

ALL CONTROL VALVES, SENSORS, AND CONTROL DEVICES TO BE NEW, REPLACE EXISTING IF APPLICABLE. MOTORS, & FANS ARE EXISTING TO REMAIN. SEE SEQUENCE OF OPERATION. PROVIDE CURRENT SENSORS FOR MONITORING AS SPECIFIED TO MOTORS AND FANS.

SHEET NOTES:

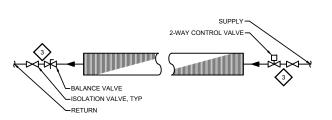
DEMOLISH EXISTING PNEUMATIC ACTUATOR. PROVIDE NEW DDC ACTUATOR.



DEMOLISH EXISTING PNEUMATIC ACTUATOR. PROVIDE NEW 24V OR LINE-VOLTAGE ACTUATOR. QUANTITY AS NOTED, FIELD VERIFY.

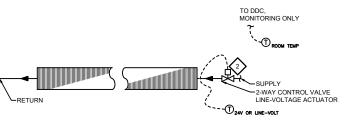


PROVIDE REPLACEMENT ISOLATION VALVES AND FLOWSETTER

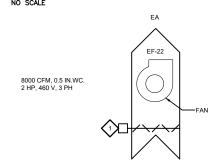


TYPICAL FINNED TUBE PIPING DIAGRAM

NO SCALE



TYPICAL FINNED TUBE CONTROL DIAGRAM



EXHAUST FAN CONTROL DIAGRAM (EF-22)

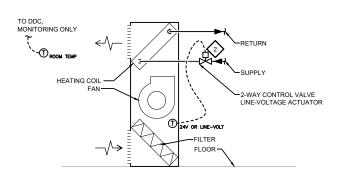
NO SCALE

NOTE: ALL VALVES AND OTHER PIPING ACCESSORIES SHALL BE CONTAINED WITHIN THE CABINET AND SHALL BE ACCESSIBLE OR PROVIDED WITH ACCESS PANELS. UNION, TYP VALVE ISOLATION VALVE, TYP -2-WAY CONTROL VALVE VALVED LOW POINT ←FLEXIBLE CONNECTION, TYP DRAIN WITH CAPPED HOSE ADAPTOR

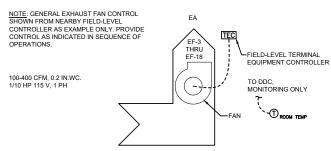
VALVED HIGH POINT AIR VENT ON SUPPLY BRANCH

SUPPLY FROM MAIN

TYPICAL CABINET UNIT HEATER PIPING DIAGRAM NO SCALE



TYPICAL CABINET UNIT HEATER CONTROL DIAGRAM



TYPICAL EF-3 THRU EF-18

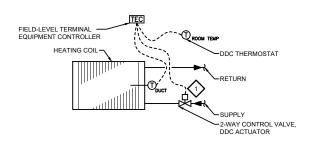
NO SCALE

VALVED HIGH POINT AIR VENT ON SUPPLY BRANCH BALANCE VALVE, TYP -RETURN TO MAIN UNION, TYP HEATING COIL -2-WAY MODULATING CONTROL VALVE -VALVED LOW POINT DRAIN WITH CAPPED HOSE ADAPTOR -FLEXIBLE CONNECTION, TYP

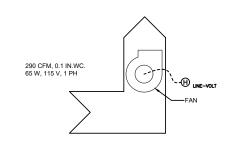
> TYPICAL BOOSTER HEATING COIL PIPING DIAGRAM

> > NO SCALE

NO SCALE



TYPICAL BOOSTER HEATING COIL CONTROL DIAGRAM



UNDERFLOOR EXHAUST FAN CONTROL DIAGRAM, TYPICAL OF 6 (EF-21)

NO SCALE

GENERAL EXHAUST FAN CONTROL DIAGRAM,





MENDENHALL RIVER COMMUNITY SCHOOL CONTROLS UPGRADE PHASE II CBJ PROJECT NO. MRE18-200

DIAGRAMS PH 2 TYPICAL MECHANICAL D

16485JM/MRE18-200

SEQUENCE OF OPERATIONS - PHASE 2

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1.1.1 1.1.1.1 1.1.1.2 1.1.1.3 1.1.1.4 1.1.1.5 1.1.1.6 1.1.1.1 1.1.1.7	THIS ARTICLE DESCRIBES THE SEQUENCE OF OPERATION FOR: GENERAL GRAPHICAL USER INTERFACE ALARMS EQUIPMENT START—UP EXHAUST FANS BOOSTER HEATING COILS ELECTRIC UNIT HEATER (AHU—3) UNIT HEATERS & CABINET UNIT HEATERS FINNED PIPE
1.2	SHOP DRAWINGS FOR MECHANICAL-SYSTEM-CONTROLLED AND CONTROL
1.2.1	SYSTEM COMPONENTS LABEL WITH SETTINGS, ADJUSTABLE RANGE OF CONTROL AND LIMITS. SUBMIT WRITTEN DESCRIPTION OF CONTROL SEQUENCE. SUBMIT FLOW DIAGRAMS FOR EACH CONTROL SYSTEM, GRAPHICALLY DEPICTING CONTROL LOGIC. SUBMIT DRAFT COPIES OF GRAPHIC DISPLAYS INDICATING MECHANICAL SYSTEM COMPONENTS, CONTROL SYSTEM COMPONENTS, AND CONTROLLED FUNCTION STATUS AND VALUE. COORDINATE SUBMITTALS WITH INFORMATION REQUESTED ELSEWHERE IN THIS SECTION.
1.3 1.3.1	GENERAL ALL POINTS AND ALARMS NOTED HERE SHALL BE DISPLAYED AT THE DISTRICT'S EXISTING GRAPHICAL USER INTERFACE FOR MONITORING AND CONTROLLING THE BUILDING. ALL SAFETY SHUTDOWNS SHALL BE HARDWIRED AND SHALL NOT BE DEPENDENT ON THE BUILDING AUTOMATION SYSTEM (BAS) FOR OPERATION.
1.3.2	ALL WORK OUTLINED HERE SHALL BE CONTROLLED BY THE BAS AND CONNECTED TO THE BAS UNLESS OTHERWISE NOTED. THE GRAPHICS AND THE MONITORING AND CONTROL TAGS SHALL BE FULLY INTEGRATED INTO THE DISTRICT'S REMOTE HOST SYSTEM.
1.3.3	IF PACKAGED CONTROL PANELS ARE USED, PROVIDE ADDITIONAL SENSORS IN THE FIELD FOR BAS MONITORING OF POINTS NOTED UNDER EACH SECTION. PROVIDE 10% SPARE CAPACITY FOR FUTURE USE AT EACH BAS PANEL.
1.3.4	ALL ALARMS BASED ON A DEVIATION FROM ADJUSTABLE SETPOINT (I.E. 2 DEGREES F ABOVE SETPOINT) THAT EXPERIENCES AN OFFSET, SUCH AS AN OUTSIDE AIR RESET SCHEDULE, SHALL NOT BE FIXED BUT RATHER MOVE WITH THE SETPOINT.
1.3.5	TERMINAL CONTROLLERS, ACTUATORS, SENSORS, AND ASSOCIATED COMPONENTS ARE TO BE NAMED/ADDRESSED BASED ON THE ROOM THEY ARE IN.
1.3.6	REVIEW THE JUNEAU SCHOOL DISTRICT NAMING CONVENTIONS AND PROGRAMMING STANDARDS. INCORPORATE STANDARDS INTO PROGRAMMING AND STANDARD SEQUENCE OF OPERATIONS.
1.3.7	INCORPORATE JSD STANDARD SEQUENCES AND PROGRAMMING DESCRIPTIONS
1.3.7.1	FOR THE FOLLOWING FUNCTIONS: OCCUPANCY SCHEDULE. UTILIZE FOR ALL AREAS UNLESS OTHERWISE
1.3.7.2	INDICATED. SCHEDULING SHALL OCCUR AT THE EQUIPMENT LEVEL. EACH PIECE OF EQUIPMENT SHALL HAVE A SEPARATE SCHEDULE TO FACILITATE ZONE OR EQUIPMENT SPECIFIC SCHEDULING OUTSIDE OF TYPICAL BUILDING OCCUPANCY HOURS.
1.3.7.3	OPTIMIZED STARTUP: PROVIDE A LEARNING ALGORITHM, OPTIMIZED START TIME, TO ALLOW BUILDING TO REACH OCCUPIED SETPOINT AT SCHEDULED OCCUPANCY. OPTIMIZED START TIME WILL BE LIMITED TO NOT EARLIER THAN 2 HOURS OF SCHEDULED OCCUPANCY.
1.3.7.4	OCCUPANCY SCHEDULING AND OCCUPIED/UNOCCUPIED MODE SHALL BE COORDINATED WITH JUNEAU SCHOOL DISTRICT.
1.3.7.5	THE FOLLOWING EXAMPLE SCHEDULE SHALL BE ADJUSTABLE IN THE DDC FRONT END FOR NIGHT TEMPERATURE SETBACK
	TIME BUILDING TEMPERATURE SETPOINT 12:00 AM - 5:00 AM 65'F 5:00 AM - 4:30 PM 72'F 4:30 PM - 8:00 PM 66'F 8:00 PM 12:00 AM 65'F
1.4 1.4.1	GRAPHICAL USER INTERFACE SYSTEM SHALL SEAMLESSLY INTEGRATE WITH EXISTING FRONT END GRAPHICS
1.4.2 1.4.2.1	PACKAGE. PROVIDE GRAPHICS TO MEET THE FOLLOWING: MAIN GRAPHIC PAGE WITH LINKS TO FLOORPLAN GRAPHICS AND SPECIFIC
1.4.2.2	EQUIPMENT GRAPHICS FLOORPLAN GRAPHICS
1.4.2.3 1.4.2.4	SPECIFIC EQUIPMENT GRAPHICS LINKS TO ANY SPECIFIC EQUIPMENT GRAPHIC SHALL NOT BE MORE THAN 3
1.4.3	LINKS AWAY FROM THE MAIN GRAPHIC PAGE ALL VALUES AND SETPOINTS NOTED WITHIN THE SEQUENCE OF OPERATION
1.4.0	ARE TO BE PROVIDED ON THE GRAPHICAL USER INTERFACE FOR MONITORING. AND CONTROLING. ADDITIONAL POINTS SHALL BE PROVIDED AS REQUIRED TO TROUBLESHOOT SYSTEM OPERATION.
1.4.3.1 1.4.4	FOR EACH POINT, PROVIDE THE POINT DESCRIPTION, ADDRESS, AND VALUE. ALL POINTS OUTLINED SHALL BE ADDRESSABLE THROUGH THE SAME MEANS. ALL POINTS SHALL BE PREPARED FOR ALL POINTS. ALL SETPOINTS SHALL BE ADJUSTABLE THROUGH THE GRAPHICS.
1.4.5	A GENERAL SYSTEM ALARM NOTIFICATION SHALL BE VISIBLE ON ALL GRAPHICS. ALARMS SHALL BE COLLECTED ON A CENTRAL ALARM PAGE. ALARMS GENERATED SHALL BE DOCUMENTED AND NOT ERASED EVEN IF THE
1.4.6	SYSTEMS HAVE AN AUTOMATIC RESET FUNCTION. FAIL POSITION FOR SPRING-WOUND ACTUATED VALVES AND DAMPERS ARE TO BE NOTED ON THE GRAPHICS. A DESCRIPTOR RELATING THE VOLTAGE

PROVIDED TO THE ACTUATOR AND THE DEVICES FIELD POSITION SHALL BE SHOWN ON THE GRAPHICS (I.E. "O V IS CLOSED, 10 V IS OPEN").

CONTRACTOR TO WORK WITH THE JSD TO IDENTIFY WHAT ALARMS ARE TO BE TEXTED OUT AND TO WHAT PHONE NUMBERS. THESE POINTS ARE TO BE NOTED IN THE OPERATION AND MAINTENANCE MANUAL.

COORDINATE WITH JSD FOR MAINTENANCE PERSONNEL TO INCLUDE IN 1.5.1 1.5.2 TEXTING NOTIFICATIONS.

TEXTING NOTIFICATIONS.

AN ALARM SHALL INDICATE THE POINT, POINT NAME, AND STATUS. JSD STANDARD PROGRAMMING ABBREVIATIONS SHALL BE UTILIZED.

THERE SHALL BE TWO (2) LEVELS OF ALARMS: CRITICAL AND MAINTENANCE. ALARM LEVELS SHALL BE IMPLEMENTED AS PER THE JSD INPUT/OUTPUT/ALARM SUMMARY. 1.5.3 1.5.4

INPUT/OUTPOT/ALARM SOMMART.
CRITICAL ALARMS:
WHENEVER A CRITICAL ALARM IS ANNUNCIATED, ANNUNCIATE THE ALARM AT
THE REMOTE WORKSTATIONS AND AT THE LOCAL WORKSTATIONS. ALL
CRITICAL ALARMS SHALL BE LATCHING. EACH ALARM SHALL REQUIRE
OPERATOR ACKNOWLEDGEMENT BEFORE CLEARING. DO NOT REPEAT ALARM
UNILESS PREVIOUSLY CLEARED. 1.5.4.1.1

UTILIZE TCP/IP NETWORK COMMUNICATIONS TO ANNUNCIATE ALARMS AT THE 1.5.4.1.2 REMOTE WORKSTATIONS. 1.5.4.1.3

PROVIDE CAPABILITY TO CLEAR CRITICAL ALARMS AT THE REMOTE WORKSTATIONS AND THE LOCAL WORKSTATIONS. MAINTENANCE ALARMS IN THE CONTROLLER MEMORY, MAINTAIN WARNING ALARM LOGS FOR THE PREVIOUS THREE (3) DAYS BEFORE OVERWRITING, SEGRECATED INTO 24 HOUR PERIODS.

1.5.4.2.2 ALARM SHALL ANNUNCIATE ONCE AFTER LATCHING. ONCE CLEARED REPEAT IF ALARM RETURNS. PROVIDE AN INDIVIDUAL MAINTENANCE ALARM FOR EACH ZONE
TEMPERATURE. INITIATE A WARNING ALARM WHENEVER ZONE TEMPERATURE
IS BELOW 58'F FOR A DELAY PERIOD OF 30 MINUTES. 1.5.4.2.3

1.6 1.6.1 EQUIPMENT START-UP

START MECHANICAL EQUIPMENT IN SEQUENCE WITH TIME DELAY BETWEEN STARTS TO AVOID POWER SURGE, FOR A PARTICULAR AREA, START PUMPS BEFORE FANS. START AHU FANS SEQUENTIALLY BY UNIT NUMBER. START EXHAUST FANS DIRECTLY AFTER ASSOCIATED SUPPLY FANS. PROVIDE START-UP DELAY PERIOD WITH A FIVE (5) SECOND SET POINT UNLESS OTHERWISE INDICATED. START EQUIPMENT ACCORDING TO THE FOLLOWING SCHEDULE: HYDRONIC HEATING EQUIPMENT 1.6.1.1

1.6.1.2 PUMPS BOILERS AIR HANDLING UNIT FANS EXHAUST FANS 1.6.1.5

1.7 GENERAL EXHAUST FANS APPLIES TO: GENERAL EXHAUST FANS AS NOTED IN THE DRAWINGS.

1.7.1

DISABLED/UNOCCUPIED MODE:

EXHAUST FANS SHALL BE OFF. 1.7.1.1 OCCUPIED MODE: EXHAUST FANS SHALL BE ENERGIZED 5 MINUTES (ADJUSTABLE) BEFORE THE SCHEDULED START OF BUILDING OCCUPANCY AND SHALL REMAIN ENERGIZED UNTIL 30 MINUTES (ADJUSTABLE) AFTER THE END OF BUILDING OCCUPANCY. COORDINATE WITH OWNER FOR FINAL SCHEDULING OF EXHAUST FANS. 1.7.2.1

STAGE STARTUP OF EXHAUST FANS AT LEAST 30 SECONDS APART FROM MAIN BUILDING VENTILATION FANS TO PREVENT PEAK SERVICE CHARGES. 1.7.2.2 1.7.2.3 UPON RETURN FROM POWER FAILURE UNIT SHALL RETURN TO PREVIOUS MODE AND INITIATE MODE STARTUP SEQUENCE. 1.7.3

SAFETY SHUTDOWNS: UPON ACTIVATION OF THE FIRE ALARM SYSTEM, THE UNIT SHALL GO INTO THE 1.7.3.1 DISABLED/UNOCCUPIED MODE, AFTER FIRE ALARM SYSTEM HAS BEEN CLEARED THE UNIT SHALL RETURN TO PREVIOUS MODE AND INITIATE MODE STARTUP SEQUENCE. 1.7.4 THE FOLLOWING POINTS SHALL BE SHOWN ON THE GRAPHICAL USER

> **POINTS** TYPE ALARM

(TYPICAL OF EACH FAN*)

FAN ENABLE* DO CRITICAL

1.8 EXHAUST FAN

APPLIES TO: EXHAUST FAN EF-22 1 181 DISABLED/UNOCCUPIED MODE: EXHAUST FANS SHALL BE OFF. 1.8.1.1 OCCUPIED MODE: 1.8.2

1.8.2.1 EXHAUST AIR DAMPER SHALL PROOF OPEN BEFORE FAN MOTOR STARTS. EXHAUST FAN SHALL BE ENERGIZED 5 MINUTES (ADJUSTABLE) BEFORE THE SCHEDULED START OF BUILDING OCCUPANCY AND SHALL REMAIN ENERGIZED UNTIL 30 MINUTES (ADJUSTABLE) AFTER THE END OF BUILDING OCCUPANCY. COORDINATE

WITH OWNER FOR FINAL SCHEDULING OF EXHAUST FAN. STAGE STARTUP OF EXHAUST FANS AT LEAST 30 SECONDS APART FROM MAIN BUILDING VENTILATION FANS TO PREVENT PEAK SERVICE CHARGES.

UPON RETURN FROM POWER FAILURE UNIT SHALL RETURN TO PREVIOUS MODE AND INITIATE MODE STARTUP SEQUENCE. 1.8.2.4 1.8.3

UPON ACTIVATION OF THE FIRE ALARM SYSTEM, THE UNIT SHALL GO INTO THE DISABLED/UNOCCUPIED MODE. AFTER FIRE ALARM SYSTEM HAS BEEN CLEARED THE UNIT SHALL RETURN TO PREVIOUS MODE AND INITIATE MODE STARTUP SEQUENCE. 1.8.3.1 THE FOLLOWING POINTS SHALL BE SHOWN ON THE GRAPHICAL USER INTERFACE:

> POINTS TYPE ALARM FAN ENABLE DO CRITICAL DAMPER STATUS DI MAINTENANCE

BOOSTER HEATING COILS 1.9

BOOSTER HEATING COIL CONTROL VALVE SHALL MODULATE OPEN/CLOSED TO MAINTAIN ROOM TEMPERATURE SETPOINT 1.9.1 1.9.2

IF SPACE TEMPERATURE DROPS BELOW 55 DEGREES F (ADJUSTABLE), A CRITICAL ALARM SHALL BE GENERATED. ALARM SHALL BE DISABLED IN SUMMER MODE.

1.9.3 THE FOLLOWING SHALL BE SHOWN ON THE GRAPHICAL USER INTERFACE:

> POINTS TYPE ALARM CONTROL VALVE COMMAND AO/DO SPACE TEMPERATURE CRITICAL SPACE TEMP SETPOINT AO SUPPLY AIR TEMP

CABINET UNIT HEATERS

24 V OR LINE-VOLTAGE INTEGRAL THERMOSTAT SHALL CYCLE CONTROL VALVE OPEN/CLOSE AND ENGAGE FAN AS REQUIRED TO MAINTAIN ROOM TEMPERATURE SETPOINT. TEMPERATURE SENSOR TO BE PROVIDED FOR BAS 1.10.1 MONITORING ONLY.

IF SPACE TEMPERATURE DROPS BELOW 55 DEGREES F (ADJUSTABLE), A CRITICAL ALARM SHALL BE GENERATED. ALARM SHALL BE DISABLED IN 1.10.2 1.10.3

THE FOLLOWING SHALL BE SHOWN ON THE GRAPHICAL USER INTERFACE:

<u>TYPE</u> <u>ALARM</u> SPACE TEMPERATURE CRITICAL AO SPACE TEMP SETPOINT

1.11.1

1.11.3

24 V OR LINE-VOLTAGE INTEGRAL THERMOSTAT-CONTROL VALVE SHALL CYCLE CONTROL VALVE OPEN/CLOSE TO MAINTAIN ROOM TEMPERATURE SETPOINT. TEMPERATURE SENSOR TO BE PROVIDED FOR BAS MONITORING

IF SPACE TEMPERATURE DROPS BELOW 55 DEGREES F (ADJUSTABLE), A CRITICAL ALARM SHALL BE GENERATED. ALARM SHALL BE DISABLED IN SUMMER MODE. 1.11.2

THE FOLLOWING SHALL BE SHOWN ON THE GRAPHICAL USER INTERFACE:

<u>TYPE</u> <u>ALARM</u> SPACE TEMPERATURE CRITICAL SPACE TEMP SETPOINT ΔO

- END OF SEQUENCE OF OPERATIONS -





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P PH 2 SEQUENCE COPERATIONS

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RAWN 16485JM/MRE18-200 REVISIONS