

Richmond Free Library - 1st Floor Heating Renovation

Options Matrix Summary

2/06/2020 BLC

Option Comparison Description	Alternative # 1 Gas Furnace w/ DX cooling	Alternative # 2 ASHP VRF w/ Perimeter Radiation	Alternative # 3 Packaged HP RTU Unit on Grade	Alternative # 4 Air to Water Heat Pump
Equipment for basis of analysis	One Trane 95% NG furnace with one 17 SEER HP Condensing Unit	Trane/ Mit VRF hyperheat Heat pump condensing unit w/ 4 Evaps	One Daiken Rebel RTU with wheel and HP compressor & NG furnace	Three Chiltrix Cx34 ATW HP with 2 Firstco VMB16 Ahus' and buffer tank, pump, glycol etc.
Heat Source Primary	95% + Eff Gas Furnace	ASHP VRF Heat Pump	Furnace (83% Eff)	Air to water heat pump
Heat Source Secondary	None	Existing Boiler (84% Eff)	None	Existing Boiler(84% Eff)
Cooling Source	Split System Condensing Unit	ASHP (one to one)	Integral Heat Pump Compressor	Air to Water HP
Heating and Cooling Distribution	1 AHU air ducted thru basement	Hot water via radiation, A/C via ducted FCU in Basement	Air Ducted thru basement	Two AHU in Basement w/ ductwork
Ventilation	400 CFM Lossnay ERU to serve 1st floor	400 CFM Lossnay ERU to serve 1st floor	Integral wheel / Economizer with RTU	400 CFM Lossnay ERU to serve 1st floor
. Ventilation air distribution	Ducted to Furnace	Direct duct to FCU's	Integral Economizer	Duct to AHU's
Impact on Library first floor	Minimal	Marginal	Minimal	Minimal
Raw Equipment First Cost	\$ 6,300.00	\$ 26,950.00	\$ 32,500.00	\$ 21,044.00
Mechanical System First Cost for Analysis	\$ 55,400.00	\$ 83,550.00	\$ 74,250.00	\$ 76,200.00
Annual Service	\$600.00/year	\$800.00/year	\$800.00/year	\$800.00/year
Operation and Maintenance Complexity	Simple Residential	Standard Commercial	Standard Commercial	Complex Commercial
Rebates	\$ (4,500.00)	\$ (4,500.00)	\$ -	\$ (5,500.00)
Utility Cost Per Year	\$ 4,635.00	\$ 4,321.00	\$ 4,407.00	\$ 4,450.00
Life Cycle Cost	\$ 106,388.00	\$ 133,421.00	\$ 131,768.00	\$ 127,326.00