OFFICE OVERBUILD: BUILDING A VERTICAL MASS TIMBER ADDITION IN WASHINGTON, DC

July 2020
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
• 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

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
CONCEPTUAL SECTION
PRIMARY DAYLIGHT AREA: APPROX 2X WINDOW HEIGHT
SECONDARY DAYLIGHT AREA: APPROX 2X PRIMARY DL VIEW CORRIDORS

80 M STREET: E/W SECTION DIAGRAM
TYPICAL FLOOR 8'-6" WINDOW HGT = 15'-8" PRIMARY DL
NEW FLOOR 15'-0" WINDOW HGT = 28'-0" PRIMARY DL

OFFICE FLOOR - 8'-6" WNDW HGT
NEW FLRs - 15'-0" & 12'-0" WNDW
IBC 2021 NEW CONSTRUCTION TYPES

**TYPE IV-A**
- **Primary Structural Frame:** 3HR Fire Rated
- **Required Noncombustible Protection:**
  - **Ceilings:** 100% Protection, 0% Exposed Timber
  - **Floors:** 1" Minimum Coverage
  - **Interior Surfaces:** Always Required, 2/3 of FRR, 80 mins min
- 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, 20% Exposed Timber
  - **Floors:** 1" Minimum Coverage
  - **Interior Surfaces:** Always Required, 2/3 of FRR, 80 mins min
- 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)
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  

Typical Amenities
- 12 units
- Building Height 85 FT
- Allowable Building Area 405,000 SF
- Average Area Per Story 45,000 SF

3 + 7 S

IBC 2021

NEW CONSTRUCTION TYPES

Courtesy atelierjones, LLC

18 STORIES
BUILDING HEIGHT 270 FT
ALLOWABLE BUILDING AREA 972,000 SF
AVERAGE AREA PER STORY 54,000 SF

TYPE IV-A

12 STORIES
BUILDING HEIGHT 180 FT
ALLOWABLE BUILDING AREA 648,000 SF
AVERAGE AREA PER STORY 54,000 SF

TYPE IV-B

3 + 7 S

18 STORIES
BUILDING HEIGHT 130 FT
ALLOWABLE BUILDING AREA 972,000 SF
AVERAGE AREA PER STORY 54,000 SF

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IBC 2021
PROPOSED CODE MODIFICATION

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 IB 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 PRG-320:2018 (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 8TH FLOOR PLAN

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

BRACE FRAME LOCATIONS

8TH FLOOR

restrooms

elevator overrun

30'-0"
TYPICAL STRUCTURAL BAY

- 3'-1" 3" WOOD COLUMN
- 3" CONCRETE TOPPING SLAB
- 5 PLY CLT PANEL
- SECONDARY BEAM
- PRIMARY BEAM
- 30'-0" 30'-0" 30'-0" 10'-0" 10'-0" 10'-0"
- PRIMARY BEAMS, 36"
- SECONDARY BEAMS, 27"
- 5 PLY CLT PANEL
CONNECTION CONCEPTS

A.1 - GLULAM BEAM TO GLULAM GIRDER CONNECTION

A.2

A.3

80 M

H. BLOMGREN

2020-01-08

SCALE: NTS

CONCEALED STEEL HANGER

INTUMESCENT STRIP, (3) SIDES

INTEGRITY STRAPPING

1 of 2

80 M

CONNECTION DETAIL B - CONCEPT

H. BLOMGREN

2020-01-08

SCALE: NTS

CONCEALED STEEL COLUMN POST

1/4" CLR, TYP (3) SIDES

FIRE SEALANT, TYP (3) SIDES

3-1/4" COVER

2 of 2

B.1

INTEGRITY STRAPPING

GL BEAM END CONNECTION - SEE DETAIL A

GL BEAM END CONNECTION - SEE DETAIL A

1/4" CLR, TYP (3) SIDES

FIRE SEALANT, TYP (3) SIDES

3-1/4" COVER

B.2 - DETAIL

B.1 - PLAN

*Images provided by Katerra and subject to copyright*
CONNECTION CONCEPT DIAGRAM

- (2) 12" x 24" glulam column
- topping slab
- 5 ply c1t deck
- stl column to column support
- primary girder
  - (2) 12" x 24" glulam column
- secondary beam
  - 2hr concealed hanger
VIBRATION ANALYSIS

*Images provided by Arup and subject to copyright

Expectations

Synchronization

1.6-2.2Hz

Structural Transmission

Mass
Stiffness
Damping
INTERIOR VIEW – CONCEPT
QUESTIONS?
LET’S GET IN TOUCH

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