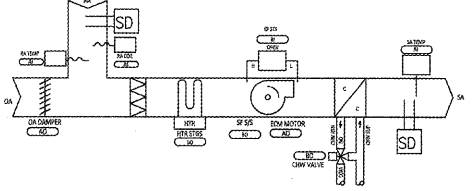


TYPICAL FCU CONTROL



SEQUENCE OF OPERATIONS UNIT VENTILATOR (TYPICAL)
 BUILDING AUTOMATION SYSTEM INTERFACE: THE BUILDING AUTOMATION SYSTEM (BAS) SHALL SEND THE CONTROLLER OCCUPIED AND UNOCCUPIED COMMANDS. THE BAS MAY ALSO SEND SPACE TEMPERATURE SETPOINT. IF COMMUNICATION IS LOST WITH THE BAS, THE UV CONTROLLER SHALL OPERATE USING ITS LOCAL SETPOINTS.

OCCUPIED MODE: WHEN THE UNIT IS ON THE SUPPLY FAN SHALL RUN CONTINUOUSLY. THE ELECTRIC HEATING SHALL STAGE OR THE CHILLED WATER VALVE SHALL MODULATE TO MAINTAIN THE ACTIVE RETURN TEMPERATURE SETPOINT.

UNOCCUPIED MODE: SUPPLY FAN SHALL BE OFF AND CHILLED WATER VALVE SHALL CLOSE.

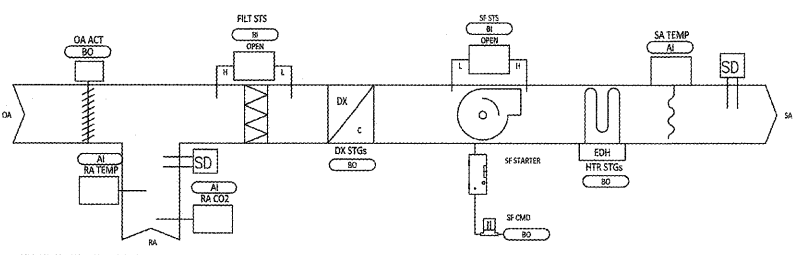
RETURN TEMPERATURE CONTROL: CASCADE ZONE CONTROL SHALL BE USED IN THE OCCUPIED MODE. IT MAINTAINS ZONE TEMPERATURE BY CONTROLLING THE DISCHARGE AIR TEMPERATURE TO CONTROL THE ZONE TEMPERATURE WHILE MINIMIZING THE FAN SPEED.

THE RETURN TEMPERATURE SHALL BE MAINTAINED BETWEEN THE OCCUPIED COOLING SETPOINT OF 74.0 DEG. F (ADJ.) AND THE OCCUPIED HEATING SETPOINT OF 71.0 DEG. F (ADJ.). THE UNIT SHALL TRANSITION TO THE COOLING MODE WHEN THE RETURN TEMPERATURE RISES ONE DEGREE ABOVE THE OCCUPIED COOLING SETPOINT OF 74.0 DEG. F (ADJ.). THE UNIT SHALL TRANSITION TO THE HEATING MODE WHEN THE RETURN TEMPERATURE DROPS ONE DEGREE BELOW THE OCCUPIED HEATING SETPOINT OF 71.0 DEG. F (ADJ.).

SUPPLY FAN OPERATION: THE SUPPLY FAN SHALL OPERATE AT HIGH SPEED BEFORE TRANSITIONING TO CONTINUOUS OPERATION AT THE SELECTED SPEED. THE SUPPLY FAN STATUS SHALL BE MONITORED BY A DIFFERENTIAL PRESSURE SWITCH. IF THE SUPPLY FAN FAILS THE FAN SHALL BE COMMANDED OFF. A MANUAL RESET SHALL BE REQUIRED TO RESTART THE FAN.

OA DAMPER / RA CO2: DURING OCCUPIED MODE, OA DAMPER SHALL OPEN TO A PRE-DETERMINED POSITION. OA DAMPER SHALL MODULATE TO MAINTAIN RA CO2 CONCENTRATION LEVEL SETPOINT (USE AHVRAE 62.1 TO DETERMINE CO2 PPM SETPOINT)

CV DX RTU CONTROL



SEQUENCE OF OPERATIONS :
 BUILDING AUTOMATION SYSTEM INTERFACE: THE BUILDING AUTOMATION SYSTEM (BAS) SHALL SEND THE CONTROLLER OCCUPIED / UNOCCUPIED MODE. IF A BAS IS NOT PRESENT, OR COMMUNICATION IS LOST WITH THE BAS THE CONTROLLER SHALL OPERATE USING DEFAULT MODES AND SETPOINTS.

OPTIMAL START: THE BAS SHALL MONITOR THE SCHEDULED OCCUPIED TIME, OCCUPIED SPACE SETPOINTS AND SPACE TEMPERATURE TO CALCULATE WHEN THE OPTIMAL START OCCURS. DURING OPTIMAL START UP, THE OA DAMPER SHALL REMAIN CLOSED.

OCCUPIED MODE: DURING OCCUPIED PERIODS, THE SUPPLY FAN SHALL RUN CONTINUOUSLY AND OA DAMPER SHALL OPEN. THE DX COILS OR ELECTRIC HEAT SHALL STAGE TO MAINTAIN THE OCCUPIED RETURN AIR TEMPERATURE SETPOINTS (74F (ADJ.) COOLING SETPOINT AND 68F (ADJ.) HEATING SETPOINT).

UNOCCUPIED MODE: DURING THIS MODE SUPPLY FAN SHALL BE OFF AND OUTSIDE AIR DAMPER SHALL CLOSE.

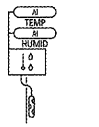
SUPPLY FAN: THE SUPPLY FAN SHALL BE ENABLED WHILE IN THE OCCUPIED MODE AND OFF DURING THE UNOCCUPIED MODE. A DIFFERENTIAL PRESSURE SWITCH SHALL MONITOR THE DIFFERENTIAL PRESSURE ACROSS THE FAN (FAN STATUS)

SMOKE DETECTOR SHUTDOWN (BY F/A): THE UNIT SHALL SHUT DOWN IN RESPONSE TO A SIGNAL FROM THE SMOKE DETECTOR INDICATING THE PRESENCE OF SMOKE. THE SMOKE DETECTOR SHALL BE INTERLOCKED TO THE UNIT THROUGH THE DRY CONTACTS OF THE SMOKE DETECTOR. A MANUAL RESET OF THE SMOKE DETECTOR SHALL BE REQUIRED TO RESTART THE UNIT.

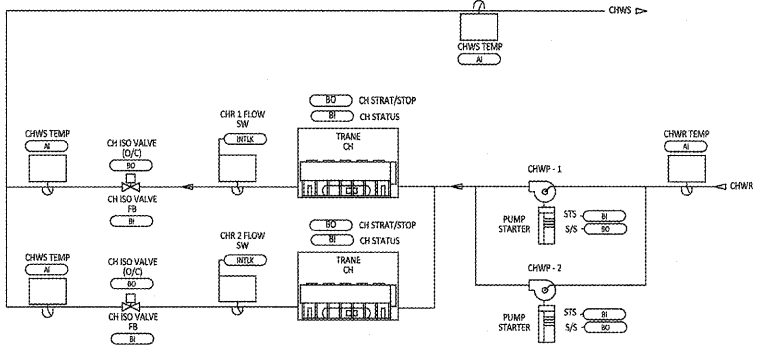
RA CO2 CONTROL: THE CONTROLLER SHALL MONITOR THE RETURN AIR CO2 CONCENTRATION LEVEL AND MODULATE THE OA DAMPER OPEN ON RISING CO2 CONCENTRATION LEVEL OVERRIDDING NORMAL DAMPER OPERATION TO MAINTAIN SPACE AIR CO2 CONCENTRATION LEVEL SETPOINT (USE PPM (ADJ.)). AN ALARM SHALL BE SENT TO THE BAS WHEN THE RETURN AIR CO2 CONCENTRATION LEVEL IS HIGHER THAN SETPOINT.

SYSTEM POINT DESCRIPTION	POINT TYPE										ALARMS	DIAGNOSTICS	NOTES:			
	GRAPHIC	HARDWARE INPUT	HARDWARE OUTPUT	SOFTWARE POINT	ANALOG IN	ANALOG OUT	DEFAULT VALUE	HIGH ANALOG LIMIT	LOW ANALOG LIMIT	BIINARY				SELECT DIAGNOSTIC		
SA TEMPERATURE	X	AI						X	X						SENSOR FAILURE	
RA TEMP / RA CO2	X	AI					X	X							SENSOR FAILURE	
SF STATUS	X	BI							X						FAN FAILURE	
CHWS VALVE	X	AO														
SF SPEED	X	AO														
SF START/STOP	X	BO													NOTE 1	
OA DAMPER	X	AO													NOTE 1	
HTR STGS	X	BO														
BAS COMM STATE	X	BI													NOTE 2	
GENERAL NOTES:	1: DISPLAY AT BAS USER INTERFACE													NOTE 1		
	2: SEE SCHEDULE FOR NUMBER OF HEATING STAGES															

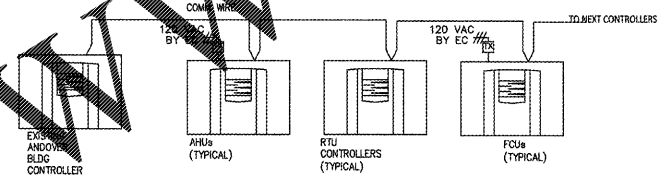
OUTDOOR TEMP/HUMIDITY SENSOR



CHILLER PLANT



SYSTEM POINT DESCRIPTION	POINT TYPE										ALARMS	DIAGNOSTICS	NOTES:			
	GRAPHIC	HARDWARE INPUT	HARDWARE OUTPUT	SOFTWARE POINT	ANALOG IN	ANALOG OUT	DEFAULT VALUE	HIGH ANALOG LIMIT	LOW ANALOG LIMIT	BIINARY				SELECT DIAGNOSTIC		
CHWS TEMP	X	AI						X	X						NOTE 1,4	
CHWR TEMP	X	AI						X	X						NOTE 1,4	
OA TEMP	X	AI								X					SENSOR FAILURE	
OA HUMIDITY	X	AI								X					SENSOR FAILURE	
CHWS STATUS	X	BI							X						CHILLER FAILURE	
CHWR PUMP STATUS	X	BI							X						PUMP FAILURE	
CHWS VALVE FB	X	BI													VALVE FAILURE	
CHWS S/S	X	BO													NOTE 1,4	
CHWR PUMP S/S	X	BO													NOTE 1	
ISOLATION VALVES	X	BO													NOTE 1,4	
CHILLER PLANT ENABLE	X	BI													NOTE 2	
CHWS SETPOINT	X	AO														
OA INVERT SETPOINT	X	AO														
BAS COMM STATE	X	BI													NOTE 2	
GENERAL NOTES:	1: TYPICAL															
	2: DISPLAY AT BAS USER INTERFACE															
	3: SEE PLANS FOR LOCATION															
	4: CHWS & CHWR UNCONTROLLED VALVE															



GENERAL NOTES:
 -NEW CONTROLLERS SHALL BE AN EXPANSION OF THE EXISTING BAS
 -PROVIDE NEW CONTROLLERS FOR BUILDINGS 1, 2, 3, 4, 5, AND 6 HVAC EQUIPMENT
 -PROVIDE NEW GRAPHICS
 -SPACE SENSORS LOCATED AS PER PLANS.
 -DIV.16 ELECTRICAL CONTRACTOR TO PROVIDE 120/277 POWER TO ALL FIELD CONTROLLERS
 -MOTORS, DAMPERS, EXHAUSTERS, JUNCTION BOXES, DAMPERS, AND EXHAUSTERS BY POWER CONTRACTOR
 -AHU'S, FCU'S, AND EXHAUST FANS MUST BE INTERFACED WITH EMS & FIRE ALARM. ALL NEW AND EXISTING FANS SHALL SHUT DOWN UPON ACTIVATION OF THE FIRE ALARM SYSTEM. COMPLY WITH BCP5 13845 2.2(A), NFPA 90A.

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Order Plans

CHILLER PLANT SEQUENCE OF OPERATIONS
 SYSTEM GENERAL DESCRIPTION: THE CHILLED WATER SYSTEM CONSISTS OF THE FOLLOWING:
 TWO (2) CHILLERS
 TWO (2) CONSTANT FLOW CHILLED WATER PUMPS
 TWO (2) ISOLATION VALVES

CHILLER - RUN CONDITIONS: CHILLERS SHALL BE COMMANDED TO RUN WHENEVER:
 - A DEFINABLE NUMBER OF CHILLED WATER COILS NEED COOLING
 - AND THE OUTSIDE AIR TEMPERATURE IS GREATER THAN 54F (ADJ.)

ONCE RUNNING, THE CHILLERS, VIA ITS INTERNAL CONTROLS, SHALL MAINTAIN THE CHILLED WATER SUPPLY TEMPERATURE AT SETPOINT.

CONTROL: SYSTEM SHALL MONITOR THE STATUS OF THE CHILLER AND CHWP AND SEND AN ALARM TO THE EMS WHEN STATUS DOES NOT MATCH ITS COMMANDED VALUE

ISOLATION VALVES SHALL OPEN BEFORE ITS ASSOCIATED CHILLER IS COMMANDED TO RUN, AND SHALL CLOSE AFTER IT IS STATED CHILLER IS COMMANDED OFF

ALARMS:
 -CHILLER FAILURE
 -CHWP FAILURE
 -CHW ISOLATION VALVE FAILURE
 -HIGH CHWS TEMP

Bid Documents Only
 Not For Construction

SEA CASTLE
 ELEMENTARY SCHOOL
 9600 MIRAMAR BOULEVARD
 MIRAMAR, FLORIDA 33025

THE SCHOOL BOARD OF BROWARD COUNTY

MECHANICAL CONTROLS

100% SUBMITTAL
 JOB PHASE: SBBC PROJECT: P-001632
 DATE: 12.13.16
 SCALE: AS SHOWN
 DRAWN BY: HA
 CHECKED BY: E.H.
 CAE PROJECT NO. 2016.55

PROFESSIONAL ENGINEER
 ERIC J. HAMMOND
 LICENSE NO. 12448
 STATE OF FLORIDA

SEAL
 DRAWING No.
 M-302