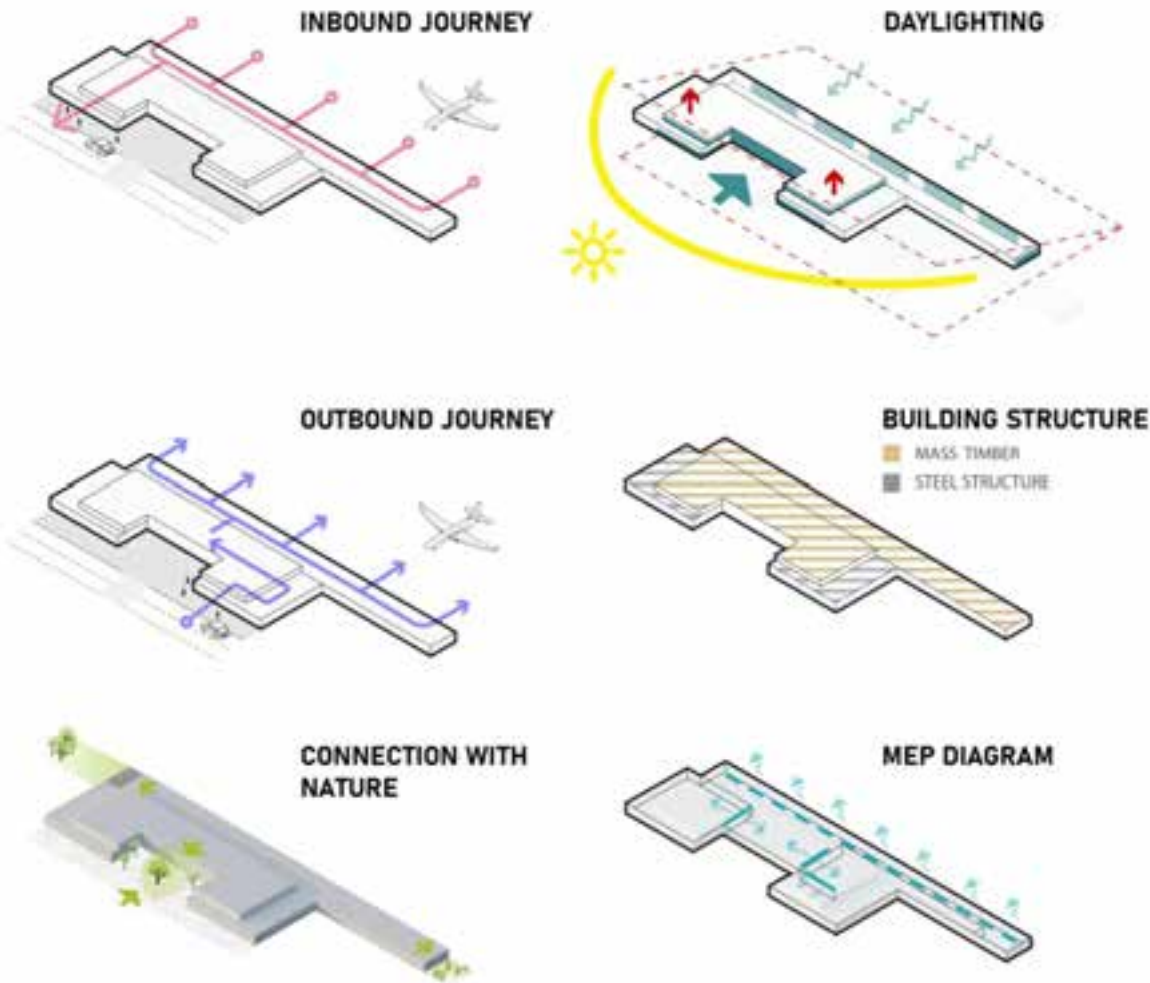
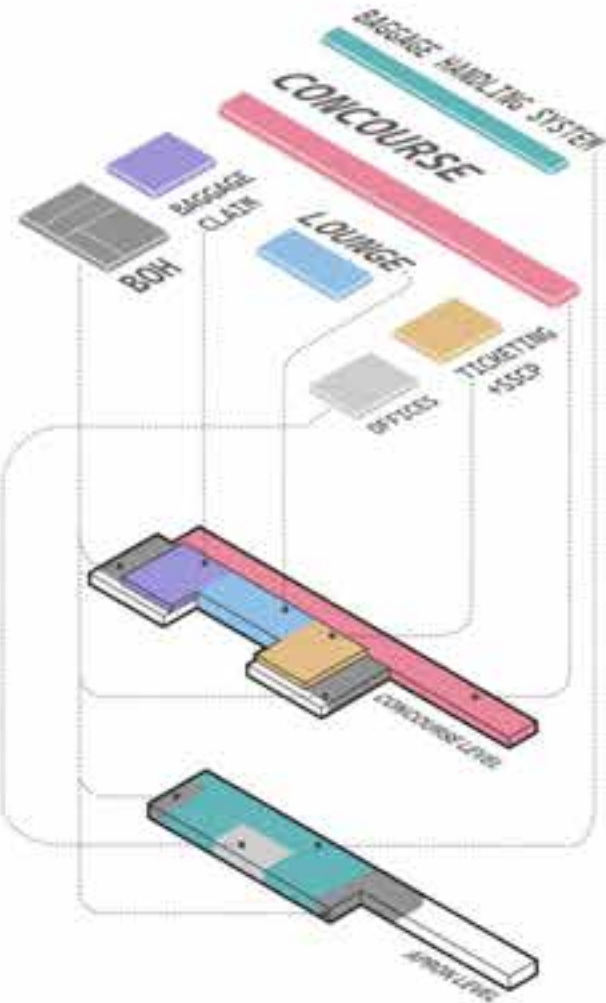
Roundabout
Parking
Ready/Return
Landscaping
Utilities



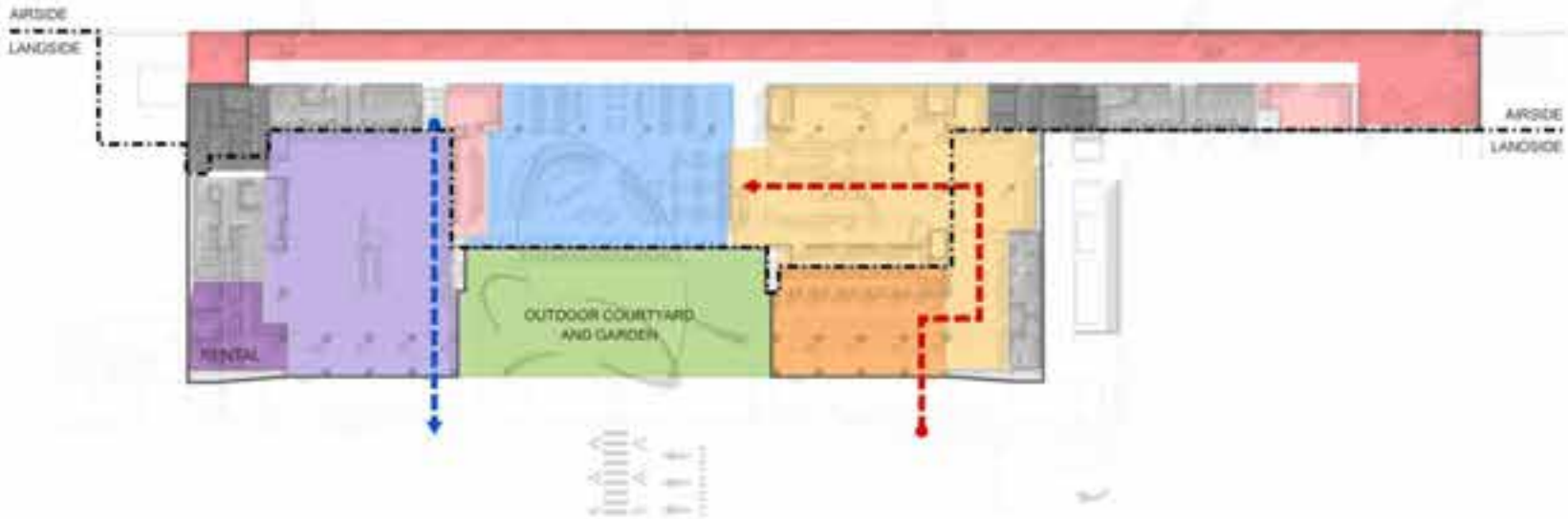
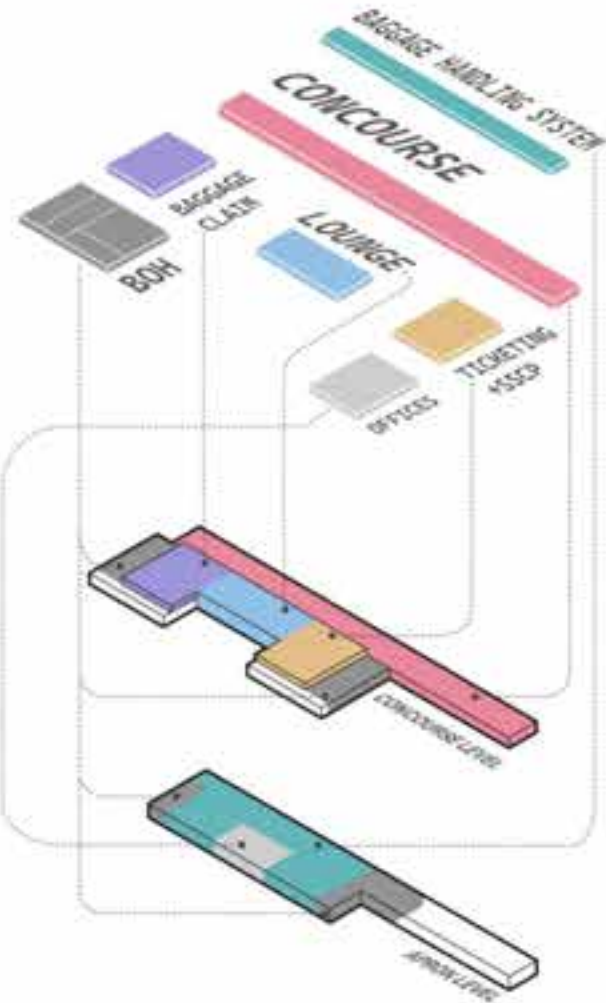
EARLY DESIGN CONCEPTS



PROGRAMMING/PASSENGER FLOW



PROGRAMMING/PASSENGER FLOW



LEGEND

- | | | |
|---|---|--|
| ■ HOLDROOMS | ■ CALL TO BOARD GATE LOUNGE | - - - - - INBOUND CIRCULATION |
| ■ CONCESSIONS | ■ BAGGAGE CLAIM | - - - - - OUTBOUND CIRCULATION |
| ■ TICKETING | ■ RESTROOMS | |
| ■ SSCP | ■ BOH | |

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MONTEREY PENINSULA

CLIMATE AND ECOSYSTEM

Central California Foothills and Coastal Mountains Ecoregion

- Subregion: Coastal Monterey Bay Plains and Terraces
- Open low mountains and foothills with irregular plains, narrow valleys and dunes
- Predominantly chaparral and oak woodlands with patches of pines at higher elevations

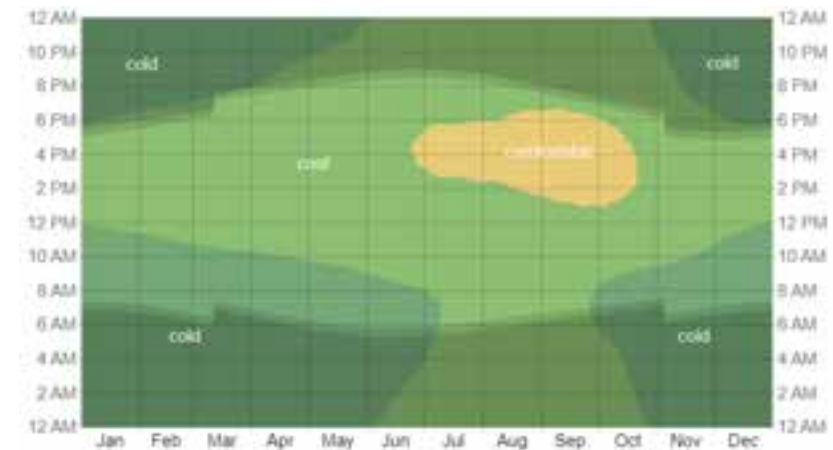


MONTEREY PENINSULA

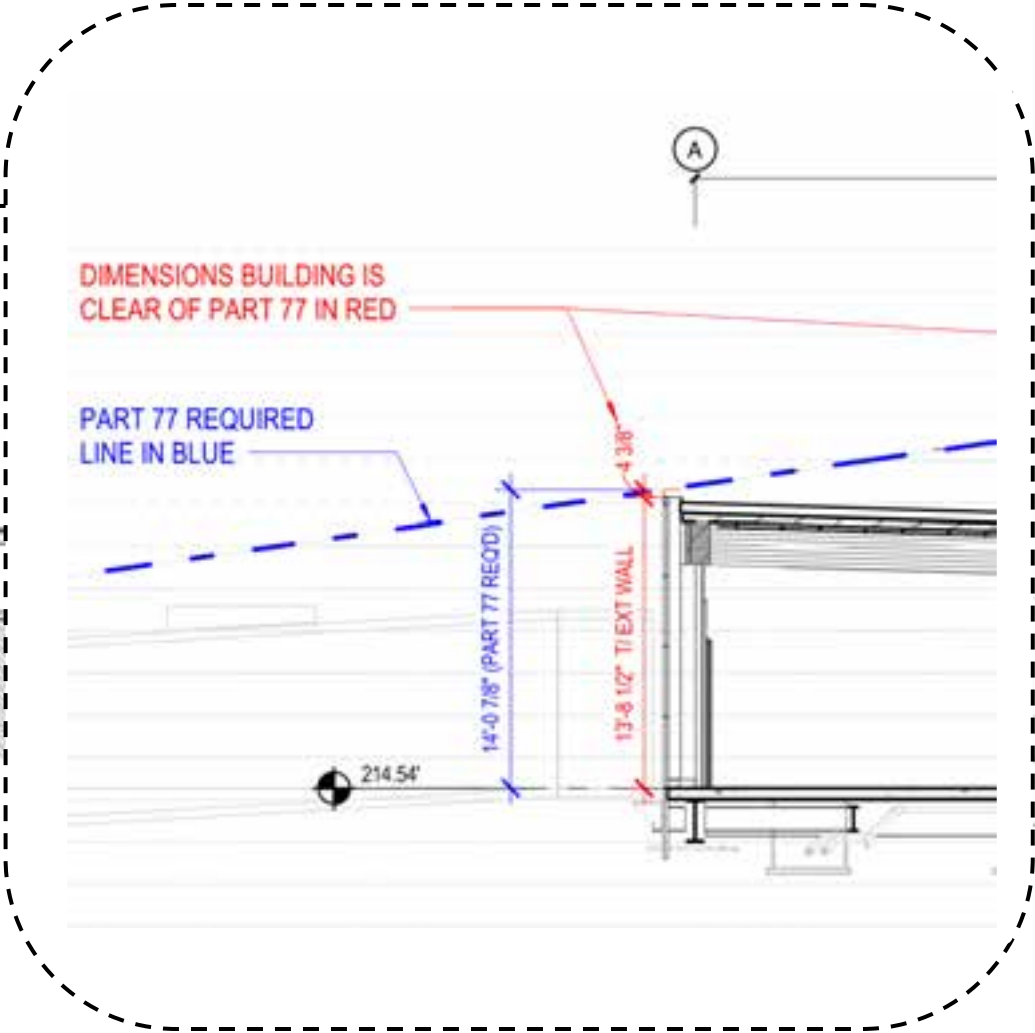
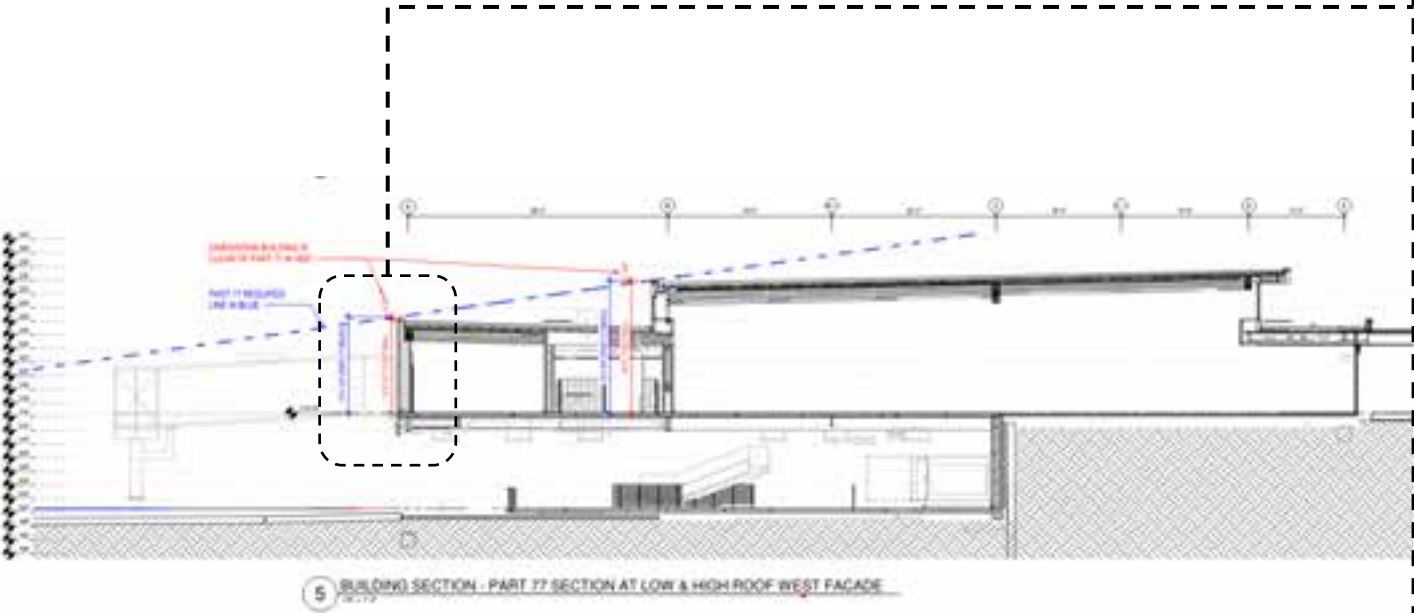
CLIMATE AND ECOSYSTEM



- ASHRAE Climate Zone – 3C
- Summers: Comfortable, arid & mostly clear (June-Oct)
- Winters: Cold, wet & partly cloudy (Nov-Mar)
- Temperature: 43°F to 69°F (Rare: 36°F to 78°F)
- Humidity: 60% (Does not vary significantly)
- Rainfall: 18.1 inches
- Wind Speed/Direction: 7-8 mph from NW to SE



AVIATION REGULATION CONSTRAIN
PART 77 SURFACE



MASS TIMBER
NATURE CONNECTION



MASS TIMBER
PROJECT BUDGET

Budget Target : \$60,000,000

Approved Budget : \$85,000,000

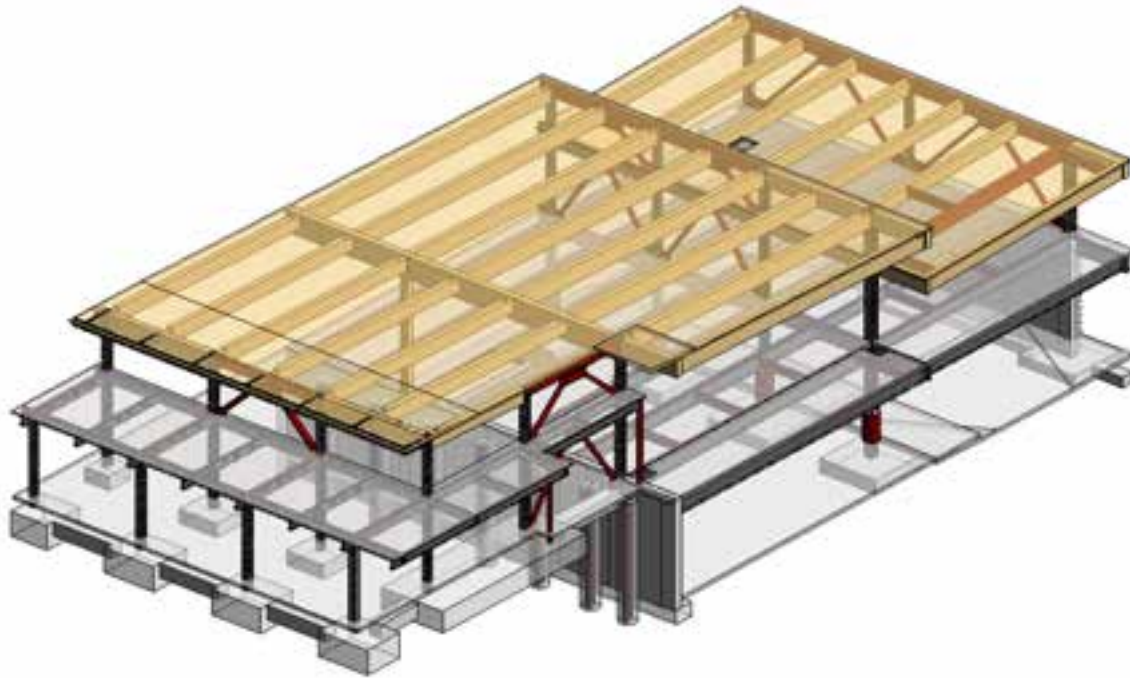
\$ 17M / Gate **\$1,350/SF**

(Landside Improvements under separate budget)

MASS TIMBER

SUSTAINABLE GOALS

- Minimum rating of **LEED Platinum**
- **Zero Net Energy** ready Building
- Minimum **20% Energy Savings** beyond Code
- **Cal Green** Compliance (PV, EV Charging)

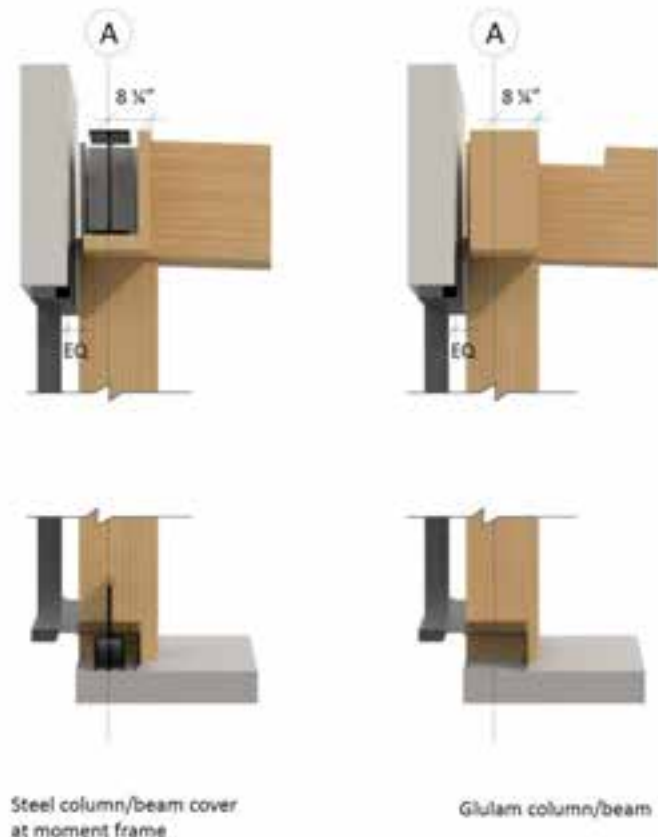
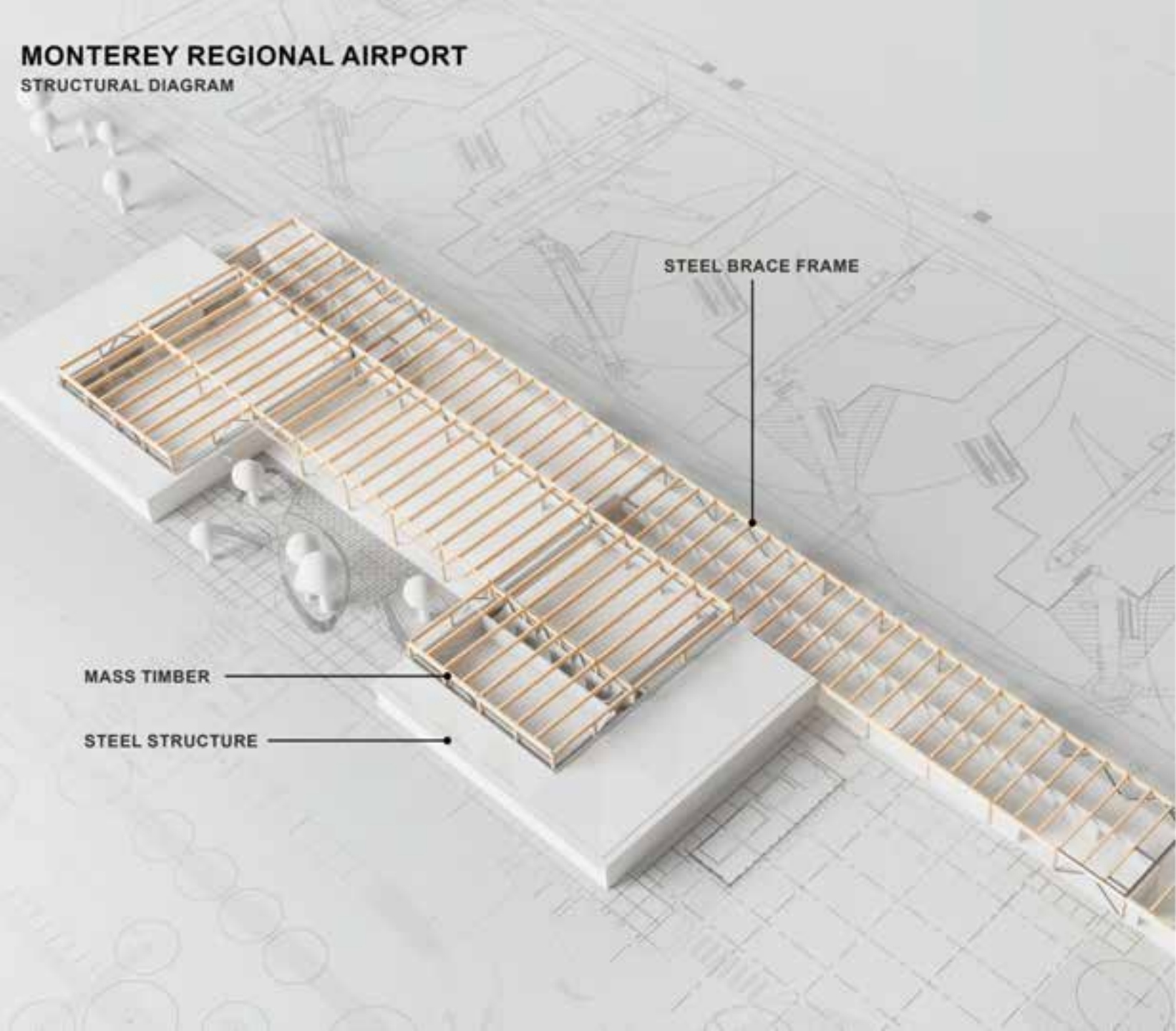


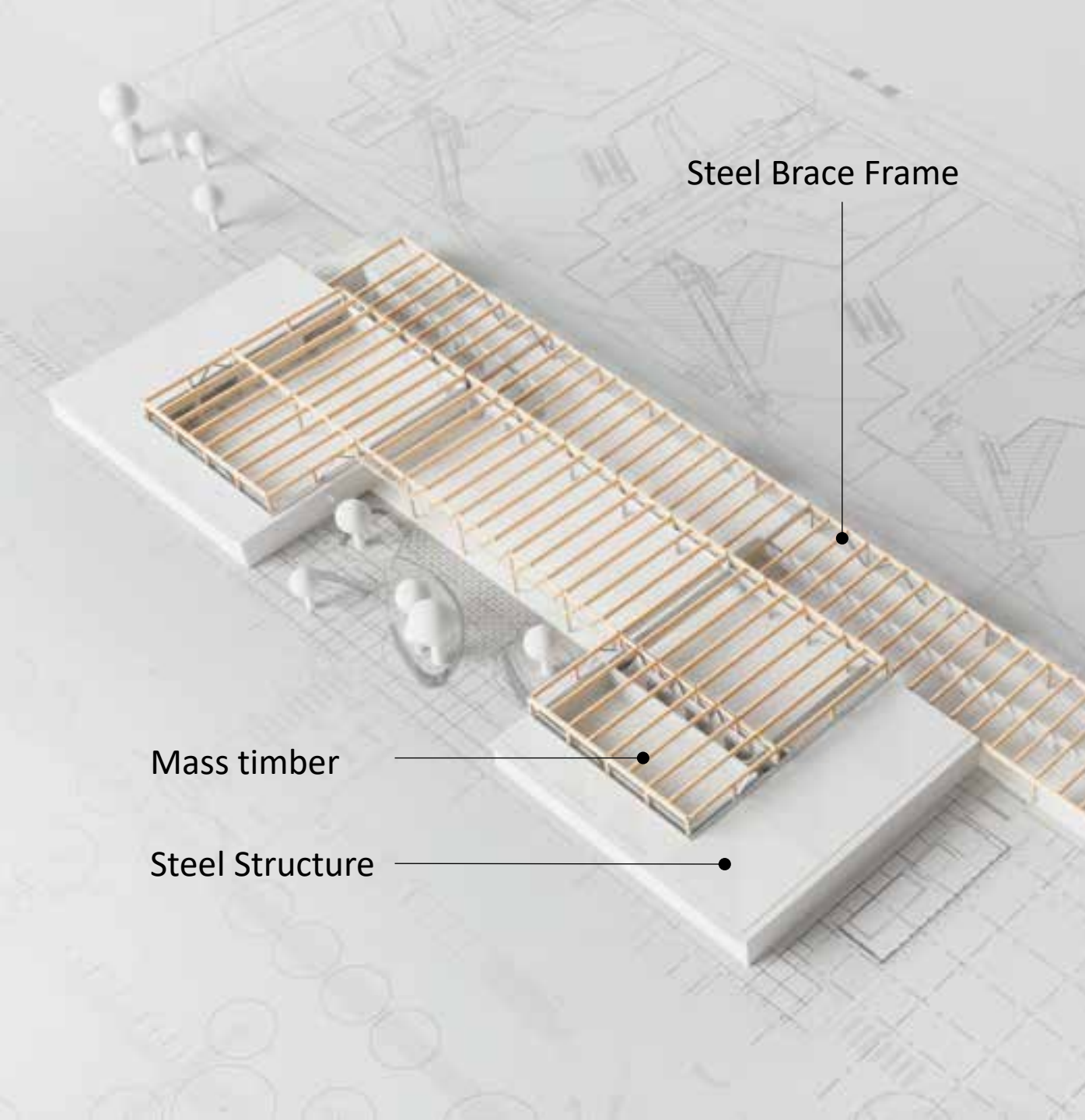
Mass Timber Components – Low Embodied Carbon

Concourse Framing –
Optimize deck and steel framing

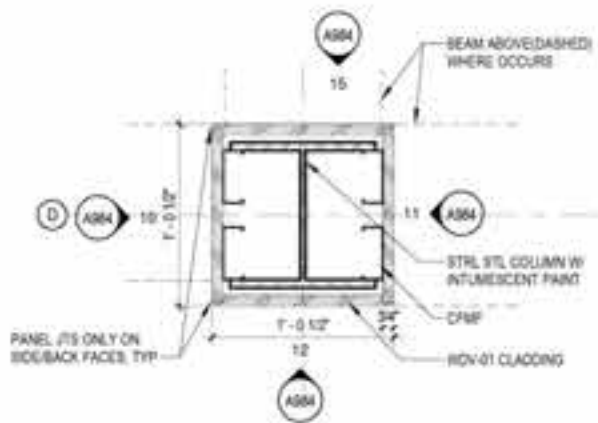
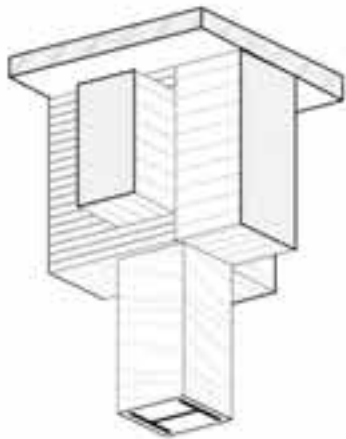
Concrete Mixes –
Specify Low Embodied Carbon Options

MONTEREY REGIONAL AIRPORT
STRUCTURAL DIAGRAM





MONTEREY REGIONAL AIRPORT
MASS TIMBER / STEEL INTERSECTION DETAIL



CLERESTORY COLUMN COVER, TYPICAL



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Monterey Regional Airport

INTERDISCIPLINARY APPROACH

HOK Architecture
HOK Structure
HOK Lighting
HOK Plumbing
HOK Mechanical
HOK Landscape
HOK Interiors
HOK Experience Design (Signage)
HOK Electrical
HOK Sustainability
HOK LV / Security

EXTERNAL CONSULTANTS

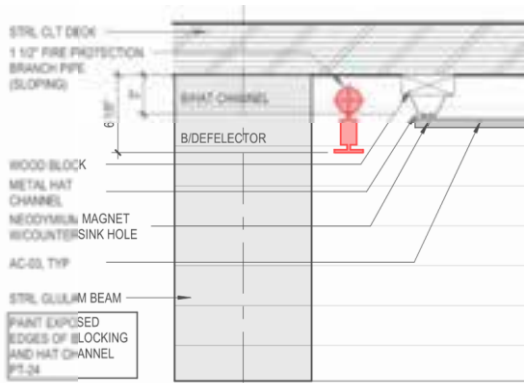
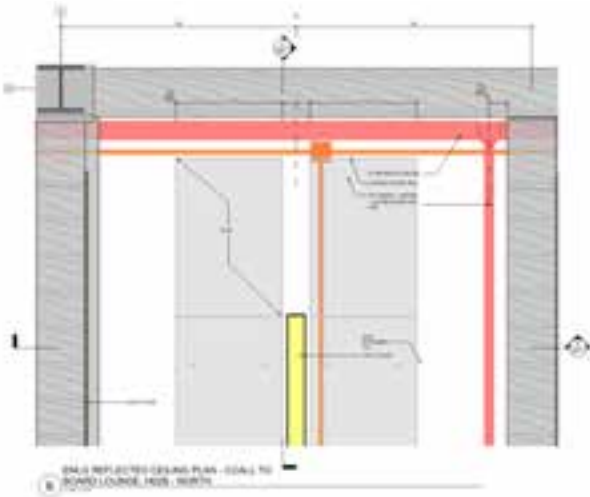
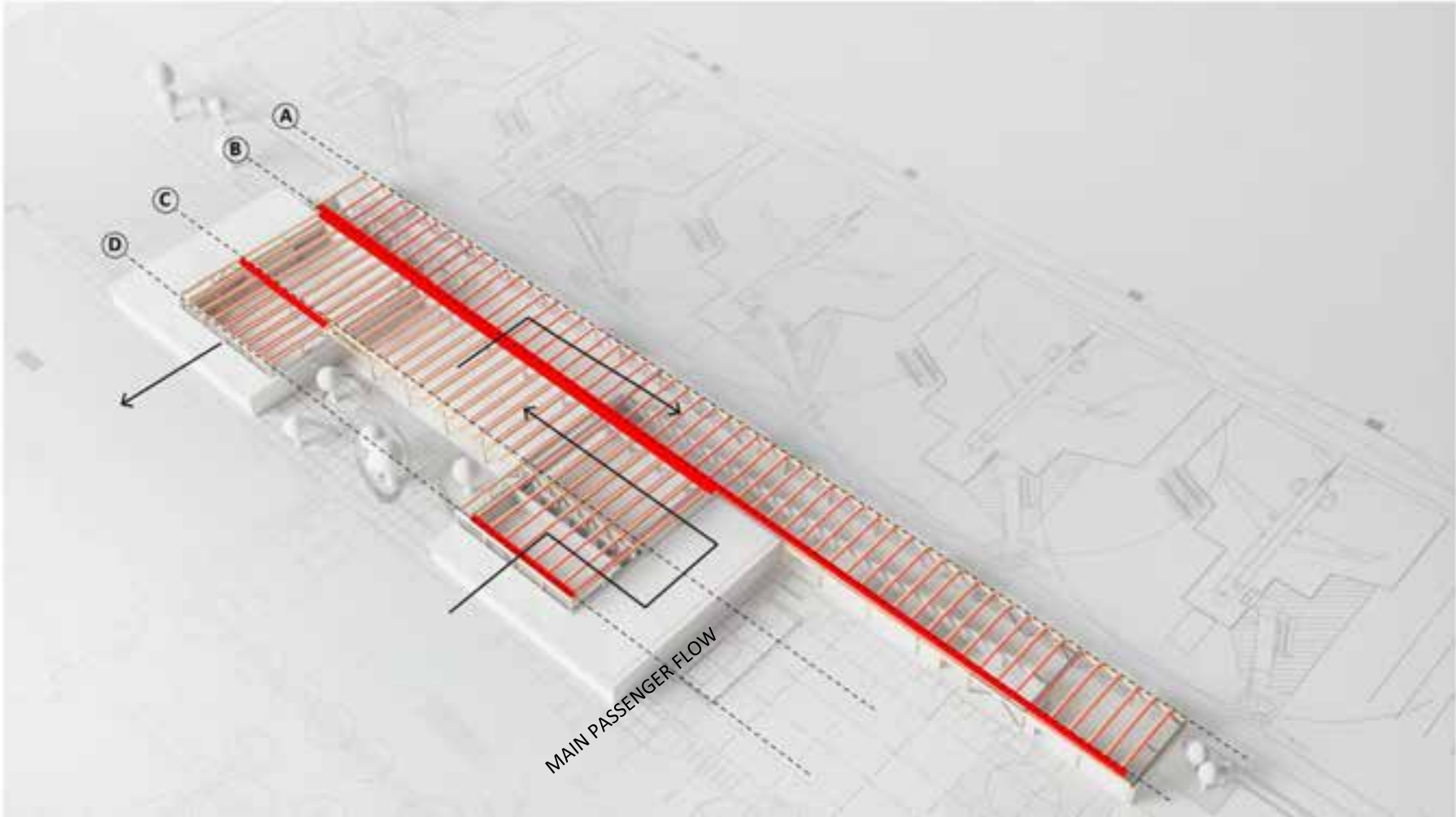
Civil
Landscape
Public Address
Airside Planning
Baggage Handling System

BUILDING SYSTEMS INTEGRATION - FIRE PROTECTION



BUILDING SYSTEM COLOR SCHEME

- █ FIRE PROTECTION - SPRINKLER MAIN
- █ FIRE PROTECTION - SPRINKLER BRANCH
- █ POWER - PUBLIC ADDRESS
- █ POWER - SECURITY CAMERA
- █ POWER - ELECTRICAL, LIGHTING

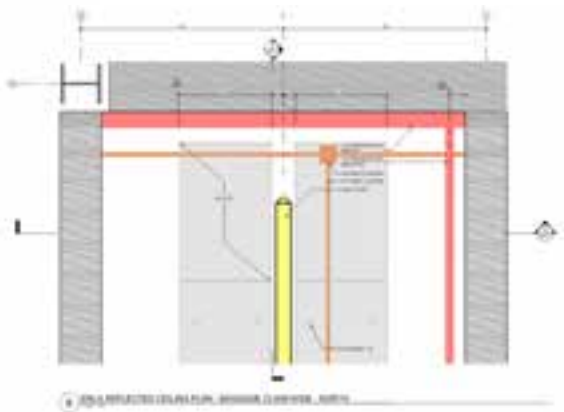
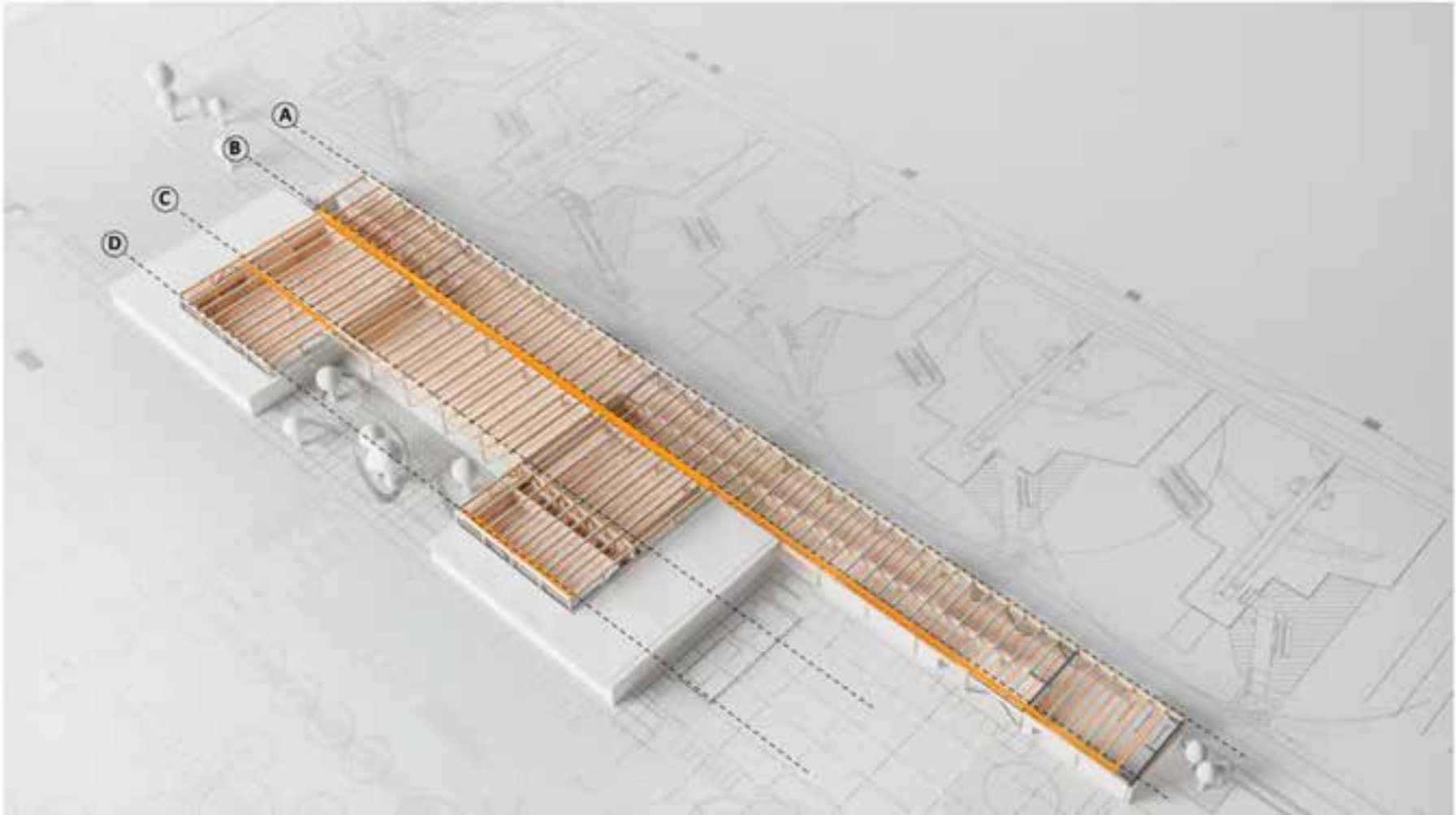


BUILDING SYSTEMS INTEGRATION - LIGHTING

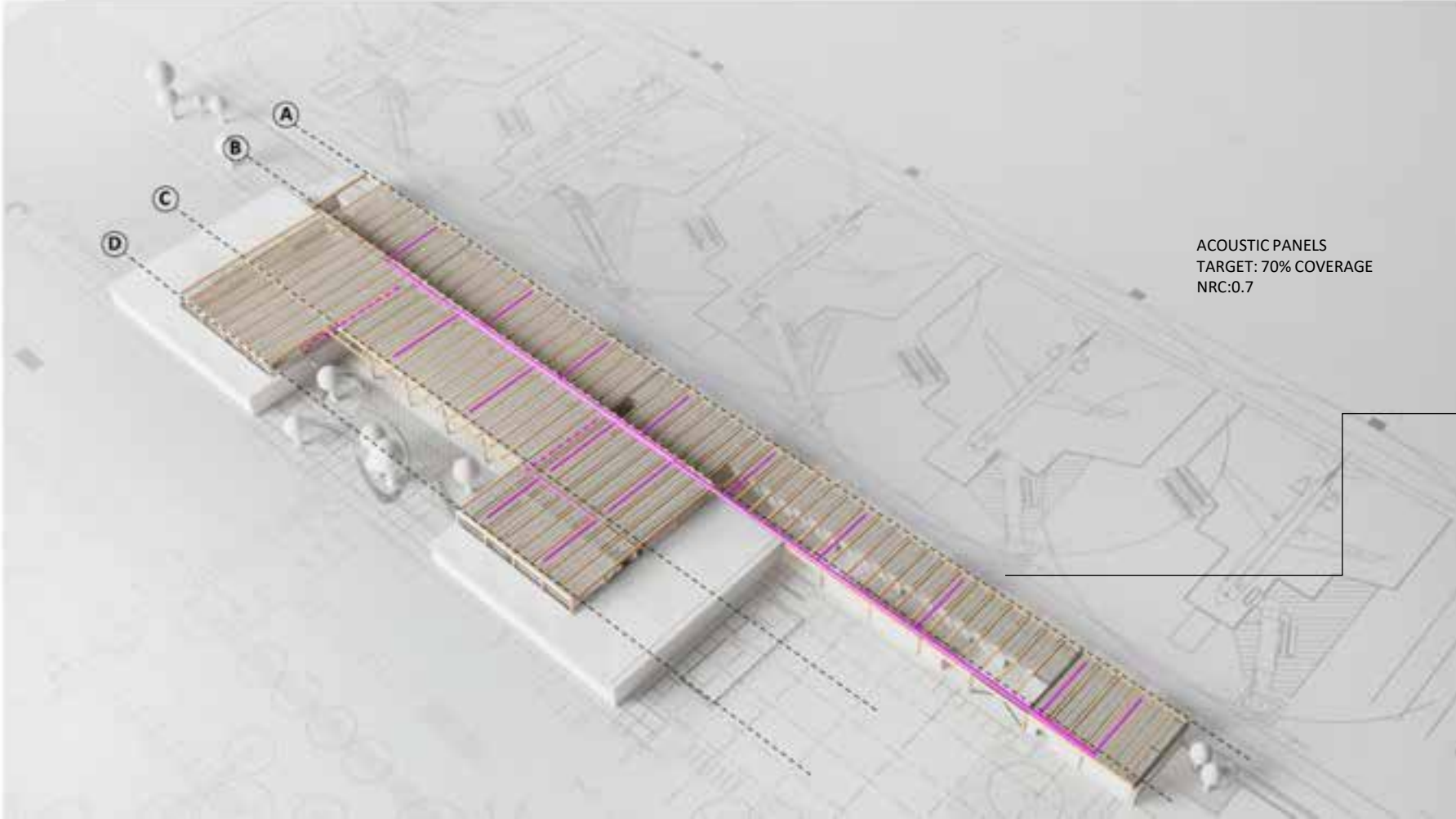
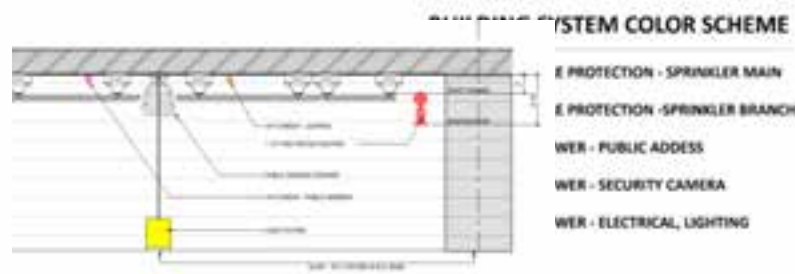
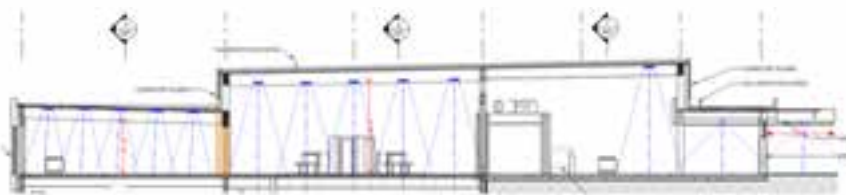


BUILDING SYSTEM COLOR SCHEME

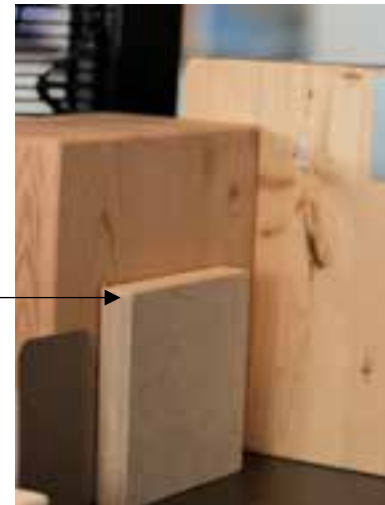
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- █ POWER - ELECTRICAL, LIGHTING



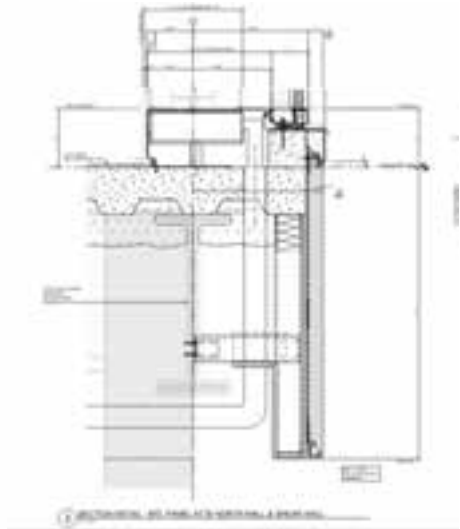
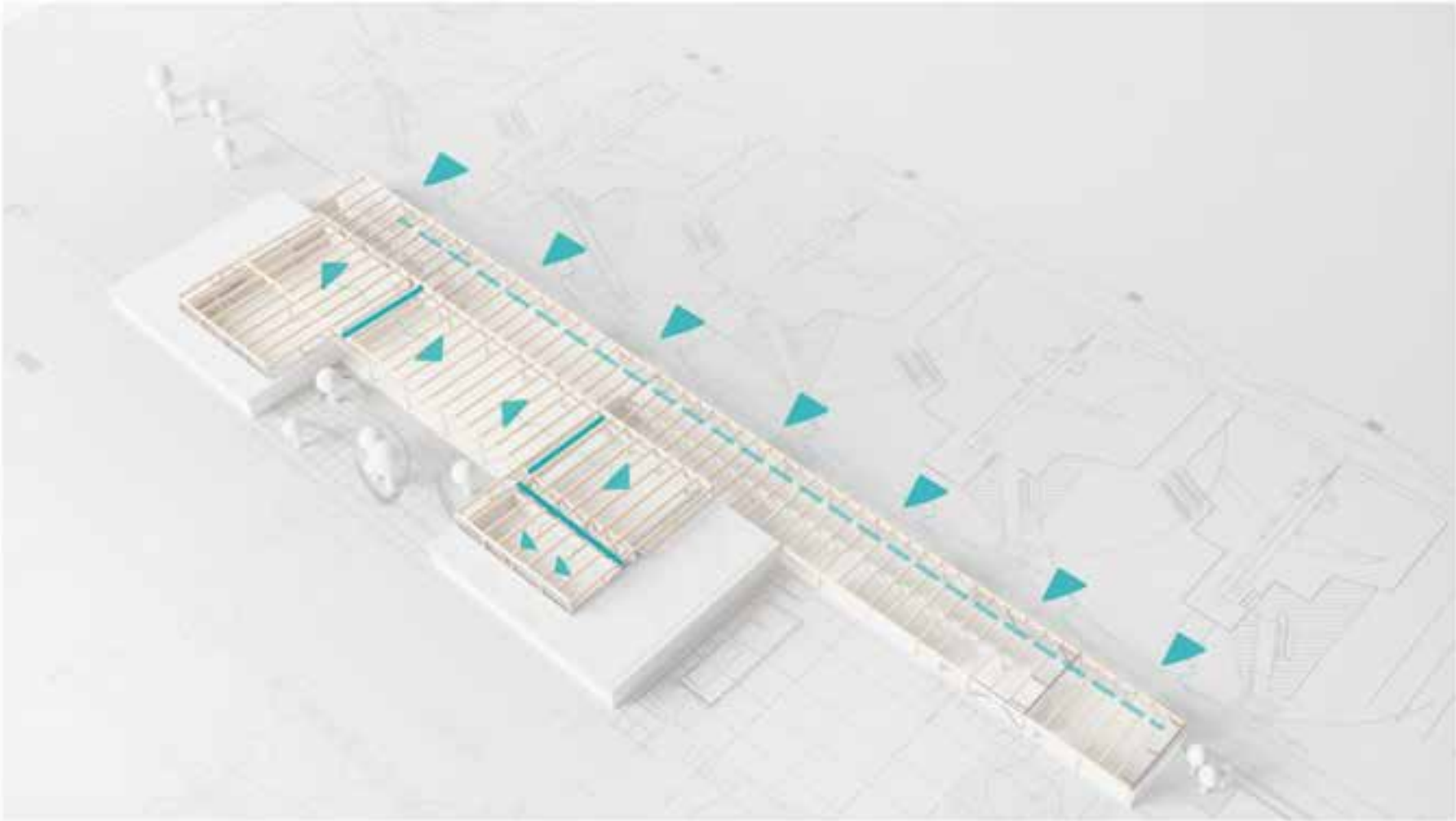
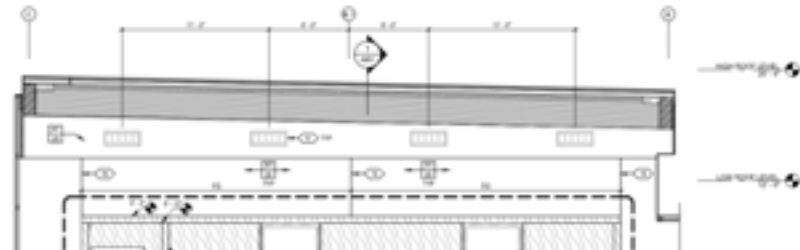
BUILDING SYSTEMS INTEGRATION - PUBLIC ADDRESS



ACOUSTIC PANELS
TARGET: 70% COVERAGE
NRC:0.7

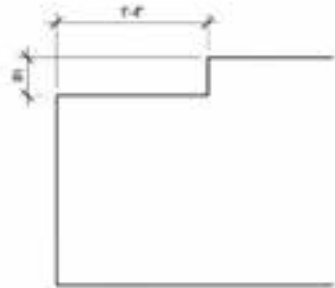


BUILDING SYSTEMS INTEGRATION - MECHANICAL



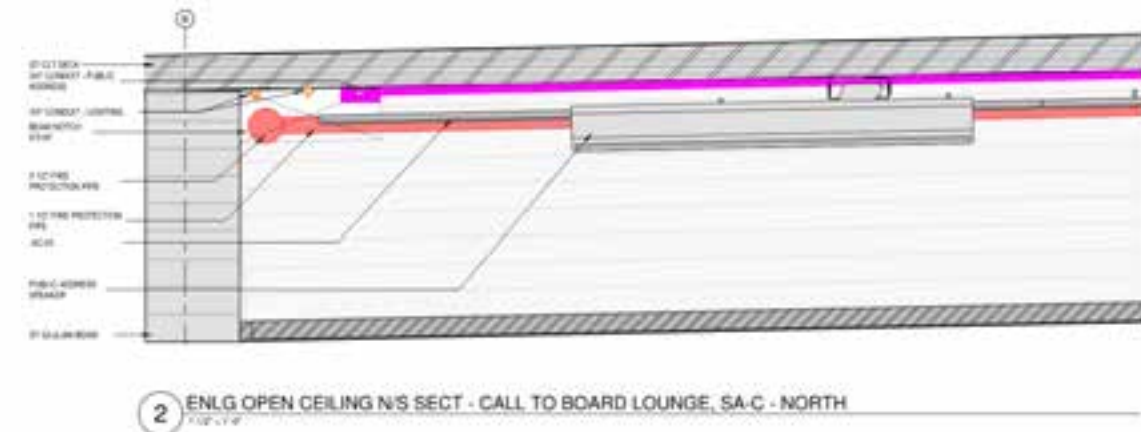
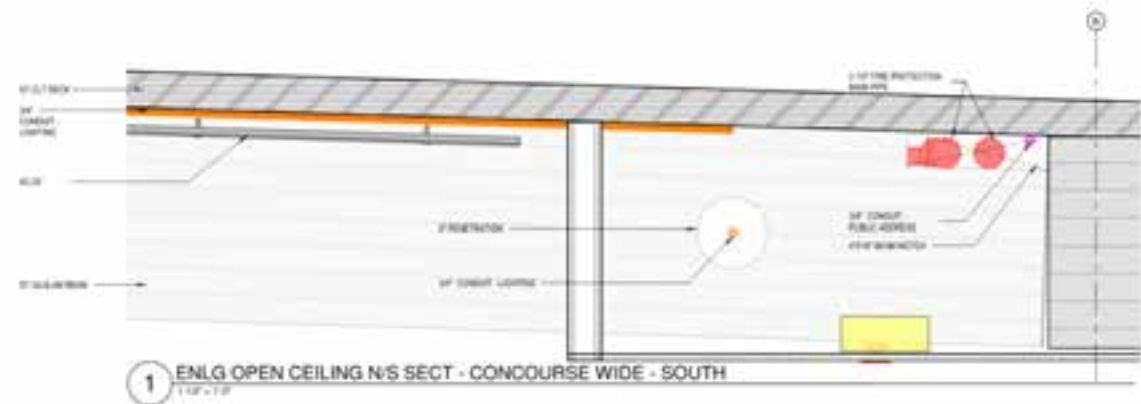
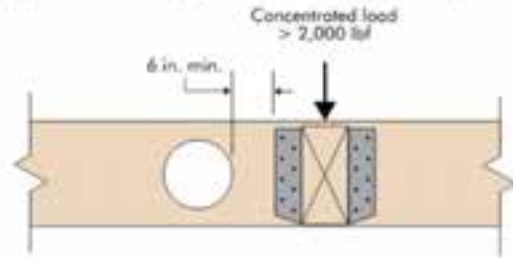
BUILDING SYSTEMS INTEGRATION - GLULAM BEAM PENETRATION AND NOTCHES

Beam Penetration and Notch Guidelines

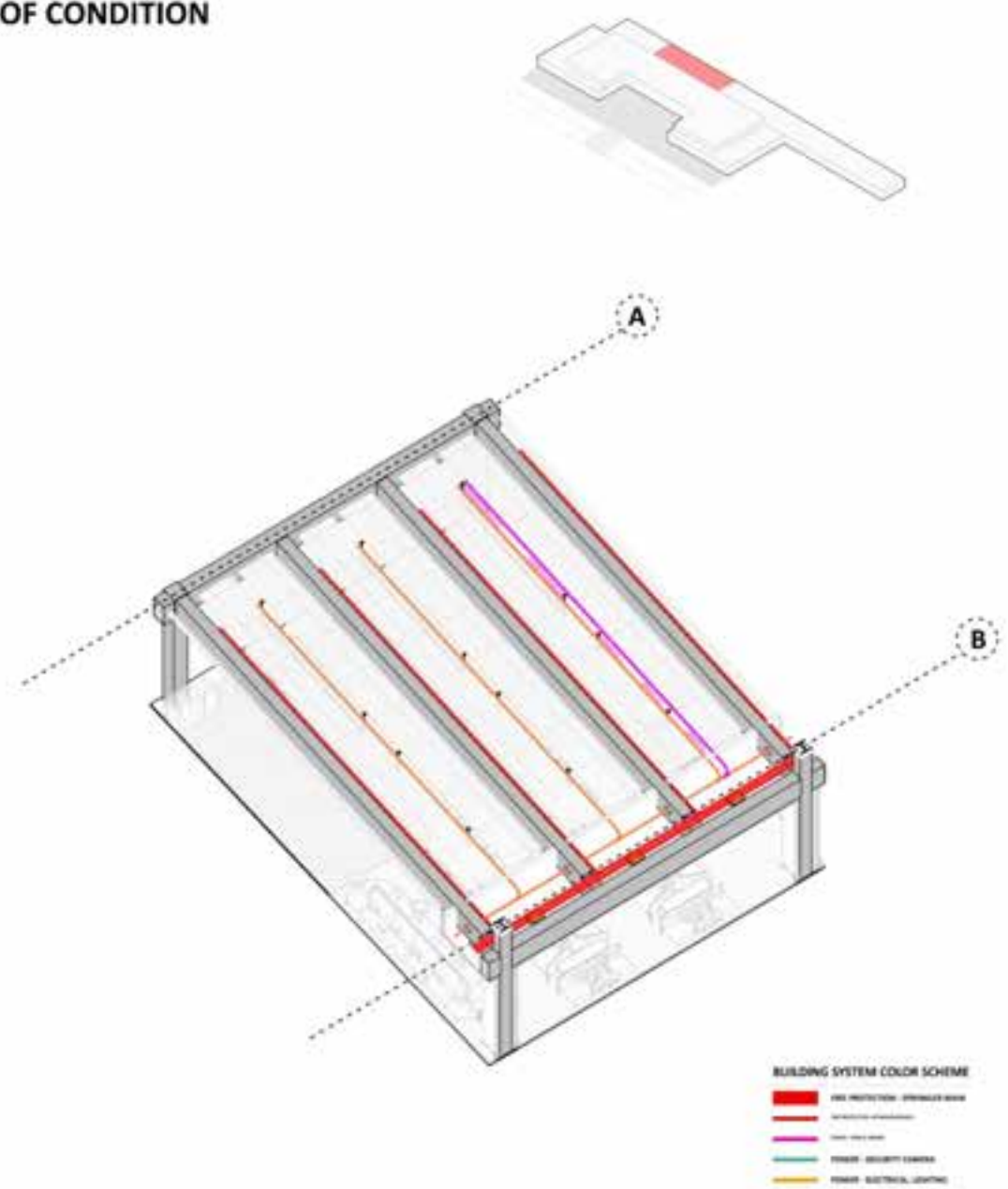
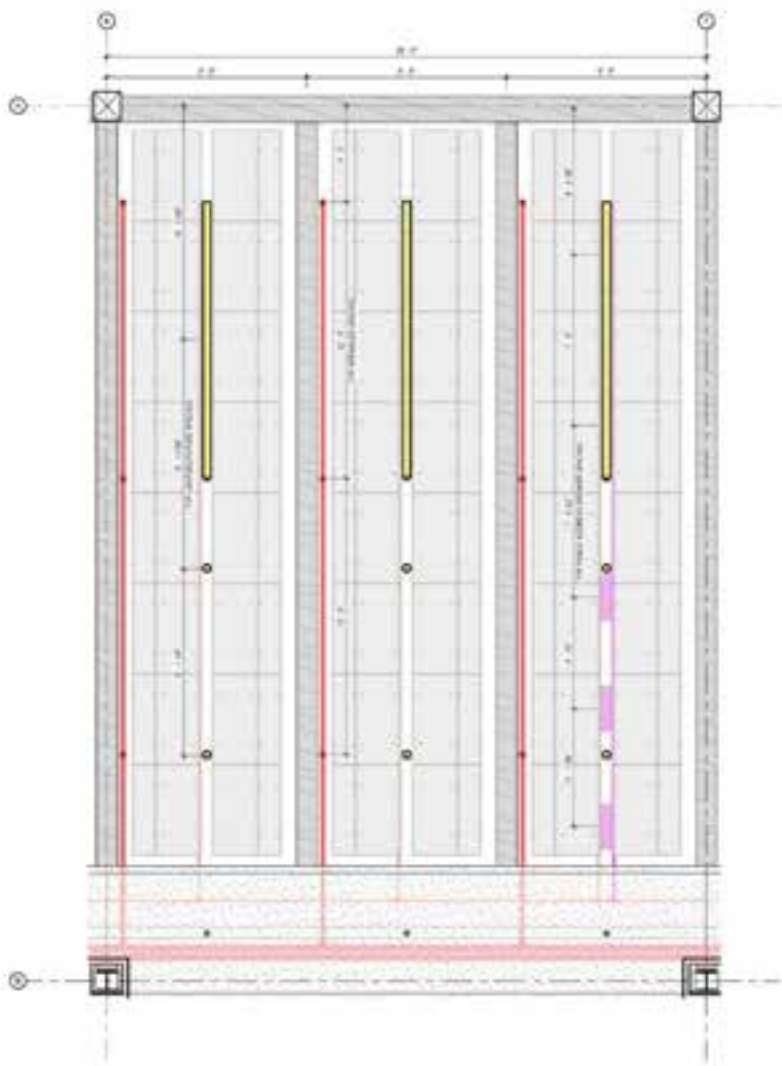


dn = 4" for 24" deep GLB
dn= 6" for 28.5 deep GLB

Penetrations in glulam beams:
3 holes max per beam
Max diameter = 8"
Edge of one hole to edge of another should be spaced at least 16"
Edge of hole to end of beam should be at least 14"
Holes should be centered in the depth of the beam, if it needs to be elsewhere, please reach out.
Edge of hole to other supports should be at least 5" away.

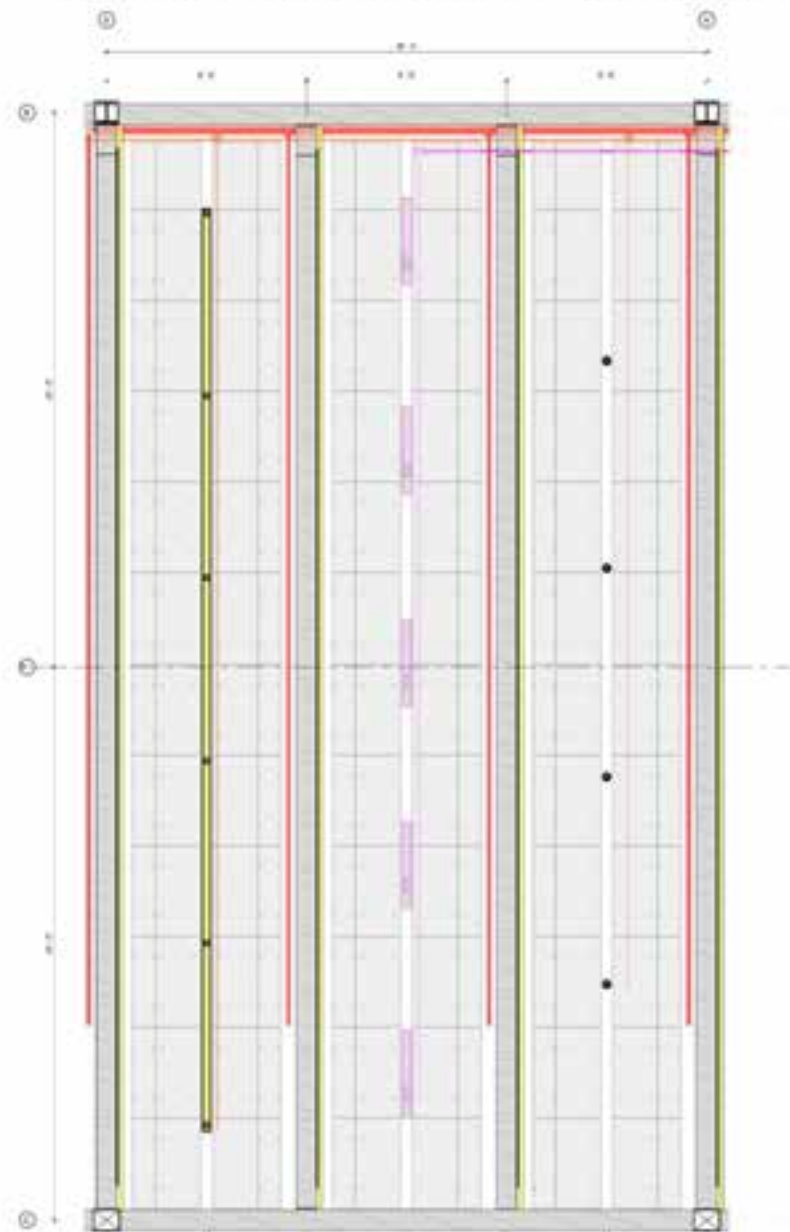


BUILDING SYSTEMS INTEGRATION - TYPICAL LOW ROOF CONDITION

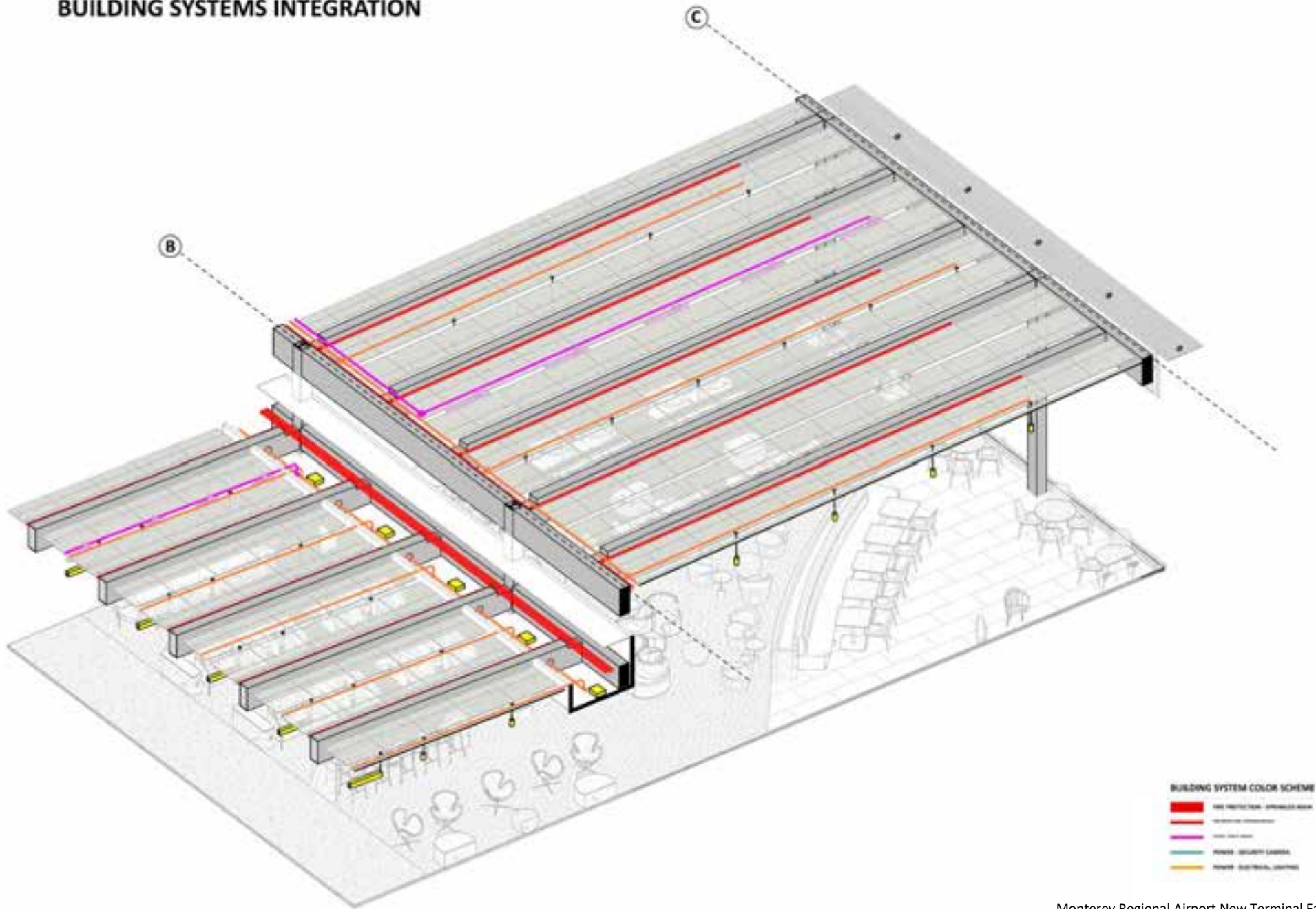


BUILDING SYSTEM COLOR SCHEME

Red	Fire Protection - Sprinkler Head
Orange	Fire Protection - Sprinkler Head
Purple	Fire Protection - Sprinkler Head
Green	Fire Protection - Sprinkler Head
Yellow	Fire Protection - Sprinkler Head



BUILDING SYSTEMS INTEGRATION



BUILDING SYSTEM COLOR SCHEME

- MASS TIMBER (TRUSS, JOIST, WALL, FLOOR)
- MECHANICAL (DUCTWORK, PIPING)
- ELECTRICAL (CONDUIT, CABLE TRAY)
- PLUMBING (PIPE, VALVE)



Public Address Speakers

Fire Sprinkler System

Acoustic Panels

Mass Timber Structure

Direct / Indirect Light Fixtures

High Performance Glazing

Trench Fan Coil Unit



Clearstory with Automated Shades

Acoustic Panels

Mass Timber Structure

Direct / Indirect Light Fixtures

Ventilation Air Supply

Ceiling Fan Coil Unit

Passive Exterior Shading

High Performance Glazing

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New Terminal Facility | Tianyu Wang, HOK – Tianyu.Wang@hok.com

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- **Design and Construction Updates**

SOUTH AERIAL VIEW



NORTH AERIAL VIEW



ARRIVING VIEW



CENTRAL COURTYARD



TICKETING, SSCP QUEUEING



CENTRAL GATE LOUNGE



CONCOURSE GATES



CONCOURSE GATES



BAGGAGE CLAIM



ARRIVAL VIEW



CONSTRUCTION UPDATES



CONSTRUCTION UPDATES





CONSTRUCTION UPDATES



CONSTRUCTION UPDATES



RENDERING VS. CONSTRUCTION



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Thank you !





INTEGRATED FRAMING & MASS TIMBER SOLUTIONS

QB SOLUTIONS

- *QB Framing Solutions*
- *QB Mass Timber Solutions*
- *QB Timber Towers*

QB INTEGRATED SERVICES

- *Preconstruction & Design Assist*
- *Structural Engineering*
- *Digital Construction & VDC*
- *Constructability Review*



Elmer Zook | President & CEO,
Quality Buildings

DESIGN | SUPPLY | INSTALL



Woodward Lofts



Colby College



Wells Transportation Station



PA State Police Academy



Wetlands Institute



Presque Isle Airport

LANDMARK MASS TIMBER PROJECTS

WOODWARD LOFTS

How a hybrid, offsite building system helped make mass timber pencil for affordable housing



1 | WHY MASS TIMBER

Innovation had to provide value.

For affordable housing, the first question was not “Can we use timber?” It was “Can it improve the project and strengthen the funding case?”

Funding driver

Woodward Lofts is Pennsylvania’s first PHFA-funded hybrid mass timber affordable housing project. Incorporating an innovative construction system strengthened the project’s competitive position for Low-Income Housing Tax Credit funding.

The project could not afford innovation for innovation’s sake.

Value had to show up not only in material, but also in delivery

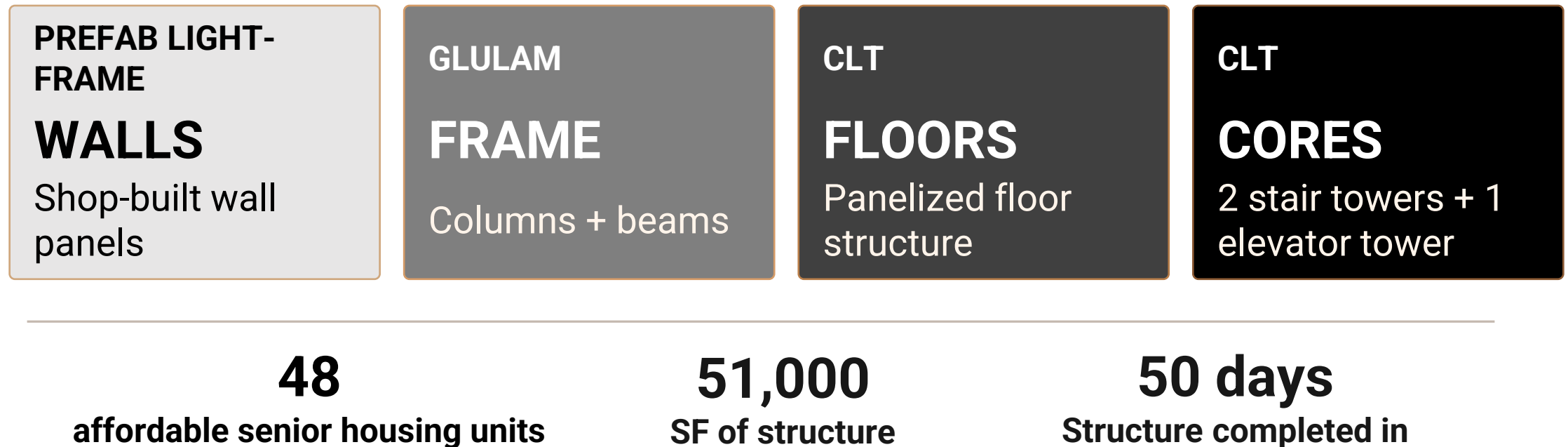
- **Construction efficiency** Fewer field variables + faster structural delivery
- **Site constraints** Less cutting, waste, noise and laydown demand
- **Sustainability** Lower-impact material choices + efficient construction
- **Resident experience** Exposed wood + biophilic character

The business case started with funding—but had to hold through design, procurement and construction.

2 | THE SYSTEM

Hybrid by design. Offsite by strategy.

The team did not force the entire building into one structural system. Each system was used where it created the **most value**.

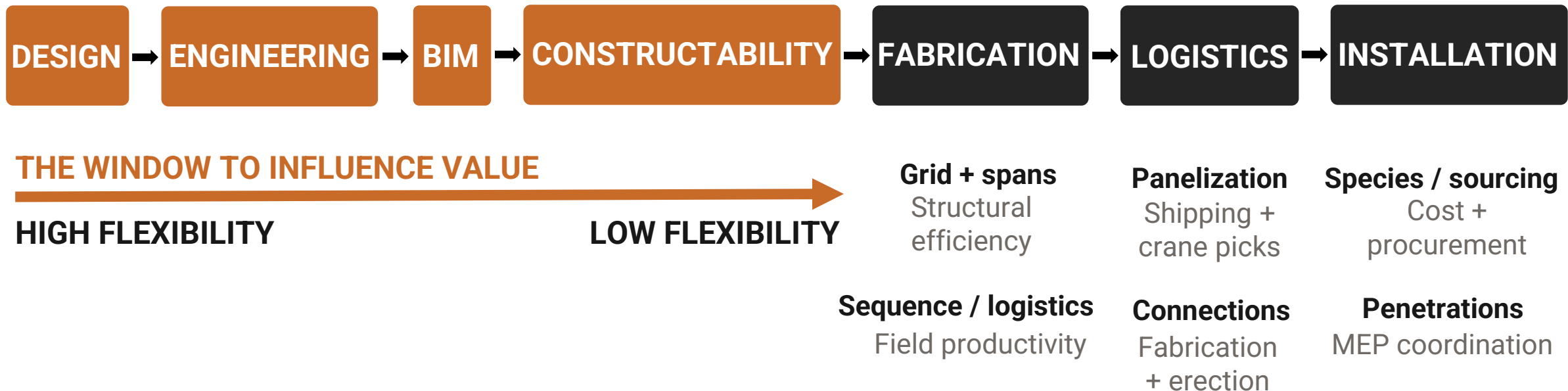


Hybrid construction = use the right system where its strengths matter most.

3 | THE DECISION WINDOW

Field speed is created months earlier.

Mass timber rewards early decisions because geometry, connections and fabrication become increasingly difficult to change after release.



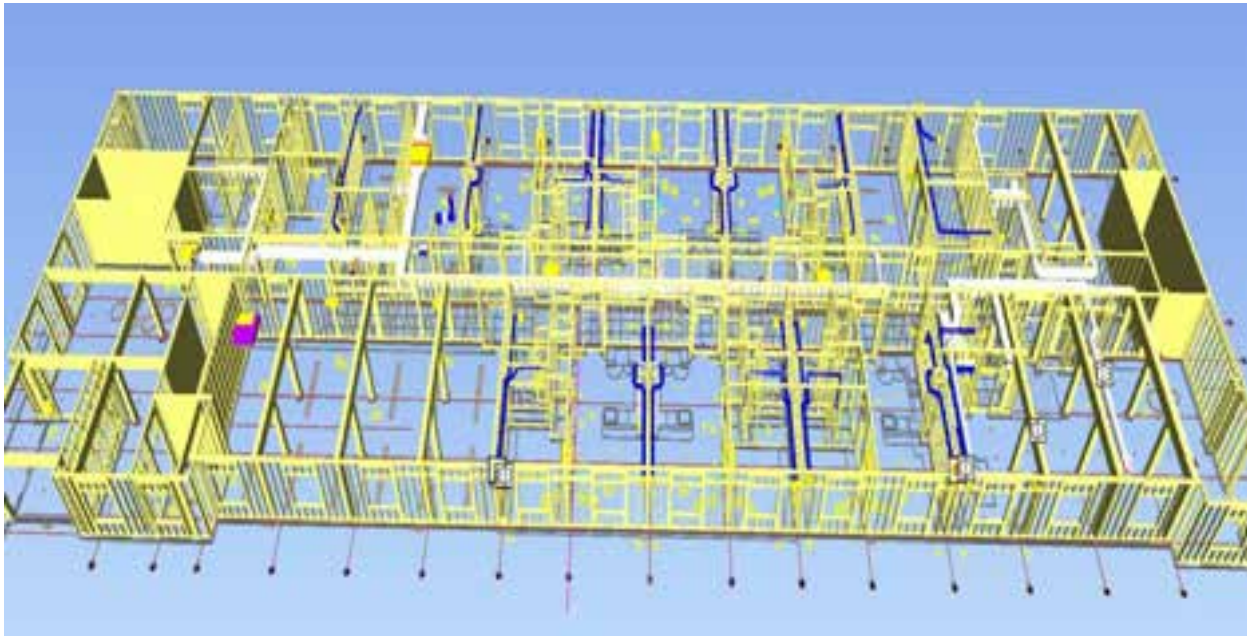
Move critical decisions upstream—before they become expensive field decisions.

Source: QB process framework + Woodward Lofts article.

4 | BIM + DIGITAL CONSTRUCTION

The model was a construction tool—not just documentation.

Offsite fabrication only works when interfaces are resolved before components reach the shop.



Resolved before fabrication

- Panel dimensions + geometry
- Connections + tolerances
- MEP / fire protection penetrations
- Hybrid system interfaces
- Fabrication requirements
- Erection sequence + site logistics

By the time material reached the field, the team was executing a process that had already been coordinated.

“Tab A goes into slot B, and you keep on moving forward.”

5 | OFFSITE CORES: Timber Towers™

CLT changed the sequence—not just the material.

The stair and elevator towers were a schedule-sensitive component that could be shifted from field assembly to precision fabrication.

Installed in 4 days

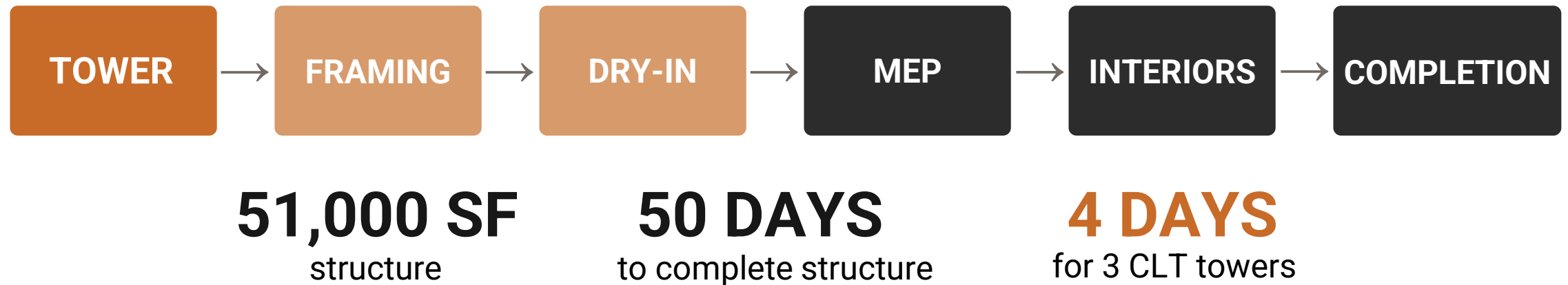


CLT _{vs} CMU		
	 Cross-Laminated Timber	 Concrete Masonry Unit
INSTALLATION	Hours	3-4 Weeks
TRADES	One	Multiple
INSPECTIONS	One	Multiple
COMPONENTS	Panelized Design	Thousands
POTENTIAL WEATHER IMPACT	Minimal	Significant

Offsite fabrication was especially valuable on a constrained urban site: less cutting, dust, waste, noise and laydown demand.

6 | THE DOWNSTREAM VALUE

A core is connected to the critical path. Earlier completion creates opportunities for every trade that follows.



The economics extend beyond the structural line item:

Field labor • General conditions • Crane utilization • Trade sequencing • Inspection schedule • Site congestion • Weather exposure • Rework • Carrying costs

THE WOODWARD LESSON

Predictability *is* the innovation.

- 1 Funding can reward innovation—but delivery has to justify it.
- 2 Hybrid systems let timber work where it creates the most value.
- 3 BIM + constructability move complexity out of the field.
- 4 Offsite fabrication converts decisions into repeatable execution.
- 5 Measure total delivered value—not material price alone.



**The goal is not simply to build one project faster.
It is to deliver the next one with greater certainty and repeatability.**



DESIGN | SUPPLY | INSTALL



Offsite Integration: A Vertical Addition

DESIGN | BUILD | DEVELOP



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Project at a Glance

85,000

SF Base Building

Adaptive reuse of an existing commercial building

57

Apartments

15 workforce housing
42 market rate
61,000 SF

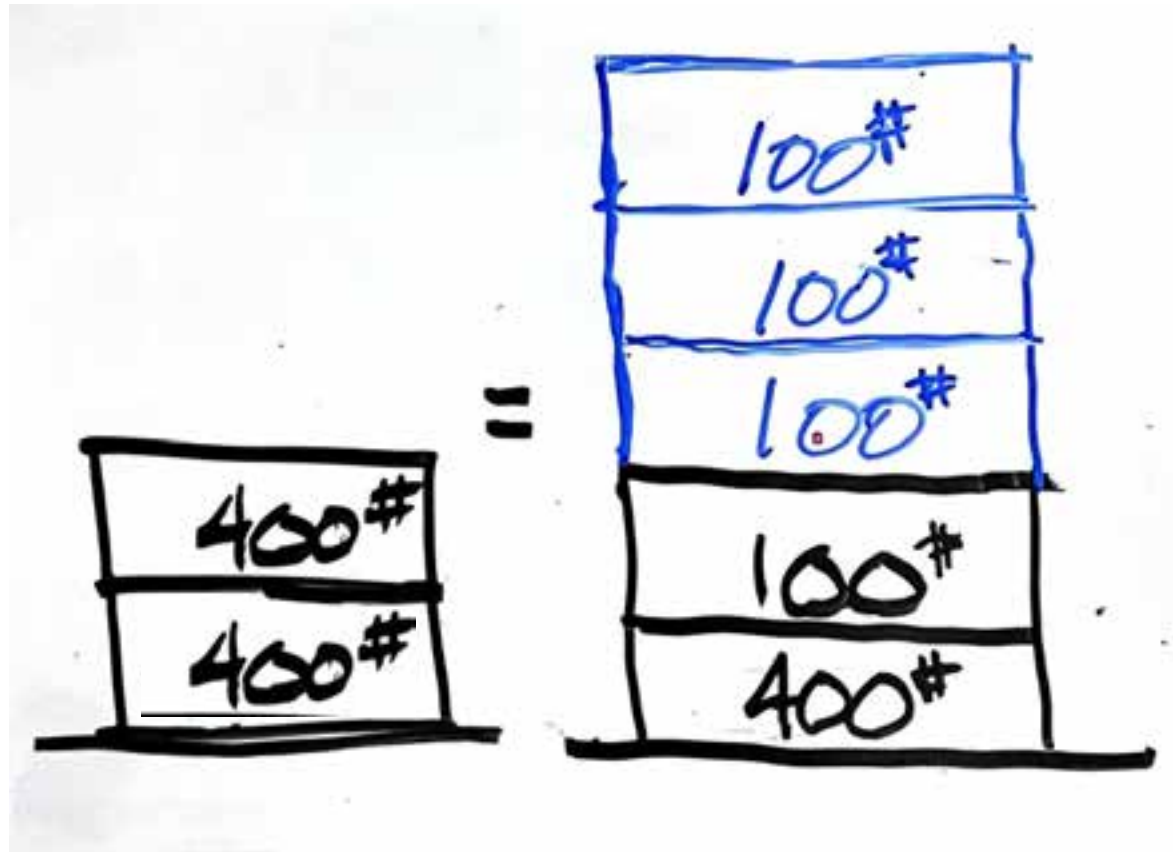
Net Zero

Energy target for the completed community

Systems

Off-site fabricated structure + building systems

Structural Section = Opportunity



PPG - EXISTING


Structural Grid



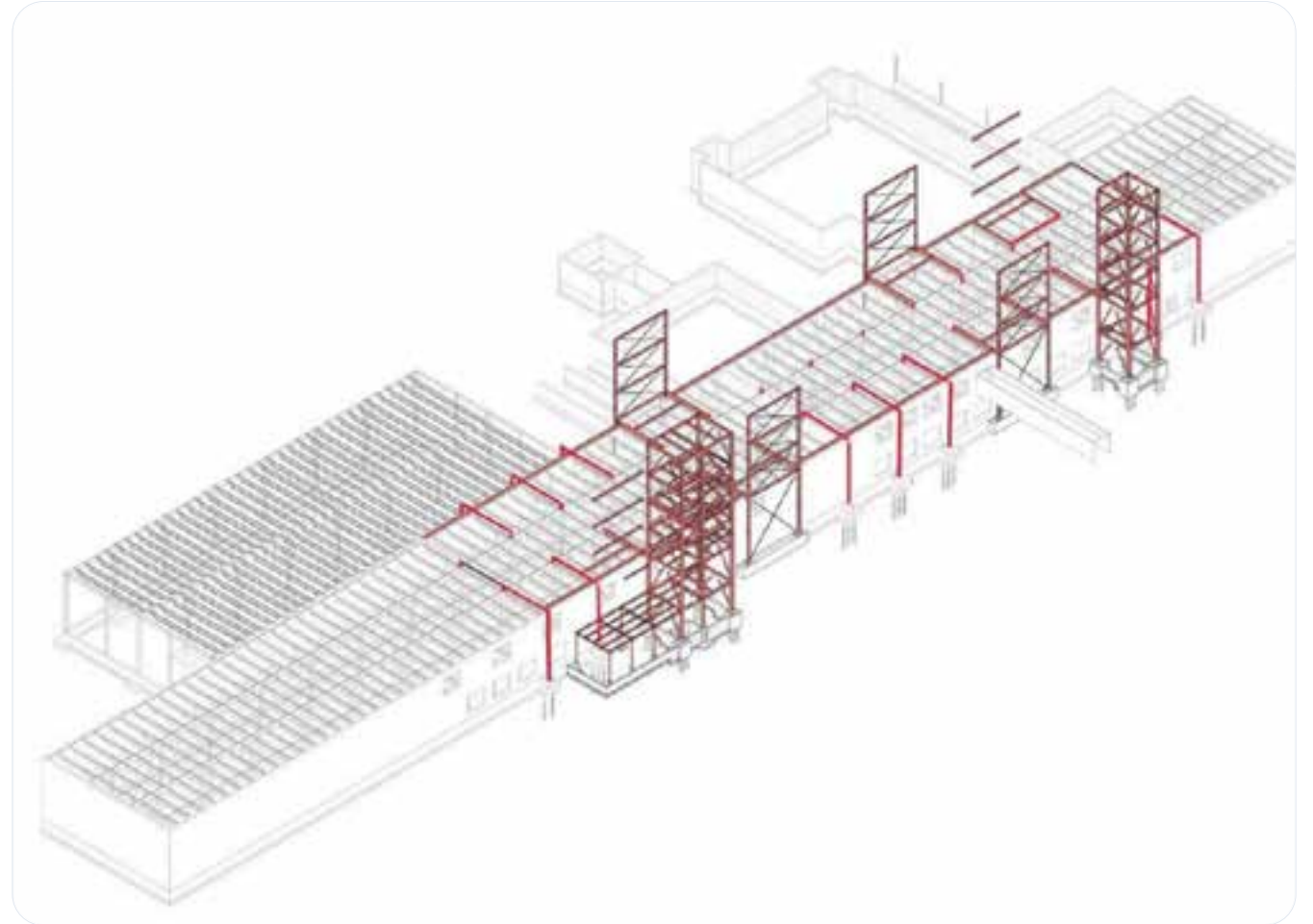
Connections & Lateral Strategy

Gravity Connections

Analysis of load transfer mechanics and joint configurations.

Lateral Loads

Bracing and shear systems engineered to resist lateral forces.



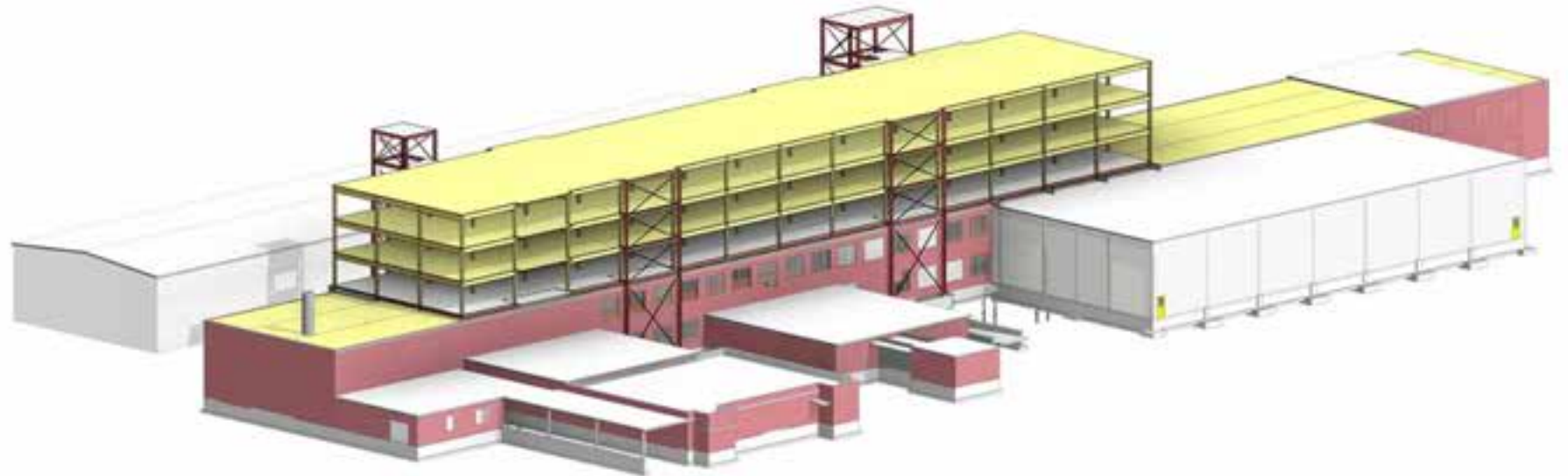
Structural Considerations

Base Building Structure

Soil Capacity

Connections

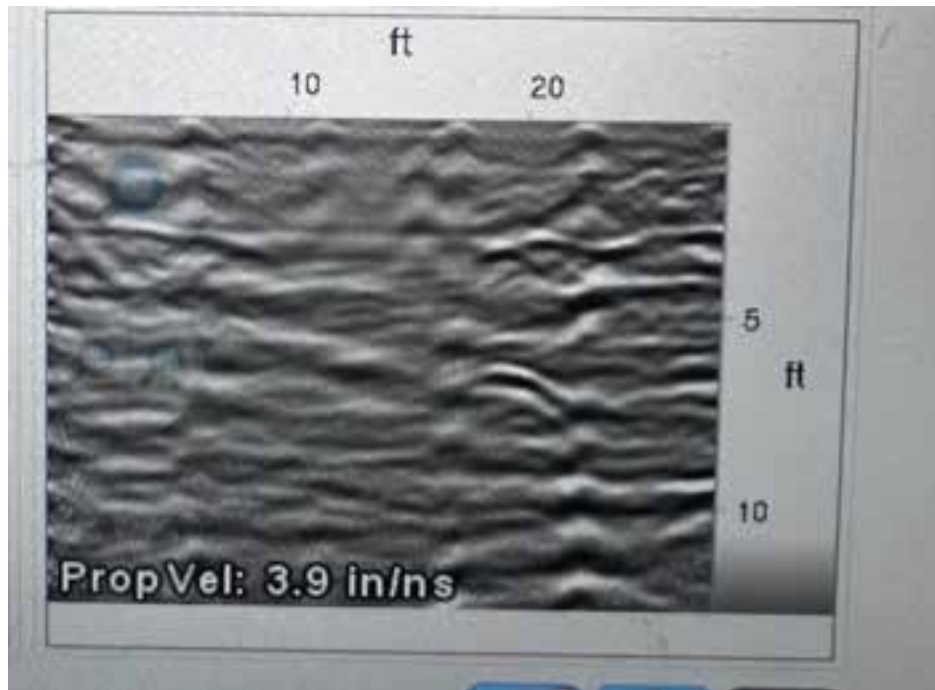
Lateral Loads



TESTING

Discovery

- Prove Capacity
- Identify Issues
- Relocate Existing Systems



TESTING



Discovery

- Prove Capacity
- Identify Issues
- Relocate Existing Systems



TESTING

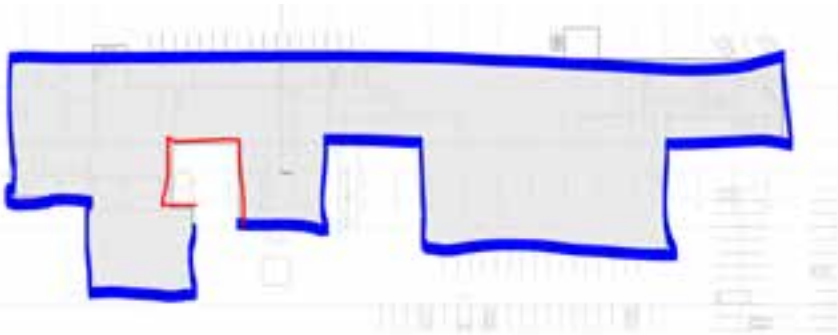
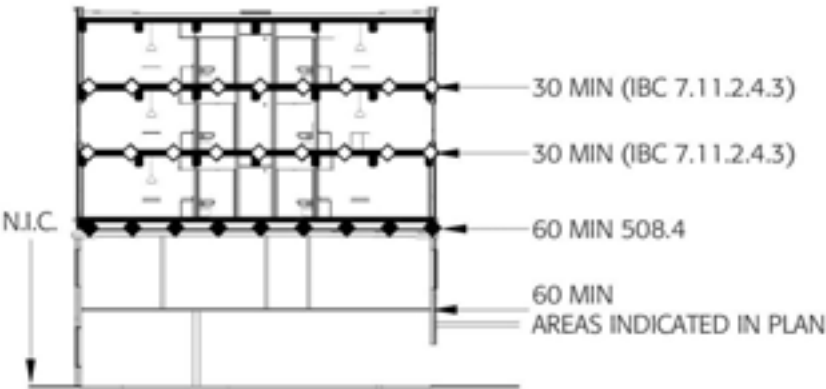
Discovery

- Prove Capacity
- Identify Issues
- Relocate Existing Systems

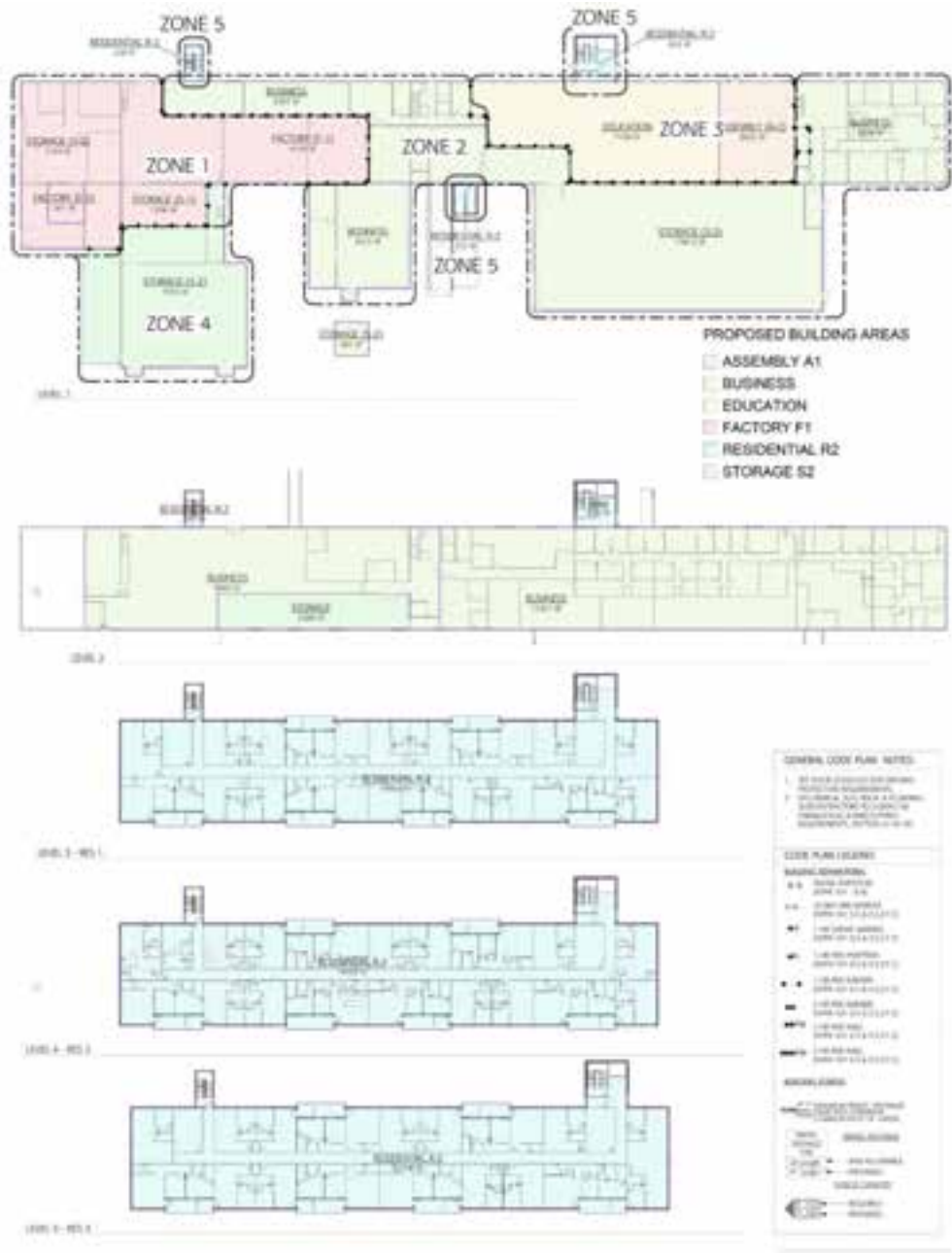


Code Compliance

Type IIIB Construction



Frontage - Allowable Areas - Separation



Off-Site Fabrication



Mass Timber

Precision-milled beams and columns, fabricated indoors year-round



Insulated walls with windows

Weather-tight envelope, insulated panels assembled in a controlled shop



Bathroom Pods

Factory fabricated finished bathrooms with tile, plumbing and electrical completed

Glulam

beams
columns

3 Ply CLT



Exterior Wall Panels

FRT
Insulated
Windows
Installed
WDP



75 Finished Baths

5 per truck
2 typologies
prep for kitchens and
laundries



Foundation

Interior & Exterior

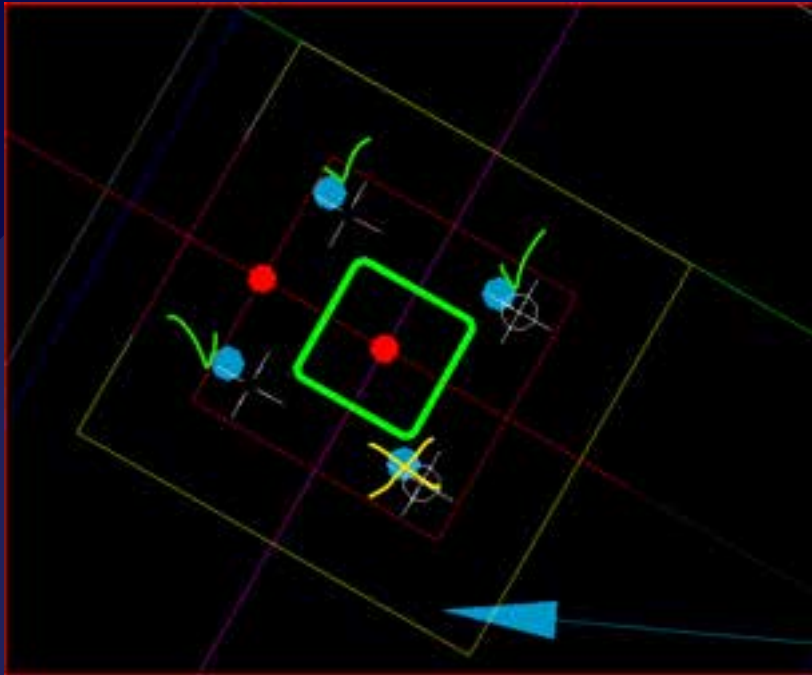


Foundation - Piles



Digital coordination

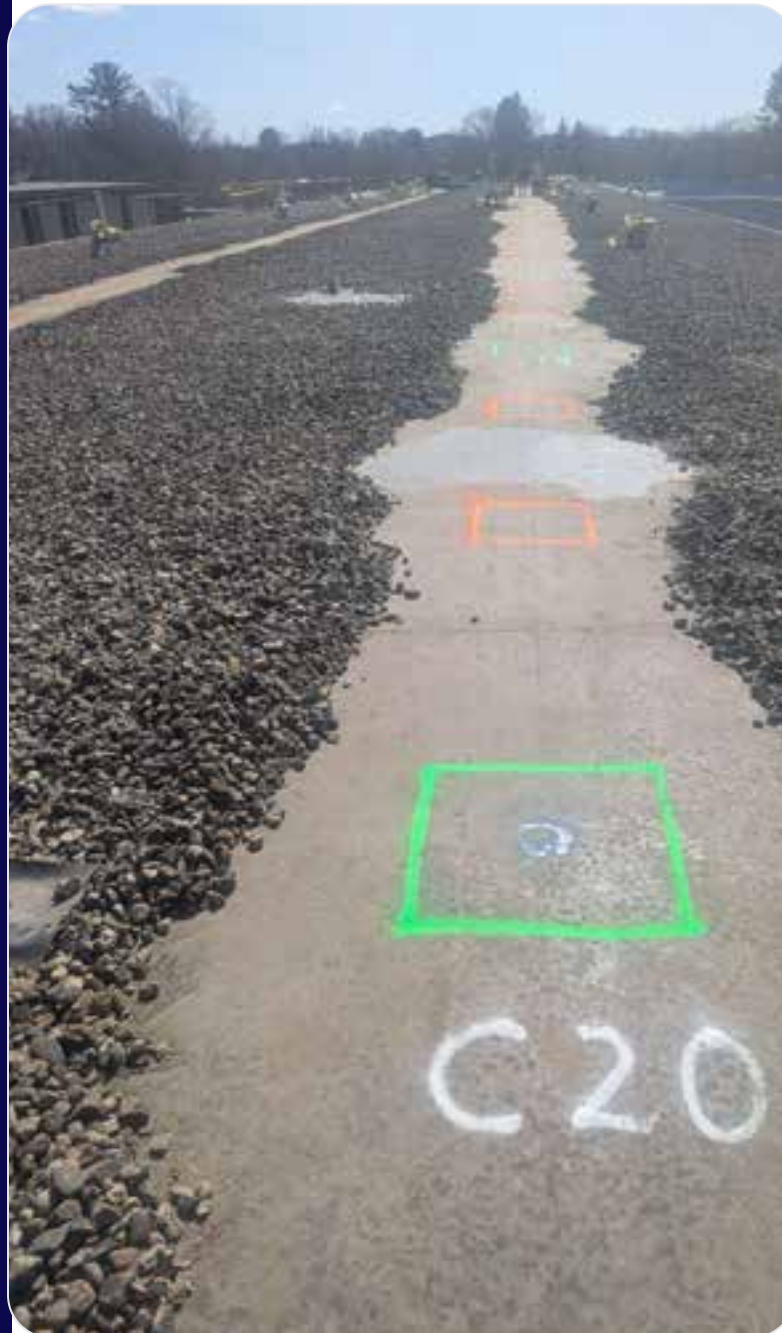
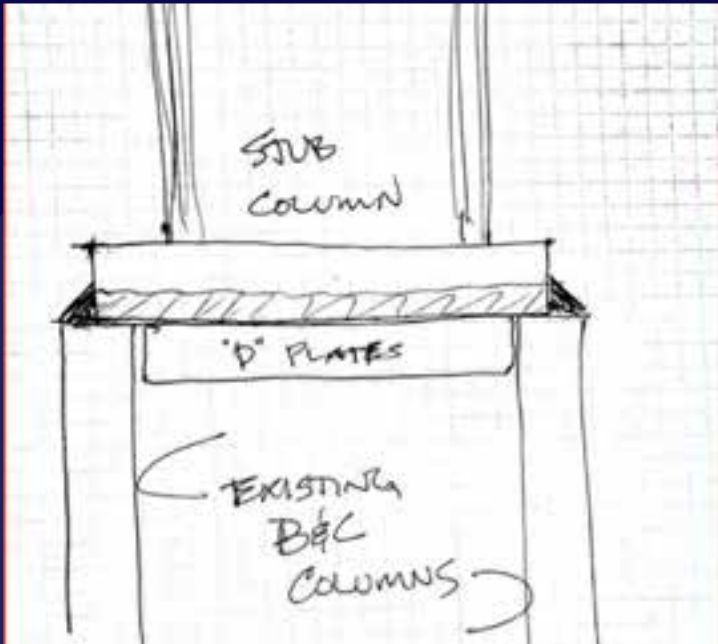
Steel Columns - Base Building
Aligning Connections



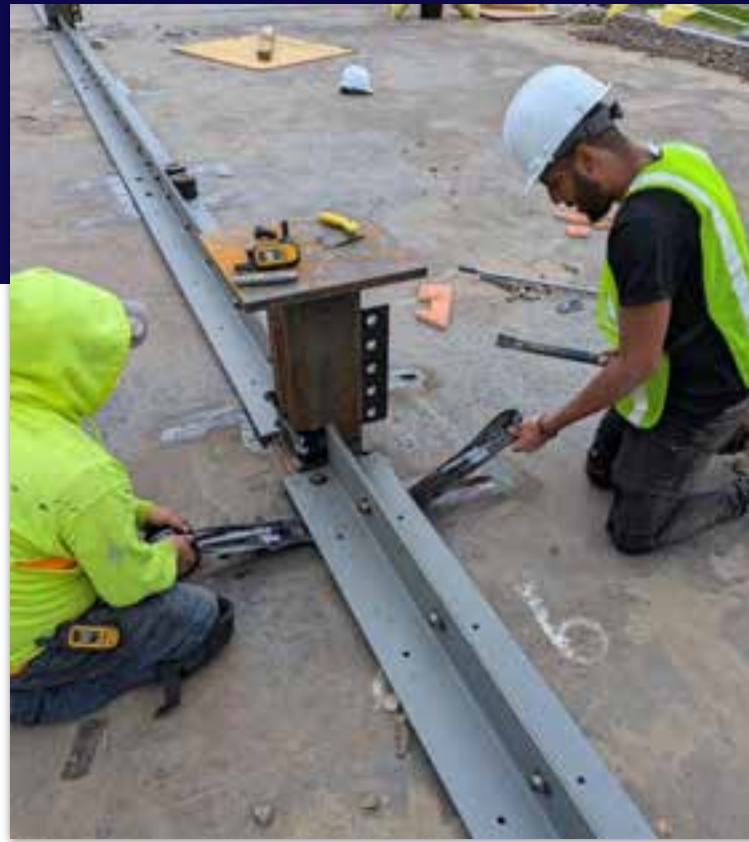
Roof top “site”

Stub Columns

Aligning Connections



Stub columns installed and waterproofed



Mass Timber Prep

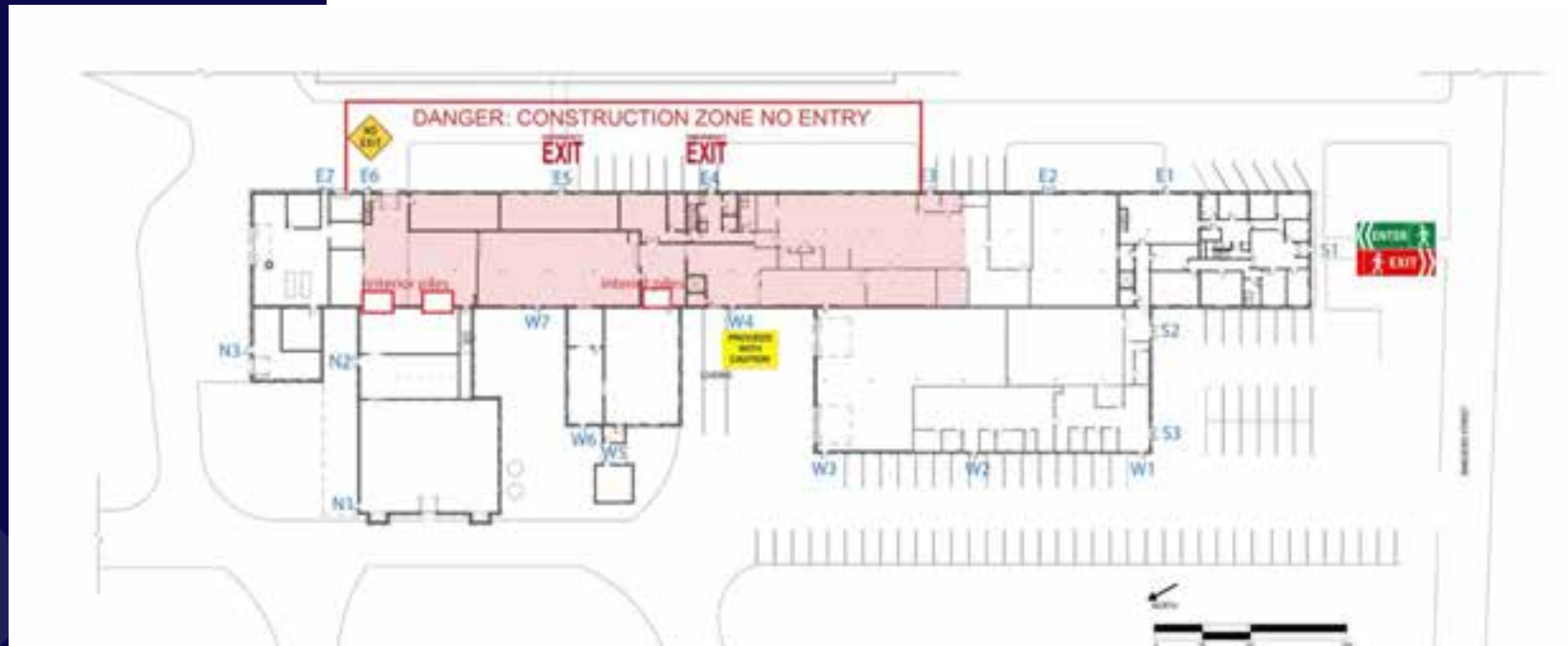
time
fasteners



Off-Site Construction Coordination

Planned coordination with an occupied base building:

- 1 Tenant Safety & Communications
- 2 Transportation & Staging Logistics
- 3 Raising sequence based on access





Raising all the components



Rigging for Various Fabricated Components

Pods Into Place





**Structural
Connection**





Linkbelt
CLIPPING

Savvy chef







Enclosed, temp site heat

Structural & Systems Integration





Finished Apartment

2 Bedroom

A wide-angle rendering of a modern, minimalist living and dining area. The room features a high ceiling with exposed wooden planks and a black track lighting system with several warm-toned spotlights. The walls are white, and the floor is a dark, textured material. Large windows with black frames provide a view of a lush green landscape. The furniture includes a light-colored sectional sofa, a dark wooden dining table with black chairs, and a low wooden coffee table. Potted plants and framed art are scattered throughout the space, adding to the contemporary aesthetic.

Finished Rendering

2 Bedroom Corner



\$287/ SF

\$17.8MM

Hard Costs





DESIGN | BUILD | DEVELOP

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This concludes The American Institute of Architects Continuing Education Systems Course