MASS TIMBER+ SM

OFFSITE CONSTRUCTION CONFERENCE

PRODUCED BY WOODWORKS WOOD PRODUCTS COUNCIL

FEA Forest Economic Advisors

Mass Timber in Data Centers and Beyond

Thomas Hooker
Thornton Tomasetti

Erik Barth
Gensler

MASS TIMBER

IN DATA CENTER DESIGN

MASS TIMBER+

BOSTON, MA | OCTOBER 28-30, 2025

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

Gensler × Thornton Tomasetti

WoodWorks | The Wood Products Council is a registered provider of AIA-approved continuing education under Provider number G516. All registered AIA CES Providers must comply with the AIA Standards for Continuing Education Programs. Any questions or concerns about this provider or this learning program may be sent to AIA CES (cessupport@aia.org or (800 AIA 3837, Option 3)

This learning program 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.

AIA Continuing education credit has been reviewed and approved by AIA CES. Learners must complete the entire learning program to receive continuing education credit. AIA Continuing education Learning Units earned upon 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.

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

Course Description

This session examines the emerging application of mass timber in data centers and similar building typologies, with designers at the forefront of this innovation sharing insights about the benefits, challenges, and design opportunities. The discussion will explore how mass timber can offset some of the environmental impact of data centers, and how the biophilic benefits of exposed wood can contribute to a healthier indoor environment for occupants. Engineers will also explain some of the fundamental differences between data centers and other building types, such as high loading and intensive MEPF systems, which are important design considerations at the start of a project.

Learning Objectives

1. Explore code-compliant design of mass timber systems in data centers and understand how construction type selection impacts design.

2. Understand the environmental benefits of using mass timber, including a lighter embodied carbon footprint.

3. Discuss the speed of construction benefit of mass timber and hybrid systems and how that contributes to efficiency.

4. Identify areas within a data center where mass timber can be exposed and how the biophilic benefits of exposed wood can contribute to a healthy indoor environment for occupants.

Erik Barth
Senior Associate

Gensler

Thomas Hooker
Senior Associate

Thornton Tomasetti

AGENDA

1. Design Overview
2. Why Mass Timber?
3. Implementation
4. Wrap-Up

Gensler × Thornton Tomasetti

EB

1. DESIGN OVERVIEW

ARCHITECTURE

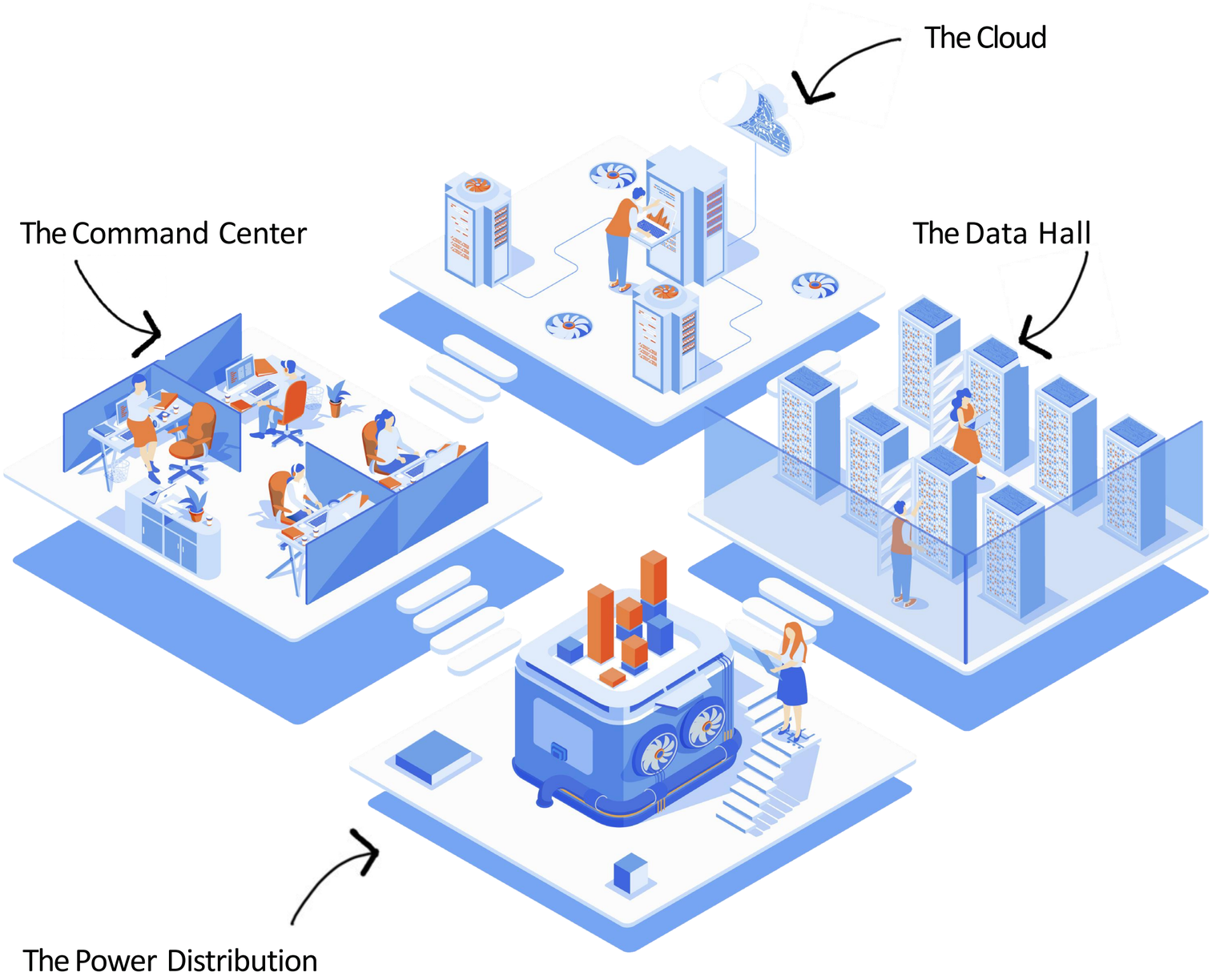
24/7 operations

Efficiencies of scale

Power in - heat out

Redundant systems

Adjacency to fiber networks, skilled labor, power & customers



STRUCTURE

Large-scale facilities

Single-story vs Multi-story

Support high floor loads

Tall but congested floor-to-floor heights

Limit structural impacts to operations of building

Align repeatable grid module with efficient bay layout

MULTI-STORY

VS

SINGLE-STORY

TH

STRUCTURE

Large-scale facilities

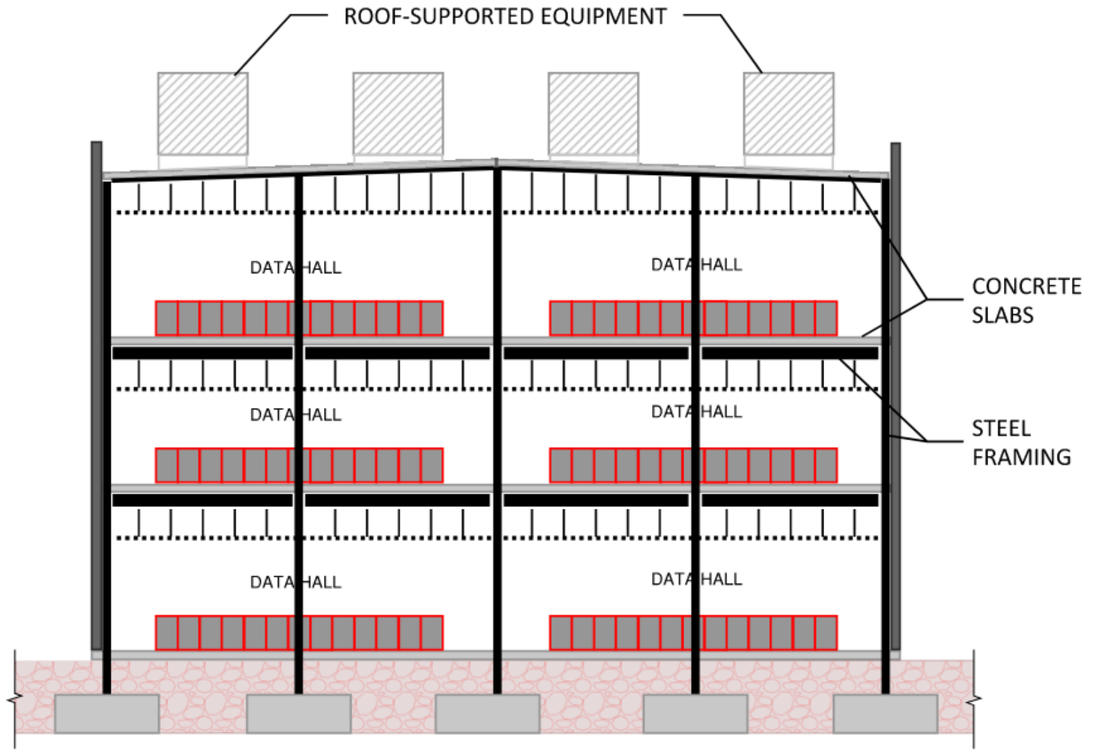
Single-story vs Multi-story

Support high floor loads

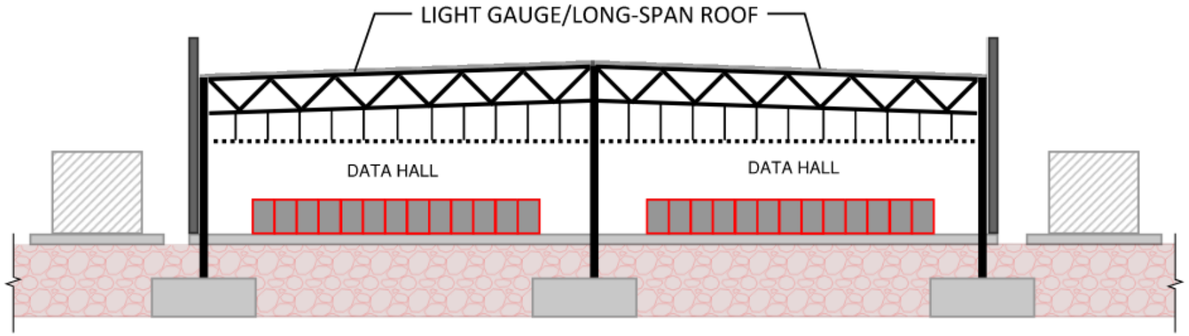
Tall but congested floor-to-floor heights

Limit structural impacts to operations of building

Align repeatable grid module with efficient bay layout



MULTI-STORY DATA CENTER



SINGLE-STORY DATA CENTER

TH

STRUCTURE

Large-scale facilities

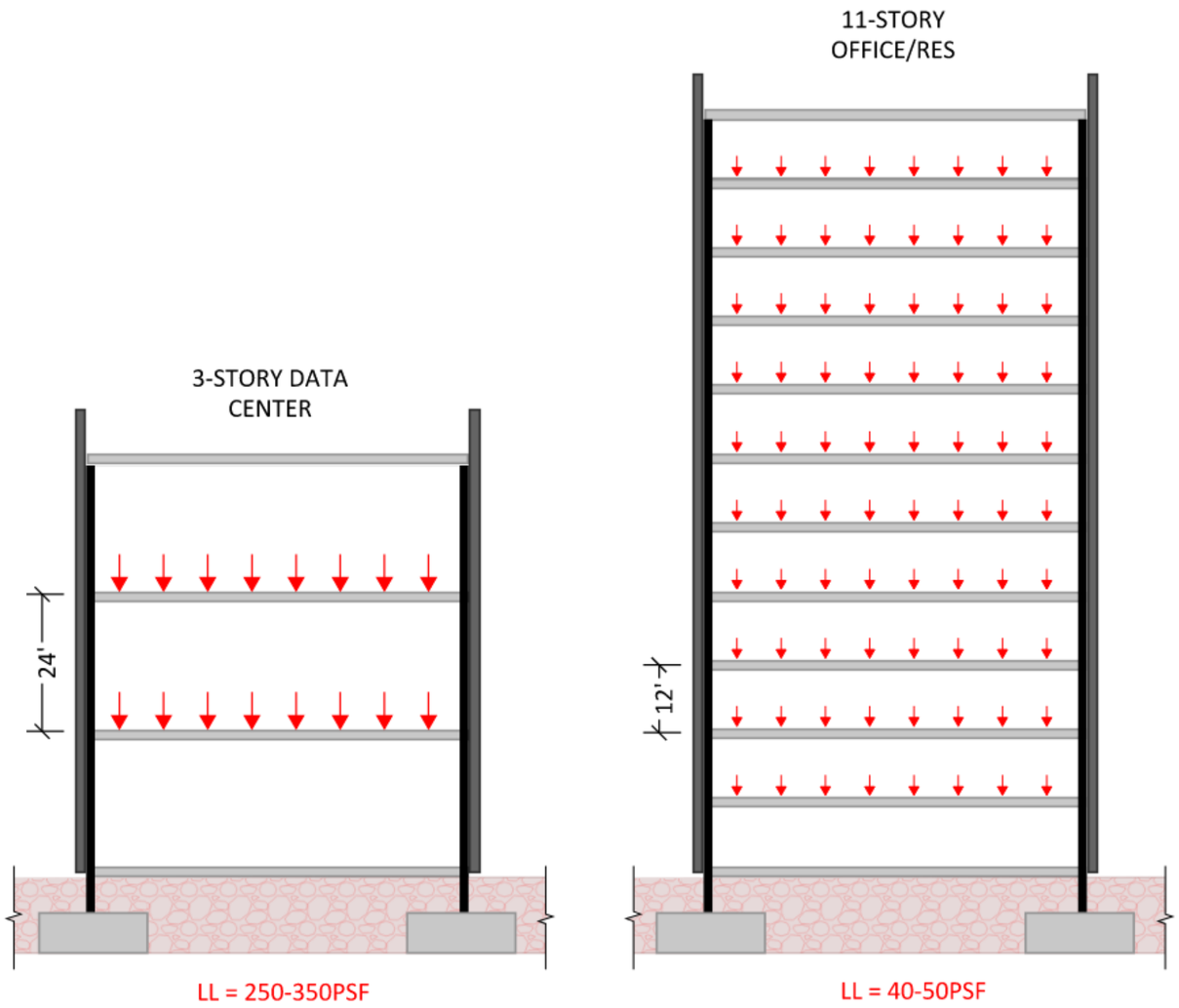
Single-story vs Multi-story

Support high floor loads

Tall but congested floor-to-floor heights

Limit structural impacts to operations of building

Align repeatable grid module with efficient bay layout



Foundation Load Comparison

STRUCTURE

Large-scale facilities

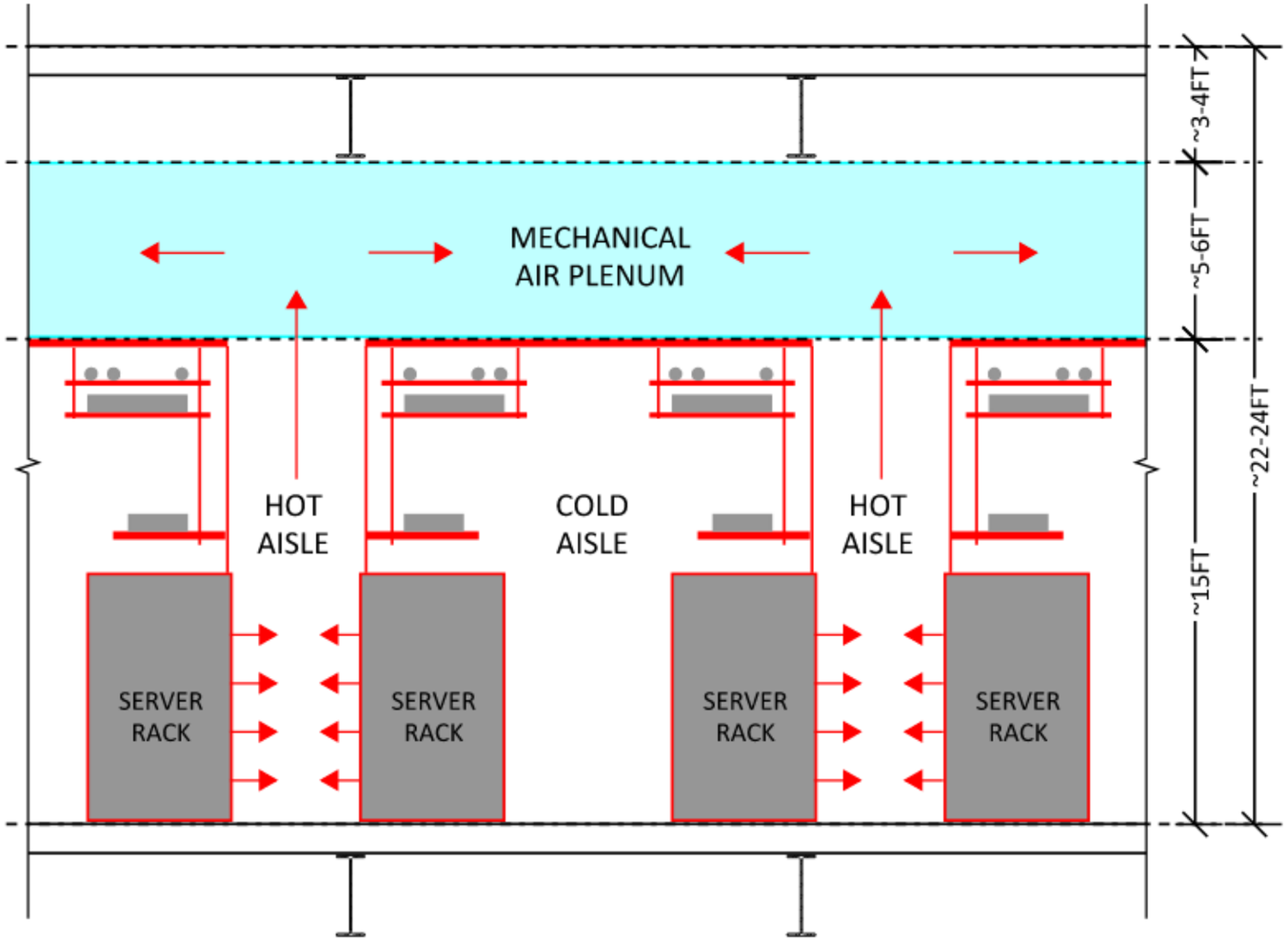
Single-story vs Multi-story

Support high floor loads

Tall but congested floor-to-floor heights

Limit structural impacts to operations of building

Align repeatable grid module with efficient bay layout



Typical Air-Cooled Data Hall Floor Section

STRUCTURE

Large-scale facilities

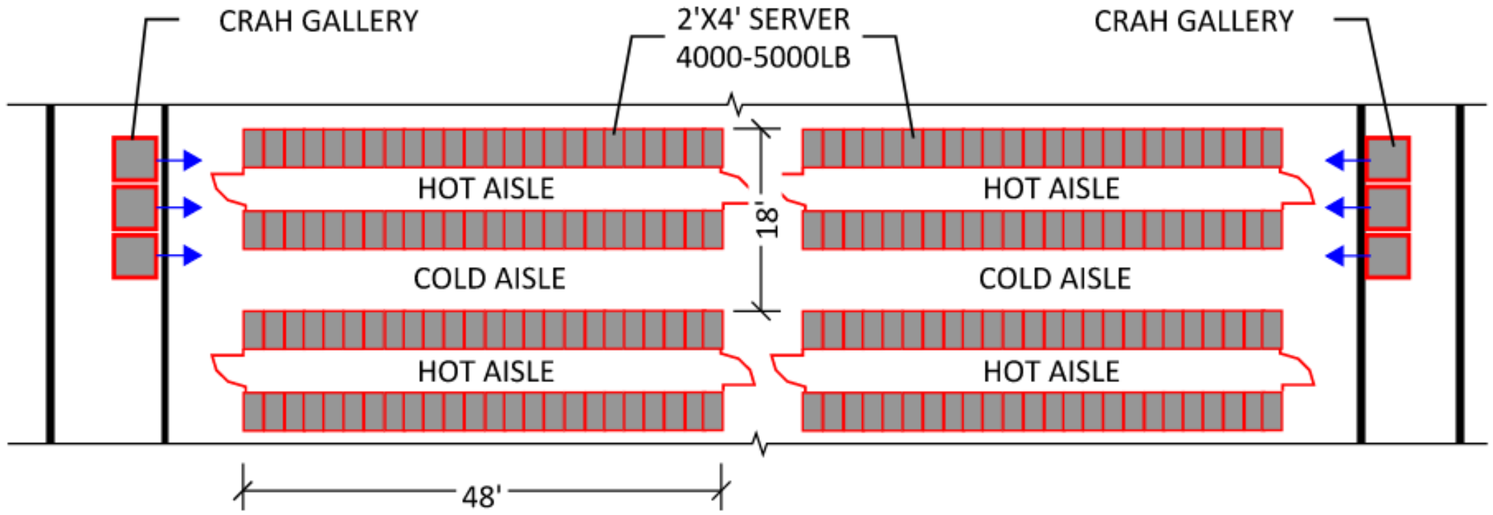
Single-story vs Multi-story

Support high floor loads

Tall but congested floor-to-floor heights

Limit structural impacts to operations of building

Align repeatable grid module with efficient bay layout



Typical Data Hall Rack Module

STRUCTURE

Large-scale facilities

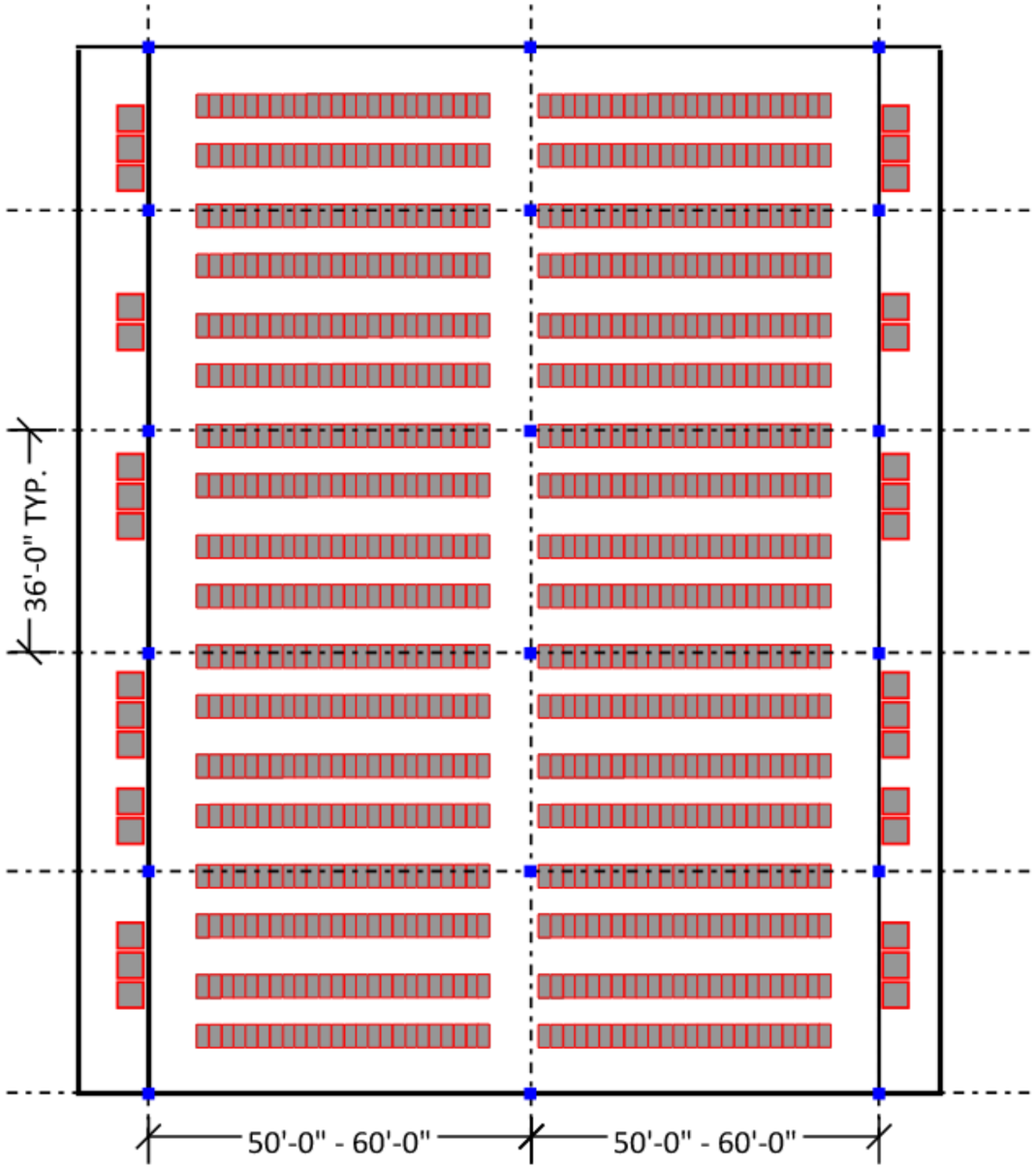
Single-story vs Multi-story

Support high floor loads

Tall but congested floor-to-floor heights

Limit structural impacts to operations of building

Align repeatable grid module with efficient bay layout



Typical Data Hall Grid Module - Long Span

STRUCTURE

Large-scale facilities

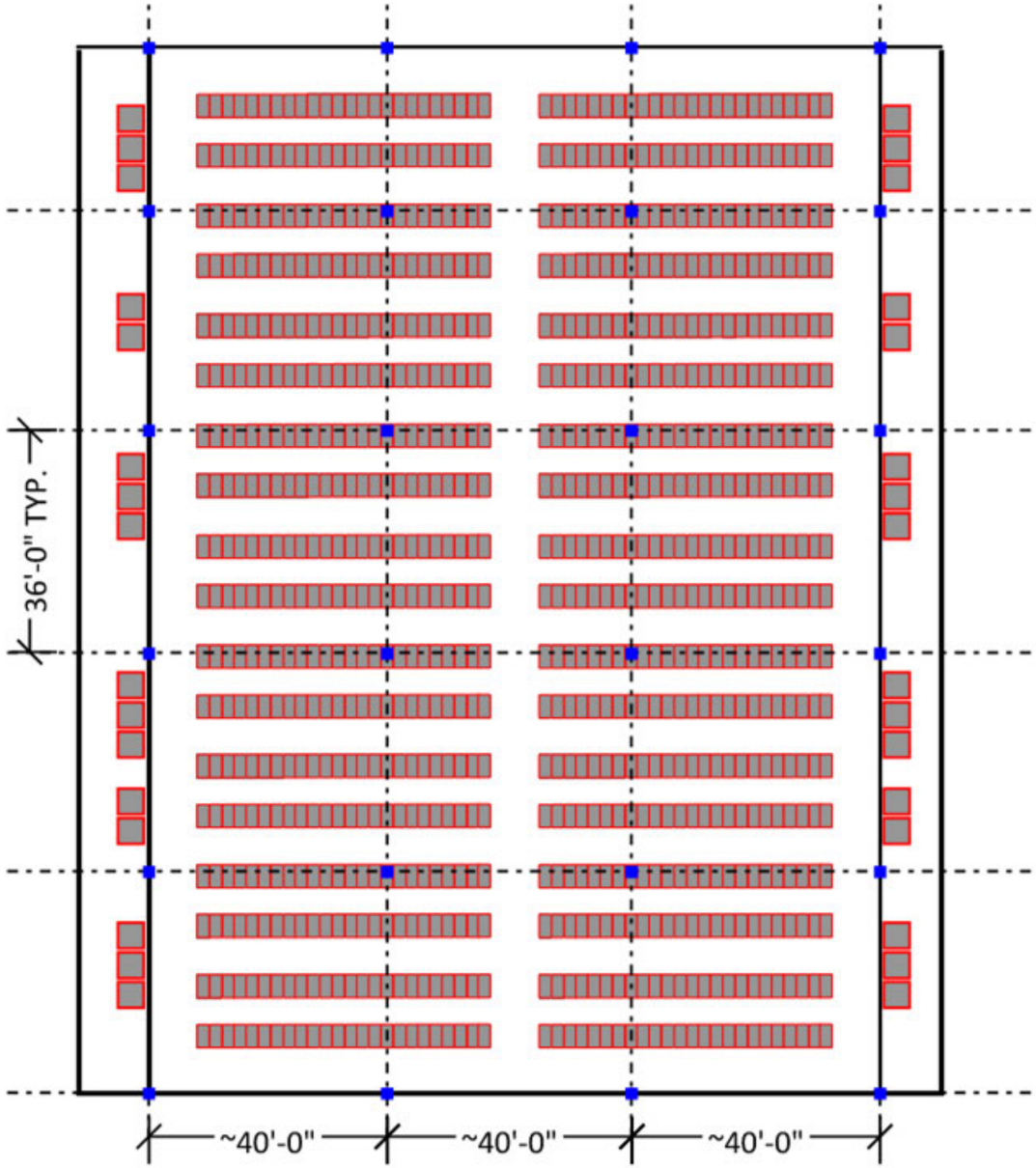
Single-story vs Multi-story

Support high floor loads

Tall but congested floor-to-floor heights

Limit structural impacts to operations of building

Align repeatable grid module with efficient bay layout



Typical Data Hall Grid Module - Short Span

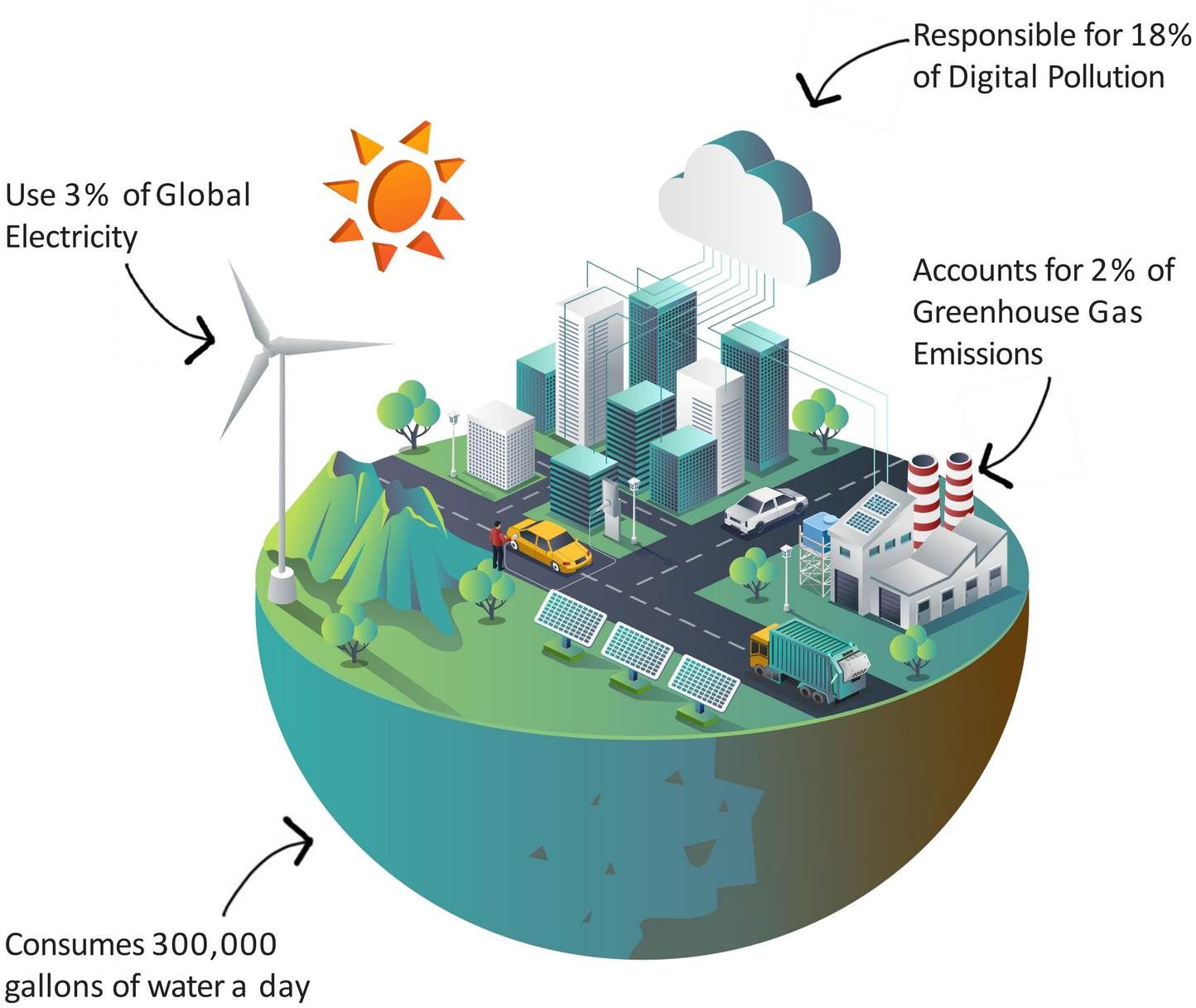
IMPACT

High energy demand and associated carbon emissions

Dense server layouts with limited lifespan

Carbon footprint of structural materials

Potential high water use



EB

2. WHY MASS TIMBER?

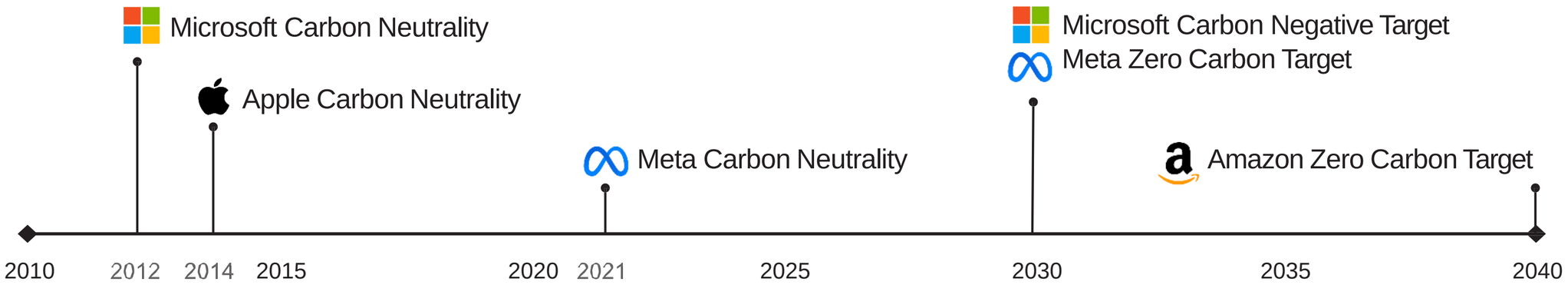
CHANGING NARRATIVE:
being a ‘positive force of change’

Data Centers are supported by over 2 GW of renewable energy projects

Partnering with local renewable utilities, including wind and solar farms

Data centers are supported by 100% renewable energy through a strategy of adding renewables to the local grids

In 2023 achieved goal to match 100% of the electricity they use, including data centers, with renewable energy



EB

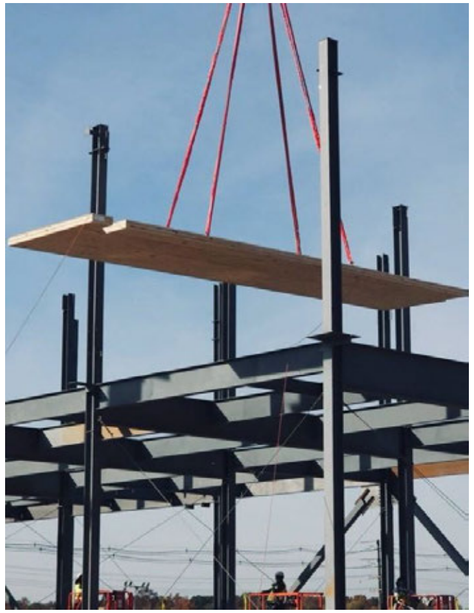
INNOVATION: being a ‘leader of new research’

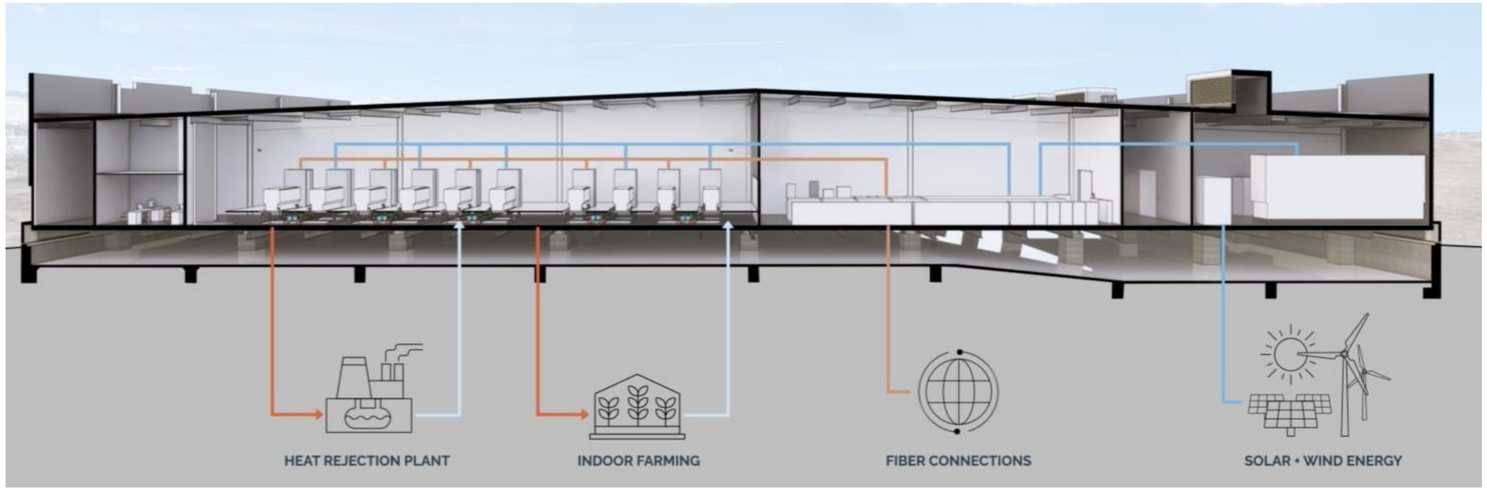
Traditionally risk averse, this industry has seen a paradigm shift toward innovation and responsible construction practices:

Modularity

Waste Heat Reuse

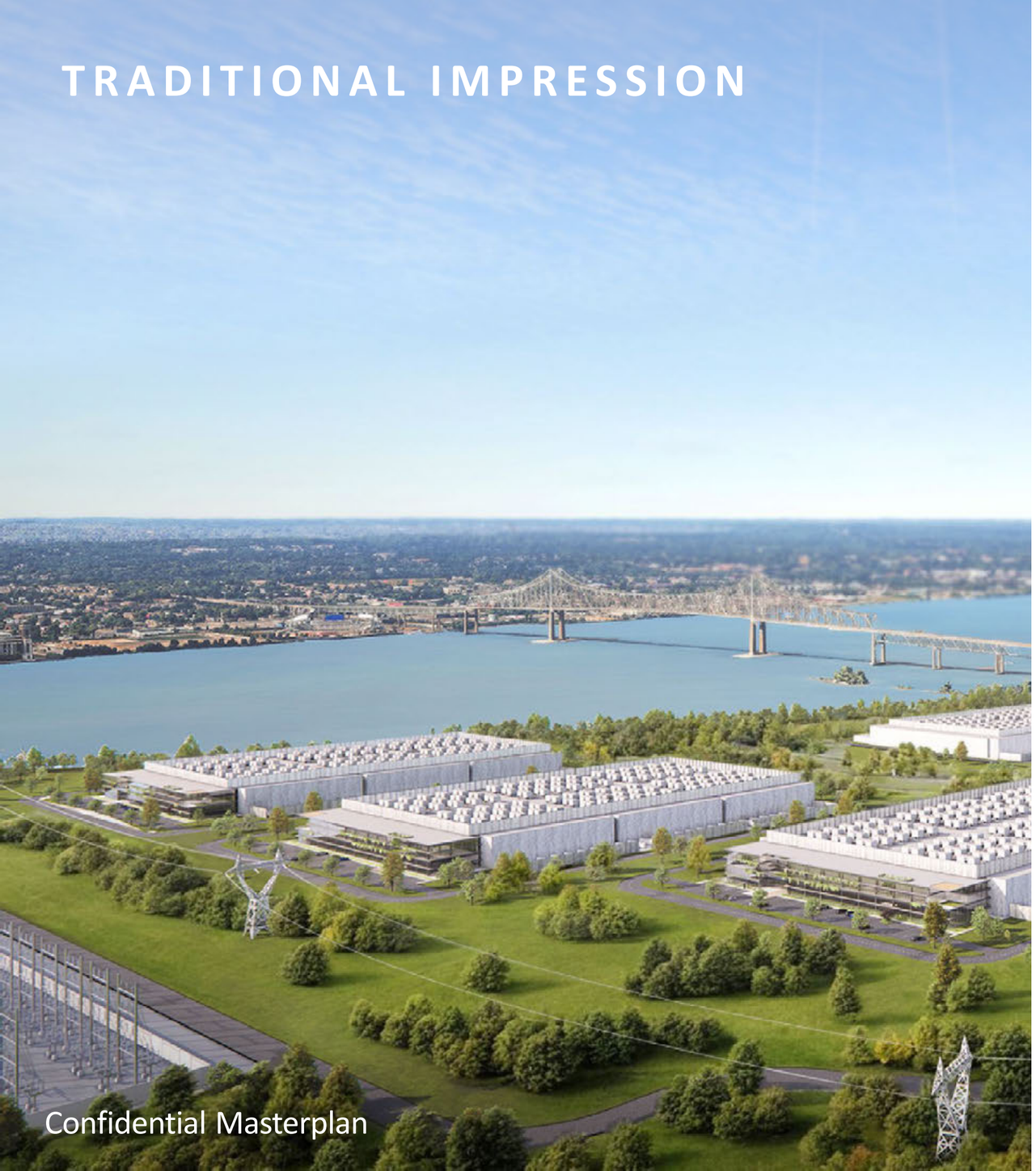
Embodied Carbon Reduction





EB

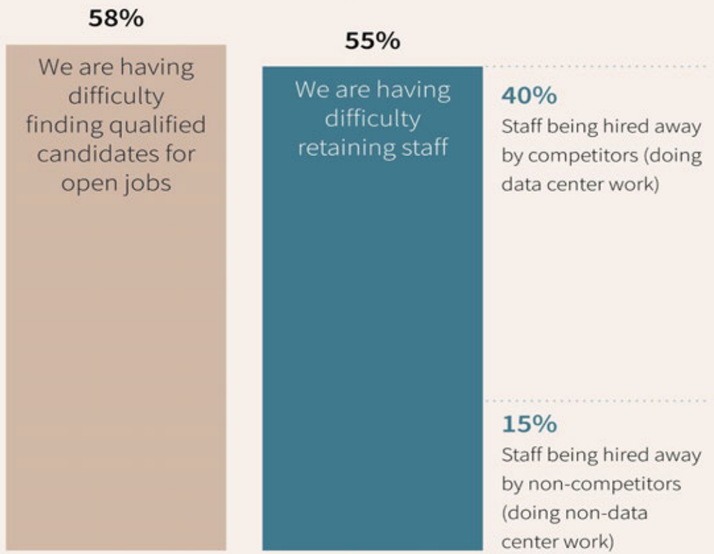
TRADITIONAL IMPRESSION



CHANGING NARRATIVE:
being a ‘good employer’

The Lighthouse
Amenity Center

What talent attraction and retention challenges are you facing? Choose all that apply.



Source: Uptime Institute Staffing Survey

EB

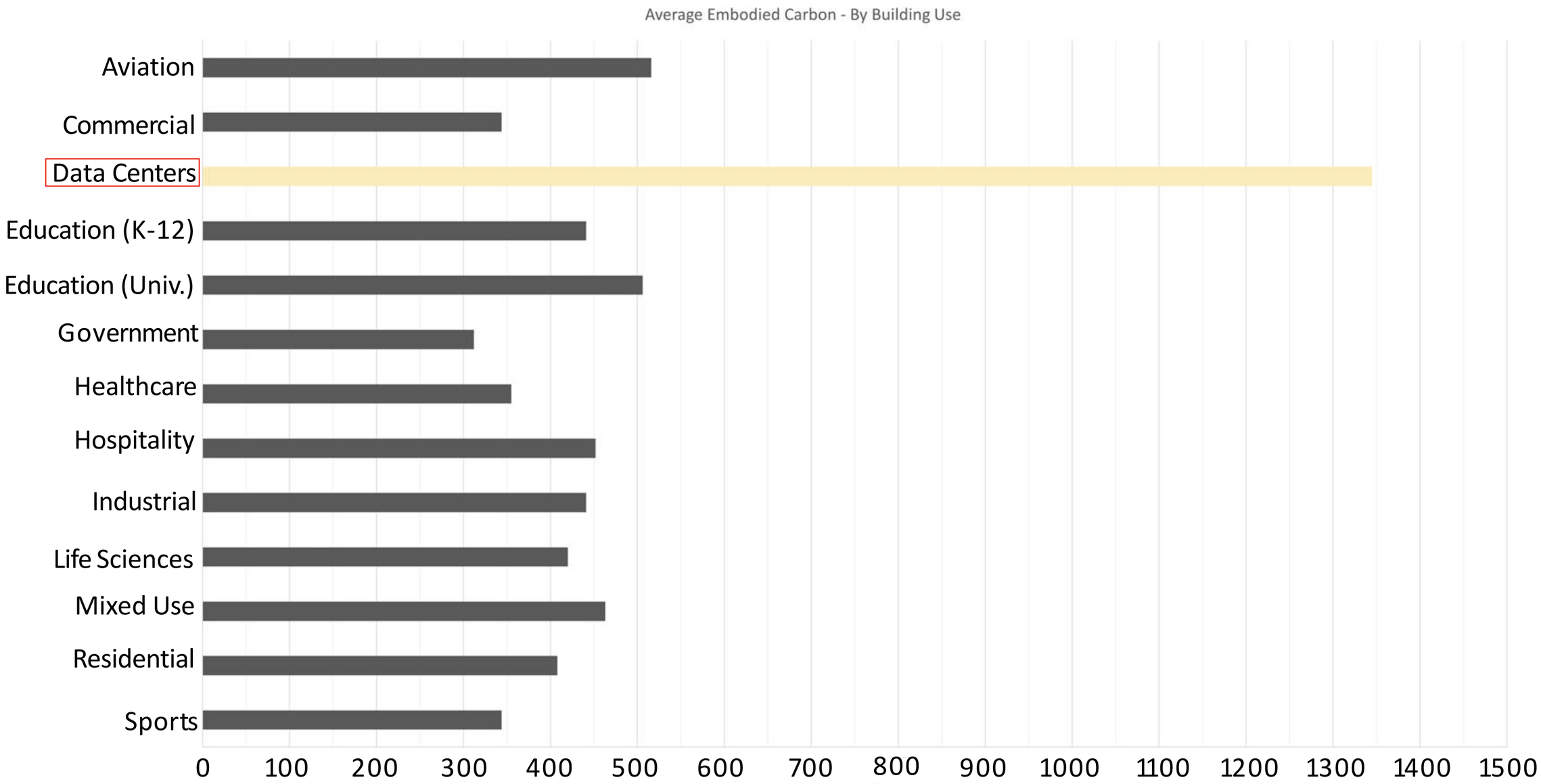
CHANGING NARRATIVE:
being a ‘good employer’

Comarch Data Center

First United Bank

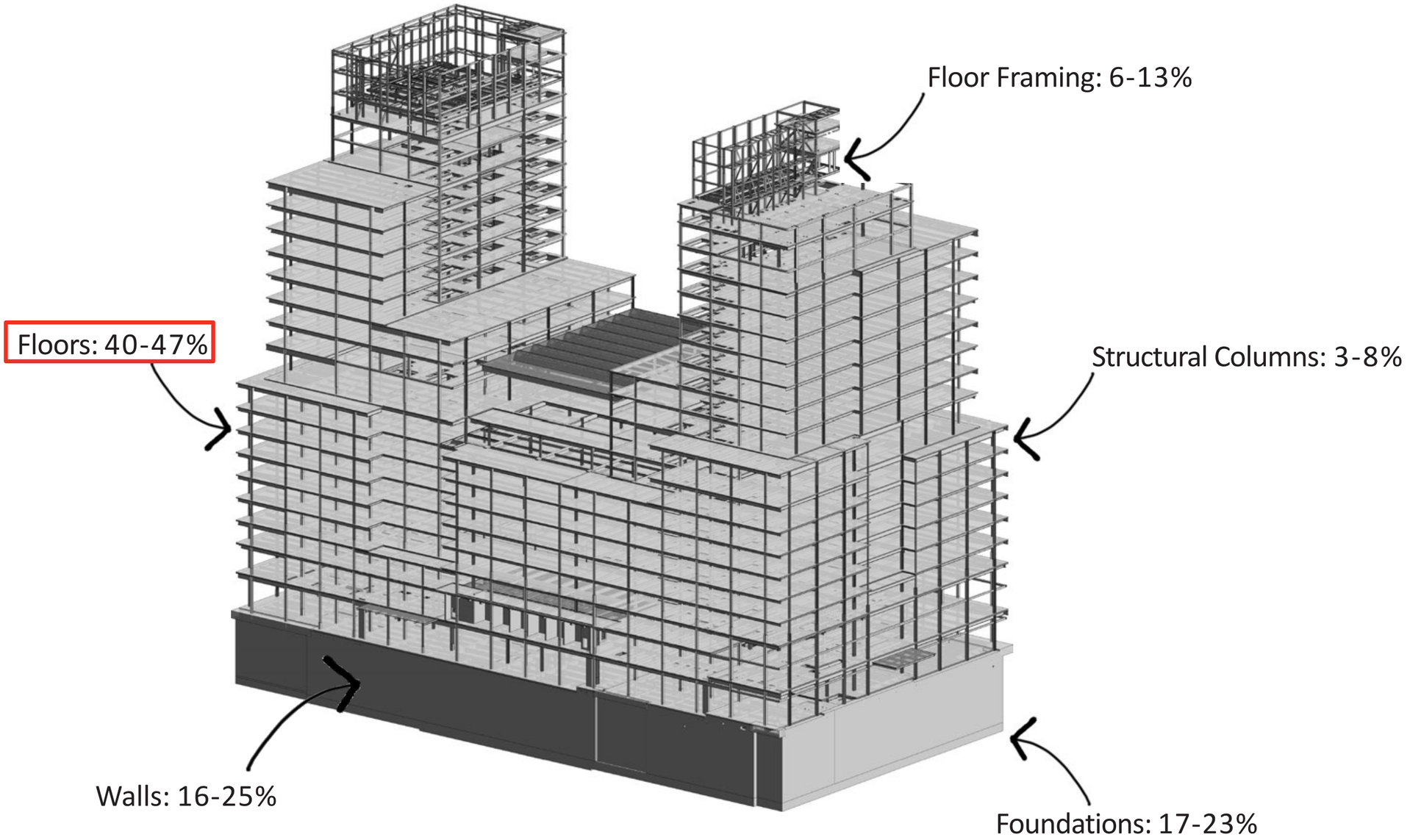
EB

EMBODIED CARBON BY BUILDING USE – CO_2e/m^2



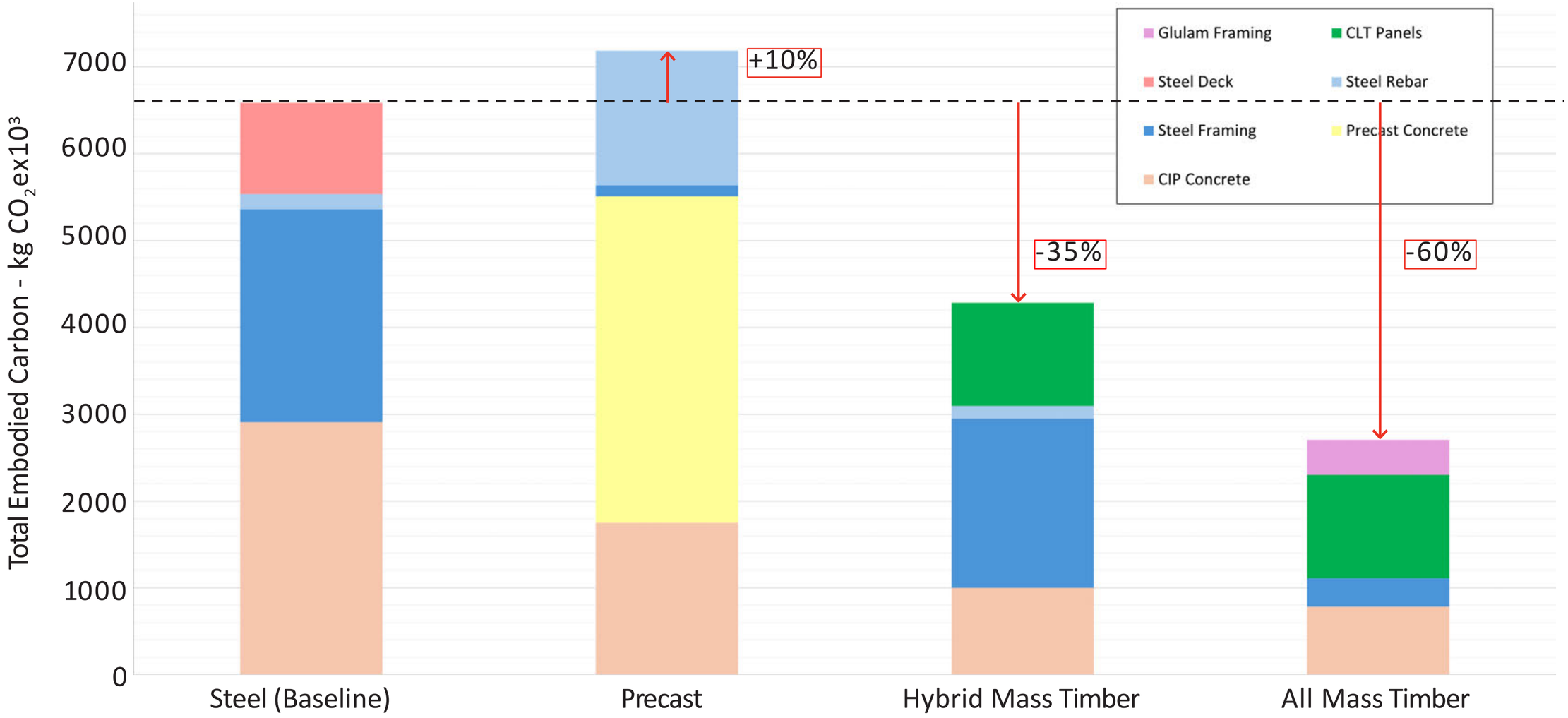
TH

EMBODIED CARBON BY STRUCTURAL ELEMENT



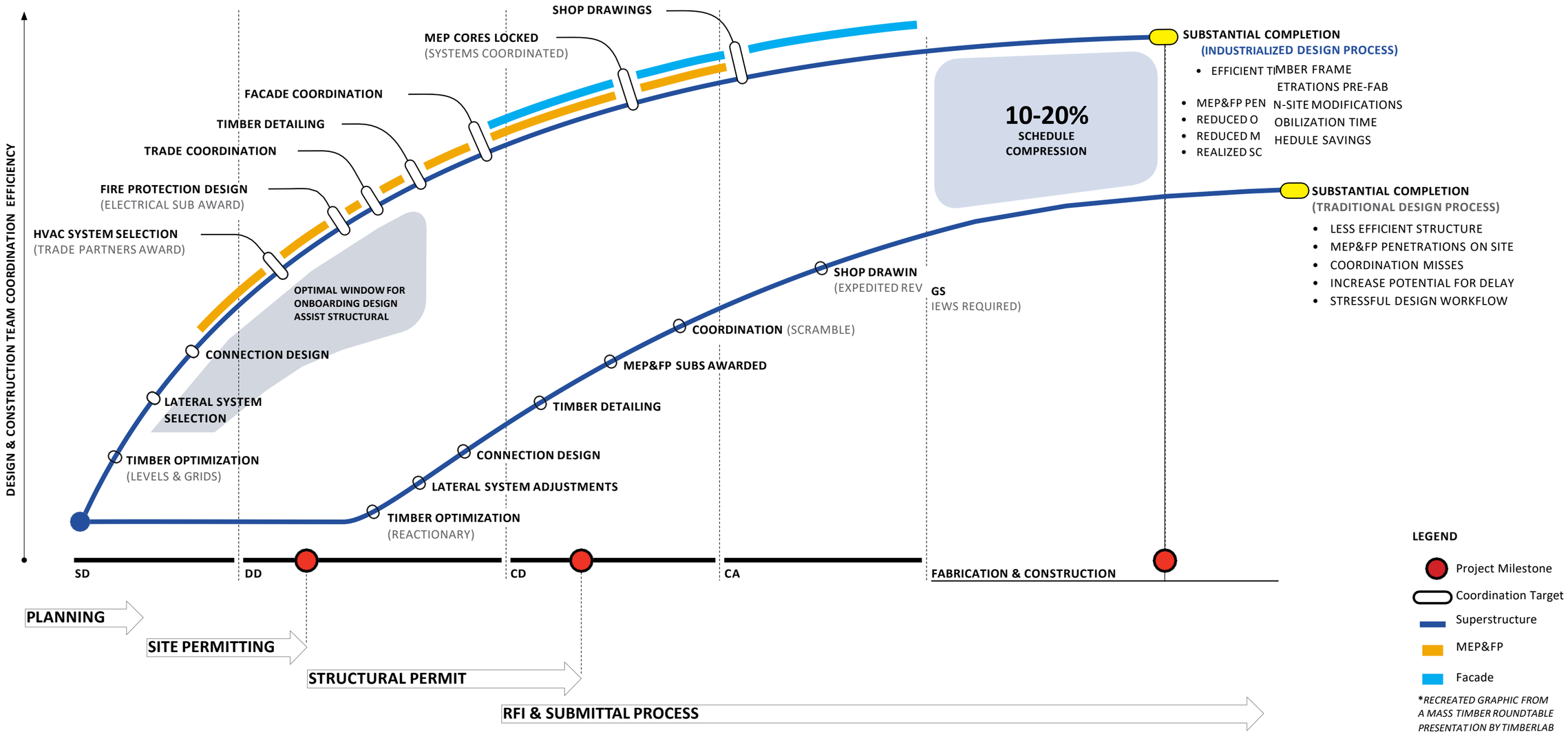
TH

EMBODIED CARBON BY MATERIAL – MULTI-STORY



TH

PROJECT APPROACH



EB

3. IMPLEMENTATION

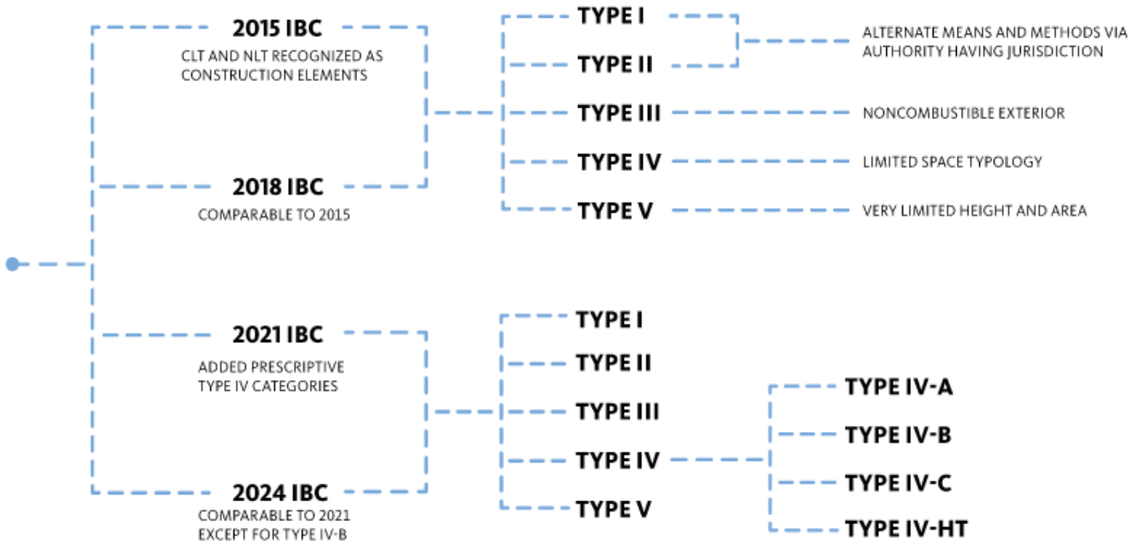
MASS TIMBER DATA CENTERS

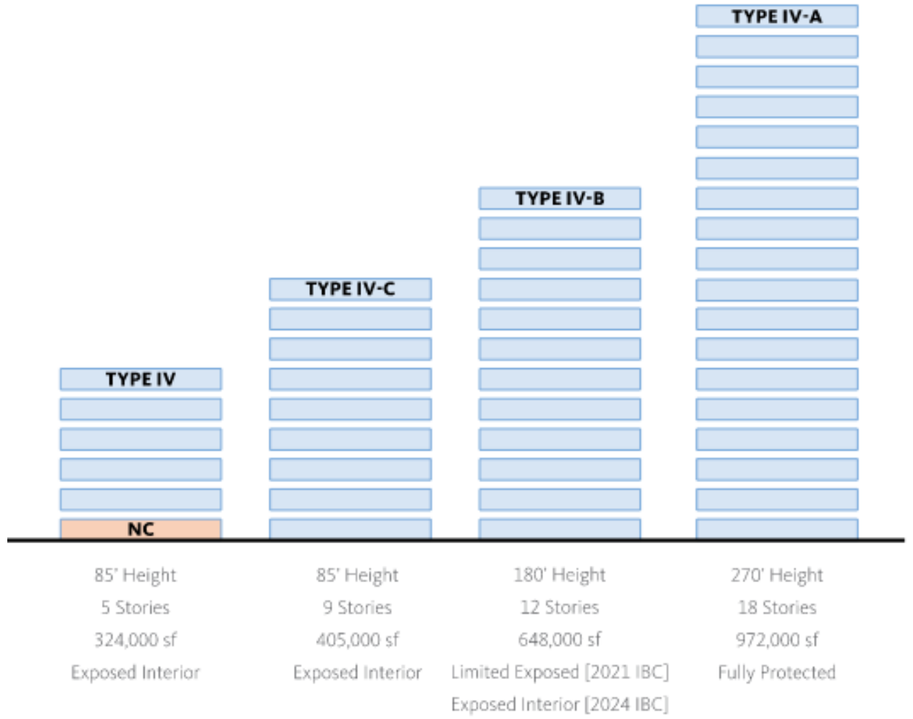
Code Analysis

Type III is most ideal for hybrid multi-story data centers; however, it limits combustible exterior walls

Type IV in data center design creates difficulty due to **concealed air plenums**

Type IV or V is more ideal for full mass timber and/or single-story data centers





EB

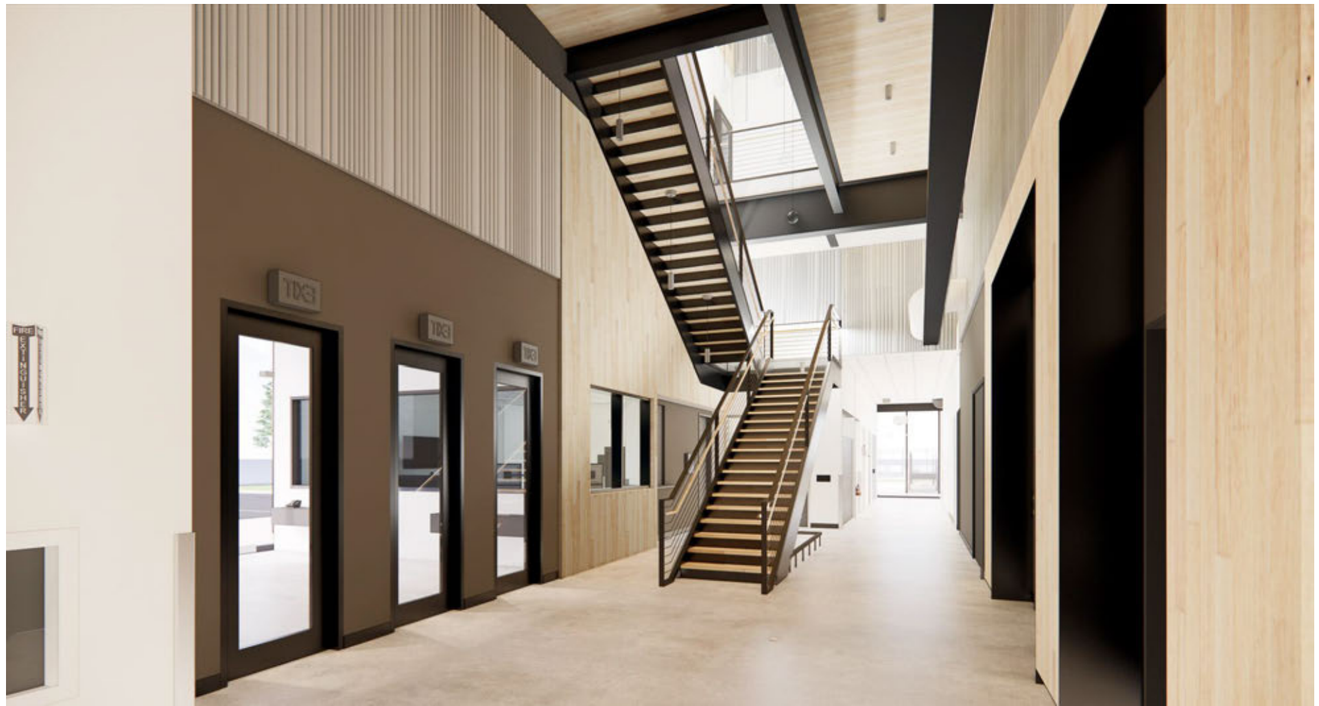
MASS TIMBER DATA CENTERS

Code Analysis

New requirements for datacenters in the 2024 IBC will **require type F1 or F2 occupancy in lieu of B or S occupancy** per AHJ interpretation

Recommendation for 60’ perimeter public way around entire facility to maximize for unlimited area per 507

Per 602.4.2, in **Type IV permits exterior walls with CLT** (min 4” thick) with a protected exterior surface

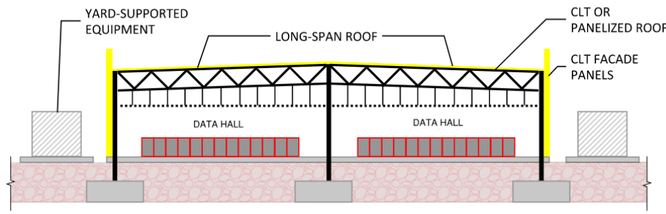


EB

DESIGN SCENARIOS

SCENARIO 01

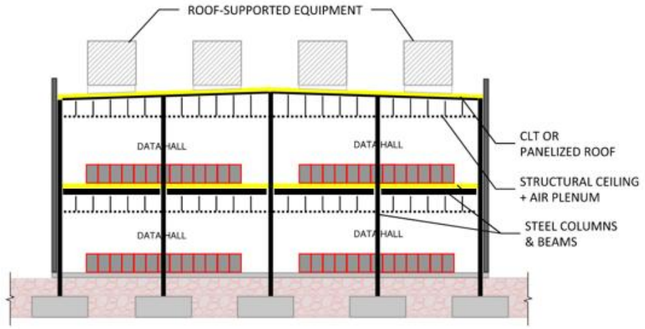
- SINGLE STORY
- TYPE V-B CONSTRUCTION
- AIR PLENUM SPACE
- CLT WALLS & TIMBER ROOF
- TIMBER CLADDING



SINGLE-STORY - TYPE V-B

SCENARIO 02

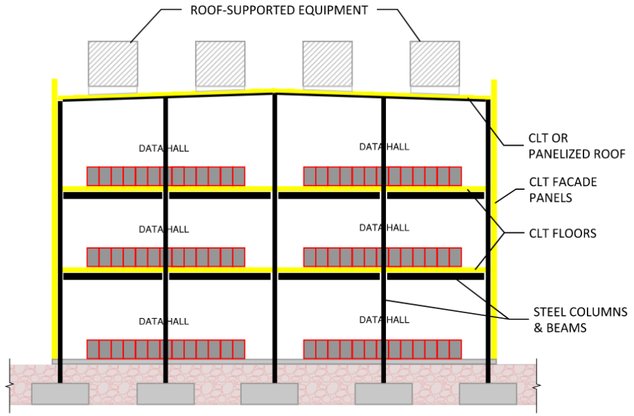
- TWO STORIES
- TYPE III-B CONSTRUCTION
- AIR PLENUM SPACE
- CLT FLOORS & TIMBER ROOF
- NONCOMBUSTIBLE ENVELOPE



MULTI-STORY - TYPE III-B

SCENARIO 03

- THREE STORIES
- TYPE IV-C CONSTRUCTION
- NO CEILING AIR PLENUM CAVITY
- CLT WALLS, FLOORS, AND ROOF
- NONCOMBUSTIBLE CLADDING



MULTI-STORY - TYPE IV-C

SCENARIO 01

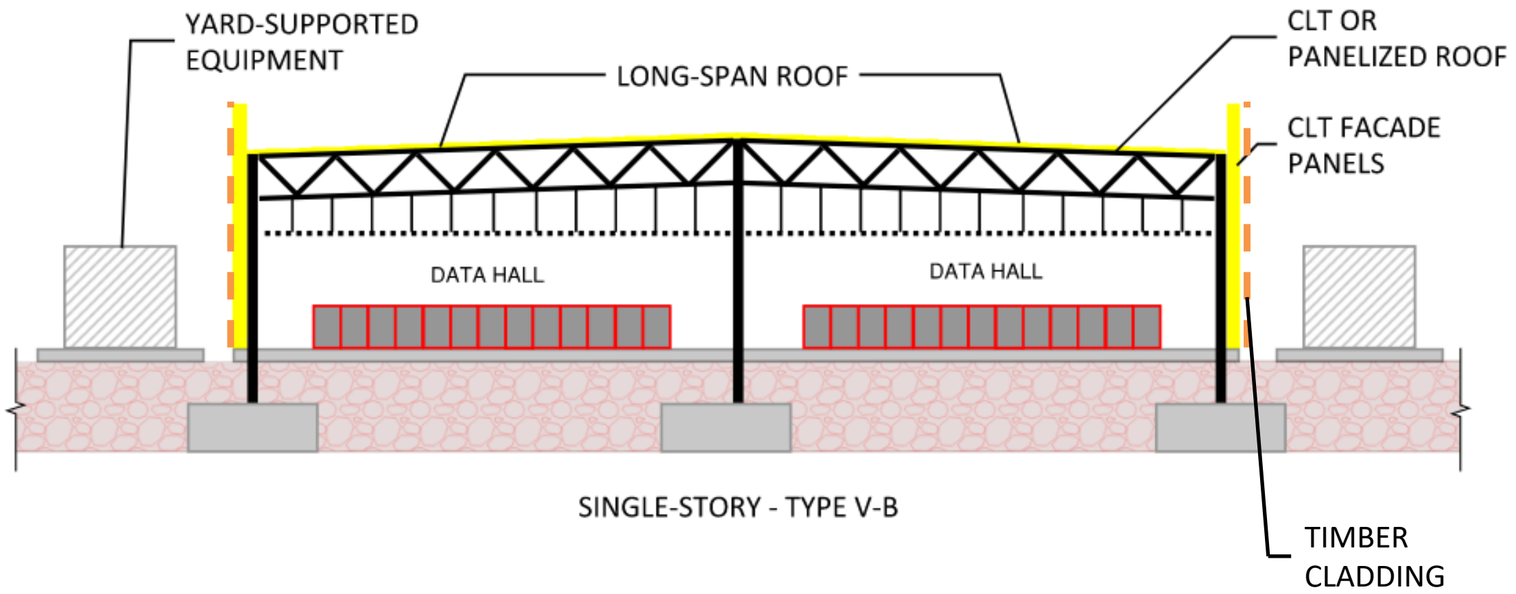
Single-Story, Type VB

CLT roof maximizes span & hung load capacity in exchange for added weight

Panelized roof offers largest embodied carbon savings

Vertically spanning CLT panels at façade (3-5 ply)

Timber cladding system



TH

SCENARIO 01

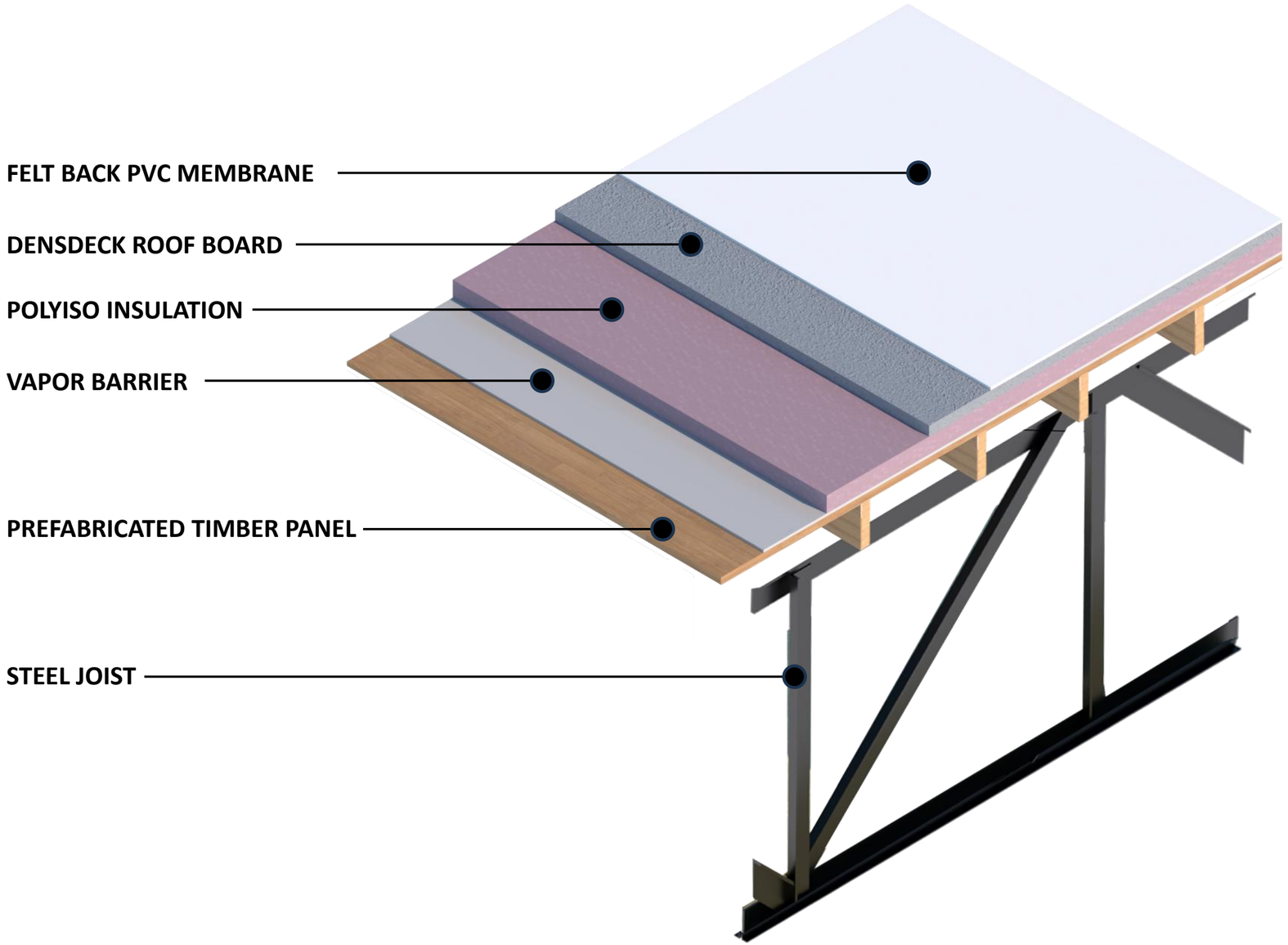
Roof Assembly

Design and Assembly

The assembly consists of a prefabricated panels of plywood and dimensional lumber, vapor barriers, 5" Polyiso insulation, 80 mil felt back PVC membrane and 5/8" DensDeck roof board.

Building Code and Performance Standards

Construction **Type V-A** requires a 1-hour fire resistance rating for the primary structural frame, floor, and roof construction. Construction **Type V-B** does not require a fire-resistance rating, unless required by other specific code requirements, such as those for occupancy or use separations.



EB

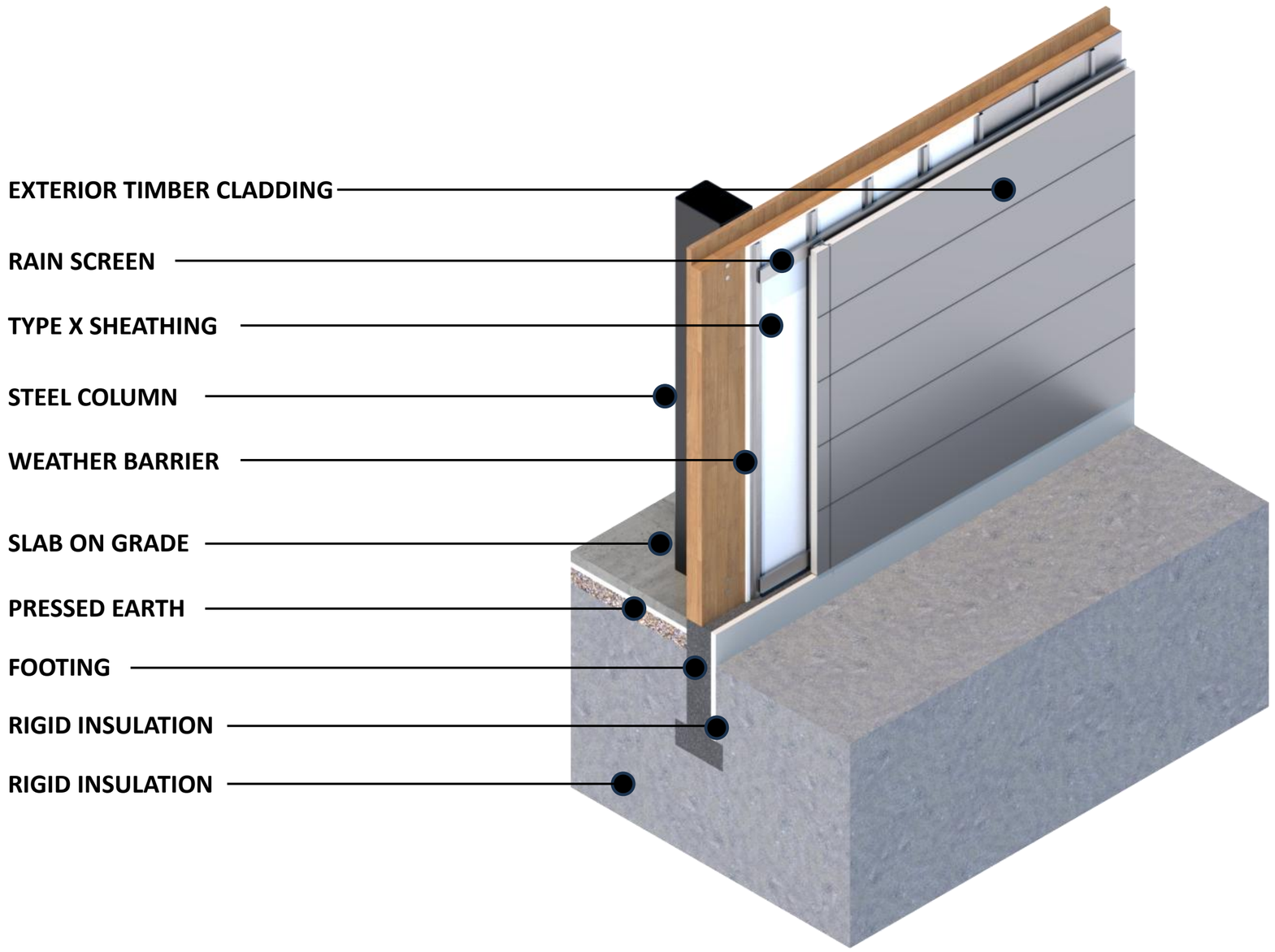
SCENARIO 01
Wall Assembly

Design and Assembly

The assembly consists of 10' high x 30’ wide 3 or 5 ply CLT panels with Type X gypsum sheathing attached directly to the CLT panels. Timber cladding or other exterior wall cover will be attached through furring strips.

Building Code and Performance Standards

Type V-B, as defined in the 2024 International Building Code (IBC), is a classification under the broader category of Type V construction where the building elements are allowed to be mass timber or non-combustible. Generally, CLT and Glulam elements are considered combustible and may require additional protection.



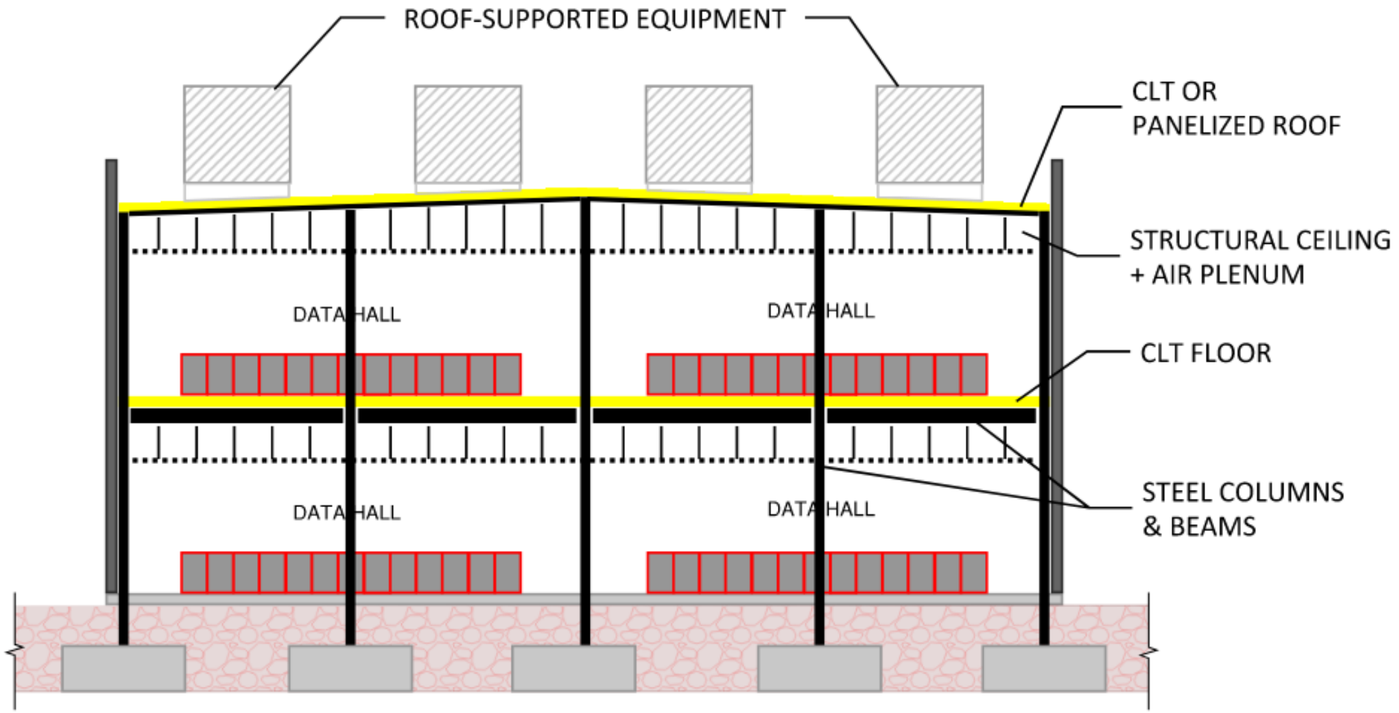
SCENARIO 02

Two-Story Type IIIB

Hybrid Steel + CLT:

Maximize framing spans to preserve flexibility and functionality of data halls

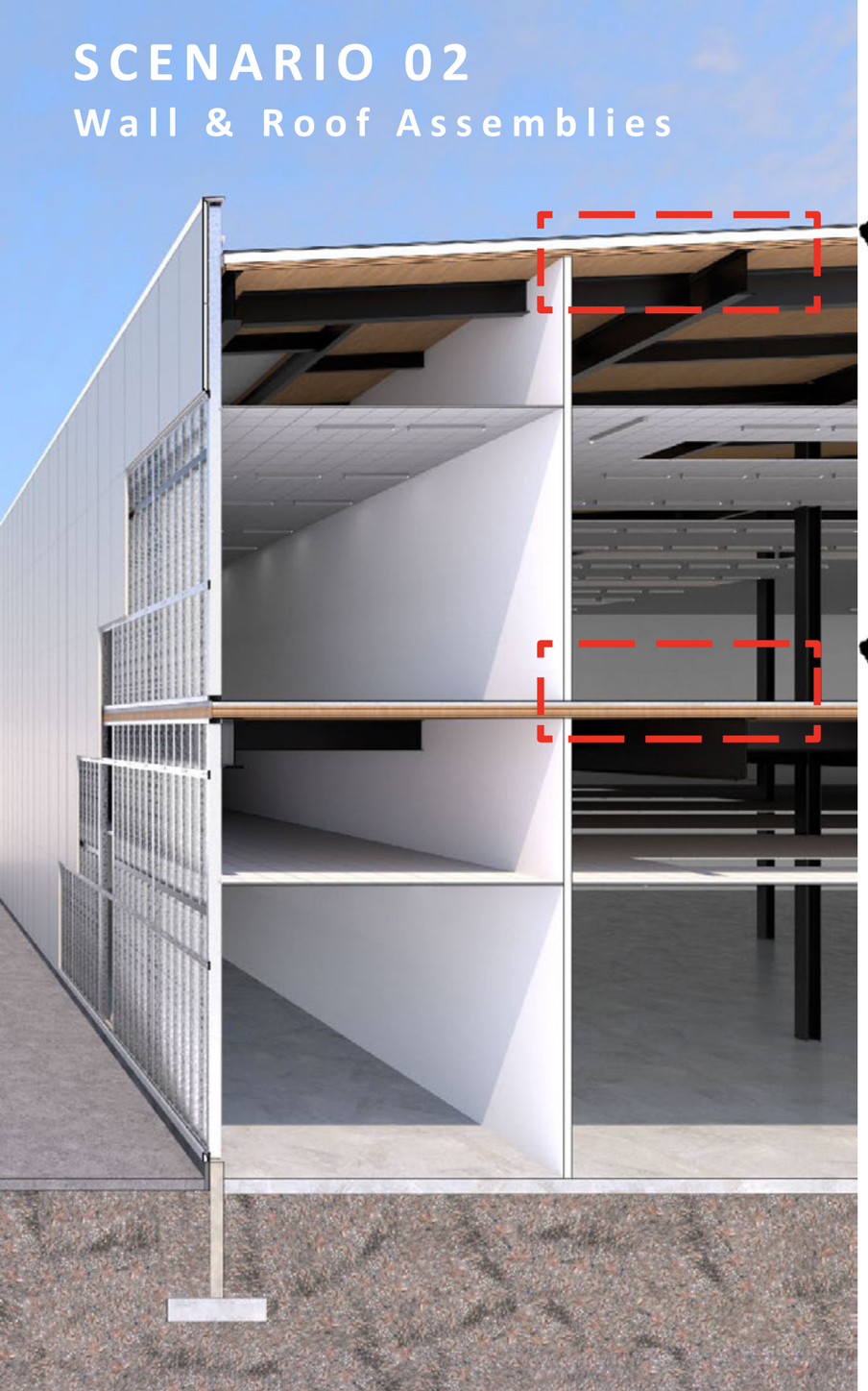
Drastically reduce the embodied carbon content of concrete contained within floor assembly

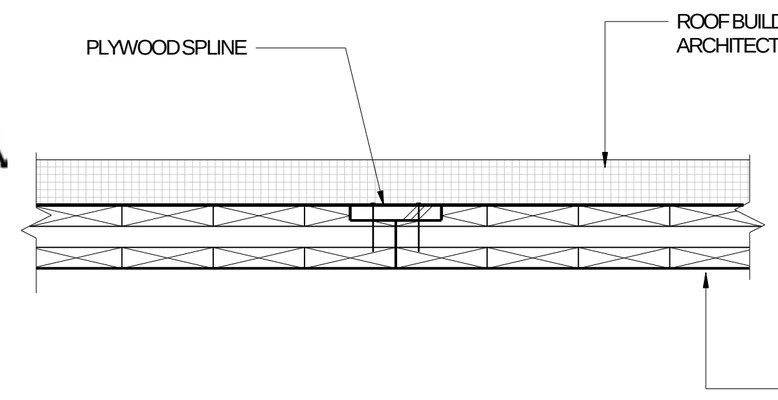


MULTI-STORY - TYPE III-B

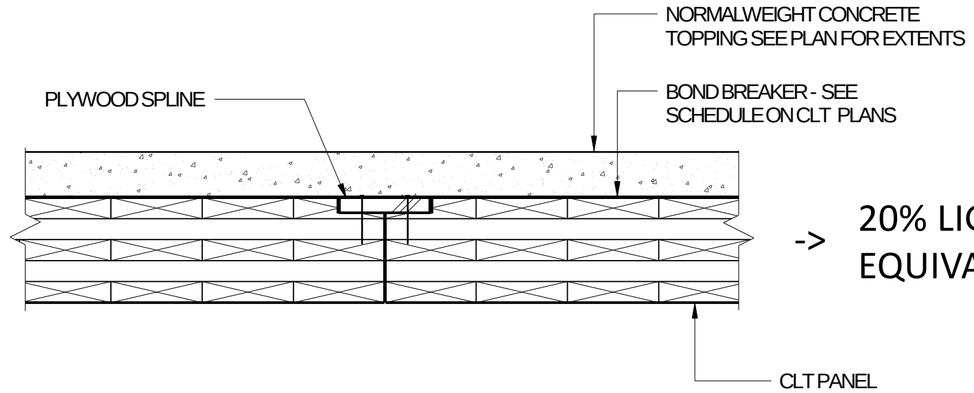
SCENARIO 02

Wall & Roof Assemblies





-> 70% LIGHTER THAN EQUIVALENT SOMD

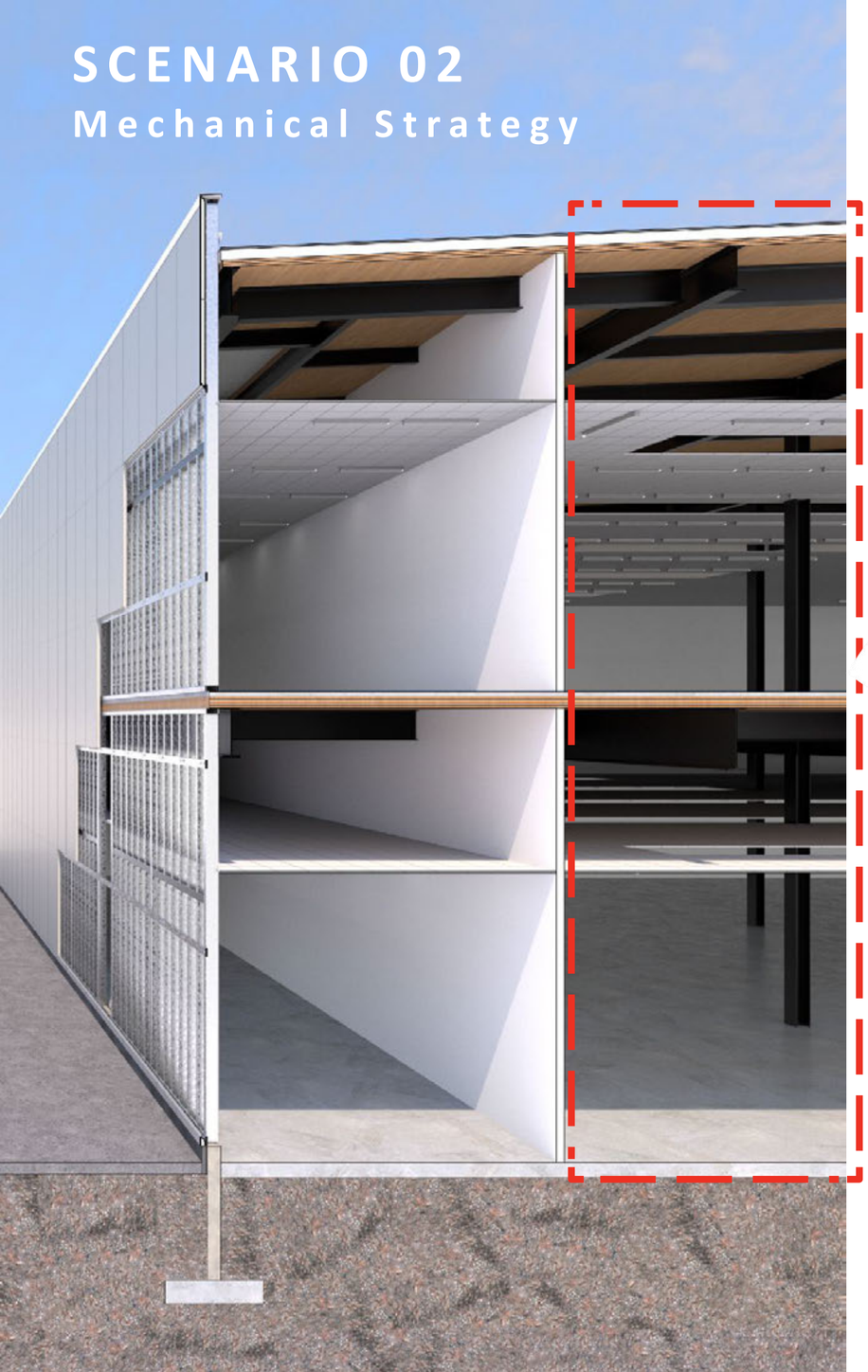


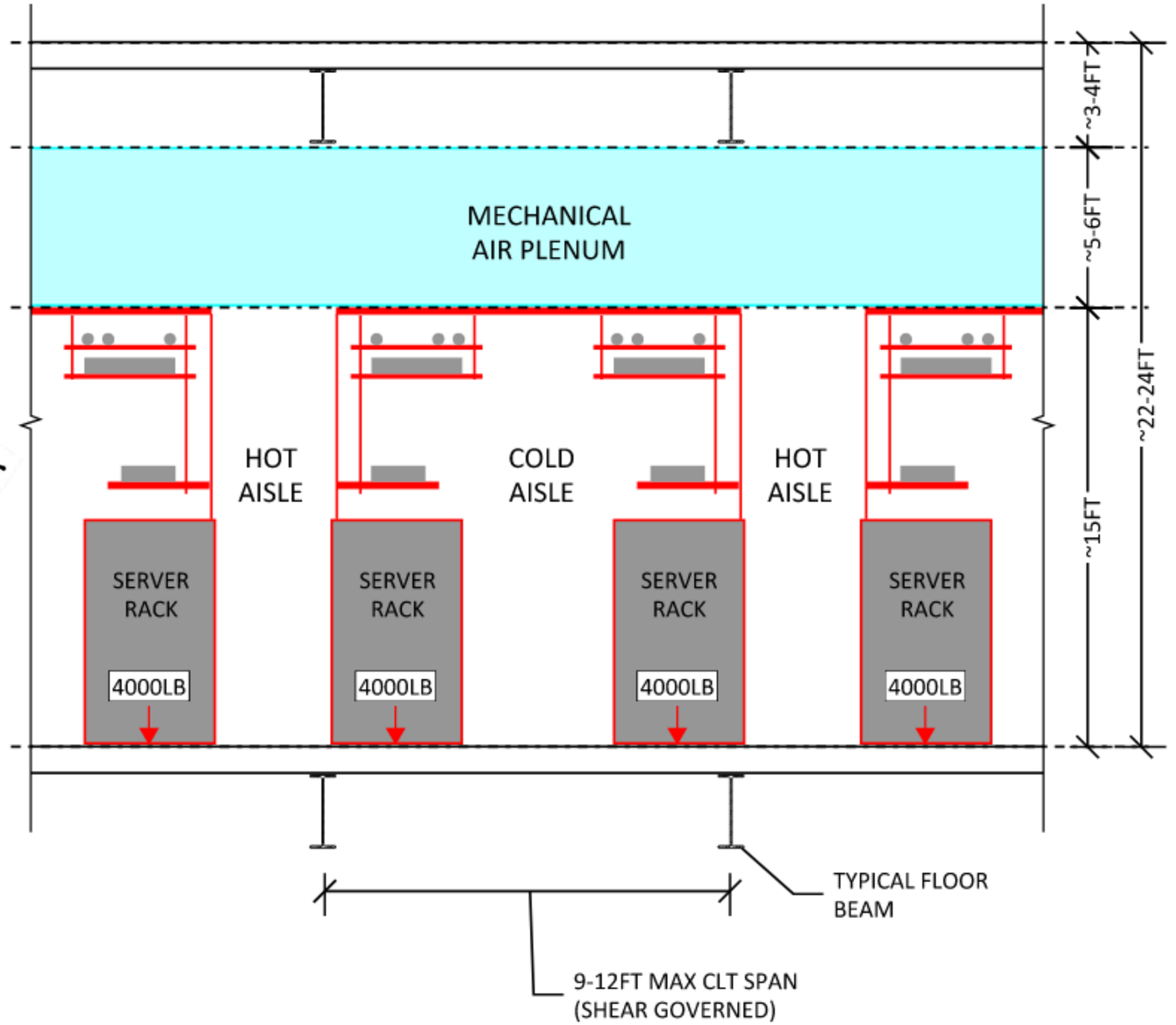
-> 20% LIGHTER THAN EQUIVALENT SOMD

TH

SCENARIO 02

Mechanical Strategy

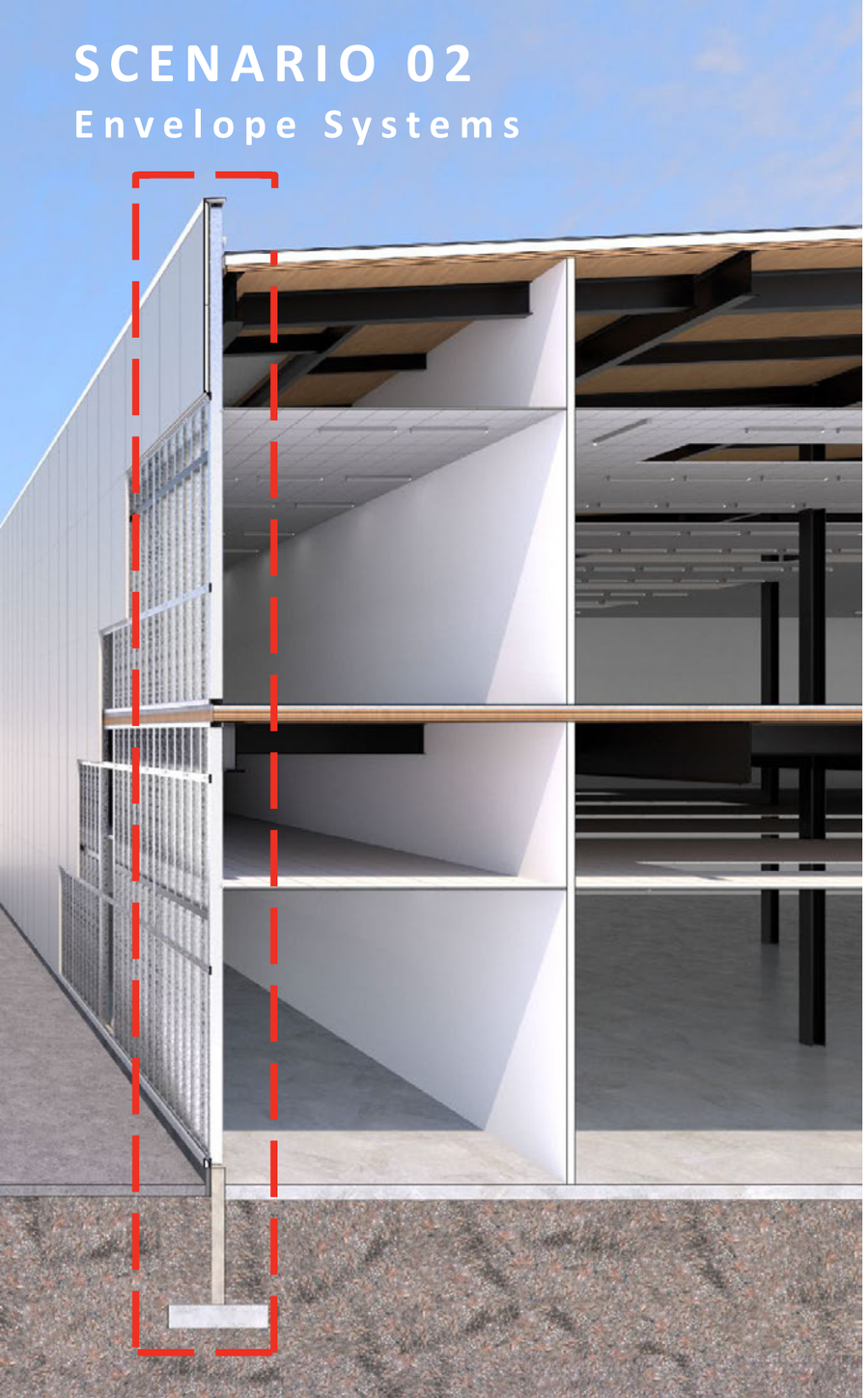


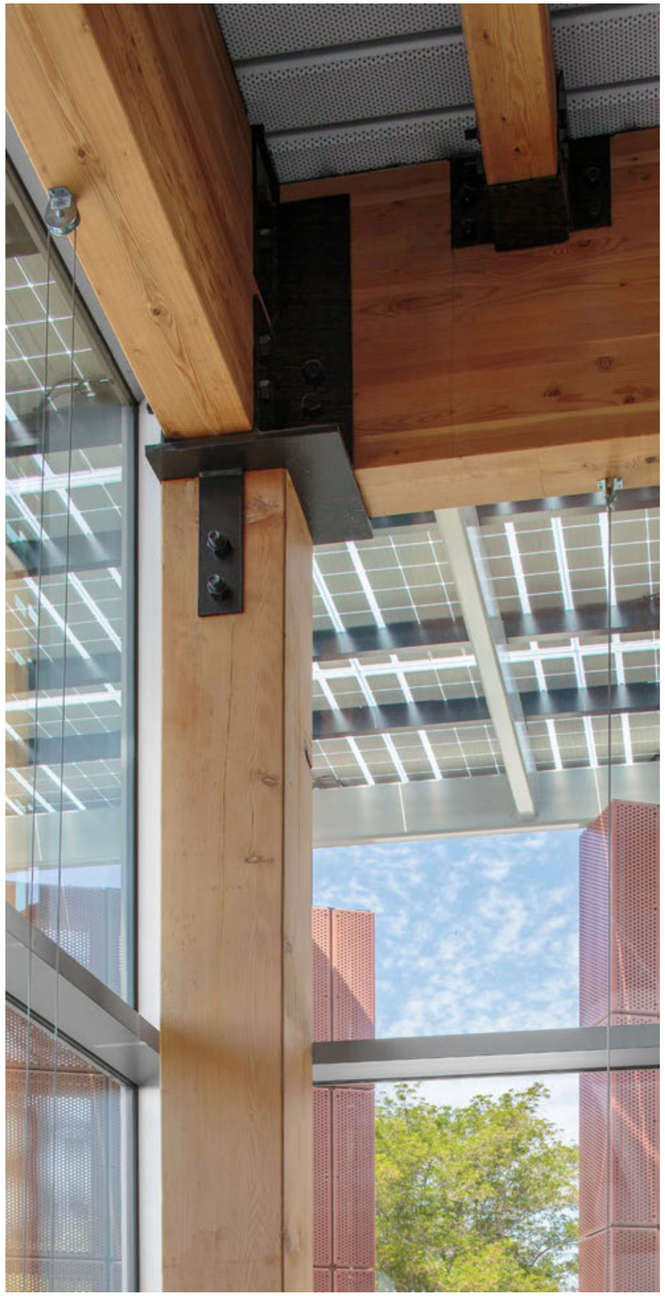


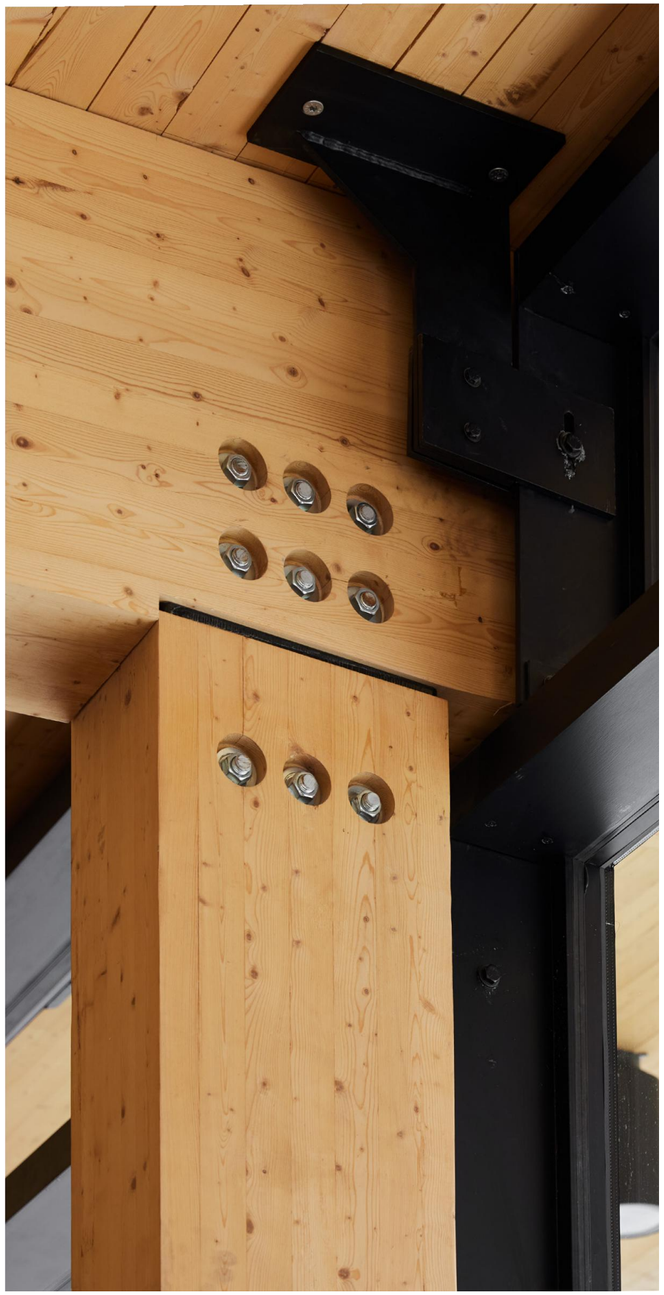
TH

SCENARIO 02

Envelope Systems







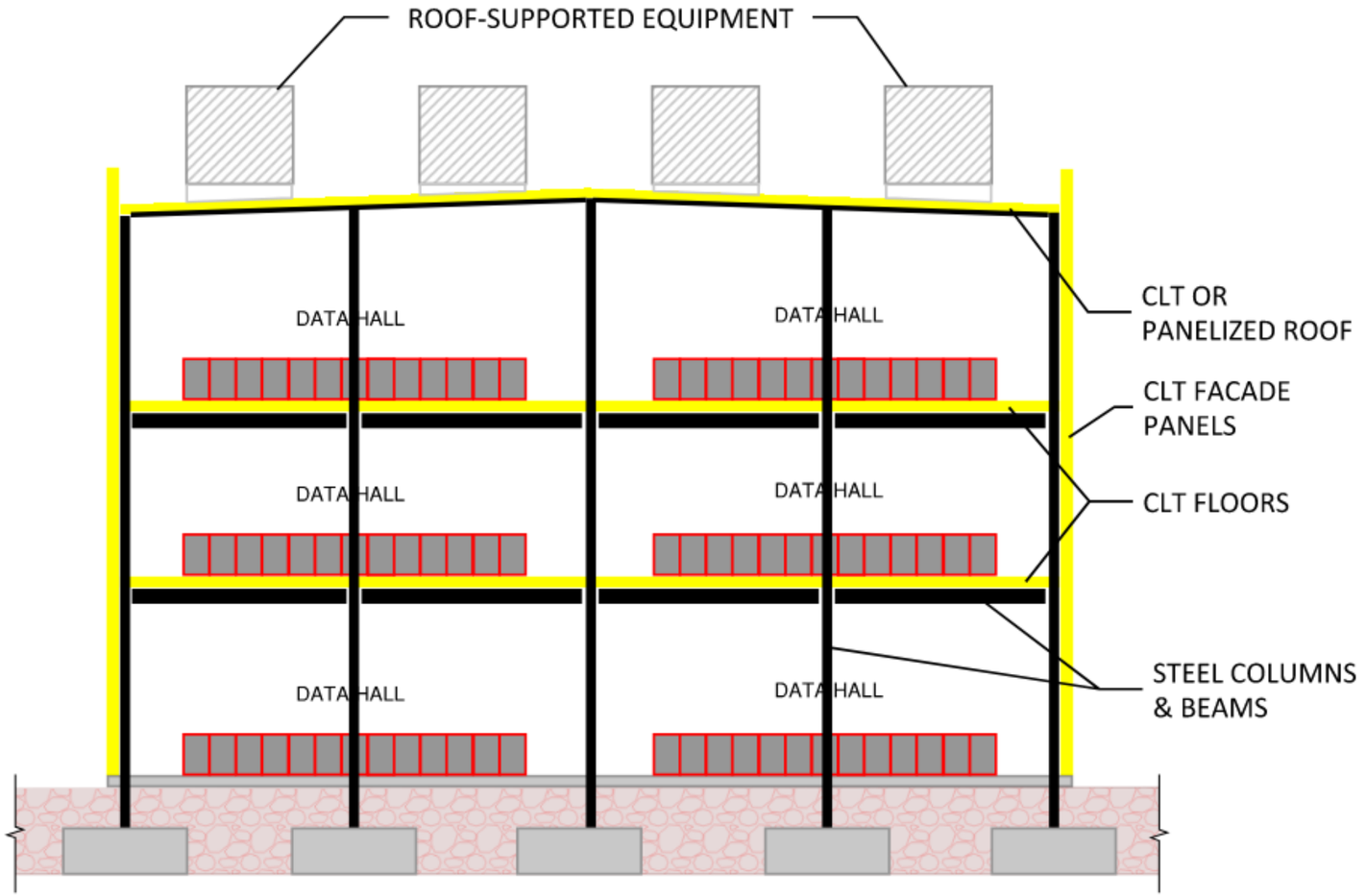
EB

SCENARIO 03

Three Story Type IV-C

Large cladding area in multi-story build offers significant EC reductions

Added height and associated structural support/requirements



MULTI-STORY - TYPE IV-C

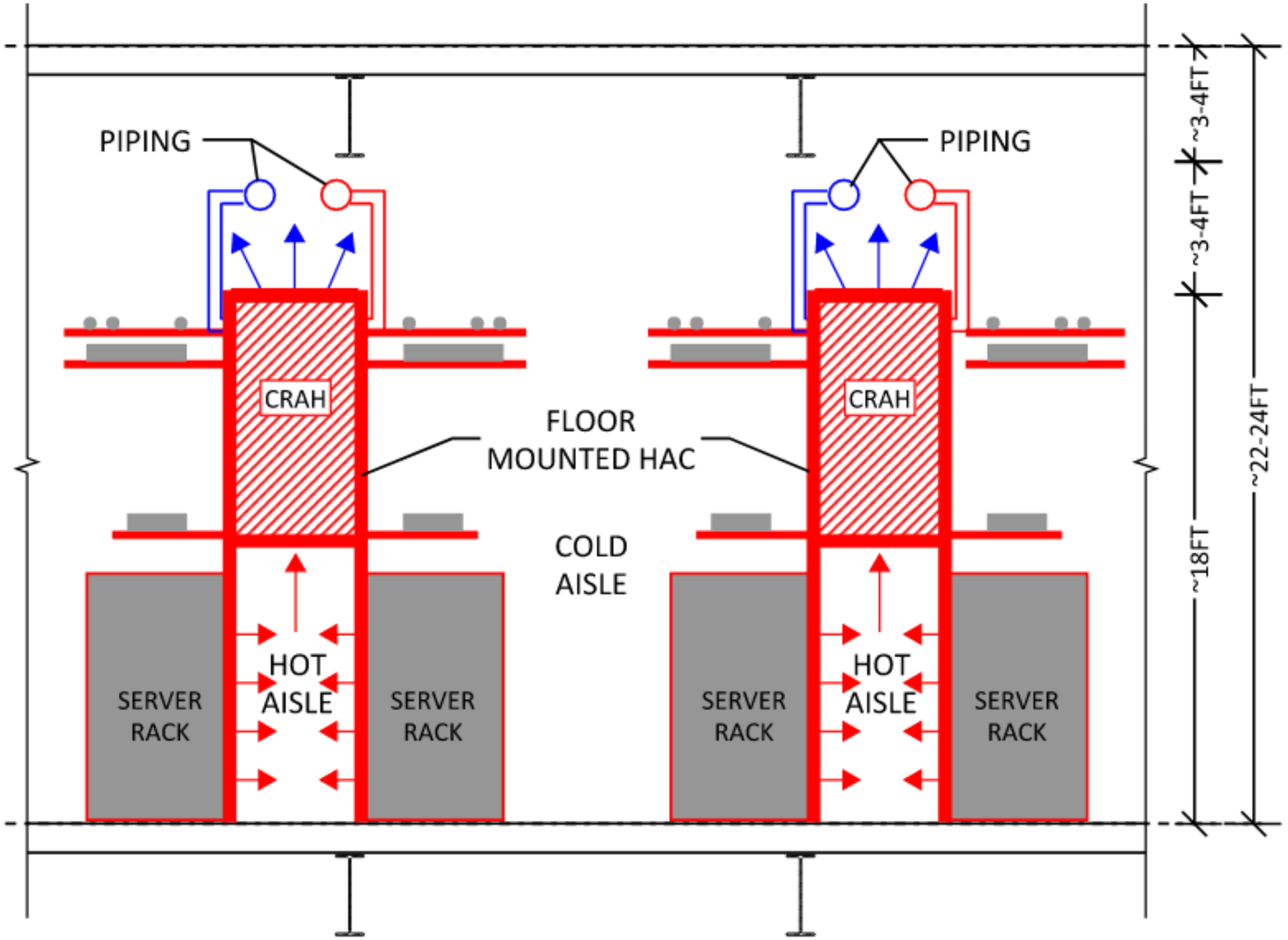
SCENARIO 03

Mechanical Plenum

Liquid cooled – no air plenum

Floor-mounted HACs

Increased design loads



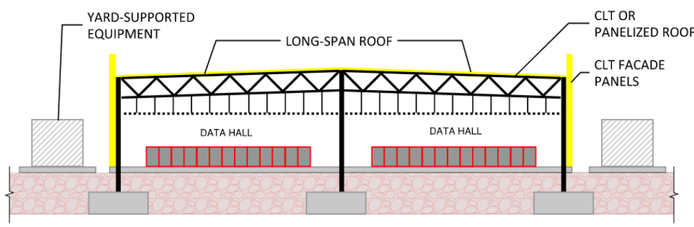
TH

4. WRAP UP

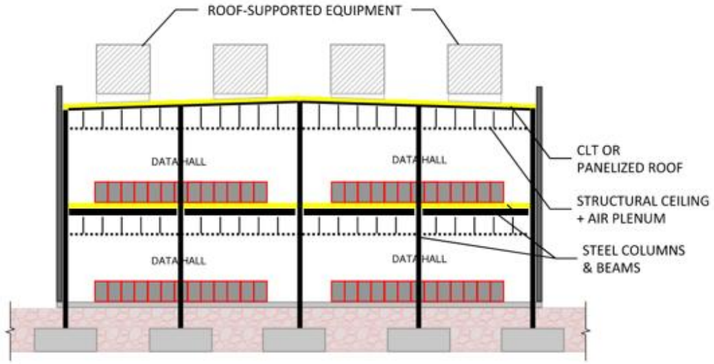
GENERAL COMMENTARY

What can we extract from this project into the wider industry?

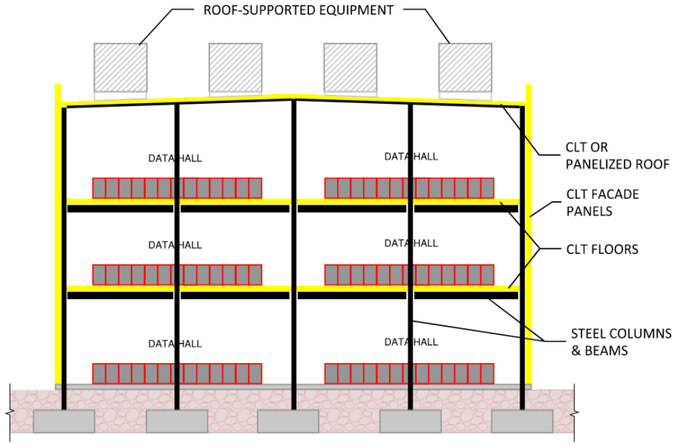
- **Industrial, logistics,warehousing, manufacturing, & heavy loading**
- **Modular & rapid development**
- **Multi-story designs**
- **In data centers – core & shell is smaller percentage of total construction cost**



SINGLE-STORY - TYPE V-B



MULTI-STORY - TYPE III-B



MULTI-STORY - TYPE IV-C

Erika Brown Edwards / courtesy Timberlab

TH

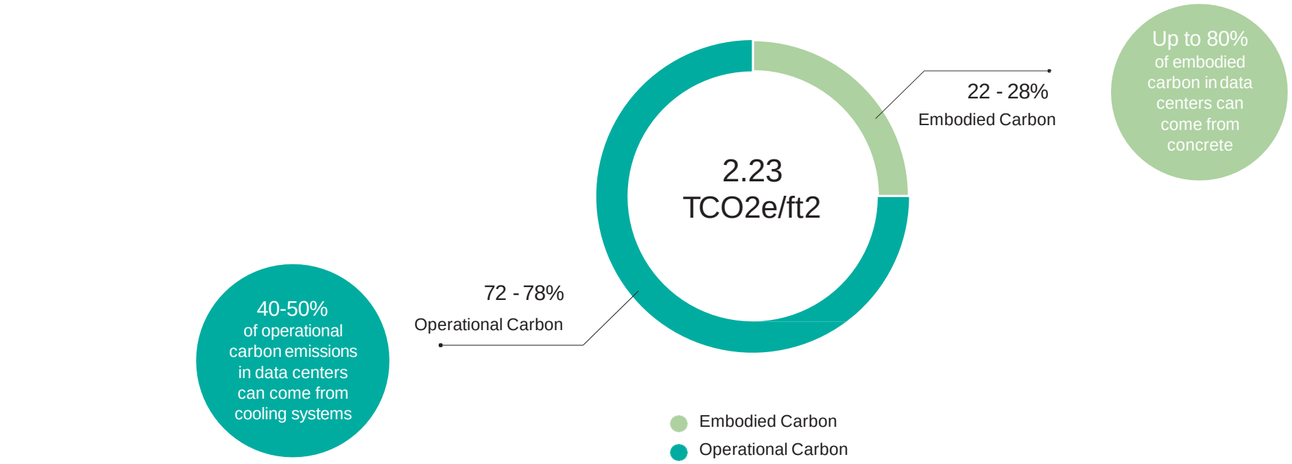
GENERAL COMMENTARY

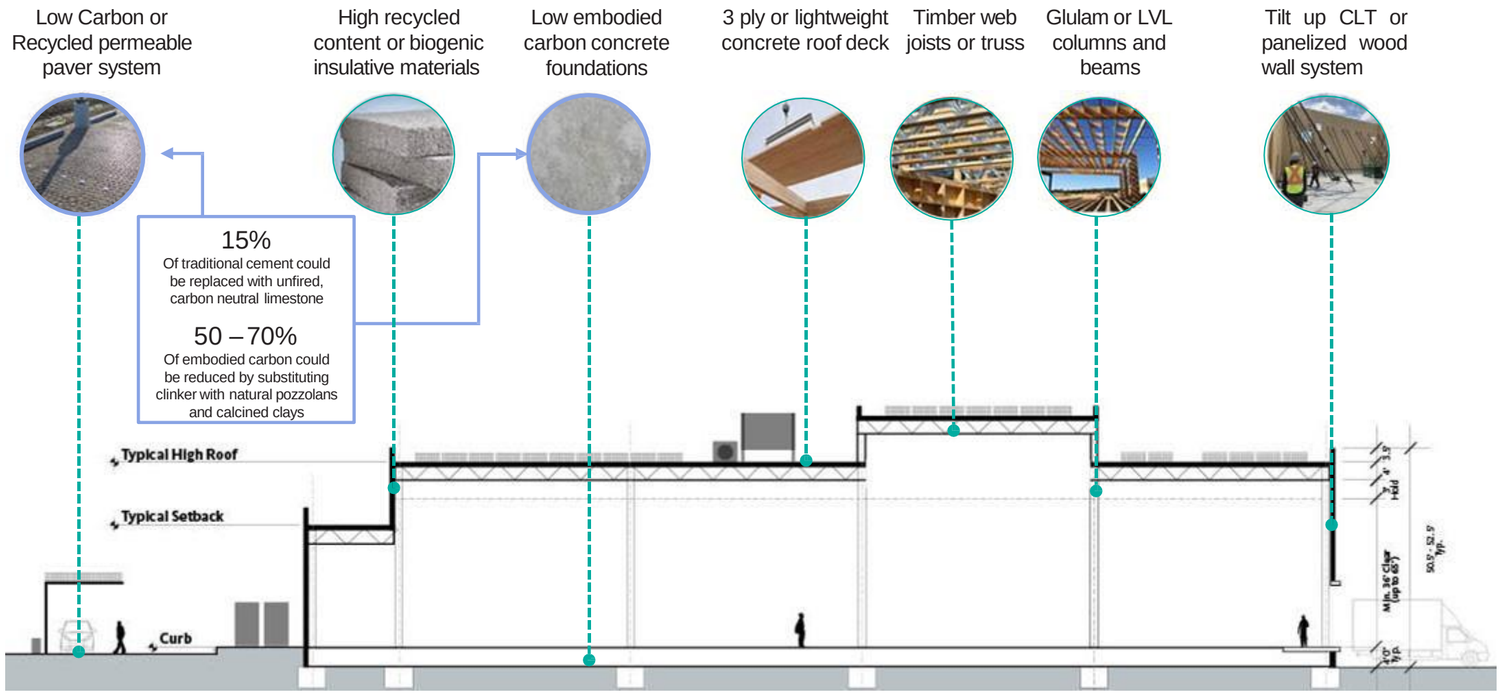
Why Might Developers or Technology Companies Want to Use Mass Timber on Their Data Center Projects?

- Community Engagement

- Low Impact Development

- Improved Staff Experience





EB

THANK YOU

MASS TIMBER+

BOSTON, MA | OCTOBER 28-30, 2025

This concludes The American Institute of Architects Continuing Education Systems Course.

Gensler × Thornton Tomasetti