

Horace Mann Elementary School

Design Development Phase

DRC / SBC Meeting

September 11, 2024





Agenda

- Schedule
- Sustainability
- HVAC Design
- Design Updates

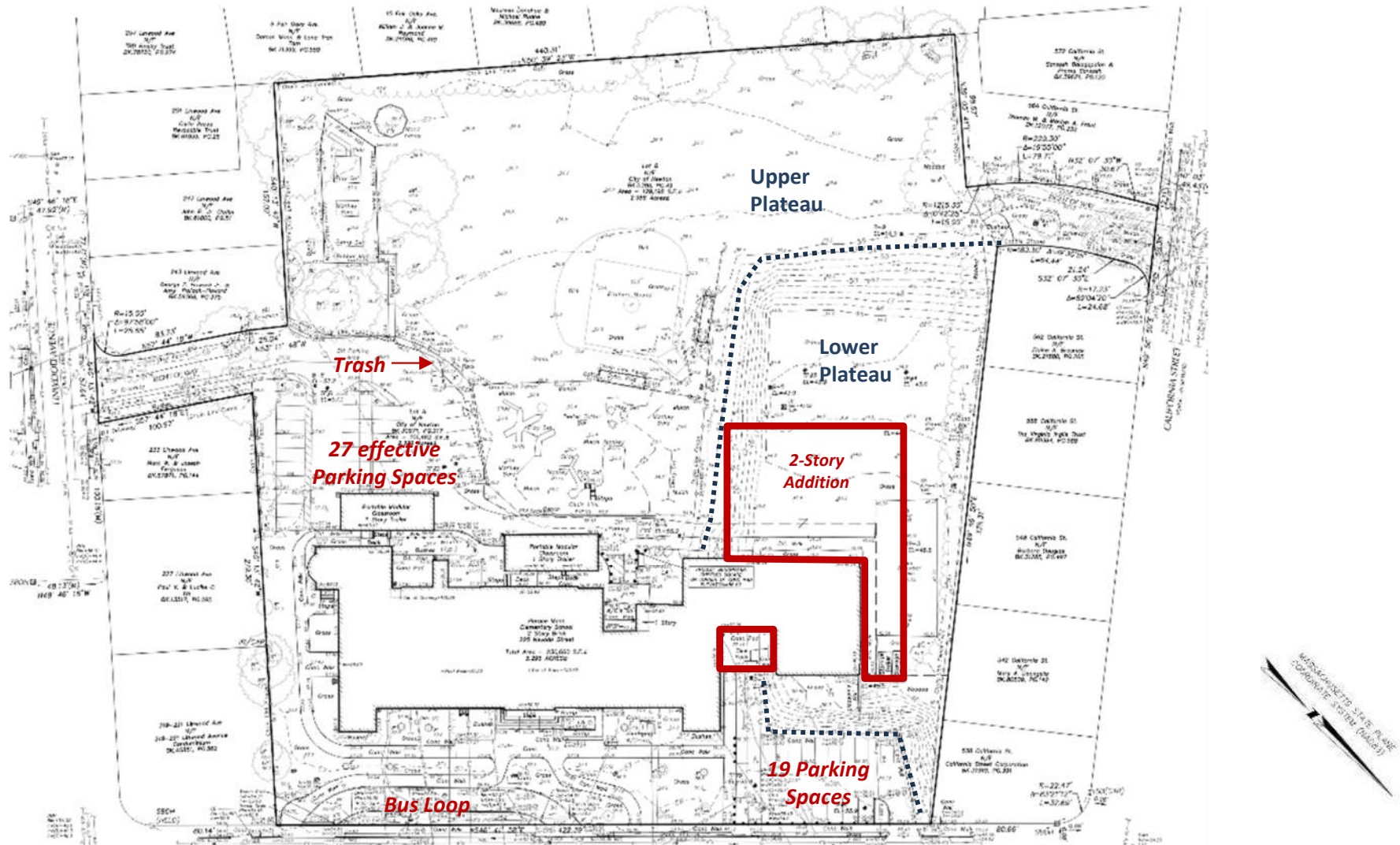


Horace Mann Elementary School

Proposed Horrace Mann Meeting Schedule

[illegible]

Existing Conditions



Site Improvements



- Emergency Access
- On-Site Parking (no net loss)
- Exterior Lighting
- New PIP Playground
- Hardsurface Play
- Relocated BB Field
- Retained Sledding Hill
- Accessibility
- Trees & Vegetation

Sustainability

Envelope Analysis

Thornton Tomasetti

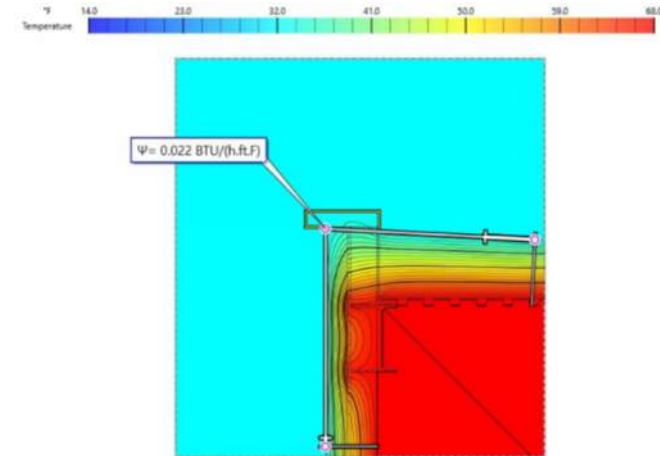
Horace Mann Elementary School

225 CMR 23 MA Commercial Stretch Energy Code

Table 1: Component Performance Alternative

	Component Tag	Reference Drawing	Component Description	Area (ft ²)	U-value (Btu/h-ft ² -°F)
Vertical Exterior Non-Glazed Wall System Components	EW1		Brick veneer, 5" ROCKWOOL cavityrock, 6" ROCKWOOL cavity	11,296	0.032
			Window Type 1 EFCO 325x Fixed	1,422	0.19
			Window Type 2 EFCO 325x Operational	765	0.3
			Curtainwall Type 1 EFCO 5600x	1,056	0.24
			Curtainwall Doors EFCO D502	224	0.57
			FRP Doors	116	0.29
Total Glazed Wall System Area				3,583	
Total Vertical Exterior Area				14,879	
Glazed Wall System %				24%	

	Component Tag	Reference Drawing	Component Description	Length (ft)	Psi-value (Btu/h-ft-°F)
Linear Thermal Bridges			1a. Curtain Wall Sill - Brick Veneer no angle	46	0.143
			1b. Curtain Wall Sill - Brick Veneer w/ angle	26	0.240
			2. Curtain Wall Jamb - Brick Veneer	186	0.104
			3a. Window Head	311	0.141
			3b. Curtain Wall Head	104	0.136
			5a.1 Roof Deck to Vertical Wall	183	0.097
			5b. Window Sill	311	0.202
			5c. Roof Deck to Curtain Wall Sill	37	0.044
			7. Roof Edge @ Brick Veneer	526	0.022
			8. Typical Foundation Detail	437	0.200
			9b. Slab Bypass- No angle, no window	329	0.046
			11. Window Jamb - Brick Veneer	725	0.113
			12. Curtain Wall Head at Roof Edge	50	0.320
			Cantilevered framing- point transmissance	7	0.136
			Connections to existing: Old masonry to new curtainwall total	66	0.250
			Connections to existing: Old masonry to new masonry	14	0.250
			Connections to existing: Old to New Roof	87	0.250
			Connections to existing: Old low roof to new wall	136	0.250
			Point thermal bridge where our HSS posts are located 4' o.c.s	131	0.880
Derated area-weighted U-value				0.124	Pass



Results

The proposed design is a low glazed wall system building. As per C402.1.5.1, the area-weighted U-value of the exterior vertical envelope must be equal to or below U-0.1285, and the vision glass used in the glazed wall system shall have a maximum whole assembly U-factor of U-0.25. The full component performance alternative weighted calculations are shown in Table 1 of this memo. The current building envelope meets the requirements with an area-weighted U-value of U-0.124.

Energy Code

Horace Mann Elementary School MA Stretch Code Energy Analysis Report (Schematic Design)

Report for:
Raymond Design Associates, Inc.
60 Ledgewood Place
Rockland, MA 02370

Report by:
Thornton Tomasetti
101 Arch St., Suite 1600
Boston, MA 02110

Thornton Tomasetti

As per C401.2.1, the project follows the Relative Performance Compliance path as it is a school building over 20,000 ft², but with an average ventilation at full occupancy greater than 0.5 cfm/ft². Under the Relative Performance Compliance path, this project must demonstrate a 49% reduction in Regulated Energy (translated from a Building Performance Factor (BPF) of 0.51 for 'all others' type) compared to ASHRAE 90.1-2019 Appendix G. Please note only the new addition is required to follow the Relative Performance Compliance path; the existing portions of the project are covered under IECC 2021 Chapter 5.

Note: This project is eligible for the Relative Performance Compliance path due to high ventilation rates, which is atypical of K-12 school projects. But because the energy analysis is only required for the new addition portion of the school, which includes the kitchen and cafeteria, the average ventilation rate for the modeled area is much higher than typical.

Table 1. Energy Use Intensity by End Use and PEI

Energy End Use	ASHRAE 90.1-2019 (kBtu/ft ² /yr)	Basis of Design (kBtu/ft ² /yr)
Internal Lighting	10.9	3.6
Exterior Lighting	0.3	0.3
Elevators	0.0	0.0
Misc Equip	12.7	12.7
Space Heating Fossil Fuel	25.0	0.0
Space Heating Electricity	0.0	4.7
Space Cooling	4.5	3.4
Heat Rejection	0.0	0.0
Pumps	0.0	0.0
Vent Fans	12.6	5.6
Domestic Hot Water Fossil Fuel	5.6	0.0
Domestic Hot Water Electricity	0.0	3.8
Total Electricity	41.0	34.1
Total Natural Gas	30.6	0.0
Total Energy	71.6	34.1
Performance Energy Index	0.60	0.48
Pass		

HVAC

HVAC SYSTEMS

Scope of Work Summary:

Renovation Area:

- Reuse & renovate existing system
- Heating: HW Boiler plant (2013) serves radiation heating
- Ventilation: Heated ventilation air (w/o cooling) via ERV unit (2013) & overhead ducted systems
- Air Conditioning: Air source VRF (2019)
- ATC Controls: Delta Controls DDC System (2013, 2019)
- Provide HVAC modifications for Renovation areas
 - For Renovation Walls - Ductwork and piping relocations
 - Perimeter fin-tube reconfigured for new room layouts. Split where passing through new walls and re-pipe to re-establish zoning.



Hot Water Boiler Plant



Perimeter FTR Heating



Rooftop Ventilation Unit



Attic - Ventilation Ductwork



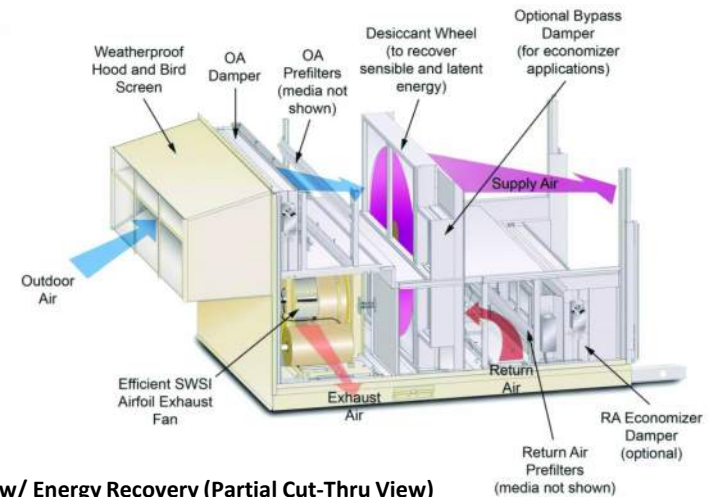
VRF Heat Pump Units (Typical Indoor Units @ Left & Outdoor Units @ Center & Right)

HVAC SYSTEMS

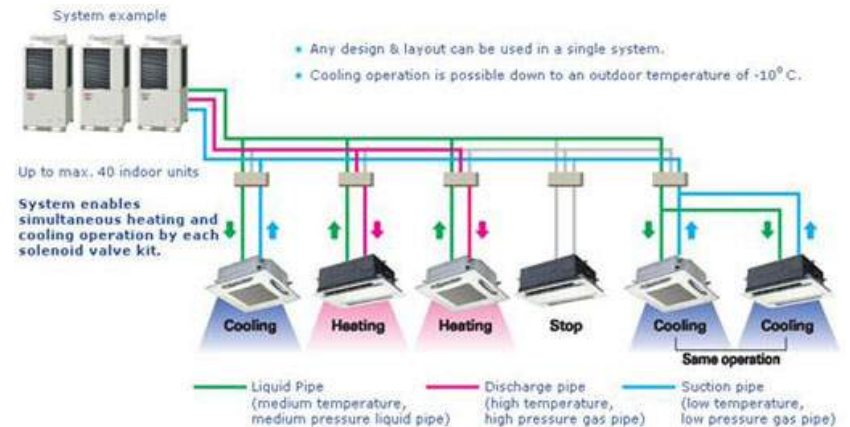
Scope of Work Summary:

Addition:

- Heating & Air Conditioning: Air Source Heat Pump VRF System
 - Indoor VRF units (combination ducted & ductless)
 - Minimize use of supplemental electric heat
- Ventilation: AHUs w/ Air Source Heat Pump heating cooling & supplemental (back up) electric heat and Energy Recovery:
 - VAVs for Demand Ventilation Control
 - New Addition Units
 - Admin/Classrooms (ERV-1)
 - Cafeteria (RTU-1)
 - Kitchen (MAU-1)
 - New Existing Bldg. Units
 - Gym (RTU-2)
- Controls
 - Connect to existing BMS

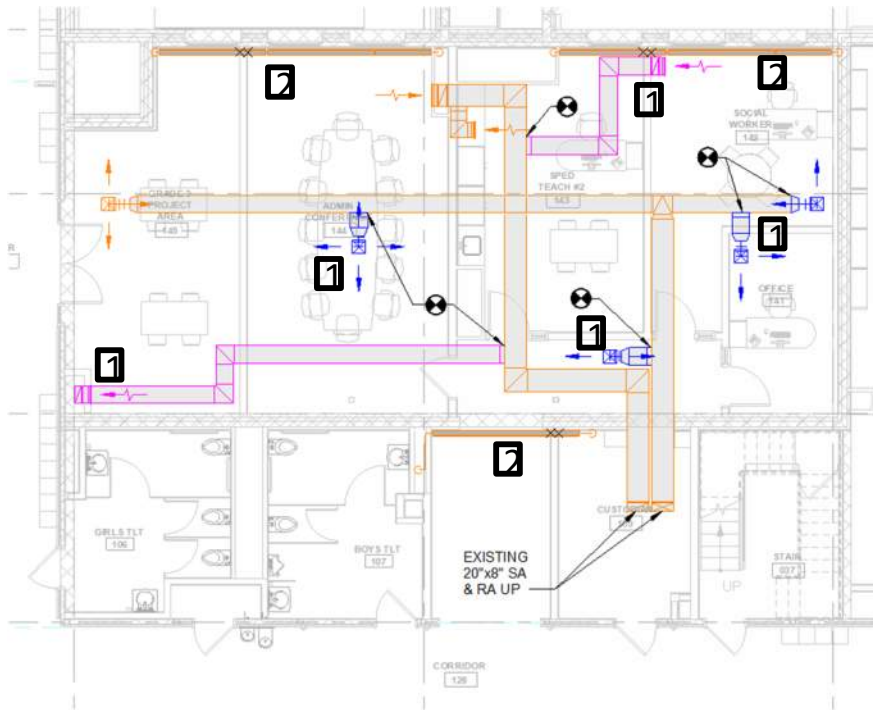


AHU w/ Energy Recovery (Partial Cut-Thru View)



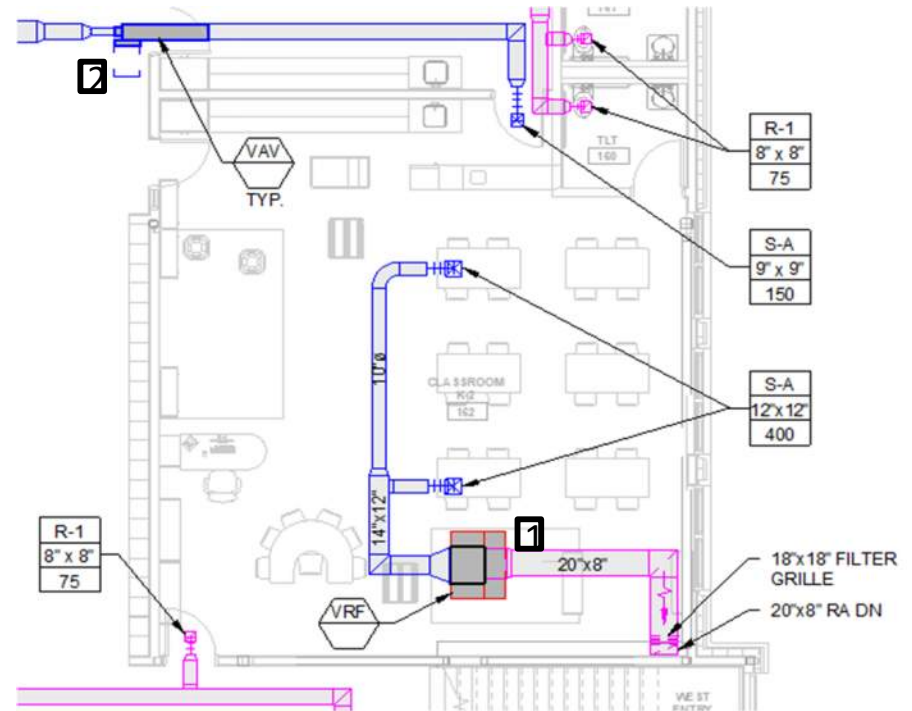
Air Source VRF Diagram

HVAC SYSTEMS



Example Renovation Area: Conference/Offices

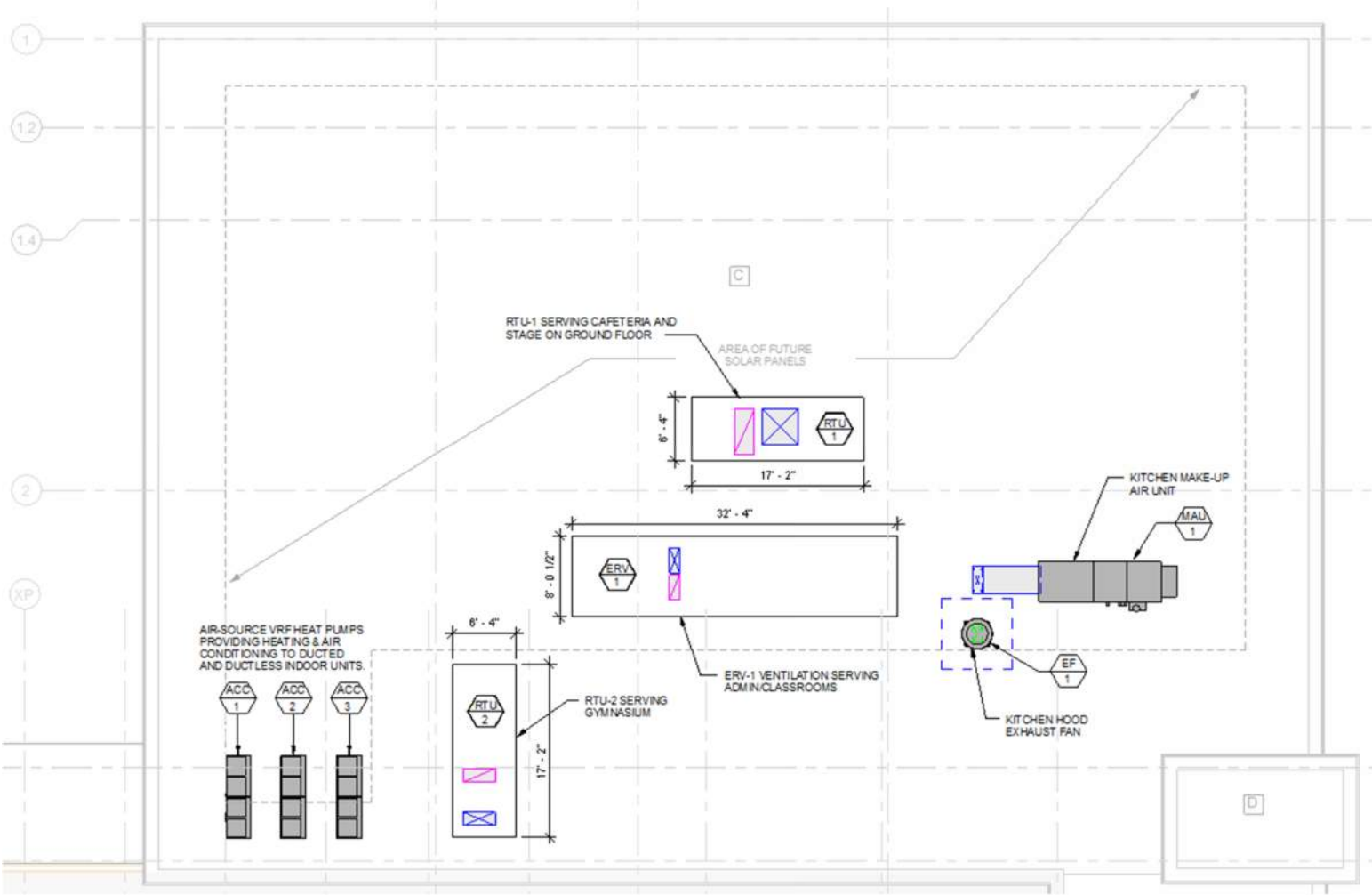
1. New Supply & Return grilles to accommodate new layout, connecting to existing system.
2. Fin-tube reconfiguration for new layouts, will require additional piping to provide HHWS&R to separated fin-tube to re-establish zoning.



Example Addition Area: Typical Classroom

1. Ducted VRF with low filter return for Heating & Air Conditioning.
2. VAV for Demand Ventilation Control

HVAC SYSTEMS – ROOF PLAN



Rear View – previous



Rear View – current thoughts



Rear Entrance to Addition – previous



Rear Entrance to Addition – current thoughts



Partial First Floor



Partial First Floor Plan - Addition



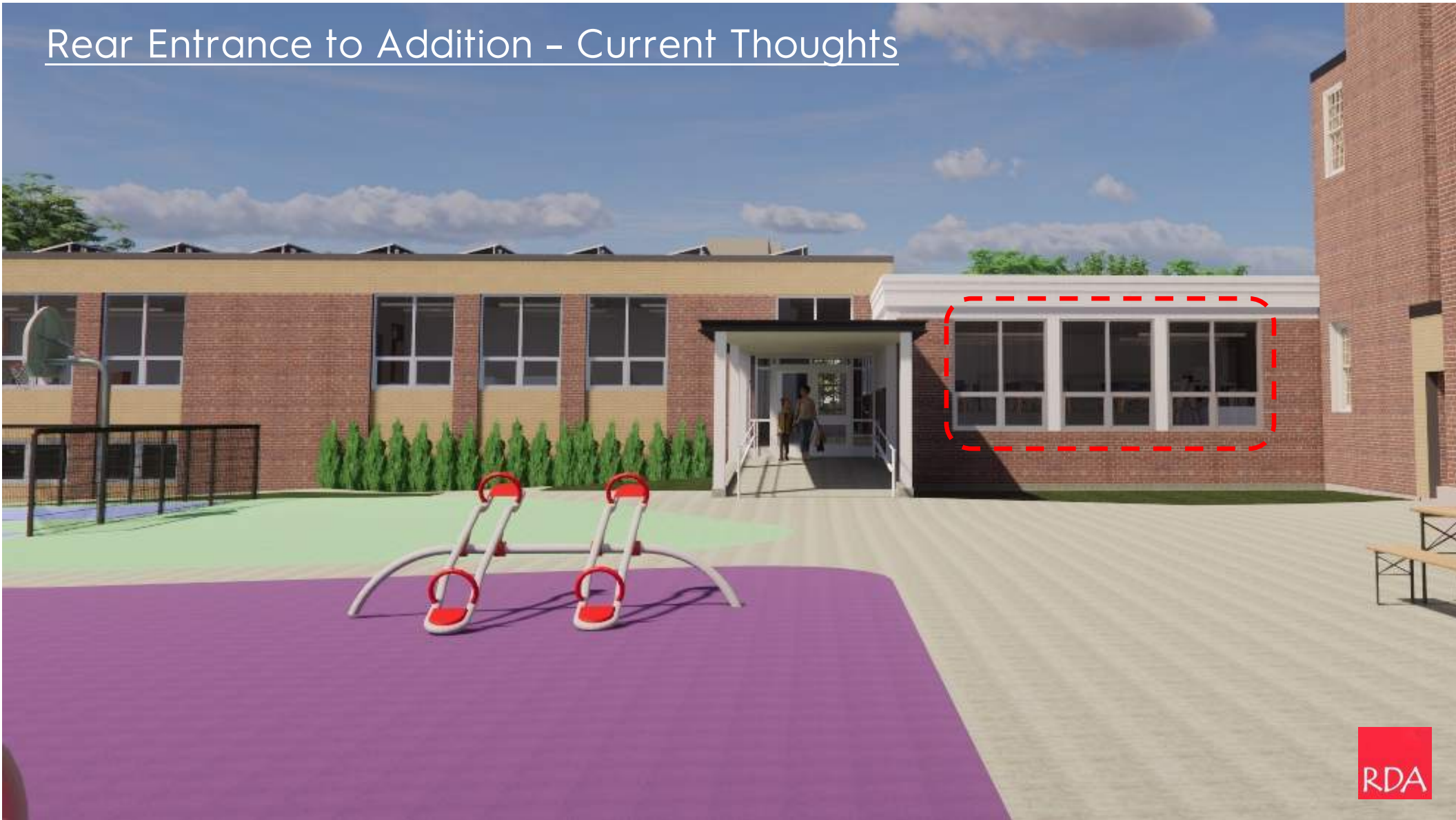
Front Accessible Entrance to Stair Addition



Front Accessible Entrance to Stair Addition – Current Thoughts



Rear Entrance to Addition – Current Thoughts



Questions & Comments

