Risk Analysis

Presented by Erica Spiritos and Graham Montgomery

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

**Risk Analysis**

Financial Risk
- Delivery Method (Design-Bid-Build vs. CM/GC or Design-Build)
- Tariffs and Trade Wars (or threat of the same)
- Commodity price fluctuation
- Unknown Product Type
- Inefficient Design

Jurisdictional Approval
- Varying levels of acceptance across jurisdictions
- Limited tested assemblies
- Engineering judgements required
- AMMRs and Performance Based Design

Schedule
- Supplier Capacity / Production Availability
- On-site productivity
- Delivery timeline (and design decision-making) for North American vs. European Supply
- Inefficient Details
- Lack of understanding of erection/assembly methods

Product Quality/Failure
- Constructability issues arising from differences in manufacturing and construction tolerances
- Improper detailing
- Water-damage of material
- Rust staining of wood from steel connectors
Types of Risk
Types of Risk

Financial Risk

• Delivery Method (Design-Bid-Build vs. CM/GC or Design-Build)
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Jurisdictional Approval

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Types of Risk

Schedule Risk

- Supplier Capacity / Production Availability
- On-site productivity
- Delivery timeline (and design decision-making) for North American vs. European Supply
- Inefficient Details
- Lack of understanding of erection/assembly methods
Product/Quality Control Risk

- Constructability issues arising from differences in manufacturing and construction tolerances
- Improper detailing
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FINANCIAL RISK
Delivery Method

5% Savings  Neutrality  10% Premium
Delivery Method
Delivery Method
Commodity Price Fluctuation

Lumber Market Report

Lumber Market Indicators

<table>
<thead>
<tr>
<th>Framing Lumber Composite Price</th>
<th>This Week</th>
<th>Last Week</th>
<th>Year Ago</th>
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<tbody>
<tr>
<td>2x4 #2B8 KD Western S-P-F</td>
<td>$338</td>
<td>$360</td>
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<td>375</td>
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<td>1x11 4x4 KD Ponderosa Pine</td>
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<td>460</td>
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<tr>
<td>Random Lengths Index</td>
<td>-53.6</td>
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<td>+29.9</td>
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</tbody>
</table>

*The index is a numerical representation of market activity based on a ratio of sawmill output to orders. In computing the index, the data are compared with similar data averaged over the past five years.*
Unknown Product Type

Detailing

Manufacture

Fabrication

Misc. Metals

Fasteners
GLULAM BEAM TO CONCRETE WALL CONNECTION

NOTE: CALCIUM VAPOR Proof TO BE USED IN TET LUMBER

SCALE: 1/50" = 1'-0"
Inefficient Design

Baseline

+5%

Source: Seattle Mass Timber Tower Book
JURISDICTIONAL RISK
Limited Tested Assemblies

- Building Inspectors look for UL rated assemblies
- UL rated assemblies are like pre approved recipes with materials acting like ingredients
- Currently no UL rated assemblies with CLT in floors or walls

Building Permit ≠ Inspectable Condition
Engineering Judgments

1hr Floor Panels in 2 Hour Rated Shafts:

• The shaft walls need to be continuous per code, but cannot feasibly be constructed as balloon frame. So to deal with this, First Tech used angle brackets at each floor to support the metal stud wall above.

• The angle bracket at each level needs to be coated with intumescent paint, which can be expensive. Best to coordinate this in advance.

• The shaft openings in the CLT need to be cut to the right size to accommodate whatever ductwork fits inside, and some degree of spacing (6”) between the duct and the wall. Need to understand the wall thickness.
- Need to determine code acceptance path very early
- Engage strong design partners familiar with alternative approaches
- Pre-permit and pre-inspection communication with AHJ is key
- Fire engineering is often overlooked
- Read the general notes and code information!
RFI & Shop Drawing Process

- Cloud collaboration is recommended to streamline process
- 3D coordination is a must, 2D documents are formality
- Front end heavy on CA – 3-6 months before project breaks ground
- Need to have all structural trades onboard early
- MEP trades onboard is strongly recommended
- Creative permitting approach is usually needed to make timing work
- Understand how specialty / delegated engineering interacts with other permits
Supplier Capacity | Production Availability

- Timing of Award
- Manufacturing availability is a huge constraint
- Workflow of information is different for every producer
- Allowances for OT and acceleration help
- Cash flow
On-Site Productivity

Considerations:

- Number of trucks allowed on-site
- Lay-down staging area to sort materials
- Building Geometry
  - Consistency of panel sizes
  - Squareness of panels
- Extent of prefabrication for connections
- CLT Bearing members: glulam or steel?
  - Manufacturing Tolerances
  - Notching around columns
Delivery Timeline

Considerations:

- Shipping distance
- Modes of transport
- Customs clearance?
- Off-site staging/storage
- Space for trucks on-site
Unfamiliar Erection & Assembly Methods

- All Engineered Pick Plans
- Specialty Rigging Hardware
- Spline Connection vs Butt Joints
PRODUCT QUALITY RISK
Manufacturing Tolerances

Timber to Concrete

Timber to Timber

Timber to Steel
Inefficient Detailing

- Field Cuts cause inefficient productivity
- Ripping down of panels
- Uncoordinated steel and concrete models
- RFI’s post approved fabrication drawings
Water Damage

- Engineered wood products are resilient when it comes to moisture
- Keep tarped as long as possible
Rust & Iron Staining

- Importance of steel coating in high moisture areas
- Galvanized
<table>
<thead>
<tr>
<th>Risk Category</th>
<th>Mitigation Phase</th>
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<tr>
<td></td>
<td>Project Start</td>
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<td>Financial</td>
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<td>Delivery Method</td>
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This concludes The American Institute of Architects Continuing Education Systems Course

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