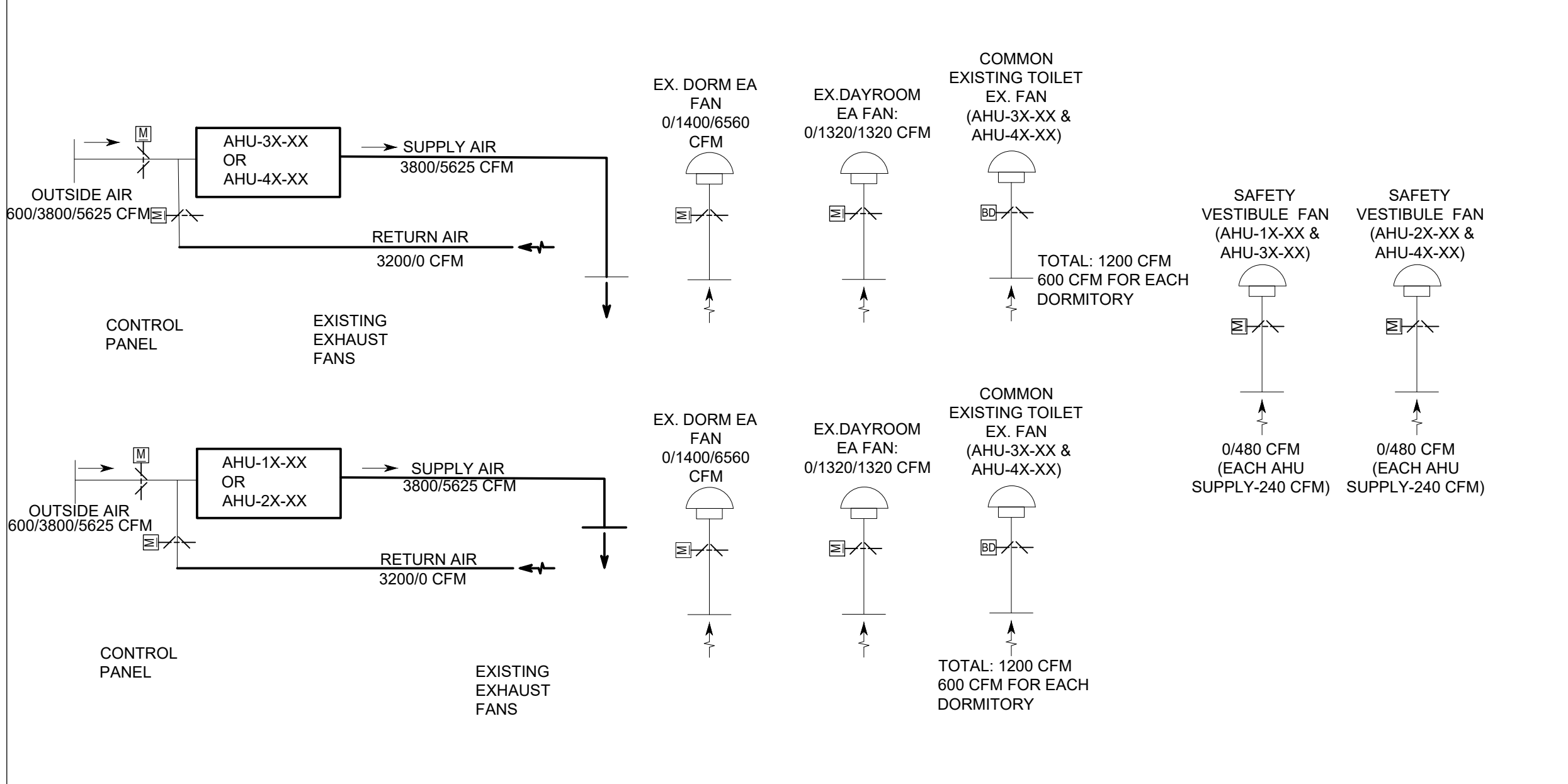


1 DUCT BRANCH TAKE-OFF

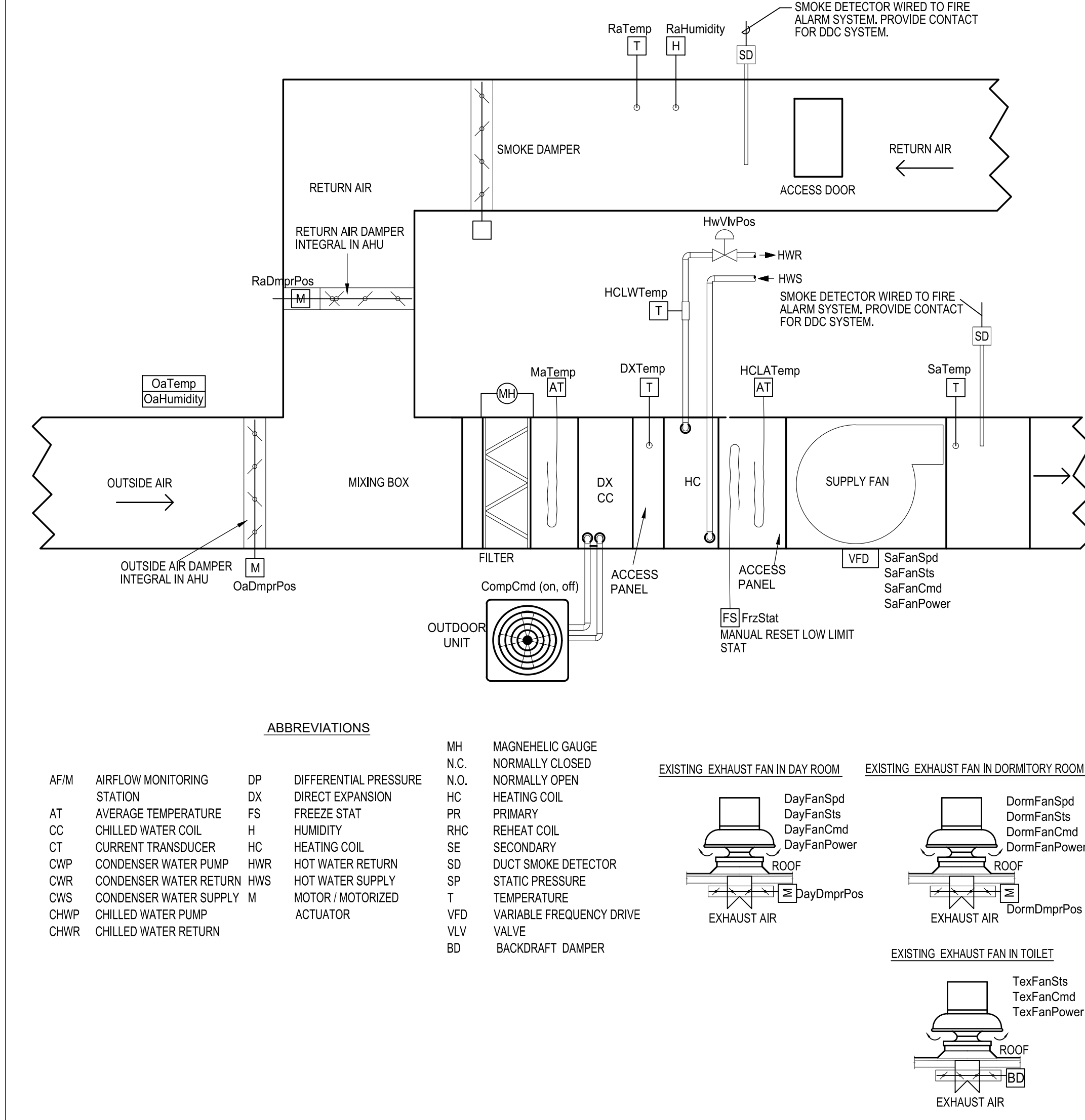


2 AIRFLOW SCHEMATIC (TYPICAL) PHOENIX, SPARROW, FALCON BUILDINGS

AIRFLOW BALANCE/MODES FOR EACH AHU

MODE	SUPPLY AIR CFM	OUTSIDE AIR CFM	RETURN AIR CFM	TOILET EXHAUST CFM	ROOM EXHAUST CFM	NOTES
NORMAL COOLING/ HEATING	3800	600	3200	600	0	EXISTING DAY AND DORMITORY EXHAUST FANS. EXISTING COMMON SAFETY VESTIBULE FANS ARE OFF. EXISTING COMMON TOILET EXHAUST FAN IS ON. OUTSIDE AIR DAMPER IS OPEN FOR 600 CFM.
ECONOMIZER	3800	3800	0	600	EX.DORMITORY EF - 1400 EX.VESTIBULE EF - 480 EX.DAYROOM EF - 1320. TOTAL: 3200	EXISTING DAY, DORMITORY AND SAFETY VESTIBULE EXHAUST FANS ARE RUN @ LOW SPEED. EXISTING COMMON TOILET FAN IS ON. OUTSIDE AIR DAMPER IS OPEN FOR 3800 CFM.
SMOKE PURGE	5625	5625	0	600	EX.DORMITORY EF - 6560 EX.DAYROOM EF - 1320 TOTAL: 8480	EXISTING DAY AND DORMITORY EXHAUST FANS ARE ON AND RUN @ HIGH SPEED. AHU SUPPLY FAN IS ON AND RUN AT HIGH SPEED @ 5625 CFM. EXISTING COMMON TOILET FAN IS ON. OUTSIDE AIR DAMPER IS OPEN TO 100% FOR 5625 CFM. ADDITIONAL MAKEUP AIR FOR PURGE OPERATION IS THROUGH DOORS, OPERABLE WINDOWS ETC.

NOTE:
THE NEW AHU (TYP. OF 24) ARE TO BE PROVIDED WITH VFDS FOR FAN SPEED CONTROL. THESE AHUS ARE INTENDED TO OPERATE AT TWO (2) DISTINCT AIRFLOW RATES.
- "HIGH" SHALL CORRESPOND TO THE FAN SPEED REQUIRED TO DELIVER 5000 CFM.
- "LOW" SHALL CORRESPOND TO THE FAN SPEED REQUIRED TO DELIVER 3000 CFM.
TAB CONTRACTOR SHALL TEST EACH SYSTEM TO DETERMINE THE BAS VFD SPEED COMMAND (%) NECESSARY FOR EACH SYSTEM TO DELIVER THESE SPECIFIC AIRFLOWS AND RECORD IN TAB REPORT. BAS CONTRACTOR SHALL PROVIDE AN ENGRAVED PHOENIX PLACARD (MIN. 38" LETTERING) AT EACH AHU/VFD INDICATING THIS INFORMATION, AND SHALL UTILIZE THE INFORMATION IN PROGRAMMING THE "HIGH" AND "LOW" BAS SPEED COMMANDS AS DESCRIBED IN THESE DRAWINGS.



3 AHU CONTROL SCHEMATIC (FOR PHONEIX, SPARROW AND FALCON BUILDING)

UNOCCUPIED MODE: WHEN THE SPACE TEMPERATURE IS BELOW THE UNOCCUPIED HEATING SETPOINT OF 55.0 DEG. F (ADJ.), THE SUPPLY FAN SHALL RUN @ LOW SPEED. THE OUTSIDE AIR DAMPER SHALL REMAIN CLOSED AND THE HOT WATER CONTROL VALVE SHALL OPEN WHEN THE SPACE TEMPERATURE RISES ABOVE THE UNOCCUPIED HEATING SETPOINT OF 55.0 DEG. F (ADJ.) PLUS THE UNOCCUPIED DIFFERENTIAL OF 2.0 DEG. F (ADJ.). THE SUPPLY FAN SHALL STOP AND THE HOT WATER CONTROL VALVE SHALL CLOSE.

WHEN THE SPACE TEMPERATURE IS ABOVE THE UNOCCUPIED COOLING SETPOINT OF 85.0 DEG. F (ADJ.), THE SUPPLY FAN SHALL START @ LOW SPEED. THE OUTSIDE AIR DAMPER SHALL OPEN IF ECONOMIZING IS ENABLED AND REMAIN CLOSED IF ECONOMIZING IS DISABLED AND THE DX COOLING SHALL BE ENABLED. WHEN THE SPACE TEMPERATURE FALLS BELOW THE UNOCCUPIED COOLING SETPOINT OF 85.0 DEG. F (ADJ.) MINUS THE UNOCCUPIED DIFFERENTIAL OF 4.0 DEG. F (ADJ.) THE SUPPLY FAN SHALL STOP. THE DX COOLING SHALL BE DISABLED AND THE OUTSIDE AIR DAMPER SHALL CLOSE.

OPTIMAL START WARMUP/COOL DOWN: NEAR THE END OF THE UNOCCUPIED PERIOD AND PRIOR TO THE BEGINNING OF THE OCCUPIED PERIOD THE SYSTEM SHALL ENTER OPTIMAL START WARMUP/COOL DOWN MODE TO BRING THE SPACE TEMPERATURE TO THE OCCUPIED PERIOD SET POINT. THE TIME AT WHICH THE OPTIMAL START WARMUP/COOLDOWN PERIOD BEGINS SHALL BE AS CLOSE TO THE BEGINNING OF THE OCCUPIED PERIOD AS POSSIBLE WHILE STILL ENSURING THE OCCUPIED PERIOD SET POINTS ARE REACHED. THIS START TIME SHALL BE OPTIMIZED BASED ON THE OUTDOOR AND INDOOR AIR CONDITIONS. OA DAMPERS REMAIN FULLY CLOSED UNLESS ECONOMIZING.

COOLING/HEATING MODE: COOLING/HEATING MODE: UNITARY CONTROLLER SHALL MODULATE THE STAGES OF COOLING CAPACITY IN ORDER TO MAINTAIN THE SPACE TEMPERATURE AT COOLING SET POINT 75°F (ADJ.). AS THE SPACE TEMPERATURE FALLS BELOW THE COOLING SET POINT, COOLING SHALL BE DISABLED. UPON A CONTINUED FALL IN SPACE TEMPERATURE TO HEATING SET POINT 70°F (ADJ.), HEAT PUMP (DX HEATING) OPERATION SHALL BE ENABLED AND UNITARY CONTROLLER SHALL MODULATE THE STAGES OF HEATING CAPACITY TO MAINTAIN THE SPACE TEMPERATURE AT HEATING SET POINT 70°F (ADJ.). IF DX HEATING IS NOT ABLE TO MAINTAIN THE HEATING SET POINT AT OUTDOOR LOW AMBIENT TEMPERATURE, SUPPLEMENTAL REHEAT COIL VALVE SHALL BE ENERGIZED AND MODULATES AS REQUIRED TO MAINTAIN THE SPACE TEMPERATURE AT HEATING SET POINT. MAXIMUM REHEAT COIL LEAVING AIR TEMPERATURE SHALL BE 110°F (ADJ.). WHEN THE SPACE TEMPERATURE IS 0.5°F OR MORE ABOVE THE HEATING SET POINT THE HEAT PUMP OPERATION SHALL BE DISABLED.

DEHUMIDIFICATION CONTROL (REHEAT IS AVAILABLE): UPON A RISE IN RETURN AIR RELATIVE HUMIDITY TO 62%, THE SYSTEM SHALL OPERATE IN DEHUMIDIFICATION CONTROL MODE. DX COOLING SHALL BE ACTIVATED AT 100% CAPACITY AND THE HW COIL SHALL BE MODULATED TO MAINTAIN THE SPACE/RETURN AIR TEMPERATURE AT ITS COOLING SETPOINT. UPON A FALL IN RELATIVE HUMIDITY BELOW 60%, THE SYSTEM SHALL BE RELEASED FROM DEHUMIDIFICATION MODE TO OPERATE IN ITS NORMAL COOLING MODE.

ECONOMIZING: WHEN THE OUTDOOR AIR ENTHALPY IS LOWER THAN 28 BTULB AND THE OUTDOOR AIR TEMPERATURE IS LOWER THAN (75°F); THE OUTSIDE AIR DAMPER IS OPEN TO 100%. RETURN AIR DAMPER IS CLOSED. EXISTING EXHAUST FAN LOCATED IN DAY AND DORMITORY ROOM SHALL RUN @ LOW SPEED AND ASSOCIATED DAMPER IS OPEN. IF SUFFICIENT FREE COOLING IS NOT AVAILABLE, DX COIL SHALL BE USED TO SUPPLEMENT THE COOLING. OA TEMPERATURE AND HUMIDITY ARE TO BE FROM THE GLOBAL DDC SENSORS.

DEMAND LIMITING: TO LOWER POWER CONSUMPTION, THE ZONE SET POINTS SHALL AUTOMATICALLY RELAX WHEN THE FACILITY POWER CONSUMPTION EXCEEDS DEFINABLE THRESHOLDS. THE AMOUNT OF RELAXATION SHALL BE INDIVIDUALLY CONFIGURABLE FOR EACH ZONE. THE ZONE SET POINTS SHALL AUTOMATICALLY RETURN TO THEIR PREVIOUS SETTINGS WHEN THE FACILITY POWER CONSUMPTION DROPS BELOW THE THRESHOLDS. DELAYED VENTILATION: WHEN TRANSITIONING FROM WARMUP OR COOLDOWN MODE TO OCCUPIED MODE, VENTILATION RATE SET POINT SHALL INITIALLY BE (50% OF THE MINIMUM ALLOWABLE VENTILATION RATE. AFTER ONE (1) HOURS INCREASE VENTILATION RATE SET POINT TO THE MINIMUM ALLOWABLE VENTILATION RATE.

FREEZE PROTECTION: IN NORMAL MODE OF OPERATION, LOW LIMIT CONTROLLER WITH SENSOR LOCATED DOWNSTREAM OF THE HEATING COIL SHALL DE-ENERGIZE THE SUPPLY FAN AND CLOSE THE OUTDOOR AIR DAMPERS IF THE TEMPERATURE FALLS BELOW 40°F. IN ADDITION, THE HOT WATER VALVE ACTUATOR AND COMPRESSORS SHALL BE DE-ENERGIZED AND THE VALVES WILL SPRING RETURN TO THE OPEN POSITION. DE-ENERGIZING SHALL BE ACCOMPLISHED VIA DDC SYSTEM. IN SMOKE PURGE MODE, FREEZE STAT IS BYPASSED VIA DDC SYSTEM AND RUN THE SUPPLY FAN AT HIGH SPEED.

SMOKE SHUTDOWN/PURGE: SMOKE DETECTORS AS INDICATED ON THE DRAWINGS SHALL SEND A DIRECT SIGNAL TO THE FIRE ALARM SYSTEM. ACTIVATION OF THE FIRE ALARM BY RETURN AND AREA SMOKE DETECTOR SHALL INITIATE A SMOKE PURGE SEQUENCE THROUGH A CONTROL RELAY NOT RELATED TO THE BUILDING DDC SYSTEM. ACTIVATION OF THE FIRE ALARM BY SUPPLY SMOKE DETECTOR SHALL INITIATE A SHUT DOWN SEQUENCE THROUGH A CONTROL RELAY AND DE-ENERGIZE THE SUPPLY FAN. AN AUXILIARY CONTACT ON THE SMOKE DETECTORS SHALL ALARM THE DDC SYSTEM FOR INFORMATIONAL PURPOSES. IN PURGE MODE, UPON A SIGNAL FROM THE FIRE ALARM SYSTEM A SET OF LISTED RELAYS WILL CUT POWER TO THE DAMPERS CAUSING ALL DAMPERS TO GO TO THE FAIL POSITION, CUT POWER TO VALVES SO THEY FAIL OPEN IN CASE NEEDED FOR FREEZE PROTECTION, AND SEND A START SIGNAL TO THE FAN MOTOR STARTERS TO RUN THE SUPPLY FAN @ HIGH SPEED AND RUN THE EXISTING DAY AND DORMITORY ROOM EXHAUST FANS @HIGH SPEED.

OA TEMPERATURE LOCKOUT: COOLING IS TO BE LOCKED OUT WHEN THE OA TEMPERATURE IS LOWER THAN (60°F). HEATING IS TO BE LOCKED OUT WHEN THE OA TEMPERATURE IS HIGHER THAN (70°F). LOCKOUTS SHALL NOT BE APPLIED DURING DEHUMIDIFICATION MODE OPERATION.

ABBREVIATIONS

AFM AIRFLOW MONITORING STATION	AT AVERAGE TEMPERATURE	CC CHILLED WATER COIL	CT CURRENT TRANSDUCER	CWP CONDENSER WATER PUMP	CWR CONDENSER WATER RETURN	CWS CONDENSER WATER SUPPLY	CHWP CHILLED WATER PUMP	CHWR CHILLED WATER RETURN	DP DIFFERENTIAL PRESSURE	DX DIRECT EXPANSION	FS FREEZE STAT	CT CURRENT TRANSDUCER	CWP CONDENSER WATER PUMP	CWR CONDENSER WATER RETURN	CWS CONDENSER WATER SUPPLY	CHWP CHILLED WATER PUMP	CHWR CHILLED WATER RETURN			
DP DIFFERENTIAL PRESSURE	DX DIRECT EXPANSION	FS FREEZE STAT	H HUMIDITY	HC HEATING COIL	HWR HOT WATER RETURN	HWS HOT WATER SUPPLY	M MOTOR / MOTORIZED	M MAGNEHELIC GAUGE	N.C. NORMALLY CLOSED	N.O. NORMALLY OPEN	HC HEATING COIL	PR PRIMARY	RHC REHEAT COIL	SE SECONDARY	SD DUCT SMOKE DETECTOR	SP STATIC PRESSURE	T TEMPERATURE	VFD VARIABLE FREQUENCY DRIVE	VLV VALVE	BD BACKDRAFT DAMPER

EXISTING EXHAUST FAN IN DAY ROOM (DayFanSpd, DayFanSts, DayFanCmd, DayFanPower)

EXISTING EXHAUST FAN IN DORMITORY ROOM (DormFanSpd, DormFanSts, DormFanCmd, DormFanPower)

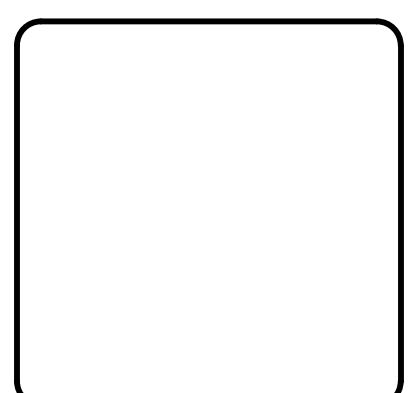
EXISTING EXHAUST FAN IN TOILET (TexFanSts, TexFanCmd, TexFanPower)

4 AHU SEQUENCE OF OPERATION AND POINT LIST (FOR PHONEIX, SPARROW AND FALCON BUILDING)

Equipment	Equipment Name	EquipmentTags						
Single Zone CV AHU (DX coil, reheat coil, supply fan)		dis, id, siteRef, equip, hvac, ahu hotWaterHeat, Dx Cool directZone, singleDuct, constantVolume						
Points	AI	AO	DI	DO	VP	Point Name	Point Tags	Trending
Supply Fan Speed		x				SaFanSpd	discharge, air, fan, speed, cmd	Int, 10min
Supply Fan Status			x			SaFanSts	discharge, air, fan, run, sensor	COV, 24
Supply Fan Command				x		SaFanCmd	discharge, air, fan, run, cmd	COV, 24
Supply Fan Power	x					SaFanPower	discharge, air, fan, power, sensor	Int, 10min
Compressor				x		CompCmd	cmd	COV, 24
Hot Water Valve Position		x				HwVlvPos	hot, water, valve, cmd	Int, 10min
DX Leaving Air Temperature	x					DXTemp	air, temp, sensor	Int, 10min
Heating Coil Leaving Water Temperature	x					HCLWTemp	hot, water, temp, sensor	Int, 10min
FreezeStat	x					FrzStat	freezeStat	COV, 24
Supply Air Temperature	x					SaTemp	discharge, air, temp, sensor	Int, 10min
Heating Coil Leaving Air Temperature	x					HCLATemp	air, temp, sensor	Int, 10min
Return Air Temperature	x					RaTemp	return, air, temp, sensor	Int, 10min
Return Air Humidity	x					RaHumidity	return, air, humidity, sensor	Int, 10min
Outside Air Temperature	x					OaTemp	outside, air, temp, sensor	Int, 10min
Outside Air Humidity	x					OaHumidity	outside, air, humidity, sensor	Int, 10min
Mixed Air Temperature	x					MaTemp	mixed, air, temp, sensor	Int, 10min
Return Air Damper Position		x				RaDmprPos	return, air, damper, cmd	Int, 10min
Outside Air Damper Position			x			OaDmprPos	outside, air, damper, cmd	Int, 10min
Equipment	Equipment Name	EquipmentTags						
Exhaust Fan (fan and Damper)		fan, damper Constant volume/ Exhaust						
Dormitory Fan Speed		x				DormFanSpd	Dorm, air, fan, speed, cmd	Int, 10min
Dormitory Fan Status			x			DormFanSts	Dorm, air, fan, run, sensor	COV, 24
Dormitory Fan Command				x		DormFanCmd	Dormf, air, fan, run, cmd	COV, 24
Dormitory Fan Power	x					DormFanPower	Dorm, air, fan, power, sensor	Int, 10min
Dormitory Air Damper Position		x				DormDmprPos	Dorm, air, damper, cmd	Int, 10min
Dayroom Fan Speed		x				DayFanSpd	Day, air, fan, speed, cmd	Int, 10min
Dayroom Fan Status			x			DayFanSts	Day, air, fan, run, sensor	COV, 24
Dayroom Fan Command				x		DayFanCmd	Day, air, fan, run, cmd	COV, 24
Dayroom Fan Power	x					DayFanPower	Day, air, fan, power, sensor	Int, 10min
Dayroom Air Damper Position		x				DayDmprPos	Day, air, damper, cmd	Int, 10min
Toilet Exhaust Fan Status			x			TexFanSts	Toilet exhaust, air, fan, run, sensor	COV, 24
Toilet Exhaust Fan Command				x		TexFanCmd	Toilet exhaust, air, fan, run, cmd	COV, 24

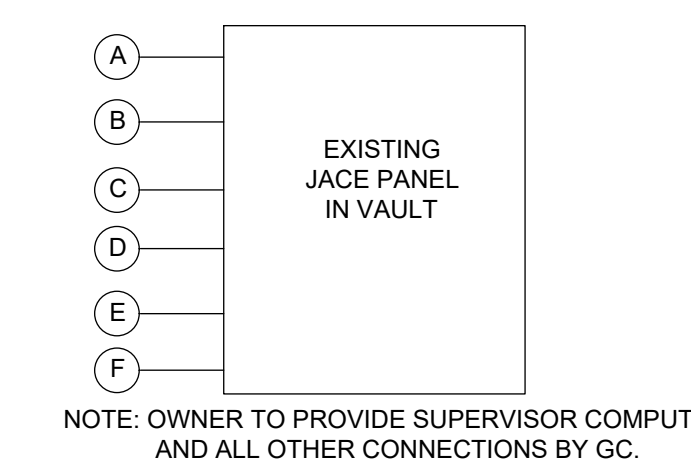
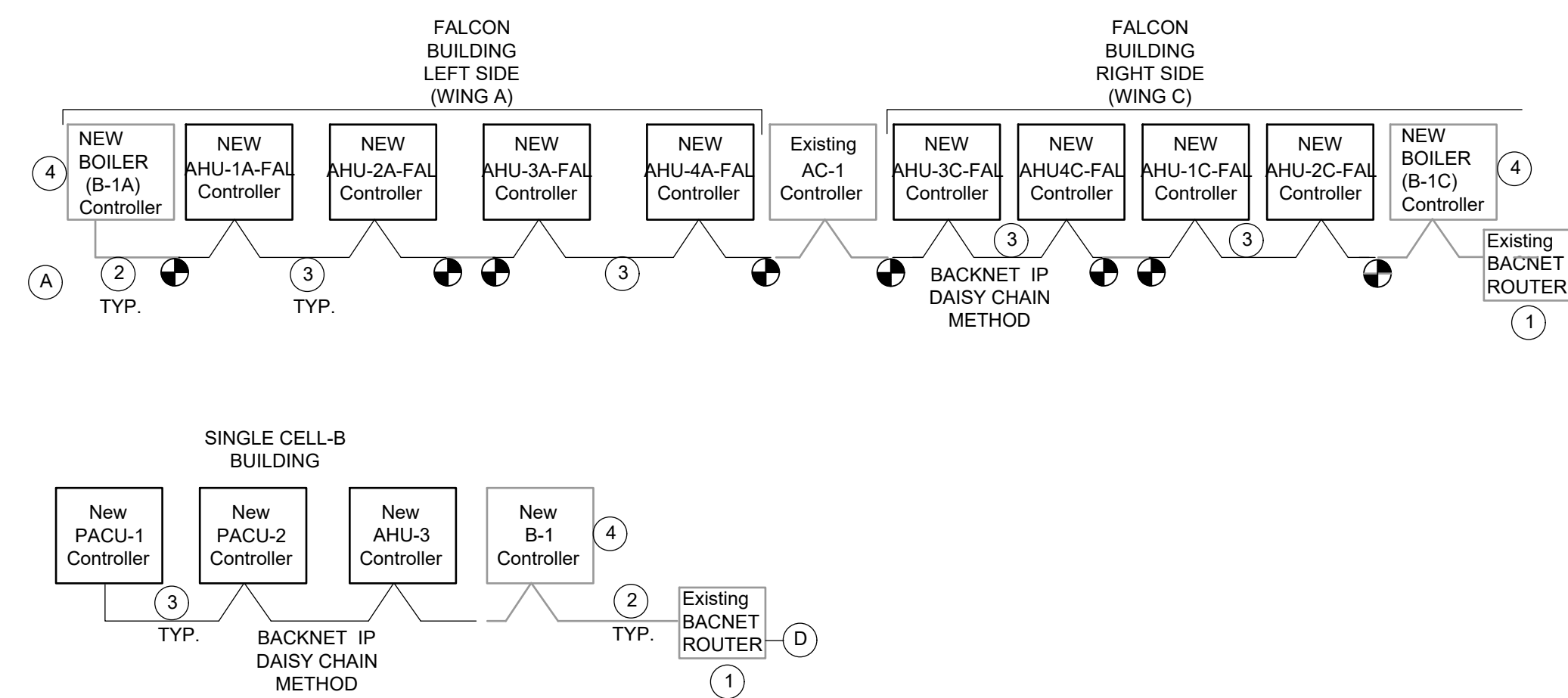
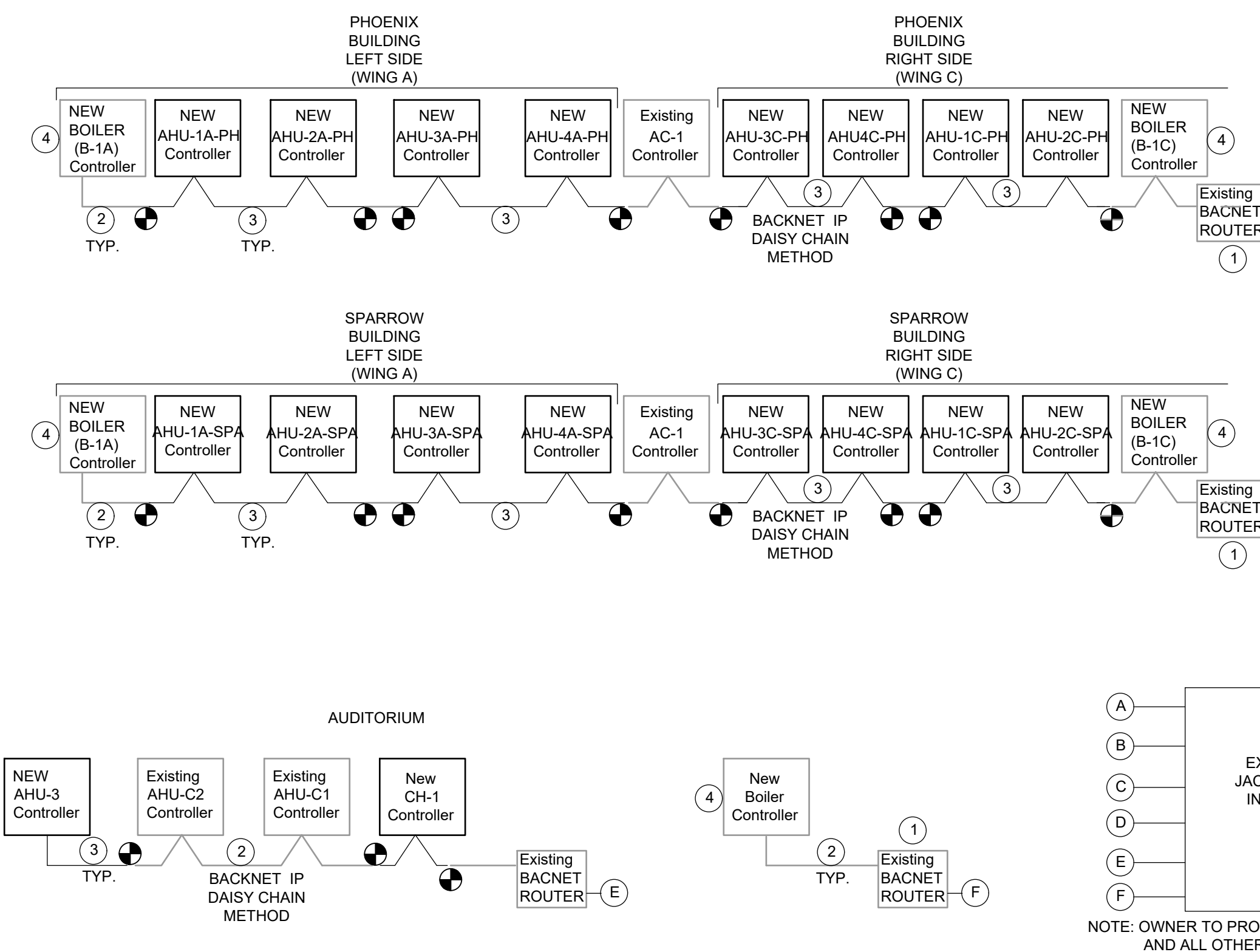
REVISIONS

REV NO	DESCRIPTION	DATE



NC Correctional Institution for Women
Air Conditioning Installation
SCO ID: 22-24913-02A Code: 42107 Item: 4112
MECHANICAL - CONTROLS

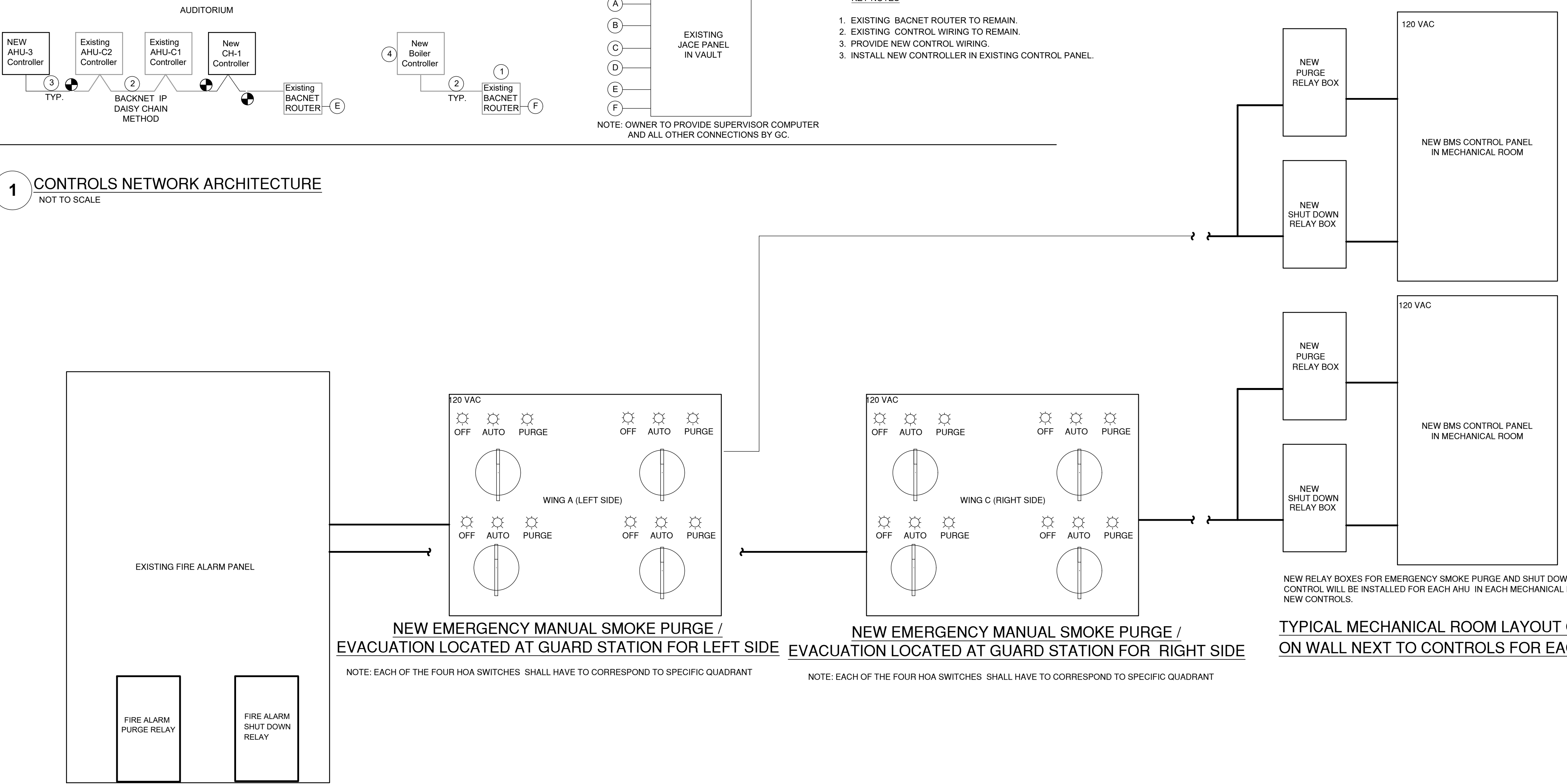
PROJ. START DATE: 08/11/2023
MCE PROJ. # 08914-0002
DRAWN: UG
DESIGNED: UG
CHECKED: MAB
PROJ. MGR. MAB
SCALE: HORIZONTAL: AS NOTED VERTICAL: N/A
M600
DRAWING NUMBER: 0
REVISION:
BID DOCUMENTS



- KEY NOTES**
- EXISTING BACNET ROUTER TO REMAIN.
 - EXISTING CONTROL WIRING TO REMAIN.
 - PROVIDE NEW CONTROL WIRING.
 - INSTALL NEW CONTROLLER IN EXISTING CONTROL PANEL.

NOTE: OWNER TO PROVIDE SUPERVISOR COMPUTER AND ALL OTHER CONNECTIONS BY GC.

1 CONTROLS NETWORK ARCHITECTURE
NOT TO SCALE



THE MANUAL SWITCHES AT THE GUARD STATION HAVE PRIORITY. WHEN A RETURN AIR DUCT AND AREA SMOKE DETECTOR IS ACTIVATED, AIR HANDLER SHALL GO INTO THE PURGE MODE THROUGH A CONTROL. RELAY NOT RELATED TO THE BUILDING DDC SYSTEM. IN PURGE MODE, THE RESPECTIVE AHU SYSTEM SHALL CONTINUE TO OPERATE AT THEIR HIGH SPEED. ASSOCIATED EXHAUST FANS (IN CORRIDOR AND DAY ROOM) SHALL BE ENERGIZED TO RUN AT HIGH SPEED. OUTSIDE AIR DAMPERS OPEN TO 100%. RETURN AIR DAMPERS SHALL BE CLOSED 100%. THE REHEAT COIL VALVES WILL OPEN TO PREVENT COIL FREEZING BUT THROUGH THE CONTROLS SINCE THIS IS NOT A LIFE SAFETY ISSUE.

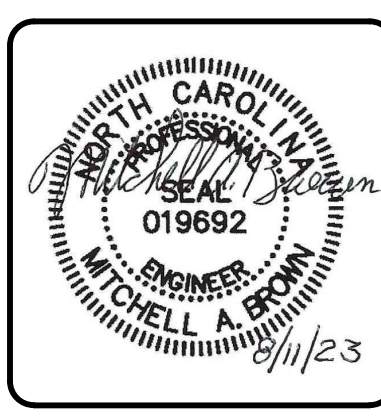
SCOPE OF WORK:
THE SCOPE OF WORK INCLUDES INSTALLING THE NEW REMOTE PURGE AND SHUT DOWN RELAYS AND NEW BMS CONTROLLER IN THE MECHANICAL ROOMS FOR EACH AHU AND 120 AND 24 VAC WIRING AND CONDUIT. THE NEW SHUT DOWN AND PURGE RELAYS WILL EACH BE MOUNTED IN THEIR OWN BOX NEXT TO THE NEW BMS CONTROL PANEL.

THE NEW CONTROLS CAN OPERATE ALL OF THE FANS AS NECESSARY USING THE POWER THAT COMES FROM THE SHUT DOWN RELAY WITHOUT INTERFERING WITH THE PURGE SEQUENCE.

EXISTING FIRE ALARM PANEL WITH PURGE AND SHUTDOWN RELAY FOR EACH AHU

2 SCHEMATIC OF MANUAL SWITCHES AND RELAY MODULES (TYPICAL FOR SPARROW, FALCON AND PHOENIX BUILDING)

REV. NO	DESCRIPTION	DATE



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www.mckimcreed.com

NC Department of Adult Correction

NC Correctional Institution for Women
Air Conditioning Installation

SCO ID: 22-24913-02A Code: 42107 Item: 4112

MECHANICAL - CONTROLS

PROJ. START DATE: 08/11/2023	SCALE: HORIZONTAL: M601
MCE PROJ. # 08914-0002	AS NOTED
DRAWN: UG	VERTICAL: N/A
CHECKED: MAB	0 REVISION
PROJ. MGR.: MAB	BID DOCUMENTS

AIRFLOW BALANCE/MODES					
MODE	SUPPLY AIR CFM	OUTSIDE AIR CFM	RETURN AIR CFM	EXHAUST AIR CFM	NOTES
COOLING/HEATING	20000	5000	15000	MEZZ. EF (EF-C1) - 5000	MEZZANINE LEVEL EXHAUST FAN IS ON. STAGE EXHAUST FANS ARE OFF. OUTSIDE AIR DAMPER IS OPEN FOR 5000 CFM.
ECONOMIZER	15000	15000	0	MEZZ. EF (EF-C1)- 5000 STAGE EF (EF-C2) - 5000 STAGE EF (EF-C3)-5000 TOTAL: 15000	STAGE AND MEZZANINE LEVEL EXHAUST FANS ARE ON. OUTSIDE AIR DAMPER IS OPEN TO 100% AND RETURN AIR DAMPER IS CLOSED. AHU SUPPLY FAN SHALL MODULATE DOWN TO 15,000 CFM.
VENT MODE	15000	15000	0	MEZZ. EF (EF-C1)-5000 STAGE EF (EF-C2) - 5000 STAGE EF (EF-C3) - 5000 TOTAL: 15000	STAGE AND MEZZANINE LEVEL EXHAUST FANS ARE ON. OUTSIDE AIR DAMPER IS OPEN TO 100% AND RETURN AIR DAMPER IS CLOSED. AHU SUPPLY FAN SHALL MODULATE DOWN TO 15,000 CFM.

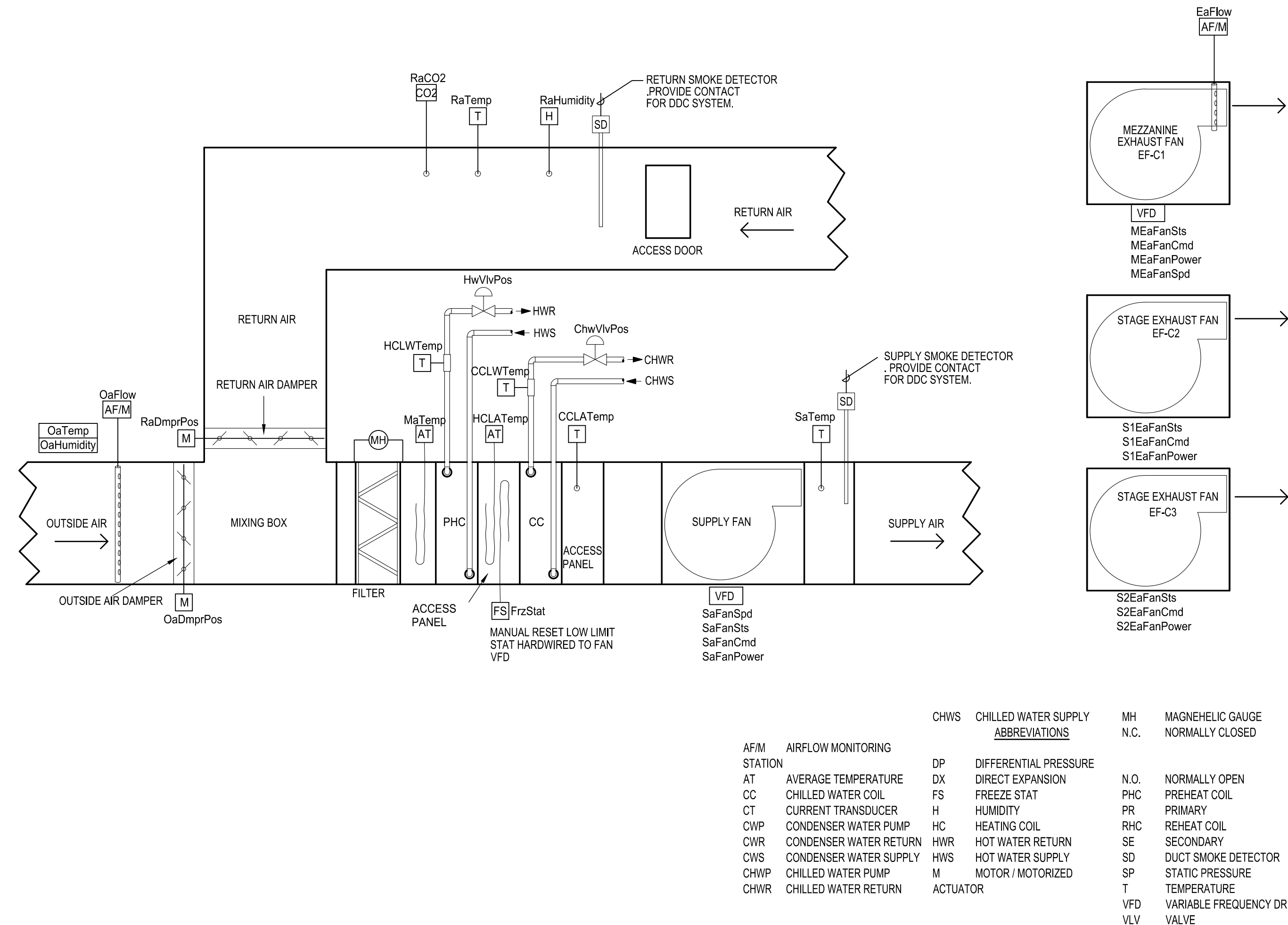
Equipment	Equipment Name	Equipment Tags						
AUDITORIUM AHU (heating coil, cooling coil, supply fan)		dis. id. siteRef, equip, hvac, ahu hotWaterHeat, chilledWaterCool directZone, singleDuct, variableVolume						
Points	AI	AO	DI	DO	VP	Point Name	Point Tags	Trending
Supply Fan Speed		x				SaFanSpd	discharge, air, fan, speed, cmd	Int, 10min
Supply Fan Status			x			SaFanSts	discharge, air, fan, run, sensor	COV, 24
Supply Fan Command				x		SaFanCmd	discharge, air, fan, run, cmd	COV, 24
Supply Fan Power	x					SaFanPower	discharge, air, fan, power, sensor	Int, 10min
Chilled Water Valve Position		x				ChWVvPos	chilled, water, valve, cmd	Int, 10min
Hot Water Valve Position		x				HwVvPos	hot, water, valve, cmd	Int, 10min
Cooling Coil Leaving Water Temperature	x					CCLWTemp	chilled, water, temp, sensor	Int, 10min
Heating Coil Leaving Water Temperature	x					HCLWTemp	hot, water, temp, sensor	Int, 10min
Freezestat			x			FrzStat	freezeStat	COV, 24
Supply Air Temperature	x					SaTemp	discharge, air, temp, sensor	Int, 10min
Cooling Coil Leaving Air Temperature	x					CCLATemp	air, temp, sensor	Int, 10min
Heating Coil Leaving Air Temperature	x					HCLATemp	air, temp, sensor	Int, 10min
Return Air Temperature	x					RaTemp	return, air, temp, sensor	Int, 10min
Return Air Humidity	x					RaHumidity	return, air, humidity, sensor	Int, 10min
Return Air CO ₂	x					RaCO2	return, air, co2, sensor	Int, 10min
Outside Air Flow	x					OaFlow	outside, air, flow, sensor	Int, 10min
Outside Air Temperature	x					OaTemp	outside, air, temp, sensor	Int, 10min
Outside Air Humidity	x					OaHumidity	outside, air, humidity, sensor	Int, 10min
Outside Air Flow	x					OaFlow	outside, air, flow, sensor	Int, 10min
Mixed Air Temperature	x					MaTemp	mixed, air, temp, sensor	Int, 10min
Return Air Damper Position		x				RaDmprPos	return, air, damper, cmd	Int, 10min
Outside Air Damper Position		x				OaDmprPos	outside, air, damper, cmd	Int, 10min
Relief Air Damper Position		x				RaDmprPos	relief, air, damper, cmd	Int, 10min
Exhaust Air Flow	x					EaFlow	Exhaust air, flow, sensor	Int, 10min
Supply Air Static Pressure	x					SaPress	discharge, air, pressure, sensor	Int, 10min

Equipment	Equipment Name	Equipment Tags		
Exhaust Fan (fan and Damper)		fan, damper Constant volume/ Exhaust		
Mezzanine Fan Speed	x	MeaFanSpd	Mezzanine exhaust, air, fan, speed, cmd	Int, 10min
Mezzanine Fan Status		MeaFanSts	Mezzanine exhaust, air, fan, run, sensor	COV, 24
Mezzanine Fan Command		MeaFanCmd	Mezzanine exhaust, air, fan, run, cmd	COV, 24
Mezzanine Fan Power	x	MeaFanPower	Mezzanine exhaust, air, fan, power, sensor	Int, 10min
Stage Fan 1 Status		Sea1FanSts	Stage exhaust1, air, fan, run, sensor	COV, 24
Stage Fan 1 Command		Sea1FanCmd	Stage exhaust1, air, fan, run, cmd	COV, 24
Stage Fan 1 Power	x	Sea1FanPower	Stage exhaust1, air, fan, power, sensor	Int, 10min
Stage Fan 2 Status		Sea2FanSts	Stage exhaust2, air, fan, run, sensor	COV, 24
Stage Fan 2 Command		Sea2FanCmd	Stage exhaust2, air, fan, run, cmd	COV, 24
Stage Fan 2 Power	x	Sea2FanPower	Stage exhaust2, air, fan, power, sensor	Int, 10min

NOT TO SCALE
1 AIRFLOW BALANCE TABLE FOR AUDITORIUM

3 AHU (AUDITORIUM) POINT LIST

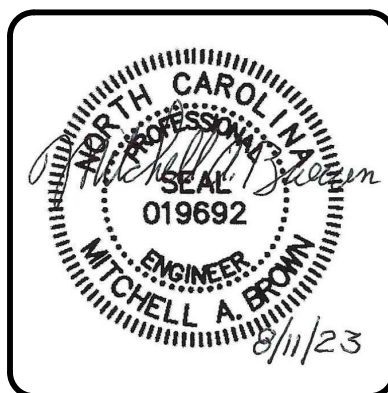
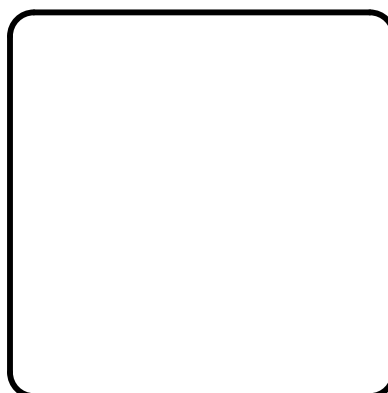
- UNOCCUPIED MODE: OA DAMPERS TO REMAIN FULLY CLOSED. SUPPLY AIR FAN SHALL CYCLE ON WHEN THERE IS A CALL FOR HEATING. OTHERWISE THE FAN IS TO REMAIN OFF.
 - WARMUP: OA DAMPERS REMAIN FULLY CLOSED. THE MORNING WARM UP PERIODS SHALL BE OPTIMIZED DEPENDING ON THE OUTDOOR AND INDOOR AIR CONDITIONS.
 - COOLDOWN: OA DAMPERS REMAIN FULLY CLOSED EXCEPT WHEN ECONOMIZING. THE MORNING COOLDOWN PERIODS SHALL BE OPTIMIZED DEPENDING ON THE OUTDOOR AND INDOOR AIR CONDITIONS.
 - COOLING/HEATING MODE: THERE ARE TO BE SEPARATE HEATING AND COOLING TEMPERATURE SET POINTS FOR THE SPACE. INITIAL SPACE TEMPERATURE SET POINTS ARE 70°F HEATING AND 75°F COOLING WITH A 2 DEGREE ADJUSTMENT ON THE DIAL. IF THE SPACE IS ABOVE COOLING SET POINT THE DISCHARGE AIR TEMPERATURE SET POINT IS TO BE 55°F. IF THE SPACE IS BELOW HEATING SET POINT THE DISCHARGE AIR TEMPERATURE IS TO BE 110°F. IF THE SPACE IS AT OR BETWEEN COOLING AND HEATING TEMPERATURE SET POINTS THE DISCHARGE AIR TEMPERATURE SET POINT IS TO BE DETERMINED BASED ON A PID LOOP WITH A MINIMUM OF 55°F AND A MAXIMUM OF 110°F. THE PID LOOP SHOULD BE WRITTEN SUCH THAT WHEN THE SPACE TEMPERATURE IS 0.5°F OR MORE BELOW THE COOLING SET POINT THE COOLING VALVE IS CLOSED. SIMILARLY, WHEN THE SPACE TEMPERATURE IS 0.5°F OR MORE ABOVE THE HEATING SET POINT THE HEATING VALVE SHOULD BE CLOSED.
 - DEHUMIDIFICATION CONTROL (REHEAT NOT AVAILABLE): DEHUMIDIFICATION CONTROL OVERRIDES SINGLE ZONE VAV DISCHARGE AIR TEMPERATURE RESET. IF THE RETURN AIR RELATIVE HUMIDITY IS ABOVE 58%, BUMP DISCHARGE AIR TEMPERATURE SET POINT DOWN 1°F EVERY 10 MINUTES UNTIL RELATIVE HUMIDITY REDUCES TO 58% OR LOWER. IF THE SPACE TEMPERATURE DROPS TO MORE THAN 2°F BELOW THE SPACE COOLING SET POINT, BUMP COOLING COIL LEAVING AIR TEMPERATURE BACK UP 1°F EVERY 10 MINUTES UNTIL THE SPACE REACHES 2°F BELOW COOLING SET POINT. ONCE RELATIVE HUMIDITY HAS REACHED 58% OR LOWER BUMP THE DISCHARGE AIR TEMPERATURE SET POINT BACK UP AT 1 DEGREE PER 10 MINUTES UNTIL IT MATCHES THE PID CALCULATED DISCHARGE AIR TEMPERATURE SET POINT. AT THAT POINT NORMAL SINGLE ZONE VAV DISCHARGE AIR TEMPERATURE RESET CONTROL STRATEGY IS RESUMED.
 - ECONOMIZING: WHEN THE OUTDOOR AIR ENTHALPY IS LOWER THAN 28 BTULB AND THE OUTDOOR AIR TEMPERATURE IS LOWER THAN (75 °F); SUPPLY FAN SPEED SHALL MODULATE DOWN TO 15,000 CFM. THE OUTSIDE AIR DAMPER IS OPEN TO 100%. RETURN AIR DAMPER IS CLOSED. EXISTING EXHAUST FANS LOCATED AT MEZZANINE LEVEL AND STAGE SHALL RUN AT MAXIMUM AIR FLOW. IF SUFFICIENT FREE COOLING IS NOT AVAILABLE, CHILLED WATER COIL SHALL BE USED TO SUPPLEMENT THE COOLING. OA TEMPERATURE AND HUMIDITY ARE TO BE FROM THE GLOBAL DDC SENSORS.
 - DEMAND CONTROL VENTILATION: VENTILATION RATE SET POINT SHALL BE BASED ON RETURN AIR CO₂ SENSOR. VENTILATION SHALL BE REDUCED WHEN RETURN AIR CO₂ LEVELS ARE BELOW THE ESTABLISHED THRESHOLD (1000 PPM). A MINIMUM ALLOWABLE VENTILATION RATE SHALL BE ESTABLISHED BASED ON THE MINIMUM REQUIRED TO MEET LOW- OR NO-OCCUPANCY VENTILATION REQUIREMENTS OR MAKEUP AIR REQUIREMENTS, WHICHEVER IS GREATER. THE MAXIMUM ALLOWABLE VENTILATION RATE SHALL BE EQUAL TO THE SCHEDULED DESIGN VENTILATION RATE. IN THIS MODE OUTSIDE AIR FLOW SENSOR AND MEZZANINE LEVEL EXHAUST FAN AIR FLOW SENSOR TRACK TOGETHER AND MODULATES THE SPEED OF EXHAUST FAN TO MEET THE VENTILATION DEMAND.
 - DELAYED VENTILATION: WHEN TRANSITIONING FROM WARMUP OR COOLDOWN MODE TO OCCUPIED MODE, VENTILATION RATE SET POINT SHALL INITIALLY BE (X)% OF THE MINIMUM ALLOWABLE VENTILATION RATE. AFTER (X) HOURS INCREASE VENTILATION RATE SET POINT TO THE MINIMUM ALLOWABLE VENTILATION RATE.
 - FREEZE PROTECTION: IN NORMAL MODE OF OPERATION, LOW LIMIT CONTROLLER WITH SENSOR (FREEZE STAT) LOCATED DOWNSTREAM OF THE DUCT REHEAT COIL SHALL DE-ENERGIZE THE SUPPLY FAN AND CLOSE THE OUTDOOR AIR DAMPERS IF THE TEMPERATURE FALLS BELOW 40°F. IN ADDITION, THE HOT AND CHILLED WATER CONTROL VALVE ACTUATORS SHALL BE DE-ENERGIZED AND THE VALVES WILL SPRING RETURN TO THE OPEN POSITION. DE-ENERGIZING SHALL BE ACCOMPLISHED VIA DDC SYSTEM. IN VENT MODE, WHEN AMBIENT TEMPERATURE IS LOWER THAN 40°F, FREEZE STAT IS BYPASSED AND ENERGIZE THE SUPPLY FAN TO REMOVE TEAR OR MACE GAS FROM THE BUILDING.
 - SMOKE SHUTDOWN/MANUAL VENTILATION MODE: ACTIVATION OF THE RETURN AIR SMOKE DETECTOR SHALL DE-ENERGIZE THE SUPPLY FAN. CONTACT ON THE SMOKE DETECTOR SHALL ALARM THE DDC SYSTEM FOR INFORMATIONAL PURPOSES.
- THE MANUAL SWITCH AT GUARD STATION SHALL BE USED TO RUN THE UNIT IN VENT MODE. IN THIS MODE, AHU SUPPLY FAN IS MODULATED TO 15,000 CFM. EXHAUST FANS LOCATED AT MEZZANINE LEVEL AND STAGE SHALL BE DE-ENERGIZED. OUTSIDE AIR DAMPER IS OPEN TO 100% AND RETURN AIR DAMPER IS CLOSED. HOT WATER VALVE SHALL OPEN 100% IF OUTSIDE TEMPERATURE IS BELOW 45 DEGREES. IF OUTSIDE TEMPERATURE IS ABOVE 45 DEGREES, CONTROL VALVE REMAINS CLOSED. THE CHILLED WATER COIL CONTROL VALVE ALSO REMAINS CLOSED IN THIS MODE.



2 AHU CONTROL SCHEMATIC (FOR AUDITORIUM)

4 AHU (AUDITORIUM) POINT LIST

REV NO	DESCRIPTION	DATE



MCKIM & CREED
 Venture IV Building, Suite 500
 1730 Varsity Drive
 Raleigh, North Carolina 27606
 Phone: (919) 233-8091, Fax: (919) 233-8031
 NC License# F-1222
 www.mckimcreed.com

NC Department of Adult Correction

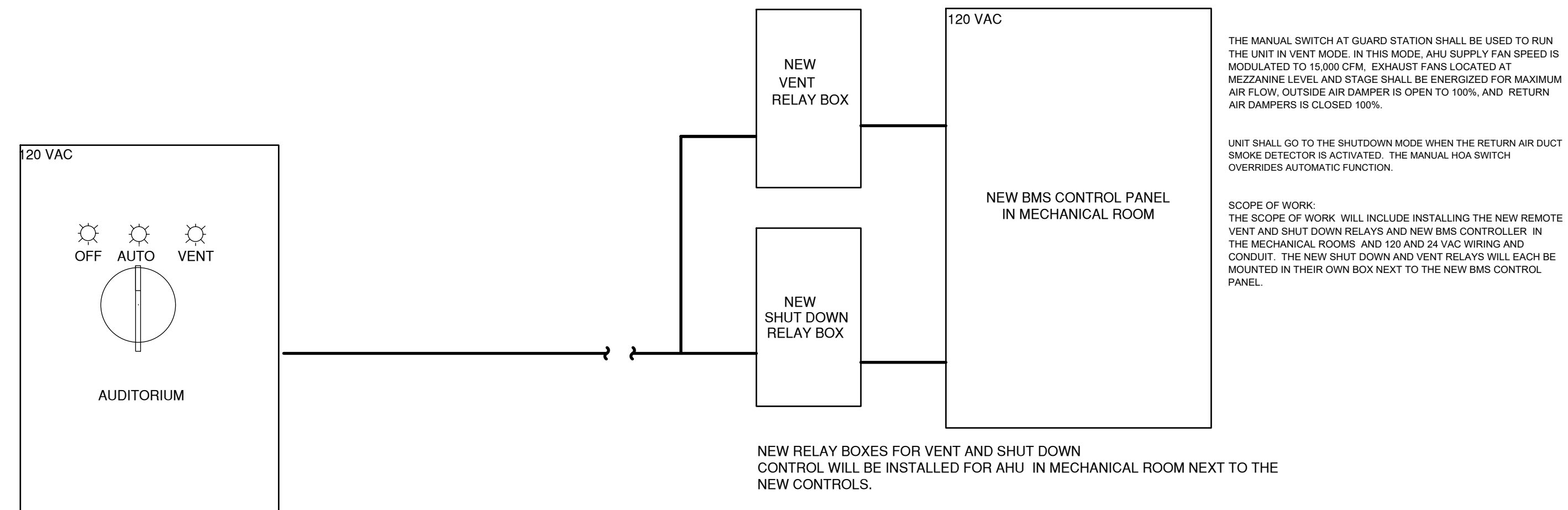
**NC Correctional Institution for Women
 Air Conditioning Installation**
 SCO ID: 22-24913-02A Code: 42107 Item: 4112
 MECHANICAL - CONTROLS

PROJ. START DATE: 08/11/2023
 MCE PROJ. # 08914-0002
 DRAWN: UG
 DESIGNED: UG
 CHECKED: MAB
 PROJ. MGR.: MAB

SCALE: HORIZONTAL: AS NOTED
 VERTICAL: N/A

M604
 DRAWING NUMBER
 0
 REVISION

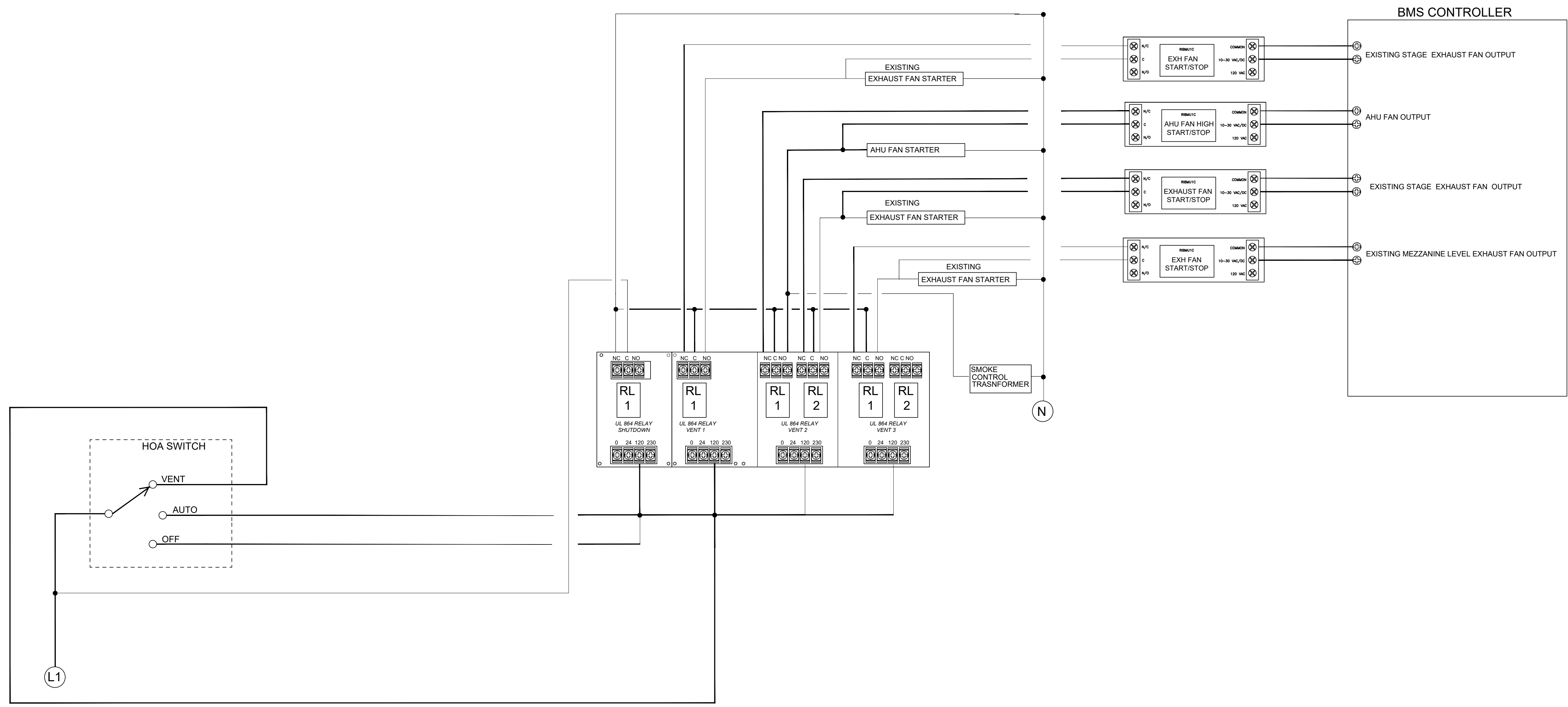
STATUS: BID DOCUMENTS



NEW MANUAL VENTILATION MODE SWITCH LOCATED AT GUARD STATION

TYPICAL MECHANICAL ROOM LAYOUT OF RELAYS ON WALL NEXT TO CONTROLS FOR AHU

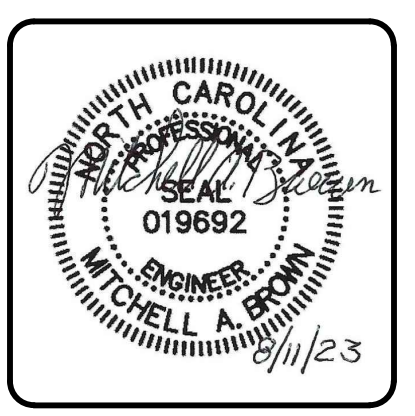
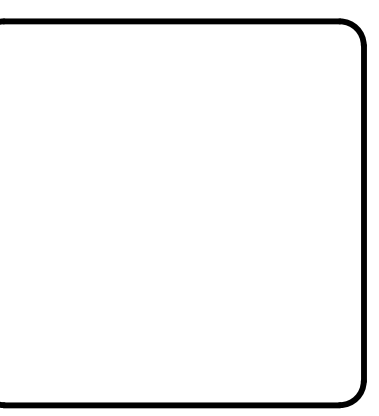
2 SCHEMATIC OF MANUAL SWITCHES AND RELAY MODULES (AUDITORIUM)



2 SIMPLIFIED VENT MODE MANUAL SWITCH INTERFACE MODEL (AUDITORIUM) NOT TO SCALE

REV. NO.	DESCRIPTION	DATE

REVISIONS



MCKIM & CREED

Venture IV Building, Suite 500
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Raleigh, North Carolina 27606
Phone: (919) 233-8091, Fax: (919) 233-8031
NC License# F-1222
www.mckimcreed.com



**NC Correctional Institution for Women
Air Conditioning Installation**

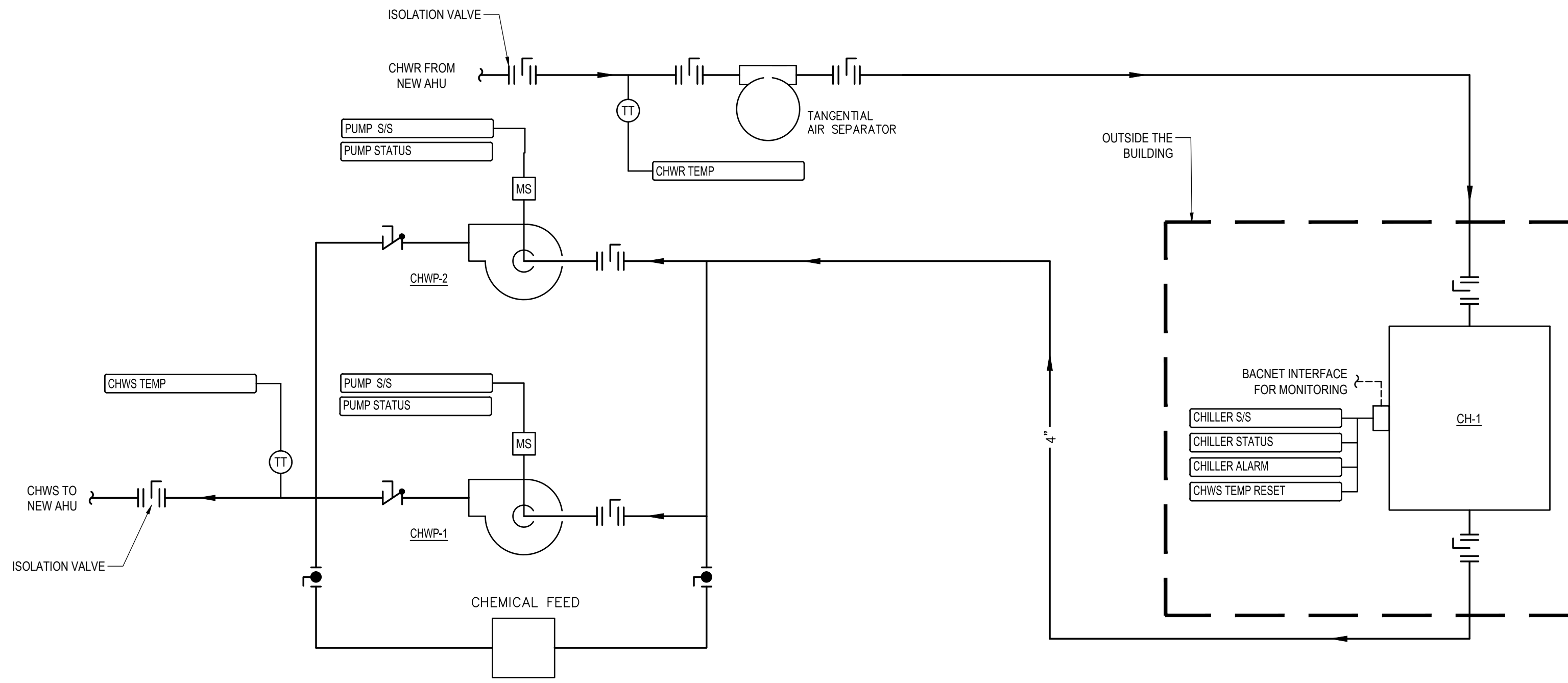
SCO ID: 22-24913-02A Code: 42107 Item: 4112

MECHANICAL - CONTROLS

PROJ. START DATE: 08/11/2023
MCE PROJ. #: 08914-0002
DRAWN: UG
CHECKED: MAB
PROJ. MGR.: MAB

SCALE: AS NOTED	M605
DRAWING NUMBER: 0	
REVISION: N/A	REVISION: 0

BID DOCUMENTS



SEQUENCE OF OPERATION

POINTS LIST

CHILLED WATER SYSTEM CONTROL
 THE CHILLED WATER SYSTEM SHALL BE ENABLED TO OPERATE WHEN THE OUTSIDE AIR TEMPERATURE IS ABOVE SETPOINT (68°F, ADJ), AND ONE UNIT REQUIRING CHILLED WATER IS INDICATED TO BE OPERATIONAL.

WHEN THE AIR COOLED CHILLER CONTROL PANEL IS ENABLED, THE CHILLER CONTROL PANEL SHALL START THE CHILLED WATER PUMP. AFTER PROOF OF CHILLED WATER FLOW THE CHILLER WILL START. THE ENERGY MANAGEMENT SYSTEM SHALL MONITOR AND DISPLAY PUMP COMMAND AND STATUS. (IF THE CHILLER CONTROL PANEL DOES NOT PROVIDE FOR PUMP CONTROL, THIS SHALL BE ACCOMPLISHED BY THE BAS.)

CHILLED WATER SUPPLY TEMPERATURE CONTROL
 THE AIR COOLED CHILLER DISCHARGE WATER TEMPERATURE SHALL BE CONTROLLED BY THE CHILLER CONTROLS. THE ENERGY MANAGEMENT SYSTEM SHALL SEND A CHILLED WATER SUPPLY TEMPERATURE SETPOINT COMMAND TO THE CHILLER CONTROL PANEL. THE SETPOINT SHALL BE CAPABLE OF BEING RESET FROM 42°F CHILLED WATER SUPPLY TEMPERATURE, AT 85°F OUTSIDE AIR TEMPERATURE, TO 50°F CHILLED WATER SUPPLY TEMPERATURE, AT 60°F OUTSIDE AIR TEMPERATURE (MINIMUM SPAN). THE INITIAL SETPOINT FOR THE CHILLED WATER SUPPLY TEMPERATURE SHALL BE 44°F.

THE ENERGY MANAGEMENT SYSTEM WILL GENERATE AN ALARM IF THE CHILLED WATER SUPPLY TEMPERATURE INCREASES ABOVE THE INDICATED HIGH LIMIT. THE ENERGY MANAGEMENT SYSTEM SHALL MONITOR THE PRIMARY PUMP COMMAND. THE BAS WILL GENERATE AN ALARM IF THE PUMP FAILS TO RUN OR IF THE CHILLER CONTROLS INDICATE AN ALARM.

CHILLED WATER PUMP CONTROL
 THE CHILLED WATER PUMPS SHALL OPERATE IN A LEAD/STANDBY FASHION. THE DESIGNATED LEAD PUMP SHALL ROTATE UPON AN ADJUSTABLE SCHEDULE OR MANUALLY THROUGH THE SOFTWARE SWITCH (USER SELECTABLE). ON FAILURE OF THE LEAD PUMP, THE STANDBY PUMP SHALL RUN AND THE LEAD PUMP SHALL TURN OFF.

MONITORING
 IN ADDITION TO THE SEQUENCE NOTED ABOVE, THE BAS SHALL MONITOR THE FOLLOWING DIGITAL AND ANALOG INPUT POINTS:

- CHILLER FAULTS
- CHILLER RUN STATUS
- CHILLED WATER SUPPLY AND RETURN TEMPERATURES
- PUMP COMMAND AND STATUS

ALARMS
 THE ENERGY MANAGEMENT SYSTEM SHALL GENERATE AN ALARM UPON:

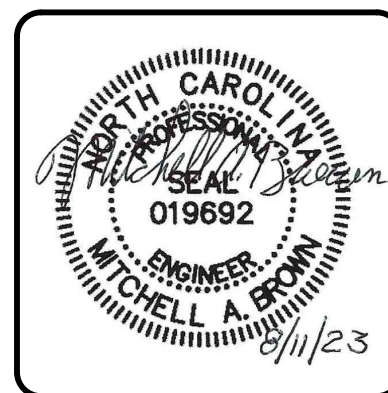
- CHILLER FAULTS
- ABNORMAL PUMP STATUS
- ABNORMAL SYSTEM TEMPERATURES.

POINT DESCRIPTOR	POINT TYPE							NOTES
	DI	AI	DO	VO	ALARM	TREND	OEM	
CHILLER SIS								
CHILLER STATUS		•						
CHILLER ALARM		•						
CHWS TEMP RESET								
CHWS TEMP		•						
CHWR TEMP		•						
CHWP-1 SIS								
CHWP-1 STATUS								
CHW FLOW		•						
CHWP-1 SIS								
CHWP-1 STATUS								

GENERAL NOTES:
 1. ALL CONTROL DEVICES ON THIS SCHEMATIC SHALL BE NEW UNLESS NOTED OTHERWISE.

NOT TO SCALE
21 AUDITORIUM - CHILLED WATER PIPING SCHEMATIC

REV NO	DESCRIPTION	DATE



**NC Correctional Institution for Women
 Air Conditioning Installation**
 SCO ID: 22-24913-02A Code: 42107 Item: 4112

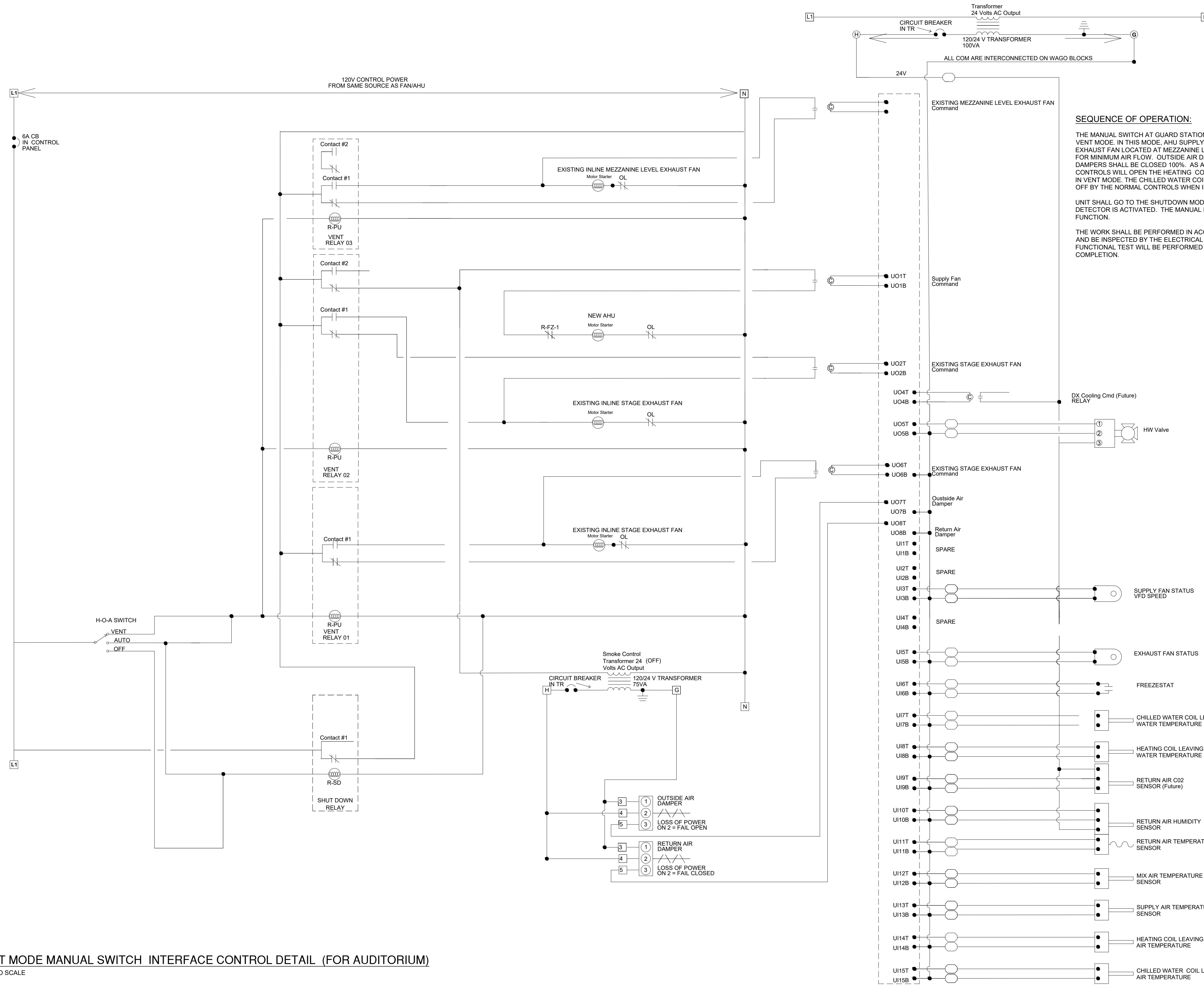
MECHANICAL - CONTROLS

PROJ. START DATE: 08/11/2023
MCE PROJ. # 08914-0002
DRAWN UG
DESIGNED UG
CHECKED MAB
PROJ. MGR. MAB

SCALE
HORIZONTAL: AS NOTED
VERTICAL: N/A

M606
DRAWING NUMBER
0
REVISION

STATUS: **BID DOCUMENTS**



SEQUENCE OF OPERATION:

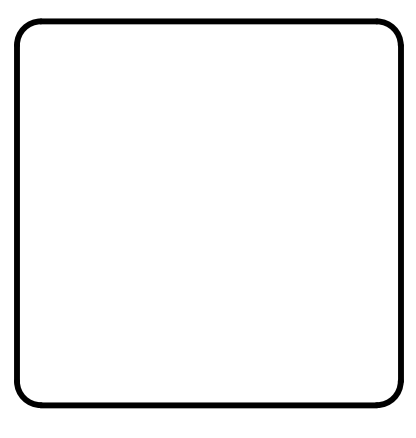
THE MANUAL SWITCH AT GUARD STATION SHALL BE USED TO RUN THE UNIT IN VENT MODE. IN THIS MODE, AHU SUPPLY FAN IS MODULATED TO 15,000 CFM, EXHAUST FAN LOCATED AT MEZZANINE LEVEL AND STAGE SHALL BE ENERGIZED FOR MINIMUM AIR FLOW. OUTSIDE AIR DAMPERS OPEN TO 100%. RETURN AIR DAMPERS SHALL BE CLOSED 100%. AS A NON-LIFE SAFETY FUNCTION THE NORMAL CONTROLS WILL OPEN THE HEATING COIL CONTROL VALVE TO PREVENT FREEZING IN VENT MODE. THE CHILLED WATER COIL CONTROL VALVE WILL ALSO BE TURNED OFF BY THE NORMAL CONTROLS WHEN IN VENT MODE.

UNIT SHALL GO TO THE SHUTDOWN MODE WHEN THE RETURN AIR DUCT SMOKE DETECTOR IS ACTIVATED. THE MANUAL HOA SWITCH OVERRIDES AUTOMATIC FUNCTION.

THE WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE ELECTRICAL CODE AND BE INSPECTED BY THE ELECTRICAL INSPECTOR PRIOR TO ACCEPTANCE. A FUNCTIONAL TEST WILL BE PERFORMED TO VERIFY THE SEQUENCE AT COMPLETION.

1 VENT MODE MANUAL SWITCH INTERFACE CONTROL DETAIL (FOR AUDITORIUM)
NOT TO SCALE

REV. NO.	DESCRIPTION	DATE



NC Correctional Institution for Women
Air Conditioning Installation
SCO ID: 22-24913-02A Code: 42107 Item: 4112

MECHANICAL - CONTROLS

PROJ. START DATE: 08/11/2023	SCALE: HORIZONTAL: AS NOTED VERTICAL: N/A
MCE PROJ. # 08914-0002	DRAWN: UG
DESIGNED: MAB	CHECKED: MAB
PROJ. MGR.: MAB	

M607
DRAWING NUMBER
0
REVISION
STATUS: BID DOCUMENTS

AIRFLOW BALANCE/MODES (FOR PACU-1)					
MODE	SUPPLY AIR CFM	OUTSIDE AIR CFM	RETURN AIR CFM	EXHAUST AIR CFM	NOTES
COOLING/HEATING	2400	980	1420	EF-S1-490 EF-S2-490	EXHAUST FANS ARE ON ALWAYS
ECONOMIZER	2400	2400	0	EF-S1-490 EF-S2-490 BAROMETRIC RELIEF DAMPER AT PACU-1: 1420 TOTAL: 2400	EXHAUST FANS ARE ON ALWAYS. OUTSIDE AIR DAMPER IS OPEN FOR 2400 CFM.
VENTILATION MODE	2400	2400	0	EF-S1-490 EF-S2-490 BAROMETRIC RELIEF DAMPER AT PACU-1: 1420 TOTAL: 2400	EXHAUST FANS ARE ON ALWAYS. OUTSIDE AIR DAMPER IS OPEN FOR 2400 CFM.

AIRFLOW BALANCE/MODES (FOR PACU-2)					
MODE	SUPPLY AIR CFM	OUTSIDE AIR CFM	RETURN AIR CFM	EXHAUST AIR CFM	NOTES
COOLING/HEATING	2400	980	1420	EF-S3-490 EF-S4-490	EXHAUST FANS ARE ON ALWAYS
ECONOMIZER	2400	2400	0	EF-S3-490 EF-S4-490 BAROMETRIC RELIEF DAMPER AT PACU-2: 1420 TOTAL: 2400	EXHAUST FANS ARE ON ALWAYS. OUTSIDE AIR DAMPER IS OPEN FOR 2400 CFM.
VENTILATION MODE	2400	2400	0	EF-S3-490 EF-S4-490 BAROMETRIC RELIEF DAMPER AT PACU-2: 1420 TOTAL: 2400	EXHAUST FANS ARE ON ALWAYS. OUTSIDE AIR DAMPER IS OPEN FOR 2400 CFM.

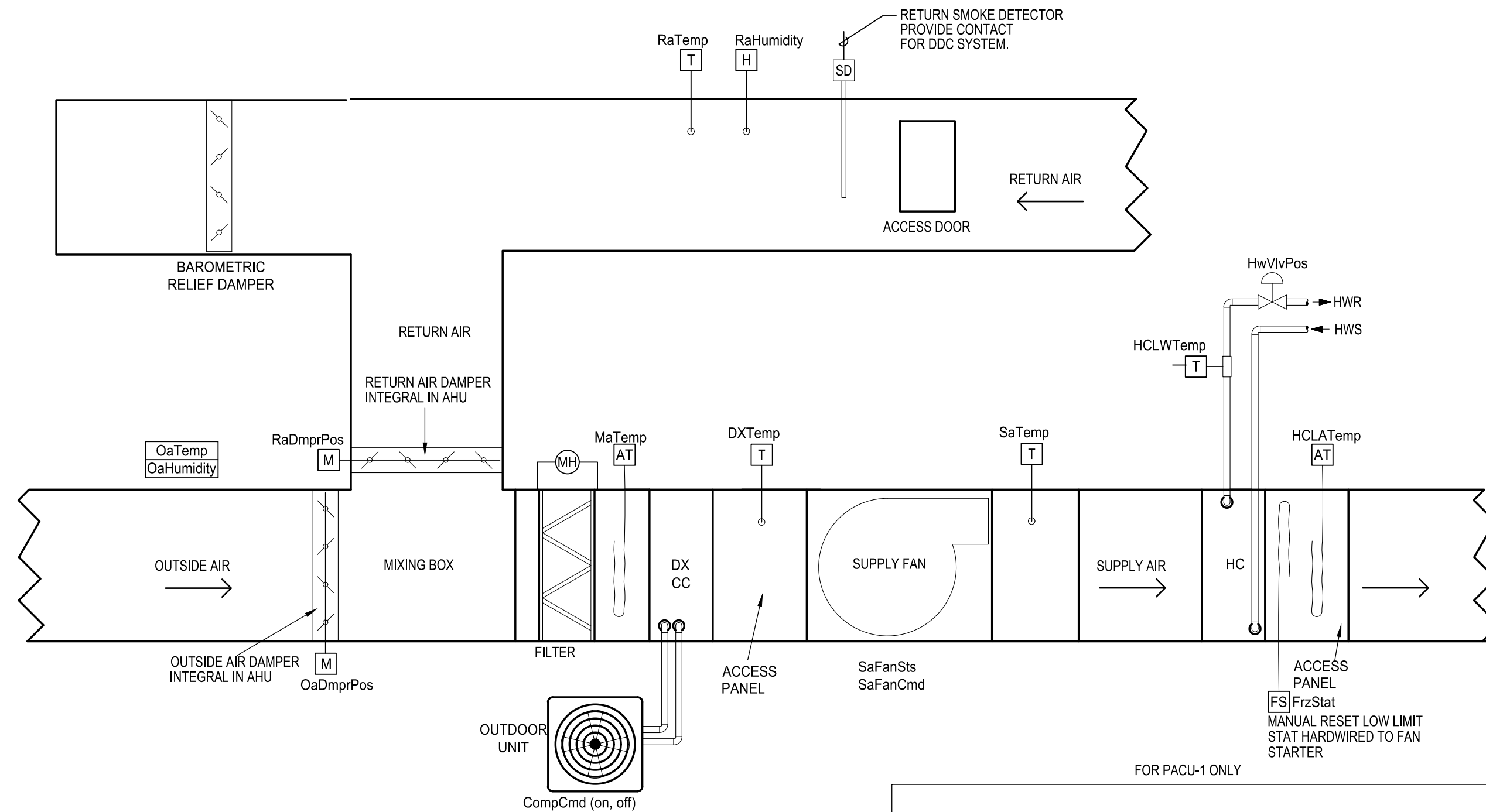
Equipment	Equipment Name	Equipment Tags
PACKAGED AIR CONDITIONING UNIT (PACU) (DX coil, Supply fan)		dis, id, siteRef, equip, hvac, ahu , Dx Cool directZone, singleDuct, constantVolume
Points	AI AO DI DO VP	Point Name Point Tags Trending
Supply Fan Status		SaFanSts discharge, air, fan, run, sensor COV, 24
Supply Fan Command		SaFanCmd discharge, air, fan, run, cmd COV, 24
Compressor		CompCmd cmd COV, 24
DX Leaving Air Temperature	x	DXTemp air, temp, sensor Int, 10min
Supply Air Temperature	x	SaTemp discharge, air, temp, sensor Int, 10min
Return Air Temperature	x	RaTemp return, air, temp, sensor Int, 10min
Return Air Humidity	x	RaHumidity return, air, humidity, sensor Int, 10min
Outside Air Temperature	x	OaTemp outside, air, temp, sensor Int, 10min
Outside Air Humidity	x	OaHumidity outside, air, humidity, sensor Int, 10min
Mixed Air Temperature	x	MaTemp mixed, air, temp, sensor Int, 10min
Return Air Damper Position	x	RaDmprPos return, air, damper, cmd Int, 10min
Outside Air Damper Position	x	OaDmprPos outside, air, damper, cmd Int, 10min
Zone Temperature	x	ZoneTemp zone, air, temperature, sensor Int, 10min
Zone Temperature Setpoint Adjust	x	ZoneTempAdjust zone, air, temperature, cmd Int, 10min
Zone Unoccupied Mode Override		ZoneOverride zone, air, temperature, cmd COV, 24

Equipment	Equipment Name	Equipment Tags
DUCTMOUNTED REHEAT COIL		
FreezeStat	x	FrzStat freezeStat COV, 24
Hot Water Valve Position	x	HwVlvPos hot, water, valve, cmd Int, 10min
Heating Coil Leaving Water Temperature	x	HCLWTemp hot, water, temp, sensor Int, 10min
Heating Coil Leaving Air Temperature	x	HCLATemp air, temp, sensor Int, 10min

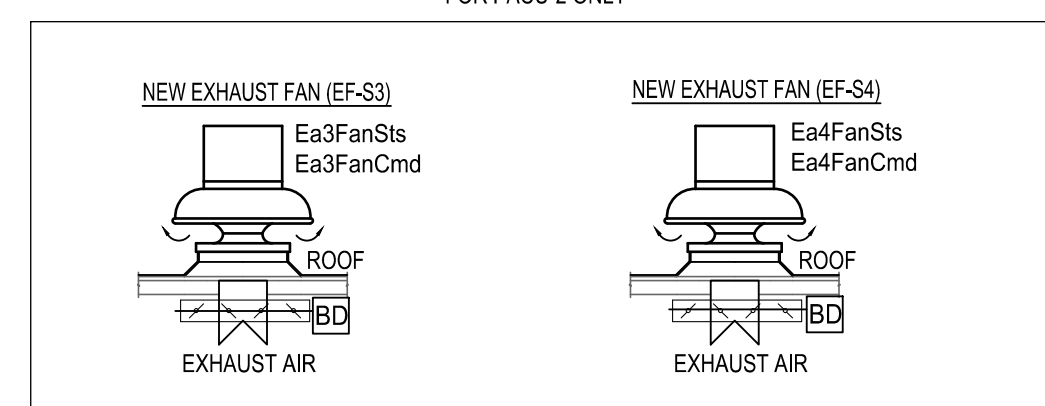
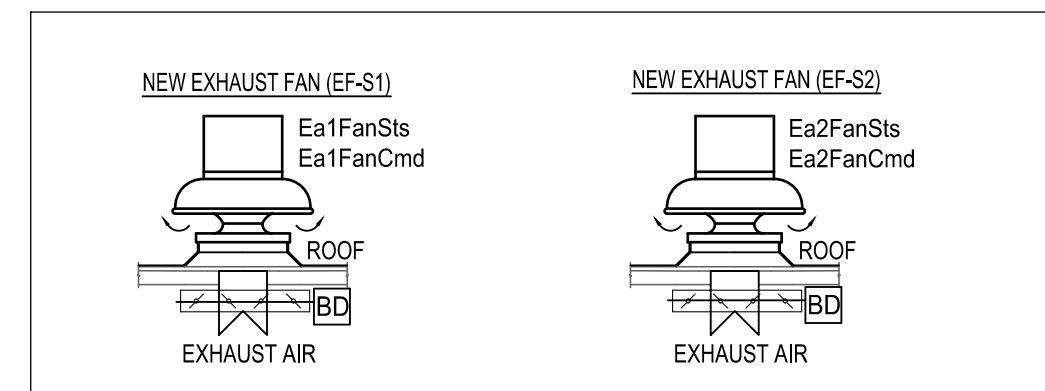
Equipment	Equipment Name	Equipment Tags
Exhaust fans (fan and Damper)		fan, damper Constant volume/ Exhaust
Exhaust Fan 1 Status		Ea1FanSts Exhaust 1, air, fan, run, sensor COV, 24
Exhaust Fan 1 Command		Ea1FanCmd Exhaust 1, air, fan, run, cmd COV, 24
Exhaust Fan 2 Status		Ea2FanSts Exhaust 2, air, fan, run, sensor COV, 24
Exhaust Fan 2 Command		Ea2FanCmd Exhaust 2, air, fan, run, cmd COV, 24

NOT TO SCALE

1 AIRFLOW BALANCE TABLE FOR SINGLE CELL B



ABBREVIATIONS	
AFM AIRFLOW MONITORING STATION	DP DIFFERENTIAL PRESSURE
AT AVERAGE TEMPERATURE	DX DIRECT EXPANSION
CC CHILLED WATER COIL	FS FREEZE STAT
CT CURRENT TRANSDUCER	H HUMIDITY
CWP CONDENSER WATER PUMP	HC HEATING COIL
CWR CONDENSER WATER RETURN	HWR HOT WATER RETURN
CWS CONDENSER WATER SUPPLY	HWS HOT WATER SUPPLY
CHWP CHILLED WATER PUMP	M MOTOR/MOTORIZED ACTUATOR
CHWR CHILLED WATER RETURN	MH MAGNETIC GAUGE
	N.C. NORMALLY CLOSED
	N.O. NORMALLY OPEN
	HC HEATING COIL
	PR PRIMARY
	RHC REHEAT COIL
	SE SECONDARY
	SD DUCT SMOKE DETECTOR
	SP STATIC PRESSURE
	T TEMPERATURE
	VFD VARIABLE FREQUENCY DRIVE
	VLV VALVE
	PACU PACKAGED AIR CONDITIONING UNIT
	BD BACKDRAFT DAMPER



3 PACU (SINGLE CELL B, TYPICAL FOR PACU-1 AND PACU-2) POINT LIST

UNOCCUPIED MODE: WHEN THE SPACE TEMPERATURE IS BELOW THE UNOCCUPIED HEATING SETPOINT OF 55.0 DEG. F (ADJ.), THE SUPPLY FAN SHALL RUN. THE OUTSIDE AIR DAMPER SHALL REMAIN CLOSED AND THE DUCT REHEAT CONTROL VALVE SHALL CLOSE. WHEN THE SPACE TEMPERATURE RISES ABOVE THE UNOCCUPIED HEATING SETPOINT OF 55.0 DEG. F (ADJ.) PLUS THE UNOCCUPIED DIFFERENTIAL OF 2.0 DEG. F (ADJ.) THE SUPPLY FAN SHALL STOP AND THE DUCT REHEAT CONTROL VALVE SHALL CLOSE.

WHEN THE SPACE TEMPERATURE IS ABOVE THE UNOCCUPIED COOLING SETPOINT OF 85.0 DEG. F (ADJ.), THE SUPPLY FAN SHALL START. THE OUTSIDE AIR DAMPER SHALL OPEN IF ECONOMIZING IS ENABLED AND REMAIN CLOSED IF ECONOMIZING IS DISABLED AND THE DX COOLING SHALL BE ENABLED. WHEN THE SPACE TEMPERATURE FALLS BELOW THE UNOCCUPIED COOLING SETPOINT OF 85.0 DEG. F (ADJ.) MINUS THE UNOCCUPIED DIFFERENTIAL OF 4.0 DEG. F (ADJ.) THE SUPPLY FAN SHALL STOP, THE DX COOLING SHALL BE DISABLED AND THE OUTSIDE AIR DAMPER SHALL CLOSE.

OPTIMAL START WARMUP/COOL DOWN: NEAR THE END OF THE UNOCCUPIED PERIOD AND PRIOR TO THE BEGINNING OF THE OCCUPIED PERIOD THE SYSTEM SHALL ENTER OPTIMAL START WARMUP/COOL DOWN MODE TO BRING THE SPACE TEMPERATURE TO THE OCCUPIED PERIOD SET POINT. THE TIME AT WHICH THE OPTIMAL START WARMUP/COOLDOWN PERIOD BEGINS SHALL BE AS CLOSE TO THE BEGINNING OF THE OCCUPIED PERIOD AS POSSIBLE WHILE STILL ENSURING THE OCCUPIED PERIOD SET POINTS ARE REACHED. THIS START TIME SHALL BE OPTIMIZED BASED ON THE OUTDOOR AND INDOOR AIR CONDITIONS. O.A DAMPERS REMAIN FULLY CLOSED UNLESS ECONOMIZING

COOLING/HEATING MODE: UNITARY CONTROLLER SHALL MODULATE THE STAGES OF COOLING CAPACITY IN ORDER TO MAINTAIN THE RETURN AIR TEMPERATURE AT COOLING SET POINT 75°F (ADJ.). AS THE RETURN AIR TEMPERATURE FALLS BELOW THE COOLING SET POINT, COOLING SHALL BE DISABLED. UPON A CONTINUED FALL IN RETURN AIR TEMPERATURE TO HEATING SET POINT 70°F (ADJ.), THE DUCT REHEAT COIL CONTROL VALVE SHALL MODULATE TO MAINTAIN RETURN AIR TEMPERATURE AT HEATING SET POINT. MAXIMUM REHEAT COIL LEAVING AIR TEMPERATURE SHALL BE 110°F (ADJ.). WHEN THE RETURN AIR TEMPERATURE IS 0.5°F OR MORE ABOVE THE HEATING SET POINT THE DUCT REHEAT CONTROL VALVE SHALL BE CLOSED.

DEHUMIDIFICATION CONTROL (REHEAT IS AVAILABLE): UPON A RISE IN SPACE OR RETURN AIR RELATIVE HUMIDITY TO 62%, THE SYSTEM SHALL OPERATE IN DEHUMIDIFICATION CONTROL MODE. DX COOLING SHALL BE ACTIVATED AT 100% CAPACITY AND THE DUCT REHEAT COIL SHALL BE MODULATED TO MAINTAIN THE RETURN AIR TEMPERATURE AT ITS COOLING SETPOINT. UPON A FALL IN RELATIVE HUMIDITY BELOW 60%, THE SYSTEM SHALL BE RELEASED FROM DEHUMIDIFICATION MODE TO OPERATE IN ITS NORMAL COOLING MODE.

ECONOMIZING: WHEN THE OUTDOOR AIR ENTHALPY IS LOWER THAN 28 BTU/LB AND THE OUTDOOR AIR TEMPERATURE IS LOWER THAN (75 °F); THE OUTSIDE AIR DAMPER IS OPEN TO 100% AND RETURN AIR DAMPER IS CLOSED. NEW EXHAUST FAN LOCATED IN CORRIDOR SHALL RUN AND ASSOCIATED DAMPER IS OPEN IF SUFFICIENT FREE COOLING IS NOT AVAILABLE. DX COIL SHALL BE USED TO SUPPLEMENT THE COOLING. O.A TEMPERATURE AND HUMIDITY ARE TO BE FROM THE GLOBAL DDC SENSORS.

DEMAND LIMITING: TO LOWER POWER CONSUMPTION, THE RETURN AIR TEMPERATURE/HUMIDITY SET POINTS SHALL AUTOMATICALLY RELAX WHEN THE FACILITY POWER CONSUMPTION EXCEEDS DEFINABLE THRESHOLDS. THE AMOUNT OF RELAXATION SHALL BE INDIVIDUALLY CONFIGURABLE FOR EACH PACU UNIT. THE RETURN AIR TEMPERATURE/HUMIDITY SET POINTS SHALL AUTOMATICALLY RETURN TO THEIR PREVIOUS SETTINGS WHEN THE FACILITY POWER CONSUMPTION DROPS BELOW THE THRESHOLDS.

DELAYED VENTILATION: WHEN TRANSITIONING FROM WARMUP OR COOLDOWN MODE TO OCCUPIED MODE, VENTILATION RATE SET POINT SHALL INITIALLY BE (50% OF THE MINIMUM ALLOWABLE VENTILATION RATE. AFTER (1) HOURS INCREASE VENTILATION RATE SET POINT TO THE MINIMUM ALLOWABLE VENTILATION RATE.

FREEZE PROTECTION: IN NORMAL MODE OF OPERATION, LOW LIMIT CONTROLLER WITH SENSOR (FREEZE STAT) LOCATED DOWNSTREAM OF THE DUCT REHEAT COIL SHALL DE-ENERGIZE THE SUPPLY FAN AND CLOSE THE OUTDOOR AIR DAMPERS IF THE TEMPERATURE FALLS BELOW 40°F. IN ADDITION, THE DUCT REHEAT HOT WATER CONTROL VALVE ACTUATOR AND COMPRESSORS SHALL BE DE-ENERGIZED AND THE VALVES WILL SPRING RETURN TO THE OPEN POSITION. DE-ENERGIZING SHALL BE ACCOMPLISHED VIA DDC SYSTEM IN VENT MODE. WHEN AMBIENT TEMPERATURE IS LOWER THAN 40°F, FREEZE STAT IS BYPASSED AND ENERGIZE THE SUPPLY FAN TO REMOVE TEAR OR MACE GAS FROM THE BUILDING.

SMOKE SHUTDOWN/MANUAL VENTILATION MODE: ACTIVATION OF THE RETURN AIR SMOKE DETECTOR SHALL DE-ENERGIZE THE SUPPLY FAN. CONTACT ON THE SMOKE DETECTOR SHALL ALARM THE DDC SYSTEM FOR INFORMATIONAL PURPOSES.

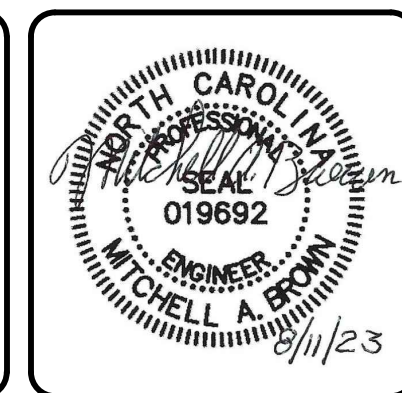
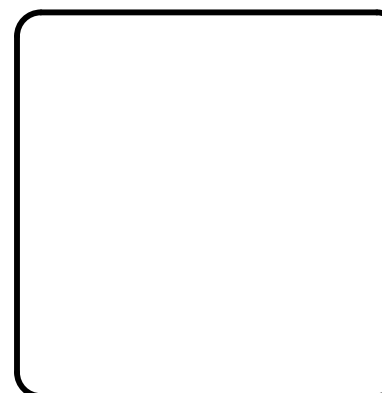
A MANUAL SWITCH AT GUARD STATION SHALL BE USED TO RUN THE UNIT IN VENTILATION MODE TO REMOVE THE MACE OR TEAR GAS. IN THIS MODE, THE ASSOCIATED NEW EXHAUST FANS AND DAMPERS ARE ON, THE NEW AIR HANDLER IS ON, THE OUTSIDE AIR DAMPER IS OPEN TO 100% AND THE RETURN AIR DAMPER IS CLOSED. THE AIR CONDITIONING COMPRESSOR WILL ALSO BE TURNED OFF. AS A NON-LIFE SAFETY FUNCTION THE NORMAL CONTROLS WILL OPEN THE DUCT REHEAT CONTROL VALVE TO PREVENT FREEZING CONDITIONS.

O.A TEMPERATURE LOCKOUT:
COOLING IS TO BE LOCKED OUT WHEN THE O.A TEMPERATURE IS LOWER THAN (60)°F.
HEATING IS TO BE LOCKED OUT WHEN THE O.A TEMPERATURE IS HIGHER THAN (70)°F.
LOCKOUTS SHALL NOT BE APPLIED DURING DEHUMIDIFICATION MODE OPERATION

2 PACU CONTROL SCHEMATIC (FOR SINGLE CELL B, TYPICAL FOR PACU-1 AND PACU-2)

4 PACU (SINGLE CELL B, TYPICAL PACU-1 AND PACU-2) SEQUENCE OF OPERATION

REV NO	DESCRIPTION	DATE



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NC Department of Adult Correction

**NC Correctional Institution for Women
Air Conditioning Installation**
 SCO ID: 22-24913-02A Code: 42107 Item: 4112

MECHANICAL - CONTROLS

PROJ. START DATE: 08/11/2023
 MCE PROJ. # 08914-0002
 DRAWN: UG
 DESIGNED: UG
 CHECKED: MAB
 PROJ. MGR.: MAB

SCALE: HORIZONTAL: AS NOTED VERTICAL: N/A

M608
 DRAWING NUMBER
 0 REVISION
 BID DOCUMENTS

STATUS:

