Public Safety Building HVAC Upgrades

City of Redmond

Investment Grade Audit Report

REDMOND, WASHINGTON

MARCH 11, 2025

Contents

IGA SCOPE

FIMs Listed in the IGA Proposal:

03.01-PSB Replace WSHP

04.01-PSB Upgrade HVAC Controls

03.02-PSB Upgrade Main AHU with Fan Array

02.01-PSB Replace Condenser Pump

03.06-PSB IDF Room Split System

This IGA is an intensive engineering analysis of Facility Improvement Measures (FIMs) for the facility, net energy savings, and a cost-effectiveness determination. This is a Level 2 audit as defined in ANSI/ASHRAE/ACCA Standard 211-2018, Standard for Commercial Building Energy Audits **(Please note that this specific IGA is not a comprehensive ASHRAE Level 2 audit proposal for the Science/SA/AD buildings. This IGA proposal as currently scoped is focused solely on the FIMs listed above and will meet the ASHRAE Level 2 audit requirements for those FIMs.)**

1. EXECUTIVE SUMMARY

A preliminary audit of the Redmond Public Safety Building (PSB) was conducted on September 19, 2024. All major Heating, Ventilating, and Air Conditioning (HVAC) systems were looked at in order to determine the scope of this targeted HVAC project. The priority Facility Improvement Measures (FIMs) were determined, and additional site walks and data collection was performed.

2. FACILITY DESCRIPTION

The Redmond Public Safety Building is a Police Station located in Renton, WA. The 61,523 -square-foot facility consists of an original building built in 1989 and a Police Department Evidence addition that was added to the facility in 2006 and 2007.

Figure 1 – Main Entrance to Redmond Public Safety Building

The Redmond Public Safety Building includes an office building as well as a parking garage that includes a gun range. Areas and functions of the office building include a city jail, a 911 Emergency Dispatch center, an auditorium, detective and administrative offices as well as a community outreach office. A laboratory and a vehicle bay were added to the building through 2006 and 2007 (PD Evidence Addition). While the building is open to public access from 7:30AM to 6:00PM, due to the nature of the building's multiple functions operation is 24 hours a day, 7 days a week.

3. DESCRIPTION OF BUILDING SYSTEMS AND MAJOR EQUIPMENT

Plug Loads

Plug load use is above average for an office building due to the 911 Dispatch center as well as the jail. The 911 Dispatch center has multiple workstations suited with computer towers and laptops. Most workstations have between 6 to 9 monitors as well a space heater. Several television monitors surround the room displaying local and national news networks around the clock.

Envelope

The Redmond PSB is roughly a rectangular-shaped building. The roof is comprised of a steel deck with board insulation on top and either pitched metal or torch down roofing. External wall construction is metal frame with batt insulation and exterior stucco. Floor construction is slab on grade on the first floor at ground level and concrete floors on steel deck between floors and above the parking garage. The fenestration is double-pane glass with aluminum framing and makes up about 9% of gross wall area from floor to floor. Most of the first and second floors are 12 feet, floor to floor with 9-foot-high t-bar acoustical tile ceilings.

Lighting

In the City of Redmond Phase 1 project, McKinstry upgraded the existing 32-Watt T8 fixtures with LED lamp and drivers. Typical interior lighting is recessed 2 feet by 4 feet prismatic lens fixtures with two LED lamps and driver. Some stairways and all exterior lights are high intensity discharge fixtures. There are no occupancy or daylighting controls currently in the building. The City is planning to convert remaining interior and exterior fixtures to LED in 2025.

Heating, Ventilating and Air-Conditioning (HVAC) Systems

Redmond PSB is served by sixty-five water source heat pumps (WSHP). Most heat pumps are located in ceiling plenums and mechanical mezzanines. As part of the Phase 1 project, 15 WSHPs were replaced and re-positioned as needed with higher efficiency models. In the Phase 2 project, 10 WSHPs were replaced and re-positioned as needed with higher efficiency models, and one condenser water pump was replaced and converted to variable frequency drive (VFD). Return air is directed through an open ceiling plenum to main return ducts. Heat pumps are connected to a hydronic loop and features two gas-fired boilers, a cooling tower and two condenser water circulation pumps.

Figure 2 – WSHP 5A (located in ceiling plenum)

Figure 3 – Condenser Pump

One large Air Handling Unit (AHU-1) serves the bulk of the building's ventilation. The evidence garage to the northwest is served by two roof top units. Parking garages are served by gas-fired overhead unit heaters and a set of exhaust fans and intake louvers. The gun range located in the northeastern corner of the parking garage is served by a gas-fired make-up air unit and an industrial exhaust fan. The building also contains an IDF, City Server, and a 911 Dispatch room that each have a dedicated unit.

HVAC Controls

There are three control systems in the building that cannot communicate with each other and cannot be accessed. The legacy Niagara control system operates most of the mechanical systems, is not compatible with current web browsers and hence not accessible. The newer Niagara system that controls some of the heat pumps but is also not supported and accessible. The Alerton system controls the WSHPs and condenser pump installed in 2021 and is accessible from the site. Heat pump set points are generally at set points between 65°F and 74°F, with most around 69°F. Heat pumps are on 24 hours a day, 7 days a week with no programmed temperature setback or unoccupied mode.

4. THE STANDARDS OF COMFORT AND SERVICE APPROPRIATE FOR THE FACILITY

Where applicable, the following section provides the standards of comfort, which the Owner must maintain to ensure the comfort of the occupants and staff, and upon which all energy calculations were based.

HVAC COMFORT

Heating, ventilating, and air conditioning (HVAC) systems provided by McKinstry will provide comfort and indoor air quality in accordance with the Standards of Comfort below. This standard will pertain only to buildings and areas of buildings in which McKinstry is installing HVAC equipment that has direct control over space comfort conditions. HVAC comfort conditions cannot be guaranteed when operable windows or doors are open.

INDOOR CONDITIONS

Occupied:

Winter Heating Minimum Set-point – 70 degrees F (Superseded by DOH Regs)

Winter Heating Maximum Set-point – 74 degrees F (Superseded by DOH Regs)

Summer Cooling Minimum Set-point – 72 degrees F (where mechanical cooling systems are employed)

Summer Cooling Maximum Set-point – 78 degrees F (where mechanical cooling systems are employed)

Unoccupied:

Minimum – 55 degrees F

Maximum – 85 degrees F (where mechanical cooling systems are employed)

Relative Humidity (If humidity control provided):

Minimum - 40%

Maximum - 60%

Minimum outside air per occupant:

Minimum outside air per occupant shall be in accordance with American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) standards and Chapter 4 of the International

Mechanical Code. Existing ventilation system design and distribution will be maintained. Changes to ventilation are not expected.

Less stringent conditions will not be proposed unless specifically approved by the Owner and DES (if applicable).

5. THE BASELINE ENERGY CONSUMPTION PER FUEL TYPE

The baseline energy consumption for the Redmond Safety Building is based on energy data from Energy Star Portfolio Manager (ESPM) between September 2021 and August 2024. The Public Safety Building is served by Puget Sound Energy (PSE) for both natural gas and electricity. The average natural gas consumption over three years was 17,163 therms per year and the average electricity consumption was 1,067,249 kWh per year. See attached Utility Data Analysis for further baseline energy consumption information.

UTILITY DATA ANALYSIS
CITY OF REDMOND - PUBLIC SAFETY BUILDING

Building Information				Energy Information
Project	City of Redmond	Building Area	61,523 ft²	**Year 1:** September 2021 to August 2022
Building	Public Safety Building			EUI: 101.6 kBtu/ft² Cost: $2.56 / ft²
Service Add.	8701 160th Ave NE, Redmond WA 98052			**Year 2:** September 2022 to August 2023
Electric Pvdr.	PSE	Electrical Mtr.	6000974689-E	EUI: 80.2 kBtu/ft² Cost: $2.53 / ft²
Natural Gas Pvdr.	PSE	Natural Gas Mtr.	325338	**Year 3:** September 2023 to August 2024
				EUI: 79.5 kBtu/ft² Cost: $2.65 / ft²
				Average: September 2021 to August 2024
				EUI: 79.8 kBtu/ft² Cost: $2.58 / ft²
				WNEUI: 89.8 kBtu/ft²

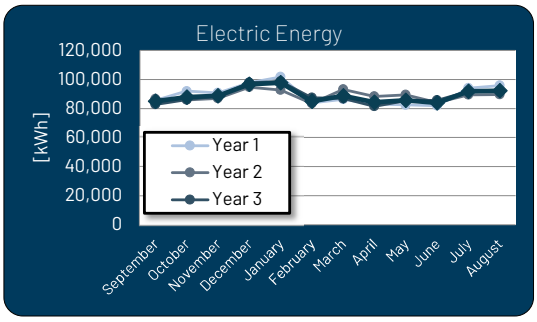
Historical Utility Data

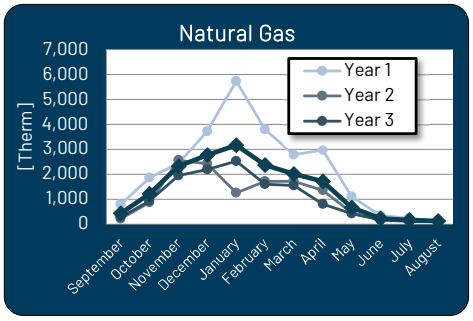
Period	Electric Energy [kWh]	Demand [kW]	Total Electric Cost [$$$]	Natural Gas [Therm]	Natural Gas Cost [$$$]	Total Energy [kBTU]	Total Cost [$$$]	Energy Use Index [kBTU / ft²]	Cost Index [$$$ / ft²]
Sep-21	85,511	152	$9,030.89	795	$818.90	371,236	$9,849.79	6.03	$0.16
Oct-21	91,877	165	$10,640.12	1,860	$1,874.84	499,470	$12,514.95	8.12	$0.20
Nov-21	90,698	172	$11,122.28	2,437	$2,538.89	553,193	$13,661.16	8.99	$0.22
Dec-21	97,790	177	$12,475.92	3,712	$3,875.16	704,851	$16,351.08	11.46	$0.27
Jan-22	101,753	181	$13,982.94	5,728	$5,886.47	919,970	$19,869.41	14.95	$0.32
Feb-22	83,832	161	$11,187.64	3,792	$3,916.21	665,251	$15,103.85	10.81	$0.25
Mar-22	86,210	155	$10,640.53	2,776	$2,886.30	571,719	$13,526.82	9.29	$0.22
Apr-22	83,019	139	$10,665.92	2,970	$3,042.45	580,253	$13,708.37	9.43	$0.22
May-22	82,423	143	$10,206.45	1,094	$1,102.03	390,614	$11,308.48	6.35	$0.18
Jun-22	81,951	146	$9,387.53	342	$380.32	313,860	$9,767.85	5.10	$0.16
Jul-22	94,021	177	$10,622.26	236	$293.84	344,373	$10,916.10	5.60	$0.18
Aug-22	95,644	191	$10,877.29	114	$155.14	337,766	$11,032.43	5.49	$0.18
Sep-22	86,428	164	$10,042.07	211	$253.18	315,997	$10,295.25	5.14	$0.17
Oct-22	85,804	151	$11,179.84	862	$988.34	378,958	$12,168.18	6.16	$0.20
Nov-22	86,960	157	$13,224.31	2,561	$3,045.10	552,846	$16,269.41	8.99	$0.26
Dec-22	94,586	166	$13,985.18	2,416	$2,981.62	564,336	$16,966.80	9.17	$0.28
Jan-23	92,700	165	$12,621.13	1,256	$1,605.99	441,905	$14,227.12	7.18	$0.23
Feb-23	83,405	157	$12,025.06	1,714	$2,210.71	456,020	$14,235.77	7.41	$0.23
Mar-23	93,159	167	$13,767.02	1,721	$2,210.37	489,935	$15,977.39	7.96	$0.26
Apr-23	88,171	161	$11,935.61	1,359	$1,754.62	436,774	$13,690.23	7.10	$0.22
May-23	89,314	172	$10,682.04	464	$620.96	351,171	$11,303.00	5.71	$0.18
Jun-23	84,100	156	$9,622.04	187	$271.58	305,652	$9,893.62	4.97	$0.16
Jul-23	89,381	172	$10,208.26	132	$203.56	318,176	$10,411.82	5.17	$0.17
Aug-23	89,547	169	$10,230.25	143	$217.67	319,809	$10,447.92	5.20	$0.17
Sep-23	82,857	141	$9,660.61	279	$394.92	310,637	$10,055.53	5.05	$0.16
Oct-23	86,052	152	$11,278.09	936	$1,285.08	387,248	$12,563.17	6.29	$0.20
Nov-23	88,535	162	$12,905.15	1,948	$2,585.08	496,911	$15,490.23	8.08	$0.25
Dec-23	97,629	170	$15,264.43	2,185	$2,881.13	551,646	$18,145.56	8.97	$0.29
Jan-24	98,631	172	$15,302.39	2,523	$3,330.76	588,817	$18,633.15	9.57	$0.30
Feb-24	87,420	161	$13,256.61	1,593	$2,078.62	457,594	$15,335.23	7.44	$0.25
Mar-24	86,820	151	$12,891.52	1,545	$2,037.65	450,739	$14,929.17	7.33	$0.24
Apr-24	81,396	152	$11,148.48	807	$1,072.42	358,417	$12,220.90	5.83	$0.20
May-24	85,378	154	$10,958.35	417	$579.37	332,963	$11,537.72	5.41	$0.19
Jun-24	85,690	159	$10,720.97	162	$231.81	308,597	$10,952.78	5.02	$0.18
Jul-24	91,836	191	$11,535.01	109	$158.92	324,259	$11,693.93	5.27	$0.19
Aug-24	91,218	170	$11,243.56	101	$150.00	321,380	$11,393.56	5.22	$0.19

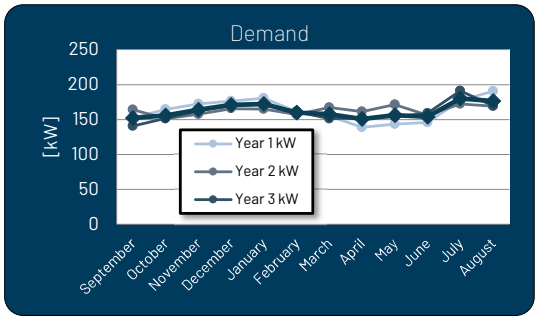
UTILITY DATA ANALYSIS
CITY OF REDMOND - PUBLIC SAFETY BUILDING

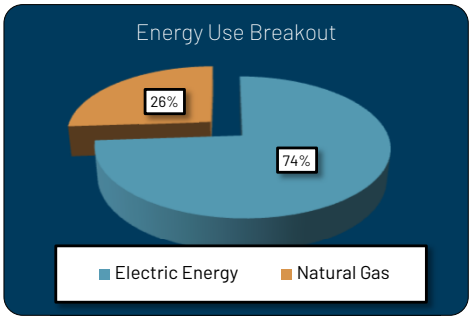
Annual Average Consumption and Cost									
Year	Electric Energy [kWh]	Total Electric Cost [$$$]	Blended Rate [$$$ / kWh]	Natural Gas [Therm]	Natural Gas Cost [$$$]	Total Energy [MMBTU]	Total Cost [$$$]	Energy Use Index [kBTU / ft²]	Cost Index [$$$ / ft²]
Year 1	1,074,728	$115,879	$ 0.108	25,856	$26,771	6,253	$157,610	102	$ 2.56
Year 2	1,063,555	$123,159	$ 0.116	13,027	$16,364	4,932	$155,887	80	$ 2.53
Year 3	1,063,463	$129,379	$ 0.122	12,607	$16,786	4,889	$162,951	79	$ 2.65
Average of Year 2 and 3*	**1,063,509**	**$252,539**	**$ 0.119**	**12,817**	**$ 16,574.730**	**4,910**	**$ 159,418.718**	**80**	**$ 2.59**

Average Monthly Utility Cost and Weather Data					
Month	Electric Energy [$]	Natural Gas [$]	Total [$]	Heating Degree Days	Cooling Degree Days
January	$13,969	$3,608	$17,577	2,024	2,024
February	$12,156	$2,735	$14,892	-1,489	-2,024
March	$12,433	$2,378	$14,811	484	0
April	$11,250	$1,956	$13,206	450	0
May	$10,616	$767	$11,383	304	6
June	$9,910	$295	$10,205	110	66
July	$10,789	$219	$11,007	33	88
August	$10,784	$174	$10,958	0	294
September	$9,578	$489	$10,067	1	296
October	$11,033	$1,383	$12,415	20	118
November	$12,417	$2,723	$15,140	148	35
December	$13,909	$3,246	$17,154	506	0
Total	**$138,843**	**$19,973**	**$158,816**	**2,590**	**902**
Pct. of Total	87%	13%			









*The reason for the high natural gas consumption in Year 1 could not be determined with certainty and therefore was left out of the average calculations. The existing main AHU inlet guide vanes are controlled manually which could be a factor.

6. UTILITY RATE SCHEDULES

Table 3.3 - Base Utility Rates

Project	City of Redmond
Scenario	PSB HVAC 2025 - PreFinal
Date	2/22/2025

Building_Name	Utility_Provider	Rate_Name	Utility_Type	Dollars_Per_Unit	Units	Published_Date_Effective
Redmond Public Safety Building	Puget Sound Energy (PSE)	SCH 25 (2-1-25)	Electricity	$0.102900	kWh	2/1/2025
Redmond Public Safety Building	Puget Sound Energy (PSE)	SCH 31 (2-1-25)	Natural Gas	$1.360000	Therms	2/1/2025

7. DETAILED ENERGY ANALYSIS CALCULATIONS

Project Information:

Project Name	Redmond PSB Phase 3	FIM Name	HVAC setbacks
TCO Project ID		Tech Contact	Sarah stevens
TCO Tool FIM ID	31871	Date	3/10/2025

Weather Data:

Nearest Weather Station	WA	SEATTLE SEATTLE-TACOMA INTL A	727930TY.xls

Description of FIM From TCO Tool:

There are three control systems in the building that cannot communicate with each other and cannot be accessed. The legacy Niagara control system operates most of the mechanical systems, is not compatible with current web browsers and hence not accessible. The newer Niagara (2017) system that controls some of the heat pumps is also not supported and not accessible. The Alerton system controls the WSHPs and condenser pump installed in 2021 and is accessible from the site.
Controls scope for mechanical FIMs will be included in respective FIMs. This FIM includes controls upgrade for remaining HVAC equipment.
The new controls system will evaluate the following features: zone-based start/stop schedule to align with space use; occupancy sensor based WSHP operation; temperature/relative humidity monitoring; monitoring for relevant spaces; status monitoring for relevant equipment; and appropriate alarming

HVAC & Load Schedules:

Schedule A Title	Load Schedule A	ASHRAE Schedule	Office
Schedule B Title	Load Schedule B	ASHRAE Schedule	Office
Schedule C Title	Load Schedule C	ASHRAE Schedule	Office

Fuel Types:

	Fuel	Unit	kbtu/unit	lbs CO2e/unit	$$$/unit
Electric Demand	Electric Demand	kW	N/A	N/A	
Electric Energy	Electric Energy	kWh	3.412	0.6434	
Fuel 2	Natural Gas	Therm	100	11.7	
Fuel 3					

Utility Rate Schedules:

Schedule 1 Title	Rate Schedule 1
Schedule 2 Title	Rate Schedule 2
Schedule 3 Title	Rate Schedule 3

Zone Data (for multi-model buildings):

Zone Name	Zone Name (e.g. Whole Facility, RTU-1, or West Wing)
Zone Description	Zone Description (e.g. Models the entire facility as one zone, or Models Zone for RTU-1)

Savings Tracker (Use if Modeling Multiple Efficiency Measures):

Measure Description		Electric Demand (kW)	Electricity (kWh)	Natural Gas (Therm)	EUI (kBTU/SqFt/Yr)
Baseline Building Performance		1,896	875,515	11,878	90.48
HVAC setbacks	Savings ►	*0*	*25,967*	*3,699*	*9.94*
	Usage ►	1,896	849,548	8,179	80.55
	Savings ►				*80.55*
	Usage ►				0.00
	Savings ►				*0.00*
	Usage ►				0.00
	Savings ►				*0.00*
	Usage ►				0.00
	Savings ►				*0.00*
	Usage ►				0.00
	Savings ►				*0.00*
	Usage ►				0.00
	Savings ►				*0.00*
	Usage ►				0.00
	Savings ►				*0.00*
	Usage ►				0.00
	Savings ►				*0.00*
	Usage ►				0.00
	Savings ►				*0.00*
	Usage ►				0.00

Notes:

Baseline HVAC Equipment Daily Schedules

0 = Fan Off 1 = Fan On

Schedule A - Load Schedule A								
Hour		Sun	Mon	Tue	Wed	Thu	Fri	Sat
From	To	1	2	3	4	5	6	7
0	1	1	1	1	1	1	1	1
1	2	1	1	1	1	1	1	1
2	3	1	1	1	1	1	1	1
3	4	1	1	1	1	1	1	1
4	5	1	1	1	1	1	1	1
There	6	1	1	1	1	1	1	1
6	7	1	1	1	1	1	1	1
7	8	1	1	1	1	1	1	1
8	9	1	1	1	1	1	1	1
9	10	1	1	1	1	1	1	1
10	11	1	1	1	1	1	1	1
11	12	1	1	1	1	1	1	1
12	13	1	1	1	1	1	1	1
13	14	1	1	1	1	1	1	1
14	15	1	1	1	1	1	1	1
15	16	1	1	1	1	1	1	1
16	17	1	1	1	1	1	1	1
17	18	1	1	1	1	1	1	1
18	19	1	1	1	1	1	1	1
19	20	1	1	1	1	1	1	1
20	21	1	1	1	1	1	1	1
21	22	1	1	1	1	1	1	1
22	23	1	1	1	1	1	1	1
23	24	1	1	1	1	1	1	1
Daily Totals		24	24	24	24	24	24	24

Schedule B - Load Schedule B								
Hour		Sun	Mon	Tue	Wed	Thu	Fri	Sat
From	To	1	2	3	4	5	6	7
0	1	1	1	1	1	1	1	1
1	2	1	1	1	1	1	1	1
2	3	1	1	1	1	1	1	1
3	4	1	1	1	1	1	1	1
4	5	1	1	1	1	1	1	1
5	6	1	1	1	1	1	1	1
6	7	1	1	1	1	1	1	1
7	8	1	1	1	1	1	1	1
8	9	1	1	1	1	1	1	1
9	10	1	1	1	1	1	1	1
10	11	1	1	1	1	1	1	1
11	12	1	1	1	1	1	1	1
12	13	1	1	1	1	1	1	1
13	14	1	1	1	1	1	1	1
14	15	1	1	1	1	1	1	1
15	16	1	1	1	1	1	1	1
16	17	1	1	1	1	1	1	1
17	18	1	1	1	1	1	1	1
18	19	1	1	1	1	1	1	1
19	20	1	1	1	1	1	1	1
20	21	1	1	1	1	1	1	1
21	22	1	1	1	1	1	1	1
22	23	1	1	1	1	1	1	1
23	24	1	1	1	1	1	1	1
Daily Totals		24	24	24	24	24	24	24

Schedule C - Load Schedule C								
Hour		Sun	Mon	Tue	Wed	Thu	Fri	Sat
From	To	1	2	3	4	5	6	7
0	1	1	1	1	1	1	1	1
1	2	1	1	1	1	1	1	1
2	3	1	1	1	1	1	1	1
3	4	1	1	1	1	1	1	1
4	5	1	1	1	1	1	1	1
5	6	1	1	1	1	1	1	1
6	7	1	1	1	1	1	1	1
7	8	1	1	1	1	1	1	1
8	9	1	1	1	1	1	1	1
9	10	1	1	1	1	1	1	1
10	11	1	1	1	1	1	1	1
11	12	1	1	1	1	1	1	1
12	13	1	1	1	1	1	1	1
13	14	1	1	1	1	1	1	1
14	15	1	1	1	1	1	1	1
15	16	1	1	1	1	1	1	1
16	17	1	1	1	1	1	1	1
17	18	1	1	1	1	1	1	1
18	19	1	1	1	1	1	1	1
19	20	1	1	1	1	1	1	1
20	21	1	1	1	1	1	1	1
21	22	1	1	1	1	1	1	1
22	23	1	1	1	1	1	1	1
23	24	1	1	1	1	1	1	1
Daily Totals		24	24	24	24	24	24	24

Proposed HVAC Equipment Daily Schedules

0 = Unoccupied Mode 1 = Occupied Mode

Schedule A - Load Schedule A								
Hour		Sun	Mon	Tue	Wed	Thu	Fri	Sat
From	To	1	2	3	4	5	6	7
0	1	0	0	0	0	0	0	0
1	2	0	0	0	0	0	0	0
2	3	0	0	0	0	0	0	0
3	4	0	0	0	0	0	0	0
4	5	0	0	0	0	0	0	0
5	6	1	1	1	1	1	1	1
6	7	1	1	1	1	1	1	1
7	8	1	1	1	1	1	1	1
8	9	1	1	1	1	1	1	1
9	10	1	1	1	1	1	1	1
10	11	1	1	1	1	1	1	1
11	12	1	1	1	1	1	1	1
12	13	1	1	1	1	1	1	1
13	14	1	1	1	1	1	1	1
14	15	1	1	1	1	1	1	1
15	16	1	1	1	1	1	1	1
16	17	1	1	1	1	1	1	1
17	18	1	1	1	1	1	1	1
18	19	1	1	1	1	1	1	1
19	20	1	1	1	1	1	1	1
20	21	1	1	1	1	1	1	1
21	22	1	1	1	1	1	1	1
22	23	0	0	0	0	0	0	0
23	24	0	0	0	0	0	0	0
Daily Totals		17	17	17	17	17	17	17

Schedule B - Load Schedule B								
Hour		Sun	Mon	Tue	Wed	Thu	Fri	Sat
From	To	1	2	3	4	5	6	7
0	1	0	0	0	0	0	0	0
1	2	0	0	0	0	0	0	0
2	3	0	0	0	0	0	0	0
3	4	0	0	0	0	0	0	0
4	5	0	0	0	0	0	0	0
5	6	1	1	1	1	1	1	1
6	7	1	1	1	1	1	1	1
7	8	1	1	1	1	1	1	1
8	9	1	1	1	1	1	1	1
9	10	1	1	1	1	1	1	1
10	11	1	1	1	1	1	1	1
11	12	1	1	1	1	1	1	1
12	13	1	1	1	1	1	1	1
13	14	1	1	1	1	1	1	1
14	15	1	1	1	1	1	1	1
15	16	1	1	1	1	1	1	1
16	17	1	1	1	1	1	1	1
17	18	1	1	1	1	1	1	1
18	19	1	1	1	1	1	1	1
19	20	1	1	1	1	1	1	1
20	21	1	1	1	1	1	1	1
21	22	1	1	1	1	1	1	1
22	23	0	0	0	0	0	0	0
23	24	0	0	0	0	0	0	0
Daily Totals		17	17	17	17	17	17	17

Schedule C - Load Schedule C								
Hour		Sun	Mon	Tue	Wed	Thu	Fri	Sat
From	To	1	2	3	4	5	6	7
0	1	0	0	0	0	0	0	0
1	2	0	0	0	0	0	0	0
2	3	0	0	0	0	0	0	0
3	4	0	0	0	0	0	0	0
4	5	0	0	0	0	0	0	0
5	6	1	1	1	1	1	1	1
6	7	1	1	1	1	1	1	1
7	8	1	1	1	1	1	1	1
8	9	1	1	1	1	1	1	1
9	10	1	1	1	1	1	1	1
10	11	1	1	1	1	1	1	1
11	12	1	1	1	1	1	1	1
12	13	1	1	1	1	1	1	1
13	14	1	1	1	1	1	1	1
14	15	1	1	1	1	1	1	1
15	16	1	1	1	1	1	1	1
16	17	1	1	1	1	1	1	1
17	18	1	1	1	1	1	1	1
18	19	1	1	1	1	1	1	1
19	20	1	1	1	1	1	1	1
20	21	1	1	1	1	1	1	1
21	22	1	1	1	1	1	1	1
22	23	0	0	0	0	0	0	0
23	24	0	0	0	0	0	0	0
Daily Totals		17	17	17	17	17	17	17

Baseline Occupancy Load Profiles (Percent of Peak Occupancy)

Schedule A - Load Schedule A								
Hour		Sun	Mon	Tue	Wed	Thu	Fri	Sat
From	To	1	2	3	4	5	6	7
0	1	40%	40%	40%	40%	40%	40%	40%
1	2	40%	40%	40%	40%	40%	40%	40%
2	3	40%	40%	40%	40%	40%	40%	40%
3	4	40%	40%	40%	40%	40%	40%	40%
4	5	40%	40%	40%	40%	40%	40%	40%
5	6	40%	40%	40%	40%	40%	40%	40%
6	7	40%	40%	40%	40%	40%	40%	40%
7	8	40%	80%	80%	80%	80%	80%	40%
8	9	40%	80%	80%	80%	80%	80%	40%
9	10	40%	80%	80%	80%	80%	80%	40%
10	11	40%	80%	80%	80%	80%	80%	40%
11	12	40%	80%	80%	80%	80%	80%	40%
12	13	40%	80%	80%	80%	80%	80%	40%
13	14	40%	80%	80%	80%	80%	80%	40%
14	15	40%	80%	80%	80%	80%	80%	40%
15	16	40%	80%	80%	80%	80%	80%	40%
16	17	40%	80%	80%	80%	80%	80%	40%
17	18	40%	80%	80%	80%	80%	80%	40%
18	19	40%	40%	40%	40%	40%	40%	40%
19	20	40%	40%	40%	40%	40%	40%	40%
20	21	40%	40%	40%	40%	40%	40%	40%
21	22	40%	40%	40%	40%	40%	40%	40%
22	23	40%	40%	40%	40%	40%	40%	40%
23	24	40%	40%	40%	40%	40%	40%	40%
		0.3	0.3	0.3	0.3	0.3	0.3	0.3

0%

Schedule B - Load Schedule B								
Hour		Sun	Mon	Tue	Wed	Thu	Fri	Sat
From	To	1	2	3	4	5	6	7
0	1	40%	40%	40%	40%	40%	40%	40%
1	2	40%	40%	40%	40%	40%	40%	40%
2	3	40%	40%	40%	40%	40%	40%	40%
3	4	40%	40%	40%	40%	40%	40%	40%
4	5	40%	40%	40%	40%	40%	40%	40%
5	6	40%	40%	40%	40%	40%	40%	40%
6	7	40%	40%	40%	40%	40%	40%	40%
7	8	40%	80%	80%	80%	80%	80%	40%
8	9	40%	80%	80%	80%	80%	80%	40%
9	10	40%	80%	80%	80%	80%	80%	40%
10	11	40%	80%	80%	80%	80%	80%	40%
11	12	40%	80%	80%	80%	80%	80%	40%
12	13	40%	80%	80%	80%	80%	80%	40%
13	14	40%	80%	80%	80%	80%	80%	40%
14	15	40%	80%	80%	80%	80%	80%	40%
15	16	40%	80%	80%	80%	80%	80%	40%
16	17	40%	80%	80%	80%	80%	80%	40%
17	18	40%	80%	80%	80%	80%	80%	40%
18	19	40%	40%	40%	40%	40%	40%	40%
19	20	40%	40%	40%	40%	40%	40%	40%
20	21	40%	40%	40%	40%	40%	40%	40%
21	22	40%	40%	40%	40%	40%	40%	40%
22	23	40%	40%	40%	40%	40%	40%	40%
23	24	40%	40%	40%	40%	40%	40%	40%

Schedule C - Load Schedule C								
Hour		Sun	Mon	Tue	Wed	Thu	Fri	Sat
From	To	1	2	3	4	5	6	7
0	1	40%	40%	40%	40%	40%	40%	40%
1	2	40%	40%	40%	40%	40%	40%	40%
2	3	40%	40%	40%	40%	40%	40%	40%
3	4	40%	40%	40%	40%	40%	40%	40%
4	5	40%	40%	40%	40%	40%	40%	40%
5	6	40%	40%	40%	40%	40%	40%	40%
6	7	40%	40%	40%	40%	40%	40%	40%
7	8	40%	80%	80%	80%	80%	80%	40%
8	9	40%	80%	80%	80%	80%	80%	40%
9	10	40%	80%	80%	80%	80%	80%	40%
10	11	40%	80%	80%	80%	80%	80%	40%
11	12	40%	80%	80%	80%	80%	80%	40%
12	13	40%	80%	80%	80%	80%	80%	40%
13	14	40%	80%	80%	80%	80%	80%	40%
14	15	40%	80%	80%	80%	80%	80%	40%
15	16	40%	80%	80%	80%	80%	80%	40%
16	17	40%	80%	80%	80%	80%	80%	40%
17	18	40%	80%	80%	80%	80%	80%	40%
18	19	40%	40%	40%	40%	40%	40%	40%
19	20	40%	40%	40%	40%	40%	40%	40%
20	21	40%	40%	40%	40%	40%	40%	40%
21	22	40%	40%	40%	40%	40%	40%	40%
22	23	40%	40%	40%	40%	40%	40%	40%
23	24	40%	40%	40%	40%	40%	40%	40%

Proposed Occupancy Load Profiles (Percent of Peak Occupancy)

Schedule A - Load Schedule A								
Hour		Sun	Mon	Tue	Wed	Thu	Fri	Sat
From	To	1	2	3	4	5	6	7
0	1	40%	40%	40%	40%	40%	40%	40%
1	2	40%	40%	40%	40%	40%	40%	40%
2	3	40%	40%	40%	40%	40%	40%	40%
3	4	40%	40%	40%	40%	40%	40%	40%
4	5	40%	40%	40%	40%	40%	40%	40%
5	6	40%	40%	40%	40%	40%	40%	40%
6	7	40%	40%	40%	40%	40%	40%	40%
7	8	40%	80%	80%	80%	80%	80%	40%
8	9	40%	80%	80%	80%	80%	80%	40%
9	10	40%	80%	80%	80%	80%	80%	40%
10	11	40%	80%	80%	80%	80%	80%	40%
11	12	40%	80%	80%	80%	80%	80%	40%
12	13	40%	80%	80%	80%	80%	80%	40%
13	14	40%	80%	80%	80%	80%	80%	40%
14	15	40%	80%	80%	80%	80%	80%	40%
15	16	40%	80%	80%	80%	80%	80%	40%
16	17	40%	80%	80%	80%	80%	80%	40%
17	18	40%	80%	80%	80%	80%	80%	40%
18	19	40%	40%	40%	40%	40%	40%	40%
19	20	40%	40%	40%	40%	40%	40%	40%
20	21	40%	40%	40%	40%	40%	40%	40%
21	22	40%	40%	40%	40%	40%	40%	40%
22	23	40%	40%	40%	40%	40%	40%	40%
23	24	40%	40%	40%	40%	40%	40%	40%

Schedule B - Load Schedule B								
Hour		Sun	Mon	Tue	Wed	Thu	Fri	Sat
From	To	1	2	3	4	5	6	7
0	1	40%	40%	40%	40%	40%	40%	40%
1	2	40%	40%	40%	40%	40%	40%	40%
2	3	40%	40%	40%	40%	40%	40%	40%
3	4	40%	40%	40%	40%	40%	40%	40%
4	5	40%	40%	40%	40%	40%	40%	40%
5	6	40%	40%	40%	40%	40%	40%	40%
6	7	40%	40%	40%	40%	40%	40%	40%
7	8	40%	80%	80%	80%	80%	80%	40%
8	9	40%	80%	80%	80%	80%	80%	40%
9	10	40%	80%	80%	80%	80%	80%	40%
10	11	40%	80%	80%	80%	80%	80%	40%
11	12	40%	80%	80%	80%	80%	80%	40%
12	13	40%	80%	80%	80%	80%	80%	40%
13	14	40%	80%	80%	80%	80%	80%	40%
14	15	40%	80%	80%	80%	80%	80%	40%
15	16	40%	80%	80%	80%	80%	80%	40%
16	17	40%	80%	80%	80%	80%	80%	40%
17	18	40%	80%	80%	80%	80%	80%	40%
18	19	40%	40%	40%	40%	40%	40%	40%
19	20	40%	40%	40%	40%	40%	40%	40%
20	21	40%	40%	40%	40%	40%	40%	40%
21	22	40%	40%	40%	40%	40%	40%	40%
22	23	40%	40%	40%	40%	40%	40%	40%
23	24	40%	40%	40%	40%	40%	40%	40%

Schedule C - Load Schedule C								
Hour		Sun	Mon	Tue	Wed	Thu	Fri	Sat
From	To	1	2	3	4	5	6	7
0	1	40%	40%	40%	40%	40%	40%	40%
1	2	40%	40%	40%	40%	40%	40%	40%
2	3	40%	40%	40%	40%	40%	40%	40%
3	4	40%	40%	40%	40%	40%	40%	40%
4	5	40%	40%	40%	40%	40%	40%	40%
5	6	40%	40%	40%	40%	40%	40%	40%
6	7	40%	40%	40%	40%	40%	40%	40%
7	8	40%	80%	80%	80%	80%	80%	40%
8	9	40%	80%	80%	80%	80%	80%	40%
9	10	40%	80%	80%	80%	80%	80%	40%
10	11	40%	80%	80%	80%	80%	80%	40%
11	12	40%	80%	80%	80%	80%	80%	40%
12	13	40%	80%	80%	80%	80%	80%	40%
13	14	40%	80%	80%	80%	80%	80%	40%
14	15	40%	80%	80%	80%	80%	80%	40%
15	16	40%	80%	80%	80%	80%	80%	40%
16	17	40%	80%	80%	80%	80%	80%	40%
17	18	40%	80%	80%	80%	80%	80%	40%
18	19	40%	40%	40%	40%	40%	40%	40%
19	20	40%	40%	40%	40%	40%	40%	40%
20	21	40%	40%	40%	40%	40%	40%	40%
21	22	40%	40%	40%	40%	40%	40%	40%
22	23	40%	40%	40%	40%	40%	40%	40%
23	24	40%	40%	40%	40%	40%	40%	40%

Zone Inputs:

Tag	Variable Description		Units	Baseline	Proposed	Basis	
I7	Floor Area		ft²	46,142	46,142	drawings	
I8	Roof Area		ft²	26,870	26,870	drawings	
I9	Opaque Wall Area		ft²	12,188	12,188	drawings	
I10	Glazing Area	*Glazing*	ft²	1,722	1,722	drawings	
I12	Roof U-Factor	*Roof*	BTU/ft²/°F	0.060	0.060	2021 MCK Record Drawing Set-adjusted for tuning	
I13	Opaque Wall U-Factor	*Walls*	BTU/ft²/°F	0.055	0.055	2021 MCK Record Drawing Set-	
There are	Glazing U-Factor	*Glazing*	BTU/ft²/°F	0.800	0.800	2021 MCK Record Drawing Set	
I15	Glazing Solar Heat Gain Coefficient (SHGC)	*Glazing*	-	0.600	0.600	2021 MCK Record Drawing Set	
I16	Glazing Solar Gain Bldg Shape Factor		-	0.300	0.300	Used to tune cooling loads/summer electrical load shape	
I17	Average Space Height (Floor to Ceiling)		ft	11.00	11.00	estimate/drawings	
I18	Infiltration		ach	0.300	0.300	2021 MCK Record Drawing Set	
I19	Peak Number of Occupants		Qty	150	150	2021 MCK Record Drawing Set-record state occ. Of 615 employees, seemed high	x
I20	Sensible Heat Gain Per Person		Btu/h	245	245	Typical	
I21	Latent Heat Gain Per Person		Btu/h	155	155	Typical	
I22	Peak Lighting Load Power Density		W/ft²	0.50	0.50	2021 MCK Record Drawing Set-adjusted for tuning-LEDs	
I23	Peak Plug Load Power Density		W/ft²	1.00	1.00	2021 MCK Record Drawing Set-adjusted for tuning	
I24	Peak Exterior Lighting Load		kW	5.00	5.00	Estimated-confirm	x
I25	Peak Miscellaneous Load (Electrical)		Watt	13,736	13,736	Exhaust FAN power	
I26	Miscellaneous Load Located in Conditioned Space		Yes/No	Yes	Yes		
I27	HVAC On Cooling Space Temperature Set Point		°F	75.0	75.0	2021 MCK Record Drawing Set	
I28	HVAC Off Cooling Space Temperature Set Point		°F	75.0	85.0	2021 MCK Record Drawing Set	
I29	HVAC On Heating Space Temperature Set Point		°F	70.0	70.0	2021 MCK Record Drawing Set	
I30	HVAC Off Heating Space Temperature Set Point		°F	70.0	65.0	2021 MCK Record Drawing Set	

AHU & Plant Inputs:

Tag	Variable Description		Units	Baseline	Proposed	Basis	FIM ID
I34	AHU Fan Power based on Control Type		Type	CV	CV	estimate-verify	x
I35	Occupied Fan Operation		Type	Continuous	Continuous	Typical for Occupied Bldgs	
I36	Maximum AHU CFM		CFM	10,000	10,000	1989 As builts	
I37	Min AHU CFM (% of Max CFM) (If CV+Cycles: min occ % run time)		%	100.0%	100.0%	100% Outside Air,	
I38	Maximum % Outside Air (Economizer % OSA)		%	100.0%	100.0%	100% Outside Air	
I39	Minimum % Outside Air (Occupied)		%	100.00%	100.00%	Used to tune heating loads	
I40	Minimum % Outside Air (Unoccupied)		%	100.0%	100.0%	100% outside air, baseline no setbacks, 100% when unoccupied, AHU can not be turned down	
I41	Economizer High Limit Set Point		°F	65.0	65.0	Typical value	
I42	Economizer Low Limit Set Point		°F	55.0	55.0	Typical value	
I43	Demand Controlled Ventilation (For Outside Air Control)		Yes/No	No	No		
I44	DCV Airflow Per Person (Based on Space Type)	*DCV Tab*	CFM/Per	~~10.00~~	~~10.00~~		
I45	DCV Airflow Per Area (Based on Space Type)	*DCV Tab*	CFM/ft²	~~0.12~~	~~0.12~~		
I46	AHU Fan TSP (At Max CFM)		in w.c.	4.500	4.500	1989 As builts-used for tuning	
I47	Fan Efficiency		%	55.0%	55.0%	Estimated	
I48	Occupied Supply Air Temperature @ OAT ---------->	70.0	°F	Single Zone	Single Zone		
I49	Occupied Supply Air Temperature @ OAT ---------->	60.0	°F	~~60~~	~~60~~		
I50	Unoccupied Heating Supply Air Temperature Setpoint		°F	85	85	Typical	
I51	Unoccupied Cooling Supply Air Temperature Setpoint		°F	55	55	Typical	
I52	AHU Cooling Efficiency (IEER)		BTU/Watt	10.6	10.60	Drawings-HP list, proposed replacement of 14 wshp-new average of efficiency for heat pumps	
I53	Evaporative Cooling Effectiveness (Air side)		%	0.0%	0.0%		
I54	AHU Cooling Lockout Below		°F	60.0	60.0	Typical	
I55	AHU Heating Efficiency or COP @ OAT ---------->	47.0	COP	3.9800	3.9800	WSHP fed by NG boiler,Proposed replacement of 14 wshp-calculated	
I56	AHU Heating Efficiency or COP @ OAT ---------->	25.0	COP	3.2000	3.2000	WSHP fed by NG boiler,Proposed replacement of 14 wshp-estimated	
I57	AHU Heating Efficiency or COP < OAT ---------->	10.0	COP	2.9000	2.9000	WSHP fed by NG boiler,Proposed replacement of 14 wshp-estimated	
I58	AHU Heating Energy Source		Type	Electric Energy	Electric Energy	WSHP fed by NG boilers	
I59	AHU Heating Lockout Above		°F	75.0	75.0	Estimated as Occ Htg SP + 1F	
I60	Evaporative Pre-Cooling on Condenser		Yes/No	No	No		
I61	Heat Recovery % Effectiveness		%	0.00%	0.00%	no HR	
I62	Onsite Central Plant?		Yes/No	Yes	Yes		

Terminal Devices Inputs (Reheat Coils, VAV Boxes, Baseboard Heaters, etc)

Tag	Variable Description		Units	Baseline	Proposed	Basis	FIM ID
I66	Terminal Devices		Yes/No	No	No		
I67	Zone Heating Lockout Above		°F	~~75.0~~	~~75.0~~		
I68	Zone Heating Efficiency or COP @ OAT ---------->	47.0	COP	~~0.9000~~	~~0.9000~~	drawings values	
I69	Zone Heating Efficiency or COP @ OAT ---------->	25.0	COP	~~0.9000~~	~~0.9000~~	estimated for cooler weather	
I70	Zone Heating Efficiency or COP < OAT ---------->	10.0	COP	~~0.9000~~	~~0.9000~~	estimated for cooler weather	
I71	Heating Energy Source Zone		Type	~~Natural Gas~~	~~Natural Gas~~		
I72	Unoccupied Heating Done By		Zone, AHU	~~AHU Coil~~	~~AHU Coil~~		
I73	SFPMB Terminal Unit Power		W/CFM	~~0.30~~	~~0.30~~	Rough estimate based on drawings	x

Chilled Water and Heating Plants Inputs:

Tag	Variable Description	Units	Baseline	Proposed	Basis	FIM ID
			Chilled Water Pumps			
I78	Chiller Source	Type	No Chiller	No Chiller	Chiller plant excluded in template. Change to "Air Cooled" or "Water Cooled" and increase Tonnage from zero to add chiller plant. Increase GPM and ft wg from zero to add Chilled Water Pumps (CHWPs).	
I79	Chiller Type	Type	~~Centrifugal~~	~~Centrifugal~~		
I80	Chiller Nominal Tonnage	Tonnage	~~0~~	~~0.0~~		
I81	Chilled Water Flow Rate	GPM	~~0~~	~~0~~		
I82	Chilled Water System Design Pressure Drop	ft wg	~~0~~	~~0~~		
I83	Chilled Water Pumping CV or VFD	Type	~~VFD~~	~~VFD~~		
I84	Chilled Water Pump Enable Method	Type	~~Demand~~	~~Demand~~		
I85	Minimum Chilled Water GPM (% of Max Flow Rate)	%	~~33.0%~~	~~33.0%~~		
I86	Chilled Water Pump Efficiency (Motor and Pump)	%	~~60.0%~~	~~60.0%~~		
I87	Chilled Water Supply Temperature	°F	~~45~~	~~45~~		
I88	Chilled Water Temperature Control Strategy	Type	~~Fixed~~	~~Fixed~~		
I89	Chilled Water System Delta T (CHWRT - CHWST)	°F	~~15~~	~~15~~		
			Condenser Water Plant: Proposed Design Does Not Have a Cooling Tower			
I91	Condenser Water Flow Rate	GPM	~~0~~	~~0~~	Condenser plant excluded in template. Increase GPM and ft wg from zero to add condenser pumps (CWPs).	
I92	Condenser Water System Design Pressure Drop	ft wg	~~0~~	~~0~~		
I93	Condenser Water Pumping CV or VFD	Type	~~VFD~~	~~VFD~~		
I94	Condenser Water Pump Enable Method	Type	~~Demand~~	~~Demand~~		
I95	Minimum Condenser Water Flow Rate (% of Max Flow Rate)	%	~~33.0%~~	~~33.0%~~		
I96	Condenser Water Pump Efficiency (Motor and Pump)	%	~~60.0%~~	~~60.0%~~	Estimated	
I97	Condenser Water System Delta T(CWRT-CWST)	°F	~~20~~	~~20~~		
I98	Cooling Tower Design CWST	°F	~~85~~	~~85~~	1989 as builts	
I99	Cooling Tower Design Wet Bulb	°F	~~67~~	~~67~~	1989 as builts	
I100	Cooling Tower Design Fan Brake HP	bhp	~~25.0~~	~~25.0~~	Cooling towers excluded in template. Increase fan BHP from zero to add cooling towers.	
I101	Cooling Tower Fan Design Flow Rate	CFM	~~37000~~	~~37000~~	Cooling towers excluded in template. Increase CFM from zero to add cooling towers.- 1989 as builts	
I102	Cooling Tower Fan Control	Type	~~CV~~	~~CV~~	1989 as builts	
I103	Cooling Tower CWST Control Strategy	Type	~~Fixed CWST~~	~~Fixed CWST~~	1989 as builts	
I104	Cooling Tower Min CWST Temp	°F	~~85~~	~~85~~	1989 as builts	
I105	Minimum Cooling Tower Fan Speed	%	~~100.0%~~	~~100.0%~~	1989 as builts	
I106	Water Side Economizer	Yes/No	~~No~~	~~No~~	no economizer	
I107	Water Side Economizer HX Temp Approach	°F	~~5~~	~~5~~	NA	
			Heating Water Plant			
I109	Heating Water Flow Rate	GPM	0	0	HW pumps excluded in template. Increase GPM and ft wg from zero to add HW Pumps- boiler specs	
I110	Heating Water System Design Pressure Drop	ft wg	0	0		
I111	Heating Water Pumping CV or VFD	Type	CV	CV		
I112	Heating Water Pump Enable Method	Type	Demand	Demand		
I113	Minimum Heating Water Flow Rate (% of Max Flow Rate)	%	100.0%	100.0%		
I114	Heating Water Pump Efficiency (Motor and Pump)	%	60.0%	60.0%	Estimated	
I115	Heating Water System Delta T (HWST - HWRT)	°F	20.0	20.0		
			Heat Pump Loop Pump: This Module Not Used			
I118	Water Source Heat Pump Boiler	Yes/No	Yes	Yes	Heat pump loop excluded in template. Increase GPM and ft wg from zero to add heat pump loop.- WSHP fed by NG boilers	
I119	Heat Pump Boiler Efficiency	COP	90%	90%	condensing boilers, est eff. Of 91%	
I120	Heat Pump Loop Water Flow Rate	GPM	412.5	412.5	pump specs	
I121	Heat Pump Loop Water System Design Pressure Drop	ft wg	82.5	82.5	pump specs	
I122	Heat Pump Loop Water Pumping CV or VFD	Type	CV	CV	pump specs	
I123	Heat Pump Loop Water Pump Enable Method	Type	Continuous	Continuous		
I124	Minimum Heat Pump Loop Water Flow Rate (% of Max Flow Rate)	%	100.0%	100.0%		
I125	Heat Pump Loop Water Pump Efficiency (Motor and Pump)	%	55.0%	55.0%	Estimated	
I126	Heat Pump Loop Water System Delta T (HWST - HWRT)	°F	25.0	25.0	typical	

Domestic Hot Water Inputs:

Tag	Variable Description	Units	Baseline	Proposed	Basis	FIM ID
I131	DHW Fuel Type	Type	Natural Gas	Natural Gas	1989 Drawings	
I132	Energy Factor	-	0.70	0.70	NG fired DHW	
I133	Working Days Per Year (Used Only For DHW Calc)	Qty	365	365	Schedule A & Schedule B (ADJUST AS NEEDED)	
I134	Average Daily Hot Water Consumption Per Person	Gallons	2.0	2.0	estimate various usages	
I135	Average Entering Cold Water Temperature	°F	50.0	50.0	Typical	
I136	Supply Hot Water Temperature	°F	120.0	120.0	Typical	

Electric Demand

Tag	Description	Units	Baseline	EUI	Proposed	EUI	Savings	Savir	
O7	Cooling Peak kW	kW	84	-	84	-	0	0.0	
O8	AHU Heating Peak kW	kW	56	-	56	-	0	0.0%	-
O9	Zone Heating Peak kW	kW	0	-	0	-	0	0.0%	-
O10	Fan Peak kW	kW	10	-	10	-	0	0.0%	-
O11	Interior Lighting Peak kW	kW	18	-	18	-	0	0.0%	-
O12	Exterior Lighting Peak kW	kW	5	-	5	-	0	0.0%	-
O13	Plug Load Peak kW	kW	44	-	44	-	0	0.0%	-
O14	Pumps Peak kW	kW	12	-	12	-	0	0.0%	-
O15	Heat Rejection kW	kW	19	-	19	-	0	0.0%	-
O16	Miscellaneous Load Peak kW	kW	14		14	-	0	0.0%	-
O17	Other Peak kW	kW	0	-	0	-	0	0.0%	-
O18	Peak kW	kW	200	-	200	-	0	0.0%	-
O19	Peak kW (Sum 12 Monthly Peaks)	kW	1,896	-	1,896	-	0	0.0%	-

Electric Energy

Tag	Description	Units	Baseline	EUI	Proposed	EUI	Savings	Savings (%)	EUI
O23	Cooling	kWh/Yr	37,972	2.81	38,114	2.82	-141	-0.4%	-0.01
O24	AHU Heating	kWh/Yr	79,957	5.91	53,830	3.98	26,127	32.7%	1.93
O25	Zone Heating	kWh/Yr	0	0.00	0	0.00	0	0.0%	0.00
O26	AHU Fans	kWh/Yr	84,281	6.23	84,281	6.23	0	0.0%	0.00
O27	Zone Fans	kWh/Yr	0	0.00	0	0.00	0	0.0%	0.00
O28	Interior Lighting	kWh/Yr	161,682	11.96	161,682	11.96	0	0.0%	0.00
O29	Exterior Lighting	kWh/Yr	21,900	1.62	21,900	1.62	0	0.0%	0.00
O30	Plug Loads	kWh/Yr	261,488	19.34	261,488	19.34	0	0.0%	0.00
O31	Pumps	kWh/Yr	102,212	7.56	102,212	7.56	0	0.0%	0.00
O32	Heat Rejection	kWh/Yr	5,694	0.42	5,713	0.42	-19	-0.3%	0.00
O33	Miscellaneous Loads	kWh/Yr	120,327	8.90	120,327	8.90	0	0.0%	0.00
O34	Domestic Hot Water	kWh/Yr	0	0.00	0	0.00	0	0.0%	0.00
O35	Other Electricity	kWh/Yr	0	0.00	0	0.00	0	0.0%	0.00
O36	Total	kWh/Yr	875,515	64.74	849,548	62.82	25,967	3.0%	1.92

Natural Gas

Tag	Description	Units	Baseline	EUI	Proposed	EUI	Savings	Savings (%)	EUI
O40	AHU Heating	Therm/Yr	11,396	24.70	7,697	16.68	3,699	32.5%	8.02
O41	Zone Heating	Therm/Yr	0	0.00	0	0.00	0	0.0%	0.00
O42	Domestic Hot Water	Therm/Yr	482	1.05	482	1.05	0	0.0%	0.00
O43	Other Natural Gas	Therm/Yr	0	0.00	0	0.00	0	0.0%	0.00
O44	Total	Therm/Yr	11,878	25.74	8,179	17.73	3,699	31.1%	8.02

0

Tag	Description	Units	Baseline	EUI	Proposed	EUI	Savings	Savings (%)	EUI
O48	AHU Heating	/Yr	0	0.00	0	0.00	0	0.0%	0.00
O49	Zone Heating	/Yr	0	0.00	0	0.00	0	0.0%	0.00
O50	Domestic Hot Water	/Yr	0	0.00	0	0.00	0	0.0%	0.00
O51	Other 0	/Yr	0	0.00	0	0.00	0	0.0%	0.00
O52	Total	/Yr	0	0.00	0	0.00	0	0.0%	0.00

Total Energy

Tag	Description	Units	Baseline	EUI	Proposed	EUI	Savings	Savings (%)	EUI
O56	Total Energy	kBtu/Yr	4,175,042	90.48	3,716,590	80.55	458,453	11.0%	9.94

Logger Data

Motor Start/Stop Loggers

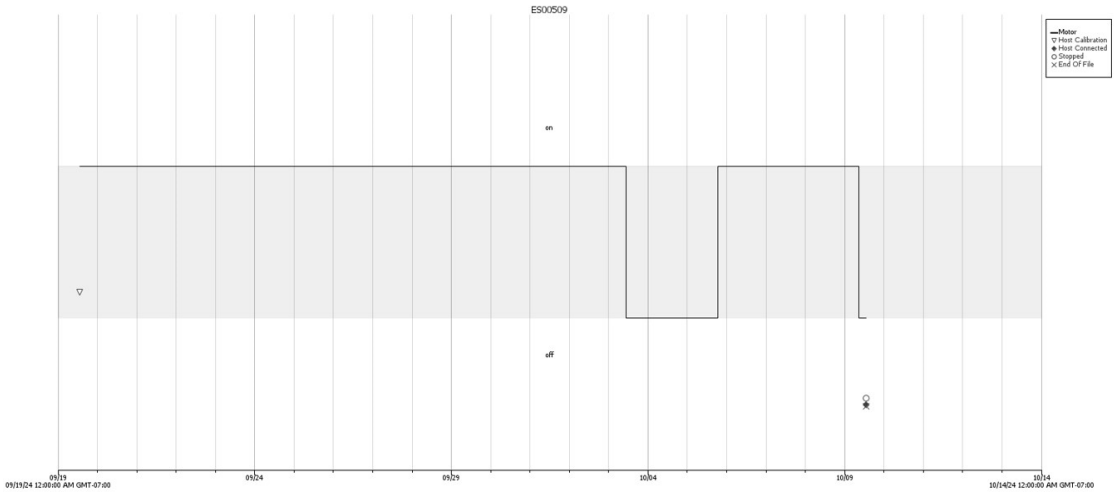


Figure 1 – Condenser Pump Start/Stop Logger,
Condenser pump and condenser water loop operate 24/7

Temperature Loggers

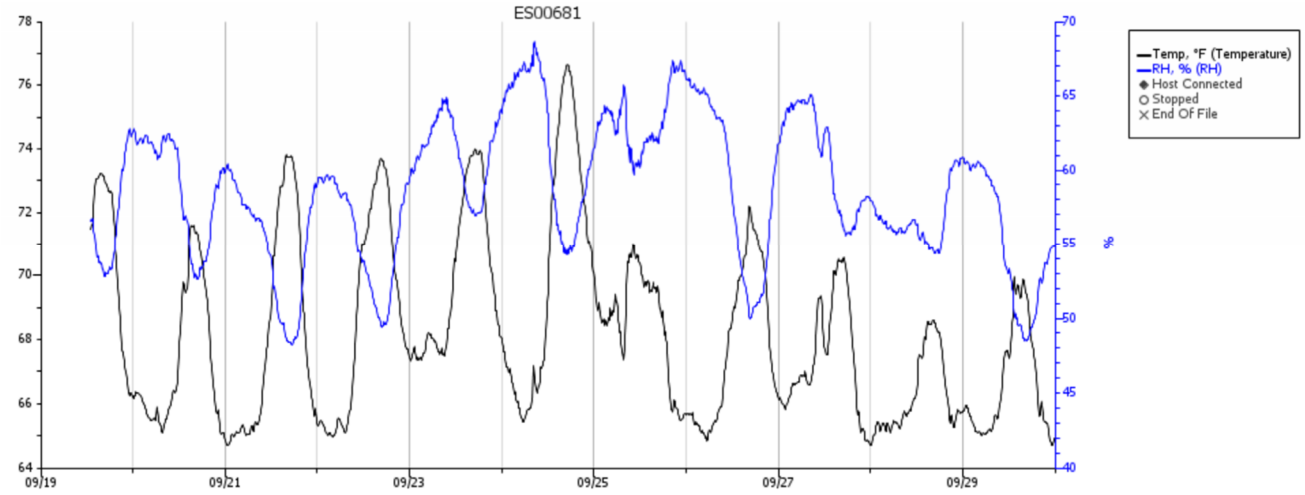


Figure 1 – AHU Supply Side Temperature Loggers

Figure 2 – Temperature Logger located in 911 Dispatch Server Room

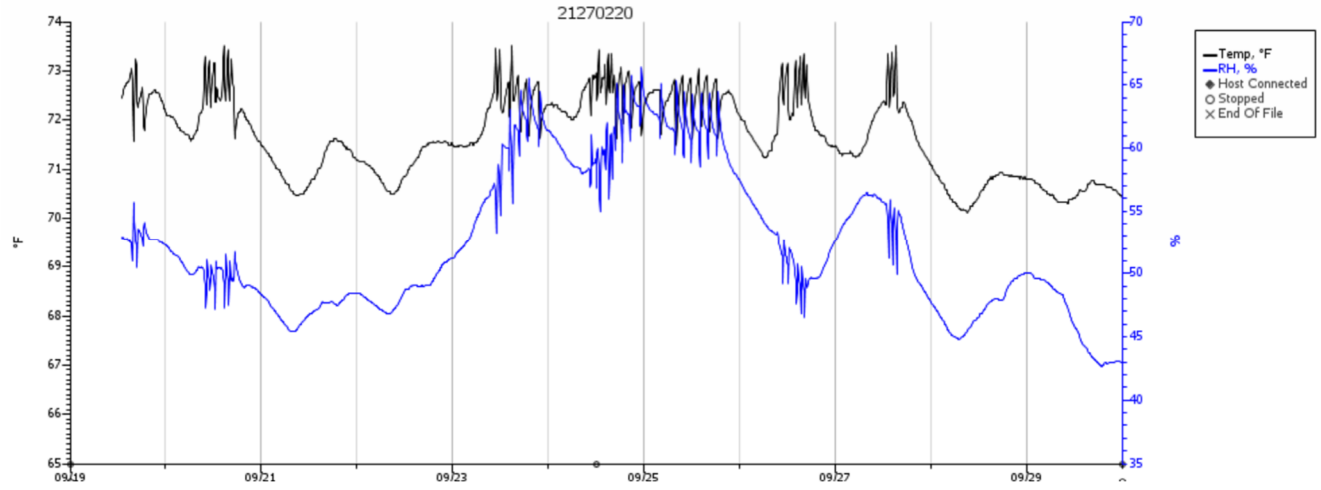


Figure 3 – Temperature Logger located in West 2nd floor investigations room, WSHP location

McK8760 - General Information

WSHP Replacement

Project Information:

Project Name	Redmond PSB Phase 3	FIM Name	WSHP Replacement
TCO Project ID		Tech Contact	Sarah stevens
TCO Tool FIM ID	53394	Date	2/25/2025

Weather Data:

Nearest Weather Station	WA SEATTLE SEATTLE-TACOMA INTL A	Station ID	727930TY.xls

Description of FIM From TCO Tool:

Replace (13), and add (1) new WSHP similar to the scope performed in Ph1 and Ph2. Relocate some WSHPs to improve access and zoning. Relocate and provide piping, ductwork, and controls for (1) existing WSHP that was previously replaced by the owner. Provide necessary duct modifications. The new WSHPs will include new hose kits and 2-position control valves for the condenser water

HVAC & Load Schedules:

Schedule A Title	Load Schedule A	ASHRAE Schedule Type	Office
Schedule B Title	Load Schedule B	ASHRAE Schedule Type	Office
Schedule C Title	Load Schedule C	ASHRAE Schedule Type	Office

Fuel Types:

	Fuel	Unit	kbtu/unit	lbs CO2e/unit	$$$/unit
Electric Demand	Electric Demand	kW	N/A	N/A	
Electric Energy	Electric Energy	kWh	3.412	0.6434	
Fuel 2	Natural Gas	Therm	100	11.7	
Fuel 3					

Utility Rate Schedules:

Schedule 1 Title	Rate Schedule 1
Schedule 2 Title	Rate Schedule 2
Schedule 3 Title	Rate Schedule 3

Zone Data (for multi-model buildings):

Zone Name	Zone Name (e.g. Whole Facility, RTU-1, or West Wing)
Zone Description	Zone Description (e.g. Models the entire facility as one zone, or Models Zone for RTU-1)

Savings Tracker (Use if Modeling Multiple Efficiency Measures):

Measure Description		Electric Demand (kW)	Electricity (kWh)	Natural Gas (Therm)	N/A	EUI (kBTU/SqFt/Yr)
Baseline Building Performance		1,941	909,382	15,171	0	100.12
WSHP Replacement	Savings ►	*78*	*10,394*	*0*	*0*	*0.77*
	Usage ►	1,864	898,988	15,171	0	99.35
	Savings ►					*99.35*
	Usage ►					0.00
	Savings ►					*0.00*
	Usage ►					0.00
	Savings ►					*0.00*
	Usage ►					0.00
	Savings ►					*0.00*
	Usage ►					0.00
	Savings ►					*0.00*
	Usage ►					0.00
	Savings ►					*0.00*
	Usage ►					0.00
	Savings ►					*0.00*
	Usage ►					0.00
	Savings ►					*0.00*
	Usage ►					0.00
	Savings ►					*0.00*
	Usage ►					0.00

Notes:

McK8760 - HVAC Schedules

WSHP Replacement

Baseline HVAC Equipment Daily Schedules

0 = Fan Off 1 = Fan On

Schedule A - Load Schedule A								
Hour		Sun	Mon	Tue	Wed	Thu	Fri	Sat
From	To	1	2	3	4	5	6	7
0	1	1	1	1	1	1	1	1
1	2	1	1	1	1	1	1	1
2	3	1	1	1	1	1	1	1
3	4	1	1	1	1	1	1	1
4	5	1	1	1	1	1	1	1
5	6	1	1	1	1	1	1	1
6	7	1	1	1	1	1	1	1
7	8	1	1	1	1	1	1	1
8	9	1	1	1	1	1	1	1
9	10	1	1	1	1	1	1	1
10	11	1	1	1	1	1	1	1
11	12	1	1	1	1	1	1	1
12	13	1	1	1	1	1	1	1
13	14	1	1	1	1	1	1	1
14	15	1	1	1	1	1	1	1
15	16	1	1	1	1	1	1	1
16	17	1	1	1	1	1	1	1
17	18	1	1	1	1	1	1	1
18	19	1	1	1	1	1	1	1
19	20	1	1	1	1	1	1	1
20	21	1	1	1	1	1	1	1
21	22	1	1	1	1	1	1	1
22	23	1	1	1	1	1	1	1
23	24	1	1	1	1	1	1	1
Daily Totals		24	24	24	24	24	24	24

Schedule B - Load Schedule B								
Hour		Sun	Mon	Tue	Wed	Thu	Fri	Sat
From	To	1	2	3	4	5	6	7
0	1	1	1	1	1	1	1	1
1	2	1	1	1	1	1	1	1
2	3	1	1	1	1	1	1	1
3	4	1	1	1	1	1	1	1
4	5	1	1	1	1	1	1	1
5	6	1	1	1	1	1	1	1
6	7	1	1	1	1	1	1	1
7	8	1	1	1	1	1	1	1
8	9	1	1	1	1	1	1	1
9	10	1	1	1	1	1	1	1
10	11	1	1	1	1	1	1	1
11	12	1	1	1	1	1	1	1
12	13	1	1	1	1	1	1	1
13	14	1	1	1	1	1	1	1
14	15	1	1	1	1	1	1	1
15	16	1	1	1	1	1	1	1
16	17	1	1	1	1	1	1	1
17	18	1	1	1	1	1	1	1
18	19	1	1	1	1	1	1	1
19	20	1	1	1	1	1	1	1
20	21	1	1	1	1	1	1	1
21	22	1	1	1	1	1	1	1
22	23	1	1	1	1	1	1	1
23	24	1	1	1	1	1	1	1
Daily Totals		24	24	24	24	24	24	24

Schedule C - Load Schedule C								
Hour		Sun	Mon	Tue	Wed	Thu	Fri	Sat
From	To	1	2	3	4	5	6	7
0	1	1	1	1	1	1	1	1
1	2	1	1	1	1	1	1	1
2	3	1	1	1	1	1	1	1
3	4	1	1	1	1	1	1	1
4	5	1	1	1	1	1	1	1
5	6	1	1	1	1	1	1	1
6	7	1	1	1	1	1	1	1
7	8	1	1	1	1	1	1	1
8	9	1	1	1	1	1	1	1
9	10	1	1	1	1	1	1	1
10	11	1	1	1	1	1	1	1
11	12	1	1	1	1	1	1	1
12	13	1	1	1	1	1	1	1
13	14	1	1	1	1	1	1	1
14	15	1	1	1	1	1	1	1
15	16	1	1	1	1	1	1	1
16	17	1	1	1	1	1	1	1
17	18	1	1	1	1	1	1	1
18	19	1	1	1	1	1	1	1
19	20	1	1	1	1	1	1	1
20	21	1	1	1	1	1	1	1
21	22	1	1	1	1	1	1	1
22	23	1	1	1	1	1	1	1
23	24	1	1	1	1	1	1	1
Daily Totals		24	24	24	24	24	24	24

Proposed HVAC Equipment Daily Schedules

0 = Unoccupied Mode 1 = Occupied Mode

Schedule A - Load Schedule A								
Hour		Sun	Mon	Tue	Wed	Thu	Fri	Sat
From	To	1	2	3	4	5	6	7
0	1	1	1	1	1	1	1	1
1	2	1	1	1	1	1	1	1
2	3	1	1	1	1	1	1	1
3	4	1	1	1	1	1	1	1
4	5	1	1	1	1	1	1	1
5	6	1	1	1	1	1	1	1
6	7	1	1	1	1	1	1	1
7	8	1	1	1	1	1	1	1
8	9	1	1	1	1	1	1	1
9	10	1	1	1	1	1	1	1
10	11	1	1	1	1	1	1	1
11	12	1	1	1	1	1	1	1
12	13	1	1	1	1	1	1	1
13	14	1	1	1	1	1	1	1
14	15	1	1	1	1	1	1	1
15	16	1	1	1	1	1	1	1
16	17	1	1	1	1	1	1	1
17	18	1	1	1	1	1	1	1
18	19	1	1	1	1	1	1	1
19	20	1	1	1	1	1	1	1
20	21	1	1	1	1	1	1	1
21	22	1	1	1	1	1	1	1
22	23	1	1	1	1	1	1	1
23	24	1	1	1	1	1	1	1
Daily Totals		24	24	24	24	24	24	24

Schedule B - Load Schedule B								
Hour		Sun	Mon	Tue	Wed	Thu	Fri	Sat
From	To	1	2	3	4	5	6	7
0	1	1	1	1	1	1	1	1
1	2	1	1	1	1	1	1	1
2	3	1	1	1	1	1	1	1
3	4	1	1	1	1	1	1	1
4	5	1	1	1	1	1	1	1
5	6	1	1	1	1	1	1	1
6	7	1	1	1	1	1	1	1
7	8	1	1	1	1	1	1	1
8	9	1	1	1	1	1	1	1
9	10	1	1	1	1	1	1	1
10	11	1	1	1	1	1	1	1
11	12	1	1	1	1	1	1	1
12	13	1	1	1	1	1	1	1
13	14	1	1	1	1	1	1	1
14	15	1	1	1	1	1	1	1
15	16	1	1	1	1	1	1	1
16	17	1	1	1	1	1	1	1
17	18	1	1	1	1	1	1	1
18	19	1	1	1	1	1	1	1
19	20	1	1	1	1	1	1	1
20	21	1	1	1	1	1	1	1
21	22	1	1	1	1	1	1	1
22	23	1	1	1	1	1	1	1
23	24	1	1	1	1	1	1	1
Daily Totals		24	24	24	24	24	24	24

Schedule C - Load Schedule C								
Hour		Sun	Mon	Tue	Wed	Thu	Fri	Sat
From	To	1	2	3	4	5	6	7
0	1	1	1	1	1	1	1	1
1	2	1	1	1	1	1	1	1
2	3	1	1	1	1	1	1	1
3	4	1	1	1	1	1	1	1
4	5	1	1	1	1	1	1	1
5	6	1	1	1	1	1	1	1
6	7	1	1	1	1	1	1	1
7	8	1	1	1	1	1	1	1
8	9	1	1	1	1	1	1	1
9	10	1	1	1	1	1	1	1
10	11	1	1	1	1	1	1	1
11	12	1	1	1	1	1	1	1
12	13	1	1	1	1	1	1	1
13	14	1	1	1	1	1	1	1
14	15	1	1	1	1	1	1	1
15	16	1	1	1	1	1	1	1
16	17	1	1	1	1	1	1	1
17	18	1	1	1	1	1	1	1
18	19	1	1	1	1	1	1	1
19	20	1	1	1	1	1	1	1
20	21	1	1	1	1	1	1	1
21	22	1	1	1	1	1	1	1
22	23	1	1	1	1	1	1	1
23	24	1	1	1	1	1	1	1
Daily Totals		24	24	24	24	24	24	24

McK8760 - Occupancy Schedules

WSHP Replacement

Baseline Occupancy Load Profiles (Percent of Peak Occupancy)

Schedule A - Load Schedule A								
Hour		Sun	Mon	Tue	Wed	Thu	Fri	Sat
From	To	1	2	3	4	5	6	7
0	1	40%	40%	40%	40%	40%	40%	40%
1	2	40%	40%	40%	40%	40%	40%	40%
2	3	40%	40%	40%	40%	40%	40%	40%
3	4	40%	40%	40%	40%	40%	40%	40%
4	5	40%	40%	40%	40%	40%	40%	40%
5	6	40%	40%	40%	40%	40%	40%	40%
6	7	40%	40%	40%	40%	40%	40%	40%
7	8	40%	80%	80%	80%	80%	80%	40%
8	9	40%	80%	80%	80%	80%	80%	40%
9	10	40%	80%	80%	80%	80%	80%	40%
10	11	40%	80%	80%	80%	80%	80%	40%
11	12	40%	80%	80%	80%	80%	80%	40%
12	13	40%	80%	80%	80%	80%	80%	40%
13	14	40%	80%	80%	80%	80%	80%	40%
14	15	40%	80%	80%	80%	80%	80%	40%
15	16	40%	80%	80%	80%	80%	80%	40%
16	17	40%	80%	80%	80%	80%	80%	40%
17	18	40%	80%	80%	80%	80%	80%	40%
18	19	40%	40%	40%	40%	40%	40%	40%
19	20	40%	40%	40%	40%	40%	40%	40%
20	21	40%	40%	40%	40%	40%	40%	40%
21	22	40%	40%	40%	40%	40%	40%	40%
22	23	40%	40%	40%	40%	40%	40%	40%
23	24	40%	40%	40%	40%	40%	40%	40%
		0.3	0.3	0.3	0.3	0.3	0.3	0.3

0%

Schedule B - Load Schedule B								
Hour		Sun	Mon	Tue	Wed	Thu	Fri	Sat
From	To	1	2	3	4	5	6	7
0	1	40%	40%	40%	40%	40%	40%	40%
1	2	40%	40%	40%	40%	40%	40%	40%
2	3	40%	40%	40%	40%	40%	40%	40%
3	4	40%	40%	40%	40%	40%	40%	40%
4	5	40%	40%	40%	40%	40%	40%	40%
5	6	40%	40%	40%	40%	40%	40%	40%
6	7	40%	40%	40%	40%	40%	40%	40%
7	8	40%	80%	80%	80%	80%	80%	40%
8	9	40%	80%	80%	80%	80%	80%	40%
9	10	40%	80%	80%	80%	80%	80%	40%
10	11	40%	80%	80%	80%	80%	80%	40%
11	12	40%	80%	80%	80%	80%	80%	40%
12	13	40%	80%	80%	80%	80%	80%	40%
13	14	40%	80%	80%	80%	80%	80%	40%
14	15	40%	80%	80%	80%	80%	80%	40%
15	16	40%	80%	80%	80%	80%	80%	40%
16	17	40%	80%	80%	80%	80%	80%	40%
17	18	40%	80%	80%	80%	80%	80%	40%
18	19	40%	40%	40%	40%	40%	40%	40%
19	20	40%	40%	40%	40%	40%	40%	40%
20	21	40%	40%	40%	40%	40%	40%	40%
21	22	40%	40%	40%	40%	40%	40%	40%
22	23	40%	40%	40%	40%	40%	40%	40%
23	24	40%	40%	40%	40%	40%	40%	40%

Schedule C - Load Schedule C								
Hour		Sun	Mon	Tue	Wed	Thu	Fri	Sat
From	To	1	2	3	4	5	6	7
0	1	40%	40%	40%	40%	40%	40%	40%
1	2	40%	40%	40%	40%	40%	40%	40%
2	3	40%	40%	40%	40%	40%	40%	40%
3	4	40%	40%	40%	40%	40%	40%	40%
4	5	40%	40%	40%	40%	40%	40%	40%
5	6	40%	40%	40%	40%	40%	40%	40%
6	7	40%	40%	40%	40%	40%	40%	40%
7	8	40%	80%	80%	80%	80%	80%	40%
8	9	40%	80%	80%	80%	80%	80%	40%
9	10	40%	80%	80%	80%	80%	80%	40%
10	11	40%	80%	80%	80%	80%	80%	40%
11	12	40%	80%	80%	80%	80%	80%	40%
12	13	40%	80%	80%	80%	80%	80%	40%
13	14	40%	80%	80%	80%	80%	80%	40%
14	15	40%	80%	80%	80%	80%	80%	40%
15	16	40%	80%	80%	80%	80%	80%	40%
16	17	40%	80%	80%	80%	80%	80%	40%
17	18	40%	80%	80%	80%	80%	80%	40%
18	19	40%	40%	40%	40%	40%	40%	40%
19	20	40%	40%	40%	40%	40%	40%	40%
20	21	40%	40%	40%	40%	40%	40%	40%
21	22	40%	40%	40%	40%	40%	40%	40%
22	23	40%	40%	40%	40%	40%	40%	40%
23	24	40%	40%	40%	40%	40%	40%	40%

Proposed Occupancy Load Profiles (Percent of Peak Occupancy)

Schedule A - Load Schedule A								
Hour		Sun	Mon	Tue	Wed	Thu	Fri	Sat
From	To	1	2	3	4	5	6	7
0	1	40%	40%	40%	40%	40%	40%	40%
1	2	40%	40%	40%	40%	40%	40%	40%
2	3	40%	40%	40%	40%	40%	40%	40%
3	4	40%	40%	40%	40%	40%	40%	40%
4	5	40%	40%	40%	40%	40%	40%	40%
5	6	40%	40%	40%	40%	40%	40%	40%
6	7	40%	40%	40%	40%	40%	40%	40%
7	8	40%	80%	80%	80%	80%	80%	40%
8	9	40%	80%	80%	80%	80%	80%	40%
9	10	40%	80%	80%	80%	80%	80%	40%
10	11	40%	80%	80%	80%	80%	80%	40%
11	12	40%	80%	80%	80%	80%	80%	40%
12	13	40%	80%	80%	80%	80%	80%	40%
13	14	40%	80%	80%	80%	80%	80%	40%
14	15	40%	80%	80%	80%	80%	80%	40%
15	16	40%	80%	80%	80%	80%	80%	40%
16	17	40%	80%	80%	80%	80%	80%	40%
17	18	40%	80%	80%	80%	80%	80%	40%
18	19	40%	40%	40%	40%	40%	40%	40%
19	20	40%	40%	40%	40%	40%	40%	40%
20	21	40%	40%	40%	40%	40%	40%	40%
21	22	40%	40%	40%	40%	40%	40%	40%
22	23	40%	40%	40%	40%	40%	40%	40%
23	24	40%	40%	40%	40%	40%	40%	40%

Schedule B - Load Schedule B								
Hour		Sun	Mon	Tue	Wed	Thu	Fri	Sat
From	To	1	2	3	4	5	6	7
0	1	40%	40%	40%	40%	40%	40%	40%
1	2	40%	40%	40%	40%	40%	40%	40%
2	3	40%	40%	40%	40%	40%	40%	40%
3	4	40%	40%	40%	40%	40%	40%	40%
4	5	40%	40%	40%	40%	40%	40%	40%
5	6	40%	40%	40%	40%	40%	40%	40%
6	7	40%	40%	40%	40%	40%	40%	40%
7	8	40%	80%	80%	80%	80%	80%	40%
8	9	40%	80%	80%	80%	80%	80%	40%
9	10	40%	80%	80%	80%	80%	80%	40%
10	11	40%	80%	80%	80%	80%	80%	40%
11	12	40%	80%	80%	80%	80%	80%	40%
12	13	40%	80%	80%	80%	80%	80%	40%
13	14	40%	80%	80%	80%	80%	80%	40%
14	15	40%	80%	80%	80%	80%	80%	40%
15	16	40%	80%	80%	80%	80%	80%	40%
16	17	40%	80%	80%	80%	80%	80%	40%
17	18	40%	80%	80%	80%	80%	80%	40%
18	19	40%	40%	40%	40%	40%	40%	40%
19	20	40%	40%	40%	40%	40%	40%	40%
20	21	40%	40%	40%	40%	40%	40%	40%
21	22	40%	40%	40%	40%	40%	40%	40%
22	23	40%	40%	40%	40%	40%	40%	40%
23	24	40%	40%	40%	40%	40%	40%	40%

Schedule C - Load Schedule C								
Hour		Sun	Mon	Tue	Wed	Thu	Fri	Sat
From	To	1	2	3	4	5	6	7
0	1	40%	40%	40%	40%	40%	40%	40%
1	2	40%	40%	40%	40%	40%	40%	40%
2	3	40%	40%	40%	40%	40%	40%	40%
3	4	40%	40%	40%	40%	40%	40%	40%
4	5	40%	40%	40%	40%	40%	40%	40%
5	6	40%	40%	40%	40%	40%	40%	40%
6	7	40%	40%	40%	40%	40%	40%	40%
7	8	40%	80%	80%	80%	80%	80%	40%
8	9	40%	80%	80%	80%	80%	80%	40%
9	10	40%	80%	80%	80%	80%	80%	40%
10	11	40%	80%	80%	80%	80%	80%	40%
11	12	40%	80%	80%	80%	80%	80%	40%
12	13	40%	80%	80%	80%	80%	80%	40%
13	14	40%	80%	80%	80%	80%	80%	40%
14	15	40%	80%	80%	80%	80%	80%	40%
15	16	40%	80%	80%	80%	80%	80%	40%
16	17	40%	80%	80%	80%	80%	80%	40%
17	18	40%	80%	80%	80%	80%	80%	40%
18	19	40%	40%	40%	40%	40%	40%	40%
19	20	40%	40%	40%	40%	40%	40%	40%
20	21	40%	40%	40%	40%	40%	40%	40%
21	22	40%	40%	40%	40%	40%	40%	40%
22	23	40%	40%	40%	40%	40%	40%	40%
23	24	40%	40%	40%	40%	40%	40%	40%

McK8760 - Inputs

WSHP Replacement

% of building in model 75%

Zone Inputs:

Tag	Variable Description		Units	Baseline	Proposed	Basis	FIM ID
I7	Floor Area		ft^2	46,142	46,142	drawings	
I8	Roof Area		ft^2	26,870	26,870	drawings	
I9	Opaque Wall Area		ft^2	12,188	12,188	drawings	
I10	Glazing Area	*Glazing*	ft^2	1,722	1,722	drawings	
I12	Roof U-Factor	*Roof*	$BTU/ft^2/°F$	0.060	0.060	2021 MCK Record Drawing Set-adjusted for tuning	
I13	Opaque Wall U-Factor	*Walls*	$BTU/ft^2/°F$	0.055	0.055	2021 MCK Record Drawing Set-	
I14	Glazing U-Factor	*Glazing*	$BTU/ft^2/°F$	0.800	0.800	2021 MCK Record Drawing Set	
I15	Glazing Solar Heat Gain Coefficient (SHGC)	*Glazing*	-	0.600	0.600	2021 MCK Record Drawing Set	
I16	Glazing Solar Gain Bldg Shape Factor		-	0.300	0.300	Used to tune cooling loads/summer electrical load shape	
I17	Average Space Height (Floor to Ceiling)		ft	11.00	11.00	estimate/drawings	
I18	Infiltration		ach	0.300	0.300	2021 MCK Record Drawing Set	
I19	Peak Number of Occupants		Qty	150	150	2021 MCK Record Drawing Set-record state occ. Of 615 employees, seemed high	x
I20	Sensible Heat Gain Per Person		Btu/h	245	245	Typical	
I21	Latent Heat Gain Per Person		Btu/h	155	155	Typical	
I22	Peak Lighting Load Power Density		W/ft^2	0.50	0.50	2021 MCK Record Drawing Set-adjusted for tuning-LEDs	
I23	Peak Plug Load Power Density		W/ft^2	1.00	1.00	2021 MCK Record Drawing Set-adjusted for tuning	
I24	Peak Exterior Lighting Load		kW	5.00	5.00	Estimated-confirm	x
I25	Peak Miscellaneous Load (Electrical)		Watt	13,736	13,736	Exhaust FAN power	
I26	Miscellaneous Load Located in Conditioned Space		Yes/No	Yes	Yes		
I27	HVAC On Cooling Space Temperature Set Point		°F	75.0	75.0	2021 MCK Record Drawing Set	
I28	HVAC Off Cooling Space Temperature Set Point		°F	75.0	75.0	2021 MCK Record Drawing Set	
I29	HVAC On Heating Space Temperature Set Point		°F	70.0	70.0	2021 MCK Record Drawing Set	
I30	HVAC Off Heating Space Temperature Set Point		°F	70.0	70.0	2021 MCK Record Drawing Set	

AHU & Plant Inputs:

Tag	Variable Description		Units	Baseline	Proposed	Basis	FIM ID
I34	AHU Fan Power based on Control Type		Type	CV	CV	estimate-verify	x
I35	Occupied Fan Operation		Type	Continuous	Continuous	Typical for Occupied Bldgs	
I36	Maximum AHU CFM		CFM	12,000	12,000	1989 As builts	
I37	Min AHU CFM (% of Max CFM) (If CV+Cycles: min occ % run time)		%	100.0%	100.0%	100% Outside Air	
I38	Maximum % Outside Air (Economizer % OSA)		%	100.0%	100.0%	100% Outside Air	
I39	Minimum % Outside Air (Occupied)		%	100.00%	100.00%	Used to tune heating loads	
I40	Minimum % Outside Air (Unoccupied)		%	100.0%	100.0%	100% outside air, baseline no setbacks,	
I41	Economizer High Limit Set Point		°F	65.0	65.0	Typical value	
I42	Economizer Low Limit Set Point		°F	55.0	55.0	Typical value	
I43	Demand Controlled Ventilation (For Outside Air Control)		Yes/No	No	No		
I44	DCV Airflow Per Person (Based on Space Type)	*DCV Tab*	CFM/Per	~~10.00~~	~~10.00~~		
I45	DCV Airflow Per Area (Based on Space Type)	*DCV Tab*	CFM/ft^2	~~0.12~~	~~0.12~~		
I46	AHU Fan TSP (At Max CFM)		in w.c.	4.500	4.500	1989 As builts-used for tuning	
I47	Fan Efficiency		%	55.0%	55.0%	Estimated	
I48	Occupied Supply Air Temperature @ OAT ---------->	70.0	°F	Single Zone	Single Zone		
I49	Occupied Supply Air Temperature @ OAT ---------->	60.0	°F	~~60~~	~~60~~		
I50	Unoccupied Heating Supply Air Temperature Setpoint		°F	85	85	Typical	
I51	Unoccupied Cooling Supply Air Temperature Setpoint		°F	55	55	Typical	
I52	AHU Cooling Efficiency (IEER)		BTU/Watt	10.6	12.49	Drawings-HP list, proposed replacement of 14 wshp-new average of efficiency for heat pumps	
I53	Evaporative Cooling Effectiveness (Air side)		%	0.0%	0.0%		
I54	AHU Cooling Lockout Below		°F	60.0	60.0	Typical	
I55	AHU Heating Efficiency or COP @ OAT ---------->	47.0	COP	3.9800	4.1700	WSHP fed by NG boiler,Proposed replacement of 14 wshp-calculated	
I56	AHU Heating Efficiency or COP @ OAT ---------->	25.0	COP	3.2000	3.4500	WSHP fed by NG boiler,Proposed replacement of 14 wshp-estimated	
I57	AHU Heating Efficiency or COP < OAT ---------->	10.0	COP	2.9000	3.1500	WSHP fed by NG boiler,Proposed replacement of 14 wshp-estimated	
I58	AHU Heating Energy Source		Type	Electric Energy	Electric Energy	WSHP fed by NG boilers	
I59	AHU Heating Lockout Above		°F	75.0	75.0	Estimated as Occ Htg SP + 1F	
I60	Evaporative Pre-Cooling on Condenser		Yes/No	No	No		
I61	Heat Recovery % Effectiveness		%	0.00%	0.00%	no HR	
I62	Onsite Central Plant?		Yes/No	Yes	Yes		

Terminal Devices Inputs (Reheat Coils, VAV Boxes, Baseboard Heaters, etc)

Tag	Variable Description		Units	Baseline	Proposed	Basis	FIM ID
I66	Terminal Devices		Yes/No	No	No		
I67	Zone Heating Lockout Above		°F	~~75.0~~	~~75.0~~		
I68	Zone Heating Efficiency or COP @ OAT ---------->	47.0	COP	~~4.1000~~	~~4.1000~~	drawings values	
I69	Zone Heating Efficiency or COP @ OAT ---------->	25.0	COP	~~4.0000~~	~~4.0000~~	estimated for cooler weather	
I70	Zone Heating Efficiency or COP < OAT ---------->	10.0	COP	~~3.5000~~	~~3.5000~~	estimated for cooler weather	
I71	Heating Energy Source Zone		Type	~~Electric Energy~~	~~Electric Energy~~		
I72	Unoccupied Heating Done By		Zone, AHU	~~Zone Coil~~	~~Zone Coil~~		
I73	SFPMB Terminal Unit Power		W/CFM	~~0.30~~	~~0.30~~	Rough estimate based on drawings	x

Chilled Water and Heating Plants Inputs:

Tag	Variable Description	Units	Baseline	Proposed	Basis	FIM ID
			Chilled Water Pumps			
I78	Chiller Source	Type	No Chiller	No Chiller	Chiller plant excluded in template. Change to "Air Cooled" or "Water Cooled" and increase Tonnage from zero to add chiller plant. Increase GPM and ft wg from zero to add Chilled Water Pumps (CHWPs).	
I79	Chiller Type	Type	~~Centrifugal~~	~~Centrifugal~~		
I80	Chiller Nominal Tonnage	Tonnage	~~0~~	~~0.0~~		
I81	Chilled Water Flow Rate	GPM	~~0~~	~~0~~		
I82	Chilled Water System Design Pressure Drop	ft wg	~~0~~	~~0~~		
I83	Chilled Water Pumping CV or VFD	Type	~~VFD~~	~~VFD~~		
I84	Chilled Water Pump Enable Method	Type	~~Demand~~	~~Demand~~		
I85	Minimum Chilled Water GPM (% of Max Flow Rate)	%	~~33.0%~~	~~33.0%~~		
I86	Chilled Water Pump Efficiency (Motor and Pump)	%	~~60.0%~~	~~60.0%~~		
I87	Chilled Water Supply Temperature	°F	~~45~~	~~45~~		
I88	Chilled Water Temperature Control Strategy	Type	~~Fixed~~	~~Fixed~~		
I89	Chilled Water System Delta T (CHWRT - CHWST)	°F	~~15~~	~~15~~		
			Condenser Water Plant: Proposed Design Does Not Have a Cooling Tower			
I91	Condenser Water Flow Rate	GPM	~~0~~	~~0~~	Condenser plant excluded in template. Increase GPM and ft wg from zero to add condenser pumps (CWPs).	
I92	Condenser Water System Design Pressure Drop	ft wg	~~0~~	~~0~~		
I93	Condenser Water Pumping CV or VFD	Type	~~VFD~~	~~VFD~~		
I94	Condenser Water Pump Enable Method	Type	~~Demand~~	~~Demand~~		
I95	Minimum Condenser Water Flow Rate (% of Max Flow Rate)	%	~~33.0%~~	~~33.0%~~		
I96	Condenser Water Pump Efficiency (Motor and Pump)	%	~~60.0%~~	~~60.0%~~	Estimated	
I97	Condenser Water System Delta T(CWRT-CWST)	°F	~~20~~	~~20~~		
I98	Cooling Tower Design CWST	°F	~~85~~	~~85~~	1989 as builts	
I99	Cooling Tower Design Wet Bulb	°F	~~67~~	~~67~~	1989 as builts	
I100	Cooling Tower Design Fan Brake HP	bhp	~~25.0~~	~~25.0~~	Cooling towers excluded in template. Increase fan BHP from zero to add cooling towers.	
I101	Cooling Tower Fan Design Flow Rate	CFM	~~37000~~	~~37000~~	Cooling towers excluded in template. Increase CFM from zero to add cooling towers.- 1989 as builts	
I102	Cooling Tower Fan Control	Type	~~CV~~	~~CV~~	1989 as builts	
I103	Cooling Tower CWST Control Strategy	Type	~~Fixed CWST~~	~~Fixed CWST~~	1989 as builts	
I104	Cooling Tower Min CWST Temp	°F	~~85~~	~~85~~	1989 as builts	
I105	Minimum Cooling Tower Fan Speed	%	~~100.0%~~	~~100.0%~~	1989 as builts	
I106	Water Side Economizer	Yes/No	~~No~~	~~No~~	no economizer	
I107	Water Side Economizer HX Temp Approach	°F	~~5~~	~~5~~	NA	
			Heating Water Plant			
I109	Heating Water Flow Rate	GPM	0	0	HW pumps excluded in template. Increase GPM and ft wg from zero to add HW Pumps-boiler specs	
I110	Heating Water System Design Pressure Drop	ft wg	0	0		
I111	Heating Water Pumping CV or VFD	Type	CV	CV		
I112	Heating Water Pump Enable Method	Type	Demand	Demand		
I113	Minimum Heating Water Flow Rate (% of Max Flow Rate)	%	100.0%	100.0%		
I114	Heating Water Pump Efficiency (Motor and Pump)	%	60.0%	60.0%	Estimated	
I115	Heating Water System Delta T (HWST - HWRT)	°F	20.0	20.0		
			Heat Pump Loop Pump: This Module Not Used			
I118	Water Source Heat Pump Boiler	Yes/No	Yes	Yes	Heat pump loop excluded in template. Increase GPM and ft wg from zero to add heat pump loop.- WSHP fed by NG boilers	
I119	Heat Pump Boiler Efficiency	COP	90%	90%	condensing boilers, est eff. Of 91%	
I120	Heat Pump Loop Water Flow Rate	GPM	412.5	412.5	pump specs	
I121	Heat Pump Loop Water System Design Pressure Drop	ft wg	82.5	82.5	pump specs	
I122	Heat Pump Loop Water Pumping CV or VFD	Type	CV	CV	pump specs	
I123	Heat Pump Loop Water Pump Enable Method	Type	Continuous	Continuous		
I124	Minimum Heat Pump Loop Water Flow Rate (% of Max Flow Rate)	%	100.0%	100.0%		
I125	Heat Pump Loop Water Pump Efficiency (Motor and Pump)	%	55.0%	55.0%	Estimated	
I126	Heat Pump Loop Water System Delta T (HWST - HWRT)	°F	25.0	25.0	typical	

Domestic Hot Water Inputs:

Tag	Variable Description	Units	Baseline	Proposed	Basis	FIM ID
I131	DHW Fuel Type	Type	Natural Gas	Natural Gas	1989 Drawings	
I132	Energy Factor	-	0.70	0.70	NG fired DHW	
I133	Working Days Per Year (Used Only For DHW Calc)	Qty	365	365	Schedule A & Schedule B (ADJUST AS NEEDED)	
I134	Average Daily Hot Water Consumption Per Person	Gallons	2.0	2.0	estimate various usages	
I135	Average Entering Cold Water Temperature	°F	50.0	50.0	Typical	
I136	Supply Hot Water Temperature	°F	120.0	120.0	Typical	

Electric Demand

Tag	Description	Units	Baseline	EUI	Proposed	EUI	Savings	Savings (%)	EUI
O7	Cooling Peak kW	kW	87	-	73	-	13	15.1%	-
O8	AHU Heating Peak kW	kW	66	-	61	-	5	7.3%	-
O9	Zone Heating Peak kW	kW	0	-	0	-	0	0.0%	-
O10	Fan Peak kW	kW	12	-	12	-	0	0.0%	-
O11	Interior Lighting Peak kW	kW	18	-	18	-	0	0.0%	-
O12	Exterior Lighting Peak kW	kW	5	-	5	-	0	0.0%	-
O13	Plug Load Peak kW	kW	44	-	44	-	0	0.0%	-
O14	Pumps Peak kW	kW	12	-	12	-	0	0.0%	-
O15	Heat Rejection kW	kW	19	-	19	-	0	0.0%	-
O16	Miscellaneous Load Peak kW	kW	14		14	-	0	0.0%	-
O17	Other Peak kW	kW	0	-	0	-	0	0.0%	-
O18	Peak kW	kW	204	-	191	-	13	6.4%	-
O19	Peak kW (Sum 12 Monthly Peaks)	kW	1,941	-	1,864	-	78	4.0%	-

Electric Energy

Tag	Description	Units	Baseline	EUI	Proposed	EUI	Savings	Savings (%)	EUI
O23	Cooling	kWh/Yr	32,852	2.43	27,881	2.06	4,971	15.1%	0.37
O24	AHU Heating	kWh/Yr	102,717	7.60	97,368	7.20	5,348	5.2%	0.40
O25	Zone Heating	kWh/Yr	0	0.00	0	0.00	0	0.0%	0.00
O26	AHU Fans	kWh/Yr	101,137	7.48	101,137	7.48	0	0.0%	0.00
O27	Zone Fans	kWh/Yr	0	0.00	0	0.00	0	0.0%	0.00
O28	Interior Lighting	kWh/Yr	161,682	11.96	161,682	11.96	0	0.0%	0.00
O29	Exterior Lighting	kWh/Yr	21,900	1.62	21,900	1.62	0	0.0%	0.00
O30	Plug Loads	kWh/Yr	261,488	19.34	261,488	19.34	0	0.0%	0.00
O31	Pumps	kWh/Yr	102,212	7.56	102,212	7.56	0	0.0%	0.00
O32	Heat Rejection	kWh/Yr	5,067	0.37	4,992	0.37	75	1.5%	0.01
O33	Miscellaneous Loads	kWh/Yr	120,327	8.90	120,327	8.90	0	0.0%	0.00
O34	Domestic Hot Water	kWh/Yr	0	0.00	0	0.00	0	0.0%	0.00
O35	Other Electricity	kWh/Yr	0	0.00	0	0.00	0	0.0%	0.00
O36	Total	kWh/Yr	909,382	67.24	898,988	66.48	10,394	1.1%	0.77

Natural Gas

Tag	Description	Units	Baseline	EUI	Proposed	EUI	Savings	Savings (%)	EUI
O40	AHU Heating	Therm/Yr	14,689	31.83	14,689	31.83	0	0.0%	0.00
O41	Zone Heating	Therm/Yr	0	0.00	0	0.00	0	0.0%	0.00
O42	Domestic Hot Water	Therm/Yr	482	1.05	482	1.05	0	0.0%	0.00
O43	Other Natural Gas	Therm/Yr	0	0.00	0	0.00	0	0.0%	0.00
O44	Total	Therm/Yr	15,171	32.88	15,171	32.88	0	0.0%	0.00

O

Tag	Description	Units	Baseline	EUI	Proposed	EUI	Savings	Savings (%)	EUI
O48	AHU Heating	/Yr	0	0.00	0	0.00	0	0.0%	0.00
O49	Zone Heating	/Yr	0	0.00	0	0.00	0	0.0%	0.00
O50	Domestic Hot Water	/Yr	0	0.00	0	0.00	0	0.0%	0.00
O51	Other 0	/Yr	0	0.00	0	0.00	0	0.0%	0.00
O52	Total	/Yr	0	0.00	0	0.00	0	0.0%	0.00

Total Energy

Tag	Description	Units	Baseline	EUI	Proposed	EUI	Savings	Savings (%)	EUI
O56	Total Energy	kBtu/Yr	4,619,907	100.12	4,584,441	99.35	35,465	0.8%	0.77

McK8760 - General Information

WSHP Replacement

Project Information:

Project Name	Redmond PSB Phase 3	FIM Name	WSHP Replacement
TCO Project ID		Tech Contact	Sarah stevens
TCO Tool FIM ID	53394	Date	2/25/2025

Weather Data:

Nearest Weather Station	WA SEATTLE SEATTLE-TACOMA INTL A	Station ID	727930TY.xls

Description of FIM From TCO Tool:

Replace (13), and add (1) new WSHP similar to the scope performed in Ph1 and Ph2. Relocate some WSHPs to improve access and zoning. Relocate and provide piping, ductwork, and controls for (1) existing WSHP that was previously replaced by the owner. Provide necessary duct modifications. The new WSHPs will include new hose kits and 2-position control valves for the condenser water

HVAC & Load Schedules:

Schedule A Title	Load Schedule A	ASHRAE Schedule Type	Office
Schedule B Title	Load Schedule B	ASHRAE Schedule Type	Office
Schedule C Title	Load Schedule C	ASHRAE Schedule Type	Office

Fuel Types:

	Fuel	Unit	kbtu/unit	lbs CO2e/unit	$$$/unit
Electric Demand	Electric Demand	kW	N/A	N/A	
Electric Energy	Electric Energy	kWh	3.412	0.6434	
Fuel 2	Natural Gas	Therm	100	11.7	
Fuel 3					

Utility Rate Schedules:

Schedule 1 Title	Rate Schedule 1
Schedule 2 Title	Rate Schedule 2
Schedule 3 Title	Rate Schedule 3

Zone Data (for multi-model buildings):

Zone Name	Zone Name (e.g. Whole Facility, RTU-1, or West Wing)
Zone Description	Zone Description (e.g. Models the entire facility as one zone, or Models Zone for RTU-1)

Savings Tracker (Use if Modeling Multiple Efficiency Measures):

Measure Description		Electric Demand (kW)	Electricity (kWh)	Natural Gas (Therm)	N/A	EUI (kBTU/SqFt/Yr)
Baseline Building Performance		887	374,069	3,171	0	103.60
WSHP Replacement	Savings ►	*33*	*4,141*	*0*	*0*	*0.92*
	Usage ►	854	369,928	3,171	0	102.68
	Savings ►					*102.68*
	Usage ►					0.00
	Savings ►					*0.00*
	Usage ►					0.00
	Savings ►					*0.00*
	Usage ►					0.00
	Savings ►					*0.00*
	Usage ►					0.00
	Savings ►					*0.00*
	Usage ►					0.00
	Savings ►					*0.00*
	Usage ►					0.00
	Savings ►					*0.00*
	Usage ►					0.00
	Savings ►					*0.00*
	Usage ►					0.00
	Savings ►					*0.00*
	Usage ►					0.00

Notes:

McK8760 - HVAC Schedules

WSHP Replacement

Baseline HVAC Equipment Daily Schedules

0 = Fan Off 1 = Fan On

Schedule A - Load Schedule A								
Hour		Sun	Mon	Tue	Wed	Thu	Fri	Sat
From	To	1	2	3	4	5	6	7
0	1	1	1	1	1	1	1	1
1	2	1	1	1	1	1	1	1
2	3	1	1	1	1	1	1	1
3	4	1	1	1	1	1	1	1
4	5	1	1	1	1	1	1	1
5	6	1	1	1	1	1	1	1
6	7	1	1	1	1	1	1	1
7	8	1	1	1	1	1	1	1
8	9	1	1	1	1	1	1	1
9	10	1	1	1	1	1	1	1
10	11	1	1	1	1	1	1	1
11	12	1	1	1	1	1	1	1
12	13	1	1	1	1	1	1	1
13	14	1	1	1	1	1	1	1
14	15	1	1	1	1	1	1	1
15	16	1	1	1	1	1	1	1
16	17	1	1	1	1	1	1	1
17	18	1	1	1	1	1	1	1
18	19	1	1	1	1	1	1	1
19	20	1	1	1	1	1	1	1
20	21	1	1	1	1	1	1	1
21	22	1	1	1	1	1	1	1
22	23	1	1	1	1	1	1	1
23	24	1	1	1	1	1	1	1
Daily Totals		24	24	24	24	24	24	24

Schedule B - Load Schedule B								
Hour		Sun	Mon	Tue	Wed	Thu	Fri	Sat
From	To	1	2	3	4	5	6	7
0	1	1	1	1	1	1	1	1
1	2	1	1	1	1	1	1	1
2	3	1	1	1	1	1	1	1
3	4	1	1	1	1	1	1	1
4	5	1	1	1	1	1	1	1
5	6	1	1	1	1	1	1	1
6	7	1	1	1	1	1	1	1
7	8	1	1	1	1	1	1	1
8	9	1	1	1	1	1	1	1
9	10	1	1	1	1	1	1	1
10	11	1	1	1	1	1	1	1
11	12	1	1	1	1	1	1	1
12	13	1	1	1	1	1	1	1
13	14	1	1	1	1	1	1	1
14	15	1	1	1	1	1	1	1
15	16	1	1	1	1	1	1	1
16	17	1	1	1	1	1	1	1
17	18	1	1	1	1	1	1	1
18	19	1	1	1	1	1	1	1
19	20	1	1	1	1	1	1	1
20	21	1	1	1	1	1	1	1
21	22	1	1	1	1	1	1	1
22	23	1	1	1	1	1	1	1
23	24	1	1	1	1	1	1	1
Daily Totals		24	24	24	24	24	24	24

Schedule C - Load Schedule C								
Hour		Sun	Mon	Tue	Wed	Thu	Fri	Sat
From	To	1	2	3	4	5	6	7
0	1	1	1	1	1	1	1	1
1	2	1	1	1	1	1	1	1
2	3	1	1	1	1	1	1	1
3	4	1	1	1	1	1	1	1
4	5	1	1	1	1	1	1	1
5	6	1	1	1	1	1	1	1
6	7	1	1	1	1	1	1	1
7	8	1	1	1	1	1	1	1
8	9	1	1	1	1	1	1	1
9	10	1	1	1	1	1	1	1
10	11	1	1	1	1	1	1	1
11	12	1	1	1	1	1	1	1
12	13	1	1	1	1	1	1	1
13	14	1	1	1	1	1	1	1
14	15	1	1	1	1	1	1	1
15	16	1	1	1	1	1	1	1
16	17	1	1	1	1	1	1	1
17	18	1	1	1	1	1	1	1
18	19	1	1	1	1	1	1	1
19	20	1	1	1	1	1	1	1
20	21	1	1	1	1	1	1	1
21	22	1	1	1	1	1	1	1
22	23	1	1	1	1	1	1	1
23	24	1	1	1	1	1	1	1
Daily Totals		24	24	24	24	24	24	24

Proposed HVAC Equipment Daily Schedules

0 = Unoccupied Mode 1 = Occupied Mode

Schedule A - Load Schedule A								
Hour		Sun	Mon	Tue	Wed	Thu	Fri	Sat
From	To	1	2	3	4	5	6	7
0	1	1	1	1	1	1	1	1
1	2	1	1	1	1	1	1	1
2	3	1	1	1	1	1	1	1
3	4	1	1	1	1	1	1	1
4	5	1	1	1	1	1	1	1
5	6	1	1	1	1	1	1	1
6	7	1	1	1	1	1	1	1
7	8	1	1	1	1	1	1	1
8	9	1	1	1	1	1	1	1
9	10	1	1	1	1	1	1	1
10	11	1	1	1	1	1	1	1
11	12	1	1	1	1	1	1	1
12	13	1	1	1	1	1	1	1
13	14	1	1	1	1	1	1	1
14	15	1	1	1	1	1	1	1
15	16	1	1	1	1	1	1	1
16	17	1	1	1	1	1	1	1
17	18	1	1	1	1	1	1	1
18	19	1	1	1	1	1	1	1
19	20	1	1	1	1	1	1	1
20	21	1	1	1	1	1	1	1
21	22	1	1	1	1	1	1	1
22	23	1	1	1	1	1	1	1
23	24	1	1	1	1	1	1	1
Daily Totals		24	24	24	24	24	24	24

Schedule B - Load Schedule B								
Hour		Sun	Mon	Tue	Wed	Thu	Fri	Sat
From	To	1	2	3	4	5	6	7
0	1	1	1	1	1	1	1	1
1	2	1	1	1	1	1	1	1
2	3	1	1	1	1	1	1	1
3	4	1	1	1	1	1	1	1
4	5	1	1	1	1	1	1	1
5	6	1	1	1	1	1	1	1
6	7	1	1	1	1	1	1	1
7	8	1	1	1	1	1	1	1
8	9	1	1	1	1	1	1	1
9	10	1	1	1	1	1	1	1
10	11	1	1	1	1	1	1	1
11	12	1	1	1	1	1	1	1
12	13	1	1	1	1	1	1	1
13	14	1	1	1	1	1	1	1
14	15	1	1	1	1	1	1	1
15	16	1	1	1	1	1	1	1
16	17	1	1	1	1	1	1	1
17	18	1	1	1	1	1	1	1
18	19	1	1	1	1	1	1	1
19	20	1	1	1	1	1	1	1
20	21	1	1	1	1	1	1	1
21	22	1	1	1	1	1	1	1
22	23	1	1	1	1	1	1	1
23	24	1	1	1	1	1	1	1
Daily Totals		24	24	24	24	24	24	24

Schedule C - Load Schedule C								
Hour		Sun	Mon	Tue	Wed	Thu	Fri	Sat
From	To	1	2	3	4	5	6	7
0	1	1	1	1	1	1	1	1
1	2	1	1	1	1	1	1	1
2	3	1	1	1	1	1	1	1
3	4	1	1	1	1	1	1	1
4	5	1	1	1	1	1	1	1
5	6	1	1	1	1	1	1	1
6	7	1	1	1	1	1	1	1
7	8	1	1	1	1	1	1	1
8	9	1	1	1	1	1	1	1
9	10	1	1	1	1	1	1	1
10	11	1	1	1	1	1	1	1
11	12	1	1	1	1	1	1	1
12	13	1	1	1	1	1	1	1
13	14	1	1	1	1	1	1	1
14	15	1	1	1	1	1	1	1
15	16	1	1	1	1	1	1	1
16	17	1	1	1	1	1	1	1
17	18	1	1	1	1	1	1	1
18	19	1	1	1	1	1	1	1
19	20	1	1	1	1	1	1	1
20	21	1	1	1	1	1	1	1
21	22	1	1	1	1	1	1	1
22	23	1	1	1	1	1	1	1
23	24	1	1	1	1	1	1	1
Daily Totals		24	24	24	24	24	24	24

McK8760 - Occupancy Schedules

WSHP Replacement

Baseline Occupancy Load Profiles (Percent of Peak Occupancy)

Schedule A - Load Schedule A								
Hour		Sun	Mon	Tue	Wed	Thu	Fri	Sat
From	To	1	2	3	4	5	6	7
0	1	40%	40%	40%	40%	40%	40%	40%
1	2	40%	40%	40%	40%	40%	40%	40%
2	3	40%	40%	40%	40%	40%	40%	40%
3	4	40%	40%	40%	40%	40%	40%	40%
4	5	40%	40%	40%	40%	40%	40%	40%
5	6	40%	40%	40%	40%	40%	40%	40%
6	7	40%	40%	40%	40%	40%	40%	40%
7	8	40%	80%	80%	80%	80%	80%	40%
8	9	40%	80%	80%	80%	80%	80%	40%
9	10	40%	80%	80%	80%	80%	80%	40%
10	11	40%	80%	80%	80%	80%	80%	40%
11	12	40%	80%	80%	80%	80%	80%	40%
12	13	40%	80%	80%	80%	80%	80%	40%
13	14	40%	80%	80%	80%	80%	80%	40%
14	15	40%	80%	80%	80%	80%	80%	40%
15	16	40%	80%	80%	80%	80%	80%	40%
16	17	40%	80%	80%	80%	80%	80%	40%
17	18	40%	80%	80%	80%	80%	80%	40%
18	19	40%	40%	40%	40%	40%	40%	40%
19	20	40%	40%	40%	40%	40%	40%	40%
20	21	40%	40%	40%	40%	40%	40%	40%
21	22	40%	40%	40%	40%	40%	40%	40%
22	23	40%	40%	40%	40%	40%	40%	40%
23	24	40%	40%	40%	40%	40%	40%	40%
		0.3	0.3	0.3	0.3	0.3	0.3	0.3

0%

Schedule B - Load Schedule B								
Hour		Sun	Mon	Tue	Wed	Thu	Fri	Sat
From	To	1	2	3	4	5	6	7
0	1	40%	40%	40%	40%	40%	40%	40%
1	2	40%	40%	40%	40%	40%	40%	40%
2	3	40%	40%	40%	40%	40%	40%	40%
3	4	40%	40%	40%	40%	40%	40%	40%
4	5	40%	40%	40%	40%	40%	40%	40%
5	6	40%	40%	40%	40%	40%	40%	40%
6	7	40%	40%	40%	40%	40%	40%	40%
7	8	40%	80%	80%	80%	80%	80%	40%
8	9	40%	80%	80%	80%	80%	80%	40%
9	10	40%	80%	80%	80%	80%	80%	40%
10	11	40%	80%	80%	80%	80%	80%	40%
11	12	40%	80%	80%	80%	80%	80%	40%
12	13	40%	80%	80%	80%	80%	80%	40%
13	14	40%	80%	80%	80%	80%	80%	40%
14	15	40%	80%	80%	80%	80%	80%	40%
15	16	40%	80%	80%	80%	80%	80%	40%
16	17	40%	80%	80%	80%	80%	80%	40%
17	18	40%	80%	80%	80%	80%	80%	40%
18	19	40%	40%	40%	40%	40%	40%	40%
19	20	40%	40%	40%	40%	40%	40%	40%
20	21	40%	40%	40%	40%	40%	40%	40%
21	22	40%	40%	40%	40%	40%	40%	40%
22	23	40%	40%	40%	40%	40%	40%	40%
23	24	40%	40%	40%	40%	40%	40%	40%

Schedule C - Load Schedule C								
Hour		Sun	Mon	Tue	Wed	Thu	Fri	Sat
From	To	1	2	3	4	5	6	7
0	1	40%	40%	40%	40%	40%	40%	40%
1	2	40%	40%	40%	40%	40%	40%	40%
2	3	40%	40%	40%	40%	40%	40%	40%
3	4	40%	40%	40%	40%	40%	40%	40%
4	5	40%	40%	40%	40%	40%	40%	40%
5	6	40%	40%	40%	40%	40%	40%	40%
6	7	40%	40%	40%	40%	40%	40%	40%
7	8	40%	80%	80%	80%	80%	80%	40%
8	9	40%	80%	80%	80%	80%	80%	40%
9	10	40%	80%	80%	80%	80%	80%	40%
10	11	40%	80%	80%	80%	80%	80%	40%
11	12	40%	80%	80%	80%	80%	80%	40%
12	13	40%	80%	80%	80%	80%	80%	40%
13	14	40%	80%	80%	80%	80%	80%	40%
14	15	40%	80%	80%	80%	80%	80%	40%
15	16	40%	80%	80%	80%	80%	80%	40%
16	17	40%	80%	80%	80%	80%	80%	40%
17	18	40%	80%	80%	80%	80%	80%	40%
18	19	40%	40%	40%	40%	40%	40%	40%
19	20	40%	40%	40%	40%	40%	40%	40%
20	21	40%	40%	40%	40%	40%	40%	40%
21	22	40%	40%	40%	40%	40%	40%	40%
22	23	40%	40%	40%	40%	40%	40%	40%
23	24	40%	40%	40%	40%	40%	40%	40%

Proposed Occupancy Load Profiles (Percent of Peak Occupancy)

Schedule A - Load Schedule A								
Hour		Sun	Mon	Tue	Wed	Thu	Fri	Sat
From	To	1	2	3	4	5	6	7
0	1	40%	40%	40%	40%	40%	40%	40%
1	2	40%	40%	40%	40%	40%	40%	40%
2	3	40%	40%	40%	40%	40%	40%	40%
3	4	40%	40%	40%	40%	40%	40%	40%
4	5	40%	40%	40%	40%	40%	40%	40%
5	6	40%	40%	40%	40%	40%	40%	40%
6	7	40%	40%	40%	40%	40%	40%	40%
7	8	40%	80%	80%	80%	80%	80%	40%
8	9	40%	80%	80%	80%	80%	80%	40%
9	10	40%	80%	80%	80%	80%	80%	40%
10	11	40%	80%	80%	80%	80%	80%	40%
11	12	40%	80%	80%	80%	80%	80%	40%
12	13	40%	80%	80%	80%	80%	80%	40%
13	14	40%	80%	80%	80%	80%	80%	40%
14	15	40%	80%	80%	80%	80%	80%	40%
15	16	40%	80%	80%	80%	80%	80%	40%
16	17	40%	80%	80%	80%	80%	80%	40%
17	18	40%	80%	80%	80%	80%	80%	40%
18	19	40%	40%	40%	40%	40%	40%	40%
19	20	40%	40%	40%	40%	40%	40%	40%
20	21	40%	40%	40%	40%	40%	40%	40%
21	22	40%	40%	40%	40%	40%	40%	40%
22	23	40%	40%	40%	40%	40%	40%	40%
23	24	40%	40%	40%	40%	40%	40%	40%

Schedule B - Load Schedule B								
Hour		Sun	Mon	Tue	Wed	Thu	Fri	Sat
From	To	1	2	3	4	5	6	7
0	1	40%	40%	40%	40%	40%	40%	40%
1	2	40%	40%	40%	40%	40%	40%	40%
2	3	40%	40%	40%	40%	40%	40%	40%
3	4	40%	40%	40%	40%	40%	40%	40%
4	5	40%	40%	40%	40%	40%	40%	40%
5	6	40%	40%	40%	40%	40%	40%	40%
6	7	40%	40%	40%	40%	40%	40%	40%
7	8	40%	80%	80%	80%	80%	80%	40%
8	9	40%	80%	80%	80%	80%	80%	40%
9	10	40%	80%	80%	80%	80%	80%	40%
10	11	40%	80%	80%	80%	80%	80%	40%
11	12	40%	80%	80%	80%	80%	80%	40%
12	13	40%	80%	80%	80%	80%	80%	40%
13	14	40%	80%	80%	80%	80%	80%	40%
14	15	40%	80%	80%	80%	80%	80%	40%
15	16	40%	80%	80%	80%	80%	80%	40%
16	17	40%	80%	80%	80%	80%	80%	40%
17	18	40%	80%	80%	80%	80%	80%	40%
18	19	40%	40%	40%	40%	40%	40%	40%
19	20	40%	40%	40%	40%	40%	40%	40%
20	21	40%	40%	40%	40%	40%	40%	40%
21	22	40%	40%	40%	40%	40%	40%	40%
22	23	40%	40%	40%	40%	40%	40%	40%
23	24	40%	40%	40%	40%	40%	40%	40%

Schedule C - Load Schedule C								
Hour		Sun	Mon	Tue	Wed	Thu	Fri	Sat
From	To	1	2	3	4	5	6	7
0	1	40%	40%	40%	40%	40%	40%	40%
1	2	40%	40%	40%	40%	40%	40%	40%
2	3	40%	40%	40%	40%	40%	40%	40%
3	4	40%	40%	40%	40%	40%	40%	40%
4	5	40%	40%	40%	40%	40%	40%	40%
5	6	40%	40%	40%	40%	40%	40%	40%
6	7	40%	40%	40%	40%	40%	40%	40%
7	8	40%	80%	80%	80%	80%	80%	40%
8	9	40%	80%	80%	80%	80%	80%	40%
9	10	40%	80%	80%	80%	80%	80%	40%
10	11	40%	80%	80%	80%	80%	80%	40%
11	12	40%	80%	80%	80%	80%	80%	40%
12	13	40%	80%	80%	80%	80%	80%	40%
13	14	40%	80%	80%	80%	80%	80%	40%
14	15	40%	80%	80%	80%	80%	80%	40%
15	16	40%	80%	80%	80%	80%	80%	40%
16	17	40%	80%	80%	80%	80%	80%	40%
17	18	40%	80%	80%	80%	80%	80%	40%
18	19	40%	40%	40%	40%	40%	40%	40%
19	20	40%	40%	40%	40%	40%	40%	40%
20	21	40%	40%	40%	40%	40%	40%	40%
21	22	40%	40%	40%	40%	40%	40%	40%
22	23	40%	40%	40%	40%	40%	40%	40%
23	24	40%	40%	40%	40%	40%	40%	40%

McK8760 - Inputs

WSHP Replacement

% of building in model 25%

Zone Inputs:

Tag	Variable Description		Units	Baseline	Proposed	Basis	FIM ID
I7	Floor Area		ft²	15,381	15,381	drawings	
I8	Roof Area		ft²	8,957	8,957	drawings	
I9	Opaque Wall Area		ft²	4,063	4,063	drawings	
I10	Glazing Area	*Glazing*	ft²	574	574	drawings	
I12	Roof U-Factor	*Roof*	BTU/ft²/°F	0.060	0.060	2021 MCK Record Drawing Set-adjusted for tuning	
I13	Opaque Wall U-Factor	*Walls*	BTU/ft²/°F	0.055	0.055	2021 MCK Record Drawing Set-	
I14	Glazing U-Factor	*Glazing*	BTU/ft²/°F	0.800	0.800	2021 MCK Record Drawing Set	
I15	Glazing Solar Heat Gain Coefficient (SHGC)	*Glazing*	-	0.600	0.600	2021 MCK Record Drawing Set	
I16	Glazing Solar Gain Bldg Shape Factor		-	0.300	0.300	Used to tune cooling loads/summer electrical load shape	
I17	Average Space Height (Floor to Ceiling)		ft	11.00	11.00	estimate/drawings	
I18	Infiltration		ach	0.300	0.300	2021 MCK Record Drawing Set	
I19	Peak Number of Occupants		Qty	50	50	2021 MCK Record Drawing Set-record state occ. Of 615 employees, seemed high	x
I20	Sensible Heat Gain Per Person		Btu/h	245	245	Typical	
I21	Latent Heat Gain Per Person		Btu/h	155	155	Typical	
I22	Peak Lighting Load Power Density		W/ft²	0.50	0.50	2021 MCK Record Drawing Set-adjusted for tuning-LEDs	
I23	Peak Plug Load Power Density		W/ft²	1.00	1.00	2021 MCK Record Drawing Set-adjusted for tuning	
I24	Peak Exterior Lighting Load		kW	5.00	5.00	Estimated-confirm	x
I25	Peak Miscellaneous Load (Electrical)		Watt	13,736	13,736	Exhaust FAN power	
I26	Miscellaneous Load Located in Conditioned Space		Yes/No	Yes	Yes		
I27	HVAC On Cooling Space Temperature Set Point		°F	75.0	75.0	2021 MCK Record Drawing Set	
I28	HVAC Off Cooling Space Temperature Set Point		°F	75.0	75.0	2021 MCK Record Drawing Set	
I29	HVAC On Heating Space Temperature Set Point		°F	70.0	70.0	2021 MCK Record Drawing Set	
I30	HVAC Off Heating Space Temperature Set Point		°F	70.0	70.0	2021 MCK Record Drawing Set	

AHU & Plant Inputs:

Tag	Variable Description		Units	Baseline	Proposed	Basis	FIM ID
I34	AHU Fan Power based on Control Type		Type	CV	CV	estimate-verify	x
I35	Occupied Fan Operation		Type	Continuous	Continuous	Typical for Occupied Bldgs	
I36	Maximum AHU CFM		CFM	4,000	4,000	1989 As builts	
I37	Min AHU CFM (% of Max CFM) (If CV+Cycles: min occ % run time)		%	100.0%	100.0%	100% Outside Air	
I38	Maximum % Outside Air (Economizer % OSA)		%	100.0%	100.0%	100% Outside Air	
I39	Minimum % Outside Air (Occupied)		%	100.00%	100.00%	Used to tune heating loads	
I40	Minimum % Outside Air (Unoccupied)		%	100.0%	100.0%	100% outside air, baseline no setbacks,	
I41	Economizer High Limit Set Point		°F	65.0	65.0	Typical value	
I42	Economizer Low Limit Set Point		°F	55.0	55.0	Typical value	
I43	Demand Controlled Ventilation (For Outside Air Control)		Yes/No	No	No		
I44	DCV Airflow Per Person (Based on Space Type)	*DCV Tab*	CFM/Per	~~10.00~~	~~10.00~~		
I45	DCV Airflow Per Area (Based on Space Type)	*DCV Tab*	CFM/ft²	~~0.12~~	~~0.12~~		
I46	AHU Fan TSP (At Max CFM)		in w.c.	4.500	4.500	1989 As builts-used for tuning	
I47	Fan Efficiency		%	55.0%	55.0%	Estimated	
I48	Occupied Supply Air Temperature @ OAT ---------->	70.0	°F	Single Zone	Single Zone		
I49	Occupied Supply Air Temperature @ OAT ---------->	60.0	°F	~~60~~	~~60~~		
I50	Unoccupied Heating Supply Air Temperature Setpoint		°F	85	85	Typical	
I51	Unoccupied Cooling Supply Air Temperature Setpoint		°F	55	55	Typical	
I52	AHU Cooling Efficiency (IEER)		BTU/Watt	10.6	12.49	Drawings-HP list, proposed replacement of 14 wshp-new average of efficiency for heat pumps	
I53	Evaporative Cooling Effectiveness (Air side)		%	0.0%	0.0%		
I54	AHU Cooling Lockout Below		°F	60.0	60.0	Typical	
I55	AHU Heating Efficiency or COP @ OAT ---------->	47.0	COP	3.9800	4.1700	WSHP fed by NG boiler,Proposed replacement of 14 wshp-calculated	
I56	AHU Heating Efficiency or COP @ OAT ---------->	25.0	COP	3.2000	3.4500	WSHP fed by NG boiler,Proposed replacement of 14 wshp-estimated	
I57	AHU Heating Efficiency or COP < OAT ---------->	10.0	COP	2.9000	3.1500	WSHP fed by NG boiler,Proposed replacement of 14 wshp-estimated	
I58	AHU Heating Energy Source		Type	Electric Energy	Electric Energy	WSHP fed by NG boilers	
I59	AHU Heating Lockout Above		°F	75.0	75.0	Estimated as Occ Htg SP + 1F	
I60	Evaporative Pre-Cooling on Condenser		Yes/No	No	No		
I61	Heat Recovery % Effectiveness		%	0.00%	0.00%	no HR	
I62	Onsite Central Plant?		Yes/No	Yes	Yes		

Terminal Devices Inputs (Reheat Coils, VAV Boxes, Baseboard Heaters, etc)

Tag	Variable Description		Units	Baseline	Proposed	Basis	FIM ID
I66	Terminal Devices		Yes/No	No	No		
I67	Zone Heating Lockout Above		°F	~~75.0~~	~~75.0~~		
I68	Zone Heating Efficiency or COP @ OAT ---------->	47.0	COP	~~4.4000~~	~~4.4000~~	drawings values	
I69	Zone Heating Efficiency or COP @ OAT ---------->	25.0	COP	~~4.0000~~	~~4.0000~~	estimated for cooler weather	
I70	Zone Heating Efficiency or COP < OAT ---------->	10.0	COP	~~3.5000~~	~~3.5000~~	estimated for cooler weather	
I71	Heating Energy Source Zone		Type	~~Electric Energy~~	~~Electric Energy~~		
I72	Unoccupied Heating Done By		Zone, AHU	~~Zone Coil~~	~~Zone Coil~~		
I73	SFPMB Terminal Unit Power		W/CFM	~~0.30~~	~~0.30~~	Rough estimate based on drawings	x

Chilled Water and Heating Plants Inputs:

Tag	Variable Description	Units	Baseline	Proposed	Basis	FIM ID
			Chilled Water Pumps			
I78	Chiller Source	Type	No Chiller	No Chiller	Chiller plant excluded in template. Change to "Air Cooled" or "Water Cooled" and increase Tonnage from zero to add chiller plant. Increase GPM and ft wg from zero to add Chilled Water Pumps (CHWPs).	
I79	Chiller Type	Type	~~Centrifugal~~	~~Centrifugal~~		
I80	Chiller Nominal Tonnage	Tonnage	~~0~~	~~0.0~~		
I81	Chilled Water Flow Rate	GPM	~~0~~	~~0~~		
I82	Chilled Water System Design Pressure Drop	ft wg	~~0~~	~~0~~		
I83	Chilled Water Pumping CV or VFD	Type	~~VFD~~	~~VFD~~		
I84	Chilled Water Pump Enable Method	Type	~~Demand~~	~~Demand~~		
I85	Minimum Chilled Water GPM (% of Max Flow Rate)	%	~~33.0%~~	~~33.0%~~		
I86	Chilled Water Pump Efficiency (Motor and Pump)	%	~~60.0%~~	~~60.0%~~		
I87	Chilled Water Supply Temperature	°F	~~45~~	~~45~~		
I88	Chilled Water Temperature Control Strategy	Type	~~Fixed~~	~~Fixed~~		
I89	Chilled Water System Delta T (CHWRT - CHWST)	°F	~~15~~	~~15~~		
			Condenser Water Plant: Proposed Design Does Not Have a Cooling Tower			
I91	Condenser Water Flow Rate	GPM	~~0~~	~~0~~	Condenser plant excluded in template. Increase GPM and ft wg from zero to add condenser pumps (CWPs).	
I92	Condenser Water System Design Pressure Drop	ft wg	~~0~~	~~0~~		
I93	Condenser Water Pumping CV or VFD	Type	~~VFD~~	~~VFD~~		
I94	Condenser Water Pump Enable Method	Type	~~Demand~~	~~Demand~~		
I95	Minimum Condenser Water Flow Rate (% of Max Flow Rate)	%	~~33.0%~~	~~33.0%~~		
I96	Condenser Water Pump Efficiency (Motor and Pump)	%	~~60.0%~~	~~60.0%~~	Estimated	
I97	Condenser Water System Delta T(CWRT-CWST)	°F	~~20~~	~~20~~		
I98	Cooling Tower Design CWST	°F	~~85~~	~~85~~	1989 as builts	
I99	Cooling Tower Design Wet Bulb	°F	~~67~~	~~67~~	1989 as builts	
I100	Cooling Tower Design Fan Brake HP	bhp	~~25.0~~	~~25.0~~	Cooling towers excluded in template. Increase fan BHP from zero to add cooling towers.	
I101	Cooling Tower Fan Design Flow Rate	CFM	~~37000~~	~~37000~~	Cooling towers excluded in template. Increase CFM from zero to add cooling towers.- 1989 as builts	
I102	Cooling Tower Fan Control	Type	~~CV~~	~~CV~~	1989 as builts	
I103	Cooling Tower CWST Control Strategy	Type	~~Fixed CWST~~	~~Fixed CWST~~	1989 as builts	
I104	Cooling Tower Min CWST Temp	°F	~~85~~	~~85~~	1989 as builts	
I105	Minimum Cooling Tower Fan Speed	%	~~100.0%~~	~~100.0%~~	1989 as builts	
I106	Water Side Economizer	Yes/No	~~No~~	~~No~~	no economizer	
I107	Water Side Economizer HX Temp Approach	°F	~~5~~	~~5~~	NA	
			Heating Water Plant			
I109	Heating Water Flow Rate	GPM	0	0	HW pumps excluded in template. Increase GPM and ft wg from zero to add HW Pumps-boiler specs	
I110	Heating Water System Design Pressure Drop	ft wg	0	0		
I111	Heating Water Pumping CV or VFD	Type	CV	CV		
I112	Heating Water Pump Enable Method	Type	Demand	Demand		
I113	Minimum Heating Water Flow Rate (% of Max Flow Rate)	%	100.0%	100.0%		
I114	Heating Water Pump Efficiency (Motor and Pump)	%	60.0%	60.0%	Estimated	
I115	Heating Water System Delta T (HWST - HWRT)	°F	20.0	20.0		
			Heat Pump Loop Pump: This Module Not Used			
I118	Water Source Heat Pump Boiler	Yes/No	Yes	Yes	Heat pump loop excluded in template. Increase GPM and ft wg from zero to add heat pump loop.- WSHP fed by NG boilers	
I119	Heat Pump Boiler Efficiency	COP	90%	90%	condensing boilers, est eff. Of 91%	
I120	Heat Pump Loop Water Flow Rate	GPM	137.5	137.5	pump specs	
I121	Heat Pump Loop Water System Design Pressure Drop	ft wg	27.5	27.5	pump specs	
I122	Heat Pump Loop Water Pumping CV or VFD	Type	CV	CV	pump specs	
I123	Heat Pump Loop Water Pump Enable Method	Type	Continuous	Continuous		
I124	Minimum Heat Pump Loop Water Flow Rate (% of Max Flow Rate)	%	100.0%	100.0%		
I125	Heat Pump Loop Water Pump Efficiency (Motor and Pump)	%	55.0%	55.0%	Estimated	
I126	Heat Pump Loop Water System Delta T (HWST - HWRT)	°F	25.0	25.0	typical	

Domestic Hot Water Inputs:

Tag	Variable Description	Units	Baseline	Proposed	Basis	FIM ID
I131	DHW Fuel Type	Type	Natural Gas	Natural Gas	1989 Drawings	
I132	Energy Factor	-	0.70	0.70	NG fired DHW	
I133	Working Days Per Year (Used Only For DHW Calc)	Qty	365	365	Schedule A & Schedule B (ADJUST AS NEEDED)	
I134	Average Daily Hot Water Consumption Per Person	Gallons	2.0	2.0	estimate various usages	
I135	Average Entering Cold Water Temperature	°F	50.0	50.0	Typical	
I136	Supply Hot Water Temperature	°F	120.0	120.0	Typical	

Electric Demand

Tag	Description	Units	Baseline	EUI	Proposed	EUI	Savings	Savings (%)	EUI
O7	Cooling Peak kW	kW	34	-	29	-	5	15.1%	-
O8	AHU Heating Peak kW	kW	19	-	18	-	1	7.3%	-
O9	Zone Heating Peak kW	kW	0	-	0	-	0	0.0%	-
O10	Fan Peak kW	kW	4	-	4	-	0	0.0%	-
O11	Interior Lighting Peak kW	kW	6	-	6	-	0	0.0%	-
O12	Exterior Lighting Peak kW	kW	5	-	5	-	0	0.0%	-
O13	Plug Load Peak kW	kW	15	-	15	-	0	0.0%	-
O14	Pumps Peak kW	kW	1	-	1	-	0	0.0%	-
O15	Heat Rejection kW	kW	19	-	19	-	0	0.0%	-
O16	Miscellaneous Load Peak kW	kW	14		14	-	0	0.0%	-
O17	Other Peak kW	kW	0	-	0	-	0	0.0%	-
O18	Peak kW	kW	92	-	87	-	5	5.6%	-
O19	Peak kW (Sum 12 Monthly Peaks)	kW	887	-	854	-	33	3.7%	-

Electric Energy

Tag	Description	Units	Baseline	EUI	Proposed	EUI	Savings	Savings (%)	EUI
O23	Cooling	kWh/Yr	19,402	4.30	16,466	3.65	2,936	15.1%	0.65
O24	AHU Heating	kWh/Yr	21,324	4.73	20,182	4.48	1,143	5.4%	0.25
O25	Zone Heating	kWh/Yr	0	0.00	0	0.00	0	0.0%	0.00
O26	AHU Fans	kWh/Yr	33,712	7.48	33,712	7.48	0	0.0%	0.00
O27	Zone Fans	kWh/Yr	0	0.00	0	0.00	0	0.0%	0.00
O28	Interior Lighting	kWh/Yr	53,894	11.96	53,894	11.96	0	0.0%	0.00
O29	Exterior Lighting	kWh/Yr	21,900	4.86	21,900	4.86	0	0.0%	0.00
O30	Plug Loads	kWh/Yr	87,163	19.34	87,163	19.34	0	0.0%	0.00
O31	Pumps	kWh/Yr	11,357	2.52	11,357	2.52	0	0.0%	0.00
O32	Heat Rejection	kWh/Yr	4,989	1.11	4,927	1.09	62	1.2%	0.01
O33	Miscellaneous Loads	kWh/Yr	120,327	26.69	120,327	26.69	0	0.0%	0.00
O34	Domestic Hot Water	kWh/Yr	0	0.00	0	0.00	0	0.0%	0.00
O35	Other Electricity	kWh/Yr	0	0.00	0	0.00	0	0.0%	0.00
O36	Total	kWh/Yr	374,069	82.98	369,928	82.06	4,141	1.1%	0.92

Natural Gas

Tag	Description	Units	Baseline	EUI	Proposed	EUI	Savings	Savings (%)	EUI
O40	AHU Heating	Therm/Yr	3,011	19.57	3,011	19.57	0	0.0%	0.00
O41	Zone Heating	Therm/Yr	0	0.00	0	0.00	0	0.0%	0.00
O42	Domestic Hot Water	Therm/Yr	161	1.05	161	1.05	0	0.0%	0.00
O43	Other Natural Gas	Therm/Yr	0	0.00	0	0.00	0	0.0%	0.00
O44	Total	Therm/Yr	3,171	20.62	3,171	20.62	0	0.0%	0.00

O

Tag	Description	Units	Baseline	EUI	Proposed	EUI	Savings	Savings (%)	EUI
O48	AHU Heating	/Yr	0	0.00	0	0.00	0	0.0%	0.00
O49	Zone Heating	/Yr	0	0.00	0	0.00	0	0.0%	0.00
O50	Domestic Hot Water	/Yr	0	0.00	0	0.00	0	0.0%	0.00
O51	Other 0	/Yr	0	0.00	0	0.00	0	0.0%	0.00
O52	Total	/Yr	0	0.00	0	0.00	0	0.0%	0.00

Total Energy

Tag	Description	Units	Baseline	EUI	Proposed	EUI	Savings	Savings (%)	EUI
O56	Total Energy	kBtu/Yr	1,593,464	103.60	1,579,335	102.68	14,129	0.9%	0.92

McK8760 - General Information

Fan Array

Project Information:

Project Name	Redmond PSB Phase 3	FIM Name	Fan Array
TCO Project ID		Tech Contact	Sarah stevens
TCO Tool FIM ID	31865	Date	3/10/2025

Weather Data:

Nearest Weather Station	WA	SEATTLE SEATTLE-TACOMA INTL A	727930TY.xls

Description of FIM From TCO Tool:

The Main AHU provides outside (ventilation) air to the area east of the main lobby at the Public Safety Building (PSB). The Main AHU is original to the building and has a non-functional Inlet Guide Vane. The exhaust fan provides relief/exhaust air for the AHU system. The exhaust fan and motor are beyond its useful life and shall be replaced. Inlet Guide Vane of the exhaust fan is non-functional as well. This measure replaces the AHU fan and motor with a new fan array and the exhaust fan motor with a new inverter duty motor. The new fan array provides redundancy and will vary fan speeds, saving energy. The system will be set to provide required ventilation airflow and economizer cooling when outside conditions are suitable. Manual balance dampers will be demolished and replaced with constant airflow regulating dampers to serve constant airflow to all 24/7 spaces identified by the City.

HVAC & Load Schedules:

Schedule A Title	Load Schedule A	ASHRAE Schedule Type	Office
Schedule B Title	Load Schedule B	ASHRAE Schedule Type	Office
Schedule C Title	Load Schedule C	ASHRAE Schedule Type	Office

Fuel Types:

	Fuel	Unit	kbtu/unit	lbs CO2e/unit	$$$/unit
Electric Demand	Electric Demand	kW	N/A	N/A	
Electric Energy	Electric Energy	kWh	3.412	0.6434	
Fuel 2	Natural Gas	Therm	100	11.7	
Fuel 3					

Utility Rate Schedules:

Schedule 1 Title	Rate Schedule 1
Schedule 2 Title	Rate Schedule 2
Schedule 3 Title	Rate Schedule 3

Zone Data (for multi-model buildings):

Zone Name	Zone Name (e.g. Whole Facility, RTU-1, or West Wing)
Zone Description	Zone Description (e.g. Models the entire facility as one zone, or Models Zone for RTU-1)

Savings Tracker (Use if Modeling Multiple Efficiency Measures):

Measure Description		Electric Demand (kW)	Electricity (kWh)	Natural Gas (Therm)	EUI (kBTU/SqFt/Yr)
Baseline Building Performance		2,129	1,010,110	13,850	78.53
Fan Array	Savings ►	*343*	*34,849*	*1,901*	*5.02*
	Usage ►	1,787	975,261	11,949	73.51
	Savings ►				*73.51*
	Usage ►				0.00
	Savings ►				*0.00*
	Usage ►				0.00
	Savings ►				*0.00*
	Usage ►				0.00
	Savings ►				*0.00*
	Usage ►				0.00
	Savings ►				*0.00*
	Usage ►				0.00
	Savings ►				*0.00*
	Usage ►				0.00
	Savings ►				*0.00*
	Usage ►				0.00
	Savings ►				*0.00*
	Usage ►				0.00
	Savings ►				*0.00*
	Usage ►				0.00

Notes:

McK8760 - HVAC Schedules

Fan Array

Baseline HVAC Equipment Daily Schedules

0 = Fan Off 1 = Fan On

Schedule A - Load Schedule A								
Hour		Sun	Mon	Tue	Wed	Thu	Fri	Sat
From	To	1	2	3	4	5	6	7
0	1	1	1	1	1	1	1	1
1	2	1	1	1	1	1	1	1
2	3	1	1	1	1	1	1	1
3	4	1	1	1	1	1	1	1
4	5	1	1	1	1	1	1	1
5	6	1	1	1	1	1	1	1
6	7	1	1	1	1	1	1	1
7	8	1	1	1	1	1	1	1
8	9	1	1	1	1	1	1	1
9	10	1	1	1	1	1	1	1
10	11	1	1	1	1	1	1	1
11	12	1	1	1	1	1	1	1
12	13	1	1	1	1	1	1	1
13	14	1	1	1	1	1	1	1
14	15	1	1	1	1	1	1	1
15	16	1	1	1	1	1	1	1
16	17	1	1	1	1	1	1	1
17	18	1	1	1	1	1	1	1
18	19	1	1	1	1	1	1	1
19	20	1	1	1	1	1	1	1
20	21	1	1	1	1	1	1	1
21	22	1	1	1	1	1	1	1
22	23	1	1	1	1	1	1	1
23	24	1	1	1	1	1	1	1
Daily Totals		24	24	24	24	24	24	24

Schedule B - Load Schedule B								
Hour		Sun	Mon	Tue	Wed	Thu	Fri	Sat
From	To	1	2	3	4	5	6	7
0	1	1	1	1	1	1	1	1
1	2	1	1	1	1	1	1	1
2	3	1	1	1	1	1	1	1
3	4	1	1	1	1	1	1	1
4	5	1	1	1	1	1	1	1
5	6	1	1	1	1	1	1	1
6	7	1	1	1	1	1	1	1
7	8	1	1	1	1	1	1	1
8	9	1	1	1	1	1	1	1
9	10	1	1	1	1	1	1	1
10	11	1	1	1	1	1	1	1
11	12	1	1	1	1	1	1	1
12	13	1	1	1	1	1	1	1
13	14	1	1	1	1	1	1	1
14	15	1	1	1	1	1	1	1
15	16	1	1	1	1	1	1	1
16	17	1	1	1	1	1	1	1
17	18	1	1	1	1	1	1	1
18	19	1	1	1	1	1	1	1
19	20	1	1	1	1	1	1	1
20	21	1	1	1	1	1	1	1
21	22	1	1	1	1	1	1	1
22	23	1	1	1	1	1	1	1
23	24	1	1	1	1	1	1	1
Daily Totals		24	24	24	24	24	24	24

Schedule C - Load Schedule C								
Hour		Sun	Mon	Tue	Wed	Thu	Fri	Sat
From	To	1	2	3	4	5	6	7
0	1	1	1	1	1	1	1	1
1	2	1	1	1	1	1	1	1
2	3	1	1	1	1	1	1	1
3	4	1	1	1	1	1	1	1
4	5	1	1	1	1	1	1	1
5	6	1	1	1	1	1	1	1
6	7	1	1	1	1	1	1	1
7	8	1	1	1	1	1	1	1
8	9	1	1	1	1	1	1	1
9	10	1	1	1	1	1	1	1
10	11	1	1	1	1	1	1	1
11	12	1	1	1	1	1	1	1
12	13	1	1	1	1	1	1	1
13	14	1	1	1	1	1	1	1
14	15	1	1	1	1	1	1	1
15	16	1	1	1	1	1	1	1
16	17	1	1	1	1	1	1	1
17	18	1	1	1	1	1	1	1
18	19	1	1	1	1	1	1	1
19	20	1	1	1	1	1	1	1
20	21	1	1	1	1	1	1	1
21	22	1	1	1	1	1	1	1
22	23	1	1	1	1	1	1	1
23	24	1	1	1	1	1	1	1
Daily Totals		24	24	24	24	24	24	24

Proposed HVAC Equipment Daily Schedules

0 = Unoccupied Mode 1 = Occupied Mode

Schedule A - Load Schedule A								
Hour		Sun	Mon	Tue	Wed	Thu	Fri	Sat
From	To	1	2	3	4	5	6	7
0	1	1	1	1	1	1	1	1
1	2	1	1	1	1	1	1	1
2	3	1	1	1	1	1	1	1
3	4	1	1	1	1	1	1	1
4	5	1	1	1	1	1	1	1
5	6	1	1	1	1	1	1	1
6	7	1	1	1	1	1	1	1
7	8	1	1	1	1	1	1	1
8	9	1	1	1	1	1	1	1
9	10	1	1	1	1	1	1	1
10	11	1	1	1	1	1	1	1
11	12	1	1	1	1	1	1	1
12	13	1	1	1	1	1	1	1
13	14	1	1	1	1	1	1	1
14	15	1	1	1	1	1	1	1
15	16	1	1	1	1	1	1	1
16	17	1	1	1	1	1	1	1
17	18	1	1	1	1	1	1	1
18	19	1	1	1	1	1	1	1
19	20	1	1	1	1	1	1	1
20	21	1	1	1	1	1	1	1
21	22	1	1	1	1	1	1	1
22	23	1	1	1	1	1	1	1
23	24	1	1	1	1	1	1	1
Daily Totals		24	24	24	24	24	24	24

Schedule B - Load Schedule B								
Hour		Sun	Mon	Tue	Wed	Thu	Fri	Sat
From	To	1	2	3	4	5	6	7
0	1	1	1	1	1	1	1	1
1	2	1	1	1	1	1	1	1
2	3	1	1	1	1	1	1	1
3	4	1	1	1	1	1	1	1
4	5	1	1	1	1	1	1	1
5	6	1	1	1	1	1	1	1
6	7	1	1	1	1	1	1	1
7	8	1	1	1	1	1	1	1
8	9	1	1	1	1	1	1	1
9	10	1	1	1	1	1	1	1
10	11	1	1	1	1	1	1	1
11	12	1	1	1	1	1	1	1
12	13	1	1	1	1	1	1	1
13	14	1	1	1	1	1	1	1
14	15	1	1	1	1	1	1	1
15	16	1	1	1	1	1	1	1
16	17	1	1	1	1	1	1	1
17	18	1	1	1	1	1	1	1
18	19	1	1	1	1	1	1	1
19	20	1	1	1	1	1	1	1
20	21	1	1	1	1	1	1	1
21	22	1	1	1	1	1	1	1
22	23	1	1	1	1	1	1	1
23	24	1	1	1	1	1	1	1
Daily Totals		24	24	24	24	24	24	24

Schedule C - Load Schedule C								
Hour		Sun	Mon	Tue	Wed	Thu	Fri	Sat
From	To	1	2	3	4	5	6	7
0	1	1	1	1	1	1	1	1
1	2	1	1	1	1	1	1	1
2	3	1	1	1	1	1	1	1
3	4	1	1	1	1	1	1	1
4	5	1	1	1	1	1	1	1
5	6	1	1	1	1	1	1	1
6	7	1	1	1	1	1	1	1
7	8	1	1	1	1	1	1	1
8	9	1	1	1	1	1	1	1
9	10	1	1	1	1	1	1	1
10	11	1	1	1	1	1	1	1
11	12	1	1	1	1	1	1	1
12	13	1	1	1	1	1	1	1
13	14	1	1	1	1	1	1	1
14	15	1	1	1	1	1	1	1
15	16	1	1	1	1	1	1	1
16	17	1	1	1	1	1	1	1
17	18	1	1	1	1	1	1	1
18	19	1	1	1	1	1	1	1
19	20	1	1	1	1	1	1	1
20	21	1	1	1	1	1	1	1
21	22	1	1	1	1	1	1	1
22	23	1	1	1	1	1	1	1
23	24	1	1	1	1	1	1	1
Daily Totals		24	24	24	24	24	24	24

McK8760 - Occupancy Schedules

Fan Array

Baseline Occupancy Load Profiles (Percent of Peak Occupancy)

Schedule A - Load Schedule A									
Hour		Sun	Mon	Tue	Wed	Thu	Fri	Sat	
From	To	1	2	3	4	5	6	7	
0	1	40%	40%	40%	40%	40%	40%	40%	0%
1	2	40%	40%	40%	40%	40%	40%	40%	
2	3	40%	40%	40%	40%	40%	40%	40%	
3	4	40%	40%	40%	40%	40%	40%	40%	
4	5	40%	40%	40%	40%	40%	40%	40%	
5	6	40%	40%	40%	40%	40%	40%	40%	
6	7	40%	40%	40%	40%	40%	40%	40%	
7	8	40%	80%	80%	80%	80%	80%	40%	
8	9	40%	80%	80%	80%	80%	80%	40%	
9	10	40%	80%	80%	80%	80%	80%	40%	
10	11	40%	80%	80%	80%	80%	80%	40%	
11	12	40%	80%	80%	80%	80%	80%	40%	
12	13	40%	80%	80%	80%	80%	80%	40%	
13	14	40%	80%	80%	80%	80%	80%	40%	
14	15	40%	80%	80%	80%	80%	80%	40%	
15	16	40%	80%	80%	80%	80%	80%	40%	
16	17	40%	80%	80%	80%	80%	80%	40%	
17	18	40%	80%	80%	80%	80%	80%	40%	
18	19	40%	40%	40%	40%	40%	40%	40%	
19	20	40%	40%	40%	40%	40%	40%	40%	
20	21	40%	40%	40%	40%	40%	40%	40%	
21	22	40%	40%	40%	40%	40%	40%	40%	
22	23	40%	40%	40%	40%	40%	40%	40%	
23	24	40%	40%	40%	40%	40%	40%	40%	
		0.3	0.3	0.3	0.3	0.3	0.3	0.3	

Schedule B - Load Schedule B								
Hour		Sun	Mon	Tue	Wed	Thu	Fri	Sat
From	To	1	2	3	4	5	6	7
0	1	40%	40%	40%	40%	40%	40%	40%
1	2	40%	40%	40%	40%	40%	40%	40%
2	3	40%	40%	40%	40%	40%	40%	40%
3	4	40%	40%	40%	40%	40%	40%	40%
4	5	40%	40%	40%	40%	40%	40%	40%
5	6	40%	40%	40%	40%	40%	40%	40%
6	7	40%	40%	40%	40%	40%	40%	40%
7	8	40%	80%	80%	80%	80%	80%	40%
8	9	40%	80%	80%	80%	80%	80%	40%
9	10	40%	80%	80%	80%	80%	80%	40%
10	11	40%	80%	80%	80%	80%	80%	40%
11	12	40%	80%	80%	80%	80%	80%	40%
12	13	40%	80%	80%	80%	80%	80%	40%
13	14	40%	80%	80%	80%	80%	80%	40%
14	15	40%	80%	80%	80%	80%	80%	40%
15	16	40%	80%	80%	80%	80%	80%	40%
16	17	40%	80%	80%	80%	80%	80%	40%
17	18	40%	80%	80%	80%	80%	80%	40%
18	19	40%	40%	40%	40%	40%	40%	40%
19	20	40%	40%	40%	40%	40%	40%	40%
20	21	40%	40%	40%	40%	40%	40%	40%
21	22	40%	40%	40%	40%	40%	40%	40%
22	23	40%	40%	40%	40%	40%	40%	40%
23	24	40%	40%	40%	40%	40%	40%	40%

Schedule C - Load Schedule C								
Hour		Sun	Mon	Tue	Wed	Thu	Fri	Sat
From	To	1	2	3	4	5	6	7
0	1	40%	40%	40%	40%	40%	40%	40%
1	2	40%	40%	40%	40%	40%	40%	40%
2	3	40%	40%	40%	40%	40%	40%	40%
3	4	40%	40%	40%	40%	40%	40%	40%
4	5	40%	40%	40%	40%	40%	40%	40%
5	6	40%	40%	40%	40%	40%	40%	40%
6	7	40%	40%	40%	40%	40%	40%	40%
7	8	40%	80%	80%	80%	80%	80%	40%
8	9	40%	80%	80%	80%	80%	80%	40%
9	10	40%	80%	80%	80%	80%	80%	40%
10	11	40%	80%	80%	80%	80%	80%	40%
11	12	40%	80%	80%	80%	80%	80%	40%
12	13	40%	80%	80%	80%	80%	80%	40%
13	14	40%	80%	80%	80%	80%	80%	40%
14	15	40%	80%	80%	80%	80%	80%	40%
15	16	40%	80%	80%	80%	80%	80%	40%
16	17	40%	80%	80%	80%	80%	80%	40%
17	18	40%	80%	80%	80%	80%	80%	40%
18	19	40%	40%	40%	40%	40%	40%	40%
19	20	40%	40%	40%	40%	40%	40%	40%
20	21	40%	40%	40%	40%	40%	40%	40%
21	22	40%	40%	40%	40%	40%	40%	40%
22	23	40%	40%	40%	40%	40%	40%	40%
23	24	40%	40%	40%	40%	40%	40%	40%

Proposed Occupancy Load Profiles (Percent of Peak Occupancy)

Schedule A - Load Schedule A								
Hour		Sun	Mon	Tue	Wed	Thu	Fri	Sat
From	To	1	2	3	4	5	6	7
0	1	40%	40%	40%	40%	40%	40%	40%
1	2	40%	40%	40%	40%	40%	40%	40%
2	3	40%	40%	40%	40%	40%	40%	40%
3	4	40%	40%	40%	40%	40%	40%	40%
4	5	40%	40%	40%	40%	40%	40%	40%
5	6	40%	40%	40%	40%	40%	40%	40%
6	7	40%	40%	40%	40%	40%	40%	40%
7	8	40%	80%	80%	80%	80%	80%	40%
8	9	40%	80%	80%	80%	80%	80%	40%
9	10	40%	80%	80%	80%	80%	80%	40%
10	11	40%	80%	80%	80%	80%	80%	40%
11	12	40%	80%	80%	80%	80%	80%	40%
12	13	40%	80%	80%	80%	80%	80%	40%
13	14	40%	80%	80%	80%	80%	80%	40%
14	15	40%	80%	80%	80%	80%	80%	40%
15	16	40%	80%	80%	80%	80%	80%	40%
16	17	40%	80%	80%	80%	80%	80%	40%
17	18	40%	80%	80%	80%	80%	80%	40%
18	19	40%	40%	40%	40%	40%	40%	40%
19	20	40%	40%	40%	40%	40%	40%	40%
20	21	40%	40%	40%	40%	40%	40%	40%
21	22	40%	40%	40%	40%	40%	40%	40%
22	23	40%	40%	40%	40%	40%	40%	40%
23	24	40%	40%	40%	40%	40%	40%	40%

Schedule B - Load Schedule B								
Hour		Sun	Mon	Tue	Wed	Thu	Fri	Sat
From	To	1	2	3	4	5	6	7
0	1	40%	40%	40%	40%	40%	40%	40%
1	2	40%	40%	40%	40%	40%	40%	40%
2	3	40%	40%	40%	40%	40%	40%	40%
3	4	40%	40%	40%	40%	40%	40%	40%
4	5	40%	40%	40%	40%	40%	40%	40%
5	6	40%	40%	40%	40%	40%	40%	40%
6	7	40%	40%	40%	40%	40%	40%	40%
7	8	40%	80%	80%	80%	80%	80%	40%
8	9	40%	80%	80%	80%	80%	80%	40%
9	10	40%	80%	80%	80%	80%	80%	40%
10	11	40%	80%	80%	80%	80%	80%	40%
11	12	40%	80%	80%	80%	80%	80%	40%
12	13	40%	80%	80%	80%	80%	80%	40%
13	14	40%	80%	80%	80%	80%	80%	40%
14	15	40%	80%	80%	80%	80%	80%	40%
15	16	40%	80%	80%	80%	80%	80%	40%
16	17	40%	80%	80%	80%	80%	80%	40%
17	18	40%	80%	80%	80%	80%	80%	40%
18	19	40%	40%	40%	40%	40%	40%	40%
19	20	40%	40%	40%	40%	40%	40%	40%
20	21	40%	40%	40%	40%	40%	40%	40%
21	22	40%	40%	40%	40%	40%	40%	40%
22	23	40%	40%	40%	40%	40%	40%	40%
23	24	40%	40%	40%	40%	40%	40%	40%

Schedule C - Load Schedule C								
Hour		Sun	Mon	Tue	Wed	Thu	Fri	Sat
From	To	1	2	3	4	5	6	7
0	1	40%	40%	40%	40%	40%	40%	40%
1	2	40%	40%	40%	40%	40%	40%	40%
2	3	40%	40%	40%	40%	40%	40%	40%
3	4	40%	40%	40%	40%	40%	40%	40%
4	5	40%	40%	40%	40%	40%	40%	40%
5	6	40%	40%	40%	40%	40%	40%	40%
6	7	40%	40%	40%	40%	40%	40%	40%
7	8	40%	80%	80%	80%	80%	80%	40%
8	9	40%	80%	80%	80%	80%	80%	40%
9	10	40%	80%	80%	80%	80%	80%	40%
10	11	40%	80%	80%	80%	80%	80%	40%
11	12	40%	80%	80%	80%	80%	80%	40%
12	13	40%	80%	80%	80%	80%	80%	40%
13	14	40%	80%	80%	80%	80%	80%	40%
14	15	40%	80%	80%	80%	80%	80%	40%
15	16	40%	80%	80%	80%	80%	80%	40%
16	17	40%	80%	80%	80%	80%	80%	40%
17	18	40%	80%	80%	80%	80%	80%	40%
18	19	40%	40%	40%	40%	40%	40%	40%
19	20	40%	40%	40%	40%	40%	40%	40%
20	21	40%	40%	40%	40%	40%	40%	40%
21	22	40%	40%	40%	40%	40%	40%	40%
22	23	40%	40%	40%	40%	40%	40%	40%
23	24	40%	40%	40%	40%	40%	40%	40%

McK8760 - Inputs

Fan Array

% of building in model 100%

Zone Inputs:

Tag	Variable Description		Units	Baseline	Proposed	Basis	FIM ID
I7	Floor Area		ft^2	61,523	61,523	drawings	
I8	Roof Area		ft^2	35,826	35,826	drawings	
I9	Opaque Wall Area		ft^2	16,251	16,251	drawings	
I10	Glazing Area	*Glazing*	ft^2	2,296	2,296	drawings	
I12	Roof U-Factor	*Roof*	BTU/ft^2/°F	0.060	0.060	2021 MCK Record Drawing Set-adjusted for tuning	
I13	Opaque Wall U-Factor	*Walls*	BTU/ft^2/°F	0.055	0.055	2021 MCK Record Drawing Set-	
I14	Glazing U-Factor	*Glazing*	BTU/ft^2/°F	0.800	0.800	2021 MCK Record Drawing Set	
I15	Glazing Solar Heat Gain Coefficient (SHGC)	*Glazing*	-	0.600	0.600	2021 MCK Record Drawing Set	
I16	Glazing Solar Gain Bldg Shape Factor		-	0.300	0.300	Used to tune cooling loads/summer electrical load shape	
I17	Average Space Height (Floor to Ceiling)		ft	11.00	11.00	estimate/drawings	
I18	Infiltration		ach	0.300	0.300	2021 MCK Record Drawing Set	
I19	Peak Number of Occupants		Qty	200	200	2021 MCK Record Drawing Set-record state occ. Of 615 employees, seemed high	x
I20	Sensible Heat Gain Per Person		Btu/h	245	245	Typical	
I21	Latent Heat Gain Per Person		Btu/h	155	155	Typical	
I22	Peak Lighting Load Power Density		W/ft^2	0.50	0.50	2021 MCK Record Drawing Set-adjusted for tuning-LEDs	
I23	Peak Plug Load Power Density		W/ft^2	0.70	0.70	2021 MCK Record Drawing Set-adjusted for tuning	
I24	Peak Exterior Lighting Load		kW	5.00	5.00	Estimated-confirm	x
I25	Peak Miscellaneous Load (Electrical)		Watt	13,736	13,736	Exhaust FAN power	
I26	Miscellaneous Load Located in Conditioned Space		Yes/No	Yes	Yes		
I27	HVAC On Cooling Space Temperature Set Point		°F	75.0	75.0	2021 MCK Record Drawing Set	
I28	HVAC Off Cooling Space Temperature Set Point		°F	75.0	75.0	2021 MCK Record Drawing Set	
I29	HVAC On Heating Space Temperature Set Point		°F	70.0	70.0	2021 MCK Record Drawing Set	
I30	HVAC Off Heating Space Temperature Set Point		°F	70.0	70.0	2021 MCK Record Drawing Set	

AHU & Plant Inputs:

Tag	Variable Description		Units	Baseline	Proposed	Basis	FIM ID
I34	AHU Fan Power based on Control Type		Type	CV	VFD	baseline cv, vfd proposed	x
I35	Occupied Fan Operation		Type	Continuous	Continuous	Typical for Occupied Bldgs	
I36	Maximum AHU CFM		CFM	10,000	10,000	1989 As builts	
I37	Min AHU CFM (% of Max CFM) (If CV+Cycles: min occ % run time)		%	100.0%	100.0%	100% Outside Air, proposed vfd turn down	
I38	Maximum % Outside Air (Economizer % OSA)		%	100.0%	100.0%	100% Outside Air	
I39	Minimum % Outside Air (Occupied)		%	100.00%	90.00%	Used to tune heating loads, proposed turndown to 70% cfm	
I40	Minimum % Outside Air (Unoccupied)		%	100.0%	100.0%	100% outside air, baseline no setbacks,	
I41	Economizer High Limit Set Point		°F	65.0	65.0	Typical value	
I42	Economizer Low Limit Set Point		°F	55.0	55.0	Typical value	
I43	Demand Controlled Ventilation (For Outside Air Control)		Yes/No	No	No		
I44	DCV Airflow Per Person (Based on Space Type)	*DCV Tab*	CFM/Per	~~10.00~~	~~10.00~~		
I45	DCV Airflow Per Area (Based on Space Type)	*DCV Tab*	CFM/ft^2	~~0.12~~	~~0.12~~		
I46	AHU Fan TSP (At Max CFM)		in w.c.	4.500	5.500	1989 As builts-used for tuning, proposed cut sheets	
I47	Fan Efficiency		%	55.0%	60.0%	baseline typical value	
I48	Occupied Supply Air Temperature @ OAT ---------->	70.0	°F	Single Zone	55	proposed vfd addition	
I49	Occupied Supply Air Temperature @ OAT ---------->	60.0	°F	~~60~~	65	proposed vfd addition	
I50	Unoccupied Heating Supply Air Temperature Setpoint		°F	85	85	Typical	
I51	Unoccupied Cooling Supply Air Temperature Setpoint		°F	55	55	Typical	
I52	AHU Cooling Efficiency (IEER)		BTU/Watt	10.6	10.60	Drawings-HP list, proposed replacement of 14 wshp-new average of efficiency for heat pumps	
I53	Evaporative Cooling Effectiveness (Air side)		%	0.0%	0.0%		
I54	AHU Cooling Lockout Below		°F	75.0	60.0	Typical	
I55	AHU Heating Efficiency or COP @ OAT ---------->	47.0	COP	3.9800	3.9800	WSHP fed by NG boiler,Proposed replacement of 14 wshp-calculated	
I56	AHU Heating Efficiency or COP @ OAT ---------->	25.0	COP	3.2000	3.2000	WSHP fed by NG boiler,Proposed replacement of 14 wshp-estimated	
I57	AHU Heating Efficiency or COP < OAT ---------->	10.0	COP	2.9000	2.9000	WSHP fed by NG boiler,Proposed replacement of 14 wshp-estimated	
I58	AHU Heating Energy Source		Type	Electric Energy	Electric Energy	WSHP fed by NG boilers	
I59	AHU Heating Lockout Above		°F	75.0	75.0	Estimated as Occ Htg SP + 1F	
I60	Evaporative Pre-Cooling on Condenser		Yes/No	No	No		
I61	Heat Recovery % Effectiveness		%	0.00%	0.00%	no HR	
I62	Onsite Central Plant?		Yes/No	Yes	Yes		

Terminal Devices Inputs (Reheat Coils, VAV Boxes, Baseboard Heaters, etc)

Tag	Variable Description		Units	Baseline	Proposed	Basis	FIM ID
I66	Terminal Devices		Yes/No	No	No		
I67	Zone Heating Lockout Above		°F	~~75.0~~	~~75.0~~		
I68	Zone Heating Efficiency or COP @ OAT ---------->	47.0	COP	~~4.4000~~	~~4.4000~~	drawings values	
I69	Zone Heating Efficiency or COP @ OAT ---------->	25.0	COP	~~4.0000~~	~~4.0000~~	estimated for cooler weather	
I70	Zone Heating Efficiency or COP < OAT ---------->	10.0	COP	~~3.5000~~	~~3.5000~~	estimated for cooler weather	
I71	Heating Energy Source Zone		Type	~~Electric Energy~~	~~Electric Energy~~		
I72	Unoccupied Heating Done By		Zone, AHU	~~Zone Coil~~	~~Zone Coil~~		
I73	SFPMB Terminal Unit Power		W/CFM	~~0.30~~	~~0.30~~	Rough estimate based on drawings	x

Chilled Water and Heating Plants Inputs:

Tag	Variable Description		Units	Baseline	Proposed	Basis	FIM ID
				Chilled Water Pumps			
I78	Chiller Source		Type	No Chiller	No Chiller	Chiller plant excluded in template. Change to "Air Cooled" or "Water Cooled" and increase Tonnage from zero to add chiller plant. Increase GPM and ft wg from zero to add Chilled Water Pumps (CHWPs).	
I79	Chiller Type		Type	~~Centrifugal~~	~~Centrifugal~~		
I80	Chiller Nominal Tonnage		Tonnage	~~0~~	~~0.0~~		
I81	Chilled Water Flow Rate		GPM	~~0~~	~~0~~		
I82	Chilled Water System Design Pressure Drop		ft wg	~~0~~	~~0~~		
I83	Chilled Water Pumping CV or VFD		Type	~~VFD~~	~~VFD~~		
I84	Chilled Water Pump Enable Method		Type	~~Demand~~	~~Demand~~		
I85	Minimum Chilled Water GPM (% of Max Flow Rate)		%	~~33.0%~~	~~33.0%~~		
I86	Chilled Water Pump Efficiency (Motor and Pump)		%	~~60.0%~~	~~60.0%~~		
I87	Chilled Water Supply Temperature		°F	~~45~~	~~45~~		
I88	Chilled Water Temperature Control Strategy		Type	~~Fixed~~	~~Fixed~~		
I89	Chilled Water System Delta T (CHWRT - CHWST)		°F	~~15~~	~~15~~		
				Condenser Water Plant: Proposed Design Does Not Have a Cooling Tower			
I91	Condenser Water Flow Rate		GPM	~~0~~	~~0~~	Condenser plant excluded in template. Increase GPM and ft wg from zero to add condenser pumps (CWPs).	
I92	Condenser Water System Design Pressure Drop		ft wg	~~0~~	~~0~~		
I93	Condenser Water Pumping CV or VFD		Type	~~VFD~~	~~VFD~~		
I94	Condenser Water Pump Enable Method		Type	~~Demand~~	~~Demand~~		
I95	Minimum Condenser Water Flow Rate (% of Max Flow Rate)		%	~~33.0%~~	~~33.0%~~		
I96	Condenser Water Pump Efficiency (Motor and Pump)		%	~~60.0%~~	~~60.0%~~	Estimated	
I97	Condenser Water System Delta T(CWRT-CWST)		°F	~~20~~	~~20~~		
I98	Cooling Tower Design CWST		°F	~~85~~	~~85~~	1989 as builts	
I99	Cooling Tower Design Wet Bulb		°F	~~67~~	~~67~~	1989 as builts	
I100	Cooling Tower Design Fan Brake HP		bhp	~~25.0~~	~~25.0~~	Cooling towers excluded in template. Increase fan BHP from zero to add cooling towers.	
I101	Cooling Tower Fan Design Flow Rate		CFM	~~37000~~	~~37000~~	Cooling towers excluded in template. Increase CFM from zero to add cooling towers.- 1989 as builts	
I102	Cooling Tower Fan Control		Type	~~CV~~	~~CV~~	1989 as builts	
I103	Cooling Tower CWST Control Strategy		Type	~~Fixed CWST~~	~~Fixed CWST~~	1989 as builts	
I104	Cooling Tower Min CWST Temp		°F	~~85~~	~~85~~	1989 as builts	
I105	Minimum Cooling Tower Fan Speed		%	~~100.0%~~	~~100.0%~~	1989 as builts	
I106	Water Side Economizer		Yes/No	~~No~~	~~No~~	no economizer	
I107	Water Side Economizer HX Temp Approach		°F	~~5~~	~~5~~	NA	
				Heating Water Plant			
I109	Heating Water Flow Rate		GPM	0	0	HW pumps excluded in template. Increase GPM and ft wg from zero to add HW Pumps- boiler specs	
I110	Heating Water System Design Pressure Drop		ft wg	0	0		
I111	Heating Water Pumping CV or VFD		Type	CV	CV		
I112	Heating Water Pump Enable Method		Type	Demand	Demand		
I113	Minimum Heating Water Flow Rate (% of Max Flow Rate)		%	100.0%	100.0%		
I114	Heating Water Pump Efficiency (Motor and Pump)		%	60.0%	60.0%	Estimated	
I115	Heating Water System Delta T (HWST - HWRT)		°F	20.0	20.0		
				Heat Pump Loop Pump: This Module Not Used			
I118	Water Source Heat Pump Boiler		Yes/No	Yes	Yes	Heat pump loop excluded in template. Increase GPM and ft wg from zero to add heat pump loop.- WSHP fed by NG boilers	
I119	Heat Pump Boiler Efficiency		COP	90%	90%	condensing boilers, est eff. Of 91%	
I120	Heat Pump Loop Water Flow Rate		GPM	550	550	pump specs	
I121	Heat Pump Loop Water System Design Pressure Drop		ft wg	110	110	pump specs	
I122	Heat Pump Loop Water Pumping CV or VFD		Type	CV	CV	pump specs	
I123	Heat Pump Loop Water Pump Enable Method		Type	Continuous	Continuous		
I124	Minimum Heat Pump Loop Water Flow Rate (% of Max Flow Rate)		%	100.0%	100.0%		
I125	Heat Pump Loop Water Pump Efficiency (Motor and Pump)		%	55.0%	55.0%	Estimated	
I126	Heat Pump Loop Water System Delta T (HWST - HWRT)		°F	25.0	25.0	typical	

Domestic Hot Water Inputs:

Tag	Variable Description	Units	Baseline	Proposed	Basis	FIM ID
I131	DHW Fuel Type	Type	Natural Gas	Natural Gas	1989 Drawings	
I132	Energy Factor	-	0.70	0.70	NG fired DHW	
I133	Working Days Per Year (Used Only For DHW Calc)	Qty	365	365	Schedule A & Schedule B (ADJUST AS NEEDED)	
I134	Average Daily Hot Water Consumption Per Person	Gallons	2.0	2.0	estimate various usages	
I135	Average Entering Cold Water Temperature	°F	50.0	50.0	Typical	
I136	Supply Hot Water Temperature	°F	120.0	120.0	Typical	

Electric Demand

Tag	Description	Units	Baseline	EUI	Proposed	EUI	Savings	Savings (%)	EUI
O7	Cooling Peak kW	kW	95	-	41	-	54	57.0%	-
O8	AHU Heating Peak kW	kW	64	-	33	-	30	47.4%	-
O9	Zone Heating Peak kW	kW	0	-	0	-	0	0.0%	-
O10	Fan Peak kW	kW	10	-	11	-	-1	-14.3%	-
O11	Interior Lighting Peak kW	kW	25	-	25	-	0	0.0%	-
O12	Exterior Lighting Peak kW	kW	5	-	5	-	0	0.0%	-
O13	Plug Load Peak kW	kW	41	-	41	-	0	0.0%	-
O14	Pumps Peak kW	kW	21	-	21	-	0	0.0%	-
O15	Heat Rejection kW	kW	19	-	19	-	0	0.0%	-
O16	Miscellaneous Load Peak kW	kW	14		14	-	0	0.0%	-
O17	Other Peak kW	kW	0	-	0	-	0	0.0%	-
O18	Peak kW	kW	223	-	170	-	53	23.6%	-
O19	Peak kW (Sum 12 Monthly Peaks)	kW	2,129	-	1,787	-	343	16.1%	-

Electric Energy

Tag	Description	Units	Baseline	EUI	Proposed	EUI	Savings	Savings (%)	EUI
O23	Cooling	kWh/Yr	43,651	2.42	19,542	1.08	24,109	55.2%	1.34
O24	AHU Heating	kWh/Yr	92,600	5.14	78,103	4.33	14,498	15.7%	0.80
O25	Zone Heating	kWh/Yr	0	0.00	0	0.00	0	0.0%	0.00
O26	AHU Fans	kWh/Yr	84,281	4.67	90,246	5.00	-5,965	-7.1%	-0.33
O27	Zone Fans	kWh/Yr	0	0.00	0	0.00	0	0.0%	0.00
O28	Interior Lighting	kWh/Yr	215,577	11.96	215,577	11.96	0	0.0%	0.00
O29	Exterior Lighting	kWh/Yr	21,900	1.21	21,900	1.21	0	0.0%	0.00
O30	Plug Loads	kWh/Yr	244,056	13.54	244,056	13.54	0	0.0%	0.00
O31	Pumps	kWh/Yr	181,710	10.08	181,710	10.08	0	0.0%	0.00
O32	Heat Rejection	kWh/Yr	6,008	0.33	3,801	0.21	2,207	36.7%	0.12
O33	Miscellaneous Loads	kWh/Yr	120,327	6.67	120,327	6.67	0	0.0%	0.00
O34	Domestic Hot Water	kWh/Yr	0	0.00	0	0.00	0	0.0%	0.00
O35	Other Electricity	kWh/Yr	0	0.00	0	0.00	0	0.0%	0.00
O36	Total	kWh/Yr	1,010,110	56.02	975,261	54.09	34,849	3.4%	1.93

Natural Gas

Tag	Description	Units	Baseline	EUI	Proposed	EUI	Savings	Savings (%)	EUI
O40	AHU Heating	Therm/Yr	13,207	21.47	11,306	18.38	1,901	14.4%	3.09
O41	Zone Heating	Therm/Yr	0	0.00	0	0.00	0	0.0%	0.00
O42	Domestic Hot Water	Therm/Yr	643	1.05	643	1.05	0	0.0%	0.00
O43	Other Natural Gas	Therm/Yr	0	0.00	0	0.00	0	0.0%	0.00
O44	Total	Therm/Yr	13,850	22.51	11,949	19.42	1,901	13.7%	3.09

0

Tag	Description	Units	Baseline	EUI	Proposed	EUI	Savings	Savings (%)	EUI
O48	AHU Heating	/Yr	0	0.00	0	0.00	0	0.0%	0.00
O49	Zone Heating	/Yr	0	0.00	0	0.00	0	0.0%	0.00
O50	Domestic Hot Water	/Yr	0	0.00	0	0.00	0	0.0%	0.00
O51	Other 0	/Yr	0	0.00	0	0.00	0	0.0%	0.00
O52	Total	/Yr	0	0.00	0	0.00	0	0.0%	0.00

Total Energy

Tag	Description	Units	Baseline	EUI	Proposed	EUI	Savings	Savings (%)	EUI
O56	Total Energy	kBtu/Yr	4,831,523	78.53	4,522,501	73.51	309,022	6.4%	5.02

Cooling required

Existing Equipment	
Room Temperature(estimated)	90
Desired Temperature	74
Temperature Difference	16
Room Area	205
Room Height	8
ACH (ASHRAE rec)	8
EER	10.6
CFM	218.7
Q(btu/hr)	3779
Watts	1216.27
annual energy consumption (kwh)	10654.51

Cooling required

Proposed Equipment	
Room Temperature(estimated)	90
Desired Temperature	74
Temperature Difference	16
Room Area	205
Room Height	8
ACH (ASHRAE rec)	8
EER	11.1
CFM	218.7
Q(btu/hr)	3779
Watts	1161.48
annual energy consumption(kwh)	10174.58

Existing Outdoor Unit

FUJITSU

SUBMITTAL 24RLXFZ

AIRSTAGE H-Series

Inverter Driven Heat Pump — **24,000 BTU Multi Zone System**

Job Name		Date	
Location		Approval	
Engineer		Construction	
Submitted To		Unit No	
Submitted By		Drawing No	
Reference			

PRODUCT FEATURES

Operate as few as one indoor unit or all indoor units
Mix & match from 4 indoor unit styles
Blue-fin condenser coil coating

MODEL NUMBERS				
Outdoor Unit				AOU24RLXFZ
System				24RLXFZ
EFFICIENCIES				
Indoor Unit Type		Non - Ducted	Ducted	Mix
SEER		18	15.5	16.75
SEER2		18.5	16	17.25
EER		12.5	10.6	11.55
EER2		12.5	10.6	11.55
HSPF		9.5	9.0	9.3
HSPF 2 (IV) / HSPF 2 (V)		8.7/6.5	8.5/6.6	8.6/6.5
COP	kW/kW	4.04	3.42	3.73
COP	Btu/hW	13.8	11.7	12.7
COP2	kW/kW	4.04	3.42	3.73
COP2	Btu/hW	13.8	11.7	12.7
OUTDOOR TEMPERATURE OPERATION RANGE				
Cooling	°F(°C)	14 to 115 (-10 to 46)		
Heating	°F(°C)	5 to 75 (-15 to 24)		
CAPACITIES				
Total Capacity Range		Btu/h	14,000 - 27,000	
Cooling	Rated		22,000	
	Min.–Max.		6,100 - 27,000	
Heating	Rated		24,000	
	Min.–Max.		6,800 - 29,800	
LINESET REQUIREMENTS				
Connection Method			Flare	
Liquid	in (mm)	Ø1/4 (Ø6.35) × 3		
Gas	in (mm)	Ø3/8 (Ø9.52) × 2 × Ø1/2 (Ø12.7) × 1		
Pre-charge length (Total)		ft (m)	98 (30)	
Max. length (Total)			164 (50)	
Max. length (Each)			82 (25)	
Min. length (Total)			49 (15)	
Min. length (Each)			16 (5)	
Max. height difference			49 (15)	
Max. height difference between indoor units			33 (10)	
OUTDOOR DIMENSIONS & WEIGHT				
Net (H x W x D)	in (mm)	27-9/16 × 35-7/16 × 13 (700 × 900 × 330)		
Gross (H x W x D)	in (mm)	34-3/16 × 41-5/16 × 17-1/2 (865 × 1,050 × 445)		
Net Weight	lb (kg)	124 (56)		
Gross Weight	lb (kg)	141 (64)		

Warranty Information

7 Year Compressor, 5 Year Parts out-of-the-box Warranty

10 Year Compressor, 10 Year Parts Warranty when registered within 60 days of installation in a residence

12 Year Compressor, 12 Year Parts Warranty when registered within 60 days of installation in a residence, and installed by a Fujitsu Elite contractor

SOUND PRESSURE			
Outdoor Unit	Cooling	dB (A)	51
	Heating		52
FAN DATA			
Outdoor Unit Airflow rate	Cooling	CFM (m3/h)	1,942 (3,300)
	Heating		1,942 (3,300)

ELECTRICAL SPECIFICATIONS				
Indoor Unit Type		Non - Ducted	Ducted	Mix
Voltage/Frequency/Phase				1Ø 208/230 V 60 Hz
Available Voltage Range				187–264V
Current	Cooling	7.7	9.1	8.4
	Heating	7.6	9	8.3
Maximum Operating Current			A	13.7
Starting current				9
MCA				17
Maximum Circuit Breaker				20
Rated Input Power	Cooling	1.76	2.08	-
	Heating	1.73	2.05	-
Max. Input Power	Cooling	2.6	2.84	-
	Heating	2.93	2.93	-

Due to continuous product improvements, specifications are subject to change without notice. Please log in to the Fujitsu Portal for the most up-to-date documentation https://connect.fujitsugeneral.com

Effective Date: 1/10/2023

Proposed Outdoor Unit

SAMSUNG

SUBMITTAL AJ020BXJ2CH/AA (JXH20J2B)

Samsung FJM Series, 2 Port Condensing Unit

Job Name _____ Location _____

Purchaser _____ Engineer _____

Submitted to _____ Reference ☐ Approval ☐ Construction ☐

Unit Designation _____ Schedule # _____

Model	US Code		JXH20J2B
	Model Number		AJ020BXJ2CH/AA
Performance	Capacity [1] (min. / standard / max.)	Cooling (Btu/h) [1]	5,500 / 18,000 / 22,650
		Heating (Btu/h) [1]	3,500 / 22,000 / 27,600
	SEER (Ducted / Mixed / Non-ducted) [2]		18.0 / 18.75 / 19.5
	EER (Ducted / Mixed / Non-ducted) [2]		11.1 / 11.9 / 12.7
	HSPF (Ducted / Mixed / Non-ducted) [2]		9.5 / 9.75 / 10.0
	SEER2 (Ducted / Mixed / Non-ducted) [3]		18.0 / 18.75 / 19.5
	EER2 (Ducted / Mixed / Non-ducted) [3]		11.1 / 11.9 / 12.7
	HSPF2 (Ducted / Mixed / Non-ducted) [3]		8.2 / 8.4 / 8.6
Power	Voltage	(a/V/Hz)	1 / 208-230 / 60
	Nominal Current [4]	Cooling (A)	6.8
		Heating (A)	8.3
	Max. Breaker	Amps	20
	Minimum Circuit Ampacity (A)		16.5
Dimensions	W X H X D	Inches	34 5/8 X 31 7/16 X 12 3/16
	Weight	lbs.	116.8
Noise Level	Cooling (Max.)	dB (A)	48
	Heating (Max.)	dB (A)	51
Operating Temperatures	Cooling		14 ~ 114.8°F (-10 ~ 46.0°C)
	Heating		5 ~75°F (-15 ~ 24.0°C)
Pipe Connections	High Side		1/4" X 2
	Low Side (suction)		3/8" X 1 + 1/2" X 1
	Maximum Individual Line Set Length		82 ft
	Maximum Line Set Length (total)		164 ft
	Maximum Vertical Separation	Outdoor to Indoor	49 ft
		Highest to Lowest Indoor	25 ft
	Included Pipe Adapter		1 - 1/2" X 3/8"
Condenser Fan	Motor		BLDC With Propeller Fan (1)
	Output	Watts / FLA	125 / 1.28
		CFM	1,667
Compressor	Type		Twin BLDC Rotary Inverter
	RLA	Amps	11.2
Heat Exchanger	Type		Aluminum Fin - Copper Tube
Refrigerant	Type		R410A
	Control Method		Electronic Expansion Valve
	Factory Charge		77.6 oz
	Charged for		98 ft
	Additional Refrigerant		0.11 oz/ft over 98 ft
Accessories	Wall Bracket		☐ CKN-250
	Wind Baffle	Front	☐ WBF-7M
		Back	☐ WBB-7M-B
Certifications	Safety		ETL (UL 60335-2-40)
Warranty	10 Years compressor, 10 year parts, 1 year limited labor (registration required)		

[1] Standard capacity is based on non-ducted rated capacity. Minimum and maximum capacity will vary based on connected indoor unit type, capacity, and quantity along with indoor and outdoor temperatures. Refer to system capacity tables for full capacity details.

[2] Performance data certified by AHRI to AHRI 210-240 (2017) with Addendum 1.

[3] Performance data certified by AHRI to AHRI 210-240 (2023). Effective January 1st, 2023.

[4] Rated current based on highest combination ratio of non-ducted indoor units.

This publication reflects both the 1987 Appendix M metric (SEER) and the 2023 Appendix M1 metric (SEER2). Efficiency requirements are published at 10 C.F.R. 430.32(c). Please refer to www.AHRInet.org for more information about updated energy metrics.

Samsung HVAC maintains a policy of ongoing development, specifications are subject to change without notice. Refer to www.AHRIdirectory.org for current reference numbers.

SHA-FJM-JXH20J2B-2311A

888-899-6067

www.SamsungHVAC.com

General Information
- Auto or manual addressing of indoor units
- The outdoor unit shall supply power individually to the indoor units via 14/3 AWG power wire
- Auto-restart after power loss
- Available maximum current setting option to reduce operating current
- System energy consumption can be viewed using Samsung SmartThings mobile app (not revenue grade, for reference only)
- Soft-start to reduce current demand during compressor start
- Optional snow accumulation prevention setting to prevent snow drifting against idle outdoor units

Construction
- The outdoor unit shall be galvanized steel with a baked on powder coated finish for durability

Heat Exchanger
- The heat exchanger shall be mechanically bonded fin to copper tube

Controls
- Control signal shall be a DDC type signal
- Interconnecting control wire between outdoor and indoor units shall be 16/2 AWG
- The system shall integrate with Samsung Controls Solution without the use of an interface module

Refrigerant System
- The refrigerant shall be R410A
- The compressor shall be hermetically sealed, inverter controlled, Twin Rotary BLDC
- Refrigerant flow shall be controlled by 2 separate electronic expansion valves at outdoor unit

Proper sizing and installation of equipment is critical to achieve optimal performance. Split system air conditioners and heat pumps (excluding ductless systems) must be matched with appropriate coil components to meet ENERGYSTAR criteria. Ask your contractor for details or visit www.energystar.gov

Note: Qualification for ENERGYSTAR requires use of non-ducted indoor units.

ENERGY STAR

AHRI CERTIFIED

Intertek

8. FACILITY BENCHMARKING

N/A

ENERGY STAR® Score[1]

Public Safety

Primary Property Type: Police Station
Gross Floor Area (ft²): 61,523
Built: 1990

For Year Ending: December 31, 2024
Date Generated: February 24, 2025

1. The ENERGY STAR score is a 1-100 assessment of a building's energy efficiency as compared with similar buildings nationwide, adjusting for climate and business activity.

Property & Contact Information

Property Address	Property Owner	Primary Contact
Public Safety 8701 160th Ave NE Redmond, Washington 98052	City of Redmond, WA 15670 NE 85th St Redmond, WA 98052 (___)___-____	____ _____ , (___)___-____ _____

Property ID: 5737726

Energy Consumption and Energy Use Intensity (EUI)

Site EUI 76.3 kBtu/ft²	**Annual Energy by Fuel**		**Annual Emissions**	
	Natural Gas (kBtu)	1,046,261 (22%)	Total (Location-Based) GHG Emissions (Metric Tons CO2e/ year)	349
	Electric - Grid (kBtu)	3,647,487 (78%)		
Source EUI 183.9 kBtu/ft²	**National Median Comparison**		**Green Power**	
	National Median Site EUI (kBtu/ft²)	51.8	Green Power – Onsite (kWh)	N/A
	National Median Source EUI (kBtu/ft²)	124.9	Green Power – Offsite (kWh)	0
	% Diff from National Median Source EUI	47%	Percent of RECs Retained	N/A

This property does not qualify for an ENERGY STAR score because it has been designated as a Police Station. The only types of properties that can earn an ENERGY STAR score for the entire campus are Hotels, Hospitals, K-12 Schools, Multifamily, Senior Care Communities, and Wastewater Treatment Plants.

Energy Use By Calendar Month (Not Weather Normalized)

Property: Public Safety (ID 5737726)

02/24/2025 01:57 PM EST

Month	Electric - Grid (kBtu)	Natural Gas (kBtu)
Sep-21	291761.8	76077.0
Oct-21	313483.8	183920.0
Nov-21	457628.1	239978.0
Dec-21	501581.2	364307.0
Jan-22	347179.5	577711.0
Feb-22	286033.4	384016.9
Mar-22	294149.6	276368.0
Apr-22	283262.3	303500.1
May-22	281226.0	111842.0
Jun-22	279616.8	34611.0
Jul-22	461497.0	24359.0
Aug-22	326337.3	11429.0
Sep-22	294893.7	21103.0
Oct-22	283680.8	86196.0
Nov-22	302700.0	256138.0
Dec-22	332139.6	241608.0
Jan-23	314671.4	125611.0

Feb-23	292425.0	171441.0
Mar-23	305310.6	172078.0
Apr-23	300840.3	135934.0
May-23	300956.2	46431.0
Jun-23	287272.9	18705.0
Jul-23	306276.8	13210.0
Aug-23	309012.0	14275.0
Sep-23	280828.7	27928.0
Oct-23	295525.6	93637.0
Nov-23	306354.9	194829.0
Dec-23	325935.9	218536.0
Jan-24	336086.5	252288.0
Feb-24	299762.0	159317.0
Mar-24	297673.6	154509.0
Apr-24	278055.9	80694.0
May-24	290947.8	41654.0
Jun-24	291454.7	16222.0
Jul-24	313344.3	10915.0
Aug-24	311234.1	10146.0

9. APPLICABLE BUILDING, MECHANICAL, ENERGY, OR OTHER PERTINENT STATE AND LOCAL CODES

The code references for this project are:

- 2021 Washington State Energy Code
- 2021 International Building Code
- 2021 Uniform Plumbing Code (UPC)
- 2021 International Mechanical Code (IMC)
- 2023 National Electrical Code

10. DESCRIPTION OF FACILITY IMPROVEMENT MEASURES (FIMS) RECOMMENDED

03.01-PSB Replace WSHP

Replace (13) and add (1) new WSHP similar to the scope performed in Ph1 and Ph2. Relocate some WSHPs to improve access and zoning. Relocate and provide piping, ductwork, and controls for (1) existing WSHP that was previously replaced by the owner. Provide necessary duct modifications. The new WSHPs will include new hose kits and 2-position control valves for the condenser water

04.01-PSB Upgrade HVAC Controls

There are three control systems in the building that cannot communicate with each other and cannot be accessed. The legacy Niagara control system operates most of the mechanical systems, is not compatible with current web browsers and hence not accessible. The newer Niagara (2017) system that controls some of the heat pumps is also not supported and not accessible. The Alerton system controls the WSHPs and condenser pump installed in 2021 and is accessible from the site. Controls scope for mechanical FIMs will be included in respective FIMs. This FIM includes controls upgrade for remaining HVAC equipment. The new controls system will evaluate the following features: zone-based start/stop schedule to align with space use, occupancy sensor based WSHP operation, zone CO2 sensor based ventilation control at the AHU, temperature/relative humidity monitoring, monitoring for relevant spaces, status monitoring for relevant equipment, and appropriate alarming

03.02-PSB Upgrade Main AHU with Fan Array

The Main AHU provides outside (ventilation) air to the area east of the main lobby at the Public Safety Building (PSB). The Main AHU is original to the building and has a non-functional Inlet Guide Vane. The exhaust fan provides relief/exhaust air for the AHU system. The exhaust fan and motor are beyond its useful life and shall be replaced. Inlet Guide Vane of the exhaust fan is non-functional as well. This measure replaces the AHU fan and motor with a new fan array and the exhaust fan motor with a new inverter duty motor. The new fan array provides redundancy and will vary fan speeds, saving energy. The system will be set to provide required ventilation airflow and economizer cooling when outside conditions are suitable. Manual balance dampers will be demolished and replaced with constant airflow regulating dampers to serve constant airflow to all 24/7 spaces identified by the City

02.01-PSB Replace Condenser Pump

Replace stand-by pump of the existing duty-standby pump setup. Duty pump was replaced in 2021. The new pump will match the 2021 installation. New VFD and programming for variable flow operation will be performed

03.06-PSB IDF Room Split System

There is one outdoor unit with two indoor wall units. The scope is to replace the system to match existing cooling capacity. Scope included replacing the indoor units, outdoor unit and refrigerant piping

11. DESCRIPTION OF FIMS CONSIDERED AND NOT RECOMMENDED OR NOT FINANCIALLY VIABLE

The following FIMs were considered but were not recommended due to financial viability, construction feasibility, and/or owner interest:

- Cooling Tower Variable Speed Operation: Existing cooling tower has (2) motors, 5hp and 20hp. Replace 5hp with 20hp and add VFD. Existing 20hp motor will be as -is as backup
- Replace Remaining Water Source Heat Pumps: The building has a total of (65) WSHPs. (26) of these have been replaced, another (14) will be replaced in this phase. This measure recommends a replacement of the remaining (25) WSHPs and including a 2-position control valve for the condenser loop hose.
- Ventilation Supply and Exhaust Duct Improvements: Existing supply duct provides ventilation air to the plenum, closer to the WSHPs. Air is ducted to some WSHPs. Modify the ductwork to improve the effectiveness of ventilation air distribution in the occupied space.
    - Extend the supply duct to connect directly to the WSHP unit. Extend the return duct to the zones served by the WSHP unit and install return diffuser (s) in the ceiling. Install necessary manual balancing damper. Optionally, motorized 2-position dampers can be installed in the supply and return duct to control airflow based on zone occupancy. This will further enhance the VAV operation of the building Main AHU and Exhaust Fan.
- Dedicated Exhaust Fans for Restrooms: Currently restrooms and spaces that require continuous exhaust connect to the general exhaust. Provide dedicated exhaust fans for restrooms, locker rooms, and other spaces. If Heat Recovery is implemented for the OA AHU, exhausting the restrooms to general exhaust will aid the heat recovery. Additional consideration will be needed to maintain the restroom exhaust airflow.
- Dedicated Make-up and Exhaust with Heat Recovery for Locker Rooms: The two locker rooms have a dedicated 1400 CFM exhaust fan and supply air is from the Main OA AHU. This could be considered along with the AHU replacement scope, only if downsizing by 1400 CFM could benefit the OA AHU design.
- Upgrade Packaged Rooftop Gas Packs with Heat Pump Units: Upgrade the (2) units with fully electric or hybrid heat pump units. This will partly depend on the available electrical capacity.
- Gas Unit Heaters Upgrades: Replace gas unit heaters with split system heat pumps. Consider replacing with electrical alternative.
- Replace Gun Range Exhaust Fan Failed VFD: The gun range exhaust fan VFD has failed. The fan is expected to operate at fixed speed airflow to maintain airflow requirements in the space. Replacing the VFD will provide soft start and ability to adjust airflow.
- Gun Range Supply Air Unit and Exhaust Fan Monitoring: The supply air Reznor unit and the exhaust fan operate standalone from a switch located in the space. It is not integrated to the BAS. This measure proposes to integrate the system to BAS for start/stop status and space temperature monitoring only. Operation of the unit will remain from the local switch.
- Decouple the 'Gun Cleaning' Area Exhaust from the 'Gun Range' HVAC: The cleaning area has a dedicated exhaust fan that is interlocked with the switch controlling the Range supply and exhaust fan. The cleaning area can be in use when the Range is not in use and the HVAC is not

switched on, resulting in lack of exhaust. The exhaust fan can be provided a dedicated manual switch for start/stop that will allow its use even when the Range is not occupied. Consider use of electrical circuit and make-up air provision.

- Dispatch Data Center Humidity Control: There are (2) split systems in the Dispatch Data Center, but they are oversized, and over cycling results in low humidity. This often enables the humidifier. Replace with a properly sized system.
- Plug Load Management: Building currently has a lot of charging stations for laptops and other electronic devices. Consider plug load management system for energy efficiency.

12. MEASUREMENT AND VERIFICATION (M&V) PLAN

Table 3.2 - M&V Plan Outline

Project	City of Redmond
Scenario	PSB HVAC 2025 - All FIMs PreFinal
Date	3/11/2025

							Audit Stage (Baselining)	Annual		
FIM Name	Facility	IPMVP Option	KPI	Key Performance Indicators	Baseline Values	Proposed Values	Tasks	Tasks	Ongoing Owner Responsibilities	Stipulated Factors
03.01-PSB Replace WSHP	Redmond Public Safety Building		1.	Heating Efficiency (COP)	HP-D: 3.6 HP-27A: 4.6 HP-26A: 5.8 HP-26B: 4.3 HP-25A: 4.6 HP-25B: 5 HP-24A: 4.5 HP-17B: 5 HP-J3:3.6 HP-C: 3.7 HP-A: 3.7	HP-A: 4.5 HP-20B: 4.6 HP-18A: 4.9 HP-7B: 5.1 HP-9B: 5.1 HP-4A: 5.1 HP-5A: 4.8 HP-9A: 4.8 HP-19A: 4.8 HP-19B: 4.8 HP-10B: 4.8 HP-20A: 4.9 HP-5B: 4.9 HP-31B: 4.7	Site Audit, Review As-Built drawings	Review submittal/as-built documentation to verify heating efficiency.	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Baseline Nameplate Values, Estimated Baseline Values, Weather, Building Envelope, Hours of Operation, Occupancy, Plug Loads, & Lighting Loads.
			2.	Cooling Efficiency (EER)	HP-D: 10.9 HP-27A: 14.3 HP-26A: 17.3 HP-26B: 13.4 HP-25A: 15.1 HP-25B: 14.5 HP-24A: 15.4 HP-17B: 14.3 HP-J3:10.2 HP-C: 10.4 HP-A: 11	HP-A: 14.3 HP-20B: 13.4 HP-18A: 16.4 HP-7B: 15 HP-9B: 15 HP-4A: 15.4 HP-5A: 14.5 HP-9A: 14.5 HP-19A: 14.5 HP-19B: 14.5 HP-10B: 14.5 HP-20A: 15.2 HP-5B: 15.2 HP-31B: 14.7	Site Audit, Review As-Built drawings	Review submittal/as-built documentation to verify cooling efficiency.	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Baseline Nameplate Values, Estimated Baseline Values, Weather, Building Envelope, Hours of Operation, Occupancy, Plug Loads, & Lighting Loads.
04.01-PSB Upgrade HVAC Controls	Redmond Public Safety Building	A	1.	Occupied Space Temperature Setpoints	Occupied Heating = 70 F Unoccupied Heating = 70 F Occupied Cooling = 75 F Unoccupied Cooling = 75 F 100% of building operated 24/7, no building setbacks	Refer Temperature Setpoints included in the SOW	Site Audit, Logger Data	Review a sampling of occupied space temperature setpoints.	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Heating and cooling baseline temperature stipulated
			2.	Occupied Schedule	Mon- Sun: 24 hrs	Refer Occupancy Schedule and building area included in the SOW	Owner Inputs	Review the HVAC system occupied schedule	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Baseline Nameplate Values, Estimated Baseline Values, Weather, Building Envelope, Hours of Operation, Occupancy, Plug Loads, & Lighting Loads.
03.02-PSB Upgrade Main AHU with Fan Array	Redmond Public Safety Building		1.	AHU TSP	4.5 in. w.c.	5.2 in. w.c.	Site Audit, Collect HVAC BMS data, Review As-Built drawings	Review TAB Report to verify TSP.	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Baseline Nameplate Values, Estimated Baseline Values, Weather, Building Envelope, Hours of Operation, Occupancy, Plug Loads, & Lighting Loads.

Table 3.2 - M&V Plan Outline

Project	City of Redmond
Scenario	PSB HVAC 2025 - All FIMs PreFinal
Date	3/11/2025

							Audit Stage (Baselining)	Annual		
FIM Name	Facility	IPMVP Option	KPI	Key Performance Indicators	Baseline Values	Proposed Values	Tasks	Tasks	Ongoing Owner Responsibilities	Stipulated Factors
			2.	AHU Fan Speed Control	Inlet Guide Vanes with manual operation	VFD with occupancy and CO2 based control	Site Audit, Collect HVAC BMS data, Review As-Built drawings	Review TAB Report to verify air flow values.	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Baseline Nameplate Values, Estimated Baseline Values, Weather, Building Envelope, Hours of Operation, Occupancy, Plug Loads, & Lighting Loads. Baseline Min Speed = 100% Proposed Min Speed = 90%
03.06-PSB IDF Room Split System	Redmond Public Safety Building		1.	Cooling Efficiency (EER)	Split System: 10.6	Split System: 11.1	Site Audit, Review As-Built drawings	Review submittal/as-built documentation to verify cooling efficiency.	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Baseline Nameplate Values, Estimated Baseline Values, Weather, Building Envelope, Hours of Operation, Occupancy, Plug Loads, & Lighting Loads.

13. FINANCIAL ANALYSIS OF FIMS

Washington State Department of Commerce Investment Criteria Tool (Form F)

Result
The SIR of this bundle of measures as analyzed is greater than or equal to 1.

Project Information	
Project:	Redmond Public Safety Targeted HVAC
Address:	8701 160th Ave NE, Redmond, 98052
Company:	McKinstry
Contact:	Heramb Amonkar
Contact Phone:	2068328765
Contact Email:	heramba@mckinstry.com

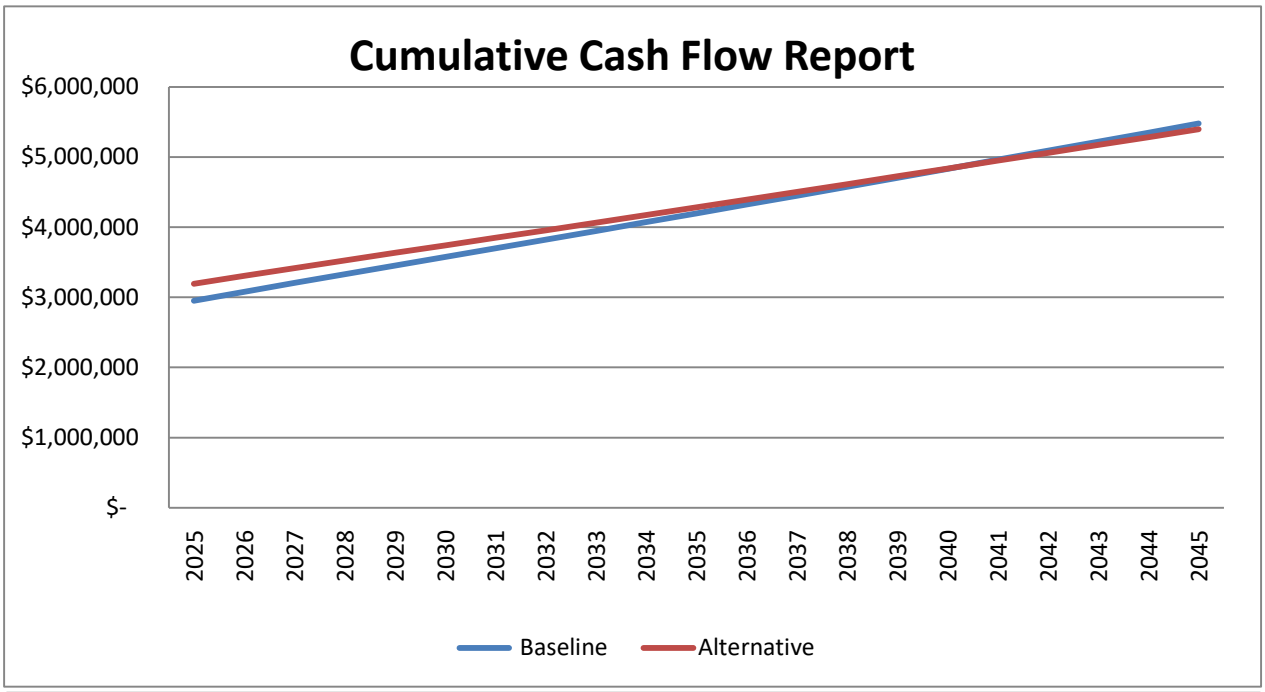
Life Cycle Cost Analysis Results		
	Baseline Code Minimum	**Alternative Redmond PSB Targeted HVAC**
Net Present Savings		$55,043
Savings-to-Investment Ratio (SIR)		1.22
Internal Rate of Return		3%
First Construction Costs (minus Grants)	$2,945,129	$3,195,260
Present Value of Capital Costs	$2,945,129	$3,195,260
Present Value of Maintenance Costs	$132,551	$0
Present Value of Utility Costs	$2,192,083	$2,019,460
Total Life Cycle Cost (LCC)	$5,269,763	$5,214,720

CO2 Emissions Reductions over Building Life by Energy Source		
	Baseline Code Minimum (tons CO2e)	**Alternative Redmond PSB Targeted HVAC (tons CO2e)**
Electricity	1,752	1,639
Natural Gas	1,339	1,117
Diesel/#2	0	0
Fuel Oil/#5, #6	0	0
Gasoline	0	0
LPG	0	0
District Heat	0	0
Coal	0	0
Biomass	0	0
Total CO2e Emissions (tons)	3,091	2,756
CO2e Emissions Reductions (tons)		335
Percent Reductions		11%

Cost Summary in 2025 Dollars		
	Baseline Code Minimum	**Alternative Redmond PSB Targeted HVAC**
CAPITAL EXPENDITURES ($ total)		
Capital Expenditures Over Study Period	$2,945,129	$3,220,000
Financing Expenses	$0	$0
Residual Value at End of Study Period	$0	$0
CapEx minus Baseline Avoided Costs		$274,871
Grants		$24,740
CapEx Minus Avoided Costs & Grants		$250,131
ANNUAL COSTS & BENEFITS ($ per year)		
Annual Maintenance Expenses	$6,200	$0
Annualized Major Maintenance Expenses	$0	$0
Incremental Total Maintenance Expenses		-$6,200
Annual Utility Savings		$9,868
Annual Incentives		$0
Annual Benefits minus Costs ($/year)		$16,068
Simple Payback (years)		15.6
Return on Investment		6%

Annual Savings Summary	
Description	**Alternative Redmond PSB Targeted HVAC**
Water (CCF/year)	**0**
Electricity (kWh/year)	**68,248**
Natural Gas (therms/year)	**2,092**
Diesel/#2 (gallons/year)	**0**
Fuel Oil/#5, #6 (gallons/year)	**0**
Gasoline (gallons/year)	**0**
LPG (gallons/year)	**0**
District Heat (MMBtu/year)	**0**
Coal (MMBtu/year)	**0**
Biomass (MMBtu/year)	**0**
CO2e Reductions through 2029 (tons/year)	39
CO2e Reductions, 2030 and later (tons/year)	11

* Electricity is assumed to be carbon neutral 2030 and later.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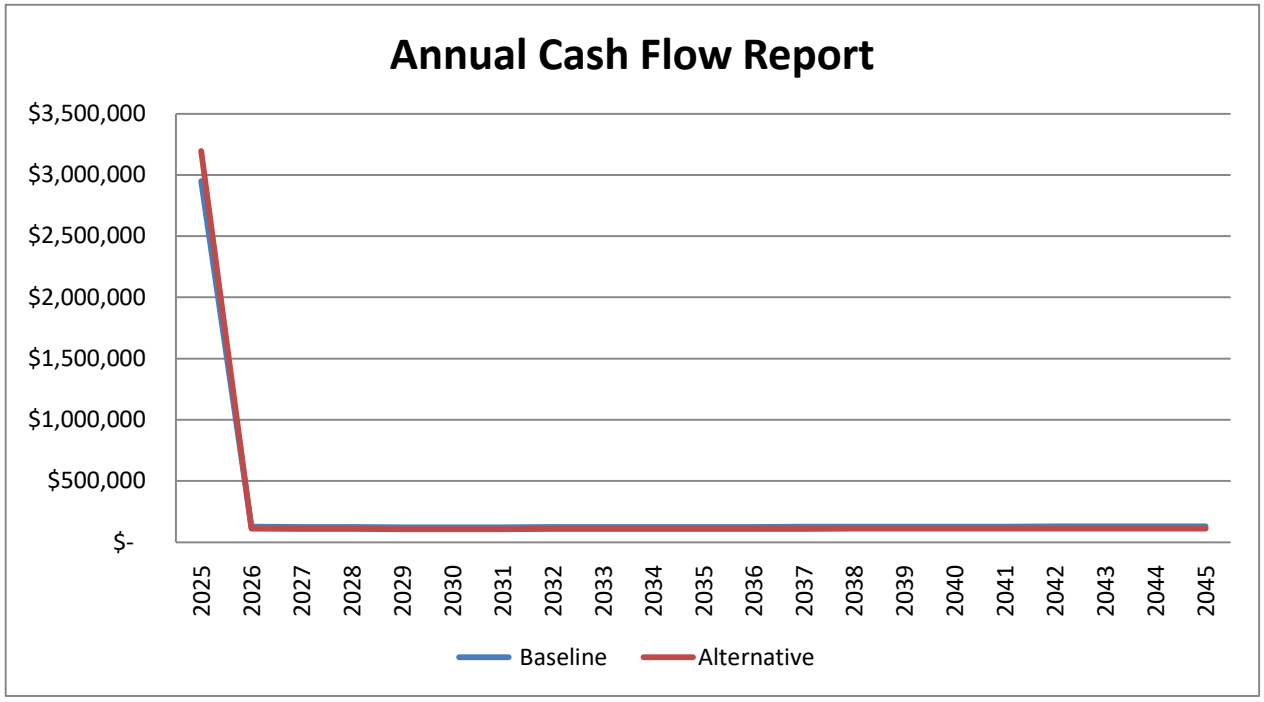
Baseline
Alternative


Annual Cash Flow Report
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Baseline
Alternative

Office of Financial Management
Olympia, Washington - Version: 2024-A
Life Cycle Cost Analysis Tool

Executive Report

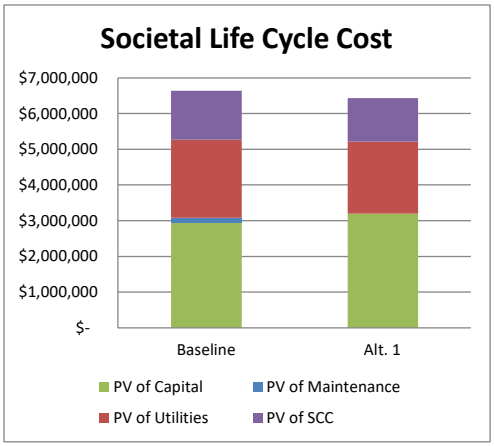
Project Information	
Project:	Redmond Public Safety Targeted HVAC
Address:	8701 160th Ave NE, Redmond, 98052
Company:	McKinstry
Contact:	Heramb Amonkar
Contact Phone:	(206) 832-8765
Contact Email:	heramba@mckinstry.com

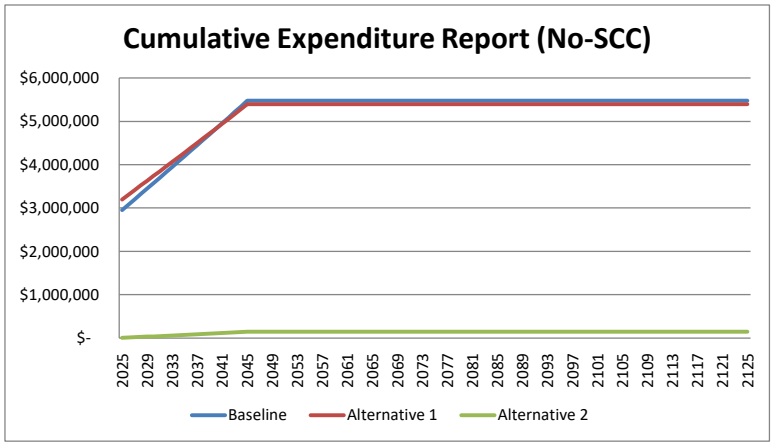
Key Analysis Variables		Building Characteristics	
Study Period (years)	20	Gross (Sq.Ft.)	61,523
Nominal Discount Rate	3.57%	Useable (Sq.Ft)	61,523
Maintenance Escalation	1.00%	Space Efficiency	100.0%
Zero Year (Current Year)	2025	Project Phase	0
Construction Years	0	Building Type	0

Life Cycle Cost Analysis		BEST
Alternative	Baseline	Alt. 1
1st Construction Costs	$ 2,945,129	$ 3,195,260
PV of Capital Costs	$ 2,945,129	$ 3,195,260
PV of Maintenance Costs	$ 132,551	$ -
PV of Utility Costs	$ 2,192,083	$ 2,019,460
Total Life Cycle Cost (LCC)	**$ 5,269,763**	**$ 5,214,720**
Net Present Savings (NPS)	**N/A**	**$ 55,043**

Societal LCC takes into consideration the social cost of carbon dioxide emissions caused by operational energy consumption

(GHG) Social Life Cycle Cost		
GHG Impact from Utility Consumption	Baseline	Alt. 1
Tons of CO2e over Study Period	3,091	2,756
% CO2e Reduction vs. Baseline	N/A	11%
Present Social Cost of Carbon (SCC)	$ 1,369,894	$ 1,220,584
Total LCC with SCC	**$ 6,639,657**	**$ 6,435,304**
NPS with SCC	**N/A**	**$ 204,353**





Baseline Short Description
Code minimum replacements for equipment being upgraded in targeted HVAC project.
Alternative 1 Short Description
Redmond PSB Targeted HVAC IGA

14. FIM SUMMARY TABLE

Table 3.1 - Energy Savings Summary

Project	City of Redmond
Scenario	PSB HVAC 2025 - All FIMs PreFinal
Date	3/11/2025

		Electricity		Fossil Natural Gas		Total
Facility Improvement Measures	Facility	kWh	kWh ($)	Therm	Therm ($)	($)
03.01-PSB Replace WSHP	Redmond Public Safety Building	13,082	$1,346	0	$0	$1,346
04.01-PSB Upgrade HVAC Controls	Redmond Public Safety Building	23,370	$2,405	1,664	$2,263	$4,668
03.02-PSB Upgrade Main AHU with Fan Array	Redmond Public Safety Building	31,364	$3,227	428	$581	$3,809
02.01-PSB Replace Condenser Pump	Redmond Public Safety Building	0	$0	0	$0	$0
03.06-PSB IDF Room Split System	Redmond Public Safety Building	432	$44	0	$0	$44
		68,248	**$7,023**	**2,092**	**$2,845**	**$9,867**

15. NORMATIVE ANNEX C REPORTING FORMS

These forms are not applicable for this audit since this was a targeted audit related to specific FIMs.

16. AUDITOR OF RECORD

Heramb Amonkar is the auditor of record and is a licensed Professional Engineer in the State of Washington.