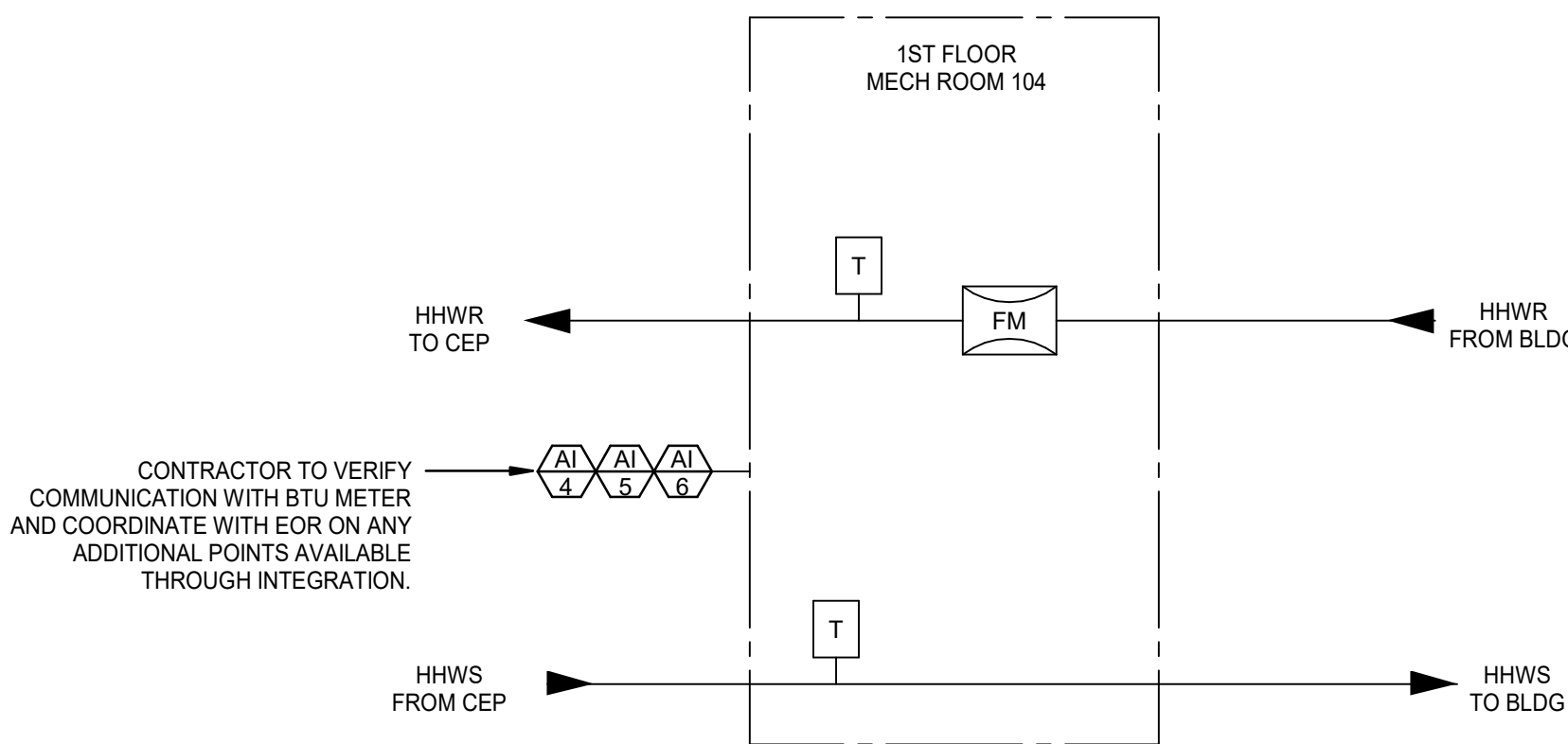


**CHILLED WATER (CHW) SYSTEM FLOW AND CONTROL SCHEMATIC**  
NO SCALE



**HEATING WATER (HW) SYSTEM FLOW AND CONTROL SCHEMATIC**  
NO SCALE

DIRECT DIGITAL CONTROL (DDC) POINTS SCHEDULE											
DRAWING TAG	EXISTING POWER METER		HARDWARE POINTS		SOFTWARE POINTS (BACNET VALUE / TREND / SETPOINT / ALARM)						
	POINT DESCRIPTION	NEW POINT	ANALOG INPUT	ANALOG OUTPUT	TREND INTERVAL (ADJ)	SETPOINT / ALARM CONDITION (ADJ)	UNITS	ALARM MESSAGE WITH TYP 5 MIN (ADJ.) ENTRY & EXIT DELAY TIMER	ALARM LEVEL 1 [HIGH] / 2 [MEDIUM] / 3 [LOW]	EMAIL ALARM	LOG ALARM
1	BUILDING POWER METER DEMAND	AI			15 MIN		KW				
2	BUILDING POWER METER CONSUMPTION	AI			15 MIN		KWH / DAY				

**EXISTING POWER METER CONTROL**  
FOR MONITORING ONLY

DIRECT DIGITAL CONTROL (DDC) POINTS SCHEDULE											
DRAWING TAG	EXISTING HEATING HOT WATER (HHW) & CHILLED WATER (CHW) SYSTEMS					SOFTWARE POINTS (BACNET VALUE / TREND / SETPOINT / ALARM)					
	POINT DESCRIPTION	NEW POINT	ANALOG INPUT	ANALOG OUTPUT	TREND INTERVAL (ADJ)	SETPOINT / ALARM CONDITION (ADJ)	UNITS	ALARM MESSAGE WITH TYP 5 MIN (ADJ.) ENTRY & EXIT DELAY TIMER	ALARM LEVEL 1 [HIGH] / 2 [MEDIUM] / 3 [LOW]	EMAIL ALARM	LOG ALARM
1	ADMIN BUILDING CHILLED WATER RETURN FLOW RATE	AI			15 MIN	SETPOINT +/- 10%	GPM	HIGH / LOW BUILDING CHILLED WATER RETURN FLOW RATE	2	X	X
2	ADMIN BUILDING CHILLED WATER RETURN TEMPERATURE	AI			15 MIN		"F	HIGH / LOW BUILDING CHILLED WATER SUPPLY TEMPERATURE	2	X	X
3	ADMIN BUILDING CHILLED WATER SUPPLY TEMPERATURE	AI			15 MIN	SETPOINT +/- 5	"F	HIGH / LOW BUILDING CHILLED WATER SUPPLY TEMPERATURE	2	X	X
4	ADMIN BUILDING HEATING WATER RETURN TEMPERATURE	AI			15 MIN		"F	HIGH / LOW BUILDING HEATING WATER SUPPLY TEMPERATURE	2	X	X
5	ADMIN BUILDING HEATING WATER SUPPLY TEMPERATURE	AI			15 MIN	SETPOINT +/- 5	"F	HIGH / LOW BUILDING HEATING WATER SUPPLY TEMPERATURE	2	X	X
6	ADMIN BUILDING HEATING HOT WATER RETURN FLOW RATE	AI			15 MIN	SETPOINT +/- 10%	GPM	HIGH / LOW BUILDING HEATING HOT WATER RETURN FLOW RATE	2	X	X

**CEP / ADMIN BUILDING HEATING HOT WATER AND CHILLED WATER MONITORING ONLY**

**HEATING HOT WATER MONITORING:**  
TWO IMMERSION TEMPERATURE SENSORS SENSING HEATING HOT WATER RETURN FROM THE BUILDING AND SENSING HEATING HOT WATER SUPPLY TO THE BUILDING ARE PROVIDED FOR MONITORING.  
A MAGNETIC TYPE FLOW METER WITH OUTPUT SIGNAL REPRESENTING 0-100% OF ITS HEATING HOT WATER FLOW RANGE IN GPM IS MONITORED BY THE DIGITAL CONTROL SYSTEM (DDC).  
THE DDC SYSTEM USING TEMPERATURES AND THE HEATING HOT WATER FLOW GPM IS CALCULATING BUILDING LOAD BTU USAGE WHICH IS THEN TOTALIZED FOR THE KBTU PER DAY USAGE.

**CHILLED WATER MONITORING:**  
TWO IMMERSION TEMPERATURE SENSORS SENSING CHILLED WATER RETURN FROM BUILDING AND SENSING CHILLED WATER SUPPLY TO THE BUILDING ARE PROVIDED FOR MONITORING.  
A MAGNETIC TYPE FLOW METER WITH OUTPUT SIGNAL REPRESENTING 0-100% OF ITS CHILLED WATER FLOW RANGE IN GPM IS MONITORED BY THE DDC.  
THE DDC SYSTEM USING TEMPERATURES AND THE CHILLED WATER FLOW GPM CALCULATES BUILDING LOAD TONS USAGE WHICH IS THEN TOTALIZED FOR TON-HOURS PER DAY USAGE.

DIRECT DIGITAL CONTROL (DDC) POINTS SCHEDULE											
DRAWING TAG	EXISTING LIGHT CONTACTORS		HARDWARE POINTS		SOFTWARE POINTS (BACNET VALUE / TREND / SETPOINT / ALARM)						
	POINT DESCRIPTION	NEW POINT	ANALOG INPUT	ANALOG OUTPUT	TREND INTERVAL (ADJ)	SETPOINT / ALARM CONDITION (ADJ)	UNITS	ALARM MESSAGE WITH TYP 5 MIN (ADJ.) ENTRY & EXIT DELAY TIMER	ALARM LEVEL 1 [HIGH] / 2 [MEDIUM] / 3 [LOW]	EMAIL ALARM	LOG ALARM
1	FLOOR 1 LIGHTING CONTACTOR START / STOP COMMAND						COV	ON / OFF			
2	FLOOR 2 LIGHTING CONTACTOR START / STOP COMMAND						COV	ON / OFF			
3	FLOOR 3 LIGHTING CONTACTOR START / STOP COMMAND						COV	ON / OFF			
4	FLOOR 4 LIGHTING CONTACTOR START / STOP COMMAND						COV	ON / OFF			
5	FLOOR 5 LIGHTING CONTACTOR START / STOP COMMAND						COV	ON / OFF			
6	EXTERIOR LIGHTING PHOTOCELL STATUS						COV	ON / OFF			
7	FRONT ENTRANCE EXTERIOR LIGHTING CONTACTOR START / STOP COMMAND						COV	ON / OFF			
8	REAR ENTRANCE EXTERIOR LIGHTING CONTACTOR START / STOP COMMAND						COV	ON / OFF			
9	EAST PARKING EXTERIOR LIGHTING CONTACTOR START / STOP COMMAND						COV	ON / OFF			
10	EAST POST EXTERIOR LIGHTING CONTACTOR START / STOP COMMAND						COV	ON / OFF			
11	WEST PARKING / POST EXTERIOR LIGHTING CONTACTOR START / STOP COMMAND						COV	ON / OFF			

**FLOOR LIGHTING CONTACTOR / RELAY (CR-L1, CR-L2, CR-L3, CR-L4, CR-L5) CONTROL**

**RUN CONDITIONS - SCHEDULED:**  
THE BUILDING'S DIVISION 16 LIGHTING CONTACTOR(S) ARE TURNED ON / OFF AUTOMATICALLY THROUGH THE DDC SYSTEM BY ONE OF THE SEVEN-DAY TIME CLOCK PROGRAMS.

**RUN CONDITIONS - REQUESTED:**  
THE BUILDING'S DIVISION 16 LIGHTING CONTACTOR(S) ARE TURNED ON / OFF MANUALLY THROUGH THE DDC SYSTEM.

**SINGLE-ZONE - COMPUTER ROOM UNIT (CRU 1-1) - CONTROL SCHEMATIC**  
NO SCALE

DIRECT DIGITAL CONTROL (DDC) POINTS SCHEDULE												
DRAWING TAG	EXISTING COMPUTER ROOM UNITS (CRU 1-1)		HARDWARE POINTS		SOFTWARE POINTS (BACNET VALUE / TREND / SETPOINT / ALARM)							
	POINT DESCRIPTION	CONTROLLED BY (DRAWING TAG)	NEW POINT	ANALOG INPUT	ANALOG OUTPUT	TREND INTERVAL (ADJ)	SETPOINT / ALARM CONDITION (ALL SHOWN VALUES ARE ADJ)	UNITS	ALARM MESSAGE	ALARM LEVEL 1 [HIGH] / 2 [MEDIUM] / 3 [LOW]	EMAIL ALARM	LOG ALARM
1	SUPPLY FAN MOTOR CURRENT	X	AI			15 MIN	0 >0	A	FAN FAILURE [FAN ON AND MOTOR IS OFF] FAN FAILURE [FAN OFF AND MOTOR IS ON]	2	X	X
2	ZONE TEMPERATURE	X	AI			15 MIN	<70 >78	DEG F	LOW RETURN AIR [SPACE] TEMPERATURE HIGH RETURN AIR [SPACE] TEMPERATURE	3		X
3	ZONE HUMIDITY	X	AI			15 MIN	<35 >60	% RH	LOW RETURN AIR [SPACE] HUMIDITY HIGH RETURN AIR [SPACE] HUMIDITY	3		X

**COMPUTER ROOM UNITS (CRU 1-1) - SEQUENCE OF OPERATIONS (MONITORING ONLY)**

**CRU INTERFACE MONITORING:**  
CURRENT UNIT STATUS AND OPERATING CONDITIONS IS MONITORED THROUGH ITS COMMUNICATIONS INTERFACE PORT AND EXISTING LOCAL NETWORK CONTROLLER LOCATED IN THE CONDITIONED SPACE ON EACH FLOOR. THE EXISTING LOCAL NETWORK CONTROLLERS SHALL BE REUSED TO BRIDGE COMMUNICATIONS WITH NEW BACNET BAS. THE INTERFACE WILL MONITOR AND TREND THE POINTS AS AVAILABLE FROM MANUFACTURER INCLUDING THE FOLLOWING:

- RUNTIME SHALL BE MEASURED BY SUPPLY FAN MOTOR AMPS.
- SPACE TEMPERATURE.
- SPACE RELATIVE HUMIDITY.

**ADDITIONAL MONITORING POINTS SHALL BE ADDED TO THESE UNITS AS FOLLOWS:**

- RUNTIME SHALL BE MEASURED BY SUPPLY FAN VFD AMPS.

**CONSTANT VOLUME SPLIT SYSTEM DX AHU (AH-1, AC-2) SCHEMATIC - FACTORY CONTROLS**  
NO SCALE

**SEQUENCE OF OPERATIONS (AH-1, AC-2)**

**BUILDING AUTOMATION SYSTEM INTERFACE:**  
THE BUILDING AUTOMATION SYSTEM (BAS) WILL SEND THE CONTROLLER OCCUPIED BYPASS, OCCUPIED / UNOCCUPIED AND HEAT / COOL MODES. IF A BAS IS NOT PRESENT, OR COMMUNICATION IS LOST WITH THE BAS THE CONTROLLER WILL OPERATE USING DEFAULT MODES AND SETPOINTS.

**OCCUPIED MODE:**  
THE BUILDING AUTOMATION SYSTEM (BAS) WILL ACTIVATE THE AIR HANDLING UNIT AND CONDENSING UNIT IN THE OCCUPIED MODE AT A PRESET TIME (ADJUSTABLE). THE COMPRESSOR WILL BE ACTIVATED WHENEVER THE AIR HANDLING UNIT SUPPLY FAN IS RUNNING. THE AIR HANDLING UNIT SUPPLY FAN WILL START AND THE CONDENSING UNIT WILL BE ENABLED. BOTH UNITS SHALL CYCLE ITS OPERATION IN THE COOLING OR HEATING MODE TO MAINTAIN SPACE TEMPERATURE. THE SPACE TEMPERATURE SENSOR CONTROLLING HVAC EQUIPMENT WILL HAVE A COOLING SET-POINT TEMPERATURE OF 75 F DEG (ADJUSTABLE) AND HEATING SET-POINT TEMPERATURE OF 70 F DEG (ADJUSTABLE). PROVIDE A MINIMUM OF A 5 F DEG DEAD BAND BETWEEN COOLING AND HEATING SYSTEM ACTIVATION SET-POINTS. PROVIDE A MINIMUM OF 5 MINUTES (ADJUSTABLE) RUN TIME FOR CONDENSING UNIT COMPRESSOR. THE COMPRESSOR WILL MOVE TO THE 1ST STAGE OF COOLING (1ST COMPRESSOR) UPON ACTIVATION OF THE SYSTEM. IF THE SYSTEM CANNOT ACHIEVE THE COOLING SET POINT TEMPERATURE OF THE 2ND STAGE OF COOLING (2ND COMPRESSOR IF APPLICABLE) WILL BE ACTIVATED.

**COOLING MODE:**  
THE AIR HANDLING UNIT FAN AND ASSOCIATED CONDENSING UNIT COMPRESSOR WILL BE ACTIVATED IN THE COOLING MODE WHENEVER SPACE TEMPERATURE IS 3 F DEG ABOVE THE COOLING SET-POINT TEMPERATURE. THE AIR HANDLING UNIT FAN AND CONDENSING UNIT COMPRESSOR WILL CYCLE TO MAINTAIN SET-POINT TEMPERATURE. THE AIR HANDLING UNIT FAN AND CONDENSING UNIT COMPRESSOR WILL BE OFF WHEN SPACE TEMPERATURE IS AT OR BELOW COOLING SET-POINT TEMPERATURE.

**HEATING MODE:**  
THE AIR HANDLING UNIT FAN AND ELECTRIC HEATER WILL BE ACTIVATED IN THE HEATING MODE WHENEVER SPACE TEMPERATURE IS 3 F DEG BELOW HEATING SET-POINT TEMPERATURE. THE AIR HANDLING UNIT FAN AND ELECTRIC HEATER WILL CYCLE TO MAINTAIN SET-POINT TEMPERATURE. THE AIR HANDLING UNIT FAN AND ELECTRIC HEATER WILL BE OFF WHEN SPACE TEMPERATURE IS AT OR ABOVE THE HEATING SET-POINT TEMPERATURE. IF THE SYSTEM GOES INTO DEFROST CYCLE AND SPACE TEMPERATURE THEN THE ELECTRIC HEATING COIL AT THE AHU WILL BE ACTIVATED TO MAINTAIN SET-POINT TEMPERATURE.

**UNOCCUPIED MODE:**  
THE BUILDING AUTOMATION SYSTEM (BAS) WILL DE-ACTIVATE THE AIR HANDLING UNIT AND CONDENSING UNIT IN THE UNOCCUPIED MODE AT PRESET TIME (ADJUSTABLE). THE AIR HANDLER UNIT SUPPLY FAN WILL BE DEACTIVATED AND CONDENSING UNIT WILL BE DEACTIVATED, BOTH UNITS WILL CYCLE OFF.

**DEHUMIDIFICATION MODE:**  
IF THE ZONE EXCEEDS THE MAXIMUM RH SETPOINT OF 60% RH THEN THE COMPRESSOR SHALL BE ACTIVATED. THE ELECTRIC HEATING COIL SHALL MODULATE TO MAINTAIN THE SPACE TEMPERATURE SETPOINT AS SENSED BY THE SPACE TEMPERATURE SENSOR. WHEN THE ZONE RELATIVE HUMIDITY (% RH) DROPS BELOW THE MINIMUM RH SETPOINT OF 50% FOR 5 MINUTES, THE DEHUMIDIFICATION MODE SHALL BE DISCONTINUED.

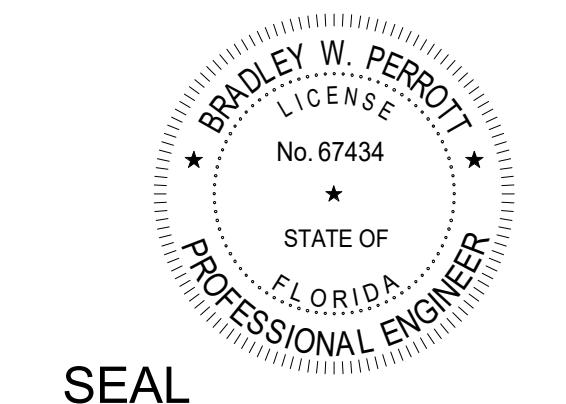
**EMERGENCY:**  
THE SUPPLY AIR SMOKE DETECTOR AT THE AHU WILL SIGNAL THE EXISTING BUILDING FIRE ALARM CONTROL PANEL (FACP) UPON SMOKE DETECTOR ACTIVATION. THE FACP WILL DETERMINE IF THE FIRE ALARM SYSTEM SHOULD BE ACTIVATED. SHOULD THE FACP ACTIVATE AN ALARM CONDITION ALL AIR HANDLING UNIT FANS WILL BE SHUT-OFF.



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This item has been digitally signed and sealed by Bradley W. Perrott, P.E. on the date listed using a digital signature.  
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**LAKE COUNTY ADMINISTRATION BUILDING - BAS REPLACEMENT**

315 W Main St,  
Tavares, FL 32778

MARK	DATE	DESCRIPTION
▲	10/26/22	PRE-BID RFI

ISSUE: 06/30/2022  
PROJECT NO: 20G0153  
DESIGN BY: JDS/SB  
DRAWN BY: LW/JDS  
REVIEWED BY: BWP  
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**SHEET TITLE**  
CONTROL SCHEMATICS

100% CD  
M-605