Schedule Management

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Learning Objectives

Schedule
Design Completion
- Speed of design completion needs to consider time for constructability review and adjustments.
- Ideally, the project delivery method allows to bring on structural + MEPF trade partners prior to design completion
- If project delivery method does not allow for early constructability review, budget more time for RFIs and shop drawings
- Example of constructability feedback: Designing to accommodate tolerances of concrete/steel. Many times, a ⅛” gap between steel/concrete and CLT is acceptable for clearance reasons but we have had bearing issues in the past and giving an inch of play on each side should be our goal going forward.
- Basis of design must consider that Manufacture availability is ranging 3-10 months out, a sole source design could delay the project schedule
- Consider time for 3rd party fire / code review and adjustments

Trade Coordination
- Other structural trades must have shop drawings and corresponding 3D model approved / “locked” for fabrication before timber detailing starts – or risk rework
- The MEPF model sign off procedure needs to be completed with a finish to finish relationship with mass timber shop drawing review, assuming “as late as possible”
- The goal is that coordination is occurring 3-6 months earlier in the project than conventional practice – this is a big shift

Procurement
- AEC team should plan for a big push to get through shop drawing review
- Lingering questions from shop drawing review could drag on for weeks or months if not addressed definitively
- Duration from shop drawings to production start varies by supplier
- Reconcile truck loading with construction sequence to reduce time for intermittent handling

Construction
- Logistics, laydown space, truck flow is critical to speed of installation. Tight sites and a lack of access to the crane dramatically decreases workflow and increases crew size. Space for crane and at minimum 1 truck in swing radius is needed.
- Best timing for construction is during dry months (varies by region) this timing is influenced by items 1, 2, 3 above
- Advancing of permeant lateral system to stabilize frame as soon as possible and shorten duration of temporary bracing
- Prepare follow-on trades to take advantage of swift structure installation
- Install roof as quickly as possible
Project Schedule

Price Award Set

Award Mass Timber Package to SMT

Fabrication-Ready Steel/Concrete Model (Lateral System)

Deposit Payment Due

Mass Timber Geometry Drawings (Slab Edge, MEP+Frame Openings, Concrete/Steel Shop Drawings)

Procurement (Shop Drawings, Manuf., Fab., Delivery)

Structural Frame Installation

Erection Start

Steel Install - Lift 1

Mass Timber Install - L1&L2

Steel Install - Lift 2

Mass Timber Install - L3&L4

Steel Install - Lift 3

Mass Timber Install - L5
TRADE PARTNER SELECTION

When do you bring on a vendor or subcontractor?
Project Award and Design Completion

100% Design Development (or 50% CDs) - 100% Design Development (or 50% CDs)

Construction Documents

Price Award Set - Feb 12 - Feb 13

Award Mass Timber Package - Feb 12 - Feb 13

Deposit Payment Due - Mar 12 - Mar 13
Selecting a Trade Partner

Trade Partner Options

• Vendor Only

• Turnkey Provider
SHOP DRAWING PROCESS

How much time will it take to get from here to fabrication-level 3D model?
Early Detailing Activities

- **Geometry Modeling**
  - Feb 12 - Apr 9

- **Fabrication-Ready Steel/Concrete Model (Lateral System)**
  - Feb 12 - Mar 25

- **Slab Edge**
  - Feb 12 - Apr 9

- **MEPF Openings**
  - Feb 12 - Apr 9

- **Framing Detailing and Opening Coordination**
  - Feb 12 - Apr 9

- **Concrete Foundation Shop Drawings**
  - Feb 12 - Apr 9
• Geometry Model

• Architectural Intent?

• Where is the CLT Edge?

• Importance of a Slab Plan
Constructability Feedback
Early Award Trade Packages

- Coordination is occurring 3-6 months earlier in the project than conventional practice. This is a big shift.

- All factory penetrations must be finalized during the shop drawings process.
MEPF Coordination for Prefabrication

MEPF model sign off procedure needs to be completed with a finish to finish relationship with mass timber shop drawing review, assuming “as late as possible”
RFI Process

RFIs Take Time
- Types of RFIs Include:
  - Geometry Based Questions
  - Discrepancies between Structural and Architectural
  - Fire Related RFIs
  - Finishes Related RFIs
PROCUREMENT

How long will it take for materials to arrive on site?
Procurement Schedule

- **Procurement**: Apr 1 - Sep 22
- **Single Piece Shop Drawings**: Apr 1 - May 15
- **Manufacturing and Fabrication**: May 18 - Aug 28
- **Delivery to Staging Area**: Jul 20 - Sep 22
Fabrication-Level Models
Single Piece Detailing
Shop Drawing Review

- AEC team should plan for a big push to get through shop drawing review
- Lingering questions from shop drawing review could drag on for weeks or months if not addressed definitively
• Reconcile truck loading with construction sequence to reduce time for intermittent handling
• Consider project phasing for large floor-plate (25,000+ SF) buildings
Project Phasing & Sequencing

A

B

C
Material Lead Time

- For small (<50,000 SF) projects, RFI and shop drawing process consumes the bulk of material lead time.
- For large (>100,000 SF) projects, production duration begins to exceed shop drawing duration.
- Material Lead Time is a function of how developed and detailed the drawings are.
- Larger projects must be procured earlier, especially if there are production constraints. Plan to stockpile material.
CONSTRUCTION

How fast can we build?
Construction Schedule

- **Jul 5 - Oct 16**: Structural Frame Installation
- **Jul 5 - Jul 6**: Erection Start
- **Jul 5 - Jul 10**: Steel Install - Lift 1
- **Jul 12 - Aug 14**: Mass Timber Install - L1&L2
- **Aug 10 - Aug 21**: Steel Install - Lift 2
- **Aug 16 - Sep 18**: Mass Timber Install - L3&L4
- **Sep 13 - Sep 25**: Steel Install - Lift 3
- **Sep 20 - Oct 16**: Mass Timber Install - L5
Off-Site Storage

Temporary local storage and local delivery of materials

Proper protection of material

Proper documentation of material hand-off via BIM 360 Field Checklists
Truck Flow

Logistics, laydown space, truck flow is critical to speed of installation.

Tight sites and a lack of access to the crane dramatically decreases workflow and increases crew size.

Space for crane and at minimum 1 truck in swing radius is needed.
Productivity is based on piece count
More pieces = Longer Install Duration
Different suppliers manufacture panels of different lengths
A job may have 80 CLT panels with Supplier X, and 140 CLT panels with Supplier Y.
Advancing of permeant lateral system to stabilize frame as soon as possible and shorten duration of temporary bracing.
Early Move-In for Follow-On Trades

- Prepare follow-on trades to take advantage of swift structure installation
Install roof as quickly as possible
This concludes The American Institute of Architects Continuing Education Systems Course

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