Elizabeth G. Lyons Elementary School

Randolph, MA






Building Committee Presentation

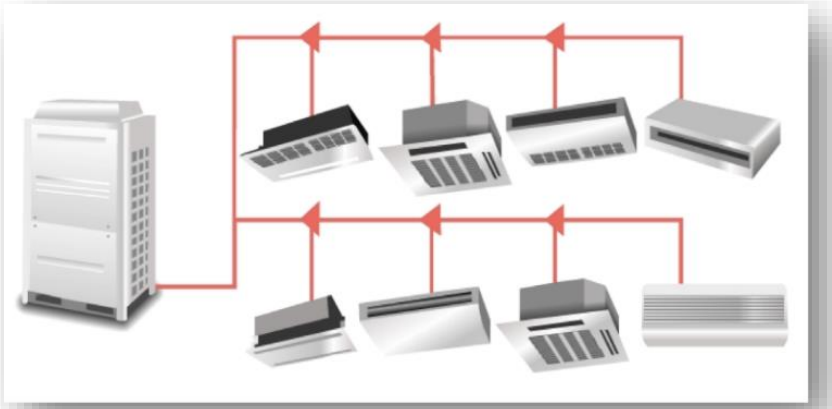
April 7, 2021

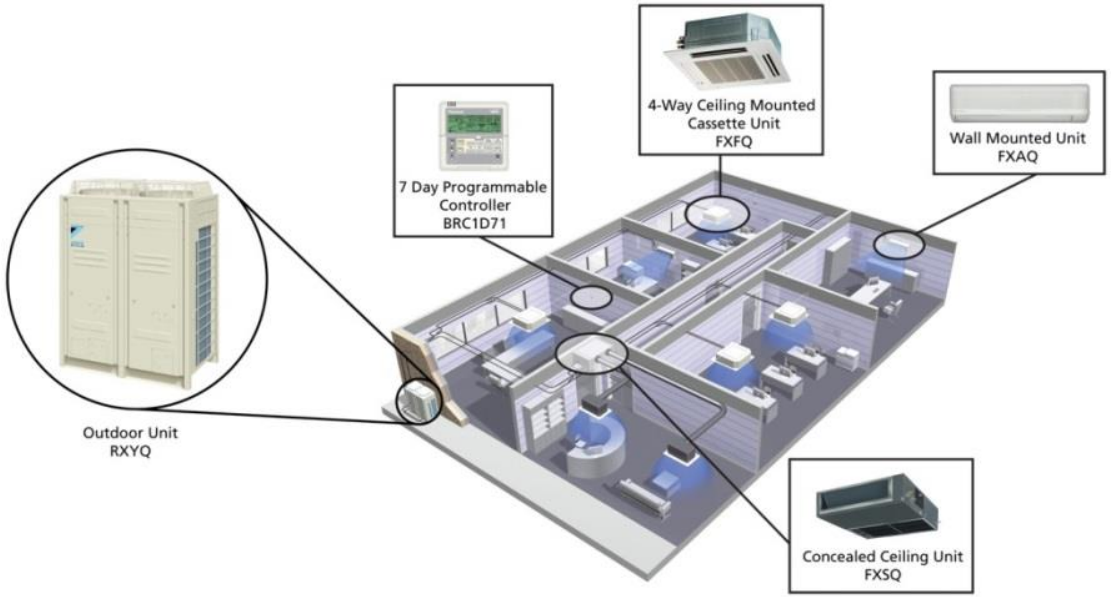
TSKP STUDIO

AEDALUS A CHA Company

LYONS ELEMENTARY SCHOOL | GOALS OF THE MEETING

- Review HVAC system pathways and MSBA requirements
- Understand preferences of the Building Committee





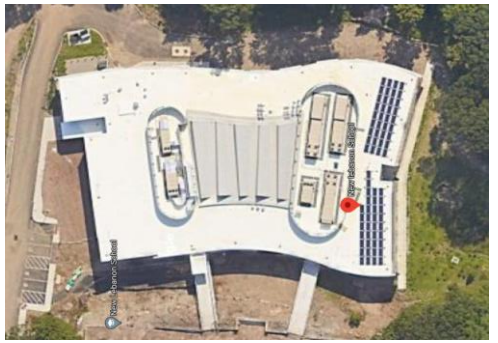
Minimum Requirements for funding:

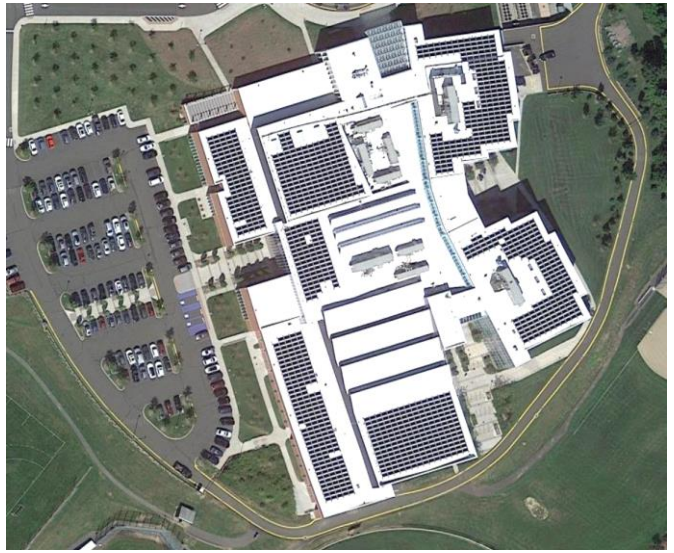
1) LEED v4 Certified, or NE-CHPS Verified
2) 10% better than energy code

Platinum	(80+ points)
Gold	(60 – 79 points)
Silver	**(50 – 59 points)**
Certified	(40 - 49 points)

2% additional reimbursement for projects that can exceed energy code by at least 20%

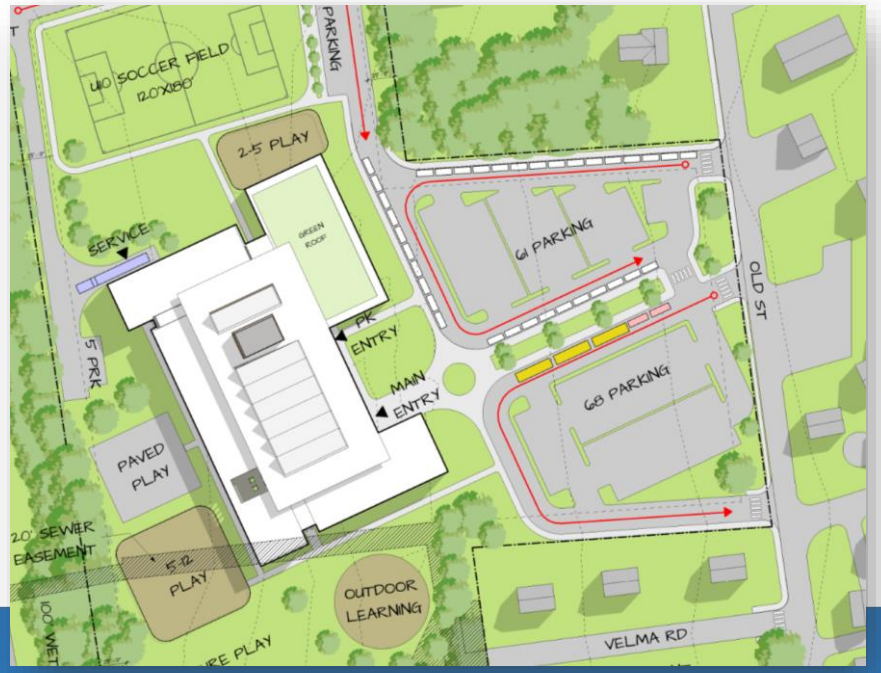
"Solar-ready" (MSBA does not fund solar)





System Selection Criteria

- Maintenance
- Standardize throughout building and district
- Identify environmental requirements
- Reliability
- Energy Efficiency / Environmental Impact
- First Cost / Return on Investment

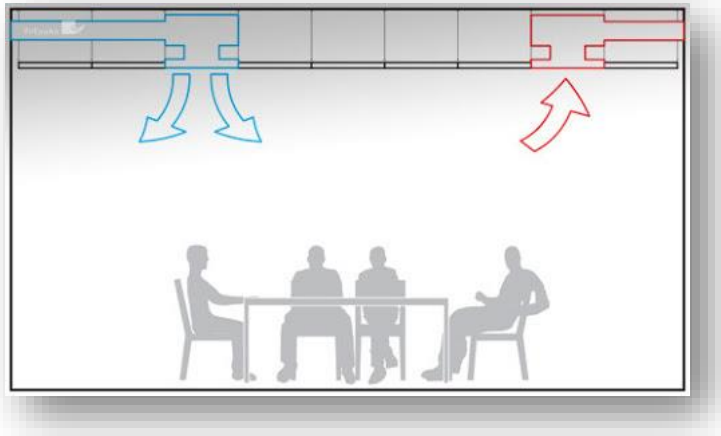


• HVAC Design Pathways

	"Traditional"	"High Efficiency" VRF	"Path to Net-Zero" Geothermal	"Hybrid"
Description	Central air handling units and VAV's	Modular Variable Refrigerant Flow (VRF)	Geothermal Heat Pumps	Partial VRF cooling, Full dehumidification
Energy Use Intensity (EUI) (lower is better)	50	40	20	30-40
First Cost Magnitude ($/SF)	60	55	70	Under 55
Overall HVAC Const. Cost ($)	$6.6M	$6.2M	$7.8M	$4.0M - $5.4M (cooling 5k – 55k SF)

• “Traditional”
Variable Air Volume (VAV)

- System consists of:
  - Outdoor Air Cooled Chiller
  - Multiple VAV Air Handlers
  - Multiple Reheat VAV Boxes
  - Chilled & Hot Water Piping
  - Pumps



Pros:

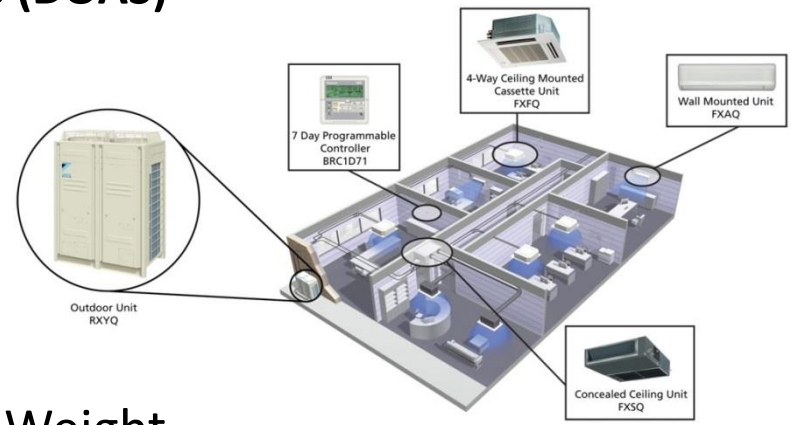
- System Familiarity
- Centralized Filter Locations

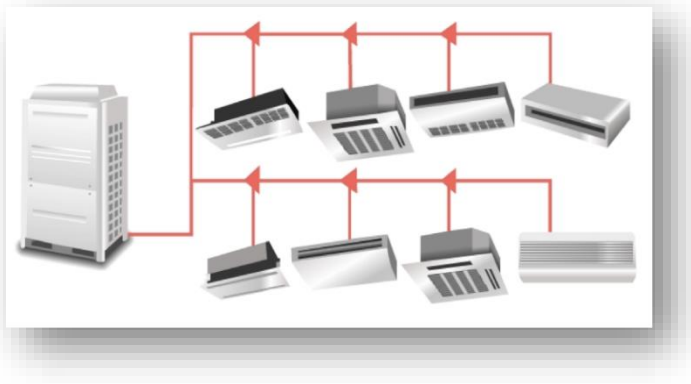
Cons:

- Air Handler + Ductwork Size / Weight
- Duct Size
- **Mixing air throughout system**

• “High Efficiency”
Variable Refrigerant Flow (VRF)

- System consists of:
  - Multiple **Dedicated Outdoor Air Systems (DOAS)**
  - Roof mounted Heat Pump Units
  - Multiple Indoor Refrigerant Air Handlers
  - Refrigerant Piping





Pros:

- Heat Pump Weight
- Low Noise Levels
- **Non-Mixing. 100% Fresh + Exhaust Air**
- Ductwork Size

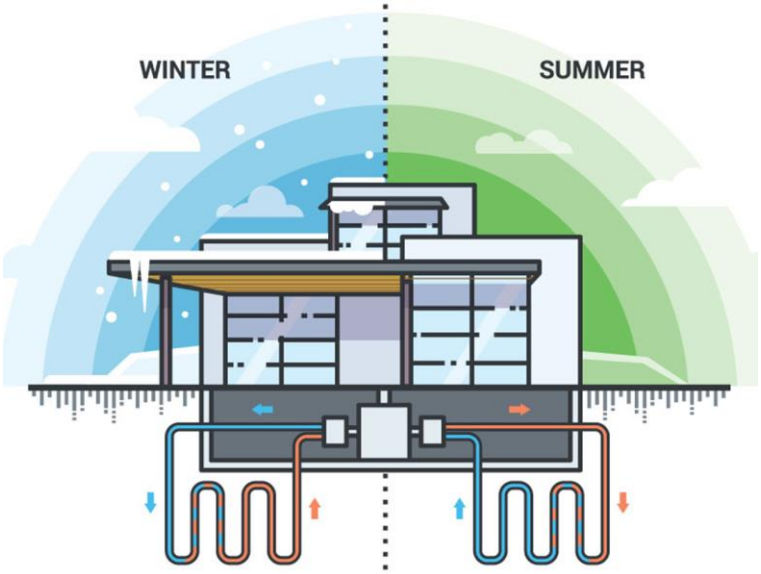
Cons:

- Distributed Filters/Compressors
- Less Familiar System

• “Path to Net Zero”

Geothermal

- System consists of:
  - Geothermal Bore field
  - Roof or indoor mounted Heat Pump Units
  - Condenser Piping



Pros:

- Low Noise Levels
- **Non-Mixing. 100% Fresh + Exhaust Air**
- Highest Efficiency

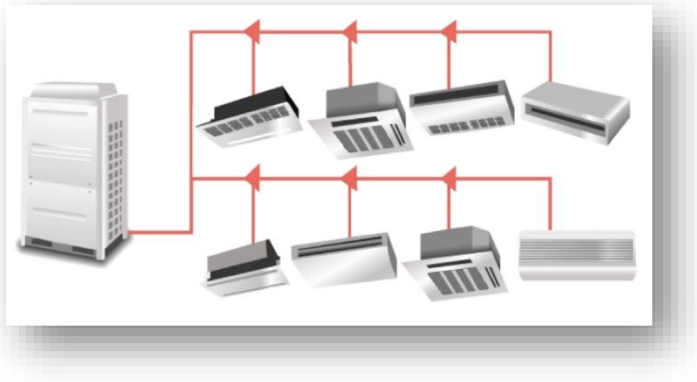
Cons:

- High initial cost : 30-40yr “payback”
- Unfamiliar System

- **“Hybrid”**

  Partial cooling – Full Dehumidification

- System consists of:
  - Dedicated outside air – cool dry ventilation air throughout
  - VRF Cooling where desired. Modular system



Pros:

- Reduced cost
- **Non-Mixing. 100% Fresh + Exhaust Air**
- High efficiency + limited usage

Cons:

- User perception

• “Hybrid”

Partial cooling – Full Dehumidification

- Full cooling zones
  - 72 degrees, under 50% humidity at any time
- Dehumidification-only zones
  - **Approximately 78 degrees**, under 50% humidity at any time
  - Eliminate VRF units at $20/SF
- Spaces to discuss
  - Main Office
  - Cafeteria
  - Gymnasium
  - Library/Media
  - Classrooms

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