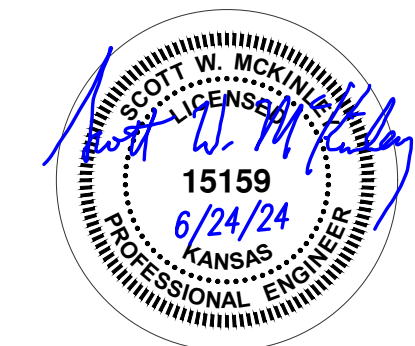


**TOPEKA METRO**

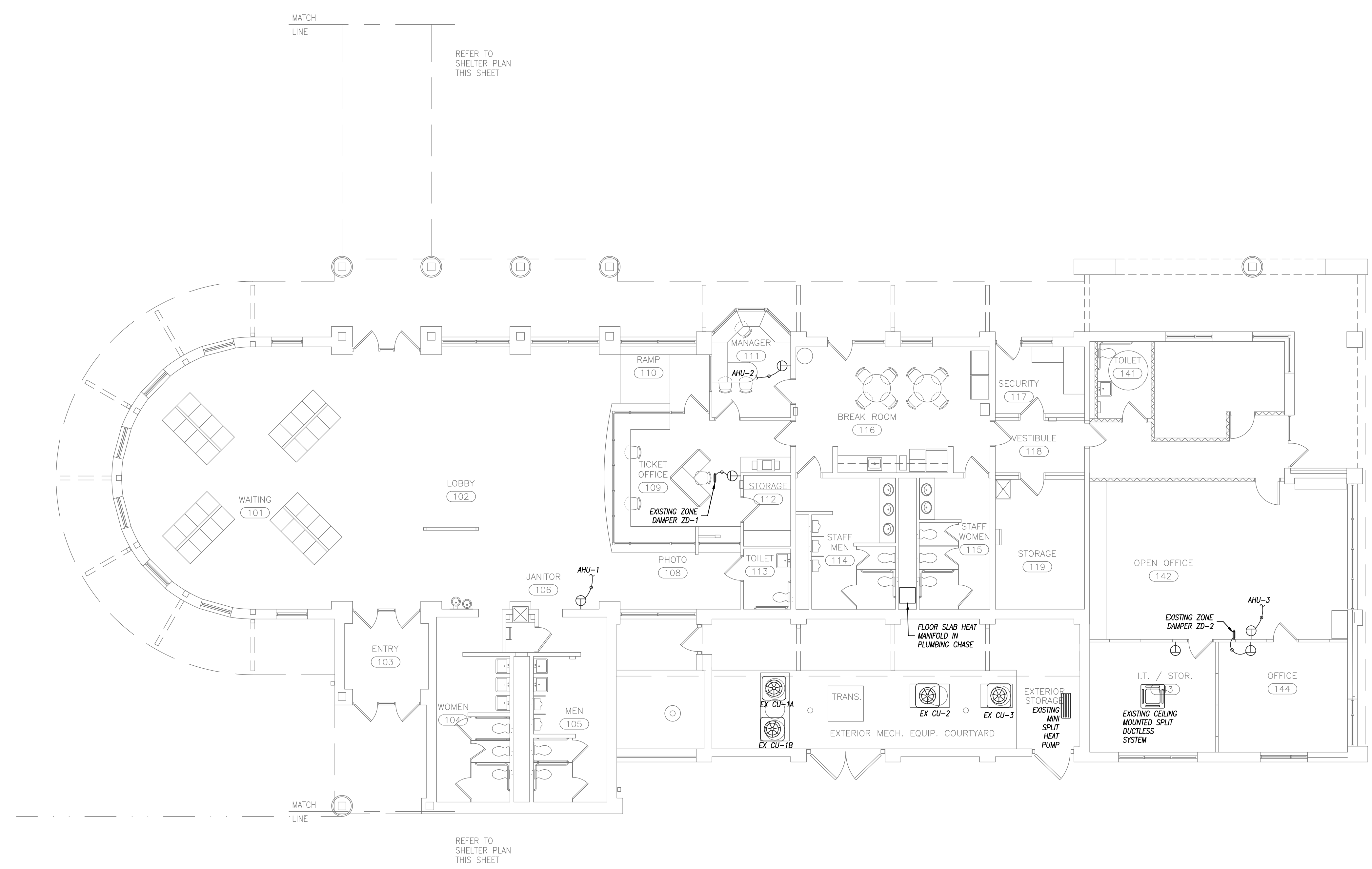
**REQUEST FOR BIDS  
QSS HVAC Controls  
TO-25-02**

**Appendix 2  
Engineering Plans**



PEARSON KENT MCKINLEY RAAF ENGINEERS LLC  
2949 SW WANAMAKER DRIVE, TOPEKA, KANSAS 66614  
785.273.2447 WWW.PKMRENG.COM

24.138



**PROJECT SCOPE:**

1. REPLACE AND UPGRADE ALL EXISTING HVAC CONTROLS FOR THE TOPEKA METRO QUINCY STATION.
2. THIS INCLUDES, AIR HANDLING UNITS, DX CONDENSING UNITS, UNIT HEATERS, EXHAUST AND RELIEF FANS, BOILERS, PUMPS, VALVES AND DAMPERS FOR A COMPLETE NEW SYSTEM.

**DEMO NOTES:**

1. REMOVE ALL CONTROLS, PIPING, WIRING, AND CONDUIT THAT BECOMES UNNECESSARY AS A RESULT OF THIS WORK. PROVIDE FOR CONTINUITY OF ALL REMAINING SYSTEMS AND CIRCUITS.
2. MAINTAIN ALL EXISTING DEVICES, EQUIPMENT, ASSOCIATED CIRCUITS ETC. SHOWN AS EXISTING TO REMAIN OR OTHERWISE UNRELATED TO THE SCOPE OF THE PROJECT IN WORKING ORDER.
3. COORDINATE ALL DEMOLITION WORK WITH OWNER. THE OWNER RESERVES THE RIGHT OF FIRST REFUSAL FOR ALL ITEMS SCHEDULED TO BE REMOVED. ALL ITEMS NOT WANTED BY THE OWNER SHALL BE REMOVED FROM THE OWNER'S PROPERTY AND LEGALLY DISCARDED.
4. CUT AND PATCH THE EXISTING WALLS, FLOORS, AND CEILINGS TO MATCH THE EXISTING SURFACES AS REQUIRED FOR NEW WORK.
5. COORDINATE ALL HVAC OUTAGES FOR PART OR ALL OF THIS BUILDING WITH THE OWNER. OUTAGES SHALL BE KEPT TO A MINIMUM AND TAKE PLACE AT A TIME APPROVED BY THE OWNER.
6. NOTES AND DRAWINGS ARE BASED UPON A FIELD EXAMINATION OF THE SITE AND MAY NOT INDICATE ALL ITEMS. THE CONTRACTOR SHALL VISIT THE SITE AND BECOME FAMILIAR WITH THE SITE AND THE SCOPE OF WORK FOR THE CONTRACT PRIOR TO BID. ANY EXISTING CONDITION WHICH IS APPARENT OR COULD BE REASONABLY INFERRED FROM A VISIT TO THE SITE SHALL NOT BE THE BASIS FOR A CHANGE IN THE CONTRACT AMOUNT.
7. PROTECT ALL EXISTING SURFACES AND EQUIPMENT DURING CONSTRUCTION. EXISTING ITEMS TO REMAIN SHALL BE ADEQUATELY PROTECTED FROM DEMOLITION AND NEW CONSTRUCTION WORK, AS REQUIRED. ANY ITEMS DAMAGED OR MARKED SHALL BE ADEQUATELY CLEANED OR REPLACED TO THE OWNERS SATISFACTION TO ORIGINAL CONDITION BEFORE CONSTRUCTION.

**TOPEKA METROPOLITAN TRANSIT AUTHORITY HVAC CONTROLS UPGRADES**

**820 SE QUINCY STREET TOPEKA, KS**

**FLOOR PLAN - HVAC**  
1/8" = 1'-0"

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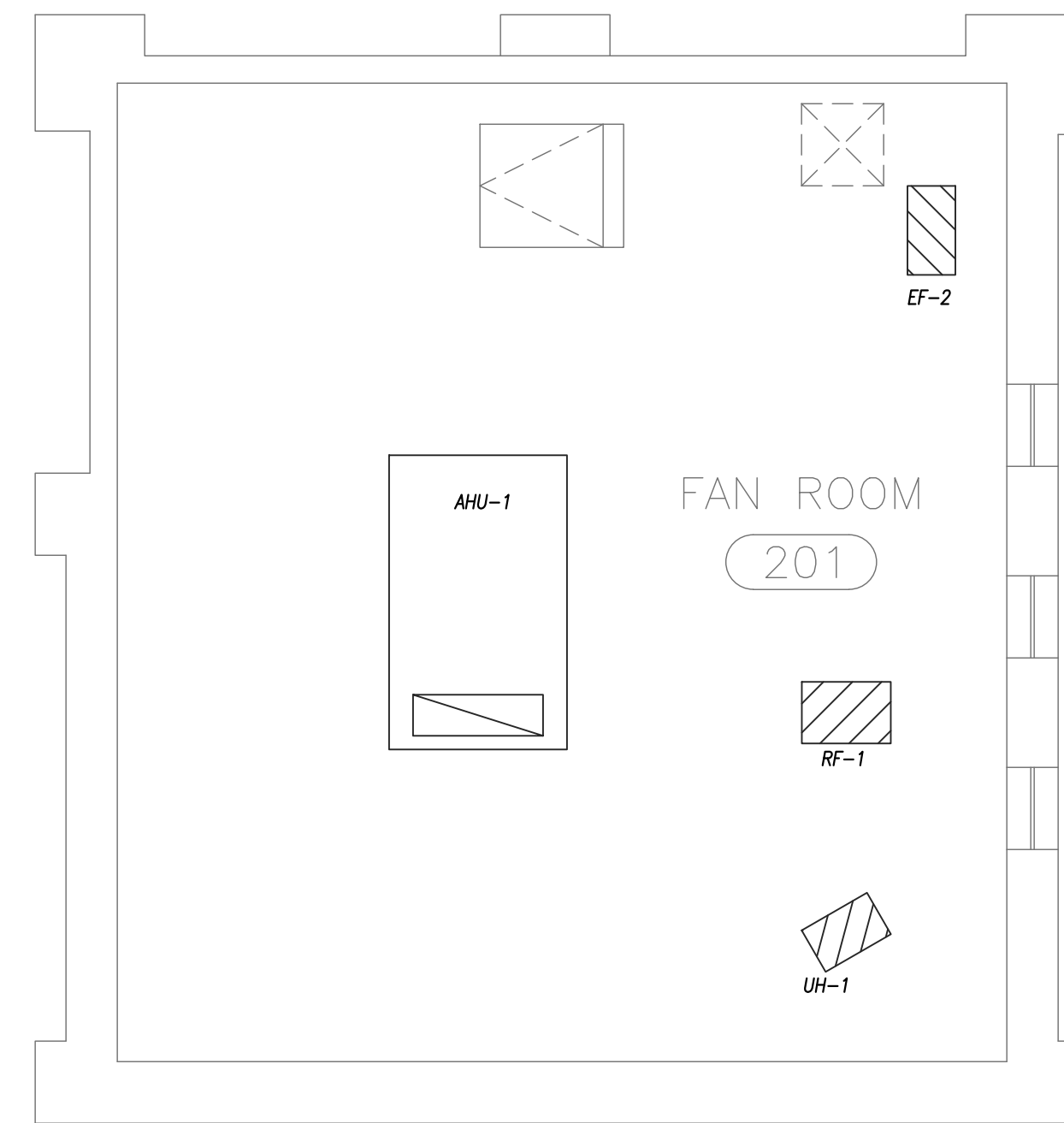
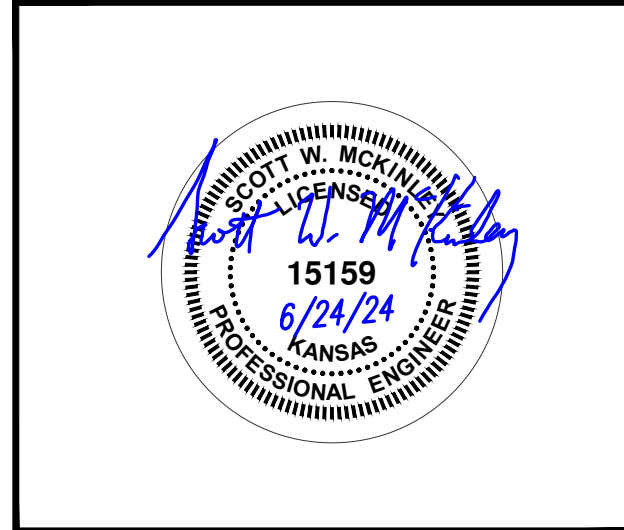
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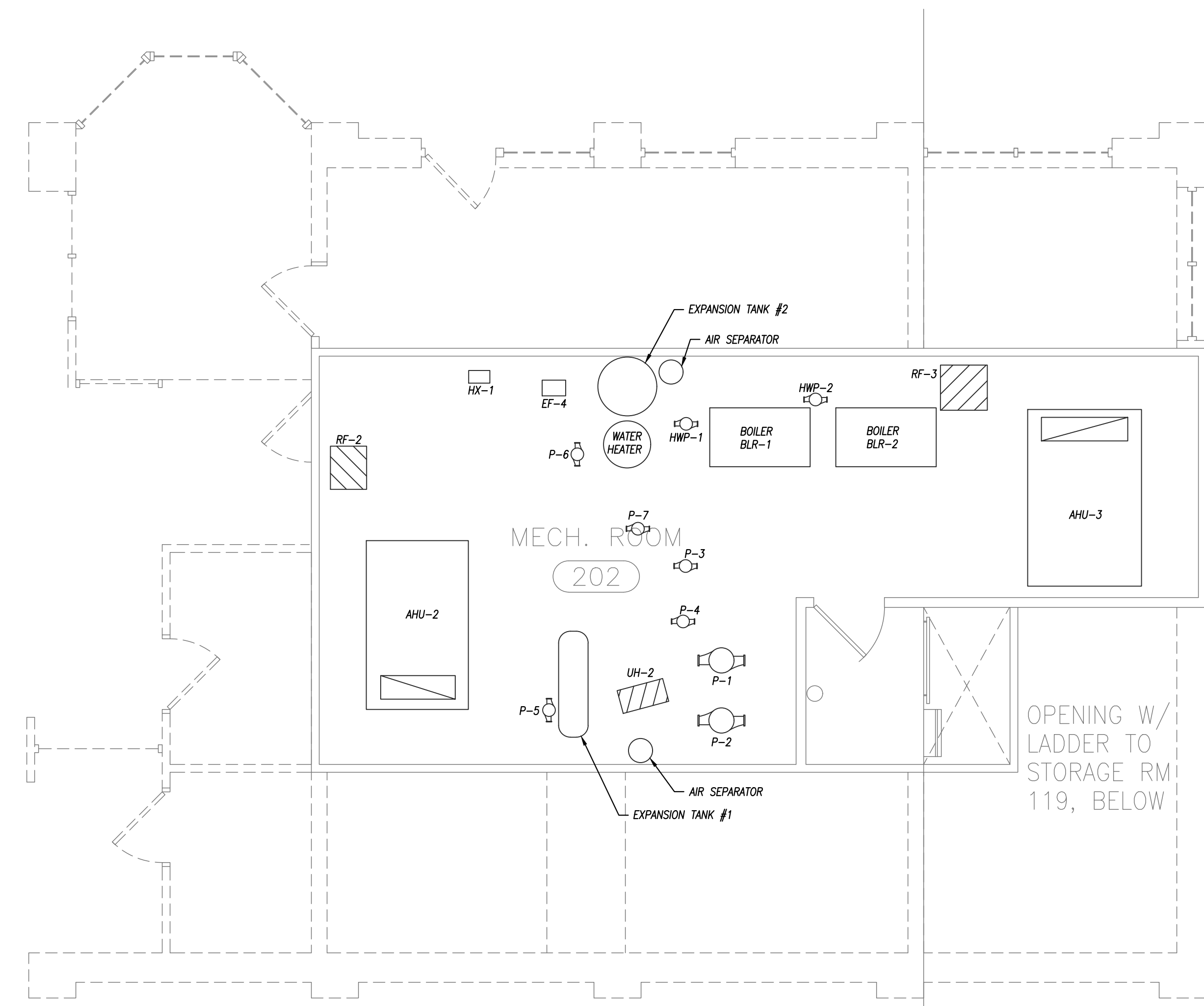
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**NORTH MECH ROOM  
FLOOR PLAN - ME DEMO**  
1/4" = 1'-0"

HATCH & LADDER  
TO JANITOR - 106  
BELOW



**SOUTH MECH ROOM  
FLOOR PLAN - MVAC**  
1/4" = 1'-0"

OPENING W/  
LADDER TO  
STORAGE RM  
119, BELOW

**TOPEKA METROPOLITAN TRANSIT  
AUTHORITY HVAC CONTROLS UPGRADES**

**820 SE QUINCY STREET  
TOPEKA, KS**

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**HVAC PLAN**

DATE: **6/24/24** PKMR PROJECT: **24.138**

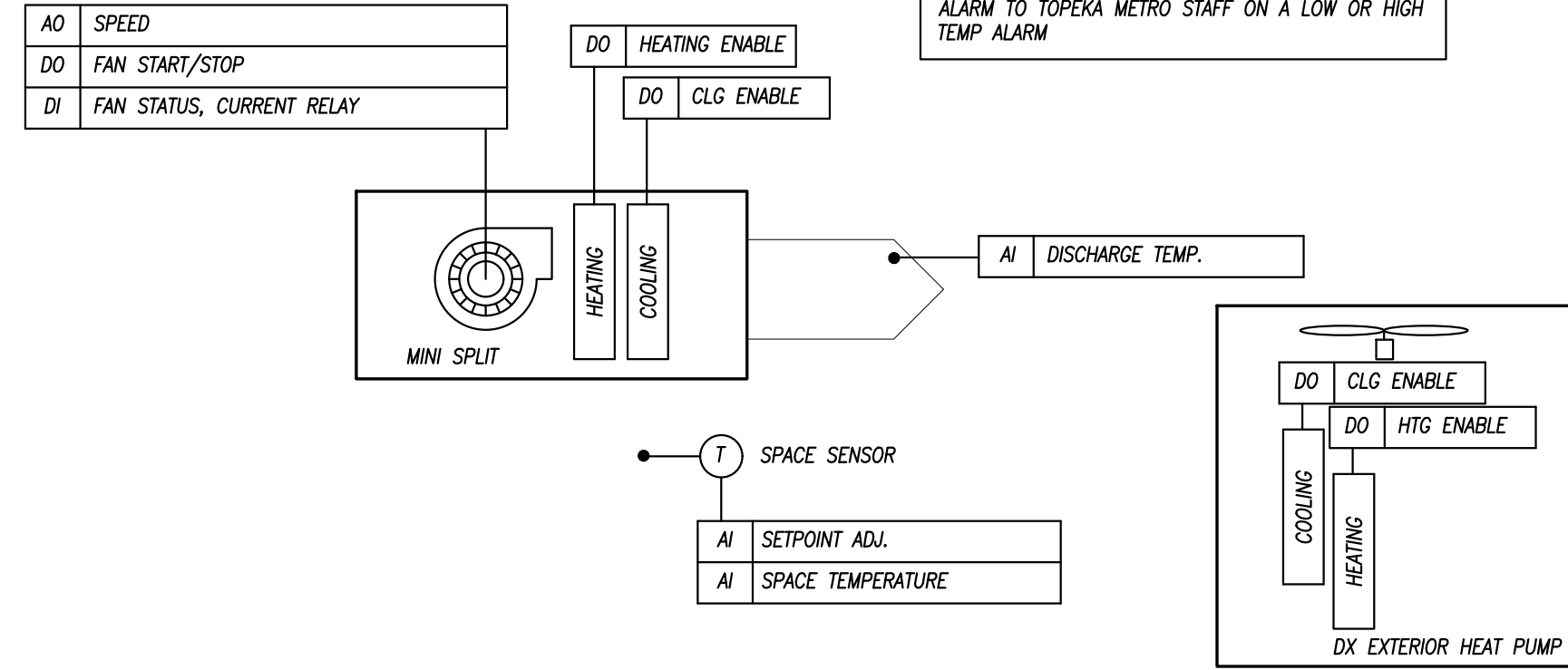
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# TOPEKA METROPOLITAN TRANSIT AUTHORITY HVAC CONTROLS UPGRADES

820 SE QUINCY STREET  
TOPEKA, KS

**MINI-SPLIT CONTROL:**  
THE MINI-SPLIT SHALL BE CONTROLLED BY THE FACTORY CONTROLS AND THERMOSTAT. PROVIDE A SEPARATE SPACE SENSOR THAT WILL ALARM TO TOPEKA METRO STAFF ON A LOW OR HIGH TEMP ALARM



**IT ROOM MINI-SPLIT SYSTEM WITH HEAT PUMP UNIT SCHEMATIC**  
NO SCALE

**AHU CONTROL:**  
The AHU fan will operate continuously during occupied hours and will be shut-down only by the manual starter switch, fire alarm system, low mixed air temperature limit switch or high static pressure switch at fan discharge (AHU-2 and AHU-3 only).

Mechanical cooling: On call for cooling, the DDC control will stage condensing units to maintain cooling discharge air temperature setpoint.

ECONOMIZER: DDC controls will utilize comparative compressor assisted control strategy. On call for cooling with outdoor air enthalpy lower than return air enthalpy, outdoor air damper modulates open and return air damper modulates closed. If outside air dry bulb temperature is above 55° F, mechanical cooling will be staged on to maintain supply air temperature setpoint. Mixed air temperature sensor will override economizer controls to prevent mixed air temperature from dropping below 52° F.

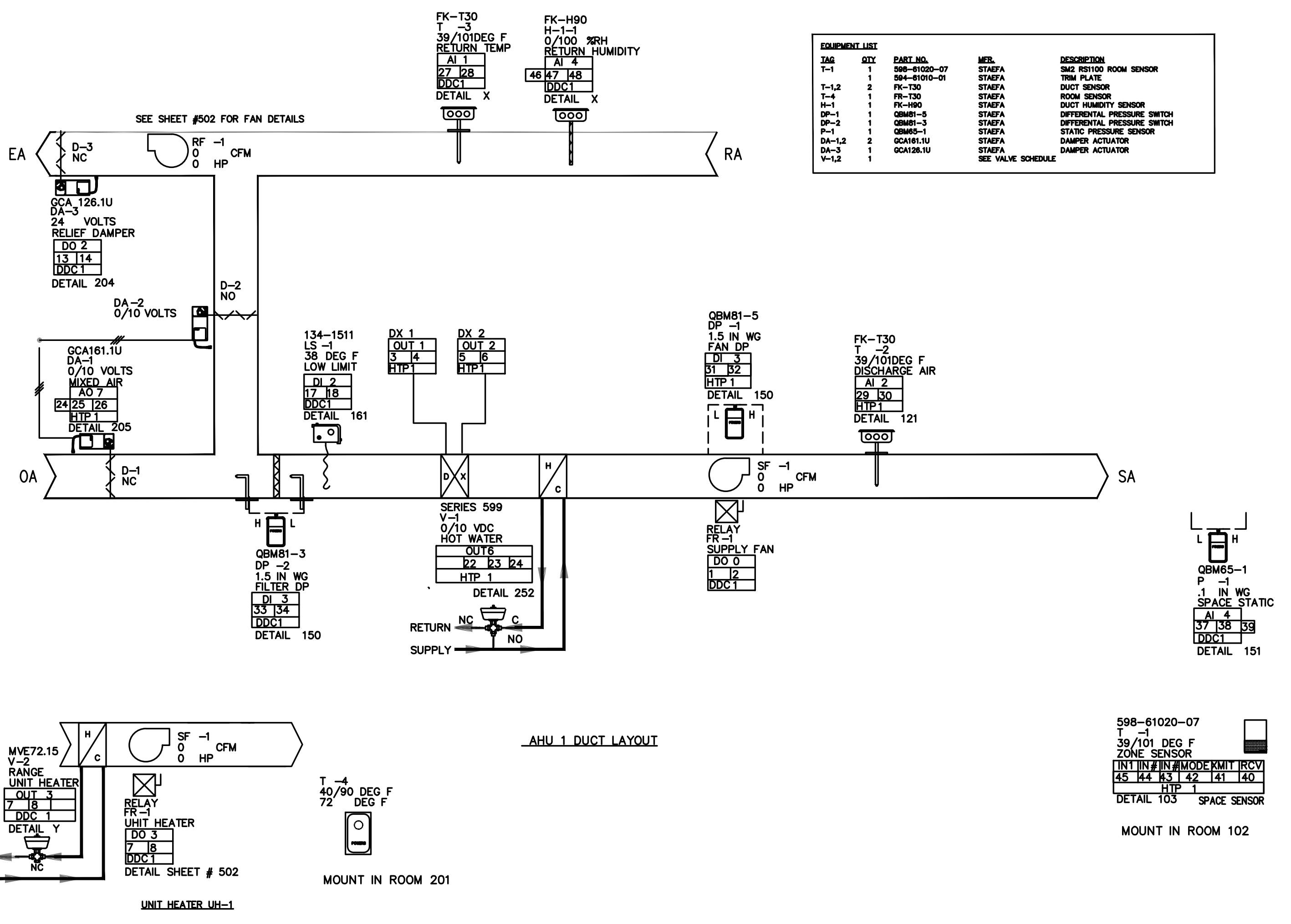
HEATING: On a call for heating, the DDC control will modulate heating coil control valve to maintain space setpoint. Outside air damper will be at minimum position and mechanical cooling locked out.

LOW TEMPERATURE LIMIT: Freeze stat located upstream from heating coil will stop the AHU fan, close the outside air damper and open the heating coil control valve to the coil if heat drops to 38°.

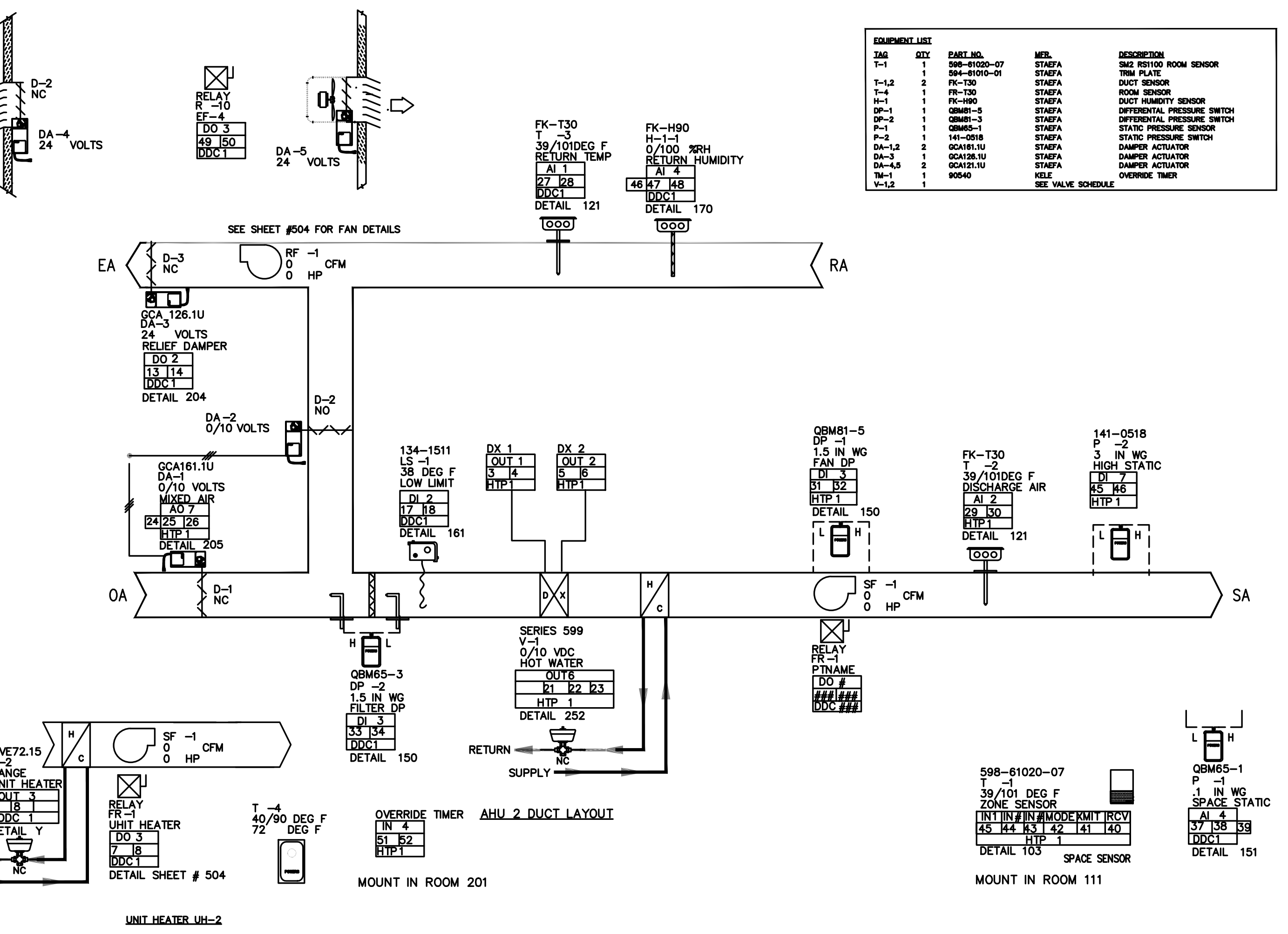
UNOCCUPIED MODE: AHU fan is off, outside air damper is closed and return air damper is open. If space temperature drops below heating setback temperature or rises above cooling setup temperature, air handling unit fan and heating or cooling control will cycle to maintain setpoint. OA damper remains closed. Manual override button on each AHU thermostat will return air handling unit to occupied mode for 2 hours.

**BUILDING PRESSURE CONTROL:**

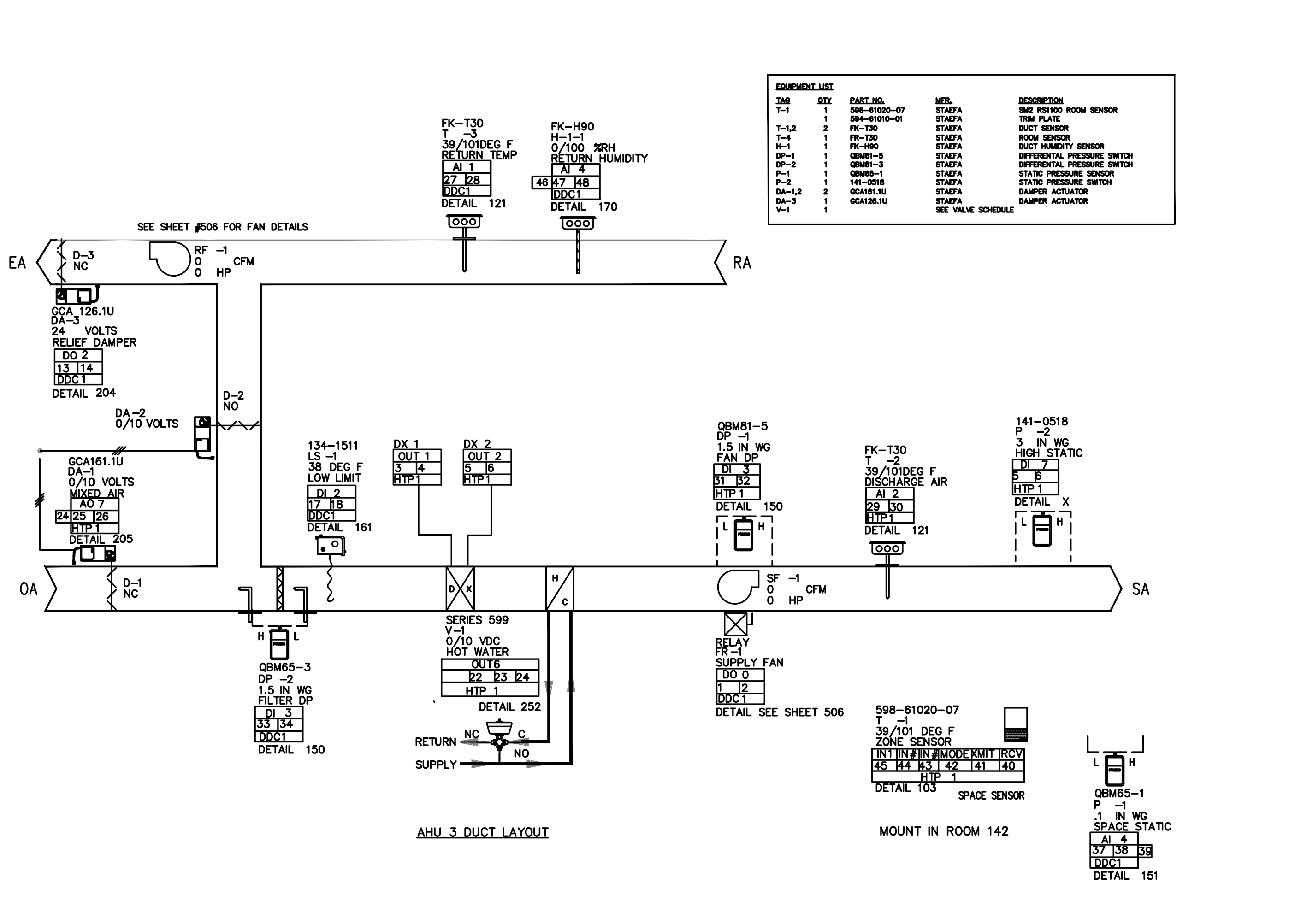
A differential pressure controller, referencing outside air pressure will control building pressure. On rise in building pressure to above setpoint, relief fan back draft damper opens and relief fan starts on low with the freq. drive. On continued increase in building pressure, fan shall ramp up to control space pressure. Sequence reverses on decrease in building pressure. Relief fans are locked out when air-handling units are not in economizer mode.



EQUIPMENT LIST	QTY	PART NO.	MFR.	DESCRIPTION
T-1	1	598-61020-07	STAFSA	SM2 RS100 ROOM SENSOR
T-1.2	2	594-81010-01	STAFSA	TRIM PLATE
T-4	1	FR-130	STAFSA	DUCT SENSOR
H-1	1	FR-H90	STAFSA	ROOM SENSOR
DP-1	1	QBMS1-5	STAFSA	DIFFERENTIAL PRESSURE SWITCH
DP-2	1	QBMS1-3	STAFSA	DIFFERENTIAL PRESSURE SWITCH
P-1	1	QBMS1-1	STAFSA	STATIC PRESSURE SENSOR
DA-1.2	2	GCA181.U	STAFSA	DAMPER ACTUATOR
DA-3	1	GCA126.U	STAFSA	DAMPER ACTUATOR
V-1.2	1			SEE VALVE SCHEDULE



EQUIPMENT LIST	QTY	PART NO.	MFR.	DESCRIPTION
T-1	1	598-61020-07	STAFSA	SM2 RS100 ROOM SENSOR
T-1.2	2	594-81010-01	STAFSA	TRIM PLATE
T-4	1	FR-130	STAFSA	DUCT SENSOR
H-1	1	FR-H90	STAFSA	ROOM SENSOR
DP-1	1	QBMS1-5	STAFSA	DIFFERENTIAL PRESSURE SWITCH
DP-2	1	QBMS1-3	STAFSA	DIFFERENTIAL PRESSURE SWITCH
P-1	1	QBMS1-1	STAFSA	STATIC PRESSURE SENSOR
DA-1.2	2	GCA181.U	STAFSA	DAMPER ACTUATOR
DA-3	1	GCA126.U	STAFSA	DAMPER ACTUATOR
DA-4.8	2	GCA126.U	STAFSA	DAMPER ACTUATOR
V-1.2	1	90040	KLE	OVERRIDE TIMER
V-1.2	1			SEE VALVE SCHEDULE



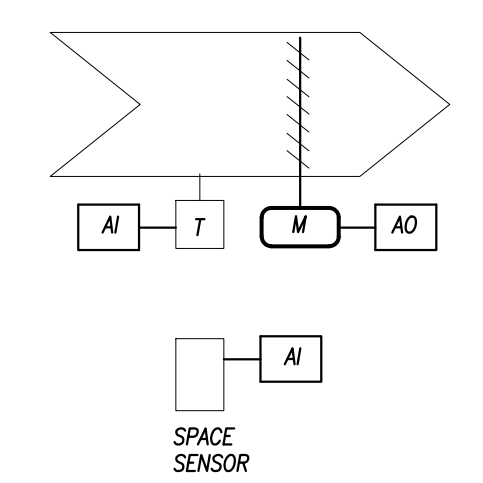
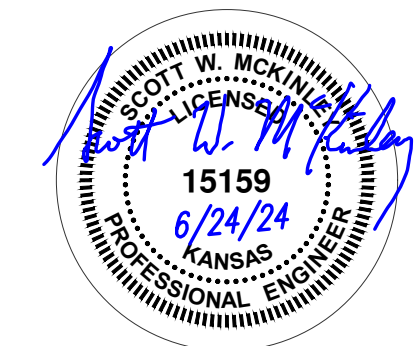
EQUIPMENT LIST	QTY	PART NO.	MFR.	DESCRIPTION
T-1	1	598-61020-07	STAFSA	SM2 RS100 ROOM SENSOR
T-1.2	2	594-81010-01	STAFSA	TRIM PLATE
T-4	1	FR-130	STAFSA	DUCT SENSOR
H-1	1	FR-H90	STAFSA	ROOM SENSOR
DP-1	1	QBMS1-5	STAFSA	DIFFERENTIAL PRESSURE SWITCH
DP-2	1	QBMS1-3	STAFSA	DIFFERENTIAL PRESSURE SWITCH
P-1	1	QBMS1-1	STAFSA	STATIC PRESSURE SENSOR
DA-1.2	2	GCA181.U	STAFSA	DAMPER ACTUATOR
DA-3	1	GCA126.U	STAFSA	DAMPER ACTUATOR
V-1	1			SEE VALVE SCHEDULE

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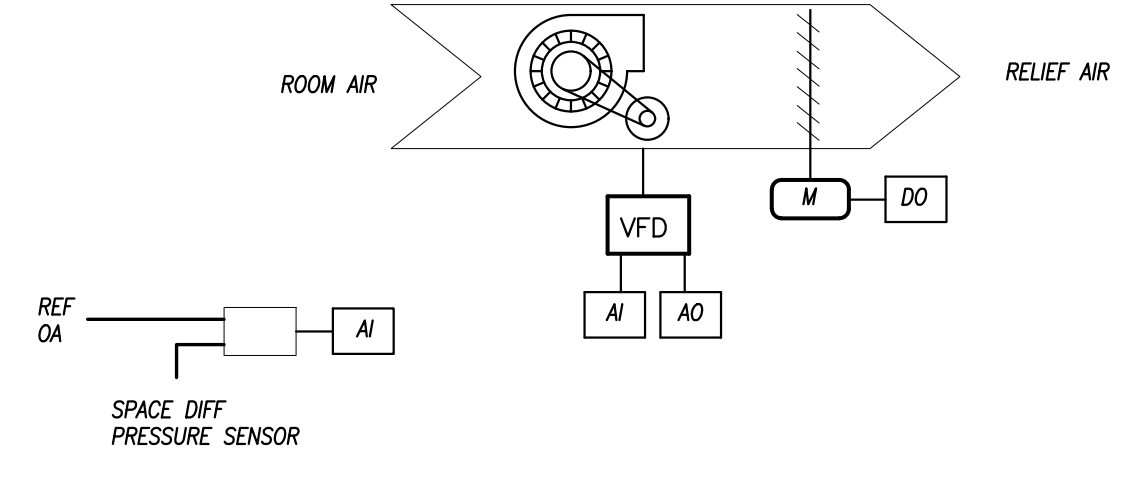
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**HVAC CONTROLS**

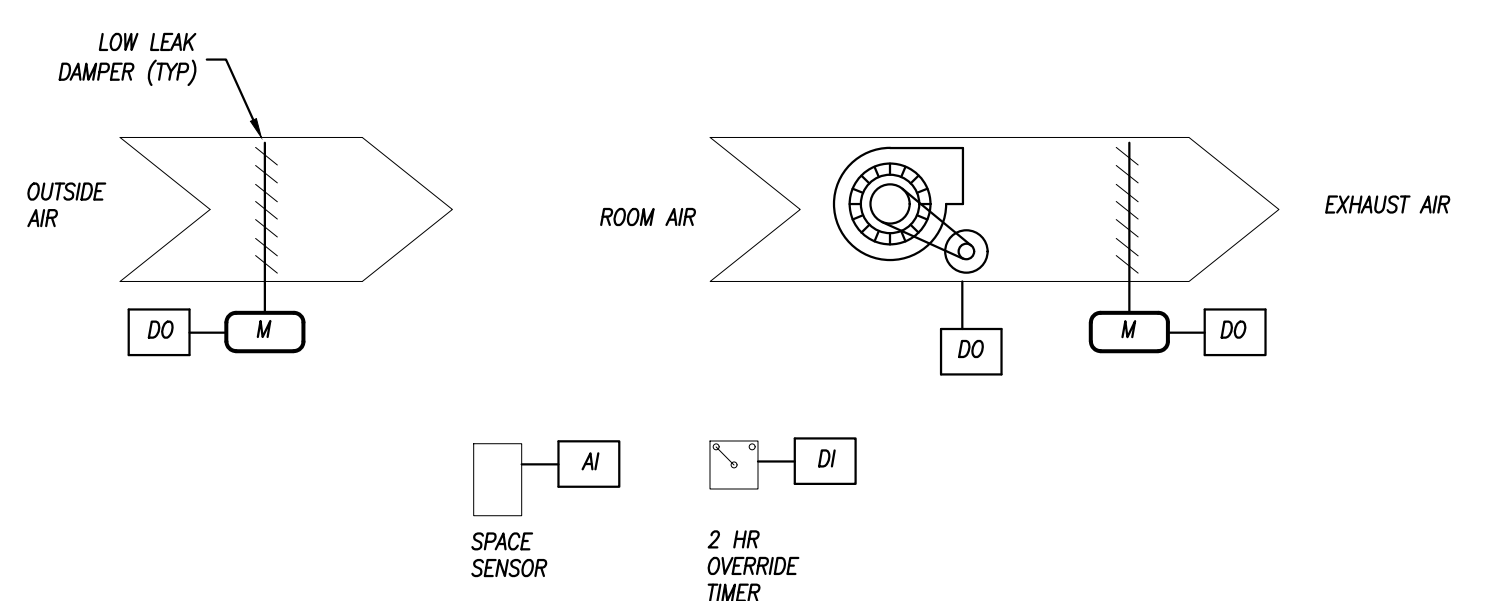
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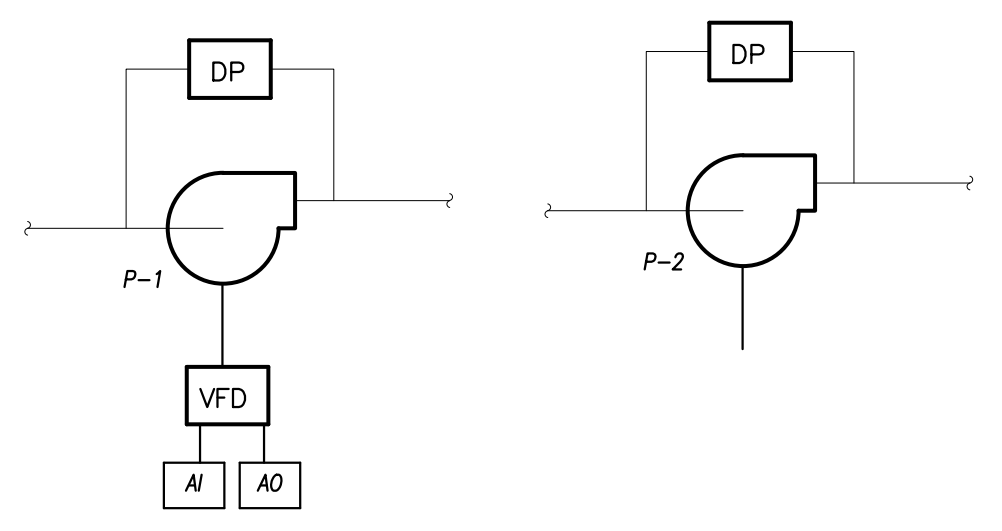
**ZONE DAMPER CONTROL**  
NOT TO SCALE



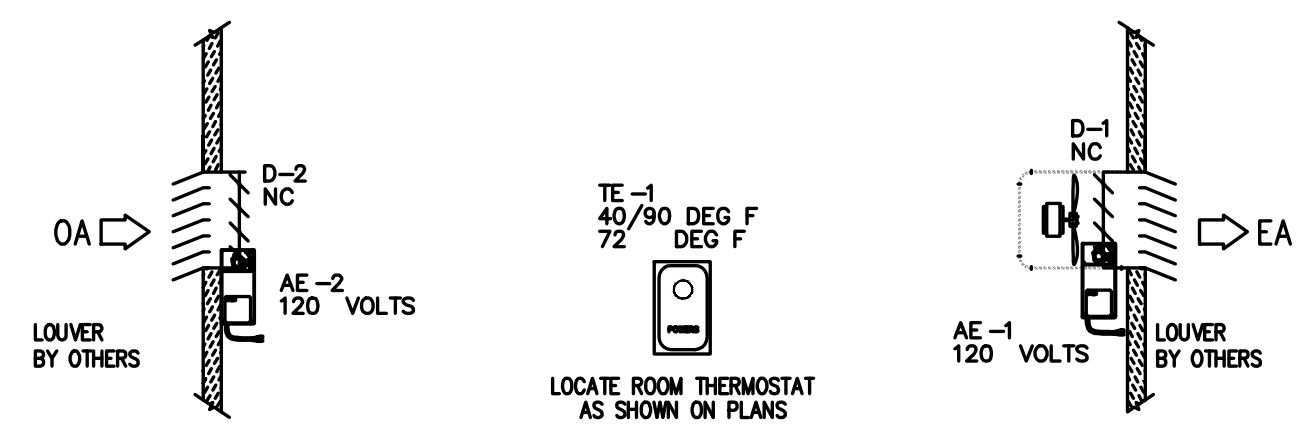
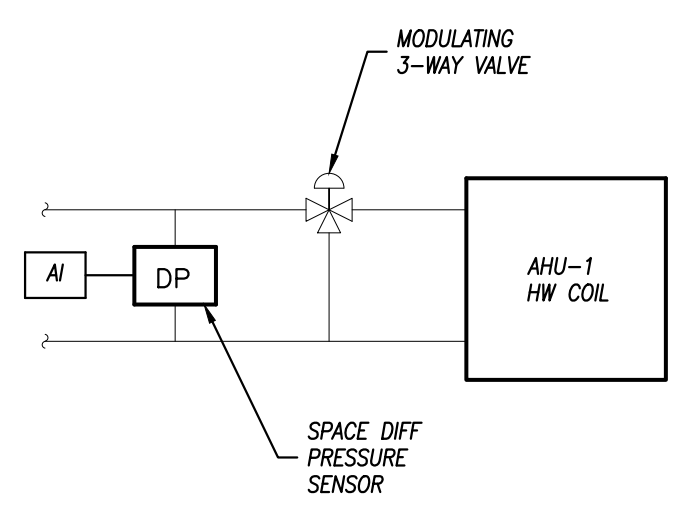
**RELIEF FAN CONTROL**  
NOT TO SCALE



**MECHANICAL ROOM EXHAUST FAN (EF-4)**  
NOT TO SCALE



**PUMP CONTROL**  
NOT TO SCALE



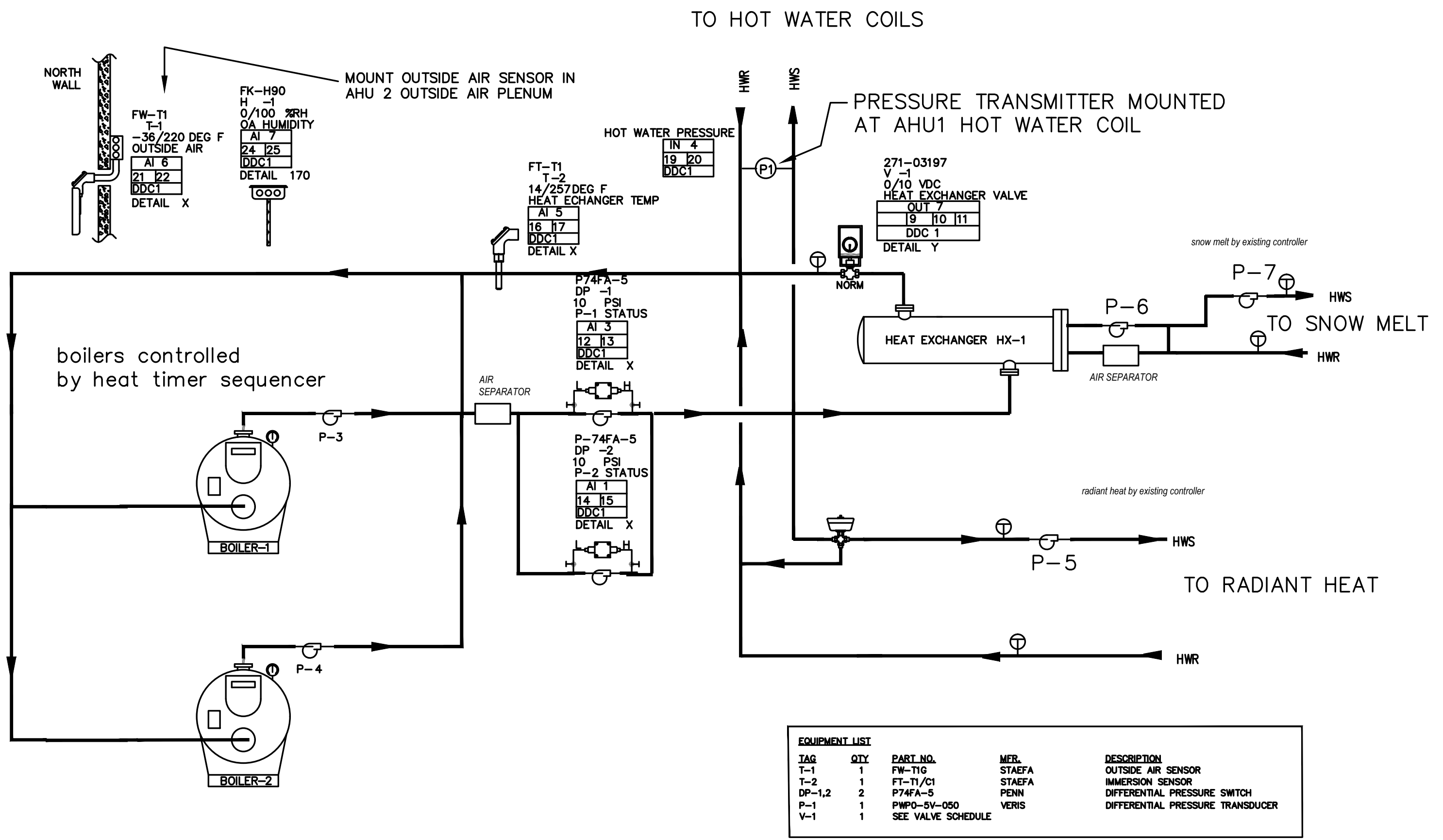
**PRIMARY HEATING WATER PUMP CONTROL (P3, P4):**  
On call for boiler to fire from manufacturer supplied boiler staging controls, associated pump starts.  
Flow through boiler must be proven before boiler is allowed to fire. If flow is not proven after 30 seconds, pump and associated boiler are de-energized and lag pump and associated boiler are started. When boiler burner cycles off, pump shall continue to operate for 5 minutes (ADJ).

**SECONDARY HEATING WATER PUMP CONTROL (P1, P2):**  
The lead secondary pump is on when outside air temperature is below 50° F., (ADJ).  
Differential pressure between HWS and HWR at AHU-1 is sensed through differential pressure sensor.  
The DDC control will transmit a control signal to pump variable speed drive to control the pump speed to maintain differential pressure setpoint. Initial setup will be done with all coils and heat exchanger calling for full flow to establish the full speed setpoint.

**LEAD-LAG CONTROL:** On call for lead pump to start, flow is proven by differential pressure sensor across pump.  
If flow is not proven after 30 seconds, lead pump is de-energized and lag pump is started. Lead pump designation shall change with each start-up and every 30 days during continuous operation.

**HEATING WATER CONTROL:**  
With outdoor air temperature below 50° F., (ADJ) lead secondary heating water pump is on and boilers are enabled.  
Boiler sequencing control provided by boiler manufacturer will stage boilers to maintain HWS temperature setpoint.  
HWS setpoint will be reset based on outside air temperature as follows:

OA TEMP	HWS SETPOINT
50	140
20	180



**EQUIPMENT LIST**

TAG	QTY	PART NO.	MFR.	DESCRIPTION
T-1	1	FW-T1G	STAFA	OUTSIDE AIR SENSOR
T-2	1	FT-T1/CI	STAFA	IMMERSION SENSOR
DP-1,2	2	P74FA-5	PENN	DIFFERENTIAL PRESSURE SWITCH
P-1	1	PMPO-SV-050	VERIS	DIFFERENTIAL PRESSURE TRANSDUCER
V-1	1	SEE VALVE SCHEDULE		

**TOPEKA METROPOLITAN TRANSIT AUTHORITY HVAC CONTROLS UPGRADES**

**820 SE QUINCY STREET TOPEKA, KS**

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SHEET NUMBER:  
**M4**