City of Redmond – Public Safety Building HVAC Upgrades

Project # 2025-147 A(1)

ENERGY SERVICES PROPOSAL

REDMOND, WA

MARCH 17, 2025

For the Life of
Your Building

McKinstry
For The Life Of Your Building

Project Contacts

AREA OF RESPONSIBILITY	NAME	EMAIL
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1. Executive Summary

OUTCOME SNAPSHOT

This project represents an excellent opportunity to significantly improve facilities while saving energy and trimming utility spending. McKinstry looks forward to making this project a success.

McKinstry estimates these **savings** if proposed facility improvement measures (FIMs) are installed:

$10,404
Utility cost savings/year

67,906
Guaranteed kWh/year

2,092
Guaranteed Therms/year

Carbon dioxide emissions reductions would equal:

18
Acres of trees planted

145,284
lbs. CO_2/year

1.1 Overview

Through the Washington State Department of Enterprise Services (DES) Energy Savings Performance Contracting (ESPC) program, McKinstry has completed an extensive study and investigation of energy upgrades for City of Redmond. Our Energy Services Proposal presents a holistic project solution for improving the overall facility efficiency and operation. Our proposed solutions will result in lower utility use and cost along with improved building system performance and occupant productivity. For additional information on the project, reference the Investment Grade Audit Report, dated TBD.

1.2 Current Situation

CHALLENGES

- Inaccessible Building HVAC Controls
- Beyond useful life AHU and Exhaust Fan with non-functional Inlet Guide Vanes
- 24x7 operational building with spaces critical to Public Safety operations
- Inefficient HVAC operations resulting in high EUI, exceeding CBPS Target EUI
- Need for workarounds to keep system operating and maintain comfort

GOALS

- Upgrade older and non-functional Main AHU system with better airflow control and redundancy.
- Access to HVAC Controls to allow monitoring and implement optimization.
- Reduce building EUI to meet CBPS EUI Target.
- Address critical maintenance needs, Leverage grants and utility incentives.
- Limit building operations impact from Construction.

1.3 Solutions

This project includes:

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

1. Executive Summary

COMPANY AT-A-GLANCE

- Established 1960
- Over 1,700 employees
- 23 offices
- 55+ Professional Engineers
- 80+ LEED Accredited Professionals

MCKINSTRY EXPERIENCE

$20 million	Customer utility savings guaranteed
$100 million	Grants & rebates secured for clients
636 million	Kilowatt hours saved
453 thousand	Metric tons of CO_2 saved
91 million	Gas Therms saved

CO_2 emission reductions resulting from McKinstry projects have environmental impacts equal to:

3,167 acres	Forest acres saved from destruction
51.5 million	Gallons of gas not used
83+ thousand	Cars taken off the road
40+ thousand	Homes taken off the power grid

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

03.08-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

1.4 Summary of Benefits

FINANCIAL BENEFITS

Section 4 of this document provides a detailed look at the project financials. The guaranteed maximum project allowable cost is $2,858,840. Including sales tax and DES management fees and prior to any utility incentives, the final project cost is $3,220,000. The annual energy savings are $9,867. Operational and maintenance savings have been included in the cash flows as agreed to by the DES energy project manager and City of Redmond - these projections are based on reduced repair costs and future avoided capital expenditures and represent

$6,200 in annual savings. Total first-year savings are estimated at $16,067. The estimated utility rebates for the project are $24,740.

This project meets the cost effectiveness criteria as indicated in the Investment Grade Audit proposal dated 08-05-2024 and described in Section 4.16.

ENVIRONMENTAL BENEFITS

By taking the necessary steps to reduce energy consumption through the implementation of the various facility improvement measures detailed in this report, City of Redmond will attain the savings outlined in the outcome snapshot on the left. This is equivalent to:

- 6 average-sized homes being removed from the power grid; or
- 18 Acres of Trees Planted; or
- 247,129 miles not driven by an average size vehicle.

NEXT STEPS

- ESP Approval and Construction Contract Execution
- Initiate Design and Finalize Equipment Selection for Procurement
- Stakeholder engagement to continue Pre-Construction Planning to evaluate and mitigate Construction Impacts

1.5 McKinstry Differentiators

COMPANY OVERVIEW

McKinstry has over 50 years of experience assessing and improving facilities in the Pacific Northwest. With more than 1,500 successful energy and facility improvement projects completed in the past 15 years, McKinstry has the expertise to offer comprehensive solutions to City of Redmond. McKinstry is more than just another energy services company, we believe in serving as your trusted advisor "*For the Life of Your Building.*"

MCKINSTRY APPROACH ADVANTAGES

- Vendor- and product-neutral for truly consultative role
- Transparent pricing
- Total cost of ownership consideration
- No "shared savings" model

City of Redmond

Environmental Impact Calculator

Non-Baseload	Load Factor to Use		
NWPP	Select Factor	1.52470	lbs CO_2e/kWh (Electricity Emissions Factor)

Amount Each Utility Type Will Be Reduced Per Year

Electricity					
68,248	kWh	=	104,058 lbs CO_2	47.2 Metric Tonnes CO_2	
Fossil Natural Gas					
2,092	Therms	=	41,748 lbs CO_2	18.9 Metric Tonnes CO_2	
Steam					
0	Mlbs	=	0 lbs CO_2	0.0 Metric Tonnes CO_2	
Fuel Oil					
0	Gallons	=	0 lbs CO_2	0.0 Metric Tonnes CO_2	
Propane					
0	Gallons	=	0 lbs CO_2	0.0 Metric Tonnes CO_2	
	Total Reduction	=	145,806 lbs CO_2	66.1 Metric Tonnes CO_2	

This Annual Emissions Reduction Is Equivalent To The Following:

13	Number of Vehicles Removed From Roads (Avg Size); or
247,129	Number of Miles Not Driven Per Year (Avg Size); or
10,125	Number of 13.5 Watt Light bulbs Not Energized; or
6	Number of Avg Sized Houses Removed From Power Grid; or
18	Acres of Trees Planted; or
68,134	Pounds of Coal Not Burned Per Year

Other Emissions Factors

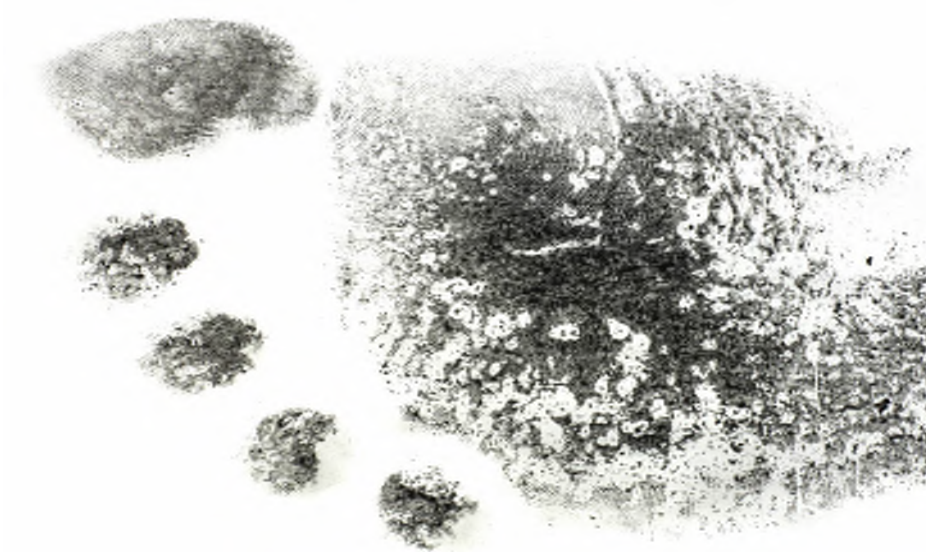
Fossil Natural Gas (ASHRAE Std. 189-2017 Table 7.5.2):	**19.96**	**lbs CO2 / Therm**
Steam (Seattle Steam):	**195.364**	**lbs CO2 / Mlbs**
Fuel Oil:	**22.384**	**lbs CO2 / gal**
Propane:	**12.5**	**lbs CO2 / gal**
Conversion:	**2204.62**	**lbs CO2 / Metric Tonnes CO2**

Equivalents Conversions

Car Emmissions: 11,470 lbs CO_2 / car / yr
Tree Carbon Sequestation: 8,066 lbs CO_2 / acre / yr
Vehicle Mileage Emmissions: 0.59 lbs CO_2 / mile
13.5 W Light Bulb Emmissions: 14.4 lbs CO_2 / Light Bulb / yr
Tree Carbon Sequestation: 8,066 lbs CO_2 / acre / yr
Coal Emmisions: 2.14 lbs CO_2 / pound Coal
Houses Removed: 22,880 lbs CO_2 / house

Sources:

* Energy Information Agency (EIA)
* Environmental Protection Agency (EPA)
* ENERGY STAR
* eGRID 2020 (If eGrid Subregion or Local Utilities Chosen)
* NWPCC Report dated June 13, 2008 (If WADES Factor Chosen)



2. Scope of Work

2.1 Facility Improvement Measure (FIM) List

For full descriptions of the scope of work of each measure, please refer to Section 2 - Detailed Scope of Work.

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

03.08-PSB IDF Room Split System

2.2 McKinstry Services

McKinstry will include the following services related to this project:

1. *Energy Audit:*

   The energy audit is complete and is detailed in the Investment Grade Audit report dated 03.11.2025

2. *Design Services:*

   McKinstry will provide a detailed engineering design as needed to obtain permitting, Owner review, and approval of the proposed systems. In addition, McKinstry will also provide construction support services, start-up, testing, as-built drawings of systems installed, and provide operations and maintenance manuals.

3. *Construction:*

   Provide, or cause to be provided, all material, labor, and equipment, including paying for permits, fees, bonds, and insurance, required for the complete and working installation of McKinstry's equipment.

   a. McKinstry will provide a site superintendent who will be responsible for the onsite supervision and coordination of trades and subcontractors. This individual's responsibilities will also include regular work observations, quality control, site security, enforcement of the site-specific safety plan, as well as coordinating any impact upon building tenants with the Owner.

   b. McKinstry may perform portions of the construction work or may subcontract portions to qualified firms. In either case, McKinstry will share information regarding actual costs of the work with the Owner and DES.

4. *Construction Management:*

   McKinstry will provide a dedicated construction manager who will provide contract administration services for the project. The owner is expected to coordinate day-to-day communications with tenants and any scheduling of tenant relocations in and around occupied areas.

5. *Operation Training:*

   McKinstry will provide relevant training of building staff during construction as agreed to by the Owner and DES.

6. *Performance Maintenance:*

   McKinstry will provide monitoring and support services to ensure guaranteed savings are achieved during the agreement term. These services shall be under separate agreement. These services shall be at the discretion of the Owner and DES to terminate. Specific tasks associated with proposed Measurement and Verification (M&V) can be found in Table 3.2 - M&V Plan Outline.

For this project, McKinstry has recommended an initial M&V term of 1 year to the Owner and DES. The reason is that the operation of the implemented measures is not expected to change after the first year of performance has been verified.

7. *Equipment Maintenance:*

   McKinstry will provide no equipment maintenance or repairs after the warranty period. Following the completion of the installation and Owner acceptance of the equipment, the Owner shall provide all necessary service, repairs, and adjustments to the equipment so that the equipment will perform in the manner and to the extent set forth in the Proposal. McKinstry shall have no obligation to service or maintain the equipment after the warranty period.

8. *Warranty:*

   McKinstry will warrant equipment for one year following Notice of Commencement of Energy Savings. Specific information regarding equipment warranty will be passed on to owner.

2.3 Extent of Subcontracting

McKinstry may subcontract the energy audit, design, construction management, start-up, and training portions of this Contract to qualified firms upon review and approval by owner. Construction subcontracts will be awarded competitively. McKinstry will endeavor to satisfy the Diverse Business Enterprise utilization goals of the Owner and DES.

2.4 Project Schedule

The proposed design and construction duration is 220 calendar days between Notice to Proceed and Substantial Completion. McKinstry will develop a detailed schedule outlining all of the various design, pre-construction, construction, and closeout tasks associated with the project and that interfaces with other construction work not under this proposal.

2. Scope of Work

PRELIMINARY WASTE RECYCLING AND DISPOSAL PLAN

TYPES OF WASTE

- Metals: Type: Scrap piping, scrap structural steel, coils, scrap sheet metal.
- Construction waste: Type: Miscellaneous packaging materials, unusable materials
- Cardboard: Type: Cardboard packaging materials for equipment and materials delivered to the project site.
- Wood/Pallets: Type: Floor and surface protection, temporary walls, material shipping support.
- General: Type: Office and food waste, other.

SORTING AND RECYCLING OF WASTE

1. McKinstry will determine if designated waste containers are necessary at the project site. When full, the servicing vendor will take the containers to their facility and process the waste for recycling and provide diversion reporting.

DOMESTIC WASTE GENERATED

1. Waste not recycled in the container above will be disposed of at the vendor sorting facility. Certificates provided by vendor of haul off waste removal and diversion will be provided to McKinstry and reported at closeout.

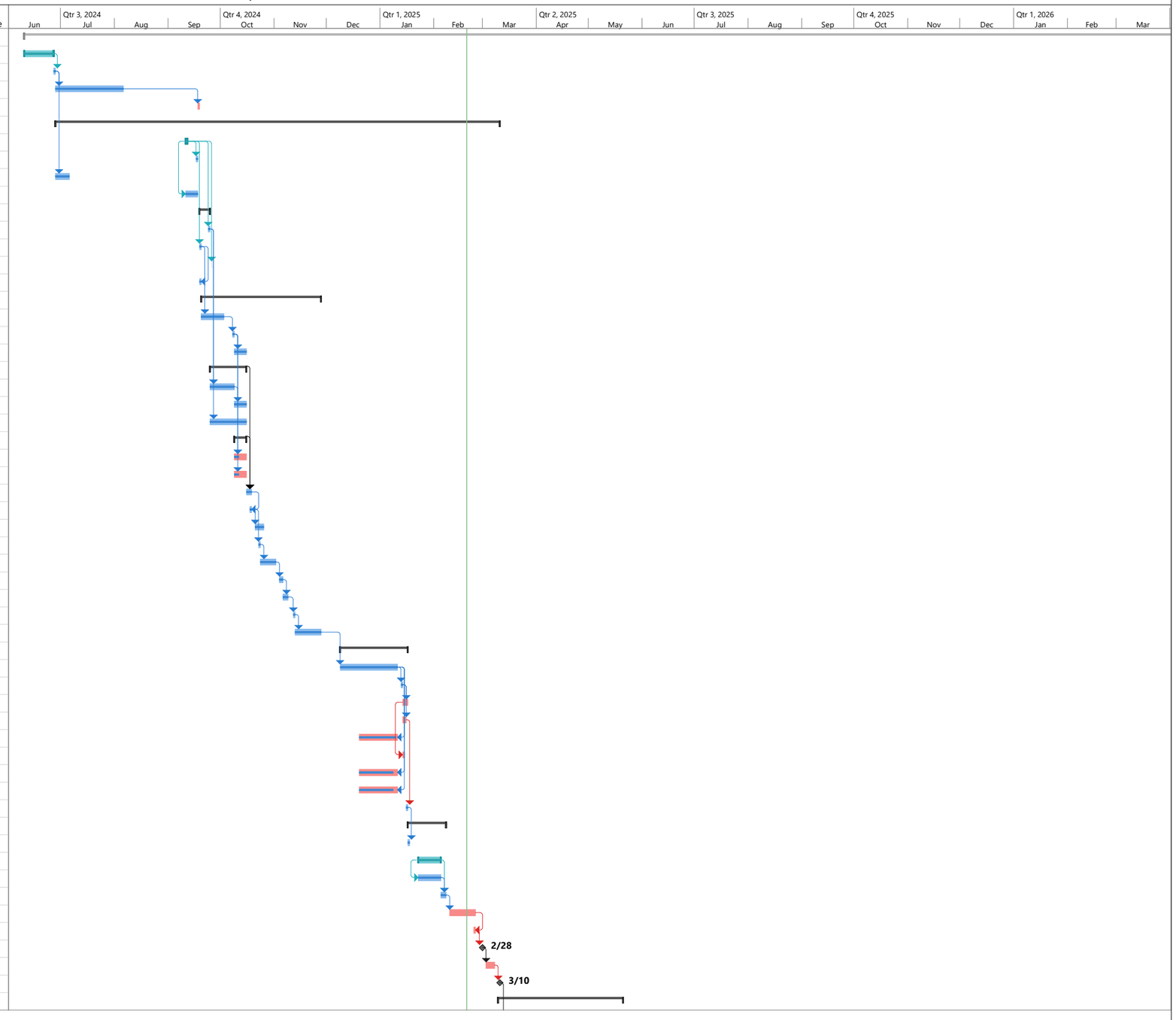
REPORTING

1. Waste Recycling and Disposal Report will be submitted to DES and client as part of project close out. Report will specify total materials diverted as a percentage of total waste through Substantial Completion.

PRELIMINARY IGA SCHEDULE.
REFER CONSTRUCTION SCHEDULE FOR DESIGN, PRECONSTRUCTION AND CONSTRUCTION DETAILS. **Thu 2/20/25**

City of Redmond - Public Safety Building
HVAC and Controls Upgrades
Preliminary IGA Schedule

ID	Task Mode	Task Name	Duration	Start	Finish	Predecessors	% Complete
0		**City of Redmond - Public Safety Building**	**708 days**	**Mon 6/10/24**	**Thu 4/15/27**		**20%**
1		Project Scope and Goals Coordination	12 days	Mon 6/10/24	Wed 6/26/24		100%
2		IGA Study Proposal Submission	1 day	Thu 6/27/24	Thu 6/27/24	1	100%
3		Study Proposal Review & Revisions	26 days	Fri 6/28/24	Mon 8/5/24	2	100%
4		IGA Proposal Contracted	1 day	Wed 9/18/24	Wed 9/18/24	3FS+30 days	0%
5		**Investment Grade Audit**	**169 days**	**Fri 6/28/24**	**Mon 3/10/25**		**83%**
6		Internal Kickoff Meetings	1 day	Wed 9/11/24	Wed 9/11/24		100%
7		Owner Kickoff Meetings	1 day	Tue 9/17/24	Tue 9/17/24	6FS+3 days	100%
8		Request Additional Documents	1 wk	Fri 6/28/24	Fri 7/5/24	2	100%
9		Complte Review of provided Documets	1 wk	Wed 9/11/24	Tue 9/17/24	6SS	100%
10		**Site Visits**	**4 days**	**Thu 9/19/24**	**Tue 9/24/24**		**100%**
11		HVAC Scope Site Walk	1 day	Tue 9/24/24	Tue 9/24/24	6FS+8 days	100%
12		Level 2 Audit Site walk 1/2	1 day	Thu 9/19/24	Thu 9/19/24	6FS+5 days	100%
13		~~Level 2 Audit Site walk 2/2~~	~~1 day~~	~~Thu 9/26/24~~	~~Thu 9/26/24~~	~~6FS+10 days~~	~~0%~~
14		Constrols Contractor Site Walk (TBD)	1 day	Thu 9/19/24	Thu 9/19/24	12FF	100%
15		**Rough Order of Magnitude (ROM)**	**47 days**	**Fri 9/20/24**	**Wed 11/27/24**		**94%**
16		Level 2 FIM List Development	9 days	Fri 9/20/24	Wed 10/2/24	12	100%
17		Level 2 FIM List Review with Owner	1 day	Tue 10/8/24	Tue 10/8/24	16FS+3 days	100%
18		Level 2 FIM List Owner Feedback	5 days	Wed 10/9/24	Tue 10/15/24	17	100%
19		**HVAC**	**15 days**	**Wed 9/25/24**	**Tue 10/15/24**		**100%**
20		ROM Scope Completed	2 wks	Wed 9/25/24	Tue 10/8/24	11	100%
21		ROM Scope Reviewed	1 wk	Wed 10/9/24	Tue 10/15/24	20	100%
22		ROM Energy Calcs	3 wks	Wed 9/25/24	Tue 10/15/24	11	100%
23		**L2 Audit**	**5 days**	**Wed 10/9/24**	**Tue 10/15/24**		**50%**
24		Prelim Scoping	1 wk	Wed 10/9/24	Tue 10/15/24	17	50%
25		Prelim Energy Estimates	1 wk	Wed 10/9/24	Tue 10/15/24	17	50%
26		Scope Internal Review and Updates	3 days	Wed 10/16/24	Fri 10/18/24	19,23	100%
27		Issue Scopes to Sub-Contractors	1 day	Fri 10/18/24	Fri 10/18/24	26FF	100%
28		Budget Development - L2 Audit Budgetary	5 days	Mon 10/21/24	Fri 10/25/24	27	100%
29		Sub-Contractor Site Walk	1 day	Wed 10/23/24	Wed 10/23/24	27FS+2 days	100%
30		Sub-Contractor Pricing	7 days	Thu 10/24/24	Fri 11/1/24	29	100%
31		Bid Review and Compiling	2 days	Mon 11/4/24	Tue 11/5/24	30	100%
32		McKinstry ROM Review	3 days	Wed 11/6/24	Fri 11/8/24	31	100%
33		Review ROM Scope & Budget with Owner	1 day	Tue 11/12/24	Tue 11/12/24	32	100%
34		Owner Provides Direction on GMAX Scope	10 days	Wed 11/13/24	Wed 11/27/24	33	100%
35		**GMAX**	**23 days**	**Mon 12/9/24**	**Thu 1/16/25**		**79%**
36		Complete Scopes for Selected FIMs	19 days	Mon 12/9/24	Fri 1/10/25	34FS+6 days	100%
37		Scope Internal Review and Updates	1 day	Mon 1/13/25	Mon 1/13/25	36	100%
38		Scope Owner Review & Feedback	3 days	Tue 1/14/25	Thu 1/16/25	37	0%
39		Scope Documents Finalized	2 days	Tue 1/14/25	Wed 1/15/25	37	0%
40		Energy Savings M&V Plan	2 wks	Fri 12/20/24	Fri 1/10/25	36FF	90%
41		M&V Plan Workshop with Owner	1 day	Tue 1/14/25	Tue 1/14/25	38SS	0%
42		Construction Planning	2 wks	Fri 12/20/24	Fri 1/10/25	36FF	75%
43		Procurement Planning	2 wks	Fri 12/20/24	Fri 1/10/25	36FF	75%
44		Scope Handover to Estimation	1 day	Thu 1/16/25	Thu 1/16/25	39	100%
45		**Estimation**	**15 days**	**Fri 1/17/25**	**Fri 2/7/25**		**100%**
46		Prepare Sub-Contractor Walk Documents	1 day	Fri 1/17/25	Fri 1/17/25	44	100%
47		Sub-contractor Walk and Pricing	9 days	Thu 1/23/25	Tue 2/4/25		100%
48		Equipment Pricing	9 days	Thu 1/23/25	Tue 2/4/25	47SS	100%
49		Bid Review & Compile Project	3 days	Wed 2/5/25	Fri 2/7/25	47,48	100%
50		McKinstry Risk Reviews	10 days	Mon 2/10/25	Mon 2/24/25	49	0%
51		ESP & IGA Compilation and QC by McKinstry	1 day	Mon 2/24/25	Mon 2/24/25	50FF	0%
52		Pre-Final ESP Presentation	1 day	Fri 2/28/25	Fri 2/28/25	51FS+3 days	0%
53		Owner & DES Review and Feedback	5 days	Mon 3/3/25	Fri 3/7/25	52	0%
54		Issue Final ESP	1 day	Mon 3/10/25	Mon 3/10/25	53	0%
55		**ESP Contracting**	**52 days**	**Mon 3/10/25**	**Tue 5/20/25**		**0%**



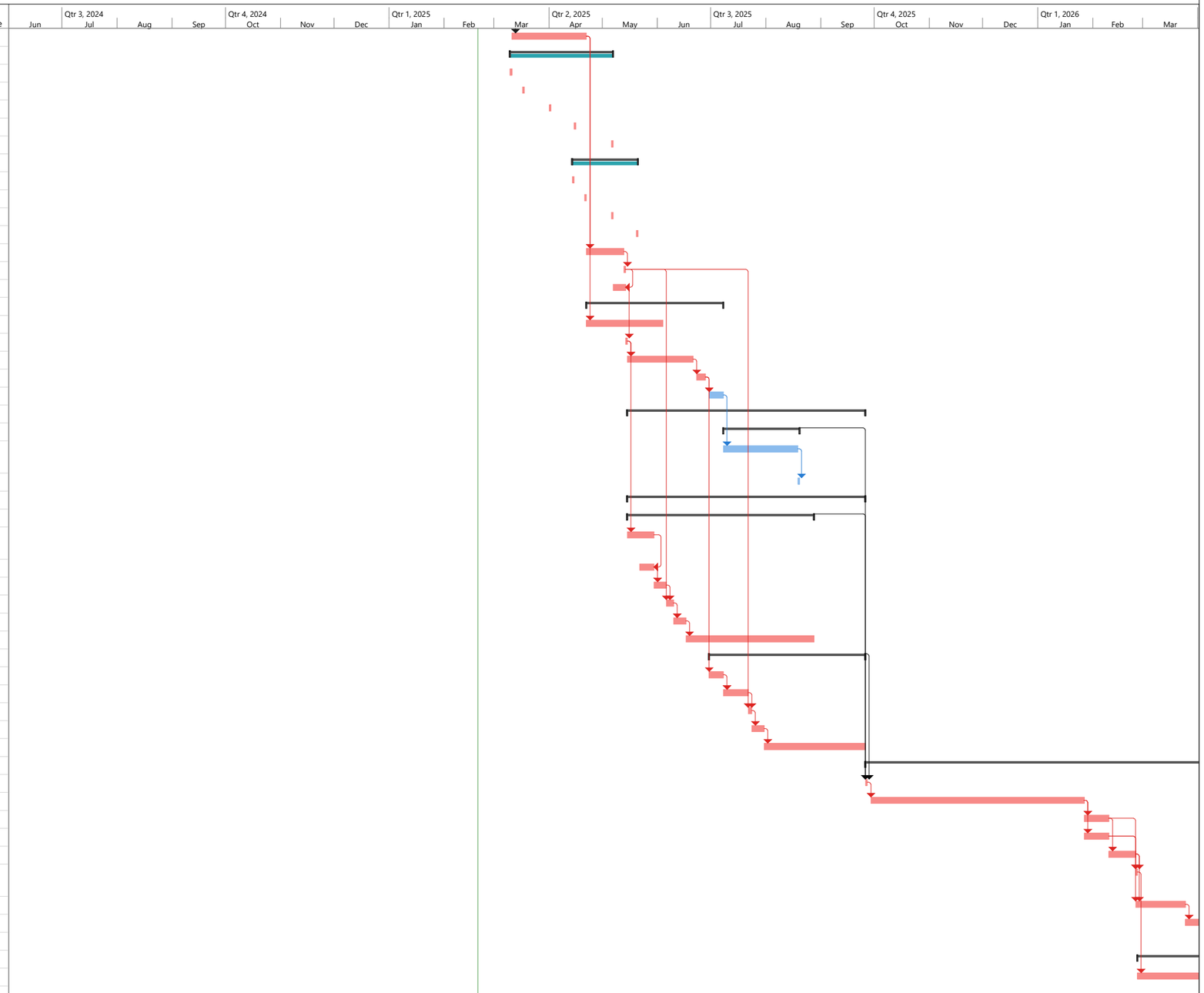
Task, Split, Milestone, Summary, Project Summary, Inactive Task, Inactive Milestone, Inactive Summary, Manual Task, Duration-only, Manual Summary Rollup, Manual Summary, Start-only, Finish-only, External Tasks, External Milestone, Deadline, Critical, Critical Split, Progress, Manual Progress

Sheet 1 /2

PRELIMINARY IGA SCHEDULE.
REFER CONSTRUCTION SCHEDULE FOR DESIGN, PRECONSTRUCTION AND CONSTRUCTION DETAILS. **Thu 2/20/25**

City of Redmond - Public Safety Building
HVAC and Controls Upgrades
Preliminary IGA Schedule

ID	Task Mode	Task Name	Duration	Start	Finish	Predecessors	% Complete
56		Council Approvals	6 wks	Tue 3/11/25	Mon 4/21/25	54	0%
57		**March - April Meeting Dates for Reference**	**42 days**	**Mon 3/10/25**	**Tue 5/6/25**		**0%**
58		Memo Due	1 day	Mon 3/10/25	Mon 3/10/25		0%
59		3P Meeting	1 day	Mon 3/17/25	Mon 3/17/25		0%
60		PPW Meeting	1 day	Tue 4/1/25	Tue 4/1/25		0%
61		Council Business Meeting	1 day	Tue 4/15/25	Tue 4/15/25		0%
62		Council Business Meeting	1 day	Tue 5/6/25	Tue 5/6/25		0%
63		**April - May Meeting Dates for Reference**	**27 days**	**Mon 4/14/25**	**Tue 5/20/25**		**0%**
64		Memo Due	1 day	Mon 4/14/25	Mon 4/14/25		0%
65		3P Meeting	1 day	Mon 4/21/25	Mon 4/21/25		0%
66		PPW Meeting	1 day	Tue 5/6/25	Tue 5/6/25		0%
67		Council Business Meeting	1 day	Tue 5/20/25	Tue 5/20/25		0%
68		DES and Owner Contract Processing	3 wks	Tue 4/22/25	Mon 5/12/25	56	0%
69		Construction Contract Executed	1 day	Tue 5/13/25	Tue 5/13/25	68	0%
70		McKinstry Books Project	1 wk	Wed 5/7/25	Tue 5/13/25	69FF	0%
71		**Design**	~~52 days~~	~~Tue 4/22/25~~	~~Mon 7/7/25~~		**0%**
72		REFER PRELIMINARY CONSTRUCTION SCHEDULE FOR TASK DETAILS.				56	0%
73		Internal and Owner Kickoffs	1 day	Wed 5/14/25	Wed 5/14/25	70	0%
74		Permit Set Design	5 wks	Thu 5/15/25	Fri 6/20/25	73	0%
75		Owner Page Turn and Review	1 wk	Mon 6/23/25	Fri 6/27/25	74	0%
76		Issue Revised Permit Set	1 wk	Mon 6/30/25	Mon 7/7/25	75	0%
77		**Pre-Construction**	~~92 days~~	~~Thu 5/15/25~~	~~Thu 9/25/25~~		**0%**
78		REFER PRELIMINARY CONSTRUCTION SCHEDULE FOR TASK DETAILS.					**0%**
79		Permit Submission and Review (City of Redmond - Mech/Elec) (Duration Assumed)	6 wks	Tue 7/8/25	Mon 8/18/25	76	0%
80		Permits Issued	1 day	Tue 8/19/25	Tue 8/19/25	79	0%
81		**Equipment Procurement**	92 days	Thu 5/15/25	Thu 9/25/25		**0%**
82		**Long Lead Time Equipment**	72 days	Thu 5/15/25	Wed 8/27/25		**0%**
83		Finalize Equipment Selection - WSHP, Pump ?	2 wks	Thu 5/15/25	Thu 5/29/25	73	0%
84		Prepare Submitals	1 wk	Thu 5/22/25	Thu 5/29/25	83FF	0%
85		Submittal Review	1 wk	Fri 5/30/25	Thu 6/5/25	84	0%
86		PO Release	2 days	Fri 6/6/25	Mon 6/9/25	85,69	0%
87		PO Processing & Freight Assumption	1 wk	Tue 6/10/25	Mon 6/16/25	86	0%
88		Lead Time (Jan 2025 Updated)	10 wks	Tue 6/17/25	Wed 8/27/25	87	0%
89		**Other Equipment**	62 days	Mon 6/30/25	Thu 9/25/25		**0%**
90		Prepare Submittals	1 wk	Mon 6/30/25	Mon 7/7/25	75	0%
91		Submittal Review	2 wks	Tue 7/8/25	Mon 7/21/25	90	0%
92		PO Release	2 days	Tue 7/22/25	Wed 7/23/25	91,69	0%
93		PO Processing & Freight Assumption	1 wk	Thu 7/24/25	Wed 7/30/25	92	0%
94		Lead Time (Assumption)	8 wks	Thu 7/31/25	Thu 9/25/25	93	0%
95		**Construction**	~~166 days~~	~~Fri 9/26/25~~	~~Wed 5/27/26~~		**0%**
96		REFER PRELIMINARY CONSTRUCTION SCHEDULE FOR TASK DETAILS.				78,82,89	0%
97		Construction (Assumption)	16 wks	Mon 9/29/25	Mon 1/26/26	96	0%
98		Startup	2 wks	Tue 1/27/26	Mon 2/9/26	97	0%
99		Punchlist	2 wks	Tue 1/27/26	Mon 2/9/26	97	0%
100		TAB/Commissioning	2 wks	Tue 2/10/26	Tue 2/24/26	98	0%
101		Substantial Completion & Notice of commencement of Energy Savings (NCES)	1 day	Wed 2/25/26	Wed 2/25/26	98,100,99	0%
102		Demobilization	4 wks	Wed 2/25/26	Tue 3/24/26	99,100	0%
103		Final Closeout Documentation	8 wks	Wed 3/25/26	Tue 5/19/26	102	0%
104		Final Acceptance Letter	1 wk	Wed 5/20/26	Wed 5/27/26	103	0%
105		**Measurement & Verification**	**285 days**	**Thu 2/26/26**	**Thu 4/15/27**		**0%**
106		Performance Period	52 wks	Thu 2/26/26	Thu 3/11/27	101	0%
107		Data Collection & Review	4 wks	Fri 3/12/27	Thu 4/8/27	106	0%
108		Issue M&V Report	1 wk	Fri 4/9/27	Thu 4/15/27	107	0%



Task, Split, Milestone, Summary, Project Summary, Inactive Task, Inactive Milestone, Inactive Summary, Manual Task, Duration-only, Manual Summary Rollup, Manual Summary, Start-only, Finish-only, External Tasks, External Milestone, Deadline, Critical, Critical Split, Progress, Manual Progress

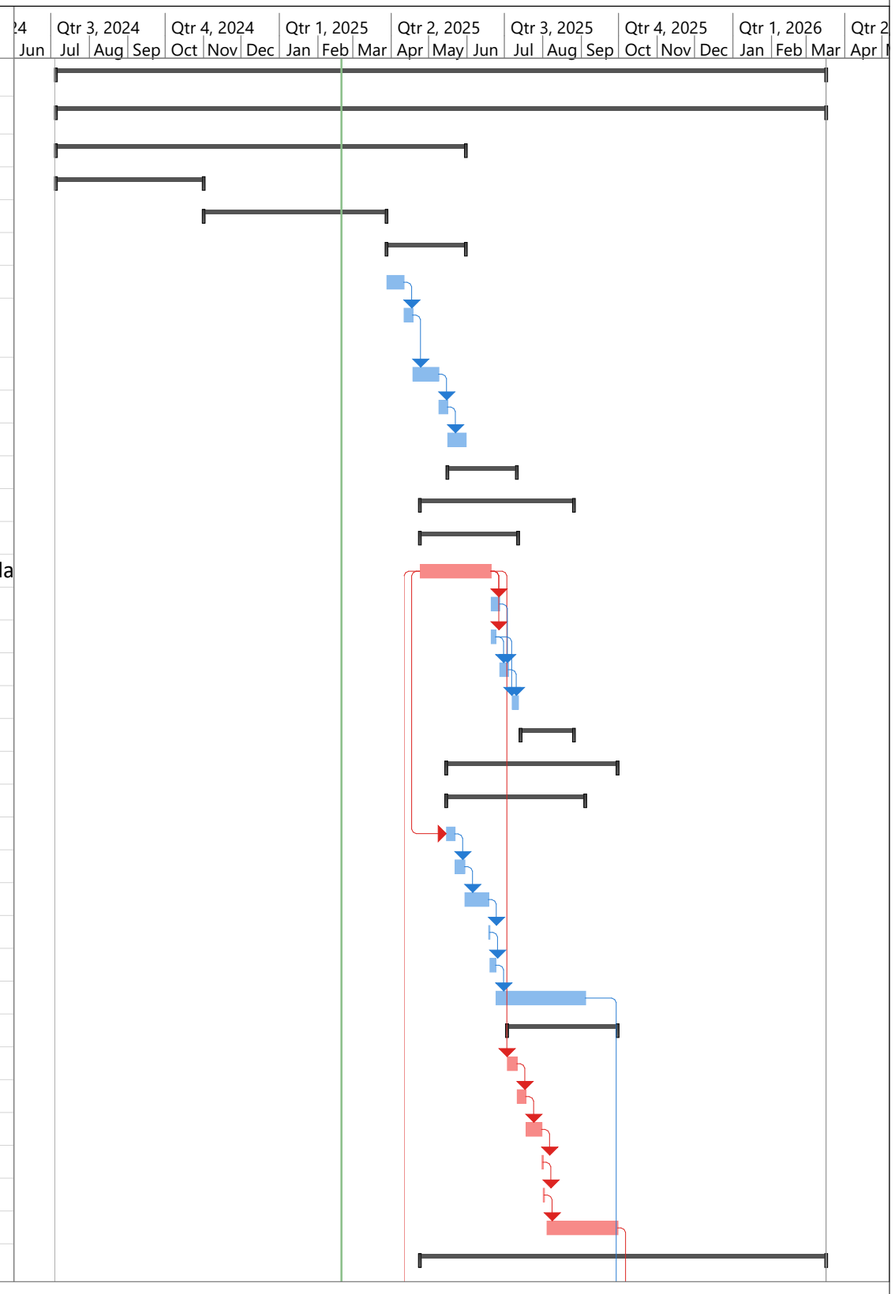
PRELIMINARY SCHEDULE. THIS WILL BE UPDATED BASED ON SUB-CONTRACTORS, CITY, DES FEEDBACK.

Redmond WASHINGTON

Redmond PSB HVAC Upgrades
Construction Schedule
Thu 2/20/25

McKinstry For The Life Of Your Building

ID	Task Mode	Task Name	Duration	Start	Finish	Predecessors	Successors
1		**Redmond PSB Phase 3 HVAC Upgrades**	**435 days**	**Fri 7/5/24**	**Mon 3/16/26**		
2		**Pre-Construction**	**435 days**	**Fri 7/5/24**	**Mon 3/16/26**		
3		**Project Development to GMAX**	**235 days**	**Fri 7/5/24**	**Fri 5/30/25**		
4		**Pre-IGA**	**85 days**	**Fri 7/5/24**	**Thu 10/31/24**		
12		**Investment Grade Audit**	**105 days**	**Fri 11/1/24**	**Thu 3/27/25**		
36		**Project Contracting**	**45 days**	**Fri 3/28/25**	**Fri 5/30/25**		
37		Design and Construction Contract Preparatio	10 days	Fri 3/28/25	Thu 4/10/25	35	38
38		McKinstry Signs Contracts and Submits Bond/Insurance	5 days	Fri 4/11/25	Thu 4/17/25	37	39
39		Client Gains Approvals to Sign Contracts	15 days	Fri 4/18/25	Thu 5/8/25	38	40
40		Design and Construction Notice to Proceed	5 days	Fri 5/9/25	Thu 5/15/25	39	41,43
41		McKinstry Books Project	10 days	Fri 5/16/25	Fri 5/30/25	40	44SS
42		**Construction Team Contracting / Job Startup**	**38 days**	**Fri 5/16/25**	**Thu 7/10/25**		
53		**Design and Permitting**	**86 days**	**Thu 4/24/25**	**Mon 8/25/25**		
54		**MEP Design**	**55 days**	**Thu 4/24/25**	**Fri 7/11/25**		
55		Develop Design Review Set	8 wks	Thu 4/24/25	Thu 6/19/25		56,57,67SS+15 da
56		Owner Design Review	1 wk	Fri 6/20/25	Thu 6/26/25	55	58
57		MEP Design Review Meeting - Internal	2 days	Fri 6/20/25	Mon 6/23/25	55	58,59
58		MEP Design Review Meeting - External	5 days	Fri 6/27/25	Thu 7/3/25	56,57	59
59		Develop Construction Set (100%)	1 wk	Mon 7/7/25	Fri 7/11/25	58,57	62
60		**Permitting (Intake / Review / Issuance)**	**31 days**	**Mon 7/14/25**	**Mon 8/25/25**		
65		**Submittals, Procurement and Fabrication**	**95 days**	**Thu 5/15/25**	**Mon 9/29/25**		
66		**Long Lead Equipment**	**77 days**	**Thu 5/15/25**	**Wed 9/3/25**		
67		Vendor Submittal	5 days	Thu 5/15/25	Wed 5/21/25	55SS+15 days	68
68		Design Review of Submittal	5 days	Thu 5/22/25	Thu 5/29/25	67	69
69		Client Review of Submittal	13 days	Fri 5/30/25	Tue 6/17/25	68	70
70		Submittal Approval	1 day	Wed 6/18/25	Wed 6/18/25	69	71
71		PO for Fabrication	3 days	Thu 6/19/25	Mon 6/23/25	70	72
72		Fabrication / Delivery	10 wks	Tue 6/24/25	Wed 9/3/25	71	100
73		**Other Equipment**	**61 days**	**Thu 7/3/25**	**Mon 9/29/25**		
74		Vendor Submittal	5 days	Thu 7/3/25	Thu 7/10/25	55FS+9 days	75
75		Design Review of Submittal	5 days	Fri 7/11/25	Thu 7/17/25	74	76
76		Client Review of Submittal	9 days	Fri 7/18/25	Wed 7/30/25	75	77
77		Submittal Approval	1 day	Thu 7/31/25	Thu 7/31/25	76	78
78		PO for Fabrication	1 day	Fri 8/1/25	Fri 8/1/25	77	79
79		Fabrication / Delivery	8 wks	Mon 8/4/25	Mon 9/29/25	78	100FS-1 day
80		**Milestones**	**226 days**	**Thu 4/24/25**	**Mon 3/16/26**		



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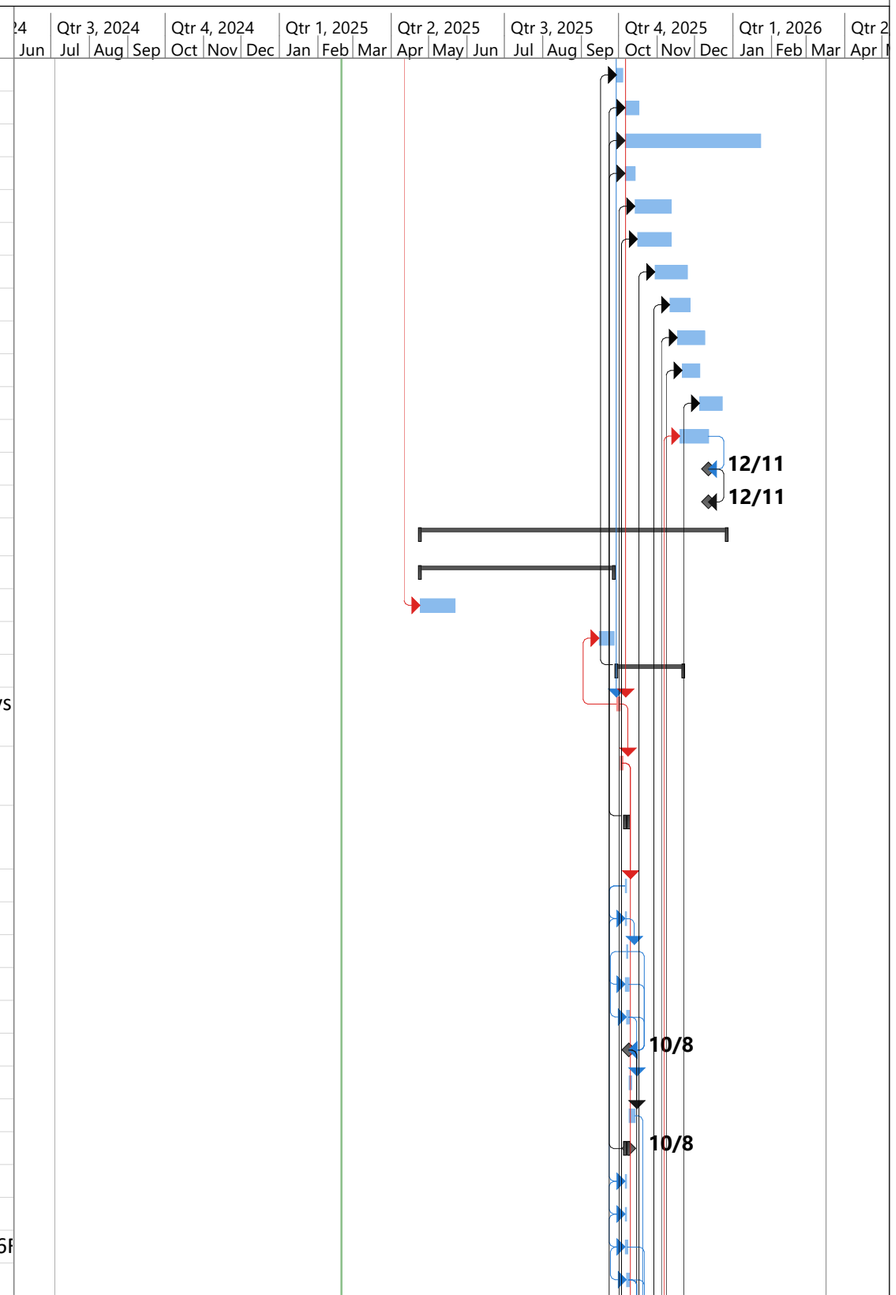
Redmond PSB HVAC Upgrades
Construction Schedule
Thu 2/20/25

ID	Task Mode	Task Name	Duration	Start	Finish	Predecessors	Successors
81		Construction Mobilization	5 days	Mon 9/29/25	Fri 10/3/25	99SS	
82		Condenser Pump Work	9 days	Mon 10/6/25	Thu 10/16/25	102SS	
83		Controls Upgrades	75 days	Mon 10/6/25	Thu 1/22/26	117SS	
84		Cooling Tower Work	6 days	Mon 10/6/25	Mon 10/13/25	111SS	
85		First Floor HP Work	21 days	Tue 10/14/25	Tue 11/11/25	128SS	
86		First Floor Womens Restroom	19 days	Thu 10/16/25	Tue 11/11/25	155SS	
87		Second Floor HP Work	18 days	Thu 10/30/25	Mon 11/24/25	168SS	
88		Mini Split Work	12 days	Tue 11/11/25	Wed 11/26/25	205SS	
89		Staged Startup (When Floors and Equipment Are Re	14 days	Mon 11/17/25	Mon 12/8/25	239SS	
90		AHU Fan Array Work	8 days	Fri 11/21/25	Thu 12/4/25	217SS	
91		Wet and Dry TAB	12 days	Fri 12/5/25	Mon 12/22/25	246SS	
92		Cx	3 wks	Wed 11/19/25	Thu 12/11/25	249SS	93FF
93		Startup Cx Complete	0 days	Thu 12/11/25	Thu 12/11/25	92FF	94FF
94		Project Substantial Completion	0 days	Thu 12/11/25	Thu 12/11/25	93FF	
95		**Construction**	**171 days**	**Thu 4/24/25**	**Fri 12/26/25**		
96		**Early Work**	**109 days**	**Thu 4/24/25**	**Fri 9/26/25**		
97		30 day metering	20 days	Thu 4/24/25	Wed 5/21/25	55SS	
98		Pre - Dry / Wet TAB	10 days	Mon 9/15/25	Fri 9/26/25	100SS-10 days	
99		**Mobilization Activities**	**40 days**	**Mon 9/29/25**	**Fri 11/21/25**		**81SS**
100		Construction Trailer / Conex Setup (Electrical Connection Included)	3 days	Mon 9/29/25	Wed 10/1/25	64,72,79FS-1 day	101,98SS-10 days
101		Other Rentals and Equipment Deliverys for McKinstry Construction Team	2 days	Thu 10/2/25	Fri 10/3/25	100	119,103
102		**FIM 53395 Replace Condenser Pump (Mech Mezz)**	**3 days**	**Mon 10/6/25**	**Wed 10/8/25**		**82SS**
103		Electrical and Mechanical LOTO	1 day	Mon 10/6/25	Mon 10/6/25	101	104SS,112SS
104		Demo Existing P-2 and Associated Piping	1 day	Mon 10/6/25	Mon 10/6/25	103SS	105,106SS
105		Set New Pump	1 day	Tue 10/7/25	Tue 10/7/25	104	107SS,108FF
106		Electrical / Controls R.I.	3 days	Mon 10/6/25	Wed 10/8/25	104SS	108FF
107		Piping	2 days	Tue 10/7/25	Wed 10/8/25	105SS	108FF,109
108		Ready for Point to Point and Startup	0 days	Wed 10/8/25	Wed 10/8/25	106FF,105FF,107F	110,236
109		Insulation	2 days	Thu 10/9/25	Fri 10/10/25	107	
110		Flushing	3 days	Thu 10/9/25	Mon 10/13/25	108	128
111		**FIM 31871 Cooling Tower Work**	**3 days**	**Mon 10/6/25**	**Wed 10/8/25**		**84SS**
112		Electrical and Mechanical LOTO	1 day	Mon 10/6/25	Mon 10/6/25	103SS	113SS
113		Demo existing 5 HP fan motor	1 day	Mon 10/6/25	Mon 10/6/25	112SS	114SS
114		Install new 20 HP fan motor and VFD	2 days	Mon 10/6/25	Tue 10/7/25	113SS	115SS+1 day,116F
115		Electrical / Controls R.I.	2 days	Tue 10/7/25	Wed 10/8/25	114SS+1 day	116FF,227,130



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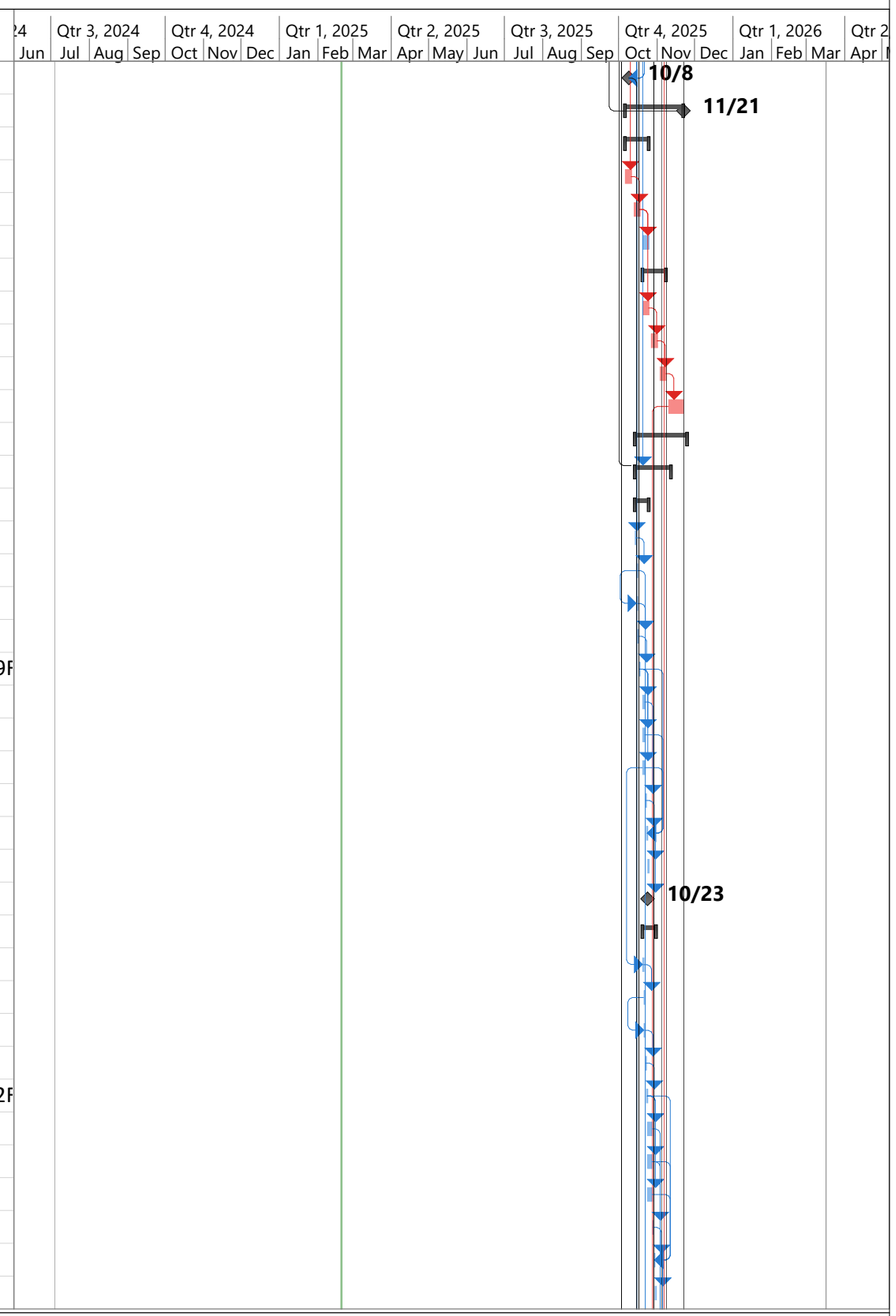
Redmond WASHINGTON

Redmond PSB HVAC Upgrades
Construction Schedule
Thu 2/20/25

McKinstry For The Life Of Your Building

ID	Task Mode	Task Name	Duration	Start	Finish	Predecessors	Successors
116		Ready for Point to Point and Startup	0 days	Wed 10/8/25	Wed 10/8/25	114FF,115FF	235
117		**FIM 31871 HVAC Controls Upgrades**	**35 days**	**Mon 10/6/25**	**Fri 11/21/25**		**83SS**
118		**First Floor**	**15 days**	**Mon 10/6/25**	**Fri 10/24/25**		
119		Pull Wire	5 days	Mon 10/6/25	Fri 10/10/25	101	120
120		Terminate at Devices / Equipment	5 days	Mon 10/13/25	Fri 10/17/25	119	121,123
121		Point to Point	5 days	Mon 10/20/25	Fri 10/24/25	120	
122		**Second Floor**	**15 days**	**Mon 10/20/25**	**Fri 11/7/25**		
123		Pull Wire	5 days	Mon 10/20/25	Fri 10/24/25	120	124
124		Terminate at Devices / Equipment	5 days	Mon 10/27/25	Fri 10/31/25	123	125
125		Point to Point	5 days	Mon 11/3/25	Fri 11/7/25	124	126
126		Controls Integration and Graphics	10 days	Mon 11/10/25	Fri 11/21/25	125	237SS
127		**FIM 53394 Replace Water Source Heat Pump**	**30 days**	**Tue 10/14/25**	**Mon 11/24/25**		
128		**First Floor**	**21 days**	**Tue 10/14/25**	**Tue 11/11/25**	**110**	**85SS**
129		**HP Replacement RM 145 - RM 150 - Stairwe**	**9 days**	**Tue 10/14/25**	**Fri 10/24/25**		
130		PSB removes furniture from space / McKir	1 day	Tue 10/14/25	Tue 10/14/25	115	131
131		Ceiling Removal / Light Removal	1 day	Wed 10/15/25	Wed 10/15/25	130	132SS,156
132		Electrical and Mechanical LOTO	1 day	Wed 10/15/25	Wed 10/15/25	131SS	133
133		Remove HP's	1 day	Thu 10/16/25	Thu 10/16/25	132	134
134		Install New HP's	1 day	Fri 10/17/25	Fri 10/17/25	133	135,136,137,139F
135		Ductwork Fab	2 days	Mon 10/20/25	Tue 10/21/25	134	138
136		Piping / Hose Kit Install	2 days	Mon 10/20/25	Tue 10/21/25	134	139FF
137		Electrical / Controls R.I.	2 days	Mon 10/20/25	Tue 10/21/25	134	139FF,143SS
138		Ductwork Install	1 day	Wed 10/22/25	Wed 10/22/25	135	139
139		Inspections	1 day	Thu 10/23/25	Thu 10/23/25	134FF,136FF,137F	140,141
140		Re-Install Ceilings / Lights	1 day	Fri 10/24/25	Fri 10/24/25	139	
141		Ready for Point to Point and Startup	0 days	Thu 10/23/25	Thu 10/23/25	139	
142		**HP Replacement Hallway 195 - RM 156 - RM**	**9 days**	**Mon 10/20/25**	**Thu 10/30/25**		
143		PSB removes furniture from space / McKir	1 day	Mon 10/20/25	Mon 10/20/25	137SS	144
144		Ceiling Removal / Light Removal	1 day	Tue 10/21/25	Tue 10/21/25	143	145SS
145		Electrical and Mechanical LOTO	1 day	Tue 10/21/25	Tue 10/21/25	144SS	146
146		Remove HP's	1 day	Wed 10/22/25	Wed 10/22/25	145	147
147		Install New HP's	1 day	Thu 10/23/25	Thu 10/23/25	146	148,149,150,152F
148		Ductwork Fab	2 days	Fri 10/24/25	Mon 10/27/25	147	151
149		Piping / Hose Kit Install	2 days	Fri 10/24/25	Mon 10/27/25	147	152FF,159
150		Electrical / Controls R.I.	2 days	Fri 10/24/25	Mon 10/27/25	147	152FF
151		Ductwork Install	1 day	Tue 10/28/25	Tue 10/28/25	148	152
152		Inspections	1 day	Wed 10/29/25	Wed 10/29/25	147FF,149FF,150F	153,154
153		Re-Install Ceilings / Lights	1 day	Thu 10/30/25	Thu 10/30/25	152	



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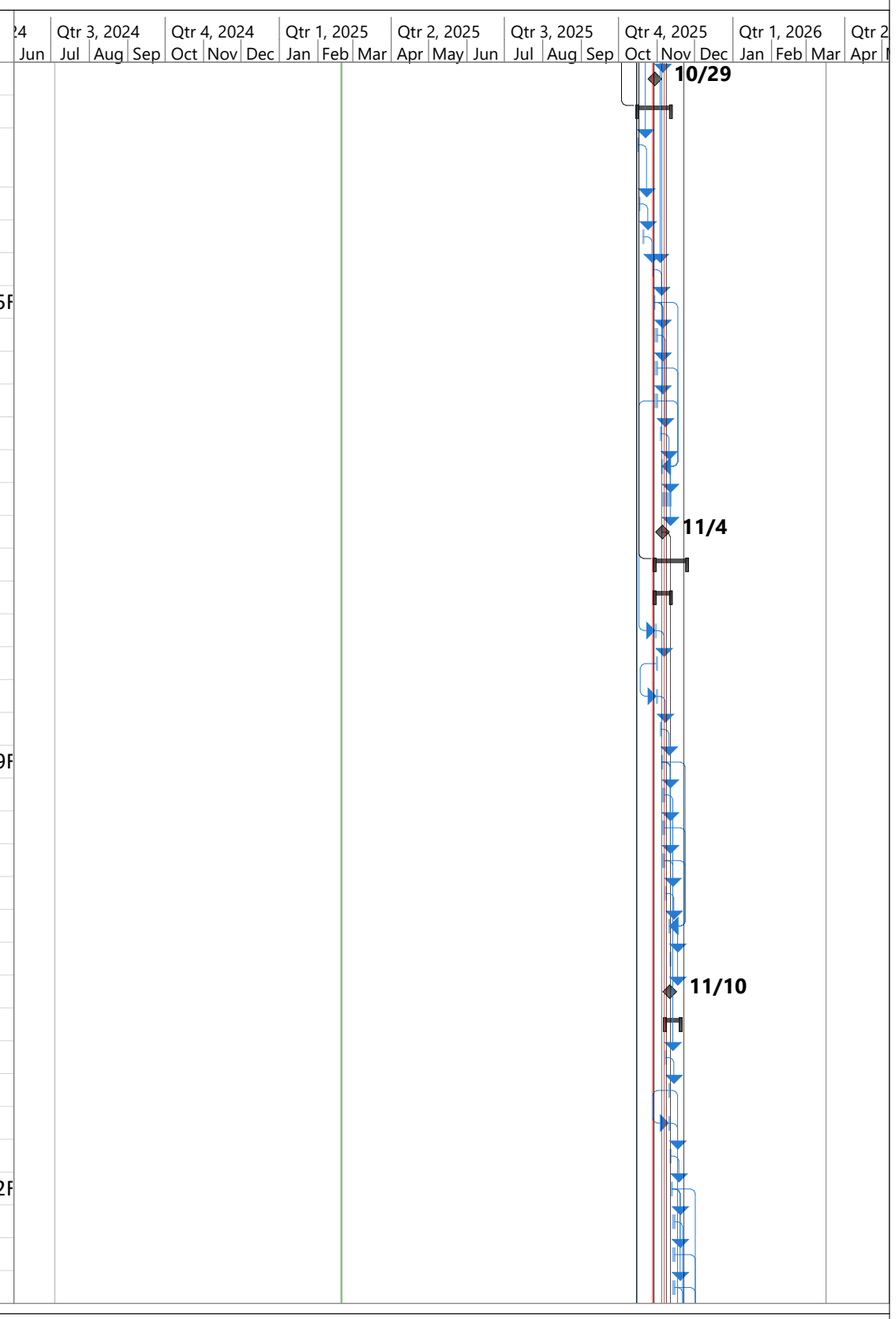
Redmond WASHINGTON

Redmond PSB HVAC Upgrades
Construction Schedule
Thu 2/20/25

McKinstry For The Life Of Your Building

ID	Task Mode	Task Name	Duration	Start	Finish	Predecessors	Successors
154		Ready for Point to Point and Startup	0 days	Wed 10/29/25	Wed 10/29/25	152	
155		**HP Replacement Womens Restroom RM 17**	**19 days**	**Thu 10/16/25**	**Tue 11/11/25**		**86SS**
156		Install Temp Construction Barrier / Remove Stalls	1 day	Thu 10/16/25	Thu 10/16/25	131	157
157		Ceiling Removal / Light Removal	1 day	Fri 10/17/25	Fri 10/17/25	156	158
158		Electrical and Mechanical LOTO	1 day	Mon 10/20/25	Mon 10/20/25	157	159
159		Remove HP	1 day	Tue 10/28/25	Tue 10/28/25	158,149	160
160		Install New HP	1 day	Wed 10/29/25	Wed 10/29/25	159	161,162,163,165F
161		Ductwork Fab	2 days	Thu 10/30/25	Fri 10/31/25	160	164
162		Piping / Hose Kit Install	2 days	Thu 10/30/25	Fri 10/31/25	160	165FF
163		Electrical / Controls R.I.	2 days	Thu 10/30/25	Fri 10/31/25	160	165FF,170SS
164		Ductwork Install	1 day	Mon 11/3/25	Mon 11/3/25	161	165
165		Inspections	1 day	Tue 11/4/25	Tue 11/4/25	160FF,162FF,163F	166,167
166		Re-Install Ceilings / Lights	5 days	Wed 11/5/25	Tue 11/11/25	165	
167		Ready for Point to Point and Startup	0 days	Tue 11/4/25	Tue 11/4/25	165	231
168		**Second Floor**	**18 days**	**Thu 10/30/25**	**Mon 11/24/25**		**87SS**
169		**HP Replacement RM 245 - RM 241 - RM 239**	**9 days**	**Thu 10/30/25**	**Tue 11/11/25**		
170		PSB removes furniture from space / McKir	1 day	Thu 10/30/25	Thu 10/30/25	163SS	171
171		Ceiling Removal / Light Removal	1 day	Fri 10/31/25	Fri 10/31/25	170	172SS
172		Electrical and Mechanical LOTO	1 day	Fri 10/31/25	Fri 10/31/25	171SS	173
173		Remove HP's	1 day	Mon 11/3/25	Mon 11/3/25	172	174
174		Install New HP's	1 day	Tue 11/4/25	Tue 11/4/25	173	175,176,177,179F
175		Ductwork Fab	2 days	Wed 11/5/25	Thu 11/6/25	174	178
176		Piping / Hose Kit Install	2 days	Wed 11/5/25	Thu 11/6/25	174	179FF
177		Electrical / Controls R.I.	2 days	Wed 11/5/25	Thu 11/6/25	174	179FF,183
178		Ductwork Install	1 day	Fri 11/7/25	Fri 11/7/25	175	179
179		Inspections	1 day	Mon 11/10/25	Mon 11/10/25	174FF,176FF,177F	180,181
180		Re-Install Ceilings / Lights	1 day	Tue 11/11/25	Tue 11/11/25	179	
181		Ready for Point to Point and Startup	0 days	Mon 11/10/25	Mon 11/10/25	179	
182		**HP Replacement RM 244 - RM 234**	**9 days**	**Fri 11/7/25**	**Wed 11/19/25**		
183		PSB removes furniture from space / McKir	1 day	Fri 11/7/25	Fri 11/7/25	177	184
184		Ceiling Removal / Light Removal	1 day	Mon 11/10/25	Mon 11/10/25	183	185SS,206
185		Electrical and Mechanical LOTO	1 day	Mon 11/10/25	Mon 11/10/25	184SS	186
186		Remove HP's	1 day	Tue 11/11/25	Tue 11/11/25	185	187
187		Install New HP's	1 day	Wed 11/12/25	Wed 11/12/25	186	188,189,190,192F
188		Ductwork Fab	2 days	Thu 11/13/25	Fri 11/14/25	187	191
189		Piping / Hose Kit Install	2 days	Thu 11/13/25	Fri 11/14/25	187	192FF
190		Electrical / Controls R.I.	2 days	Thu 11/13/25	Fri 11/14/25	187	192FF,196



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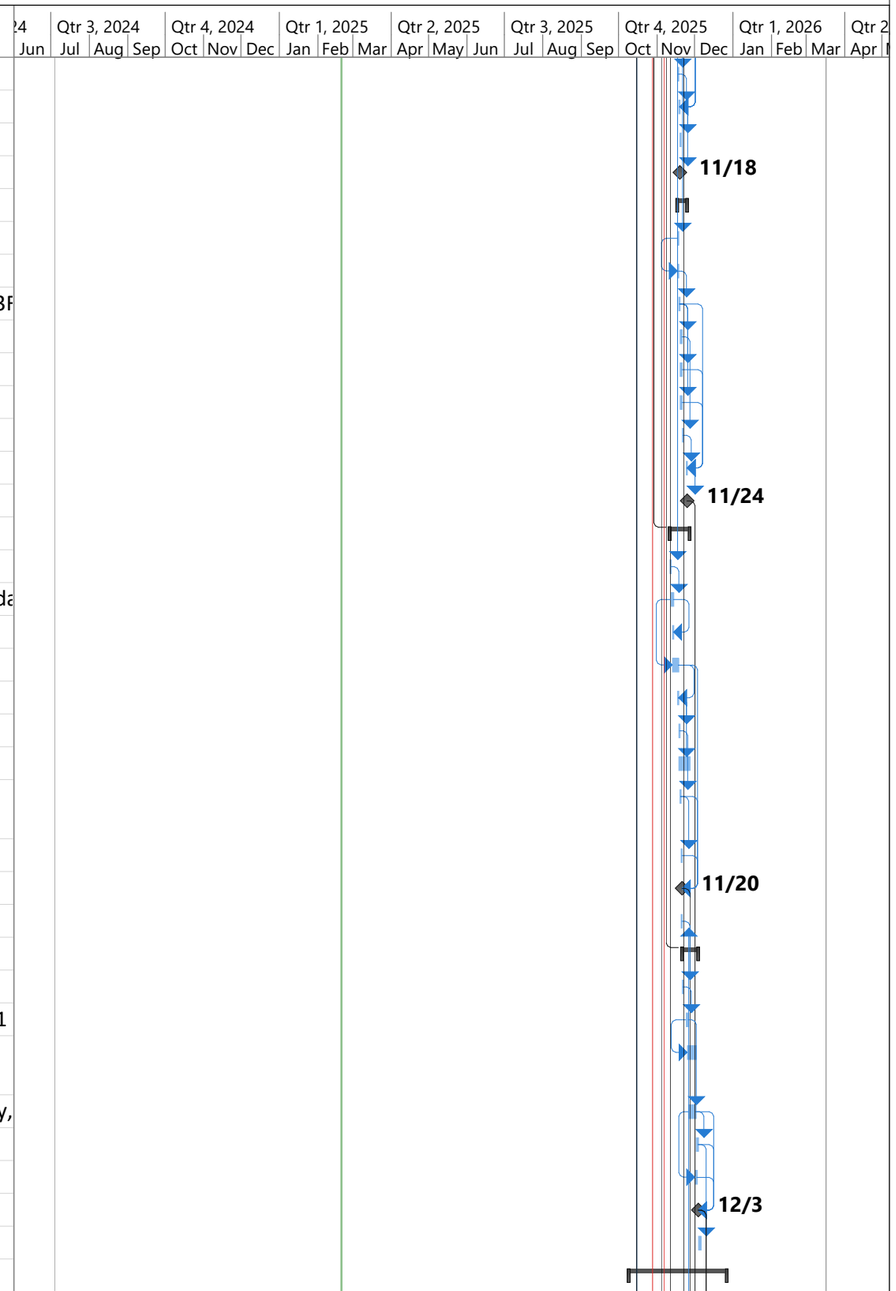
Redmond PSB HVAC Upgrades
Construction Schedule
Thu 2/20/25

ID	Task Mode	Task Name	Duration	Start	Finish	Predecessors	Successors
191		Ductwork Install	1 day	Mon 11/17/25	Mon 11/17/25	188	192
192		Inspections	1 day	Tue 11/18/25	Tue 11/18/25	187FF,189FF,190F	193,194
193		Re-Install Ceilings / Lights	1 day	Wed 11/19/25	Wed 11/19/25	192	
194		Ready for Point to Point and Startup	0 days	Tue 11/18/25	Tue 11/18/25	192	
195		**HP Replacement West Mechanical RM**	**6 days**	**Mon 11/17/25**	**Mon 11/24/25**		
196		Electrical and Mechanical LOTO	1 day	Mon 11/17/25	Mon 11/17/25	190	197SS
197		Remove HP's	1 day	Mon 11/17/25	Mon 11/17/25	196SS	198
198		Install New HP's	1 day	Tue 11/18/25	Tue 11/18/25	197	199,200,201,203F
199		Ductwork Fab	2 days	Wed 11/19/25	Thu 11/20/25	198	202
200		Piping / Hose Kit Install	2 days	Wed 11/19/25	Thu 11/20/25	198	203FF
201		Electrical / Controls R.I.	2 days	Wed 11/19/25	Thu 11/20/25	198	203FF
202		Ductwork Install	1 day	Fri 11/21/25	Fri 11/21/25	199	203
203		Inspections	1 day	Mon 11/24/25	Mon 11/24/25	198FF,200FF,201F	204
204		Ready for Point to Point and Startup	0 days	Mon 11/24/25	Mon 11/24/25	203	233
205		**FIM 53391 IDF Room Split System**	**12 days**	**Tue 11/11/25**	**Wed 11/26/25**		**88SS**
206		Protections of Finishes	1 day	Tue 11/11/25	Tue 11/11/25	184	207
207		Demo Ceilings to Expose Old Line Set and Read	2 days	Wed 11/12/25	Thu 11/13/25	206	208FF,209SS+1 da
208		Set Up Temp Cooling For IDF Room	1 day	Thu 11/13/25	Thu 11/13/25	207FF	
209		Install New Line Sets	3 days	Thu 11/13/25	Mon 11/17/25	207SS+1 day	210FF,215FF
210		Inspect New Linesets	1 day	Mon 11/17/25	Mon 11/17/25	209FF	211,212
211		Remove Existing Indoor and Outdoor Units	1 day	Tue 11/18/25	Tue 11/18/25	210	213
212		Re-Install Ceilings and Patch / Paint	7 days	Tue 11/18/25	Wed 11/26/25	210	
213		Install New Indoor and Outdoor Units Connect Piping	1 day	Wed 11/19/25	Wed 11/19/25	211	214,215FF
214		Reconnect Electrical and Controls	1 day	Thu 11/20/25	Thu 11/20/25	213	215FF
215		Ready for Point to Point and Startup	0 days	Thu 11/20/25	Thu 11/20/25	209FF,213FF,214F	232
216		Remove Temp Cooling	1 day	Thu 11/20/25	Thu 11/20/25	241	218
217		**FIM 31865 Main AHU Fan Array (Mech Mezz)**	**7 days**	**Fri 11/21/25**	**Wed 12/3/25**		**90SS**
218		Electrical and Mechanical LOTO	1 day	Fri 11/21/25	Fri 11/21/25	216	219
219		Demo Existing Fan Motor / 42" Duct	2 days	Mon 11/24/25	Tue 11/25/25	218	220SS+1 day,221
220		Measure and Fabricate AHU Extension and Duct / Connections	3 days	Tue 11/25/25	Mon 12/1/25	219SS+1 day	
221		Install Fan Wall	2 days	Wed 11/26/25	Mon 12/1/25	219	222,223SS+1 day,
222		Install New AHU Extension and Duct.	2 days	Tue 12/2/25	Wed 12/3/25	221	224FF,225
223		Electrical / Controls R.I.	2 days	Mon 12/1/25	Tue 12/2/25	221SS+1 day	224FF
224		Ready for Point to Point and Startup	0 days	Wed 12/3/25	Wed 12/3/25	221FF,222FF,223F	234,243
225		Insulation	2 days	Thu 12/4/25	Fri 12/5/25	222	
226		**Third Party and AHJ inspections**	**54 days**	**Thu 10/9/25**	**Fri 12/26/25**		



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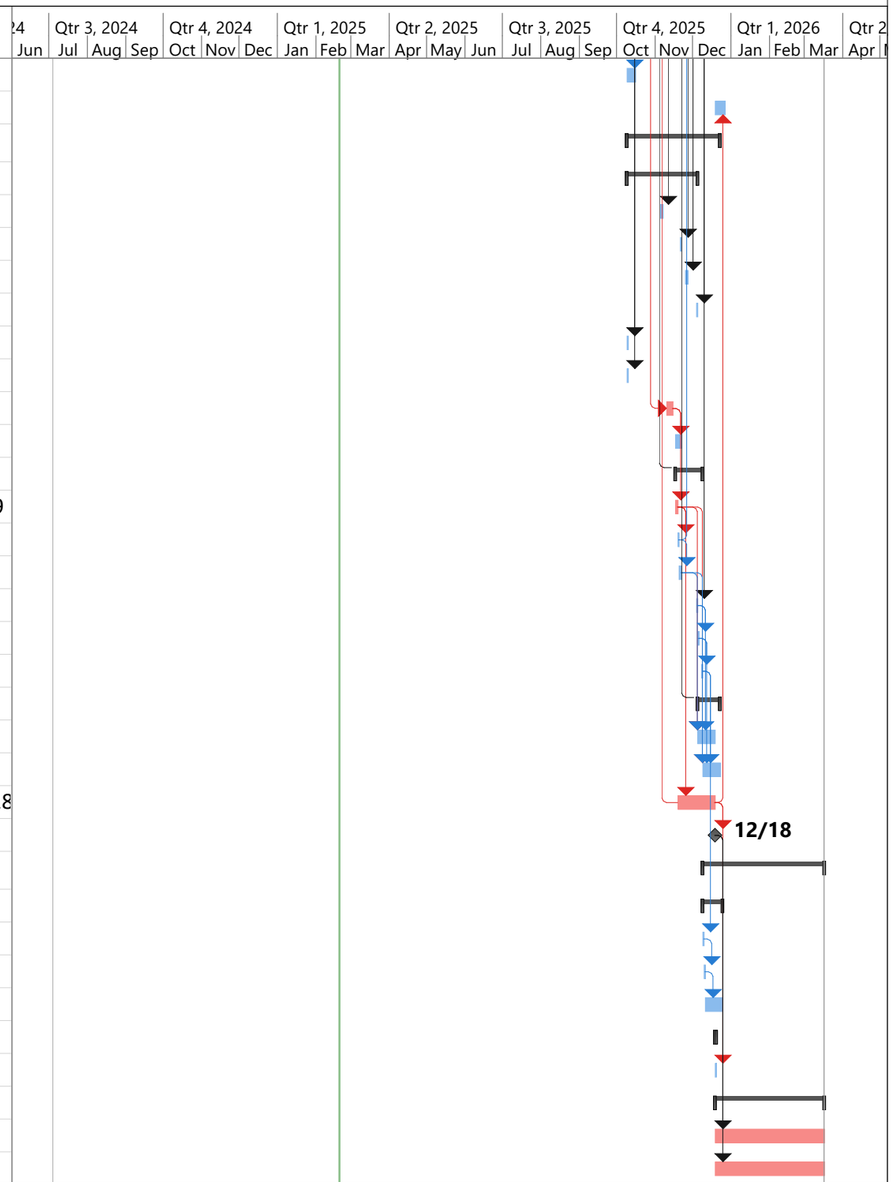
Redmond PSB HVAC Upgrades
Construction Schedule
Thu 2/20/25

ID	Task Mode	Task Name	Duration	Start	Finish	Predecessors	Successors
227		**City/State Electrical Final**	5 days	Thu 10/9/25	Wed 10/15/25	115	
228		City/State Mechanical Final	5 days	Fri 12/19/25	Fri 12/26/25	249	
229		**Startup / Cx**	**51 days**	**Thu 10/9/25**	**Mon 12/22/25**		
230		**Point to Point**	**39 days**	**Thu 10/9/25**	**Thu 12/4/25**		
231		First Floor New HP's	2 days	Wed 11/5/25	Thu 11/6/25	167	
232		Mini Splits	1 day	Fri 11/21/25	Fri 11/21/25	215	
233		Second Floor New HP's	2 days	Tue 11/25/25	Wed 11/26/25	204	
234		AHU	1 day	Thu 12/4/25	Thu 12/4/25	224	
235		Cooling Tower	1 day	Thu 10/9/25	Thu 10/9/25	116	
236		Condenser Pump	1 day	Thu 10/9/25	Thu 10/9/25	108	
237		Controls Integration	5 days	Mon 11/10/25	Fri 11/14/25	126SS	238,240
238		Graphic	5 days	Mon 11/17/25	Fri 11/21/25	237	
239		**Startup**	**14 days**	**Mon 11/17/25**	**Mon 12/8/25**		**89SS**
240		First Floor New HP's	2 days	Mon 11/17/25	Tue 11/18/25	237	248,247,241,249
241		Mini Splits	1 day	Wed 11/19/25	Wed 11/19/25	240	216,242
242		Second Floor New HP's	2 days	Thu 11/20/25	Fri 11/21/25	241	248,247
243		AHU	1 day	Thu 12/4/25	Thu 12/4/25	224	247,244
244		Cooling Tower	1 day	Fri 12/5/25	Fri 12/5/25	243	248,245
245		Condenser Pump	1 day	Mon 12/8/25	Mon 12/8/25	244	248,253
246		**TAB**	**12 days**	**Fri 12/5/25**	**Mon 12/22/25**		**91SS**
247		Dry Side	10 days	Fri 12/5/25	Thu 12/18/25	240,242,243	
248		Wet Side	10 days	Tue 12/9/25	Mon 12/22/25	240,242,244,245	
249		Cx of Systems	4 wks	Wed 11/19/25	Thu 12/18/25	240	250,257,92SS,228
250		Project Substantial Completion	0 days	Thu 12/18/25	Thu 12/18/25	249	259,260
251		**Punchlist / Training / Closeout**	**68 days**	**Tue 12/9/25**	**Mon 3/16/26**		
252		**Punchlist**	**12 days**	**Tue 12/9/25**	**Wed 12/24/25**		
253		Designer Final Punch Walk	1 day	Tue 12/9/25	Tue 12/9/25	245	254
254		Owner / Contractor Punch Walk	1 day	Wed 12/10/25	Wed 12/10/25	253	255
255		Punchlist Corrections	10 days	Thu 12/11/25	Wed 12/24/25	254	
256		**Training**	**1 day**	**Fri 12/19/25**	**Fri 12/19/25**		
257		Training	1 day	Fri 12/19/25	Fri 12/19/25	249	
258		**Closeout**	**60 days**	**Fri 12/19/25**	**Mon 3/16/26**		
259		Compile O&M Materials From Subcontractors	60 days	Fri 12/19/25	Mon 3/16/26	250	
260		Finalize Contracts and Retention	60 days	Fri 12/19/25	Mon 3/16/26	250	



Detailed Scope of Work

FIM ID # 53394
03.01-PSB Replace WSHP
Redmond Public Safety Building

GENERAL

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.

SCOPE OF WORK INCLUDES

1. Major Equipment Installed in this FIM. Control valves shall be provided by manufacturer. (Replaced Units-13, New Unit – 1)
   A. HP-4A
   B. HP-5A
   C. HP-5B
   D. HP-7B
   E. HP-8A (Corrected Tag #)
   F. HP-9B (New Zone)
   G. HP-10B
   H. HP-18A
   I. HP-19A
   J. HP-19B
   K. HP-20A
   L. HP-20B
   M. HP-31 (to include factory provided Refrigerant Monitoring Sensor)
   N. HP-A
   O. (2) Communicating Service Tool (ACDU03)
2. General
   A. Coordinate early during design with owner and controls contractor to establish equipment name tag nomenclature and identifiers in the controls system.
   B. Coordinate refrigerant removal with the City ahead of the WSHP demolition. The City HVAC staff is interested to retain the R-22 refrigerant. Removal and capture by mechanical contractor.
3. Mechanical
   A. Demo
      1) Sheet Metal
         (i) Demo or remove for relocation identified existing heat pumps and all associated appurtenances per sketches.
         (ii) Abandon and make safe units noted on drawings
         (iii) Demo distribution duct and diffusers at locations indicated on sketches.
         (iv) Demo or cap outdoor air duct as necessary.
      2) Piping
         (i) Demo condenser water piping connections at each identified heat pump. Demolish piping back to nearest isolation valve.
         (ii) Demo condensate piping at each identified heat pump as necessary. Field verify extent of demolition
         (iii) Field verify conditions at each heat pump identified for demolition and report issues related to existing conduit, piping, etc., that block access or impede work.
   B. New Work
      1) Sheet Metal
         (i) Install fourteen (14) new heat pumps at locations indicated on sketches.
         (ii) Provide new ductwork and accessories for existing HP-9A (Corrected Tag #)
         (iii) Furnish and install new diffusers at locations indicated on sketches.
         (iv) Extend outdoor air duct as necessary to deliver ventilation air within 12” of heat pump intake. See sketches. Outside air duct to be flex duct.
         (v) Provide heat pump supply air distribution duct as indicated on sketches.
         (vi) Reuse duct smoke detectors for any new heat pumps with outputs equal to or greater than 2000 cfm.
         (vii) Provide each new heat pump with a return air boot. Match existing.
         (viii) Provide insulation in accordance with WSEC.

2) Piping
   (i) Provide condenser water piping and associated appurtenances; connect pipe to new heat pump as indicated per sketches and Detail 4/M500.
   (ii) Provide condensate piping from each heat pump and connect to existing gravity drain per sketches.
   (iii) Furnish and install hose kits including strainers, P/T ports, air vents (at high points), and flex hoses for each new heat pump. 2-way control valves by manufacturer.
   (iv) Furnish and install up to (6) new condensate pumps as necessary to maintain proper draining of new and existing condensate piping; Little Giant Series VCMA or approved equal.
   (v) Provide insulation in accordance with WSEC.
   (vi) Provide propylene glycol and inhibitor as necessary to refill hydronic loop after construction.

4. Controls
   A. Demo heat pump controls and associated appurtenances. See sketches for locations of (14) heat pumps.
   B. Demo space temperature sensors and associated appurtenances. New thermostats to be temperature only. Field verify existing locations.
   C. Provide hardware required to support controls indicated on the points list.
   D. Provide the software and sequences associated with the attached points list necessary to implement fully functional system.
   E. Controls contractor shall reference McKinstry control provider performance standard for project expectations and shall work with the Commissioning agent for adherence.
   F. Perform low voltage wiring from WSHP controller to 2-position condenser valve.
5. Structural (existing framing has been verified with preliminary equipment selection; existing framing is adequate for new incoming loads associated with replacement mech equipment without triggering structural upgrade. Existing framing will be confirmed at a future date with final equipment selection).
   A. (14) WSHP:
      1) Provide seismic cable brace with MEB kit; hung to concrete deck and steel beam above
      2) Minimum (1) cable brace at each corner; total (4) cables per unit.
   B. Special inspection:
      1) Post-installed concrete anchors required special periodic inspection.
6. Electrical
   A. See Electrical Scope Table.
7. Carpentry
   A. Ceilings
      1) Removal and replacement of ceiling tiles for demo and installation of heat pumps will be necessary. Ceiling grid may need to be removed for demo or installation of heat pumps.
      2) Provide additional ceiling access doors for installation of new heat pumps if heat pumps are located over a hard lid.
8. Testing, Adjusting, and Balancing (TAB)
   A. Provide post-install airside balancing at each heat pump in scope.
   B. Provide post-install waterside balancing at each heat pump in scope.
9. Commissioning
   A. Provide point to point verification at each heat pump provided or relocated.
   B. Provide functional performance testing at each heat pump provided or relocated.
   C. Develop drain down plan for review by engineer.
10. Training
    A. Provide training as required for this FIM.

CLARIFICATIONS AND EXCLUSIONS

1. Excludes hazardous material testing and abatement. McKinstry will coordinate with the City on additional testing and abatement as necessary.
2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.
   A. All WSHP units not in scope to remain as is.
3. Provide a (2) week lookahead schedule during construction. For areas where people need to be relocated, furniture to be removed, at least 2-week notice is required. For other area impacts, a 2-week notice is preferred, and at least 1-week notice is required.
4. All work will be performed during regular hours, Monday – Friday. Except as noted below.
   A. Weekday Regular Hours
      1) HP-18A, 19A, 19B, 20A, 20B, 10B scope will be performed during regular hours. Spaces served by these HPs will be vacated during construction in these zones.
      2) End of shift cleaning of the space is not necessary and not included in the scope.

Detailed Scope of Work

B. Weekday Swing Shift HPs
   1) Perform work in swing shift for HP-4A, 5A, 5B, 8A, 9A (duct modification), 9B. This includes start-up, TAB and controls for the units.
   2) Work to start after 5:00 PM.
   3) Women's Restroom Unit HP-A: Budget includes installing a temporary separation wall and performing work during swing shift.
   4) Spaces are expected to be used by staff during regular hours.

C. McKinstry will coordinate the construction schedule and expected impact with the City in advance. The City shall communicate impacts notifications to the building occupants.

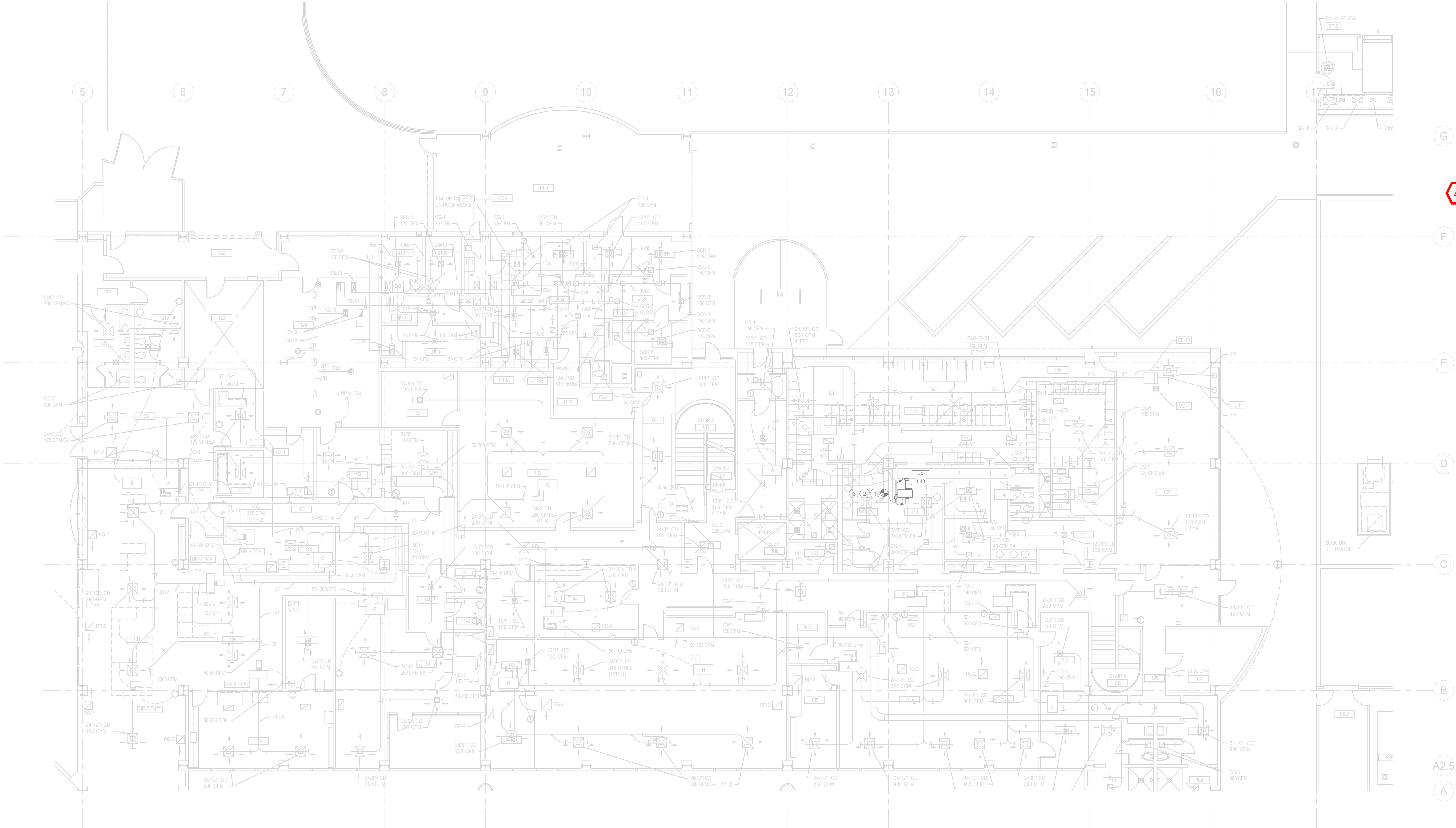
5. WSHP Access
   A. Existing HP-5A and HP-5B not accessible for demolition and will be abandoned in place.
   B. The City Owner to relocate existing furniture and equipment as needed to accommodate construction access to the WSHP in scope. McKinstry will provide mark-up of area required for construction access.
   C. For each work zone, demolition of the ceiling and wall will be performed at the start of work in the zone. The ceiling and wall will be repaired after work is completed in the zone.
   D. In areas with ACT, the impact tiles will be removed, stored on-site and re-installed after replacing a HP. The ceiling will remain open for the duration for HP replacement. Same will be followed for hard ceiling.
   E. McKinstry to inspect and document the area for existing conditions, damage from City removal of furniture and equipment
6. Construction Space Use by Staff
   A. Per coordination with the City none of the WSHP in scope are located in spaces that will require presence of a police department escort.
   B. The HPs will not be operational during the replacement. Space heating and cooling will not be available during the day.
   C. For swing shift WSHP spaces, the City to provide temporary move-in cools for cooling or temporary heaters for heating. These are not included in the scope and budget.
   D. Vinyl sheets will be installed on remaining equipment in the space. City to remove fragile/sensitive material, staff personal belongings from the space prior to construction start in that space.
   E. For swing shift WSHP spaces, vacuum of the work area floor will be performed at the end of the swing shift.
7. Outdoor air duct will be extended near to the new heat pumps using flex duct to satisfy the code requirements at the time of the building's constructions. No other modifications or improvements to AHU-1 and the building ventilation system will be made.
8. There is one instance where (1) heat pump is being split into (2) smaller heat pumps to accommodate some changes in space use since original construction. Currently this heat pump serves two distinct spaces and there are numerous comfort complaints, which this will address. With these heat pumps being "new" and not like-for-like replacement units, the concern is that these (2) units would be required to have 100% economizer per the WSEC. A request for these (2) heat pumps be designed to match the existing configuration of the (1) heat pump to be replaced was submitted to the City for review with the AHJ. Preliminary response from the AHJ indicated acceptance of this design approach and recommended submitting for formal review. This will be performed during the design phase.
9. Per discussion with facilities full drain down of the condenser loop should not be required. Isolation valves are available at the WSHP. In some cases partial branch drain down could be performed if necessary. Full drain down and chemical treatment of the condenser loop is not included in the scope. Chemical testing and balance after the project is included in the scope.
10. City confirmed it will provide a designated space in the building to be used as office and breakroom by the construction crew during the construction duration and access to restroom. The crew will have access to the space during the construction shifts and after hours. Such a space was provided in the previous two construction phases and will eliminate the need for a on-site construction trailer. The City is coordinating internally to identify the space and details will be coordinated during pre-construction.

SHEET NOTES

1. NEW WORK SHOWN IN BOLD ON THIS SHEET

KEYNOTES

1 PROVIDE HEAT PUMP AND ASSOCIATED APPURTENANCES. SEE SCHEDULE ON SHEET M-060 AND DETAIL 4/M-500.
2 PROVIDE WALL THERMOSTAT AND ASSOCIATED APPURTENANCES. FIELD VERIFY INSTALLATION LOCATION.
3 PROVIDE DISCHARGE DUCT; CONNECT TO EXISTING AND INSULATE AS NECESSARY. FIELD VERIFY CONNECTION SIZES AND POINTS OF CONNECTION.



1 / M-101 MECHANICAL PLAN FIRST FLOOR EAST

SCALE: 1/8" = 1'-0"

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McKINSTRY Co, LLC

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1-800-669-6223

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PROJECT:
CITY OF REDMOND PUBLIC SAFETY BUILDING PH II

8701 160TH AVE NE
REDMOND, WA

CAP

CONSULTANTS:

REGISTRATION:

ISSUES:

NO	DATE	DESCRIPTION
	3/24/2020	90% SET
	08/05/2020	PERMIT SET

DESIGNED: K.MORK, B.MORRIS
DRAWN: K.MORK
CHECKED: B.MORRIS
JOB NO: 202835
ISSUED ON: 08/05/2020

SHEET TITLE:
MECHANICAL PLAN FIRST FLOOR EAST

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SHEET NUMBER:
M-101

SHEET NOTES

1. NEW WORK SHOWN IN BOLD ON THIS SHEET
2. SEE UNIT HP-284 FOR TYPICAL NOTES

KEYNOTES

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3 PROVIDE INTAKE BOOT AS NECESSARY. SEE DETAIL 2/M-500.
4 PROVIDE DIFFUSER. SEE SCHEDULE ON SHEET M-060. SEE DETAIL 1/M-500.
5 RE-USE EXISTING THERMA-FUSERS IF POSSIBLE, OTHERWISE, PROVIDE THERMA-FUSER AND ASSOCIATED APPURTENANCES. PROVIDE NEW CONTROLS FOR EXISTING THERMA-FUSERS IF REUSED. SEE SCHEDULE ON SHEET M-060.
6 REINSTALL EXISTING BACKDRAFT DAMPER.
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8 FIELD VERIFY VENTILATION AIR CONNECTION TO UNIT. INSTALL DUCTING OR BOOT TO MATCH EXISTING CONFIGURATION.

DEMO FIRE SPRINKLER TO SUFFICIENTLY TO FACILITATE RELOCATION OF WATER SOURCE HEAT PUMP HP-10B

1 / M-102 MECHANICAL PLAN SECOND FLOOR EAST
SCALE: 1/8" = 1'-0"

0 4' 8' 16'

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ISSUED ON: 08/05/2020

SHEET TITLE:
MECHANICAL PLAN SECOND FLOOR EAST

SHEET NUMBER:
M-102

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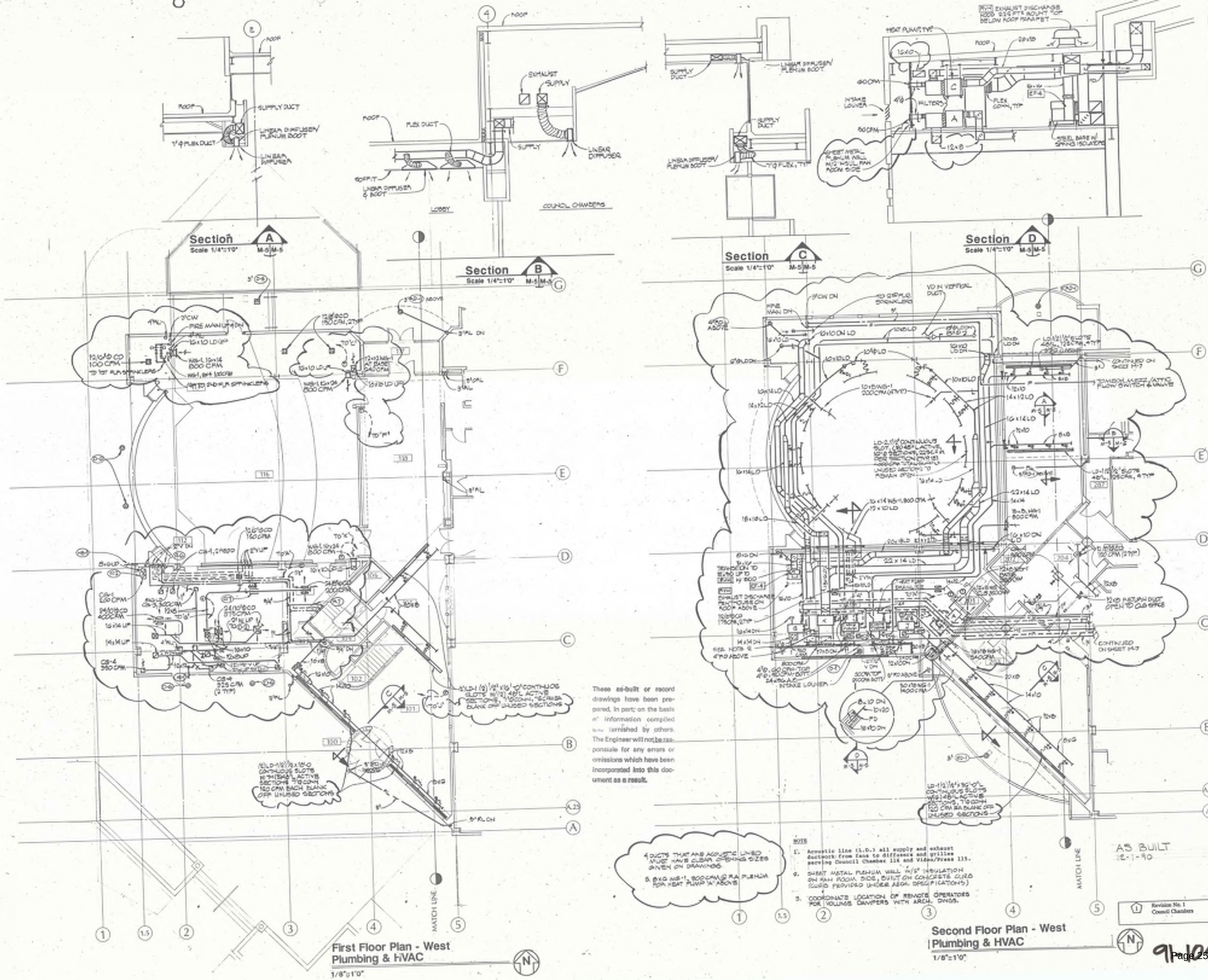
Section A
Scale 1/4"=1'0"
M-5/M-5
Section B
Scale 1/4"=1'0"
M-5/M-5
Section C
Scale 1/4"=1'0"
M-5/M-5
Section D
Scale 1/4"=1'0"
M-5/M-5
First Floor Plan - West
Plumbing & HVAC
1/8"=1'0"
Second Floor Plan - West
Plumbing & HVAC
1/8"=1'0"
AS BUILT
12-1-90
MATCH LINE
These as-built or record drawings have been prepared, in part, on the basis of information compiled and furnished by others. The Engineer will not be responsible for any errors or omissions which have been incorporated into this document as a result.
Revision No. 1
Council Chambers
ARAI/JACKSON ARCHITECTS & PLANNERS
REDMOND MUNICIPAL CAMPUS
Police Building and Site Improvements
For: City of Redmond, Washington
FIRST/SECOND FLOOR PLAN (WEST)
PLUMBING AND HVAC
12/9/88
1-5-89
R 9/1/89
M-5
91-1045

SHEET NOTES

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3. PROVIDE DISCHARGE DUCT; CONNECT TO EXISTING AND INSULATE AS NECESSARY. FIELD VERIFY CONNECTION SIZES AND POINT OF CONNECTION.

HP-9A
PER
KEN

12"x10"

10"x8"

HP-8A

HP-9

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CONSULTANTS:

REGISTRATION:

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DRAWN: K.MORK
CHECKED: B.MORRIS
JOB NO: 202835
ISSUED ON: 08/05/2020

SHEET TITLE:

MECHANICAL PLAN
FIRST FLOOR EAST

SHEET NUMBER:

M-101

1
M-101

MECHANICAL PLAN FIRST FLOOR EAST

SCALE: 1/8" = 1'-0"

0 4' 8' 16'

SHEET NOTES

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2. SEE UNIT HP-284 FOR TYPICAL NOTES

KEYNOTES

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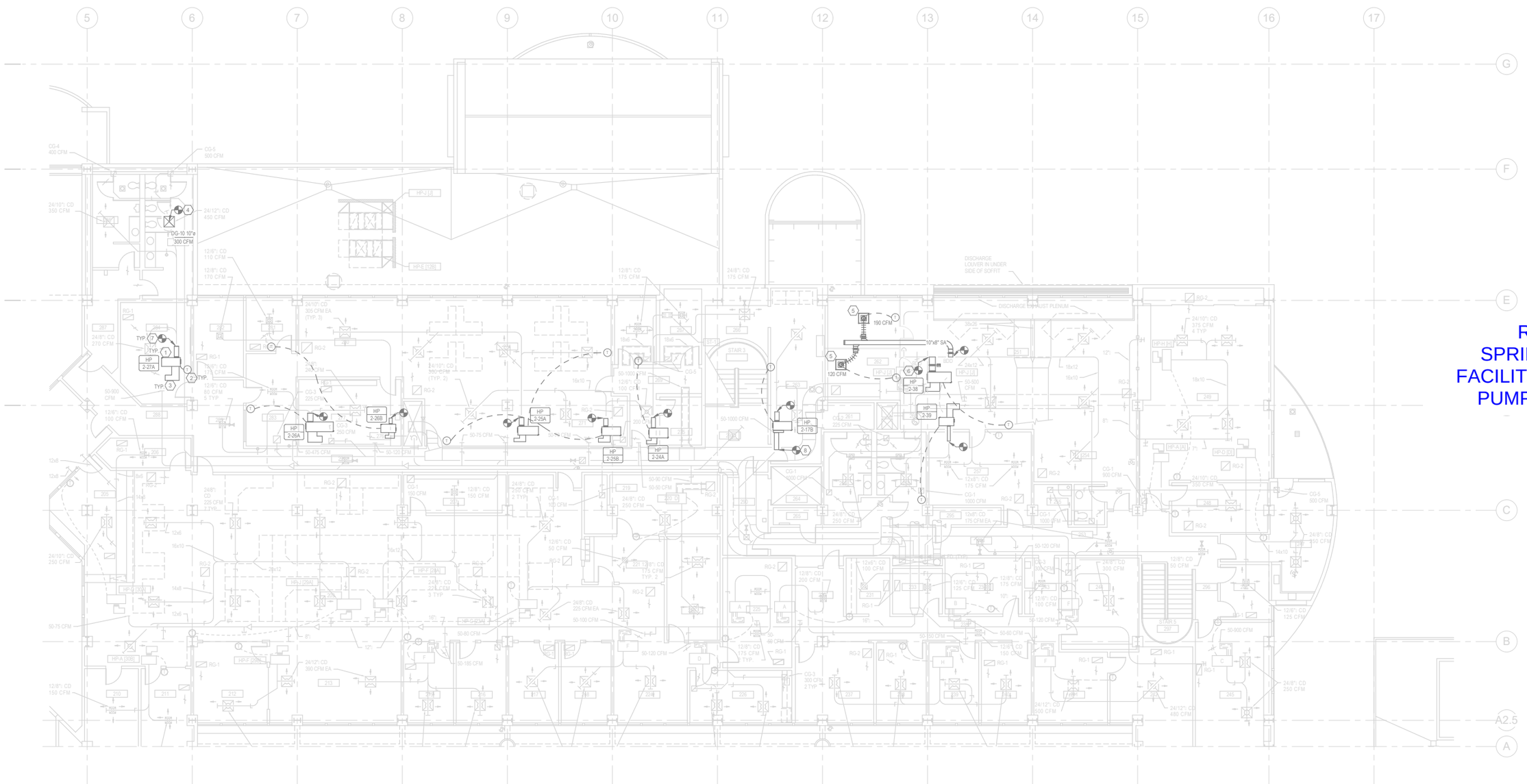

1 / M-102 MECHANICAL PLAN SECOND FLOOR EAST

SCALE: 1/8" = 1'-0"

0 4" 8" 16"

RELOCATE SPRINKLER TO FACILITATE HEAT PUMP INSTALL.

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MECHANICAL PLAN SECOND FLOOR EAST

SHEET NUMBER:
M-102

Section A
Scale 1/4"=1'0"
M-5/M-5

Section B
Scale 1/4"=1'0"
M-5/M-5

Section C
Scale 1/4"=1'0"
M-5/M-5

Section D
Scale 1/4"=1'0"
M-5/M-5

First Floor Plan - West
Plumbing & HVAC
1/8"=1'0"

Second Floor Plan - West
Plumbing & HVAC
1/8"=1'0"

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AS BUILT
12-1-90

Revision No. 1
Council Chambers

ARAI/JACKSON ARCHITECTS & PLANNERS

Revisions

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REDMOND MUNICIPAL CAMPUS
Police Building and Site Improvements
For: City of Redmond, Washington

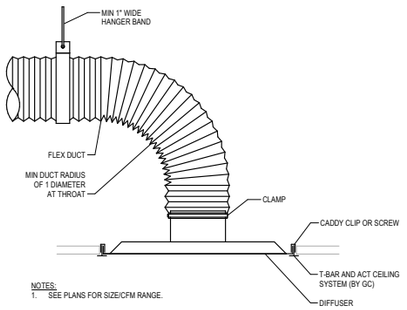
FIRST/SECOND FLOOR PLAN (WEST)
PLUMBING AND HVAC

12/9/88
1-5-89
R 9/1/89

M-5

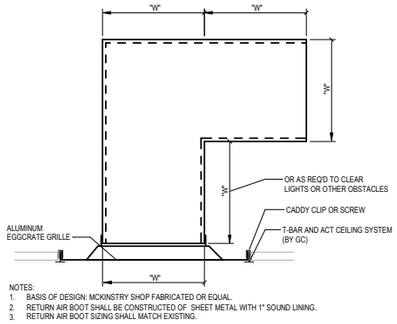
Approval

91-1045



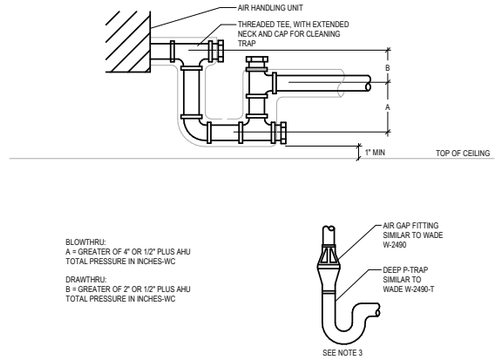
1 M-500 CEILING MULTI-CORE DIFFUSER W/O BOOT DETAIL

SCALE: NTS



2 M-500 RETURN AIR GRILLE AND CAN DETAIL - SINGLE ELBOW DETAIL

SCALE: NTS

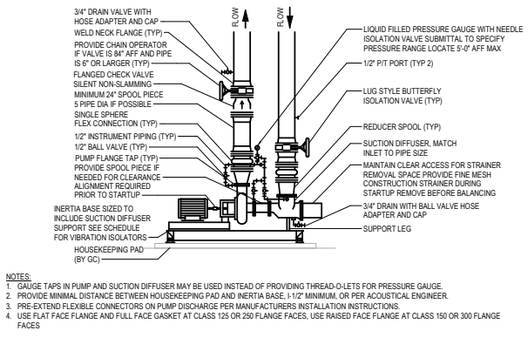


3 M-500 CONDENSATE DRAIN TRAP DETAIL

SCALE: NTS

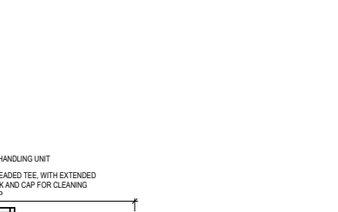
4 M-500 HEAT PUMP UNIT DETAILS

SCALE: NTS



5 M-500 END SUCTION PUMP DETAIL WITH INERTIA BASE VARIABLE VOLUME PUMP (WITH VFD)

SCALE: NTS



6 M-500 DIFFERENTIAL PRESSURE SENSOR ASSEMBLY DETAIL

SCALE: NTS

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DRAWN: K.MORK
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JOB NO: 202835
ISSUED ON: 08/05/2020

SHEET TITLE:
MECHANICAL
DETAILS

SHEET NUMBER:
M-500

ELECTRICAL SCOPE TABLE

Project Name: Redmond PSB Phase 3 - 204738
FIM No: 53394-03.08
FIM Name: Replace WSHP
Location: Redmond, WA
Project Phase: GMAX
Purpose: The following MEP Scope Table is intended to be referenced along with the 'Electrical Sketches'.
Date: 1/14/2025

EXISTING ELECTRICAL CONNECTION INFORMATION														NEW ELECTRICAL CONNECTION INFORMATION													LOAD CHANGE
EXISTING. EQUIP. TAG	LOCATION	V	PH	HP	FLA	MCA	KVA	PANEL OR JBOX	OCPD	CONDUIT	WIRE	DISCONNECT (SIZE/NEMA/FUSE)	MOTOR CONTROLLER	NEW EQUIP. TAG	V	PH	HP	FLA	MCA	KVA	MOCP	PANEL OR JBOX	OCPD	CONDUIT	WIRE	DISCONNECT (SIZE/NEMA/FUSE)	MOTOR CONTROLLER	MIN SCCR	
E	ROOM 159	277	1	N/A	1.50	13.46	3.73	1A4-2	**20**	1/2"	#12	**DISCONNECT**	N/A	HP-4A	277	1	N/A	13.70	16.30	4.52	25	1A4-2	**25**	1/2"	#12	**30/1**	N/A	N/A	+ 0.79
D	ROOM 189	277	1	N/A	1.20	9.66	2.68	1A4-9	**20**	1/2"	#12	**DISCONNECT**	N/A	HP-7B	277	1	N/A	8.60	10.20	2.83	15	1A4-9	**15**	1/2"	#12	**30/1**	N/A	N/A	+ 0.15
A	ROOM 173	277	1	N/A	0.50	4.34	1.20	1A4-11	**20**	1/2"	#12	**DISCONNECT**	N/A	HP-A	277	1	N/A	5.00	5.90	1.63	15	1A4-11	**15**	1/2"	#12	**30/1**	N/A	N/A	+ 0.43
H	ROOM 150	480	3	N/A	1.80	9.24	7.68	JBOX-3	**20**	**1/2"**	**3#12**	**DISCONNECT**	N/A	HP-9A	480	3	N/A	7.90	9.00	7.48	15	1A4-8,10,12	**15**	**3/4"**	**4#12, #12G**	**30/1/15**	N/A	N/A	- 0.20
FDR-F,H		480	3					1A4-31,33,35	**20**	**1/2"**	**3#10**	N/A	N/A	FDR-5A,5B	480	3	N/A	N/A	N/A	N/A	N/A	1A4-31,33,35	**30**	**3/4"**	**4#10, #10G**	N/A	NA		
F	ROOM 195	480	3	N/A	1.00	6.35	5.28	JBOX-4	**UNKN**	**1/2"**	**3#10**	**DISCONNECT**	N/A	HP-5B	480	3	N/A	10.60	12.10	10.06	15	FDR-5A, 5B	**15**	**3/4"**	**4#10, #10G**	**30/1/15**	N/A	N/A	+ 4.78
H	ROOM 195	480	3	N/A	1.80	9.24	7.68	JBOX-4	**UNKN**	**1/2"**	**3#10**	**DISCONNECT**	N/A	HP-5A	480	3	N/A	7.90	9.00	7.48	15	FDR-5A, 5B	**15**	**3/4"**	**4#10, #10G**	**30/1/15**	N/A	N/A	- 0.20
B	ROOM 234	277	1	N/A	0.81	6.79	1.88	2XA-4	**20**	1/2"	#12	**DISCONNECT**	N/A	HP-20B	277	1	N/A	6.70	7.80	2.16	15	2XA-4	**15**	1/2"	#12	**30/1**	N/A	N/A	+ 0.28
C	ROOM 245	277	1	N/A	0.82	7.71	2.13	2XA-6	**20**	1/2"	#12	**DISCONNECT**	N/A	HP-18A	277	1	N/A	7.40	8.70	2.41	15	2XA-6	**15**	1/2"	#12	**30/1**	N/A	N/A	+ 0.27
														FDR-19A,19B ,20A	480	3	N/A	N/A	N/A	N/A	N/A	2XA4-8,10,12	**20**	**3/4"**	**4#10, #10G**	N/A	N/A	N/A	
F	ROOM 241	480	3	N/A	1.00	6.35	5.28	JBOX-6	**UNKN**	**1/2"**	**3#12**	**DISCONNECT**	N/A	HP-19A	480	3	N/A	7.90	9.00	7.48	15	FDR-19A,19B ,20A	**15**	**3/4"**	**4#12, #12G**	**30/1/15**	N/A	N/A	+ 2.20
F	ROOM 243	480	3	N/A	1.00	6.35	5.28	JBOX-6	**UNKN**	**1/2"**	**3#12**	**DISCONNECT**	N/A	HP-19B	480	3	N/A	7.90	9.00	7.48	15	FDR-19A,19B ,20A	**15**	**3/4"**	**4#12, #12G**	**30/1/15**	N/A	N/A	+ 2.20
H	ROOM 239	480	3	N/A	1.80	9.24	7.68	JBOX-7	**UNKN**	**1/2"**	**3#12**	**DISCONNECT**	N/A	HP-20A	480	3	N/A	10.60	12.10	10.06	15	FDR-19A,19B ,20A	**15**	**3/4"**	**4#12, #12G**	**30/1/15**	N/A	N/A	+ 2.38
J	ROOM 200	480	3	N/A	2.60	12.79	10.63	JBOX-8	**UNKN**	**1/2"**	**3#12**	**DISCONNECT**	N/A	HP-31 [5]	480	3	N/A	13.30	15.10	12.55	20	**2H4-19,21,23**	**20**	**3/4"**	**4#12, #12G**	**30/1**	N/A	N/A	+ 1.92
D	ROOM 224	277	1	N/A	1.20	9.66	2.68	2E4-15	**20**	1/2"	#12	**DISCONNECT**	N/A	HP-10B	277	1	N/A	8.60	10.20	2.83	15	2E4-15	**15**	1/2"	#12	**30/1**	N/A	N/A	+ 0.15
														HP-9B	277	1	N/A	8.60	10.20	2.83	15	JBOX-2	**15**	**1/2"**	**2#12, #12G**	**30/1/15**	N/A	N/A	+ 2.83
														CP-1 (CONDENSATE PUMP 1)	120	1	1/30	1.50	1.88	0.23	N/A	UNKN [7]	**20**	**3/4"**	**#12**	**MRS-15A**	INTEGRAL	N/A	+ 0.23
														CP-2 (CONDENSATE PUMP 2)	120	1	1/30	1.50	1.88	0.23	N/A	UNKN [7]	**20**	**3/4"**	**#12**	**MRS-15A**	INTEGRAL	N/A	+ 0.23
														CP-3 (CONDENSATE PUMP 3)	120	1	1/30	1.50	1.88	0.23	N/A	UNKN [7]	**20**	**3/4"**	**#12**	**MRS-15A**	INTEGRAL	N/A	+ 0.23
														CP-4 (CONDENSATE PUMP 4)	120	1	1/30	1.50	1.88	0.23	N/A	UNKN [7]	**20**	**3/4"**	**#12**	**MRS-15A**	INTEGRAL	N/A	+ 0.23
														CP-5 (CONDENSATE PUMP 5)	120	1	1/30	1.50	1.88	0.23	N/A	UNKN [7]	**20**	**3/4"**	**#12**	**MRS-15A**	INTEGRAL	N/A	+ 0.23
														CP-6 (CONDENSATE PUMP 6)	120	1	1/30	1.50	1.88	0.23	N/A	UNKN [7]	**20**	**3/4"**	**#12**	**MRS-15A**	INTEGRAL	N/A	+ 0.23
HP-8A [6]	ROOM 145	480	3	N/A	UNKN	UNKN	UNKN	1E4-8,10,12	20	1/2"	3#12	DISCONNECT	N/A																NO CHANGE

GENERAL NOTES:

A. BOLD TEXT IN 'EXISTING' COLUMNS INDICATES WORK THAT IS TO BE DEMOLISHED. BOLD TEXT IN 'NEW' COLUMNS INDICATES NEW WORK.
B. THIS PROJECT WILL RESULT IN A NET LOAD INCREASE. 30-DAY METERING WILL BE REQUIRED FOR (4) PANELS, LISTED BELOW.

NUMBERED NOTES:

[5] RELOCATE EXISTING LUMINAIRE TO ACCOMMODATE INSTALLATION OF NEW HEAT PUMP, SEE 'MECHANICAL SKETCHES'.
[6] THE EXISTING CONDUIT AND WIRE TO EXISTING HEAT PUMP 'HP-8A' WILL NEED TO BE RE-ROUTED TO FACILITATE INSTALLATION OF NEW HEAT PUMP 'HP-9B'. DEMO EXISTING CONDUIT AND WIRE TO 'HP-8A' AND PROVIDE NEW CONDUIT AND WIRE FROM THE PANEL TO THE UNIT. 'HP-8A' IS FED FROM PANEL 1E4.
[7] INSTALL UP TO 6 CONDENSATE PUMPS AS NEEDED. LOCATION OF CONDENSATE PUMPS HAVE NOT BEEN SET, SO PANELS ARE NOT KNOWN. ASSUME 150 LINEAL FEET OF CONDUIT AND WIRE.

30-DAY METERING:

PANEL 1A4, 2XA4, 2E4, 2H4

MCKINSTRY
Project: 204738 - REDMOND PSB PHASE 3
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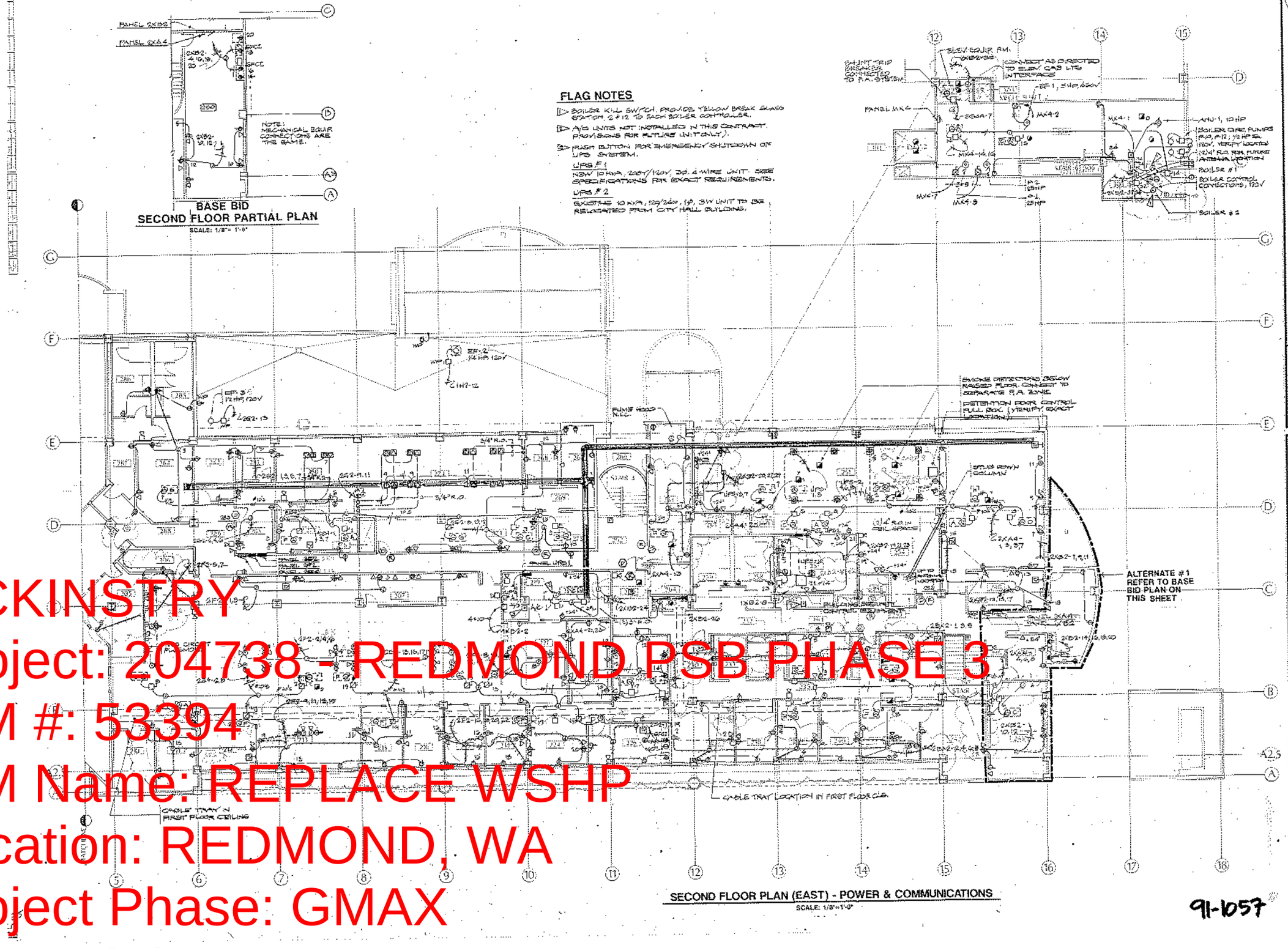

ARAI/JACKSON ARCHITECTS & PLANNERS

Revisions

Approval

Project: REDMOND MUNICIPAL CAMPUS
Police Building and Site Improvements
For: City of Redmond, Washington

SECOND FLOOR PLAN
EAST - POWER

1-5-89

E 5

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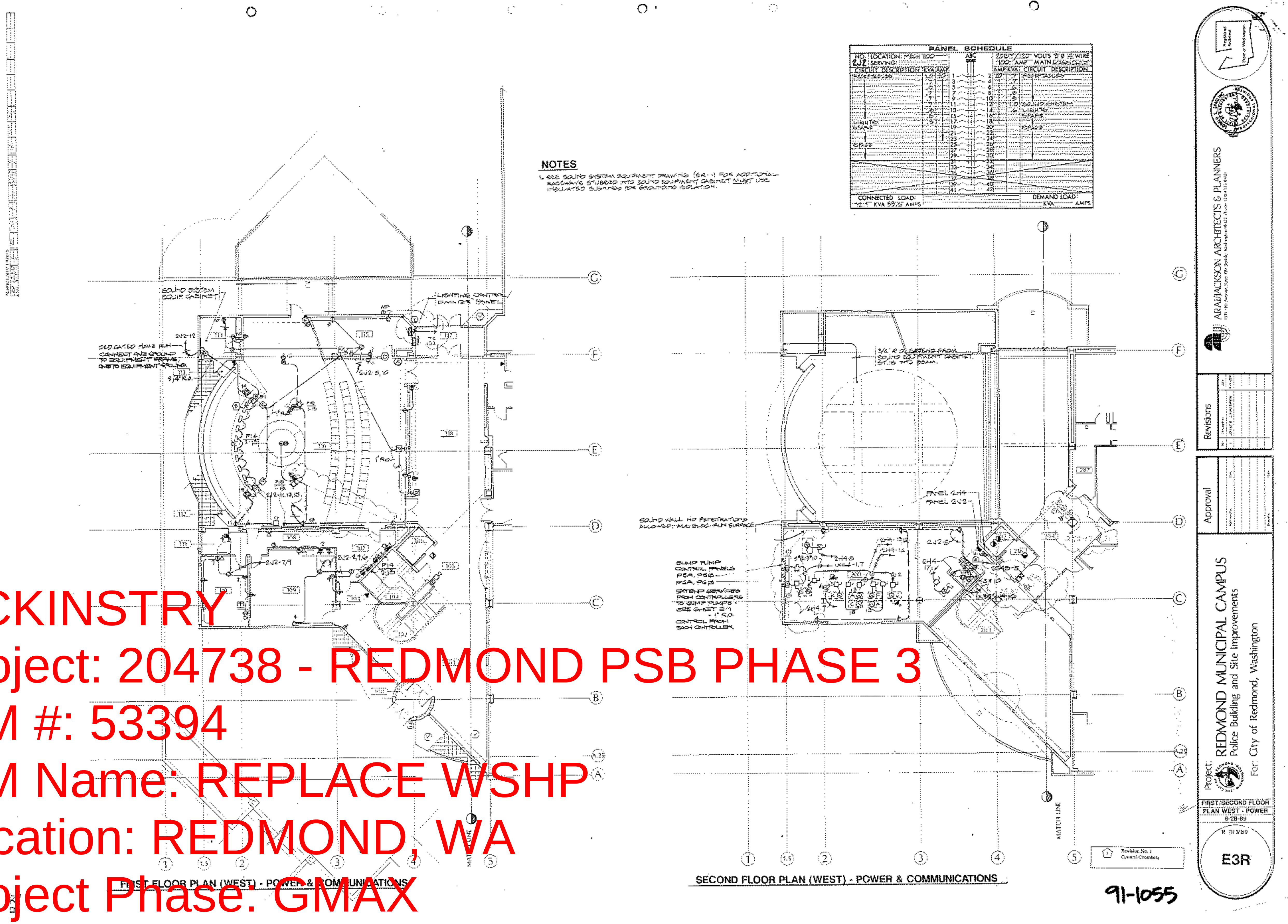

MCKINSTRY
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REDMOND PUBLIC SAFETY BLDG, FIM 3.01 PSB: UPGRADES OF HEAT PUMPS DDC POINTS LIST

1. **NETWORK POINTS SHALL REQUIRE MAPPING OF VIRTUAL POINTS AVAILABLE VIA THE BACNET CONNECTION**
2. **MONITOR POINTS LISTED BELOW GRAPHICALLY ON THE BAS OPERATOR WORKSTATION.**
3. **TRENDED POINTS SHALL HAVE THE SAME START TIME.**
4. **THE TRENDED DURATION SHALL BE EVERY 15 MINUTES (ADJ).**

POINT COUNT TOTALS	**75**	**0**	**94**	**75**	**0**	
	AI	**AO**	**DI**	**DO**	**NETWORK**	**NOTES**
NEW HEAT PUMPS						
SPACE TEMPERATURE	15					
SPACE OVERRIDE SWITCH			15			
SPACE CO2	15					OPTIONS
SUPPLY AIR TEMPERATURE	15					
RETURN AIR TEMPERATURE	15		15	15		
SUPPLY FAN START/STOP				15		
REVERSING VALVE				15		
SUPPLY FAN STATUS			15			
AIR FILTER DP	15					
COMPRESSOR STAGE 1 COMMAND			15			
COMPRESSOR STAGE 2 COMMAND				15		
COMPRESSOR STATUS			15	15		
CONDENSATE PUMP STATUS			3			
UNIT ALARM			15			
REFRIGERANT DETECTION SYSTEM ALARM			1			HP-31B
SUBTOTAL	75		94	75		
NOTES:						

CLIMATEMASTER®
A NIBE GROUP MEMBER

SC009: HP-A
SC012: HP-20B
SC015: HP-18A
SC018: HP-7B, HP-9B
SC024: HP-4A
SC030: HP-5A, HP-9A, HP-19A, HP19B, HP10B
SC042: HP-20A, HP5B
SC060: HP-31B

COMMERCIAL

TRANQUILITY® 18 (SC) COMPACT SINGLE-STAGE SERIES

PRODUCT CATALOG

Part#: LC3000 | Updated: July 11, 2024

Models: SC 006-060
60 Hz - R-454B

THE TRANQUILITY® 18 (SC) COMPACT SINGLE-STAGE SERIES

The Tranquility 18 (SC) Compact Series raises the bar for water-source heat pump efficiencies, features, and application flexibility. Not only does the Tranquility SC exceed ASHRAE 90.1 efficiency standards, but it also uses R-454B low Global Warming Potential (GWP) refrigerant, making it an extremely environmentally friendly space conditioning product solution. Tranquility SC is eligible for LEED® (Leadership in Energy and Environmental Design) points due to its innovative and environmentally-conscious design. With one of the smallest cabinets in the industry, the Tranquility SC easily fits into tight spaces. Designed to be backward compatible with thousands of older water-source heat pumps, the Tranquility 18 (SC) Compact Series heat pump is packed full of the innovation you have come to expect from the experts at ClimateMaster.

Available in sizes from ½ ton (1.8 kW) through 5 tons (17.6 kW) with multiple cabinet options (vertical upflow and horizontal) the Tranquility SC offers a wide range of units for most any application. The Tranquility SC has an extended range refrigerant circuit, capable of geothermal ground loop applications (with optional extended range insulation) as well as boiler-tower water loop applications. Standard features include: scroll compressors, microprocessor controls, galvanized steel cabinet, polymer drain pan and sound absorbing air handler insulation are just some of the features of the Tranquility SC.

Recent EPA mandates require an industry transition to low-GWP refrigerants, such as R-454B which is a gas that is classified as having low-toxicity, low-flammability rating. Due to these characteristics, R-454B systems charged with over 62 ounces of refrigerant must contain an integrated Refrigerant Detection System (RDS). In the unlikely event of a system-refrigerant leak, the RDS shuts down compressor operation and runs the unit blower motor to disperse any concentration of leaked refrigerant in compliance with UL 60335-2-40 safety standards. For Tranquility SC products, only the 5 ton size (060) is required to have the RDS and the feature is optional on all other sizes.

ClimateMaster's exclusive double isolation compressor mounting system makes the Tranquility SC one of the quietest units on the market. Compressors are mounted on specially engineered sound-tested EPDM grommets to a heavy gauge mounting plate, which is further isolated from the cabinet base with EPDM grommets to minimize vibration transmission and to maximize sound attenuation. The easy access control box and large access panels make installing and maintaining the unit easier than other water-source heat pumps currently on the market, proving that a small unit can be easy to service.

Options such as tin-plated air coil, DDC controls, and high efficiency pleated MERV-rated air filters allow customized design solutions. Two tiers of Electronically Commutated (EC) fan motor options allow for premium efficiency at a budget price with a Constant Torque (CT) EC or maximized airflow control with an intelligent Constant Volume (CV) EC. Cupro-nickel water-coils and ClimateMaster's industry-leading sound attenuation UltraQuiet package are options that make a great unit even better.

iGate® 2 technology provides technicians an interface into the operation of the system in real time without the need for hard tooling. On-board advanced controls communicate the key operating system temperatures enabling technicians to startup, commission, and service the equipment remotely by smart phone or website via the cloud. Communication can also be done at the unit via a communicating thermostat or handheld service tool. Not only does iGate 2 monitor current performance, it also allows the functionality to make system adjustments and captures operating conditions at time of fault. All this information is displayed in an easy-to-read format maximizing the usability of the experience.

The Tranquility 18 (SC) Compact Series water-source heat pumps are designed to meet the challenges of today's HVAC demands with one of the most innovative products available on the market.

FEATURES

- Sizes 006 (½ ton, 1.8 kW) through 060 (5 tons, 17.6 kW)
- Exceeds ASHRAE 90.1 efficiency standards
- Environmentally-friendly R-454B low-GWP refrigerant
- Refrigerant Detection System (RDS) (mandatory on size 060, optional feature for sizes 006-048)
- Coaxial heat exchanger
- Galvanized-steel cabinet construction
- Sound-absorbing glass-fiber insulation
- Unique double-isolation compressor mounting for quiet operation
- Insulated divider and separate compressor/ air handler compartments
- TXV metering device
- Microprocessor controls with on-board fuse and emergency shutdown
- Field-convertible discharge-air arrangement for horizontal units
- PSC three-speed fan motor (two-speed for 575V)
- Unit Performance Sentinel performance-monitoring system
- Eight standard safety features
- Non-corrosive polymer drain pan
- External Connecting Port on front-left corner post facilitates service tool connectivity, thereby reducing startup, commissioning, and service time
- Communicating Controls Powered by CXM2:
  - Multiple communication pathways for unit access and diagnosis:
    - Cloud-based remote monitoring via Wi-Fi communicating color-touchscreen thermostat
    - Connect directly to the system with a handheld service tool
  - Provides real-time unit operating conditions
  - Reduces startup, commissioning, and service time by providing key system temperatures electronically
  - Captures operating conditions in the event of a safety shutdown

OPTIONS

- High-efficiency EC blower motors:
  - Intelligent Constant Volume (CV) EC motors for ultimate airflow control
  - Entry-level Constant Torque (CT) EC motors provide efficiency at a value
- Communicating Controls Powered by DXM2.5:
  - Includes all of the CXM2 control features
  - Dial in desired airflows for CV EC blower motors
- BACnet, Modbus, and Johnson Controls N2 compatibility options for Building Management Systems (BMS)
- Corrosion-resistant cupro-nickel water heat exchanger
- UltraQuiet sound-attenuation package
- Tin-plated air coils for added protection from formicary corrosion
- Easy-to-clean rust-prohibitive stainless-steel drain pans
- Extended-range insulation for geothermal applications
- Electrical-service disconnect

ACCESSORIES

- Wi-Fi communicating (AWC) thermostat with color touchscreen
- Wide variety of thermostat options to meet your application needs
- Braided-hose kits in various lengths with optional water valve, PT plugs, blowdown valve, flow regulator, and strainer
- Externally-mounted manual and motorized water valves
- 1-inch Merv 8 filter
- 2-inch Merv 8 or 13 filters
- Aesthetically-pleasing wall sensors for connection to BMS (MPC) controls

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
S	C	L	0	2	4	A	G	C	3	0	C	0	P	S

MODEL
S = R-454B Refrigerant

MODEL TYPE
C = Compact Single-Stage Series

SUPPLY & RETURN CONFIGURATIONS

Horizontal Configuration		
	Left	Right
Straight	L	R
Back	B	P

Vertical Configuration		
	Left	Right
Top	T	K
Front/Top	F	

SIZE

006	018	042
009	024	048
012	030	060
015	036	

REVISION
A = Current

VOLTAGE

G = 208/230-1-60	J = 208/230-1-60 Refrigerant Detection System
H = 208/230-3-60	K = 208/230-3-60 Refrigerant Detection System
E = 265-1-60	D = 265-1-60 Refrigerant Detection System
F = 460-3-60	L = 460-3-60 Refrigerant Detection System
N = 575-3-60	M = 575-3-60 Refrigerant Detection System

CONTROLS

Control	Standard	MPC
CXM2	C	N
DXM2.5	D	P
CXM2 with Disconnect	W	R
DXM2.5 with Disconnect	B	S

CABINET

Cabinet	UltraQuiet	Rail		Frame	
		1"	2"	1"	2"
Extended Range	No	1	J	K	A
	Yes	2	L	M	C
Standard Range	No	3	N	P	E
	Yes	4	F	S	G

STANDARD
S = Standard

BLOWER MOTOR
P = Permanent Split Capacitor (PSC)
T = Constant Torque Electronically Commuted (CT EC)
V = Constant Volume Electronically Commuted (CV EC)

EXTENDED OPTIONS
0 = Standard
C = Cooling Only

DRAIN PAN/HEAT EXCHANGER OPTIONS
C = Standard Drain Pan, Non-Coated Air Coil
T = Standard Drain Pan, Tin-Coated Air Coil
S = Stainless Steel Drain Pan, Non-Coated Air Coil
R = Stainless Steel Drain Pan, Tin-Coated Air Coil

WATER/HEAT EXCHANGER OPTIONS

Water Option	Standard	Cupro Nickel
None	0	Z

Use ClimateMaster's selection software at https://climatemastersolutions.com/eRep/ to configure your Tranquility SC model.

ASHRAE/AHRI/ISO 13256-1 English (I-P) Units

Model	Motor Type	Water Loop Heat Pump				Ground Water Heat Pump				Ground Loop Heat Pump			
		Cooling 86°F		Heating 68°F		Cooling 59°F		Heating 50°F		Full Cooling 77°F		Full Heating 32°F	
		Capacity Btuh	EER Btuh/W	Capacity Btuh	COP	Capacity Btuh	EER Btuh/W	Capacity Btuh	COP	Capacity Btuh	EER Btuh/W	Capacity Btuh	COP
SC006	PSC	5,900	13.4	8,400	4.8	7,200	22.8	6,600	3.9	6,300	15.5	4,900	3.1
	EC	6,100	15.0	8,300	5.1	7,300	26.6	6,500	4.0	6,400	17.7	4,800	3.3
SC009	PSC	8,500	13.8	11,700	4.4	10,000	22.0	9,500	3.9	8,900	15.7	7,200	3.3
	EC	8,600	14.3	11,600	4.5	10,000	23.4	9,500	4.0	9,000	16.7	7,200	3.3
SC012	PSC	10,500	12.7	14,400	4.5	12,800	19.0	11,700	3.9	11,400	14.1	9,300	3.2
	EC	10,700	13.4	14,400	4.6	13,000	21.0	11,700	4.0	11,500	14.9	9,300	3.3
SC015	PSC	14,500	15.2	16,000	4.8	16,700	23.5	13,800	4.3	15,000	16.5	11,000	3.5
	EC	14,700	16.4	15,900	4.9	16,900	26.2	13,800	4.5	15,200	17.3	10,700	3.6
SC018	PSC	17,900	14.3	21,500	4.9	20,700	23.0	17,900	4.2	19,000	16.1	14,000	3.4
	EC	18,000	15.0	21,500	5.1	20,900	25.0	17,700	4.4	19,400	17.3	13,800	3.6
SC024	PSC	24,700	14.7	28,800	5.0	27,500	23.3	24,200	4.4	25,600	17.3	19,000	3.6
	EC	24,900	15.4	28,500	5.1	27,800	24.0	24,000	4.5	25,800	18.0	19,000	3.7
SC030	PSC	28,800	13.7	35,400	4.6	32,400	21.0	29,200	4.1	30,100	16.0	23,300	3.5
	EC	29,200	14.5	35,000	4.8	32,800	23.5	28,800	4.3	30,500	17.3	23,000	3.6
SC036	PSC	34,800	14.6	43,900	4.6	38,800	23.3	36,200	4.0	36,100	16.7	28,500	3.4
	EC	35,200	15.3	43,500	4.8	39,200	25.2	35,800	4.2	36,400	17.4	27,900	3.6
SC042	PSC	41,100	14.0	49,500	4.6	45,200	21.0	40,900	4.0	42,700	16.0	32,700	3.4
	EC	41,800	15.2	48,500	4.9	46,000	22.9	39,900	4.3	43,400	17.4	31,700	3.5
SC048	PSC	48,000	14.3	57,900	4.7	53,000	21.5	48,000	4.1	50,400	16.5	38,000	3.5
	EC	48,900	15.2	57,500	4.8	53,500	22.8	47,700	4.2	50,800	17.6	38,100	3.5
SC060	PSC	59,400	13.2	70,000	4.4	65,800	18.2	59,200	3.9	61,300	15.0	45,400	3.3
	EC	60,200	14.7	68,000	4.7	67,000	21.5	57,100	4.2	62,200	17.4	44,300	3.5

Notes:
- Where dual voltages are available, ratings are based on the lower voltage setting.
- Cooling capacities based upon 80.6°F DB, 66.2°F WB entering air temperature.
- Heating capacities based upon 68°F DB, 59°F WB entering air temperature.
- Ground Loop Heat Pump ratings based on 15% antifreeze solution.

SC009: HP-A
SC012: HP-20B
SC015: HP-18A
SC018: HP-7B, HP-9B, HP-10B
SC024: HP-4A
SC030: HP-5A, HP-9A, HP-19A, HP19B
SC036: HP-G
SC042: HP-20A, HP5B
SC060: HP-31B

345 CFM Rated Airflow

EWT °F	WPD			COOLING - EAT 80/66.2 °F					WPD			Heating - EAT 70°F			
	FLOW GPM	PSI	FT	TC	SC	kW	HR	EER	FLOW GPM	PSI	FT	HC	kW	COP	HE
20	Operation Not Recommended								2.5	6.3	14.5	6.1	0.6	2.8	3.9
30	1.3	1.9	4.4	10.7	7.6	0.4	11.9	30.5	1.3	1.9	4.4	6.9	0.7	3.0	4.6
	1.9	3.5	8.0	10.8	7.7	0.3	11.8	34.1	1.9	3.5	8.0	7.2	0.7	3.1	4.9
	2.5	5.0	11.6	10.8	7.7	0.3	11.8	36.0	2.5	5.0	11.6	7.3	0.7	3.2	5.0
40	1.3	1.6	3.6	10.4	7.5	0.4	11.8	25.6	1.3	1.6	3.6	8.0	0.7	3.4	5.7
	1.9	2.9	6.6	10.6	7.6	0.4	11.9	28.6	1.9	2.9	6.6	8.4	0.7	3.5	6.0
	2.5	4.2	9.6	10.7	7.6	0.4	11.9	30.2	2.5	4.2	9.6	8.6	0.7	3.6	6.2
50	1.3	1.4	3.2	10.1	7.3	0.5	11.6	21.5	1.3	1.4	3.2	9.2	0.7	3.8	6.8
	1.9	2.5	5.7	10.3	7.4	0.4	11.8	24.0	1.9	2.5	5.7	9.7	0.7	3.9	7.2
	2.5	3.6	8.3	10.4	7.5	0.4	11.8	25.4	2.5	3.6	8.3	9.9	0.7	4.0	7.4
60	1.3	1.3	2.9	9.6	7.1	0.5	11.4	18.1	1.3	1.3	2.9	10.4	0.7	4.1	7.9
	1.9	2.3	5.2	9.9	7.3	0.5	11.6	20.1	1.9	2.3	5.2	10.9	0.7	4.3	8.4
	2.5	3.3	7.6	10.0	7.3	0.5	11.6	21.3	2.5	3.3	7.6	11.2	0.8	4.4	8.7
70	1.3	1.2	2.8	9.0	6.9	0.6	11.1	15.2	1.3	1.2	2.8	11.6	0.8	4.5	9.0
	1.9	2.2	5.0	9.4	7.0	0.6	11.3	16.9	1.9	2.2	5.0	12.2	0.8	4.6	9.6
	2.5	3.1	7.2	9.5	7.1	0.5	11.4	17.8	2.5	3.1	7.2	12.5	0.8	4.7	9.9
80	1.3	1.2	2.8	8.5	6.6	0.7	10.7	12.8	1.3	1.2	2.8	12.8	0.8	4.8	10.1
	1.9	2.2	5.0	8.8	6.8	0.6	10.9	14.1	1.9	2.2	5.0	13.4	0.8	5.0	10.7
	2.5	3.1	7.2	9.0	6.8	0.6	11.0	14.9	2.5	3.1	7.2	13.7	0.8	5.0	11.0
90	1.3	1.2	2.8	7.8	6.3	0.7	10.3	10.7	1.3	1.2	2.8	13.9	0.8	5.1	11.1
	1.9	2.2	5.0	8.2	6.5	0.7	10.6	11.8	1.9	2.2	5.0	14.5	0.8	5.2	11.8
	2.5	3.1	7.2	8.4	6.6	0.7	10.7	12.4	2.5	3.1	7.2	14.9	0.8	5.3	12.1
100	1.3	1.2	2.8	7.2	6.0	0.8	10.0	8.9	Operation Not Recommended						
	1.9	2.1	5.0	7.5	6.2	0.8	10.2	9.8							
	2.5	3.1	7.2	7.7	6.3	0.7	10.3	10.3							
110	1.3	1.1	2.6	6.6	5.8	0.9	9.6	7.4							
	1.9	2.1	4.8	6.9	5.9	0.8	9.8	8.2							
	2.5	3.0	6.9	7.1	6.0	0.8	9.9	8.6							
120	1.3	1.0	2.4	6.0	5.5	1.0	9.2	6.2							
	1.9	1.9	4.3	6.3	5.6	0.9	9.4	6.8							
	2.5	2.7	6.3	6.4	5.7	0.9	9.5	7.1							

Notes:
- Interpolation is permissible; extrapolation is not.
- All entering air conditions are 80°F (26.6°C) DB and 67°F (19.4°C) WB in cooling, and 70°F (21°C) DB in heating.
- Table does not reflect fan or pump power corrections for AHRI/ISO conditions.
- All performance is based upon the lower voltage of dual voltage rated units.
- Performance stated is at the rated power supply; performance may vary as the power supply varies from the rated.
- Operation below 40°F (4.4°C) is based upon 20% methanol antifreeze solution.
- Operation below 60°F (15.5°C) EWT requires optional insulated water/refrigerant circuit.
- See performance correction tables for operating conditions other than those listed above.
- See Performance Data Selection Notes for operation in the shaded areas.
- Performance capacities shown in thousands of Btuh.
- For unit operation in the shaded area when LWT is below 40°F (4.4°C), antifreeze must be used and the JW3 jumper on the DXM2.5/CXM2 should be clipped. This is due to the potential of the refrigerant temperature being as low as 32°F (0°C) with 40°F (4.4°C) LWT, which may lead to a nuisance cutout due to the activation of the Low Temperature Protection. JW3 should never be clipped for standard range equipment or systems without antifreeze.

400 CFM Rated Airflow

EWT °F	WPD			COOLING - EAT 80/66.2 °F					WPD			Heating - EAT 70°F			
	FLOW GPM	PSI	FT	TC	SC	kW	HR	EER	FLOW GPM	PSI	FT	HC	kW	COP	HE
20	Operation Not Recommended								3.0	10.0	23.1	8.1	0.8	2.8	5.2
30	1.5	2.7	6.3	13.7	8.6	0.5	15.5	25.6	1.5	2.7	6.3	9.0	0.9	3.0	6.0
	2.3	5.6	13.0	13.8	8.8	0.5	15.5	28.5	2.3	5.6	13.0	9.3	0.9	3.1	6.4
	3.0	8.5	19.6	13.9	8.8	0.5	15.5	30.1	3.0	8.5	19.6	9.6	0.9	3.2	6.6
40	1.5	2.3	5.4	13.4	8.4	0.6	15.4	22.1	1.5	2.3	5.4	10.4	0.9	3.4	7.3
	2.3	4.8	11.1	13.6	8.6	0.6	15.5	24.5	2.3	4.8	11.1	10.9	0.9	3.5	7.8
	3.0	7.3	16.8	13.7	8.7	0.5	15.5	25.8	3.0	7.3	16.8	11.1	0.9	3.6	8.0
50	1.5	2.0	4.7	12.9	8.2	0.7	15.2	19.1	1.5	2.0	4.7	11.8	0.9	3.7	8.6
	2.3	4.2	9.7	13.2	8.4	0.6	15.4	21.1	2.3	4.2	9.7	12.4	0.9	3.9	9.2
	3.0	6.4	14.7	13.4	8.4	0.6	15.4	22.2	3.0	6.4	14.7	12.8	1.0	3.9	9.5
60	1.5	1.8	4.2	12.4	7.9	0.8	14.9	16.4	1.5	1.8	4.2	13.3	1.0	4.0	10.0
	2.3	3.8	8.7	12.8	8.1	0.7	15.1	18.2	2.3	3.8	8.7	14.0	1.0	4.2	10.7
	3.0	5.7	13.2	12.9	8.2	0.7	15.2	19.1	3.0	5.7	13.2	14.4	1.0	4.3	11.0
70	1.5	1.7	3.8	11.7	7.7	0.8	14.6	14.2	1.5	1.7	3.8	14.8	1.0	4.4	11.4
	2.3	3.4	8.0	12.2	7.8	0.8	14.8	15.6	2.3	3.4	8.0	15.6	1.0	4.5	12.1
	3.0	5.2	12.1	12.4	7.9	0.8	14.9	16.4	3.0	5.2	12.1	16.0	1.0	4.6	12.5
80	1.5	1.6	3.6	11.0	7.4	0.9	14.1	12.1	1.5	1.6	3.6	16.2	1.0	4.6	12.7
	2.3	3.2	7.5	11.5	7.5	0.9	14.4	13.4	2.3	3.2	7.5	17.0	1.0	4.8	13.5
	3.0	4.9	11.3	11.7	7.6	0.8	14.5	14.1	3.0	4.9	11.3	17.5	1.1	4.9	13.9
90	1.5	1.5	3.4	10.3	7.0	1.0	13.7	10.4	1.5	1.5	3.4	17.6	1.1	4.9	14.0
	2.3	3.1	7.1	10.7	7.2	0.9	14.0	11.4	2.3	3.1	7.1	18.4	1.1	5.0	14.7
	3.0	4.7	10.8	11.0	7.3	0.9	14.1	12.0	3.0	4.7	10.8	18.8	1.1	5.1	15.1
100	1.5	1.4	3.2	9.5	6.7	1.1	13.2	8.8	Operation Not Recommended						
	2.3	2.9	6.8	10.0	6.9	1.0	13.5	9.7							
	3.0	4.5	10.4	10.2	7.0	1.0	13.6	10.2							
110	1.5	1.3	3.1	8.7	6.3	1.2	12.7	7.4							
	2.3	2.8	6.5	9.2	6.5	1.1	13.0	8.2							
	3.0	4.3	10.0	9.4	6.6	1.1	13.1	8.6							
120	1.5	1.2	2.8	7.9	6.0	1.3	12.2	6.2							
	2.3	2.7	6.1	8.3	6.2	1.2	12.5	6.9							
	3.0	4.1	9.5	8.6	6.3	1.2	12.6	7.2							

Notes:
- Interpolation is permissible; extrapolation is not.
- All entering air conditions are 80°F (26.6°C) DB and 67°F (19.4°C) WB in cooling, and 70°F (21°C) DB in heating.
- Table does not reflect fan or pump power corrections for AHRI/ISO conditions.
- All performance is based upon the lower voltage of dual voltage rated units.
- Performance stated is at the rated power supply; performance may vary as the power supply varies from the rated.
- Operation below 40°F (4.4°C) is based upon 20% methanol antifreeze solution.
- Operation below 60°F (15.5°C) EWT requires optional insulated water/refrigerant circuit.
- See performance correction tables for operating conditions other than those listed above.
- See Performance Data Selection Notes for operation in the shaded areas.
- Performance capacities shown in thousands of Btuh.
- For unit operation in the shaded area when LWT is below 40°F (4.4°C), antifreeze must be used and the JW3 jumper on the DXM2.5/CXM2 should be clipped. This is due to the potential of the refrigerant temperature being as low as 32°F (0°C) with 40°F (4.4°C) LWT, which may lead to a nuisance cutout due to the activation of the Low Temperature Protection. JW3 should never be clipped for standard range equipment or systems without antifreeze.

525 CFM Rated Airflow

EWT °F	WPD			COOLING - EAT 80/66.2 °F					WPD			Heating - EAT 70°F			
	FLOW GPM	PSI	FT	TC	SC	kW	HR	EER	FLOW GPM	PSI	FT	HC	kW	COP	HE
20	Operation Not Recommended								3.8	5.3	12.3	9.4	0.9	3.0	6.2
30	1.9	1.8	4.1	17.6	12.4	0.6	19.6	30.0	1.9	1.8	4.1	10.5	0.9	3.3	7.3
	2.8	3.1	7.1	17.7	12.2	0.5	19.5	33.1	2.8	3.1	7.1	10.9	1.0	3.4	7.7
	3.8	4.4	10.2	17.7	12.1	0.5	19.4	34.7	3.8	4.4	10.2	11.2	1.0	3.4	7.9
40	1.9	1.5	3.4	17.3	12.3	0.7	19.6	26.0	1.9	1.5	3.4	12.1	1.0	3.6	8.8
	2.8	2.6	6.0	17.5	12.4	0.6	19.6	28.7	2.8	2.6	6.0	12.6	1.0	3.7	9.3
	3.8	3.7	8.6	17.6	12.4	0.6	19.6	30.2	3.8	3.7	8.6	12.9	1.0	3.8	9.5
50	1.9	1.3	2.9	16.9	12.0	0.8	19.5	22.5	1.9	1.3	2.9	13.7	1.0	4.0	10.3
	2.8	2.3	5.3	17.2	12.2	0.7	19.6	24.9	2.8	2.3	5.3	14.3	1.0	4.1	10.9
	3.8	3.3	7.6	17.3	12.3	0.7	19.6	26.2	3.8	3.3	7.6	14.7	1.0	4.2	11.2
60	1.9	1.2	2.7	16.3	11.6	0.8	19.2	19.3	1.9	1.2	2.7	15.3	1.0	4.3	11.8
	2.8	2.1	4.8	16.7	11.9	0.8	19.4	21.4	2.8	2.1	4.8	16.0	1.1	4.5	12.4
	3.8	3.0	7.0	16.9	12.0	0.7	19.5	22.6	3.8	3.0	7.0	16.4	1.1	4.5	12.8
70	1.9	1.1	2.5	15.6	11.1	0.9	18.8	16.6	1.9	1.1	2.5	16.9	1.1	4.6	13.3
	2.8	2.0	4.6	16.1	11.4	0.9	19.1	18.4	2.8	2.0	4.6	17.7	1.1	4.8	14.0
	3.8	2.9	6.6	16.3	11.6	0.8	19.2	19.4	3.8	2.9	6.6	18.1	1.1	4.9	14.4
80	1.9	1.1	2.5	14.8	10.7	1.0	18.3	14.1	1.9	1.1	2.5	18.5	1.1	4.9	14.8
	2.8	1.9	4.5	15.3	11.0	1.0	18.7	15.7	2.8	1.9	4.5	19.4	1.1	5.1	15.6
	3.8	2.8	6.5	15.6	11.1	0.9	18.8	16.6	3.8	2.8	6.5	19.8	1.1	5.2	16.0
90	1.9	1.1	2.5	13.8	10.3	1.2	17.7	12.0	1.9	1.1	2.5	20.1	1.1	5.2	16.3
	2.8	1.9	4.5	14.4	10.5	1.1	18.1	13.3	2.8	1.9	4.5	21.0	1.1	5.4	17.2
	3.8	2.8	6.4	14.7	10.7	1.0	18.3	14.1	3.8	2.8	6.4	21.6	1.1	5.5	17.7
100	1.9	1.1	2.5	12.7	10.0	1.3	17.0	10.1	Operation Not Recommended						
	2.8	1.9	4.4	13.4	10.2	1.2	17.4	11.2							
	3.8	2.7	6.3	13.7	10.3	1.2	17.7	11.8							
110	1.9	1.0	2.4	11.5	9.8	1.4	16.2	8.4							
	2.8	1.8	4.3	12.2	9.9	1.3	16.7	9.3							
	3.8	2.6	6.1	12.6	10.0	1.3	16.9	9.9							
120	1.9	0.9	2.2	10.2	9.5	1.5	15.3	6.8							
	2.8	1.7	3.9	10.9	9.7	1.4	15.8	7.7							
	3.8	2.4	5.6	11.3	9.7	1.4	16.0	8.1							

Notes:
- Interpolation is permissible; extrapolation is not.
- All entering air conditions are 80°F (26.6°C) DB and 67°F (19.4°C) WB in cooling, and 70°F (21°C) DB in heating.
- Table does not reflect fan or pump power corrections for AHRI/ISO conditions.
- All performance is based upon the lower voltage of dual voltage rated units.
- Performance stated is at the rated power supply; performance may vary as the power supply varies from the rated.
- Operation below 40°F (4.4°C) is based upon 20% methanol antifreeze solution.
- Operation below 60°F (15.5°C) EWT requires optional insulated water/refrigerant circuit.
- See performance correction tables for operating conditions other than those listed above.
- See Performance Data Selection Notes for operation in the shaded areas.
- Performance capacities shown in thousands of Btuh.
- For unit operation in the shaded area when LWT is below 40°F (4.4°C), antifreeze must be used and the JW3 jumper on the DXM2.5/CXM2 should be clipped. This is due to the potential of the refrigerant temperature being as low as 32°F (0°C) with 40°F (4.4°C) LWT, which may lead to a nuisance cutout due to the activation of the Low Temperature Protection. JW3 should never be clipped for standard range equipment or systems without antifreeze.

630 CFM Rated Airflow

EWT °F	WPD			COOLING - EAT 80/66.2 °F					WPD			Heating - EAT 70°F			
	FLOW GPM	PSI	FT	TC	SC	kW	HR	EER	FLOW GPM	PSI	FT	HC	kW	COP	HE
20	Operation Not Recommended								4.5	9.2	21.1	11.8	1.1	3.0	7.9
30	2.3	2.7	6.3	23.1	15.8	0.8	25.6	30.7	2.3	2.7	6.3	13.1	1.2	3.3	9.1
	3.4	5.2	12.1	23.6	16.1	0.7	25.9	34.9	3.4	5.2	12.1	13.7	1.2	3.4	9.7
	4.5	7.7	17.9	23.9	16.2	0.6	26.1	37.2	4.5	7.7	17.9	14.1	1.2	3.4	10.0
40	2.3	2.4	5.6	22.3	15.4	0.9	25.2	26.0	2.3	2.4	5.6	15.2	1.2	3.6	11.0
	3.4	4.6	10.5	22.9	15.7	0.8	25.5	29.5	3.4	4.6	10.5	15.9	1.2	3.7	11.7
	4.5	6.7	15.4	23.2	15.8	0.7	25.7	31.4	4.5	6.7	15.4	16.3	1.3	3.8	12.0
50	2.3	2.2	5.1	21.5	15.0	1.0	24.8	22.0	2.3	2.2	5.1	17.2	1.3	4.0	12.9
	3.4	4.1	9.4	22.1	15.3	0.9	25.1	24.9	3.4	4.1	9.4	18.0	1.3	4.1	13.6
	4.5	5.9	13.7	22.4	15.4	0.8	25.3	26.5	4.5	5.9	13.7	18.5	1.3	4.2	14.0
60	2.3	2.1	4.8	20.7	14.7	1.1	24.4	18.6	2.3	2.1	4.8	19.2	1.3	4.3	14.7
	3.4	3.8	8.7	21.3	14.9	1.0	24.7	21.0	3.4	3.8	8.7	20.1	1.3	4.4	15.6
	4.5	5.4	12.6	21.6	15.1	1.0	24.9	22.4	4.5	5.4	12.6	20.6	1.3	4.5	16.0
70	2.3	2.0	4.5	19.7	14.3	1.3	24.0	15.8	2.3	2.0	4.5	21.2	1.4	4.6	16.5
	3.4	3.5	8.2	20.4	14.6	1.1	24.3	17.8	3.4	3.5	8.2	22.2	1.4	4.7	17.4
	4.5	5.1	11.9	20.7	14.7	1.1	24.5	18.9	4.5	5.1	11.9	22.7	1.4	4.8	17.9
80	2.3	1.9	4.4	18.7	13.8	1.4	23.5	13.3	2.3	1.9	4.4	23.1	1.4	4.8	18.3
	3.4	3.4	7.9	19.4	14.2	1.3	23.9	15.0	3.4	3.4	7.9	24.1	1.4	5.0	19.3
	4.5	5.0	11.5	19.8	14.3	1.2	24.0	15.9	4.5	5.0	11.5	24.7	1.4	5.1	19.8
90	2.3	1.8	4.2	17.6	13.4	1.6	23.0	11.3	2.3	1.8	4.2	24.9	1.4	5.1	20.0
	3.4	3.3	7.7	18.4	13.7	1.5	23.3	12.7	3.4	3.3	7.7	26.0	1.4	5.3	21.1
	4.5	4.9	11.2	18.8	13.9	1.4	23.5	13.4	4.5	4.9	11.2	26.6	1.5	5.4	21.7
100	2.3	1.8	4.1	16.4	12.8	1.7	22.3	9.5	Operation Not Recommended						
	3.4	3.3	7.5	17.2	13.2	1.6	22.8	10.7							
	4.5	4.8	11.0	17.6	13.4	1.6	23.0	11.3							
110	2.3	1.7	3.9	15.1	12.1	1.9	21.6	7.9							
	3.4	3.2	7.3	16.0	12.6	1.8	22.1	8.9							
	4.5	4.6	10.6	16.4	12.8	1.7	22.3	9.5							
120	2.3	1.6	3.7	13.7	11.4	2.1	20.7	6.6							
	3.4	3.0	6.9	14.6	11.9	2.0	21.3	7.4							
	4.5	4.3	10.0	15.0	12.1	1.9	21.5	7.9							

Notes:
- Interpolation is permissible; extrapolation is not.
- All entering air conditions are 80°F (26.6°C) DB and 67°F (19.4°C) WB in cooling, and 70°F (21°C) DB in heating.
- Table does not reflect fan or pump power corrections for AHRI/ISO conditions.
- All performance is based upon the lower voltage of dual voltage rated units.
- Performance stated is at the rated power supply; performance may vary as the power supply varies from the rated.
- Operation below 40°F (4.4°C) is based upon 20% methanol antifreeze solution.
- Operation below 60°F (15.5°C) EWT requires optional insulated water/refrigerant circuit.
- See performance correction tables for operating conditions other than those listed above.
- See Performance Data Selection Notes for operation in the shaded areas.
- Performance capacities shown in thousands of Btuh.
- For unit operation in the shaded area when LWT is below 40°F (4.4°C), antifreeze must be used and the JW3 jumper on the DXM2.5/CXM2 should be clipped. This is due to the potential of the refrigerant temperature being as low as 32°F (0°C) with 40°F (4.4°C) LWT, which may lead to a nuisance cutout due to the activation of the Low Temperature Protection. JW3 should never be clipped for standard range equipment or systems without antifreeze.

800 CFM Rated Airflow

EWT °F	WPD			COOLING - EAT 80/66.2 °F					WPD			Heating - EAT 70°F			
	FLOW GPM	PSI	FT	TC	SC	kW	HR	EER	FLOW GPM	PSI	FT	HC	kW	COP	HE
20	Operation Not Recommended								6.0	4.2	9.6	17.0	1.6	3.1	11.5
30	3.0	1.2	2.7	27.7	18.7	1.0	31.2	27.2	3.0	1.2	2.7	18.6	1.7	3.3	13.0
	4.5	2.3	5.3	27.1	18.2	1.0	30.3	28.4	4.5	2.3	5.3	19.5	1.7	3.4	13.8
	6.0	3.3	7.7	26.6	17.9	0.9	29.8	28.8	6.0	3.3	7.7	19.9	1.7	3.5	14.2
40	3.0	0.9	2.1	27.9	19.0	1.1	31.8	24.7	3.0	0.9	2.1	21.4	1.7	3.7	15.5
	4.5	1.8	4.2	27.8	18.8	1.0	31.4	26.5	4.5	1.8	4.2	22.4	1.7	3.8	16.5
	6.0	2.7	6.3	27.7	18.7	1.0	31.1	27.3	6.0	2.7	6.3	22.9	1.7	3.9	17.0
50	3.0	0.7	1.7	27.5	19.0	1.3	31.9	21.7	3.0	0.7	1.7	24.1	1.8	4.0	18.1
	4.5	1.5	3.4	27.9	19.0	1.2	31.9	23.8	4.5	1.5	3.4	25.3	1.8	4.1	19.2
	6.0	2.3	5.4	27.9	19.0	1.1	31.8	24.8	6.0	2.3	5.4	25.9	1.8	4.2	19.8
60	3.0	0.6	1.4	26.7	18.7	1.4	31.6	18.7	3.0	0.6	1.4	26.8	1.8	4.3	20.6
	4.5	1.3	3.0	27.3	18.9	1.3	31.8	20.8	4.5	1.3	3.0	28.2	1.8	4.5	21.9
	6.0	2.1	4.8	27.6	19.0	1.3	31.9	21.9	6.0	2.1	4.8	28.9	1.9	4.6	22.5
70	3.0	0.6	1.3	25.7	18.2	1.6	31.2	15.9	3.0	0.6	1.3	29.5	1.9	4.6	23.2
	4.5	1.2	2.7	26.4	18.6	1.5	31.5	17.8	4.5	1.2	2.7	31.0	1.9	4.8	24.5
	6.0	2.0	4.5	26.8	18.7	1.4	31.7	18.8	6.0	2.0	4.5	31.8	1.9	4.9	25.2
80	3.0	0.5	1.2	24.4	17.6	1.8	30.6	13.4	3.0	0.5	1.2	32.2	1.9	4.9	25.6
	4.5	1.1	2.6	25.3	18.1	1.7	31.0	15.1	4.5	1.1	2.6	33.8	2.0	5.1	27.1
	6.0	1.9	4.3	25.7	18.2	1.6	31.2	16.0	6.0	1.9	4.3	34.6	2.0	5.1	27.9
90	3.0	0.5	1.1	23.0	17.0	2.1	30.1	11.2	3.0	0.5	1.1	34.8	2.0	5.1	28.0
	4.5	1.1	2.5	23.9	17.4	1.9	30.4	12.6	4.5	1.1	2.5	36.4	2.0	5.3	29.6
	6.0	1.8	4.3	24.4	17.7	1.8	30.6	13.4	6.0	1.8	4.3	37.3	2.0	5.4	30.4
100	3.0	0.5	1.1	21.7	16.4	2.3	29.7	9.3	Operation Not Recommended						
	4.5	1.1	2.4	22.6	16.8	2.1	29.9	10.5							
	6.0	1.8	4.1	23.0	17.0	2.1	30.1	11.2							
110	3.0	0.4	0.9	20.6	15.9	2.6	29.5	7.8							
	4.5	1.0	2.2	21.3	16.2	2.4	29.6	8.8							
	6.0	1.7	3.9	21.7	16.4	2.3	29.7	9.3							
120	3.0	0.3	0.7	19.7	15.6	3.0	29.8	6.6							
	4.5	0.8	1.9	20.2	15.8	2.7	29.6	7.4							
	6.0	1.5	3.4	20.5	15.9	2.6	29.5	7.8							

Notes:
- Interpolation is permissible; extrapolation is not.
- All entering air conditions are 80°F (26.6°C) DB and 67°F (19.4°C) WB in cooling, and 70°F (21°C) DB in heating.
- Table does not reflect fan or pump power corrections for AHRI/ISO conditions.
- All performance is based upon the lower voltage of dual voltage rated units.
- Performance stated is at the rated power supply; performance may vary as the power supply varies from the rated.
- Operation below 40°F (4.4°C) is based upon 20% methanol antifreeze solution.
- Operation below 60°F (15.5°C) EWT requires optional insulated water/refrigerant circuit.
- See performance correction tables for operating conditions other than those listed above.
- See Performance Data Selection Notes for operation in the shaded areas.
- Performance capacities shown in thousands of Btuh.
- For unit operation in the shaded area when LWT is below 40°F (4.4°C), antifreeze must be used and the JW3 jumper on the DXM2.5/CXM2 should be clipped. This is due to the potential of the refrigerant temperature being as low as 32°F (0°C) with 40°F (4.4°C) LWT, which may lead to a nuisance cutout due to the activation of the Low Temperature Protection. JW3 should never be clipped for standard range equipment or systems without antifreeze.

1,000 CFM Rated Airflow

EWT °F	WPD			COOLING - EAT 80/66.2 °F					WPD			Heating - EAT 70°F			
	FLOW GPM	PSI	FT	TC	SC	kW	HR	EER	FLOW GPM	PSI	FT	HC	kW	COP	HE
20	Operation Not Recommended								7.5	6.6	15.3	19.9	1.9	3.0	13.3
30	3.8	2.0	4.6	33.5	23.1	1.2	37.7	27.3	3.8	2.0	4.6	21.8	2.0	3.3	15.1
	5.6	3.7	8.5	33.4	23.0	1.2	37.4	29.0	5.6	3.7	8.5	22.6	2.0	3.3	15.9
	7.5	5.3	12.3	33.3	22.9	1.1	37.1	29.8	7.5	5.3	12.3	23.1	2.0	3.4	16.3
40	3.8	1.6	3.6	33.2	23.0	1.4	37.9	24.5	3.8	1.6	3.6	24.8	2.0	3.6	17.9
	5.6	2.9	6.7	33.5	23.1	1.3	37.8	26.3	5.6	2.9	6.7	25.7	2.0	3.7	18.7
	7.5	4.4	10.1	33.5	23.1	1.2	37.7	27.3	7.5	4.4	10.1	26.3	2.1	3.7	19.2
50	3.8	1.3	3.0	32.5	22.8	1.5	37.6	21.5	3.8	1.3	3.0	27.7	2.1	3.9	20.6
	5.6	2.4	5.5	33.0	23.0	1.4	37.8	23.4	5.6	2.4	5.5	28.8	2.1	4.0	21.6
	7.5	3.8	8.7	33.2	23.0	1.4	37.9	24.4	7.5	3.8	8.7	29.4	2.1	4.1	22.2
60	3.8	1.1	2.5	31.4	22.5	1.7	37.1	18.6	3.8	1.1	2.5	30.6	2.1	4.2	23.3
	5.6	2.1	4.8	32.1	22.7	1.6	37.5	20.4	5.6	2.1	4.8	31.8	2.2	4.3	24.4
	7.5	3.4	7.8	32.5	22.8	1.5	37.6	21.4	7.5	3.4	7.8	32.5	2.2	4.4	25.1
70	3.8	1.0	2.3	30.0	22.0	1.9	36.4	15.8	3.8	1.0	2.3	33.5	2.2	4.5	26.0
	5.6	1.9	4.4	30.9	22.3	1.8	36.9	17.5	5.6	1.9	4.4	34.9	2.2	4.6	27.3
	7.5	3.2	7.3	31.3	22.5	1.7	37.1	18.5	7.5	3.2	7.3	35.7	2.3	4.6	28.0
80	3.8	1.0	2.2	28.4	21.4	2.1	35.6	13.3	3.8	1.0	2.2	36.5	2.3	4.7	28.7
	5.6	1.9	4.3	29.4	21.8	2.0	36.1	14.8	5.6	1.9	4.3	38.0	2.3	4.8	30.1
	7.5	3.1	7.1	29.9	22.0	1.9	36.4	15.7	7.5	3.1	7.1	38.8	2.3	4.9	30.9
90	3.8	0.9	2.1	26.6	20.7	2.4	34.8	11.1	3.8	0.9	2.1	39.4	2.3	5.0	31.4
	5.6	1.8	4.2	27.7	21.2	2.2	35.3	12.4	5.6	1.8	4.2	41.1	2.4	5.1	33.0
	7.5	3.0	7.0	28.2	21.4	2.1	35.6	13.2	7.5	3.0	7.0	42.0	2.4	5.2	33.9
100	3.8	0.9	2.0	24.9	20.0	2.7	34.1	9.2	Operation Not Recommended						
	5.6	1.8	4.1	25.9	20.4	2.5	34.5	10.3							
	7.5	3.0	6.9	26.5	20.7	2.4	34.7	10.9							
110	3.8	0.8	1.9	23.1	19.2	3.0	33.5	7.6							
	5.6	1.7	3.8	24.1	19.6	2.8	33.8	8.5							
	7.5	2.8	6.5	24.7	19.9	2.7	34.0	9.0							
120	3.8	0.7	1.5	21.5	18.3	3.4	33.2	6.2							
	5.6	1.4	3.3	22.4	18.8	3.2	33.4	7.0							
	7.5	2.5	5.8	22.9	19.1	3.1	33.5	7.4							

Notes:
- Interpolation is permissible; extrapolation is not.
- All entering air conditions are 80°F (26.6°C) DB and 67°F (19.4°C) WB in cooling, and 70°F (21°C) DB in heating.
- Table does not reflect fan or pump power corrections for AHRI/ISO conditions.
- All performance is based upon the lower voltage of dual voltage rated units.
- Performance stated is at the rated power supply; performance may vary as the power supply varies from the rated.
- Operation below 40°F (4.4°C) is based upon 20% methanol antifreeze solution.
- Operation below 60°F (15.5°C) EWT requires optional insulated water/refrigerant circuit.
- See performance correction tables for operating conditions other than those listed above.
- See Performance Data Selection Notes for operation in the shaded areas.
- Performance capacities shown in thousands of Btuh.
- For unit operation in the shaded area when LWT is below 40°F (4.4°C), antifreeze must be used and the JW3 jumper on the DXM2.5/CXM2 should be clipped. This is due to the potential of the refrigerant temperature being as low as 32°F (0°C) with 40°F (4.4°C) LWT, which may lead to a nuisance cutout due to the activation of the Low Temperature Protection. JW3 should never be clipped for standard range equipment or systems without antifreeze.

1,150 CFM Rated Airflow

EWT °F	WPD			COOLING - EAT 80/66.2 °F					WPD			Heating - EAT 70°F			
	FLOW GPM	PSI	FT	TC	SC	kW	HR	EER	FLOW GPM	PSI	FT	HC	kW	COP	HE
20	Operation Not Recommended								9.0	5.1	11.7	24.5	2.3	3.1	16.5
30	3.0	0.9	2.0	38.7	27.4	1.5	43.9	25.6	4.5	1.6	3.8	25.5	2.4	3.1	17.4
	6.0	2.4	5.5	38.0	26.0	1.3	42.2	30.2	6.0	2.4	5.5	27.9	2.4	3.4	19.6
	9.0	4.1	9.5	37.3	25.3	1.2	41.3	31.4	9.0	4.1	9.5	28.8	2.5	3.4	20.4
40	3.0	0.6	1.5	38.3	27.7	1.7	44.2	22.2	4.5	1.3	3.0	29.1	2.5	3.5	20.7
	6.0	1.9	4.3	38.7	27.1	1.4	43.6	27.1	6.0	1.9	4.3	32.0	2.5	3.7	23.3
	9.0	3.4	7.8	38.5	26.7	1.3	43.0	28.7	9.0	3.4	7.8	33.1	2.6	3.8	24.3
50	3.0	0.5	1.2	37.3	27.5	2.0	44.0	19.1	4.5	1.0	2.4	32.8	2.6	3.8	24.1
	6.0	1.5	3.5	38.6	27.6	1.6	44.1	23.8	6.0	1.5	3.5	36.1	2.6	4.0	27.1
	9.0	2.9	6.7	38.7	27.5	1.5	43.9	25.4	9.0	2.9	6.7	37.4	2.7	4.1	28.3
60	3.0	0.4	1.0	35.9	27.0	2.2	43.4	16.3	4.5	0.9	2.1	36.5	2.7	4.0	27.4
	6.0	1.3	3.1	37.8	27.7	1.8	44.1	20.5	6.0	1.3	3.1	40.2	2.8	4.3	30.8
	9.0	2.6	6.0	38.3	27.7	1.7	44.2	22.1	9.0	2.6	6.0	41.7	2.8	4.4	32.1
70	3.0	0.4	0.9	34.3	26.3	2.5	42.7	13.9	4.5	0.8	2.0	40.1	2.7	4.3	30.7
	6.0	1.2	2.9	36.6	27.3	2.1	43.7	17.6	6.0	1.2	2.9	44.2	2.9	4.5	34.5
	9.0	2.4	5.6	37.3	27.5	2.0	44.0	19.0	9.0	2.4	5.6	45.8	2.9	4.6	35.9
80	3.0	0.4	0.9	32.4	25.4	2.8	41.9	11.7	4.5	0.8	1.9	43.7	2.8	4.5	34.0
	6.0	1.2	2.8	35.0	26.6	2.4	43.0	14.9	6.0	1.2	2.8	48.2	3.0	4.7	38.0
	9.0	2.4	5.5	35.8	27.0	2.2	43.4	16.1	9.0	2.4	5.5	49.9	3.0	4.8	39.6
90	3.0	0.4	0.9	30.6	24.5	3.1	41.0	9.9	4.5	0.8	1.9	47.3	2.9	4.7	37.2
	6.0	1.2	2.8	33.2	25.8	2.6	42.2	12.6	6.0	1.2	2.8	52.0	3.1	4.9	41.5
	9.0	2.3	5.4	34.1	26.2	2.5	42.6	13.6	9.0	2.3	5.4	53.8	3.2	5.0	43.0
100	3.0	0.4	0.9	28.7	23.7	3.4	40.3	8.4	Operation Not Recommended						
	6.0	1.2	2.8	31.3	24.9	3.0	41.3	10.6							
	9.0	2.3	5.3	32.2	25.3	2.8	41.7	11.5							
110	3.0	0.4	0.9	27.0	22.9	3.8	39.9	7.2							
	6.0	1.1	2.6	29.4	24.0	3.3	40.6	8.9							
	9.0	2.2	5.2	30.2	24.4	3.1	40.9	9.7							
120	3.0	0.3	0.7	25.6	22.4	4.1	39.8	6.2							
	6.0	1.0	2.3	27.6	23.1	3.6	40.0	7.6							
	9.0	2.1	4.7	28.3	23.5	3.5	40.2	8.1							

Notes:
- Interpolation is permissible; extrapolation is not.
- All entering air conditions are 80°F (26.6°C) DB and 67°F (19.4°C) WB in cooling, and 70°F (21°C) DB in heating.
- Table does not reflect fan or pump power corrections for AHRI/ISO conditions.
- All performance is based upon the lower voltage of dual voltage rated units.
- Performance stated is at the rated power supply; performance may vary as the power supply varies from the rated.
- Operation below 40°F (4.4°C) is based upon 20% methanol antifreeze solution.
- Operation below 60°F (15.5°C) EWT requires optional insulated water/refrigerant circuit.
- See performance correction tables for operating conditions other than those listed above.
- See Performance Data Selection Notes for operation in the shaded areas.
- Performance capacities shown in thousands of Btuh.
- For unit operation in the shaded area when LWT is below 40°F (4.4°C), antifreeze must be used and the JW3 jumper on the DXM2.5/CXM2 should be clipped. This is due to the potential of the refrigerant temperature being as low as 32°F (0°C) with 40°F (4.4°C) LWT, which may lead to a nuisance cutout due to the activation of the Low Temperature Protection. JW3 should never be clipped for standard range equipment or systems without antifreeze.

1,350 CFM Rated Airflow

EWT °F	WPD			COOLING - EAT 80/66.2 °F					WPD			Heating - EAT 70°F			
	FLOW GPM	PSI	FT	TC	SC	kW	HR	EER	FLOW GPM	PSI	FT	HC	kW	COP	HE
20	Operation Not Recommended								10.5	3.9	8.9	27.9	2.6	3.1	19.0
30	5.3	1.2	2.8	43.9	30.4	1.7	49.5	26.5	5.3	1.2	2.8	30.4	2.6	3.4	21.4
	7.9	2.2	5.1	43.1	29.5	1.6	48.4	27.6	7.9	2.2	5.1	31.5	2.7	3.5	22.4
	10.5	3.3	7.6	42.6	28.9	1.5	47.7	28.0	10.5	3.3	7.6	32.1	2.7	3.5	23.0
40	5.3	0.9	2.2	44.4	31.3	1.8	50.7	24.3	5.3	0.9	2.2	34.4	2.7	3.7	25.2
	7.9	1.8	4.2	44.2	30.9	1.7	50.1	25.8	7.9	1.8	4.2	35.8	2.7	3.8	26.4
	10.5	2.8	6.5	44.0	30.5	1.7	49.6	26.4	10.5	2.8	6.5	36.5	2.8	3.9	27.1
50	5.3	0.8	1.7	44.2	31.6	2.0	51.1	21.7	5.3	0.8	1.7	38.6	2.8	4.0	29.0
	7.9	1.6	3.6	44.4	31.5	1.9	50.9	23.4	7.9	1.6	3.6	40.2	2.8	4.2	30.5
	10.5	2.5	5.9	44.4	31.4	1.8	50.7	24.2	10.5	2.5	5.9	41.0	2.9	4.2	31.3
60	5.3	0.7	1.5	43.3	31.4	2.3	51.1	19.0	5.3	0.7	1.5	42.8	2.9	4.3	32.9
	7.9	1.4	3.2	43.9	31.6	2.1	51.1	20.7	7.9	1.4	3.2	44.6	2.9	4.4	34.6
	10.5	2.3	5.4	44.1	31.6	2.0	51.1	21.6	10.5	2.3	5.4	45.6	3.0	4.5	35.5
70	5.3	0.6	1.4	41.9	30.8	2.6	50.6	16.3	5.3	0.6	1.4	47.0	3.0	4.6	36.8
	7.9	1.3	3.1	42.8	31.2	2.4	50.9	18.0	7.9	1.3	3.1	49.0	3.0	4.7	38.6
	10.5	2.2	5.2	43.2	31.4	2.3	51.1	18.9	10.5	2.2	5.2	50.0	3.1	4.8	39.5
80	5.3	0.6	1.4	40.1	30.0	2.9	50.0	13.8	5.3	0.6	1.4	51.1	3.1	4.8	40.5
	7.9	1.3	3.0	41.3	30.5	2.7	50.4	15.4	7.9	1.3	3.0	53.2	3.2	4.9	42.4
	10.5	2.2	5.0	41.8	30.8	2.6	50.6	16.2	10.5	2.2	5.0	54.3	3.2	5.0	43.4
90	5.3	0.6	1.5	38.1	29.1	3.3	49.3	11.6	5.3	0.6	1.5	55.0	3.2	5.0	44.1
	7.9	1.3	3.0	39.4	29.7	3.0	49.8	12.9	7.9	1.3	3.0	57.1	3.2	5.2	46.0
	10.5	2.2	5.0	40.0	30.0	2.9	50.0	13.7	10.5	2.2	5.0	58.2	3.3	5.2	47.1
100	5.3	0.6	1.5	35.9	28.1	3.7	48.6	9.6	Operation Not Recommended						
	7.9	1.3	3.0	37.2	28.7	3.5	49.0	10.8							
	10.5	2.1	4.9	37.9	29.0	3.3	49.2	11.4							
110	5.3	0.6	1.4	33.5	27.2	4.3	48.0	7.9							
	7.9	1.3	2.9	34.9	27.8	3.9	48.4	8.9							
	10.5	2.1	4.8	35.7	28.0	3.8	48.5	9.4							
120	5.3	0.6	1.3	31.2	26.4	4.8	47.8	6.4							
	7.9	1.2	2.7	32.6	26.9	4.5	47.9	7.3							
	10.5	2.0	4.6	33.3	27.1	4.3	48.0	7.7							

Notes:
- Interpolation is permissible; extrapolation is not.
- All entering air conditions are 80°F (26.6°C) DB and 67°F (19.4°C) WB in cooling, and 70°F (21°C) DB in heating.
- Table does not reflect fan or pump power corrections for AHRI/ISO conditions.
- All performance is based upon the lower voltage of dual voltage rated units.
- Performance stated is at the rated power supply; performance may vary as the power supply varies from the rated.
- Operation below 40°F (4.4°C) is based upon 20% methanol antifreeze solution.
- Operation below 60°F (15.5°C) EWT requires optional insulated water/refrigerant circuit.
- See performance correction tables for operating conditions other than those listed above.
- See Performance Data Selection Notes for operation in the shaded areas.
- Performance capacities shown in thousands of Btuh.
- For unit operation in the shaded area when LWT is below 40°F (4.4°C), antifreeze must be used and the JW3 jumper on the DXM2.5/CXM2 should be clipped. This is due to the potential of the refrigerant temperature being as low as 32°F (0°C) with 40°F (4.4°C) LWT, which may lead to a nuisance cutout due to the activation of the Low Temperature Protection. JW3 should never be clipped for standard range equipment or systems without antifreeze.

2,000 CFM Rated Airflow

EWT °F	WPD			COOLING - EAT 80/66.2 °F					WPD			Heating - EAT 70°F			
	FLOW GPM	PSI	FT	TC	SC	kW	HR	EER	FLOW GPM	PSI	FT	HC	kW	COP	HE
20	Operation Not Recommended								15.0	9.5	22.0	36.4	3.9	2.7	23.1
30	7.5	2.6	6.0	66.6	44.5	2.7	75.8	24.6	7.5	2.6	6.0	41.0	3.9	3.0	27.5
	11.3	5.3	12.3	65.6	43.3	2.6	74.4	25.4	11.3	5.3	12.3	42.7	4.0	3.2	29.2
	15.0	8.5	19.6	64.9	42.5	2.5	73.6	25.6	15.0	8.5	19.6	43.7	4.0	3.2	30.1
40	7.5	2.3	5.3	66.8	45.5	2.9	76.8	22.9	7.5	2.3	5.3	47.8	4.1	3.5	34.0
	11.3	4.7	10.9	66.8	44.9	2.8	76.2	24.1	11.3	4.7	10.9	50.0	4.1	3.6	36.1
	15.0	7.7	17.8	66.5	44.5	2.7	75.7	24.7	15.0	7.7	17.8	51.2	4.1	3.7	37.2
50	7.5	2.1	4.9	66.0	45.6	3.2	76.9	20.7	7.5	2.1	4.9	54.8	4.2	3.8	40.5
	11.3	4.3	10.0	66.7	45.6	3.0	76.9	22.2	11.3	4.3	10.0	57.4	4.2	4.0	43.0
	15.0	7.2	16.5	66.8	45.5	2.9	76.8	23.0	15.0	7.2	16.5	58.9	4.3	4.1	44.4
60	7.5	2.0	4.6	64.3	45.2	3.5	76.3	18.3	7.5	2.0	4.6	61.7	4.3	4.2	47.0
	11.3	4.1	9.4	65.6	45.6	3.3	76.8	20.0	11.3	4.1	9.4	64.7	4.4	4.3	49.8
	15.0	6.8	15.6	66.1	45.7	3.2	76.9	20.8	15.0	6.8	15.6	66.4	4.4	4.4	51.4
70	7.5	1.9	4.4	62.0	44.3	3.9	75.3	15.9	7.5	1.9	4.4	68.5	4.4	4.5	53.3
	11.3	3.9	9.0	63.7	44.9	3.6	76.1	17.5	11.3	3.9	9.0	71.7	4.5	4.7	56.3
	15.0	6.5	15.1	64.4	45.2	3.5	76.4	18.4	15.0	6.5	15.1	73.5	4.6	4.7	57.9
80	7.5	1.9	4.3	59.2	43.1	4.3	74.1	13.6	7.5	1.9	4.3	74.9	4.6	4.8	59.3
	11.3	3.8	8.8	61.2	43.9	4.0	74.9	15.1	11.3	3.8	8.8	78.2	4.7	4.9	62.3
	15.0	6.4	14.8	62.1	44.3	3.9	75.4	15.9	15.0	6.4	14.8	79.9	4.7	5.0	63.9
90	7.5	1.8	4.2	56.1	41.7	4.9	72.7	11.5	7.5	1.8	4.2	80.8	4.7	5.0	64.7
	11.3	3.8	8.7	58.2	42.6	4.5	73.6	12.9	11.3	3.8	8.7	84.0	4.8	5.1	67.6
	15.0	6.3	14.5	59.2	43.1	4.3	74.1	13.6	15.0	6.3	14.5	85.5	4.8	5.2	69.1
100	7.5	1.8	4.1	52.8	40.3	5.4	71.4	9.7	Operation Not Recommended						
	11.3	3.7	8.5	55.0	41.2	5.1	72.2	10.9							
	15.0	6.2	14.3	56.1	41.7	4.9	72.7	11.5							
110	7.5	1.7	4.0	49.6	38.9	6.1	70.4	8.1							
	11.3	3.6	8.2	51.7	39.8	5.7	71.0	9.1							
	15.0	6.0	13.9	52.7	40.2	5.5	71.4	9.6							
120	7.5	1.6	3.7	46.4	37.8	6.9	69.8	6.8							
	11.3	3.4	7.8	48.4	38.5	6.4	70.1	7.6							
	15.0	5.8	13.4	49.4	38.9	6.1	70.4	8.0							

Notes:
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- See Performance Data Selection Notes for operation in the shaded areas.
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CV EC Motor Limits

CV EC MOTOR ADVANTAGE

A major benefit of the CV EC motor over other blower motor types is its ability to adjust airflow remotely through the iGate 2 web portal/mobile app or directly at the unit with a communicating diagnostic service tool. Airflow levels can be adjusted in increments of 25 CFM from the unit's minimum and maximum CFM range (see the CV EC motor configuration table for details).

Table 1: CV EC Blower Motor Limits

Size	Max ESP (in. wg)	Fan Motor (hp)	Airflow Range	Cooling Mode	Heating Mode	Dehumid Mode	Fan Only
6	0.9	1/8	Minimum	150	150	150	150
	1.0		Default	275	275	150	275
	1.0		Maximum	275	275	225	275
9	0.9	1/8	Minimum	225	225	225	225
	0.9		Default	345	345	225	345
	0.9		Maximum	375	375	325	375
12	0.8	1/4	Minimum	300	300	300	300
	0.8		Default	400	400	300	400
	0.9		Maximum	415	415	380	415
15	0.8	1/3	Minimum	375	375	375	375
	1.0		Default	525	525	375	525
	1.0		Maximum	625	625	600	625
18	0.8	1/3	Minimum	450	450	450	450
	0.9		Default	630	630	450	630
	0.9		Maximum	750	750	600	750
24	0.75	1/2	Minimum	600	600	600	300
			Default	750	750	650	350
			Maximum	850	850	800	850
30	0.5	1/2	Minimum	750	750	750	375
			Default	925	925	800	425
			Maximum	1,050	1,050	1,000	1,050
36	0.6	3/4	Minimum	900	900	900	450
			Default	1,125	1,125	975	525
			Maximum	1,275	1,275	1,200	1,275
42	0.6	3/4	Minimum	1,050	1,050	1,050	525
			Default	1,300	1,300	1,125	600
			Maximum	1,475	1,475	1,400	1,475
48	0.6	3/4	Minimum	1,200	1,200	1,200	600
			Default	1,500	1,500	1,300	700
			Maximum	1,700	1,700	1,600	1,700
60	0.75	1	Minimum	1,500	1,500	1,500	750
			Default	1,875	1,875	1,625	875
			Maximum	2,125	2,125	2,000	2,125

- Airflow is controlled within ±5% up to Max ESP shown with wet coil and standard 1-inch fiberglass air filter.
- Performance shown is with wet coil and factory air filters.

Cooling Corrections

Full Load Cooling Corrections									
Ent Air WB F	Total Clg Cap	Sens Clg Cap Multipliers- Entering DB F						Power	Heat of Rejection
		65	70	75	80	85	90		
45	0.621	*	*	*	*	*	*	1.005	0.729
50	0.708	*	*	*	*	*	*	1.004	0.775
55	0.794	*	*	*	*	*	*	1.003	0.852
60	0.880		0.891	*	*	*	*	1.002	0.914
65	0.966		0.680	0.884	1.086	1.293	*	1.000	0.975
67	1.000		0.596	0.799	1.000	1.207	1.410	1.000	1.000
70	1.052			0.672	0.871	1.077	1.280	0.999	1.037
75	1.138				0.657	0.862	1.063	0.998	1.098

* Sensible Capacity equals Total Capacity.
AHRI/ISO/ASHRAE 13256-1 uses entering air conditions of Cooling - 80.6°F DB/ 66.2°F WB, and Heating - 68°F DB/ 59°F WB entering air temperature.
Entering DB temperature range is based on operating limits, not on commision limits.
Cooling air corrections based on rated airflow.

Heating Corrections

Full EAT Heating Corrections			
Ent Air DB °F	Heating Capacity	Power	Heat of Extraction
50	1.022	0.775	1.086
55	1.016	0.841	1.060
60	1.011	0.894	1.040
65	1.005	0.947	1.020
70	1.000	1.000	1.000
75	0.995	1.053	0.980
80	0.989	1.106	0.960

Heating air corrections based on rated airflow.

Airflow Correction Table

Full Airflow Corrections								
Airflow	Heating			Cooling				
% of Rated	Heating Capacity	Heating Power	Heat of Extraction	Total Capacity	Sensible Capacity	Sens/Total Ratio	Power	Heat of Rejection
80	0.979	1.044	0.969	0.970	0.904	0.932	0.968	0.974
85	0.984	1.033	0.977	0.977	0.928	0.950	0.976	0.980
90	0.989	1.022	0.985	0.985	0.952	0.967	0.984	0.987
95	0.995	1.011	0.992	0.992	0.976	0.983	0.992	0.993
100	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
105	1.005	0.989	1.008	1.008	1.024	1.016	1.008	1.007
110	1.011	0.978	1.015	1.015	1.048	1.032	1.016	1.013

Cooling and heating air corrections based on rated airflow.

Antifreeze Correction Table

EWT (°F)	Antifreeze Type	Antifreeze %	Cooling			Heating		WPD
			Total Cap	Sensible Cap	Watts	Total Cap	Watts	
90	Water	0%	1.000	1.000	1.000	1.000	1.000	1.000
	Ethanol	5%	0.998	0.998	1.002	0.996	0.999	1.025
		10%	0.996	0.996	1.003	0.991	0.997	1.048
		15%	0.994	0.994	1.005	0.987	0.996	1.098
		20%	0.991	0.991	1.006	0.982	0.994	1.142
		25%	0.986	0.986	1.009	0.972	0.991	1.207
		30%	0.981	0.981	1.012	0.962	0.988	1.265
		35%	0.977	0.977	1.015	0.953	0.985	1.312
		40%	0.972	0.972	1.018	0.943	0.982	1.370
		45%	0.966	0.966	1.023	0.931	0.978	1.431
		50%	0.959	0.959	1.027	0.918	0.974	1.494
	Ethylene Glycol	5%	0.998	0.998	1.002	0.996	0.999	1.021
		10%	0.996	0.996	1.003	0.991	0.997	1.040
		15%	0.994	0.994	1.004	0.987	0.996	1.079
		20%	0.991	0.991	1.005	0.982	0.995	1.114
		25%	0.988	0.988	1.008	0.976	0.993	1.146
		30%	0.985	0.985	1.010	0.969	0.990	1.175
		35%	0.982	0.982	1.012	0.963	0.988	1.208
		40%	0.979	0.979	1.014	0.956	0.986	1.243
		45%	0.976	0.976	1.016	0.950	0.984	1.278
		50%	0.972	0.972	1.018	0.943	0.982	1.314
	Methanol	5%	0.997	0.997	1.002	0.993	0.998	1.039
		10%	0.993	0.993	1.004	0.986	0.996	1.075
		15%	0.990	0.990	1.007	0.979	0.994	1.116
		20%	0.986	0.986	1.009	0.972	0.991	1.154
		25%	0.982	0.982	1.012	0.964	0.989	1.189
		30%	0.978	0.978	1.014	0.955	0.986	1.221
		35%	0.974	0.974	1.017	0.947	0.984	1.267
		40%	0.970	0.970	1.020	0.939	0.981	1.310
		45%	0.966	0.966	1.023	0.930	0.978	1.353
		50%	0.961	0.961	1.026	0.920	0.975	1.398
	Propylene Glycol	5%	0.995	0.995	1.003	0.990	0.997	1.065
		10%	0.990	0.990	1.006	0.980	0.994	1.119
		15%	0.986	0.986	1.009	0.971	0.991	1.152
		20%	0.981	0.981	1.012	0.962	0.988	1.182
		25%	0.978	0.978	1.014	0.956	0.986	1.227
		30%	0.975	0.975	1.016	0.950	0.984	1.267
		35%	0.972	0.972	1.018	0.944	0.982	1.312
		40%	0.969	0.969	1.020	0.938	0.980	1.356
		45%	0.965	0.965	1.023	0.929	0.977	1.402
		50%	0.960	0.960	1.026	0.919	0.974	1.450

Table continued on next page

Table continued from previous page

EWT (°F)	Antifreeze Type	Antifreeze %	Cooling			Heating		WPD
			Total Cap	Sensible Cap	Watts	Total Cap	Watts	
30	Water	0%	1.000	1.000	1.000	1.000	1.000	1.000
	Ethanol	5%	0.991	0.991	1.006	0.981	0.994	1.140
		10%	0.981	0.981	1.012	0.961	0.988	1.242
		15%	0.973	0.973	1.018	0.944	0.983	1.295
		20%	0.964	0.964	1.024	0.927	0.977	1.343
		25%	0.959	0.959	1.028	0.917	0.974	1.363
		30%	0.954	0.954	1.031	0.907	0.970	1.383
		35%	0.949	0.949	1.035	0.897	0.967	1.468
		40%	0.944	0.944	1.038	0.887	0.964	1.523
		45%	0.940	0.940	1.041	0.880	0.962	1.580
		50%	0.936	0.936	1.043	0.872	0.959	1.639
	Ethylene Glycol	5%	0.997	0.997	1.002	0.993	0.998	1.040
		10%	0.993	0.993	1.004	0.986	0.996	1.075
		15%	0.990	0.990	1.006	0.980	0.994	1.122
		20%	0.987	0.987	1.008	0.973	0.992	1.163
		25%	0.983	0.983	1.011	0.966	0.990	1.195
		30%	0.979	0.979	1.013	0.958	0.987	1.225
		35%	0.976	0.976	1.016	0.951	0.985	1.279
		40%	0.972	0.972	1.018	0.943	0.982	1.324
		45%	0.969	0.969	1.021	0.937	0.980	1.371
		50%	0.966	0.966	1.023	0.930	0.978	1.419
	Methanol	5%	0.995	0.995	1.004	0.989	0.997	1.069
		10%	0.989	0.989	1.007	0.978	0.993	1.127
		15%	0.984	0.984	1.011	0.968	0.990	1.164
		20%	0.979	0.979	1.014	0.957	0.986	1.197
		25%	0.975	0.975	1.017	0.949	0.984	1.216
		30%	0.971	0.971	1.019	0.941	0.981	1.235
		35%	0.967	0.967	1.022	0.933	0.979	1.286
		40%	0.963	0.963	1.025	0.924	0.976	1.323
		45%	0.959	0.959	1.028	0.917	0.974	1.360
		50%	0.955	0.955	1.030	0.910	0.971	1.399
	Propylene Glycol	5%	0.995	0.995	1.004	0.989	0.997	1.071
		10%	0.989	0.989	1.007	0.978	0.993	1.130
		15%	0.985	0.985	1.010	0.968	0.990	1.206
		20%	0.980	0.980	1.013	0.958	0.987	1.270
		25%	0.974	0.974	1.017	0.947	0.983	1.359
		30%	0.968	0.968	1.021	0.935	0.979	1.433
		35%	0.963	0.963	1.025	0.924	0.976	1.522
		40%	0.957	0.957	1.029	0.913	0.972	1.614
		45%	0.949	0.949	1.034	0.898	0.967	1.712
		50%	0.941	0.941	1.039	0.882	0.962	1.816

Model	Rated CFM	Min CFM	Motor Type	Speed Tap		External Static Pressure (in. wg)									
						0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
SC009	345	225	PSC	Low	Power (W)	Operation Not Recommended									
					CFM	340	322	300	260						
				Medium	Power (W)										
					CFM	390	360	320	290	260					
				High	Power (W)										
					CFM	410	380	350	320	280					
	345	225	CT EC	1	Power (W)	40	42	44	47	49					
					CFM	294	278	259	245	230					
				2	Power (W)	67	70	73	74	79	82	85	88	90	85
					CFM	370	357	343	326	318	302	291	278	265	235
				3	Power (W)	Operation Not Recommended		86	88	91	95	98	101	96	90
					CFM			370	358	346	334	322	307	280	247
				4	Power (W)							120	113	107	102
					CFM							340	309	276	234
	345	225	CV EC	Minimum CFM	Power (W)	25	32	39	45	53	60	66	78	83	
					CFM	225	225	225	225	225	225	225	225	225	
				Default CFM	Power (W)	49	58	67	77	88	100	105	95	88	
					CFM	325	325	325	325	325	325	325	325	325	
				Maximum CFM	Power (W)	126	134	131	125	119	118	105	98	90	
					CFM	375	375	375	375	375	375	375	375	375	

- Blower performance data is based on the lowest nameplate voltage setting.
- Blower performance is based on a wet coil with clean 1-inch filter.
- Blower performance is based on operating conditions of 80°F DB and 67°F WB.
- CFM Tolerance is ±7%
- Cells in grey - option not available

Model	Rated CFM	Min CFM	Motor Type	Speed Tap		External Static Pressure (in. wg)									
						0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
SC012	400	300	PSC	Low	Power (W)	Operation Not Recommended									
					CFM	360	350	320	310						
				Medium	Power (W)										
					CFM	420	400	380	360	340					
				High	Power (W)										
					CFM	470	450	430	400	380	320				
	400	300	CT EC	1	Power (W)	64	66	69	71	75	78	82	85	87	83
					CFM	358	345	332	319	305	291	275	261	247	218
				2	Power (W)	86	88	91	94	97	100	103	104	97	91
					CFM	400	388	377	365	354	342	328	309	269	237
				3	Power (W)	116	119	122	124	126	126	121	114	99	91
					CFM	449	437	427	414	401	385	359	327	274	238
				4	Power (W)	131	133	135	137	135	130	123	110	99	92
					CFM	467	456	444	433	414	390	361	318	273	239
	400	300	CV EC	Minimum CFM	Power (W)	55	64	73	81	90	99	107	106		
					CFM	300	300	300	300	300	300	300	300		
				Default CFM	Power (W)	105	115	125	135	132	127	123	118		
					CFM	380	380	380	380	380	380	380	380		
				Maximum CFM	Power (W)	147	149	146	143	139	134	130	126	120	
					CFM	415	415	415	415	415	415	415	415	415	

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- Blower performance is based on operating conditions of 80°F DB and 67°F WB.
- CFM Tolerance is ±7%
- Cells in grey - option not available

Model	Rated CFM	Min CFM	Motor Type	Speed Tap		External Static Pressure (in. wg)									
						0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
SC015	525	375	PSC	Low	Power (W)	161	158	146	138	Operation Not Recommended					
					CFM	503	490	479	439						
				Medium	Power (W)	184	181	174	153	143					
					CFM	595	575	562	510	451					
				High	Power (W)				174	159	141				
					CFM				581	510	386				
	525	375	CT EC	1	Power (W)	67	55	62	68	75	82				
					CFM	648	588	542	493	441	378				
				2	Power (W)	67	74	81	87	95	102	108			
					CFM	648	608	557	514	460	402	354			
				3	Power (W)	79	86	94	101	107	117	124	130		
					CFM	695	659	611	570	526	475	422	377		
				4	Power (W)	92	98	107	114	121	129	138	145	151	
					CFM	737	705	661	622	582	534	482	438	396	
				5	Power (W)	106	110	117	126	133	141	151	159	165	172
					CFM	745	745	708	662	626	585	535	488	444	402
	525	375	CV EC	Minimum CFM	Power (W)		36	52	68	84	99	114	129		
					CFM		375	375	375	375	375	375	375		
				Default CFM	Power (W)		55	74	90	108	127	147	166	186	
					CFM		525	525	525	525	525	525	525	525	
				Maximum CFM	Power (W)	54	73	93	112	132	152	173	194	216	238
					CFM	625	625	625	625	625	625	625	625	625	625

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- Cells in grey - option not available

Model	Rated CFM	Min CFM	Motor Type	Speed Tap		External Static Pressure (in. wg)									
						0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
SC018	630	450	PSC	Low	Power (W)	147	145	135	127	Operation Not Recommended					
					CFM	524	509	493	451						
				Medium	Power (W)	170	167	161	143						
					CFM	611	588	564	514						
				High	Power (W)	195	189	184	177	149					
					CFM	704	668	643	617	504					
	630	450	CT EC	1	Power (W)	73	78	85	90						
					CFM	600	558	518	491						
				2	Power (W)	92	99	107	109	116	123	131			
					CFM	676	641	599	570	536	498	452			
				3	Power (W)	112	118	126	135	140	147	155	163	170	
					CFM	741	713	677	640	619	586	554	512	471	
				4	Power (W)	138	144	152	161	170	174	181	190	199	207
					CFM	802	780	751	714	680	662	633	603	567	529
				5	Power (W)	170	175	182	190	201	210	214	222	231	240
					CFM	854	848	820	791	754	724	711	683	655	625
	630	450	CV EC	Minimum CFM	Power (W)	Operation Not Recommended			93	111	132	157	180		
					CFM				450	450	450	450	450		
				Default CFM	Power (W)	85	101	113	145	178	206	228	248	266	
					CFM	600	600	600	600	600	600	600	600	600	
				Maximum CFM	Power (W)	157	171	186	200	214	251	286	323		
					CFM	750	750	750	750	750	750	750	750		

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- Cells in grey - option not available

Model	Rated CFM	Min CFM	Motor Type	Speed Tap		External Static Pressure (in. wg)									
						0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
SC024	800	600	PSC	Low	Power (W)	224	215	204	191	176	Operation Not Recommended				
					CFM	777	768	737	684	608					
				Medium	Power (W)	257	246	233	219	204	187				
					CFM	888	868	830	774	701	610				
				High	Power (W)	294	281	268	253	237	219				
					CFM	997	964	916	854	777	686				
	800	600	CT EC	1	Power (W)	116	122	128	135						
					CFM	755	728	695	653						
				2	Power (W)	146	152	159	166	174	185	193			
					CFM	836	810	782	750	708	657	616			
				3	Power (W)	181	187	194	201	209	218	230	239	246	252
					CFM	910	887	861	834	804	762	714	674	642	619
				4	Power (W)	232	240	247	254	262	270	278	291	303	312
					CFM	996	975	952	929	904	876	845	798	755	725
				5	Power (W)	Operation Not Recommended				323	331	340	348	361	374
					CFM					999	975	951	923	884	840
	800	600	CV EC	Minimum CFM	Power (W)	71	89	107	124	141	159	177	195	213	230
					CFM	600	600	600	600	600	600	600	600	600	600
				Default CFM	Power (W)	145	165	185	205	225	245	266	285	306	326
					CFM	800	800	800	800	800	800	800	800	800	800
				Maximum CFM	Power (W)	284	300	315	332	351	364	379	396	412	428
					CFM	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000

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Model	Rated CFM	Min CFM	Motor Type	Speed Tap		External Static Pressure (in. wg)									
						0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
SC030	1,000	750	PSC	Low	Power (W)	305	290	274	256	236	Operation Not Recommended				
					CFM	916	911	883	833	761					
				Medium	Power (W)	338	323	306	288	268	246				
					CFM	1,021	1,014	983	929	850	747				
				High	Power (W)	384	372	357	340	322	301				
					CFM	1,084	1,076	1,044	988	906	800				
	1,000	750	CT EC	1	Power (W)	158	165	176	184	192					
					CFM	904	873	832	796	763					
				2	Power (W)	211	219	227	240	250	258	267	276	285	
					CFM	1,020	992	965	927	894	864	835	805	771	
				3	Power (W)	280	289	298	306	321	330	342	351	361	368
					CFM	1,139	1,113	1,089	1,064	1,027	999	966	937	910	879
				4	Power (W)	336	346	355	364	374	389	399	413	423	430
					CFM	1,216	1,193	1,168	1,146	1,123	1,086	1,062	1,028	1,002	975
				5	Power (W)				452	462	471	490	499	508	478
					CFM				1,250	1,229	1,208	1,173	1,151	1,112	1,036
	1,000	750	CV EC	Minimum CFM	Power (W)	71	89	108	127	145	162	181	199	217	235
					CFM	750	750	750	750	750	750	750	750	750	750
				Default CFM	Power (W)	251	274	296	315	337	362	387	407		
					CFM	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000		
				Maximum CFM	Power (W)	388	410	431	453	471	Operation Not Recommended				
					CFM	1,150	1,150	1,150	1,150	1,150					

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Model	Rated CFM	Min CFM	Motor Type	Speed Tap		External Static Pressure (in. wg)									
						0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
SC036	1,150	900	PSC	Low	Power (W)										
					CFM	970	960	951	941	902	Operation Not Recommended				
				Medium	Power (W)										
					CFM	1,106	1,096	1,086	1,067	1,009	912				
				High	Power (W)										
					CFM	1,436	1,387	1,329	1,280	1,174	1,077	931			
	1,150	900	CT EC	1	Power (W)	166	175	184							
					CFM	974	941	904							
				2	Power (W)	241	251	261	272	282	292	299	307		
					CFM	1,132	1,103	1,074	1,041	1,005	973	944	916		
				3	Power (W)	294	304	316	326	337	349	359	367	375	385
					CFM	1,271	1,242	1,214	1,185	1,153	1,118	1,083	1,056	1,029	999
				4	Power (W)	376	387	399	409	421	433	446	457	468	478
					CFM	1,403	1,377	1,351	1,324	1,295	1,268	1,233	1,201	1,169	1,143
				5	Power (W)			499	510	523	524	521	519	516	514
					CFM			1,485	1,460	1,434	1,396	1,347	1,295	1,240	1,194
	1,150	900	CV EC	Minimum CFM	Power (W)	105	132	164	188	211	233	257	280	307	339
					CFM	900	900	900	900	900	900	900	900	900	900
				Default CFM	Power (W)	205	232	261	303	349	382	415	446	475	505
					CFM	1,150	1,150	1,150	1,150	1,150	1,150	1,150	1,150	1,150	1,150
				Maximum CFM	Power (W)	406	403	438	474	511	564	629	680	692	691
					CFM	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500

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Model	Rated CFM	Min CFM	Motor Type	Speed Tap		External Static Pressure (in. wg)									
						0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
SC042	1,350	1,050	PSC	Low	Power (W)	388	Operation Not Recommended								
					CFM	918									
				Medium	Power (W)	517	509	496	477	452	422				
					CFM	1,201	1,223	1,218	1,185	1,125	1,038				
				High	Power (W)	665	654	636	611	580	542	498			
					CFM	1,584	1,592	1,571	1,518	1,436	1,323	1,180			
	1,350	1,050	CT EC	1	Power (W)	238	248	259	272						
					CFM	1,186	1,152	1,113	1,056						
				2	Power (W)	331	369	352	365	381	396	411	423	437	446
					CFM	1,345	1,317	1,283	1,251	1,215	1,181	1,150	1,124	1,094	1,050
				3	Power (W)	448	461	474	486	501	518	534	551	568	581
					CFM	1,507	1,482	1,455	1,427	1,396	1,365	1,331	1,296	1,276	1,246
				4	Power (W)	582	595	609	622	635	651	669	688	706	681
					CFM	1,641	1,623	1,601	1,577	1,548	1,519	1,488	1,455	1,423	1,355
				5	Power (W)			756	775	776	774	772	768	765	679
					CFM			1,743	1,717	1,688	1,645	1,596	1,541	1,490	1,352
	1,350	1,050	CV EC	Minimum CFM	Power (W)	154	177	200	224	252	280	306	331	355	383
					CFM	1,050	1,050	1,050	1,050	1,050	1,050	1,050	1,050	1,050	1,050
				Default CFM	Power (W)	334	359	390	421	453	484	517	555	595	636
					CFM	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400
				Maximum CFM	Power (W)	658	674	703	700	697	Operation Not Recommended				
					CFM	1,750	1,750	1,750	1,750	1,750					

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Model	Rated CFM	Min CFM	Motor Type	Speed Tap		External Static Pressure (in. wg)									
						0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
SC060	2,000	1,500	PSC	Low	Power (W)	779	766	750	731	710	686	659			
					CFM	1,771	1,756	1,732	1,700	1,658	1,608	1,549			
				Medium	Power (W)	877	856	833	806	777	744	708	669		
					CFM	1,979	1,968	1,940	1,894	1,831	1,751	1,653	1,539		
				High	Power (W)	996	969	938	904	867	826	783	736	687	
					CFM	2,208	2,178	2,132	2,069	1,990	1,893	1,780	1,649	1,502	
	2,000	1,500	CT EC	1	Power (W)	342	354	366	380	Operation Not Recommended					
					CFM	1,685	1,640	1,593	1,545						
				2	Power (W)	460	476	489	501	518	533	548	561	577	
					CFM	1,879	1,833	1,795	1,754	1,705	1,657	1,608	1,563	1,514	
				3	Power (W)	648	666	678	694	708	724	740	757	773	
					CFM	2,113	2,069	2,039	1,998	1,963	1,925	1,885	1,840	1,795	
				4	Power (W)	771	785	803	817	832	848	864	883	900	
					CFM	2,235	2,198	2,163	2,130	2,094	2,061	2,019	1,977	1,939	
				5	Power (W)	866	881	899	916	934	951	970	977	973	969
					CFM	2,322	2,290	2,253	2,219	2,188	2,152	2,120	2,083	2,013	1,940
	2,000	1,500	CV EC	Minimum CFM	Power (W)	246	301	354	405	453	500	544	587	627	665
					CFM	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
				Default CFM	Power (W)	503	564	631	686	734	808	875	929	990	1,051
					CFM	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
				Maximum CFM	Power (W)	885	896	901	916	937	Operation Not Recommended				
					CFM	2,200	2,200	2,200	2,200	2,200					

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Tranquility (SC) Series

Unit Size	006	009	012	015	018	024	030	036	042	048	060
Number of refrigerant circuits	1	1	1	1	1	1	1	1	1	1	1
Factory Charge R-454B (oz)	17	18	21	29	37	40	39	46	56	56	69
Refrigerant Leak Detection System	O	O	O	O	O	O	O	O	O	O	R
Number of Sensors	2	2	2	2	2	2	2	2	2	2	2
Water Connection Size											
FPT	1/2"	1/2"	1/2"	1/2"	1/2"	3/4"	3/4"	3/4"	3/4"	1"	1"
Coax Volume (gallons)	0.143	0.143	0.167	0.286	0.45	0.323	0.323	0.738	0.89	0.89	0.939
Vertical											
Filter Standard - 1" Throwaway	10x18	10x18	10x18	20x20	20x20	20x20	20x20	24x24	24x24	28x28	28x28
Weight - Operating (lbs.)	103	105	114	153	158	189	197	203	218	315	330
Weight - Packaged (lbs.)	113	115	124	158	163	194	202	209	224	322	337
Horizontal											
Filter Standard - 1" Throwaway	10x18	10x18	10x18	16x25	16x25	18x24	18x24	2-14x20	2-14x20	1-20x24 1-14x20	1-20x24 1-14x20
Weight - Operating (lbs.)	103	105	114	153	158	174	182	203	218	263	278
Weight - Packaged (lbs.)	113	115	124	158	163	179	187	209	224	270	285

Notes:
All dimensions displayed above are in inches unless otherwise marked.
All units have a TXV and ½-inch and ¾-inch electrical knockouts.
The standard Condensate Drain Connection is a rubber coupling that couples to ¾-inch schedule 40/80 PVC.
The optional Stainless Steel Condensate Drain Connection is ¾-inch FPT.
FPT = Female Pipe Thread
575V fan motors are two speed.
O = Optional, R = Required

Unit Maximum Water Working Pressure

Options	Max Pressure PSIG [kPa]
Base Unit	500 [3447]

SC009: HP-A
SC012: HP-20B
SC015: HP-18A
SC018: HP-7B, HP-9B
SC024: HP-4A
SC030: HP-5A, HP-9A, HP-19A, HP19B, HP10B
SC036: HP-G
SC042: HP-20A, HP5B
SC060: HP-31B

Cabinet Dimensions (inches)

Model	Cabinet Config	Depth/ Length	Width	Height
		A	B	C
SC006	H	34.1	19.1	11.0
	V	19.0	19.1	22.0
SC009-012	H	34.1	19.1	11.0
	V	19.0	19.1	22.0
	F	19.0	19.1	22.0
SC015-018	H	43.0	20.1	17.0
	V	21.5	21.6	40.0
	F	21.5	21.6	40.0
SC024-030	H	43.0	20.1	18.3
	V	21.5	21.6	40.0
	F	21.5	21.6	40.0
SC036-042	H	47.1	20.1	21.0
	V	26.0	21.6	45.0
SC048-060	H	54.1	24.1	21.0
	V	29.3	25.5	50.5

Hanger Dimensions (inches)

Model	Cabinet Config	Unit Hanger Detail		
		U	V	W
SC006-012	H	34.1	21.3	16.9
SC015-018	H	43.0	22.1	17.9
SC024-030	H	43.0	22.1	17.9
SC036-042	H	47.0	22.6	17.9
SC048-060	H	54.0	26.2	21.9

SC009: HP-A
SC012: HP-20B
SC015: HP-18A
SC018: HP-7B, HP-9B
SC024: HP-4A
SC030: HP-5A, HP-9A, HP-19A, HP19B, HP10B
SC036: HP-G
SC042: HP-20A, HP5B
SC060: HP-31B

Water Connections (inches)

Model	Cabinet Config	Water Connections					Condensate Drain Pan		
		Water In		Water Out		Water In/Out	AA	BB	Condensate Drain Pan Fitting
		D	E	F	E				
SC006	H	5.7	1.0	9.7	1.0	1/2"	3.3	0.7	*3/4" MPT
	V	1.7	1.7	9.7	1.7	1/2"	11.7	1.5	*3/4" MPT
SC009-012	H	5.7	1.0	9.7	1.0	1/2"	3.3	0.7	*3/4" MPT
	V	1.7	1.7	9.7	1.7	1/2"	11.7	1.5	*3/4" MPT
	F	1.7	1.7	9.7	1.7	1/2"	11.7	1.5	*3/4" MPT
SC015-018	H	3.5	1.5	13.8	1.5	1/2"	3.4	1.0	*3/4" MPT
	V	3.7	1.5	9.7	1.5	1/2"	19.7	1.5	*3/4" MPT
	F	3.7	1.9	9.7	1.9	1/2"	19.7	1.5	*3/4" MPT
SC024-30	H	2.0	1.5	15.4	1.5	3/4"	3.5	0.8	*3/4" MPT
	V	3.7	1.5	9.8	1.5	3/4"	19.7	1.4	*3/4" MPT
	F	3.8	1.9	9.8	1.9	3/4"	19.7	1.6	*3/4" MPT
SC036-042	H	2.0	1.6	16.8	1.6	3/4"	3.4	0.8	*3/4" MPT
	V	3.7	1.5	9.8	1.5	3/4"	20.7	1.4	*3/4" MPT
SC048-060	H	2.0	1.5	17.4	1.5	1"	3.4	0.8	*3/4" MPT
	V	3.7	2.0	11.1	2.0	1"	22.1	1.4	*3/4" MPT

* See PDF drawings for reference

Discharge and Return Connections (inches)

Model	Cabinet Config	Discharge Connection Duct Flange Installed				Return Connection Using Return Air Opening			
		Supply Height	Supply Width	O	P	Return Width	Return Height	S	T
		M	N			Q	R		
SC006	H	4.1	6.6	6.0	1.3	16.1	9.0	1.2	1.0
	V	9.0	9.0	5.0	8.9	16.1	9.0	2.1	1.0
SC009-012	H	4.1	6.6	6.0	1.3	16.1	9.0	1.2	1.0
	V	9.0	9.0	5.0	8.9	16.1	9.0	2.1	1.0
	F	9.0	9.0	5.5	4.4	16.1	9.0	2.1	1.0
SC015-018	H	13.1	9.6	3.9	1.2	23.0	15.0	1.1	1.0
	V	14.0	14.0	3.8	6.6	18.4	18.2	2.3	1.0
	F	14.0	14.0	5.7	3.8	18.9	19.1	2.0	1.0
SC024-030	H	9.6	13.1	3.9	1.2	22.9	16.3	1.1	1.0
	V	14.0	14.0	6.6	3.7	18.4	18.3	2.3	1.0
	F	14.0	14.0	5.7	3.8	18.0	19.1	2.1	1.0
SC036-042	H	10.9	16.1	3.0	2.5	25.9	19.0	1.1	1.0
	V	14.0	14.0	6.6	6.0	22.9	22.2	2.3	1.0
SC048-060	H	13.3	18.1	4.2	1.1	36.9	19.0	1.1	1.0
	V	18.0	16.0	8.5	5.6	26.2	26.3	2.4	1.0

Electrical Knockouts (inches)

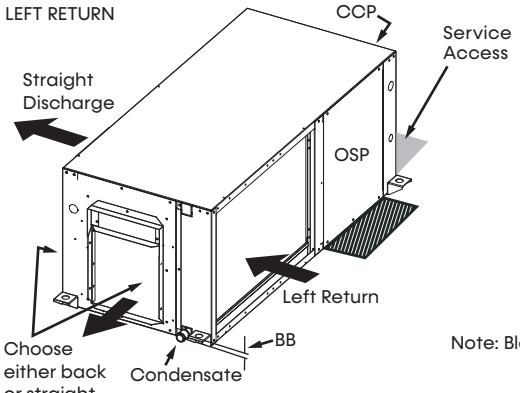
Model	Cabinet Config	H	Low Voltage	High Voltage	G
			J KO 1/2"	K KO 3/4"	
SC006	H	3.6	5.9	8.9	1.1
	V	3.6	5.9	8.1	1.1
SC009-012	H	3.6	5.9	8.9	1.1
	F/V	3.6	5.9	8.1	1.1
SC015-018	H	4.1	7.1	14.1	1.3
	F/V	4.1	7.1	15.1	1.3
SC024-030	H	4.1	7.1	14.1	1.3
	F/V	4.1	7.1	15.1	1.3
SC036-042	H	4.1	7.1	17.1	1.3
	V	4.1	7.1	15.8	1.3
SC048-060	H	4.1	7.1	17.1	1.3
	V	4.1	7.1	16.7	1.3

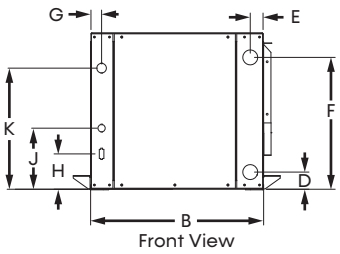
Corner Weights (lb)

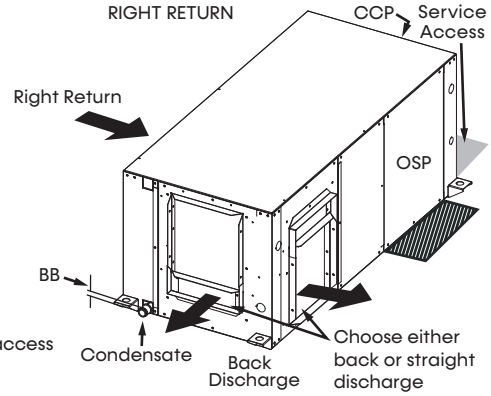
Model	Left - Front	Right - Front	Left - Back	Right/Back
SC006	37.0	24.0	23.0	19.0
SC009	38.0	24.0	23.0	20.0
SC012	42.0	26.0	25.0	21.0
SC015	53.0	36.0	34.0	30.0
SC018	55.0	37.0	35.0	31.0
SC024	62.0	40.0	39.0	33.0
SC030	67.0	41.0	40.0	34.0
SC036	75.0	47.0	44.0	37.0
SC042	81.0	50.0	48.0	39.0
SC048	98.0	60.0	58.0	47.0
SC060	94.0	59.0	56.0	69.0

Corner Weights (kg)

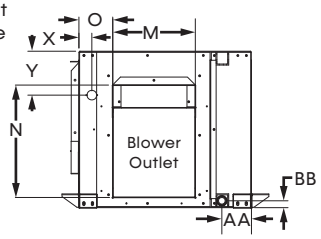
Model	Left - Front	Right - Front	Left - Back	Right/Back
SC006	16.8	10.9	10.4	8.6
SC009	17.2	10.9	10.4	9.1
SC012	19.1	11.8	11.3	9.5
SC015	24.0	16.3	15.4	13.6
SC018	24.9	16.8	15.9	14.1
SC024	28.1	18.1	17.7	15.0
SC030	30.4	18.6	18.1	15.4
SC036	34.0	21.3	20.0	16.8
SC042	36.7	22.7	21.8	17.7
SC048	44.5	27.2	26.3	21.3
SC060	42.6	26.8	25.4	31.3



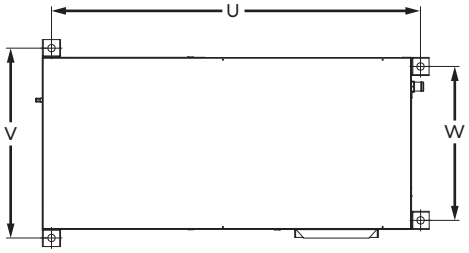


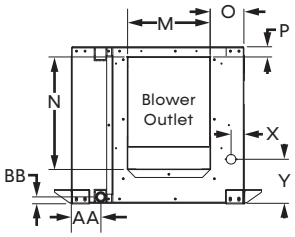


Note: Blower service panel requires 2-foot service access

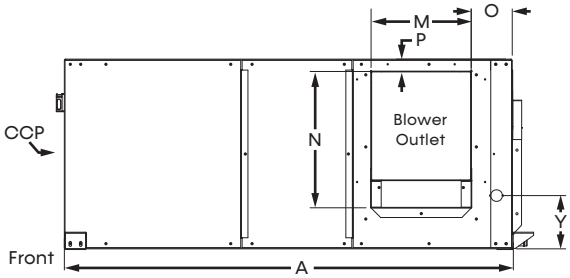


Left Return Back Discharge

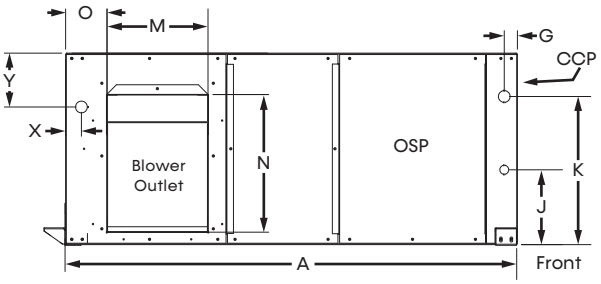




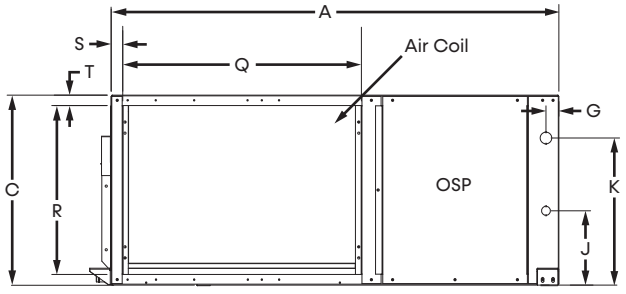
Right Return Back Discharge



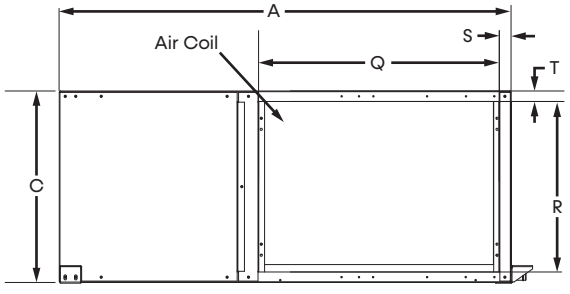
Left Return Straight Discharge



Right Return Straight Discharge



Left Return Left View
Air Coil Opening



Right Return Right View
Air Coil Opening

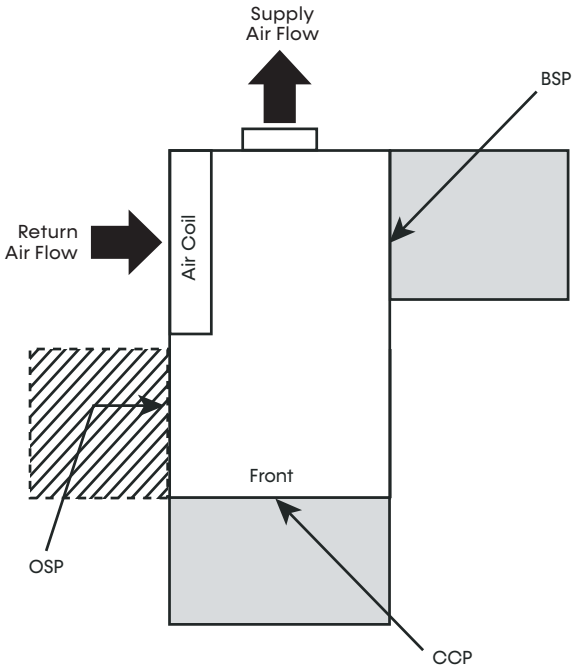
Notes:

1. While clear access to all removable panels is not required, installer should take care to comply with all building codes and allow adequate clearance for future field service.
2. Units come standard with air filter rails. For duct connections, order optional filter frames. See product options decoder for details. You can convert filter rails in the field with an accessory air filter frame kit. Please see the accessory submittal for details.
3. Discharge flange and hanger brackets are factory installed.
4. Condensate is a rubber coupling that couples to 3/4-inch schedule 40/80 PVC.
5. Blower service panel requires 2-foot service access.
6. Blower service access is through back panel on straight discharge units or through panel opposite air coil on back discharge units.
7. OSP are removable panels that provide additional access to the units interior. Clear access to OSP panels is not required and they are not to be used in place of the mandatory CCP and BSP panels.

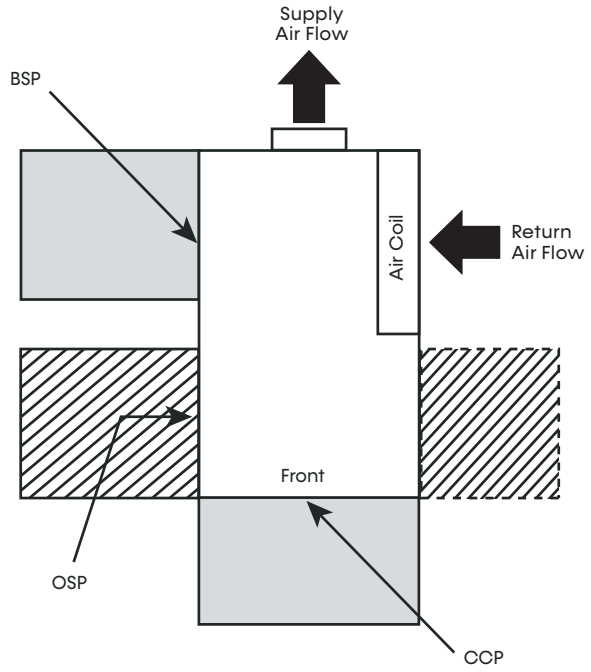
Legend:
CCP = Control/Compressor Access
BSP = Blower Service Panel
OSP = Optional Service Panel (not required)

Horizontal Service Access

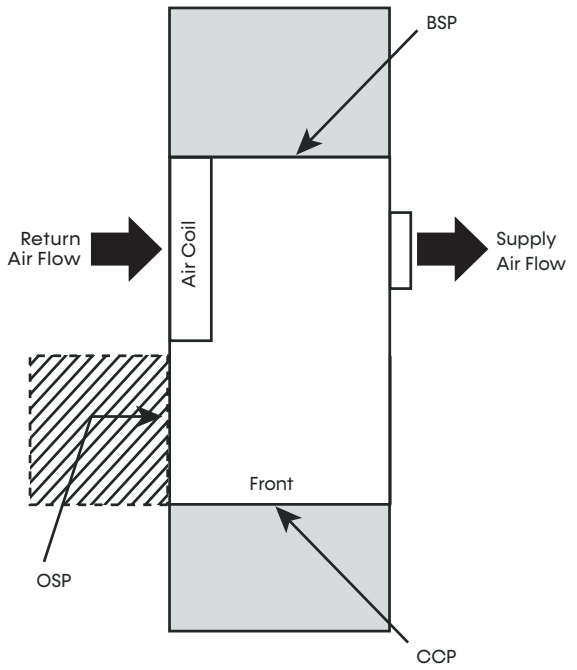
Left Return Back Discharge



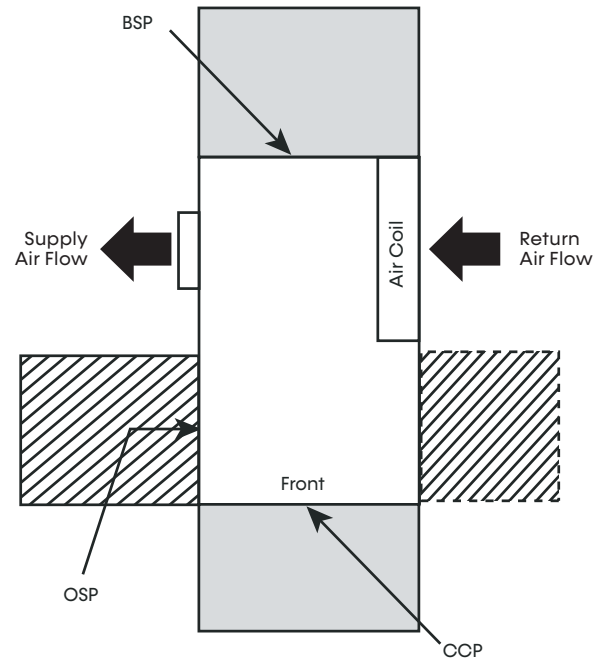
Right Return Back Discharge



Left Return Straight Discharge



Right Return Straight Discharge



= Mandatory Service Access 2-foot (61 cm)

= Optional Service Access 2-foot (61 cm)

Notes:
1. While clear access to all removable panels is not required, installer should take care to comply with all building codes and allow adequate clearance for future field service.
2. CCP and BSP requires 2 feet of service access.
3. Blower service access is through back panel on straight discharge units or through panel opposite air coil on back discharge units.
4. OSP are removable panels that provide additional access to the units interior. Clear access to OSP panels is not required and they are not to be used in place of the mandatory CCP and BSP panels.

Legend:
CCP = Control/Compressor Access
BSP = Blower Service Panel
OSP = Optional Service Panel (not required)

MINIMUM INSTALLATION AREA

Minimum area where a blower-equipped unit must be installed, and mechanical/natural ventilation is not required

Model	Charge (oz)	Configuration	Minimum Installation Area ft² (m²) [A_{min}]			
			Floor	Window	Wall	Ceiling
SC060	69	Vertical	1,496 (456)	130 (40)	75 (23)	62 (19)
		Horizontal	36,370 (11,086)	142 (43)	79 (24)	65 (20)

A_{min} = Minimum area where unit is installed where unit has incorporated airflow

h_{inst} (floor) = 0.0 ft (0.0 m)

h_{inst} (window) = 3.3 ft (1.0 m)

h_{inst} (wall) = 5.9 ft (1.8 m)

h_{inst} (ceiling) = 7.2 ft (2.2 m)

Minimum area and CFM requirements for the conditioned space

Model	Charge (oz)	Minimum CFM [Q_{min}]	
		TA_{min} (ft²)	Q_{min} (ft³/min)
SC060	69	3.50	116.7

TA_{min} = Minimum conditioned area for venting leaked refrigerant

Q_{min} = Minimum ventilation flow rate for conditioned space if space is less than TA_{min}

Minimum area of opening for natural ventilation

Model	Charge (oz)	A_{nv} (in²)
SC060	69	111.57

A_{nv} = Minimum natural ventilation area opening

When the openings for connected rooms or natural ventilation are required, the following conditions shall be applied:

- The area of any openings above 11.8 inches (300 mm) from the floor shall not be considered in determining compliance with Anv_{min}.
- At least 50% of the required opening area Anv_{min} shall be below 7.8 inches (200 mm) from the floor.
- The bottom of the lowest openings shall not be higher than the point of release when the unit is installed and not more than 3.9 inches (100 mm) from the floor.
- Openings are permanent openings which cannot be closed.
- For openings extending to the floor, the height shall not be less than 0.78 inch (20 mm) above the surface of the floor covering.
- A second higher opening shall be provided. The total size of the second opening shall not be less than 50% of minimum opening area for Anv_{min} and shall be at least 3.3 ft (1.5 m) above the floor.

SC Electrical Table							CT EC				CV EC*			
Model	VOLTAGE CODE	VOLTAGE	VOLTAGE MIN/MAX	COMPRESSOR			FAN MOTOR FLA	TOTAL UNIT FLA	MIN CIRCUIT AMP	FUSE/ HACR AMP	FAN MOTOR FLA	TOTAL UNIT FLA	MIN CIRCUIT AMP	FUSE/ HACR AMP
				QTY	RLA	LRA								
SC006	G.J.	208/230-1-60	187/252	1	3.7	17.7	2.3	6.0	6.9	15	1.5	5.2	6.1	15
	E.D.	265-1-60	249/291	1	2.6	10.5	2.3	4.9	5.6	15	1.4	4.0	4.7	15
SC009	G.J.	208/230-1-60	187/252	1	5.0	22.2	2.3	7.3	8.6	15	1.5	6.5	7.8	15
	E.D.	265-1-60	249/291	1	3.6	13.5	2.3	5.9	6.8	15	1.4	5.0	5.9	15
SC012	G.J.	208/230-1-60	187/252	1	5.6	32.5	2.3	7.9	9.3	15	2.6	8.2	9.6	15
	E.D.	265-1-60	249/291	1	4.2	23.0	2.3	6.5	7.6	15	2.5	6.7	7.8	15
SC015	G.J.	208/230-1-60	187/252	1	6.6	31.0	2.6	9.2	10.9	15	2.6	9.2	10.9	15
	E.D.	265-1-60	249/291	1	5.0	27.0	1.9	6.9	8.2	15	2.4	7.4	8.7	15
SC018	G.J.	208/230-1-60	187/252	1	7.0	35.0	2.6	9.6	11.4	15	2.6	9.6	11.4	15
	E.D.	265-1-60	249/291	1	6.5	40.0	1.9	8.4	10.0	15	2.1	8.6	10.2	15
SC024	G.J	208/230-1-60	187/252	1	11.4	64.4	3.9	15.3	18.2	25	4.2	15.6	18.5	25
	E.D.	265-1-60	249/291	1	10.3	60.5	3.7	14.0	16.6	25	3.4	13.7	16.3	25
	H.K.	208/230-3-60	187/252	1	7.7	59.9	3.9	11.6	13.5	20	4.2	11.9	13.8	20
	F.L.	460-3-60*	432/504	1	3.8	32.4	1.2	5.0	6.0	15	3.4	7.2	8.2	15
SC030	G.J	208/230-1-60	187/252	1	12.7	75.6	3.9	16.6	19.8	30	4.2	16.9	20.1	30
	E.D.	265-1-60	249/291	1	11.5	84.0	3.7	15.2	18.1	25	3.4	14.9	17.8	25
	H.K.	208/230-3-60	187/252	1	9.6	67.7	3.9	13.5	15.9	25	4.2	13.8	16.2	25
	F.L.	460-3-60*	432/504	1	4.5	38.1	1.2	5.7	6.8	15	3.4	7.9	9.0	15
SC036	G.J	208/230-1-60	187/252	1	14.4	86.0	6.0	20.4	24.0	30	5.9	20.3	23.9	30
	E.D.	265-1-60	249/291	1	15.4	55.0	5.2	20.6	24.5	35	4.8	20.2	24.1	35
	H.K.	208/230-3-60	187/252	1	9.0	70.0	6.0	15.0	17.3	25	5.9	14.9	17.2	25
	F.L.	460-3-60*	432/504	1	4.1	39.0	1.7	5.8	6.8	15	4.8	8.9	9.9	15
SC042	G.J.	208/230-1-60	187/252	1	17.3	123.0	6.0	23.3	27.6	40	5.9	23.2	27.5	40
	H.K.	208/230-3-60	187/252	1	12.8	102.8	6.0	18.8	22.0	30	5.9	18.7	21.9	30
	F.L.	460-3-60*	432/504	1	5.8	48.5	1.7	7.5	9.0	15	4.8	10.6	12.1	15
SC048	G.J.	208/230-1-60	187/252	1	22.4	126.0	6.0	28.4	34.0	50	5.9	28.3	33.9	50
	H.K.	208/230-3-60	187/252	1	12.8	120.4	6.0	18.8	22.0	30	5.9	18.7	21.9	30
	F.L.	460-3-60*	432/504	1	6.0	49.4	1.7	7.7	9.2	15	4.8	10.8	12.3	15
SC060	G.J.	208/230-1-60	187/252	1	23.7	157.0	7.4	31.1	37.0	60	7.5	31.2	37.1	60
	H.K.	208/230-3-60	187/252	1	16.0	156.4	7.4	23.4	27.4	40	7.5	23.5	27.5	40
	F.L.	460-3-60*	432/504	1	7.1	69.0	2.3	9.4	11.2	15	6.2	13.3	15.1	20

Notes:
- All fuses Class RK-5.

***Neutral connection required! All F and L voltage (460VAC) units with a CV EC motor require a four-wire power supply with neutral. The CV EC motor is rated 265VAC and is wired between one hot leg and neutral.**

SC009: HP-A
SC012: HP-20B
SC015: HP-18A
SC018: HP-7B, HP-9B
SC024: HP-4A
SC030: HP-5A, HP-9A, HP-19A, HP19B, HP10B
SC036: HP-G
SC042: HP-20A, HP5B
SC060: HP-31B

GENERAL

Furnish and install ClimateMaster Tranquility® SC Water Source Heat Pumps, as indicated on the plans. Equipment shall be completely assembled, piped and internally wired. Capacities and characteristics as listed in the schedule and the specifications that follow.

Units shall be supplied completely factory built capable of operating over an entering water temperature range from 20° to 120°F (-6.7° to 48.9°C) as standard. Equivalent units from other manufacturers may be proposed provided approval to bid is given 10 days prior to bid closing. All equipment listed in this section must be rated and certified in accordance with Air-Conditioning, Heating and Refrigeration Institute/International Standards Organization (AHRI/ISO 13256-1). All equipment must be tested, investigated, and determined to comply with the requirements of the standards for Heating and Cooling Equipment UL 60335-2-40 4th Edition, UL 60335-1 6th Edition for the United States and Can/CSA C22.2 No. 60335-2-40:22, CAN/CSA C22.2 No 60335-1:16 for Canada, by Intertek Testing Laboratories (ETL). The units shall have AHRI/ISO and ETL-US-C labels.

All units shall pass a factory acceptance test. The quality control system shall automatically perform the factory acceptance test via computer. A detailed report card from the factory acceptance test shall be shipped with each unit. **Note: If a unit fails the factory acceptance test, it shall not be allowed to ship. Unit serial number will be recorded by factory acceptance test and furnished on report card for ease of unit warranty status.**

BASIC CONSTRUCTION

Horizontal units shall have one of the following air flow arrangements: Left Inlet/Straight (Right) Discharge; Right Inlet/Straight (Left) Discharge; Left Inlet/Back Discharge: or Right Inlet/Back Discharge as shown on the plans. Units must have the ability to be field convertible from straight to back or back to straight discharge with no additional parts or unit structure modification. Horizontal units will have factory installed hanger brackets with rubber isolation grommets packaged separately.

Vertical units shall have one of the following airflow arrangements: Left Return/Top Discharge, Right Return/Top Discharge, and Front Return/Top Discharge, as shown on the plans.

If units with these arrangements are not used, the contractor is responsible for any extra costs incurred by other trades. All units (horizontal and vertical) must have a minimum of two access panels for serviceability of compressor compartment. **Units having only one access panel to compressor/heat exchangers/expansion device/refrigerant piping shall not be acceptable.**

Compressor section interior surfaces shall be lined with ½-inch (12.7 mm) thick, 1-½ lb/ft³ (24 kg/m³) acoustic type glass fiber insulation. Air handling section interior surfaces shall be lined with ½-inch (12.7 mm) thick, 1-½ lb/ft³ (24 kg/m³) **foil-faced**, glass-fiber insulation for ease of cleaning. Insulation placement shall be designed in a manner that will eliminate any exposed edges to prevent the introduction of glass fibers into the air stream. **Units without foil-faced insulation in the air handling section will not be accepted.**

The heat pumps shall be fabricated from heavy gauge galvanized steel.

Standard insulation must meet NFPA Fire Hazard Classification requirements 25/50 per ASTM E84, UL 723, CAN/ULC S102-M88 and NFPA 90A requirements; air erosion and mold growth limits of UL-181; stringent fungal resistance test per ASTM-C1071 and ASTM G21; and shall meet zero level bacteria growth per ASTM G22. **Unit insulation must meet these stringent requirements or unit(s) will not be accepted.**

All horizontal units to have factory installed 1-inch (25.4 mm) discharge air duct collars, 1 inch (25.4 mm) filter rails with 1-inch (25.4 mm) filters factory installed, and factory installed unit-mounting brackets. Vertical units to have field installed discharge air duct collar, shipped loose and 1-inch (25.4 mm) filter rails with 1-inch (25.4 mm) filters factory installed. **If units with these factory installed provisions are not used, the contractor is responsible for any extra costs to field install these provisions, and/or the extra costs for their subcontractor to install these provisions.**

All units must have an insulated panel separating

the fan compartment from the compressor compartment. **Units with the compressor in the air stream are not acceptable.** Units shall have factory installed 1-inch (25.4 mm) wide filter rails for filter removal from either side. Units shall have a 1-inch (25.4 mm) thick throwaway type glass fiber filter. **The contractor shall purchase one spare set of filters and replace factory shipped filters on completion of startup.** Filters shall be standard sizes. **If units utilize non-standard filter sizes, then the contractor shall provide 12 spare filters for each unit.**

Cabinets shall have separate holes and knockouts for entrance of line voltage and low voltage control wiring. All factory-installed wiring passing through factory knockouts and openings shall be protected from sheet metal edges at openings by plastic ferrules. Supply- and return-water connections shall be copper FPT fittings. All water connections and electrical knockouts must be in the compressor compartment corner post as to not interfere with the serviceability of unit. **Contractors shall be responsible for any extra costs involved in the installation of units that do not have this feature.** Contractors must ensure that units can be easily removed for servicing and coordinate locations of electrical conduit and lights with the electrical contractor.

Option: 2-inch (50.8 mm) filter frame with removable access door and 2-inch (50.8 mm) Glass Fiber throwaway filters on all units.

Option: The contractor shall install 1-inch or 2-inch MERV-rated pleated media disposable air filters on all units.

Option: UltraQuiet package shall consist of additional sound insulation applied to the base pan, removable panels, and blower housing.

Option: The unit shall be supplied with extended range insulation option, which adds closed cell insulation to internal water lines, and provides insulation on suction side refrigeration tubing including refrigerant to water heat exchanger.

BLOWER AND MOTOR ASSEMBLY

Blowers shall have inlet rings to allow removal of wheel and motor from one side without removing housing. Units shall have a direct-drive centrifugal fan. The fan motor shall be 3-speed (2-speed for 575V), permanently lubricated, PSC type, with internal thermal overload protection. Units supplied without permanently lubricated motors must provide external oilers for easy service. The fan motor on small and medium size units (006-042) shall be isolated from the fan housing by a torsionally flexible motor mounting system with rubber type grommets to inhibit vibration induced high noise levels associated with "hard wire belly band" motor mounting. The fan motor on larger units (048 and 060) shall be isolated with flexible rubber type isolation grommets only. The fan and motor assembly must be capable of overcoming the external static pressures as shown on the schedule. Airflow/Static pressure rating of the unit shall be based on a wet coil and a clean filter in place. **Ratings based on a dry coil, and/or no air filter shall NOT be acceptable.**

Option: Constant Torque (CT) EC motors (sizes 006 to 060): The CT EC fan motor maximizes efficiency over its static operating range and provides airflow adjustment with 4 or 5 speed taps. The fan motor shall be isolated from the housing by rubber grommets. The motor shall be permanently lubricated and have thermal overload protection.

Option: Constant Volume (CV) EC motors (sizes 006 to 060): CV EC variable speed ball bearing type motor. The CV EC fan motor shall provide a soft low noise fan start by ramping fan up to full selected speed over a 30 second period, and slowly ramp down fan at the end of each blower cycle, maintain constant CFM, maximize motor efficiency over its static operating range, and provide airflow adjustment in multiple CFM increments. The fan motor shall be isolated from the housing by rubber grommets. The motor shall be permanently lubricated and have thermal overload protection.

A special dehumidification mode shall be provided to allow lower airflows in cooling for better dehumidification. The dehumidification mode may be constant or automatic (humidistat controlled). Constant CFM EC motors without controlled ramp up and ramp down features, with constant CFM speed taps, or with no microprocessor controller are not acceptable.

REFRIGERANT CIRCUIT

All units shall contain an R-454B sealed refrigerant circuit including a high efficiency scroll or rotary compressor designed for heat pump operation, a thermostatic expansion valve for refrigerant metering, an enhanced corrugated aluminum lanced fin and rifled copper tube refrigerant to air heat exchanger, reversing valve, coaxial (tube in tube) refrigerant to water heat exchanger, and safety controls including a high-pressure switch, low-pressure (loss-of-charge) switch, water coil low-temperature sensor, and air coil low-temperature sensor. Access fittings shall be factory installed on high- and low-pressure refrigerant lines to facilitate field service. Activation of any safety device shall prevent compressor operation via a microprocessor lockout circuit. The lockout circuit shall be reset at the thermostat or at the contractor-supplied disconnect switch. **Units that cannot be reset at the thermostat shall not be acceptable.**

The compressor shall have a dual level vibration isolation system. The compressor will be mounted on specially engineered sound-tested EPDM vibration isolation grommets or springs to a large heavy gauge compressor mounting plate, which is then isolated from the cabinet base with EPDM grommets for maximized vibration attenuation. Compressors shall have thermal overload protection. Compressors shall be located in an insulated compartment away from air stream to minimize sound transmission.

Refrigerant to air heat exchangers shall utilize enhanced corrugated lanced aluminum fins and rifled copper tube construction rated to withstand 625 PSIG (4309 kPa) working refrigerant pressure. Refrigerant to water heat exchangers shall be of copper inner water tube and steel refrigerant outer tube design, rated to withstand 625 PSIG (4309 kPa) working refrigerant pressure and 500 PSIG (3445 kPa) working water pressure. The refrigerant to water heat exchanger shall be "electro-coated" with a low cure cathodic epoxy material a minimum of 0.4 mils thick (0.4 – 1.5 mils range) on all surfaces. The black colored coating shall provide a minimum of 1000 hours salt spray protection per ASTM B117-97 on all external steel and copper tubing. The material shall be formulated without the inclusion of any heavy metals and shall exhibit a pencil hardness of 2H (ASTM D3363-92A), crosshatch adhesion of 4B-5B (ASTM D3359-95), and impact resistance of 160 in-lbs (184 kg-cm) direct (ASTM D2794-93).

Refrigerant metering shall be accomplished by thermostatic expansion valve only. Expansion valves shall be dual port balanced type with external equalizer for optimum refrigerant metering. Units shall be designed and tested for operating ranges of entering water temperatures from 20° to 120°F (-6.7° to 48.9°C). The reversing valve shall be four-way solenoid activated refrigerant valve, which shall default to heating mode should the solenoid fail to function. If the reversing valve solenoid defaults to cooling mode, an additional low-temperature thermostat must be provided to prevent over-cooling an already cold room.

Units charged with 62 ounces or greater of R-454B shall be supplied with a Refrigerant Detection System (RDS) with sensors to be strategically placed within the cabinet. In the event of a refrigerant leak, the RDS disables compressor operation, and the unit blower runs to disperse any concentration of leaked refrigerant in compliance with UL 60335-2-40 safety standards for flammable refrigerants. **Units charged with 62 ounces or greater of R-454B that do not have an RDS shall not be acceptable.**

Option: **The unit will be supplied with cupro-nickel coaxial water to refrigerant heat exchanger.**

Option: **The refrigerant to air heat exchanger shall be tin-plated.**

Option: **The Refrigerant Detection System (RDS) package shall consist of the RDS module and sensors to be strategically placed within the cabinet. In the event of a refrigerant leak, the RDS triggers an alert through the DDC control system, disables compressor operation, and the unit blower runs to disperse any concentration of leaked refrigerant in compliance with UL 60335-2-40 safety standards for flammable refrigerants (Optional for sizes 006-048).**

DRAIN PAN

The drain pan shall be constructed of a polymer material that inhibits corrosion. Drain outlet shall be connected from pan using provided polymer coupling and clamps that meet UL 2043 as required for discrete products by the IMC and UMC when located in a plenum. If galvanized-steel drain pan is used, it shall be fully insulated on both sides and must meet the stringent 1,000-hour salt spray test per ASTM B117. Drain outlet shall be located at pan as to allow unobstructed drainage of condensate. Drain outlet shall be connected from pan directly to a rubber coupling. **No hidden internal tubing extensions from pan outlet extending to unit casing (that can create drainage problems) will be accepted.** The unit as standard will be supplied with solid-state electronic condensate overflow protection. Mechanical float switches will NOT be accepted.

Option: **The unit shall be supplied with stainless-steel drain pan with ¾-inch MPT plumbing connection. The stainless steel drain pan shall be fully insulated on all sides.**

ELECTRICAL

A control box shall be located within the unit compressor compartment and shall contain a 50VA transformer, 24V activated, two or three-pole compressor contactor, terminal block for thermostat wiring and solid-state controller for complete unit operation. The control box on sizes 006 through 060 shall have a door to protect the internal components. The entire control box shall be capable of rotating out of the unit to allow access to the components behind the control box. Low voltage wires shall enter the box through a hole in the lower left side and high voltage wires shall enter the box through a hole in the upper left side. Reversing valve and blower motor wiring shall be routed through this electronic controller. Units shall be name-plated for use with time delay fuses or HACR circuit breakers. Unit controls shall be 24V and provide heating or cooling as required by the remote thermostat/sensor.

Option: **Disconnect Switch, Non-Fused, classified as motor disconnect.**

ENHANCED SOLID STATE CONTROL SYSTEM (CXM2)

Units shall have a solid-state control system. Units utilizing electro-mechanical control shall not be acceptable. The control system microprocessor board shall be specifically designed to protect against building electrical system noise contamination, EMI, and RFI interference. The control system shall interface with a heat pump type thermostat. The control system shall have the following features:

a. Anti-short cycle time delay on compressor operation.

b. Random start on power-up mode.

c. Low-voltage protection.

d. High-voltage protection.

e. Unit shutdown on high- or low-refrigerant pressures.

f. Unit shutdown on low water temperature.

g. Condensate-overflow electronic protection.

h. Option to reset unit at thermostat or disconnect.

i. Automatic intelligent reset. Unit shall automatically reset the unit 5 minutes after trip if the fault has cleared. If a fault occurs three times sequentially without thermostat meeting temperature, then lockout requiring manual reset will occur.

j. Ability to defeat time delays for servicing.

k. The low-pressure switch shall not be monitored for the first 120 seconds after a compressor start command to prevent nuisance safety trips.

l. 24V output to cycle a motorized water valve or other device with compressor contactor.

m. Unit Performance Sentinel (UPS). The UPS warns when the heat pump is running inefficiently.

n. Water coil low-temperature sensing (selectable for water or anti-freeze).

o. Air coil low-temperature sensing.

p. Minimized reversing-valve operation (Unit control logic shall only switch the reversing valve when cooling is demanded for the first time. The reversing valve shall be held in this position until the first call for heating, ensuring quiet operation and increased valve life.

q. Emergency-shutdown contacts.

r. Entering- and leaving-water temperature sensing.

s. Leaving-air temperature sensing.

t. Compressor-discharge temperature sensing.

NOTE: Units not providing the eight safety protections of anti-short cycle, low voltage, high voltage, high refrigerant pressure, low pressure (loss of charge), air coil low temperature cut-out, water coil low temperature cut-out, and condensate overflow protections will not be accepted.

When CXM2 is connected to AWC99U01 thermostat or handheld service tool, the installer/service technician can; check DIP switch S2 settings; run operation modes manually; check all physical inputs from switches st switch, and the followi (LT2), comp water, ente last five fa When the AWC99U01 communicating thermostat is used this same functionality can be viewed and adjusted remotely in the web portal or mobile app. Systems not providing remote access, diagnosis, and adjustment functionality will not be accepted.

Heramb -
Understand the use/benefit of each of the feature.

Which of this Alterton will be doing as well. Does this introduce SOO/priority conflict?

Which feature is actually needed?

Option: Enhanced Solid State Control System (DXM2.5)

This control system is a communicating controller.

Control shall have the features of the CXM2 control system along with the following expanded features:

a. Removable thermostat connector.

b. Night setback control.

c. Random start on return from night setback.

d. Override temperature control with 2-hour timer for room occupant to override setback temperature at the thermostat.

e. Dry contact night setback output for digital night setback thermostats.

f. Ability to work with heat pump or heat/cool (Y, W) type thermostats.

g. Ability to work with heat pump thermostats using O or B reversing valve control.

h. Boilerless system heat control at low loop water temperature.

i. Ability to allow up to three units to be controlled by one thermostat.

j. Relay to operate an external damper.

k. Relay to start system pump.

l. 75VA control transformer. Control transformer shall have load side short circuit and overload protection via a built-in circuit breaker.

NOTE: Units not providing the eight safety protections of anti-short cycle, low voltage, high voltage, high refrigerant pressure, low pressure (loss of charge), air coil low temperature cut-out, water coil low temperature cut-out, and condensate overflow protection for both drain pans will not be accepted.

When DXM2.5 is connected to AWC99U01 communicating thermostat or handheld service tool, the installer/service technician can; check and set CFM; check DIP switch S1, S2, and S3 settings; run operation modes manually; check all physical inputs from thermostat and refrigerant pressure switches status, (Y1, Y2, W, O, G, H, ESD, NSB, OR, HP switch, and LOC switch); current or at time of fault the following temperatures - water coil (LT1), air coil (LT2), compressor discharge, leaving air, leaving water, entering water and control voltage; record last five faults, list possible reasons, and clear faults. When the AWC99U01 communicating thermostat is used this same functionality can be viewed and adjusted remotely with the only portal or mobile app. **Systems not providing remote access, diagnosis, and adjustment functionality will not be accepted.**

DIGITAL NIGHT SETBACK WITH PUMP RESTART (DXM2.5 W/ ATP32U03C/04C, AWC99U01)

The unit will be provided with a Digital Night Setback feature using an accessory relay on the DXM2.5 controller with an ATP32U03C/04C or AWC99U01 thermostat and an external, field-provided time clock. The external time clock will initiate and terminate the night setback period. The thermostat will have a night setback override feature with a programmable override time period. An additional accessory relay on the unit DXM2.5 controller will energize the building loop pump control for the duration of the override period. **Note: This feature requires additional low voltage wiring. Consult Application Drawings for details.**

REMOTE SERVICE SENTINEL (CXM2/DXM2.5)

The solid-state control system shall communicate with applicable thermostats to display (at the thermostat) the unit status, fault status, and specific fault condition, as well as retrieve previously stored fault that caused unit shutdown. The Remote Service Sentinel allows building maintenance personnel or service personnel to diagnose unit from the wall thermostat. The control board shall provide a signal to the thermostat, indicating a lockout. A detailed message shall be provided at the communicating thermostat or service tool and specific fault status such as over/under voltage fault, high pressure fault, low pressure fault, low water temperature fault, condensate overflow fault, etc. **Units that do not provide this remote service sentinel shall not be acceptable.**

Option: MPC (Multiple Protocol Control) Interface System

Units shall have all the features listed above (either CXM2 or DXM2.5) and the control board will be supplied with a Multiple Protocol interface board. Available protocols are BACnet MS/TP, Modbus, or Johnson Controls N2. The choice of protocol shall be field selectable/changeable via the use of a simple selector switch. **Protocol selection shall not require any additional programming or special external hardware or software tools.** This will permit all units to be daisy chain connected by a two-wire twisted pair shielded cable. The following points must be available at a central or remote computer location:

a. Space temperature.

b. Leaving-water temperature.

c. Discharge-air temperature.

d. Command-of-space temperature setpoint.

e. Cooling status.

f. Heating status.

g. Low-temperature sensor alarm.

h. Low-pressure sensor alarm.

i. High-pressure switch alarm.

j. Condensate-overflow alarm.

k. High-/low-voltage alarm.

l. Fan "ON/AUTO" position of space thermostat as specified above.

m. Unoccupied / occupied command.

n. Cooling command.

o. Heating command.

p. Fan "ON/AUTO" command.

q. Fault-reset command.

r. Itemized fault code revealing reason for specific shutdown fault (any one of seven).

This option also provides the upgraded 75VA control transformer with load side short circuit and overload protection via a built-in circuit breaker.

WARRANTY

ClimateMaster shall warranty equipment for a period of 12 months from startup or 18 months from shipping (whichever occurs first).

Option: Extended 4-year compressor warranty covers compressor for a total of 5 years.

Option: Extended 4-year refrigeration circuit warranty covers coils, reversing valve, expansion valve and compressor for a total of 5 years.

Option: Extended 4-year control board warranty covers the CXM2/DXM2.5 control board for a total of 5 years.

FIELD-INSTALLED OPTIONS

Hose Kits

All units shall be connected with hoses. The hoses shall be braided stainless steel; fire-rated hoses complete with adapters. Only fire rated hoses will be accepted.

Valves

The following valves are available and will be shipped loose:

a. Ball valve; bronze material, standard port full flow design, FPT connections.

b. Ball valve with memory stop and PT port.

c. "Y" strainer with blowdown valve; bronze material, FPT connections.

d. Motorized water valve; slow acting, 24V, FPT connections.

Hose Kit Assemblies

The following assemblies ship with the valves already assembled to the hose described:

a. Supply and return hoses having ball valve with PT port.

b. Supply hose having ball valve with PT port; return hose having automatic flow regulator valve with PT ports, and ball valve.

c. Supply hose having "Y" strainer with blowdown valve, and ball valve with PT port; return hose having automatic flow regulator with PT ports, and ball valve.

d. Supply hose having "Y" strainer with blowdown valve, and ball valve with PT port; return hose having ball valve with PT port.

VCMA-20 SERIES

APPLICATIONS

- Designed for automatic collection and removal of condensate from air conditioning, refrigeration and dehumidification equipment when gravity drainage is not possible or practical. Also, suitable for high efficiency oil and gas-fired condensing furnace and condensing boiler equipment.

FEATURES

- 1/2-gallon collection tank
- Vertical centrifugal pump design
- Stainless steel motor shaft
- Automatic start and stop operation
- Some models equipped with float (solid polymer) activated switch for automatic high-level water detection (overflow detection switch)
- For models with overflow detection switch: dual function NO and NC operation (set to NO from factory for equipment shut down connection)
- Models equipped with overflow detection switch include two 5" switch lead wires
- 3/8" O.D. barbed discharge adapter with built-in check valve
- Three 1-1/8" diameter inlet openings (two fitted with removable cap plug)
- Thermally protected, fan cooled motor
- Built-in wall mount tabs on tank
- Removable pump float locking tab for safety during transportation (remove at time of installation)
- Maximum water temperature: 140 °F
- 6 ft, 3-conductor cable with grounded 3-prong plug
- Some models include 20' x 3/8" I.D. vinyl discharge tubing

SERIES SPECIFICATIONS

Item No.	Model	HP	Volts	Hz	Amps	Watts	Discharge	Gallons per hour (Liters per hour) @ Height				Shut-Off	PSI	Cord	Weight lbs (kg)
								1'	5'	10'	20'				
554421	VCMA-20UL	1/30	115	60	1.5	93	3/8" (9.5mm) OD Barbed	80 (303.2)	70 (265.3)	48 (181.9)	0 (0)	20' (6.1 m)	8.7	6' (1.8 m)	5 (2.3 Kg)
554451	VCMA-20UL	1/30	230	50/60	0.5	75	3/8" (9.5mm) OD Barbed	80 (303.2)	70 (265.3)	48 (181.9)	0 (0)	17' (5.2 m)	7.4	6' (1.8 m)	5 (2.3 Kg)
554431	VCMA-20ULT	1/30	115	60	1.5	93	3/8" (9.5mm) OD Barbed	80 (303.2)	70 (265.3)	48 (181.9)	0 (0)	20' (6.1 m)	8.7	6' (1.8 m)	6 (2.7 Kg)
554425	VCMA-20ULS	1/30	115	60	1.5	93	3/8" (9.5mm) OD Barbed	80 (303.2)	70 (265.3)	48 (181.9)	0 (0)	20' (6.1 m)	8.7	6' (1.8 m)	5 (2.3 Kg)
554455	VCMA-20ULS	1/30	230	50/60	0.5	75	3/8" (9.5mm) OD Barbed	80 (303.2)	70 (265.3)	48 (181.9)	0 (0)	17' (5.2 m)	7.4	6' (1.8 m)	5 (2.3 Kg)
554435	VCMA-20ULST	1/30	115	60	1.5	93	3/8" (9.5mm) OD Barbed	80 (303.2)	70 (265.3)	48 (181.9)	0 (0)	20' (6.1 m)	8.7	6' (1.8 m)	6.3 (2.9 Kg)
554461	VCMA-20ULST	1/30	230	60	0.5	75	3/8" (9.5mm) OD Barbed	80 (303.2)	70 (265.3)	48 (181.9)	0 (0)	17' (5.2 m)	7.4	6' (1.8 m)	6.3 (2.9 Kg)

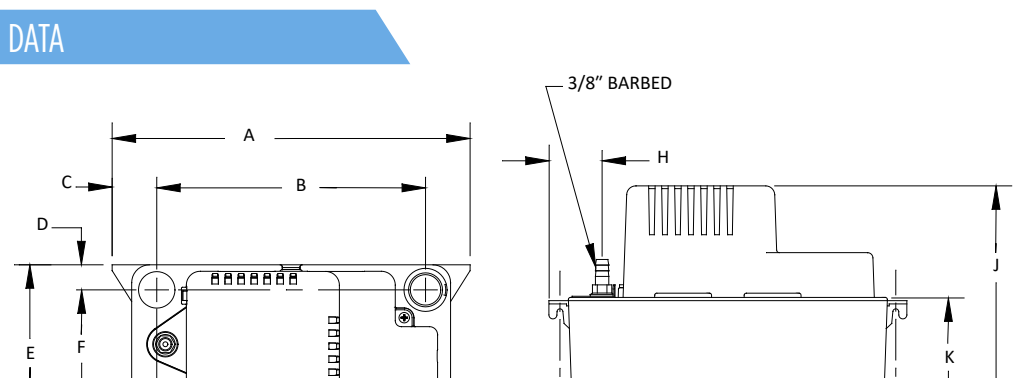
Note: GPH is through check valve.

VCMA-20 SERIES

REPLACEMENT PARTS & KITS

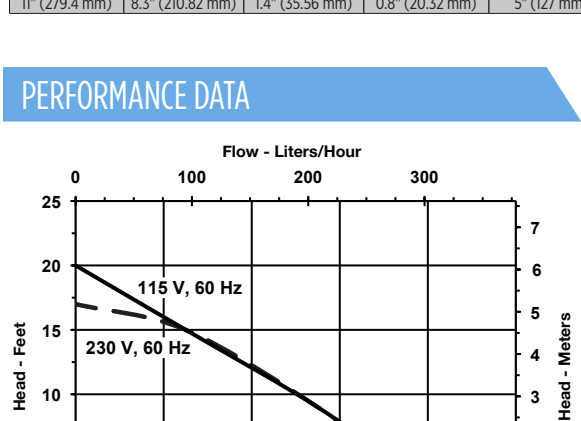
Item	Part Number
Tank	154401
Cover, Motor	154421
Float Arm	154452
Switch Holder	154471
Switch	950337

ENGINEERING DATA



A	B	C	D	E	F	G	H	J	K	L
11" (279.4 mm)	8.3" (210.82 mm)	1.4" (35.56 mm)	0.8" (20.32 mm)	5" (127 mm)	3.5" (88.9 mm)	9.8" (248.92 mm)	1.6" (400.64 mm)	7" (177.8 mm)	3.6" (91.4 mm)	10.3" (261.6 mm)

PERFORMANCE DATA



CONSTRUCTION

Motor	1/30 hp
Discharge	3/8" OD barbed
Housing/Tank Cover	ABS
Volute	ABS
Tank	ABS
Impeller	Glass filled polypropylene
Check Valve	Acetal

ACDU03 Communicating Service Tool

Operation Manual
97B0106N01
Rev.: 11/3/17

Caution:
These instructions are intended to be used by the installer or service personnel. End users are NOT advised to change or modify any of these settings. Doing so may cause the equipment to stop working properly and/or may void the warranty on both the thermostat and the equipment.

Table of Contents

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1.0 Connection

ClimateMaster's Communicating Service Tool (ACDU03) allows install and service technicians to configure and diagnose ClimateMaster Digital Communicating Units without installing a digital communicating thermostat.

Using the Service Tool, a technician can ELECTRONICALLY:

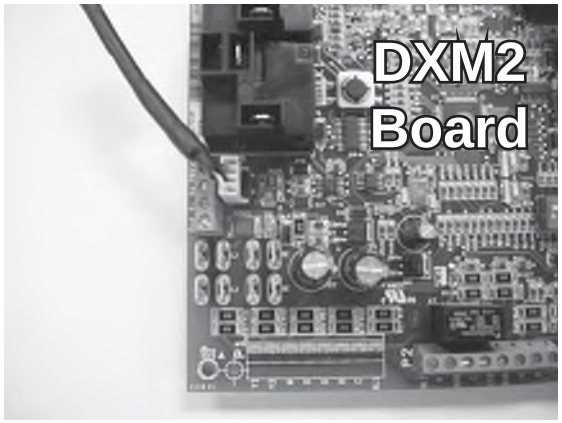
1. Configure items like: airflow, heat pump options and configuration, pump or modulating valve operation, unit family, unit size, etc.

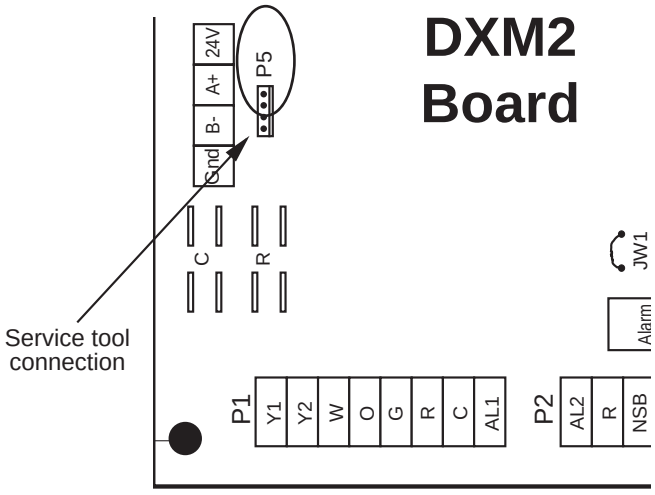
   AND

2. Diagnose the unit by operating it manually, performing control diagnostics, viewing dip switch configurations, or by viewing fault history and operating conditions when a fault occurred.

The Service Tool connects to the DXM2 board with a 4-Wire Connector as shown below:

Note: For Vertical Stack models (TSM, TSL) must order harness for connection to service port outside chassis. Harness part number 11B0100N27. DXM2 to service port is factory wired.





⚠ WARNING! ⚠

WARNING! Connecting wire harness while unit is powered on or connecting backward may damage service tool.

2.0 Menu Structure

Menu Structure

- System Configuration
  - Airflow Selection
  - Option Selection
  - Unit Configuration
  - Pump Configuration
  - Valve Configuration
- Service Mode
  - Manual Operation
  - Control Diagnostics
  - Dipswitch Configuration
  - Fault History
  - Clear Fault History

3.0 System Configuration

Use the System Configuration option on the start-up screen to adjust critical equipment settings.

The System Configuration information will be automatically obtained from each communicating control in the system.

Note 1: The Airflow Selection menu (section 3.1) will not be present if the connected communicating control system has no blower.

Note 2: The Pump Configuration menu (section 3.4) will not be present if the connected communicating control is configured for No Loop Configuration (OTHER).

Note 3: The Valve Configuration menu (section 3.5) will not be present if the connected communicating control is configured for No Loop Configuration (OTHER).

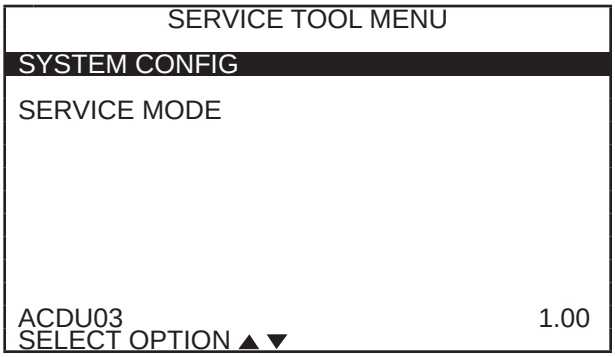
3.1 AIRFLOW SELECTION

Adjust the airflow settings for each system operating mode using the up/down arrow buttons. Press the center button to select each item.

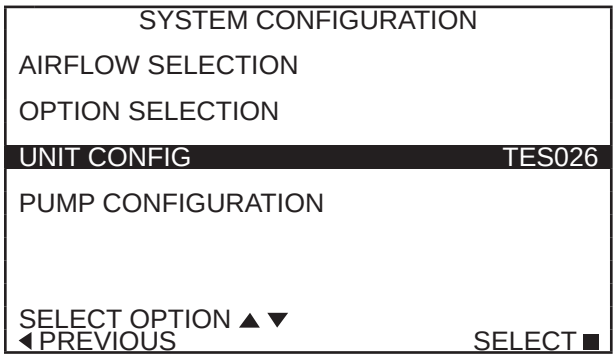
- Airflow Settings (defaults stored in control) - valid range: obtained from control (in 25 CFM increments)
- Blower Off Delay (default 60 seconds) – valid range: 0 to 255 seconds (in 5 second increments)

NOTE 1: The Airflow Settings will only be present if the connected communicating control is configured for ECM blower.

NOTE 2: If multiple units are connected to one thermostat, refer to section 3.6 for unit selection.



Start-up Screen



System Configuration Menu

3.2 OPTION SELECTION

This option allows the configuration of heat pump options to be modified.

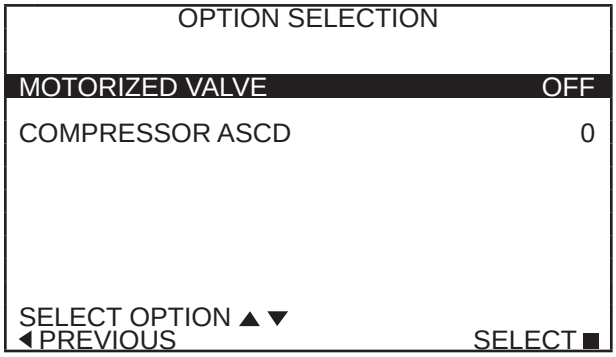
Adjust the Option settings using the up/down arrow buttons. Press the center button to select each item.

- Motorized Valve (defaults stored in control) – valid range: Off, On "On" delays compressor start until the valve is fully open.
- Compressor ASCD (Anti-Short Cycle Delay (default stored in control) – valid range: 5 to 8 (in 1 minute increments)

NOTE 1: The Compressor Anti-Short Cycle Delay setting provides equipment protection by forcing the compressor to wait a few minutes before restarting.

NOTE 2: If multiple units are connected to one thermostat, refer to section 3.6 for unit selection.

NOTE: "Motorized Valve" used here refers to a two-position motorized water valve, not to be confused with the modulating motorized water valve found in the LOOP CONFIG.



Option Selection Menu

3.3 UNIT CONFIGURATION

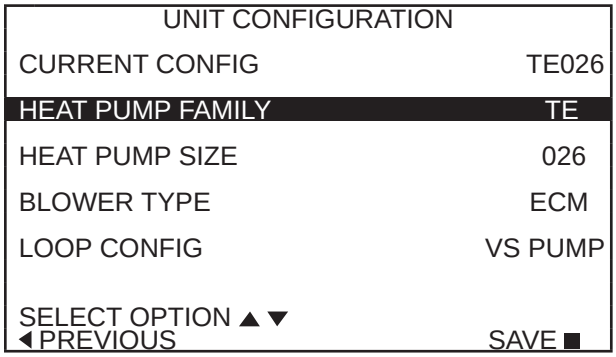
Adjust the Unit Configuration settings including Heat Pump Family, Heat Pump Size, Blower Type, and Loop Configuration using the up/down arrow buttons. Press the center button to select each item.

- Heat Pump Family (default stored in control) – valid range: TE, TY, TES, TEP, TRT, TSM, TSL
- Heat Pump Size (default stored in control) – valid range: depends on Heat Pump Family setting
- Blower Type (default stored in control) – valid range: NO BLOWER, 2-SPD PSC, COM ECM-V, 1-SPD PSC, 2-SPD CTM, PWM ECM, VFD
- Loop Config (default stored in control) – valid range: Other, VS PUMP, MOD VALVE

Airflow, pump and valves can be configured from 'System Configuration' screen.

Select 'VS PUMP PARALLEL' when applying an internal variable speed flow controller with other flow controllers on a single loop in parallel.

NOTE: Refer to section 3.6.3 for multi-unit configuration instructions.



Unit Configuration Menu

3.4 PUMP CONFIGURATION

vFlow™ vs internal flow control pump can be controlled either through temperature differential (Delta T) or can be set to specific speed (fixed; % of full speed for each heat and cool stage).

Can be configured for either single pumping or parallel pumping.

Configure temperature differentials at the thermostat for vFlow™ units with an internal flow control pump.

Adjust the Pump Configuration settings using the up/down arrow buttons. Press the center button to select each item.

- Heating Delta T (default stored in control) – valid range: 4 to 12ºF (in 1ºF increments)
- Cooling Delta T (default stored in control) – valid range: 9 to 20ºF (in 1ºF increments)

Maximum Heat LWT (valid range based on specific model; refer to model IOM). Minimum Cool LWT (valid range based on specific model; refer to model IOM).

NOTE: Refer to section 3.6.3 for multi-unit configuration instructions.

To control vs pump by fixed speed, select 'Pump Control', press ■, use down arrow to select 'Fixed', and press ■ to save.

Default stored in control. Valid range: 15% - 90% (in 1% increments)

Heating Stage 1	Cooling Stage 1
Heating Stage 2	Cooling Stage 2

If Pump Configuration is set to 'VS PUMP PARALLEL', valid range changes to 50-90% (in 1% increments).

VARIABLE SPD INTERNAL PUMP CONFIGURATION

LOOP OPTION	PARALLEL
PUMP CONTROL	DELTA T
HEATING DELTA T	7 F
COOLING DELTA T	10 F
MAXIMUM HEAT LWT	80 F
MINIMUM COOL LWT	40 F
◄ PREVIOUS	SELECT ■

VARIABLE SPD INTERNAL PUMP CONFIGURATION

LOOP OPTION	SINGLE
PUMP CONTROL	FIXED
HEATING STAGE 1	60%
COOLING STAGE 2	75%
COOLING STAGE 1	50%
COOLING STAGE 2	70%
◄ PREVIOUS	SELECT ■

3.5 VALVE CONFIGURATION

Configure temperature differentials at the thermostat for vFlow™ units with a motorized modulating valve.

Adjust the Valve Configuration settings using the up/down arrow buttons. Press the center button to select each item.

- Heating Delta T (default stored in control) – valid range: 4 to 12ºF (in 1ºF increments)
- Cooling Delta T (default stored in control) – valid range: 9 to 20ºF (in 1ºF increments)

NOTE 1: Minimum and Maximum degree values are shown only when the control is configured with the appropriate values.

NOTE 2: Refer to section 3.6.3 for multi-unit configuration instructions.

MODULATING VALVE CONFIGURATION

OFF POSITION	0.0
VALVE CONTROL DELTA T	
HEATING DELTA T	7 F
COOLING DELTA T	10 F
MAXIMUM HEAT LWT	80 F
MINIMUM COOL LWT	40 F
◄ PREVIOUS	SELECT ■

3.5.1 MODULATING VALVE OFF POSITION

For certain commercial multi-unit applications, the modulating valve can be kept slightly open by choosing values 3.3-4.0.

3.6 MULTI-UNIT CONFIGURATION

If multiple units are connected to one ATC thermostat upon unit start-up, the thermostat will automatically register the serial numbers of all units connected to it.

NOTE: Multiple units may be connected directly to the ATC thermostat or connected to one another in series, as shown by the figure below.

Or

3.6.1 MULTI-UNIT AIRFLOW SELECTION

In section 3.1, when an installer selects “Airflow Selection” from the System Configuration menu, the installer may choose the unit to configure by the last 4 digits of its serial number from the following screen.

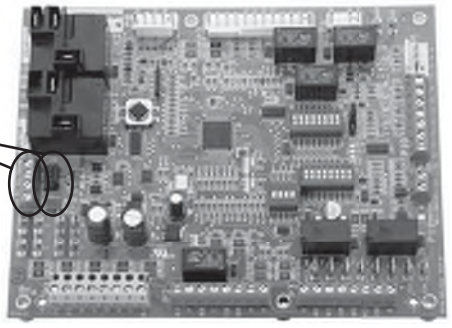
3.6.2 MULTI-UNIT OPTION SELECTION

In section 3.2, when an installer selects “Option Selection” from the System Configuration menu, the installer may choose the unit to configure by the last 4 digits of its serial number from the following screen.

3.6.3 Multi-Unit, Unit, Pump, & Valve Configuration

To configure Unit, Pump, and Valve options in sections 3.3-3.5, the thermostat must be connected to only one unit at a time.

Two connections on DXM2 board to allow for multi-unit installation



AIRFLOW SELECTION

TT026	S N - - - - - 1 2 3 4
TT026	S N - - - - - 5 6 7 8
TT038	S N - - - - - 9 0 1 2

◄ PREVIOUS SELECT ■

OPTION SELECTION

TT026	S N - - - - - 1 2 3 4
TT026	S N - - - - - 5 6 7 8
TT038	S N - - - - - 9 0 1 2

◄ PREVIOUS SELECT ■

4.0 Service Mode

4.1 MANUAL OPERATION

Manual Operation mode allows service personnel to manually command operation for any of the thermostat outputs, blower speed, as well as pump speed or valve position to help troubleshoot specific components.

NOTE 1: The ECM Airflow adjustment will not be present if the connected communicating control (DXM2) is not configured for ECM (section 3.1).

NOTE 2: The Pump Speed adjustment will not be present if the connected communicating control (DXM2) is not configured for Pump (section 3.4).

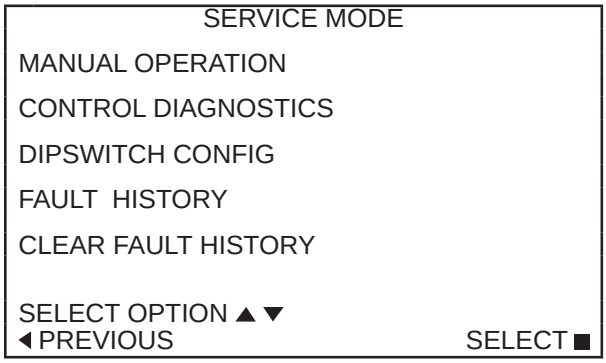
NOTE 3: The Valve Position adjustment will not be present if the connected communicating control (DXM2) is configured for Valve (section 3.5).

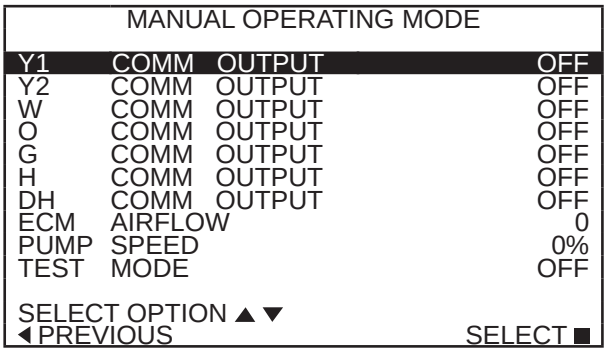
4.2 CONTROL DIAGNOSTICS

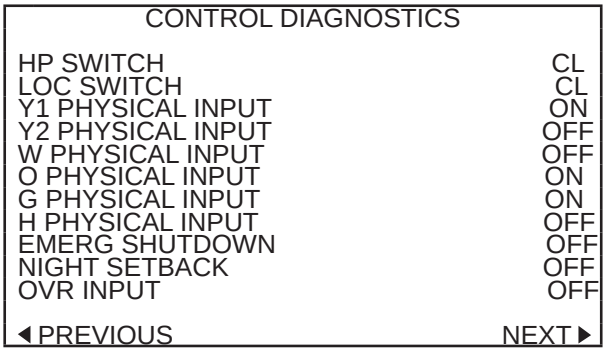
Control Diagnostics mode allows service personnel to view the status of all physical inputs, switches and temperature sensor readings, as well as the operational status of the heat pump at the thermostat.

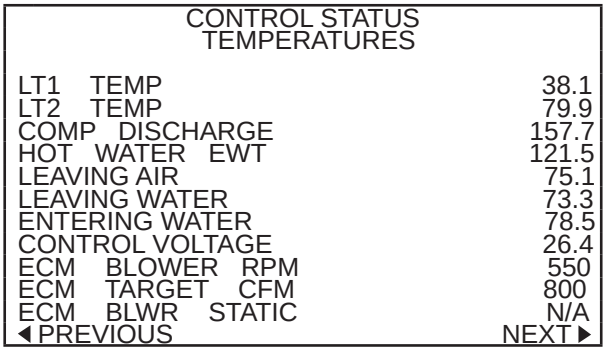
Navigate between diagnostic screens using the left/right arrow buttons.

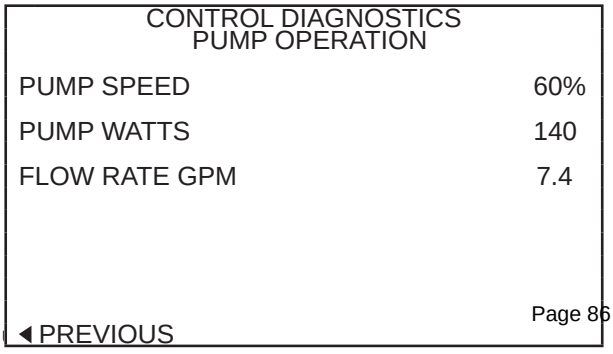
NOTE: The Pump Status will not be present if the connected communicating control (DXM2) is not configured for Pump (section 3.4).









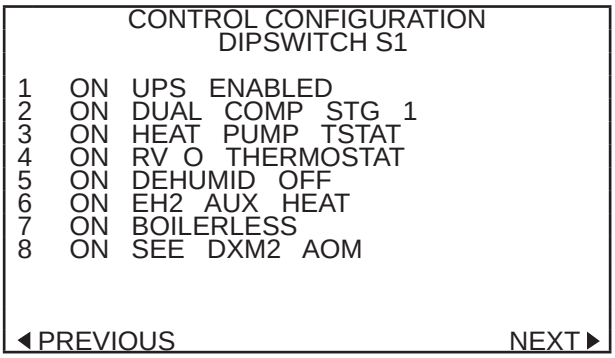


4.3 DIPSWITCH CONFIGURATION

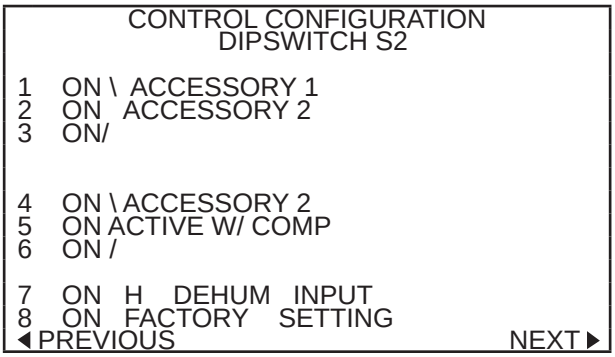
Dipswitch Configuration mode allows the service personnel to view the status of all dipswitch settings for the connected communicating control (DXM2/AXM) at the thermostat.

Navigate between configuration screens using the left/right arrow buttons.

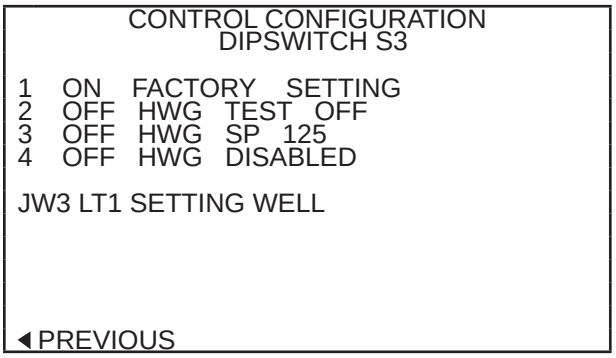
NOTE: The unit control dipswitch settings cannot be changed from the thermostat or configuration/diagnostics tool.



S1 Dipswitch Status



S2 Dipswitch Status

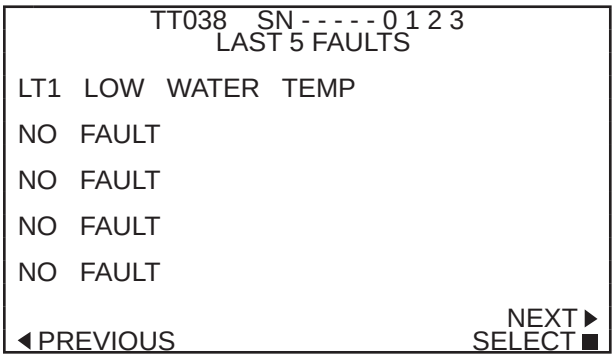


S3 Dipswitch Status

4.4 FAULT HISTORY

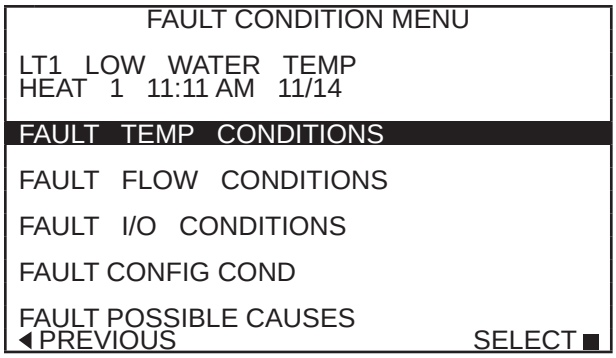
Fault History mode displays the five most recent stored fault codes for the connected communicating control (DXM2).

Navigate between control fault codes using the up/down arrow buttons. Press the center button to view more information about the highlighted fault code.



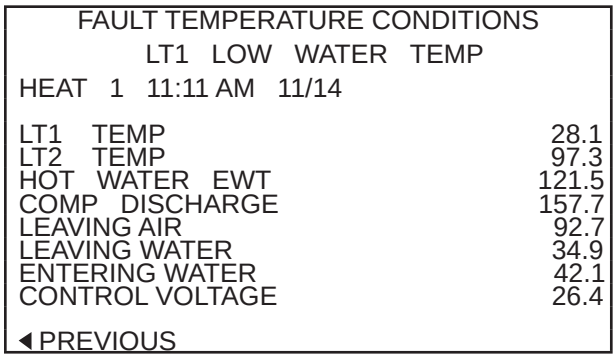
Fault History

4.4.0 Fault Conditions Menu



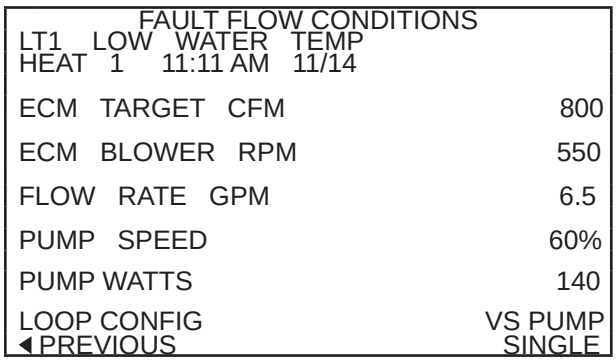
4.4.1 Temperature Conditions

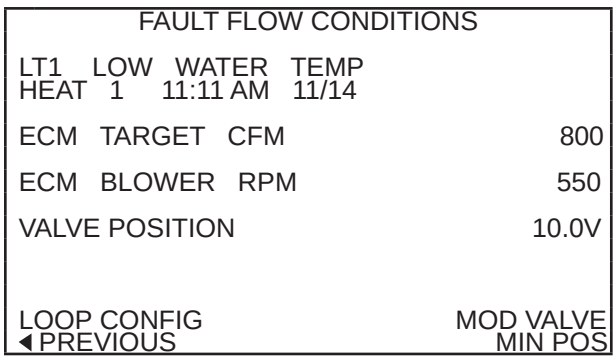
Displays detailed temperature readings that were recorded at the time the fault occurred



4.4.2 Flow Conditions

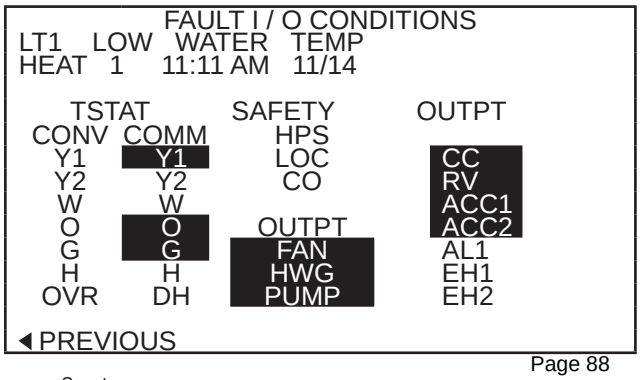
Displays detailed blower and pump speed / valve position readings that were recorded at the time the fault occurred.





4.4.3 Input/Output Conditions

Displays the status of all physical and communicated inputs, switches, and control outputs that were recorded at the time the fault occurred.



4.4.3 Configuration Conditions

Displays the status of all dipswitch settings that were recorded at the time the fault occurred.

```
FAULT CONFG CONDITIONS

LT1 LOW WATER TEMP
HEAT 1 11:11 AM 11/14

     S1      S2      S3
1    ON   1  ON   1  ON
2    ON   2  ON   2  OFF
3    ON   3  ON   3  OFF
4    ON   4  ON   4  OFF
5    ON   5  ON
6    ON   6  ON   LT1  WELL
7    ON   7  ON   LT2  WELL
8    ON   8  ON
◄PREVIOUS
```

4.4.4 Possible Causes

Displays possible causes as to why the fault occurred

```
POSSIBLE FAULT CAUSES
LOW WATER COIL TEMP

LOW WATER TEMP - HTG
LOW WATER FLOW - HTG
LOW REFRIG CHARGE - HTG
INCORRECT LT1 SETTING
BAD LT1 THERMISTOR
◄PREVIOUS
```

4.5 CLEAR FAULT HISTORY

Clear Fault History will clear all fault codes stored in the thermostat as well as the fault history in any connected communicating controls (DXM2/AXM).

5.0 Revision History

Date	Page #	Description
23 Jan. 19	3,4	Update harness and service tool part number
3 Nov., 17	All	Updated tstat Part number to ATC32U03
16 October, 2017	5	Update blower types
25 Jan., 2016	12	Updated Certification Logos
17 Apr., 14	3,5	Text Updated
11 Feb., 14	All	ACDU01 Updated to ACDU02
23 Oct. 12	4-7	Unit Config, Pump Config and Valve Config Sections Updated
8 May, 12	All	First Published

National Rural Electric Cooperative Association
ASSOCIATE MEMBER

IGSHPA GEO ENERGY STAR AHRI CERTIFIED Intertek

CLIMATEMASTER
Geothermal Heating & Cooling

7300 S.W. 44th Street
Oklahoma City, OK 73179
Phone: 405-745-6000
Fax: 405-745-6058
climatemaster.com

97B0106N01

Detailed Scope of Work

FIM ID # 31871
04.01-PSB Upgrade HVAC Controls
Redmond Public Safety Building

GENERAL

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; sample zone CO2 sensor based ventilation control at the AHU.

SCOPE OF WORK INCLUDES

1. Mechanical
   A. None
2. General
   A. Coordinate early during design with owner and controls contractor to establish equipment name tag nomenclature and identifiers in the controls system.
3. Equipment included in this FIM Scope
   1) Legacy R2 Niagara
      (i) (25) WSHP
      (ii) (3) Exhaust Fans
      (iii) (2) Boilers
      (iv) (1) Cooling Tower
      (v) (6) Sump Pumps
      (vi) (2) Server Room Systems
   2) Newer Niagara – Refer
      (i) (15) WSHP
      (ii) (1) Exhaust Fans
   3) Existing Alerton – Refer
      (i) (12) WSHP
      (ii) (1) Condenser Water Pump
   4) Existing Standalone – PD Evidence Addition
      (i) (2) Packaged RTU
      (ii) ()Exhaust Fans
      (iii) () Unit Heaters
   5) Equipment in Other FIMs – Controls scope and budget included in the respective FIMs
      (i) FIM 53394 : (13) Existing WSHP, (1) New WSHP
      (ii) FIM 31865: (1) Main AHU, (1) General Exhaust
      (iii) FIM 53395: (1) Condenser Pump
      (iv) FIM 53391 : (1) Split System for Investigations Server Room
4. General
   A. Furnish and install new BACNet digital controls for the existing mechanical equipment. Controls contractor to field verify equipment type and count.
      1) Replace all damper and valve actuators, sensors.
      2) Reuse existing control cabinets, conduits where possible. Furnish and install conduit or plenum rated wiring where necessary as per local codes. Include required cabinets, conduits and other fittings as necessary.
      3) Include programming for above new controls to maintain similar operation. Include current control strategies and code required sequences. Implement occupancy schedule and temperature set points.
      4) Apply new Equipment name tags. To be coordinated with Owner, Mechanical and Electrical during Final Design.
      5) Include hours for setting trends for specified points. Include hours to support commissioning of the system.
      6) Provide training for system users.
   B. IAQ monitoring
      1) Furnish and install separate wall mount CO2 sensor to monitor IAQ in below spaces. Perform programing to

modulate Main AHU supply airflow based CO2 value.
(i) Investigations,
(ii) 911 Dispatch,
(iii) 1st Floor Admin,
(iv) 1st Floor Briefing Room.

2) Furnish and install return duct mount CO2 sensors for below spaces. Perform DCV programming based CO2 value.
(i) Existing HP-32B and HP-33B

3) Furnish and install combination temperature and relative humidity wall mount stat in below spaces. Perform programing to modulate provide alarms based on Owner provided temperature and relative humidity set points.
(i) 911 Server Room,
(ii) City Server Room

C. Utility Incentive Program Compliance
1) Frontend graphics and programming shall comply with Utility Incentives Requirements. Refer attached program requirements.
2) Provide Facility Guide. Refer attached Facility Guide Outline.

5. System Specific
A. Legacy R2 Niagara
1) Replace controllers, communications wiring, actuators, sensors. Abandon filter dP sensor.
2) Replace Thermostat and associated wiring.
3) Replace controls valves, reuse dampers.
4) Reuse device controls wiring, enclosures, transformers.
5) No new 2-position valves for WSHP condenser connection.

B. Newer Niagara
1) Verify if existing Thermostat and associated wiring can be reused. Replace only if necessary.
2) Verify if existing controllers can be reused. Replace only if necessary.
3) Reuse dampers, valves, actuators, sensors. Abandon filter dP sensor.
4) Reuse device controls wiring, enclosures, transformers.
5) Existing 2-position valves for WSHP condenser connection to remain as-is.

C. Alerton
1) Reuse existing Thermostat and associated wiring can be reused
2) Reuse existing controllers.
3) Reuse dampers, valves, actuators, sensors. Abandon filter dP sensor.
4) Reuse device controls wiring, enclosures, transformers.
5) Existing 2-position valves for WSHP condenser connection to remain as-is.
6) Integrate existing to new control systems.

6. Temperature Set points and Schedules
A. Please refer attached proposed set points and schedules.
7. Testing, Adjusting, and Balancing (TAB)
A. Document/ Mark existing Min OA Damper setpoints and physical positions prior to construction.
8. Commissioning
A. Commission systems per Washington State Energy Code.
B. Provide point to point review and functional performance testing. Include scope from Utility Incentive Program and complete necessary utility forms.
C. Verify system data collection and controls trending necessary for M&V KPIs is completed.
D. Provide commissioning report
9. Training
A. Provide training as required for this FIM.

1) .

CLARIFICATIONS AND EXCLUSIONS

1. Excludes hazardous material testing and abatement. McKinstry will coordinate with the City on additional testing and abatement as necessary.
2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.
A. Repairs of existing deficiencies of mechanical equipment is not included in the scope.
B. Controls hardware installed in the 2016 and 2018 project will be re-used.

Detailed Scope of Work

C. Per discussion with the necessary repairs will be performed by the City.

3. All work will be performed during weekdays and day shift.
4. Systems and Scope excluded from the project
   A. Gun range HVAC equipment controls will be abandoned in place. Existing wiring from the main controller will be disconnected.
5. Systems and Scope excluded from the scope and will be re-considered during construction
   A. Snow Melt System Improvements
      1) Abandon existing temperature and rain sensor.
      2) Install new start/stop and status monitoring controls for the system. Perform programming to enable the system based on Outdoor Temperature.
   B. WSHP Air Filter dP Sensor
      1) Furnish and install filter dP sensors for the (25) WSHP on the Legacy Niagara system.
      2) Reuse existing filter dP sensors of (15) Newer Niagara and (12) Alerton System WSHP.
      3) Perform programming to provide alarms.
   C. Garage Equipment
      1) Furnish and install controls to provide Status monitoring of Garage Equipment. Reuse existing conduit pathways, provide new wiring. Perform programming to provide alarm when the pumps start.
      2) Unit Heater, Pumps P-5A, 5B, 6A, 6B, 7A, 7B
6. During the IGA Alerton and Niagara control systems were evaluated and the City selected to move forward with the Alerton system. The scopes and budgets are based on an Alerton system.
7. During the IGA existing MS/TP communication cable replacement with new MS/TP or new IP ethernet cable was evaluated. The City selected to move forward with new MS/TP cable.
8. Access to spaces where WSHP are located and where communication cable is routed will be required. McKinstry will coordinate in advance access to restricted spaces and spaces where escort is required.
9. The new BAS frontend will be setup for remote access. Ethernet connection and internet access is required for accessing the BAS remotely. Internet connection is not available at this time due to IT restrictions, providing necessary IT access is not included in the project scope. The City to work with their IT department to enable remote access.
10. In absence of remote access, the BAS frontend could be accessed by physically connecting to the building controller using ethernet cable.
11. Per discussion with the Facilities, there is not existing building pressure control concern other than no visibility to the controls systems. Building pressure control will be based on speed difference between Main AHU fan and the Exhaust fan. New building differential pressure will be installed for monitoring only.
12. Proposed space temperature set points and schedules are included with the scope of works. This will be reviewed and updated based on City's feedback prior to the ESP.

City of Redmond - Public Safety Building

HVAC Occupancy Schedules and Setpoints

Project Name	City of Redmond - Public Safety Building
Location	Redmond, WA
Date	2/10/2025

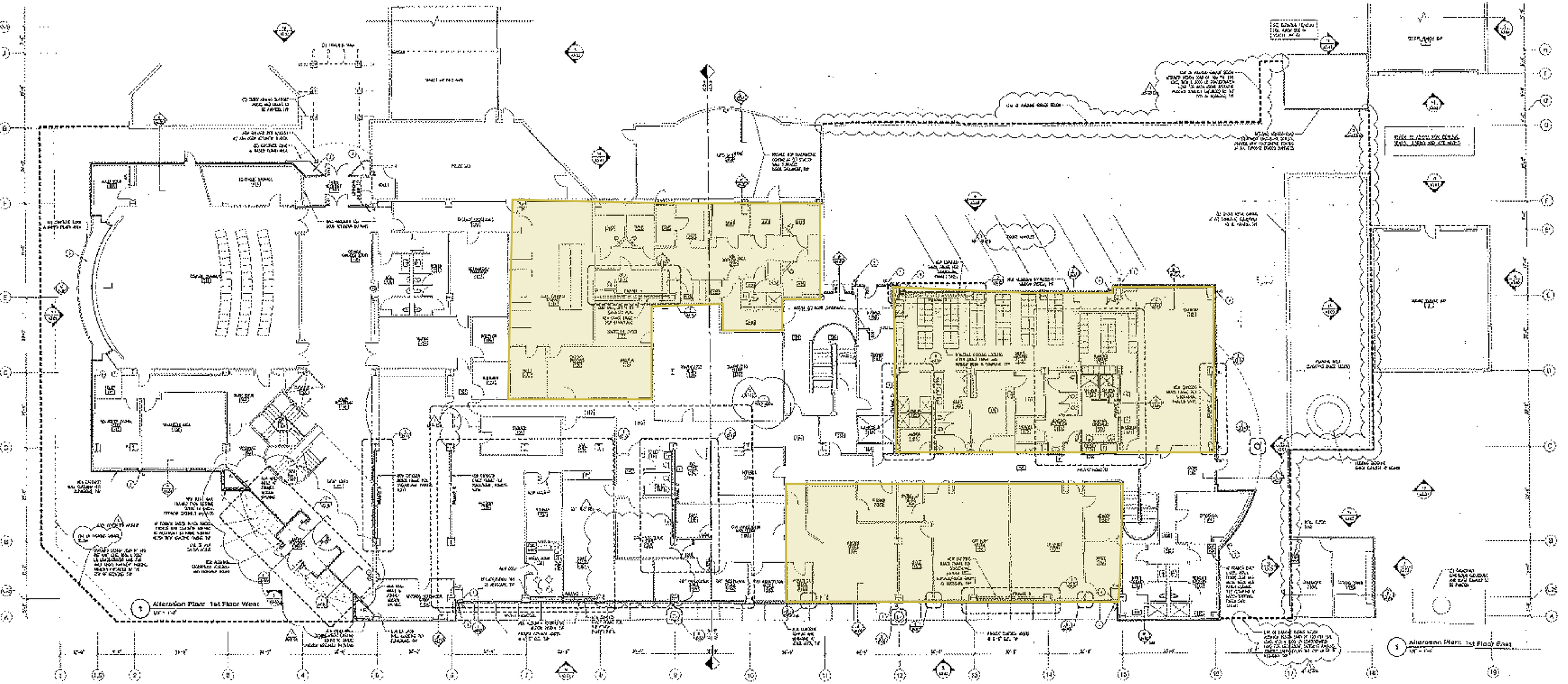
EXISTING	
Zone/Schedule	**24x7 Occupied**
Monday	12:00 am - 11:59 pm
Tuesday	12:00 am - 11:59 pm
Wednesday	12:00 am - 11:59 pm
Thursday	12:00 am - 11:59 pm
Friday	12:00 am - 11:59 pm
Saturday	12:00 am - 11:59 pm
Sunday	12:00 am - 11:59 pm
Holiday	12:00 am - 11:59 pm
Occupied Cooling Setpoint	75
Occupied Heating Setpoint	70
Unoccupied Cooling Setpoint	NA
Unoccupied Heating Setpoint	NA

PROPOSED			
Zone/Schedule	**24x7 Occupied**	**7 Days Occupied**	**Weekday Occupied**
Monday	12:00 am - 11:59 pm	6:00 am - 6:00 pm	6:00 am - 6:00 pm
Tuesday	12:00 am - 11:59 pm	6:00 am - 6:00 pm	6:00 am - 6:00 pm
Wednesday	12:00 am - 11:59 pm	6:00 am - 6:00 pm	6:00 am - 6:00 pm
Thursday	12:00 am - 11:59 pm	6:00 am - 6:00 pm	6:00 am - 6:00 pm
Friday	12:00 am - 11:59 pm	6:00 am - 6:00 pm	6:00 am - 6:00 pm
Saturday	12:00 am - 11:59 pm	6:00 am - 6:00 pm	Unoccupied
Sunday	12:00 am - 11:59 pm	6:00 am - 6:00 pm	Unoccupied
Holiday	12:00 am - 11:59 pm	Unoccupied	Unoccupied
Occupied Cooling Setpoint	75	75	75
Occupied Heating Setpoint	70	70	70
Unoccupied Cooling Setpoint	NA	85	85
Unoccupied Heating Setpoint	NA	65	65

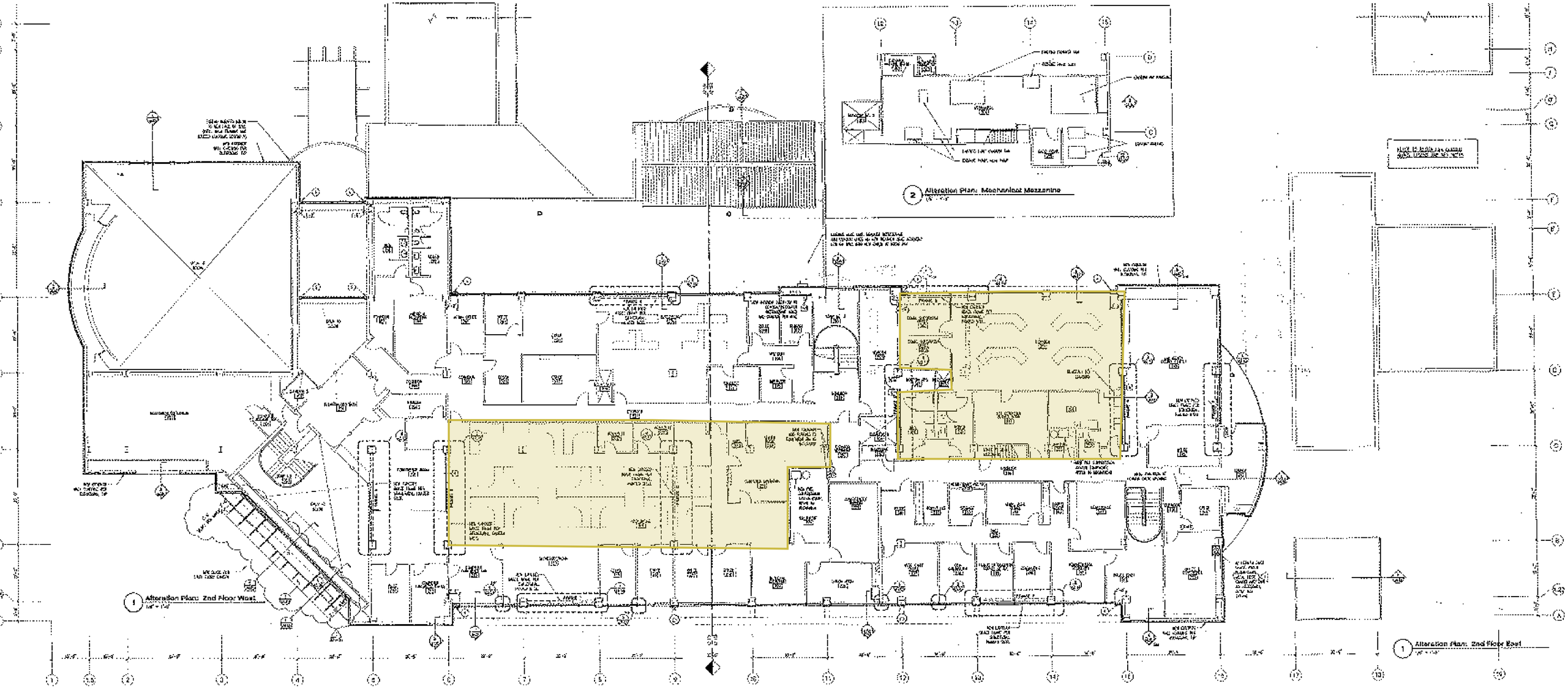
WSHP will be programmed for Optimal Start/Stop.
Temperature setpoints will be adjustable. Deadband will be coordinated with the City during design.
City to confirm the holiday schedule and update the system going forward.

24x7 OCCUPIED	
7 DAYS OCCUPIED	NO SPACES IDENTIFIED AT THIS TIME
WEEKDAY OCCUPIED	ALL OF NON-HIGHLIGHTED SPACES

REDMOND PUBLIC SAFETY BUILDING
FIRST FLOOR STITCHED
FOR REFERENCE ONLY



REDMOND PUBLIC SAFETY BUILDING
SECOND FLOOR STITCHED
FOR REFERENCE ONLY



FIM ID # 31871
04.01-PSB Upgrade HVAC Controls
Points List

1. NETWORK POINTS SHALL REQUIRE MAPPING OF VIRTUAL POINTS AVAILABLE VIA THE BACNET CONNECTION
2. MONITOR POINTS LISTED BELOW GRAPHICALLY ON THE BAS OPERATOR WORKSTATION.
3. TRENDED POINTS SHALL HAVE THE SAME START TIME.
4. THE TRENDED DURATION SHALL BE EVERY 15 MINUTES (ADJ).
4. THIS FIM 31871 INCLUDE CONTROLS SCOPE AND BUDGET FOR ALL IDENTIFIED EQUIPMENT NOT INCLUDED IN OTHER MECHANICAL FIMS.

POINT COUNT TOTALS	**234**	**18**	**125**	**112**	**0**	
POINT NAME	**AI**	**AO**	**DI**	**DO**	**NETWORK**	**NOTES**
BUILDING OAT	1					REUSE EXISTING
(25) Original WSHP to Remain (Existing Legacy Niagara)	**91**	**7**	**50**	**50**	**0**	
SPACE TEMPERATURE	25					
SPACE OVERRIDE SWITCH			25			
SUPPLY AIR TEMPERATURE	25					
SUPPLY FAN START/STOP				25		
REVERSING VALVE				25		
SUPPLY FAN STATUS			25			
UNIT ALARM						
OA/ECONOMIZER		7				HP-31A, 32A, 32B, 33A, 33B, 35A, 35B
RETURN AIR TEMPERATURE	7					HP-31A, 32A, 32B, 33A, 33B, 35A, 35B
MIXED AIR TEMPERATURE	7					HP-31A, 32A, 32B, 33A, 33B, 35A, 35B
RETURN AIR CO2	2					HP-32B, 33B
AIR FILTER DP	25					THIS IS AN ADD/ALT
(15) WSHP replaced in 2017 to Remain (Existing New Niagara)	**30**	**6**	**30**	**30**	**0**	
SPACE TEMPERATURE	15					
SPACE OVERRIDE SWITCH			15			
SUPPLY AIR TEMPERATURE	15					
SUPPLY FAN START/STOP				15		
REVERSING VALVE				15		
SUPPLY FAN STATUS			15			
SPACE RELATIVE HUMIDITY						ASSUMED. SPACES TO BE DETERMINED
OA/ECONOMIZER		2				HP-12B, J
RETURN AIR TEMPERATURE		2				HP-12B, J
MIXED AIR TEMPERATURE		2				HP-12B, J
AIR FILTER DP	15					REUSE EXISTING
(12) WSHP replaced in 2021 to Remain (Existing Alerton)	**32**	**0**	**24**	**24**	**0**	
SPACE TEMPERATURE	12					RESUE EXISTING
SPACE OVERRIDE SWITCH			12			RESUE EXISTING
SUPPLY AIR TEMPERATURE	12					RESUE EXISTING
SUPPLY FAN START/STOP				12		RESUE EXISTING
REVERSING VALVE				12		RESUE EXISTING
SUPPLY FAN STATUS			12			RESUE EXISTING
CO2 SENSORS	**4**	**0**	**0**	**0**	**0**	
SPACE CO2	4					
BOILER PLANT	**3**	**2**	**5**	**3**	**0**	
BOILER START/STOP				2		
BOILER STATUS			2			
BOILER CIRC PUMP START/STOP						TO BE CONTROLLED BY THE BOILER
BOILER CIRC PUMP STATUS			2			
BOILER TEMPERATURE SETPOINT		1				
SUPPLY WATER TEMPERATURE	1					
RETURN WATER TEMPERATURE	1					
CONDENSER PUMP START/STOP				1		RESUE EXISTING
CONDENSER PUMP STATUS			1			RESUE EXISTING
CONDENSER PUMP SPEED		1				RESUE EXISTING

POINT NAME	AI	AO	DI	DO	NETWORK	NOTES
CONDENSER LOOP DP	1					RESUE EXISTING
COOLING TOWER	**3**	**2**	**3**	**3**	**0**	
COOLING TOWER FAN 1 START/STOP				1		
COOLING TOWER FAN 1 STATUS			1			
COOLING TOWER FAN 2 START/STOP				1		
COOLING TOWER FAN 2 STATUS			1			
COOLING TOWER SPRAY PUMP START/STOP				1		
COOLING TOWER SPRAY PUMP STATUS			1			
LEAVING WATER TEMPERATURE SETPOINT		1				
ENTERING WATER TEMPERATURE	1					
LEAVING WATER TEMPERATURE	1					
SUMP WATER TEMPERATURE	1					
BYPASS VALVE		1				
ALARMS						
MISC EXHAUST FANS	**0**	**1**	**1**	**1**	**0**	
EF-4 START/STOP				1		
EF-4 STATUS			1			
EF-1O VFD LOCKER ROOM		1				
911 DISPATCH SERVER ROOM	**2**	**0**	**2**	**0**	**0**	
UNIT 1 STATUS			1			
UNIT 2 STATUS			1			
SPACE TEMPERATURE	1					
SPACE RELATIVE HUMIDITY	1					
ALARMS						
CITY SERVER ROOM	**2**	**0**	**2**	**0**	**0**	
UNIT 1 STATUS			1			
UNIT 2 STATUS			1			
SPACE TEMPERATURE	1					
SPACE RELATIVE HUMIDITY	1					
ALARMS						
ELEVATOR/MECH RM	**3**	**0**	**0**	**0**	**0**	
SPACE TEMPERATURE	3					
ALARMS						
ALTERNATE # 01 - SNOW MELT SYSTEM	**52**	**0**	**8**	**1**	**0**	
SYSTEM START/STOP				1		
SYSTEM STATUS			1			
ALTERNATE # 02 - WSHP AIR FILTER DP	**52**	**0**	**7**	**0**	**0**	
AIR FILTER DP	25					
AIR FILTER DP	27					REUSE EXISTING
ALTERNATE # 03 - GARAGE EQUIPMENT	**0**	**0**	**7**	**0**	**0**	
UH STATUS			1			
P-5A STATUS			1			
P-5B STATUS			1			
P-6A STATUS			1			
P-6B STATUS			1			
P-7A STATUS			1			
P-7B STATUS			1			
ALARMS						

PUGET SOUND ENERGY

GRANT ATTACHMENT D Project # _____

Controls Upgrade: Requirements Checklist (12/31/2023)

See full detailed requirements in "PSE Controls Upgrades: Requirement Details 12/31/2023"

PROJECT NAME: City of Redmond Public Safety Building DATE:_____

REQUIRED: CONTROL/FEATURES

To qualify the upgrade must add or substantially modify 3 or more sequences/system capabilities. Also, all sequences and items listed under the required section are needed in the final system and project unless waived by PSE. If an item is not being added, please explain why at the bottom of this page.

Check boxes to show if existing or NA and if will be added or modified. Provide explanations at bottom.

Exists	Add	Modify	NA	General Description
HVAC non-CENTRAL PLANT SEQUENCES				
	X			Zone level scheduling & limited time override
	X			Optimum start/stop (OSS) for warm-up and for cool-down
	X			Unoccupied (night) set-back with zone limited time override
			X	Supply air temperature (SAT) reset based on load
			X	Duct static pressure (DSP) reset based on load
			X	Demand controlled ventilation (DCV) in interior spaces with single zone system
	X			Upgrade to VFD (from inlet vane or from constant volume to variable speed)
	X			Zone box air & temperature controls (specifics depend on if new box/box controls)
		X		Air-side economizer controls (integrated, lockout based on RAT, mech. clg. lock-out)
	X			Room space temperatures setpoints deadband
			X	HEAT PUMPS ONLY: Air-side heat pumps strip heating control
			X	LABS ONLY: Exhaust and OA ventilation based on fume hood and room use
CENTRAL PLANT SEQUENCES (If no Central Plant skip this section)				
	X			WSHP loop temperature setpoints deadband and maximums
		X		Differential pressure (DP) control for building loop pump(s) >10 hp
	X			Efficient cooling tower and chiller staging
			X	Condenser water temperature (CWT) reset based on load
			X	Chilled water temperature (CHWT) reset based on load
	X			Hot water temperature (HWT) reset based on load
	X			Boiler and chiller plant lockout on outside air temperature (OAT)
X				Efficient boiler modulation and staging
REQUIRED GRAPHICAL USER INTERFACE (in text - means on GUI but not adjustable by operator)				
	X			AHU graphic in text: final setpoints, key controlling variables w/explanation
	X			AHU graphic: schedule name, air & supply water temps, total box cfm, other key pts
	X			Central plant graphic in text: final setpoints, key controlling variables w/ explanation
	X			Floor plan in text: location of remote key sensors and AHU zones
	X			Zone/Box graphic: AHU serving box, design cfms in text, incoming air and water temperature, schedule, if available – discharge air temperature
	X			Zone/Box table: key points, AHU serving box, schedule, reset logic interaction
	X			VFD s in text: actual speed of VFD when command signal is 0 (if does not equal 0)
	X			Digital easy access to: controls sequences, drawings and submittal; Facility Guide
		X		Outside air temperature (OAT): on all pages

EXPLAIN: Why not adding a sequence or NA and specifics of modifications:

_____

PUGET SOUND ENERGY

GRANT ATTACHMENT D Project # _____

Controls Upgrade: Requirements Checklist (12/31/2023)

See full detailed requirements in "PSE Controls Upgrades: Requirement Details 12/31/2023"

PROJECT NAME: _____DATE:_____

OTHER REQUIREMENTS For ALL PROJECTS

- OAT sensor and location check
- Limited Test and Balance activities with report on results and how tested:
  (The program does not pay for nor require a complete TAB)

  Required for all System Types & Projects:
  - ➢ Determine existing and required minimum OA ventilation (see PSE form).
  - ➢ Determine outside air minimum control damper position for required ventilation.
  - ➢ Building Pressure Check: verify building properly pressurized in all modes of operation.

  Required Depending on System Type & Project:
  - ☐ ~~VAV Boxes or box controls replaced: balance/calibration of box flow rates; determine ventilation rates~~
  - ☒ Duct Static Reset: determine efficient minimum and maximum duct static setpoints
  - ☒ Differential Pressure Control for pumps: determine minimum possible differential pressure setpoint
  - ☐ _____
- Commissioning
  - ➢ Functional Performance Tests (provided by PSE)
  - ➢ Facility Guide (outline of elements required provided by PSE)
  - ➢ O&M/Staff training (based on Facility Guide)

RECOMMENDED OR ADDITIONAL: CONTROL/FEATURES

REQUIRED completion with one "add," if used to meet minimum of 3 sequences added or substantially modified.
Check boxes to show if existing or NA or if will be added or modified. Provide explanations at bottom.

Exists	Add	Modify	NA	General Description
			X	Monitor Based Commissioning (MBCx) – PSE preapproval
	X			Demand controlled ventilation (DCV) in exterior spaces (garage etc.) – hook to DDC
	may be			Space temperature and ventilation setback based on occupancy
			X	Demand controlled ventilation (DCV) for kitchen hoods
			X	Demand Controlled Ventilation (DCV) for multi-zone spaces (with PSE approval)
			X	Door contacts/switches for mechanical system shut off
			X	Water-side economizer for chiller water plant
	X			Valves to isolate plant or heat pump equipment from pumping loop when not in use
		X		Differential pressure loop pump control: add VFD and 2-way valves
		X		Improved loop pump control: DP reset controls based on load
	X			Improved minimum outside air (OA) control: OA measuring station or DP sensors etc.
			X	Exterior heater occupancy controls: time switch or occupancy sensor
			X	Vestibule heating control: air curtain, heating shut-off and setpoint
	may be			Improved cooling tower control: VFDs ramping controls, wetbulb control

ADDITIONAL SEQUENCES/FEATURES

EXPLANATIONS:

HVAC Controls Full Upgrades: Facility Guide Outline (12-31-2023)

Facility guide must be presented in written and electronic form. These must be in one document that is easy to navigate. The electronic document must be available from the front end of the controls GUI.

1. Outline of the Guide
2. Written Description of Systems and Operation
    a. HVAC overview
    b. Sequence of Operations
    c. Ventilation amount and control
    d. How systems (Ex: AHU & VAV boxes) are zoned and how the zones are controlled
    e. Key items to monitor to maintain efficiency. For example: Schedules, ventilation, setpoints, calibration of OA and CO2 (example provided by PSE)
    f. Unique challenges of building
3. DDC Graphics/Screenshots of each major system, representative VAV boxes, floor plans and VAV box list (note: these will have operational /graphical use interface information required by the program)
4. Final setpoints and schedules and unique facility requirements like ventilation or room pressure (in table format)
5. Energy Use: pre, post and savings needed to get maximum grant (provided by PSE)
6. Basics instructions on how to work with the controls graphical interface
7. Controls As-Built Drawings: Sequences of Operations, wiring and components
8. Equipment As-Builts and O&M information
9. List of controls that need to be calibrated and how to calibrate them (example: CO2 and OA sensor calibration procedures)
10. Test and Balance report (TAB required by PSE for the controls features installed)
11. Functional Performance Tests & Start-up (PSE required tests)
    a. Completed (with trend graphs)
    b. Blank
12. Training Provided – who, what and when

Detailed Scope of Work

FIM ID # 31865
03.02-PSB Upgrade Main AHU with Fan Array
Redmond Public Safety Building

GENERAL

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.

SCOPE OF WORK INCLUDES

1. Equipment Furnished
   A. Supply Fan Array. Furnish with (1) VFD per fan, Motor guards, Airflow Measuring station, (1) blank off panel.
   B. (1) Exhaust Fan to match existing with (1) VFD.
2. General
   A. Coordinate early during design with owner and controls contractor to establish equipment name tag nomenclature and identifiers in the controls system.
3. Mechanical
   A. Demo
      1) Demo existing AHU-1 fan, Inlet Guide Vanes and appurtenances
      2) Demo existing exhaust fan motor, Inlet Guide Vanes and appurtenances
      3) Demo casing of existing AHU as necessary to facilitate work.
      4) Demo exhaust ductwork as necessary to facilitate work.
   B. New Work (reference sketches and equipment proposals)
      1) Install fan array system with modifications to the existing casing as shown in the sketches.
      2) Provide 20”x20”x2” MERV13 pre-filters.
      3) Provide 42” round medium pressure duct with insulation per WSEC.
      4) Provide 99”W x 63”H discharge plenum with base rail.
      5) Provide 16 gage single wall plenum panels for new discharge plenum.
      6) Provide (1) inswing door (24”Wx60”H).
      7) Provide 42” bellmouth at discharge of AHU casing.
      8) Seal air handling unit enclosure to meet air pressure classification.
      9) Install new airflow monitoring station. Airflow monitoring station furnished by controls.
4. Controls
   A. Integrate new supply fan array and exhaust fan VFDs into existing BAS. See points list.
   B. Replace or provide all end devices, including airflow measuring station (Ebtron Gold or equivalent approved by engineering), pressure switches, pressure sensors, temperature elements, pressure differential transmitters, etc to facilitate design intent of points list.
5. Electrical
   A. See Electrical Scope Table.
6. Structural
   A. Existing framing has been verified with preliminary equipment selection; existing framing is adequate for new incoming loads associated with replacement mech equipment without triggering structural upgrade. Existing framing will be confirmed at a future date with final equipment selection.
   B. Fan array:
      1) Provide seismic attachment connection to the new hat channel
      2) Provide 10-gauge hat channel for fan wall and anchor to concrete floor.
   C. Provide (1) lifting eye adjacent to the fan array system (Contractor option)
   D. Special inspection:
      1) Post-installed concrete anchors required special periodic inspection.
7. TAB
   A. Provide pre-measurements on existing AHU fan and Exhaust Fan (airflow and SP profile).
   B. Perform airside TAB at the air handling unit ductwork supply outlet and exhaust fan ductwork exhaust inlet.

Detailed Scope of Work

8. Commissioning
   A. Provide functional performance testing (FPT), Point to Point Testing for the AHU Fan Array and Exhaust Fan
   B. Verify set points, Setup BAS trends necessary for M&V annual tasks
9. Training
   A. Provide training as required for this FIM.

Constant Airflow Regulating Dampers (Included)

   B. Mechanical
      1) Demo manual balance dampers in locations where constant airflow regulators are to be installed.
      2) Furnish and install constant airflow regulators. (18) CAR dampers in the air handling unit ductwork. CAR damper locations are identified in the drawing mark-up.
   C. Controls
      1) Perform programming to modulate the fan array speed based on building use schedule of occupied and unoccupied modes.
   D. Carpentry
      1) Perform ceiling modifications for access during construction.
   E. TAB
      1) Perform airside TAB at each air handling unit ductwork supply outlet and exhaust fan ductwork exhaust inlet.
      2) TAB to test and set air handling unit fan array minimum speed to achieve sufficient airflow at all 24/7 space ductwork outlets.

Replace Building Exhaust Fan (Included)

   A. Mechanical
      1) Furnish and install new exhaust fan to replace existing. The new fan to match existing fan.
      2) Demolish inlet and Outlet duct as necessary to facilitate connections to the new fan.

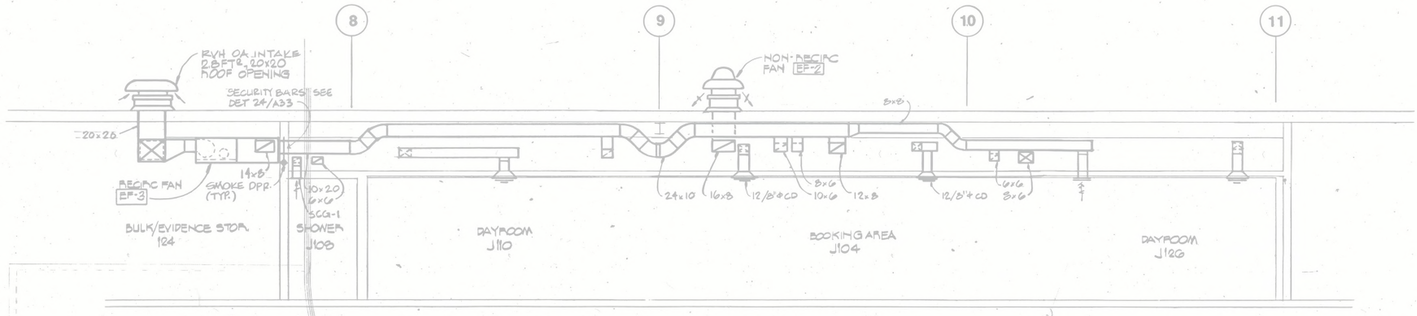
CLARIFICATIONS AND EXCLUSIONS

1. Excludes hazardous material testing and abatement. McKinstry will coordinate with the City additional testing and abatement as necessary.
2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.
   A. Existing outdoor air louver will be reused.
   B. Existing heating coil circulation pump will be reused.
   C. Repairs or modifications to the ventilation system distribution duct is not included and not necessary for the scope, except as necessary for installing the Constant Airflow Regulating Dampers included in the scope.
3. All work will be performed during weekdays and day shift, except as noted below.
4. Building Ventilation and Exhaust Shutdown Construction Impact
   A. Shutting the main air handler (OA) will stop the ventilation airflow to the building (East of the main entrance lobby) and the Exhaust Fan will stop the exhaust connected to it.
   B. The WSHP can remain operational and provide zone heating and cooling during the Main AHU shutdown.
   C. Per discussion with the City, the lack of ventilation and exhaust is understood and is manageable for the shutdown duration specified below. Building use will be coordinated with the Departments to reduce occupancy and impact during the shutdown. Supplemental ventilation and exhaust flow is not required and is not included in the budget.
   D. City reviewed and did not identify other critical spaces that will require alternative cooling/heating/ventilation. Scope and budget for this is not included in the project.
   E. Scope related to AHU casing retrofit, demolition of existing fan, installation of the new fan array, demolition of the existing exhaust fan, installation of the new exhaust fan, all supply and exhaust duct modifications in the mechanical room is required to be completed during the shutdown prior to restarting the unit.
   F. Weekday Regular Hours - Single Shift Daily
      1) Anticipated completion duration is 14 days.
   G. Weekday Regular Hours – Two Shifts Daily
      1) Anticipated completion duration is 7 days. The work will be performed Monday – Friday.
      2) <u>This is included in the budget.</u>
   H. Installation of the Constant Airflow Regulating Dampers will be performed when the Main AHU is operating. This could be before or after the Main AHU upgraded and will be determined during pre-construction.
      1) The Constant Airflow Regulator Dampers are for 24x7 operating zones and ventilation airflow to the zone will be impacted when performing this work.
5. Airside TAB is included at the AHU and Exhaust Fan level, for the new Constant Air Regulating dampers to verify airflow at AHU low speed operation. Airside TAB of WSHP not in the scope was discussed with the City and deemed not

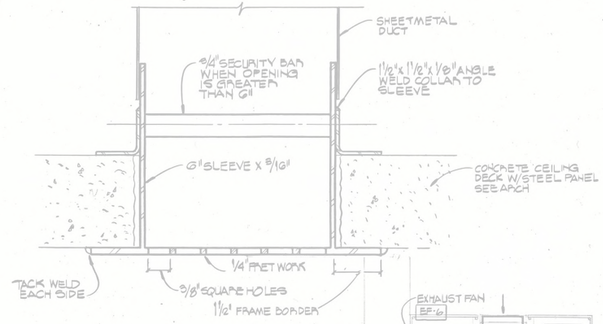
necessary. It is not included in the scope.

6. Location for the Fan Array control panel is not identified at this time. During design, the control panel size and clearance requirements will be coordinated with the vendor. If a location meeting the requirements is not available, the design will utilize an EC motor fan array.
7. The CRAC AHUs serving the 911 Dispatch data closet are located above the Main AHU and refrigerant lines run in proximity of the Main AHU. Removal and rerouting of the refrigerant lines will be required to improve construction access to the Main AHU and reduce accidental damage. This is included in the scope. Implementation schedule and sequence will be coordinate with the City to minimize the cooling disruption to the 911 Dispatch data closet.
   A. The City confirmed they can provide temporary cooling for the dispatch data closet to allow shutdown of the CRAC units to perform the necessary modifications.
   B. The City accepts this solution, and additional contingency plan is not required.
8. 911 Dispatch center is located under the Main AHU. McKinstry understand this space is sensitive to loud sound and intents to perform work to limit sound disturbances. Based on the extent of construction work and schedule constraints, complete elimination of sound disturbances cannot be ensured.
9. McKinstry will coordinate with the City for staging the lift in the driveway to coordinate and minimize traffic impact.
10. Necessary roof protection and temporary fall protection is included. The city confirmed Permanent fall protection is not required, and it is not included in the scope.
11. A response from the City Fire Alarm vendor was not received. McKinstry has included budget to coordinate with City's Fire Alarm System vendor to disconnect and reconnect the smoke detectors in the AHU to facilitate construction. Full system upgrade is not anticipated and not included in the scope.

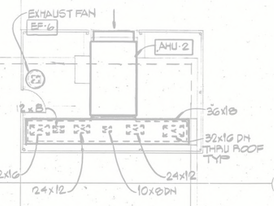
DEMO



Section A
1/4"=1'0"
M-8 | M-8

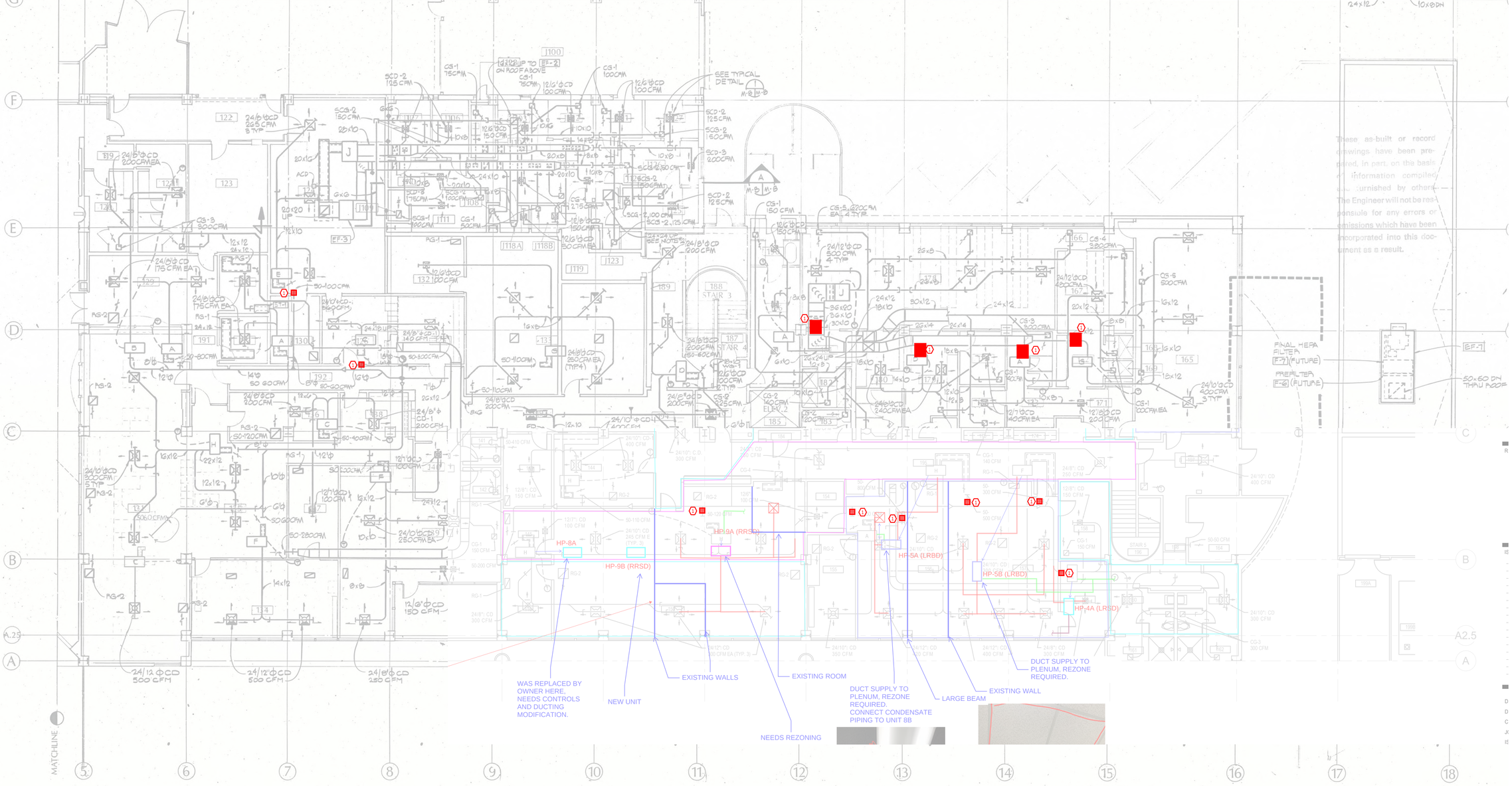


Typical Diffuser (SCD) & Exhaust Grille (SCG) Detail 1
1/2"=1'0"
M-8 | M-8



KEY NOTES

1 ADD ALT #1: DEMOLISH MANUAL BALANCE DAMPER

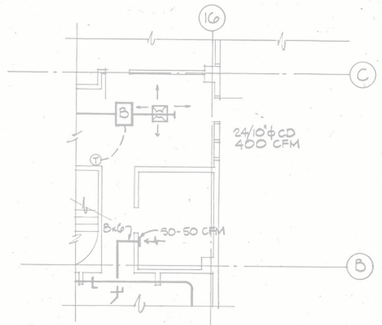


First Floor Plan East - HVAC
1/8"=1'0"

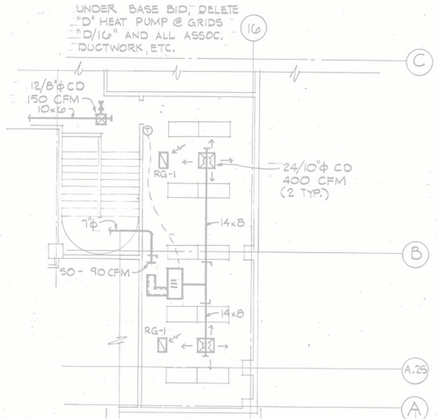
AS BUILT
12-1-90

91-1042

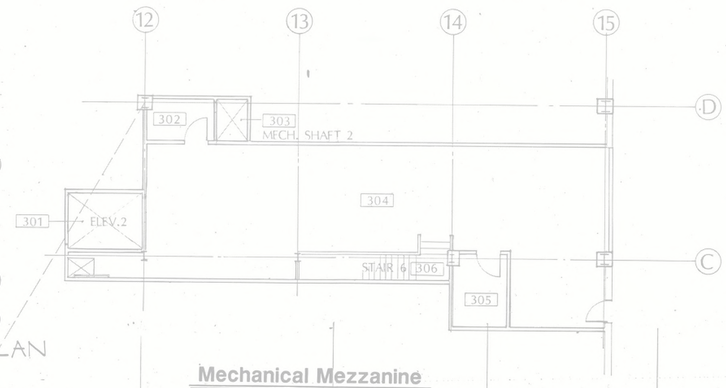
DEMO



1ST FLR HVAC - PARTIAL PLAN
BASE BID CONDITION



2ND FLR HVAC - PARTIAL PLAN
BASE BID CONDITION



Mechanical Mezzanine
(See 1/4" Plans Sht. M-10)

KEY NOTES

1. ADD ALT #1: DEMOLISH MANUAL BALANCE DAMPER

POLICE BLDG.
ALTERNATE #1
(SEE PARTIAL PLAN, SHT. M-9
FOR BASE BID HVAC THIS AREA)

These as-built or record drawings have been prepared, in part, on the basis of information compiled and furnished by others. The Engineer will not be responsible for any errors or omissions which have been incorporated into this document as a result.

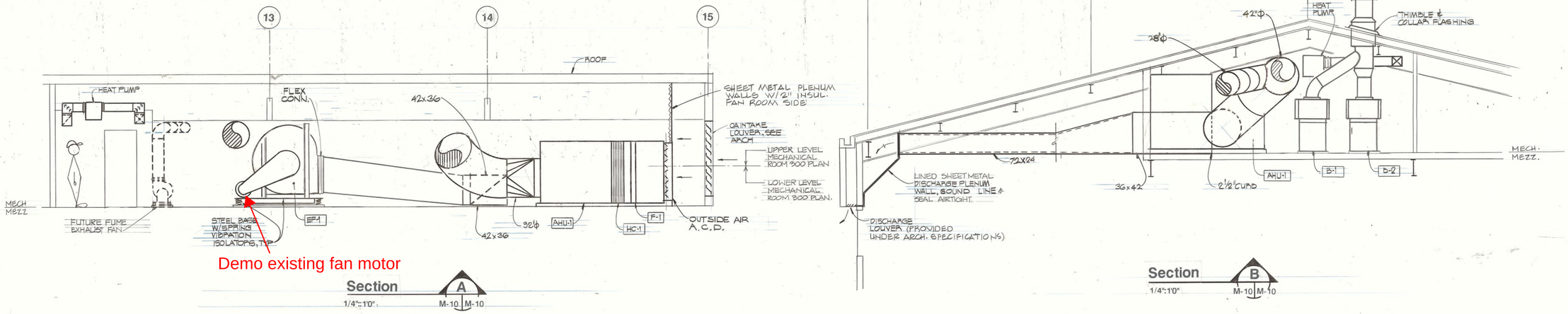
AS BUILT
12-1-90

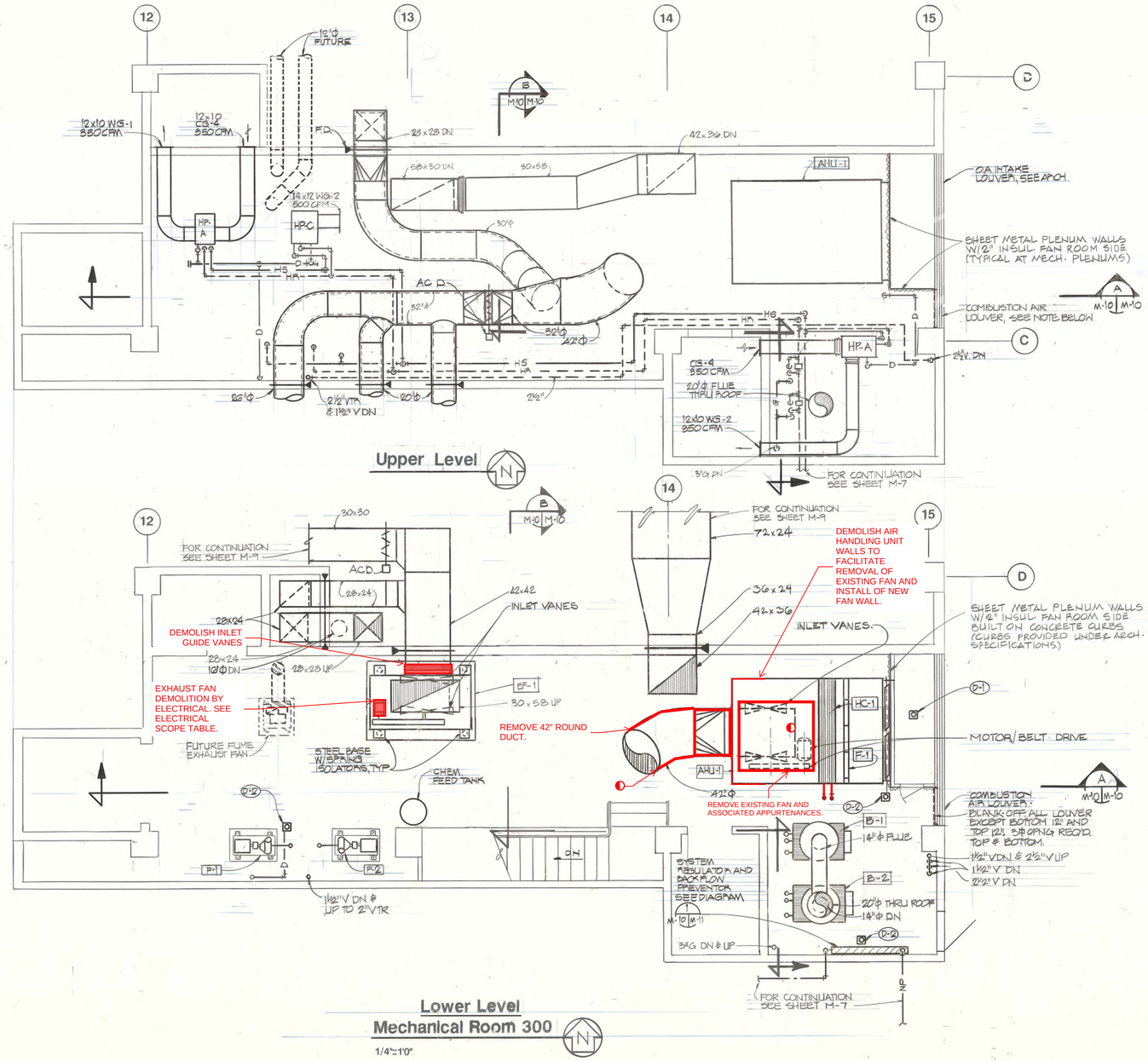
MATCHLINE

Second Floor Plan East - HVAC
1/8"=1'0"

91-104

DEMO





As Built Pending

Mechanical Room 304 & Sections

91-1050

Registered Architect
State of Washington
ARAI/JACKSON ARCHITECTS & PLANNERS
155 11th Avenue, Suite 300, Seattle, Washington 98122. Phone: (206) 123-4800
MITCHELL/ENGINEERING, INC.

Revisions

No.	Description	Date

Approval

Approved by	Date	Drawn by KL	Date 1/5/89

Project: REDMOND MUNICIPAL CAMPUS
Police Building and Site Improvements
For: City of Redmond, Washington

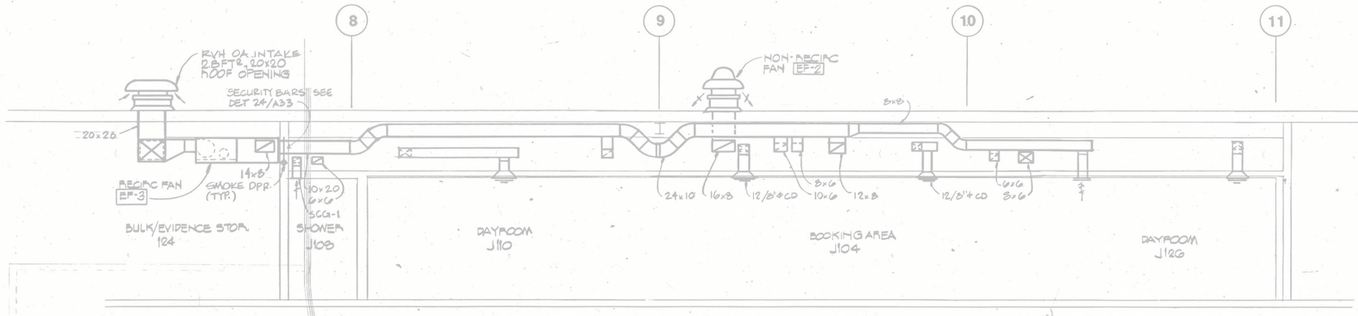
MECHANICAL ROOM

12/9/88
1-5-89

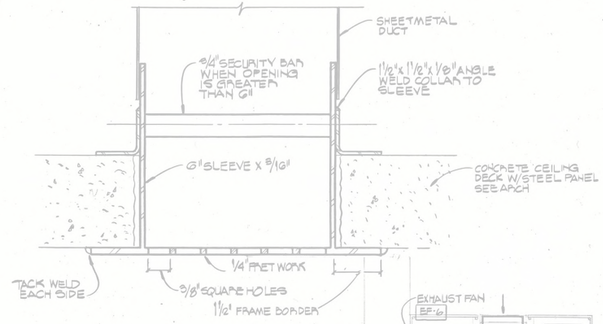
M-10

NEW

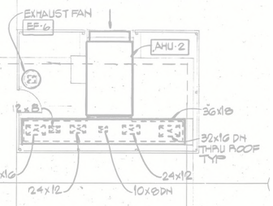
Name/Date/Hours



Section A
1/4"=1'0"
M-8 | M-8



Typical Diffuser (SCD) & Exhaust Grille (SCG) Detail 1
1/2"=1'0"
M-8 | M-8



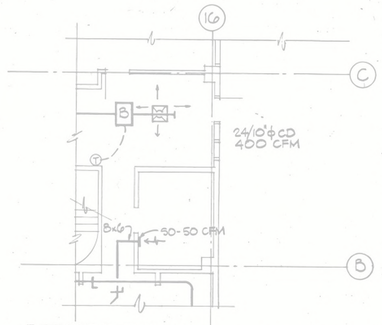
KEY NOTES

1. ADD ALT #1: FURNISH AND INSTALL NEW CONSTANT AIRFLOW REGULATING DAMPER.

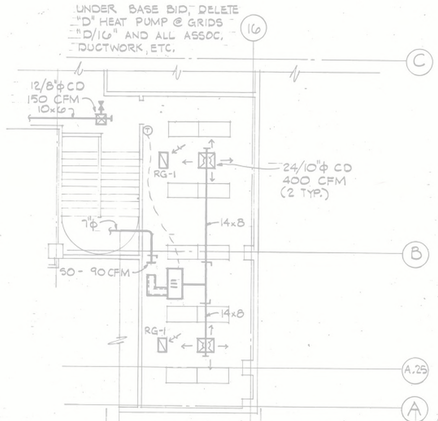
First Floor Plan East - HVAC
1/8"=1'0"

AS BUILT
12-1-90
91-1042

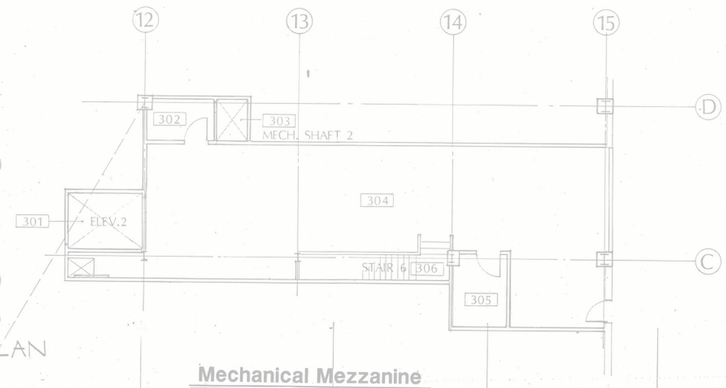
NEW



1ST FLR HVAC - PARTIAL PLAN
BASE BID CONDITION



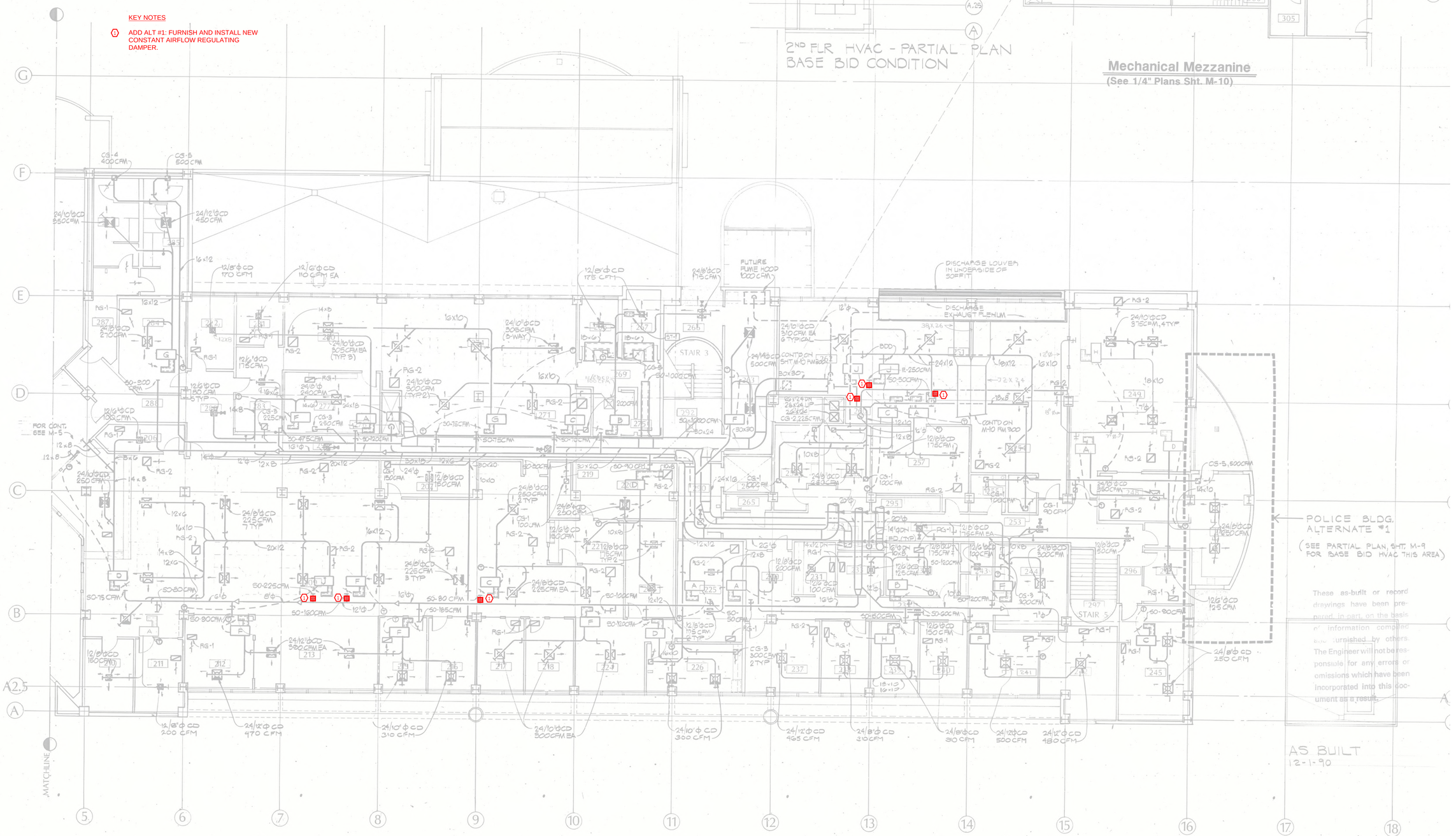
2ND FLR HVAC - PARTIAL PLAN
BASE BID CONDITION



Mechanical Mezzanine
(See 1/4" Plans Sht. M-10)

KEY NOTES

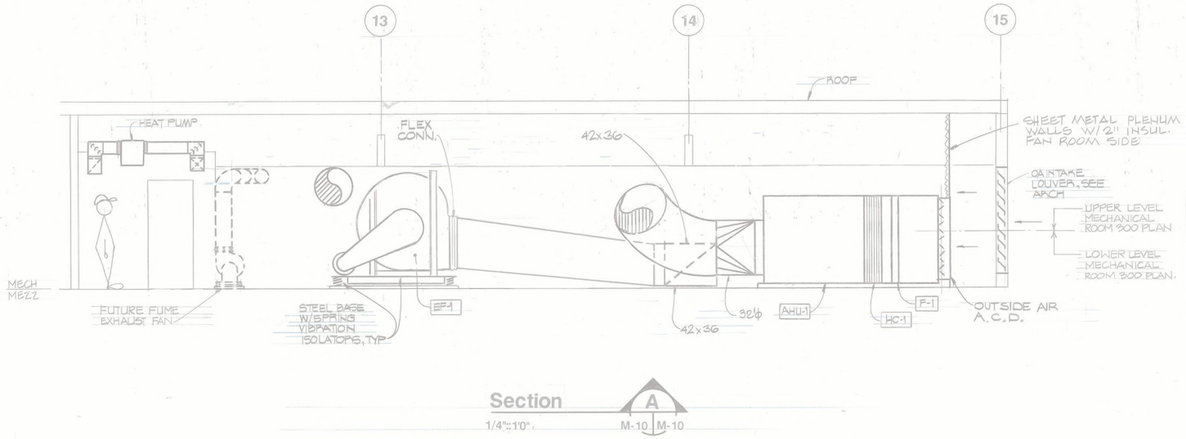
(1) ADD ALT #1: FURNISH AND INSTALL NEW CONSTANT AIRFLOW REGULATING DAMPER.



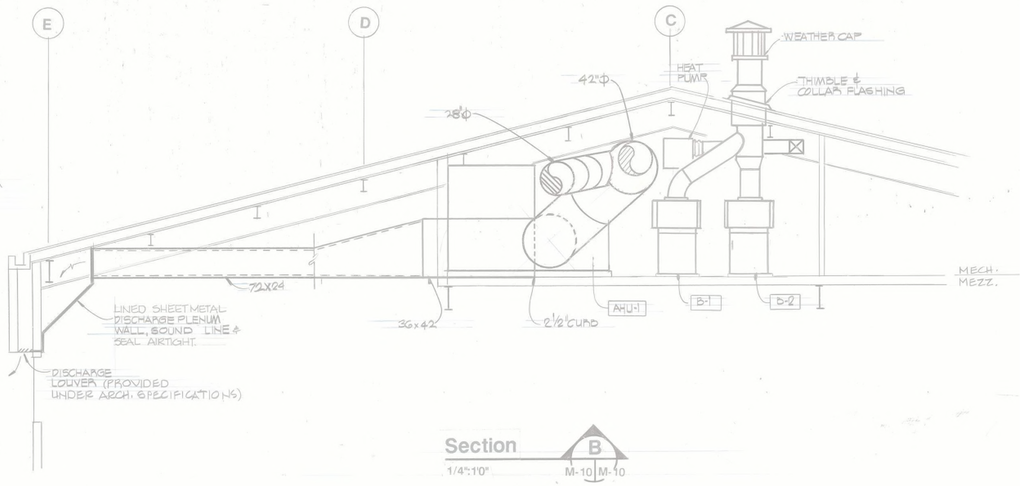
Second Floor Plan East - HVAC
1/8"=1'0"

91-104

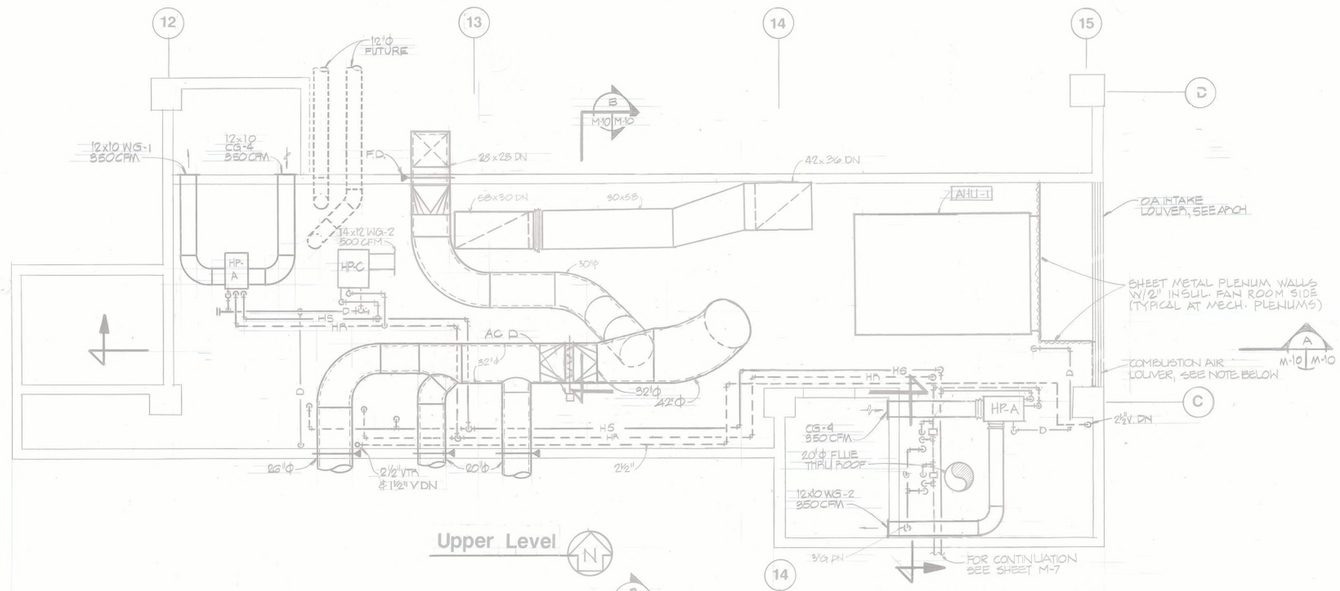
NEW



Section A
1/4"=1'0" M-10 M-10



Section B
1/4"=1'0" M-10 M-10



Mechanical Room 300
1/4"=1'0"

As Built Pending

Mechanical Room 304 & Sections

91-105C

ELECTRICAL SCOPE TABLE

Project Name: Redmond PSB Phase 3 - 204738
FIM No: 31865-03.02
FIM Name: Upgrade Main AHU - Fan Array
Location: Redmond, WA
Project Phase: GMAX
Purpose: The following MEP Scope Table is intended to be referenced along with the 'Electrical Sketches'.
Date: 1/14/2025

EXISTING ELECTRICAL CONNECTION INFORMATION														NEW ELECTRICAL CONNECTION INFORMATION													LOAD CHANGE
EXISTING. EQUIP. TAG	LOCATION	V	PH	HP	FLA	MCA	KVA	PANEL OR JBOX	OCPD	CONDUIT	WIRE	DISCONNECT (SIZE/NEMA/FUSE)	MOTOR CONTROLLER	NEW EQUIP. TAG	V	PH	HP	FLA	MCA	KVA	MOCP	PANEL OR JBOX	OCPD	CONDUIT	WIRE	DISCONNECT (SIZE/NEMA/FUSE)	MOTOR CONTROLLER	MIN SCCR	
AHU-1	MECH ROOM	480	3	10	14.00	17.50	14.55	MX4-1,3,5	**30**	**1/2"**	**#12**	**30/1R/NON-FUSE**	MAG. STRTR	FWCP (FANWALL CTRL PNL) [5]	480	3	N/A	35.20	37.40	29.25	40	MX4-1,3,5	**40**	**3/4"**	**3#8, #10G**	INTEGRAL TO FWCP	N/A	65 KA	+ 14.70
														SF-1	480	3	5	7.6	9.50	7.90	N/A	**FWCP**	N/A	**3/4"**	**3#12, #12G**	INTEGRAL TO FWCP	VFD (FWCP)	N/A	+ 7.90
														SF-2	480	3	5	7.6	9.50	7.90	N/A	**FWCP**	N/A	**3/4"**	**3#12, #12G**	INTEGRAL TO FWCP	VFD (FWCP)	N/A	+ 7.90
														SF-3	480	3	5	7.6	9.50	7.90	N/A	**FWCP**	N/A	**3/4"**	**3#12, #12G**	INTEGRAL TO FWCP	VFD (FWCP)	N/A	+ 7.90
														SF-4	480	3	5	7.6	9.50	7.90	N/A	**FWCP**	N/A	**3/4"**	**3#12, #12G**	INTEGRAL TO FWCP	VFD (FWCP)	N/A	+ 7.90
														BMS PANEL	120	1	N/A	N/A	N/A	0.50	N/A	**[1]**	**20**	**3/4"**	**2#12, #12G**	N/A	**N/A**	N/A	+ 0.50
EF-1-MOTOR ONLY	MECH ROOM	480	3	5	6.80	8.50	7.07	MX4-2,4,6	20	1/2"	#12	**INTEGRAL TO STRTR**	**MAG. STRTR.**	EF-1-MOTOR ONLY [4]	480	3	5	7.6	9.50	7.90	20	MX4-2,4,6	20	1/2"	3#12, #12G	INTEGRAL TO VFD	**VFD [2]**	100 KA	+ 0.83

GENERAL NOTES:

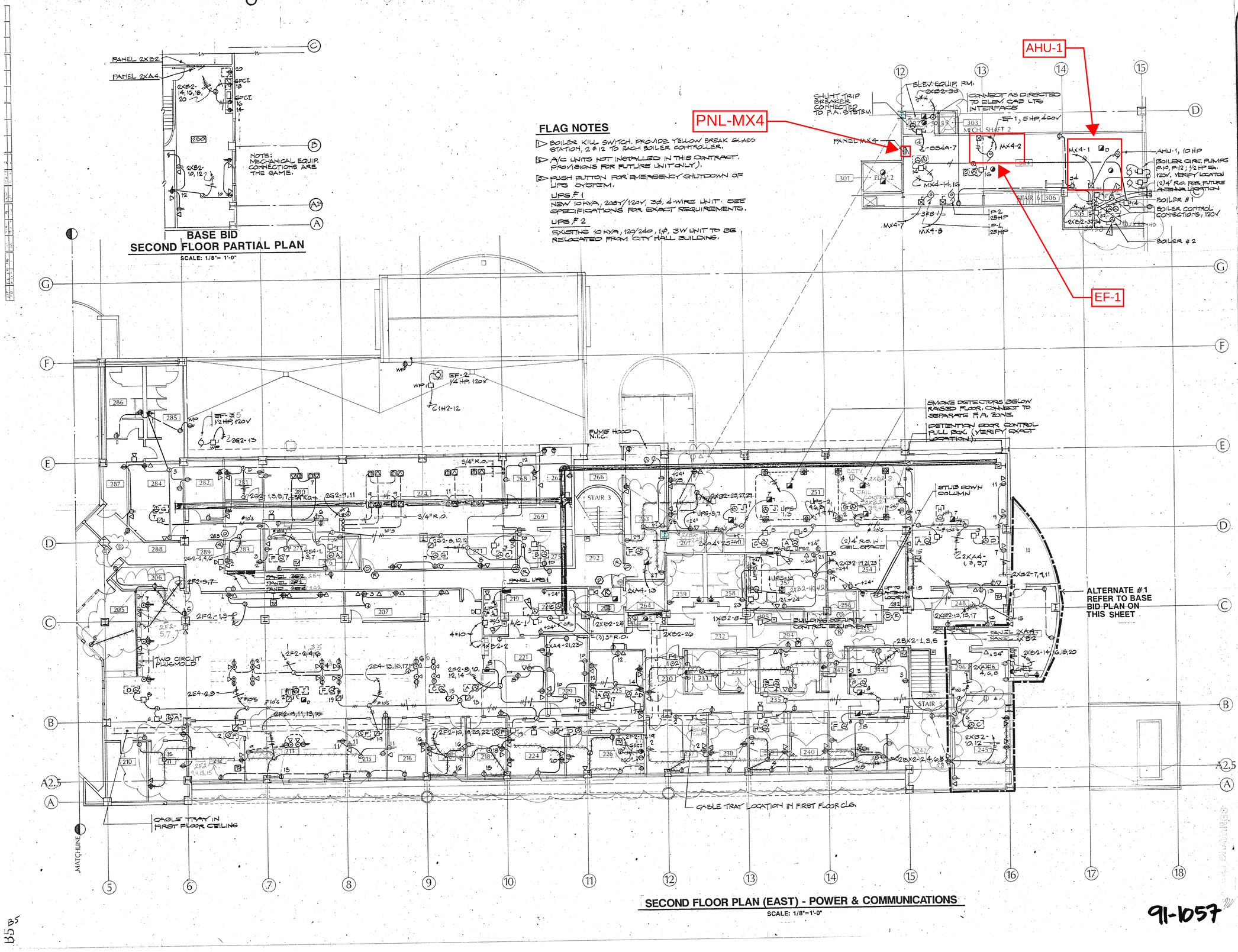
A. BOLD TEXT IN 'EXISTING' COLUMNS INDICATES WORK THAT IS TO BE DEMOLISHED. BOLD TEXT IN 'NEW' COLUMNS INDICATES NEW WORK.
B. THIS PROJECT WILL RESULT IN A NET LOAD INCREASE. 30-DAY METERING WILL BE REQUIRED FOR (1) PANEL, LISTED BELOW.

NUMBERED NOTES:

[1] EXISTING 208/120 VOLT PANEL TO RUN CIRCUIT FROM IS TBD. FOR THE PURPOSE OF THIS DELIVERABLE, ASSUME 150 LINEAL FEET OF NEW CONDUIT AND WIRE TO BMS PANEL.
[2] NEW VFD FOR EXHAUST FAN TO BE FURNISHED AND INSTALLED BY EC. ABB ACH580 SERIES DRIVE, WITH INTEGRAL DISCONNECT, AND NO BYPASS. EXTEND EXISTING UNISTRUT RACK TO MAKE SPACE FOR VFD FOR EXHAUST FAN
[4] EC TO FURNISH, INSTALL, AND CONNECT REPLACEMENT MOTOR INTO EXISTING EXHAUST FAN EF-1. CONTRACTOR IS RESPONSIBLE FOR MATCHING ALL PROPERTIES OF THE EXISTING MOTOR.
[5] FANWALL CONTROL PANEL TO BE FURNISHED BY MC, INSTALLED AND WIRED BY EC.

30-DAY METERING:

PANEL MX4



MCKINSTRY
Project: 204738 - REDMOND PSB PHASE 3
FIM #: 31865
FIM Name: UPGRADE MAIN AHU
Location: REDMOND, WA
Project Phase: GMAX
Date: 1/9/25 - MXM
Page: 1/1

Detailed Scope of Work

FIM ID # 53395
02.01-PSB Replace Condenser Pump
Redmond Public Safety Building

GENERAL

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.

SCOPE OF WORK INCLUDES

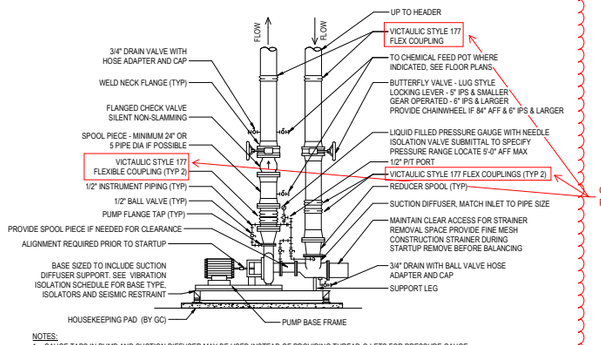
1. Equipment Furnished
   A. (1) 30 HP Condenser water pump
2. Mechanical
   1) Demo existing condenser water pump and associated appurtenances.
   2) Demo condenser water pipe connection.
   3) Install (1) new condenser water loop pump and suction diffuser.
   4) Connect condenser water piping to the new pump.
   5) Provide propylene glycol and inhibitor as necessary to refill hydronic loop after construction.
   6) Existing air-dirt separator to remain as-in per coordination with Owner.
3. Controls
   A. See Points List.
4. Electrical
   1) Electrical work associated with the replacement of (1) existing circulation pump and replacing existing starters with VFDs.
      (i) 30-Day Metering: Replacement of the one circulation pump will result in an increase in load on the associated panel, due to the input current rating of the ABB VFD's. 30-day metering will be required at the panel.
      (ii) Demo: Scope below applies to each of the one pump:
         (a) Disconnect power to pump.
         (b) Demo existing stand-alone motor starter.
         (c) Retain existing breaker in panel.
         (d) Retain existing conduit and wire. It is assumed to be #6 AWG. #6 AWG would have been 'Code-minimum' wire size at time of installation. #6 AWG wire will be Code-minimum size for new VFD.
      (iii) New Work: Scope below applies to each of the two pumps, unless otherwise indicated.
         (a) Furnish and install new VFD with Bypass. ABB , 480 volt, 30 hp, with integral disconnect, 100KA SCCR, with bypass, NEMA 1 enclosure.
         (b) Mount VFD on the existing uni-strut rack.
         (c) Extend conduit and wire as needed to new VFD, and from VFD to replacement pump.
5. Structural(existing framing has been verified with preliminary equipment selection; existing framing is adequate for new incoming loads associated with replacement mech equipment without triggering structural upgrade. Existing framing will be confirmed at a future date with final equipment selection).
   A. Provide seismic connection to secure pump to existing inertia base.
   B. Special inspection:
      1) Post-installed concrete anchors required special periodic inspection.
6. Testing, Adjusting, and Balancing (TAB)
   A. Perform hydronic TAB of the new water pump.
7. Commissioning
   A. Provide point to point verification and functional performance testing of the new pump.
8. Training
   A. Provide training as required for this FIM.

CLARIFICATIONS AND EXCLUSIONS

1. Excludes hazardous material testing and abatement. McKinstry will coordinate with the City additional testing and abatement as necessary.
2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.
   A. Previously replaced condenser pump to remain as-is, no changes or repair expected and not included.
3. All work will be performed during weekdays and day shift.

Detailed Scope of Work

4. Shutdown of the building condenser loop will be required to allow replacement of the pump isolation valve. This shutdown is expected to be couple of hours. Header isolation valves will be used to isolate the pump in scope. These are newer valves and are expected to hold. After the pump isolation valves are replaced and verified to operate, the building loop can be energized and continue to operate while the pump is being replaced.
5. Necessary roof protection and temporary fall protection is included. Permanent fall protection is not included.



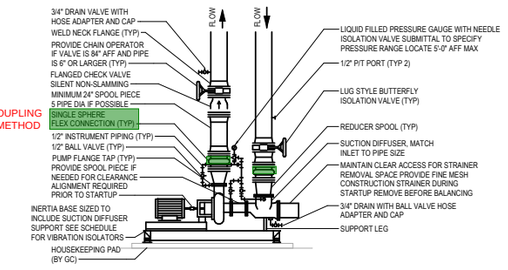
NOTES:
1. GAUGE TAPS IN PUMP AND SUCTION DIFFUSER MAY BE USED INSTEAD OF PROVIDING THREAD-O-LETS FOR PRESSURE GAUGE.
2. PROVIDE MINIMAL DISTANCE BETWEEN HOUSEKEEPING PAD AND BASE, 1-1/2" MINIMUM.
3. SEE PIPING SHEET SPECIFICATION FOR FLEX CONNECTION. FLEX CONNECTION MAY UTILIZE FLEXIBLE VICTAULIC COUPLINGS OR STAINLESS STEEL FLEX CONNECTION. RUBBER FLEX CONNECTIONS ARE NOT ALLOWED. INSTALL PER VICTAULIC 3 - FLEXIBLE COUPLING METHOD ABOVE OR ALTERNATE VICTAULIC CONFIGURATION.
4. USE RAISED FACE FLANGES AND GASKETS PER PRESSURE CLASS
5. ATTACH PUMP FRAME TO BASE WITH APPROVED FASTENERS AND GROUT PUMP FRAME PER MANUFACTURER'S INSTRUCTIONS.
6. VERTICAL PIPING SHALL BE SUPPORTED FROM ABOVE WITHOUT STRESS ON THE FLEX CONNECTIONS.
7. HOUSE KEEPING PAD SHALL BE DOWLED / SECURED TO BUILDING FLOOR TO WITHSTAND SEISMIC LOADS (BY G.C.)
8. PLACE ISOLATION VALVES AT SAME ELEVATION AND AT EYE LEVEL WHERE POSSIBLE

1 M-500

END SUCTION PUMP DETAIL - VICTAULIC FLEX

SCALE: NTS

CHANGE TO 3-VIC COUPLING FLEX CONNECTION METHOD



NOTES:
1. GAUGE TAPS IN PUMP AND SUCTION DIFFUSER MAY BE USED INSTEAD OF PROVIDING THREAD-O-LETS FOR PRESSURE GAUGE
2. PROVIDE MINIMAL DISTANCE BETWEEN HOUSEKEEPING PAD AND INERTIA BASE, 1-1/2" MINIMUM, OR PER ACOUSTICAL ENGINEER.
3. PRE-EXTEND FLEXIBLE CONNECTORS ON PUMP DISCHARGE PER MANUFACTURERS INSTALLATION INSTRUCTIONS.
4. USE FLAT FACE FLANGE AND FULL FACE GASKET AT CLASS 125 OR 250 FLANGE FACES, USE RAISED FACE FLANGE AT CLASS 150 OR 300 FLANGE FACES

5 M-500

END SUCTION PUMP DETAIL WITH INERTIA BASE VARIABLE VOLUME PUMP (WITH VFD)

SCALE: NTS

Inertia Base to be reused

McKinstry
For The Life Of Your Building
McKINSTRY Co, LLC

SEATTLE:
5005 3RD AVENUE S
PO BOX 24567
SEATTLE, WA 98124
1-800-669-6223

www.mckinstry.com

PROJECT:

CITY OF REDMOND
PUBLIC SAFETY
BUILDING PH II

8701 160TH AVE NE,
REDMOND, WA 98052

CONSULTANTS:

REGISTRATION:

RECORD DRAWINGS
AS REPORTED

DOCUMENTS HAVE BEEN REVISED BASED SOLELY ON RECORD WORKING DRAWINGS SUPPLIED BY THE CONTRACTOR AND THE CONTRACT DOCUMENTS. THEY DO NOT NECESSARILY SHOW ALL EXISTING CONDITIONS AND MAY NOT BE ACCURATE AT ALL LOCATIONS. FIELD VERIFY EXISTING AND/OR HIDDEN CONDITIONS PRIOR TO COMMENCEMENT OF NEW WORK.

ISSUES:

NO	DATE	DESCRIPTION
	3/24/2020	90% SET
	08/05/2020	PERMIT SET
	05/21/2021	RECORD SET

DESIGNED: K.MORK, B.MORRIS
DRAWN: K.MORK
CHECKED: B.MORRIS
JOB NO: 202835
ISSUED ON: 05/21/2021

SHEET TITLE:
MECHANICAL
DETAILS

SHEET NUMBER:
M-500

BIM 360://Energy Sandbox/202835-MEP-Redmond PSB Ph II.rvt

5/21/2021 11:48:43 AM

ELECTRICAL SCOPE TABLE

Project Name: Redmond PSB Phase 3 - 204738
FIM No: 53395-02.06
FIM Name: Replace Condenser Pump
Location: Redmond, WA
Project Phase: GMAX
Purpose: The following MEP Scope Table is intended to be referenced along with the 'Electrical Sketches'.
Date: 1/14/2025

EXISTING ELECTRICAL CONNECTION INFORMATION														NEW ELECTRICAL CONNECTION INFORMATION													LOAD CHANGE
EXISTING. EQUIP. TAG	LOCATION	V	PH	HP	FLA	MCA	KVA	PANEL OR JBOX	OCPD	CONDUIT	WIRE	DISCONNECT (SIZE/NEMA/FUSE)	MOTOR CONTROLLER	NEW EQUIP. TAG	V	PH	HP	FLA	MCA	KVA	MOCP	PANEL OR JBOX	OCPD	CONDUIT	WIRE	DISCONNECT (SIZE/NEMA/FUSE)	MOTOR CONTROLLER	MIN SCCR	
P-2	MECH ROOM	480	3	25	34.00	42.50	35.33	MX4-8,10,12	50	**1/2"**	**3#8**	**DISCONNECT**	**MAG. STRTR.**	P-2	480	3	30	40.00	50.00	41.57		MX4-8,10,12	50	**3/4"**	**3#6, #8G**	**INTEGRAL TO VFD**	**VFD [3]**	100 KA	+ 6.24

GENERAL NOTES:

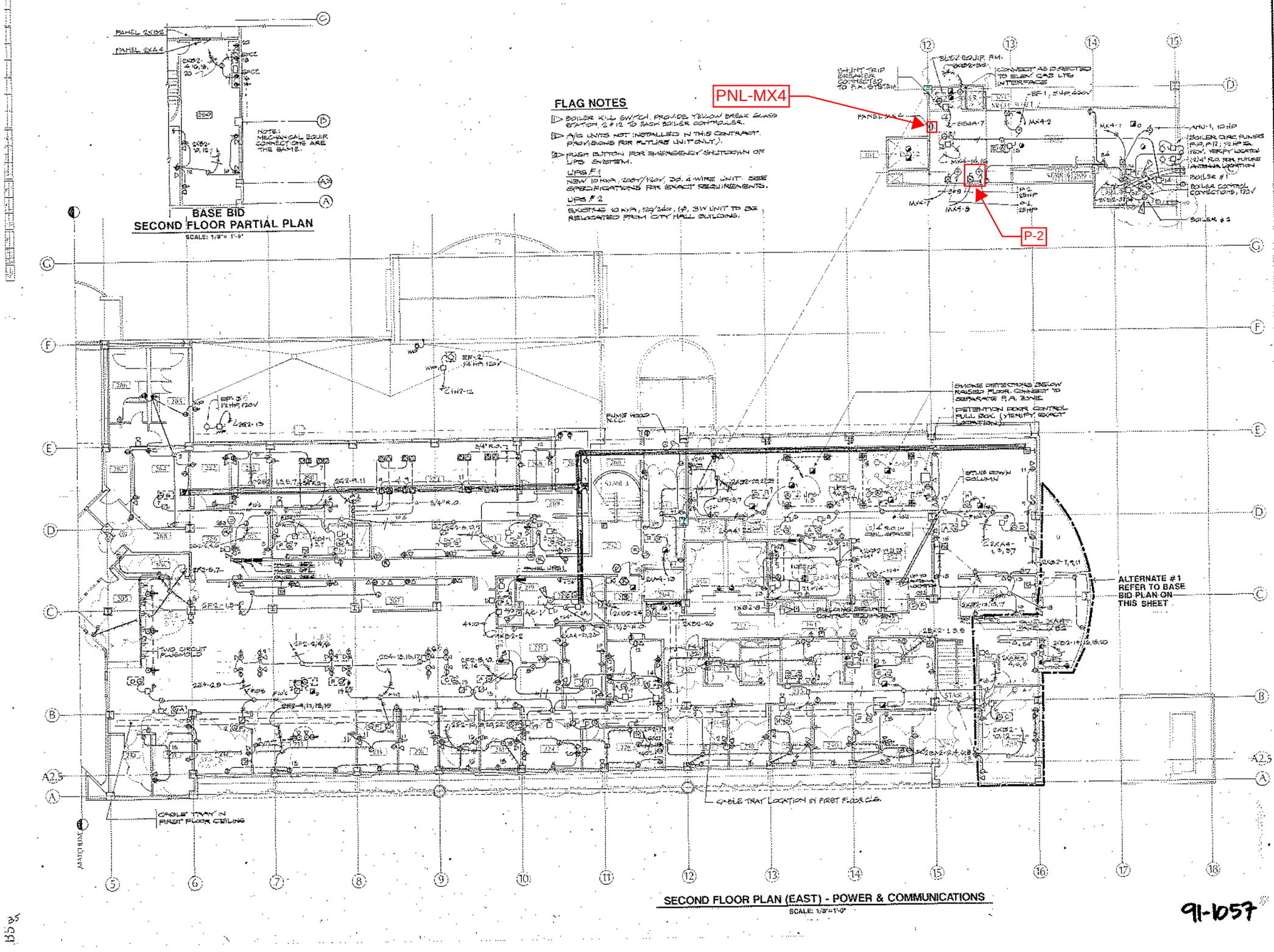
A. BOLD TEXT IN 'EXISTING' COLUMNS INDICATES WORK THAT IS TO BE DEMOLISHED. BOLD TEXT IN 'NEW' COLUMNS INDICATES NEW WORK.
B. THIS PROJECT WILL RESULT IN A NET LOAD INCREASE. 30-DAY METERING WILL BE REQUIRED FOR (1) PANEL, LISTED BELOW.

NUMBERED NOTES:

[3] NEW VFD FOR CONDENSER WATER PUMP TO BE FURNISHED AND INSTALLED BY EC. ABB ACH580 SERIES DRIVE, WITH INTEGRAL DISCONNECT, AND BYPASS. INSTALL VFD ON EXISTING RACK, NEXT TO VFD FOR P-1.

30-DAY METERING:

PANEL MX4



MCKINSTRY
Project: 204738 - REDMOND PSB PHASE 3
FIM #: 53395
FIM Name: REPLACE CONDENSER PUMP
Location: REDMOND, WA
Project Phase: GMAX
Date: 1/9/25 - MXM
Page: 1/1

Detailed Scope of Work

FIM ID # 53391
03.06-PSB IDF Room Split System
Redmond Public Safety Building

GENERAL

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.

SCOPE OF WORK INCLUDES

1. Equipment Furnished
   A. Ductless split system, (2) indoor units and (1) outdoor unit. Provide with wired thermostat.
2. Mechanical
   A. Demo
      1. Demo (1) split outdoor unit
      2. Demo (2) split indoor unit
      3. Demo refrigerant piping
      4. Demo thermostat
      5. Recover refrigerant for proper disposal
   B. New
      1. Install (1) split outdoor unit
      2. Install (2) split indoor unit
      3. Furnish and install refrigerant piping. Provide ½" insulation on all piping with shielding on exterior pipe (jacketing or similar, pipe wrap tape is not sufficient).
      4. Provide condensate piping as necessary to connect into existing.
3. Controls
   A. Install and wire thermostat provided with mechanical equipment for Start/Stop and temperature monitoring for the new Split System. The unit will be occupied 24x7 and temperature setpoint will be maintained by unit's standalone thermostat.
   B. Provide point in BAS for temperature monitoring.
   C. Provide BAS alarm if space temperature is above setpoint for more than 5 minutes (adj)
4. Structural
   A. Replacement ODU
      1. Provide seismic/wind attachment connection to existing conc footing.
      2. Concrete footing: existing conc footing to be remained and reused.
   B. Special inspection:
      1. Post-installed concrete anchors required special periodic inspection.
5. Electrical
   A. Basic Scope: Electrical work associated with replacement Split System.
   B. 30-Day Metering: There is no net load increase. No 30-day metering will be required.
   C. Demo: See 'Electrical Scope Table'.
   D. New Work: See 'Electrical Scope Table'.
6. TAB and Commissioning
   A. Perform start-up of new split system.
   B. Perform Point-to-Point and Functional Performance Testing of controls for split system and S/S control.
7. Measurement and Verification (M&V)
   A. Refer to Table 3.2.
8. Training
   A. Provide training as required for this FIM.

CLARIFICATIONS AND EXCLUSIONS

1. Excludes hazardous material testing and abatement. McKinstry will coordinate with the City additional testing and abatement as necessary.
2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above.
   A. Condensate drain from the new unit will be routed to the existing drain to match existing.
3. All work will be performed during weekdays and day shift.
4. Extensive impact to existing hard ceiling is expected along the refrigerant line routing. The ceiling will be removed

before start of work in that area and repaired after mechanical installation is complete.

5. Temporary cooling of the IDF space is not included in the project scope. City to provide temporary cooling.
6. Vinyl sheet covers for the network racks is included in the scope.
7. Necessary roof protection and temporary fall protection is included. The city confirmed Permanent fall protection is not required and it is not included in the scope.

FIM 53391
INDOOR UNIT LOCATION AND REFRIGERANT PIPING PATH

Outdoor Unit Location

Anticipated existing refrigerant piping path. Field verify.

DEMOLISH AND INSTALL NEW OUTDOOR UNIT.

DEMOLISH AND REPLACE EXISTING REFRIGERANT PIPING

DEMOLISH AND INSTALL NEW INDOOR UNIT

Indoor Unit -1

Indoor Unit - 2

MECH. MEZZANINE

SECOND FLOOR east

APPROVED

FIM 53391
REFLECTED CELING PLAN
FOR REFERENCE

Note:
1) SEE ROOM FINISH SCHEDULE FOR CLG HGTS.

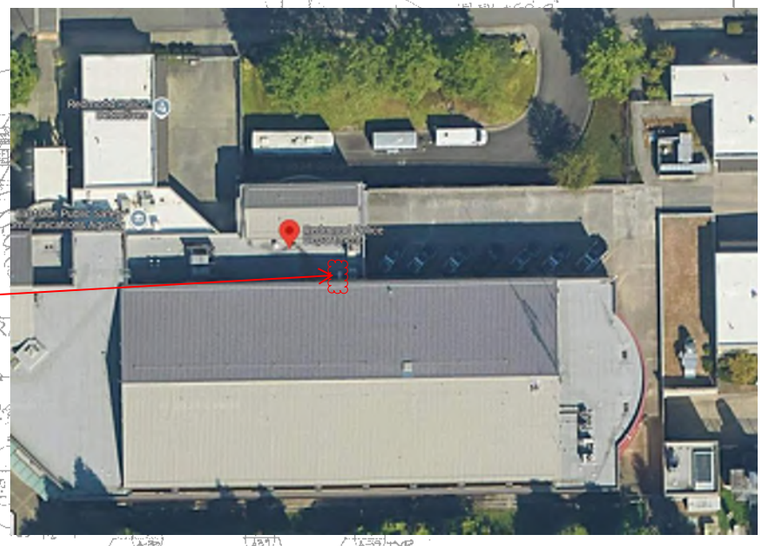
LEGEND
- ACT 1
- ACT 2
- GWB
- EXPOSED STRUCTURE
- PLASTER
- SPRAY-ON PROTECTION
- CLOSED CELL METAL PAN + 3" CONC.
- INTERIOR WALLS TO RUN FROM FINISH FL. TO STRUCTURAL DECK ABOVE
- 1 HR. TUNNEL CORRIDOR

MECHANICAL MEZZANINE
1/8" = 1'-0"

Areas with ceiling impact.

SECOND FLOOR REF. CLG. PLAN east
1/8" = 1'-0"

FIM 53391
OUTDOOR UNIT



Outdoor Unit

Lower Roof Ladder

Roof Access Hatch

ELECTRICAL SCOPE TABLE

Project Name: Redmond PSB Phase 3 - 204738
FIM No: 53391-02.05
FIM Name: IDF Room Split System
Location: Redmond, WA
Project Phase: GMAX
Purpose: The following MEP Scope Table is intended to be referenced along with the 'Electrical Sketches'.
Date: 1/10/2025

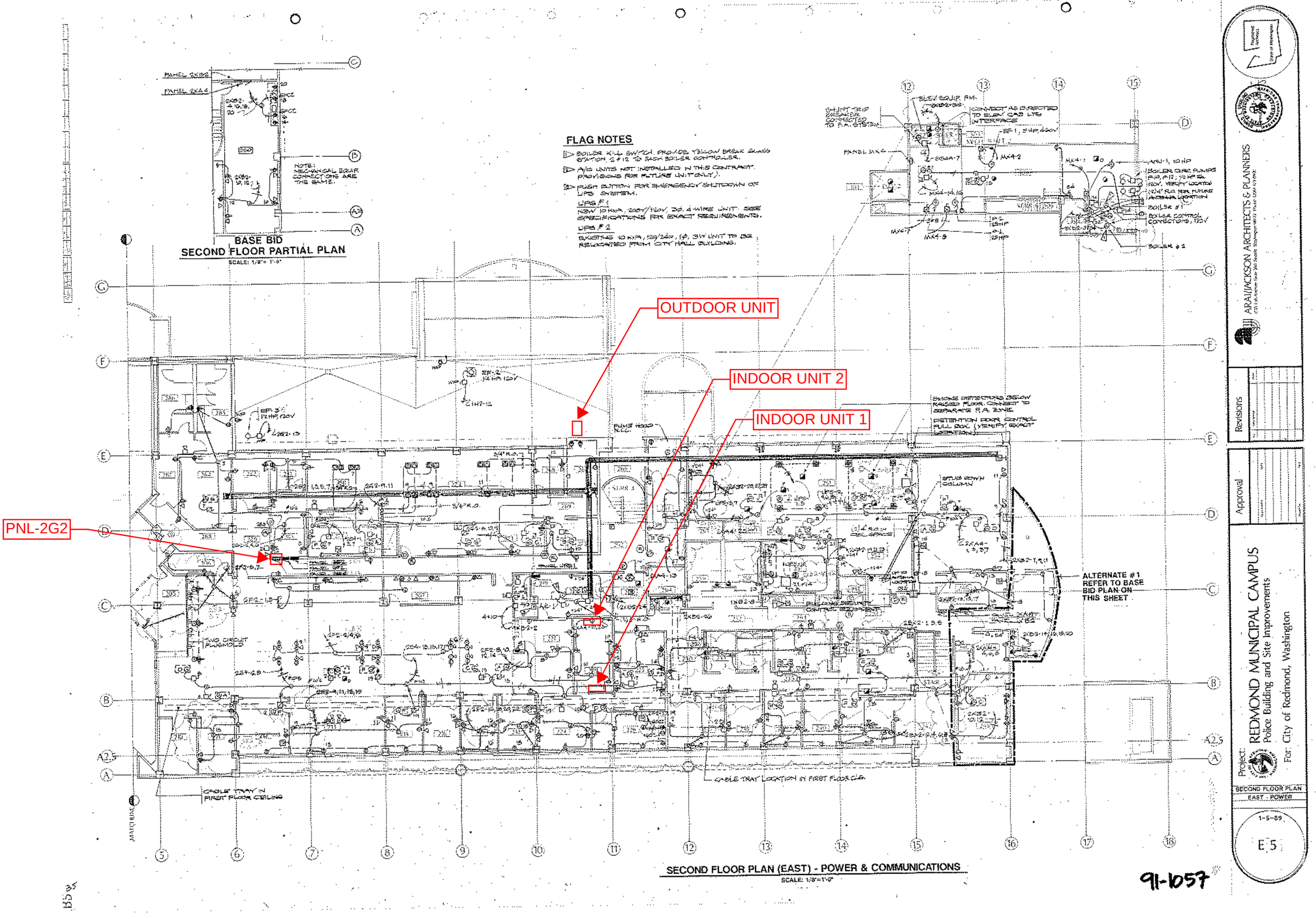
EXISTING ELECTRICAL CONNECTION INFORMATION														NEW ELECTRICAL CONNECTION INFORMATION													LOAD CHANGE
EXISTING. EQUIP. TAG	LOCATION	V	PH	HP	FLA	MCA	KVA	PANEL OR JBOX OR OTHER SOURCE	OCPD	CONDUIT	WIRE	DISCONNECT (SIZE/NEMA/FUSE)	MOTOR CONTROLLER	NEW EQUIP. TAG	V	PH	HP	FLA	MCA	KVA	MOCP	PANEL OR JBOX OR OTHER SOURCE	OCPD	CONDUIT	WIRE	DISCONNECT (SIZE/NEMA/FUSE)	MOTOR CONTROLLER	MIN SCCR	
CU-1	ROOF	208	1	N/A		17.00	3.54	2G2-20,22	20	1/2"	#12	**30/3R/?**	N/A	OUTDOOR UNIT	208	1	N/A		16.50	3.43	20	2G2-20,22	20	1/2"	#12	**30/3R/20**	N/A	5 KA	- 0.10
FCU-1-N	DATA ROOM	208	1	N/A		0.10	0.02	CU-1	N/A	1/2"	#12	MRS-15A	N/A	INDOOR UNIT 2	208	1	N/A	0.12	0.15	0.03	N/A	OUTDOOR UNIT	N/A	1/2"	#12	MRS-15A	N/A	N/A	+ 0.01
FCU-1-S	DATA ROOM	208	1	N/A		0.10	0.02	CU-1	N/A	1/2"	#12	MRS-15A	N/A	INDOOR UNIT 1	208	1	N/A	0.12	0.15	0.03	N/A	OUTDOOR UNIT	N/A	1/2"	#12	MRS-15A	N/A	N/A	+ 0.01

GENERAL NOTES:

A. BOLD TEXT IN 'EXISTING' COLUMNS INDICATES WORK THAT IS TO BE DEMOLISHED. BOLD TEXT IN 'NEW' COLUMNS INDICATES NEW WORK.
B. THIS PROJECT WILL RESULT IN A NET LOAD DECREASE. 30-DAY METERING WILL NOT BE REQUIRED.

30-DAY METERING:

NOT REQUIRED.



MCKINSTRY
Project: 204738 - REDMOND PSB PHASE 3
FIM #: 53391
FIM Name: IDF ROOM SPLIT SYSTEM
Location: REDMOND, WA
Project Phase: GMAX
Date: 1/9/25 - MXM
Page: 1/1

3. Energy Savings Guarantee

3.1 Guarantee Overview

1. *Philosophy*:
   McKinstry is prepared to guarantee any portion of a project over which it has direct control. Where McKinstry does not have direct control (such as operating hours associated with lighting), we are prepared to work with the Owner and DES to devise a method of Measurement and Verification (M&V), which will provide the highest degree of assurance that the energy savings are achieved.
2. *This Project*:
   For this project, McKinstry guarantees the performance of the installed initiatives to reduce energy consumption. The target energy reductions for the initiatives that will be implemented are shown in the attached Table 3.1 Energy Savings Summary. Based upon the stipulated conditions as enumerated by the Owner and DES personnel and the utility rates as described below, the utility cost savings calculations are also shown in Table 3.1.
3. *Ongoing Services:*
   Refer to Table 4.1 for the cost and duration of ongoing M&V. The cost of ongoing M&V beyond the duration listed in Table 4.1 is at the discretion of the Owner. McKinstry is prepared to continue the guarantee as long as the Owner continues the ongoing services as described herein. When the Owner chooses to cancel the ongoing services, the guarantee will also be terminated at the same point in time. Please refer to Table 3.2 M&V Plan Outline for a summary of the proposed measurement and verification scope.

3.2 FIM Specific Performance Assurance Methodology

1. *Guarantees:*
   Table 3.1 Energy Savings Summary provides the specific energy consumption savings for each Facility Improvement Measure (FIM) and the guarantee that McKinstry will provide associated with that measure. Savings calculations are based upon both baseline operating characteristics and proposed operation criteria:
   a. *Baseline:* Baseline refers to the existing operating characteristics that were used to calculate energy savings. The baseline values, including system performance and operational conditions, which were used for this project are provided in Table 3.2. In general, all parties acknowledge the baseline associated with any specific measure has been derived from the following sources:
      i. Actual operating information gathered through field observation, measurement, micro-data loggers, and Owner's operating logbooks.
      ii. Owner provided information concerning stipulated factors such as burn hours, occupancy, or operational expenditures.
      iii. In some instances, a modified baseline may have been developed to address areas whereby pre-retrofit conditions do not reflect a system that is operating per current code or what the Owner may deem as normal operation. The actual impact to energy usage will be identified along with the "avoided costs" associated with the modified baseline.
   b. *Proposed:* The proposed operating values, including system performance and operational conditions, which were used for savings calculations are provided in Table 3.2. Systems must be operated per the proposed criteria to ensure energy savings are realized. McKinstry will provide the initial start-up, commissioning, and programming of the system to ensure the systems operate per the proposed operating criteria. The Owner acknowledges their responsibility to ensure these criteria are maintained and associated energy savings are realized. Energy Savings

Guarantees are predicated based on the Owner maintaining their responsibilities as provided below in “Ongoing Owner Responsibilities” in Section 3.5.

3.3 Utility Rates

1. *Utility Rate:*
   For the purpose of calculating energy cost savings, the utility rates used will be the utility rates as paid by the Owner to the utility company at the time the Energy Services Proposal was developed. In the event that a building has multiple meters on different rate schedules, the per-unit cost of the utility will be the average of all the rate schedules in effect at that facility.
   a. *Base Utility Rate:*
      Refer to table 3.3 for the Base Utility Rates (including sales tax).

3.4 Standards Of Comfort Service

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.

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

LIGHTING

Illumination Levels Verification:

McKinstry shall perform a light level survey of the existing conditions during the audit phase of the project development. The existing lighting conditions shall be discussed with the Owner to gauge the preference for general illumination throughout the facility.

Illumination Levels Design:

It is McKinstry's intent to provide energy efficient lighting conditions that effectively meet the needs of the occupants and accommodate the application requirements. Where deemed appropriate, McKinstry will follow IESNA recommendations for illumination criteria in the absence of the Owner's preferred lighting standards.

3.5 Ongoing Owner Responsibilities

The Owner shall provide the following services as part of this energy services project. In the event that these services are not provided, energy savings and associated guarantees will be modified to reflect the associated impact.

1. Maintain all equipment per manufacturer's recommendations and proposed maintenance schedule.
2. Maintain all sequence of operations and performance criteria related to installed systems as proposed and designed.
3. Provide other FIM specific ongoing responsibilities as provided in Table 3.2.
4. Provide McKinstry with copies of actual monthly utility billing information on a quarterly basis for the duration of the M&V service period. This includes electric, natural gas, and fuel oil. The associated facilities where utility information shall be provided include all meters providing direct or indirect service to all buildings included in this project.
5. Provide McKinstry all internal sub-meter data, including electric and condensate meters, providing direct or indirect service to all buildings included in this project.
6. Provide McKinstry access to Energy Management and Control Systems for the purpose of collecting and logging data over time as required for performance verification.
7. The Owner shall notify McKinstry in writing concerning any changes or alterations to the building that will affect energy usage. This notification should be provided within two weeks of the change. This includes occupancy or use changes, computer load or other load changes, scheduling changes, and sequence of operations changes.

3.6 Non-Performance

In the event the equipment performance is not met, McKinstry accepts responsibility for additional energy consumption, due to reduced performance. McKinstry may, at its option, execute any of the following options:

1. Repair or replace equipment as necessary to meet required performance.
2. Make payments for the extra energy consumption to the Owner. In the event that McKinstry chooses the payment option, McKinstry reserves the right to select either an annual payment for the duration of the guarantee term or a one-time lump-sum payment of the same amount. In either case, the payment will be calculated based upon the quantity of additional electricity or natural gas used and the Base Utility Rate as described above.

3. Energy Savings Guarantee

3.7 Change Of Use

In the event that the Owner chooses to make changes to the facility that require set point adjustments, longer operating hours, or continuous equipment operation, the Owner agrees that:

1. Savings deemed as met described above will continue to be deemed as met.
2. Additional cost of extended equipment operation is a cost of the change, not due to a failure of McKinstry or their equipment.
3. McKinstry shall not be responsible for any increase in energy, maintenance, or any other costs incurred because of the extended equipment operation.
4. During the M&V portion of the project McKinstry at its option may make a baseline energy use adjustment to identify and account for a change-of-use at the facility.
5. McKinstry will calculate the change in energy consumption due to the specific change made to the system's operation.

Table 3.1 - Energy Savings Summary

Project	City of Redmond
Scenario	PSB HVAC 2025 - All FIMs PreFinal
Date	3/17/2025

			Electricity		Fossil Natural Gas		Total	EUI
Facility Improvement Measures	Facility	Net Effective Multiplier	kWh	kWh ($)	Therm	Therm ($)	($)	(kBtu/SF)
03.01-PSB Replace WSHP	Redmond Public Safety Building	90.0%	13,082	$1,456	0	$0	$1,456	0.73
04.01-PSB Upgrade HVAC Controls	Redmond Public Safety Building	90.0%	23,370	$2,601	1,664	$2,264	$4,865	4.00
03.02-PSB Upgrade Main AHU with Fan Array	Redmond Public Safety Building	90.0%	31,364	$3,491	428	$582	$4,073	2.43
02.01-PSB Replace Condenser Pump	Redmond Public Safety Building	90.0%	0	$0	0	$0	$0	0.00
03.06-PSB IDF Room Split System	Redmond Public Safety Building	90.0%	90	$10	0	$0	$10	0.00
		Totals	**67,906**	**$7,559**	**2,092**	**$2,845**	**$10,404**	**7.17**

NOTE:
Building Area (SF): 61,523

Table 3.2 - M&V Plan Outline

Project	City of Redmond
Scenario	PSB HVAC 2025 - All FIMs PreFinal
Date	3/17/2025

							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	A	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	A	1.	AHU TSP	4.5 in. w.c.	5.5 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	3/17/2025

							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 schedule and CO2 based control.	Site Audit, Collect HVAC BMS data, Review As-Built drawings	Review TAB Report to verify air flow values. Review sample fan speed trend data to verify VFD speed control. Review sample CO2 level and fan speed trends to verify DCV control. Review HVAC operating schedule to verify scheduled occuancy control.	Maintain and operate equipment per manufacturer's and McKinstry's recommendations. McKinstry to provide list of trend points and Owner to download and provide trend data.	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%
02.01-PSB Replace Condenser Pump	Redmond Public Safety Building	Non-Measured	1.	Not Applicable	Not Applicable	Not Applicable	Verify existing pump sizing and operation.	Not Applicable	Maintain and operate equipment per manufacturer's and McKinstry's recommendations.	Not Applicable
03.06-PSB IDF Room Split System	Redmond Public Safety Building	A	1.	Cooling Efficiency (EER)	Split System: 10.6	Split System: 12.7 (Non Ducted)	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.

Table 3.3 - Base Utility Rates

Project	City of Redmond
Scenario	PSB HVAC 2025 - All FIMs PreFinal
Date	3/17/2025

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	$0.111313	kWh	2/1/2025
Redmond Public Safety Building	Puget Sound Energy (PSE)	SCH 31 (2-1-25)	Natural Gas	$1.360290	Therms	2/1/2025

4. Project Financials

4.1 Maximum Project Allowable Cost

McKinstry guarantees that the Maximum Project Cost will not exceed the guaranteed value shown in Table 4.1 – Budget Summary; this cost does not include sales tax, WA State Interagency fees, or the utility incentive. The sales tax and interagency fees are shown in Table 4.1 for reference, and the utility incentive is shown in Table 4.2 for reference. (McKinstry does not guarantee the value of sales tax, interagency fees, or the utility incentive.)

If notice to proceed is not issued within 90 days, McKinstry reserves the right to re-evaluate the project and make necessary modifications to the construction costs.

4.2 Project Cost Table

See Table 4.1 – Budget Summary. All fee percentages and costs are unique to the project.

4.3 Items Included in Maximum Project Cost

1. Engineering audit, which includes the cost for the preparation of this proposal and Investment Grade Audit report.
2. Engineering design
3. Construction management services
4. Installation of McKinstry Equipment including the following costs as specified in the scope of work:
    a. All costs paid by McKinstry for the installation of the equipment. This includes costs paid to subcontractors or directly to McKinstry personnel, when related to installation or system verification of McKinstry equipment.
    b. The portion of reasonable travel, lodging, and meal expenses of officers or employees incurred while traveling in discharge of duties connected with the work. McKinstry will comply with OFM guidelines for reimbursement of travel expenses.
    c. Cost of all materials, supplies, and equipment incorporated in the Work, including costs of transportation thereof.
    d. Cost or rental charges, including transportation and maintenance, of all materials, supplies, equipment, temporary facilities, and hand tools not owned by the workers, which are consumed in the performance of the work in compliance with the General Conditions to the Main Energy Services Agreement.
    e. Cost of premiums for all bonds and insurance, which McKinstry is required to purchase and maintain.
    f. Sales, use, or similar taxes related to the Work and for which McKinstry is liable imposed by a governmental authority.
    g. Permit fees, royalties, and deposits lost for causes other than McKinstry's negligence.
    h. Losses and expenses not compensated by insurance or otherwise, sustained by McKinstry in connection with the work, in compliance with the General Conditions to the Main Energy Services Agreement.
    i. Demolition cost and cost of removal of all debris unless specifically excluded within the Scope of Work.
    j. Costs incurred due to an emergency affecting the safety of persons and property.

k. Other costs incurred in the performance of the Work if and to the extent approved in advance in writing by the Owner and DES.
l. Contingency as defined in Section 4.4.
m. Allowances as defined in Section 4.5.
n. Cost of equipment startup, training, system verification, and balancing performed by McKinstry.
o. Construction Bonds (including Performance & Payment Bond), Liability Insurance, and Builder's Risk Insurance.
p. McKinstry fee. This includes McKinstry's remuneration for compensation of personnel, expenses, risks related to the project, overhead, and profit.
q. McKinstry shall provide a Schedule of Values. The schedule of values will include all costs related to the installation of McKinstry's equipment.

4.4 Construction Contingency

A construction contingency as identified in Table 4.1 – "Budget Summary" has been established for this project. McKinstry can expend the contingency after a change order has been approved by the Owner, McKinstry, and the DES Project Manager for items necessary to complete the original scope of this project. The intent of the contingency is for "unforeseen conditions" beyond what was originally estimated. McKinstry and the Owner and DES will jointly manage any contingency left after the project scope is completed. All unused construction contingency funds shall reduce the overall project cost to the Owner.

4.5 Allowances

McKinstry may set aside allowances as identified in Table 4.1 - "Budget Summary" for specific areas of work that have been identified as a potential cost impact but cannot be determined at this stage. Should the allowance not be adequate, the Owner and the DES Project Manager will be advised. McKinstry will be compensated for any additional costs via Change Order to the contract should the Owner and the DES Project Manager agree. In extreme situations, McKinstry may request additional funds to cover cost overruns that could not have been foreseen by either party. Allowances are to be agreed upon by the Owner and DES.

4.6 Ongoing Services

Refer to Table 4.1 for the cost and duration of any ongoing services.

4.7 Accounting Records

McKinstry shall check all material, equipment, and labor entering into the worksite and shall keep such full and detailed accounts as may be necessary for proper financial management under this Agreement. The Owner and the DES Project Manager shall be afforded access to all McKinstry's records, books, correspondence, instructions, drawings, receipts, vouchers, memoranda, and similar data relating to this Contract, and the McKinstry shall preserve all such records for a period of seven years, or for such longer period as may be required by law, after the final payment.

4.8 Reconciliation of Labor & Material Costs

The maximum project allowable cost is based on firm negotiated bids or estimated labor and material costs developed by McKinstry. In recognition that actual Labor & Material costs may vary from the estimate, the following procedures are established to reconcile this difference:

1. If the total maximum guaranteed project cost at completion exceeds the estimated amount (plus contingency), the additional costs will be borne by McKinstry at their expense.
2. If the total project costs at completion are less than the estimated proposal amount (less contingency), the savings will be retained by the Owner.
3. There shall be no cost savings split between the Owner and McKinstry.

The following Figure 4.A outlines proposed procurement and payment reconciliation methods. Changing the proposed method of reconciliation after the acceptance of the Proposal may require an adjustment to the Guaranteed Maximum Project Cost.

DEFINITIONS:

Major Equipment:

Major Equipment is any single piece of equipment purchased by McKinstry with a value over $5,000.

Negotiated:

Construction contract value is to be established through negotiations with a select or single contractor (i.e. owner preferred controls contractor, mechanical contractor, etc.).

Bid:

Construction contract value is to be established through a bid process based upon formal bid documents including plans and specifications which will be bid to a minimum of two (typically three) pre-qualified contractors as approved by McKinstry and the Owner.

Self-Perform:

McKinstry intends to perform work with McKinstry personnel.

Schedule of Values (SOV):

Cost shall be substantiated with a properly executed invoice from the subcontractor or supplier that matches the schedule of values in their contract or purchase order.

Time & Materials (T&M):

Published sell rates will be established prior to issuance of contract to subcontractor or commencement of work by McKinstry. A monthly labor and material report will be provided which will include labor hours and dollars per individual, and material and equipment invoices.

Firm:

Fees that are negotiated prior to proposal and are not reconciled at the end of the project.

4. Project Financials

Figure 4.A

CONSTRUCTION COST CATEGORY (REF TABLE 4.1)	PROPOSED CONSTRUCTION METHOD	END OF PROJECT – RECONCILED
Controls Systems	Negotiated Subcontract Sole Source	SOV
Major Equipment	Negotiated	SOV
Sheet Metal	Subcontract Bid	SOV
Electrical	Subcontract Bid	SOV
TAB/Start up	Self-Perform	SOV
Commissioning	Self-Perform	SOV
General/Other	Self-Perform	T&M
Change Order (CO)	As Specified in CO	T&M
Fees	Self-Perform	Firm

Compensation

1. **TERMS**:
   Net 30 days (45 days for State Treasurer payments) from the date of invoice, monthly billings as the job progresses.
2. **PAYMENTS**:
   At a minimum, payments will be made in the amount of 100% at the completion and implementation of any individual facility improvement measure (FIM) in the amount of that FIM as delineated in the contract. If more than one FIM is completed in a monthly period, all those FIMS will be paid.
3. **FINANCE CHARGES ON UNPAID BALANCES**:
   Payments due and unpaid shall be subject to interest charges within 30 days (45 days for State Treasurer payments) of receipt of a properly completed invoice per RCW 39.76. Finance charges will be calculated on the un-paid balance per RCW 39.76 which specifies the interest rate shall be one percent per month but not less than one dollar per month on amounts due beyond 30 days. Interest charges will be calculated daily, compounded monthly. Charges accrue until balances are paid in full.
4. **CONSTRUCTION PERIOD FINANCE CHARGES**:
   McKinstry may charge construction period finance charges for projects, independent of financing method, whereby the anticipated billing lags the earned schedule of values by more than 90 days. If Owner controlled schedule delays occur during the progress of the project, McKinstry may request additional finance charges be added to the project. Construction period finance will be calculated on the un-paid balance at the rate of Prime + 2% per annum. Interest charges will be calculated daily, compounded monthly. Charges accrue until balances are paid in full. McKinstry and the Owner will work together to minimize finance charges.
5. **SUBSTANTIATION OF FINANCE CHARGE:**
   McKinstry will do an accounting of finance charges progressively through the project, and at contract completion submit a change request itemizing the summary of additional costs for implementation. The contract will then be increased to reflect the same and finance charges will be paid within 30 days of the date of approved substantiation.

4. Project Financials

4.10 Financing

McKinstry enjoys over 55 years of experience within the engineering and contracting industry and its financial strength exceeds the industry average. This strength makes it possible to provide and assist with the financing needs of its customers. Long standing relationships with vendors assures reasonable pricing and excellent payment terms.

LONG-TERM FINANCING:

The Owner has several options available for long term permanent financing. The Washington State Treasurer's Office can provide financing. Third Party financing is also available

4.11 Termination Value

Should the owner choose to finance the project through McKinstry, a schedule will be provided showing the termination value of the financing agreement for each year during the term of the agreement.

4.12 Terms of Agreement

The Contract shall be effective and binding upon the parties immediately upon its execution and the period from contract execution until the Commencement of Energy Savings Date shall be known as the "Interim Period". All energy savings achieved during the interim period will be fully credited to the Owner.

4.13 Insurance & Bonding

McKinstry shall provide a payment and performance bond and builders Risk Insurance.

For The Purposes of This Agreement, the "Sum Amount of Bond" Shall Be (See Table 4.1 –"Budget Summary").

1. The bond amount consists of Labor and Materials and State Sales Tax.
2. This bond does not include any construction contingencies.
3. Certificates of General Liability Insurance will be provided prior to Contract Signing. The State of Washington shall be named as An Additional Insured on all insurance certificates.

McKinstry shall provide a payment and performance bond in the amount of 100% of the construction cost, as defined in the General Conditions to the Main Energy Services Agreement. The amount shall include all authorized changes and state sales tax. The Bond shall be in the form attached to the Conditions of the Main Energy Services Agreement. The Contract listed on the bond form shall be the Addendum No. and Agreement No., which incorporates the work, and the "Contract Date" shall be the date of the Authorization. The full and just sum of the Bond shall be as defined above and shall include the actual cost of purchasing and installing McKinstry's Equipment. The Bond shall specifically exclude coverage for those portions of the Energy Services Agreement and/or Energy Services Agreement Authorization pertaining to design services, energy cost savings guarantee, maintenance guarantee, utility incentives, efficiency guarantees, and any other clauses which do not relate specifically to construction management and supervision of work for purchasing and installing of McKinstry's Equipment, or for work to be accomplished by the Owner. The Bond shall be with a Surety or Bonding Company that is registered with the State of Washington Insurance Commissioner's Office.

While McKinstry stands behind our safety record, we cannot control the work flow around items we have no control over. At no point does McKinstry assume any responsibility for the loss of use of any equipment and we exclude any and all claims for consequential damages therein.

4. Project Financials

4.14 Diverse Business Participation Goals for this Project

McKinstry has established the following diverse business participation goals for this project in consultation with the Owner and the DES Energy Program.

McKinstry will be able to partially meet the McKinstry standard Inclusion Plan diverse business participation goals.

(1) The buildings controls is a significant portion of the construction scope. The Owner has directed McKinstry to subcontract to a particular building controls subcontractor for standardization with their existing building controls. Potential for low voltage electrical installation second tier subcontracting is being evaluated.

(2) McKinstry has provided information and training to many potential subcontractors, suppliers, and consultants on how to register for the State certifications.

(3) The following tables are a list of diverse subcontractors or suppliers who may provide services or assistance on this project, and project specific inclusion goals.

Figure 4.C

Vet First

Figure 4.D

State Certification Category	McKinstry Standard Inclusion Plan	For this Project: Percentages for Construction	For this Project: Percentages for Professional Services
Minority-owned business	10%	0%	0%
Women-owned business	6%	0%	0%
Veteran-owned business	5%	22%	0%
Small/mini/micro business	5%	0%	0%
Total	26%	0%	0%

4.15 Apprenticeship

This Energy Services Proposal acknowledges the minimum levels of apprenticeship participation of 15% for construction contracts of one million dollars or more per the 2023 General Conditions Section 10.16. McKinstry will upload the Apprenticeship Utilization Plan to the Labor and Industries site and provide a copy to DES and the Owner prior to initial invoice if applicable.

4.16 Cost Effectiveness Criteria

The following table describes how this project meets the cost effectiveness criteria for implementation as indicated in the IGA proposal dated 08-05-2024.

4. Project Financials

Figure 4.E

Cost Effective Criteria	How Criteria were Met

• The NPV of the proposed project will be neutral or positive over the term of the useful life of the equipment where the following will be included in the cash flow: total project cost, any available utility incentives, the value of the energy saved on an annual basis (cost at current utility rates).
  ○ For the purpose of the financial cash flow models, McKinstry will work with DES Energy Program and the client to use appropriate financial rates and other variables to show project benefits.
  ○ The cash flow model may include the following based on client approval: Hard-cost operational savings (no labor), Capital infusion from planned capital project budgets, cash reserves, grants, utility incentives, or other sources, Loans/financing, Deferred maintenance, Social cost of carbon etc.
	The Investment Grade Audit report dated 03.11.2025 includes a Life Cycle Cost Analysis that shows that the NPV cost of the proposed project conditions is lower than the NPV cost of the baseline conditions.

• The project scope could be adjusted to align with the funds budgeted for the project.	McKinstry supported City's application for WA Commerce Audit and AWC Audit grant.
• McKinstry will work with Puget Sound Energy to secure rebates for applicable scope.	Incentive program review with PSE is initiated. After confirmation of the project scope, suitable PSE program will be confirmed and its application will be submitted.

4.17 Liquidated Damages

The mechanical mezzanine scope of FIM '03.02-PSB Upgrade Main AHU with Fan Array' that will impact the 911 area shall be substantially complete within 11 working days from the commencement of work on that scope. Not included in this schedule requirement is the installation of the (3) Constant Airflow Regulating Dampers in the 911 area. It is part of this FIM and will be performed separately to minimize impact to the space and focus effort on the mezzanine scope.

Liquidated damages will be calculated based on the number of working days beyond the specified duration required to substantially complete the 911 area (i.e., the FIM 31865 Main AHU Fan Array (Mech Mezz)). These damages shall apply solely to the 911 area and will not be imposed on other portions of the project.

The liquidated damages shall follow a sliding scale, with penalties reducing as progress is made:

- Days 1-3 Delay: $200/day
- Days 4-7 Delay: $400/day

- Days 8+ Delay: $800/day

To successfully deliver the project and reduce the risk for all parties, after receiving the NTP, McKinstry will thoroughly review the schedule again with the sub-contractors to assess its validity and provide early notice to the City and DES if any issues arise that could delay the start or duration of the work. If new issues arise, the current proposed construction start schedule and duration will be re-negotiated. This review will take place at least one months before work begins in the building.

4.18 EECBG Program Support

The City of Redmond has notified DES and McKinstry of the use of Federal EECBG Block Grant funding for this project. The City of Redmond, DES, McKinstry, and its subcontractors agree to comply with the Federal funding requirements. This will be consistent with 29 CFR 5.5 -Contract Provisions and Related Matters (Refer Appendix A1 of this ESP) and as required in the MESA Section K-State and Federal Requirements and ESPC General Conditions Section 5.06 Prevailing Wages.

McKinstry to provide weekly reporting necessary for Davis Bacon Act and facility site interviews. The DES to perform interviews and the City to compile and submit documentation required for the grant.

Table 4.1 - Budget Summary

Project	City of Redmond
Scenario	PSB HVAC 2025 - All FIMs PreFinal
Date	3/17/2025

Database ID	FIM Name	Mechanical	Electrical	EMCS	Lighting	General	Equipment	Other	Total
53395	02.01-PSB Replace Condenser Pump	$ 80,923	$ 16,676	$ 3,924	$ -	$ 10,751	$ -	$ -	$ 112,274
53394	03.01-PSB Replace WSHP	$ 484,314	$ 149,076	$ 58,006	$ -	$ 67,209	$ -	$ -	$ 758,605
31865	03.02-PSB Upgrade Main AHU with Fan Array	$ 388,152	$ 53,259	$ 59,602	$ -	$ 32,491	$ -	$ -	$ 533,504
53391	03.06-PSB IDF Room Split System	$ 61,977	$ 8,776	$ 10,727	$ -	$ 35,573	$ -	$ -	$ 117,053
31871	04.01-PSB Upgrade HVAC Controls	$ 129,107	$ -	$ 274,700	$ -	$ -	$ -	$ -	$ 403,807
	Total Base FIM Cost	$ 1,144,473	$ 227,787	$ 406,959	$ -	$ 146,024	$ -	$ -	$ 1,925,243

A. Construction Costs					
	Construction Bonds & Insurance	%	1.50%	Percent of Subtotal (FIM Cost and A)	$ 28,879
				Total Construction Cost	$ 1,954,122

B. Professional Services Costs					
	Audit Fee	Lump	$99,000		$ 99,000
	Design	%	10.00%	Percent of Total Base FIM Cost	$ 192,524
	Const. Management & Proj. Admin	%	9.00%	Percent of Total Base FIM Cost	$ 173,272
	Overhead	%	10.00%	Percent of Total Construction Cost	$ 192,524
	Profit (Fee)	%	8.00%	Percent of Total Construction Cost	$ 154,019
				Total Professional Services Cost	$ 811,339

C. Other Project Costs					
	Construction Contingency	%	4.28%	Percent of Total Base FIM Cost	$ 74,779
	Apprenticeship Incentive	Lump	$1,000	WA State Apprenticeship Requirement for Projects with Construction Cost >= $1M	$ 1,000
	Performance Assurance (M&V)	Lump	$17,600		$ 17,600
				Total Other Project Cost	$ 93,379

E. Total Guaranteed Construction & ESCO Services (A + B + C + D)	$ 2,858,840

F. Non-Guaranteed Costs					
	Sales Tax	%	10.30%	Percent of Section E	$ 294,460
	DES Energy Program PM Fee	Lump	$66,700		$ 66,700
				Total Non-Guaranteed Cost	$ 361,160

G. Total Maximum Project Cost (E + F)	$ 3,220,000

Table 4.2 - Facility Improvement Measure (FIM) Summary

Project	City of Redmond
Scenario	PSB HVAC 2025 - All FIMs PreFinal
Date	March 17, 2025

Facility Improvement Measures	FIM Description	Facility	Budget *	Annual Utility Savings	Annual Operational Savings **	Potential Incentives ***
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	Redmond Public Safety Building	$1,268,780	$1,456	$1,000	$2,326
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; sample zone CO2 sensor based ventilation control at the AHU	Redmond Public Safety Building	$675,374	$4,865	$3,500	$13,179
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	Redmond Public Safety Building	$892,295	$4,073	$1,500	$9,235
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	Redmond Public Safety Building	$187,780	$0	$0	$0
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	Redmond Public Safety Building	$195,772	$10	$200	$0
		Totals	**$3,220,000**	**$10,404**	**$6,200**	**$24,740**

* Since design cost, audit cost, etc. are distributed among the FIMs, the total project cost will not go up or down by exactly the amounts shown here if a FIM or FIMs are dropped.
** For non recurring operational savings, the values are averaged over the 30 year length of this analysis.
*** Incentives are contingent on final approval and are not guaranteed. Funds are shown for reference only.

Energy Services Performance Contracting 2025 Labor Rates - 1st Edition			
Title - Classification	Regular Time	Overtime	Double Time
Service Rates (#)			
Standard Rate (*, †)	206	309	412
Contract Rate (*, †)	191	286	382
Construction Field Rates (#)			
Trade Project Manager	164	0	0
Plumbing/Pipefitter (*)	186	279	372
Sprinkler Fitter (*)	174	261	348
Sheet Metal (*)	161	242	322
Electrician (*)	190	285	380
Lighting Maint. Worker (*)	70	105	140
Carpenter (*)	133	200	266
Laborer	93	140	186
Warehouse/Driver (*)	122	183	244
Commissioning/TAB/Start Up Rates (#)			
Cx Lead	207	0	0
Sr. Cx Engineer (*)	196	294	392
Cx Engineer (*)	180	269	359
Cx Specialist (*)	167	251	335
Cx Technician (*)	144	216	288
TAB Technician (*, †, #)	208	312	416
Start-up Technician (*, †, #)	221	332	443
Technical Services Rates (Fac Assessment, Fac Operations, System Integration)			
TS Sr. Project Manager	230	0	0
TS Project Manager	207	0	0
Lead Engineer/Consultant	220	0	0
Senior Engineer/Consultant	213	0	0
Engineer/Consultant	207	0	0
Specialist	183	0	0
Site / Staff Rates			
Site Superintendent (*)	203	305	406
Site Coordinator	118	177	235
Site Safety (*)	167	0	0
Project Engineer	173	259	345
Purchasing / CSR / Dispatch	123	184	246
Administrative Assistant	118	177	235

- All-Inclusive Rates per L&I Prevailing Wage Tables and Authorized Allowances per General Conditions for Washington State Energy Savings Performance Contracting
- Regular Time - Monday thru Friday, from 6:30 AM to 3:00 PM

- Shift Premiums (2nd and graveyard) percentage based on respective trade agreements

* Truck & Rental Costs per WSDOT/AGC (Premedia) Blue Book at the Stand-By Rate (No Fuel Cost). 3RD Party Rental Cost per Actual Invoice.

† - Safety, Consumables & Small Tools Expense per GCs for WA ST Energy Savings Performance Contracting

Appendix

A1: 29 CFR 5.5 Contract provisions and related matters

Title 29 —Labor

Subtitle A —Office of the Secretary of Labor

Part 5 —Labor Standards Provisions Applicable to Contracts Covering Federally Financed and Assisted Construction (Also Labor Standards Provisions Applicable to Nonconstruction Contracts Subject to the Contract Work Hours and Safety Standards Act)

Subpart A —Davis-Bacon and Related Acts Provisions and Procedures

Source: 48 FR 19540, Apr. 29, 1983, unless otherwise noted.

Authority: 5 U.S.C. 301; Reorganization Plan No. 14 of 1950, 5 U.S.C. appendix; 28 U.S.C. 2461 note; 40 U.S.C. 3141 *et seq.;* 40 U.S.C. 3145; 40 U.S.C. 3148; 40 U.S.C. 3701 *et seq.;* Secretary's Order No. 01-2014, 79 FR 77527; and the laws referenced by § 5.1(a).

Source: 48 FR 19541, Apr. 29, 1983, unless otherwise noted.

Editorial Note: Nomenclature changes to subpart A of part 5 appear at 61 FR 19984, May 3, 1996.

§ 5.5 Contract provisions and related matters.

(a) ***Required contract clauses.*** The Agency head will cause or require the contracting officer to require the contracting officer to insert in full, or (for contracts covered by the Federal Acquisition Regulation (48 CFR chapter 1)) by reference, in any contract in excess of $2,000 which is entered into for the actual construction, alteration and/or repair, including painting and decorating, of a public building or public work, or building or work financed in whole or in part from Federal funds or in accordance with guarantees of a Federal agency or financed from funds obtained by pledge of any contract of a Federal agency to make a loan, grant or annual contribution (except where a different meaning is expressly indicated), and which is subject to the labor standards provisions of any of the laws referenced by § 5.1, the following clauses (or any modifications thereof to meet the particular needs of the agency, *Provided,* That such modifications are first approved by the Department of Labor):

(1) ***Minimum wages*** —

(i) ***Wage rates and fringe benefits.*** All laborers and mechanics employed or working upon the site of the work (or otherwise working in construction or development of the project under a development statute), will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of basic hourly wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. As provided in paragraphs (d) and (e) of this section, the appropriate wage determinations are effective by operation of law even if they have not been attached to the contract. Contributions made or costs reasonably anticipated for bona fide fringe benefits under the Davis-Bacon Act (40 U.S.C. 3141(2)(B)) on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (a)(1)(v) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred

during such weekly period. Such laborers and mechanics must be paid the appropriate wage rate and fringe benefits on the wage determination for the classification(s) of work actually performed, without regard to skill, except as provided in paragraph (a)(4) of this section. Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: *Provided,* That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classifications and wage rates conformed under paragraph (a)(1)(iii) of this section) and the Davis-Bacon poster (WH-1321) must be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

(ii) ***Frequently recurring classifications.***

(A) In addition to wage and fringe benefit rates that have been determined to be prevailing under the procedures set forth in 29 CFR part 1, a wage determination may contain, pursuant to § 1.3(f), wage and fringe benefit rates for classifications of laborers and mechanics for which conformance requests are regularly submitted pursuant to paragraph (a)(1)(iii) of this section, provided that:

(*1*) The work performed by the classification is not performed by a classification in the wage determination for which a prevailing wage rate has been determined;

(*2*) The classification is used in the area by the construction industry; and

(*3*) The wage rate for the classification bears a reasonable relationship to the prevailing wage rates contained in the wage determination.

(B) The Administrator will establish wage rates for such classifications in accordance with paragraph (a)(1)(iii)(A)(*3*) of this section. Work performed in such a classification must be paid at no less than the wage and fringe benefit rate listed on the wage determination for such classification.

(iii) ***Conformance.***

(A) The contracting officer must require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract be classified in conformance with the wage determination. Conformance of an additional classification and wage rate and fringe benefits is appropriate only when the following criteria have been met:

(*1*) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(*2*) The classification is used in the area by the construction industry; and

(*3*) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(B) The conformance process may not be used to split, subdivide, or otherwise avoid application of classifications listed in the wage determination.

(C) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a

report of the action taken will be sent by the contracting officer by email to *DBAconformance@dol.gov*. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer will, by email to *DBAconformance@dol.gov*, refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(E) The contracting officer must promptly notify the contractor of the action taken by the Wage and Hour Division under paragraphs (a)(1)(iii)(C) and (D) of this section. The contractor must furnish a written copy of such determination to each affected worker or it must be posted as a part of the wage determination. The wage rate (including fringe benefits where appropriate) determined pursuant to paragraph (a)(1)(iii)(C) or (D) of this section must be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iv) ***Fringe benefits not expressed as an hourly rate.*** Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor may either pay the benefit as stated in the wage determination or may pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(v) ***Unfunded plans.*** If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, *Provided,* That the Secretary of Labor has found, upon the written request of the contractor, in accordance with the criteria set forth in § 5.28, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

(vi) ***Interest.*** In the event of a failure to pay all or part of the wages required by the contract, the contractor will be required to pay interest on any underpayment of wages.

(2) ***Withholding*** —

(i) ***Withholding requirements.*** The [write in name of Federal agency or the recipient of Federal assistance] may, upon its own action, or must, upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor so much of the accrued payments or advances as may be considered necessary to satisfy the liabilities of the prime contractor or any subcontractor for the full amount of wages and monetary relief, including interest, required by the clauses set forth in paragraph (a) of this section for violations of this contract, or to satisfy any such liabilities required by any other Federal contract, or federally assisted contract subject to Davis-Bacon labor standards, that is held by the same prime contractor (as defined in § 5.2). The necessary funds may be withheld

from the contractor under this contract, any other Federal contract with the same prime contractor, or any other federally assisted contract that is subject to Davis-Bacon labor standards requirements and is held by the same prime contractor, regardless of whether the other contract was awarded or assisted by the same agency, and such funds may be used to satisfy the contractor liability for which the funds were withheld. In the event of a contractor's failure to pay any laborer or mechanic, including any apprentice or helper working on the site of the work (or otherwise working in construction or development of the project under a development statute) all or part of the wages required by the contract, or upon the contractor's failure to submit the required records as discussed in paragraph (a)(3)(iv) of this section, the [Agency] may on its own initiative and after written notice to the contractor, sponsor, applicant, owner, or other entity, as the case may be, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

(ii) ***Priority to withheld funds.*** The Department has priority to funds withheld or to be withheld in accordance with paragraph (a)(2)(i) or (b)(3)(i) of this section, or both, over claims to those funds by:

(A) A contractor's surety(ies), including without limitation performance bond sureties and payment bond sureties;

(B) A contracting agency for its reprocurement costs;

(C) A trustee(s) (either a court-appointed trustee or a U.S. trustee, or both) in bankruptcy of a contractor, or a contractor's bankruptcy estate;

(D) A contractor's assignee(s);

(E) A contractor's successor(s); or

(F) A claim asserted under the Prompt Payment Act, 31 U.S.C. 3901-3907.

(3) ***Records and certified payrolls*** —

(i) ***Basic record requirements*** —

(A) ***Length of record retention.*** All regular payrolls and other basic records must be maintained by the contractor and any subcontractor during the course of the work and preserved for all laborers and mechanics working at the site of the work (or otherwise working in construction or development of the project under a development statute) for a period of at least 3 years after all the work on the prime contract is completed.

(B) ***Information required.*** Such records must contain the name; Social Security number; last known address, telephone number, and email address of each such worker; each worker's correct classification(s) of work actually performed; hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in 40 U.S.C. 3141(2)(B) of the Davis-Bacon Act); daily and weekly number of hours actually worked in total and on each covered contract; deductions made; and actual wages paid.

(C) ***Additional records relating to fringe benefits.*** Whenever the Secretary of Labor has found under paragraph (a)(1)(v) of this section that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan

or program described in 40 U.S.C. 3141(2)(B) of the Davis-Bacon Act, the contractor must maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits.

(D) ***Additional records relating to apprenticeship.*** Contractors with apprentices working under approved programs must maintain written evidence of the registration of apprenticeship programs, the registration of the apprentices, and the ratios and wage rates prescribed in the applicable programs.

(ii) ***Certified payroll requirements*** —

(A) ***Frequency and method of submission.*** The contractor or subcontractor must submit weekly, for each week in which any DBA- or Related Acts-covered work is performed, certified payrolls to the [write in name of appropriate Federal agency] if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the certified payrolls to the applicant, sponsor, owner, or other entity, as the case may be, that maintains such records, for transmission to the [write in name of agency]. The prime contractor is responsible for the submission of all certified payrolls by all subcontractors. A contracting agency or prime contractor may permit or require contractors to submit certified payrolls through an electronic system, as long as the electronic system requires a legally valid electronic signature; the system allows the contractor, the contracting agency, and the Department of Labor to access the certified payrolls upon request for at least 3 years after the work on the prime contract has been completed; and the contracting agency or prime contractor permits other methods of submission in situations where the contractor is unable or limited in its ability to use or access the electronic system.

(B) ***Information required.*** The certified payrolls submitted must set out accurately and completely all of the information required to be maintained under paragraph (a)(3)(i)(B) of this section, except that full Social Security numbers and last known addresses, telephone numbers, and email addresses must not be included on weekly transmittals. Instead, the certified payrolls need only include an individually identifying number for each worker (*e.g.,* the last four digits of the worker's Social Security number). The required weekly certified payroll information may be submitted using Optional Form WH-347 or in any other format desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division website at *https://www.dol.gov/sites/dolgov/files/WHD/legacy/files/wh347/.pdf* or its successor website. It is not a violation of this section for a prime contractor to require a subcontractor to provide full Social Security numbers and last known addresses, telephone numbers, and email addresses to the prime contractor for its own records, without weekly submission by the subcontractor to the sponsoring government agency (or the applicant, sponsor, owner, or other entity, as the case may be, that maintains such records).

(C) ***Statement of Compliance.*** Each certified payroll submitted must be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor, or the contractor's or subcontractor's agent who pays or supervises the payment of the persons working on the contract, and must certify the following:

(*1*) That the certified payroll for the payroll period contains the information required to be provided under paragraph (a)(3)(ii) of this section, the appropriate information and basic records are being maintained under paragraph (a)(3)(i) of this section, and such information and records are correct and complete;

(*2*) That each laborer or mechanic (including each helper and apprentice) working on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in 29 CFR part 3; and

(*3*) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification(s) of work actually performed, as specified in the applicable wage determination incorporated into the contract.

(D) ***Use of Optional Form WH-347.*** The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 will satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (a)(3)(ii)(C) of this section.

(E) ***Signature.*** The signature by the contractor, subcontractor, or the contractor's or subcontractor's agent must be an original handwritten signature or a legally valid electronic signature.

(F) ***Falsification.*** The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under 18 U.S.C. 1001 and 31 U.S.C. 3729.

(G) ***Length of certified payroll retention.*** The contractor or subcontractor must preserve all certified payrolls during the course of the work and for a period of 3 years after all the work on the prime contract is completed.

(iii) ***Contracts, subcontracts, and related documents.*** The contractor or subcontractor must maintain this contract or subcontract and related documents including, without limitation, bids, proposals, amendments, modifications, and extensions. The contractor or subcontractor must preserve these contracts, subcontracts, and related documents during the course of the work and for a period of 3 years after all the work on the prime contract is completed.

(iv) ***Required disclosures and access*** —

(A) ***Required record disclosures and access to workers.*** The contractor or subcontractor must make the records required under paragraphs (a)(3)(i) through (iii) of this section, and any other documents that the [write the name of the agency] or the Department of Labor deems necessary to determine compliance with the labor standards provisions of any of the applicable statutes referenced by § 5.1, available for inspection, copying, or transcription by authorized representatives of the [write the name of the agency] or the Department of Labor, and must permit such representatives to interview workers during working hours on the job.

(B) ***Sanctions for non-compliance with records and worker access requirements.*** If the contractor or subcontractor fails to submit the required records or to make them available, or refuses to permit worker interviews during working hours on the job, the Federal agency

may, after written notice to the contractor, sponsor, applicant, owner, or other entity, as the case may be, that maintains such records or that employs such workers, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available, or to permit worker interviews during working hours on the job, may be grounds for debarment action pursuant to § 5.12. In addition, any contractor or other person that fails to submit the required records or make those records available to WHD within the time WHD requests that the records be produced will be precluded from introducing as evidence in an administrative proceeding under 29 CFR part 6 any of the required records that were not provided or made available to WHD. WHD will take into consideration a reasonable request from the contractor or person for an extension of the time for submission of records. WHD will determine the reasonableness of the request and may consider, among other things, the location of the records and the volume of production.

(C) ***Required information disclosures.*** Contractors and subcontractors must maintain the full Social Security number and last known address, telephone number, and email address of each covered worker, and must provide them upon request to the [write in name of appropriate Federal agency] if the agency is a party to the contract, or to the Wage and Hour Division of the Department of Labor. If the Federal agency is not such a party to the contract, the contractor, subcontractor, or both, must, upon request, provide the full Social Security number and last known address, telephone number, and email address of each covered worker to the applicant, sponsor, owner, or other entity, as the case may be, that maintains such records, for transmission to the [write in name of agency], the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or other compliance action.

(4) ***Apprentices and equal employment opportunity*** —

(i) ***Apprentices*** —

(A) ***Rate of pay.*** Apprentices will be permitted to work at less than the predetermined rate for the work they perform when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship (OA), or with a State Apprenticeship Agency recognized by the OA. A person who is not individually registered in the program, but who has been certified by the OA or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice, will be permitted to work at less than the predetermined rate for the work they perform in the first 90 days of probationary employment as an apprentice in such a program. In the event the OA or a State Apprenticeship Agency recognized by the OA withdraws approval of an apprenticeship program, the contractor will no longer be permitted to use apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(B) ***Fringe benefits.*** Apprentices must be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage

determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringe benefits must be paid in accordance with that determination.

(C) ***Apprenticeship ratio.*** The allowable ratio of apprentices to journeyworkers on the job site in any craft classification must not be greater than the ratio permitted to the contractor as to the entire work force under the registered program or the ratio applicable to the locality of the project pursuant to paragraph (a)(4)(i)(D) of this section. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated in paragraph (a)(4)(i)(A) of this section, must be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under this section must be paid not less than the applicable wage rate on the wage determination for the work actually performed.

(D) ***Reciprocity of ratios and wage rates.*** Where a contractor is performing construction on a project in a locality other than the locality in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyworker's hourly rate) applicable within the locality in which the construction is being performed must be observed. If there is no applicable ratio or wage rate for the locality of the project, the ratio and wage rate specified in the contractor's registered program must be observed.

(ii) ***Equal employment opportunity.*** The use of apprentices and journeyworkers under this part must be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

(5) ***Compliance with Copeland Act requirements.*** The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

(6) ***Subcontracts.*** The contractor or subcontractor must insert in any subcontracts the clauses contained in paragraphs (a)(1) through (11) of this section, along with the applicable wage determination(s) and such other clauses or contract modifications as the [write in the name of the Federal agency] may by appropriate instructions require, and a clause requiring the subcontractors to include these clauses and wage determination(s) in any lower tier subcontracts. The prime contractor is responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in this section. In the event of any violations of these clauses, the prime contractor and any subcontractor(s) responsible will be liable for any unpaid wages and monetary relief, including interest from the date of the underpayment or loss, due to any workers of lower-tier subcontractors, and may be subject to debarment, as appropriate.

(7) ***Contract termination: debarment.*** A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

(8) ***Compliance with Davis-Bacon and Related Act requirements.*** All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

(9) ***Disputes concerning labor standards.*** Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5,

6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

(10) ***Certification of eligibility.***

(i) By entering into this contract, the contractor certifies that neither it nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of 40 U.S.C. 3144(b) or § 5.12(a).

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of 40 U.S.C. 3144(b) or § 5.12(a).

(iii) The penalty for making false statements is prescribed in the U.S. Code, Title 18 Crimes and Criminal Procedure, 18 U.S.C. 1001.

(11) ***Anti-retaliation.*** It is unlawful for any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, or to cause any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, any worker or job applicant for:

(i) Notifying any contractor of any conduct which the worker reasonably believes constitutes a violation of the DBA, Related Acts, this part, or 29 CFR part 1 or 3;

(ii) Filing any complaint, initiating or causing to be initiated any proceeding, or otherwise asserting or seeking to assert on behalf of themselves or others any right or protection under the DBA, Related Acts, this part, or 29 CFR part 1 or 3;

(iii) Cooperating in any investigation or other compliance action, or testifying in any proceeding under the DBA, Related Acts, this part, or 29 CFR part 1 or 3; or

(iv) Informing any other person about their rights under the DBA, Related Acts, this part, or 29 CFR part 1 or 3.

(b) ***Contract Work Hours and Safety Standards Act (CWHSSA).*** The Agency Head must cause or require the contracting officer to insert the following clauses set forth in paragraphs (b)(1) through (5) of this section in full, or (for contracts covered by the Federal Acquisition Regulation) by reference, in any contract in an amount in excess of $100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses must be inserted in addition to the clauses required by paragraph (a) of this section or 29 CFR 4.6. As used in this paragraph (b), the terms “laborers and mechanics” include watchpersons and guards.

(1) ***Overtime requirements.*** No contractor or subcontractor contracting for any part of the conract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

(2) ***Violation; liability for unpaid wages; liquidated damages.*** In the event of any violation of the clause set forth in paragraph (b)(1) of this section the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages and interest from the date of the underpayment. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done

under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchpersons and guards, employed in violation of the clause set forth in paragraph (b)(1) of this section, in the sum of $33 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (b)(1).

(3) ***Withholding for unpaid wages and liquidated damages*** —

(i) ***Withholding process.*** The [write in the name of the Federal agency or the recipient of Federal assistance] may, upon its own action, or must, upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor so much of the accrued payments or advances as may be considered necessary to satisfy the liabilities of the prime contractor or any subcontractor for any unpaid wages; monetary relief, including interest; and liquidated damages required by the clauses set forth in this paragraph (b) on this contract, any other Federal contract with the same prime contractor, or any other federally assisted contract subject to the Contract Work Hours and Safety Standards Act that is held by the same prime contractor (as defined in § 5.2). The necessary funds may be withheld from the contractor under this contract, any other Federal contract with the same prime contractor, or any other federally assisted contract that is subject to the Contract Work Hours and Safety Standards Act and is held by the same prime contractor, regardless of whether the other contract was awarded or assisted by the same agency, and such funds may be used to satisfy the contractor liability for which the funds were withheld.

(ii) ***Priority to withheld funds.*** The Department has priority to funds withheld or to be withheld in accordance with paragraph (a)(2)(i) or (b)(3)(i) of this section, or both, over claims to those funds by:

(A) A contractor's surety(ies), including without limitation performance bond sureties and payment bond sureties;

(B) A contracting agency for its reprocurement costs;

(C) A trustee(s) (either a court-appointed trustee or a U.S. trustee, or both) in bankruptcy of a contractor, or a contractor's bankruptcy estate;

(D) A contractor's assignee(s);

(E) A contractor's successor(s); or

(F) A claim asserted under the Prompt Payment Act, 31 U.S.C. 3901-3907.

(4) ***Subcontracts.*** The contractor or subcontractor must insert in any subcontracts the clauses set forth in paragraphs (b)(1) through (5) of this section and a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor is responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (b)(1) through (5). In the event of any violations of these clauses, the prime contractor and any subcontractor(s) responsible will be liable for any unpaid wages and monetary relief, including interest from the date of the underpayment or loss, due to any workers of lower-tier subcontractors, and associated liquidated damages and may be subject to debarment, as appropriate.

(5) ***Anti-retaliation.*** It is unlawful for any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, or to cause any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, any worker or job applicant for:

(i) Notifying any contractor of any conduct which the worker reasonably believes constitutes a violation of the Contract Work Hours and Safety Standards Act (CWHSSA) or its implementing regulations in this part;

(ii) Filing any complaint, initiating or causing to be initiated any proceeding, or otherwise asserting or seeking to assert on behalf of themselves or others any right or protection under CWHSSA or this part;

(iii) Cooperating in any investigation or other compliance action, or testifying in any proceeding under CWHSSA or this part; or

(iv) Informing any other person about their rights under CWHSSA or this part.

(c) ***CWHSSA required records clause.*** In addition to the clauses contained in paragraph (b) of this section, in any contract subject only to the Contract Work Hours and Safety Standards Act and not to any of the other laws referenced by § 5.1, the Agency Head must cause or require the contracting officer to insert a clause requiring that the contractor or subcontractor must maintain regular payrolls and other basic records during the course of the work and must preserve them for a period of 3 years after all the work on the prime contract is completed for all laborers and mechanics, including guards and watchpersons, working on the contract. Such records must contain the name; last known address, telephone number, and email address; and social security number of each such worker; each worker's correct classification(s) of work actually performed; hourly rates of wages paid; daily and weekly number of hours actually worked; deductions made; and actual wages paid. Further, the Agency Head must cause or require the contracting officer to insert in any such contract a clause providing that the records to be maintained under this paragraph must be made available by the contractor or subcontractor for inspection, copying, or transcription by authorized representatives of the (write the name of agency) and the Department of Labor, and the contractor or subcontractor will permit such representatives to interview workers during working hours on the job.

(d) ***Incorporation of contract clauses and wage determinations by reference.*** Although agencies are required to insert the contract clauses set forth in this section, along with appropriate wage determinations, in full into covered contracts, and contractors and subcontractors are required to insert them in any lower-tier subcontracts, the incorporation by reference of the required contract clauses and appropriate wage determinations will be given the same force and effect as if they were inserted in full text.

(e) ***Incorporation by operation of law.*** The contract clauses set forth in this section (or their equivalent under the Federal Acquisition Regulation), along with the correct wage determinations, will be considered to be a part of every prime contract required by the applicable statutes referenced by § 5.1 to include such clauses, and will be effective by operation of law, whether or not they are included or incorporated by reference into such contract, unless the Administrator grants a variance, tolerance, or exemption from the application of this paragraph. Where the clauses and applicable wage determinations are effective by operation of law under this paragraph, the prime contractor must be compensated for any resulting increase in wages in accordance with applicable law.

(The information collection, recordkeeping, and reporting requirements contained in the following paragraphs of this section were approved by the Office of Management and Budget:

Paragraph	OMB Control No.
(a)(1)(ii)(B)	1235-0023
(a)(1)(ii)(C)	1235-0023
(a)(1)(iv)	1235-0023
(a)(3)(i)	1235-0023
(a)(3)(ii)(A)	1235-0023
	1235-0008
(c)	1235-0023

[48 FR 19540, Apr. 29, 1983, as amended at 51 FR 12265, Apr. 9, 1986; 55 FR 50150, Dec. 4, 1990; 57 FR 28776, June 26, 1992; 58 FR 58955, Nov. 5, 1993; 61 FR 40716, Aug. 5, 1996; 65 FR 69693, Nov. 20, 2000; 73 FR 77511, Dec. 19, 2008; 81 FR 43450, July 1, 2016; 82 FR 2225, 2226, Jan. 9, 2017; 83 FR 12, Jan 2, 2018; 84 FR 218, Jan. 23, 2019; 87 FR 2334, Jan. 14, 2022; 88 FR 2215, Jan. 13, 2023; 88 FR 57734, Aug. 23, 2023; 89 FR 1815, Jan. 11, 2024; 90 FR 1859, Jan. 10, 2025]