

NewCAL

Design Review Committee

November 16, 2022



Agenda

- Plan Development
- Exterior Elevations
- Energy Model Update

Highland Avenue

Walnut Street

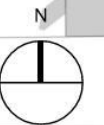
Washington

Walnut Place

Walnut Place

Site Plan

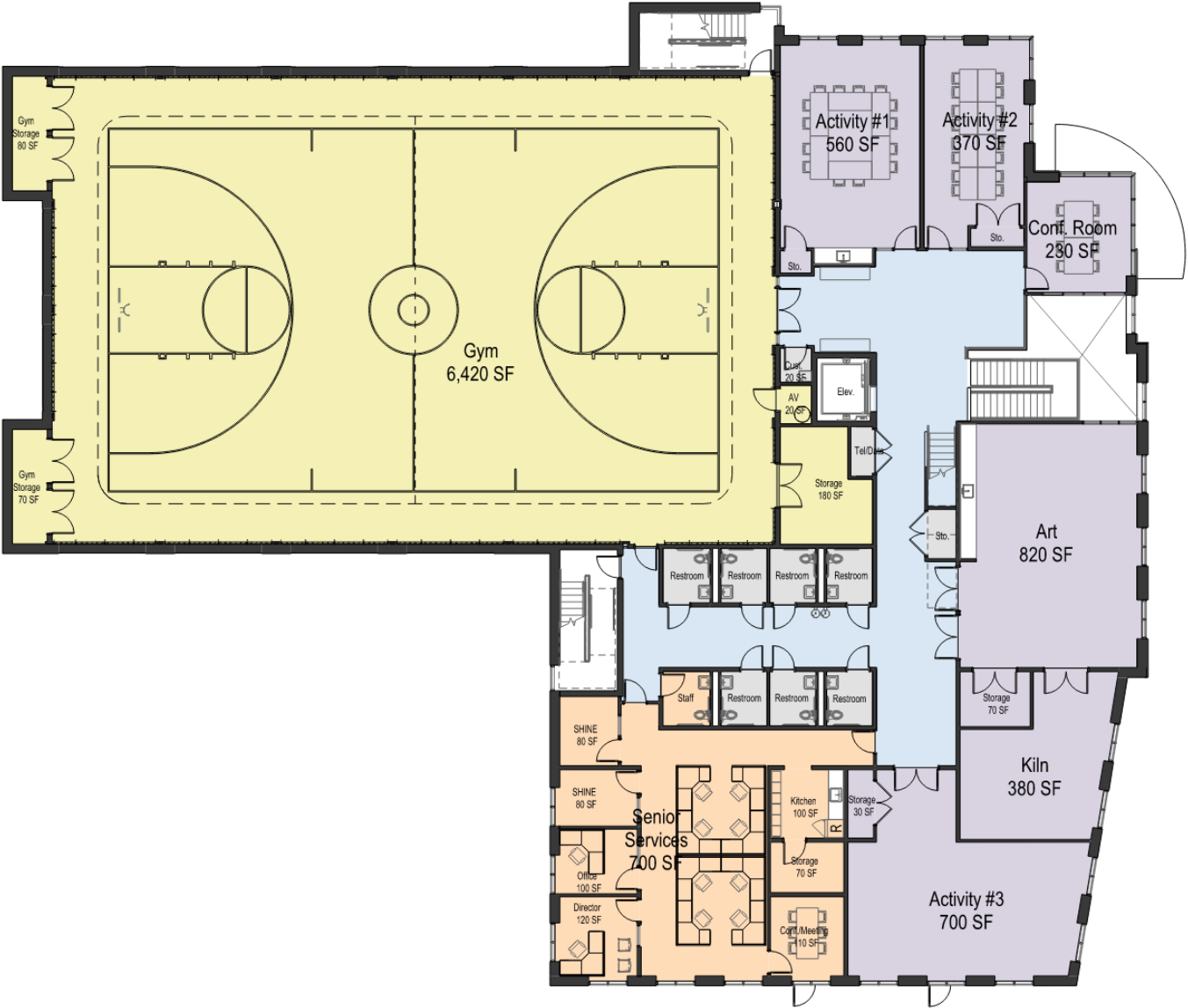
0' 15' 30' 60'



FIRST FLOOR



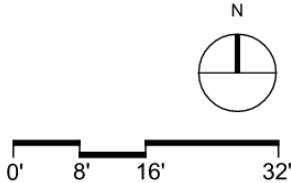
Highland Avenue



Walnut Street

Walnut Place

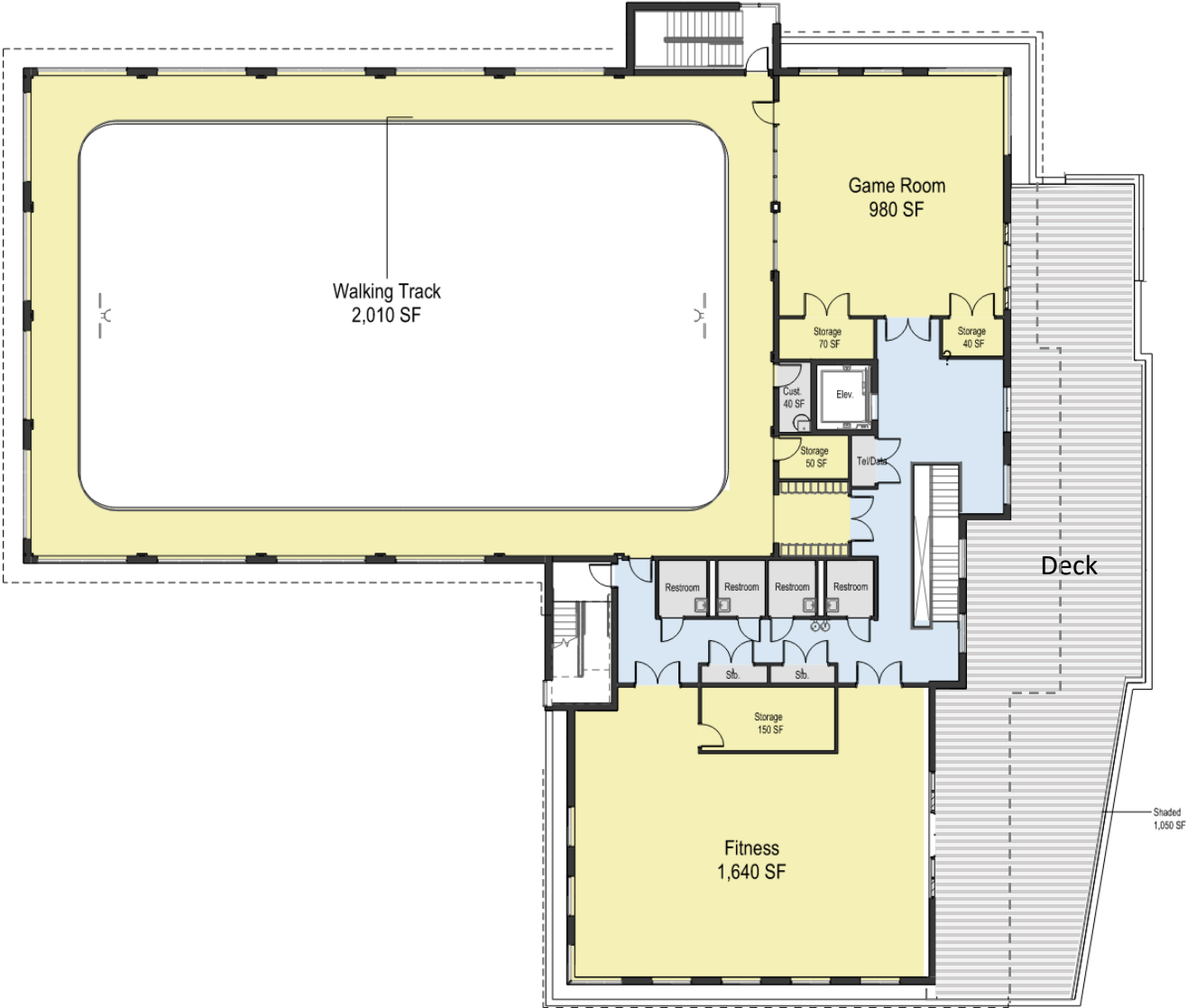
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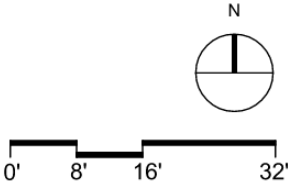
Highland Avenue

Walnut Street

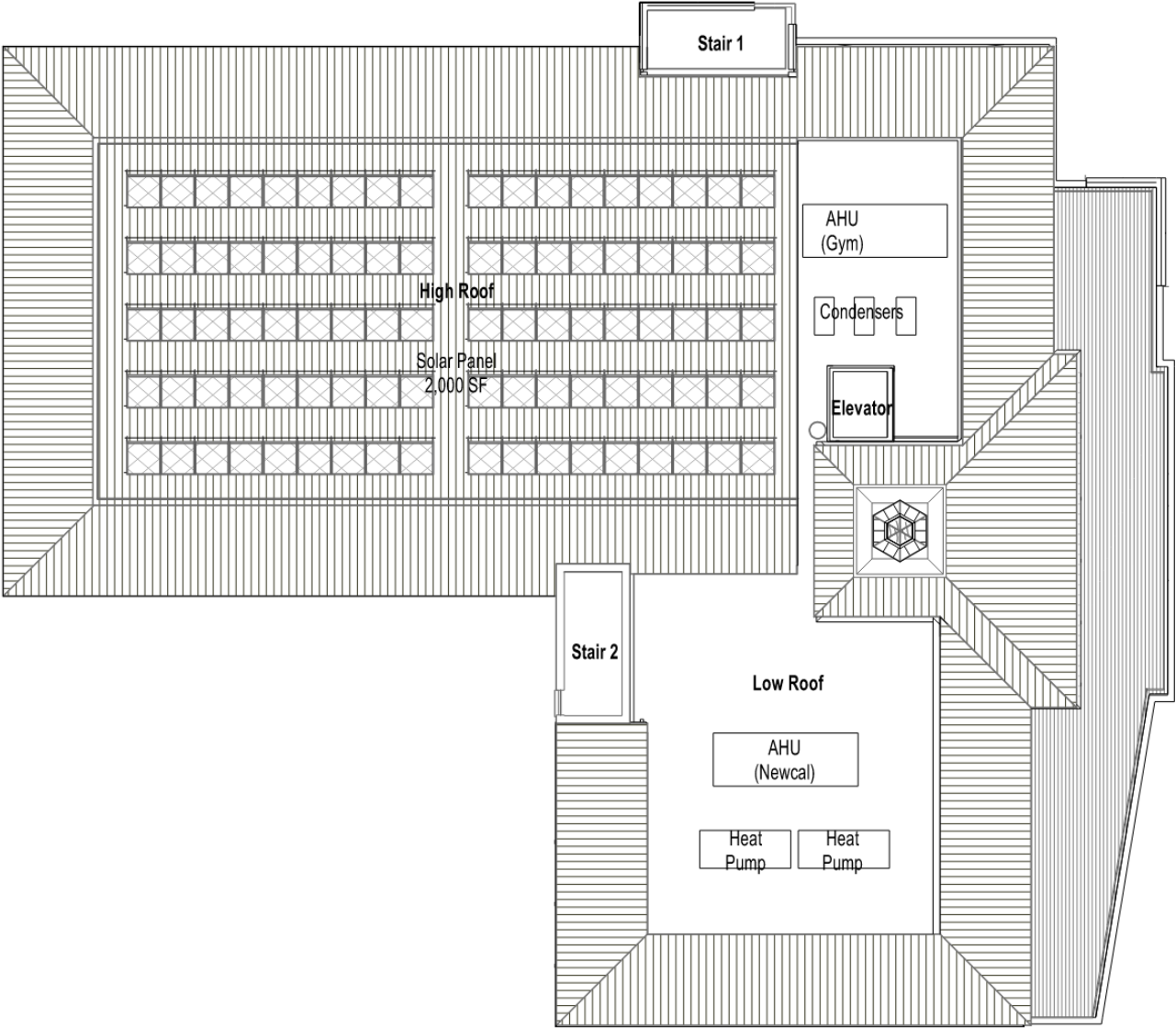
THIRD FLOOR



Walnut Place



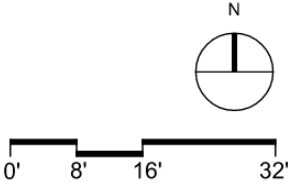
Highland Avenue



Walnut Street

ROOF PLAN

Walnut Place



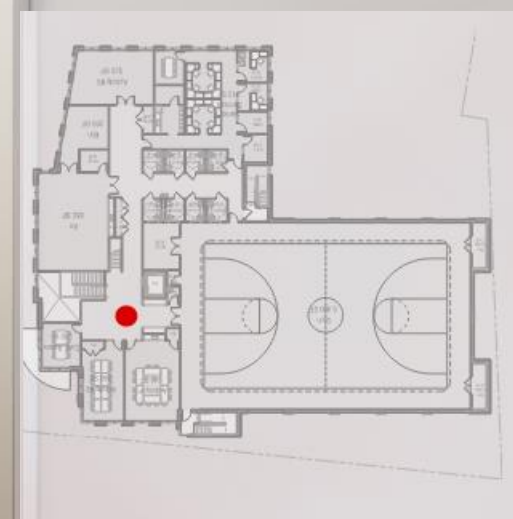
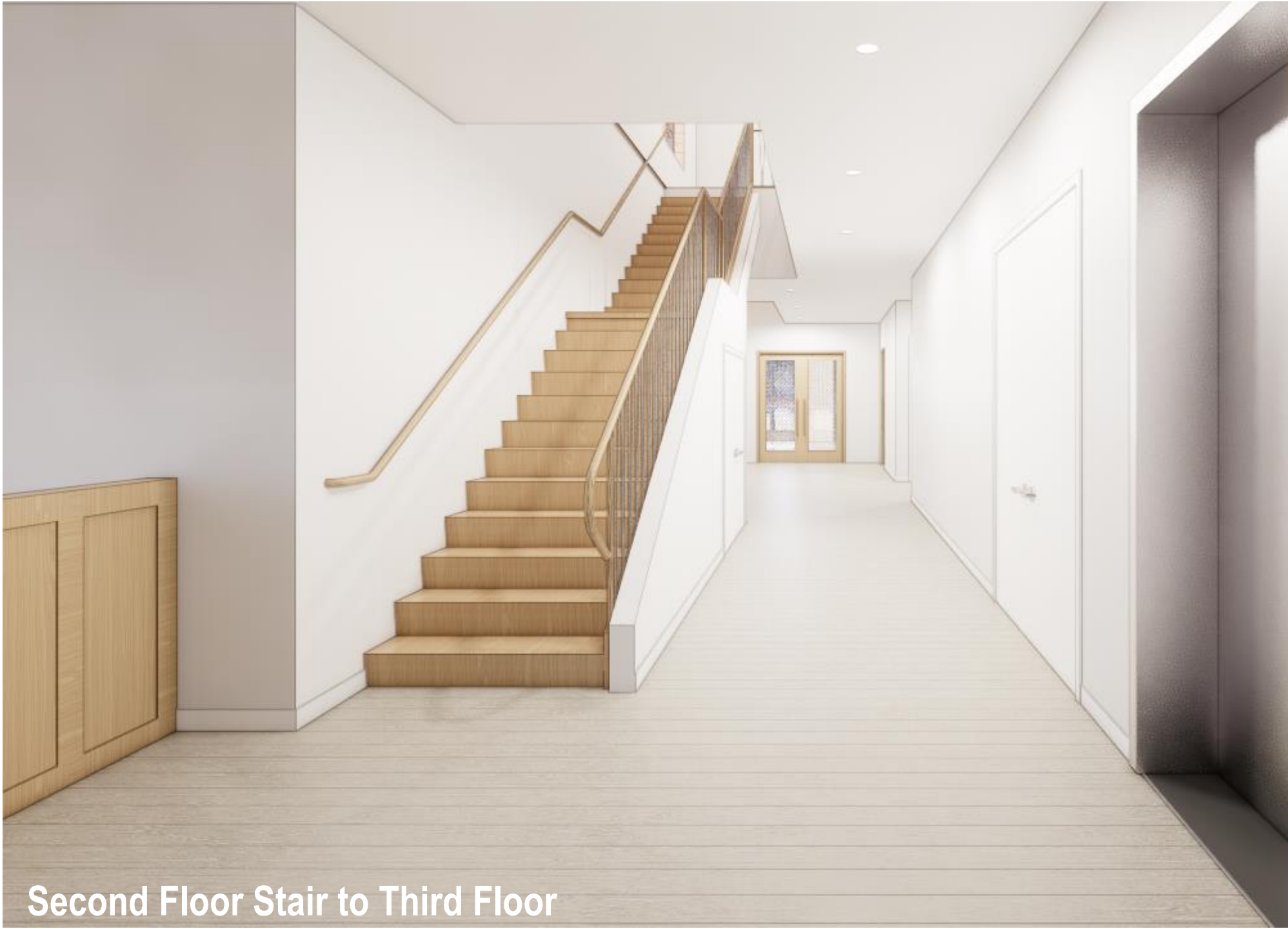
Interior Perspectives



Lobby Communicating Stair



Lobby View Towards Multiple Purpose Room



Second Floor Stair to Third Floor



Gymnasium



Gymnasium Walking Track



Gymnasium



Third Floor Stair Landing

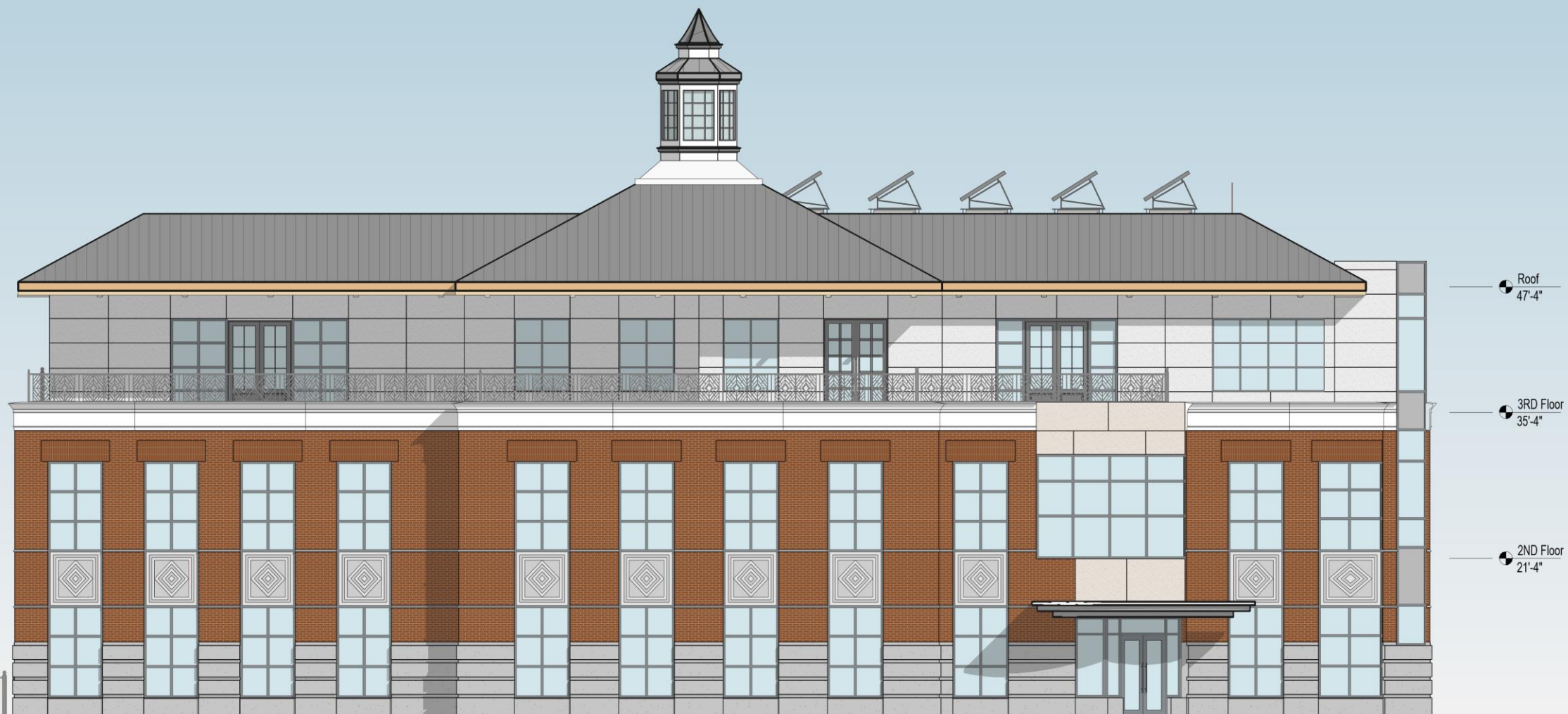


Third Floor Lounge

Exterior Elevations



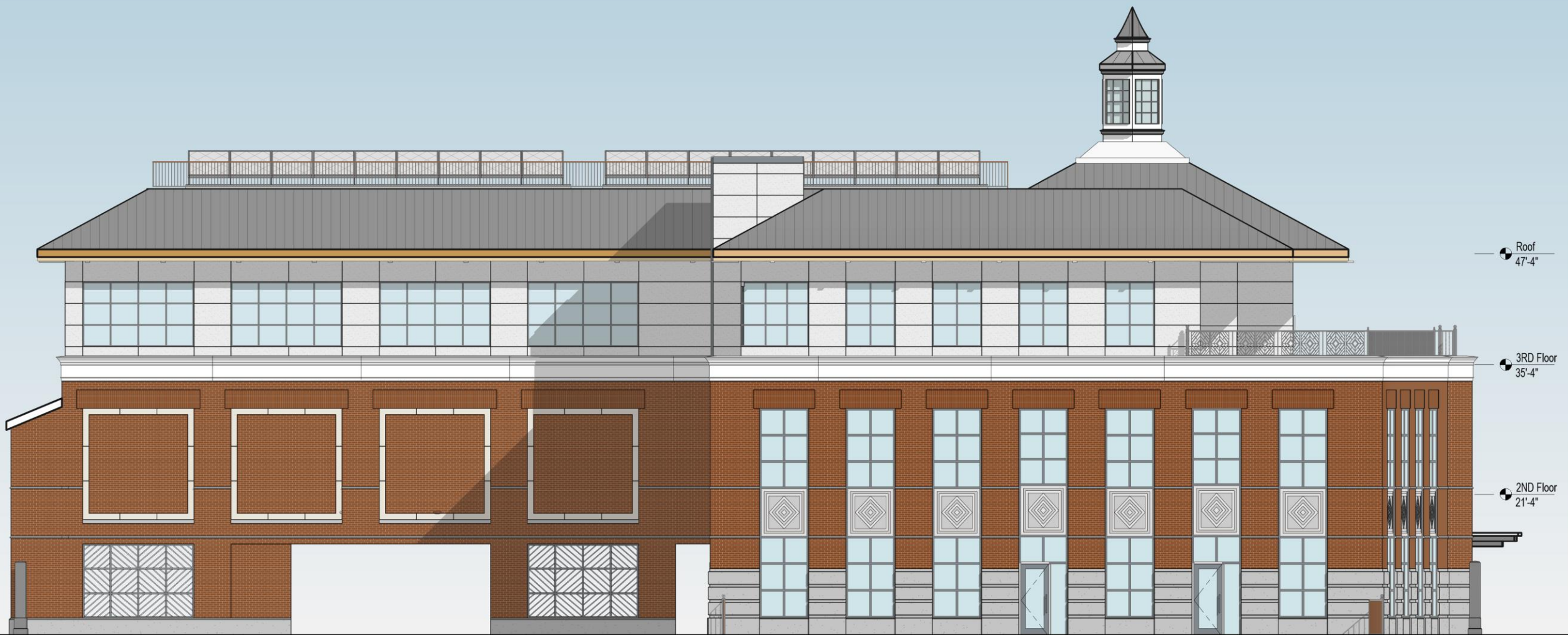
West Elevation



Walnut Street Elevation



Highland Avenue Elevation



Walnut Place Elevation



Walnut Street and Highland Avenue

Energy Model Update

System Descriptions

Air-source VRF

- ▶ Air cooled VRF Heat pumps (outdoor)
- ▶ Fan coil units (refrigerant)
- ▶ BC Controller (refrigerant distribution box)
- ▶ Copper refrigerant piping
- ▶ All system controls by VRF manufacturer
- ▶ Single system provides simultaneous heating and cooling to different zones
- ▶ System operates to -13°F outdoor air temp. No supplemental heat required

Air-Water Heat Pump/Chiller

- ▶ Air source water chillers (outdoor)
 - ▶ 2 systems, 1 for heating, 1 for cooling
- ▶ Fan coil units (hydronic, 4-pipe)
- ▶ 4-pipe system (hot and chilled water) Steel or copper pipe
- ▶ 3rd party controls to integrate all system components (heat pumps/chillers and fan coil units)
- ▶ System operates down to 0°F outdoor air temp. Supplemental heat required (electric boiler)

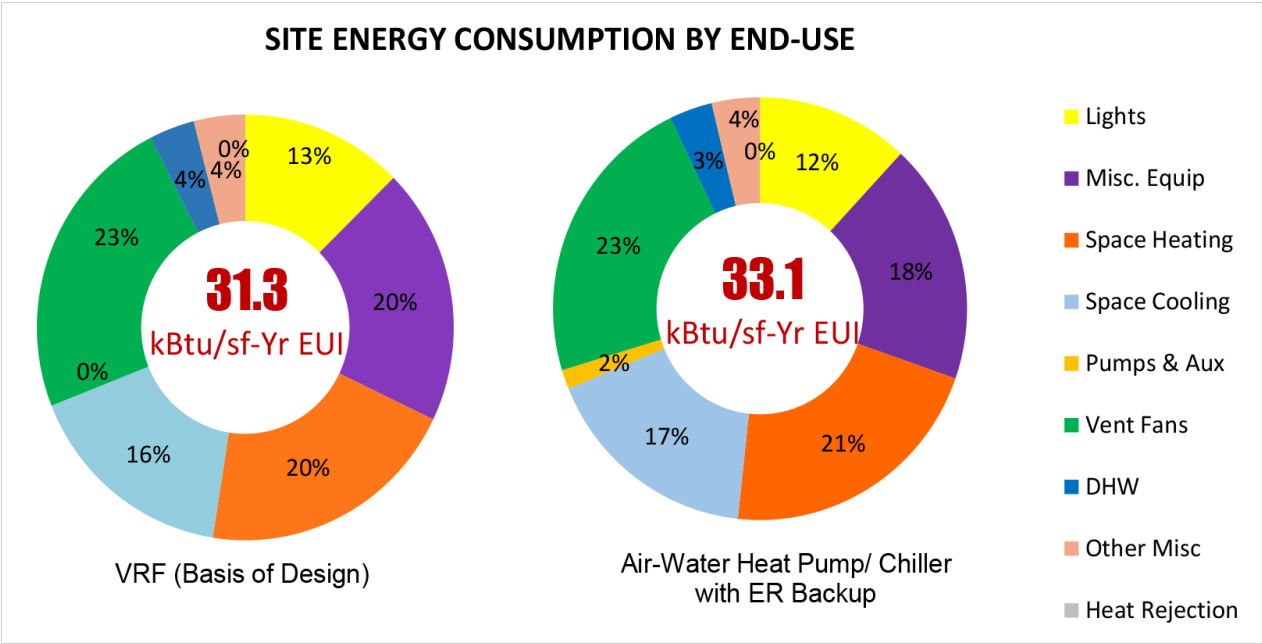
HVAC System Options

Table-1 HVAC System Options		
Description	VRF (BOD)	Air-Water Heat Pump Chiller with ER Backup
System Description	Air cooled VRF Heat Pumps (outdoor) Fan Coil Units (indoor)	Air source water chillers with hydronic 4-pipe fan coil units.
	Single system provides simultaneous heating and cooling to different zones. System operates to -13F outdoor air temperature.	Two systems, one for heating and one for cooling. System operated down to 0F outdoor air temperature. Supplemental electric boiler may be needed below 0F.
Basis of Design	<p>Mitsubishi CitiMulti VRF System</p> <p>Two (2) high-efficiency outdoor units: PURY-EP216TSNU-A PURY-EP240TSNU-A</p> <p>VRF (air) COP = 3.46 @AHRI 47F</p> <p>There will be approximately 42 indoor units.</p>	<p>Trane or similar</p> <p>Four (4) AXM030 modules - these modules operate either in heating or cooling mode.</p> <p>There will be approximately 42 indoor units.</p> <p>Chiller Heat Pump Performance - Cooling: 9.28 EER Heating: 1.57 COP</p>
Ventilaition	<p>Dedicated Out Door Air System (DOAS) sized for ventilaiton requirements with continuous operation during all occupied houts and shut-off during unoccupiedd hours.</p> <p>DX Cooling / HP Heating DOAS Effy: 12.5 EER/ 20 IEER (Estimated based on Daikin REYQ Series)</p>	Same as Basis of Design

Detail Energy Analysis and Energy Usage Intensity

Site Energy Use Savings (MMBtu/Yr) - Enhanced Case											*EUI (kBtu/SF-yr)
Description	Lights	Misc. Equip	Space Heating	Space Cooling	Pumps & Aux	Vent Fans	DHW	Other Misc	Heat Rejection	Total	
VRF (Basis of Design)	125.5	194.3	203.0	164.3	0.0	234	35.2	39.6	0	996	31.3
Air-Water Heat Pump/ Chiller with ER Backup	125.5	194.3	224.8	180.2	15.5	238	35.2	39.6	0	1,053	33.1

Energy Use, GHG Reduction and Cost Summary - Enhanced Case			
Description		VRF (Basis of Design)	Air-Water Heat Pump/ Chiller with ER Backup
Annual Site Energy			
Electricity	kWh	291,810	308,632
Natural Gas	MMBtu	-	-
Total Site Energy use	MMBtu	996	1,053
Annual Energy Cost			
Electricity	\$/year	\$46,690	\$49,381
Natural Gas	\$/year	\$0	\$0
Total Energy Cost	\$/year	\$46,690	\$49,381
Annual Source Energy			
Total Source Energy use	MMBtu	2,789	2,949
Green House Gas (GHG)			
Total GHG Emissions	MTCO2e	65.3	69.1



Summary of Comparison

Summary - Enhanced Case ¹													
HVAC System	EUI (Enhanced Case)	Net Zero	Carbon Emissions	Annual Energy Use	% Provided by PV ²	Annual Energy Cost	Annual Energy Cost/SF	Annual Maintenance Cost	Annual Savings against BOD	Capital Investment Cost	Lifetime Savings	Discounted Payback	Eversource Incentive ³
	kBtu/SF-yr	Y/N	Tons	MWh	%	\$/yr	\$/SF	\$/SF	\$/yr	\$	\$	Yrs	\$
VRF (Basis of Design)	31.3	N	65.3	291.8	9.1%	\$ 46,690	\$ 1.47		NA				\$ 135,600
Air-Water Heat Pump/ Chiller with ER Backup	33.1	N	69.1	308.6	8.6%	\$ 49,381	\$ 1.55		-\$2,691.6				\$ 115,600

Notes:

1. Enhanced Case includes passive house level exterior assemblies and infiltration, reduced installed interior lighting, higher efficiency HVAC equipment and energy recovery that was assessed in the energy analysis report issued on June 16 2022.

2. PV production is estimated based on available roof area of 2,000SF and 1,252 kWh/pkW solar generation @20degree panel tilt due south and 21 kW PV system capacity (26.5 MWh generation)

3. Eversource incentive calculation is a preliminary estimate based on our understanding of the current MassSave Path-1 ZNE pathway + heat pump incentives currently being offered. The calculations are based on the assumption that the design will achieve the maximum Construction Incentive and the Heat Pump Adder Incentives. Design team should contact MassSave Program Administrators to confirm the incentive amounts.

For more details refer to: <https://www.masssave.com/en/saving/business-rebates/new-buildings-and-major-renovations/net-zero-and-low-eui-buildings>

Thank You