



TIMBER FOR ARCHITECTS

Making the System Work for You

COPYRIGHT MATERIALS

This presentation is protected by U.S. and international copyright laws. Reproduction, distribution, display, and use of the presentation without written permission of the speaker is prohibited.

© Mid-Atlantic Timberframes

CREDITS STATEMENT

- a. Credit(s) earned on 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.
- b. This course 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.
- c. Course Number K2210N LU HSW Credit

COURSE OVERVIEW



LEARNING OBJECTIVES

At the conclusion of this course, participants will be able to:

1

Describe the various typology and taxonomy of timber building methods, and the nuances of each, so that they can make an informed decision as to which typology best suits future project needs.

2

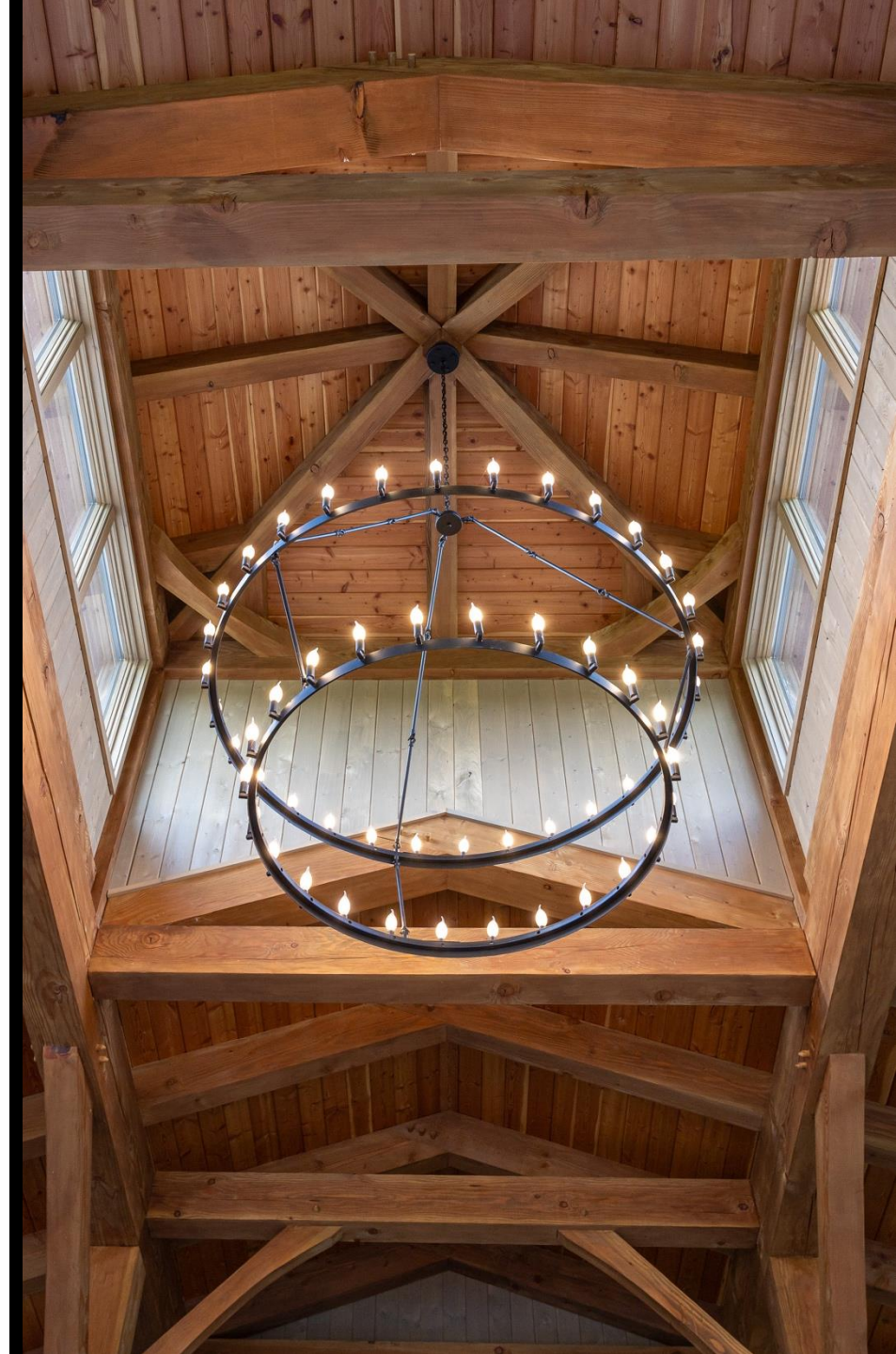
Plan for the critical considerations that a project team must examine BEFORE embarking on a timber project.

3

Prepare appropriately for the key considerations pertaining to design principles, sourcing and specifying, basis of design, and structural considerations and make informed decisions at each stage of the pre-construction process.

4

Prepare appropriately for the key considerations pertaining to relevant building codes, transportation, on-site assembly, and maintenance and make informed decisions throughout the construction process.





SECTION 1:

Timber Talk

Learning Objective 1

Describe the various typology and taxonomy of timber building methods, and the nuances of each, to make an informed decision as to which typology best suits future project needs.

TIMBER TALK

“ All mass timber **is heavy timber,**
but not all heavy timber is mass timber. ”

HEAVY TIMBER

Materials and Species

SELECT HEIGHT AND AREA LIMITS BY CONSTRUCTION TYPE

		I-A	I-B	<u>IV-A</u>	<u>IV-B</u>	<u>IV-C</u>	IV-HT
Occupancies	Value	Allowable Building Height Above Grade Plane, Feet (IBC Table 504.3)					
A, B, R	S	Unlimited	180	270	180	85	85
		Allowable Number of Stories above Grade Plane (IBC Table 505.4)					
A-2, A-3, A-4	S	Unlimited	12	<u>18</u>	<u>12</u>	<u>6</u>	4
B	S	Unlimited	12	<u>18</u>	<u>12</u>	<u>9</u>	6
R-2	S	Unlimited	12	<u>18</u>	<u>12</u>	<u>8</u>	5
		Allowable Area Factor (At), Feet ² (IBC Table 506.2)					
A-2, A-3, A-4	SM	Unlimited	Unlimited	<u>135,000</u>	<u>90,000</u>	<u>56,250</u>	45,000
B	SM	Unlimited	Unlimited	<u>324,000</u>	<u>216,000</u>	<u>135,000</u>	108,000
R-2	SM	Unlimited	Unlimited	<u>184,500</u>	<u>123,000</u>	<u>76,875</u>	61,500
<p><i>S is sprinklered with NFPA 13 sprinklers. SM is the multi-story allowable area factor. Underlined entries are the new additions.</i></p>							

Common Species

- Douglas Fir
- Oak
- Pine
- Black Spruce
- Cedar



WHEN TO USE
HEAVY TIMBER

TIMBER TALK

Mass Timber

A class of engineered wood products (EWPs) that utilizes the fundamental strengths of wood coupled with proven innovations in structural engineering and CNC fabrication.

Main Categories

- Cross-Laminated Timber (CLT)
- Glue-Laminated Timber (Glulam or GLT)
- Dowel-Laminated Timber (DLT)
- Glue-Laminated Decking



CATEGORY 1

Cross-laminated Timber (CLT)

Common Species

- Black Spruce
- Douglas Fir
- Southern Yellow Pine



CATEGORY 2

**Glue-laminated Timber
(Glulam Or GLT)**

Common Species

- Black Spruce
- Douglas Fir
- Southern Yellow Pine



CATEGORY 3

Dowel-laminated Timber (DLT)

Common Species

- Douglas Fir



CATEGORY 4

Glue-laminated Decking

Common Species

- Douglas Fir
- Southern Yellow Pine
- Black Spruce

SECTION 2:

Considering Timber: Practical Considerations to Utilize the Full Value of Timber

- Early Involvement
- Who Does What — and Why?

Learning Objective 2

Plan for the critical considerations that a project team must examine BEFORE taking on a timber project.

EARLY INVOLVEMENT

Q:

The Big Question to Ask Your Timber Framer:

What Do I Need to Show in My Drawings So That You Can Accurately Price the Project?

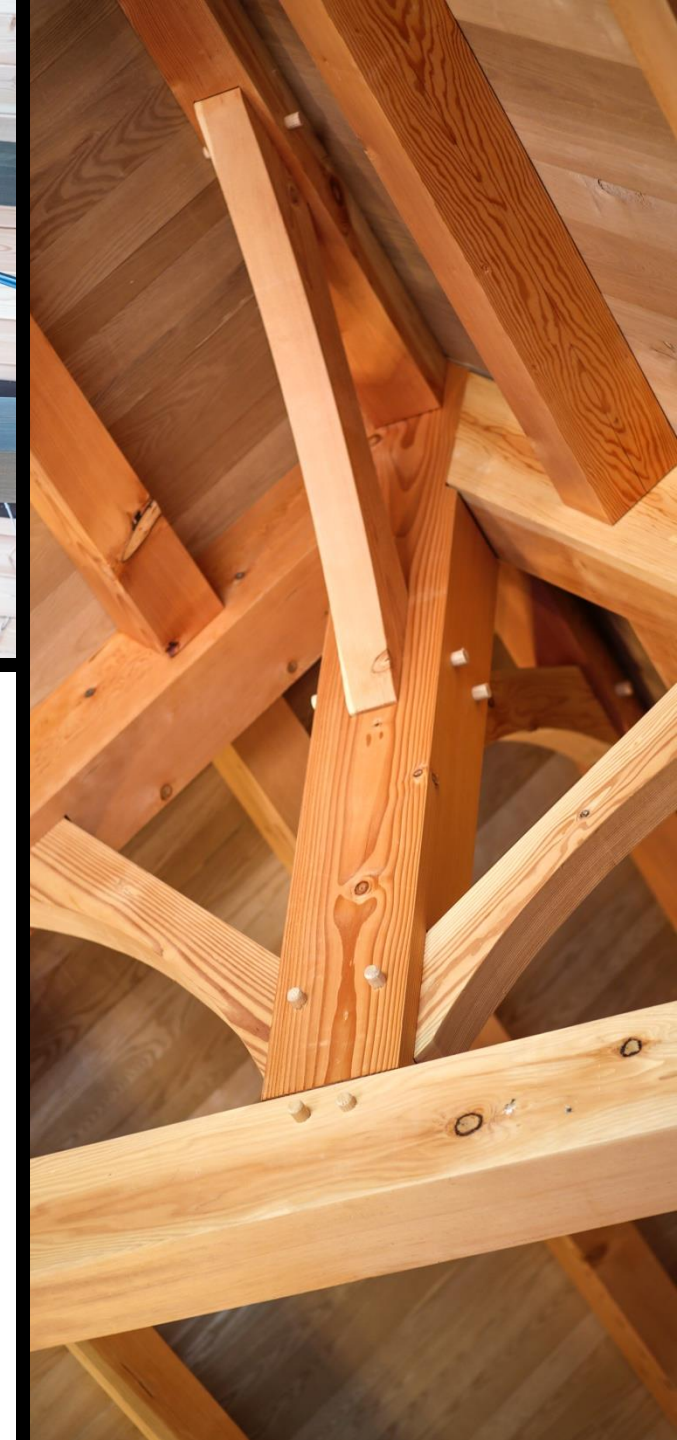
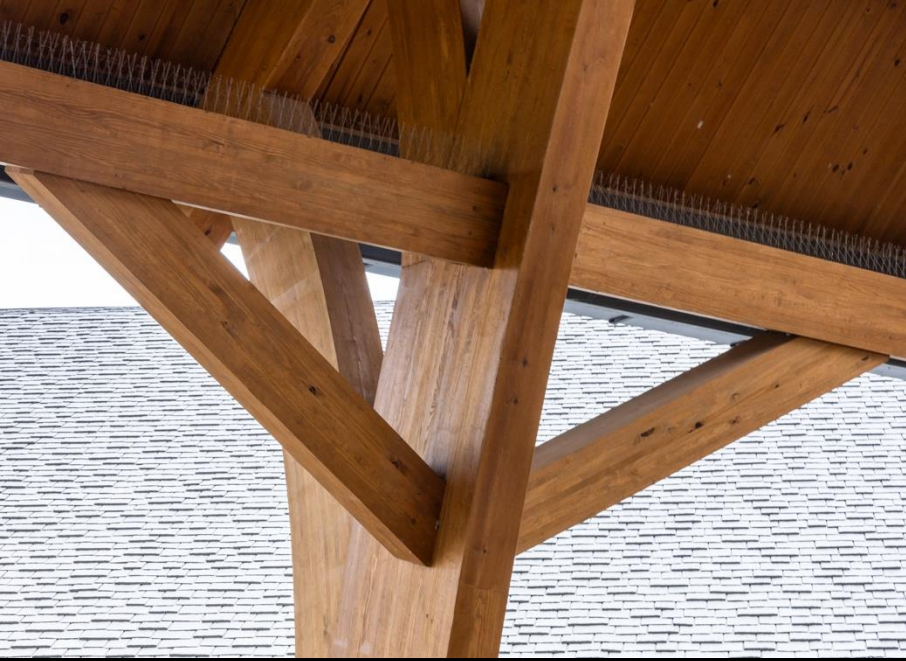
A:

Basis of Design (BOD) Details, Sustainability Goals, and Material Specifications



ENGAGE EARLY & OFTEN

- More Critical with Timber Frame Than Traditional Structures
- Engage BEFORE the Design Development Phase
- Some Connections are Unexpected



TIMBER TIP 1: Reach out to the local building jurisdiction immediately.

TIMBER TIP 2: Don't tie yourself to one product or vendor at this phase in your drawings.



THE UPFRONT DETAILS

- Basis of Design
- Lateral System
- Construction Type
- Occupancy Type
- Sustainability Requirements

WHO DOES WHAT — AND WHY?

Architect

- Overall Programming
- Building Requirements
- Sustainability Goals
- Engagement with Code Officials
- Specifications

Engineer of Record

- Engineering and Oversight
- Lateral Load Resistance System (LLRS)

General Contractor / Builder

- Overall Project Coordination
- Executing the Project According to Specifications

Timber Frame Contractor

- Insights Specific to the Timber Scope of Work
- Material Specifications and Lead Times
- Fabrication and Installation
- Timber Design and Engineering
- Coating, Stain, Finishes

SECTION 3:

Off-Site Timber Construction — How Does It Work?

Part 1: Pre-Construction



Learning Objective 3

Prepare appropriately for the key considerations pertaining to design principles, sourcing and specifying, basis of design, and structural considerations and make informed decisions at each stage of the pre-construction process.

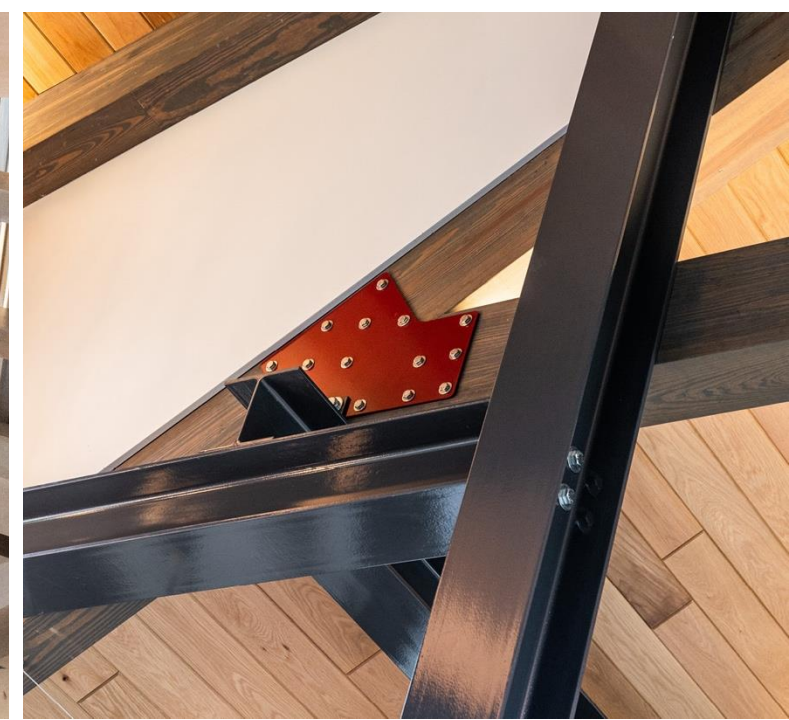
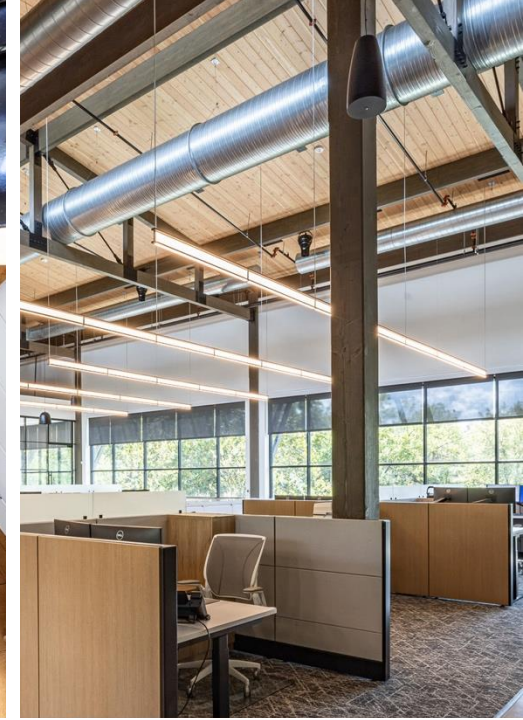


DESIGN PRINCIPLES



DESIGN ELEMENTS

- Proportion
- Texture
- Color
- Sheen
- Lighting and Ductwork (Integrated or Concealed)
- Truss Style
- Mixed Materials





DESIGNING AROUND THE MEP SYSTEM

Integrating With Other Materials and Trades

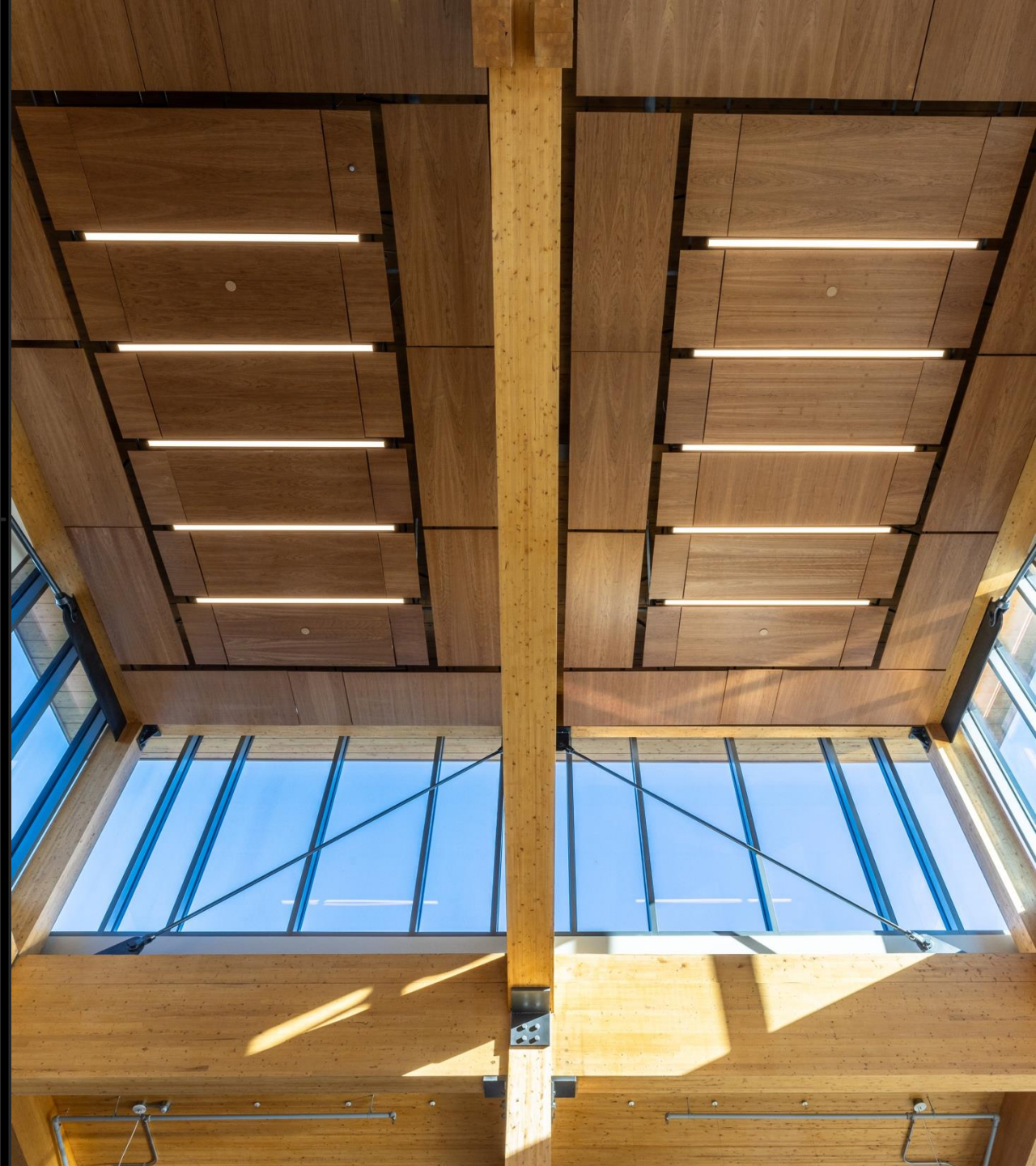
SOURCING & SPECIFYING

Understand the Availability of Materials, Plus Procurement and Cost Implications of Each

- Material Selection
- Working with Sustainable Materials
- Environmental Impact

TIMBER TIP:

Before specifying, check out apawood.org.



MATERIAL SELECTION

- Exterior Exposure
- Appearance — Industrial Grade vs. Architectural Grade
- Preservative Treated

TIMBER TIP:

Purchase a downloadable copy of AWPA Standard U1
(type AWPA U1 in the search box).





WORKING WITH SUSTAINABLE MATERIALS

Large Volumes of FSC®-C164575-Certified Lumber

- Solid Sawn Timber — Extended Lead Time and Cost
- Glulam & CLT — Readily Available

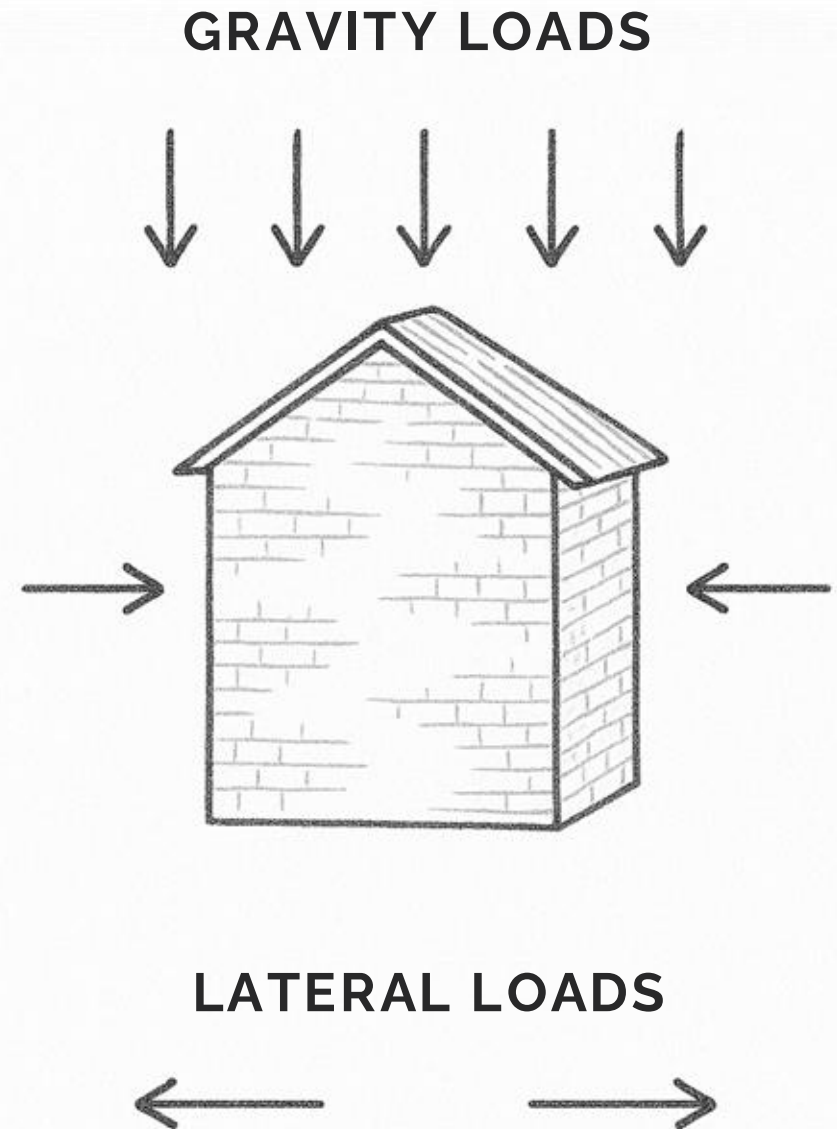


ENVIRONMENTAL IMPACT

- Ensure Responsible Forestry
- Write It Into the Spec
- Request Documentation
- Consider Steel Components

STRUCTURAL CONSIDERATIONS

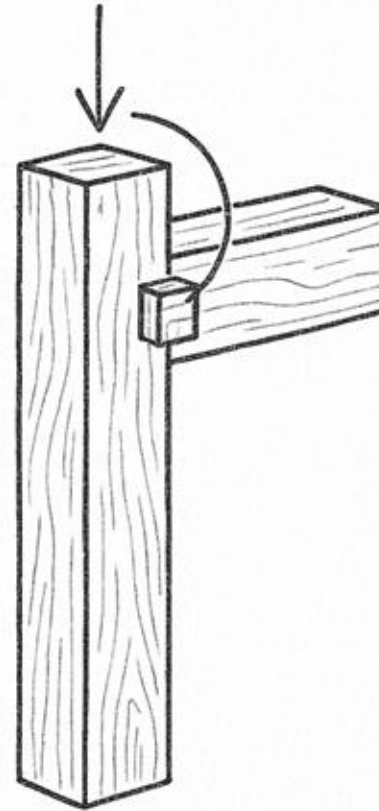
Gravity Load and Lateral Load



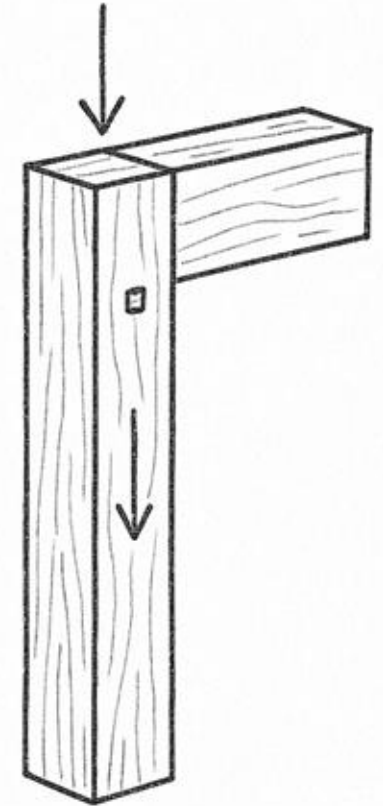
LOAD PATHS

Eccentric Load Path vs. Direct Load Path

ECENTRIC LOAD PATH VS. DIRECT LOAD PATH



ECENTRIC
LOAD PATH



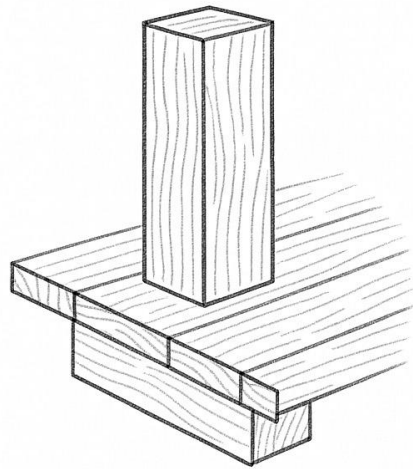
DIRECT
LOAD PATH

FOUNDATION DETAILS

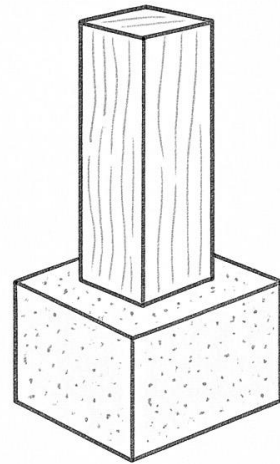
Exterior: Residential & Commercial

- Elevated and Dry
- Post-Base Detail with 1" Standoff
- Do Not Envelop in a Pier

BEARING ON WOOD DECK VS. CONCRETE



**BEARING ON
WOOD DECK**



**BEARING ON
CONCRETE**

FOUNDATION DETAILS

Interior: Residential

- Subfloor or Wood Deck — Solid Wood Blocking
- Concrete — Anchor Bolt Connection
(Cast-In-Place or Post-Installed)
- Steel — Coordinate Connection for Specific Load Case

Interior: Commercial

- Finished Floor — Elevate Post Base

BASIS OF DESIGN

It doesn't have to be completely figured out; just point us in a direction.

- Convey Your Vision
- Express Your Concept
- Post-Base Connection Appearance

COATINGS & TREATMENTS

Timber

- Level of Exposure
- Stain vs. Natural
- Treatments

Steel

- Mild Steel or Stainless Steel
- Powder Coated
- Hot-Dip Galvanized

Texture — Wood

- Surfaced 4 Sides (S4S)
- Wire-Brushed
- Cross Grain
- Band-Sawn
- Hand-Hewn

Texture — Steel

- Smooth or Forged/Hammered



FABRICATION & TOLERANCES

- Design for Manufacturing (DfMA)
- Extremely Tight Tolerances
- Precision Manufacturing
- Common Challenges and Solutions

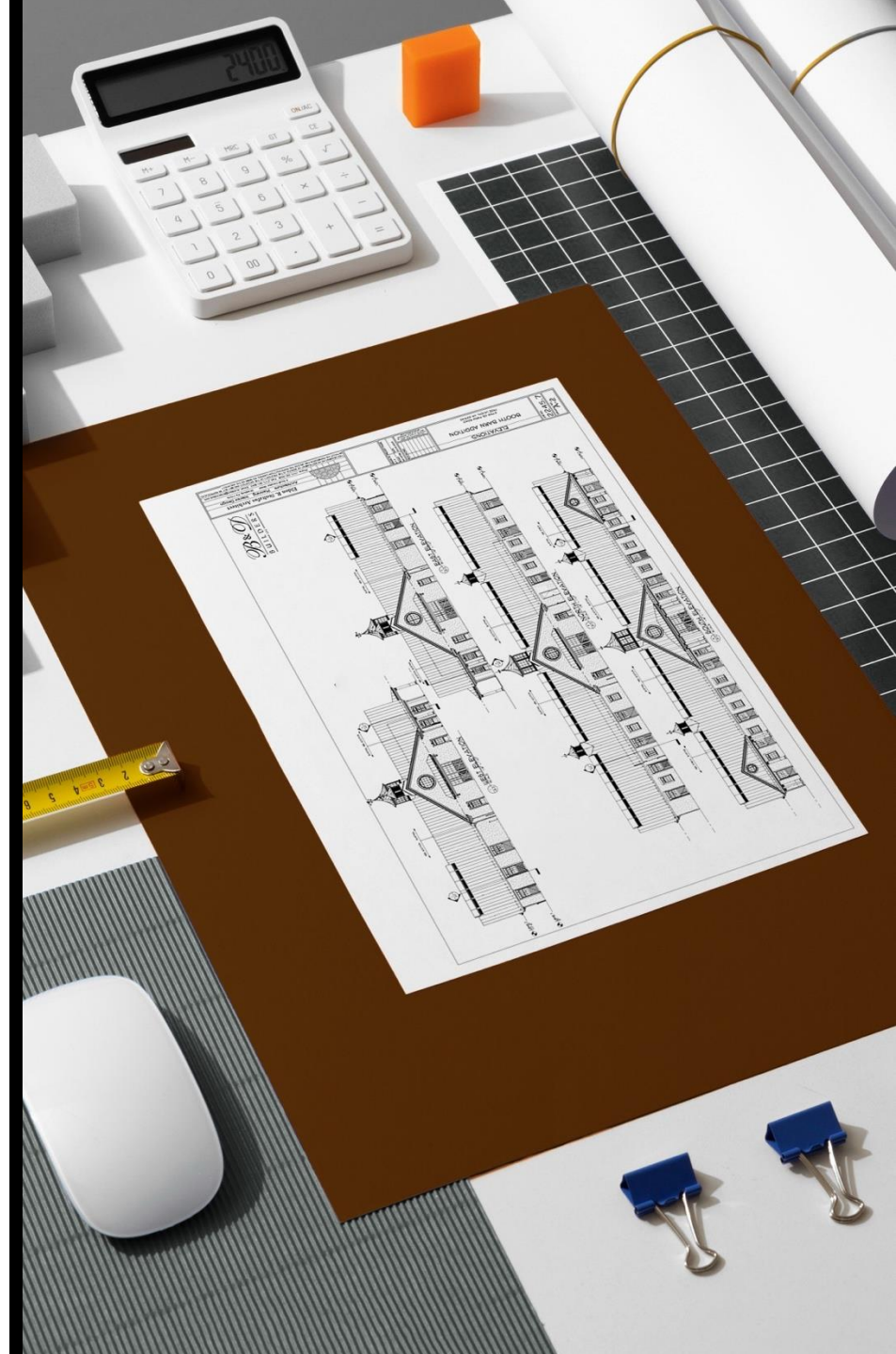
BUDGETING & ESTIMATING

What do we need to show in our drawings to get a good budget price?

- Delegated Design — Yes or No?
- Basis of Design for Any Exposed Connections
- Framing Plans
- Cross Sections
- Reflected Ceiling Plans
- Design Criteria — Dead Loads, Live Loads, Snow Loads, Building Exposure, Occupancy Type, Construction Type, Fire Ratings Required for Structural Components, Prescribed Lateral Resisting System

TIMBER TIP:

Before specifying, remember: the more detailed the drawing, the more accurate the budget.



SECTION 4:

Off-Site Timber Construction — Putting It All Together

Learning Objective 4

Prepare appropriately for the key considerations pertaining to relevant building codes, transportation, on-site assembly, and maintenance and make informed decisions throughout the construction process.

BUILDING CODES

- Outline Applicable Building Codes for Building Type
- RISC Category Lateral Impacts
- Fire Ratings



TRANSPORTATION

- Bundle Wrapped or Individually Wrapped
- Flatbed Trailer, Pre-Assembled If Possible
- Site Access, Conditions, and Challenges



ON-SITE ASSEMBLY

On-Site Accommodations Required

- Staging Area
- Lay-Down Area or Adjacent Lot
- Seasonal Impact
- Sequencing of Construction
- Walk-Through

MAINTENANCE

Understand the Availability of Materials, Plus Procurement and Cost Implications of Each

- Maintenance Plan for Moisture Mitigation — Before, During and After Installation
- Warranty

TIMBER TIP:

Don't ever leave the end grain exposed. Instead, consider flashing the top to shed water away and provide longer life for the material.

SECTION 5:

Review

1

Describe the various typology and taxonomy of timber building methods and the nuances of each so that they can make an informed decision as to which typology best suits future project needs.

2

Plan for the critical considerations that a project team must examine BEFORE embarking on a timber project.

3

Prepare appropriately for the key considerations pertaining to design principles, sourcing and specifying, basis of design, and structural considerations and make informed decisions at each stage of the pre-construction process.

4

Prepare appropriately for the key considerations pertaining to relevant building codes, transportation, on-site assembly, and maintenance and make informed decisions throughout the construction process.

QUESTIONS

Mid-Atlantic
TIMBERFRAMES

Mike Banta

717.288.2460 x207
mike.banta@matflc.com