NEW ROCHELLE POLICE DEPARTMENT

New Rochelle Police Department

475 North Avenue, New Rochelle, NY 10801

Investment Grade Energy Efficiency Audit Report

WILLDAN

Summary of Revisions

4/19/2022:	Initial Draft

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1. Contacts

Site Details

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2. Executive Summary

Site:	New Rochelle Police Department
	475 North Ave, New Rochelle, New York
Dates of Audit:	April – May 2021, January – February 2022
Auditors:	Nick Hesser
	Willdan Energy Solutions

Willdan Energy Solutions (Willdan) conducted an energy audit of the New Rochelle Police Department located at 475 North Avenue in New Rochelle. This report summarizes the Energy Conservation Measures (ECMs) that Willdan identified, along with the associated energy and cost savings for each measure.

Section 2 summarizes the estimated savings, describes the site, and discusses the building occupancy and use, the local climate conditions, the existing building systems, the facility's utility use, the facility's energy end use, and peer benchmarking of the facility.

Section 3 describes each ECM in detail and includes estimates of projected energy cost savings.

Section 4 describes ECMs that were considered but were either not recommended or were recommended for further study.

The energy cost savings have been derived through a detailed and customized spreadsheet bin model analysis. Willdan Energy Solutions will continue to work closely with the client to facilitate implementation of the selected energy conservation measures identified in this report.

Table 1: Estimated Savings

Savings			% Reduction
Annual Electric Energy	309,194	kWh	29%
Annual Electric Demand	36	kW	-
Annual Natural Gas	6,527	Therms	44%
Annual Utility Cost	$43,284	USD	31%

2.1 Overall Opportunity Summary

The table below presents the projected savings for New Rochelle Police Department.

Table 2: Projected Overall Savings

Measure		Annual Estimated Savings[1]					Estimated Implementation Cost[2]	Estimated Simple Payback Period (Years)	Measure Life (Years)
Meas. No.	Description	Electricity (kWh)	Annual Demand (kW)	Natural Gas (Therms)	#2 Fuel Oil (Gallons)	Annual Cost Savings ($)			
ECM-1	Lighting Upgrade - Interior	213,444	32.1	-	-	$24,527	$58,142	2.4	15
ECM-2	Boiler Plant Upgrade: Replace Atmospheric Boilers with HE Boilers	-	-	284	-	$337	$250,797	744.2	35
ECM-3	Hot Water Distribution System Optimization: Convert from Constant to Variable Speed Flow	2,986	2.9	-	-	$343	$62,741	182.8	15
ECM-4	RTU Controls Optimization: Supply Air Temperature Reset Implementation	41,148	-	3,949	-	$9,420	$136,988	14.5	20
ECM-5	RTU Controls Optimization: Occupancy Scheduling Implementation	49,861	-	2,031	-	$8,143	$23,000	2.8	15
ECM-6	RTU Upgrade: Like-to-Like Replacement	1,755	1.4	264	-	$515	$436,271	847.6	20
Total/Average		**309,194**	**36**	**6,527**	**-**	**$43,284**	**$967,938**	**22.4**	**20**

[1] All energy savings were calculated against the baseline on a measure-by-measure basis. Estimated implementation cost includes material, equipment and labor only.

[2] Cost estimates do not include soft costs – engineering services, construction management, commissioning, permitting & expediting, testing & inspections, hazardous material abatement.

Table 3: Measures Considered But Not Recommended

Measures Considered but Not Recommended		Annual Estimated Savings					Estimated Implementation Cost	Estimated Simple Payback Period (Years)	Measure Life (Years)
Meas. No.	Description	Electricity (kWh)	Annual Demand (kW)	Natural Gas (Therms)	#2 Fuel Oil (Gallons)	Cost ($)			
ECM-6B	RTU Upgrade: Heat Pump Replacement	(12,378)	(36.7)	(2,022)	-	($3,801)	$436,271	N/A	20

All energy savings were calculated against the calendar year 2019 baseline on a measure-by-measure basis.

2.2 Site Background Information

Project Name:	New Rochelle Police Department
Location:	475 North Avenue, New Rochelle, NY 10801
Building Type:	Police Court Facility
Occupancy Type:	General Office
Building Square Footage:	80,100 sq. ft.
Owner:	New Rochelle Police Department
Building Completed:	1998 – Latest Construction
Hours of Operation:	24 hours per day, 7 days per week, 365 days per year

2.3 Site Description

New Rochelle Police Department is located at 475 North Avenue, New Rochelle, NY 10801. The 80,100 square foot property was constructed in 1998 and houses the police department, municipal courts and various offices for development, civil services, parks and recreation, public works, tax, and fire and emergency management. The police department includes overnight prisoner holding cells and an interior firing range. There are about 250 employees in the building.

Figure 1: New Rochelle Police Department Satellite View

2.4 Building Occupancy & Usage

New Rochelle Police Department operates twenty-four hours per day, seven days per week, all year long. Other spaces such as offices, court rooms and other administrative spaces are occupied during regular business hours; five days per week and approximately eight hours per day.

2.5 Local Climate Conditions

Local climate is an important factor in a building's energy use. Outdoor temperatures affect the building envelope and drive heat transfer through the "skin" of the building. Outdoor temperatures also dictate the energy required to condition fresh air that is drawn into the building for occupant ventilation, which is typically a large portion of the overall heating and cooling load for a majority of building types. Outdoor weather conditions also determine the types of technologies and systems that will be effective in an HVAC system. The following design conditions apply.

Location: New Rochelle, New York

Cooling Season Design Condition: 93F Dry Bulb / 74F Wet Bulb (RH – 41%)

Heating Season Design Condition: 11F Dry Bulb

This climate zone experiences both harsh summers and winters, relative to the continental United States as a whole.

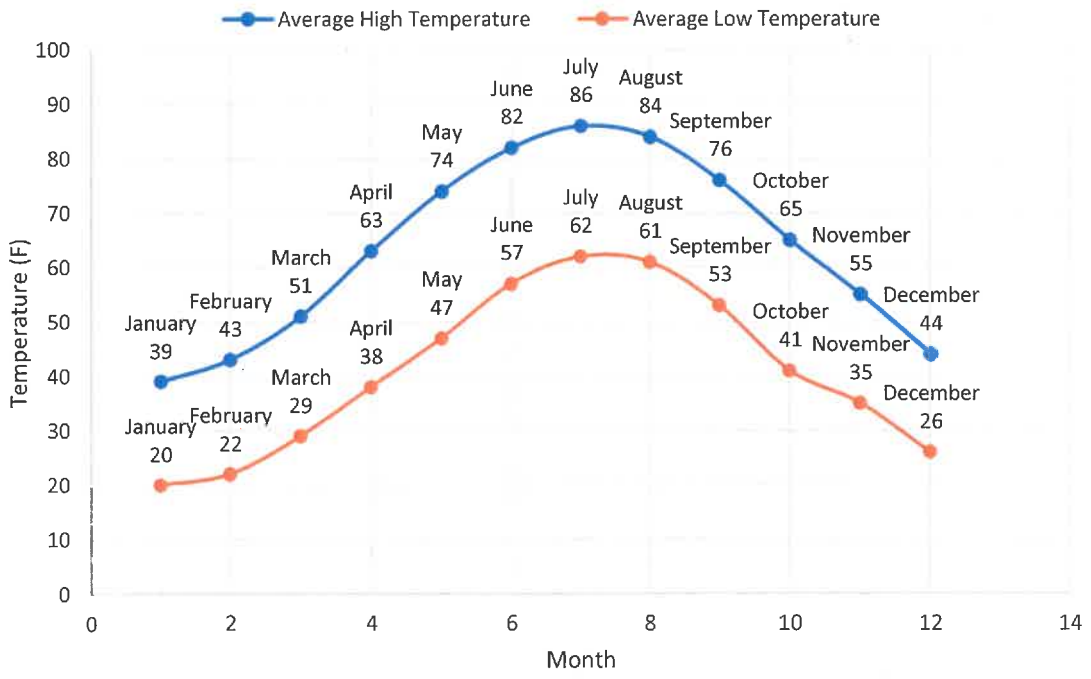

Figure 2: Historical Weather Conditions for New Rochelle, NY

2.6 Building Systems Description

Heating, ventilating, and air-conditioning (HVAC) is provided for all conditioned spaces in the facility. The HVAC systems maintain a comfortable environment in the building and provide required ventilation to meet code requirements.

Heating for the building is provided by two natural gas-fired, atmospheric hot water boilers for perimeter heating and approximately 50 reheat coils, and nine (9) packaged gas-fired roof top units for the interior spaces. Cooling is provided by roof top units and split DX AC systems. The domestic hot water loads are met by two (2) gas-fired storage tank water heaters.

2.6.1 Roof Top Units

The building cooling and majority of heating are provided by nine (9) rooftop units – seven (7) of which are Carrier units and two (2) Seasons-4 units. All the rooftop units are gas-fired-heating and DX-cooling type. The sizes of the RTUs range from 7.5 to 40 cooling tons. All the RTUs were installed in 2011.

RTU-1 through 5 are equipped with variable speed drives and economizers with return fans.

The ground floor indoor shooting range is served by a gas-fired, heating only Reznor air-handler located in the basement and a rooftop exhaust and filtration units (AHU-1) located on the roof. The unit consists of several banks of air filters and a 20 hp exhaust fan.

Rooftop unit information is summarized in Table 4 below.

Interior ductwork drawings and unit photos are shown in Figure 3 through Figure 7.

Table 4: Existing RTU Summary

Tag	Manufacture	Model	Area served	Cooling	Heating	Year	CFM	Supply Motor HP	Exhaust Motor HP	Tons
RTU-1	Seasons-4 Inc	6SJI21-0403-TN6.5-10SE	Ground Floor VAV Boxes	DX	Gas	2011	10,000	10	1	40
RTU-2	Carrier	48A3DO25BLQ51HH	2nd Floor South & East Boxes	DX	Gas	2011	6,500	5	1	25
RTU-3	Seasons-4 Inc	6SJI13-0232-TN4.0-07SE	1st Floor South & East Boxes	DX	Gas	2011	6,500	7.5	1	23
RTU-4	Carrier	48A3DO25BLQ51HH	1st Foor South & East Boxes	DX	Gas	2011	7,200	5	1	25
RTU-5	Carrier	48A3DO25BLQ51HH	2nd Floor VAV Boxes	DX	Gas	2011	6,500	5	1	25
RTU-6	Carrier	48PGFC14AA-50-B1	Court Room #1	DX	Gas	2011	4,200	5	1	12.5
RTU-7	Carrier	48PGFC12AA-50-B1	Court Room #2	DX	Gas	2011	3,500	5	1	10
RTU-8	Carrier	48PGFC12AA-50-B1	Court Room #3	DX	Gas	2011	3,500	5	1	10
RTU-9	Carrier	48PGFC08AA-5--B1	Main Entry	DX	Gas	2011	2,500	5	1	7.5
AHU-1	York	CP46DWDIAF20046	Ground Floor Range Shooting	None	Gas	1997	9,200	15	20	-

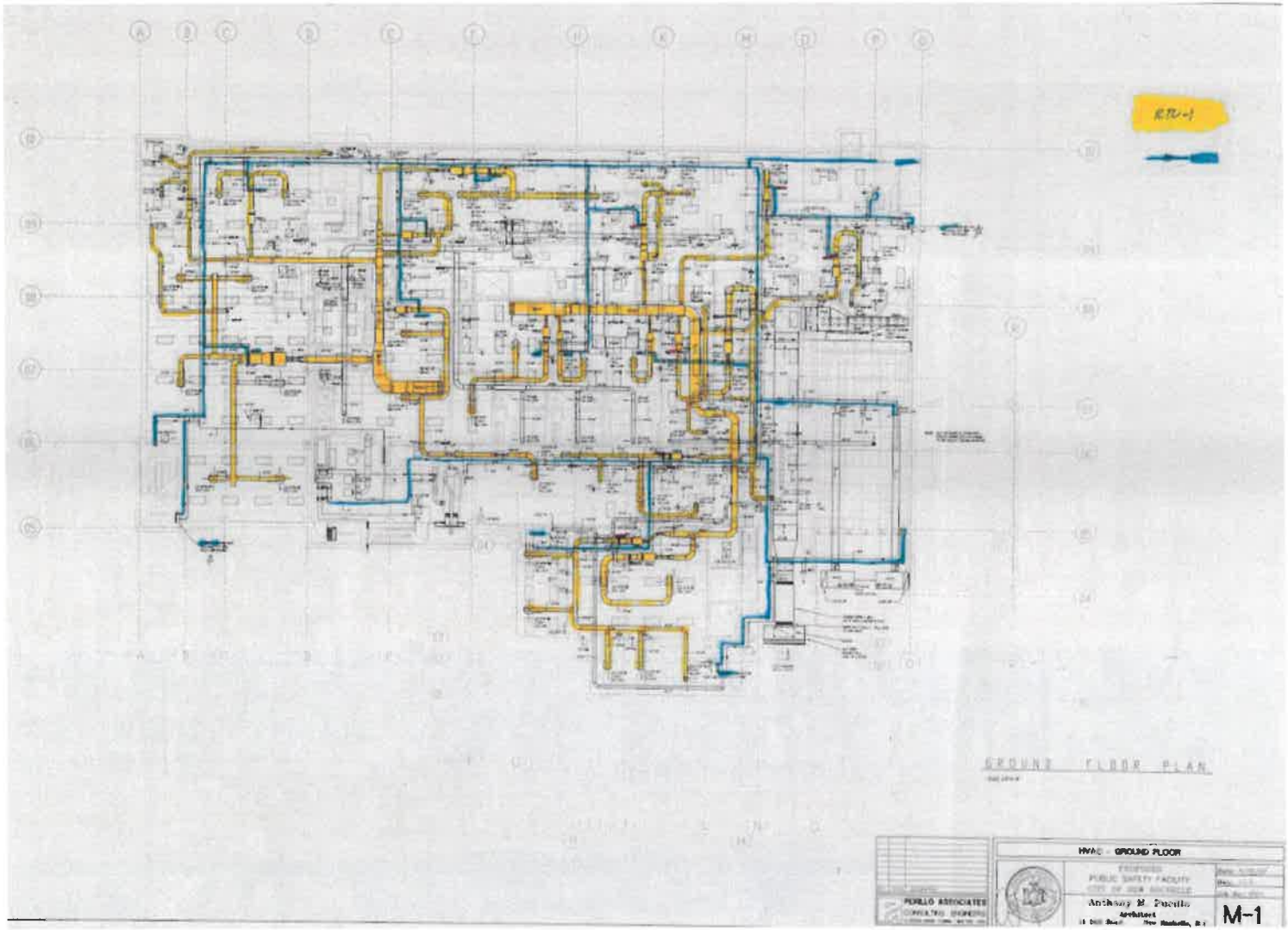

Figure 3: RTUs Supply and HWS at Ground Floor

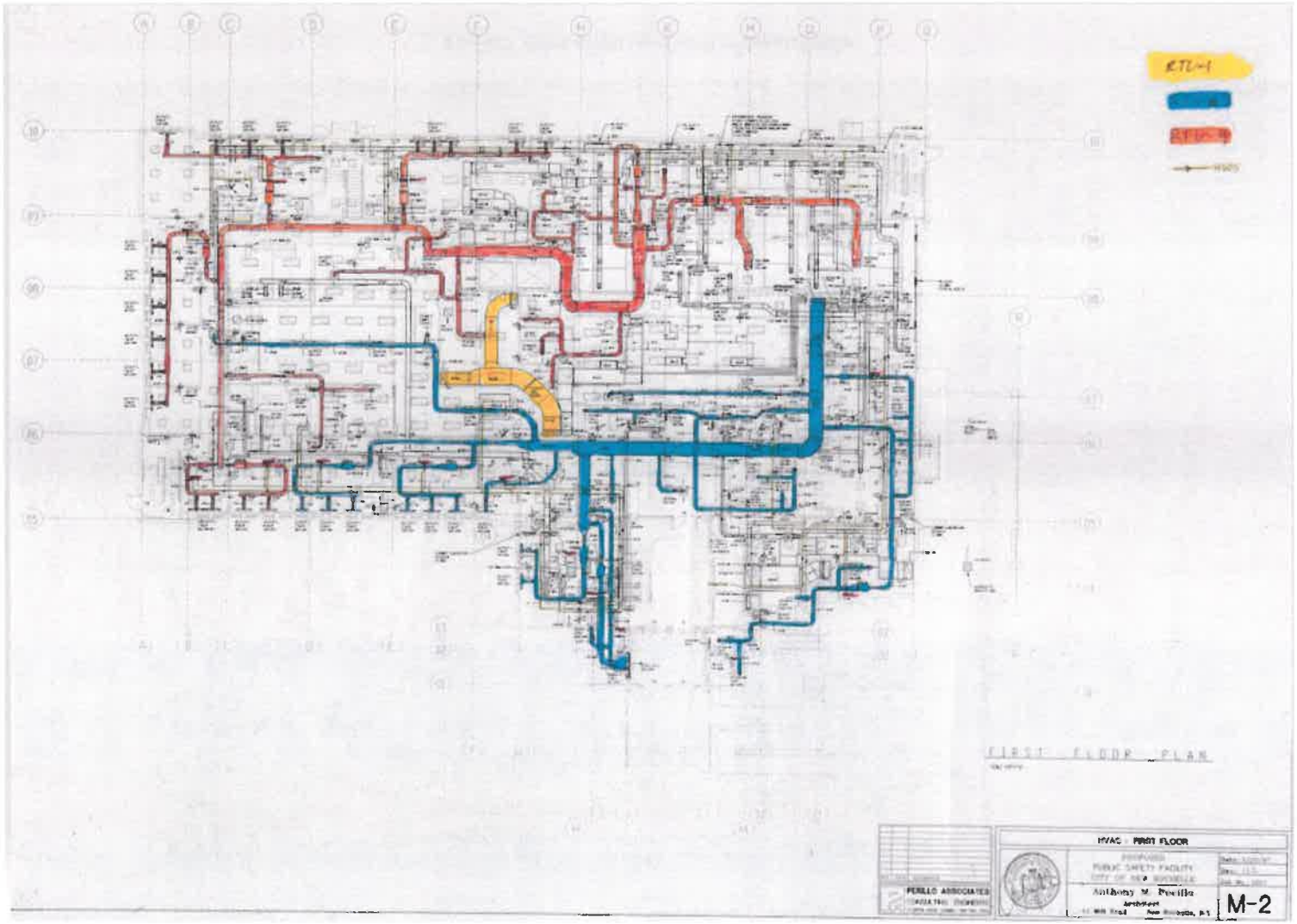

Figure 4: RTUs Supply and HWS at First Floor

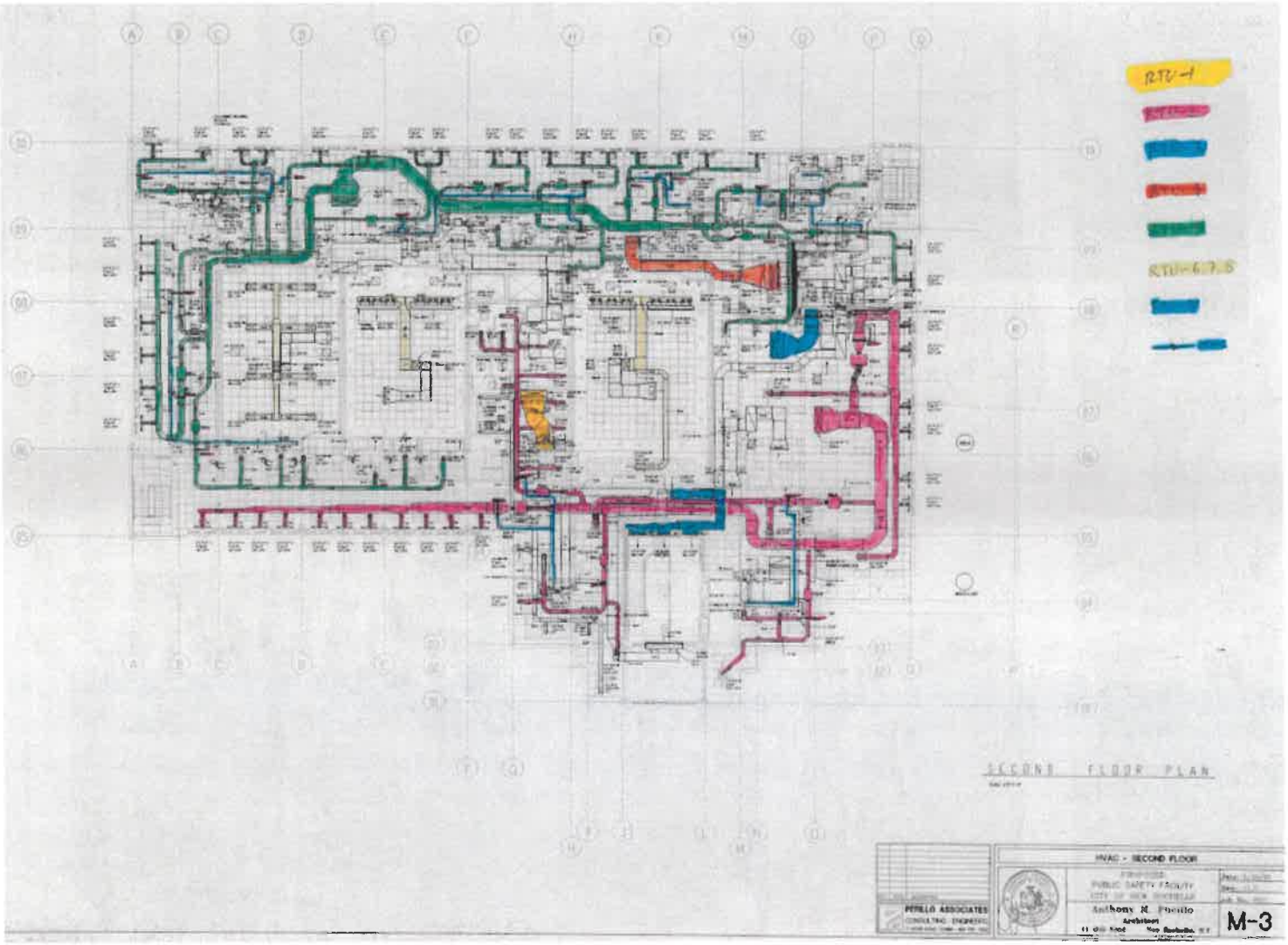

Figure 5: RTUs Supply and HWS at Second Floor

Figure 6: RTU-1 to RTU-9, and AHU-1

Figure 7: AHU-1 at Basement (Reznor air handler with only heating coil)

2.6.2 Hot Water Boiler

There are two (2) gas-fired atmospheric Raypak hot water boilers located in the basement mechanical room. The boilers provide hot water to approximately 50 duct-mounted reheat coils, and various cabinet and unit heaters throughout the building.

The boilers are configured as Lead/Lag and operate seasonally from typically from November to April. The boilers were installed in 1998 and appear to be nearing the end of their useful life.

The facility personnel were unable to provide combustion test reports or a sequence of operations. However, from site observations it appears an individual boiler cycles on/off as required to maintain the hot water loop supply temperature setpoint.

Table 5: Boiler Plant Schedule

Tag	Manufacturer	Model #	Boiler Input Cap (BTU/hour)	Output Cap (BTU/hour)	Nameplate Efficiency	Description	Installation Year
Boiler 1	Raypak	H3-1631	1,630,000	1,336,600	82.0%	Natural gas fired, atmospheric HW boiler	1998
Boiler 2	Raypak	H3-1631	1,630,000	1,336,600	82.0%	Natural gas fired, atmospheric HW boiler	1998

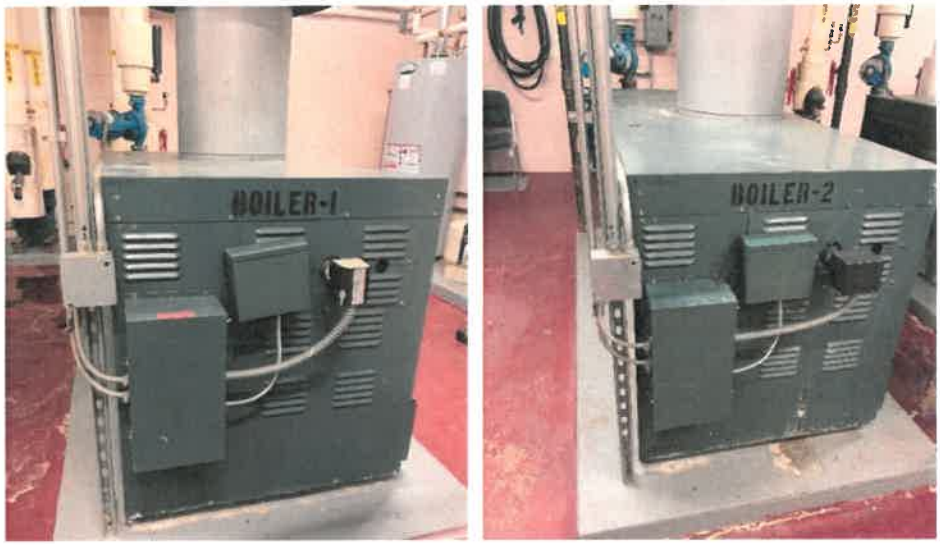

Figure 8: Boiler 1 & 2

2.6.3 Hot Water Pumps

There are two (2) hot water pumps located in the boiler room. These pumps serve hot water to fan powered boxes, reheat coils, cabinet unit heaters and propeller unit heaters. The pumps are operated at constant speed with N+1 redundancy. The pumps are controlled manually via the electrical disconnects located in the mechanical room.

Table 6: Hot Water Pump Schedule

Tag	Location	Service	Make	HP	Speed Control	Eff (%)	Pump Flow (GPM)
P-3	Boiler Room	Hot Water Loop	MagneTek	5.0	Constant Speed	85.5%	175
P-4	Boiler Room	Hot Water Loop	Marathon	5.0	Constant Speed	87.5%	175

Figure 9: Hot Water Pump (P-3, and P-4)

2.6.4 Hot Water System Load Verification

The initial equipment surveys were conducted in April/May 2021. At the time the boiler plant was not in operation. To gain a clearer understanding of the boiler plant operation and heating load, hot water system flow and temperature measurements were collected by Willdan in January and February of 2022.

An ultrasonic flowmeter and two temperature sensors were installed on the exterior of the hot water system piping to measurement the flowrate, hot water supply and return temperatures. The calculated heating load was then correlated to the ambient temperature and plotted in Figure 11.

An hourly average heat load of about 400MBH was observed at an outdoor air temperature of 10F. The boilers and boiler pumps cycled on/off approximately every 20 minutes to inject hot water into the distribution loop. This can be seen in Figure 12 as a spike in the hot water supply and return temperature differential.

The hot water loop flow rate remained at a relatively constant 190-200gpm throughout the measurement period as shown in Figure 13.

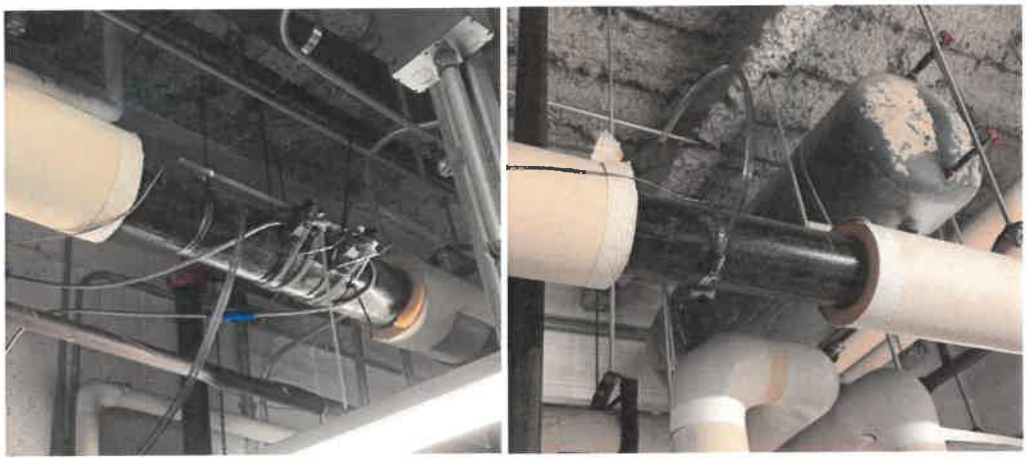

Figure 10: Ultrasonic Flow Meter Installation

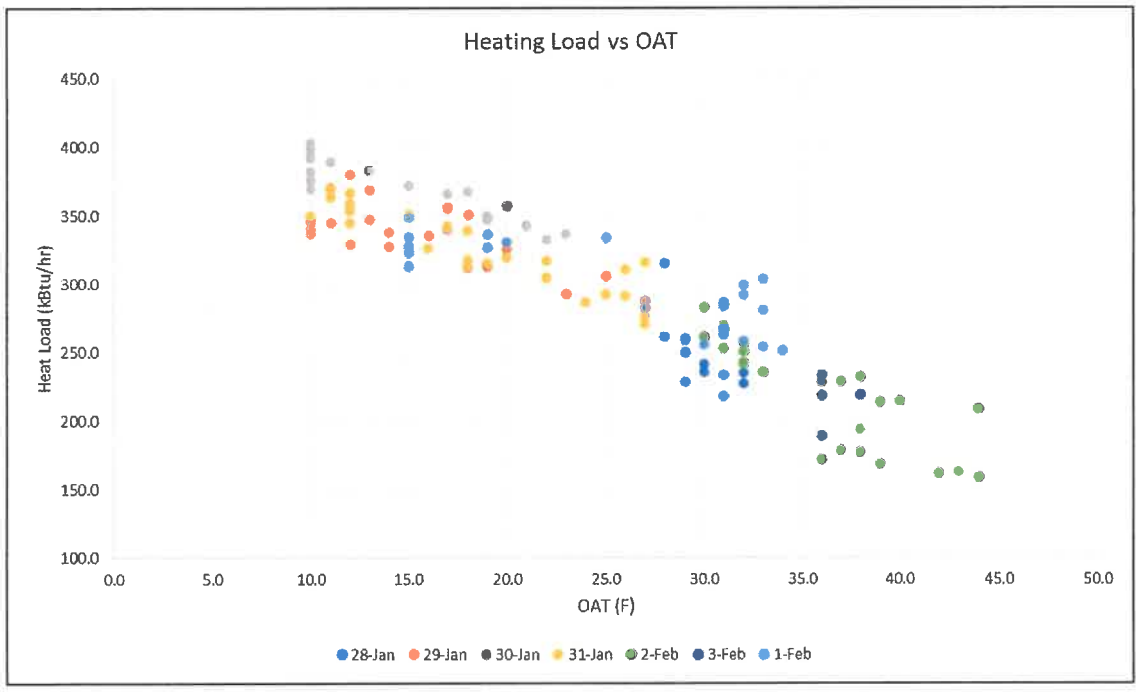

Figure 11: Average Heat Load vs Outdoor Temp

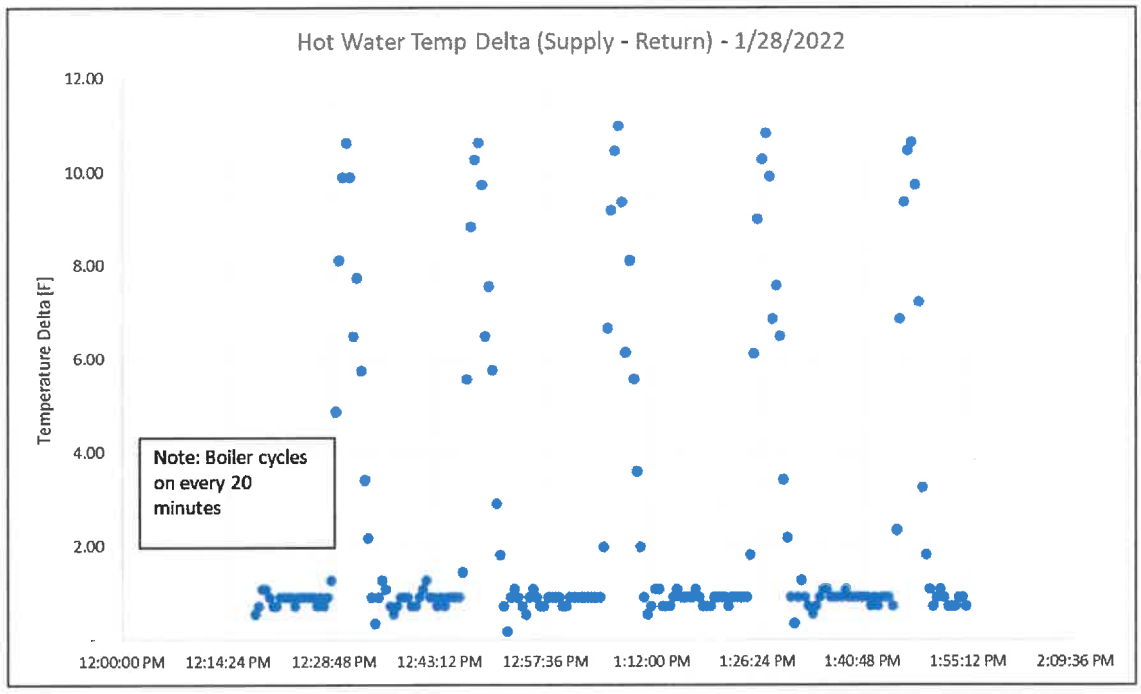

Figure 12: Boiler Cycling

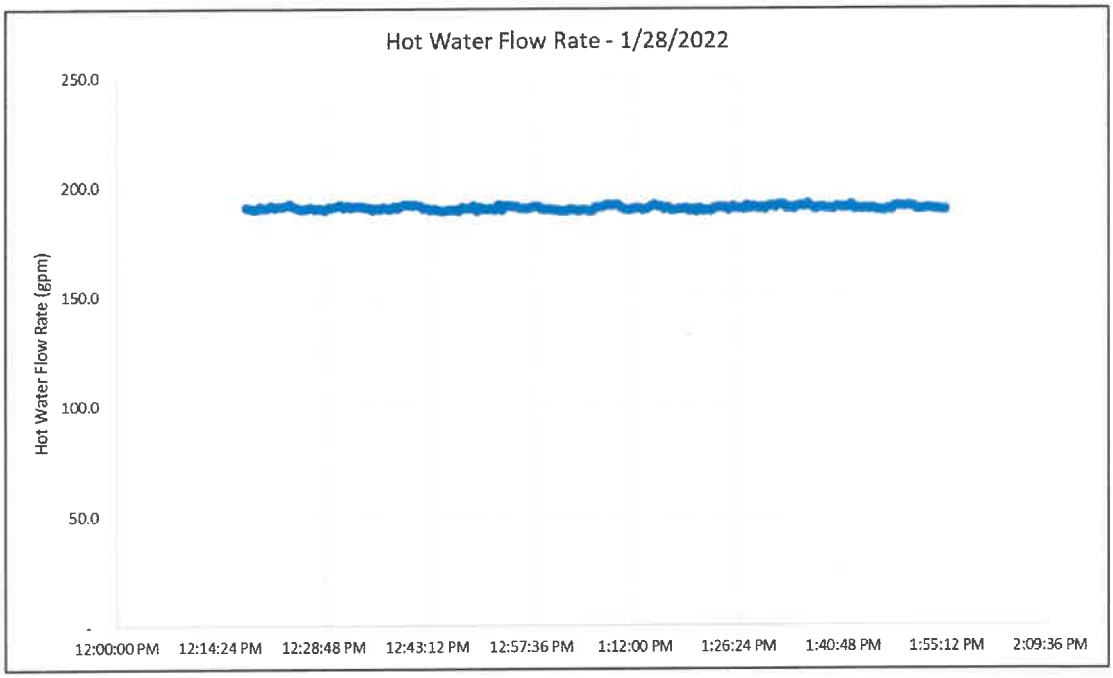

Figure 13: Hot Water Flow Rate

2.6.4 Domestic Hot Water Heater

The building domestic hot water requirements are served by two (2) gas-fired storage tank water heaters located in the boiler room. The units were installed in 2017 and 2020, respectively, and appear to be in good condition.

Table 7: DHW Heater Schedule

Tag	Location	Service	Make	Year Installed	Model	Capacity (Btu/hr)	Tank Storage (gal)
DHW Heater 1	Boiler Room	DHW	AO Smith	2020	BT-100 400	75,100	73
DHW Heater 2	Boiler Room	DHW	AO Smith	2017	BT-100 400	75,100	73

Figure 14: DHW Heater

2.6.5 Fan Powered Boxes, Reheat Coils and Unit Heaters

There are approximately 54 fan powered boxes with reheat coils throughout the supply air distribution ductwork. The boxes fall into categorized seven sizes ranging from 300 to 3000 CFM. The quantity, motor HP and CFM of FPB is summarized in Table below.

Table 8: Fan Powered Box Schedule

Tag	Quantity	Motor HP	CFM
FPB-A	10	1/4	300
FPB-B	17	1/4	500
FPB-C	15	1/3	750
FPB-D	6	1/3	1000
FPB-E	3	1/2	1500
FPB-F	2	1/3	2000
FPB-G	1	1/2	3000

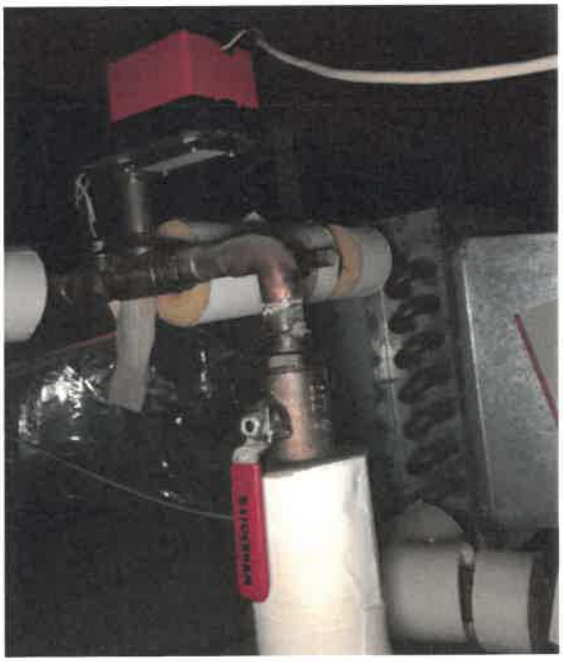

Figure 15: Reheat Coil Control Value

There are 53 reheat coils in the supply air distribution. The reheat coil is installed right after fan powered box. Hot water flow is controlled via an electronic three-way valve.

Table 9: Reheat Coil Schedule

Coil No.	Size (in) HxW	CFM	Btu/hr	GPM	Model	Quantity
RHC-1	6x9	250	10,668	1.1	5BS1201H	3
RHC-2	6x9	300	11,027	1	5BS1201H	5
RHC-3	6x12	320	14,535	1.4	5BS1201H	1
RHC-4	6x12	410	15,726	1.3	5BS1201H	14
RHC-5	6x12	400	16,574	1.7	5BS1201H	2
RHC-6	9x9	420	13,583	1.4	5BS0801H	1
RHC-7	9x9	450	18,938	2	5BS1201H	1
RHC-8	9x12	605	19,553	2	5BS0801H	8
RHC-9	9x12	600	26,091	2.6	5BS1201H	0
RHC-10	9x15	680	23,463	2.2	5BS0801H	4
RHC-11	9x15	700	32,044	3.1	5BS1201H	2
RHC-12	9x15	750	50,923	4.9	5BS1401H	1
RHC-13	12x12	820	26,985	2.7	5BS0801H	1
RHC-14	12x15	900	31,839	3	5BS0801H	3
RHC-15	12x15	1010	45,652	4.4	5BS1201H	2
RHC-16	12x18	1100	39,056	3.6	5BS0801H	0
RHC-17	12x18	1100	52,546	4.8	5BS1201H	1
RHC-18	12x21	1350	47,285	4.4	5BS0801H	2
RHC-19	12x27	1800	62,762	5.9	5BS0801H	0
RHC-20	12x36	2300	120,892	11.3	5BD0902B	1
RHC-21	15x36	3000	137,820	13.1	5WQ1201H	1

Additional, supplemental heating is provided a several stairwells and vestibules by the cabinet unit heaters shown in Table 10.

Table 10: Cabinet Unit Heater Schedule

Unit No.	Location	CFM	MBH	GPM	RPM	Motor Watts Input	Model
CUH-1	Vest 118	310	13.9	0.5	1,060	60	C30-1
CUH-2	Stair No. 3	400	28	1	1,060	55	C40-3
CUH-3	Vest 157	310	17.9	1.5	1,060	60	C30-1
CUH-4	Stair No. 5	400	28	1	1,060	55	C40-3

2.6.7 Roof Exhaust Fan

Exhaust is provided by thirteen (13) roof exhaust fans. The units operate at constant speed, 24/7. The schedule of the exhaust fan is summarized in Table 11 below.

Table 11: Roof Exhaust Fan Schedule

Fan No.	Service	CFM	HP	RPM	Model
REF-1	Toilets	3825	3/4	640	GB-240
REF-2	Fitness Room	450	1/4	1230	GB-80
REF-3	Toilets	805	1/4	1270	GB-70
REF-4	Lounge	200	1/4	1180	GB-70
REF-5	Lockers	180	1/4	1110	GB-70
REF-6	Elevator Machine	220	1/4	1400	GB-70
REF-7	Forensic Storage	150	1/4	1040	GB-70
REF-8	Dark Room	220	1/4	1280	GB-70
REF-9	Kitchen	120	1/4	930	GB-70
REF-10	Toilets	1565	1/4	850	GB-160
REF-11	Toilets	150	1/4	1000	GB-70
REF-12	Kitchen	120	1/4	930	GB-70
REF-13	Sallyport	2000	1/4	820	CUBE-160

2.6.8 Lighting System

Willdan conducted a complete lighting audit of the facility and developed a room-by-room lighting inventory. Lighting is predominantly comprised of 2x2 and 2x4 recessed fixtures with linear fluorescent T8 tubes and recessed can fixtures with compact fluorescent lamps.

A summary of the various fixture types identified is summarized in Table 12.

Table 12: Existing Lighting Fixture Inventory

Fixture Type	Fixture Qty.
1x4 Recessed Prismatic	6
2' Security Fixture	25
2x2 Prismatic Troffer	18
2x2 Recessed Prismatic	62
2x2 Surface Box	5
2x2 Vented Parabolic Troffer	333
2x4 Prismatic Troffer	7
2x4 Recessed Parabolic	2
2x4 Recessed Prismatic	10
2x4 Vented Parabolic Troffer	336
4' Cove Strip	70
4' Strip	29
4' Vanity	3
4' Vapor Tight	6
6" Recessed Can	9
7" Recessed Can	263
7" Recessed Wall Wash	11
Chandelier	32
Decorative Sconce	4
Globe	2
Globe Pole Topper	8
Recessed Walkway	12
Sconce	32
Spotlight	10
Track	1
Wall Wash	6
Wall Pack	18
Grand Total	**1320**

2.6.9 Building Management System

New Rochelle Police Department Building utilizes a Carrier i-Vu building management system (BMS) to control and monitor the rooftop units and fan powered boxes. The BMS appears to have limited functionality and is used primarily to monitor space temperature within the various zones.

Figure 16: Typical RTU BMS Screenshot

Figure 17: Typical Space Temp Overview Screen

2.7 Utility Bill Energy Use Summary

New Rochelle Police Department electric and natural gas utility data for January through December 2019 has been summarized in the Table 13. 2019 electric data was used in place of more recent 2020-2021 data to ensure an accurate baseline at full building use and occupancy. This summary highlights the annual consumption of each utility and the variation in energy use throughout the year.

The utility cost data was used to determine a blended rate. The blended rate is the overall annual rate per unit of consumption that the facility pays for electricity and natural gas. The blended rate is determined by dividing each utility's cost for a period of time by the utility's consumption for the same time period.

The blended rate for electricity was determined to be $0.115 per kilowatt-hour. The blended rate for natural gas was determined to be $1.188 per Therm.

Table 13: Base Building Energy Consumption and Costs (1/2019 – 12/2019)

Energy Type	Total Annual Use	Units	kBTU	% Energy	Total Annual Cost ($)	% Cost	kBTU/SF	$/SF
Electricity	1,076,800	kWh	3,674,042	71%	$123,735	88%	45.9	$1.55
Natural Gas	14,678	Therms	1,467,800	29%	$17,439	12%	18.3	$0.22
Total			**5,141,842**		**$141,174**		**64.2**	**$1.76**

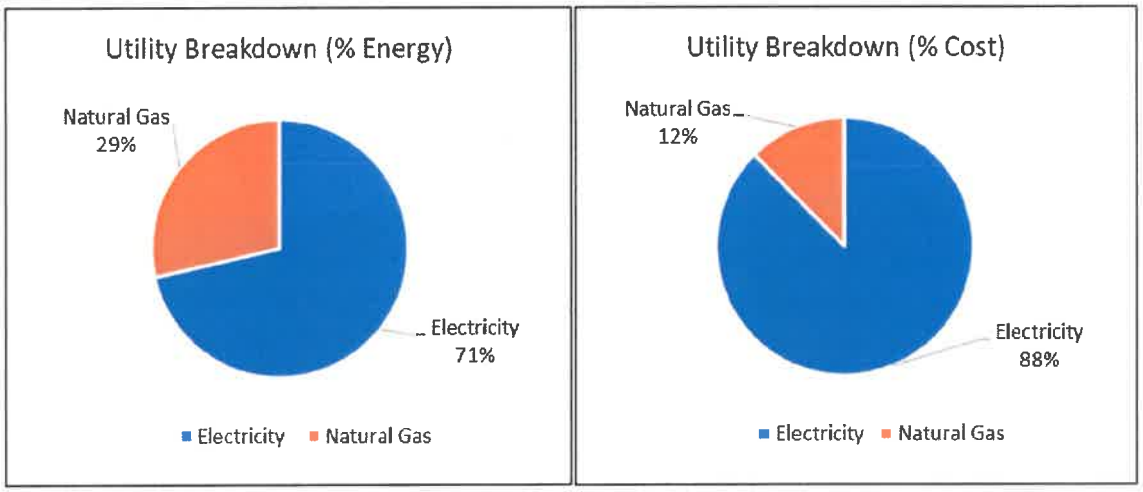

Figure 18: Utility Breakdown (1/2019 – 12/2019)

Table 14: Unit Energy Cost Summary (1/2019 – 12/2019)

Utility	Blended Rate[1]	Rate Units
Electric	$0.115	$/kWh
Natural Gas	$1.188	$/Therm

2.7.1 Electric Energy Usage

The facility's electric energy usage for the period of January 2019 through December 2019 was 1,076,800 kWh. The electrical consumption increases during summer due to increased fan and compressor electric consumption associated with the rooftop packaged DX cooling systems.

Table 15: Electric Energy Usage (1/2019 – 12/2019)

Month-Year	Usage (kWh)	Total Electric Cost
Jan-19	80,400	$8,967
Feb-19	88,000	$17,323
Mar-19	69,600	$8,471
Apr-19	70,800	$7,488
May-19	74,000	$3,696
Jun-19	104,000	$12,353
Jul-19	112,800	$12,447
Aug-19	109,600	$11,433
Sep-19	110,800	$12,755
Oct-19	94,800	$11,133
Nov-19	77,600	$8,471
Dec-19	84,400	$9,197
Total/Peak	**1,076,800**	**$123,735**

[1] ECM cost savings are based on blended electric, natural gas and fuel oil rates. Electric demand charges were analyzed for a typical summer and winter month which account for a small portion of the overall electric bill with minimal impact on electric savings when calculated separated.

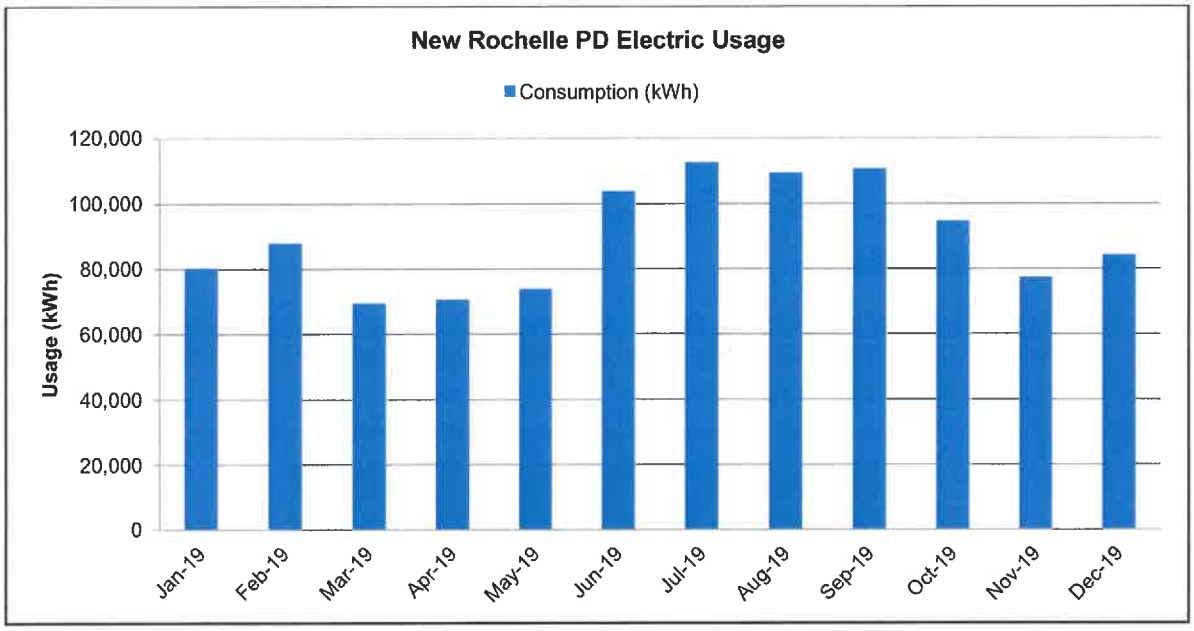

Figure 19: Electric Energy Usage Data (1/2019 – 12/2019)

2.7.2 Natural Gas Usage

The facility's natural gas usage for the period of January 2020 through December 2020 was 14,678 therm. The building natural gas consumption increases during the winter month due to increased gas consumption associated with the space heating provided by the hot water boilers and gas-fired packaged rooftop units.

Table 16: Natural Gas Usage (1/2020 – 12/2020)

Month-Year	Gas Usage (Therms)	Total Gas Cost
Jan-20	3,091	$3,607
Feb-20	2,002	$2,446
Mar-20	1,594	$1,721
Apr-20	227	$231
May-20	223	$267
Jun-20	192	$239
Jul-20	180	$224
Aug-20	285	$321
Sep-20	349	$402
Oct-20	1,102	$1,351
Nov-20	2,194	$2,597
Dec-20	3,239	$4,033
Total	**14,678**	**$17,439**

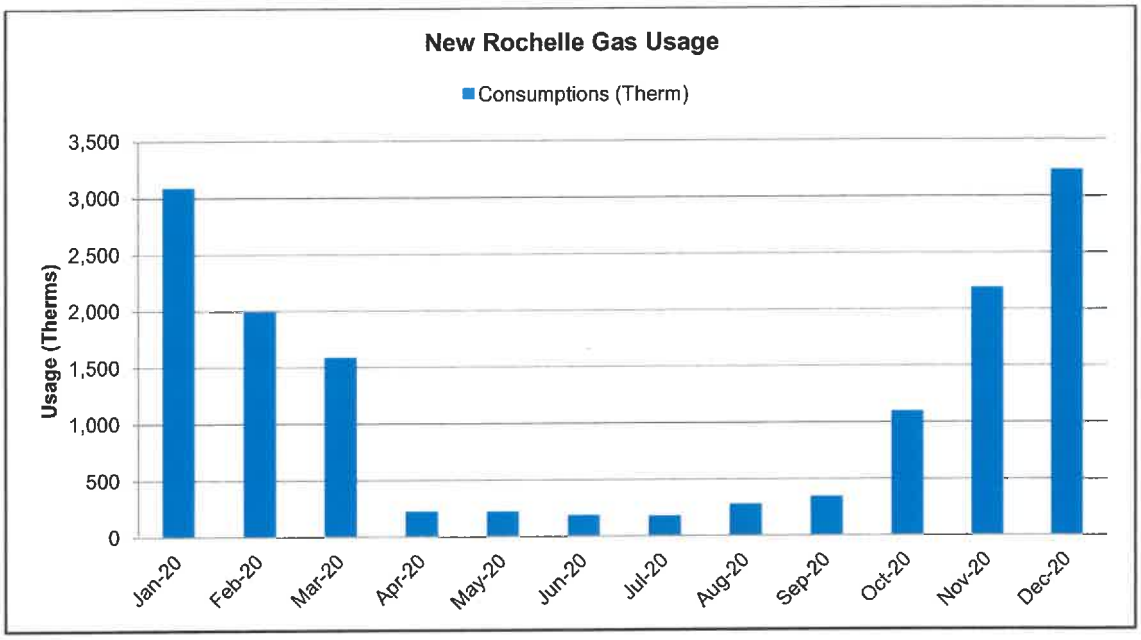

Figure 20: Natural Gas Usage Data (1/2020 – 12/2020)

2.8 Energy End Use Breakdown

Table 17 below summarizes the existing annual electric, and natural gas usage within the facility. This end use breakdown is based on the annual usage calculations for all energy consuming equipment.

Table 17: End Use Breakdown Summary

End Use Type	Electricity (kWh)	Natural Gas (Therms)	Total Site Energy (kBTU)
Space Heating	4,067	17,289	1,742,787
Domestic Hot Water	-	957	95,690
Space Cooling	78,457	-	267,695
Ventilation	299,254	-	1,021,056
Lighting	390,681	-	1,333,004
Plug Loads/Miscellaneous	320,328		1,092,959
Total Estimated	1,092,788	18,246	5,553,191
Total per Sq-ft	13.6	0.23	69

2.8.1 Electric End Use Breakdown

The figure below shows an estimated distribution of electric usage among the building systems. This breakdown is based on the project calculations and, as a result, may vary from the site's actual energy distribution.

Approximately 35% of the electrical energy used in the building was dedicated to HVAC use (fans, space cooling, pumps, and heat rejection) with lighting accounting for another 36%. The remaining 29% was used for plug loads/miscellaneous equipment, and other process equipment.

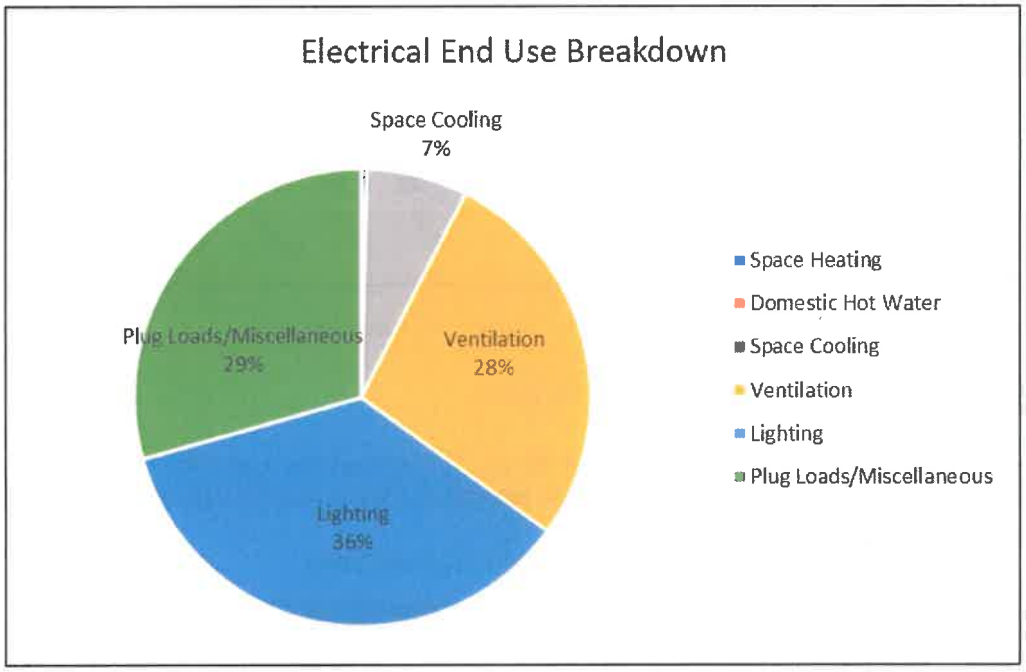

Figure 21: Electric End Use Breakdown

2.8.2 Natural Gas End Use Breakdown

The figure below shows an estimated distribution of natural gas usage among the building systems. This breakdown is based on the project calculations and, as a result, may vary somewhat from the site's real distribution. Space heating accounted for approximately 95% of the building natural gas usage. Domestic hot water generation accounted for approximately 5%.

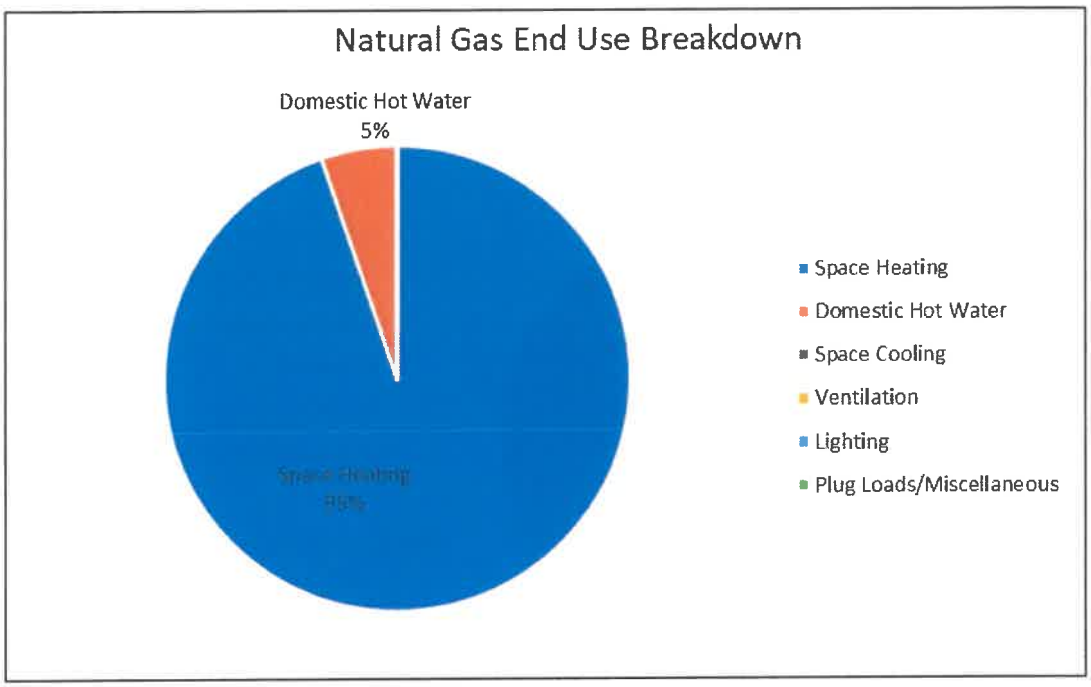

Figure 22: Natural Gas End Use Breakdown

2.8.3 Total Energy Use Breakdown

The conversion of each utility's consumption to a common energy unit, MMBTU, allows for a total energy end use breakdown to be estimated. The figure below shows an estimated distribution of energy usage among the building systems. This breakdown is based on the project calculations and, as a result, may vary somewhat from the site's actual distribution. Space heating accounted for approximately 31% of the building's energy usage, domestic hot water generation: 5%, space cooling: 18%, ventilation: 24%, lighting: 20%, plug loads/miscellaneous: 4%.

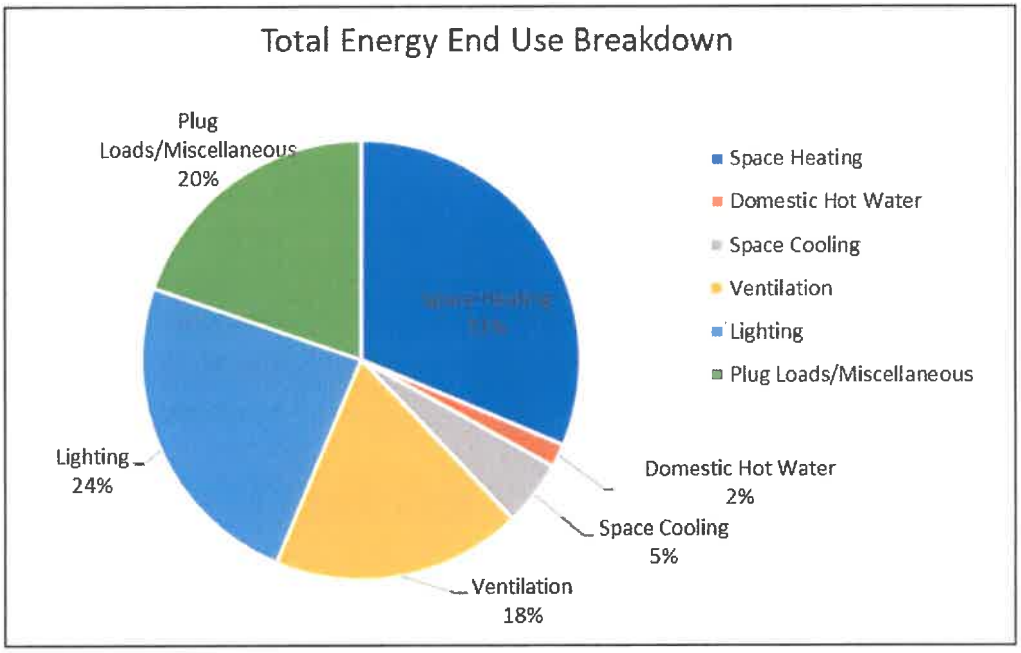

Figure 23: Total Energy Use Breakdown

2.8.4 Average Energy Cost

The average energy cost per square foot was calculated by dividing the total cost of all utilities – electric, and natural gas the total conditioned area of the facility.

Table 18: Average Energy Cost per Square Foot

Total Conditioned Area in SF	kBTU	Total Annual Cost ($)	$/SF
80,082	5,141,842	$141,174	$1.76

Note: Building area information is acquired from data provided by the facility.

2.9 Peer Group Benchmarking

Willdan uses the U.S. Environmental Protection Agency (EPA) Portfolio Manager to rate the building on a scale of 1 to 100, as defined by its Energy Star (ES) score. This score compares a property under consideration to similar properties nationwide. The building is compared using a database of similar buildings from a national survey conducted by the Department of Energy. An ES score of 50 indicates that the building, from an energy consumption standpoint, performs better than 50% of all similar buildings nationwide, while a rating of 75 indicates that the building performs better than 75% of all similar buildings nationwide.

Willdan used Police Station as the property type in the database for comparison with similar buildings. The Site Energy Use Intensity (EUI) for New Rochelle Police Department is 64.2 kBTU/SF, as compared to a national median EUI for similar buildings of 54.3 kBTU/SF. The Source EUI for the facility is 147.7 kBTU/SF, as compared to a national median EUI for similar buildings of 124.9 kBTU/SF.

2.9.1 Current EUI

The Site Energy Use Intensity (EUI) is the amount of heat and electricity consumed by a building, as commonly reflected in utility bills, divided by the facility's conditioned square footage. The Source EUI is the total amount of fuel consumed in the generation and use of energy consumed at a building, such as electricity and natural gas, divided by the facility's square footage. A facility's site and source EUI can be obtained from the Statement of Performance (SOP). The SOP for this facility has been reiterated in table below. It incorporates generation, transmission, and storage losses, thereby enabling a complete assessment of energy use in a building.

The utility bills and other information gathered during the energy audit process were analyzed to obtain the site and source EUIs of the existing facility. The site and source U.S. Median EUIs mentioned below have been obtained from the EPA Portfolio Manager. The following is a summary of the Portfolio Manager's results for the facility:

Table 19: Benchmarking EUI

Benchmarking*	This Facility	National Median
Site Energy Use Intensity (EUI kBTU/sf/yr)*	64.2	54.3
Source Energy Use Intensity (EUI kBTU/sf/yr)*	147.7	124.9
Energy Star Score	N/A	

* From EPA Portfolio Manager

3. Energy Efficiency Measures

Willdan performed a detailed audit of the building. The facility's management provided extensive information, facility access, and made facility engineers available. This allowed for Willdan to determine ECM recommendations. The ECMs, energy savings, and cost savings are shown in Table 20 below.

Table 20: Projected Overall Savings

Measure		Annual Estimated Savings[1]					Estimated Implementation Cost[2]	Estimated Simple Payback Period (Years)	Measure Life (Years)
Meas. No.	Description	Electricity (kWh)	Annual Demand (kW)	Natural Gas (Therms)	#2 Fuel Oil (Gallons)	Annual Cost Savings ($)			
ECM-1	Lighting Upgrade - Interior	213,444	32.1	-	-	$24,527	$58,142	2.4	15
ECM-2	Boiler Plant Upgrade: Replace Atmospheric Boilers with HE Boilers	-	-	284	-	$337	$250,797	744.2	35
ECM-3	Hot Water Distribution System Optimization: Convert from Constant to Variable Speed Flow	2,986	2.9	-	-	$343	$62,741	182.8	15
ECM-4	RTU Controls Optimization: Supply Air Temperature Reset Implementation	41,148	-	3,949	-	$9,420	$136,988	14.5	20
ECM-5	RTU Controls Optimization: Occupancy Scheduling Implementation	49,861	-	2,031	-	$8,143	$23,000	2.8	15
ECM-6	RTU Upgrade: Like-to-Like Replacement	1,755	1.4	264	-	$515	$436,271	847.6	20
Total		**309,194**	**36**	**6,527**	**-**	**$43,284**	**$967,938**	**22.4**	**20**

[1] All energy savings were calculated against the baseline on a measure-by-measure basis. Estimated implementation cost includes material, equipment and labor only.

[2] Cost estimates do not include soft costs – engineering services, construction management, commissioning, permitting & expediting, testing & inspections, hazardous material abatement.

Table 21: Other Measures Considered

Measures Considered but Not Recommended		Annual Estimated Savings					Estimated Implementation Cost	Estimated Simple Payback Period (Years)	Measure Life (Years)
Meas. No.	Description	Electricity (kWh)	Annual Demand (kW)	Natural Gas (Therms)	#2 Fuel Oil (Gallons)	Cost ($)			
ECM-7	RTU Upgrade: Heat Pump Replacement	(12,387)	(36.7)	(2,002)	-	($3,801)	$436,271	-	20

All energy savings were calculated against the baseline on a measure-by-measure basis.

3.1 Energy Efficiency Measure Descriptions

ECM-1: Lighting Upgrade- Interior

Existing Conditions

Willdan conducted a complete lighting audit of the facility and developed a room-by-room lighting inventory. Lighting is predominantly comprised of 2x2 and 2x4 recessed fixtures with linear fluorescent T8 tubes and recessed can fixtures with compact fluorescent lamps.

A summary of the various fixture types identified is summarized in Table 22.

Table 22: Existing Lighting Fixture Inventory

Fixture Type	Fixture Qty.
1x4 Recessed Prismatic	6
2' Security Fixture	25
2x2 Prismatic Troffer	18
2x2 Recessed Prismatic	62
2x2 Surface Box	5
2x2 Vented Parabolic Troffer	333
2x4 Prismatic Troffer	7
2x4 Recessed Parabolic	2
2x4 Recessed Prismatic	10
2x4 Vented Parabolic Troffer	336
4' Cove Strip	70
4' Strip	29
4' Vanity	3
4' Vapor Tight	6
6" Recessed Can	9
7" Recessed Can	263
7" Recessed Wall Wash	11
Chandelier	32
Decorative Sconce	4
Globe	2
Globe Pole Topper	8
Recessed Walkway	12
Sconce	32
Spotlight	10
Track	1
Wall Wash	6
Wall Pack	18
Grand Total	**1320**

ECM Description

Fixtures with T8 tubes are recommended to be retrofitted with the more efficient linear LED tubes. CFL, incandescent, and halogen lamps should be changed with compatible LED replacements. For this measure the total installation cost, which includes both material and labor, has been estimated based on Willdan Lighting and Electric rates. All recommended lighting is DLC and/or Energy Star compliant. The line-by-line lighting survey will be provided as an appendix along with other surveys performed at the facility. Below is a summary of recommended lighting upgrades.

Table 23: Proposed Interior Lighting Summary

Fixture Type	Proposed Solution	Fixture Qty.
1x4 Recessed Prismatic	RLRB – Ballast Bypass	6
2' Security Fixture	RLRB – Ballast Bypass	25
2x2 Prismatic Troffer	RLRB – Ballast Bypass	18
2x2 Recessed Prismatic	RLRB – Ballast Bypass	62
2x2 Surface Box	RLRB – Ballast Bypass	5
2x2 Vented Parabolic Troffer	RLRB – Ballast Bypass	333
2x4 Prismatic Troffer	RLRB – Ballast Bypass	7
2x4 Recessed Parabolic	RLRB – Ballast Bypass	2
2x4 Recessed Prismatic	RLRB – Ballast Bypass	10
2x4 Vented Parabolic Troffer	RLRB – Ballast Bypass	336
4' Cove Strip	RLRB – Ballast Bypass	70
4' Strip	RLRB – Ballast Bypass	29
4' Vanity	RLRB – Ballast Bypass	3
4' Vapor Tight	RLRB – Ballast Bypass	6
6" Recessed Can	RLRB – Ballast Bypass	9
7" Recessed Can	RLRB – Ballast Bypass	263
7" Recessed Wall Wash	RLRB – Ballast Bypass	11
Chandelier	RLRB – Ballast Bypass	32
Decorative Sconce	RLRB – Ballast Bypass	4
Globe	RLRB – Ballast Bypass	2
Globe Pole Topper	RLRB – Ballast Bypass	8
Recessed Walkway	No Upgrade	12
Sconce	RLRB – Ballast Bypass	32
Spotlight	Re-Lamp	10
Track	No Upgrade	1
Wall Wash	New Fixture	6
Wall Pack	New Fixture	18

Measure Baseline & Proposed Upgrades

Baseline

- Existing CFL, Fluorescent, Incandescent, tubular fluorescent lamps and fixtures. Refer to lighting line by line survey for existing fixture details.

Proposed

- High efficiency compatible LED replacements for existing interior non-LED lighting. Refer to lighting line by line survey for proposed fixture details.

Calculation Methodology

- Energy savings have been calculated using a custom spreadsheet analysis and New York Standard Approach for Estimating Energy Savings from Energy Efficiency Programs

Energy Savings Metrics: Cost Savings

Preliminary Calculations: Annual Savings

Table 24: ECM-1 Summary Table

Electric Usage Savings	213,444	kWh
Electric Annual Demand Savings	32.1	kW
Electric Cost Savings	$24,527	USD
NG Usage Savings	0	Therms
NG Cost Savings	$0	USD
#2 Fuel Oil Usage Savings	0	Gallons
#2 Fuel Oil Cost Savings	$0	USD
Total kBTU Savings	728,301	kBTU
Total Cost Savings	$24,527	USD
Estimated Installation Cost	$58,142	USD

Design Considerations

- Integration with lighting controls
- Emergency lighting

ECM-2: Boiler Plant Upgrade: Replacement Atmospheric Boiler with High Efficiency Boiler

Existing Conditions

There are two (2) gas-fired atmospheric Raypak hot water boilers located in the basement mechanical room. The boilers provide hot water to about 50 duct-mounted reheat coils, and numerous cabinet and unit heaters throughout the building.

The boilers are configured as Lead/Lag and operate seasonally from typically from November to April. The boilers were installed in 1998 and appear to be in poor to fair condition.

The facility personnel were unable to provide combustion test reports or a sequence of operations. However, from site observations it appears a boiler cycles on/off as required to maintain the hot water loop supply temperature setpoint.

ECM Description

Willdan recommends replacing the existing boilers with two (2) high efficiency 1750MBH hot water boilers with 4:1 turndown ratio. The efficiency of the proposed boiler is 85.1%.

Measure Baseline & Proposed Upgrades

Baseline

- Two (2) existing 70-75% efficiency (est.) atmospheric natural gas fired hot water boilers

Proposed

- Two (2) new hot water boilers with 85.1% efficiency

Calculation Methodology

ECM energy savings have been calculated using a custom spreadsheet bin model analysis.

Energy Savings Metrics: Cost Savings

Preliminary Calculations: Annual Savings

Table 25: ECM Summary Table

Electric Usage Savings	0	kWh
Electric Annual Demand Savings	0.0	kW
Electric Cost Savings	$0	USD
NG Usage Savings	284	Therms
NG Cost Savings	$337	USD
#2 Fuel Oil Usage Savings	0	Gallons
#2 Fuel Oil Cost Savings	$0	USD
Total kBTU Savings	28,797	kBTU
Total Cost Savings	$337	USD
Estimated Installation Cost	$250,797	USD

Design Considerations

- Integration with existing controls and BMS
- Integration with existing flue and gas piping
- Demolition and rigging
- Installation of pipework over existing layout
- Temporary heating requirements

ECM-3: Hot Water Distribution System Optimization: Convert from Constant Speed to Variable Speed

Existing Conditions

There are two (2) hot water pumps in the boiler room to serve hot water to the reheat coils and cabinet unit heaters. Typically, one pump operates at constant speed to circulate hot water through the building loop.

ECM Description

Willdan recommends replacing the existing hot water pumps and motors with new pumps with NEMA premium efficiency motors and variable frequency drives. The hot water distribution system will be converted from constant flow to variable flow. The pump speed will be controlled in accordance with the building heat load by modulating to maintain an adjustable differential pressure setpoint. Additionally, hot water coil control valves will be converted from three-way to two-way where applicable.

With a VFD installed, the pump speed can vary based on demand. The reduction in speed decreases the flow rate without increasing the system resistance and decreases the power required by the system. Also, pump affinity laws define the hydraulic horsepower as proportional to the cube of the pump speed. This means that even small reductions in pump speed will greatly reduce the input power to the system. Table 26 provides a summary of all the pumps that are to be included as part of this measure.

Table 26: Hot Water Pump Schedule

Tag	Location	Service	Make	HP	Speed Control	Eff (%)	Flow (GPM)
P-3	Boiler Room	Hot Water Loop	MagneTek	5.0	Constant Speed	85.5%	175
P-4	Boiler Room	Hot Water Loop	Marathon	5.0	Constant Speed	87.5%	175

Measure Baseline & Proposed Upgrades

Baseline

- Two (2) constant speed hot water distribution pumps with standard efficiency motors

Proposed

- Two new pumps with premium efficiency motors and variable speed drives
- Convert hot water coil control valves from three-way to two-way on about 60-70 reheat coils, unit heaters and converters, where applicable.
- Install distribution loop differential pressure sensor at location 2/3rd of the maximum distance from boiler plant

Calculation Methodology

- Energy savings have been calculated using a custom spreadsheet analysis.

Energy Savings Metrics: Cost Savings

Preliminary Calculations: Annual Savings

Table 27: ECM Summary Table

Electric Usage Savings	2,986	kWh
Electric Annual Demand Savings	2.9	kW
Electric Cost Savings	$343	USD
NG Usage Savings	0	Therms
NG Cost Savings	$0	USD
#2 Fuel Oil Usage Savings	0	Gallons
#2 Fuel Oil Cost Savings	$0	USD
Total kBTU Savings	10,190	kBTU
Total Cost Savings	$343	USD
Estimated Installation Cost	$62,741	USD

Design Considerations

- Integration with BMS/controls system
- Conversion of three-way valves to two-way valves
- System balancing and flow verification

ECM-4: RTU Controls Optimization: Supply Air Temperature Reset

Existing Conditions

New Rochelle Police Department provides HVAC through nine (9) rooftop units. Equipment details including size, areas served, and age are discussed in building system description (section 2.6.1 Rooftop Units). During the site survey all airside equipment were inspected visually. The BMS setpoints for all rooftop units were collected. The supply air temperature of the units is constant regardless of outside air temperature. Table 28 below shows the BMS setpoints of supply air temperature for cooling mode and heating mode.

Table 28: SAT Setpoint

RTU Tag	Supply Air Temp (F)	
	Cooling Mode	Heating Mode
RTU-1	55	85
RTU-2	52	85
RTU-3	55	85
RTU-4	52	85
RTU-5	55	85
RTU-6	55	85
RTU-7	55	85
RTU-8	55	85
RTU-9	55	85
AHU-1	N/A	70

EEM Description

Willdan recommends implementing a supply air temperature reset control scheme that allows an airside system to modulate the supply air temperature based on outside air temperature. When enabled, the temperature of supply air is increased, which allows for reduced compressor energy or reheat energy, but also increases fan energy in a VAV system. When supply air temperature reset is based on outside air temperature, the supply air temperature can be increased as the outside air temperature decreases.

Measure Baseline and Proposed Upgrades

Baseline

- Supply air temperature on all rooftop unit kept constant

Proposed

- Implement supply air temperature reset on all rooftop unit

Calculation Methodology

- Energy savings have been calculated using custom spreadsheet analysis

Energy Savings Metrics: Cost Savings

Preliminary Calculations: Annual Savings

Table 29: ECM Summary Table

Electric Usage Savings	41,148	kWh
Electric Annual Demand Savings	0.0	kW
Electric Cost Savings	$4,728	USD
NG Usage Savings	3,949	Therms
NG Cost Savings	$4,692	USD
#2 Fuel Oil Usage Savings	0	Gallons
#2 Fuel Oil Cost Savings	$0	USD
Total kBTU Savings	535,283	kBTU
Total Cost Savings	$9,420	USD
Estimated Installation Cost	$136,988	USD

Design Considerations

- Integration with existing BMS

ECM-5: RTU Controls Optimization: Occupancy Scheduling

Existing Conditions

There are nine (9) packaged rooftop units serving the core zones of the building. Some of units serve areas that are typically unoccupied outside of normal business hours. According to the building management system these units do not operate according to a schedule or setback control. Table 30 below summarizes the areas served and estimated weekly operating hours in occupied and unoccupied mode.

Table 30: BMS schedule

RTU Tag	Service Area	Operation Hours/week	
		Occupied	Unoccupied
RTU-1	Ground Floor	168	0
RTU-2	Ticketing Area 2nd Floor	168	0
RTU-3	Radia Rm Jail Cell Office 1st Floor	168	0
RTU-4	Detective / Captain Office 1st Floor	168	0
RTU-5	Offices 2nd Floor	168	0
RTU-6	Court Room #1	168	0
RTU-7	Court Room #2	168	0
RTU-8	Court Room #3	50	118
RTU-9	Main Hallway 2nd Floor	168	0
AHU-1	Ground Floor Range Shooting	14	0

ECM Description

Willdan recommends implementing schedule control scheme that allows an airside system to shutdown or setback based on a programmable occupancy schedule. Several areas, such as Court Room 1, 2, 3, and the offices are not occupied after business hours and hence do not need 24/7 conditioned air supply.

Measure Baseline and Proposed Upgrades

Baseline

- Unoccupied rooms are served conditioned air after business hours

Proposed

- Implement occupancy schedule to the RTU that served unoccupied area

Calculation Methodology

- Energy savings have been calculated using custom spreadsheet analysis

Energy Savings Metrics: Cost Savings

Preliminary Calculations: Annual Savings

Table 31: ECM Summary Table

Electric Usage Savings	49,861	kWh
Electric Annual Demand Savings	0.0	kW
Electric Cost Savings	$5,730	USD
NG Usage Savings	2,031	Therms
NG Cost Savings	$2,413	USD
#2 Fuel Oil Usage Savings	0	Gallons
#2 Fuel Oil Cost Savings	$0	USD
Total kBTU Savings	373,263	kBTU
Total Cost Savings	$8,143	USD
Estimated Installation Cost	$23,000	USD

Design Considerations

- Integration with existing BMS

ECM-6: RTU Upgrade: Like-to-Like Replacement

Existing Conditions

The building cooling and majority of heating are provided by nine (9) rooftop units – seven (7) of which are Carrier units and two (2) Seasons-4 units. All the rooftop units are gas-fired-heating and DX-cooling type. The sizes of the RTUs are ranging from 7.5 to 40 cooling tons. All the RTUs were installed in 2011.

RTU-1 through 5 are equipped with variable speed drives and economizers with return fans.

The ground floor indoor shooting range is served by a gas-fired, heating only Reznor air-handler located in the basement and a rooftop exhaust and filtration units (AHU-1) located on the roof. The unit consists of several banks of air filters and a 20 hp exhaust fan.

ECM Description

Willdan recommends replacing the existing rooftop units with new like-to-like units. Over time the unit cooling and heating efficiency becomes degraded resulting in higher electric and gas usage to meeting the required heating and cooling loads. Replacing the older units with new, high efficiency units can save energy.

Measure Baseline and Proposed Upgrades

Baseline

- Nine (9) packaged rooftop units with DX cooling and gas fired heating. The units are about 10 years old and approaching their end of life

Proposed

- Nine (9) packaged rooftop units with Like-to-Like replacement

Calculation Methodology

- Energy savings have been calculated using custom spreadsheet analysis

Energy Savings Metrics: Cost Savings

Preliminary Calculations: Annual Savings

Table 32: ECM Summary Table

Electric Usage Savings	1,755	kWh
Electric Annual Demand Savings	1.4	kW
Electric Cost Savings	$202	USD
NG Usage Savings	264	Therms
NG Cost Savings	$313	USD
#2 Fuel Oil Usage Savings	0	Gallons
#2 Fuel Oil Cost Savings	$0	USD
Total kBTU Savings	32,340	kBTU
Total Cost Savings	$515	USD
Estimated Installation Cost	$436,271	USD

Design Considerations

- Integration with existing BMS
- Rigging
- Temporary heating, cooling, and ventilation

3.2 Other Measures Considered but Not Recommended

ECM-7: RTU Upgrade: Heat Pump Replacement

Existing Conditions

The building cooling and majority of heating are provided by nine (9) rooftop units – seven (7) of which are Carrier units and two (2) Seasons-4 units. All the rooftop units are gas-fired-heating and DX-cooling type. The sizes of the RTUs are ranging from 7.5 to 40 cooling tons. All the RTUs were installed in 2011.

RTU-1 through 5 are equipped with variable speed drives and economizers with return fans.

The ground floor indoor shooting range is served by a gas-fired, heating only Reznor air-handler located in the basement and a rooftop exhaust and filtration units (AHU-1) located on the roof. The unit consists of several banks of air filters and a 20 hp exhaust fan.

ECM Description

Willdan recommends replacing four rooftop units (RTU-6,7,8,9) with air-source heat pumps, and the rest (RTU-1,2,3,4,5) with Like-to-Like units. Air-source heat pumps utilize the vapor compression cycle in both cooling and heating modes eliminating the need for gas-fired heaters.

Measure Baseline and Proposed Upgrades

Baseline

- Nine (9) packaged rooftop units with DX cooling and gas fired heating. The units are about 10 years old and approaching their end of life

Proposed

- Four (4) packaged rooftop units (RTU-6,7,8,9) with air-source heat pumps and the rest (RTU-1,2,3,4,5) with Like-to-Like units

Calculation Methodology

- Energy savings have been calculated using custom spreadsheet analysis

Energy Savings Metrics: Cost Savings

Preliminary Calculations: Annual Savings

Table 33: ECM Summary Table

Electric Usage Savings	-12,378	kWh
Electric Annual Demand Savings	-36.7	kW
Electric Cost Savings	-$1,422	USD
NG Usage Savings	-2,002	Therms
NG Cost Savings	-$2,378	USD
#2 Fuel Oil Usage Savings	0	Gallons
#2 Fuel Oil Cost Savings	$0	USD
Total kBTU Savings	-242,410	kBTU
Total Cost Savings	-$3,801	USD
Estimated Installation Cost	$436,271	USD

Design Considerations

- Integration with existing BMS
- Rigging

- Temporary heating, cooling, and ventilation

4. Disclaimer

For various combinations of HVAC measures, ECMs have complex interactive effects which cannot always be isolated on an individual measure basis. As such, a number of packages of HVAC optimization measures have been modeled.

The intent of this energy analysis report is to estimate energy savings associated with recommended upgrades to the HVAC systems, lighting systems, and other relevant energy consumers at your facility. Appropriate detail is included to make decisions about implementing energy efficiency measures at the facility. However, this report is not intended to serve as a detailed engineering design document, as the description of the improvements are diagrammatic in nature only in order to document the basis of cost estimates and savings, and to demonstrate the feasibility of constructing the improvements. It should be noted that detailed design efforts will likely be required in order to implement several of the improvements evaluated as part of this energy analysis. Interactive effects between the individual measures can cause the total project savings to be larger or smaller depending on which recommendations are selected for implementation.

While the recommendations in this report have been reviewed for technical accuracy and are believed to be reasonable and accurate, the findings are estimates and actual results may vary. As a result, Willdan is not liable if projected estimated savings or economics are not actually achieved. All savings and cost estimates in the report are for informational purposes and are not to be construed as a design document or as guarantees -- express or implied.

In no event will Willdan be liable for the failure of the customer to achieve a specified amount of energy savings, the operation of customer's facilities, or any incidental or consequential damages of any kind in connection with this report or the installation of recommended measures.

Purchase Order

City of New Rochelle
515 North Avenue
New Rochelle, NY 10801
Telephone (914) 654-2072
OFFICE OF PURCHASE AND SUPPLY

Fiscal Year 2022 Page 1

THIS NUMBER MUST APPEAR ON ALL INVOICES, PACKAGES AND SHIPPING PAPERS.

Purchase Order # 00220992-00

The City of New Rochelle is exempt from all Taxes
ID # A-146133

Vendor
GENESYS ENGINEERING PC
629 FIFTH AVE BLDG 3 STE 100

PELHAM, NY 10803

Ship To
NEW ROCHELLE DPW- ENGINEERING
515 NORTH AVE

NEW ROCHELLE, NY 10801
10801

Bill To
NEW ROCHELLE DPW- ENGINEERING
515 NORTH AVE

NEW ROCHELLE, NY 10801

Date Ordered	Vendor Number	Date Required	Freight Method/Terms	Department/Location
10/19/22	023201		DEST NET 30 KC	PW

Item#	Description/Part No.	Qty/Unit	Cost Each	Extended Price
	ORIGINAL			
	THIS PURCHASE ORDER REPLACES PURCHASE ORDER #200309 (WAS CLOSED IN ERROR)			
	CNR CONTRACT # 2019-0093 AMENDMENT #1 SPEC# 5274			
001		1.00 LS	45800.00000	45,800.00
	ASHHREA TARGET ENERGY AUDIT AT 475 NOTH AVE			
	1440-46000 45,800.00			
			PO Total	45,800.00
	NOTE TO VENDOR: YOU MUST INCLUDE THIS PURCHASE ORDER NUMBER ON ALL INVOICES AND CORRESPONDANCE.			

1. INVOICES MUST BE MAILED TO THE BILL TO ADDRESS TO THE ATTN OF THE PERSON AS INDICATED THEREIN.
2. PURCHASE ORDER NO. MUST APPEAR ON ALL INVOICES, PACKING SLIPS AND CLAIM FORMS.
3. ALL INVOICES MUST BE IN ACCORDANCE WITH UNIT PRICES, TERMS AND SPEC. AS INDICATED ABOVE.
4. ITEMS DEFECTIVE OR NOT IN COMPLIANCE WITH OUR SPEC. SHALL BE RETURNED AT THE VENDOR'S EXPENSE.
5. NOT VALID UNLESS SIGNED BY THE PURCHASING MANAGER.

For City Manager

Purchasing Manager

VENDOR COPY