80 M St. Case Study

Adding Complexity - Mass Timber Vertical Expansion

Presented by Sean Fox

Disclaimer: This presentation was developed by a third party and is not funded by WoodWorks or the Softwood Lumber Board.
1. Project Details
2. Preconstruction
3. Delegated Design
4. Procurement
5. Project Sequence
6. Lessons Learned and Best Practices
PROJECT STAKEHOLDERS

Owner
Columbia Property Trust CxP

Architect
Hickok Cole

Structural / Fire / Code Engineer
ARUP

General Contractor
DAVIS Construction

Timber Contractor
Katerra
First Mass Timber Project in DC

Existing 7-Story Concrete Building

Vertical Expansion of 3 floors, adding 105k sq ft.

Occupied Building

Upgrading of Existing Structure

Phased Modernization of Existing Elevators
DAVIS (GC), Hickok Cole (Architect), and ARUP (Engineer) engaged by Columbia to assist in budgeting a future repositioning of 80 M.

**Q1 | 2018**

General scope determined - (vertical expansion (2.5 timber, vs 3.5 concrete))

**Q1 | 2019**

DCRA Presentation for Code Modification

**MAY | 2019**

Timber contractors engaged

Katerra hired

**Q1 | 2020**

April | 2020

Job Mobilized

**SCHEDULED TO DELIVER Q2 2022**

APRIL 2019

SD Presentation

Q4 | 2019

Timber contractors engaged
HCA began researching mass timber in 2016

Designed under DCMR 2013 (IBC 2012)

DCRA was willing to look at projects on case-by-case basis

Accepted as a code modification using IBC 2021 type IV-C, even though over 85’
DCRA required addition of normal use sprinklers and redundant fire pump

DAVIS assisted throughout design with concrete cores, early demolition of L7, and structural construction strategy
**DC Code Acceptance**

IBC 2021 and Type IV-C updates have not been adopted by the local AHJ, however the design team was able to get the project accepted as a code modification. IBC 2021 may be adopted by DCMR by 2023.

**Early Design Assist Packages**

Elevators, Curtainwall, and Mass Timber

**Design team provided an early release drawing package to price and release the delegated design mass timber scope of work**
MASS TIMBER RELEASE PROCESS + TIMELINE

BID SOLICITATION + INTERVIEW

1. TIMBER vs STEEL CONCEPTUAL BUDGETING
2. SCHEMATIC DESIGN
3. EARLY RELEASE DESIGN PACKAGES
4. MASS TIMBER BIDDING AS DELEGATED DESIGN
5. INTERVIEWS
PROCUREMENT PROCESS + TIMELINE

DESIGN ASSIST + SUBMITTAL CRITERIA

PROGRESS MEETINGS

ANALYSIS

TESTING

SHOP DRAWINGS

FINAL SHOP DRAWINGS

10 Month Overall Submittal Process
PROCUREMENT – DELEGATED DESIGN

JANUARY
Katerra Release / Beginning of Delegated Design Effort

MARCH
Redesign for revised vibration requirements

MAY
Structural optimization and geometry lock complete

JULY
Connection Testing

NOVEMBER
Full Shop Drawings Complete with VC Coordination

2020
PROCUREMENT – FABRICATION AND DELIVERY

**2020**

**NOVEMBER**
Glulam production begins

**MARCH**
Mass timber delivered to site

**2021**

**FEBRUARY**
CLT fabrication begins
PROCUREMENT PROCESS + TIMELINE

DESIGN ASSIST + SUBMITTAL CRITERIA

Month Overall
Procurement After Initial Engagement
PROCUREMENT
PROCESS + TIMELINE

FABRICATION + PROCUREMENT

GLULAM COLUMN BEAMS
CLT DECKING
Designed as Type IV-C per 2021 IBC, although DC AHJ has not formally adopted this code update.

Vibration Model / Requirements are the primary controlling factor in Mass Timber Design.

Core of 80 M Street is steel. Remainder of floorplate is CLT and Glulam.

Glulam and CLT portion of the structure included a Design Assist Effort.

Design Assist Process originally scheduled for 14 weeks; it was extended due to redesign of footfall and vibration model, totaling almost 30 weeks altogether.

Sound Transmission Testing will be conducted in early 2021 to confirm acoustic properties of CLT slabs.
Day
Every Colored Dot equals 1 Day of Installation

Delivery + Logistics
Delivery + Logistics are keyed off of this plan
Faster Installation
Glulam + CLT Installation: 10 weeks
Equivalent Steel Building: 14-16 weeks

Timeline
Mass Timber installation is scheduled to begin early March 2021
Elevator Phase 1 – Modernization of first half of existing elevators

Existing Building Structural Reinforcement

Installation of temporary mechanical system

Demolition of Existing Roof and Penthouse

Installation of new 8th Floor Steel Structure

Installation of new steel core to final height

Installation of mass timber structure and CLT
LESSONS LEARNED + BEST PRACTICES

Water Mitigation
- CLT Spline sealing
- Top of Column Sealing
- Early Unwrapping of Structure
- Perimeter Flashing

Factory vs. Field Sealing

Construction Tolerances
- AISC Steel Tolerances
- Concrete Slab Tolerances

Temporary Storm System
This concludes The American Institute of Architects Continuing Education Systems Course

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