

**NOTES:**

- SEE SHEET M-001 FOR LEGEND, ABBREVIATIONS AND GENERAL NOTES.
- SCOPE OF WORK REPRESENTED IS TYPICAL FOR BUILDINGS 1,2,3,4,7,9,11,20.
- REFER TO SHEET M-501 FOR DETAILS, INCLUDING INLINE PUMP INSTALLATION, MAKE-UP WATER SUPPLY, AND GAS TRAIN.
- CONTRACTOR SHALL FLOSH ALL EXISTING HYDRONIC PIPING AND PROVIDE WATER TREATMENT PER BOILER MANUFACTURER'S INSTRUCTIONS.

**BUILDING MANAGEMENT SYSTEM:**

- CONTROLLERS SHALL BE STAND-ALONE AND INSTALLED IN THE BOILER ROOMS.
- ALARMS SHALL BE LOCAL.
- BOILERS AND HHW PUMPS SHALL ALTERNATE LEAD/LAG OPERATION ON A MONTHLY BASIS.

**HEATING HOT WATER SYSTEM SEQUENCE OF OPERATIONS**

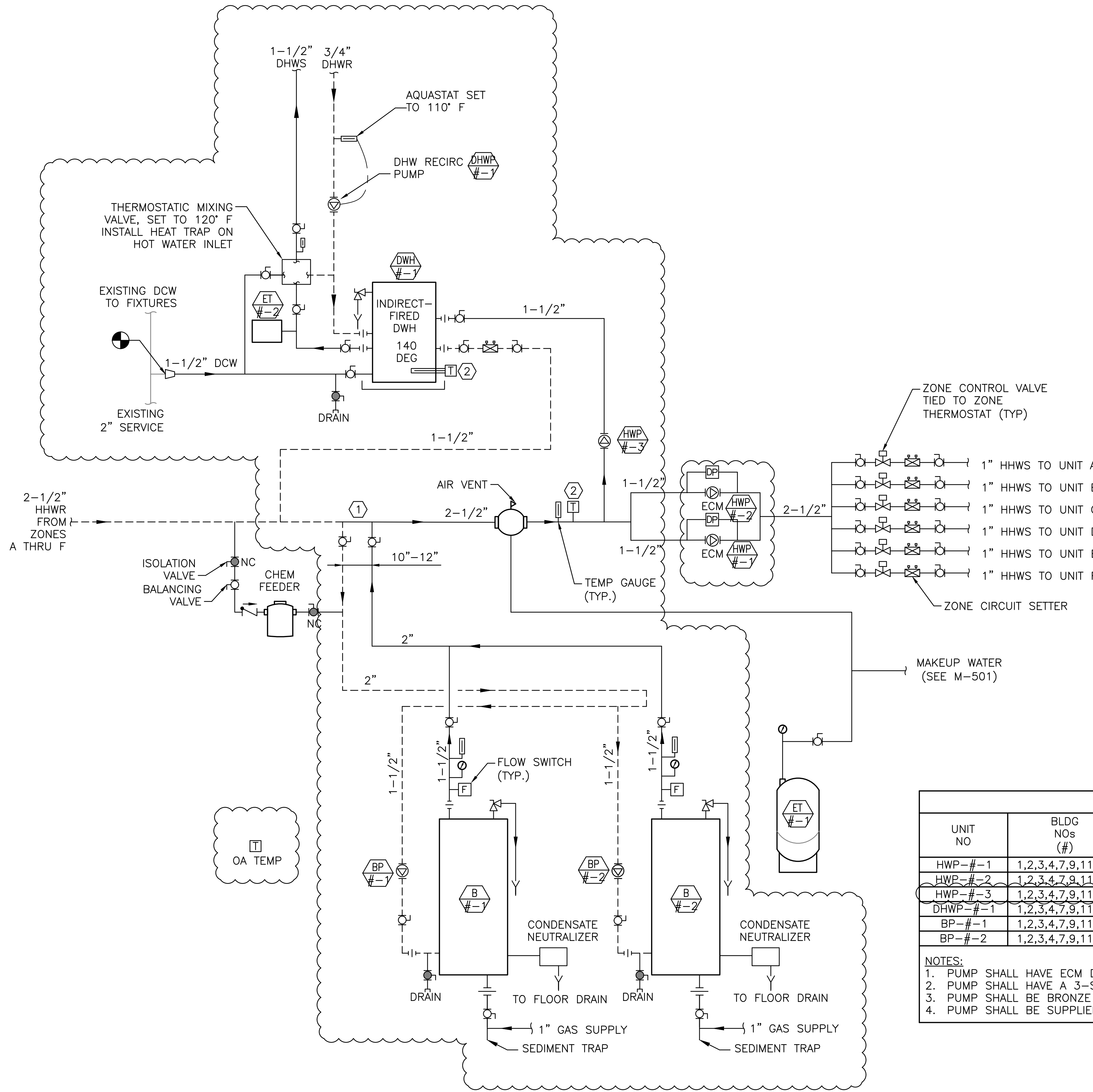
- WHEN OA TEMPERATURE IS BELOW 68 DEG F AND THERE IS A CALL FOR HEATING AT ONE OR MORE ZONE THERMOSTATS, THE LEAD SPACE HEATING PUMP (HWP-#-1 OR HWP-#-2) SHALL BE ENERGIZED AND THE VALVE(S) ASSOCIATED WITH ZONES CALLING FOR HEAT SHALL BE OPENED.
- THE SYSTEM TEMPERATURE SENSOR IN THE HWS MAIN SHALL CALL FOR HEAT WHEN IT FALLS BELOW SETPOINT. LEAD BOILER SHALL BE ENERGIZED. AFTER FLOW IS PROVEN, BOILERS SHALL CASCADE ON AND OFF IN ORDER TO MAINTAIN SYSTEM SUPPLY WATER SETPOINT. BOILER SUPPLY WATER SETPOINT SHALL VARY BASED ON AN OA TEMPERATURE RESET SCHEDULE PROGRAMMED INTO THE BOILER CONTROLLERS. SEE BOILER SPECIFICATION 235216 FOR DETAILS.
- WHEN THE SPACE TEMPERATURE IS SATISFIED IN A UNIT, THE ASSOCIATED ZONE VALVE SHALL CLOSE.
- ONE OR BOTH HHW PUMPS (HWP-#-1, HWP-#-2) SHALL BE ENERGIZED TO MAINTAIN A CONSTANT DIFFERENTIAL PRESSURE AS FLOW RATE VARIES DUE TO ZONE VALVES OPENING AND CLOSING. TAB CONTRACTOR SHALL DETERMINE DP SETPOINT ONCE SYSTEM BALANCING IS COMPLETE.
- BOILER PUMPS SHALL BE VARIABLE SPEED AND MODULATED BY THE BOILER CONTROLLERS.

**DOMESTIC HOT WATER SYSTEM SEQUENCE OF OPERATIONS**

- A DIRECT ACTING AQUASTAT AT THE DWH TANK WITH A 140 DEG F SETPOINT TIES INTO THE BOILER CONTROLLER. WHEN THE TANK TEMPERATURE DROPS 6 DEG F BELOW SETPOINT, THE HOT WATER CIRCULATING PUMP (HWP-#-3) SHALL BE ENERGIZED. THE SPEED SETPOINT (SPEED 1, 2, OR 3) SHALL BE SET BY THE TAB CONTRACTOR ONCE SYSTEM BALANCING IS COMPLETE.
- THE BOILER CONTROLLER SHALL UTILIZE A DOMESTIC HOT WATER ZONE-MODE PRIORITY SEQUENCE WHENEVER THE DWH CALLS FOR HEATING. THE SYSTEM HEATING PUMPS (HWP-#-1, HWP-#-2) SHALL NOT BE DE-ENERGIZED IN DHW PRIORITY MODE.
- THE DOMESTIC HOT WATER CIRCULATION PUMP (DHWP-#-1) SHALL BE ENERGIZED WHEN THE DOMESTIC WATER RETURN PIPE TEMPERATURE REACHES 110 DEG F (ADJUSTABLE) AND SHALL DE-ENERGIZE WHEN THE DHWR TEMPERATURE REACHES 115 DEG F (ADJUSTABLE).

**KEYED NOTES:**

- CLOSELY SPACED TEE. PROVIDE MINIMUM 1' STRAIGHT PIPE UPSTREAM AND MIN 2' STRAIGHT PIPE DOWNSTREAM.
- DEVICE SUPPLIED BY BOILER MANUFACTURER, INSTALLED BY CONTRACTOR.



**HEATING & DOMESTIC HOT WATER SCHEMATIC**

SCALE: NTS

**CIRCULATOR PUMP SCHEDULE**

UNIT NO	BLDG NOs (#)	SERVICE	TYPE	FLUID	GPM	HEAD (FT)	MOTOR SIZE	V/PH/HZ	MANUFACTURER AND MODEL	NOTES
HWP-#-1	1,2,3,4,7,9,11,20	HHW	INLINE CIRCULATOR	WATER	30	25	1/2 HP	230/1/60	B&G ECOCIRC XL 55-45	1
HWP-#-2	1,2,3,4,7,9,11,20	HHW	INLINE CIRCULATOR	WATER	30	25	1/2 HP	230/1/60	B&G ECOCIRC XL 55-45	1
HWP-#-3	1,2,3,4,7,9,11,20	DWH	INLINE CIRCULATOR	WATER	12	18	270 WATTS	120/1/60	B&G NRF-45 #103404	-
DHWP-#-1	1,2,3,4,7,9,11,20	DHWR	INLINE CIRCULATOR	WATER	6	8	125 WATTS	120/1/60	B&G NBF-33 #103351LF	3
BP-#-1	1,2,3,4,7,9,11,20	B-1	INLINE CIRCULATOR	WATER	20	15		120/1/60	GRUNDFOS UPS-26-99FC	4
BP-#-2	1,2,3,4,7,9,11,20	B-2	INLINE CIRCULATOR	WATER	20	15		120/1/60	GRUNDFOS UPS-26-99FC	4

**NOTES:**

- PUMP SHALL HAVE ECM DRIVE.
- PUMP SHALL HAVE A 3-SPEED MOTOR.
- PUMP SHALL BE BRONZE AND LISTED FOR POTABLE WATER.
- PUMP SHALL BE SUPPLIED BY BOILER MANUFACTURER.

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PROJECT NO.  
218.011.001  
SHEET  
1 OF 1

DRAWING NO.  
**MSK-1**

PORTLAND HOUSING AUTHORITY PORTLAND, MAINE			
RIVERTON BOILER REPLACEMENTS BUILDING NOs 1,2,3,4,7,9,11,20			
0	MECHANICAL REVISIONS	CSS	ERP 3-4-16
REV	DESCRIPTION	DWN	APP DATE