Mass Timber - Highrise
Lessons Learned

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Outline

• **Virtual Construction**
  – Clash Detection + Trade Coordination
  – 4D Schedule Animation
  – Precision of Workmanship

• **Managing Expectations**
  – Importance of Offsite Mock-ups
  – Mold and Staining Management
  – Site Water Management
  – Fire Mitigation During Construction
  – Settlement of Building

• **Benefits of Mass Timber**
  – Shortened Duration of Construction
  – Increased Offsite Construction

• **Social Responsibility**
  – Reduction in Footprint
Virtual Construction
Clash Detection + Trade Coordination

• **Installation** Run-through
• **Sequencing** with Multiple Trade Participation
• **Safety** Accessibility
Virtual Construction
4D Schedule Animation - Cores

Concrete Cores:
• 5 days cycles
• 18 floors (2 cores) in 9 weeks
Virtual Construction

4D Schedule Animation - Tower
Virtual Construction
4D Schedule Animation - Tower

Wood Element:
• Installation from June 6th - August 9th, 2016
• 16 Levels of CLT installed in 8 weeks
Virtual Construction
4D Schedule Animation – Mechanical Room
Virtual Construction
4D Schedule Animation – Mechanical Room
Virtual Construction
Precision of Workmanship

- The level of precision of the manufactured panels allows following trades to work more effectively and efficiently

- Reduces RFI’s during construction

- Reduces trade conflict changes

- Allows multiple trades to prefabricate hence reducing installation time on site
Managing Expectations
Importance of Offsite Mock-ups
Managing Expectations
Mold and Staining Management

- End Grain Wax
- Manufacturer-installed Sealant
- Site-applied Sealant
- Final Coat
Managing Expectations
Site Water Management

- M & E penetration protected after installation
- Concrete Topping
- Shower Drains, Kiddy Pools
- Interior Tarping
- Use of Fans to Control Moisture
- Chamfer Strips
- SIGA Tape
- Prep of CLT
Managing Expectations
Site Water Management
Managing Expectations
Fire Mitigation During Construction

- **Required Vs. Installed**
- **Drywall Detail** of the curbs
- **Standpipes**
Managing Expectations
Fire Mitigation During Construction

Video:
Fire test: wooden house vs. ordinary house

By
Paulius Milčius
Managing Expectations
Fire Mitigation During Construction
Managing Expectations
Fire Mitigation During Construction

- Exposed Timber **Charring** Vs. **Type X** Drywall Protection
Managing Expectations
Settlement of Building

- **Line & Plumb** Column Installation
- **Surveying** of L-Angles on every floor
- **Continuous** monitoring of CLT Moisture
- Cutting **down steel** connections
Benefits of Mass Timber
Shortened Construction Duration

CLT Panels

- **5 ½ hrs** to drop in 10,000sqft of CLT, 29 panels

- Installing *splines*, *drag straps* and *handrails*
Benefits of Mass Timber
Shortened Construction Duration

Envelope Panels

- 22 envelope panels per floor (windows are installed in the panel at the factory)
- One floor installed in a single day sequence (8-9 hrs.)
Benefits of Mass Timber
Shortened Construction Duration

Envelope Panels

• Envelope panels clip similar to a curtain wall

• System flashing connecting panels

• Installation of flashing from above eliminates the need of a scaffold system
Benefits of Mass Timber
 Increased Offsite Construction

Envelope
Panels
Benefits of Mass Timber
Increased Offsite Construction

Millwork

[Images of millwork materials]
Benefits of Mass Timber
Increased Offsite Construction

Mechanical Kit-of-parts
Social Responsibility
Reduction in Footprint

• **6 people** to install 1 CLT floor vs **27 people** to install concrete, reinforcing, formwork, reshoring
• **Eliminates 4 floors** of reshore below the active floor installation
• **6 people** to install 1 envelope vs **12 multiple layers**
• **Eliminates scaffold** installation and removal
Social Responsibility
Reduction in Footprint

- Reduces trucking per 1 floor to 5 trucks of acoustic concrete
- 3 trucks of CLT
- 2 trucks of Envelope panels per floor
- Currently project waste is 92% recycled
Thanks! Questions?