Planning
• Anatomy of a Mass Timber Package
• Procurement, Supply Chain, Schedule Drivers

Environmental Exposure
• Site Planning
• Moisture Planning and Mitigation
• UV Planning and Mitigation

Workforce Training
• Strategic Partnerships
• Training/Education
• Resources
Holistic Costing

$/SF

$/SF

Image: GBD Architects
Anatomy of a Turnkey Mass Timber Package

- **Project Overhead**: 7%
- **Labor**: 15%
- **Material**: 14%
- **Equipment**: 64%

Source: Swinerton
Material (Direct Cost)

- 64% Turnkey Mass Timber Package
- 15% Source: Swinerton
Mass Timber Package Costs

- Project Overhead: 15%
- Labor: 14%
- Material: 64%
- Equipment: 7%

Panels are the biggest part of the biggest piece of the cost pie

Source: Swinerton
Labor (Direct Cost)

Turnkey Mass Timber Package

Source: Swinerton
Equipment (Direct Cost)

Turnkey Mass Timber Package

Source: Swinerton

Photo: Swinerton

Photo: Alex Schreyer
Project Overhead

Turnkey Mass Timber Package

Cost Analysis
Design Refinement
System Integration
VD&C
Detail Optimization
Logistics Planning

Source: Swinerton

Photos: Swinerton
CONSIDERATIONS:

- Ceiling Treatment
- Floor Topping
- HVAC System & Route
- Foundation Size
- Material Savings
- Perimeter glazing
- Value of Time
- Completion Bonds/Insurance
## Sample Procurement Strategies

<table>
<thead>
<tr>
<th>GC/CM Hires Turnkey Mass Timber Subcontractor</th>
<th>GC/CM Buys Material, Self-Performs Installation and Coordinates</th>
<th>GC/CM Buys Material, Subcontracts Labor and Coordinates</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Risk Spectrum</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>+ Hiring experience</td>
<td>+ Hiring experience</td>
<td>+ Potential added mark-up</td>
</tr>
<tr>
<td>+ Single point of responsibility</td>
<td>+ Single point of responsibility</td>
<td></td>
</tr>
<tr>
<td></td>
<td>+ Financial security of strong GC/CM</td>
<td></td>
</tr>
<tr>
<td>− Prequalify capacity of subs</td>
<td>− Lack of familiarity with supply chain</td>
<td>− Multiple layers of coordination</td>
</tr>
<tr>
<td>− Potential added mark-up</td>
<td>− Steep learning curve for coordination</td>
<td>− Prequalify capacity of sub</td>
</tr>
</tbody>
</table>

Source: Timberlab
Potential Cost Impacts: Design-Bid-Build Procurement
Alternate Procurement Option: Trade Partner/Master Builder Approach
Procurement Strategy is Key to Success

5% Savings  Neutrality  10% Premium
Understand the Supply Chain
Understand Manufacturer’s Capabilities

Credit: Tanya Luthi, Entuitive
Understand Manufacturer’s Capabilities

Credit: TimberLab
Embrace the Prefab Advantage
Tolerances: Interface with Other Structural Materials

Photos: Swinerton
Procurement Approach Determines Schedule
Procurement Logic for Scheduling

Shop drawings, Planning, Fabrication, Delivery

Example 6 Story Type IIIA Project

[Source: Swinerton]
Procurement Approach Determines Schedule

When do we need to engage a trade partner for the mass timber work?
Schedule Comparison
Schedule Drivers
BIM/Digital Twins

Photos: Swinerton
Schedule Impacts: Hybrid Structures
Look At Schedule Holistically
Overall Project Schedule Analysis: 12 Story Type IV-B

Source: Swinerton
A large scale MT project can be up to 2% higher in direct costs, but a minimum of 20% lower in project overhead costs. The net result is cost-neutrality and higher value.

Source: Swinerton
Photo: Alex Schreyer
Early Move-In for Rough-In Trades.

Photos: Swinerton
Embracing BIM for Fabrication

Photos: Swinerton
MEP Layout & Integration
MEP Layout & Integration

Smaller grid bays at central core (more head height)
• Main MEP trunk lines around core, smaller branches in exterior bays
MEP Layout & Integration

Dropped below MT framing
• Can simplify coordination (fewer penetrations)
• Bigger impact on head height
MEP Layout & Integration

In penetrations through MT framing
• Requires more coordination (penetrations)
• Bigger impact on structural capacity of penetrated members
• Minimal impact on head height
MEP Layout & Integration

In chases above beams and below panels
- Fewer penetrations
- Bigger impact on head height (overall structure depth is greater)
- FRR impacts: top of beam exposure

Credit: JC Buck
Credit: KL&A Engineers & Builders
MEP Layout & Integration

In gaps between MT panels
- Fewer penetrations, can allow for easier modifications later
MEP Layout & Integration

In raised access floor (RAF) above MT
- Impact on head height
- Concealed space code provisions
MEP Layout & Integration

In topping slab above MT
• Greater need for coordination prior to slab pour
• Limitations on what can be placed (thickness of topping slab)
• No opportunity for renovations later
SITE PLANNING

Photo: Swinerton
Table 1705.5.3
REQUIRED SPECIAL INSPECTIONS OF MASS TIMBER CONSTRUCTION

<table>
<thead>
<tr>
<th>Type</th>
<th>Continuous Special Inspection</th>
<th>Periodic Special Inspection</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Inspection of anchorage and connections of mass timber construction to timber deep foundation systems.</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>2. Inspect erection of mass timber construction</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>3. Inspection of connections where installation methods are required to meet design loads</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.1. Threaded fasteners</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.1.1. Verify use of proper installation equipment</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>3.1.2. Verify use of pre-drilled holes where required</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>3.1.3. Inspect screws, including diameter, length, head type, spacing, installation angle, and depth.</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>3.2. Adhesive anchors installed in horizontal or upwardly inclined orientation to resist sustained tension loads</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>3.3. Adhesive anchors not defined in 3.2.</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>3.4. Bolted connections</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>3.5. Concealed connections</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

Table is only required for Type IV-A, IV-B, and IV-C

Source: International Building Code
Sequencing
PICK PLAN
MATERIAL DELIVERY
STAGING
Planning for Environmental Exposures

- Plan Early
- Risk Evaluation
- Develop Construction
- Phase Plan
- Execute the Design and Moisture Management Plan
- Monitor

RDH Moisture Management Guide 1st Ed
Material Environmental Exposure and Moisture Management

Enroute
Onsite
Post-Install
Other Material
Enroute Exposure
On Site Considerations
On Site Considerations
Onsite Considerations
Workforce Development

Training is the key to efficiency
Training takes time and money

Training versus Education

Resources available to all

MT Construction Manual
Installer Curriculum
Other WW Resources
CM Workshops
Previous recorded versions
Learning Management System
Mass Timber Construction Management Program

- Mass Timber Construction Manual
- 8- & 16-Hour Installer Training Package and Training Centers
- Community College and University CM Programs
- Virtual and/or In-Person Workshops
- Partner with Construction Associations
- Project Tours
- Engage with General Contractors Across the US
https://www.woodworks.org/mass-timber-construction-management-program/
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Questions? Ask me anything.

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