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OFFICE OF ADMINISTRATION  
DIVISION OF FACILITIES  
MANAGEMENT,  
DESIGN AND CONSTRUCTION

DEPARTMENT OF  
PUBLIC SAFETY,  
MISSOURI VETERANS  
COMMISSION

HVAC REPLACEMENT  
PROJECT

MISSOURI VETERANS  
HOME

620 N. JEFFERSON  
ST. JAMES, MO 65559

PROJECT # U1503-03  
FAI # 29-051  
SITE # 4700  
FACILITY # 55019

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DATE: \_\_\_\_\_  
ISSUE DATE: 10-27-17

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SHEET TITLE:  
**BAS  
DIAGRAMS**

SHEET NUMBER:  
**M-605**

34 OF 41 SHEETS

10-27-17

**EXISTING CHILLED WATER SYSTEM - GENERAL NOTES**

CONTROL CONTRACTOR SHALL MODIFY THE CHILLED WATER SYSTEM ENABLE/DISABLE COMMAND AS FOLLOWS:  
1. WHEN THE OAT DROPS BELOW 45°F (ADJ.), THE CHILLED WATER SYSTEM SHALL BE DISABLED.  
2. WHEN THE OAT RISES ABOVE 50°F (ADJ.) AND THERE IS A CALL FOR COOLING FROM ANY OF THE AIR HANDLING UNITS, THE CHILLED WATER SYSTEM SHALL BE ENABLED.  
3. WHEN ALL AIR HANDLER CHILLED WATER VALVES HAVE BEEN CLOSED FOR 15 MINUTES (ADJ.), THE CHILLED WATER SYSTEM SHALL BE DISABLED.

**CHILLED WATER SYSTEM CONTROL DETAILS**

2  
M-605 NO SCALE

**AHU-2,3,11&12 - GENERAL NOTES**

1. AIR HANDLING UNITS AHU- 2, 3, 11 & 12 ARE EXISTING TO REMAIN.  
2. THE EXISTING DDC CONTROLLERS SHALL BE RE-UTILIZED AND REPROGRAMMED TO MEET THE SEQUENCE OF OPERATION. THE CONTRACTOR SHALL PROVIDE ANY ADDITIONAL CONTROLLERS REQUIRED TO MEET THE NEW POINTS LIST SHOWN.  
3. THE EXISTING DAMPER ACTUATORS SHALL BE REPLACED. ALL OTHER EXISTING CONTROL DEVICES, SENSORS, ACTUATORS, AND WIRING SHALL BE RE-UTILIZED. ANY ADDITIONAL DEVICES, SENSORS, ACTUATORS, THAT ARE NOT EXISTING, BUT REQUIRED TO MEET THE POINTS LIST AND SEQUENCE OF OPERATION, SHALL BE FURNISHED AND INSTALLED.  
4. THE EXISTING COMMUNICATION BUS MAY BE RE-UTILIZED. IF ADDITIONAL CONTROLLERS ARE REQUIRED THEY SHALL BE TIED INTO THE EXISTING COMMUNICATION BUS.

**SEQUENCE OF OPERATION**

**AHU 2 (DINING), AHU 3 (KITCHEN), AHU 11 (CORE AREAS) & AHU 12 (DEMENTIA DINING):**  
**GENERAL NOTES:**  
THE EXISTING CONTROLS SYSTEM SHALL BE MAINTAINED WITH THE INCLUSION OF THE FOLLOWING ENHANCEMENTS.  
**ECONOMIZER CONTROL:** CONTROL CONTRACTOR SHALL CONFIRM EXISTING CONTROL PROGRAMMING AND PROVIDE ANY ADDITIONAL CHANGES AS REQUIRED TO UTILIZE ECONOMIZER MODE AS THE FIRST SOURCE OF COOLING, WHENEVER THE OUTSIDE AIR TEMPERATURE DROPS BELOW 55°F (ADJ.).  
**COIL PUMP OPERATION:**  
MAINTAIN EXISTING CHILLED WATER AND HOT WATER VALVE CONTROL TO SERVE THE NEW CONTROL VALVES.  
THE HOT WATER COIL PUMP SHALL BE ENABLED WHEN EITHER THE HOT WATER VALVE IS COMMANDED OPEN OR WHEN THE OUTSIDE AIR TEMPERATURE DROPS BELOW 40°F (ADJ.). THE CHILLED WATER COIL PUMP SHALL BE ENABLED WHEN EITHER THE CHILLED WATER VALVE IS COMMANDED OPEN OR WHEN THE MIXED AIR TEMPERATURE DROPS BELOW 36°F (ADJ.).  
**FREEZE PROTECTION:**  
CONTROL CONTRACTOR SHALL VERIFY THAT THE EXISTING FREEZE PROTECTION IS FULLY OPERATIONAL. INCORPORATE THE COIL PUMP OPERATION FOR ADDITIONAL FREEZE PROTECTION.

CONTROL CONTRACTOR SHALL ADD THE FOLLOWING POINTS TO THE EXISTING CONTROLS SYSTEM.

TYPE	POINT	DESCRIPTION	UNITS	TREND	ALARM	TOTALIZE
BO	HWP-C	HOT WATER PUMP COMMAND	ON/OFF	X	X	X
BI	HWP-S	HOT WATER PUMP STATUS	ON/OFF	X	X	X
BO	CWP-C	CHILLED WATER PUMP COMMAND	ON/OFF	X	X	X
BI	CWP-S	CHILLED WATER PUMP STATUS	ON/OFF	X	X	X

ISSUE DATE: 10-27-17

**AHU-1,4,5-10 - GENERAL NOTES**

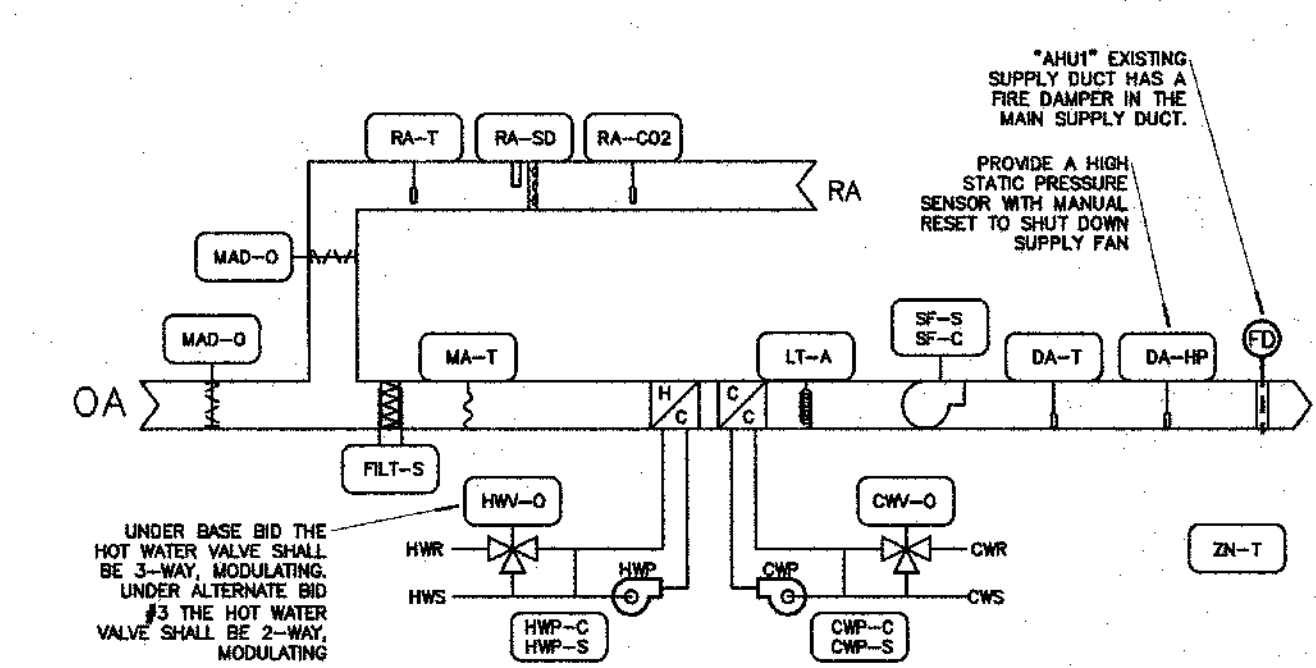
1. AIR HANDLING UNITS AHU- 1, 4, AND 5 THRU AHU-10 SHALL BE REPLACED IN THEIR ENTIRETY.  
2. THE EXISTING DDC CONTROLLERS SHALL BE RE-UTILIZED AND REPROGRAMMED TO MEET THE SEQUENCE OF OPERATION. THE CONTRACTOR SHALL PROVIDE ANY ADDITIONAL CONTROLLERS REQUIRED TO MEET THE NEW POINTS LIST SHOWN.  
3. ALL EXISTING CONTROL DEVICES, SENSORS, ACTUATORS, AND WIRING SHALL BE REMOVED AND REPLACED. ANY ADDITIONAL DEVICES, SENSORS, ACTUATORS, THAT ARE NOT EXISTING, SHALL BE FURNISHED AND INSTALLED.  
4. THE EXISTING COMMUNICATION BUS MAY BE RE-UTILIZED. IF ADDITIONAL CONTROLLERS ARE REQUIRED THEY SHALL BE TIED INTO THE EXISTING COMMUNICATION BUS.

**SEQUENCE OF OPERATION**

**AHU 1 (SERVING BASEMENT LEVEL):**  
**OCCUPIED/UNOCCUPIED MODE:** THE UNIT SHALL OPERATE BASED ON AN OCCUPANCY SCHEDULE. IN OCCUPIED MODE THE UNIT SHALL OPERATE AS INDICATED BELOW AND THE OUTSIDE AIR DAMPER SHALL REMAIN AT THE MINIMUM INDICATED SET POINT. IN UNOCCUPIED MODE THE OUTSIDE AIR DAMPER SHALL BE CLOSED AND THE UNIT OPERATE TO MAINTAIN THE SET BACK TEMPERATURES.  
**SUPPLY FAN START/STOP:** THE SUPPLY FAN SHALL RUN CONTINUOUSLY. IF THE SUPPLY FAN STATUS DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE SHALL BE ENABLED.  
**COOLING MODE:**  
IF THE OUTSIDE AIR TEMPERATURE IS LESS THAN 53°F (ADJ.), THEN THE ECONOMIZER MODE SHALL BE THE FIRST SOURCE OF COOLING. IF THE OUTSIDE AIR TEMPERATURE IS GREATER THAN 55°F, ECONOMIZER MODE SHALL BE DISABLED AND THE CHILLED WATER VALVE SHALL MODULATE AS REQUIRED TO MAINTAIN UNIT ZONE TEMPERATURE SETPOINT OF 75°F (ADJ.). THE HOT WATER VALVE SHALL REMAIN CLOSED. THE CHILLED WATER COIL PUMP SHALL BE ENABLED WHEN EITHER THE CHILLED WATER VALVE IS COMMANDED OPEN OR WHEN THE MIXED AIR TEMPERATURE DROPS BELOW 36°F (ADJ.).  
**HEATING MODE:**  
THE CHILLED WATER VALVE SHALL BE CLOSED AND THE HOT WATER VALVE SHALL MODULATE TO MAINTAIN ZONE TEMPERATURE SETPOINT OF 72°F (ADJ.). THE HOT WATER COIL PUMP SHALL BE ENABLED WHEN EITHER THE HOT WATER VALVE IS COMMANDED OPEN OR WHEN THE OUTSIDE AIR TEMPERATURE DROPS BELOW 40°F (ADJ.).  
**VENTILATION CONTROL:**  
1. DURING UNOCCUPIED MODE THE OUTSIDE AIR DAMPER SHALL BE CLOSED.  
2. DURING OCCUPIED MODE:  
2.1. WHEN THE CO2 LEVEL IS LESS THAN 1200 PPM (ADJ.) THE OUTSIDE AIR SETPOINT SHALL BE THE MINIMUM SETPOINT LISTED IN THE SCHEDULE.  
2.2. IF THE RETURN AIR CARBON DIOXIDE LEVEL EXCEEDS 1200 PPM (ADJ.), THE OUTSIDE AIR SETPOINT SHALL BE THE MAXIMUM SETPOINT LISTED IN THE SCHEDULE. WHEN THE CO2 LEVEL DROPS BELOW 800 PPM THE OUTSIDE AIR SETPOINT SHALL REVERT BACK TO THE MINIMUM POSITION.  
**FREEZE PROTECTION:**  
IF THE MIXED AIR TEMPERATURE DROPS BELOW 38°F (ADJ.), THE OUTSIDE AIR DAMPER SHALL FULLY CLOSE.  
IF THE MIXED AIR TEMPERATURE DROPS BELOW 34°F (ADJ.), THE OUTSIDE AIR DAMPER SHALL FULLY CLOSE, THE RETURN AIR DAMPER SHALL FULLY OPEN, THE SUPPLY FAN SHALL STOP, BOTH THE HOT WATER AND CHILLED WATER VALVES SHALL MOVE TO FULL OPEN POSITIONS, AND BOTH COIL PUMPS SHALL BE ENABLED.  
AN ALARM SHALL BE GENERATED AT THE CENTRAL WORKSTATION UPON ACTIVATION OF ANY OF THE THREE SETPOINTS ABOVE.  
**FREEZESTAT CONTROL:**  
IF THE FREEZESTAT SENSES A TEMPERATURE BELOW 34°F, THE OUTSIDE AIR DAMPER SHALL FULLY CLOSE, THE RETURN AIR DAMPER SHALL FULLY OPEN, AND THE SUPPLY FAN SHALL STOP.  
**SAFETY:**  
ALL OF THE SAFETY DEVICES SHALL BE MANUAL RESET; THE DEVICE THAT HAS TRIPPED SHALL BE MANUALLY RESET BEFORE RESTARTING THE AIR HANDLING UNIT.

**AHU-1 - POINTS LIST**

TYPE	POINT	DESCRIPTION	UNITS	TREND	ALARM	TOTALIZE
AI	MA-T	MIXED AIR TEMPERATURE	DEG F	X	X	X
AI	DA-T	DISCHARGE AIR TEMPERATURE	DEG F	X	X	X
AI	RA-CO2	RETURN AIR CO2	PPM	X	X	X
AI	RA-H	RETURN AIR RELATIVE HUMIDITY	% RH	X	X	X
AI	FILT-S	DIRTY FILTER STATUS	PSI	X	X	X
BI	SF-S	SUPPLY FAN STATUS	ON/OFF	X	X	X
BI	RA-SD	RETURN AIR SMOKE DETECTOR	ON/OFF	X	X	X
BO	SF-C	SUPPLY FAN COMMAND	%	X	X	X
BO	HWP-C	HOT WATER PUMP COMMAND	ON/OFF	X	X	X
BI	HWP-S	HOT WATER PUMP STATUS	ON/OFF	X	X	X
BO	CWP-C	CHILLED WATER PUMP COMMAND	ON/OFF	X	X	X
BI	CWP-S	CHILLED WATER PUMP STATUS	ON/OFF	X	X	X
AO	MAD-O	MIXED AIR DAMPER	%	X	X	X
AO	CWV-O	CHILLED WATER VALVE OUTPUT	%	X	X	X
AO	CWV-O	CHILLED WATER VALVE OUTPUT	%	X	X	X
AO	HWV-O	HOT WATER VALVE OUTPUT	%	X	X	X



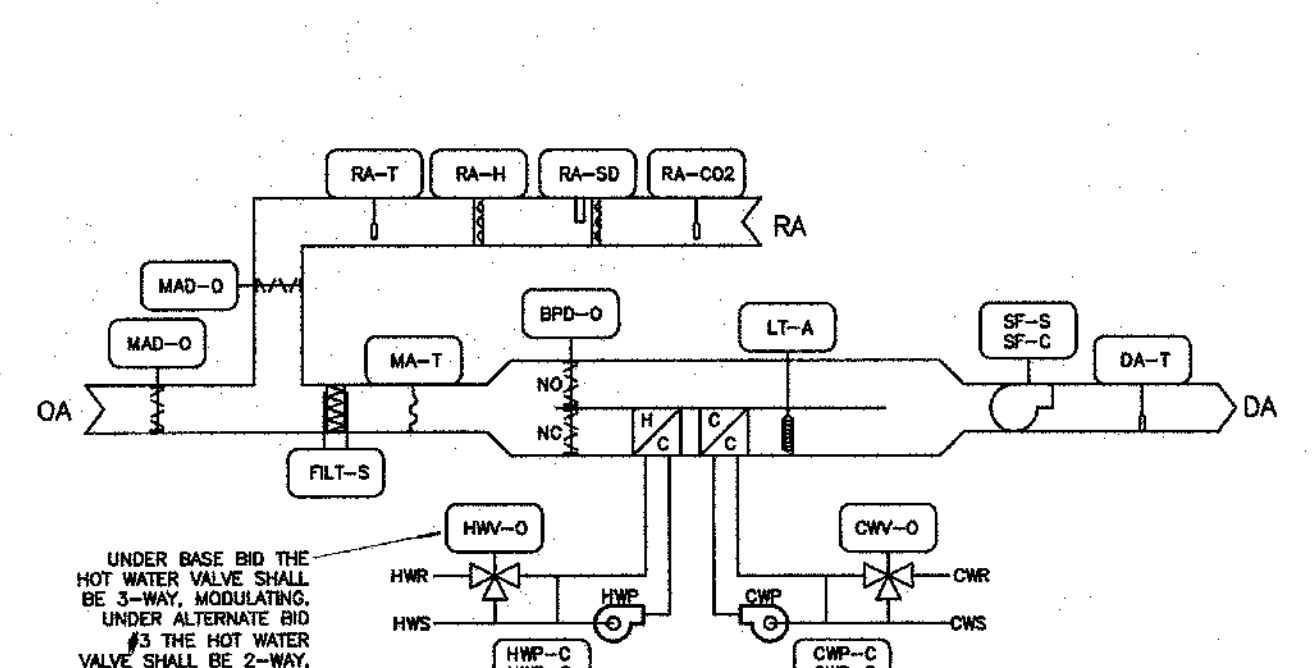
**AHU 1 CONTROL DIAGRAM**  
3  
M-605 NO SCALE

**SEQUENCE OF OPERATION**

**AHU 4 (SERVING ADMIN) & AHU 11 (SERVING CORE AREAS):**  
**OCCUPIED/UNOCCUPIED MODE:** THE UNIT SHALL OPERATE BASED ON AN OCCUPANCY SCHEDULE. IN OCCUPIED MODE THE UNIT SHALL OPERATE AS INDICATED BELOW AND THE OUTSIDE AIR DAMPER SHALL REMAIN AT THE MINIMUM INDICATED SET POINT. IN UNOCCUPIED MODE THE OUTSIDE AIR DAMPER SHALL BE CLOSED AND THE UNIT OPERATE TO MAINTAIN THE SET BACK TEMPERATURES.  
**SUPPLY FAN CONTROL:** THE SUPPLY FAN SHALL OPERATE CONTINUOUSLY WHENEVER THE AHU IS IN EITHER THE OCCUPIED COOLING MODE OR THE MORNING WARM-UP HEATING MODE. THE SUPPLY FAN SHALL SHUT-DOWN IF HIGH LIMIT STATIC PRESSURE IS ACTIVATED. IF THE SUPPLY FAN STATUS DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE SHALL BE ENABLED.  
**DISCHARGE AIR TEMPERATURE CONTROL:**  
1. CONTINUOUSLY MONITOR ALL ZONE TEMPERATURE SENSORS SERVING THE HOT WATER ZONE REHEAT COILS AND BYPASS TERMINAL BOXES.  
1.1. IF ANY ZONE IS IN COOLING MODE THE AHU DISCHARGE TEMPERATURE SHALL BE SET TO 55°F (ADJ.).  
1.2. IF THE RETURN AIR RELATIVE HUMIDITY RISES ABOVE 55% RH, THE DEHUMIDIFICATION SEQUENCE SHALL BE ENABLED AND THE AHU DISCHARGE TEMPERATURE SHALL BE SET TO 55°F (ADJ.). WHEN THE RETURN AIR RELATIVE HUMIDITY DROPS BELOW 50% RH, THE DEHUMIDIFICATION SEQUENCE SHALL BE DISABLED.  
1.3. IF ALL ZONES ARE IN HEATING MODE THE AHU DISCHARGE TEMPERATURE SHALL BE SET TO 75°F (ADJ.).  
**COOLING MODE:**  
IF THE OUTSIDE AIR TEMPERATURE IS LESS THAN 53°F (ADJ.), THEN THE ECONOMIZER MODE SHALL BE THE FIRST SOURCE OF COOLING. IF THE OUTSIDE AIR TEMPERATURE IS GREATER THAN 55°F, ECONOMIZER MODE SHALL BE DISABLED AND THE CHILLED WATER VALVE SHALL MODULATE AS REQUIRED TO MAINTAIN UNIT DISCHARGE TEMPERATURE SETPOINT OF 55°F (ADJ.). THE HOT WATER PREHEAT VALVE SHALL REMAIN CLOSED. THE CHILLED WATER COIL PUMP SHALL BE ENABLED WHEN EITHER THE CHILLED WATER VALVE IS COMMANDED OPEN OR WHEN THE MIXED AIR TEMPERATURE DROPS BELOW 36°F (ADJ.).  
**HEATING MODE:**  
THE CHILLED WATER VALVE SHALL BE CLOSED AND THE HOT WATER VALVE SHALL MODULATE TO MAINTAIN UNIT DISCHARGE AIR TEMPERATURE SETPOINT OF 75°F (ADJ.). WHEN THE MIXED AIR TEMPERATURE DROPS BELOW 40°F, THE HOT WATER VALVE SHALL MOVE TO FULL OPEN AND THE BYPASS DAMPER SHALL MODULATE TO MAINTAIN UNIT DISCHARGE AIR TEMPERATURE SETPOINT. WHEN THE MIXED AIR TEMPERATURE IS GREATER THAN 45°F (ADJ.), THE BYPASS DAMPER SHALL MOVE TO FULL COIL POSITION AND THE HOT WATER VALVE SHALL MODULATE TO MAINTAIN UNIT DISCHARGE AIR TEMPERATURE SETPOINT. THE HOT WATER COIL PUMP SHALL BE ENABLED WHEN EITHER THE HOT WATER VALVE IS COMMANDED OPEN OR WHEN THE OUTSIDE AIR TEMPERATURE DROPS BELOW 40°F (ADJ.).  
**VENTILATION CONTROL:**  
1. DURING UNOCCUPIED MODE THE OUTSIDE AIR DAMPER SHALL BE CLOSED.  
2. DURING OCCUPIED MODE:  
2.1. WHEN THE CO2 LEVEL IS LESS THAN 1200 PPM (ADJ.) THE OUTSIDE AIR SETPOINT SHALL BE THE MINIMUM SETPOINT LISTED IN THE SCHEDULE.  
2.2. IF THE RETURN AIR CARBON DIOXIDE LEVEL EXCEEDS 1200 PPM (ADJ.), THE OUTSIDE AIR SETPOINT SHALL BE THE MAXIMUM SETPOINT LISTED IN THE SCHEDULE. WHEN THE CO2 LEVEL DROPS BELOW 800 PPM THE OUTSIDE AIR SETPOINT SHALL REVERT BACK TO THE MINIMUM POSITION.  
**FREEZE PROTECTION:**  
IF THE MIXED AIR TEMPERATURE DROPS BELOW 38°F (ADJ.), THE OUTSIDE AIR DAMPER SHALL FULLY CLOSE.  
IF THE MIXED AIR TEMPERATURE DROPS BELOW 34°F (ADJ.), THE OUTSIDE AIR DAMPER SHALL FULLY CLOSE, THE RETURN AIR DAMPER SHALL FULLY OPEN, THE SUPPLY FAN SHALL STOP, BOTH THE HOT WATER AND CHILLED WATER VALVES SHALL MOVE TO FULL OPEN POSITIONS, AND BOTH COIL PUMPS SHALL BE ENABLED.  
AN ALARM SHALL BE GENERATED AT THE CENTRAL WORKSTATION UPON ACTIVATION OF ANY OF THE THREE SETPOINTS ABOVE.  
**FREEZESTAT CONTROL:**  
IF THE FREEZESTAT SENSES A TEMPERATURE BELOW 34°F, THE OUTSIDE AIR DAMPER SHALL FULLY CLOSE, THE RETURN AIR DAMPER SHALL FULLY OPEN, AND THE SUPPLY FAN SHALL STOP.  
**SAFETY:**  
ALL OF THE SAFETY DEVICES SHALL BE MANUAL RESET; THE DEVICE THAT HAS TRIPPED SHALL BE MANUALLY RESET BEFORE RESTARTING THE AIR HANDLING UNIT.

**AHU-4 - POINTS LIST**

TYPE	POINT	DESCRIPTION	UNITS	TREND	ALARM	TOTALIZE
AI	MA-T	MIXED AIR TEMPERATURE	DEG F	X	X	X
AI	DA-T	DISCHARGE AIR TEMPERATURE	DEG F	X	X	X
AI	RA-CO2	RETURN AIR CO2	PPM	X	X	X
AI	RA-H	RETURN AIR RELATIVE HUMIDITY	% RH	X	X	X
AI	FILT-S	DIRTY FILTER STATUS	PSI	X	X	X
BI	SF-S	SUPPLY FAN STATUS	ON/OFF	X	X	X
BI	RA-SD	RETURN AIR SMOKE DETECTOR	ON/OFF	X	X	X
BO	SF-C	SUPPLY FAN COMMAND	%	X	X	X
BO	HWP-C	HOT WATER PUMP COMMAND	ON/OFF	X	X	X
BI	HWP-S	HOT WATER PUMP STATUS	ON/OFF	X	X	X
BO	CWP-C	CHILLED WATER PUMP COMMAND	ON/OFF	X	X	X
BI	CWP-S	CHILLED WATER PUMP STATUS	ON/OFF	X	X	X
AO	MAD-O	MIXED AIR DAMPER	%	X	X	X
AO	CWV-O	CHILLED WATER VALVE OUTPUT	%	X	X	X
AO	CWV-O	CHILLED WATER VALVE OUTPUT	%	X	X	X
AO	HWV-O	HOT WATER VALVE OUTPUT	%	X	X	X



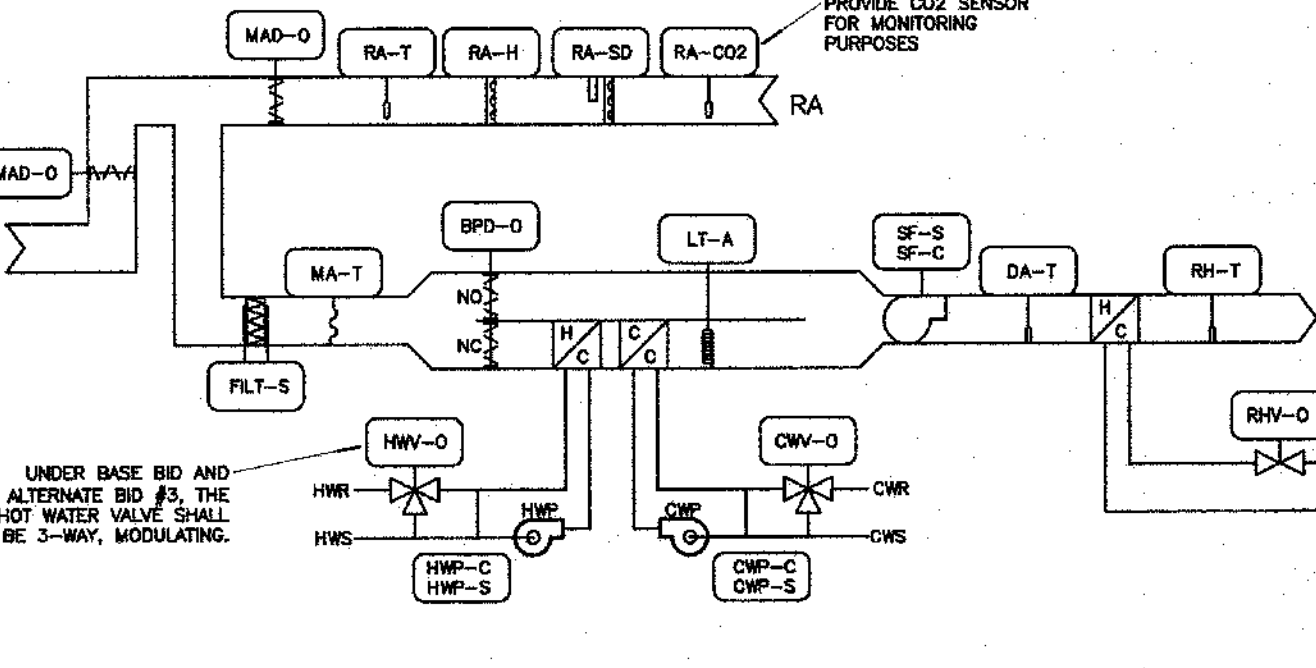
**AHU 4 CONTROL DIAGRAM**  
4  
M-605 NO SCALE

**SEQUENCE OF OPERATION**

**AIR HANDLING UNITS 5 THRU 10 (SERVING RESIDENT WINGS):**  
**SUPPLY FAN START/STOP:** THE SUPPLY FAN SHALL RUN CONTINUOUSLY. IF THE SUPPLY FAN STATUS DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE SHALL BE ENABLED.  
**UNIT AND REHEAT COIL DISCHARGE AIR TEMPERATURE CONTROL:**  
1. CONTINUOUSLY MONITOR ALL ZONE TEMPERATURE SENSORS SERVING THE HOT WATER ZONE REHEAT COILS.  
1.1. IF ANY ZONE IS IN COOLING MODE THE UNIT DISCHARGE TEMPERATURE SHALL BE SET TO 55°F (ADJ.).  
1.1.1. DURING THE COOLING MODE THE HOT WATER REHEAT COIL VALVE SHALL MODULATE TO MAINTAIN THE FOLLOWING REHEAT COIL DISCHARGE TEMPERATURE RESET SCHEDULE. WHEN THE OUTSIDE AIR TEMPERATURE IS BELOW 60°F (ADJ.) THE REHEAT COIL DISCHARGE TEMPERATURE SHALL BE 60°F (ADJ.). WHEN THE OUTSIDE AIR TEMPERATURE IS ABOVE 90°F (ADJ.) THE HOT WATER VALVE SHALL BE CLOSED. A LINEAR SLIDING SCALE SHALL RESET THE HOT WATER DISCHARGE TEMPERATURE FROM 60°F (ADJ.) AT 60°F (ADJ.) AMBIENT DOWN TO 55°F (ADJ.) AT 90°F (ADJ.) AMBIENT.  
1.2. IF THE RETURN AIR RELATIVE HUMIDITY RISES ABOVE 55% RH, THE DEHUMIDIFICATION SEQUENCE SHALL BE ENABLED AND THE UNIT DISCHARGE TEMPERATURE SHALL BE SET TO 55°F (ADJ.). WHEN THE RETURN AIR RELATIVE HUMIDITY DROPS BELOW 50% RH, THE DEHUMIDIFICATION SEQUENCE SHALL BE DISABLED.  
1.3. IF ALL ZONES ARE IN HEATING MODE THE UNIT DISCHARGE TEMPERATURE SHALL BE SET TO 75°F (ADJ.) AND THE REHEAT COIL VALVE SHALL BE CLOSED.  
**COOLING MODE:**  
IF THE OUTSIDE AIR TEMPERATURE IS LESS THAN 53°F (ADJ.), THEN THE ECONOMIZER MODE SHALL BE THE FIRST SOURCE OF COOLING. IF THE OUTSIDE AIR TEMPERATURE IS GREATER THAN 55°F, ECONOMIZER MODE SHALL BE DISABLED AND THE CHILLED WATER VALVE SHALL MODULATE AS REQUIRED TO MAINTAIN UNIT DISCHARGE TEMPERATURE SETPOINT OF 55°F (ADJ.). THE HOT WATER PREHEAT VALVE SHALL REMAIN CLOSED. THE CHILLED WATER COIL PUMP SHALL BE ENABLED WHEN EITHER THE CHILLED WATER VALVE IS COMMANDED OPEN OR WHEN THE MIXED AIR TEMPERATURE DROPS BELOW 36°F (ADJ.).  
**HEATING MODE:**  
THE CHILLED WATER VALVE SHALL BE CLOSED AND THE HOT WATER PREHEAT VALVE SHALL MODULATE TO MAINTAIN UNIT DISCHARGE AIR TEMPERATURE SETPOINT OF 75°F (ADJ.). WHEN THE MIXED AIR TEMPERATURE DROPS BELOW 40°F, THE HOT WATER PREHEAT VALVE SHALL MOVE TO FULL OPEN AND THE BYPASS DAMPER SHALL MODULATE TO MAINTAIN UNIT DISCHARGE AIR TEMPERATURE SETPOINT. WHEN THE MIXED AIR TEMPERATURE IS GREATER THAN 45°F (ADJ.), THE BYPASS DAMPER SHALL MOVE TO FULL COIL POSITION AND THE HOT WATER VALVE SHALL MODULATE TO MAINTAIN UNIT DISCHARGE AIR TEMPERATURE SETPOINT. THE HOT WATER COIL PUMP SHALL BE ENABLED WHEN EITHER THE HOT WATER VALVE IS COMMANDED OPEN OR WHEN THE OUTSIDE AIR TEMPERATURE DROPS BELOW 40°F (ADJ.).  
**VENTILATION CONTROL:**  
1. DURING UNOCCUPIED MODE THE OUTSIDE AIR DAMPER SHALL BE CLOSED.  
2. DURING OCCUPIED MODE THE OUTSIDE AIR DAMPER SHALL BE OPEN TO THE MINIMUM POSITION.  
**FREEZE PROTECTION:**  
IF THE MIXED AIR TEMPERATURE DROPS BELOW 38°F (ADJ.), THE OUTSIDE AIR DAMPER SHALL FULLY CLOSE.  
IF THE MIXED AIR TEMPERATURE DROPS BELOW 34°F (ADJ.), THE OUTSIDE AIR DAMPER SHALL FULLY CLOSE, THE RETURN AIR DAMPER SHALL FULLY OPEN, THE SUPPLY FAN SHALL STOP, BOTH THE HOT WATER AND CHILLED WATER VALVES SHALL MOVE TO FULL OPEN POSITIONS, AND BOTH COIL PUMPS SHALL BE ENABLED.  
AN ALARM SHALL BE GENERATED AT THE CENTRAL WORKSTATION UPON ACTIVATION OF ANY OF THE THREE SETPOINTS ABOVE.  
**FREEZESTAT CONTROL:**  
IF THE FREEZESTAT SENSES A TEMPERATURE BELOW 34°F, THE OUTSIDE AIR DAMPER SHALL FULLY CLOSE, THE RETURN AIR DAMPER SHALL FULLY OPEN, AND THE SUPPLY FAN SHALL STOP.  
**SAFETY:**  
ALL OF THE SAFETY DEVICES SHALL BE MANUAL RESET; THE DEVICE THAT HAS TRIPPED SHALL BE MANUALLY RESET BEFORE RESTARTING THE AIR HANDLING UNIT.

**AHU-5 THRU 10 SYSTEM - POINTS LIST**

TYPE	POINT	DESCRIPTION	UNITS	TREND	ALARM	TOTALIZE
AI	MA-T	MIXED AIR TEMPERATURE	DEG F	X	X	X
AI	DA-T	DISCHARGE AIR TEMPERATURE	DEG F	X	X	X
AI	RH-T	REHEAT COIL DISCHARGE TEMP.	DEG F	X	X	X
AI	RA-T	RETURN AIR TEMPERATURE	DEG F	X	X	X
AI	RA-H	RETURN AIR RELATIVE HUMIDITY	% RH	X	X	X
AI	RA-CO2	RETURN AIR CO2	PPM	X	X	X
AI	FILT-S	DIRTY FILTER STATUS	PSI	X	X	X
BI	SF-S	SUPPLY FAN STATUS	ON/OFF	X	X	X
BI	RA-SD	RETURN AIR SMOKE DETECTOR	ON/OFF	X	X	X
BO	SF-C	SUPPLY FAN COMMAND	%	X	X	X
BO	HWP-C	HOT WATER PUMP COMMAND	ON/OFF	X	X	X
BI	HWP-S	HOT WATER PUMP STATUS	ON/OFF	X	X	X
BO	CWP-C	CHILLED WATER PUMP COMMAND	ON/OFF	X	X	X
BI	CWP-S	CHILLED WATER PUMP STATUS	ON/OFF	X	X	X
AO	MAD-O	MIXED AIR DAMPER	%	X	X	X
AO	CWV-O	CHILLED WATER VALVE OUTPUT	%	X	X	X
AO	HWV-O	HOT WATER VALVE OUTPUT	%	X	X	X
AO	RHV-O	REHEAT COIL VALVE OUTPUT	%	X	X	X



**AHU 5 - 10 CONTROL DIAGRAM**  
5  
M-605 NO SCALE