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

Presented by: Thomas Corrado, Hickok Cole

hickok cole

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80 M STREET

Washington, DC

FIRM
Hickok Cole

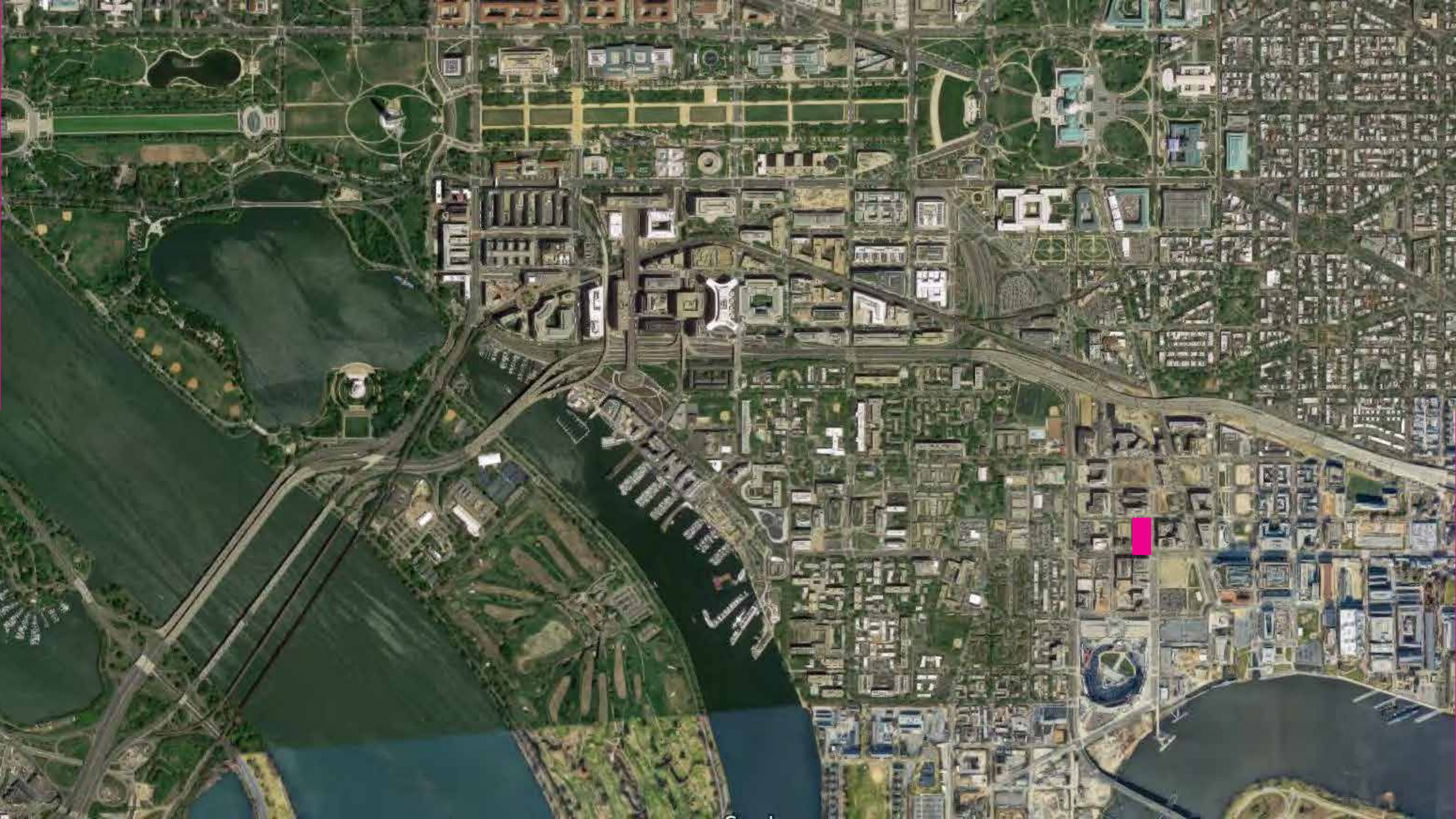
CLIENT
Columbia Property Trust

SIZE
100,000 SF

DETAILS
Vertical addition/extension to an existing seven-story building

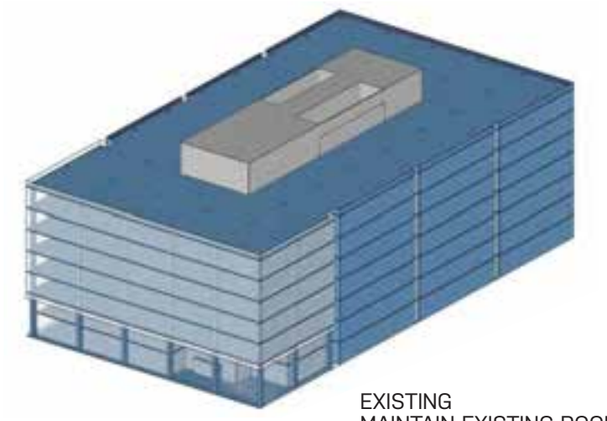
Adds two full floors of trophy class office space with 17’-0” ceiling heights

An occupied penthouse level will add additional office density as well as a roof top terrace and social space

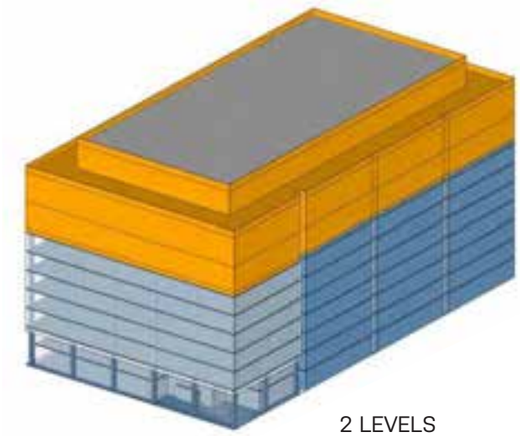


EXISTING CONDITIONS

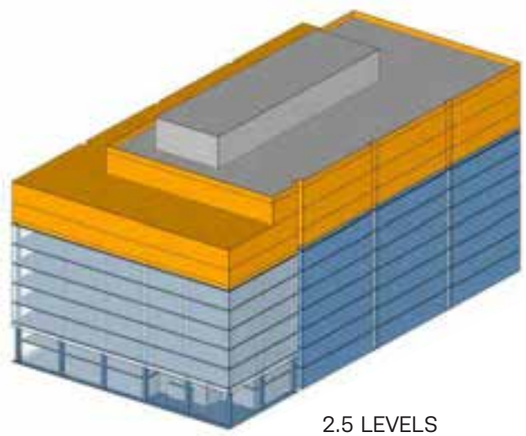
MASSING CONCEPTS



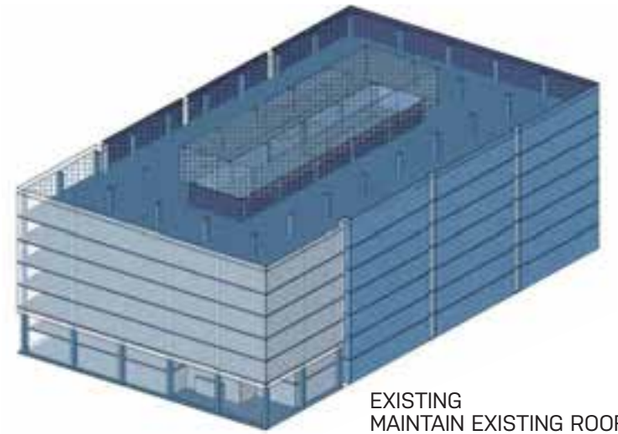
EXISTING
MAINTAIN EXISTING ROOF
MOVE MECHANICAL EQUIPMENT UP



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



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



EXISTING
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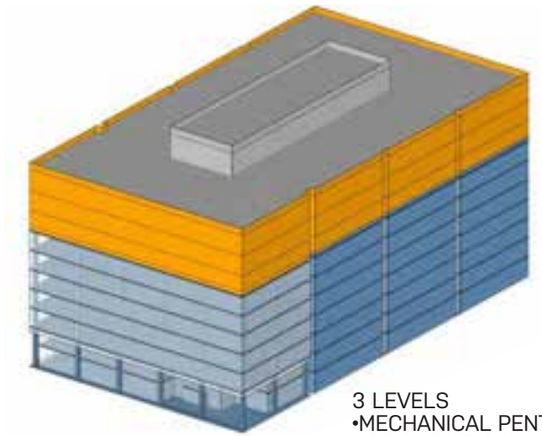
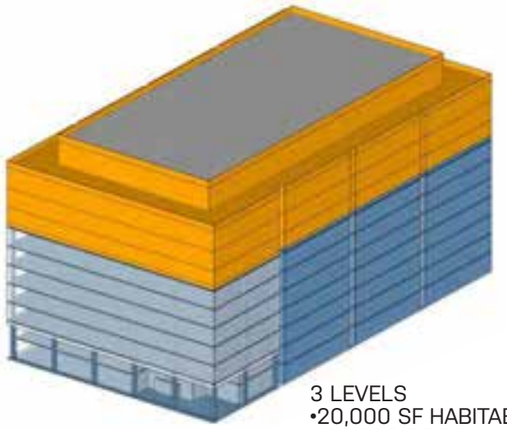


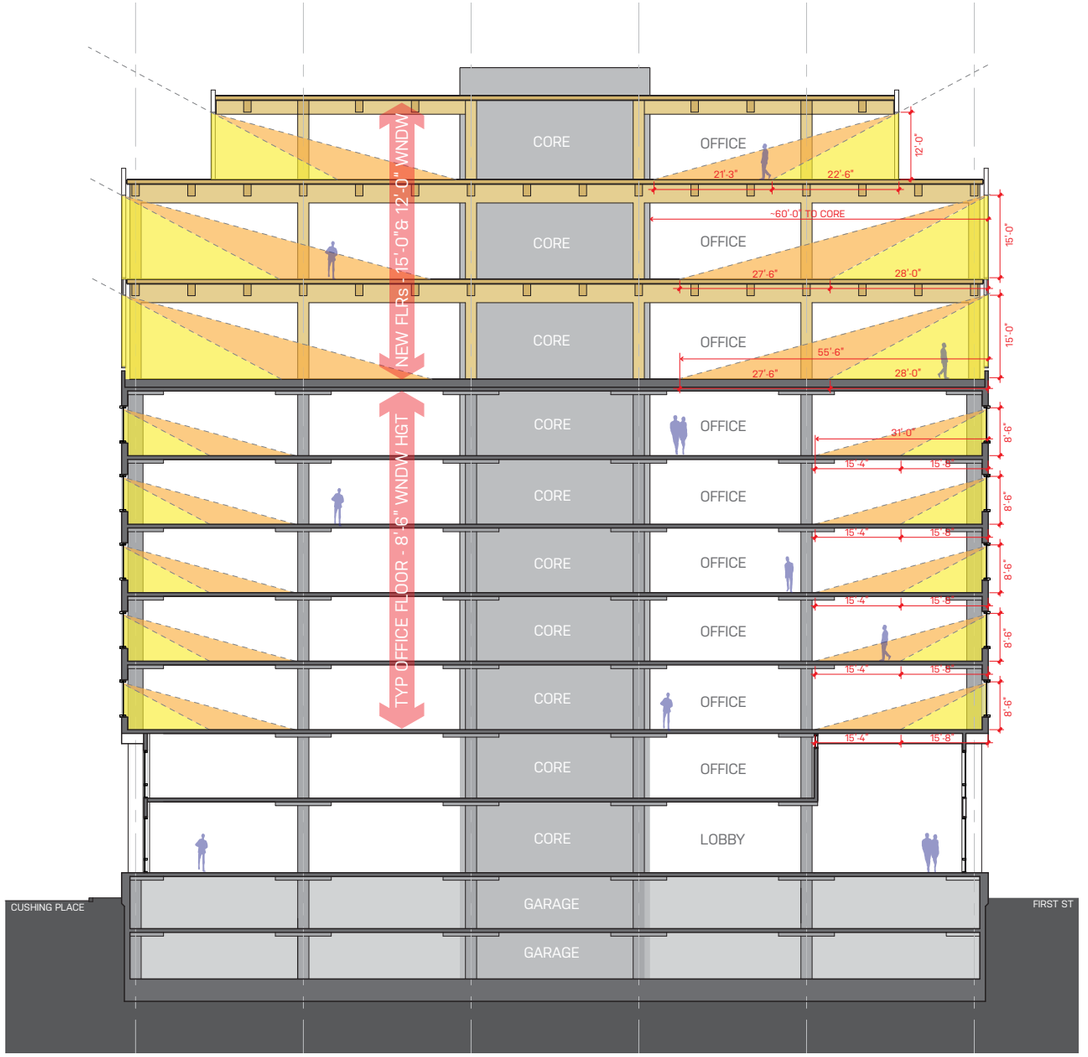
3 LEVELS
•MECHANICAL PENTHOUSE
•120,000 SF GFA



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

CONCEPTUAL SECTION

CONCEPTUAL SECTION



IBC 2021 NEW CONSTRUCTION TYPES

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

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

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

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

9 STORIES
BUILDING HEIGHT 85 FT
ALLOWABLE BUILDING AREA 405,000 SF
AVERAGE AREA PER STORY 45,000 SF

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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NEW CONSTRUCTION TYPES

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

9 STORIES
BUILDING HEIGHT 85 FT
ALLOWABLE BUILDING AREA 405,000 SF
AVERAGE AREA PER STORY 45,000 SF

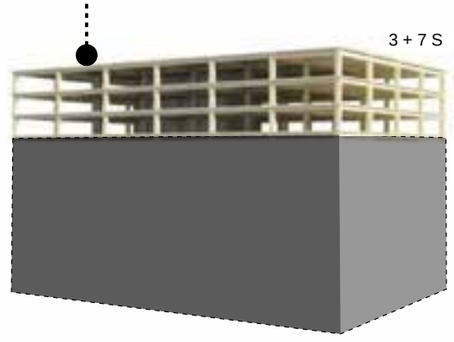
TYPE IV-C

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



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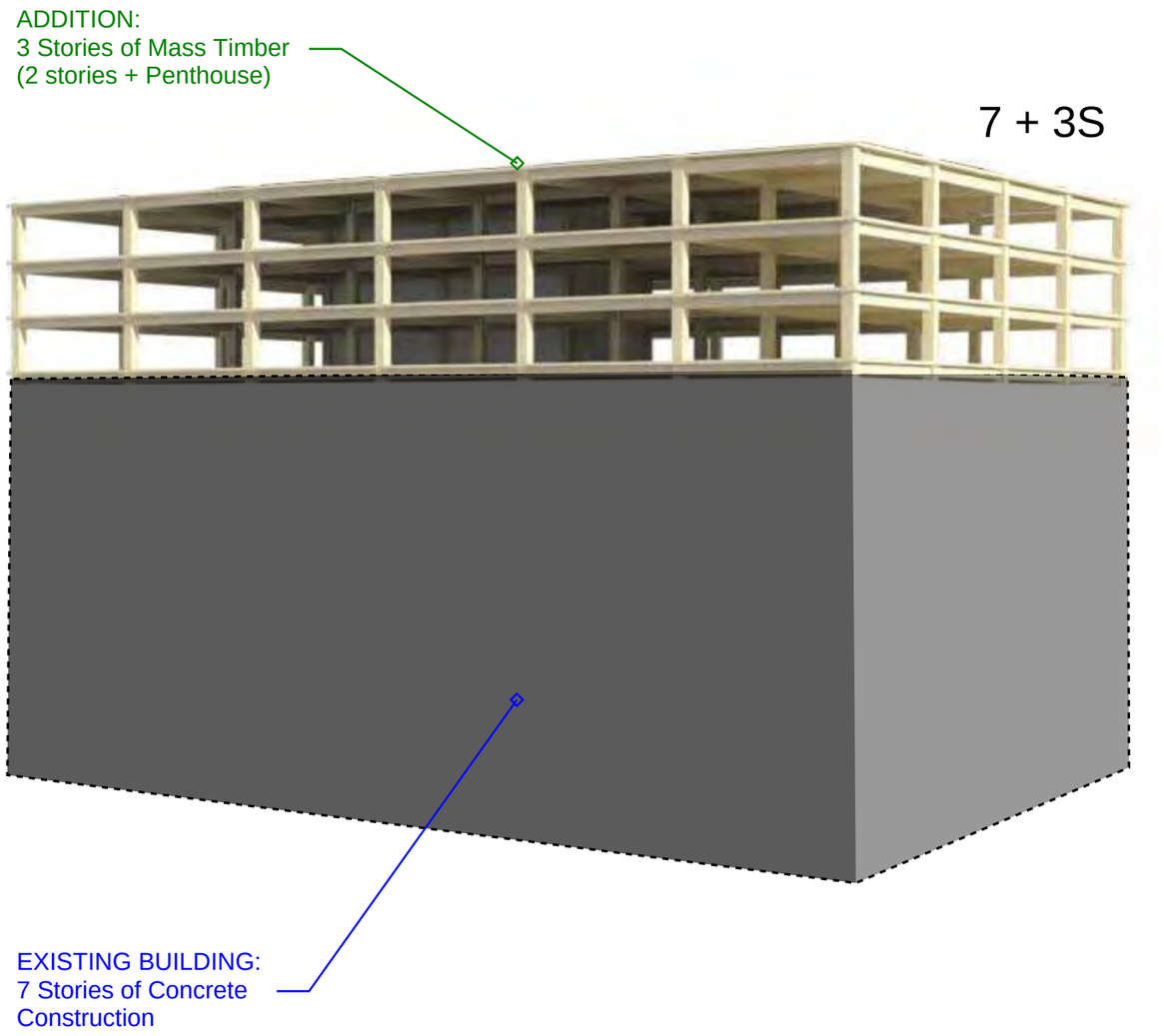
PROPOSED CODE MODIFICATION



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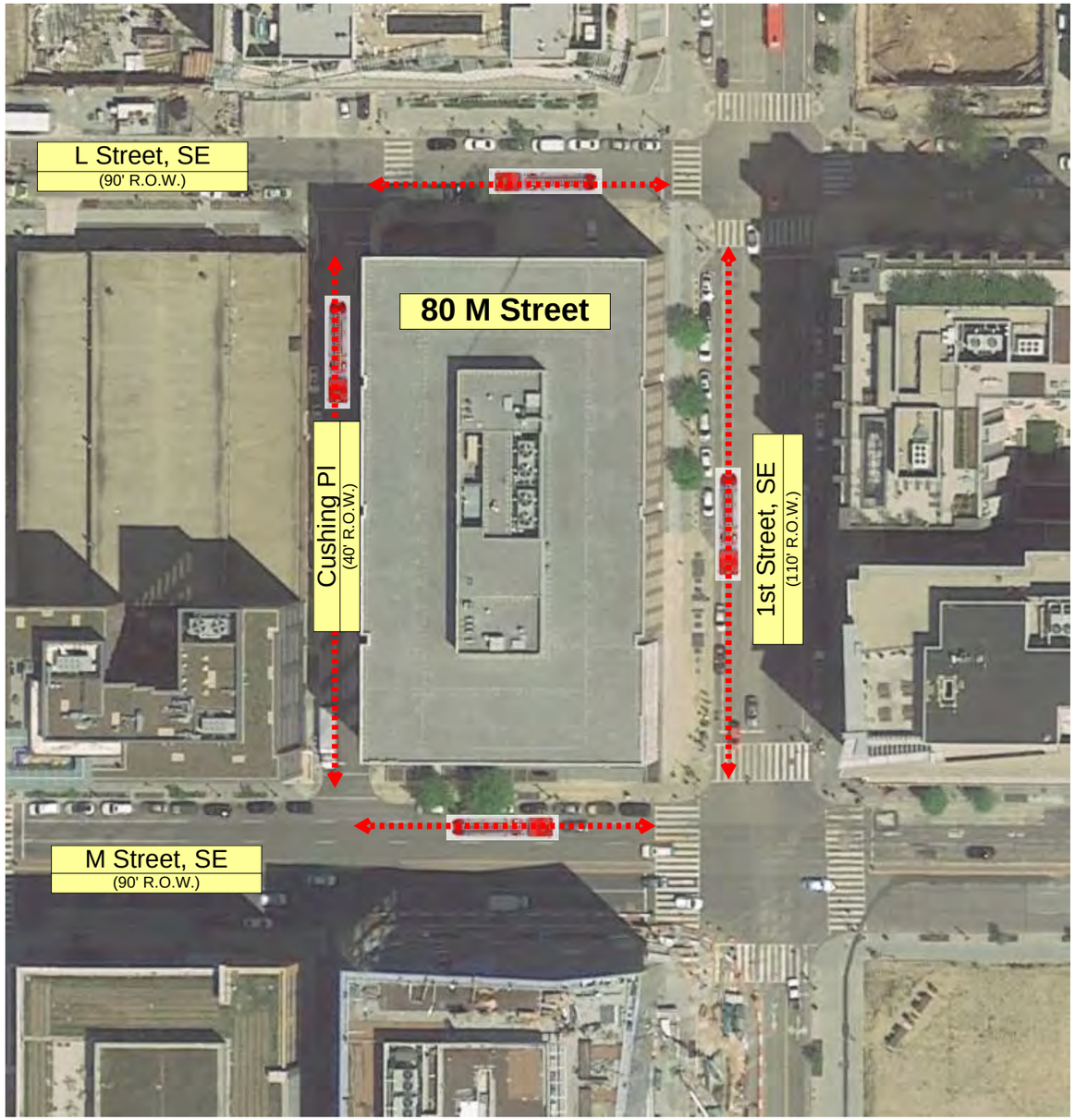
To incorporate mass timber construction, we proposed a code modification to the DC Building Code under the Alternative Materials, Design and Methods permitted in Chapter 1 of DCMAR 12A:

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.

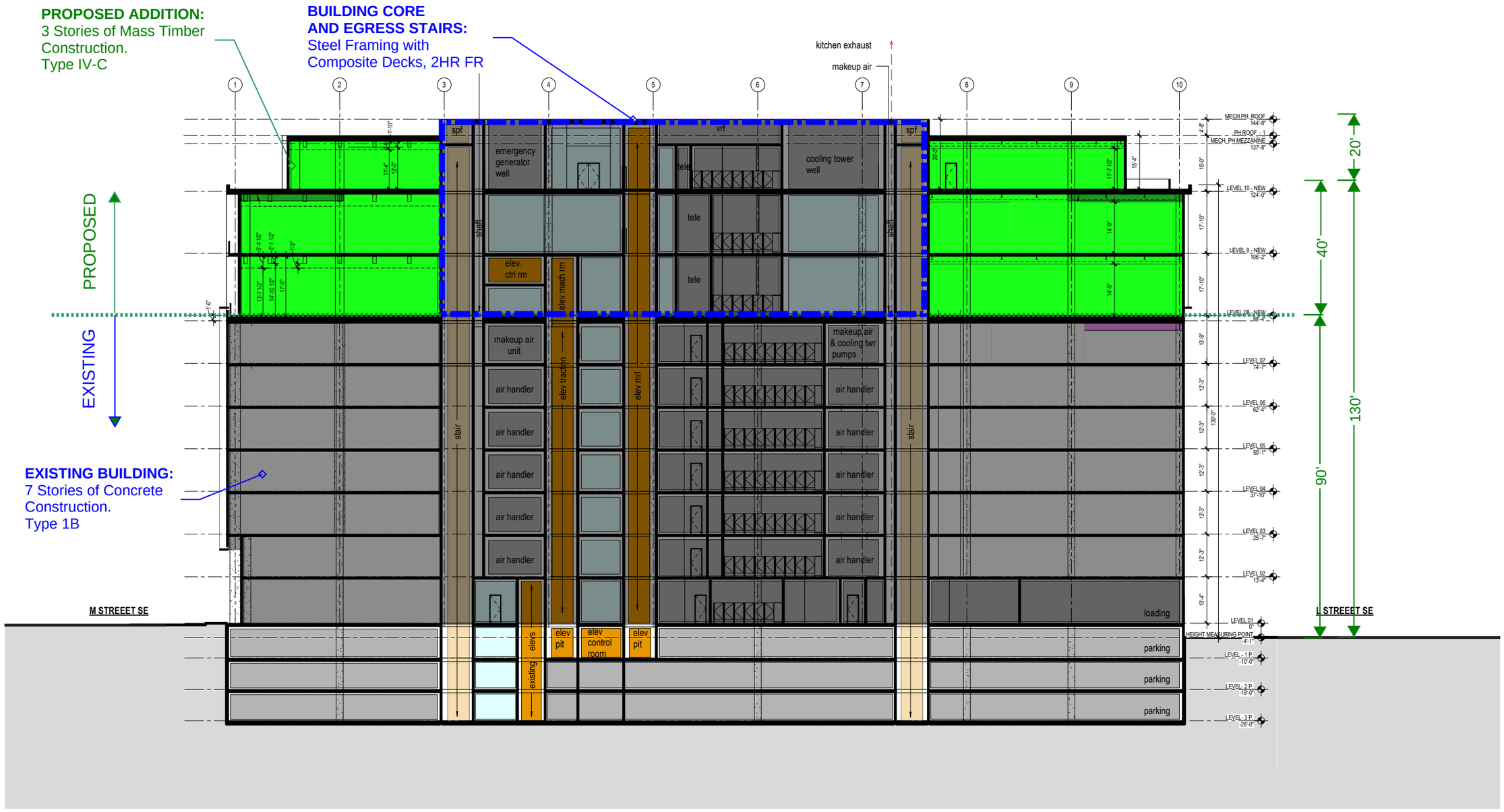
In support of the proposed code modification, we offer the following information:

- 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.



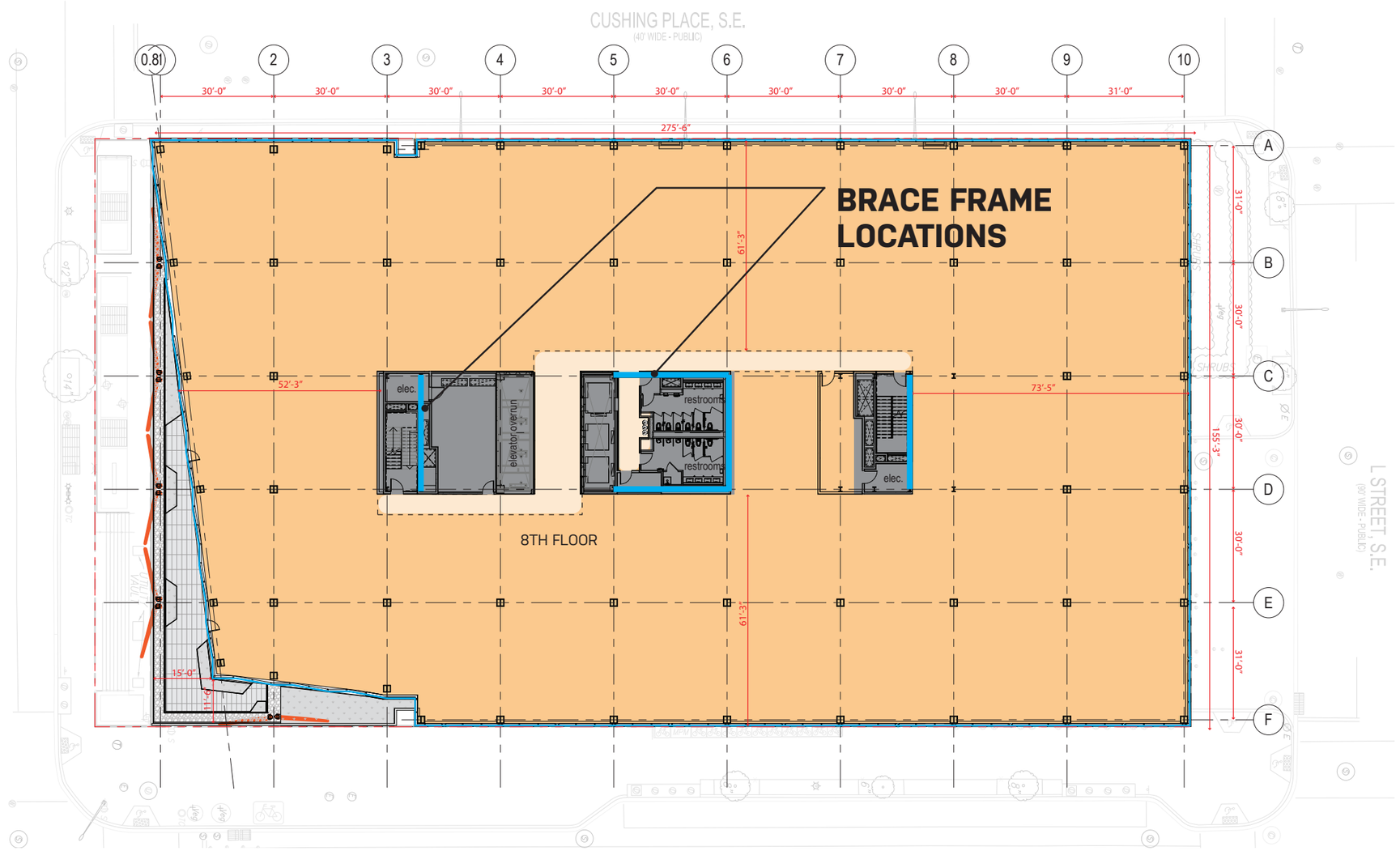
FIRE DEPARTMENT ACCESS ON ALL FOUR SIDES OF THE BUILDING

100% of the building's facades are accessible to fire trucks.

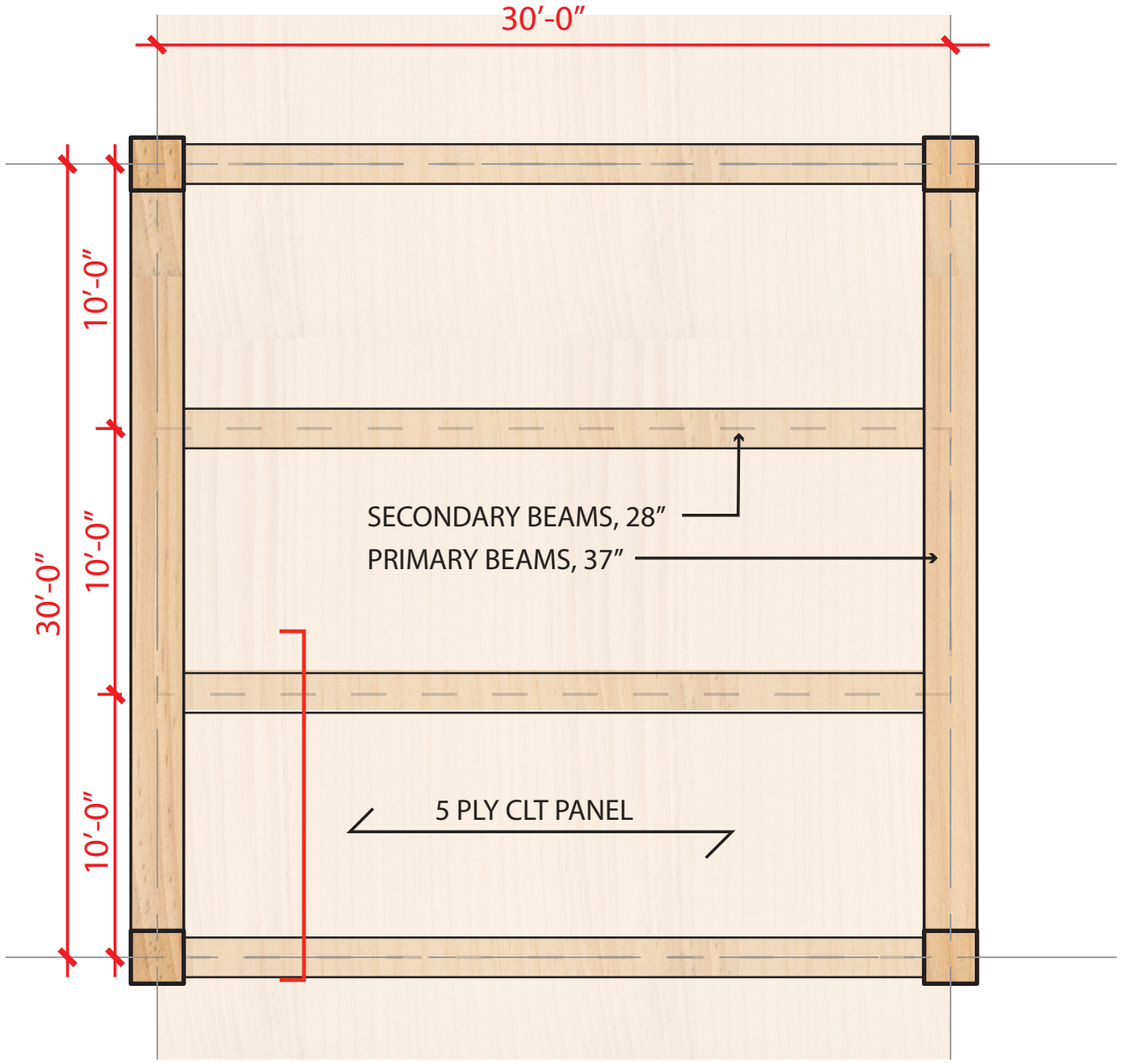

PROPOSED ADDITION:
3 Stories of Mass Timber Construction.
Type IV-C
BUILDING CORE AND EGRESS STAIRS:
Steel Framing with Composite Decks, 2HR FR
EXISTING BUILDING:
7 Stories of Concrete Construction.
Type 1B
PROPOSED
EXISTING
kitchen exhaust
makeup air
emergency generator well
cooling tower well
tele
vrf
spf
shaft
stair
elev. ctrl rm
elev mach rm
elev traction
elev mrl
makeup air unit
air handler
makeup air & cooling twr pumps
elevs
existing
elev pit
elev control room
loading
parking
M STREEET SE
L STREEET SE
MECH PH ROOF 144'-8"
PH ROOF - 1
MECH PH MEZZANINE 137'-8"
LEVEL 10 - NEW 124'-0"
LEVEL 9 - NEW 106'-2"
LEVEL 08 - NEW 88'-4"
LEVEL 07 74'-7"
LEVEL 06 62'-4"
LEVEL 05 50'-1"
LEVEL 04 37'-10"
LEVEL 03 25'-7"
LEVEL 02 13'-4"
LEVEL 01 0'
HEIGHT MEASURING POINT -4'-1"
LEVEL - 1 P -10'-0"
LEVEL - 2 P -19'-0"
LEVEL - 3 P -28'-0"
20'
40'
90'
130'

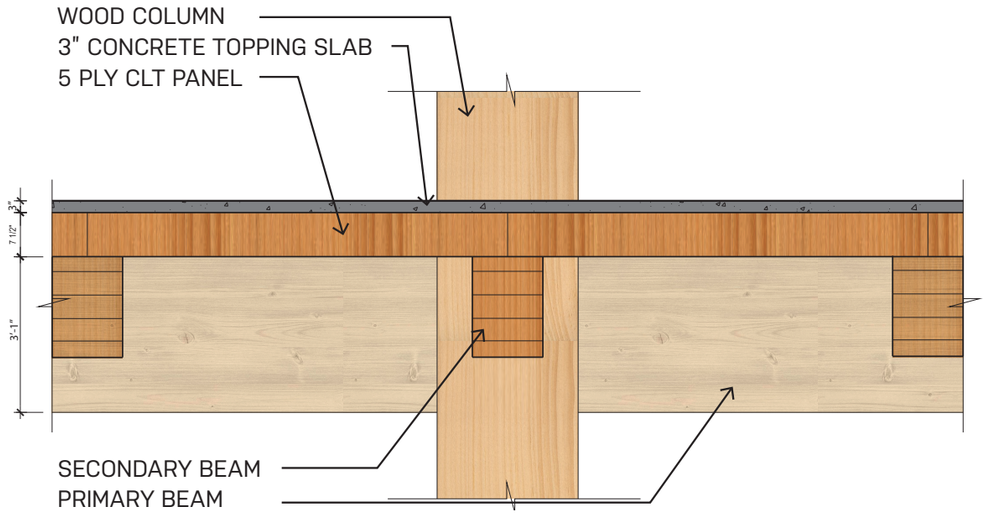
PROPOSED 8TH FLOOR PLAN

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



TYPICAL STRUCTURAL BAY





INTERIOR VIEW

CONNECTION CONCEPTS

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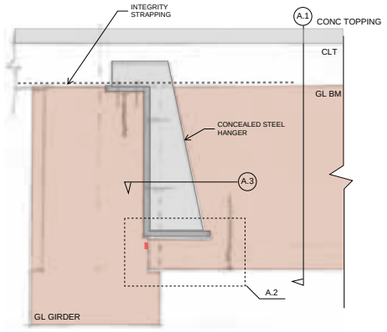
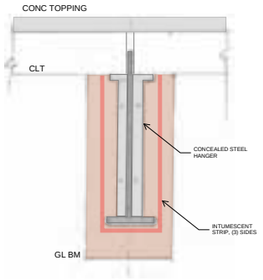
KATERRA | Project or Part Number: CONNECTION DETAIL A - CONCEPT | Reference: SCALE: NTS | Made by: H. BLOMGREN | Date: 2020-01-08 | Sheet #: 1 of 2

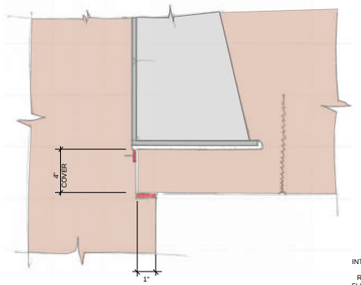




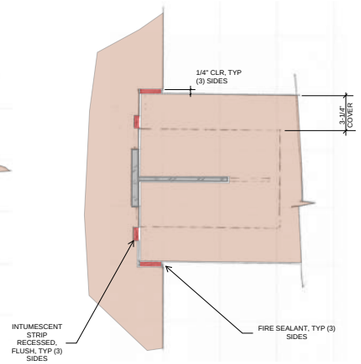
A.1

A - GLULAM BEAM TO GLULAM GIRDER CONNECTION

KATERRA | Project or Part Number: CONNECTION DETAIL A - CONCEPT | Reference: SCALE: NTS | Made by: H. BLOMGREN | Date: 2020-01-08 | Sheet #: 2 of 2

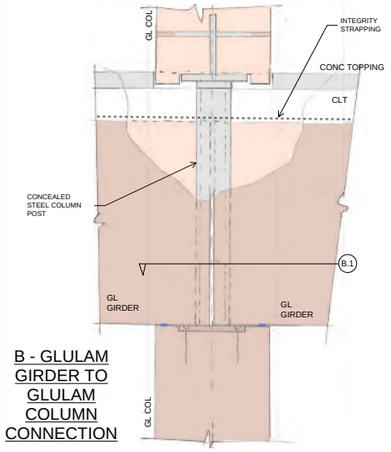


A.2

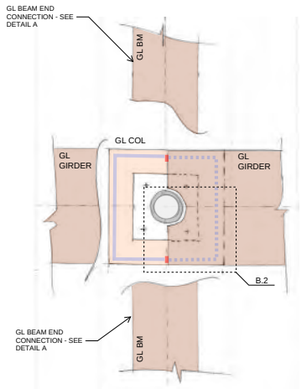


A.3

KATERRA | Project or Part Number: CONNECTION DETAIL B - CONCEPT | Reference: SCALE: NTS | Made by: H. BLOMGREN | Date: 2020-01-08 | Sheet #: 1 of 2

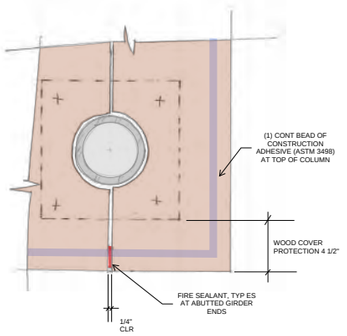


B - GLULAM GIRDER TO GLULAM COLUMN CONNECTION



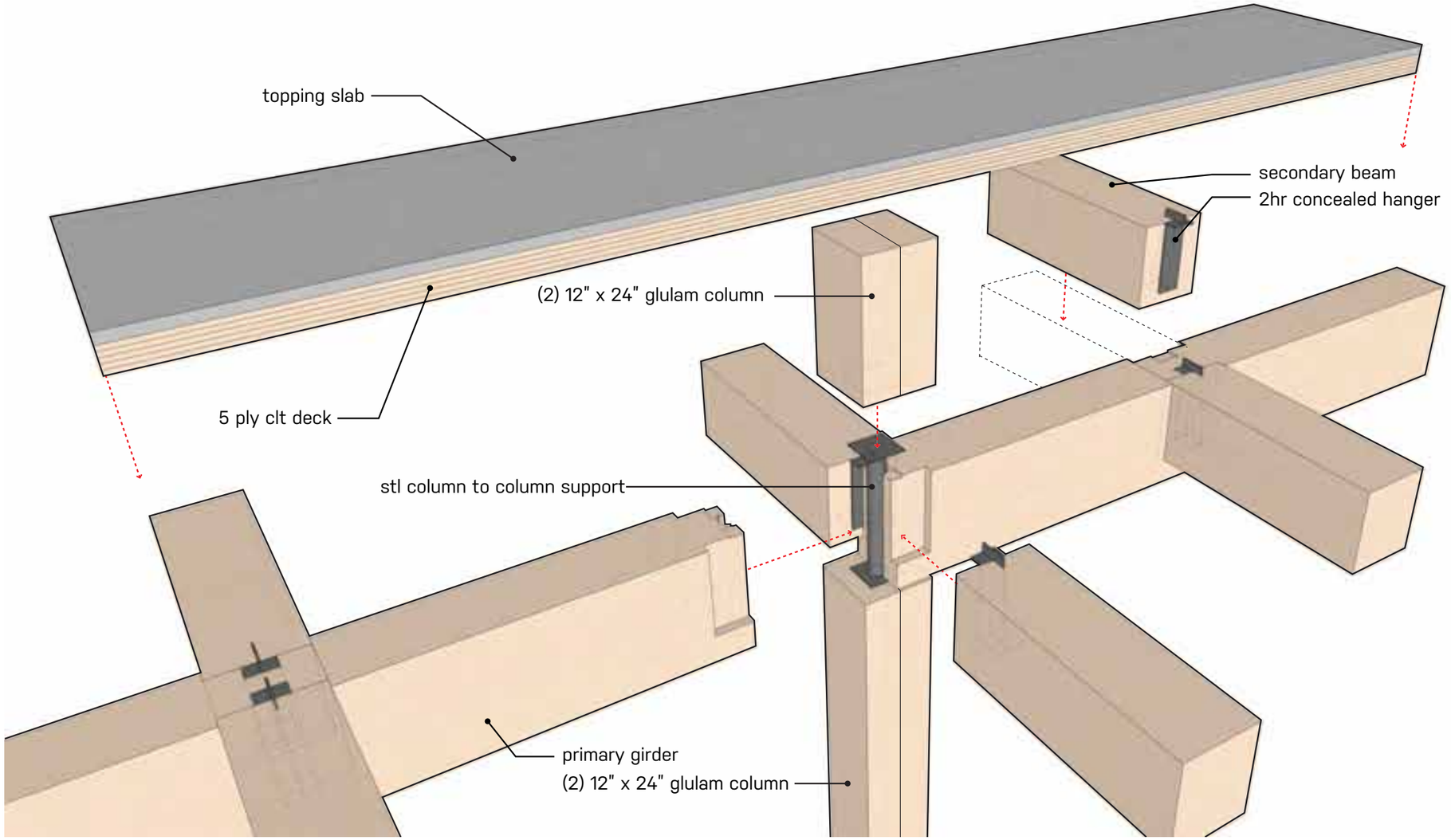
B.1 - PLAN

KATERRA | Project or Part Number: CONNECTION DETAIL B - CONCEPT | Reference: SCALE: NTS | Made by: H. BLOMGREN | Date: 2020-01-08 | Sheet #: 2 of 2



B.2 - DETAIL

CONNECTION CONCEPT DIAGRAM



INTERIOR VIEW

VIBRATION ANALYSIS

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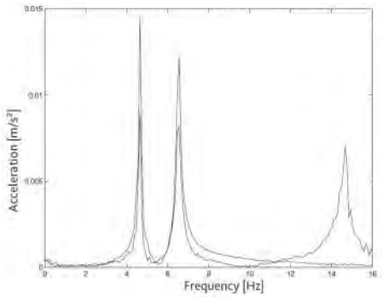
Synchronization



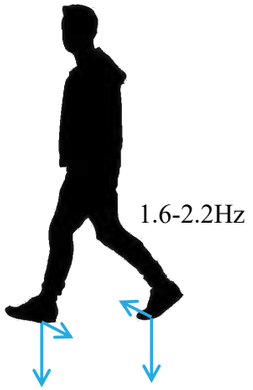
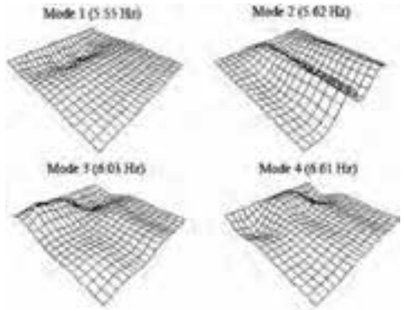


Photo credit

Structural Transmission

Mass
Stiffness
Damping



VIBRATION ANALYSIS

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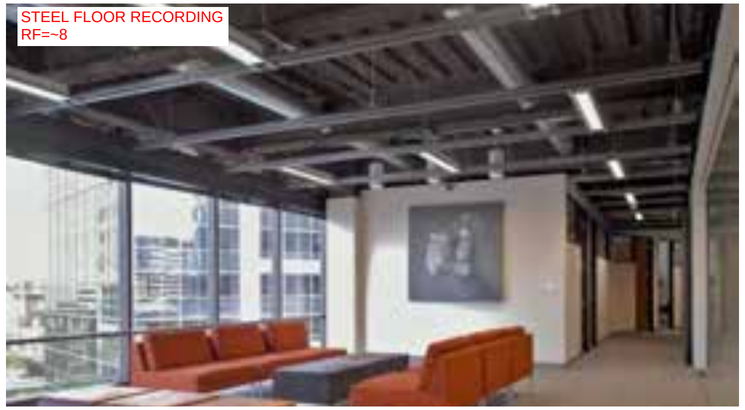
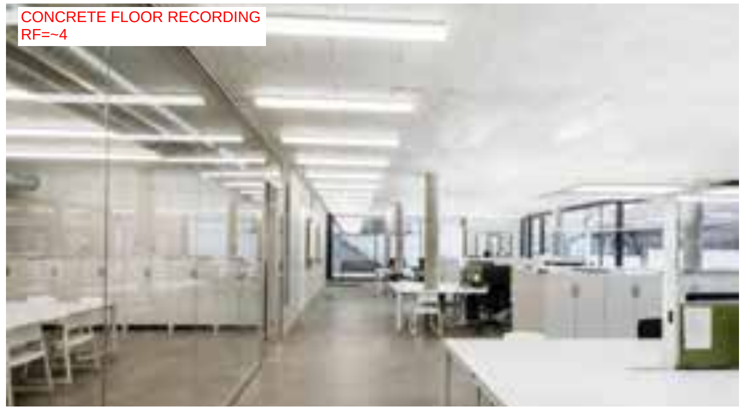
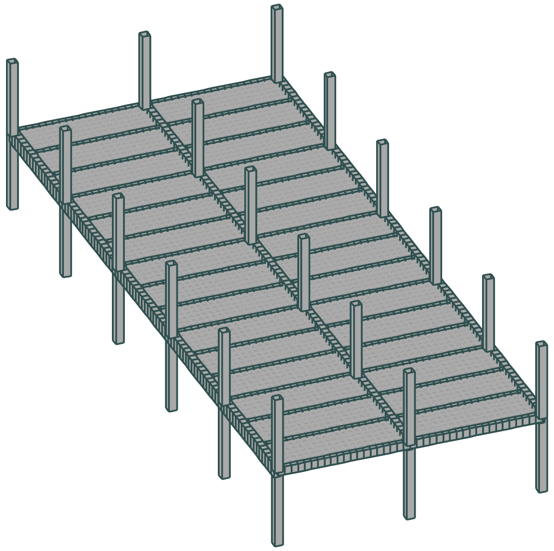
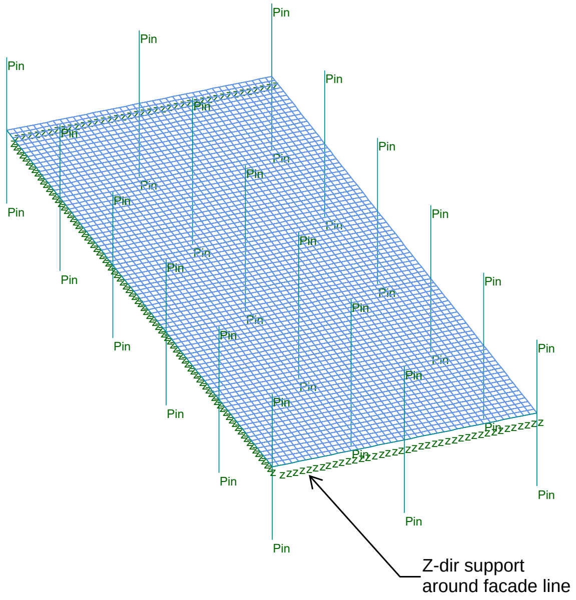
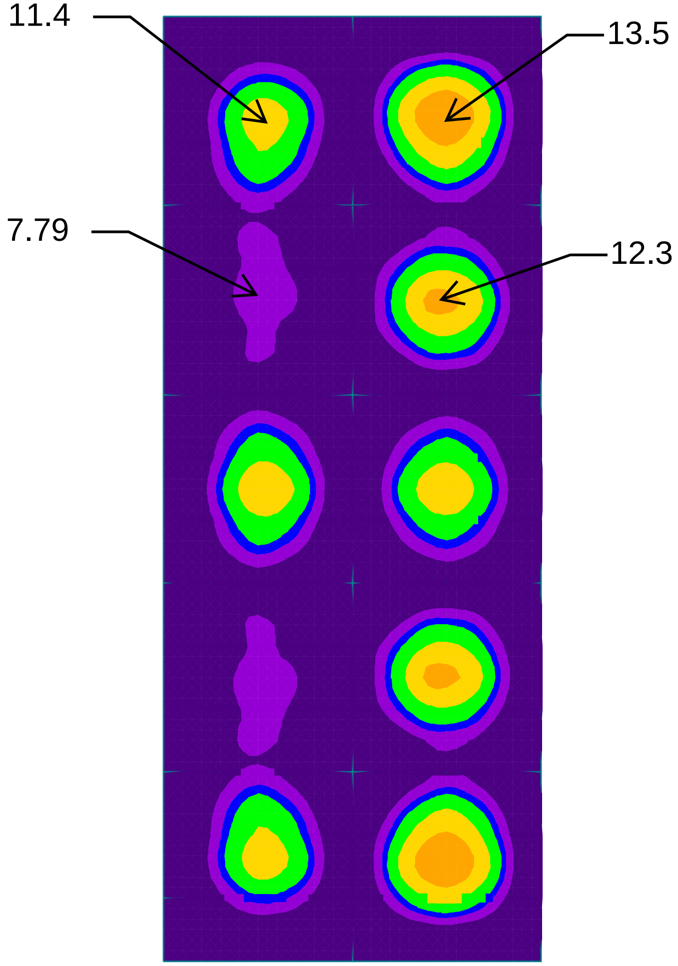




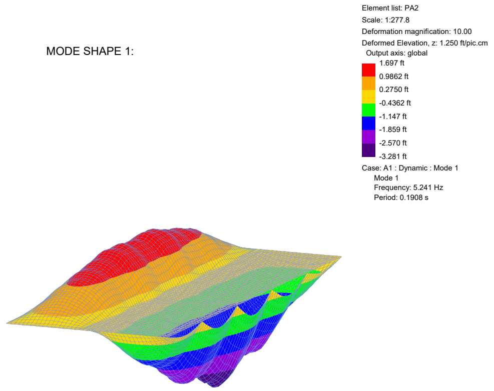




TARGET MAXIMUM RESPONSE FACTOR OF 8



MODE SHAPE 1:



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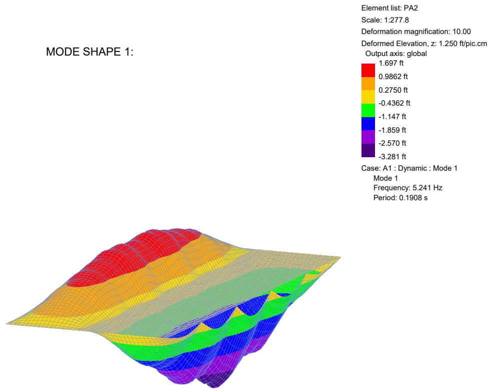
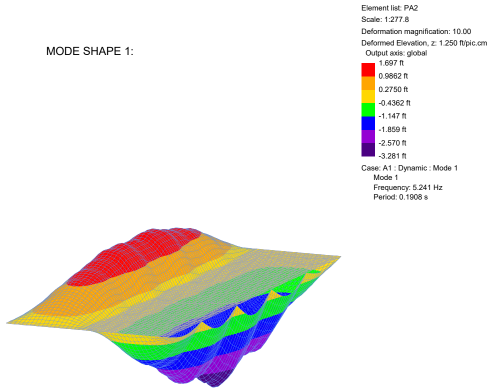


MODE SHAPE 1:



INTERIOR VIEW – CONCEPT

FACADE ANCHOR – CONCEPT

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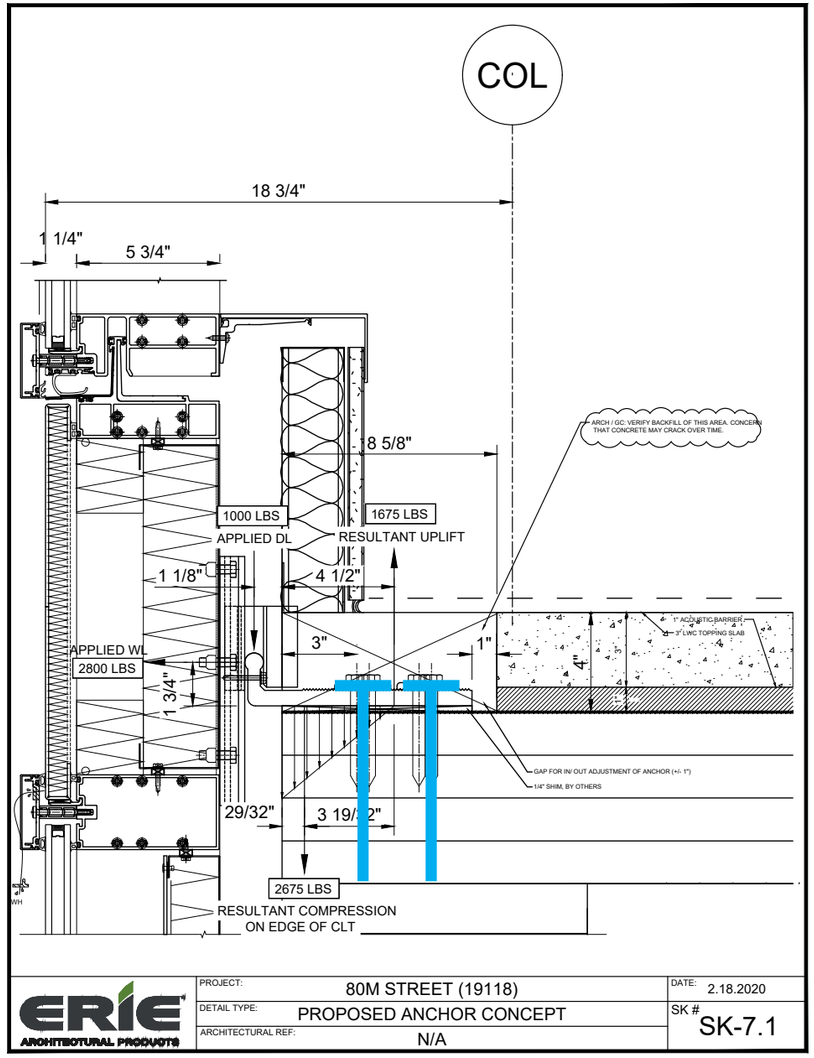

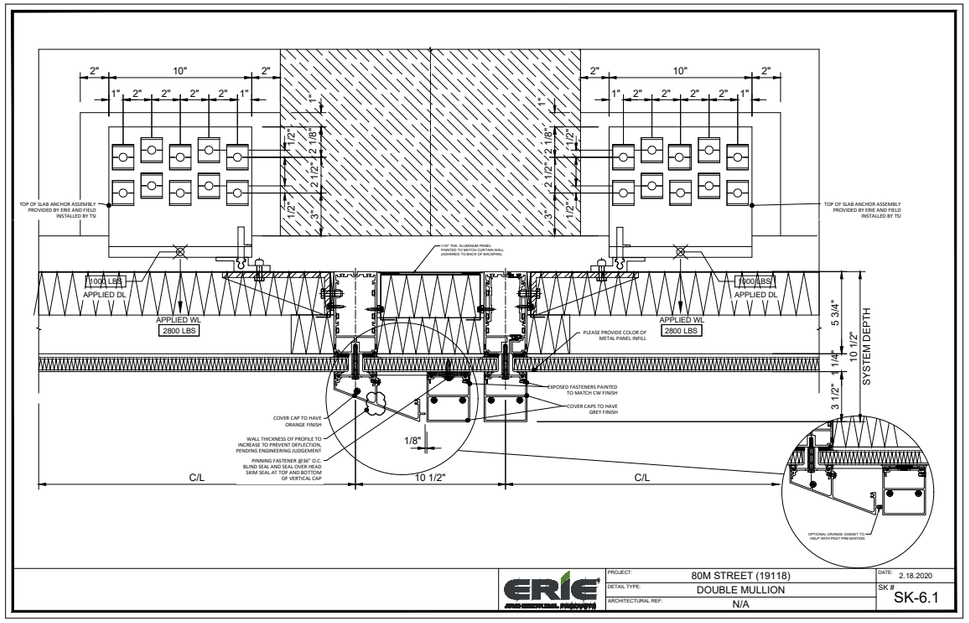

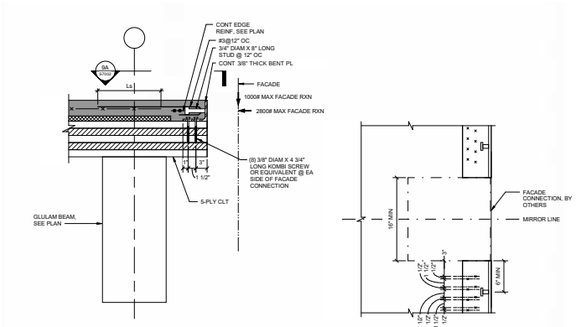

9 TYPICAL CLT SLAB EDGE - MAJOR AXIS CANTILEVER
NTS

NOTES:
1. INSTALL FASTENERS THROUGH STEEL IN STEEL-TO-WOOD CONNECTIONS WITH TORQUE-CONTROLED EQUIPMENT.
2. PLACE SINGLE ROW OF 3/8" DIAM X 4 3/4" LONG KOMBI SCREWS @ 6" OC WHERE FACADE CONNECTION IS NOT PRESENT.

9A DETAIL
NTS

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

THANK YOU!

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