Office Overbuild: Building a Vertical Mass Timber Addition in Washington, DC

Presented by: Thomas Corrado, Hickok Cole

Disclaimer: This presentation was developed by a third party and is not funded by WoodWorks or the Softwood Lumber Board.
80 M STREET
Washington, DC

FIRM
Hickok Cole

CLIENT
Columbia Property Trust

SIZE
100,000 SF

DETAILS
Vertical addition/extension to an existing seven-story building
Adds two full floors of trophy class office space with 17'-0" ceiling heights
An occupied penthouse level will add additional office density as well as a roof top terrace and social space
EXISTING CONDITIONS
MASSING CONCEPTS

EXISTING
MAINTAIN EXISTING ROOF
MOVE MECHANICAL EQUIPMENT UP

2 LEVELS
• 60,000 SF GFA
• 10,000 SF ROOFTOP TERRACE

2.5 LEVELS
• MECHANICAL PENTHOUSE
• 108,000 SF GFA
• 14,000 SF TERRACE ON LEVEL 10

EXISTING
MAINTAIN EXISTING ROOF
MOVE MECHANICAL EQUIPMENT UP

3 LEVELS
• MECHANICAL PENTHOUSE
• 120,000 SF GFA

3 LEVELS
• 20,000 SF HABITABLE PENTHOUSE
• 120,000 SF GFA
• 10,000 SF ROOFTOP TERRACE

3 LEVELS
• MECHANICAL PENTHOUSE
• 120,000 SF GFA
• 10,000 SF ROOFTOP TERRACE

2 LEVELS
• 20,000 SF HABITABLE PENTHOUSE
• 80,000 SF GFA
• 10,000 SF ROOFTOP TERRACE

2.5 LEVELS
• MECHANICAL PENTHOUSE
• 108,000 SF GFA
• 14,000 SF TERRACE ON LEVEL 10
CONCEPTUAL SECTION
80 M STREET: E/W SECTION DIAGRAM

TYPICAL FLOOR 8'-6" WINDOW HGT = 15'-8" PRIMARY DL

NEW FLRs - 15'-0" & 12'-0" WINDOW
IBC 2021 NEW CONSTRUCTION TYPES

**Type IV-A**
- **Primary Structural Frame:** 3HR Fire Rated
- **Required Noncombustible Protection:**
  - **Ceilings:** 100% Protection
  - **Floors:** 1" Minimum Coverage
  - **Interior Surfaces:** Always Required
- **Redundant water main feed at Fire Pump**
- **Fire Safety Procedures During Construction**
- **Other High Rise Requirements**

**Type IV-B**
- **Primary Structural Frame:** 2HR Fire Rated
- **Required Noncombustible Protection:**
  - **Ceilings:** 80% Protection
  - **Floors:** 1" Minimum Coverage
  - **Interior Surfaces:** Always Required
- **Redundant water main feed at Fire Pump**
- **Fire Safety Procedures During Construction**
- **Other High Rise Requirements**

**Type IV-C**
- **Primary Structural Frame:** 2HR Fire Rated
- **Required Noncombustible Protection:**
  - **Ceilings:** Not Required
  - **Floors:** Not Required
  - **Interior Surfaces:** Not Required
- **Fire Safety Procedures (Over 4 Stories)**
- **Other High Rise Requirements (Over 75 FT)**

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Images courtesy of AtelierJones, LLC
NEW CONSTRUCTION TYPES

OUR DESIGN:
10 STORIES (9 STORIES + PENTHOUSE)
BUILDING HEIGHT 130 FT
7 EXISTING STORIES, TYPE 1B
3 STORIES OF MASS TIMBER
ADDITION OF 100,000 SF
AVERAGE AREA PER STORY 33,000 SF

IMAGES COURTESY OF ATELIERJONES, LLC
To incorporate mass timber construction, we proposed a code modification to the DC Building Code under the Alternative Materials, Design and Methods permitted in Chapter 1 of DCMAR 12A:

Over height Type IV-C, at a building height of 130ft, with 3 floors mass timber, over 7 floors of concrete construction with additional fire protection.

In support of the proposed code modification, we offer the following information:
• All Four sides of the building allow fire department access.
• The existing seven story building is Type 1B construction, non-combustible concrete.
• The existing non-combustible egress stairs are 48" wide. (wider than the Code Min. 44" width)
• The proposed three story addition would incorporate 2 hour fire rated, exposed mass timber.
  » Glulam meeting Chapter 23 of 2018 IBC
  » CLT meeting Chapter 23 of 2018 IBC and PRG-320 (using non-heat delaminating adhesives)
• With the Mass Timber Addition, the building core and egress stairs would be constructed of non-combustible steel and concrete.
• Three Hour Fire Separation between Type IB and Type IV-C.
FIRE DEPARTMENT ACCESS ON ALL FOUR SIDES OF THE BUILDING

100% of the building's facades are accessible to fire trucks.
PROPOSED ADDITION:
3 Stories of Mass Timber Construction, Type IV-C

BUILDING CORE AND EGRESS STAIRS:
Steel Framing with Composite Decks, 2HR FR

EXISTING BUILDING:
7 Stories of Concrete Construction, Type 1B

BUILDERS RISK PRESENTATION
PROPOSED 8TH FLOOR PLAN

*All floor plans are illustrative & final layout is subject to adjustment prior to permit review
TYPICAL STRUCTURAL BAY

- Primary Beams, 37"
- Secondary Beams, 28"
- 5-Ply CLT Panel
- Wood Column
- 3" Concrete Topping Slab
- 5-Ply CLT Panel
CONNECTION CONCEPTS

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CONNECTION CONCEPT DIAGRAM

- Topping slab
- (2) 12" x 24" glulam column
- 5 ply CLT deck
- STL column to column support
- Primary girder
- (2) 12" x 24" glulam column
- Secondary beam
- 2hr concealed hanger
INTERIOR VIEW
VIBRATION ANALYSIS

Expectations

Synchronization

1.6-2.2Hz

Mass
Stiffness
Damping

Structural Transmission
VIBRATION ANALYSIS

*Images provided by Arup and subject to copyright

TARGET MAXIMUM RESPONSE FACTOR OF 8

MODE SHAPE 1:

Deformation magnification: 10.00
Scale: 1:277.8

Period: 0.1908 s
Mode 1
Case: A1 : Dynamic : Mode 1

Element list: PA2

Output axis: global
Deformed Elevation, z: 1.250 ft/pic.cm
Deformation magnification: 10.00

-3.281 ft
-1.147 ft
-2.570 ft
-1.859 ft
0.2750 ft
1.697 ft
-2.570 ft
-1.859 ft
0.9862 ft
INTERIOR VIEW – CONCEPT
**FACADE ANCHOR – CONCEPT**

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### Notes

1. AT COLUMN LOCATIONS, APPLY FASTENER PATTER AND STUD LOCATION (1) EA SIDE OF COLUMN.

### Details

**System Depth:**
- 10 1/2" C/L
- 10 1/2" C/L

**Cover Cap to Have:**
- Orange Finish
- Grey Finish

**Please Provide Color of Metal Panel Infill:**
- 1/8" THK. ALUMINUM PANEL
- Painted to match curtain wall (adhered to back of backpan)

**Optional Orange Gasket to Help with Pest Prevention**

**Wall Thickness of Profile to Increase to Prevent Deflection, Pending Engineering Judgement**

**Exposed Fasteners Painted to Match CW Finish**

**Pinning Fastener @36" O.C.**

**Blind Seal and Seal Over Head Skim Seal at Top and Bottom of Vertical Cap**

**2800 LBS**

**1000 LBS**

**1675 LBS**

**2675 LBS**

**Apex Fitting**

**3" LWC Topping Slab**

**1" Acoustic Barrier**

**1/4" Shim, by Others Applied WL**

**Resultant Uplift**

**Resultant Compression on Edge of CLT**

**3 19/32"**

**29/32"**

**3"**

**2 1/8"**

**4 1/2"**

**1 1/8"**

**1"**

**2800 LBS**

**1000 LBS**

**1675 LBS**

**2675 LBS**

**Applied WL**

**Applied DL**
THANK YOU!

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