110 CANAL

MASS TIMBER ACCELERATOR GRANT PROGRAM

JULY 15, 2022

QuakerLane cbt Thornton Tomasetti

EXECUTIVE SUMMARY

There are a number of factors that contribute to making a mass timber approach ideal for 110 Canal.

First, there are many tangible benefits—from a sustainability perspective, to versatility and speed of construction. Second, at 10 stories, the scale of what's being proposed is right in the sweet spot for this type of engineering & construction. Last, but not least, mass timber provides an architectural aesthetic ideal for great placemaking within this unique combination of historic adaptive re-use and new construction.

Unlike many other US regions, the Northeast and neighboring Canadian land have a special advantage of land-based access to regionally-sourced timber. There is no need for carbon-heavy shipping and use of global resources to access materials for great structures. The lower carbon footprint makes all the difference—from the indigenous materials to the methods of procurement to the regeneration of forests for a future generation of trees.

Where historically prohibitive, we're now seeing advancements from a code perspective which are opening doors for mass timber projects. Construction/material costs, however, have been a prohibiting factor. The last 25 months have seen (on average) an increase in timber prices by about a third, as compared with pre-2020. From a basic logistical standpoint, this increase has caused a ripple effect in the industry and in the region, which has stunted the scale of use of mass timber. We are optimistic that this trend is changing.

Map of Boston, Massachusetts

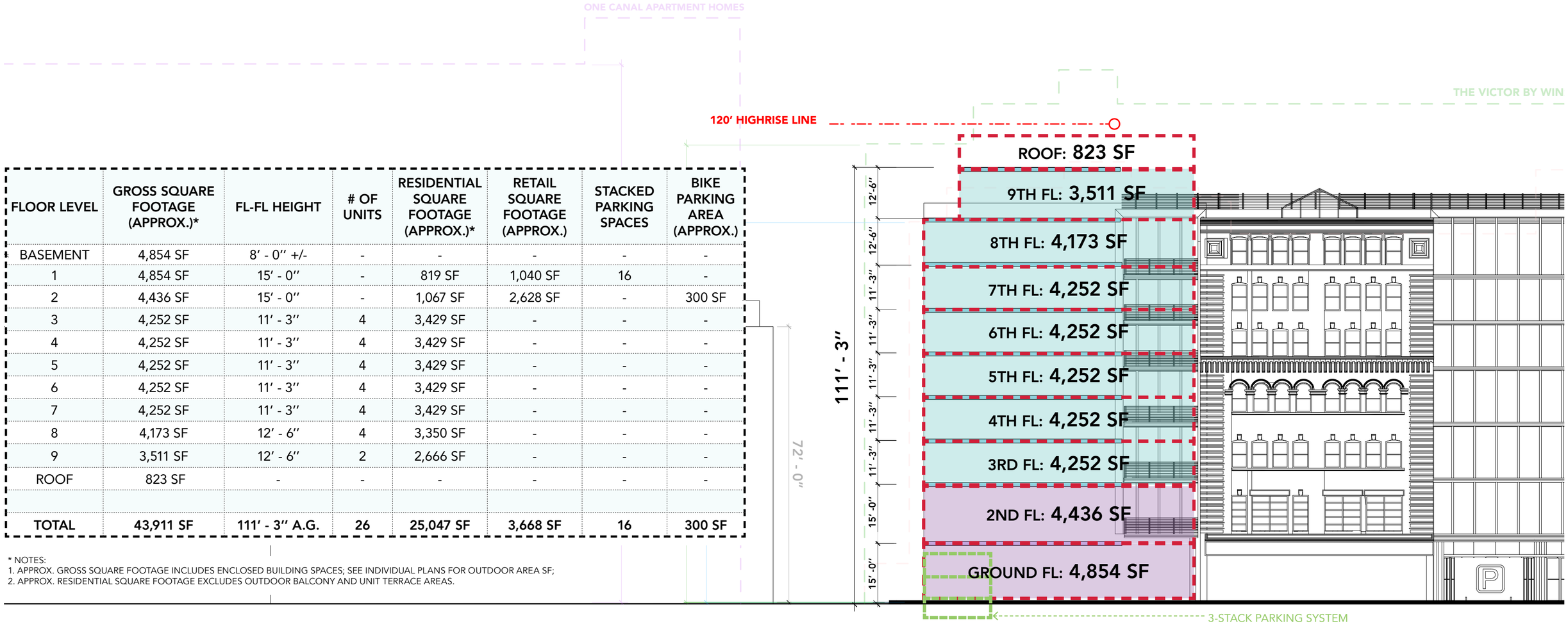
EXTERIOR RENDERINGS

ELEVATIONS AND STREET PERSPECTIVE

BUILDING MATRIX

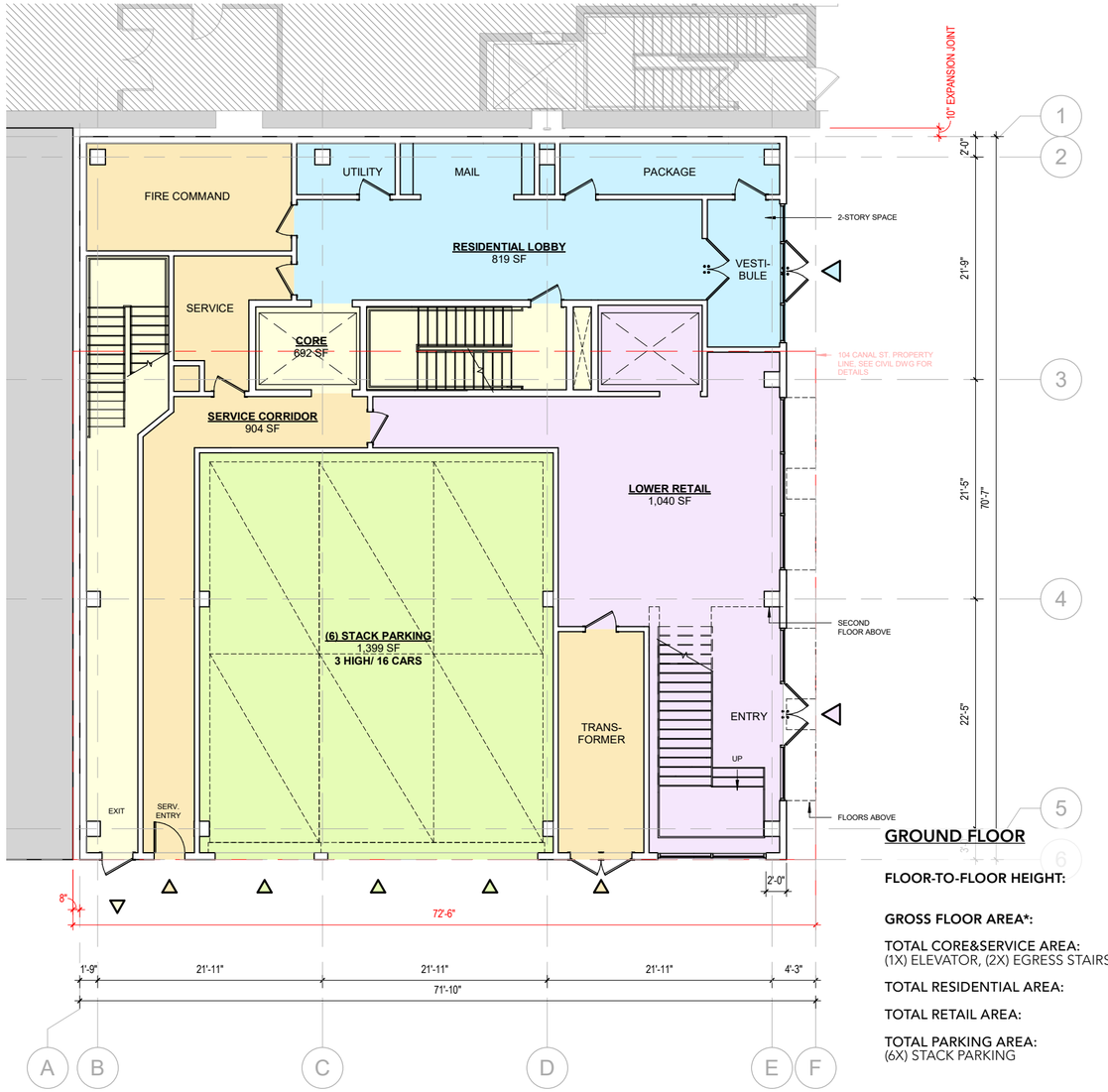
FLOOR LEVEL	GROSS SQUARE FOOTAGE (APPROX.)*	FL-FL HEIGHT	# OF UNITS	RESIDENTIAL SQUARE FOOTAGE (APPROX.)*	RETAIL SQUARE FOOTAGE (APPROX.)	STACKED PARKING SPACES	BIKE PARKING AREA (APPROX.)
BASEMENT	4,854 SF	8' - 0" +/-	-	-	-	-	-
1	4,854 SF	15' - 0"	-	819 SF	1,040 SF	16	-
2	4,436 SF	15' - 0"	-	1,067 SF	2,628 SF	-	300 SF
3	4,252 SF	11' - 3"	4	3,429 SF	-	-	-
4	4,252 SF	11' - 3"	4	3,429 SF	-	-	-
5	4,252 SF	11' - 3"	4	3,429 SF	-	-	-
6	4,252 SF	11' - 3"	4	3,429 SF	-	-	-
7	4,252 SF	11' - 3"	4	3,429 SF	-	-	-
8	4,173 SF	12' - 6"	4	3,350 SF	-	-	-
9	3,511 SF	12' - 6"	2	2,666 SF	-	-	-
ROOF	823 SF	-	-	-	-	-	-
TOTAL	43,911 SF	111' - 3" A.G.	26	25,047 SF	3,668 SF	16	300 SF

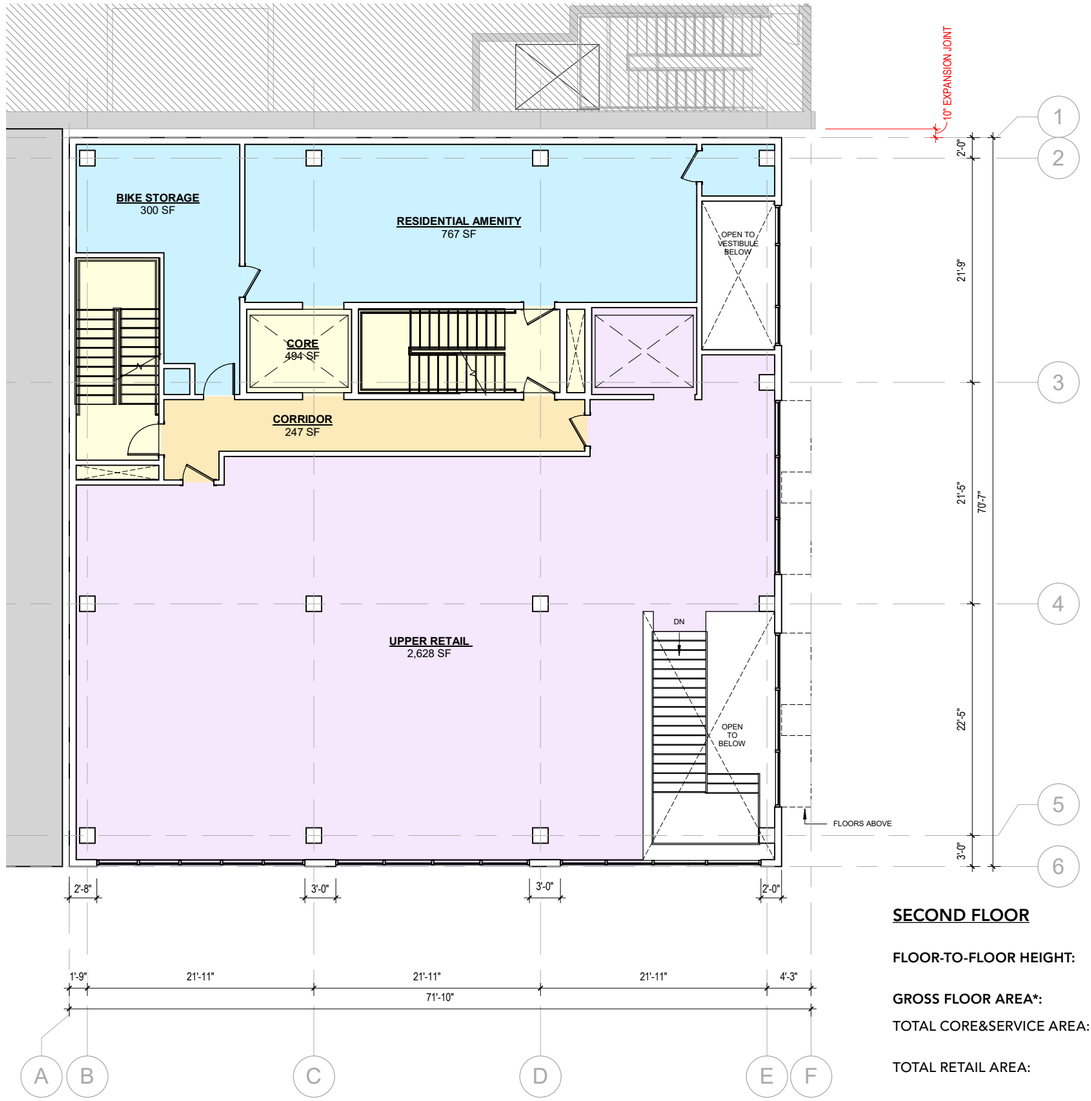
* NOTES:
1. APPROX. GROSS SQUARE FOOTAGE INCLUDES ENCLOSED BUILDING SPACES; SEE INDIVIDUAL PLANS FOR OUTDOOR AREA SF;
2. APPROX. RESIDENTIAL SQUARE FOOTAGE EXCLUDES OUTDOOR BALCONY AND UNIT TERRACE AREAS.



FLOOR PLANS

GROUND AND SECOND FLOOR





GROUND FLOOR

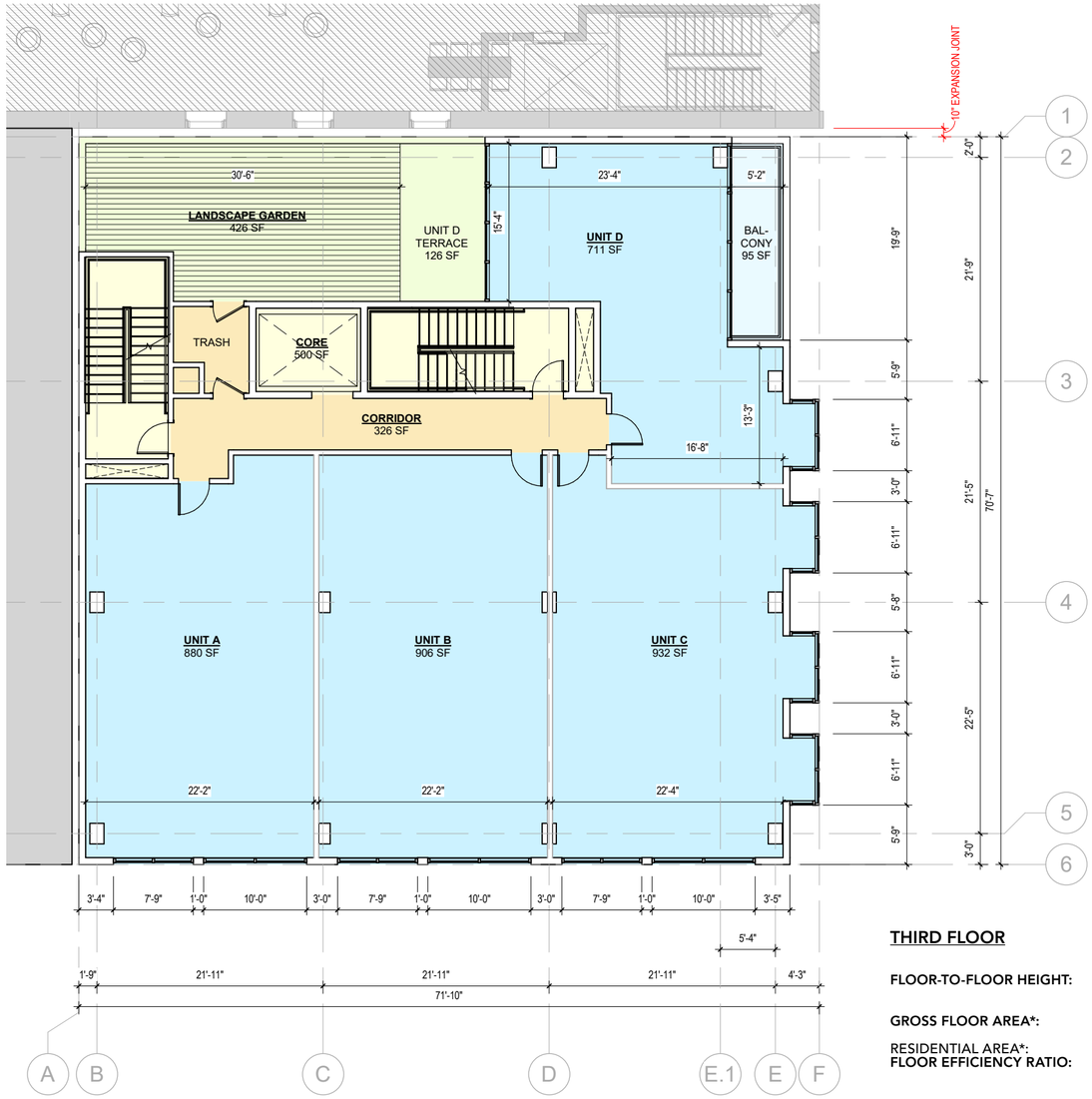
FLOOR-TO-FLOOR HEIGHT:	**15' - 0''**
GROSS FLOOR AREA*:	**4,854 SF**
TOTAL CORE&SERVICE AREA: (1X) ELEVATOR, (2X) EGRESS STAIRS	1,596 SF
TOTAL RESIDENTIAL AREA:	819 SF
TOTAL RETAIL AREA:	1,040 SF
TOTAL PARKING AREA: (6X) STACK PARKING	1,399 SF

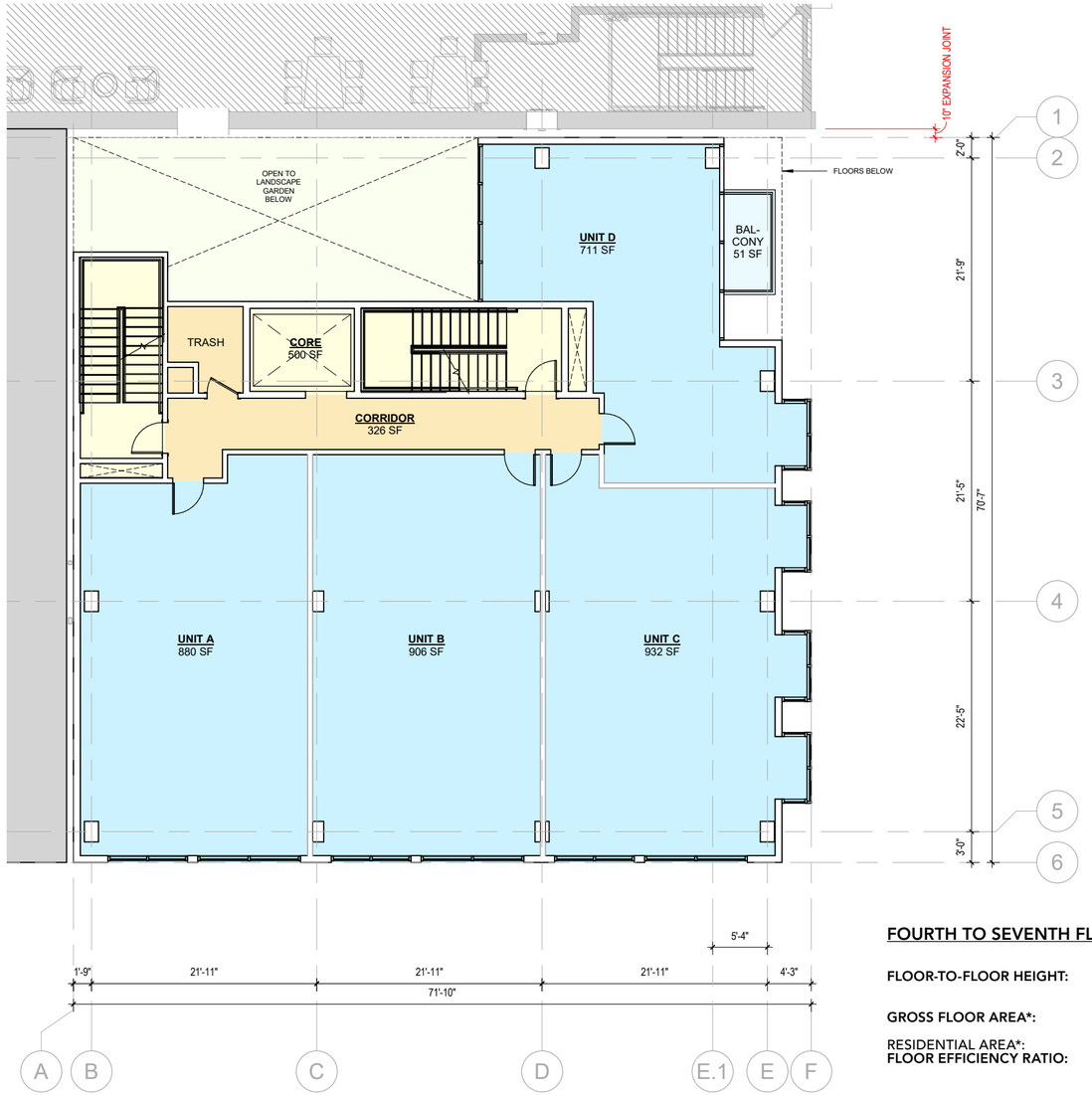
SECOND FLOOR

FLOOR-TO-FLOOR HEIGHT:	**15' - 0''**
GROSS FLOOR AREA*:	**4,436SF**
TOTAL CORE&SERVICE AREA:	741 SF
TOTAL RETAIL AREA:	2,628 SF

FLOOR PLANS - RESIDENTIAL FLOORS

THIRD TO SEVENTH FLOOR





THIRD FLOOR

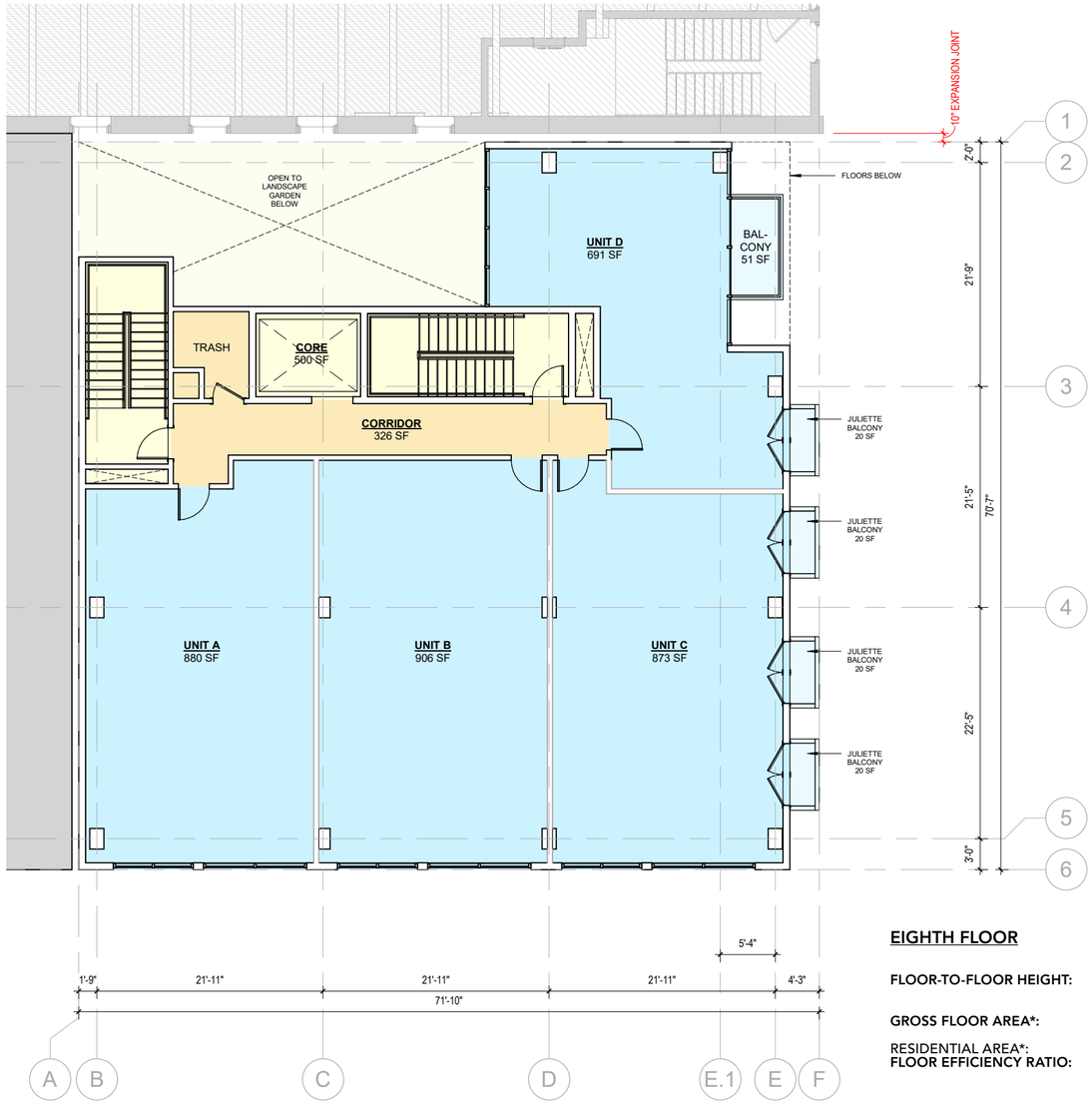
FLOOR-TO-FLOOR HEIGHT:	**11' - 3"**
GROSS FLOOR AREA*:	**4,252 SF**
RESIDENTIAL AREA*:	3,429 SF
FLOOR EFFICIENCY RATIO:	**81%**

FOURTH TO SEVENTH FLOOR

FLOOR-TO-FLOOR HEIGHT:	**11' - 3"**
GROSS FLOOR AREA*:	**4,252 SF**
RESIDENTIAL AREA*:	3,429 SF
FLOOR EFFICIENCY RATIO:	**81%**

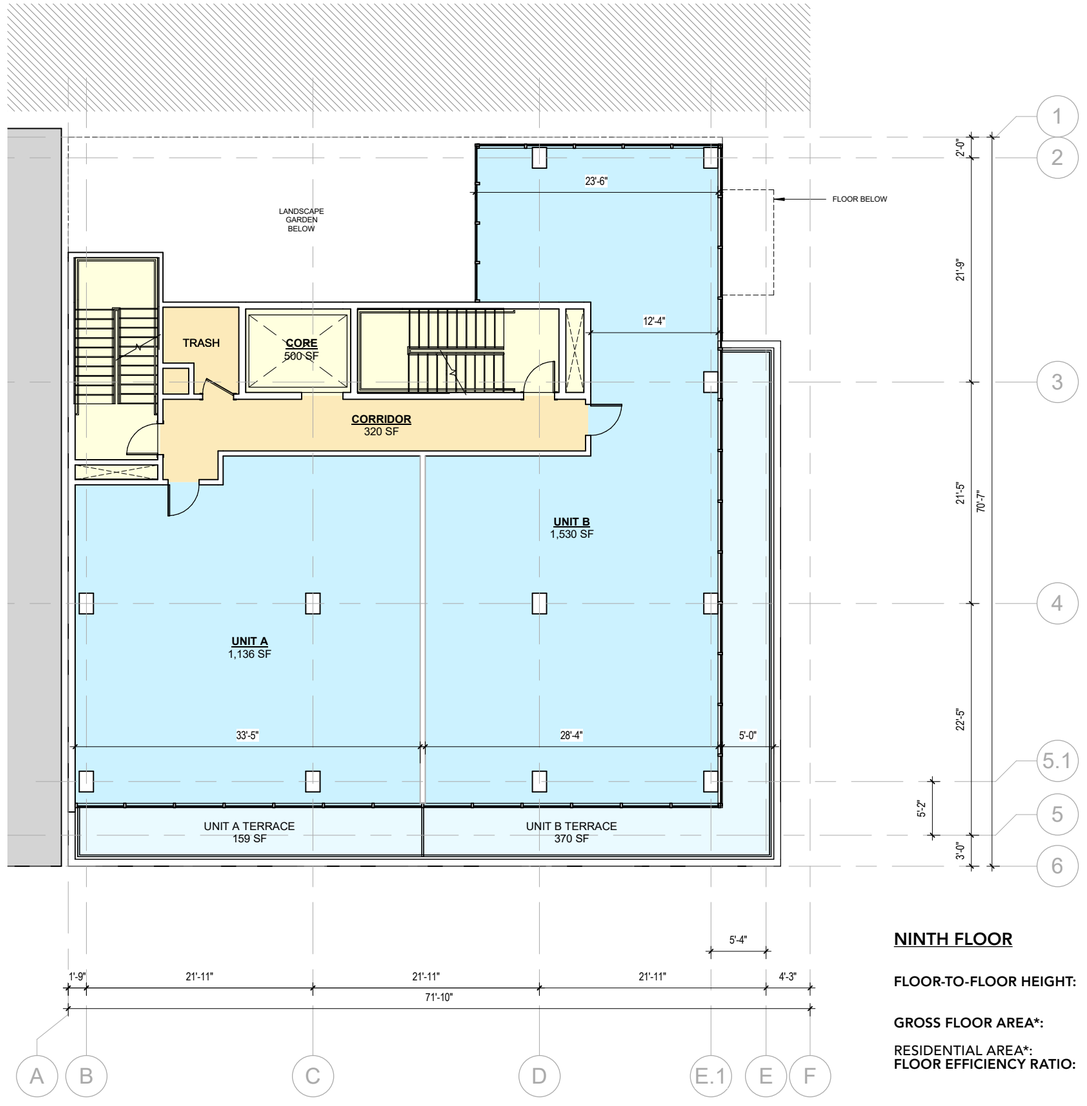
FLOOR PLANS - RESIDENTIAL FLOORS

EIGHTH TO NINTH FLOOR



EIGHTH FLOOR

FLOOR-TO-FLOOR HEIGHT:	12' -6''
GROSS FLOOR AREA*:	4,173 SF
RESIDENTIAL AREA*:	3,350 SF
FLOOR EFFICIENCY RATIO:	80%



NINTH FLOOR

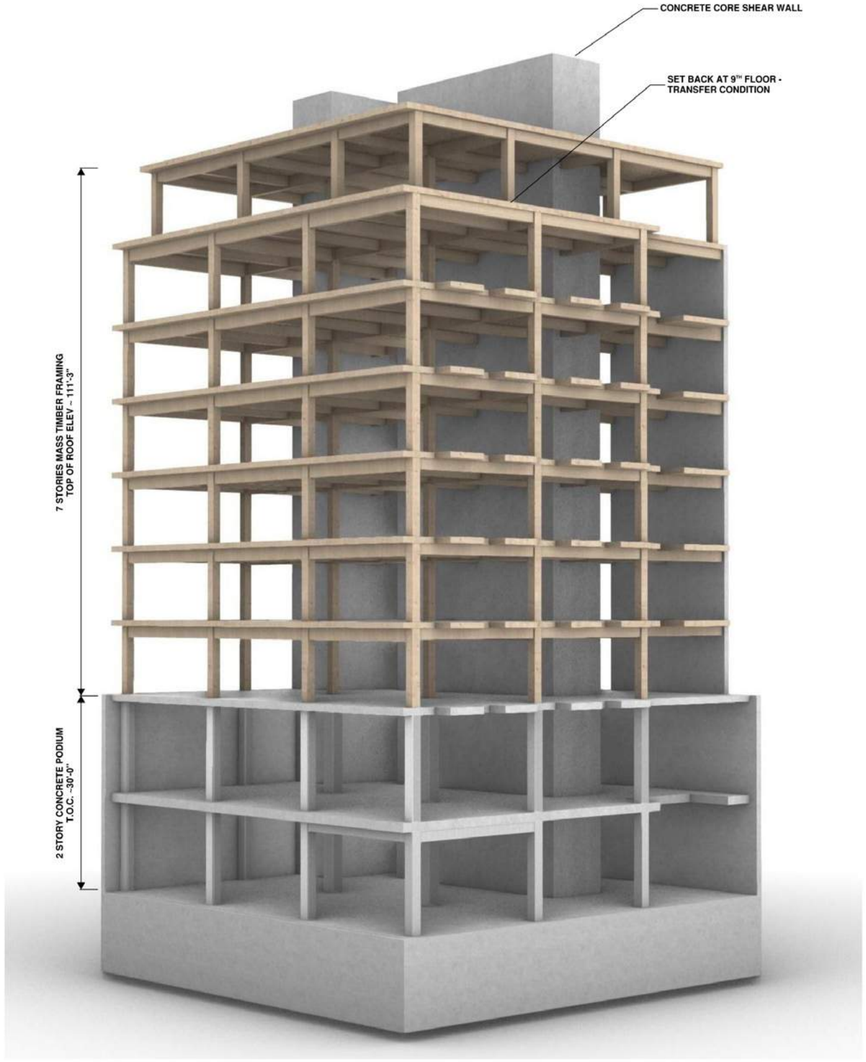
FLOOR-TO-FLOOR HEIGHT:	12' -6''
GROSS FLOOR AREA*:	3,511 SF
RESIDENTIAL AREA*:	2,666 SF
FLOOR EFFICIENCY RATIO:	76%

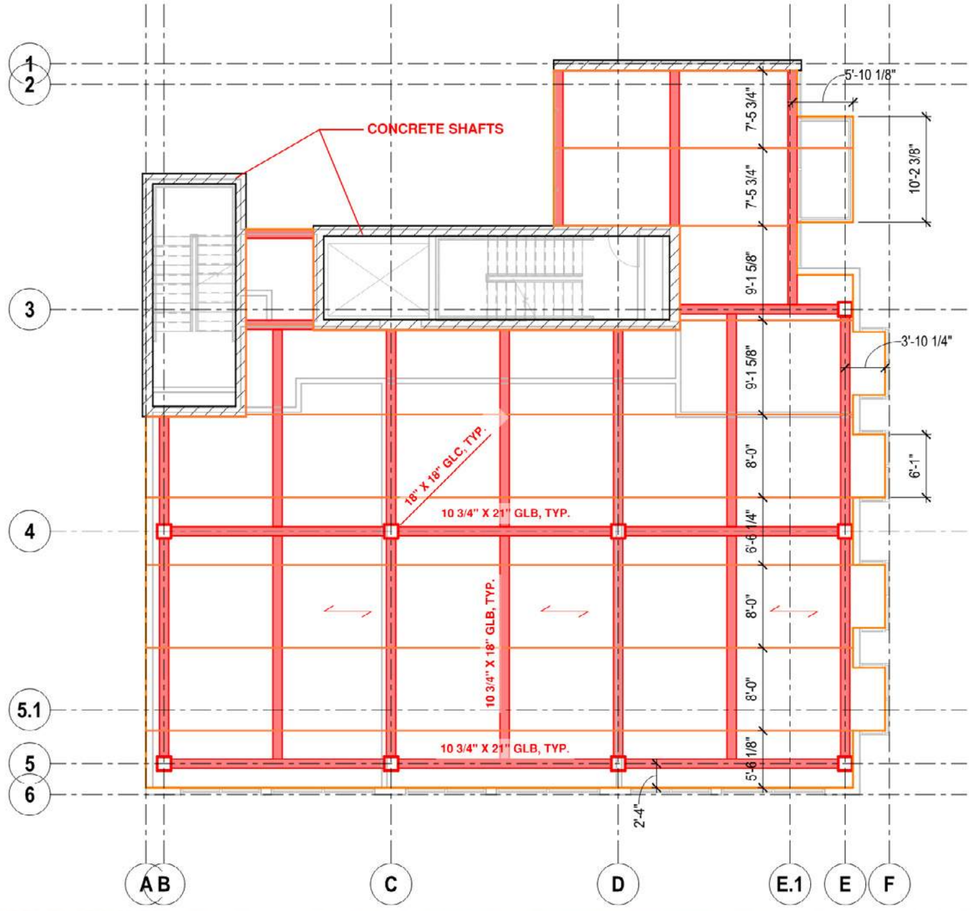
ROOF PLAN

ROOF

GROSS FLOOR AREA:	**823 SF**
SELLABLE RESIDENT AREA:	958 SF
COMMUNAL AREA:	2,228 SF

STRUCTURAL DIAGRAMS



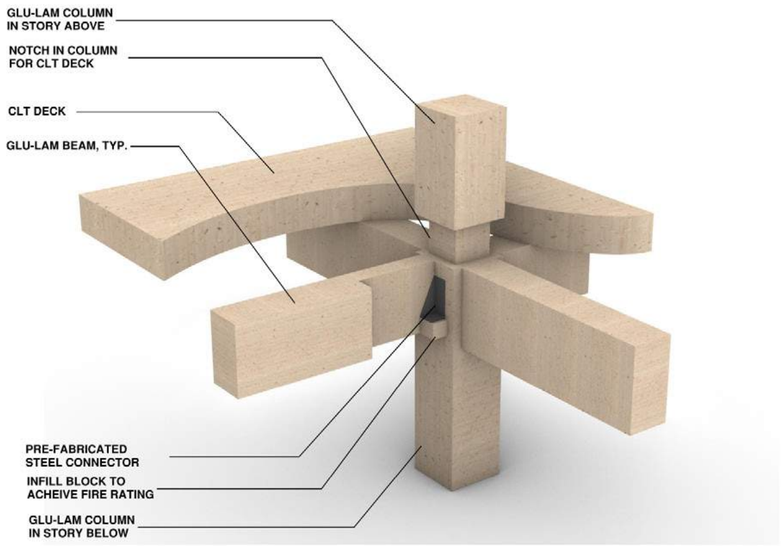


DRAWING NOTES:

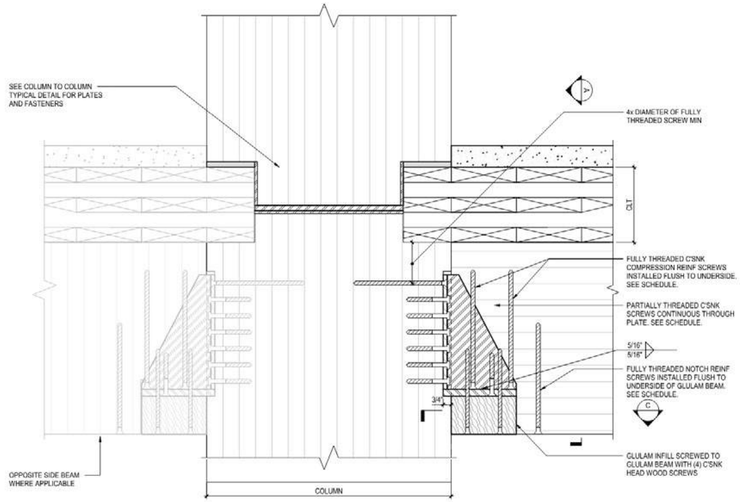
1. ⟷ Indicates double span of 5-PLY Grade E1 CLT topped with 2" concrete slab and acoustic layer, total thickness ~9.875"
2. Column sizes reported for lowest level of wood, resulting in maximum column size. Column sizes at upper stories likely to decrease in depth.
3. ** tag on beam indicates member assumed to be fully fire protected by architectural finishes.

Thornton Tomasetti

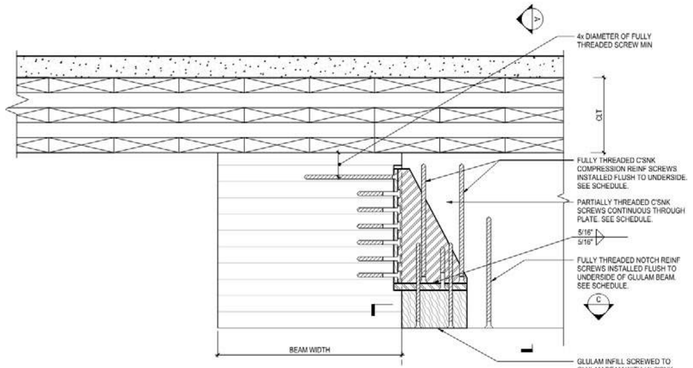
STRUCTURAL DETAILS



TYPICAL EXPOSED GLU-LAM CONNECTION

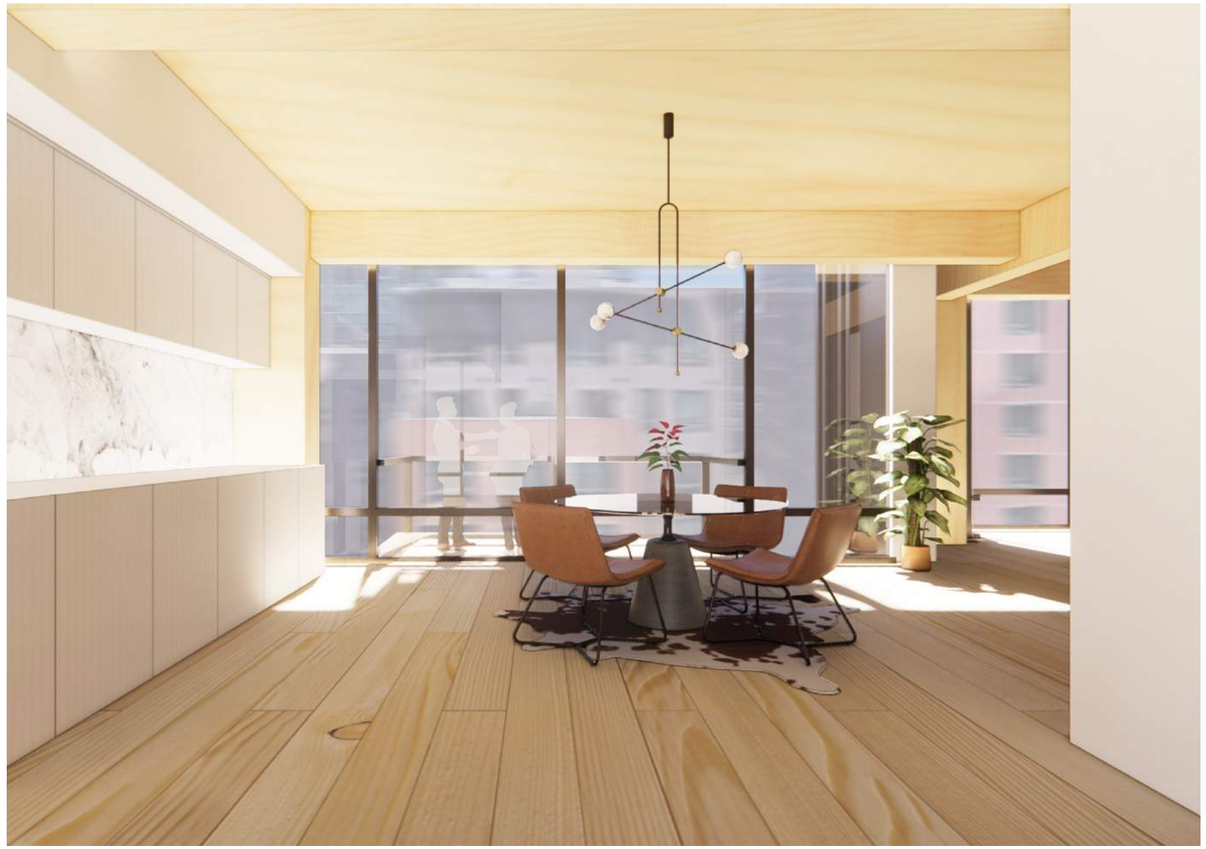


BEAM TO COLUMN



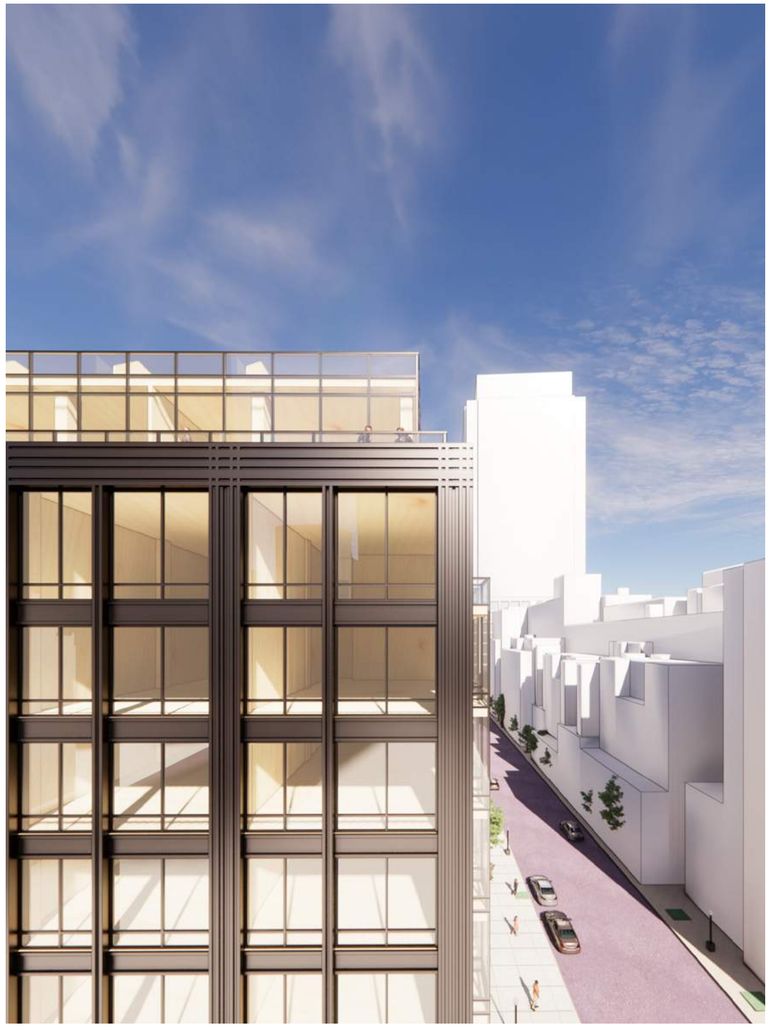
BEAM TO BEAM

INTERIOR RENDERINGS



EXTERIOR RENDERINGS

PERSPECTIVES AND DETAILS



STRUCTURAL DATA

TYPE IV-B MASS TIMBER LAYOUT

7 STORIES WOOD OVER 2 STORY CONCRETE

FIRE RATING REQUIREMENTS FOR STRUCTURAL ELEMENTS (PER IBC 2021)

Primary Structural Frame	2 hrs
Bearing Walls	2 hrs
Floor Construction	2 hrs
Roof Construction	1 hr

WOOD VOL / SF:

5-PLY CLT = 990 in^3/sf
Glulam Beams = 335 in^3/sf
Glulam Columns = 120 in^3/sf

TOTAL = 1441 in^3/sf
% of framing in total wood volume = 31%

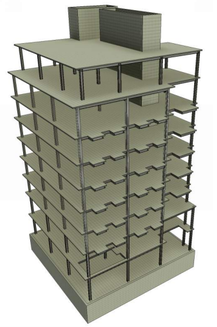
MATERIAL ASSUMPTIONS

CLT Floor and Roof Panels: *Grade E1*
Glu-lam Beam Framing: *Western Species Grade 24F-1.8E*
Glu-lam Column Framing: *Western Species Grade 2 DF-L2*

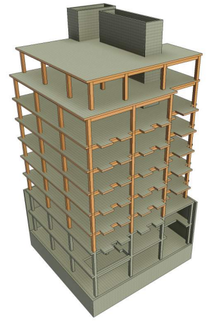
DESIGN CRITERIA:

FLOOR DEAD LOAD = 65 psf (including CLT weight)
FLOOR LIVE LOAD = 40 psf (residential)
BALCONY LOAD = 60 psf

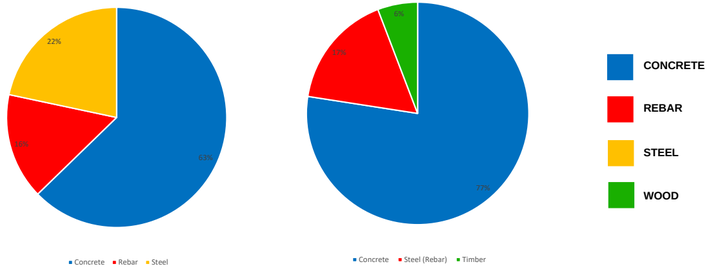
EMBODIED CARBON IN SUPERSTRUCTURE = approx 3.8 kgCO2e / sq. foot
Reference steel framed alternative with concrete slab on deck approx 12.2 kgCO2e / sq. foot

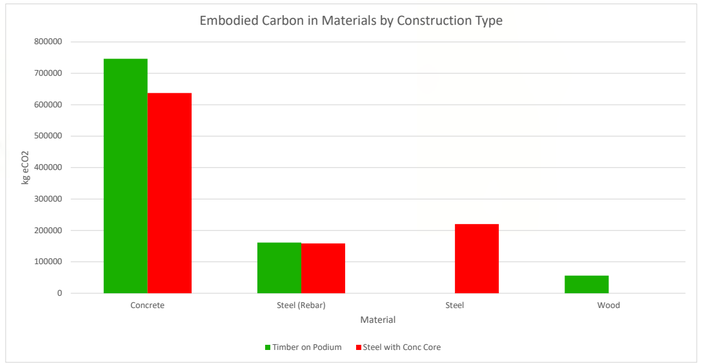


Steel with Concrete Core
1016000 kg eCO2



Timber on Concrete Podium
963500 kg eCO2





Carbon Summary

Results

Volume of wood products used:
592 cubic meters (20,906 cubic feet)

U.S. and Canadian forests grow this much wood in:
2 minutes

Carbon stored in the wood:
526 metric tons of carbon dioxide

Avoided greenhouse gas emissions:
204 metric tons of carbon dioxide

Total potential carbon benefit:
729 metric tons of carbon dioxide

Equivalent to:

154 cars off the road for a year

Energy to operate 77 homes for a year

Project Name: 104 Canal Street
Date: June 14, 2022

Results from this tool are based on wood volumes only and are estimates of carbon stored within wood products and avoided emissions resulting from the substitution of wood products for non-wood products. The results do not indicate a carbon footprint or global warming potential and are not intended to replace a detailed life cycle assessment (LCA) study. Please refer to the References and Notes' for assumptions and other information related to the calculations.

WoodWorks™ WOOD PRODUCTS COUNCIL

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