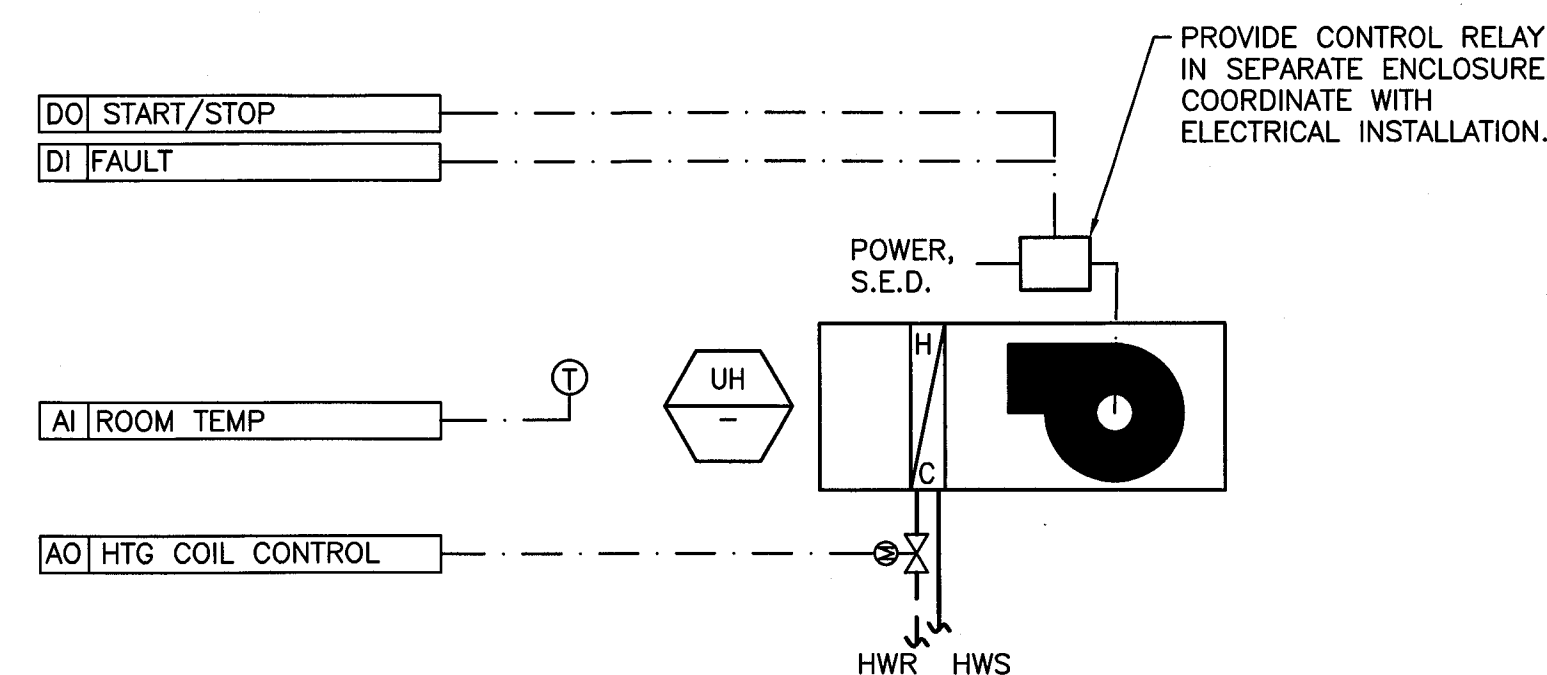


#### SEQUENCE OF OPERATION:

1. NORMALLY THE SOLENOID VALVE IS CLOSED.
2. THE SOLENOID VALVE OPENS FOR 3 MINUTES, ONCE A WEEK.
3. AN ALARM IS RAISED AT THE OPERATOR'S WORKSTATION IF OPERATION FAILS.

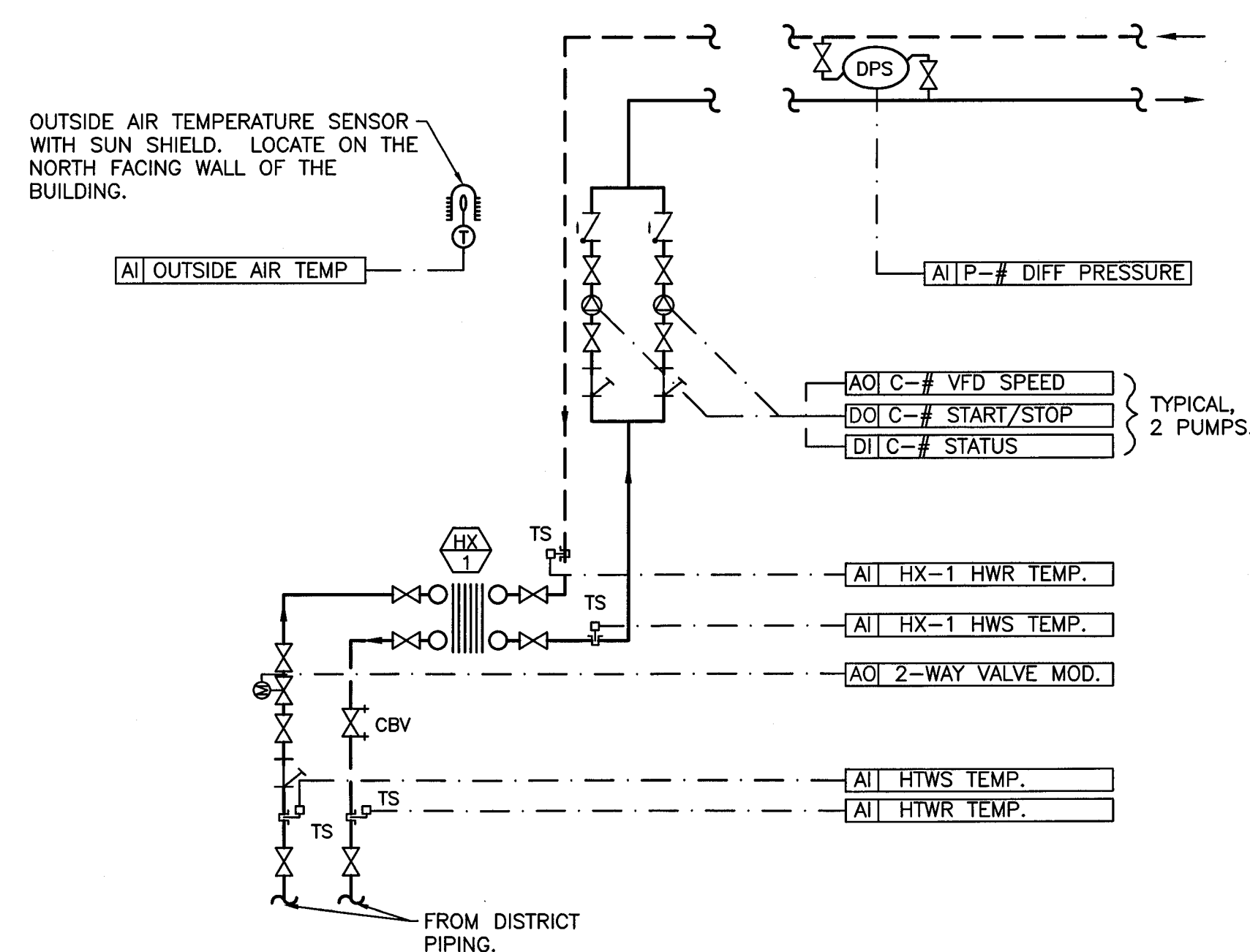
**1 CONTROLS SCHEMATIC — TRAP PRIMERS**  
SCALE : N.T.S.



#### SEQUENCE OF OPERATION:

1. DURING BUILDING OCCUPANCY HOURS THE FAN WILL START AND THE CONTROL VALVE WILL MODULATE IN ORDER TO MAINTAIN THE SPACE AT [20]°C.
2. DURING OUT OF BUILDING OCCUPANCY PERIODS THE FAN WILL START AND THE CONTROL VALVE WILL MODULATE IN ORDER TO MAINTAIN THE SPACE AT [16]°C.
3. WHEN SPACE TEMPERATURE HAS REACHED 2°C ABOVE SETPOINT, VALVE CLOSING AND FAN STOPS.

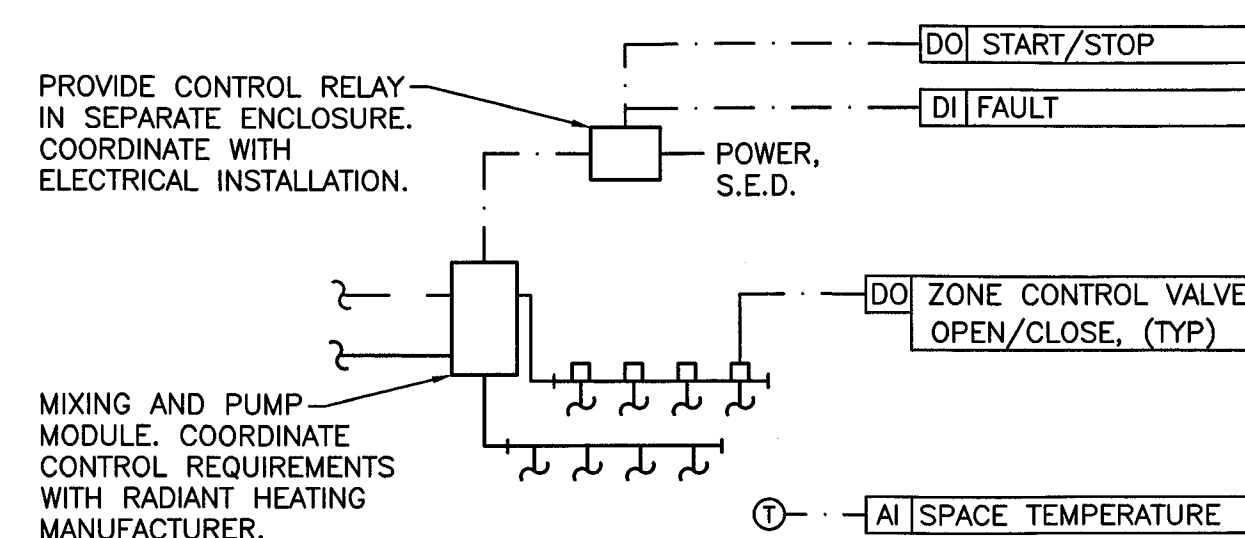
**4 CONTROLS SCHEMATIC — UNIT HEATER CONTROLS**  
SCALE : N.T.S.



#### SEQUENCE OF OPERATION:

1. THE BMS SHALL MONITOR HOT WATER TEMPERATURES IN AND OUT OF BOTH SIDES OF HEAT EXCHANGERS. THE 2-WAY VALVE ON THE PRIMARY SIDE OF THE HEAT EXCHANGER SHALL MODULATE OPEN TO MAINTAIN THE HWS TEMPERATURE SET POINT.
2. HEATING PUMPS SHALL BE ENABLED WHENEVER THERE IS A DEMAND FOR HEATING. A DEMAND FOR HEATING SHALL BE GENERATED BY ANY HEATING CONTROL VALVE BEING 10% OR MORE OPEN FOR A CONTINUOUS PERIOD OF 2 MINUTES.
3. BMS SHALL DETERMINE SET POINT OF BUILDING HOT WATER LOOP BASED ON AN OUTDOOR RESET SCHEDULE.
4. THE BUILDING HEATING PUMPS BE OPERATED IN A LEAD/LAG ARRANGEMENT. THE LEAD PUMP SHALL BE SWITCHED EVERY 2 WEEKS.
5. EACH PUMP SHALL BE MONITORED FOR A FAILURE CONDITION. A FAILURE SHALL BE A MISMATCH BETWEEN A COMMAND TO RUN AND A STATUS FEEDBACK SIGNAL. IN THE EVENT OF A PUMP FAILURE AN ALARM SIGNAL SHALL BE RAISED AT THE OPERATOR'S WORK STATION. THE FAILED PUMP SHALL IMMEDIATELY BE MADE THE STANDBY PUMP AND THE DUTY/STANDBY SEQUENCE SHALL BE LOCKED OUT UNTIL THE ALARM IS CLEARED BY THE OPERATOR.
6. PUMPS SHALL OPERATE ON VARIABLE SPEED DRIVE. BMS SHALL MONITOR HWS & HWR DIFFERENTIAL PRESSURE & ADJUST PUMP SPEED TO MEET SETPOINT. SETPOINT SHALL BE ESTABLISHED @ TIME OF WATER BALANCING.

**7 DETAIL — HEAT INJECTION CONTROLS**  
SCALE : N.T.S.

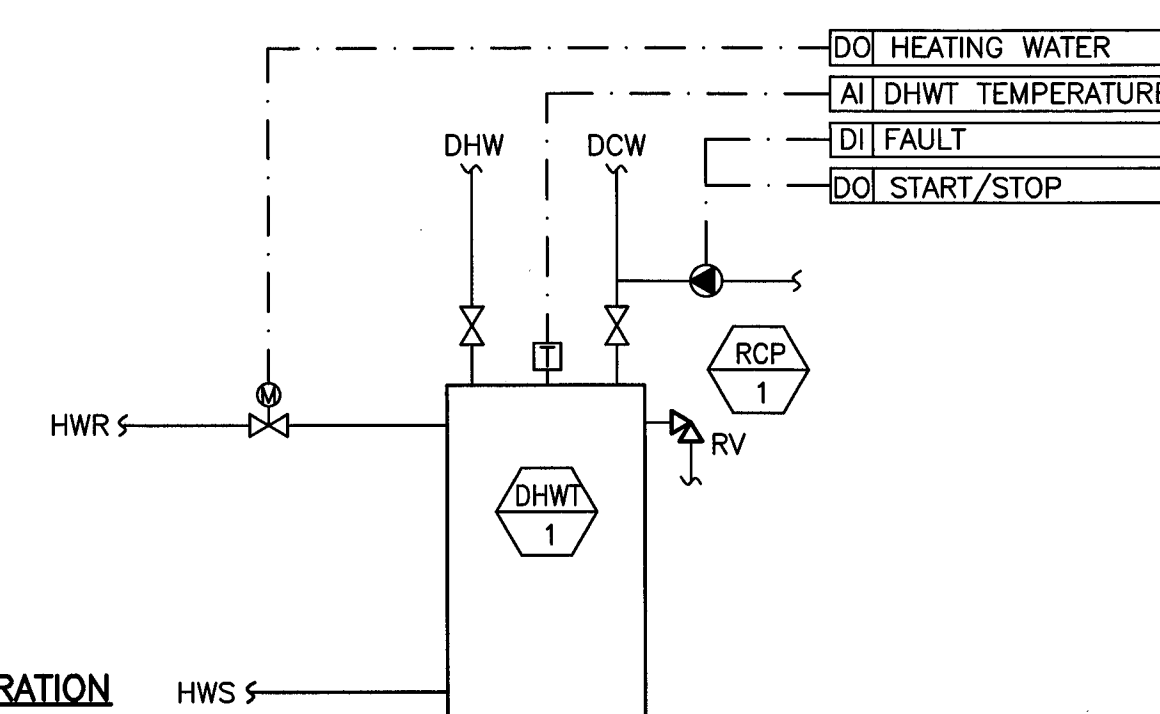


#### SEQUENCE OF OPERATION:

1. DURING BUILDING OCCUPANCY HOURS THE FAN WILL START AND THE CONTROL VALVE WILL MODULATE IN ORDER TO MAINTAIN THE SPACE AT [20]°C.
2. DURING OUT OF BUILDING OCCUPANCY PERIODS THE FAN WILL START AND THE CONTROL VALVE WILL MODULATE IN ORDER TO MAINTAIN THE SPACE AT [16]°C.
3. WHEN SPACE TEMPERATURE HAS REACHED 2°C ABOVE SETPOINT, VALVE CLOSING AND FAN STOPS.

NOTE: RADIANT INFLOOR HEAT TO BE CONTROLLED BY HEAT PUMP CONTROLLER IN OFFICE 102

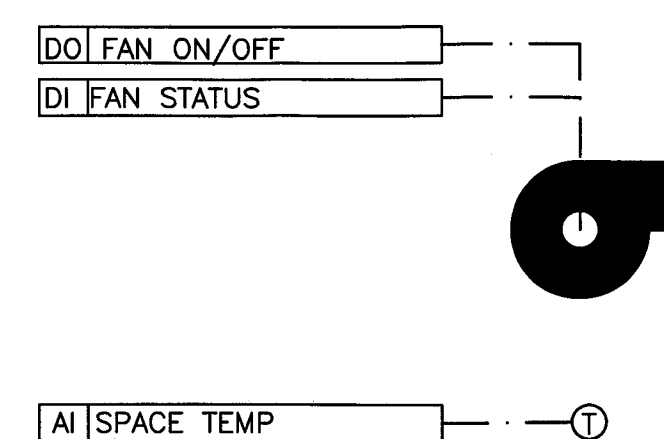
**2 CONTROLS SCHEMATIC — RADIANT INFLOOR HEATING**  
SCALE : N.T.S.



#### SEQUENCE OF OPERATION

1. **START/STOP:**  
— WHEN THE TEMPERATURE IN THE DOMESTIC HOT WATER TANK IS AT [59]°C OR BELOW THE CONTROL VALVE SHALL OPEN. WHEN THE TEMPERATURE IN THE TANK IS AT [62]°C OR ABOVE, THE CONTROL VALVE SHALL CLOSE.  
— AN OPERATOR COMMAND SHALL ALSO BE AVAILABLE TO MANUALLY OPEN OR CLOSE THE CONTROL VALVE.
2. **DOMESTIC HOT WATER RECIRCULATION PUMP:** THE BUILDING DOMESTIC HOT WATER RECIRCULATION PUMP SHALL BE STARTED AND STOPPED BASED ON A TIME SCHEDULE. THE TIME SCHEDULE SHALL BE SET UP TO MATCH THE BUILDING OCCUPANCY SCHEDULE, EXCEPT THAT THE PUMP SHALL START AND STOP [30] MINUTES EARLIER/LATER THAN THE OCCUPANCY SCHEDULE.
3. **PUMP FAILURE:** THE CIRCULATING PUMP SHALL BE MONITORED FOR A FAILURE CONDITION. A FAILURE SHALL BE A MISMATCH BETWEEN A COMMAND TO RUN AND A STATUS FEEDBACK SIGNAL. IN THE EVENT OF A PUMP FAILURE A CRITICAL ALARM SHALL BE RAISED AT THE BUILDING OPERATORS TERMINAL.

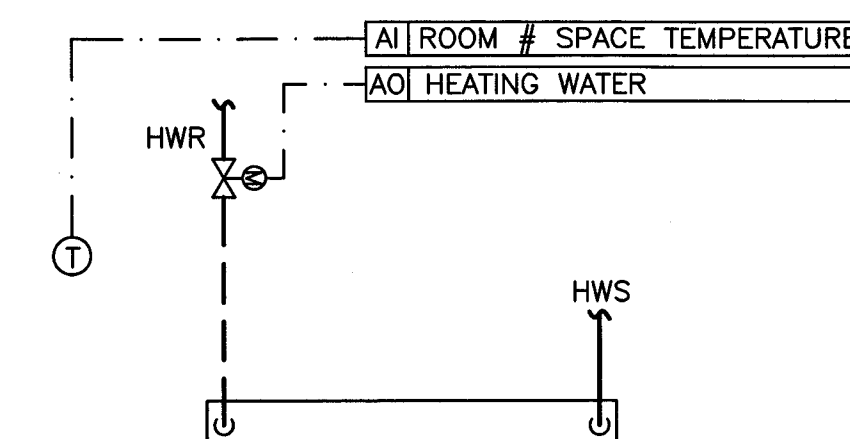
**5 CONTROLS SCHEMATIC — MISC PLUMBING CONTROLS**  
SCALE : N.T.S.



#### SEQUENCE OF OPERATION:

1. IF SPACE TEMPERATURE IS [32]°C OR GREATER THE FAN STARTS.
2. WHEN SPACE TEMPERATURE HAS DROPPED 2°C BELOW SETPOINT, THE FAN STOPS.

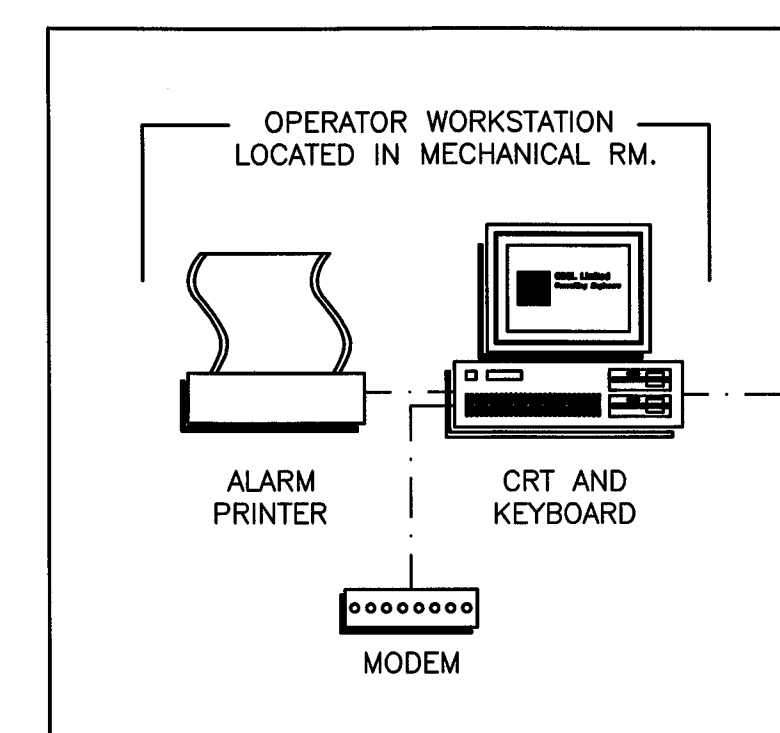
**8 CONTROLS SCHEMATIC — EF-1**  
SCALE : N.T.S.



#### SEQUENCE OF OPERATION:

1. DURING BUILDING OCCUPANCY HOURS THE CONTROL VALVE WILL MODULATE IN ORDER TO MAINTAIN THE SPACE AT [20]°C.
2. DURING OUT OF BUILDING OCCUPANCY PERIODS THE CONTROL VALVE WILL MODULATE IN ORDER TO MAINTAIN THE SPACE AT [16]°C.

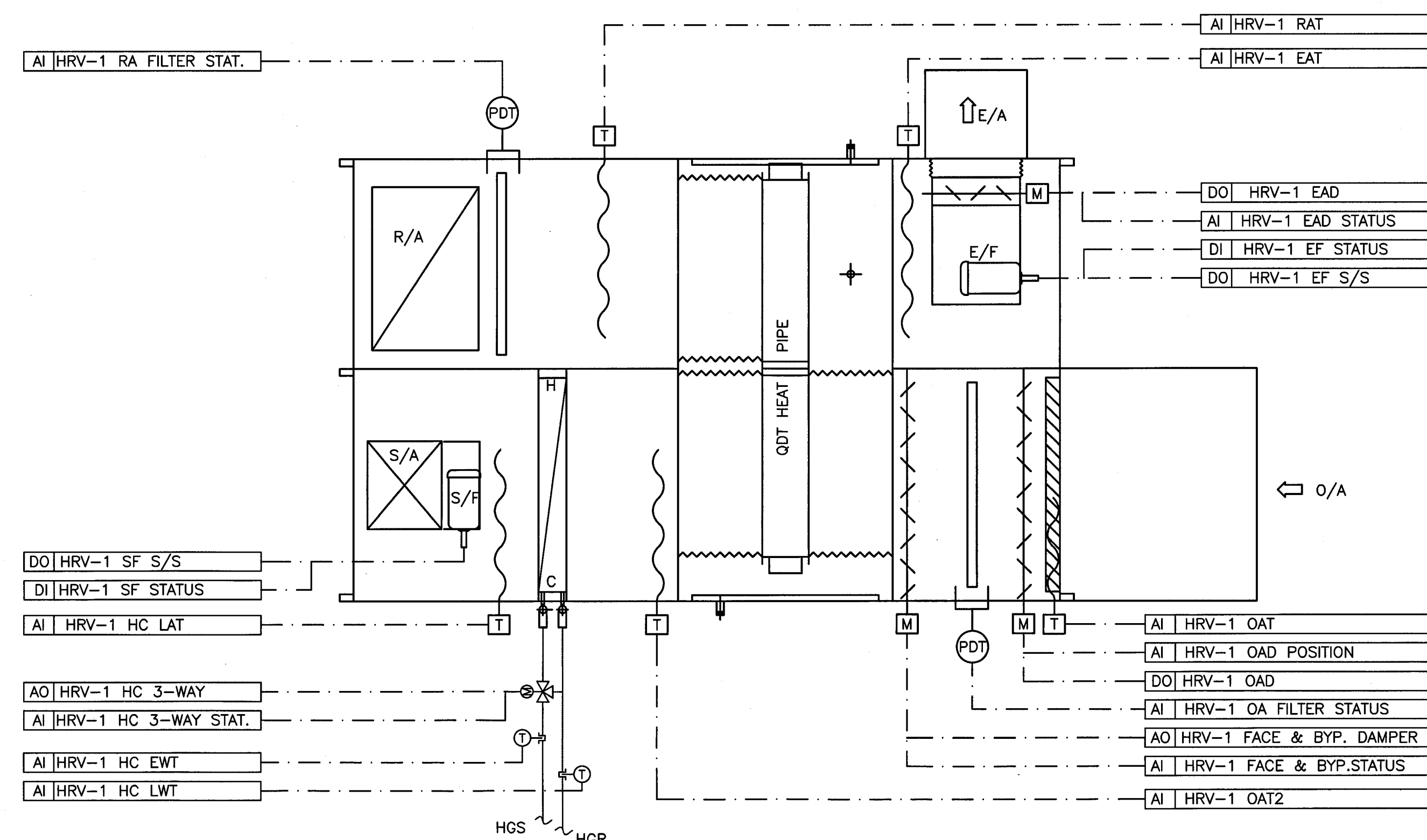
**3 CONTROLS SCHEMATIC — SPACE HEAT CONTROL**  
SCALE : N.T.S.



SPRINGHILL INSTITUTION IS EQUIPPED WITH AN EMCS. THE WASTE MANAGEMENT BUILDING WILL EXTEND THIS EXISTING CONTROL SYSTEM IN ACCORDANCE WITH SPECIFICATION SECTION 25 00 00. ALL NEW CONTROLS MUST BE COMPATIBLE WITH EXISTING EMCS. THE EXISTING SYSTEM IS SCHNEIDER TAC VISTA 5. PROVIDE NEW GRAPHICS AND PROGRAMMING AS NECESSARY TO ACCOMMODATE THE NEW ADDITION.

PROVIDE NEW CONTROLLERS & CONNECT TO EXISTING SYSTEM AS REQUIRED FOR A FULLY FUNCTIONING SYSTEM.

**6 DETAIL — CONTROL SYSTEM ARCHITECTURE**  
SCALE : N.T.S.



#### HRV-1 SEQUENCE OF OPERATION

ALL SET POINTS & VARIABLES INDICATED IN [SQUARE BRACKETS] SHALL BE EASILY ADJUSTABLE BY THE BUILDING OPERATOR AT THE SYSTEM GRAPHIC.

GENERAL: HRV-1 SERVES VENTILATION. THE UNIT CONSISTS OF: OUTSIDE AIR DAMPER, PRE & FINAL FILTERS, HEAT RECOVERY COIL, HEATING COIL, CONSTANT SPEED SUPPLY FAN. PARALLEL AIRSTREAM WILL CONSIST OF FILTERS, CONSTANT SPEED EXHAUST FAN, HEAT RECOVERY COIL & EXHAUST AIR DAMPERS.

1. **OCCUPIED MODE:** THE OCCUPANCY MODE FOR HRV-1 WILL BE ESTABLISHED BASED ON A PROGRAMMABLE TIME OF DAY SCHEDULE COORDINATED WITH THE OWNER.
2. **UNOCCUPIED MODE:** DURING UNOCCUPIED MODE THE SUPPLY & EXHAUST FANS SHALL STOP, THE OUTSIDE AIR & EXHAUST AIR DAMPERS SHALL CLOSE, THE HEATING COIL CONTROL VALVE SHALL CLOSE. ALARMS & OTHER SEQUENCE PROGRAMMING SHALL BE DISABLED DURING UNOCCUPIED PERIODS.
3. **SUPPLY & EXHAUST FAN CONTROL:** THE SUPPLY & EXHAUST FAN WILL BE STARTED BASED ON THE OCCUPANCY MODE. DURING OCCUPANCY MODE, THE SUPPLY AND EXHAUST DAMPERS SHALL OPEN. ONCE THE DAMPERS HAVE REACHED THEIR END SWITCH, THE SUPPLY AND EXHAUST FANS SHALL START. WHEN THE FAN STATUS INDICATES THAT THE FAN IS RUNNING, THE CONTROL SEQUENCE WILL BE ENABLED. UPON A LOSS OF AIRFLOW, THE SYSTEM WILL AUTOMATICALLY RESTART. IF THE EXHAUST FANS FAIL (STOP DUE TO FAULT, ETC.) THEN THE SUPPLY FAN SHALL AUTOMATICALLY SHUT DOWN.
4. **TEMPERATURE CONTROL:** WHENEVER THE CONTROL SEQUENCE IS ENABLED HRV-1 SHALL CONTROL THE BY-PASS DAMPER & HEATING COIL IN ACCORDANCE WITH A PROPORTIONAL PLUS INTEGRAL CONTROL LOOP TO MAINTAIN THE DISCHARGE AIR TEMPERATURE [70]DEG F AT ITS SETPOINT.
5. **HEAT RECLAIM CONTROLS:** THE BYPASS DAMPER SHALL BE CONTROLLED TO MAINTAIN THE EXHAUST AIR TEMPERATURE AT [35]DEG F OR ABOVE.
6. **POWER FAIL RESTART:** UPON POWER RESTORATION, THE UNIT RESTART SHALL BE DELAYED.

**9 DETAIL — HRV-1 CONTROL DETAIL**  
SCALE : N.T.S.

Public Works and Government Services Canada / Travaux Publics et Services gouvernementaux Canada

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<b>SPRINGHILL SOLID WASTE MANAGEMENT CENTRE</b>  <b>SPRINGHILL, NS</b>		
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<b>MECHANICAL</b>		
<b>CONTROLS</b>		
designed GH	conçu	
date JUNE 2012		
drawn KRG	dessiné	
date JUNE 2012		
approved MDW	approuvé	
date JUNE 2012		
Tender	Soumission	
Project Manager	Administrateur de projets	
project number	no. du projet	
<b>R.043944.002</b>		
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