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 PROJECT: 21502.10

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RENOVATIONS TO THE
 STEVENS AVENUE ARMORY

CONTROL DIAGRAMS 2

SCALE: AS NOTED
 DATE: 05-24-16

DWG. M-702

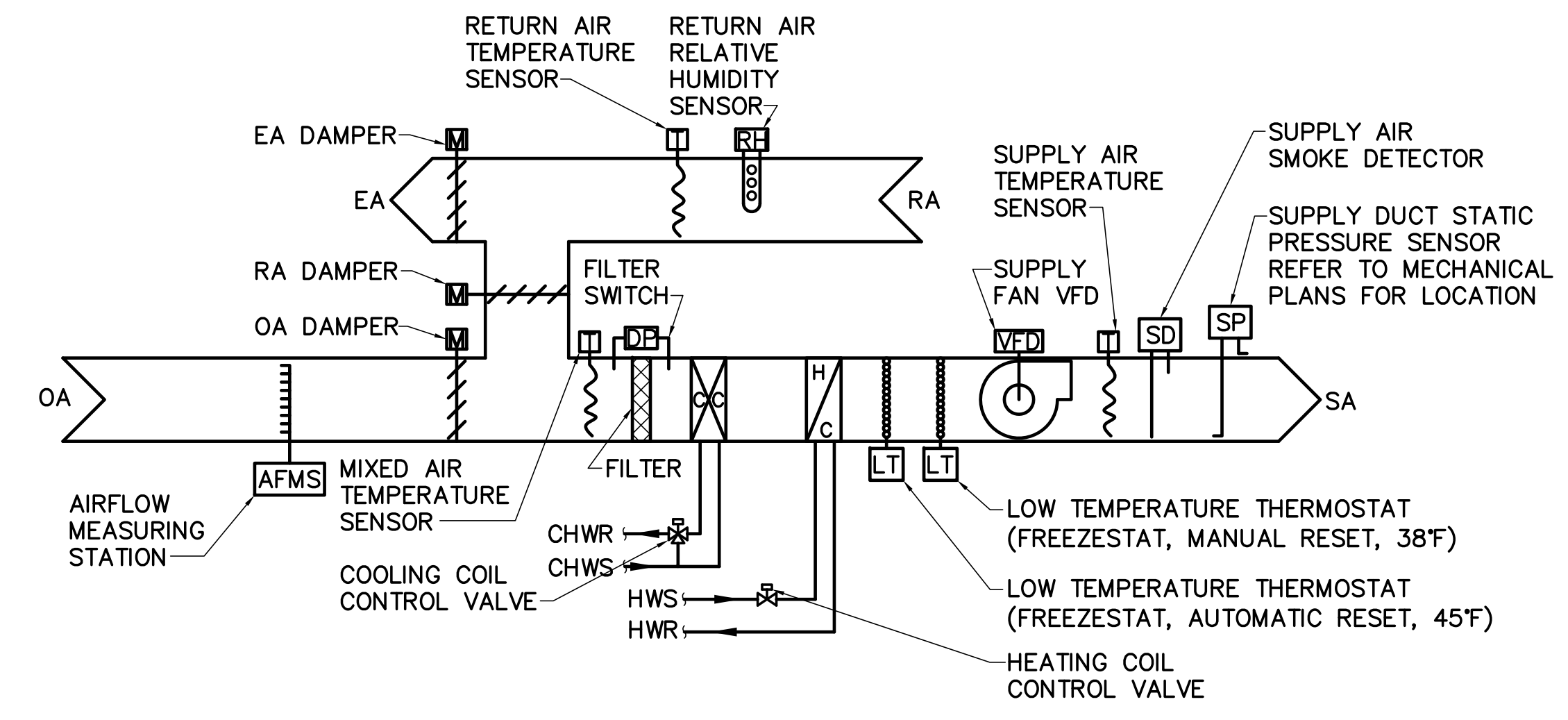
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AHU-2 POINTS LIST

SYSTEM POINT DESCRIPTION	GRAPHIC	ANALOG INPUT	ANALOG OUTPUT	BINARY INPUT	BINARY OUTPUT	ALARM	ANALOG VARIABLE	BINARY VARIABLE	TREND LOG	NOTES
SUPPLY FAN VFD ENABLE		x								
SUPPLY FAN VFD SIGNAL			x							
SUPPLY FAN VFD ALARM		x		x		x				1,6
SUPPLY AIR TEMPERATURE		x								2
HEATING COIL CONTROL VALVE		x	x							
COOLING COIL CONTROL VALVE		x	x							
MANUAL RESET (FREEZESTAT)		x								3,9
AHU FILTER SWITCH		x		x						7
RETURN AIR TEMPERATURE		x								
RETURN AIR RELATIVE HUMIDITY		x								
MIXED AIR TEMPERATURE		x								5
SUPPLY AIR SMOKE DETECTOR		x		x		x				8
SUPPLY DUCT STATIC PRESSURE SENSOR		x								4
AIRFLOW MEASURING STATION		x								
AHU OUTSIDE AIR DAMPER		x								
AHU RETURN AIR DAMPER		x								
AHU EXHAUST AIR DAMPER		x								
AUTOMATIC RESET FREEZESTAT		x								3,9

- NOTES:
1. GENERATE ALARM IF MOTOR FAILS TO SHOW PROOF OF OPERATION.
 2. GENERATE ALARM IF TEMPERATURE IS NOT ±5°F OF SET POINT FOR MORE THAN 20 MINUTES.
 3. GENERATE ALARM IF FREEZESTAT INDICATES A LOW TEMPERATURE CONDITION.
 4. GENERATE ALARM IF THE SUPPLY DUCT STATIC PRESSURE IS BELOW 0.5 IN H2O (ADJUSTABLE) FOR MORE THAN 30 MINUTES (ADJUSTABLE).
 5. GENERATE ALARM IF TEMPERATURE FALLS BELOW 45°F.
 6. GENERATE ALARM IF VFD INDICATES AN ALARM CONDITION.
 7. GENERATE MAINTENANCE ALARM WHEN PRESSURE DROP EXCEEDS 0.70 IN H2O.
 8. GENERATE ALARM IF SMOKE DETECTOR INDICATES AN ALARM CONDITION.
 9. FREEZESTAT SHALL BE HARD-WIRED TO SHUT DOWN THE FAN, OPEN THE HEATING COIL CONTROL VALVE, AND CLOSE THE OUTSIDE AND EXHAUST AIR DAMPERS.

1 AHU-2 CONTROL DIAGRAM
 W-702 NOT TO SCALE

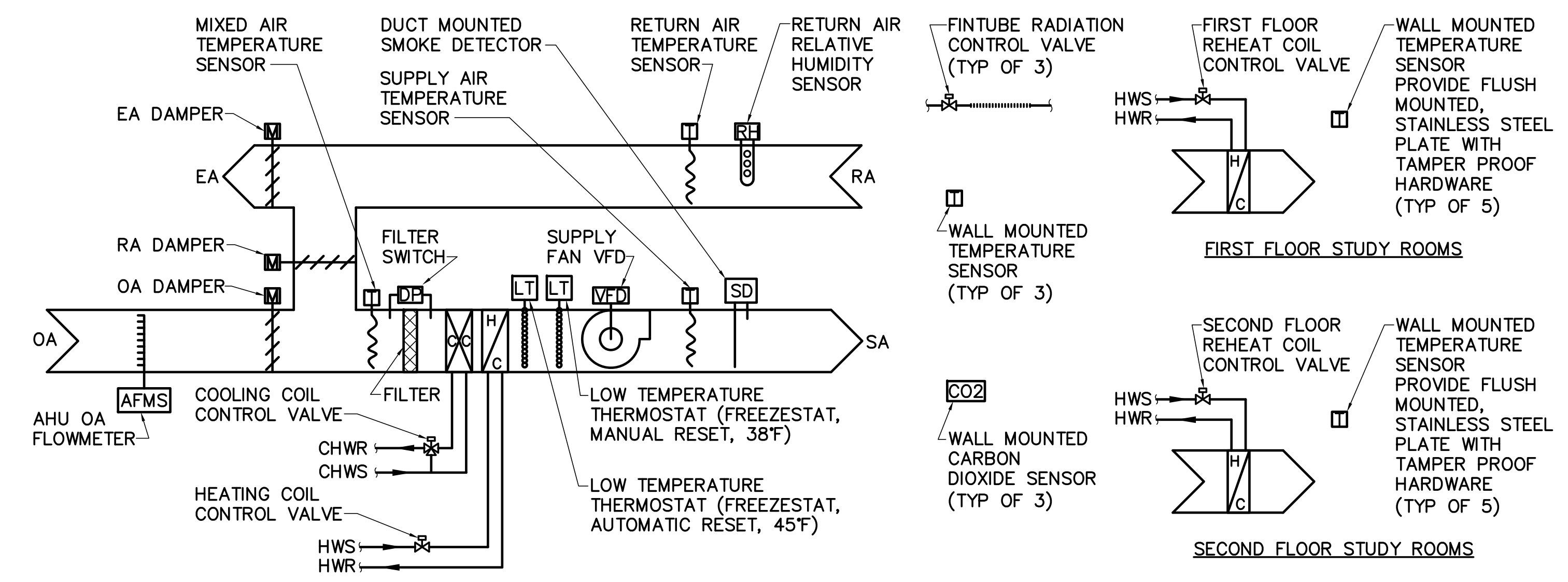


AHU-3 POINTS LIST

SYSTEM POINT DESCRIPTION	GRAPHIC	ANALOG INPUT	ANALOG OUTPUT	BINARY INPUT	BINARY OUTPUT	ALARM	ANALOG VARIABLE	BINARY VARIABLE	TREND LOG	NOTES
SUPPLY FAN VFD ENABLE		x								
SUPPLY FAN VFD SIGNAL			x							
SUPPLY FAN VFD ALARM		x		x		x				1,5
SUPPLY AIR TEMPERATURE		x								2
HEATING COIL CONTROL VALVE		x	x							
COOLING COIL CONTROL VALVE		x	x							
FREEZESTAT MANUAL RESET		x								3
FREEZESTAT AUTOMATIC RESET		x								3
AHU FILTER SWITCH		x		x						6
RETURN AIR TEMPERATURE		x								
RETURN AIR RELATIVE HUMIDITY		x								
CARBON DIOXIDE SENSOR		x								4,8
MIXED AIR TEMPERATURE		x								
SMOKE DETECTOR		x		x		x				7
AHU OUTSIDE AIR FLOW		x								
AHU OUTSIDE AIR DAMPER		x								
AHU RETURN AIR DAMPER		x								
AHU EXHAUST AIR DAMPER		x								
FINTUBE VALVE		x		x						8
ROOM TEMPERATURE		x								8
REHEAT COIL VALVE		x	x							9
STUDY ROOM TEMPERATURE		x								10

- NOTES:
1. GENERATE ALARM IF MOTOR FAILS TO SHOW PROOF OF OPERATION.
 2. GENERATE ALARM IF TEMPERATURE IS NOT ±5°F OF SET POINT FOR MORE THAN 30 MINUTES.
 3. GENERATE ALARM IF FREEZESTAT INDICATES A LOW TEMPERATURE CONDITION.
 4. GENERATE ALARM IF CARBON DIOXIDE LEVEL RISES ABOVE 1000 PPM.
 5. GENERATE ALARM IF VFD INDICATES AN ALARM CONDITION.
 6. GENERATE MAINTENANCE ALARM WHEN PRESSURE DROP EXCEEDS 0.70 IN H2O (ADJUSTABLE).
 7. GENERATE ALARM IF SMOKE DETECTOR INDICATES AN ALARM CONDITION.
 8. TYPICAL OF 3.
 9. TYPICAL OF 2.
 10. TYPICAL OF 10.

2 AHU-3 CONTROL DIAGRAM
 W-702 NOT TO SCALE



SEQUENCE OF OPERATION (AHU-3)
 OCCUPIED / UNOCCUPIED MODES: THE OCCUPIED AND UNOCCUPIED MODES SHALL BE DETERMINED BY USER ADJUSTABLE 7 DAY / 24 HOUR SCHEDULES ACCESSIBLE TO THE BUILDING OPERATOR THROUGH THE GUI.

OCCUPIED MODE: THE SUPPLY AIR TEMPERATURE SET POINT SHALL BE ADJUSTED ACCORDING TO THE FOLLOWING, OPERATOR ADJUSTABLE, RESET SCHEDULE:

LARGE FUNCTION ROOM AVERAGE TEMPERATURE **SUPPLY AIR SET POINT**
 3 DEG F BELOW ROOM SET POINT 110 DEG F
 BETWEEN ROOM SET POINT AND (ROOM SET POINT-1) EQUAL TO ROOM SET POINT
 3 DEG F ABOVE ROOM SET POINT 58 DEG F

THE AIR HANDLING UNIT (AHU) SUPPLY FAN SHALL RUN CONTINUOUSLY AND ITS SPEED SHALL MODULATE TO MAINTAIN THE ROOM TEMPERATURE SET POINT (72 DEG F, ADJUSTABLE). THE FAN SPEED SHALL RESET FROM FULL SPEED WHEN THE ROOM IS MORE THAN 3 DEG F FROM SET POINT (ABOVE OR BELOW) TO MINIMUM SPEED (30%, ADJUSTABLE) WHEN THE ROOM TEMPERATURE IS EQUAL TO THE ROOM SET POINT.

OPERATIONAL MODES: THE AHU SHALL OPERATE IN THE HEATING MODE, COOLING MODE OR ECONOMIZER COOLING MODE. THE OPERATIONAL MODE OF THE AHU SHALL NOT CHANGE MORE OFTEN THAT ONCE PER HOUR.

HEATING MODE: THE HEATING MODE SHALL BE ENABLED WHENEVER THERE IS A CALL FOR HEATING. DURING THE HEATING MODE THE AHU OUTSIDE AIR (OA) AND EXHAUST AIR (EA) DAMPERS SHALL REMAIN CLOSED, THE AHU RETURN AIR (RA) DAMPER SHALL REMAIN OPEN. THE COOLING COIL CONTROL VALVE SHALL REMAIN CLOSED AND THE HEATING COIL CONTROL VALVE SHALL MODULATE TO MAINTAIN THE SUPPLY AIR SET POINT. IF THE ROOM TEMPERATURE FALLS 1 DEG F BELOW SET POINT THEN THE FINTUBE SHALL OPEN AND REMAIN OPEN UNTIL THE ROOM SET POINT IS SATISFIED.

COOLING MODE: THE COOLING MODE SHALL BE ENABLED WHENEVER THERE IS A CALL FOR COOLING. DURING THE COOLING MODE THE AHU OA AND EA DAMPERS SHALL REMAIN CLOSED, THE AHU RA DAMPER SHALL REMAIN OPEN. THE HEATING COIL CONTROL VALVE SHALL REMAIN CLOSED AND THE COOLING COIL CONTROL VALVE SHALL MODULATE TO MAINTAIN THE SUPPLY AIR SET POINT.

ECONOMIZER COOLING MODE: THE ECONOMIZER COOLING MODE SHALL BE ENABLED WHENEVER THE OUTSIDE AIR ENTHALPY IS 10 PERCENT (OR MORE) BELOW THE RETURN AIR ENTHALPY, THE OUTSIDE AIR TEMPERATURE IS BELOW 55 DEG F (ADJUSTABLE). OTHERWISE ECONOMIZER COOLING SHALL BE DISABLED. DURING ECONOMIZER COOLING THE HEATING AND COOLING COIL CONTROL VALVES SHALL REMAIN CLOSED, AND AHU OA, EA AND RA DAMPERS SHALL OPERATE IN UNISON AS A MIXED AIR (MA) DAMPER. THE MA DAMPER SHALL MODULATE TO MAINTAIN THE SUPPLY AIR SET POINT. THE AHU OA AIRFLOW SHALL NOT FALL BELOW THE MINIMUM SCHEDULED OA REQUIREMENTS (REFER TO M601). IF THE MA DAMPER IS AT MINIMUM OA AND THE SA TEMPERATURE FALLS 5 DEG F (ADJUSTABLE) BELOW THE SA SET POINT THEN THE ECONOMIZER COOLING MODE SHALL BE DISABLED AND THE COOLING MODE SHALL BE ENABLED.

DEMAND VENTILATION MODE: THE DEMAND VENTILATION MODE SHALL OVERRIDE NORMAL OPERATIONAL MODES. THE OUTSIDE AIR DAMPER MINIMUM POSITION SHALL MODULATE TO MAINTAIN THE SPACE CO2 LEVEL BETWEEN 700 PPM AND 1000 PPM.

STUDY ROOMS: THE STUDY ROOMS HEATING SET POINT SHALL BE 68 DEG F (ADJUSTABLE). THE FIRST FLOOR AND SECOND FLOOR STUDY ROOMS SHALL HAVE SEPARATE SET POINTS. IF THE AVERAGE STUDY ROOM TEMPERATURE FALLS MORE THAN 1 DEG F BELOW SET POINT THEN THE REHEAT COIL VALVE SHALL START TO MODULATE TO SATISFY THE SET POINT. IF THE AVERAGE STUDY ROOM TEMPERATURE RISES MORE THAN 0.5 DEG F ABOVE SET POINT THEN THE CONTROL VALVE SHALL CLOSE AND REMAIN CLOSED UNTIL THE AVERAGE TEMPERATURE FALLS AS DESCRIBED ABOVE.

UNOCCUPIED MODE: DURING THE UNOCCUPIED MODE THE AHU FANS SHALL REMAIN OFF AND THE OUTSIDE AND EXHAUST AIR DAMPERS SHALL REMAIN CLOSED. IN ORDER TO PREVENT FREEZING, THE HEATING COIL CONTROL VALVES SHALL MODULATE TO MAINTAIN 55 DEG F (ADJUSTABLE) AT THE SUPPLY AIR TEMPERATURE SENSOR. THE FINTUBE RADIATION VALVES SHALL CYCLE TO MAINTAIN NIGHT SETBACK TEMPERATURE OF 65 DEG F (ADJUSTABLE).

SAFETY - FREEZESTAT: UPON ACTIVATION OF EITHER FREEZESTAT THE SUPPLY FAN SHALL STOP, THE HEATING COIL CONTROL VALVE SHALL OPEN AND THE OUTSIDE AND EXHAUST AIR DAMPERS SHALL CLOSE.

SAFETY - SMOKE DETECTORS/FIRE ALARM: UPON ACTIVATION OF A SMOKE DETECTOR OR THE FIRE ALARM THE AHU SHALL ENTER UNOCCUPIED MODE AND SHALL REMAIN IN UNOCCUPIED MODE UNTIL THE ALARM IS CLEARED. THE SMOKE DETECTOR SHALL BE HARD WIRED TO SHUT DOWN THE SUPPLY FAN AND CLOSE THE OUTSIDE AND EXHAUST AIR DAMPERS.