

Mass Timber Enables Beauty, Warmth and Functional Design in The Soto

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BOKAPowell



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



Course Description

At six stories and 140,000 square feet, The Soto is a model of sustainable design. Developed by Hixon Properties, it is the first phase of an 8.5-acre mixed-use area in San Antonio that will include food and beverage, entertainment, office, apartment, and retail. The primary design direction was to provide a unique and beautiful workplace that appeals to tenants, is highly flexible, and incorporates technologies that make the building operationally efficient and sustainable. Mass timber helped achieve many of these objectives. The Soto, Spanish for a grove of trees or small forest, represents the building's material origin and its location a stone's throw from the San Antonio River. In this presentation, the architects will share valuable insights and lessons learned from the design, permitting and construction phases of the project – currently drawing close to completion.



The Soto
San Antonio, Texas

DOWNTOWN SAN ANTONIO

SAN ANTONIO RIVERWALK

THE SOTO OFFICE BUILDING

THE PEARL BREWERY





Learning Objectives

1. Review Code provisions applicable to a six-story mass timber structure including construction type and fire-resistance ratings
2. Highlight effective means of accommodating M.E.P. in an exposed timber structure office building while minimizing visual distractions and providing functionality
3. Discuss local interpretations from the AHJ relative to a first-of-its-kind mass timber structure in San Antonio
4. Describe lessons learned relative to Code compliance, detailing best practices and material procurement for a dowel laminated timber structure



Why Timber?

- It's different
- It's highly sustainable
- It aligns with the developer's company ethos and investment philosophy
- Lake|Flato's experience, advocacy, and prior success
- BOKA Powell's interests in Mass Timber and office expertise
- Later benefits
 - Speed of construction
 - Lighter foundation
 - Lower TI allowance
 - Aesthetic





MFAH
Houston, Texas



Hotel Magdalena
Austin, Texas

LAKE | FLATO



Trinity University
San Antonio, Texas



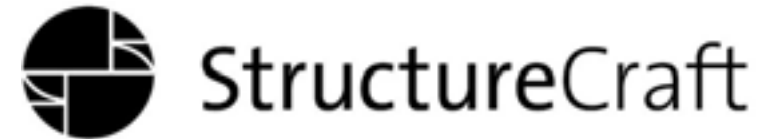
The Soto
San Antonio, Texas

Why This Team?

DESIGN ARCHITECT Lake|Flato



STRUCTURAL ENGINEER/FABRICATOR StructureCraft



MEP ENGINEER Integral Group



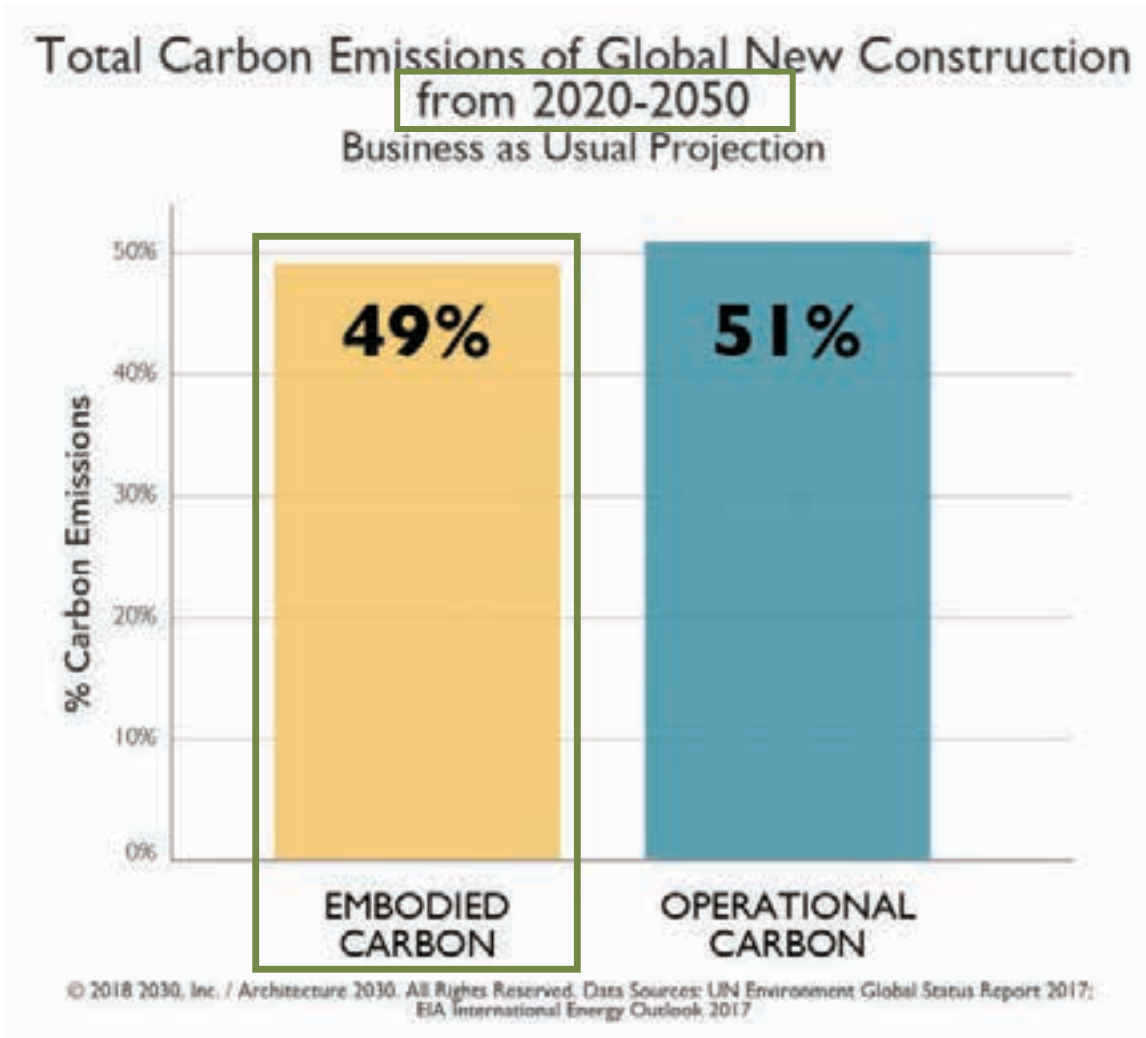
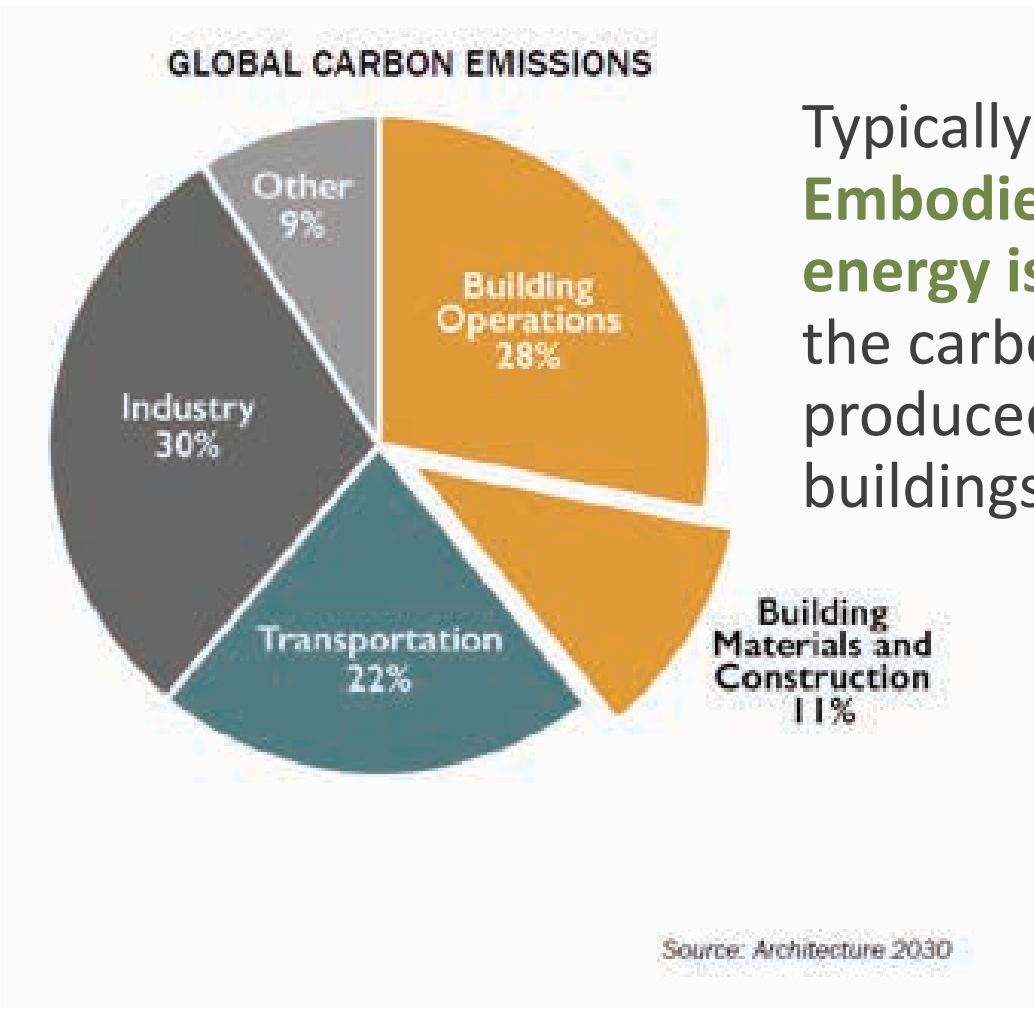
ARCHITECT OF RECORD BOKA Powell



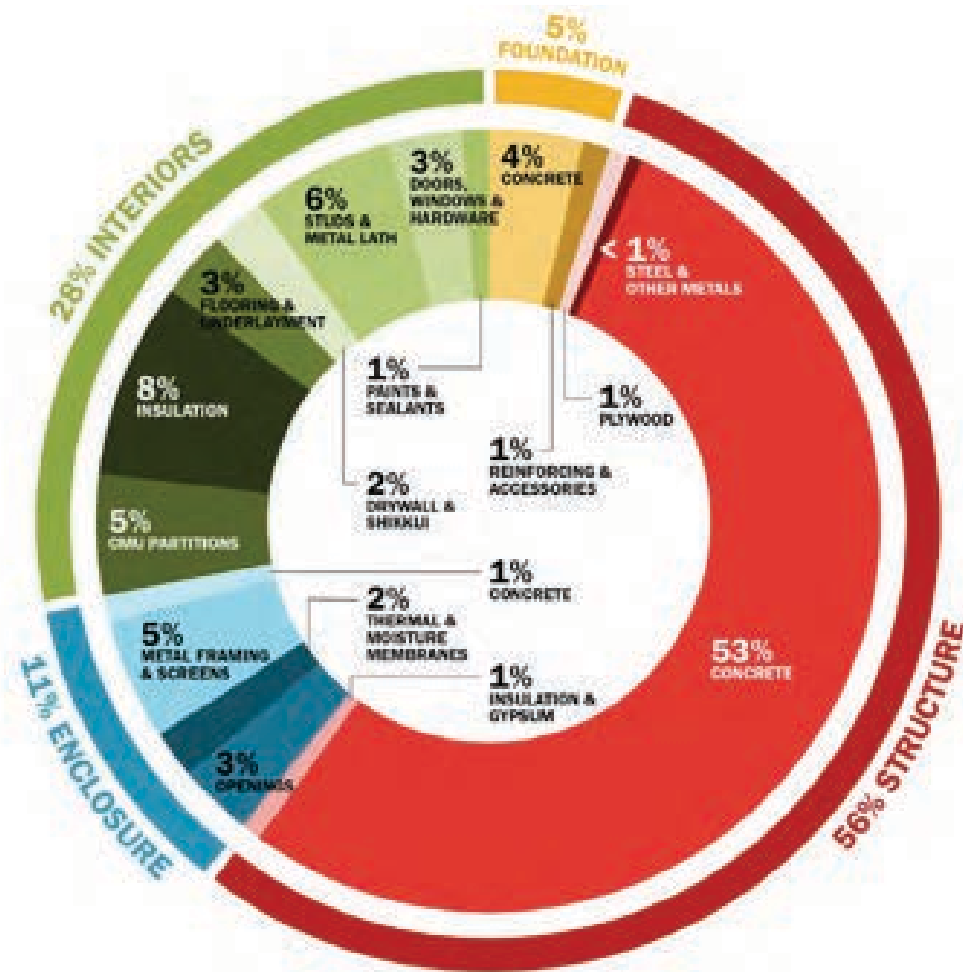
GENERAL CONTRACTOR Byrne Construction



Buildings are 39% of global co2 emissions



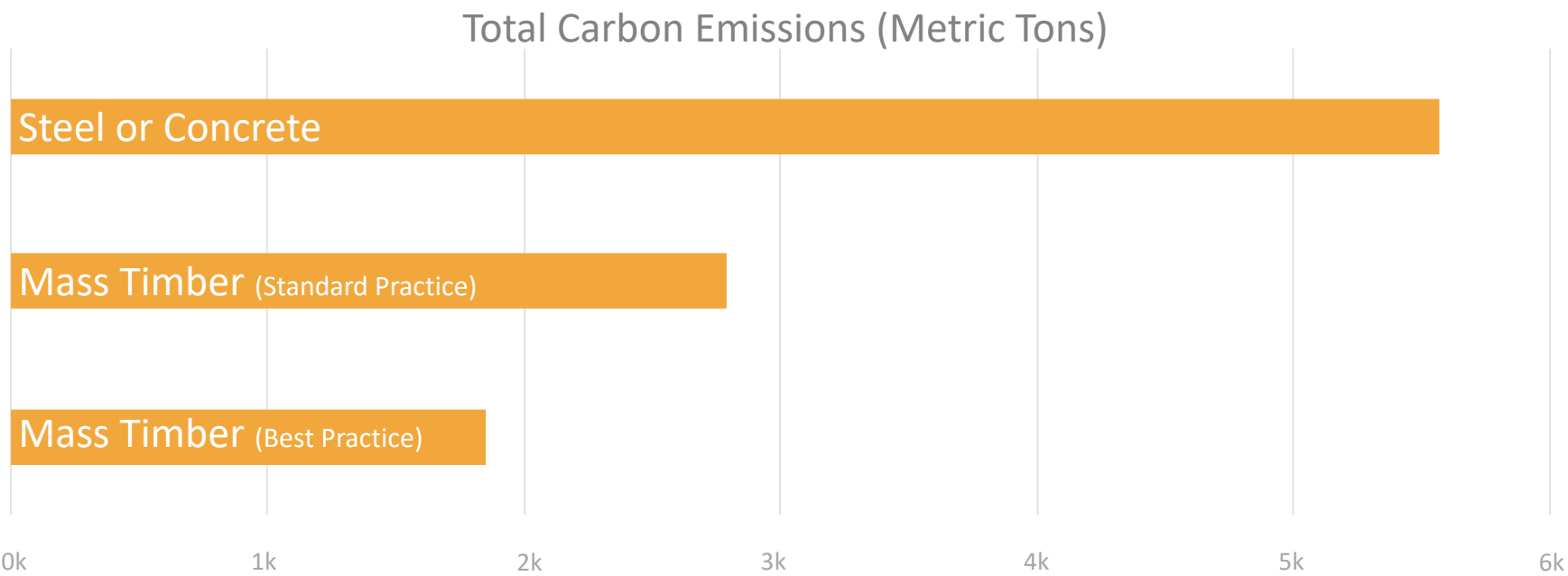
Impact of building components



* Doesn't include MEP and other details

Carbon in Construction - Material Comparison

Structural Material	Building Area (sf)	Building Area (m2)	kg CO2 per m2	Total kg CO2	Net Savings (kg CO2)	Vehicle Miles
Steel or Concrete	150,000	13,935	400	5,574,000	-	13,661,874
Mass Timber - Standard Practice	150,000	13,935	200	2,787,000	2,787,000	6,830,937
Mass Timber - Best Practice	150,000	13,935	133	1,853,355	3,720,645	4,542,573



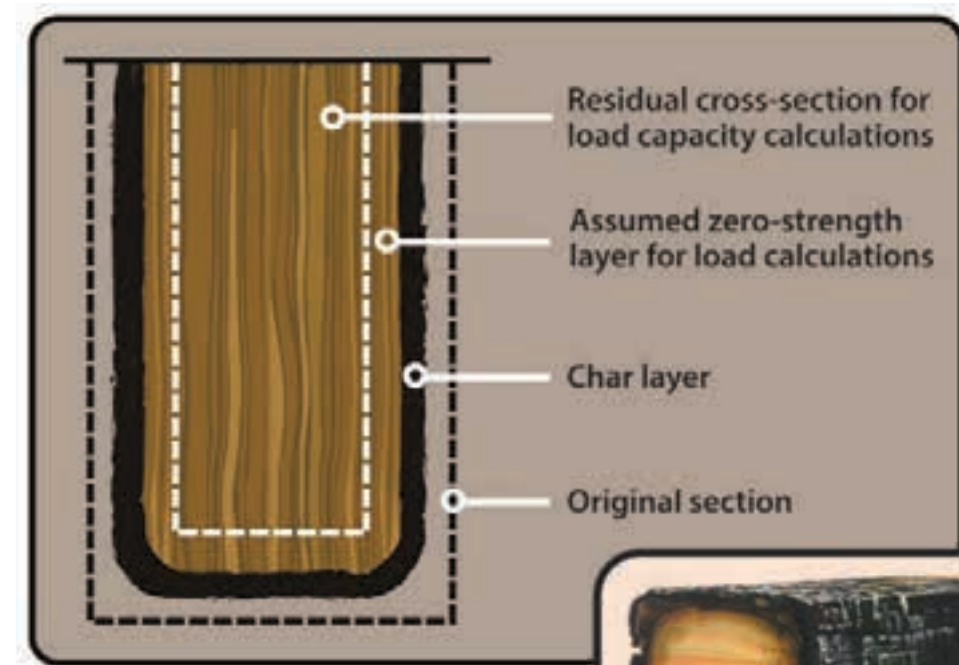
Exterior Cladding Options & Challenges



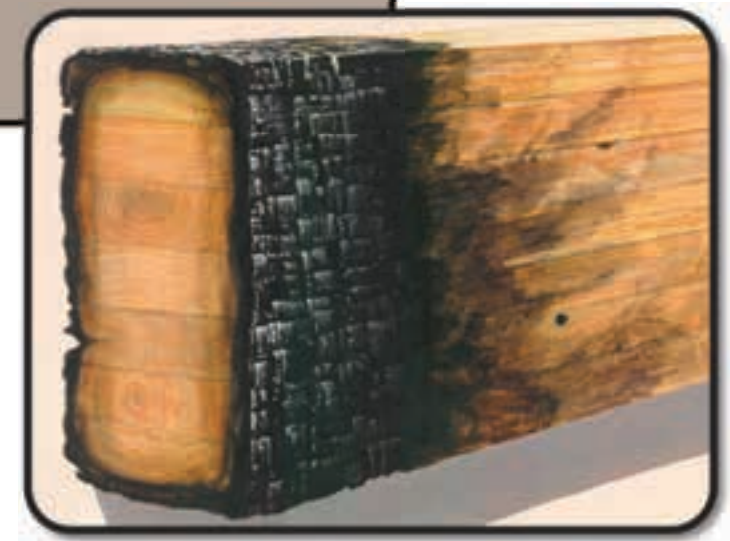
Challenges of Construction Type with Timber (2015 IBC)

Type IIIA

- Requires Char Calculations for member sizes
- Exterior primary frame & bearing walls require one-hour fire-resistance rating
- Protection of combustible concealed spaces applies
- Exposed steel connections require protection



SOURCE
Structure Magazine



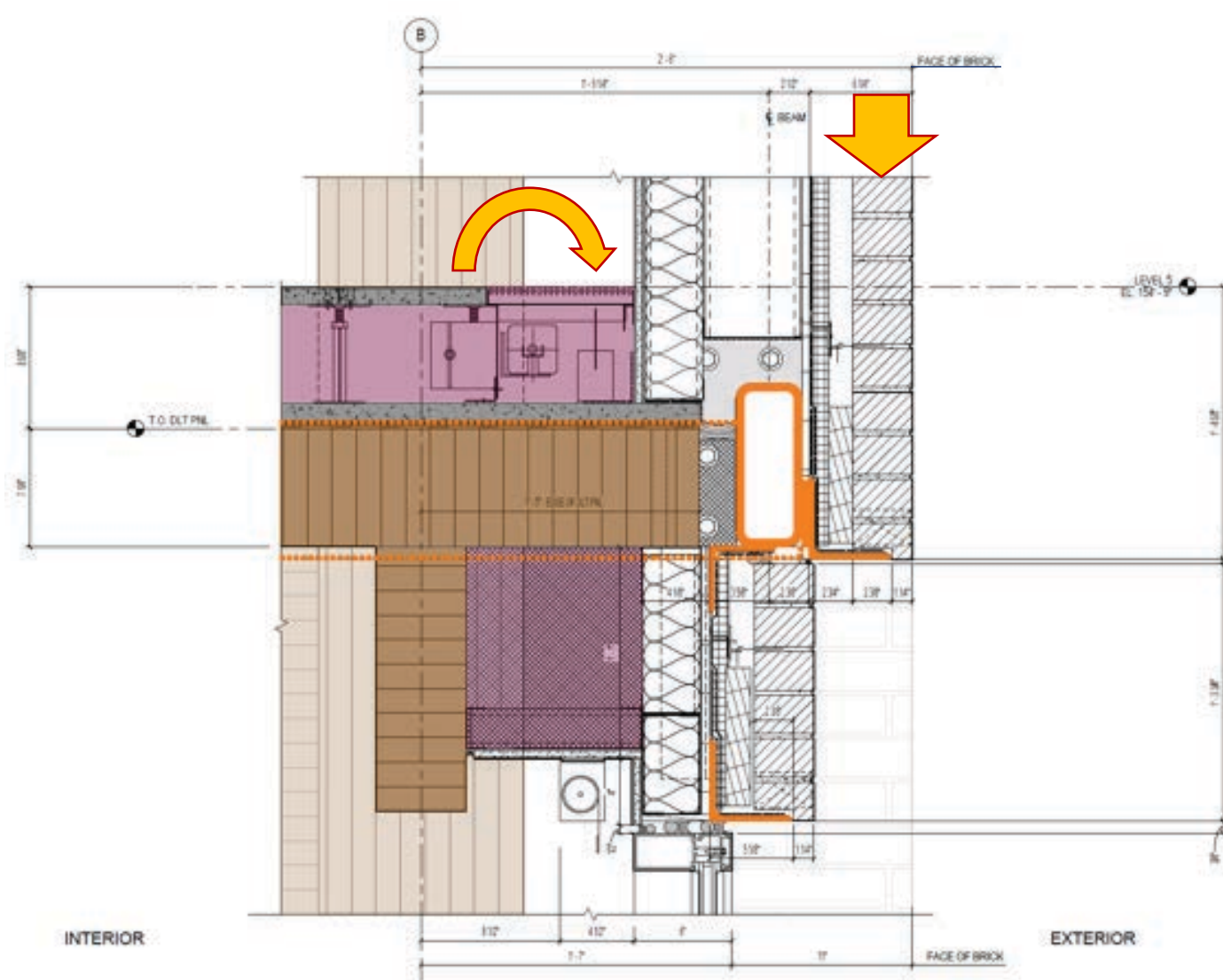
Challenges of Construction Type with Timber (2015 IBC)



Type IV

- Does not require char calculations per Table 601 & Section 2304.11
- Exterior wood columns do not require protection with horizontal separation of 20 feet or greater (602.4.9)
- Protection of concealed spaces applies
- Currently, the IBC does not address exposed steel connections for Type IV
- Interior partitions require solid or laminated wood OR one-hour fire resistance-rated construction (2015 IBC 602.4.8.1)

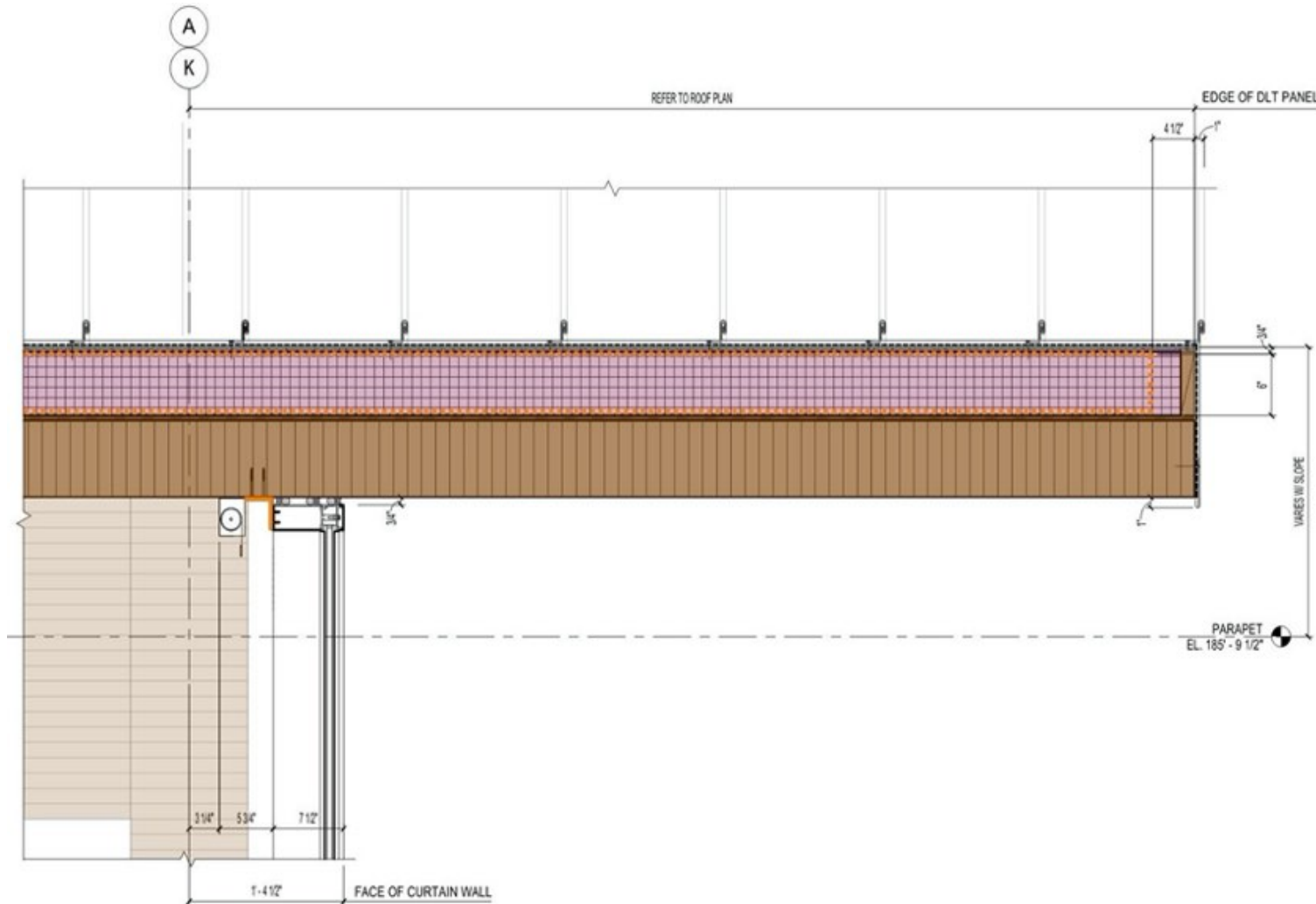
Masonry Implications



Key Factors

- Engineered hybrid solution integrated into the DLT panels
- Distance from column centerline to face of brick creates need for additional stiffness
- DLT panel aids in providing a thermal break

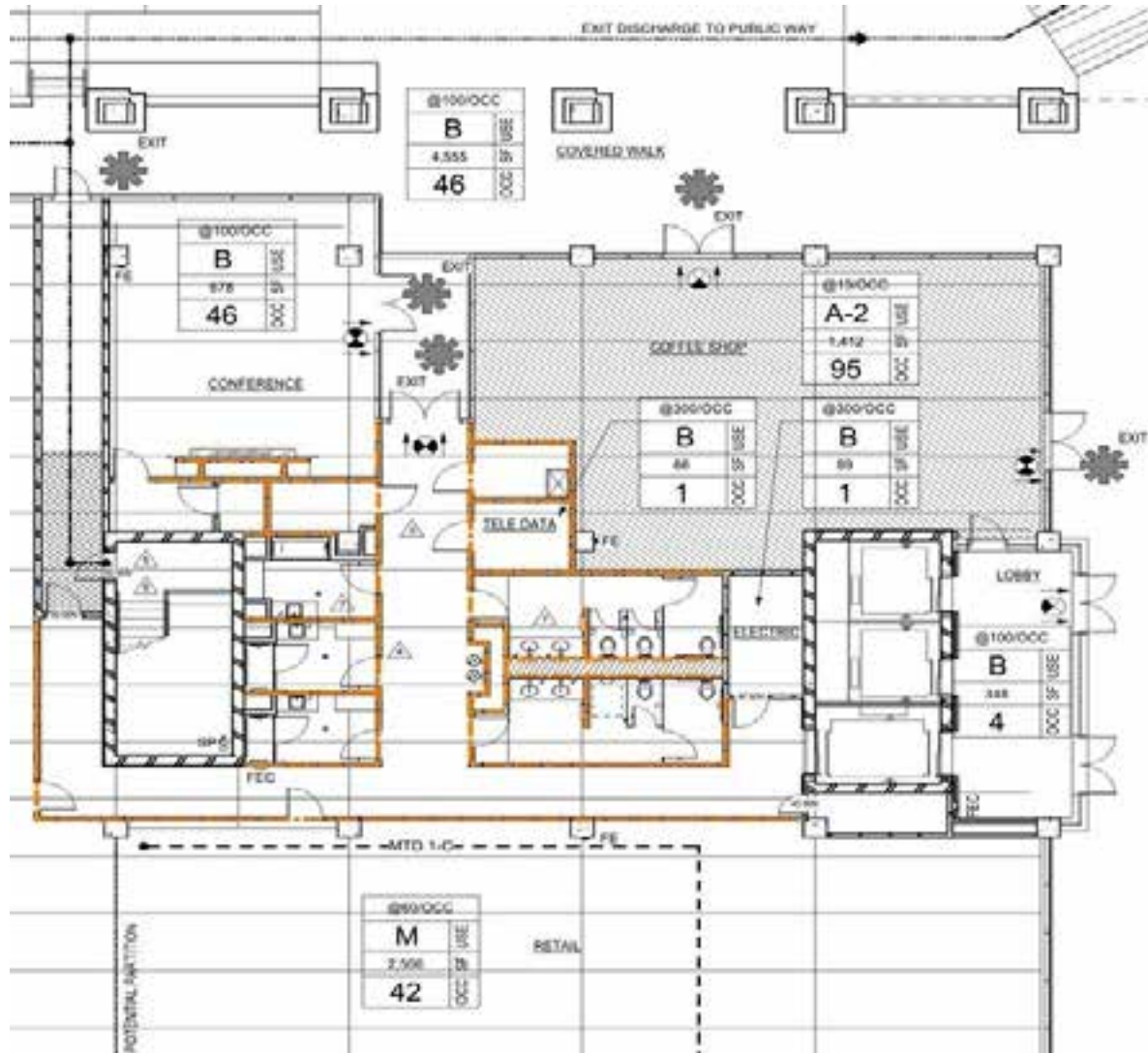
Cantilevered DLT



Key Factors

- Cantilevered DLT in weak axis requires additional steel for support
- HSS steel members integrated with roof insulation to keep underside of roof plane 'pure'.
- Ideal steel member size to match minimum required thermal resistance of roof insulation (R-25ci)

1-Hour Fire-Resistant Interior Partitions (IBC 602.4.8.1)

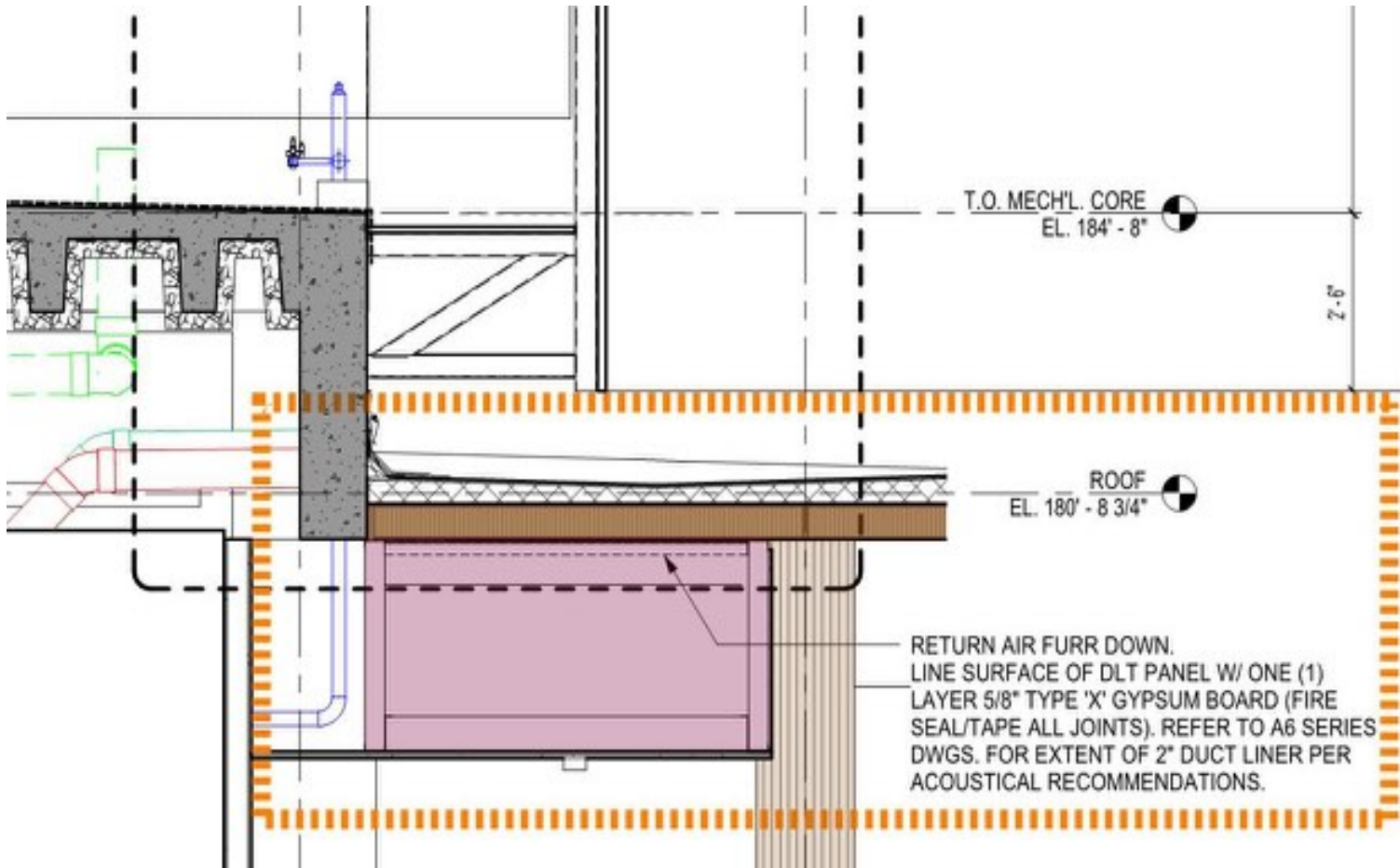


LIFE SAFETY LEGEND	
FIRE RESISTANCE RATED CONSTRUCTION	
	1 HR FIRE PROTECTION
	2 HR FIRE PROTECTION
	2 HR SHAFT ENCLOSURE
	2 HR HORIZONTAL ASSEMBLY
	1 HR HORIZONTAL ASSEMBLY
	DOOR FIRE RATING
FIRE RESISTIVE CONSTRUCTION (UNPROTECTED OPENINGS)	
	1 HR FIRE RESISTIVE CONSTRUCTION

Key Factors

- Interior walls and partitions shall be of solid wood construction formed by not less than two layers of 1-inch matched boards, laminated construction 4-inches thick OR of 1-hour fire-resistance-rated construction.

Concealed Spaces



Key Factors

- AHJ allowed the application of IBC section 718.2.1 as acceptable means of protecting the combustible surfaces within concealed cavities
- Where only the surface of DLT was exposed within a plenum (see example), covering the mass timber with one layer of 5/8" type 'X' gypsum board 'removed' the combustible surface

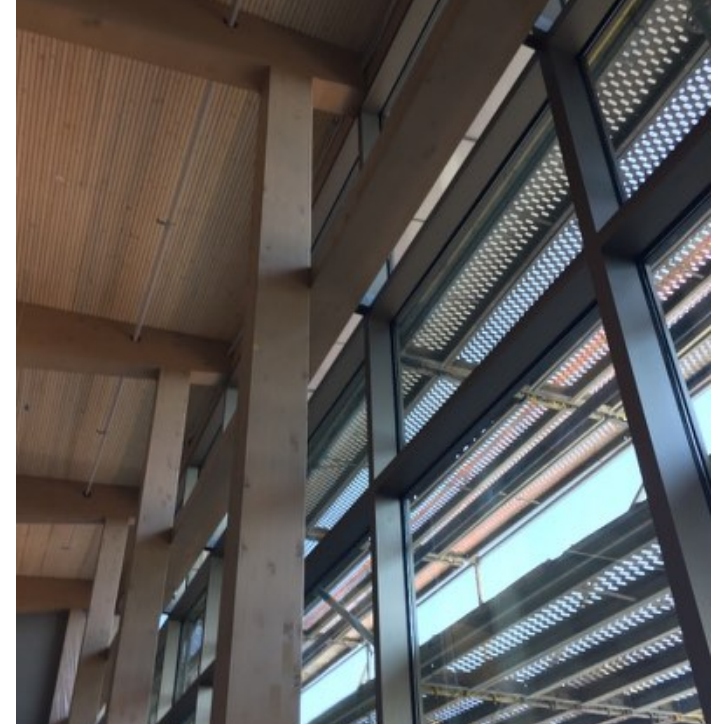
The Beauty of Wood



Characteristics of DLT vs. CLT



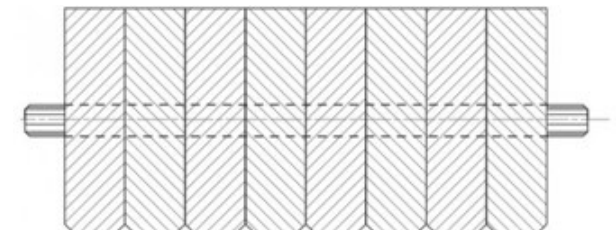
Choosing the Right Wood Species and DLT Profiles



KERF-EDGED

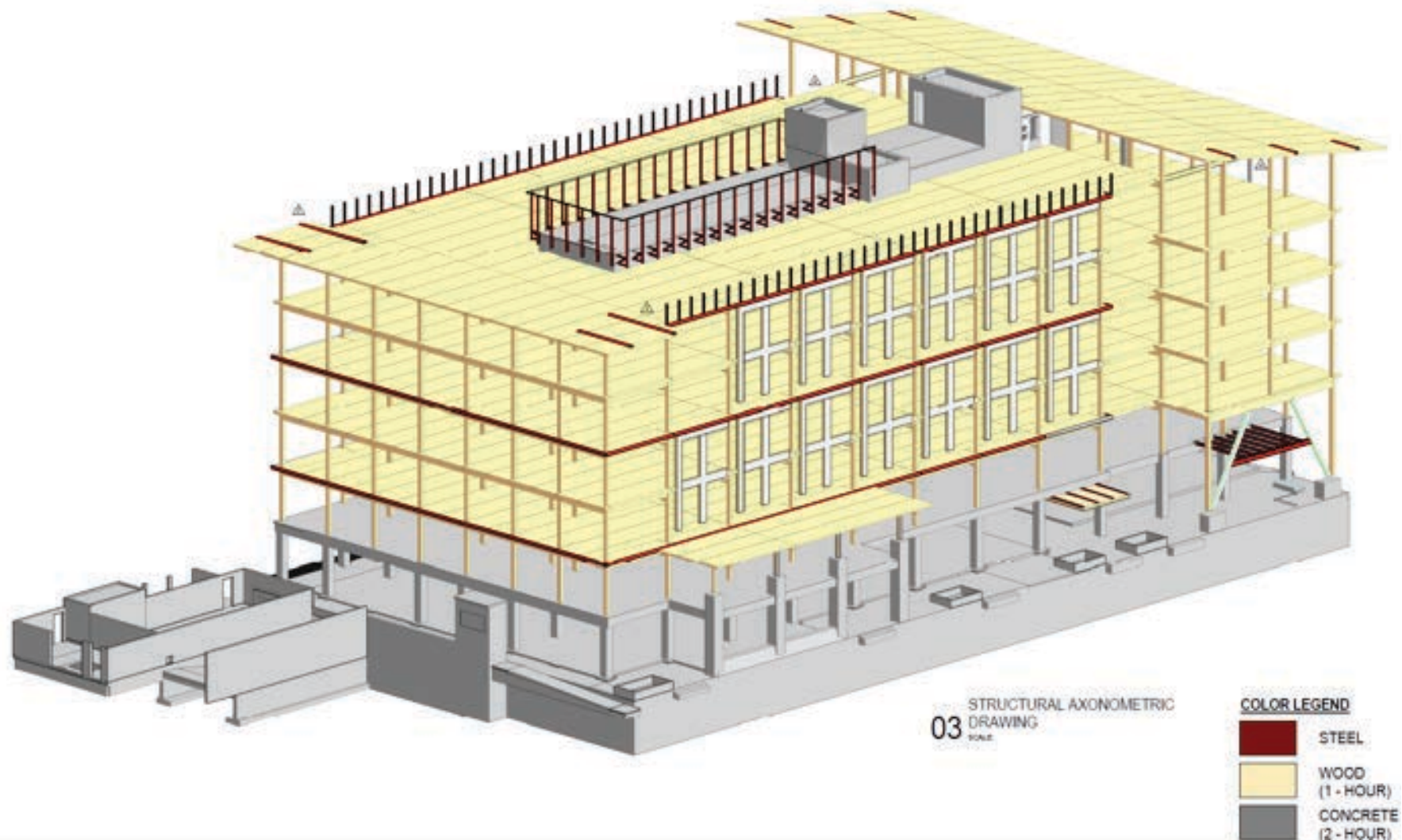


SQUARE-EDGE

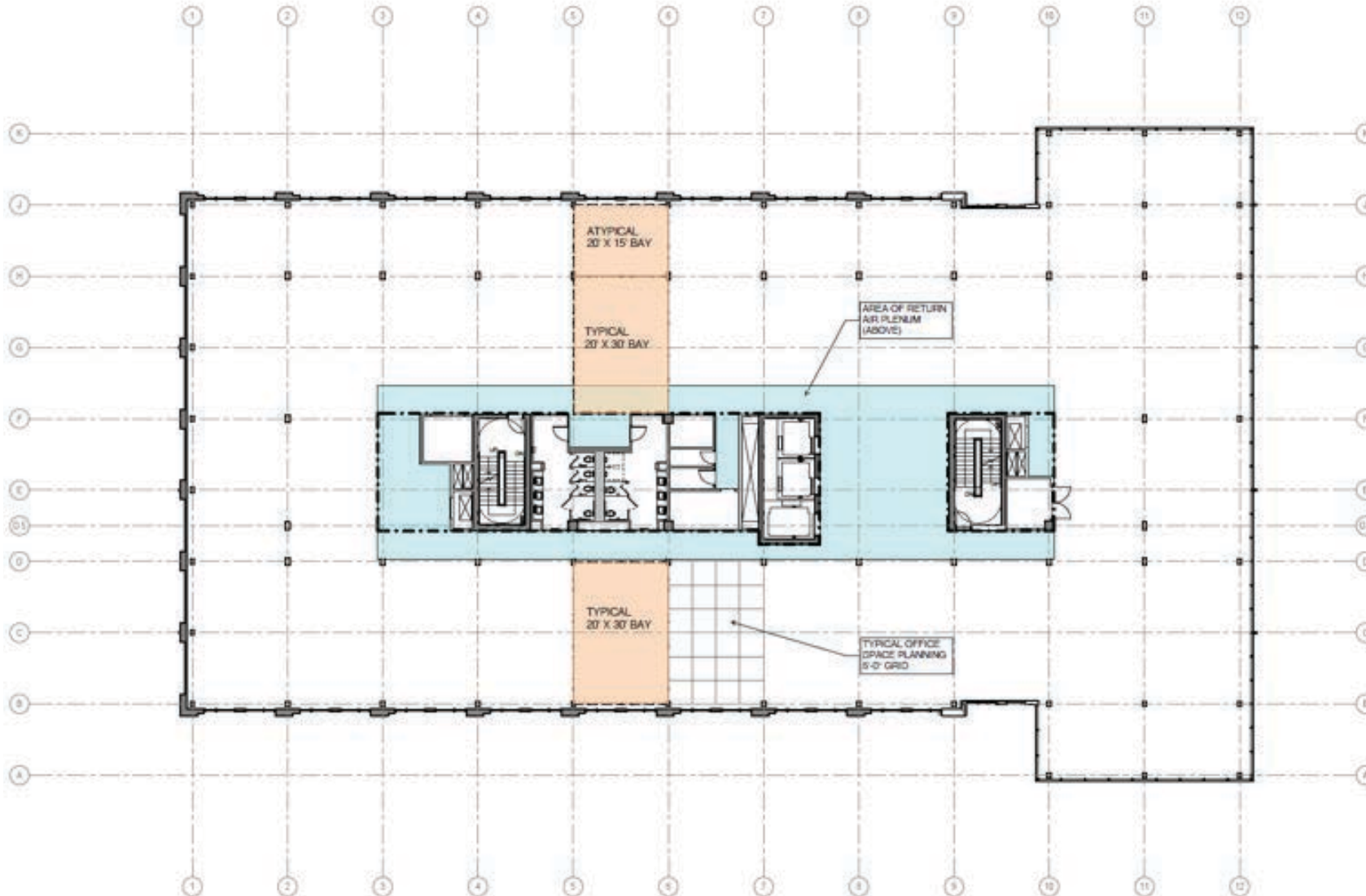


CHAMFERED-EDGE

Structural Integration: Concrete + Timber + Steel



Column Grid Spacing



- To accommodate parking requirements
- To utilize a 5'-0" grid for open office space planning
- To economize on mass timber panel spans and laminated member depths

Systems Integration and Finishes



- Exposed Air Ducts
- Exposed Electrical Conduit



- Floor Finish Selections
- Wood

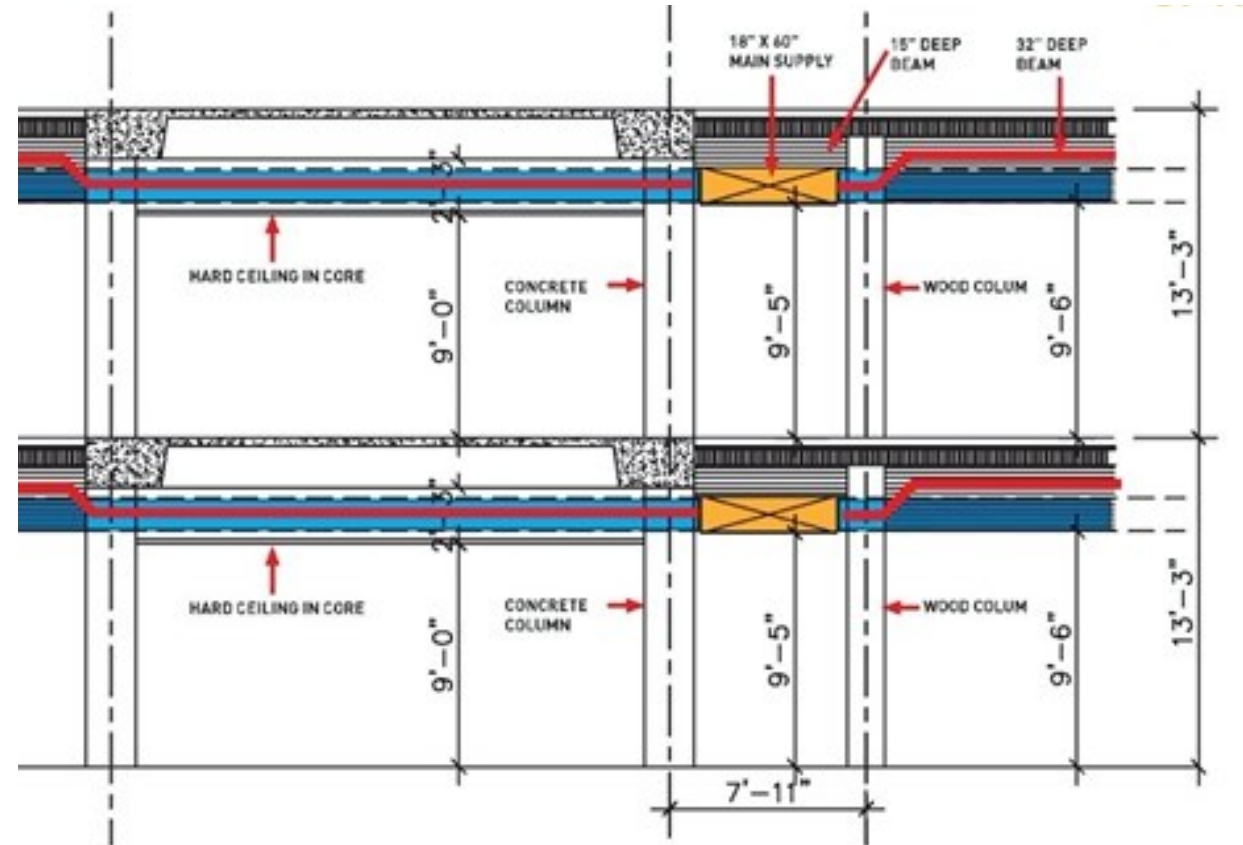
- Lighting Systems
- Sprinkler Systems

System Integration Options



CONSIDERATIONS:

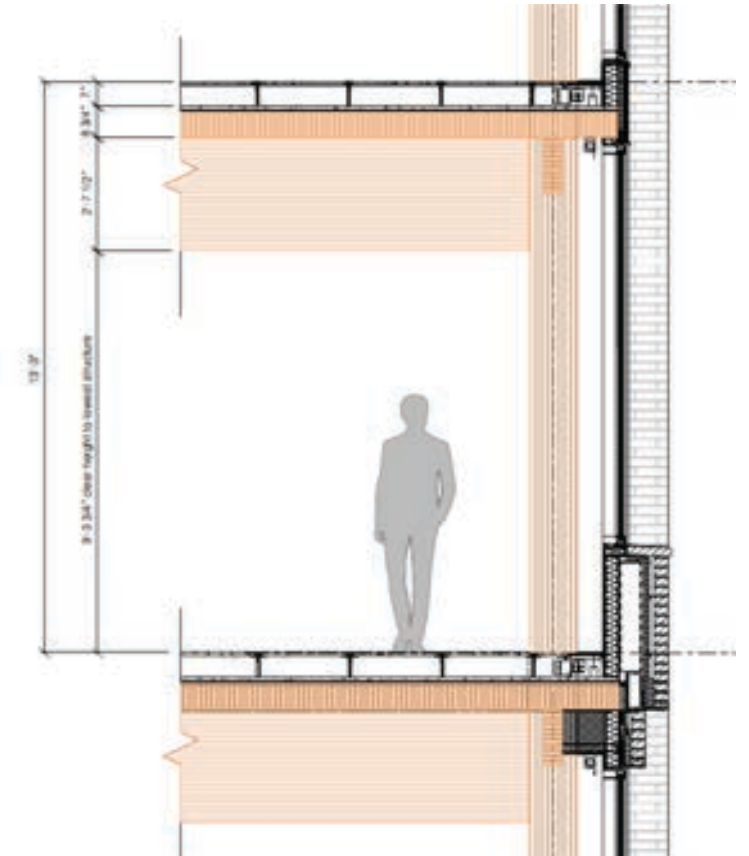
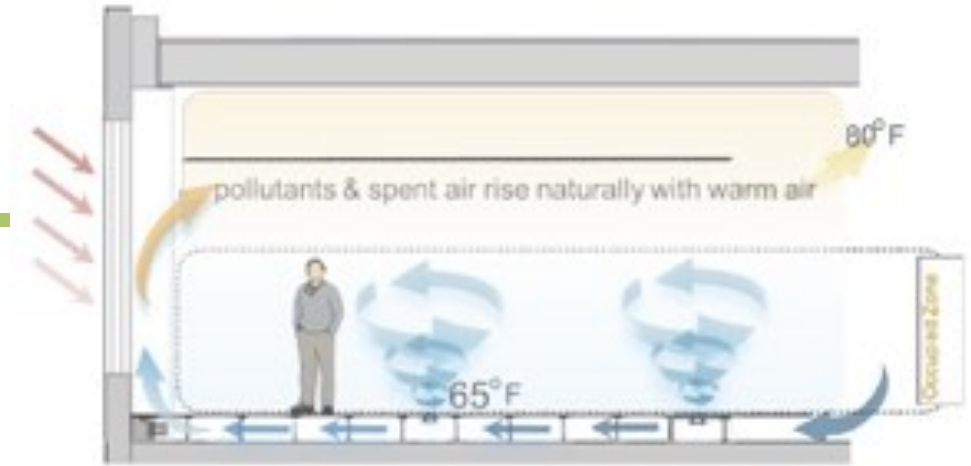
- Air Ducts
- Electrical Conduit
- Sprinkler Systems
- AV/Data



Underfloor Air Distribution



- Precise temperature control
- Reduce “draft” complaints
- Better indoor air quality
- Increased mechanical efficiencies
- Flexibility for alteration of floor plans
- No unsightly wall and ceiling vents



Interior Conditioning



Sharing the Beauty of Wood



Sharing the Beauty of Wood

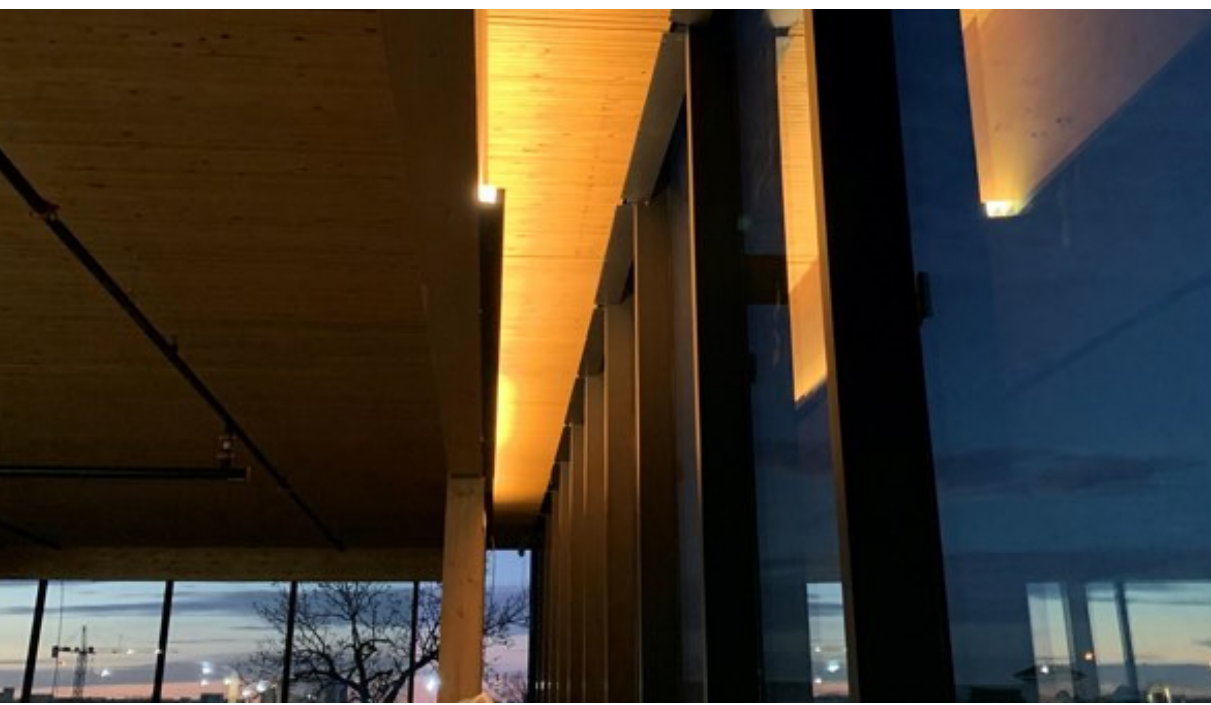
















Lessons Learned

1. Supporting brick on mass timber and tributary effects
2. Talk with the AHJ about their concerns with heavy timber before committing
3. Be mindful of how other building systems are integrated towards the advantages of using timber
4. Give thought to type of mass timber system and whether a turn-key or open bid approach is the best for the building type and client.
5. Discuss Special Inspections requirements with your AHJ during the Preliminary Plan Review process



The Soto Project Team

Role	Firm	Location	Website
Developer	Hixon Properties	San Antonio, Texas	http://www.hixonproperties.com/
Design Architect	Lake Flato	San Antonio, Texas	https://www.lakeflato.com/
Architect of Record	BOKA Powell	Austin, Texas	http://www.bokapowell.com/
Structural Engineer / Wood Fabricator	StructureCraft	Abbotsford, BC, Canada	https://structurecraft.com/
Structural Engineer	Danysh & Associates	San Antonio, Texas	-
MEP Engineer	Integral Group	Austin, Texas	https://www.integralgroup.com/
Landscape Architect	Hocker Design Group	Dallas, Texas	https://www.hockerdesign.com/
Civil Engineer	Pape-Dawson	San Antonio, Texas	http://www.pape-dawson.com/
General Contractor	Byrne Construction Services	San Antonio, Texas	https://www.tsbyrne.com/
Building Envelope Consultant	Building Exterior Solutions	Austin, Texas	https://building-exterior-solutions.com/
Code Consultant	Garabedian Associates	Helotes, Texas	-
Commissioning Agent	ACR Engineering	Austin, Texas	http://www.acreng.com/
Lighting Consultant	Scott Oldner Lighting	Dallas, Texas	https://www.solighting.net/
Archaeological and Geotechnical	Raba Kistner Consultants	San Antonio, Texas	https://www.rkci.com/

> QUESTIONS?

This concludes The American Institute
of Architects Continuing Education
Systems Course

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