



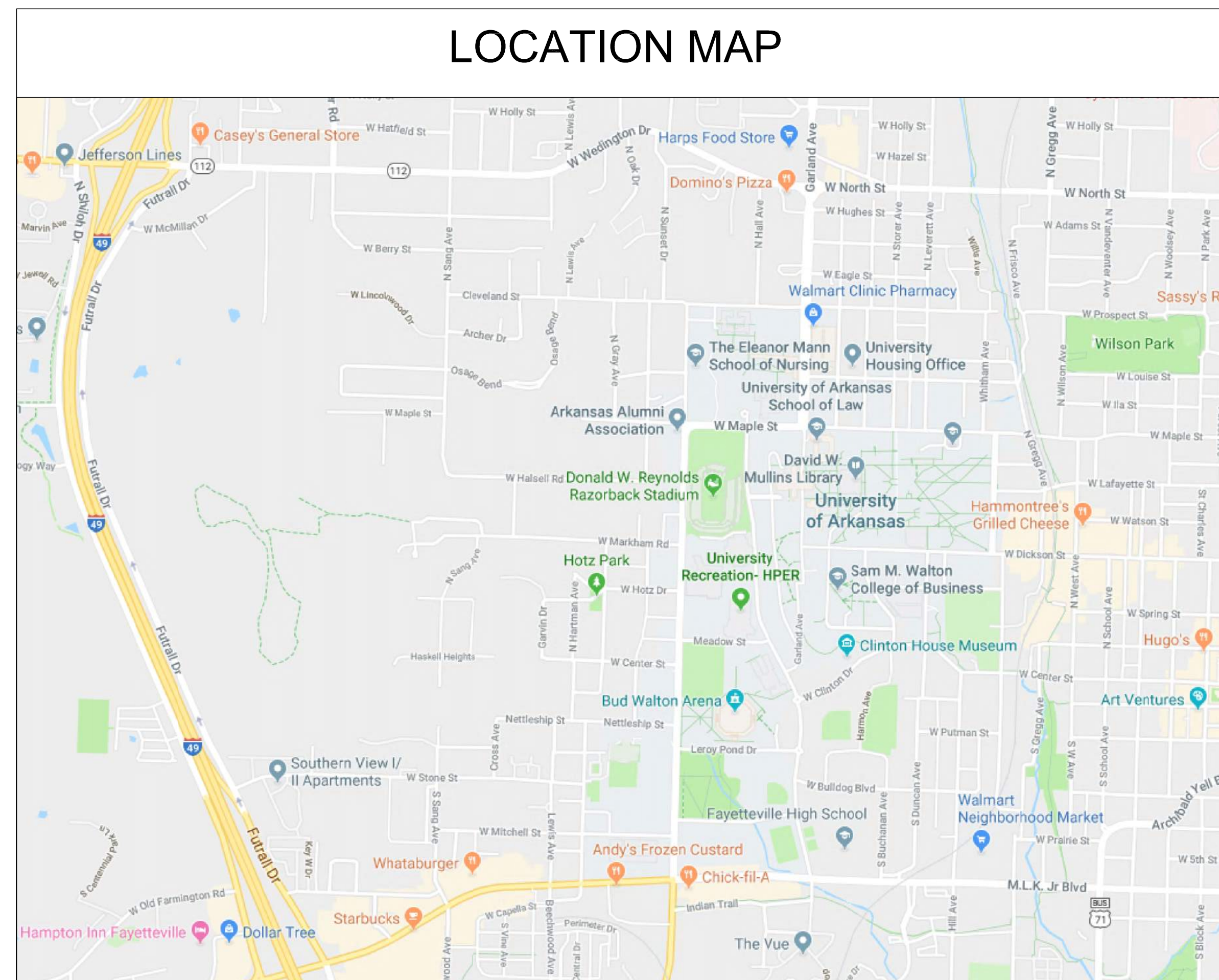
UNIVERSITY OF ARKANSAS

AUTOMATIC TEMPERATURE CONTROLS INDEFINITE DELIVERY INDEFINITE QUANTITY (IDIQ)

FINAL BID SET

CORPORATE SEAL

ENGINEER SEAL



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UA REVISION TO CO MONITORING REQUIREMENTS 3/28/2024

CXA REVISION TO DIAGRAMS AND SCHEDULES 4/3/2024

IDIQ CONTROL DRAWINGS

UNIVERSITY OF ARKANSAS
FAYETTEVILLE, ARKANSAS

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ISSUE DATE: 03/20/19

PROJECT NUMBER: 04-18-0072

GENERAL NOTES APPLICABLE TO ALL CONTROL DIAGRAMS:

- ALL CONTROL DEVICES SHOWN ON THE CONTROL DIAGRAMS ARE FURNISHED BY DIVISION 230900 UNLESS OTHERWISE NOTED OR SPECIFIED.
- ALL COMPONENTS REQUIRED FOR THE SEQUENCES OF OPERATION, SHOWN ON THE CONTROL DIAGRAMS, DESCRIBED IN THE SPECIFICATION, OR AS REQUIRED FOR A PROPERLY OPERATING SYSTEM SHALL BE FURNISHED AND INSTALLED BY DIVISION 230900 UNLESS OTHERWISE NOTED, SHOWN, OR SPECIFIED.
- DIVISION 230900 IS RESPONSIBLE TO FURNISH, INSTALL, AND WIRE ALL COMPONENTS REQUIRED FOR INTEGRATION OF INFORMATION SHOWN TO BE ACCESSED BY THE EMS FROM OTHER SYSTEMS AND EQUIPMENT UNLESS OTHERWISE NOTED OR SPECIFIED.
- ALL POWER WIRING AND TRANSFORMERS FOR SENSORS, ACTUATORS, AND OTHER CONTROL COMPONENTS AS REQUIRED FOR THE EMS AND/OR DDC SYSTEMS TO FUNCTION PROPERLY, SHALL BE FURNISHED AND INSTALLED BY DIVISION 23 UNLESS OTHERWISE SHOWN, NOTED, OR SPECIFIED.
- ALL POWER WIRING FOR SENSORS, ACTUATORS, AND OTHER DEVICES SHALL BE FROM THE EQUIPMENT CONTROLLERS DDC PANELS OR THE FEP PANELS OF THE ASSOCIATED SYSTEM.
- ALL CONTROL, INTERLOCK, AND POWER WIRING SHALL BE INSTALLED PER THE DIVISION 26, LOCAL, STATE, AND NATIONAL CODES. RACEWAY SHALL BE INSTALLED PER THE ELECTRICAL SPECIFICATIONS.
- ALL CONTROL POINTS SHOWN ON THE CONTROL DIAGRAMS SHALL BE PROVIDED AND INTEGRATED INTO AN EMS SYSTEM GRAPHIC REPRESENTATIVE OF THE CONTROL DIAGRAMS.
- ALL CONTROL BANDS, SETPOINTS, SETPOINT LIMITS, SETPOINT INCREMENT VALUES, SETPOINT DECREMENT VALUES, ALARM LIMITS, AND OTHER PARAMETERS SHALL BE ADJUSTABLE FROM THE EMS.
- ALL CONTROL BANDS, SETPOINTS, TIME DELAYS, CONTROL LOOPS, AND OTHER PARAMETERS SHALL BE COMMISSIONED BY THE DIVISION 230900 TO PROVIDE STABLE CONTROL OF ALL SYSTEMS.
- ALL SETPOINTS SHALL BE ADJUSTABLE FROM THE EMS SYSTEM GRAPHIC(S).
- SPACE SETPOINTS SHALL BE ADJUSTABLE FROM THE ROOM SENSOR UNLESS OTHERWISE SHOWN ON DRAWINGS OR SPECIFIED.
- THE EMS SYSTEM GRAPHICS SHALL BE LINKED WITH ASSOCIATED BUILDING FLOOR PLANS FROM THE SPACE SENSOR OR AREA SERVED.
- WHERE ONE SYSTEM IS ASSOCIATED WITH ANOTHER SYSTEM, THE SYSTEM GRAPHIC SHALL BE LINKED TO THE ASSOCIATED GRAPHIC AS WELL AS THE BUILDING FLOOR PLAN GRAPHIC. EXAMPLE - AN AIR HANDLING UNIT SYSTEM GRAPHIC SHALL BE LINKED TO THE CHILLED WATER SYSTEM GRAPHIC IN ADDITION TO BOTH BEING LINKED TO THE BUILDING FLOOR PLAN.
- THE BUILDING FLOOR PLAN SHALL DISPLAY THE SPACE TEMPERATURE AND THE ACTIVE SET POINT AT EACH SPACE SENSOR LOCATION WITH AREA SERVED DISPLAYED IN SEPARATE COLORS BASED ON THE CONDITION OF THE ZONE. AREAS WITH HUMIDITY AND PRESSURE CONTROL WILL ALSO HAVE THOSE VALUES DISPLAYED. EXAMPLE - ALARM, NORMAL, HIGH OR LOW TEMPERATURE, HIGH OR LOW HUMIDITY, ETC.
- ALL GRAPHICS (SCHEDULES, PLANS, AND DIAGRAMS) WILL INDICATED EQUIPMENT, POINTS, AND AREAS IN ALARM VIA A RED ALARM INDICATOR, RED TEXT, AND/OR A RED HIGHLIGHT. OVERRIDDEN POINTS WILL BE INDICATED WITH PURPLE.
- THE BUILDING FLOOR PLAN SHALL DISPLAY THE DUCTWORK AND THE PIPING LAYOUT. THE DUCTWORK AND PIPING SHALL BE ABLE TO TOGGLE ON AND OFF INDEPENDENTLY.
- ALL BUILDING FLOOR PLANS AND SYSTEM GRAPHICS SHALL DISPLAY OUTSIDE AIR TEMPERATURE AND HUMIDITY.
- THE FLOOR PLAN GRAPHICS SHALL BE LINKED TO A BUILDING GRAPHIC WITH A DIGITAL PHOTOGRAPH BACKGROUND OF THE ACTUAL BUILDING. DURING CONSTRUCTION A TEMPORARY GRAPHIC MAY BE USED THAT IS REPRESENTATIVE OF THE BUILDING.
- ALL GRAPHICS SHALL BE SUBMITTED IN COLOR WITH THE ATC SUBMITTAL. FAILURE TO INCLUDE ALL GRAPHICS IN SUBMITTAL SHALL BE CAUSE FOR REJECTION OF COMPLETE SUBMITTAL.
- VARIABLE FREQUENCY DRIVES ARE FURNISHED BY DIVISION 230900, INSTALLED AND WIRED BY DIVISION 26. REFER TO VARIABLE FREQUENCY DRIVE SCHEDULE. VERIFY ALL EXISTING MOTOR HORSEPOWER AND ELECTRICAL RATINGS PRIOR TO SUBMITTAL AND ORDERING VARIABLE FREQUENCY DRIVES.
- POWER WIRING (PWR) FROM POWER SOURCE TO VARIABLE FREQUENCY DRIVES AND FROM VARIABLE FREQUENCY DRIVES TO MOTORS SHALL BE FURNISHED AND INSTALLED BY DIVISION 26.
- POWER WIRING (PWR) FROM POWER SOURCE TO MOTOR STARTERS AND FROM MOTOR STARTERS TO MOTORS SHALL BE FURNISHED AND INSTALLED BY DIVISION 26.
- POWER WIRING (PWR) FROM POWER SOURCE TO DDC, AND FEP PANELS SHALL BE FURNISHED AND INSTALLED BY THE DIVISION 26 UNLESS OTHERWISE NOTED ON DRAWINGS.
- GLOBAL DDC SYSTEM POINTS ARE DEFINED AS A SINGLE POINT USED IN ALL SYSTEMS IN A BUILDING OR CAMPUS TO MAINTAIN CONSISTENCY OF CONTROL ACTIONS THROUGHOUT THE BUILDING OR CAMPUS. EXAMPLE: OUTSIDE AIR TEMPERATURE POINT SAMPLED ON THE NORTH SIDE OF A BUILDING USED TO ENABLE/DISABLE AIRSIDE ECONOMIZER OPERATION THROUGHOUT THE BUILDING OR CAMPUS.
- THE PROJECT SEQUENCES ARE WRITTEN IN A GENERAL FORM INTENDED FOR IMPLEMENTATION BY ANY CONTROLS SYSTEM AND CONTRACTOR. DIVISION 230900 SHALL REVIEW ALL SPECIFICATIONS AND CONTROL SEQUENCES FOR CONSTRUCTABILITY, COMPATIBILITY, AND FEASIBILITY WITH ACTUAL CONDITIONS, BUILDING EQUIPMENT, AND THEIR OWN HARDWARE AND SOFTWARE LIMITATIONS AND CAPABILITIES. CONTROL SEQUENCES ARE INTENDED TO BE THE GENERAL STRUCTURE OF THE CONTRACTORS PROGRAMMING, BUT DO NOT NECESSARILY CONTAIN ALL THE REQUIRED DETAILS (LOOP AND TABLE STATEMENT TUNING, RAMP, LIMITS, ETC) AND BEST PRACTICES FOR THE FINAL PRODUCT. DIVISION 230900 SHALL PROVIDE A COMPLETE, OPERABLE, AND TUNED CONTROL SYSTEM THAT MEETS THE INTENDED SEQUENCES AND THE SPECIFIC EQUIPMENT REQUIREMENTS. IF UPON IMPLEMENTATION IT IS DISCOVERED THAT ADDITIONAL PROGRAMMING IS REQUIRED TO MEET THE INTENDED DESIGN OF THE CONTROLS SYSTEM, DIVISION 230900 SHALL PROVIDE THE ADDITIONAL PROGRAMMING AT NO ADDITIONAL COST. ALL PROGRAMMING (GRAPHICAL AND/OR TEXT BASED) SHALL BE REVIEWED WITH THE DIVISION 230900 AS PART OF THE SUBMITTAL AND COMMISSIONING PROCESSES. DIVISION 230900 WILL PROVIDE A SUBMITTAL OF THE GRAPHICAL AND/OR TEXT BASED PROGRAMMING FOR A SIDE TO SIDE COMPARISON WITH THE CONTRACT DOCUMENTS. THIS REVIEW WILL PART OF A SCHEDULED MEETING INVOLVING THE BAS CONTROLS DESIGN TEAM, DIVISION 230900, AND THE COMMISSIONING AGENT. LIBERTIES TAKEN BY DIVISION 230900 ARE ALLOWED AFTER REVIEW AND APPROVAL FROM THE BAS DESIGN TEAM. ALL MODIFICATIONS SHALL BE RECORDED IN THE AS-BUILT DOCUMENTS. DIVISION 230900 SHALL BE REQUIRED SET UP TRENDS AS INDICATED BY THE CONSTRUCTION DOCUMENTS, AND AS REQUESTED BY THE BAS DESIGN AND COMMISSIONING TEAM(S).
- ALL EQUIPMENT SHALL HAVE THE OPTION OF BEING EXCLUDED FROM INDIVIDUAL RESET STRATEGIES BY EQUIPMENT SUMMARY SCHEDULES AND BY EQUIPMENT GRAPHICS.
- ALL EQUIPMENT CONTROLLERS IN THIS PROJECT SHALL BE HARD WIRED. NO WIRELESS SENSORS SHALL BE ALLOWED UNLESS WRITTEN APPROVAL IS GIVEN BY THE OWNER AND EOR AND THE WIRELESS FREQUENCY BANDS ARE COORDINATED WITH THE OWNER.
- AN ALARM SUMMARY SHALL BE CREATED FOR REVIEW OF FACILITY PERSONNEL DAILY. ALARM SUMMARY TO BE CAPABLE OF BEING SORTED BY ALARM LEVEL AND TIME OF ALARMS.
- AN OVERRIDE SUMMARY SHALL BE PROVIDED FOR ALL OVERRIDES AND SHALL BE CAPABLE OF BEING SORTED BY DATE, DURATION, AND LEVEL OF PRIORITY.
- OVERRIDES SHALL BE CAPABLE OF TIMED RESETS.
- CONTROL LOGIC AND COMPONENTS SHALL BE ADJUSTED TO OBTAIN AT A MINIMUM THE FOLLOWING RESULTS.
 - TEMP CONTROL SHALL DEVIATE FROM SET POINT NO MORE THAN 0.2°F WITH PERIODS OF LESS THAN 1 MINUTE.
 - AIRFLOW CONTROL SHALL DEVIATE FROM SET POINT NO MORE THAN 2% OF THE SYSTEM SET POINT, OR SET POINT FOR THAT BRANCH OF SYSTEM, WITHIN A PERIOD OF LESS THAN 5 MINUTES.
 - HYDRONIC FLOW CONTROL SHALL DEVIATE FROM SET POINT NO MORE THAN 2% OF THE SYSTEM SET POINT, OR SET POINT FOR THAT BRANCH OF SYSTEM, WITHIN A PERIOD OF LESS THAN 5 MINUTES.
 - ACTUATORS SHALL NOT OSCILLATE MORE THAN 1% WITHIN A 5 MINUTE PERIOD.
 - VARIABLE FREQUENCY DRIVE COMMANDS SHALL NOT OSCILLATE MORE THAN 1% IN A 5 MINUTE PERIOD.
- ALL GRAPHICS TO DISPLAY APPROPRIATE UNITS FOR VALUES DISPLAYED.

DIRECT DIGITAL CONTROL POINT TYPES

AI	DDC SYSTEM ANALOG INPUT POINT TYPE	SA	GLOBAL DDC SYSTEM ANALOG INPUT POINT TYPE
AO	DDC SYSTEM ANALOG OUTPUT POINT TYPE	GAO	GLOBAL DDC SYSTEM ANALOG OUTPUT POINT TYPE
DI	DDC SYSTEM DIGITAL OR BINARY INPUT POINT TYPE	GDI	GLOBAL DDC SYSTEM DIGITAL OR BINARY INPUT POINT TYPE
DO	DDC SYSTEM DIGITAL OR BINARY OUTPUT POINT TYPE	GDO	GLOBAL DDC SYSTEM DIGITAL OR BINARY OUTPUT POINT TYPE

ANALOG INPUT SENSORS

T	DUCT TEMPERATURE SENSOR; FURNISHED, INSTALLED, AND WIRED BY DIVISION 230900.	T	AVERAGING DUCT TEMPERATURE SENSOR; FURNISHED, INSTALLED, AND WIRED BY DIVISION 230900. REFER TO DETAIL I.
T	OUTSIDE AIR TEMPERATURE SENSOR; FURNISHED, INSTALLED, AND WIRED BY DIVISION 230900.	T	PIPE TEMPERATURE SENSOR; FURNISHED AND WIRED BY DIVISION 230900. THERMAL WELL INSTALLED IN THE PIPING BY DIVISION 23.
VAC P	VACUUM PRESSURE SENSOR; FURNISHED, INSTALLED, AND WIRED BY DIVISION 230900. TAP AND ISOLATION VALVE FURNISHED AND INSTALLED BY DIVISION 23.	AIR P	AIR PRESSURE SENSOR; FURNISHED, INSTALLED, AND WIRED BY DIVISION 230900. TAP AND ISOLATION VALVE FURNISHED AND INSTALLED BY DIVISION 23.
T	ROOM TEMPERATURE SENSOR WITH SETPOINT, OVERRIDE PUSHBUTTON, AND DIGITAL DISPLAY; FURNISHED, INSTALLED, AND WIRED BY DIVISION 230900.	GAS P	GAS PRESSURE SENSOR; FURNISHED, INSTALLED, AND WIRED BY DIVISION 230900. TAP AND ISOLATION VALVE FURNISHED AND INSTALLED BY DIVISION 23. COORDINATE PRESSURE REQUIREMENTS.
T	ROOM TEMPERATURE SENSOR WITH SETPOINT, AND OVERRIDE PUSHBUTTON; FURNISHED, INSTALLED, AND WIRED BY DIVISION 230900.	H	ROOM HUMIDITY SENSOR WITH DIGITAL DISPLAY; FURNISHED, INSTALLED, AND WIRED BY DIVISION 230900.
BSP	BUILDING STATIC PRESSURE SENSOR WITH DIGITAL DISPLAY; FURNISHED, INSTALLED, AND WIRED BY DIVISION 230900. REFER TO DETAIL F.	H	ROOM HUMIDITY SENSOR; FURNISHED, INSTALLED, AND WIRED BY DIVISION 230900.
DPS WM	DIFFERENTIAL PRESSURE SENSOR FOR WET MEDIA WITH DIGITAL DISPLAY; FURNISHED, INSTALLED, AND WIRED BY DIVISION 230900. ISOLATION VALVES AND TAPS IN PIPING BY DIVISION 23.	DSP	DUCT STATIC PRESSURE SENSOR WITH DIGITAL DISPLAY; FURNISHED, INSTALLED AND WIRED BY DIVISION 230900.
H	DUCT RELATIVE HUMIDITY SENSOR; FURNISHED, INSTALLED, AND WIRED BY DIVISION 230900.	DPS	DIFFERENTIAL PRESSURE SENSOR WITH DIGITAL DISPLAY; FURNISHED, INSTALLED AND WIRED BY DIVISION 230900.
T	STRAP ON TEMPERATURE SENSOR; FURNISHED, INSTALLED, AND WIRED BY DIVISION 230900.	PS WM	PRESSURE SENSOR FOR WET MEDIA WITH DIGITAL DISPLAY; FURNISHED, INSTALLED, AND WIRED BY DIVISION 230900. ISOLATION VALVES AND TAPS IN PIPING BY DIVISION 23.
FM LIQ	LIQUID FLOW METER - FURNISHED AND WIRED BY DIVISION 230900. INSTALLED IN PIPING BY DIVISION 23.	CO2	ROOM CARBON DIOXIDE SENSOR WITH DIGITAL DISPLAY; FURNISHED, INSTALLED, AND WIRED BY DIVISION 230900.
RPS	ROOM PRESSURE SENSOR; FURNISHED, INSTALLED, AND WIRED BY DIVISION 230900.	CO2	DUCT CARBON DIOXIDE SENSOR WITH DIGITAL DISPLAY; FURNISHED, INSTALLED, AND WIRED BY DIVISION 230900.
RPM	ROOM PRESSURE MONITOR; FURNISHED, INSTALLED, AND WIRED BY DIVISION 230900.	FM GAS	GAS FLOW METER - FURNISHED AND WIRED BY DIVISION 230900. INSTALLED IN PIPING BY DIVISION 23.
HOOD PROX	FUME HOOD PROXIMITY SENSOR; FURNISHED, INSTALLED, AND WIRED BY DIVISION 230900.	FHC	FUME HOOD CONTROL WITH DISPLAY AND KEYPAD; FURNISHED, INSTALLED, AND WIRED BY DIVISION 230900.

LEGEND

	THREE PHASE POWER WIRING; FURNISHED AND INSTALLED BY DIVISION 26 (PWR)
	SINGLE PHASE POWER WIRING; FURNISHED AND INSTALLED BY DIVISION 26 (PWR)
	CONTROL AND INTERLOCK WIRING, FURNISHED AND INSTALLED BY DIVISION 230900 (ILK)
	EMS ETHERNET LAN COMMUNICATION WIRING, FURNISHED AND INSTALLED BY DIVISION 230900 (EMS LAN)
	EMS SUB-NETWORK COMMUNICATION WIRING, FURNISHED AND INSTALLED BY DIVISION 230900 (EMS SN)
	ROOM SENSOR COMMUNICATION WIRING, FURNISHED AND INSTALLED BY DIVISION 230900 (EMS RS)
	COMMUNICATION WIRING FOR OTHER HVAC SYSTEMS, FURNISHED AND INSTALLED BY DIVISION 230900 (EMS OTH)
	PNEUMATIC CONTROL TUBING, FURNISHED AND INSTALLED BY DIVISION 230900
	CONTROL PIPING, FURNISHED AND INSTALLED BY DIVISION 230900
	LOCAL AREA NETWORK DATA PORT DROP, FURNISHED AND INSTALLED BY DIVISION 26.
NC	NORMALLY CLOSED - POWERED OPEN
NO	NORMALLY OPEN - POWERED CLOSED
	NORMALLY CLOSED - POWERED OPEN RELAY CONTACT
	NORMALLY OPEN - POWERED CLOSED RELAY CONTACT
TFD	TO FLOOR DRAIN
	PNEUMATIC CONTROL SUPPLY AIR CONNECTION
E-PWR	EMERGENCY (ESSENTIAL) ELECTRICAL POWER

CONTROL SYMBOL LEGEND

TLL	LOW LIMIT TEMPERATURE SWITCH WITH MANUAL RESET; FURNISHED, INSTALLED, AND WIRED BY DIVISION 230900. DPDT SWITCH FOR HARDWIRE INTERLOCK TO FANS AND DDC MONITORING. REFER TO DETAIL H.	HSL	HIGH STATIC PRESSURE LIMIT SWITCH WITH MANUAL RESET; FURNISHED, INSTALLED, AND WIRED BY DIVISION 230900. DPDT SWITCH FOR HARDWIRE INTERLOCK TO FANS AND DDC MONITORING. ORIENT FOR STATIC PRESSURE SENSING.
OCC	OCCUPANCY SENSOR; FURNISHED AND WIRED BY DIVISION 230900. INSTALLED IN LIGHTING CIRCUIT BY DIVISION 26.	CSR	CURRENT SENSING RELAY; FURNISHED, INSTALLED, AND WIRED BY DIVISION 230900.
ES	END SWITCH; FURNISHED, INSTALLED AND WIRED BY DIVISION 230900 UNLESS OTHERWISE NOTED. SHOWN ON THE DRAWINGS, OR SPECIFIED.	FIL DP SW	FILTER DIFFERENTIAL PRESSURE SWITCH; FURNISHED, INSTALLED, AND WIRED BY DIVISION 230900.
WFS	WATER FLOW SWITCH SPECIFIED TO BE FURNISHED WITH HVAC EQUIPMENT; INSTALLED BY DIVISION 230900; WIRED BY DIVISION 230900.	LDP SW WM	DIFFERENTIAL PRESSURE SWITCH FOR WET MEDIA; FURNISHED, INSTALLED, AND WIRED BY DIVISION 230900. PRESSURE TAPS IN PIPING BY DIVISION 23.
RM OCC	WALL MOUNTED ROOM OCCUPANCY SWITCH; FURNISHED, INSTALLED, AND WIRED BY DIVISION 230900.	RM OCC	CEILING MOUNTED ROOM OCCUPANCY SWITCH; FURNISHED, INSTALLED, AND WIRED BY DIVISION 230900.
MS	MOISTURE SENSOR; FURNISHED, INSTALLED, AND WIRED BY DIVISION 230900.	PE SW	PRESSURE TO ELECTRIC SWITCH; FURNISHED, INSTALLED, PNEUMATIC PIPING, AND ELECTRICAL WIRING BY DIVISION 230900.
KS	KEYED SWITCH; FURNISHED, INSTALLED AND WIRED BY DIVISION 230900.	EFS	ELECTRONIC WATER FLOW SENSOR; FURNISHED, AND WIRED BY DIVISION 230900; INSTALLED IN PIPING BY DIVISION 23.

OUTPUT DEVICES

VA	CONTROL VALVE (2-WAY) WITH ELECTRIC OR ELECTRONIC ACTUATOR; FURNISHED AND WIRED BY DIVISION 230900. INSTALLED IN PIPING BY DIVISION 23.	VA ES	CONTROL VALVE (2-WAY) WITH ELECTRONIC ACTUATOR AND INTEGRAL END SWITCH; FURNISHED AND WIRED BY DIVISION 230900. INSTALLED IN PIPING BY DIVISION 23.
VA	CONTROL VALVE (3-WAY) ELECTRIC OR ELECTRONIC; FURNISHED AND WIRED BY DIVISION 230900. INSTALLED IN PIPING BY DIVISION 23.	VA ES	CONTROL VALVE (3-WAY) WITH ELECTRONIC ACTUATOR AND INTEGRAL END SWITCH; FURNISHED AND WIRED BY DIVISION 230900; INSTALLED IN PIPING BY DIVISION 23.
VA	BUTTERFLY CONTROL VALVE (2-WAY) WITH ELECTRONIC ACTUATOR; FURNISHED AND WIRED BY DIVISION 230900. INSTALLED IN PIPING BY DIVISION 23.	VA ES	BUTTERFLY CONTROL VALVE (2-WAY) WITH ELECTRONIC ACTUATOR AND INTEGRAL END SWITCH; FURNISHED AND WIRED BY DIVISION 230900; INSTALLED IN PIPING BY DIVISION 23.
VA	BUTTERFLY CONTROL VALVE (3-WAY) WITH ELECTRONIC ACTUATOR; FURNISHED AND WIRED BY DIVISION 230900. INSTALLED IN PIPING BY DIVISION 23.	VA ES	BUTTERFLY CONTROL VALVE (3-WAY) WITH ELECTRONIC ACTUATOR AND INTEGRAL END SWITCH; FURNISHED AND WIRED BY DIVISION 230900; INSTALLED IN PIPING BY DIVISION 23.
DA	DAMPER ACTUATOR; FURNISHED, INSTALLED, AND WIRED BY DIVISION 230900 UNLESS OTHERWISE NOTED ON DRAWINGS OR IN SPECIFICATIONS.	DA ES	DAMPER ACTUATOR WITH INTEGRAL END SWITCH(ES); FURNISHED, INSTALLED, AND WIRED BY DIVISION 230900 UNLESS OTHERWISE NOTED ON DRAWINGS OR IN SPECIFICATIONS.
SDA	SMOKE DAMPER ACTUATOR(S) FURNISHED AND INSTALLED BY DIVISION 23. REFER TO DETAIL G.	SDA ES	SMOKE DAMPER ACTUATOR(S) WITH INTEGRAL END SWITCH; FURNISHED AND INSTALLED BY DIVISION 23. REFER TO DETAIL G.
FSDA	FIRE/SMOKE DAMPER ACTUATOR(S); FURNISHED AND INSTALLED BY DIVISION 23. REFER TO DETAIL G.	FSDA ES	FIRE/SMOKE DAMPER ACTUATOR(S) WITH INTEGRAL END SWITCH; FURNISHED AND INSTALLED BY DIVISION 23. REFER TO DETAIL G.

EPT	ELECTRIC TO PRESSURE TRANSDUCER; FURNISHED, INSTALLED, PIPED, AND WIRED BY DIVISION 230900.	AFMS ATC	AIR FLOW MEASURING STATION; FURNISHED AND WIRED BY DIVISION 230900; INSTALLED BY DIVISION 23.
AFMS ATC	AIR FLOW MEASURING STATION WITH INTEGRAL CONTROL DAMPER; FURNISHED AND WIRED BY DIVISION 230900; INSTALLED BY THE DIVISION 23.		EXHAUST AIRFLOW MEASURING DEVICE; FURNISHED AND INSTALLED BY DIVISION 23; DIFFERENTIAL PRESSURE SENSOR FURNISHED AND INSTALLED BY DIVISION 230900.
FEP	FIELD EQUIPMENT PANEL (FEP); FURNISHED AND INSTALLED BY DIVISION 230900. POWER WIRING TO FEP BY DIVISION 26.	DDC	DIRECT DIGITAL CONTROL PANEL (DDC); FURNISHED AND INSTALLED BY DIVISION 230900. POWER WIRING TO DDC PANEL BY DIVISION 26.
	FILTER GAGE; FURNISHED WITH FILTERS; INSTALLATION AND INSTRUMENT PIPING BY DIVISION 230900.		BALL-IN-TUBE VISUAL OFFSET INDICATOR; FURNISHED AND INSTALLED BY DIVISION 230900.

OTHER CONTROL DEVICES

CONTROL DEVICES FURNISHED BY OTHER TRADES:

HHL EQ	HUMIDITY HIGH LIMIT SENSOR; FURNISHED WITH THE STEAM HUMIDIFIER; INSTALLED AND WIRED BY DIVISION 230900.		PLENUM FAN INLET BELL HOUSING AIRFLOW MEASURING STATION FURNISHED AND INSTALLED BY THE FAN MANUFACTURER.
SV EQ	EMERGENCY GENERATOR SOLENOID VALVE; FURNISHED AND INSTALLED BY THE FUEL OIL SYSTEM SUPPLIER, WIRED BY DIVISION 23.		CENTRIFUGAL FAN INLET BELL HOUSING AIRFLOW MEASURING STATION FURNISHED AND INSTALLED BY THE FAN MANUFACTURER.
AFMS EQ	AIR FLOW MEASURING STATION; FURNISHED AND INSTALLED BY THE AIR HANDLING UNIT MANUFACTURER. WIRING FROM THE AFMS TO THE DDC PANEL BY DIVISION 230900. POWER WIRING BY DIVISION 26.	AFMS SM	AIR FLOW MEASURING STATION; FURNISHED, AND INSTALLED BY DIVISION 23. WIRING FROM THE AFMS TO THE DDC PANEL BY DIVISION 230900. POWER WIRING BY DIVISION 26.
VA EQ	CONTROL VALVE (2-WAY) WITH ELECTRIC OR ELECTRONIC ACTUATOR; FURNISHED WITH EQUIPMENT (EQ); WIRED BY DIVISION 230900; INSTALLED IN PIPING BY DIVISION 23.	NC	CONTROL DAMPER; FURNISHED AND INSTALLED BY DIVISION 230900. DAMPER ACTUATOR FURNISHED INSTALLED AND WIRED BY DIVISION 230900.
AFMS EQ	AIR FLOW MEASURING STATION WITH INTEGRAL CONTROL DAMPER; FURNISHED AND INSTALLED BY THE AIR HANDLING UNIT MANUFACTURER. WIRING TO DDC SYSTEM BY DIVISION 230900.	AFMS SM	AIR FLOW MEASURING STATION WITH INTEGRAL CONTROL DAMPER; FURNISHED AND INSTALLED BY DIVISION 23.
FAR SMK	FIRE ALARM PROGRAMMABLE RELAY (FAR) FOR SMOKE PURGE OPERATION (SMK); FURNISHED, INSTALLED, AND PROGRAMMED BY DIVISION 28. FAR SHALL BE LOCATED IN SAME ROOM AS HVAC EQUIPMENT SERVED PER NFPA. ALL WIRING FROM FAR TO FIRE ALARM SYSTEM BY DIVISION 28. INTERLOCK WIRING FROM FAR TO ATC PANEL BY DIVISION 230900.	FAR	FIRE ALARM PROGRAMMABLE RELAY (FAR); FURNISHED, INSTALLED, AND PROGRAMMED BY DIVISION 28. FAR SHALL BE LOCATED IN SAME ROOM AS HVAC EQUIPMENT SERVED PER NFPA. ALL WIRING FROM FAR TO FIRE ALARM SYSTEM BY DIVISION 28. INTERLOCK WIRING FROM FAR TO ATC PANEL BY DIVISION 230900.
DSD	DUCT MOUNTED SMOKE DETECTOR(S); FURNISHED, INSTALLED, AND WIRED BY DIVISION 28 AS PART OF THE FIRE ALARM SYSTEM.		

ABBREVIATIONS

HWS	HEATING WATER SUPPLY	MA	MIXED AIR
HWR	HEATING WATER RETURN	MAT	MIXED AIR TEMPERATURE
DHWS	DISTRICT HEATING WATER SUPPLY	MAH	MIXED AIR HUMIDITY
DHWR	DISTRICT HEATING WATER RETURN	DAT	DISCHARGE AIR TEMPERATURE
CWS	CONDENSER SUPPLY	DAH	DISCHARGE AIR HUMIDITY
CWR	CONDENSER RETURN	DB	DRY BULB
CHS	CHILLED WATER SUPPLY	WB	WET BULB
CHR	CHILLED WATER RETURN	RH	RELATIVE HUMIDITY
DCHS	DISTRICT CHILLED WATER SUPPLY	ILK	INTERLOCK
DCHR	DISTRICT CHILLED WATER RETURN	AHU	AIR HANDLING UNIT
SETP.	SETPOINT	BCOO	BLOWER COIL UNIT COOLING ONLY
SP	STATIC PRESSURE	BCU	BLOWER COIL UNIT
DP	DIFFERENTIAL PRESSURE	CVET	CONSTANT VOLUME EXHAUST TERMINAL
OA	OUTSIDE AIR	CVRT	CONSTANT VOLUME RETURN TERMINAL
OAF	OUTSIDE AIRFLOW	CVST	CONSTANT VOLUME SUPPLY TERMINAL
OAT	OUTSIDE AIR TEMPERATURE (DRY BULB)	FCOO	FAN COIL UNIT COOLING ONLY
OAH	OUTSIDE AIR HUMIDITY	FCHU	FAN COIL UNIT HEATING ONLY
RA	RETURN AIR	FCU	FAN COIL UNIT
RAF	RETURN AIRFLOW	IUH	INDUCTION UNIT HEATER
RAT	RETURN AIR TEMPERATURE	PFST	PARALLEL FAN SUPPLY TERMINAL
RAH	RETURN AIR HUMIDITY	SFST	SERIES FAN SUPPLY TERMINAL
SA	SUPPLY AIR	UH	UNIT HEATER
SAF	SUPPLY AIRFLOW	VVET	VARIABLE VOLUME EXHAUST TERMINAL
SAT	SUPPLY AIR TEMPERATURE	VVRT	VARIABLE VOLUME RETURN TERMINAL
		VVST	VARIABLE VOLUME SUPPLY TERMINAL

SHEET ABBREVIATIONS

SD	STANDARD DETAIL
SS	STANDARD SYSTEM
SME	STANDARD MATERIALS AND EQUIPMENT

GENERAL NOTE: THESE STANDARD SYSTEM DIAGRAMS AND SEQUENCES ARE DEVELOPED AS THE BASIS FOR DESIGN AND MAY NOT BE DIRECTLY APPLICABLE AS IS DUE TO EXISTING EQUIPMENT OR SYSTEM CAPABILITIES, OR DUE TO SYSTEM OR EQUIPMENT ARRANGEMENTS. IT IS THE RESPONSIBILITY OF THE ENGINEER OF RECORD TO MODIFY THESE DOCUMENTS AS REQUIRED FOR THE SPECIFIC CONDITIONS OF A PROJECT. REFER TO THE RFP DOCUMENTS FOR MODIFICATION PROCEDURES.

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FINAL BID SET
CORPORATE SEAL
ENGINEER SEAL

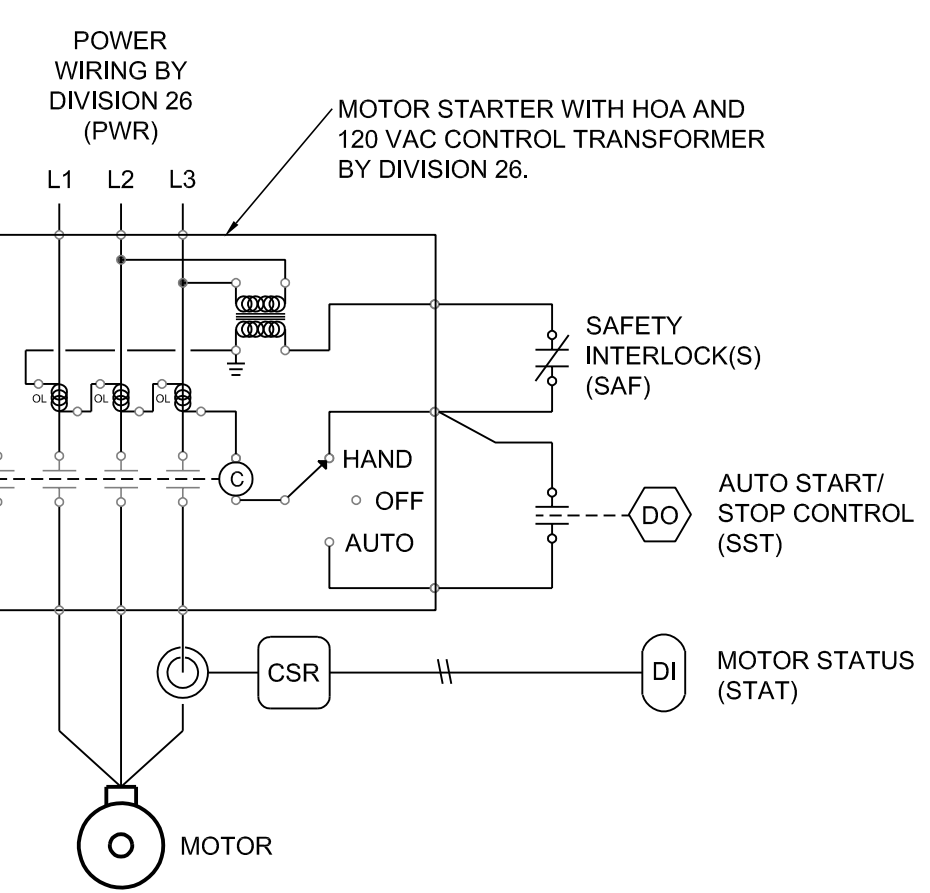
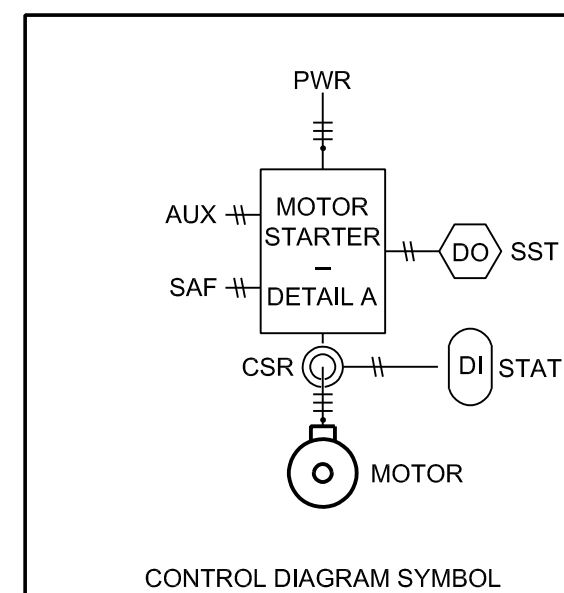
IDIQ CONTROL DRAWINGS
UNIVERSITY OF ARKANSAS
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MARK	DATE	DESCRIPTION
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PROJECT NUMBER:	04-18-0072	
SHEET TITLE:		
CONTROLS LEGEND		
SHEET NUMBER: ATC0.00		

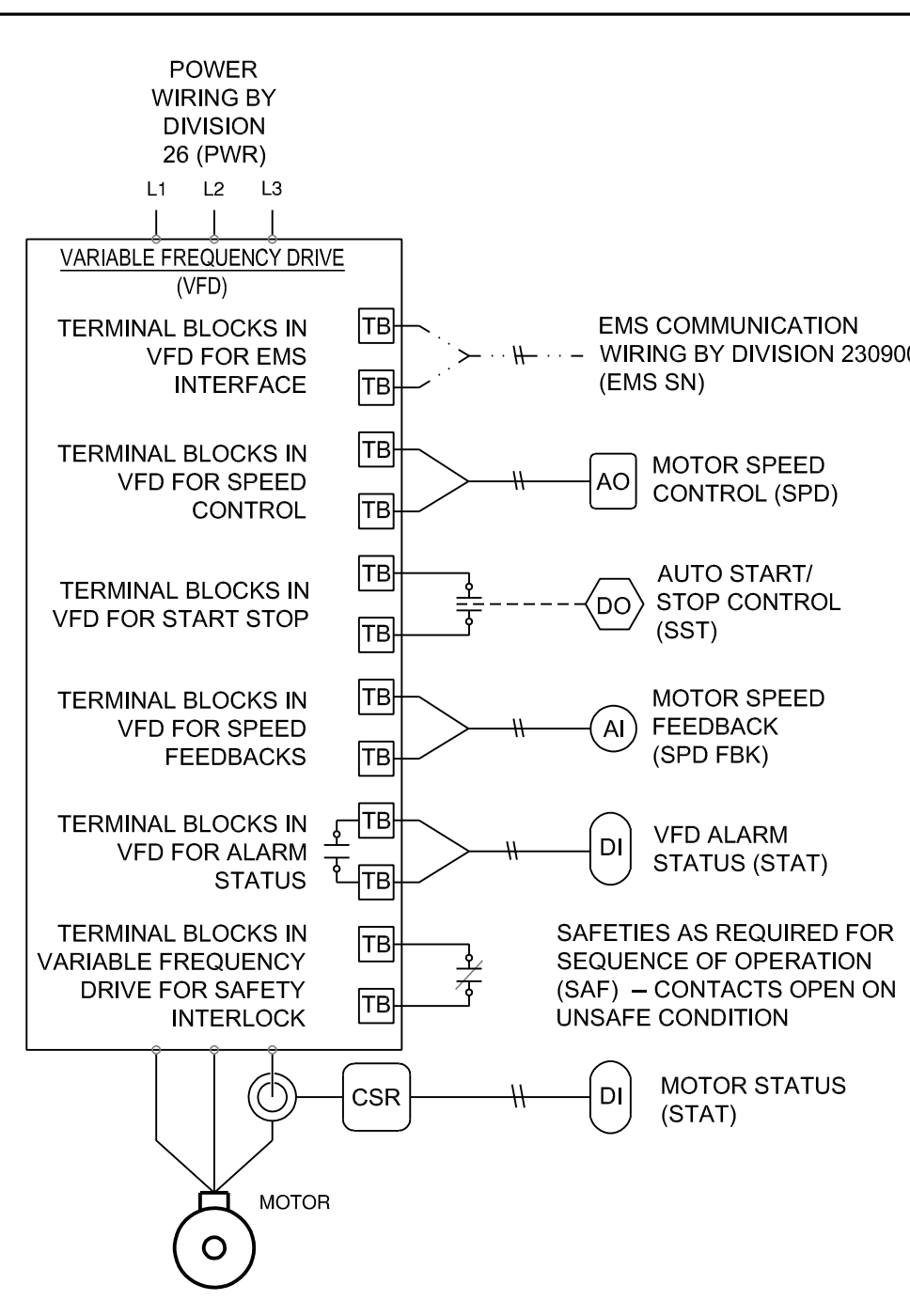
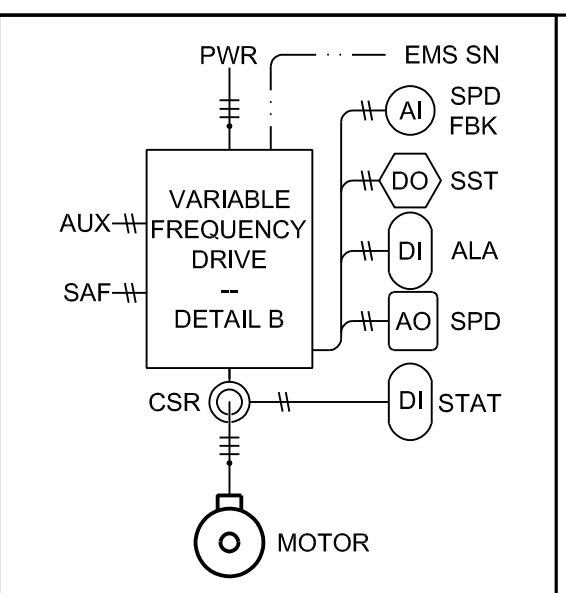
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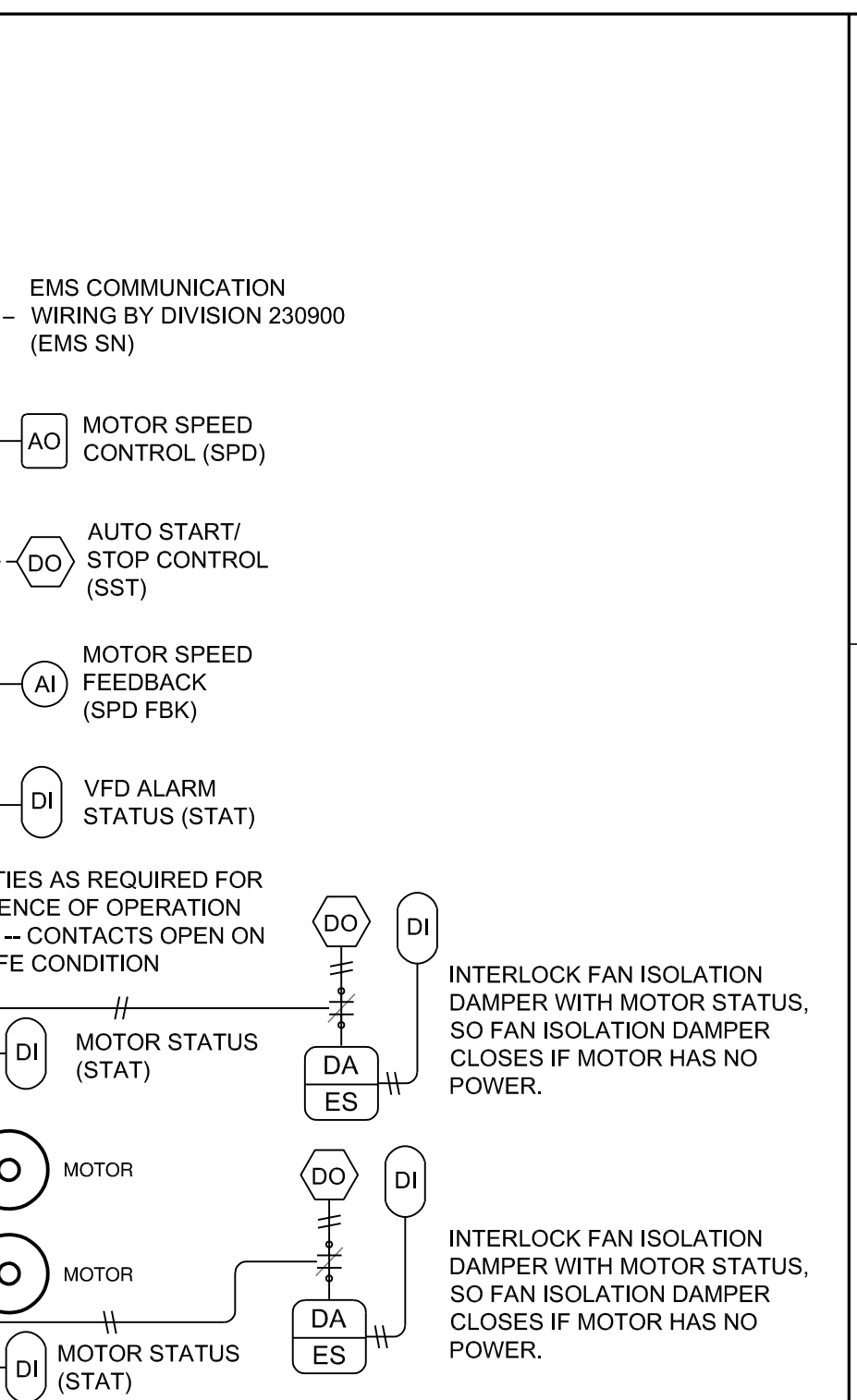
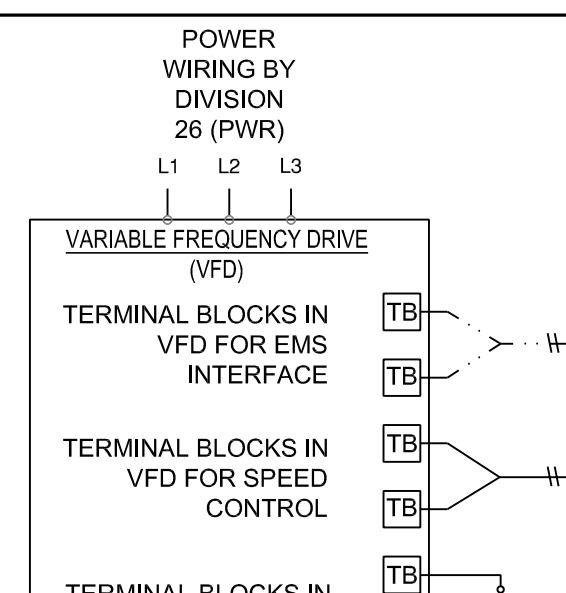
IDIQ CONTROL DRAWINGS
UNIVERSITY OF ARKANSAS
FAYETTEVILLE, ARKANSAS



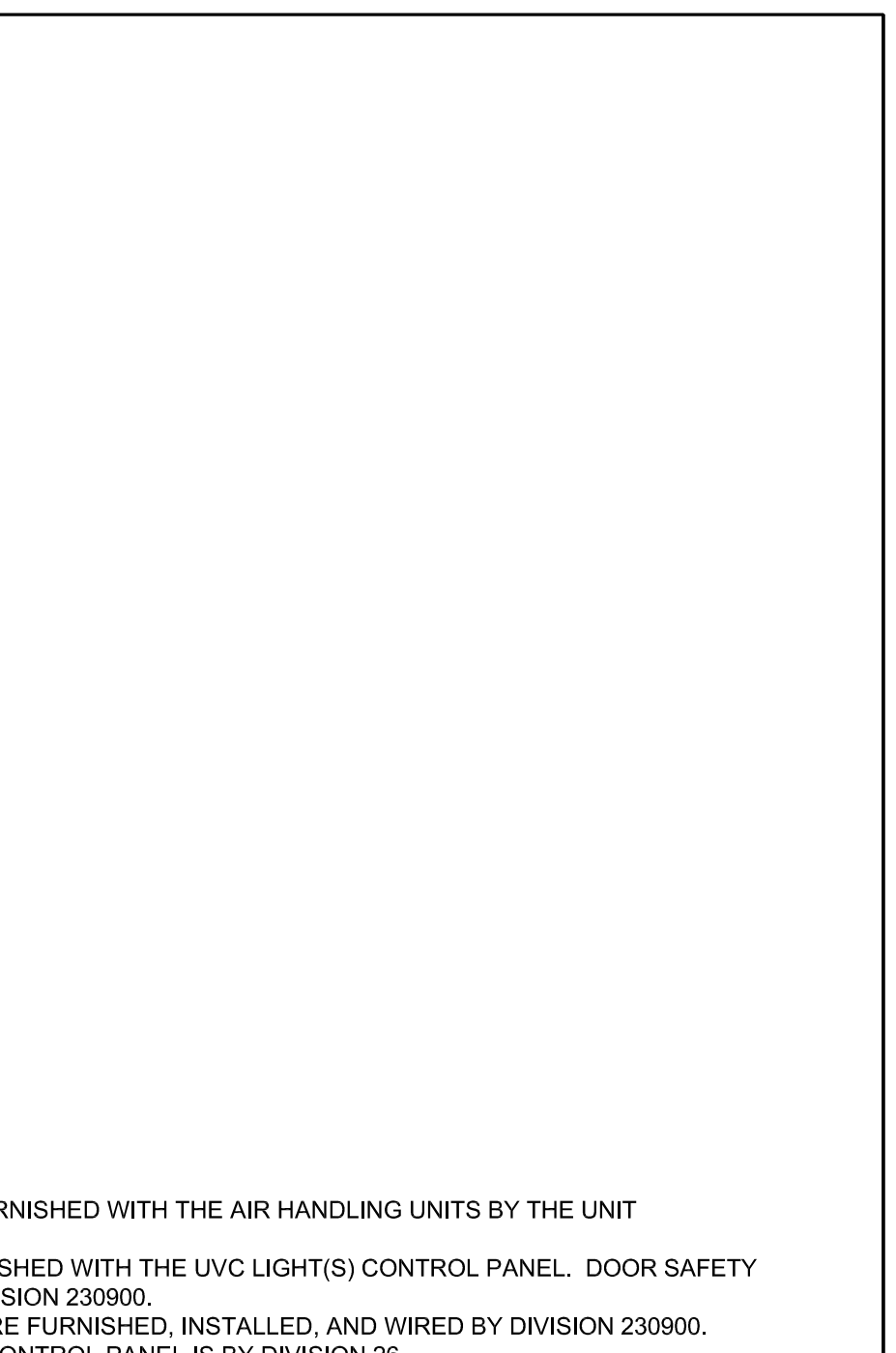
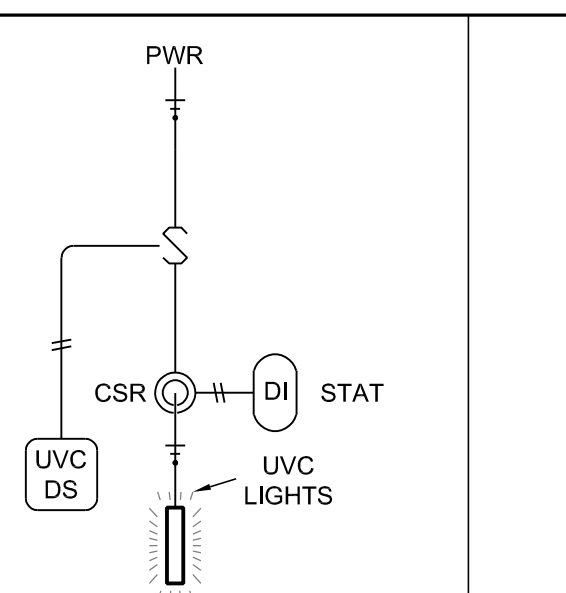
A DETAIL: MOTOR STARTER INTERLOCK DETAIL
NOT TO SCALE



B DETAIL: VARIABLE FREQUENCY DRIVE INTERLOCK
NOT TO SCALE

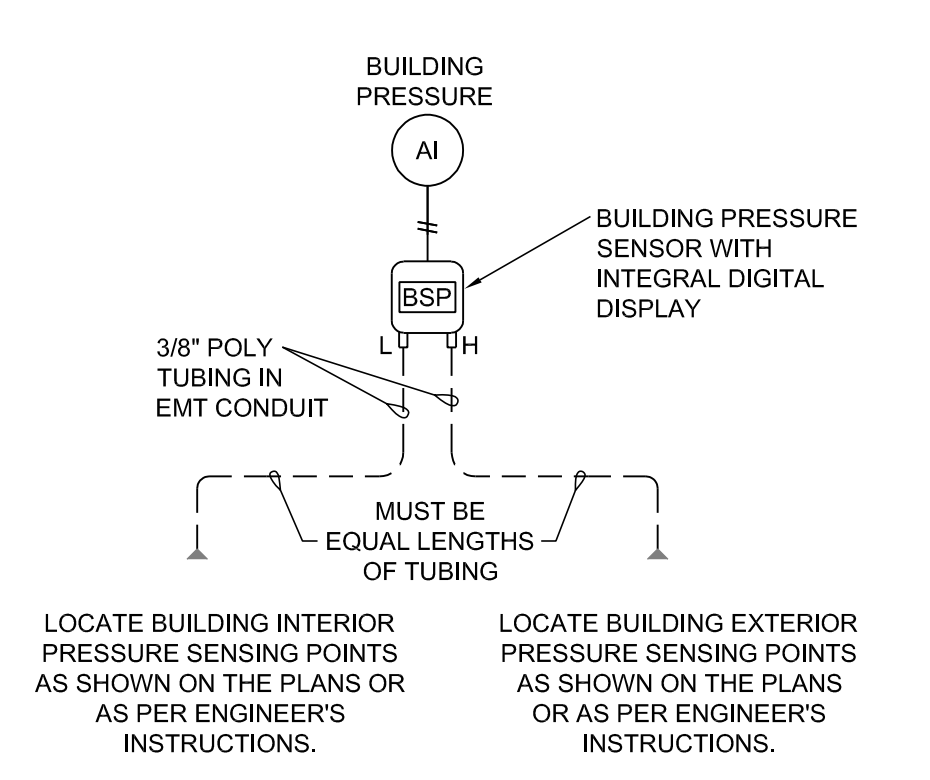
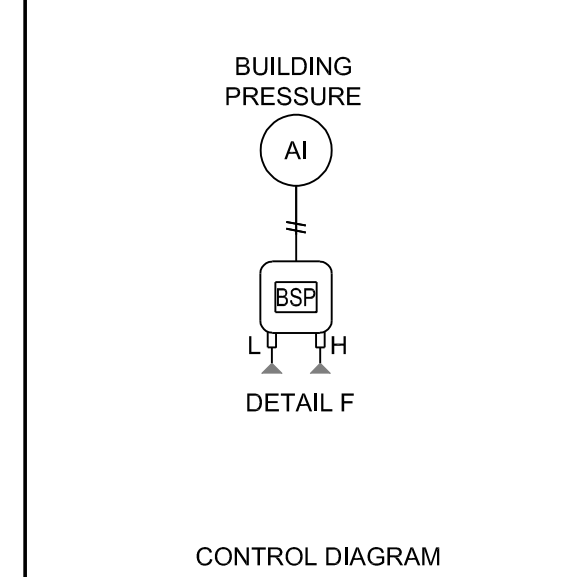


C DETAIL: AHU FAN CONTROL DETAIL
NOT TO SCALE



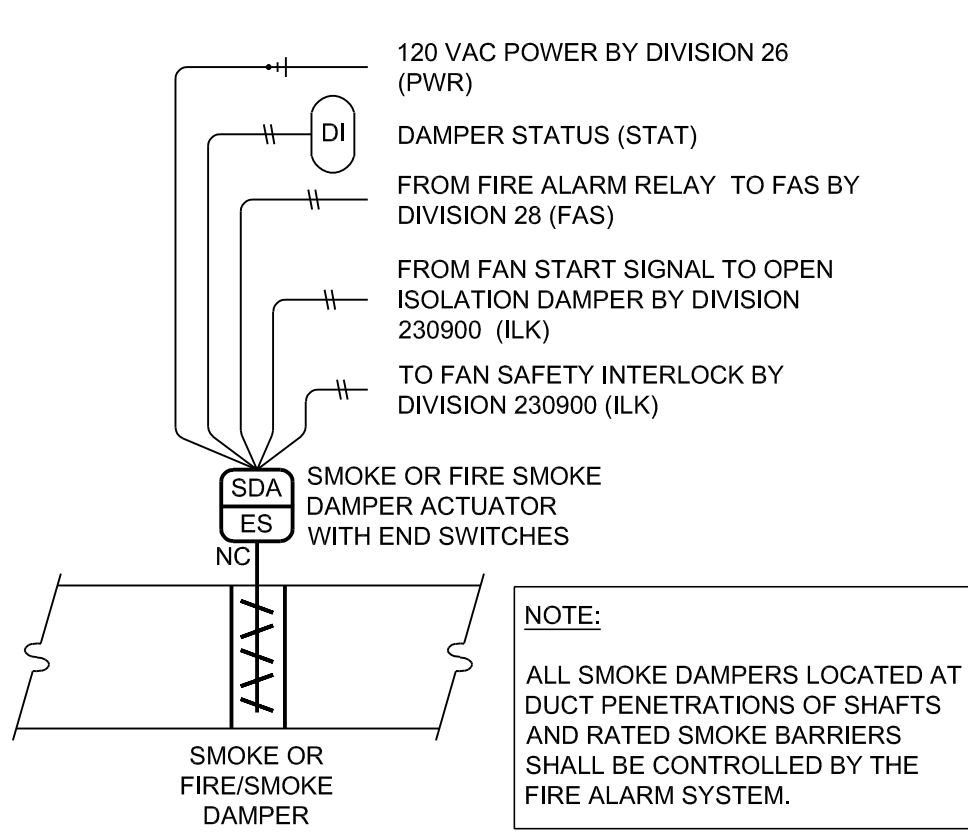
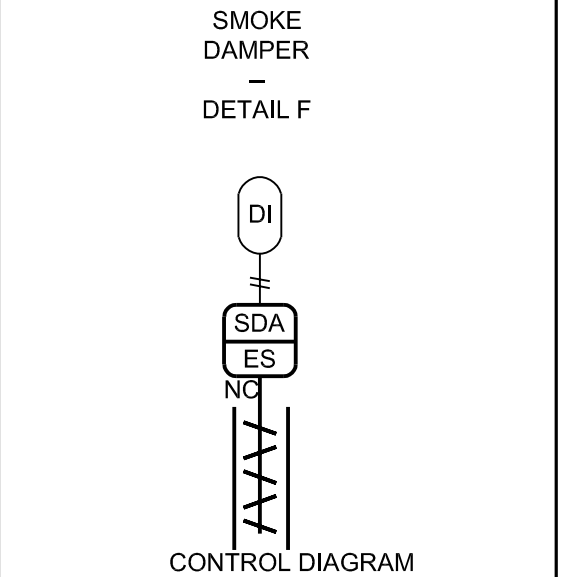
D DETAIL: UVC LIGHT(S) AND CONTROL PANEL
NOT TO SCALE

- NOTES:
- UVC LIGHT(S) AND CONTROL PANEL ARE FURNISHED WITH THE AIR HANDLING UNITS BY THE UNIT MANUFACTURERS.
 - DOOR SAFETY INTERLOCK SWITCH IS FURNISHED WITH THE UVC LIGHT(S) CONTROL PANEL. DOOR SAFETY INTERLOCK IS MOUNTED AND WIRED BY DIVISION 230900.
 - CURRENT SENSING RELAY (CSR) RELAYS ARE FURNISHED, INSTALLED, AND WIRED BY DIVISION 230900.
 - POWER WIRING TO THE UVC LIGHT(S) AND CONTROL PANEL IS BY DIVISION 26.



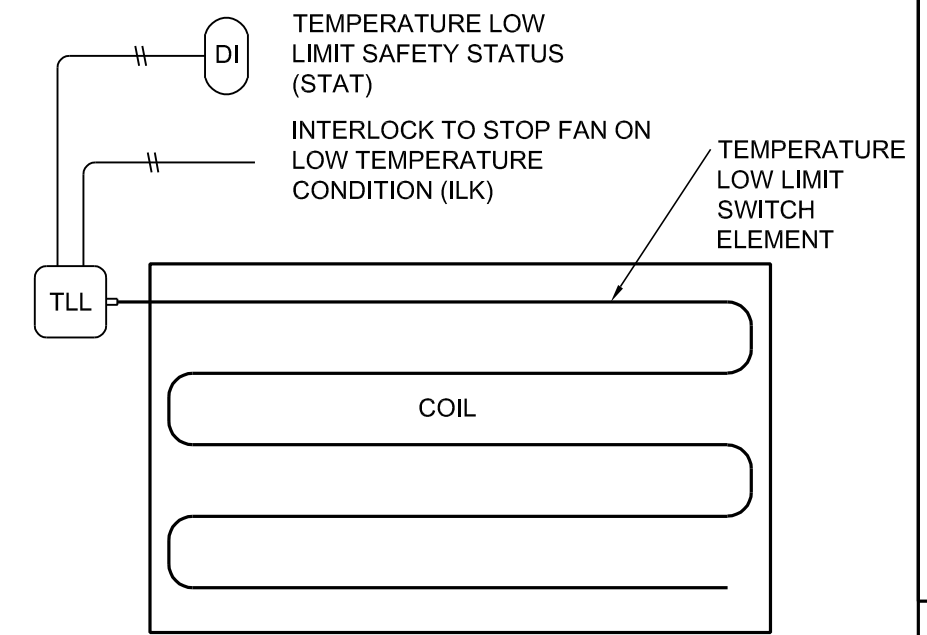
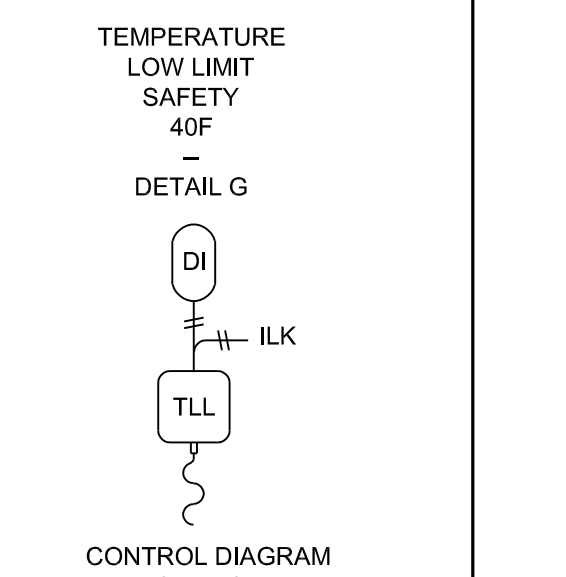
- NOTES:
- LOCATE BUILDING PRESSURE SENSOR TO ALLOW EQUAL LENGTHS OF TUBING TO BOTH INTERIOR AND EXTERIOR SENSING LOCATIONS.
 - CAPPED TEES ON DIFFERENTIAL PRESSURE TEST PORTS FURNISHED AND INSTALLED BY DIVISION 230900.

E DETAIL: BUILDING PRESSURE SENSOR
NOT TO SCALE



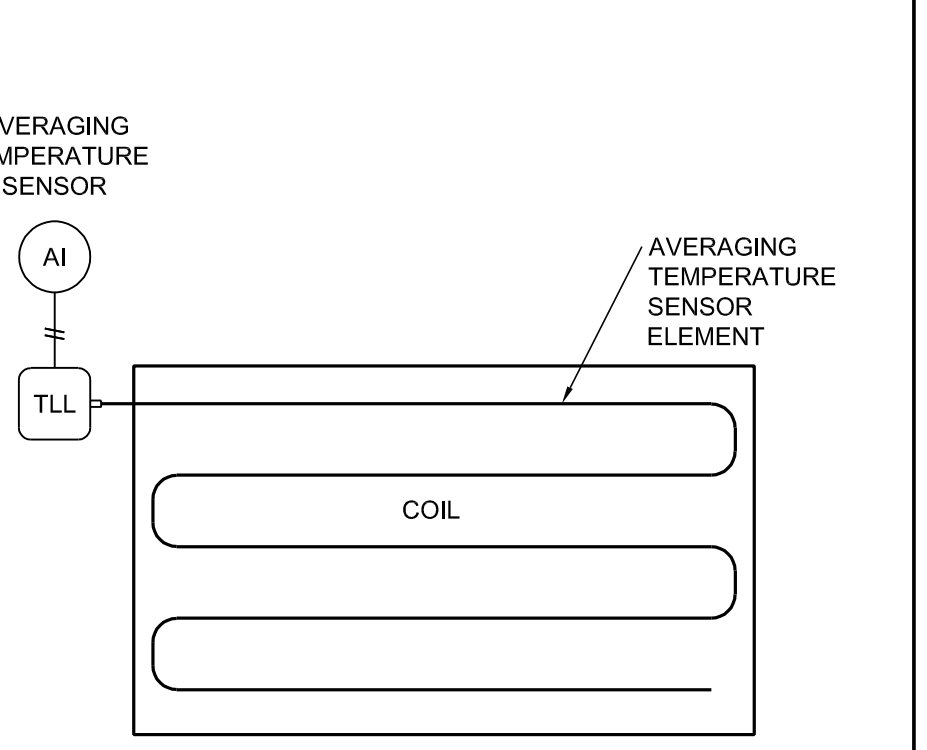
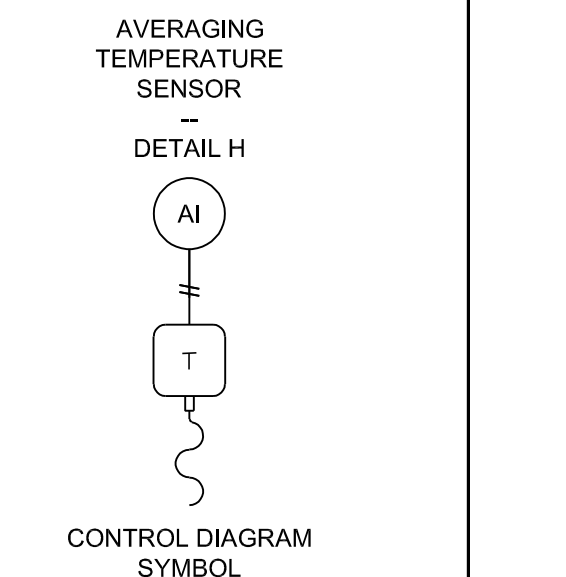
- NOTES:
- SMOKE OR FIRE/SMOKE DAMPER(S) ARE FURNISHED BY DIVISION 23 WITH ELECTRONIC SPRING RETURN TO CLOSED OR OPEN ACTUATOR(S) AND END SWITCH(ES).
 - SMOKE OR FIRE SMOKE DAMPER(S) ARE INSTALLED BY DIVISION 23.
 - FIRE ALARM RELAY(S) ARE FURNISHED AND INSTALLED BY DIVISION 28 AT THE SMOKE OR FIRE/SMOKE DAMPER ACTUATOR(S).
 - INTERLOCK WIRING FROM THE FIRE ALARM RELAY TO THE SMOKE OR FIRE/SMOKE DAMPER ACTUATOR(S) IS BY DIVISION 28.
 - WHERE SMOKE OR FIRE/SMOKE DAMPERS ARE USED AS ISOLATION DAMPERS FOR AIR HANDLING UNITS, THE INTERLOCK WIRING FROM THE FAN START SIGNAL TO OPEN THE ISOLATION SMOKE OR FIRE/SMOKE DAMPERS IS BY DIVISION 230900.
 - INTERLOCK WIRING FROM THE SMOKE OR FIRE/SMOKE DAMPER ACTUATOR END SWITCH(ES) TO THE FAN SAFETY CIRCUIT(S) IS BY DIVISION 230900.

F DETAIL: SMOKE OR FIRE/SMOKE DAMPER INTERLOCK
NOT TO SCALE



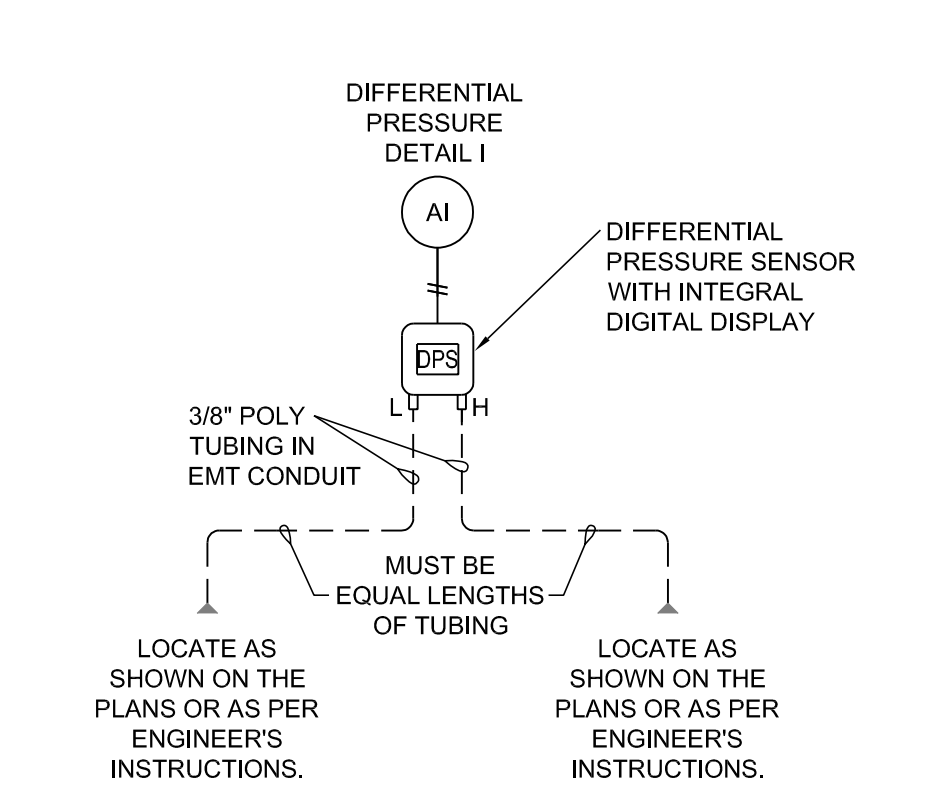
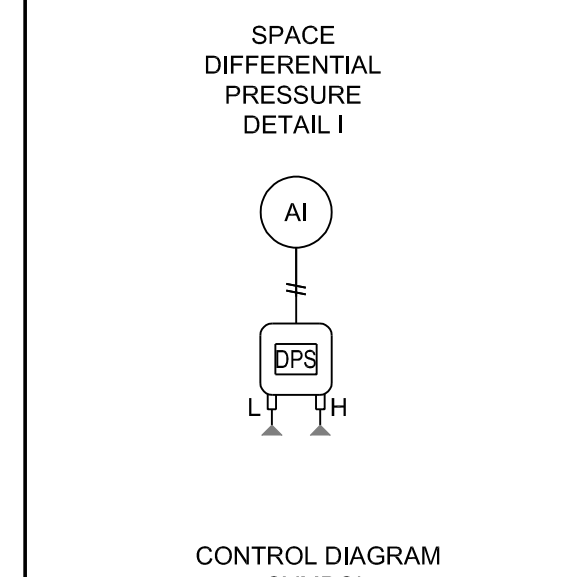
- NOTES:
- A MANUAL RESET TEMPERATURE LOW LIMIT (TLL) SWITCH WITH DPST OR DPDT CONTACTS FOR HARDWARE INTERLOCK TO FANS AND DDC MONITORING SHALL BE PROVIDED. CONTACTS SHALL INCLUDE OPEN ON ALARM CONTACT FOR FAN SHUTDOWN AND A CLOSE ON ALARM CONTACT FOR ALARM STATUS.
 - TEMPERATURE LOW LIMIT SHALL HAVE ONE FOOT OF ELEMENT LENGTH PER ONE SQUARE FOOT OF COIL SURFACE EVENLY DISTRIBUTED OVER THE COIL SURFACE AS SHOWN IN DETAIL.
 - MULTIPLE TEMPERATURE LOW LIMIT SWITCHES MAY BE REQUIRED TO MEET THE ONE FOOT OF ELEMENT PER ONE SQUARE FOOT OF COIL SURFACE AND IN THIS EVENT THE MULTIPLE TEMPERATURE LOW LIMIT SWITCHES SHALL BE WIRED IN SERIES FOR FAN SHUTDOWN AND WIRED IN PARALLEL FOR ALARM STATUS.
 - INTERLOCK WIRING FROM THE TEMPERATURE LOW LIMIT SWITCH TO THE FAN CONTROLLER IS BY DIVISION 230900.
 - TEMPERATURE LOW LIMIT SWITCH SHALL BE INSTALLED PER MANUFACTURER RECOMMENDATIONS AT REGULAR INTERVALS NOTED TO COVER THE ENTIRE COIL.
 - TEMPERATURE LOW LIMIT (TLL) SWITCHES SHALL HAVE SETPOINT ADJUSTMENT AND MANUAL RESET AT THE SWITCH.
 - TEMPERATURE LOW LIMIT SWITCH SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS IN A MANNER TO PREVENT THE ELEMENT FROM BEING DAMAGED FROM VIBRATION.

G DETAIL: TEMPERATURE LOW LIMIT SWITCH
NOT TO SCALE



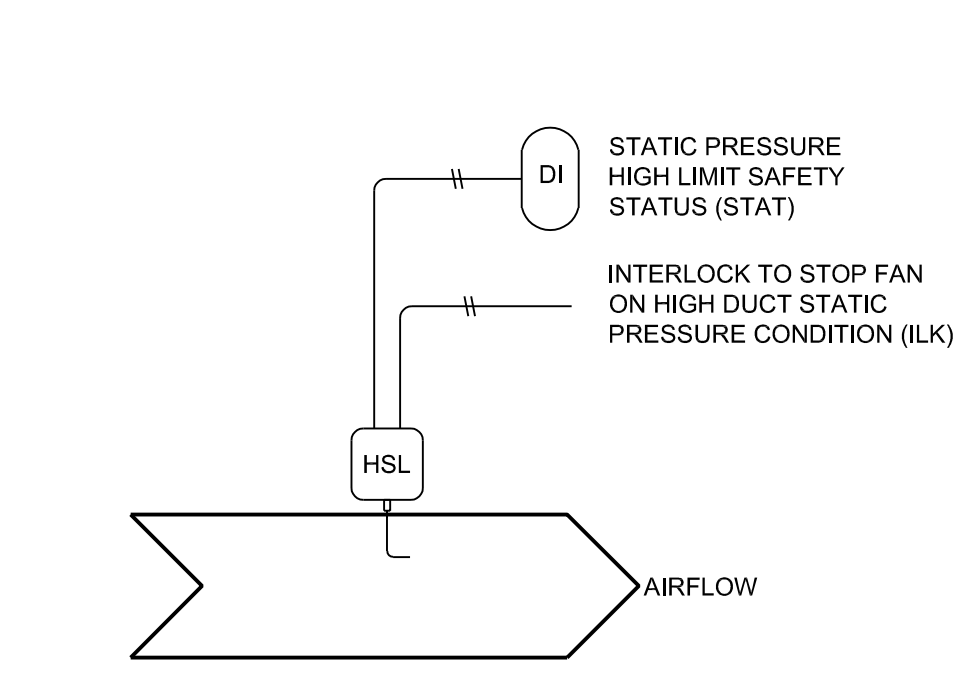
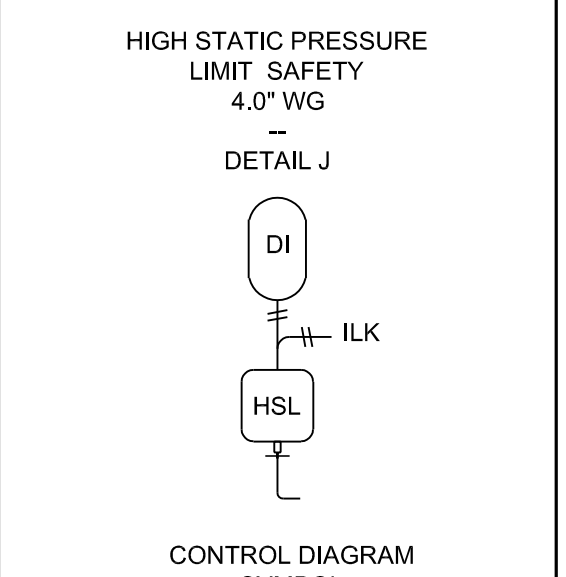
- NOTES:
- AVERAGING TEMPERATURE SENSOR SHALL HAVE ONE FOOT OF ELEMENT LENGTH PER THREE SQUARE FOOT OF COIL SURFACE EVENLY DISTRIBUTED OVER THE COIL SURFACE AS SHOWN IN DETAIL.
 - MULTIPLE AVERAGING TEMPERATURE SENSORS MAY BE REQUIRED TO MEET THE ONE FOOT OF ELEMENT PER TWO SQUARE FOOT OF COIL SURFACE AND IN THIS EVENT THE MULTIPLE AVERAGING TEMPERATURE SENSORS SHALL BE WIRED TO PROVIDE THE CORRECT AVERAGE TEMPERATURE TO THE DDC SYSTEM.
 - AVERAGING TEMPERATURE SENSORS SHALL BE INSTALLED PER MANUFACTURER RECOMMENDATIONS AT REGULAR INTERVALS TO COVER THE ENTIRE COIL.
 - AVERAGING TEMPERATURE SENSORS SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS IN A MANNER TO PREVENT THE ELEMENT FROM BEING DAMAGED FROM VIBRATION.

H DETAIL: DUCT AVERAGING TEMPERATURE SENSOR
NOT TO SCALE



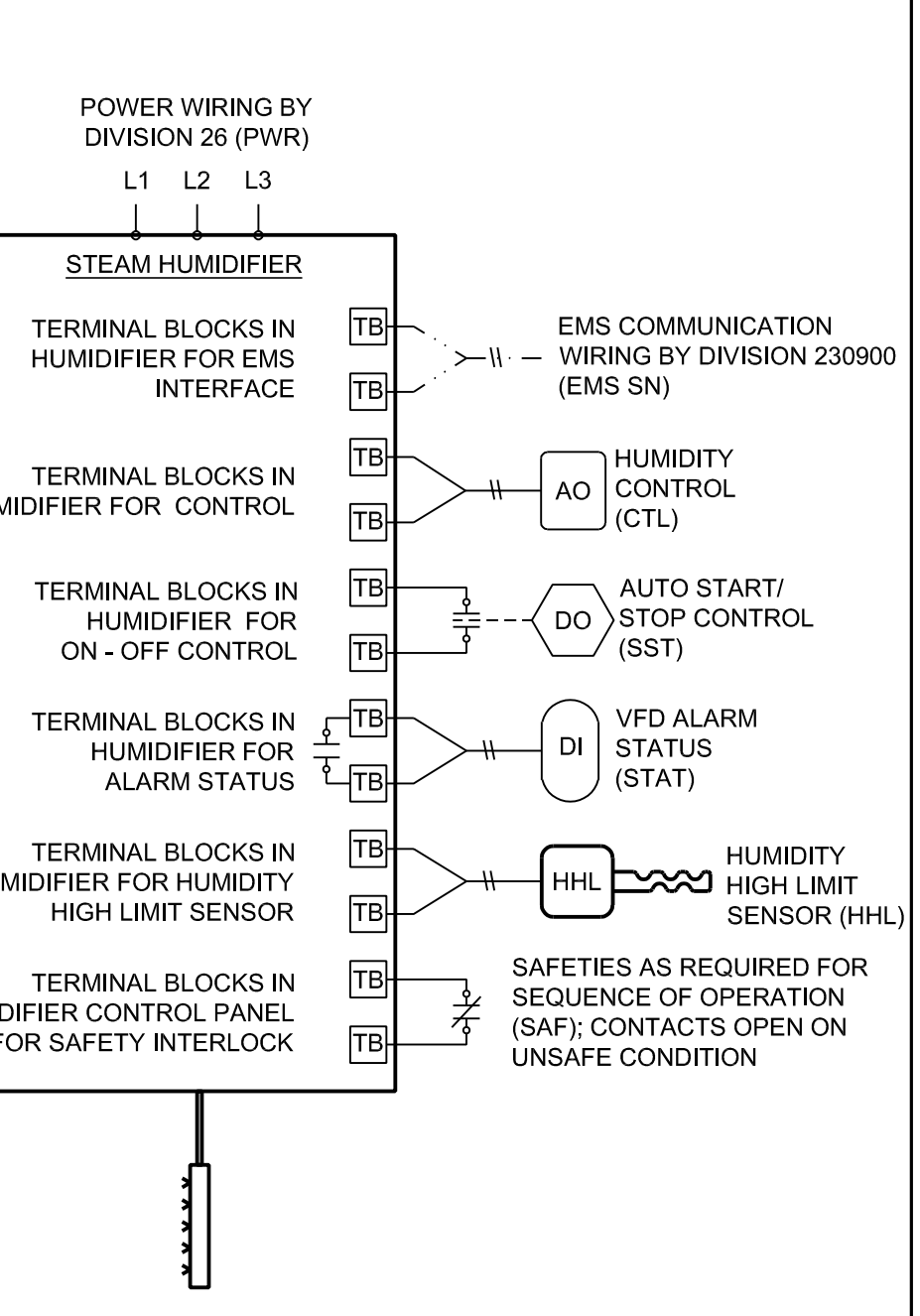
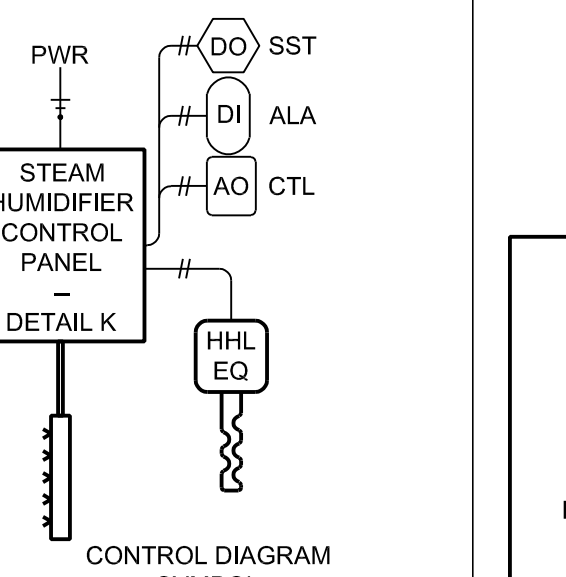
- NOTES:
- LOCATE BUILDING PRESSURE SENSOR TO ALLOW EQUAL LENGTHS OF TUBING TO BOTH SENSING LOCATIONS.
 - CAPPED TEES ON DIFFERENTIAL PRESSURE TEST PORTS FURNISHED AND INSTALLED BY DIVISION 230900.

I DETAIL: SPACE DIFFERENTIAL PRESSURE SENSOR
NOT TO SCALE

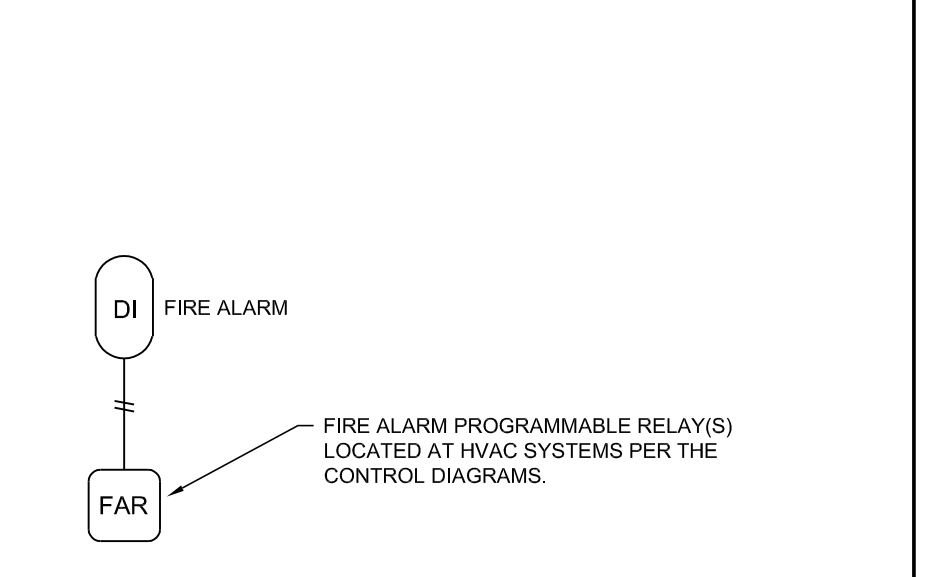


- NOTES:
- A MANUAL RESET DUCT HIGH STATIC PRESSURE LIMIT (HSL) SWITCH(ES) WITH DPST OR DPDT CONTACTS FOR HARDWARE INTERLOCK TO FANS AND DDC MONITORING SHALL BE PROVIDED. CONTACTS SHALL INCLUDE OPEN ON ALARM CONTACT FOR FAN SHUTDOWN AND A CLOSE ON ALARM CONTACT FOR ALARM STATUS.
 - DUCT HIGH STATIC PRESSURE LIMIT (HSL) SWITCH(ES) SHALL BE INSTALLED TO SENSE DUCT STATIC PRESSURE AND STOP THE ASSOCIATED FAN TO PREVENT DAMAGE TO THE DUCT WORK.
 - MULTIPLE DUCT HIGH STATIC PRESSURE LIMIT (HSL) SWITCHES MAY BE REQUIRED AS SHOWN ON THE CONTROL DIAGRAMS. THE MULTIPLE DUCT HIGH STATIC LIMIT SWITCHES SHALL BE WIRED IN SERIES FOR FAN SHUTDOWN AND WIRED IN PARALLEL FOR ALARM STATUS.
 - INTERLOCK WIRING FROM THE DUCT HIGH STATIC PRESSURE LIMIT (HSL) SWITCHES TO THE FAN CONTROLLER IS BY DIVISION 230900.
 - DUCT HIGH STATIC PRESSURE LIMIT (HSL) SWITCHES SHALL HAVE SETPOINT ADJUSTMENT AND MANUAL RESET AT THE SWITCH.
 - DUCT HIGH STATIC LIMIT (HSL) SWITCHES SHALL BE INSTALLED PER MANUFACTURER RECOMMENDATIONS.

J DETAIL: DUCT STATIC PRESSURE HIGH LIMIT SWITCH
NOT TO SCALE



K DETAIL: SELF CONTAINED STEAM HUMIDIFIER INTERLOCK
NOT TO SCALE



- NOTES:
- DIVISION 28 SHALL PROVIDE A PROGRAMMABLE RELAY AT EACH HVAC SYSTEM AS SHOWN ON THE CONTROL DIAGRAMS OR AS REQUIRED FOR THE SEQUENCE OF OPERATION FOR THE SPECIFIC HVAC SYSTEM. THE FAR SHALL INITIATE THE EMERGENCY OPERATION OF THE HVAC SYSTEM ON AN ALARM CONDITION.
 - DIVISION 230900 SHALL BE RESPONSIBLE FOR ADDITIONAL RELAY(S) AS REQUIRED TO ACTIVATE AUXILIARY SYSTEM COMPONENTS AS PER THE SEQUENCE OF OPERATION.
 - FIRE ALARM RELAY(S) LOCATED AT SMOKE OR FIRE/SMOKE DAMPER(S) IN DUCTWORK SYSTEM SHALL BE WIRED TO CLOSE THE DAMPER(S) IN THE EVENT OF AN ALARM CONDITION BY DIVISION 28.

L DETAIL: FIRE ALARM RELAY (FAR)
NOT TO SCALE

1 CONTROLS DETAILS 1
NOT TO SCALE

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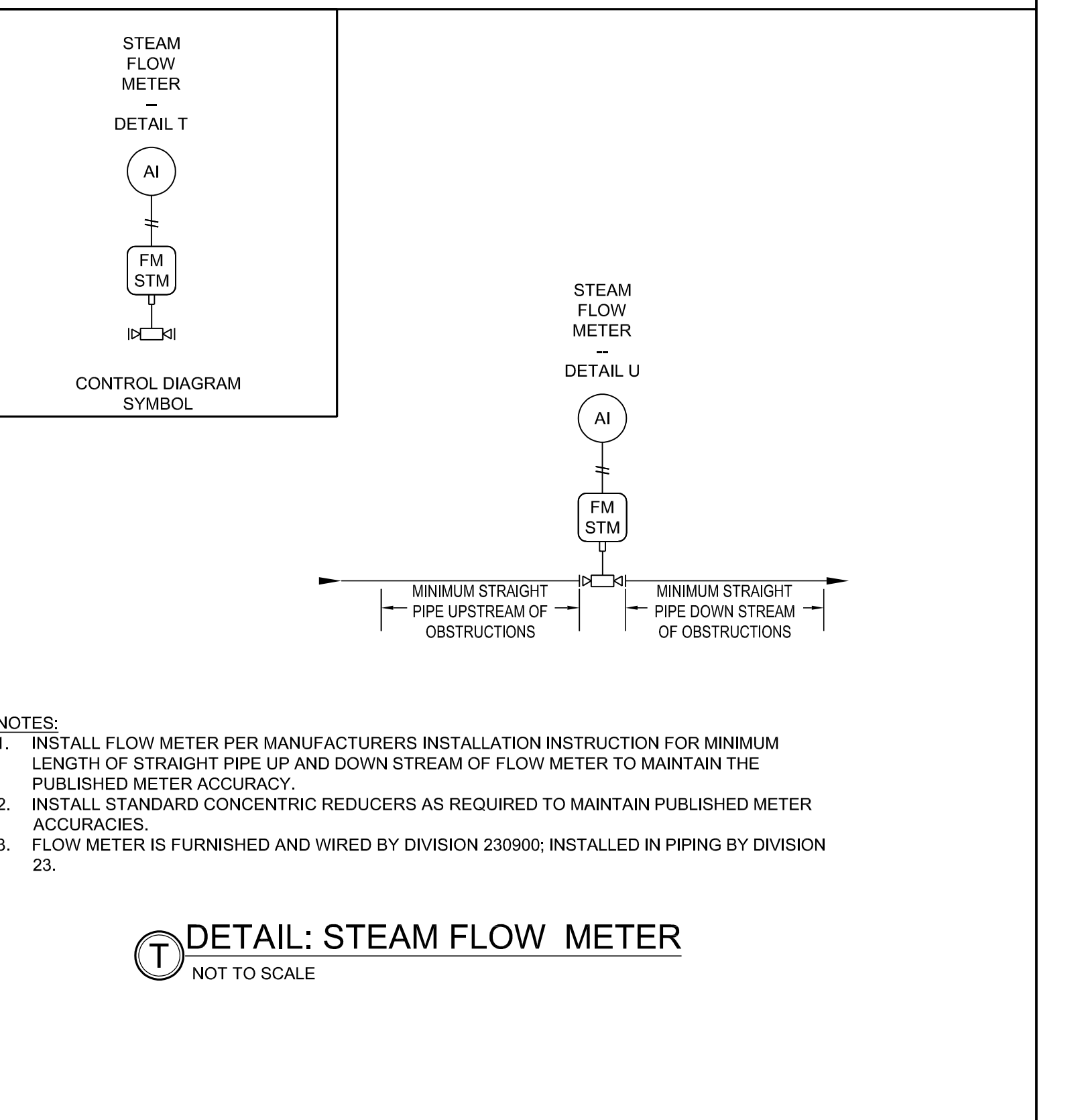
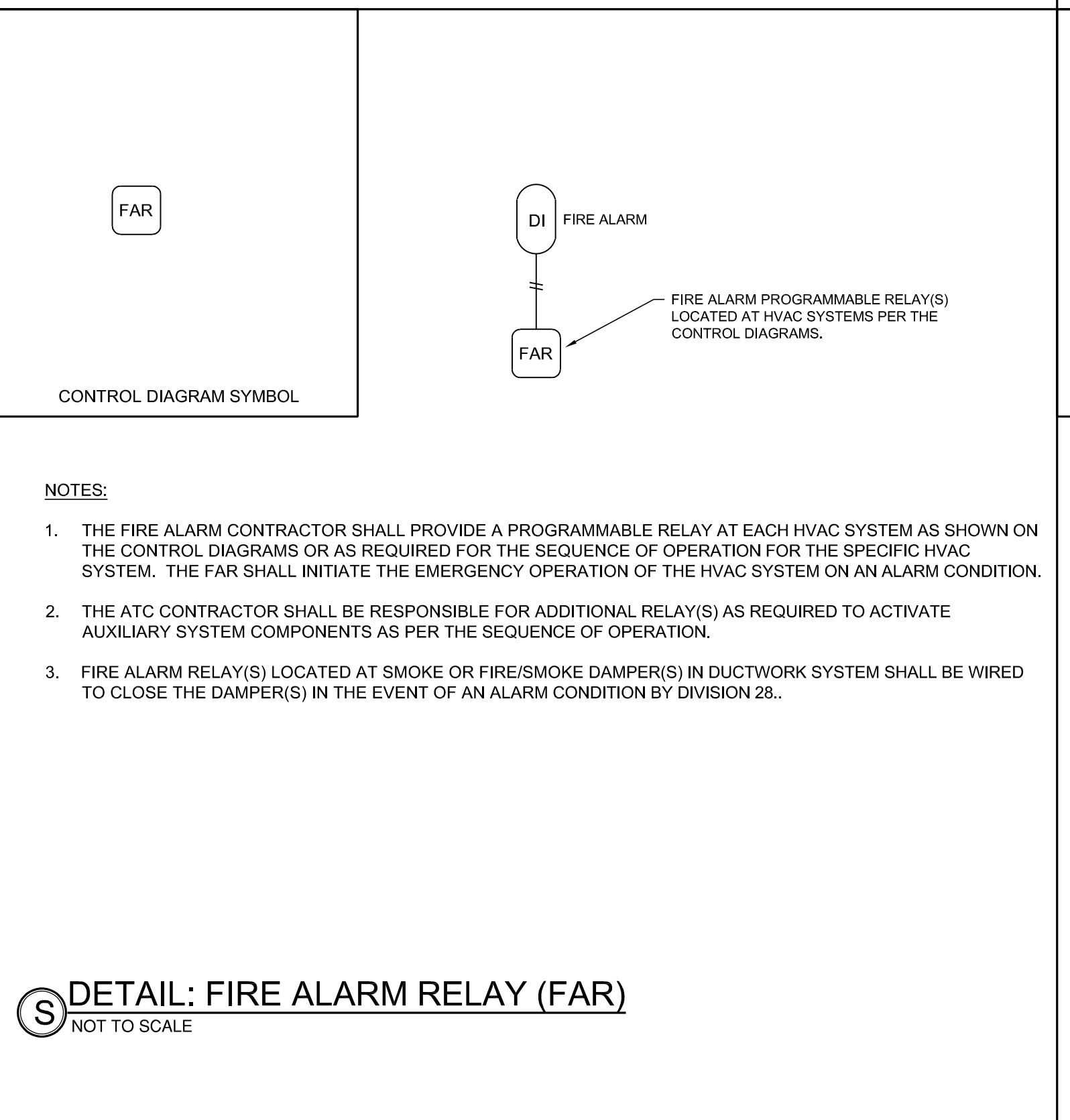
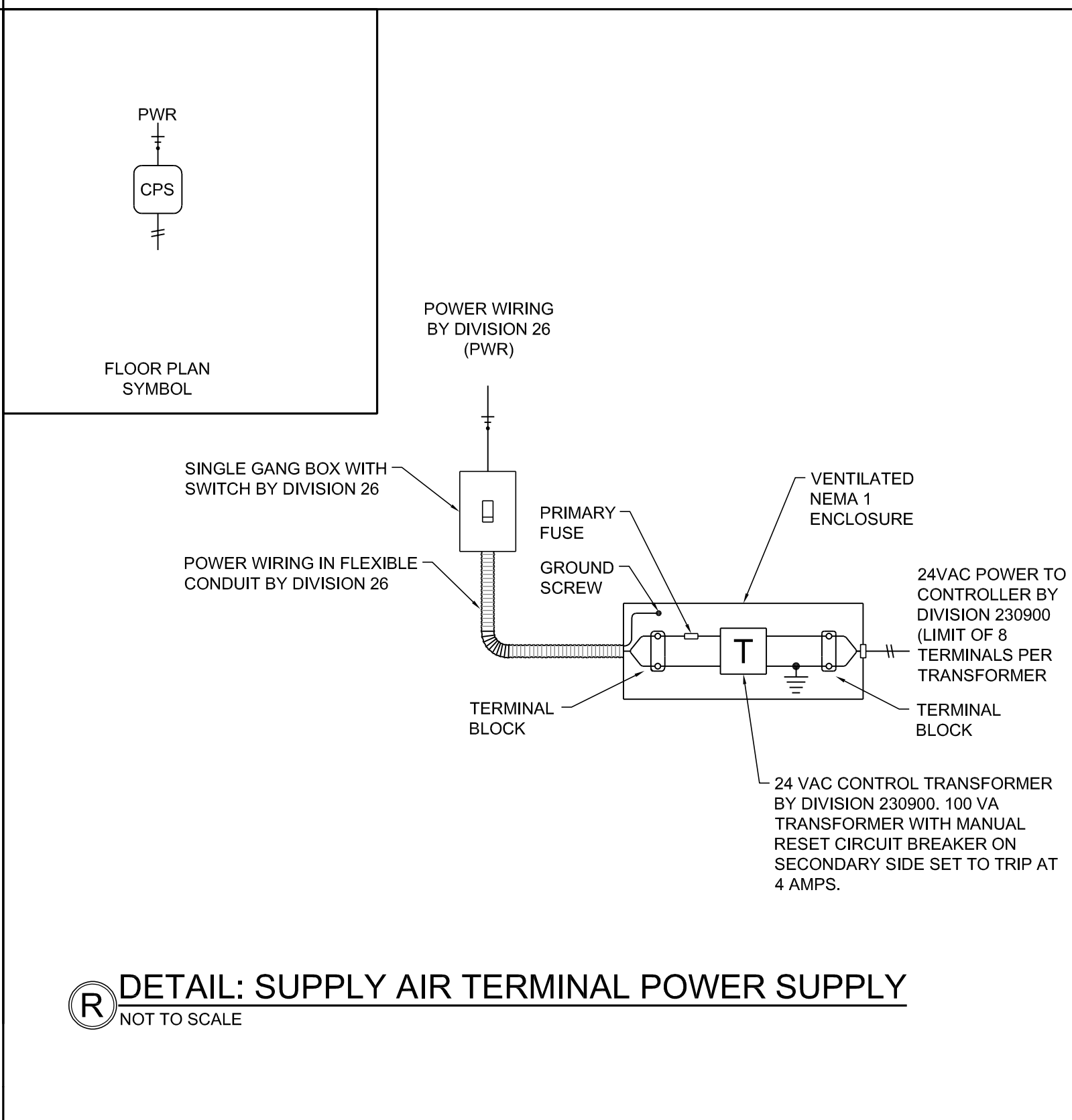
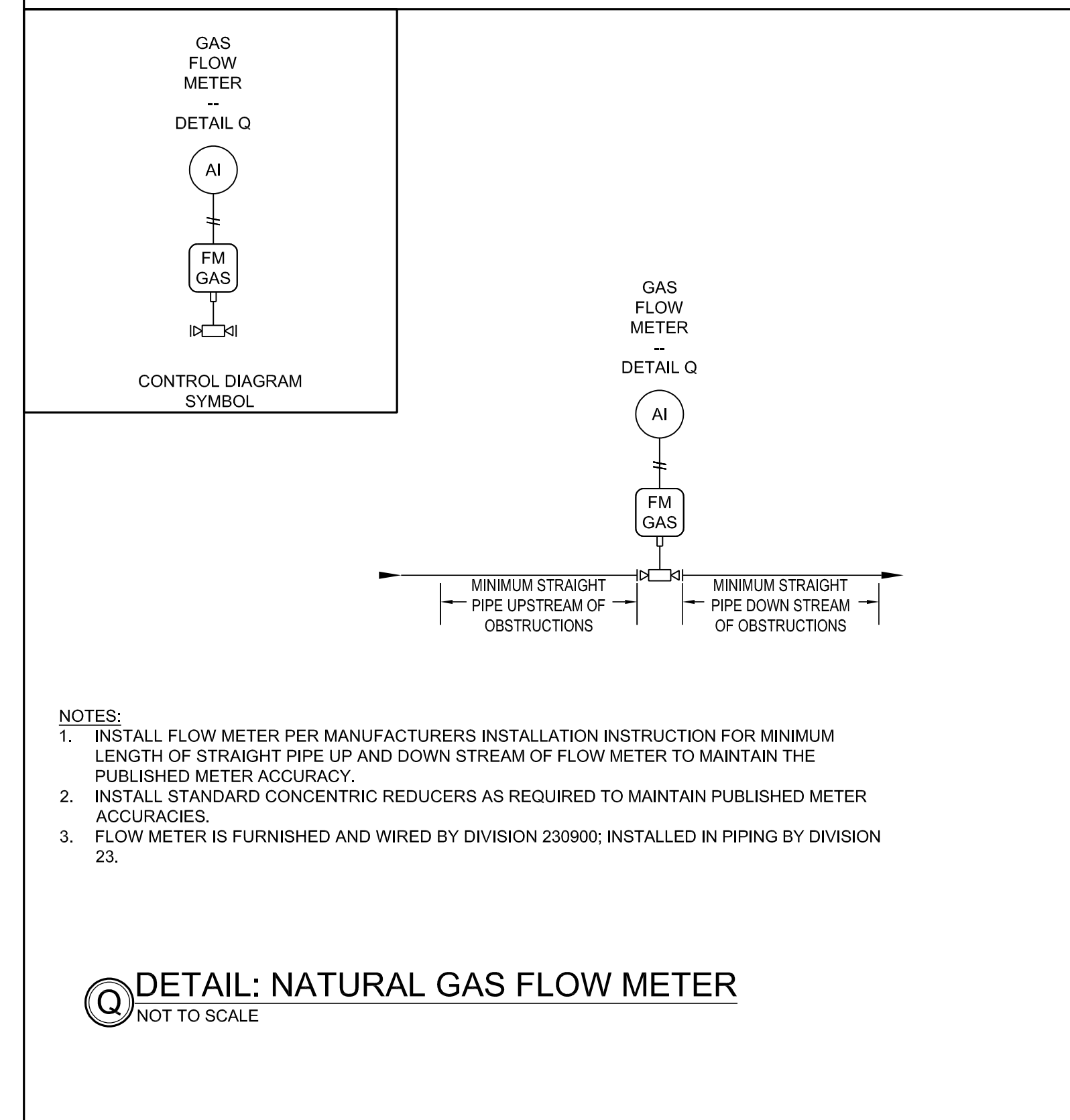
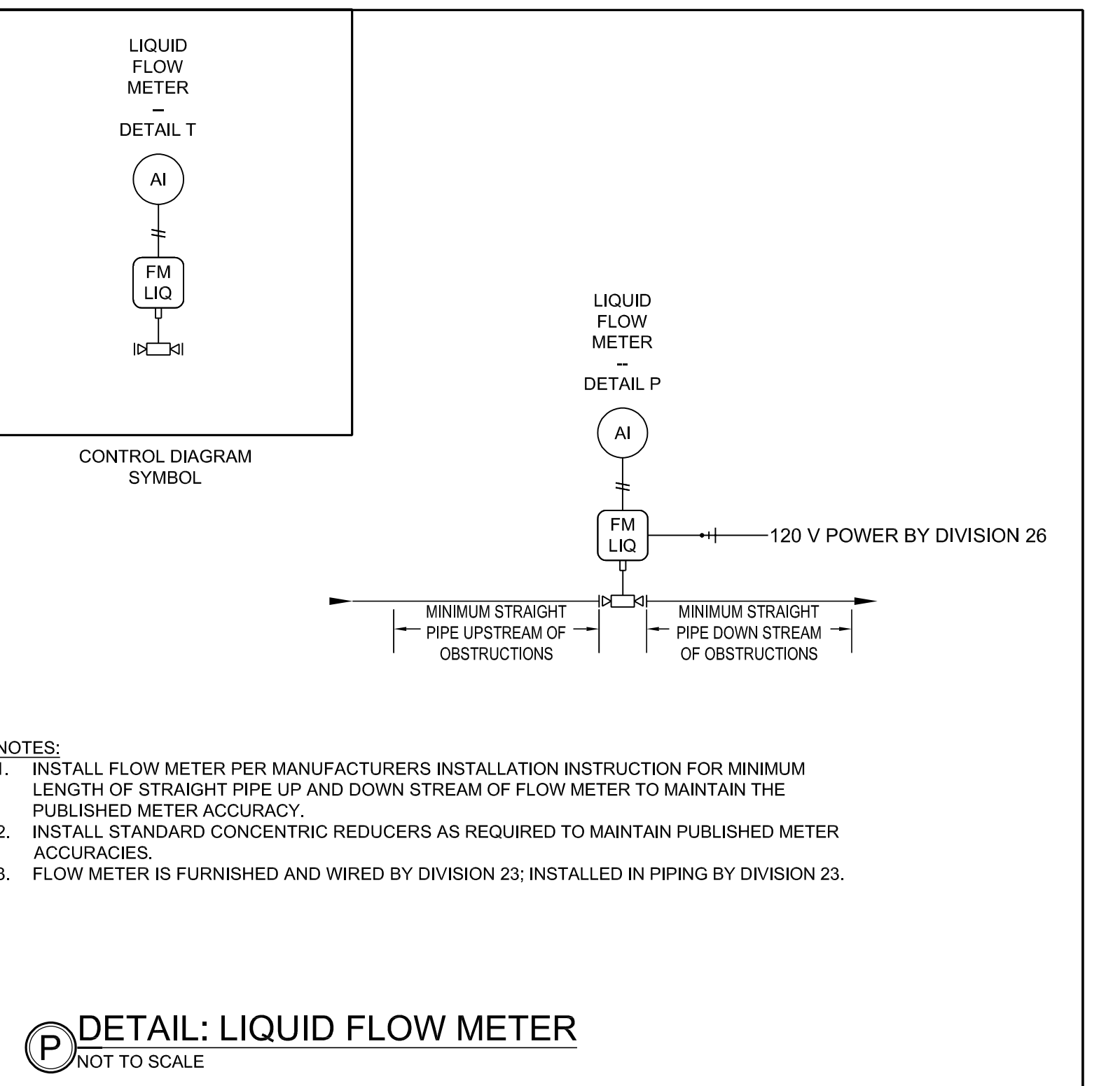
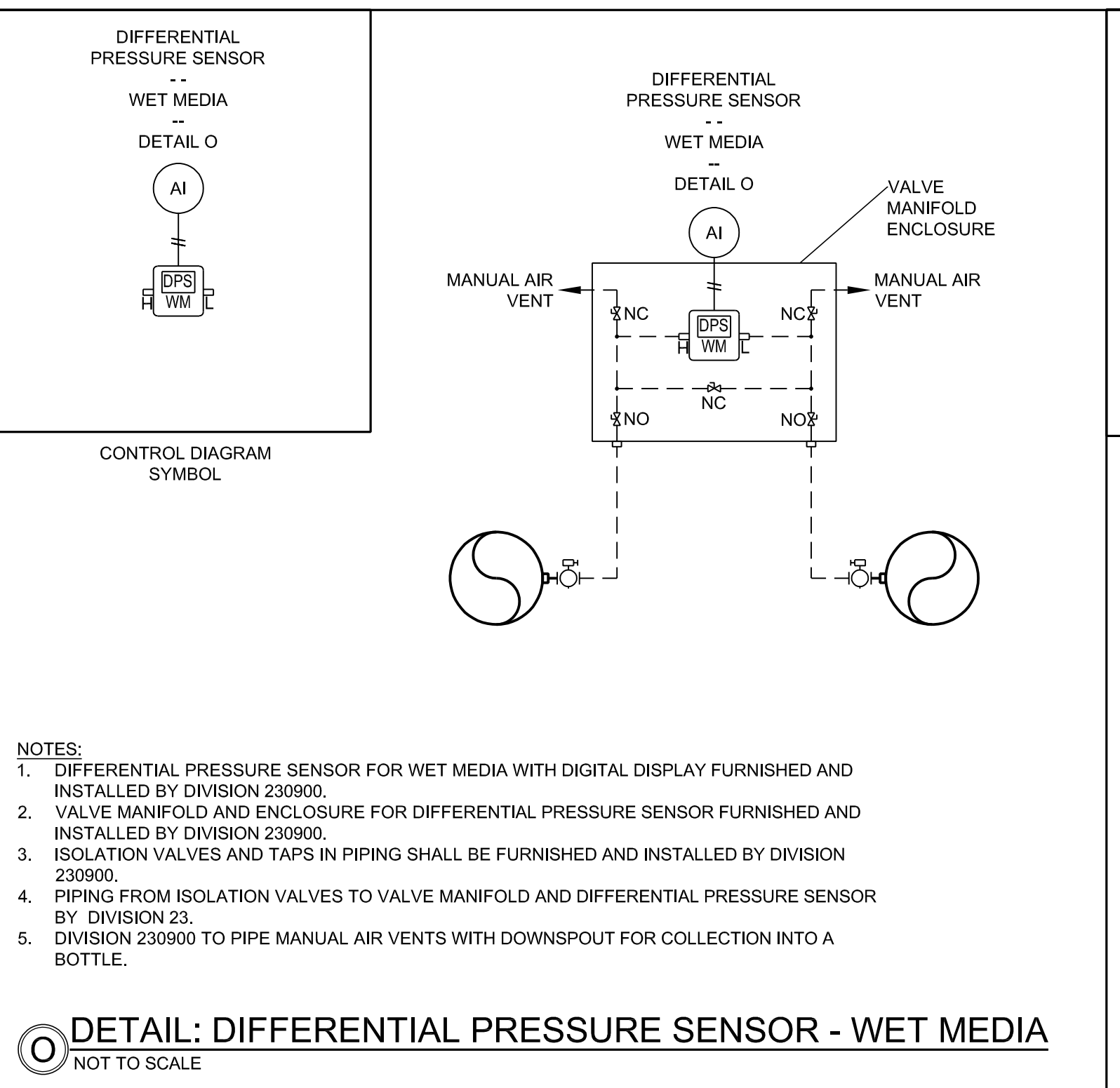
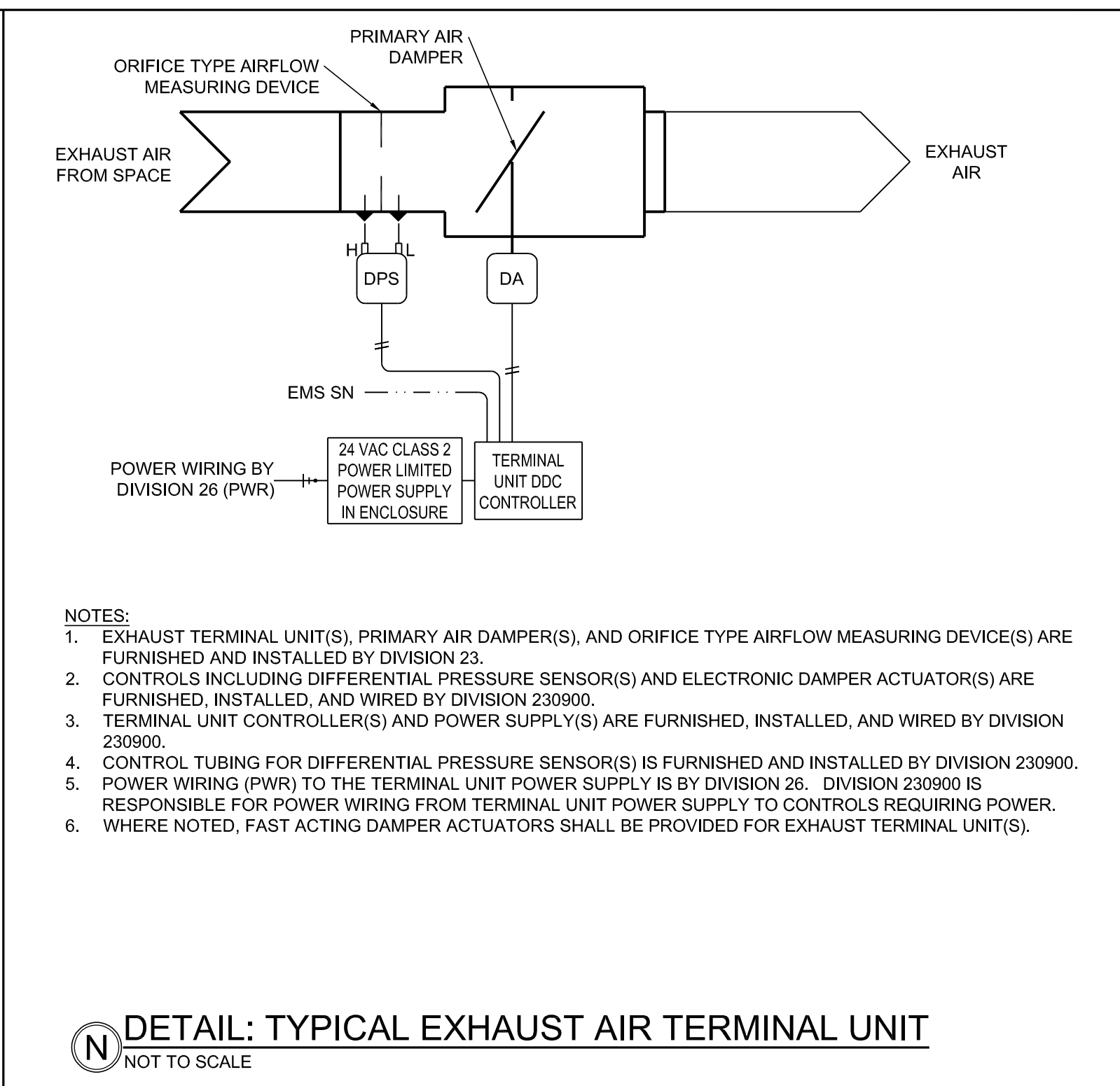
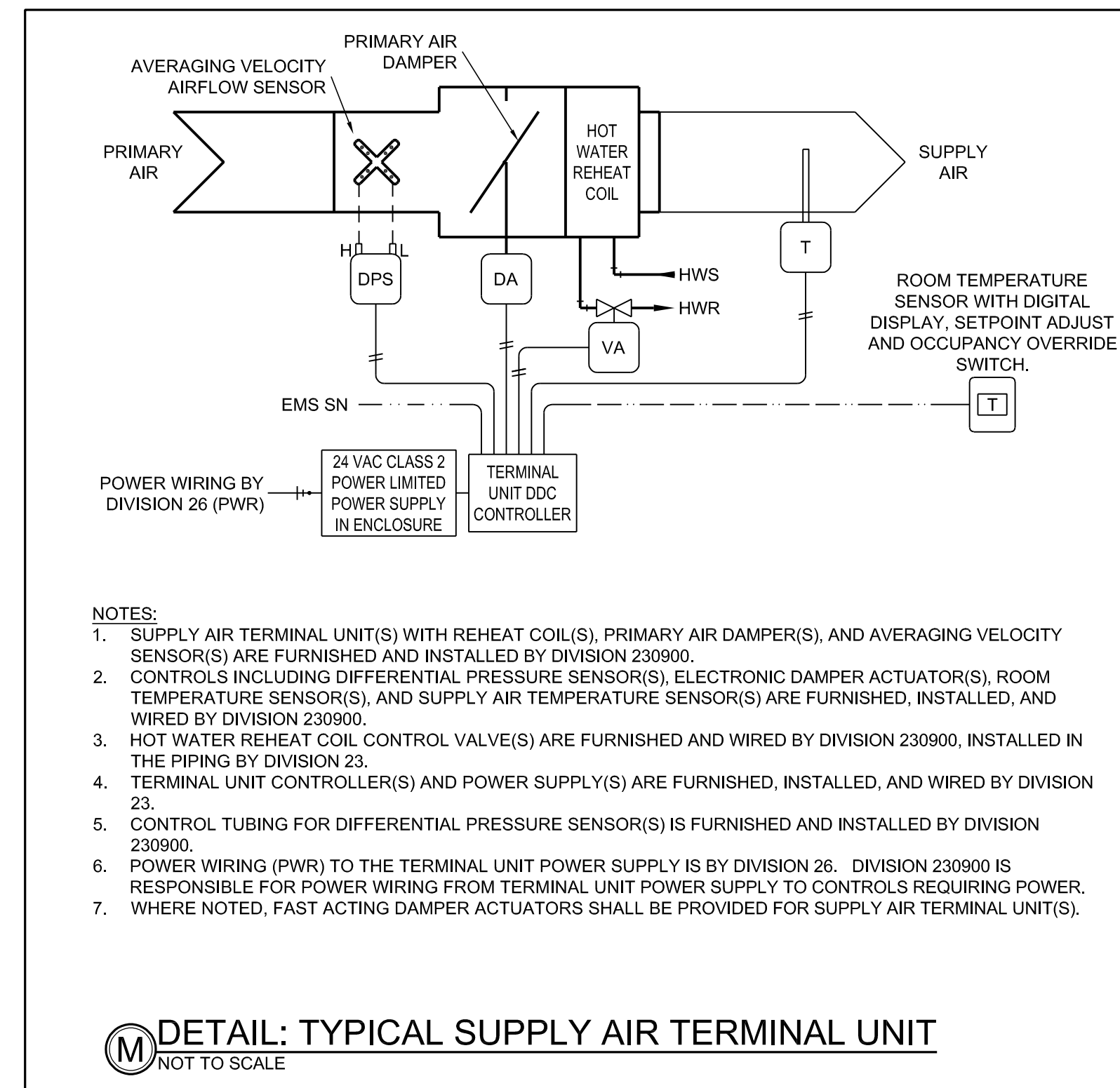
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ISSUE DATE:	03/20/19	
PROJECT NUMBER:	04-18-0072	
SHEET TITLE: CONTROLS DETAILS 1		
SHEET NUMBER: ATC0.01		

FINAL BID SET

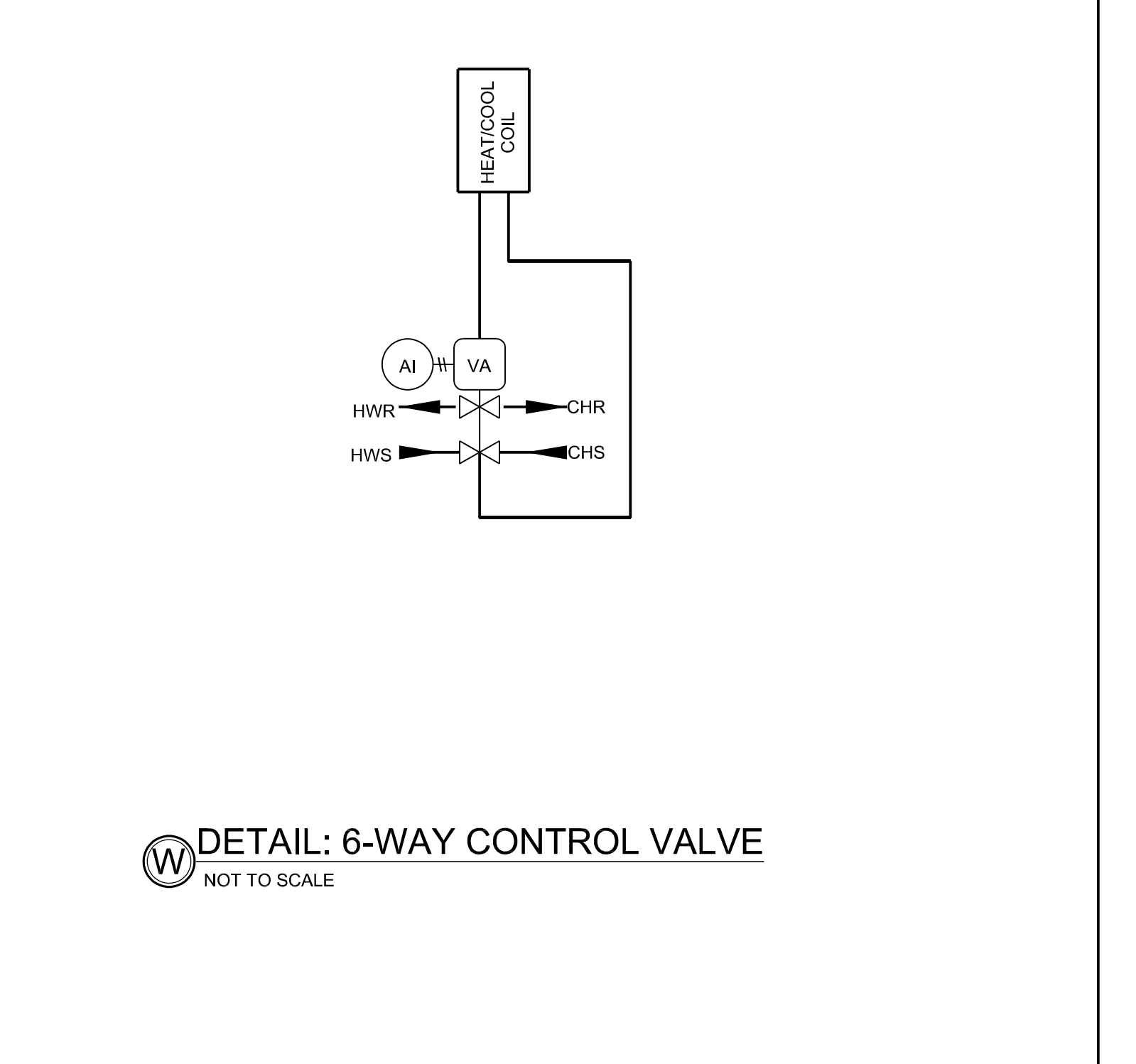
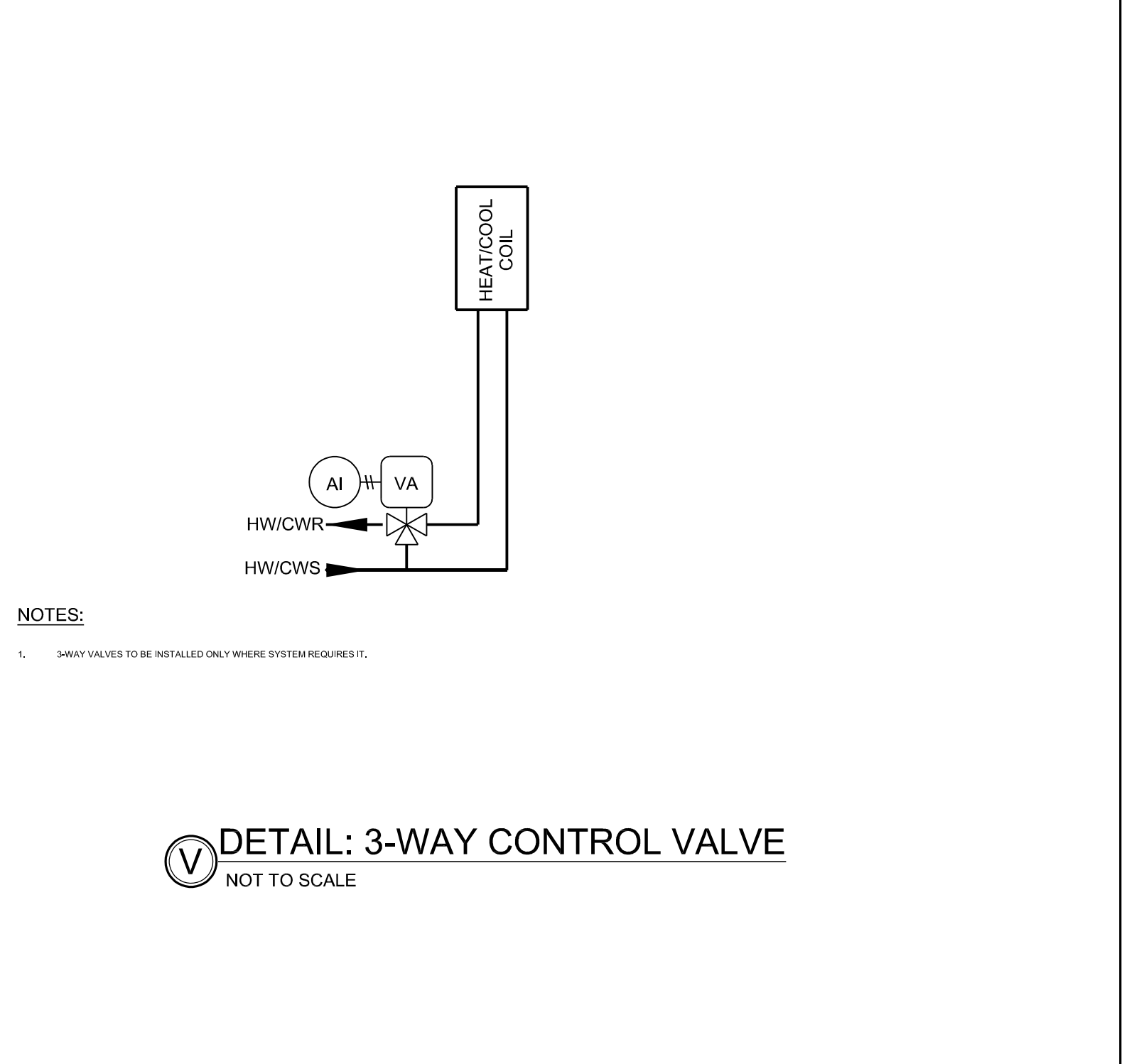
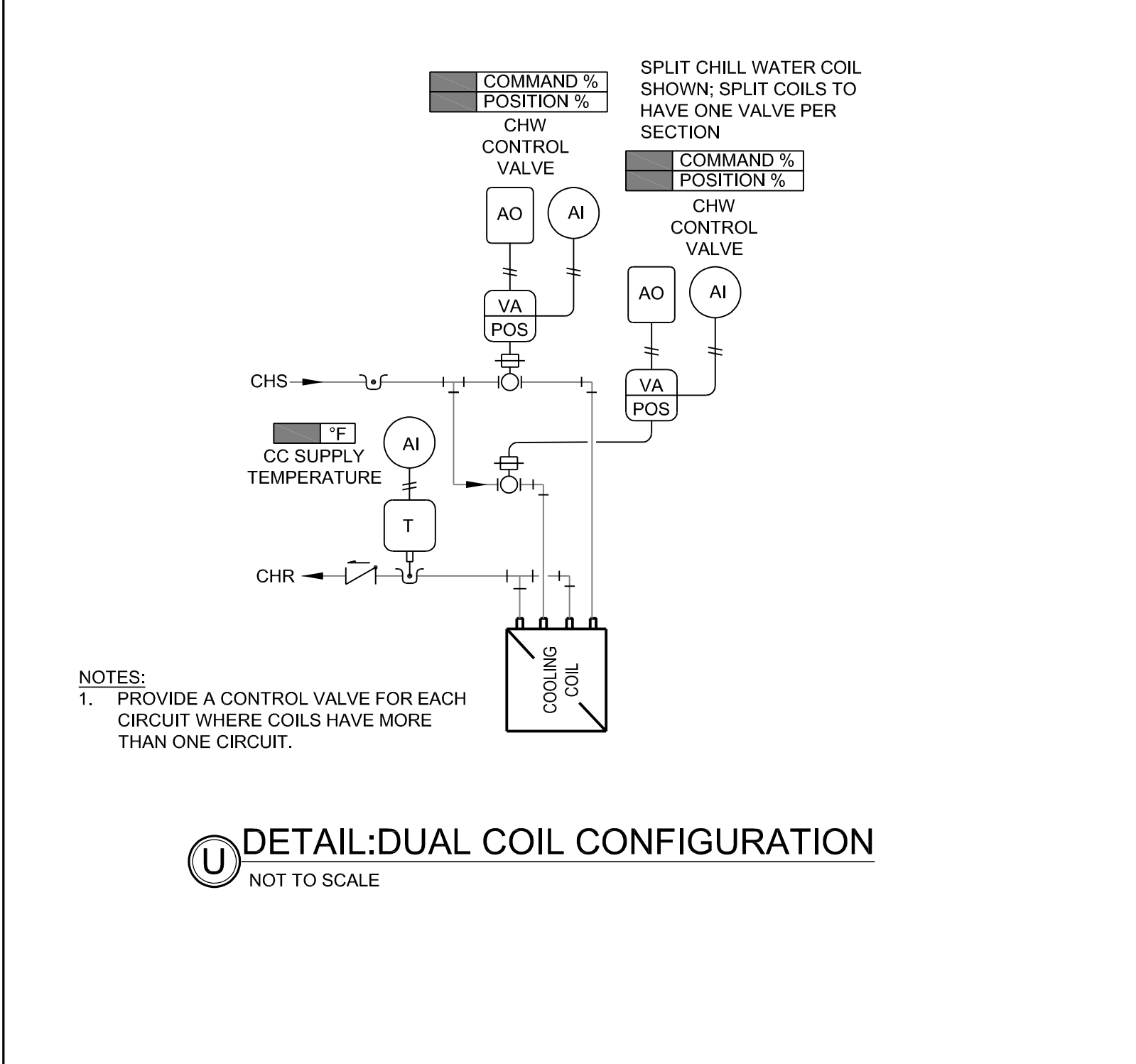
CORPORATE SEAL

ENGINEER SEAL

IDIQ CONTROL DRAWINGS
UNIVERSITY OF ARKANSAS
FAYETTEVILLE, ARKANSAS



NEED TO ADD DETAIL FOR MOISTURE SENSOR AND REQUIRED INSTALLATION LOCATION FOR CHILLED WATER AND HEATING WATER WATER COILS



1 CONTROLS DETAILS 2
NOT TO SCALE

GENERAL NOTE: THESE STANDARD SYSTEM DIAGRAMS AND SEQUENCES ARE DEVELOPED AS THE BASIS FOR DESIGN AND MAY NOT BE DIRECTLY APPLICABLE AS IS DUE TO EXISTING EQUIPMENT OR SYSTEM CAPABILITIES, OR DUE TO SYSTEM OR EQUIPMENT ARRANGEMENTS. IT IS THE RESPONSIBILITY OF THE ENGINEER OF RECORD TO MODIFY THESE DOCUMENTS AS REQUIRED FOR THE SPECIFIC CONDITIONS OF A PROJECT. REFER TO THE RFP DOCUMENTS FOR MODIFICATION PROCEDURES.

MARK	DATE	DESCRIPTION
ISSUE DATE:	03/20/19	
PROJECT NUMBER:	04-18-0072	
SHEET TITLE: CONTROLS DETAILS 2		
SHEET NUMBER: ATC0.02		

FINAL BID SET

CORPORATE SEAL

ENGINEER SEAL

IDIQ CONTROL DRAWINGS
UNIVERSITY OF ARKANSAS
FAYETTEVILLE, ARKANSAS

Device Type	BUILDING	IP	Device Type	BUILDING	IP	Device Type	BUILDING	IP	Device Type	BUILDING	IP	Device Type	BUILDING	IP
NAE-55	BELL	172.16.200.1	NAE-55	SCEN	172.16.200.51	???	???	172.16.200.101	NCE-25	ECHP	172.16.200.151	NAE-55	CHIL	172.16.200.201
NAE-55	ENGR	172.16.200.2	NAE-55	SCEN	172.16.200.52	NAE-55	ADSB	172.16.200.102	NAE-55	GEAR	172.16.200.152			
NCE-25	BEHL	172.16.200.3	NAE-55	CHRC	172.16.200.53	NCE-25	ASUP	172.16.200.103	Integration	ECHP/Beant gateway	172.16.200.153	Desktop	NANO	172.16.200.203
NCE-25	HAPG	172.16.200.4	NAE-55	WCOB	172.16.200.54	NAE-35	MCHS	172.16.200.104	NAE-55	ENGR	172.16.200.154			172.16.200.204
NAE-55	AGRI	172.16.200.5	NAE-55	MHSR	172.16.200.55	NAE-55	ARAS	172.16.200.105	NAE-55	HOTZ	172.16.200.155			172.16.200.205
NAE-55	HOEC	172.16.200.6	NAE-55	MHSR	172.16.200.56	NAE-55	AFLS	172.16.200.106	NAE-55	HOTZ	172.16.200.156			172.16.200.206
NAE-55	KIMP	172.16.200.7	NAE-55	POMF	172.16.200.57	???	???	172.16.200.107	NAE-55	HOTZ	172.16.200.157			172.16.200.207
NAE-55	MISC	172.16.200.8	NAE-55	WJWH	172.16.200.58	NAE-55	MULN	172.16.200.108	NAE-55	POMF	172.16.200.158			172.16.200.208
NAE-55	GRAD	172.16.200.9	NAE-55	WJWH	172.16.200.59	NAE-55	POSC	172.16.200.109	NAE-55	POMF	172.16.200.159			172.16.200.209
NAE-55	MEMH	172.16.200.10	NAE-55	UNHS	172.16.200.60	NAE-55	PEAH	172.16.200.110	NCE-25	FBGC/Metering	172.16.200.160			172.16.200.210
NAE-55	NANO	172.16.200.11	NAE-55	FUTR	172.16.200.61	NCE-25	ARKU	172.16.200.111	NAE-55	ECHP	172.16.200.161			172.16.200.211
NAE-55	MJUN	172.16.200.12	NAE-55	PTSC	172.16.200.62	NCE-25	CHL/RTU	172.16.200.112	NAE-55	YOCM	172.16.200.162			172.16.200.212
NAE-55	FUTR	172.16.200.13	NAE-55	DUNR	172.16.200.63	Integration	NANO/HUMID	172.16.200.113	NAE-55	YOCM	172.16.200.163			172.16.200.213
NAE-55	HOCM	172.16.200.14	NAE-55	PDTT	172.16.200.64	NAE-55	HILL	172.16.200.114	NAE-55	YOCM	172.16.200.164			172.16.200.214
NAE-55	GRIG	172.16.200.15	NAE-55	BELL	172.16.200.65	NAE-35	WAXX	172.16.200.115	NAE-35	ENRC	172.16.200.165			172.16.200.215
NCE-25	LNST	172.16.200.16	NAE-55	HJHT	172.16.200.66	NAE-55	ARKU	172.16.200.116	NAE-55	Housing Office	172.16.200.166			172.16.200.216
NAE-55	SCIE	172.16.200.17	NAE-55	MAIN	172.16.200.67	NAE-55	ARKU	172.16.200.117	NCE-25	HEATING PLANT	172.16.200.167			172.16.200.217
NCE-25	YOCM	172.16.200.18	NAE-55	PHYS	172.16.200.68	NAE-55	ARKU	172.16.200.118	NAE-55	WATR	172.16.200.168			172.16.200.218
NAE-55	HUMP	172.16.200.19	NAE-55	PHYS	172.16.200.69	NAE-35	ARKU-ADD	172.16.200.119	NCE-25	North Chiller Plant	172.16.200.169			172.16.200.219
NAE-55	NANO	172.16.200.20	NAE-55	BOR	172.16.200.70	NAE-55	HCH	172.16.200.120	???	???	172.16.200.170			172.16.200.220
NAE-55	POMF	172.16.200.21	NAE-35	FAMA	172.16.200.71	NCE-25	GREG	172.16.200.121	???	???	172.16.200.171			172.16.200.221
???	SAEF	172.16.200.22	NAE-55	AGRI	172.16.200.72	NAE-55	DAVH	172.16.200.122	Integration	ECHP/AC-SMART	172.16.200.172			172.16.200.222
NAE-55	HOTZ	172.16.200.23	NAE-55	AJUM	172.16.200.73	NCE-25	POSC	172.16.200.123	???	???	172.16.200.173			172.16.200.223
NAE-55	GIBS	172.16.200.24	NAE-55	BAND	172.16.200.74	NAE-55	NWQA	172.16.200.124	???	???	172.16.200.174			172.16.200.224
NAE-55	AFLS	172.16.200.25	NAE-55	GAPG	172.16.200.75	NAE-55	REID	172.16.200.125	Integration	ENGR/Phoenix	172.16.200.175			172.16.200.225
NAE-55	MEEG	172.16.200.26	NAE-55	KIMP	172.16.200.76	NAE-55	REID	172.16.200.126	NCE-25	BGHL	172.16.200.176			172.16.200.226
NAE-55	NANO	172.16.200.27	NAE-55	GRAD	172.16.200.77	NAE-55	NWQB	172.16.200.127	BAU-1	HOTZ-BAU-1	172.16.200.177			172.16.200.227
NAE-55	WATR	172.16.200.28	NCE-25	NANO	172.16.200.78	NAE-55	NWQC	172.16.200.128	BAU-2	HOTZ-BAU-2	172.16.200.178			172.16.200.228
NAE-55	CHEM	172.16.200.29	NCE-25	YOCM	172.16.200.79	NAE-55	NWGD	172.16.200.129	Phoenix	POSC-PHOENIX	172.16.200.179			172.16.200.229
NAE-55	CHEM	172.16.200.30	Integration	NANO/Phoenix	172.16.200.80	Integration	YOCM/RTU	172.16.200.130	NAE-35	ADMIN/4th FL	172.16.200.180			172.16.200.230
NAE-55	POSC	172.16.200.31	NAE-55	HFER	172.16.200.81	Integration	YOCM/RTU	172.16.200.131	NAE-35	ESU/Prvior	172.16.200.181			172.16.200.231
NAE-55	MHWR	172.16.200.32	NAE-55	HFER	172.16.200.82	NCE-25	HPER/HG/TK/LANT	172.16.200.132	NAE-55	CHPN	172.16.200.182			172.16.200.232
NAE-55	MHER	172.16.200.33	NAE-55	ADMIN	172.16.200.83	NAE-55	FNDR	172.16.200.133	NCE-25	BBPF/Metering	172.16.200.183			172.16.200.233
NAE-55	JBHT	172.16.200.34	NCE-25	MEMH	172.16.200.84	NAE-55	FNDR	172.16.200.134	NCE-25	SASC/Metering	172.16.200.184			172.16.200.234
NAE-55	JBHT	172.16.200.35	NCE-25	MULN	172.16.200.85	NAE-55	FNDR	172.16.200.135	NAE-55	FPAC	172.16.200.185			172.16.200.235
NCE-25	BUCH	172.16.200.36	NCE-25	MULN	172.16.200.86	NAE-55	WALK	172.16.200.136	NAE-55	DETRAV	172.16.200.186			172.16.200.236
NCE-25	GLAD	172.16.200.37	NAE-55	PTSC	172.16.200.87	NAE-55	WALK	172.16.200.137	Delta V OPC Server	OPC Server	172.16.200.187			172.16.200.237
NAE-55	SINF	172.16.200.38	NCE-25	FAMA	172.16.200.88	NAE-55	GEAR	172.16.200.138	NAE-55	LCAF-188	172.16.200.188			172.16.200.238
NAE-55	FSBC	172.16.200.39	NCE-25	ENRC	172.16.200.89	NCE-25	HUMP	172.16.200.139	Integration	LCAF MIT-1	172.16.200.189			172.16.200.239
NCE-25	GLBL	172.16.200.40	NCE-25	WAHR	172.16.200.90	NAE-55	HUMP	172.16.200.140	Integration	LCAF MIT-2	172.16.200.190			172.16.200.240
NAE-55	POSC	172.16.200.41	NCE-25	BWAR	172.16.200.91	NAE-55	HUMP	172.16.200.141	NCE-25	PRESS	172.16.200.191			172.16.200.241
NAE-55	POSC	172.16.200.42	NCE-25	JBAR	172.16.200.92	NCE-25	PGDF	172.16.200.142	Wireless T-Stat RM 163	ADSB	172.16.200.192			172.16.200.242
NAE-55	POSC	172.16.200.43	NCE-25	RSEA	172.16.200.93	NAE-55	ARMY	172.16.200.143	NAE-55	SCUL	172.16.200.193			172.16.200.243
NAE-55	POSC	172.16.200.44	NCE-25	IDPA	172.16.200.94	NAE-55	WLR	172.16.200.144	NCE-25	ARKU	172.16.200.194			172.16.200.244
NAE-55	RCID	172.16.200.45	NCE-25	POMF	172.16.200.95	NAE-55	POMF	172.16.200.145	Boilers	AGRI	172.16.200.195			172.16.200.245
NAE-55	MULN	172.16.200.46	NCE-25	MAIN	172.16.200.96	NCE-25	NWQB	172.16.200.146	Phoenix RMI 300-1	AGRI	172.16.200.196			172.16.200.246
NAE-55	FNAR	172.16.200.47	???	???	172.16.200.97	NAE-55	GEAR	172.16.200.147	Phoenix RMI 300-2	AGRI	172.16.200.197			172.16.200.247
NAE-55	FERR	172.16.200.48	NCE-25	BLCA	172.16.200.98	NAE-55	ITCD	172.16.200.148	NAE-45	AGRI	172.16.200.198			172.16.200.248
NAE-55	FERR	172.16.200.49	NAE-55	WATR	172.16.200.99	NAE-55	ENRC	172.16.200.149	NAE-55	AGRI	172.16.200.199			172.16.200.249
NAE-55	SCEN	172.16.200.50	NAE-55	ROSE	172.16.200.100	NCE-25	HOEC	172.16.200.150	???	???	172.16.200.200			172.16.200.250
???	UPTW	130.184.78.39												

1 LIST OF CURRENT UA JOHNSON CONTROL SYSTEMS
NOT TO SCALE

Item	Description
LNDC-CCC	LNDC/CCC Command
STEAM & HEATING POINTS	
HWP-SP	Hot Water Diff Pres SetP
HWP-CP	Hot Water Diff Pressure
HWP-IC	Hot Water Pump 1 Command
HWP-LS	Hot Water Pump 1 Status
HWP-SC	Hot Wtr Pmp 1 Speed Ctrl
HWP-VSD	Hot Wtr Pmp 1 VSD CS
HWP-SP	Hot Water Temp SetP
HWS-T	Hot Water Supply Temp
HWR-T	Hot Water Return Temp
HWEK-LV	Hot Wtr Exchanger Valve
STM-F	Steam Flow x 10
HSTM-P	High Steam Pressure
LS-TRP	Low Steam Pressure
VENT-ALM	Steam Relief Temp Monitor
CHILL WATER POINTS--	
TEMP-PRES	Temp or Pressure Mode
CWB/P-V	Chill Wtr ByPass Valve
SCW/P-SP	Sec Chl Wtr SP SetP
SCW/P-DP	Sec Chl Wtr Diff Press
CW/P-TOT-R	CW/PS Total Reset
BC/H-I-S	Building Chill Pmp 1-5
BC/H-I-S	Building Chill Pmp 1-5
BC/H-I-S-C	Building Chill Pmp 1-5C
BC/H-I-VSD	Chill Wtr Pmp 1 VSD CS
PCW/R-T-SP	Pri Chl Wtr Temp SetP
PCW/R-T	Pri Chl Wtr Return T
PCW/S-T	Pri Chl Wtr Supply T
PCHW-F	Pri Chl Wtr Flow
PCW-DP	Pri Chl Wtr Diff Press
PCW-LV-LV	Pri Chl Wtr Valve
#NAME?	
--- MISC POINTS ---	
DH/M-T-A	Dom Hot Wtr High T-Alm
M/A-T-A	Main Air Leak-Alm
HWC/P-I-S	Hot Wtr Cir Pmp 1 Status
DOM-W-F	Dom Water Flow 1=1000gal
RPZ-ALM	RPZ 1 Alarm
BPT-I-S	Dom Wtr Boost Pmp 1-Stat
TUN-S-A	Tuneup Sump Alarm
BASEMS-A	Basement Sump Alarm
ESUMP-A	Elevator Sump High Alarm
PCW/G-T	Pri Chl Wtr Delta T
CW-TONS	Chill Wtr Load 15Min Avg
PCW-F-TOT	Pri Chl Wtr Load Tot
PCW-F-TOT2	PCW/F TOT x 32000+PCW/F-TOT
DOM-W-TOT	DOM Wtr Total x 1000
DOM-W-TOT2	DOM WTR TOT x 3200+DOM-W-TOT
GAS-FLOW	Gas Flow x 10 CFM
GAS-F-TOT	Gas Flow Total x 10
GAS-F-TOT2	GAS/F TOT x 32000+GAS-F-TOT
CCC-CMD	
FAN-RBT	Supply Fan Reset Cmd
SE-ALM	Supply Fan Alarm
SP-S	Supply Fan Status
SFC-C	Supply Fan Command
DAT-SP	Discharge Air Temp SP
DA-T	Discharge Air Temp
H-CV-LV	Heat/Cool Valves
WU-SP	Warm-Up Temp SetPoint
WU-MODE	Warm-Up Mode Status
RAT-F6	Return Air Temp x 60 Deg
RAT-T	Return Air Temp
STAT-SP	Static Pressure SP
DA-SP	Discharge Air Static Pre
SFC-SC	Supply Fan Speed Control
OA-SP	Outside Air CFM SetPoint
OA-CFM	Outside Air CFM
DMP-CMD	OA/R Damper CMD
OA-T	Outside Air Temp
MA-T	Mixed Air Temp
CHW-R-T	Chill Wtr Return Temp
HSP-L	High Static Press Limit
MA-L	Mixed Air

FINAL BID SET

CORPORATE SEAL

ENGINEER SEAL

IDIQ CONTROL DRAWINGS
UNIVERSITY OF ARKANSAS
FAYETTEVILLE, ARKANSAS

GENERAL NOTES:

1. BAS GRAPHICS SHALL INCLUDE EQUIPMENT SUMMARIES FOR THE ENTIRE BUILDING / CAMPUS.
2. SUMMARIES SHALL INDICATE THE SYSTEM SERVED BY THE COMPONENT.
3. OPERATORS WITH APPROPRIATE CLEARANCE SHALL BE CAPABLE OF CHANGING THE AIR FLOWS AND SET POINTS FROM THE SUMMARY TABLE.
4. DIVISION 230900 TO ASSIGN AIR FLOWS TO SUPPLY TERMINALS BASED ON ROOM VENTILATION SCHEDULE. OVERRIDDEN VALUES SHALL BE HIGHLIGHTED OR THE TEXT COLOR SHALL CHANGE TO INDICATE VALUES HAVE BEEN OVERRIDDEN.
5. EQUIPMENT IN ALARM SHALL BE HIGHLIGHTED RED OR THE TEXT SHALL TURN RED TO INDICATE AN ALARM.
6. IDENTIFY ALL ALARMS ASSOCIATED WITH EACH PIECE OF EQUIPMENT. A GENERAL ALARM STATUS CAN BE DISPLAYED AND SPECIFIC ALARMS CAN BE VIEWED BY CLICKING ON THE ALARM STATUS FOR THAT BOX.
7. REPORTS ARE NOT AN ACCEPTABLE FORM OF SYSTEM SUMMARIES. REPORTS SHALL CONTAIN LIVE DATA.
8. SCHEDULE COLUMNS SHALL BE CAPABLE OF BEING TOGGLED ON AND OFF.
9. ALL EQUIPMENT SHALL BE CAPABLE OF BEING EXCLUDED FROM ANY RESET CALCULATION.
10. GRAPHICS SHALL INCLUDE A SUMMARY TABLE SIMILAR TO THAT SHOWN. THIS PROJECT MAY REQUIRE ADDITIONAL ROWS, COLUMNS, GRAPHICS, AND CALCULATIONS TO BE INCORPORATED (CONTROL LOOP OUTPUTS, BUILDINGS, ETC).
11. PROVIDE LINKS TO AND FROM BUILDING FLOOR GRAPHICS AND SYSTEM GRAPHICS.
12. TABLES INDICATED HERE ARE PROVIDED TO CONVEY THE MINIMUM LEVEL OF DETAIL EXPECTED.
13. TERMINAL SUMMARY SCHEDULES SHALL BE PROVIDED PER AIR HANDLING UNIT.

CHILLED WATER SYSTEM SUMMARY SCHEDULE

DESIGNATION	AREA SERVED	EQUIPMENT PRIORITY LEVEL	ACTIVE DAT SET POINT (°F)	DAT (°F)	CHW PRESSURE SETP. RESET	CHW VALVE COMMAND	CHW VALVE POSITION	ALARMS
AHU-###	AREA ###	-	-	-	✓	-	-	-
FCCO-###	AREA ###	-	-	-	✓	-	-	-
FCU-###	AREA ###	-	-	-	✓	-	-	-
CRAC-###	AREA ###	-	-	-	✓	-	-	-
SUMMARY						MIN. / MAX.	- / -	
PLANT SUPPLY TEMP SET POINT(°F)	PLANT RETURN TEMPERATURE (°F)	ZONE 1 DP (IN. W.G.)	ZONE 3 DP (IN. W.G.)					
PLANT SUPPLY TEMPERATURE (°F)	ZONE 2 DP (IN. W.G.)	PLANT DP (IN. W.G.)						

HEATING WATER SYSTEM SUMMARY SCHEDULE

DESIGNATION	AREA SERVED	EQUIPMENT PRIORITY LEVEL	ACTIVE DAT SET POINT (°F)	DAT (°F)	HW PRESSURE SETP. RESET	HW TEMP RESET	HW VALVE COMMAND	HW VALVE POSITION	ALARMS
AHU-###	AREA ###	-	-	-	✓	✓	-	-	-
FCU-###	AREA ###	-	-	-	✓	✓	-	-	-
VVST-###	AREA ###	-	-	-	✓	✓	-	-	-
SUMMARY							MIN. / MAX.	- / -	
PLANT SUPPLY TEMP SET POINT(°F)	PLANT RETURN TEMPERATURE (°F)	ZONE 1 DP (IN. W.G.)							
PLANT SUPPLY TEMPERATURE (°F)	PLANT FLOW CONTROL OUTPUT	ZONE 2 DP (IN. W.G.)	PLANT DP (IN. W.G.)						

UNITARY EQUIPMENT SUMMARY SCHEDULE

DESIGNATION	AREA SERVED	EQUIP. PRIORITY LEVEL	SPACE TEMP CONTROL LOOPOUT	FAN SPEED SET POINT	FAN SPEED	MIN SPACE SETP.	MAX SPACE SETP.	ACTIVE SPACE TEMP SET POINT	MAX SAT DIFF. SET POINT	SPACE TEMP	DAT	CLG DAT SET POINT	HTG DAT SET POINT	HW PRESSURE. RESET	HW VALVE COMMAND	HEATING VALVE POSITION	CHW PRESSURE. RESET	CHW VALVE COMMAND	CHW VALVE POSITION	OCCUPANCY SCHED	OCCUPANCY SWITCH	OCCUPANCY SENSOR	OCCUPANCY OVERRIDE	OCCUPANCY STATUS	ALARMS
FCU-###	AREA ###	-	-	-	-	-	-	-	-	-	-	-	-	✓	-	-	✓	-	-	-	-	-	-	-	-
FCCO-###	AREA ###	-	-	-	-	-	-	-	-	-	-	-	-	✓	-	-	✓	-	-	-	-	-	-	-	-
SUMMARY			MIN. / MAX.														MIN. / MAX.	MIN. / MAX.							

TERMINAL SUMMARY SCHEDULE (PER AHU)

DESIGNATION	AHU SERVED	AREA SERVED	EQUIP. PRIORITY LEVEL	SPACE TEMP CONTROL LOOPOUT	MIN SPACE SETP.	MAX SPACE SETP.	ACTIVE SPACE TEMP SET POINT	SPACE TEMP	DAT	AHU DAT	MAX SAT DIFF. SET POINT	RELATIVE HUMIDITY SET POINT	RELATIVE HUMIDITY	AIR FLOW	ACTIVE AIR FLOW SET POINT	TERMINAL DAMPER POSITION	STATIC PRESSURE SETP. RESET	COOLING COIL TEMP. RESET	HW PRESSURE. RESET	HEATING VALVE POSITION	COOLING AIRFLOW OCC. MIN.	COOLING AIRFLOW OCC. MAX.	UNOC. MIN.	UNOC. MAX.	HEATING AIRFLOW OCC. MIN.	HEATING AIRFLOW OCC. MAX.	OCCUPANCY SCHED	OCCUPANCY SWITCH	OCCUPANCY SENSOR	OCCUPANCY OVERRIDE	OCCUPANCY STATUS	ALARMS	
VVST-###	AHU-###	AREA ###	-	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	✓	✓	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CVST-###	AHU-###	AREA ###	-	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	✓	✓	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VVRT-###	AHU-###	AREA ###	-	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	✓	✓	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CVRT-###	AHU-###	AREA ###	-	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	✓	✓	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VVET-###	AHU-###	AREA ###	-	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	✓	✓	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CVET-###	AHU-###	AREA ###	-	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	✓	✓	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SUMMARY				MIN. / MAX.															MIN. / MAX.		TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL						

AIR HANDLING UNIT SUMMARY SCHEDULE

DESIGNATION	AREA SERVED	SAT CONTROL LOOPOUT	SAT SET POINT	ACTIVE SAT SET POINT	MIN SAT SET POINT	MAX SAT SET POINT	CHW PRESSURE. SETP. RESET	CHW VALVE COMMAND	CHW VALVE POSITION	CC DAT	MAX ST COOLING LOOPOUT	MAX ST CLG LOOPOUT SETP.	HW PRESSURE. SETP. RESET	HW VALVE COMMAND	HW VALVE POSITION	HC DAT	HW RECIRC. PUMP STATUS	FILTER DP / MAX FILTER DP SETP.	VA PRESS. SETP. RESET
AHU-###	-	-	-	-	-	-	✓	-	-	-	-	-	✓	-	-	-	-	- / -	✓
AHU-###	-	-	-	-	-	-	✓	-	-	-	-	-	✓	-	-	-	-	- / -	✓
ERU-###	-	-	-	-	-	-	✓	-	-	-	-	-	✓	-	-	-	-	- / -	✓
SUMMARY													MIN. / MAX.						MIN. / MAX.

AIR HANDLING UNIT SUMMARY SCHEDULE (CONTINUED)

DESIGNATION	SUPPLY AF / AF SETP.	SA STATIC PRESS./STATIC PRESS. SETP.	MIN. SA STATIC PRESS. SET POINT	MAX. SA STATIC PRESS. SETP.	SF SPEED SET POINT SF1/SF2/SF3/SF4	SF SPEED SF1/SF2/SF3/SF4	EXHAUST AF / AF SETP.	EA STATIC PRESS./STATIC PRESS. SETP.	MIN. EA STATIC PRESS. SET POINT	MAX. EA STATIC PRESS. SETP.	MAX ET DAMPER POSITION	EF SPEED SET POINT EF1/EF2/EF3/EF4	EF SPEED EF1/EF2/EF3/EF4	ACTIVE WHEEL SPEED / DAMPER STATUS COMMAND	WHEEL SPEED / DAMPER POSITION	OA DAMPER POSITION	RETURN DAMPER POSITION	VENTILATION DAMPER POSITION	VENTILATION AIR FLOW	VENTILATION AIR FLOW SETP.	MAT	RAT	RA RH	MIN / MAX RA RH SETP.	MIN / MAX RA RH	MIN / MAX SPACE RH SETP.	MIN / MAX SPACE RH	HUMIDIFIER COMMAND	ALARMS
AHU-###	- / -	- / -	-	-	- / - / - / -	- / - / - / -	- / -	- / -	-	-	-	- / - / - / -	- / - / - / -	-	-	-	-	-	-	-	-	-	-	- / -	- / -	- / -	-	-	-
AHU-###	- / -	- / -	-	-	- / - / - / -	- / - / - / -	- / -	- / -	-	-	-	- / - / - / -	- / - / - / -	-	-	-	-	-	-	-	-	-	-	- / -	- / -	- / -	-	-	-
ERU-###	- / -	- / -	-	-	- / - / - / -	- / - / - / -	- / -	- / -	-	-	-	- / - / - / -	- / - / - / -	-	-	-	-	-	-	-	-	-	-	- / -	- / -	- / -	-	-	-
SUMMARY																													
CLNG BUFFER LOAD SHED COMMAND	-	CLNG EMERG. LOAD SHED COMMAND	-	HTNG EMERG. LOAD SHED COMMAND	-																								

1 BUILDING EQUIPMENT SUMMARY SCHEDULES
NOT TO SCALE

GENERAL NOTE: THESE STANDARD SYSTEM DIAGRAMS AND SEQUENCES ARE DEVELOPED AS THE BASIS FOR DESIGN AND MAY NOT BE DIRECTLY APPLICABLE AS IS DUE TO EXISTING EQUIPMENT OR SYSTEM CAPABILITIES, OR DUE TO SYSTEM OR EQUIPMENT ARRANGEMENTS. IT IS THE RESPONSIBILITY OF THE ENGINEER OF RECORD TO MODIFY THESE DOCUMENTS AS REQUIRED FOR THE SPECIFIC CONDITIONS OF A PROJECT. REFER TO THE RFP DOCUMENTS FOR MODIFICATION PROCEDURES.

MARK	DATE	DESCRIPTION
ISSUE DATE:	03/20/19	
PROJECT NUMBER:	04-18-0072	
SHEET TITLE: BUILDING EQUIPMENT SUMMARY SCHEDULES		

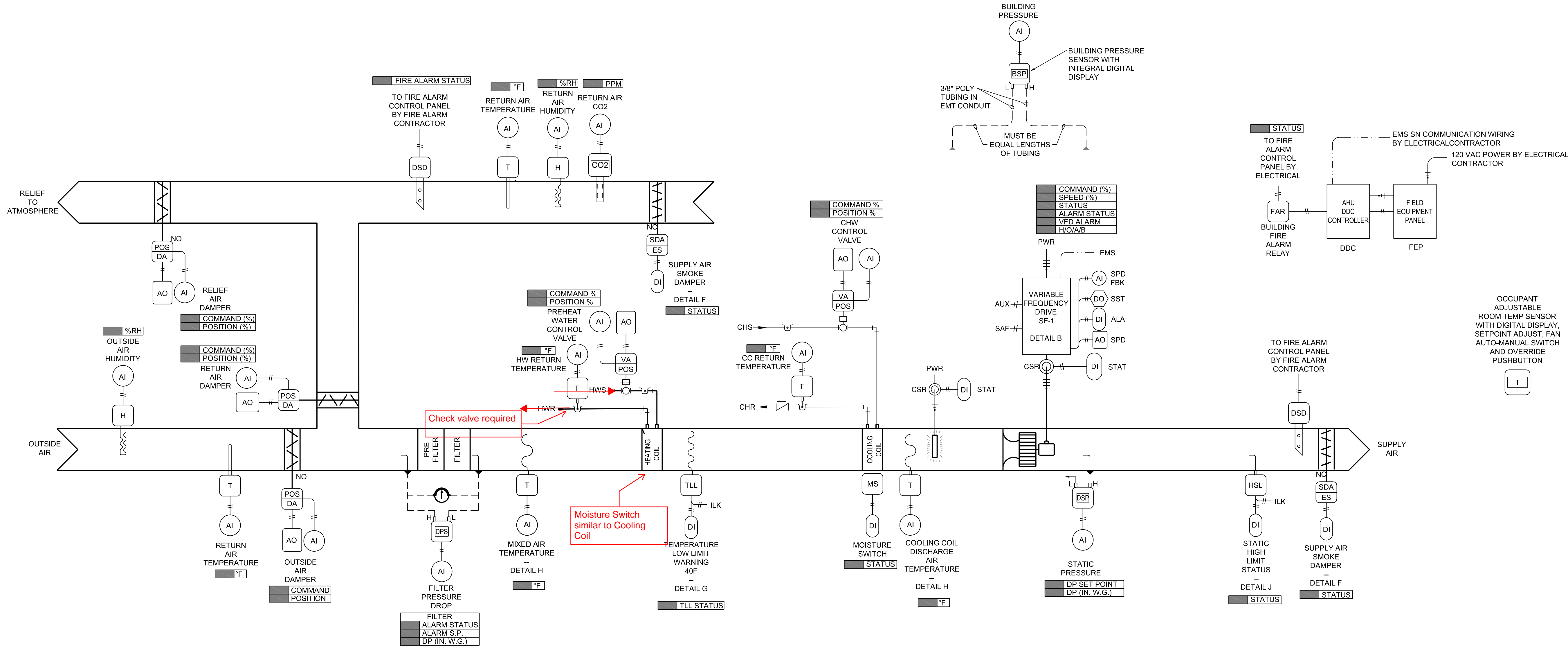
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FINAL BID SET

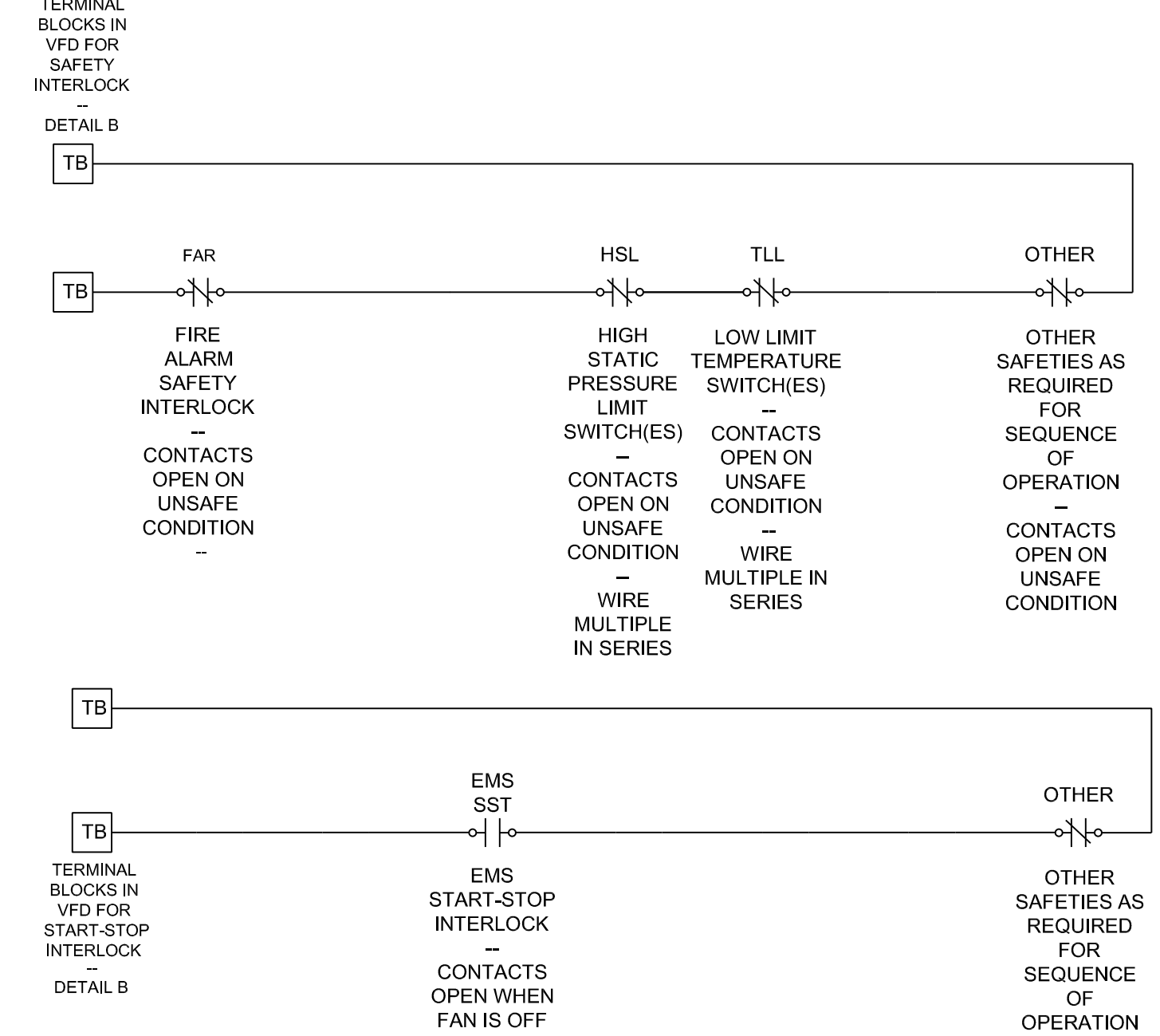
CORPORATE SEAL

ENGINEER SEAL

IDIQ CONTROL DRAWINGS
UNIVERSITY OF ARKANSAS
FAYETTEVILLE, ARKANSAS



1 CONSTANT VOLUME AIR HANDLING UNIT WITH PREHEAT
[AHU-CV-2]
NOT TO SCALE



2 VAV SUPPLY FAN VFD INTERLOCKS
NOT TO SCALE

SEQUENCE OF OPERATION:

SUPPLY FAN: STARTED AND STOPPED THROUGH PUSHBUTTONS AT THE VFD, OPERATOR COMMAND, OR BY THE DDC PANEL BASED UPON A WEEKLY OCCUPIED/LINOCOUPED SCHEDULE. THE FAN SHALL BE AUTOMATICALLY STOPPED BY THE FIRE ALARM PANEL, HIGH STATIC PRESSURE ALARM, OR THE LOW LIMIT IN THE EVENT OF AN UNSAFE OR ALARM CONDITION. THE FAN VFD SHALL BE MODULATED TO MAINTAIN A DISCHARGE AIR STATIC PRESSURE SET POINT AS ESTABLISHED BY THE TEST AND BALANCE CONTRACTOR. THE SPEED SHALL MODULATE TO OVERCOME SYSTEM PRESSURE DROPS (FILTER LOADING).

CHILL WATER CONTROL VALVES: WHEN THE FAN IS IN OPERATION, THE CHILL WATER CONTROL VALVE SHALL MODULATE AS REQUIRED TO MAINTAIN THE SPACE TEMPERATURE AT SET POINT (ADJUSTED AT THE THERMOSTAT) VIA SPACE RESET OF DISCHARGE AIR TEMPERATURE. THE CHILL WATER VALVES SHALL CLOSE WHEN THE SUPPLY FAN IS NOT IN OPERATION. IF THE LOW LIMIT TRIPS, THE CHILL WATER VALVES SHALL OPEN FULLY TO FLOW THROUGH THE COIL.

HEATING WATER CONTROL VALVE: WHEN THE FAN IS IN OPERATION, THE HEATING WATER CONTROL VALVE SHALL MODULATE AS REQUIRED TO MAINTAIN THE SPACE TEMPERATURE AT SET POINT (ADJUSTED AT THE THERMOSTAT) VIA SPACE RESET OF DISCHARGE AIR TEMPERATURE. THE HEATING WATER VALVE SHALL CLOSE WHEN THE SUPPLY FAN IS NOT IN OPERATION. IF THE LOW LIMIT TRIPS, THE HEATING WATER VALVE SHALL OPEN FULLY TO FLOW THROUGH THE COIL.

AIR DAMPERS: WHEN THE SUPPLY FAN IS IN OPERATION, THE OUTSIDE, RETURN, AND RELIEF DAMPERS SHALL MODULATE TO PROVIDE OUTSIDE AIR AS NEEDED TO PREVENT THE RETURN CO2 FROM EXCEEDING SET POINT. THE MIXED AIR SENSOR SHALL OVERRIDE THE OUTSIDE AND RELIEF DAMPER CLOSED AND THE RETURN DAMPER OPEN TO MAINTAIN A MINIMUM SET POINT (45 DEGREES, ADJUSTABLE). THE OUTSIDE AND RELIEF DAMPER SHALL CLOSE AND THE RETURN DAMPER SHALL OPEN WHEN THE UNIT IS NOT IN OPERATION.

MOISTURE DETECTOR TRIP: UPON ACTIVATION OF THE MOISTURE DETECTION SENSOR AN ALARM WILL BE GENERATED AND SENT TO THE EMS. THE UNIT SHALL BE SHUT DOWN, THE OUTSIDE AIR ACTUATOR SHALL BE COMMANDED CLOSED, AND ALL CONTROL VALVES WILL BE COMMANDED CLOSED.

GENERAL NOTES:

- IF EQUIPMENT (CHILLERS, PUMPS, ETC.) IS DISABLED DUE TO MAINTENANCE SHUTDOWN OR A FAULT CONDITION OR OVERRIDDEN, EQUIPMENT SHALL BE HIGHLIGHTED, OUTLINED, OR CHANGE COLORS.
- VARIABLE FREQUENCY DRIVES FURNISHED BY 230900, INSTALLED BY DIVISION 26.
- CONTROL VALVES, FLOW METERS, THERMOWELLS, AND TAPS ARE PROVIDED BY DIVISION 230900 AND INSTALLED BY DIVISION 23 IN LOCATIONS INDICATED BY THE CONTROL DIAGRAMS AND AS SPECIFIED. TRANSFORMERS ARE PROVIDED BY DIVISION 230900, INSTALLED BY DIVISION 26.
- ALL ACTUATORS, SENSORS, SWITCHES, TUBING, AND POINTS INDICATED ON THE PLANS ARE PROVIDED BY DIVISION 230900, UNLESS NOTED OTHERWISE.
- ALL POINTS AND COMPONENTS INDICATED ON THE CONTROL DRAWINGS ARE NEW, PROVIDED BY DIVISION 230900, UNLESS INDICATED OTHERWISE.
- EQUIPMENT PROVIDED WITH CONTROLLERS (CHILLERS, VARIABLE FREQUENCY DRIVES, ETC) SHALL COMMUNICATE DIRECTLY WITH THE BAS. ALL REQUIRED GATEWAYS AND ROUTERS SHALL BE PROVIDED WITH EQUIPMENT WHERE POSSIBLE. ALL AVAILABLE POINTS SHALL BE OBTAINED FROM THE EQUIPMENT CONTROLLER AND THE BAS SHALL PROVIDE SET POINTS, COMMANDS, ETC. TO THE EQUIPMENT PER THE SEQUENCE OF OPERATIONS.
- EQUIPMENT SHALL HAVE DEDICATED GRAPHICS PER SPECIFICATIONS. ALL COMMUNICATED POINTS SHALL BE AVAILABLE IN A LIST FORMAT WITH COMPLETE DESCRIPTIONS OF THE POINT, INCLUDING ALARMS. THE OPERATOR SHALL NOT HAVE TO REFER TO DOCUMENTATION TO DETERMINE WHAT THE POINT IS.
- VARIABLE FREQUENCY DRIVES SHALL INDICATE HAND, OFF, AUTO, AND BYPASS STATUS.
- CONTROL VALVES SHALL BE SELECTED WITH PROPER AUTHORITY FOR THEIR GIVEN APPLICATION.
- CONTROL WIRING BY DIVISION 230900.
- REFER TO IDIQ STANDARD SYSTEM VALVE SCHEDULE FOR VALVE AND PIPE SIZES FOR BASE PRICING.
- POWER WIRING BY DIVISION 26.
- ALL COMMUNICATED POINTS SHALL BE BROUGHT INTO THE BAS AND LABELED. REFERENCE TO ANOTHER DOCUMENT FOR ADDRESS DEFINITION IS NOT ACCEPTABLE.
- ALL EXISTING SAFETIES AND INTERLOCKS SHALL BE MAINTAINED.

GENERAL NOTE: THESE STANDARD SYSTEM DIAGRAMS AND SEQUENCES ARE DEVELOPED AS THE BASIS FOR DESIGN AND MAY NOT BE DIRECTLY APPLICABLE AS IS DUE TO EXISTING EQUIPMENT OR SYSTEM CAPABILITIES, OR DUE TO SYSTEM OR EQUIPMENT ARRANGEMENTS. IT IS THE RESPONSIBILITY OF THE ENGINEER OF RECORD TO MODIFY THESE DOCUMENTS AS REQUIRED FOR THE SPECIFIC CONDITIONS OF A PROJECT. REFER TO THE RFP DOCUMENTS FOR MODIFICATION PROCEDURES.

IO POINT MATRIX	I/O COUNT	INPUT DEVICE														OUTPUT DEVICE				TRACKING	
		ANALOG	DIGITAL	P	ANALOG	DIGITAL	TRIPPING	COV TREND	TOTALIZE	TOTALIZE MONTHLY											
		ANALOG INPUT	DIGITAL INPUT	PI	ANALOG OUTPUT	DIGITAL OUTPUT	RELAY	VALVE ACTUATOR	RELAY	VALVE ACTUATOR	UNIT TERM	IP RELAY									
SYSTEM / DESCRIPTION																					
OUTSIDE AIR TEMPERATURE		X														15min					
DAMPER COMMAND			X							X	X					10min					
FILTER ALARM			X														X				
MIXED AIR TEMPERATURE		X														5min					
PREHEAT VALVE OUT			X							X	X					5min					
LOW LIMIT ALARM			X														X				
COOLING COIL OUT		X								X	X					5min					
CHILL WATER RET TEMPERATURE		X														10min					
VFD SPEED OUT			X							X						5min					
VFD START STOP			X									X					X				
DISCHARGE AIR TEMPERATURE		X														5min					
ZONE TEMPERATURE		X															X				
REMOTE SETPOINT		X															X				
OUTSIDE AIR HUMIDITY		X														15min					
RETURN AIR TEMPERATURE		X														10min					
RETURN AIR CO2		X															X				
DISCHARGE DUCT PRESSURE		X														5min					
FAN STATUS		X															X				
DISCHARGE DUCT HIGH PRESSURE ALARM		X															X				

Moisture Switch, DI, Auxiliary Contact, COV Trend

MARK	DATE	DESCRIPTION
ISSUE DATE:	03/20/19	
PROJECT NUMBER:	04-18-0072	

SHEET TITLE:
CONSTANT VOLUME AHU WITH PREHEAT

SHEET NUMBER:
ATC4.00

FINAL BID SET

CORPORATE SEAL

ENGINEER SEAL

IDIQ CONTROL DRAWINGS

UNIVERSITY OF ARKANSAS
FAYETTEVILLE, ARKANSAS

MARK DATE DESCRIPTION

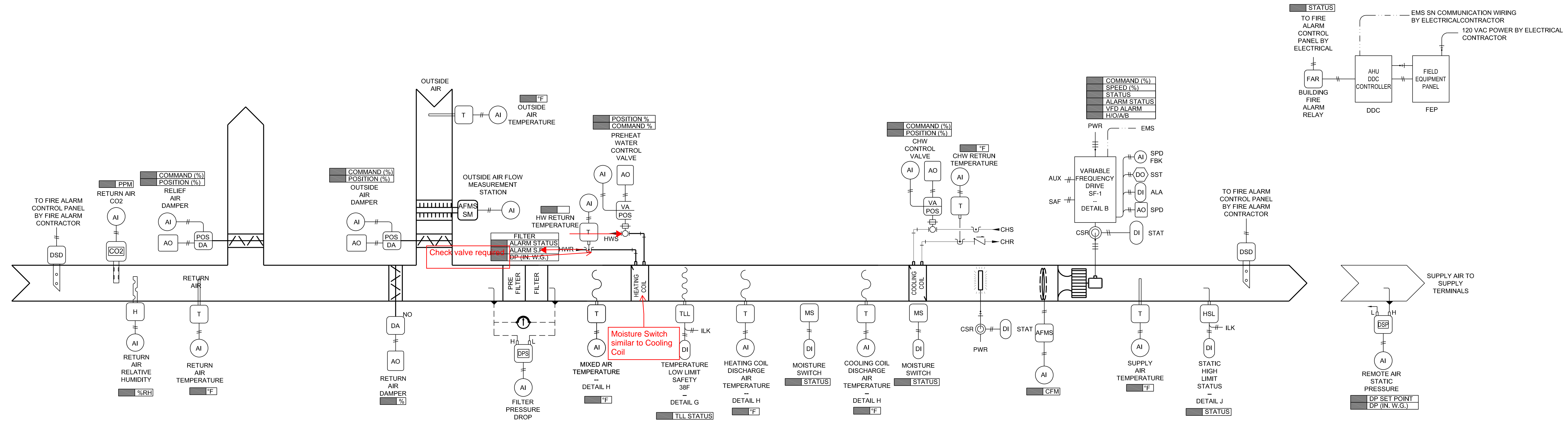
ISSUE DATE: 03/20/19

PROJECT NUMBER: 04-18-0072

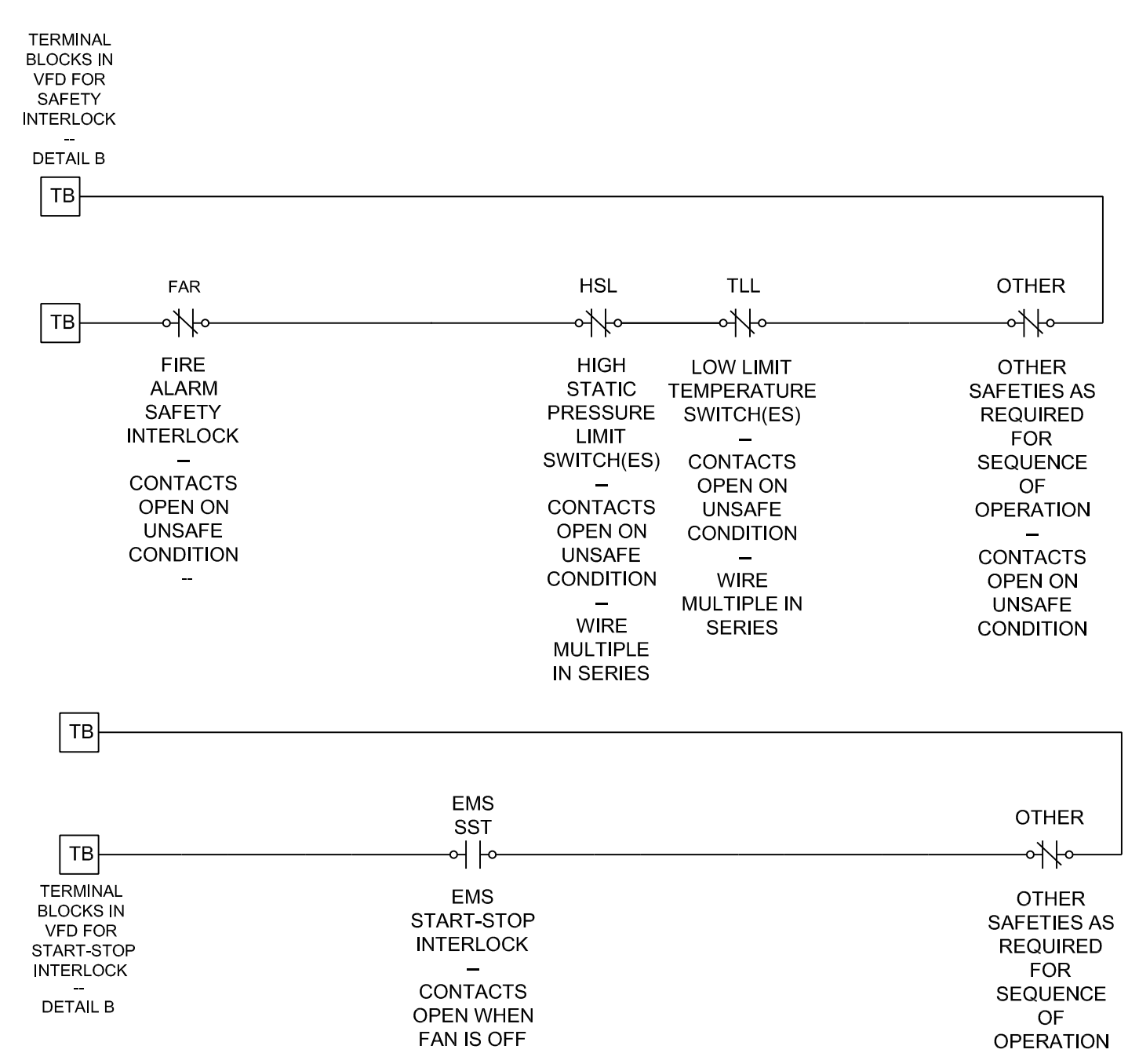
SHEET TITLE:
VARIABLE AIR VOLUME
AIR HANDLING UNIT
WITH PREHEAT

SHEET NUMBER:

ATC4.02



1 VARIABLE AIR VOLUME AIR HANDLING UNIT W/ PREHEAT
[AHU-VV]
NOT TO SCALE



2 VAV SUPPLY FAN VFD INTERLOCKS
NOT TO SCALE

SEQUENCE OF OPERATION:

AHU-VV - VARAIR VOL.

SEQUENCE OF OPERATION:

SUPPLY FAN: THE SUPPLY FAN SHALL BE STARTED AND STOPPED BY THE PUSH BUTTON SWITCH AT THE FAN VARIABLE FREQUENCY DRIVE. WHEN THE SWITCH IS IN THE LOCAL POSITION, THE FAN SHALL BE STARTED AND STOPPED LOCALLY AT THE VFD. WHEN THE SWITCH IS IN THE AUTO POSITION, THE FAN SHALL BE STARTED AND STOPPED BY THE DDC CONTROLLER BASED UPON A WEEKLY SCHEDULE, OPERATOR COMMAND, OR WHEN ANY OF THE ASSOCIATED VAV BOXES ARE IN OCCUPIED OR TEMPORARY OVERRIDE. THE SUPPLY FAN SHALL BE AUTOMATICALLY STOPPED BY THE FIRE ALARM SYSTEM, LOW LIMIT SWITCH, OR SUPPLY AIR HIGH STATIC PRESSURE ALARM WHENEVER AN UNSAFE CONDITION OCCURS. STATUS OF THE SUPPLY FAN SHALL BE MONITORED BY THE DDC CONTROLLER. THE SPEED OF THE SUPPLY FAN SHALL BE MODULATED TO MAINTAIN THE DUCT STATIC PRESSURE AT SET POINT (1.0' WC ADJUSTABLE). THE STATIC PRESSURE SET POINT SHALL BE RESET TO MAINTAIN THE MOST OPEN TERMINAL DAMPER AT 95%. ALL TERMINALS SHALL HAVE THE ABILITY TO BE EXCLUDED FROM THE CALCULATION.

OUTSIDE AIR DAMPER: THE OUTSIDE AIR DAMPER SHALL PROVIDE THE SCHEDULED AMOUNT OF OUTSIDE AIR (SET BY THE TEST AND BALANCE CONTRACTOR). THE RETURN AIR CO2 SENSOR SHALL MODULATE THE OUTSIDE AIR DAMPER TO MAINTAIN SET POINT. THE MIXED AIR SENSOR SHALL OVERRIDE THE OUTSIDE DAMPER CLOSED TO MAINTAIN A MINIMUM SET POINT (35 DEGREES, ADJUSTABLE). THE OUTSIDE AIR DAMPER SHALL CLOSE WHEN THE UNIT IS NOT IN OPERATION. IF CONDITIONS ALLOW FOR ECONOMIZER OPERATION, THE OUTSIDE, RETURN, AND RELIEF AIR DAMPER SHALL MODULATE IN TOGETHER IN SEQUENCE TO MEET THE MIXED AIR TEMPERATURE SETPOINT, WHICH WILL BE RESET BASED ON THE DISCHARGE AIR TEMPERATURE SETPOINT REQUIREMENTS. ECONOMIZER OPERATION WILL BE SUBJECT TO OVERRIDE BY PRIORITY OF THE MIXED AIR LOW-LIMIT SEQUENCE AND BUILDING PRESSURE.

CHILL WATER AND HEATING WATER VALVES: THE CHILL WATER AND THE HEATING WATER CONTROL VALVES SHALL MODULATE IN SEQUENCE TO MAINTAIN THE SUPPLY AIR TEMPERATURE AT SET POINT. THE SET POINT IS 55 DEG. F. (ADJUSTABLE). THE VALVES SHALL CLOSE WHEN THE SUPPLY FAN IS NOT IN OPERATION UPON A LOW LIMIT TRIP. THE VALVES SHALL BOTH OPEN FULLY TO FLOW THROUGH THE COIL. THE SUPPLY AIR TEMPERATURE SHALL BE RESET TO MAINTAIN THE HIGHEST TERMINAL COOLING LOOP OUTPUT AT 95%. ALL TERMINALS SHALL HAVE THE ABILITY TO BE EXCLUDED FROM THIS CALCULATION. THE SUPPLY AIR TEMPERATURE SHALL BE RESET TO MAINTAIN THE RETURN AIR HUMIDITY BELOW 55%. THE UNIT SHALL OPERATE TO THE LOWER SET POINT FROM THE TWO CONTROL METHODS.

FILTERS: THE FILTER PRESSURE DROP SHALL BE MONITORED BY FILTER ALARM FROM A DIFFERENTIAL PRESSURE SWITCH. IF THE PRESSURE DROP EXCEEDS THE SET POINT (0.5'WC, LOCAL ADJUSTMENT) AN ALARM SHALL BE SENT TO OPERATOR STATION.

MOISTURE DETECTOR TRIP: UPON ACTIVATION OF THE MOISTURE DETECTION SENSOR AN ALARM WILL BE GENERATED AND SENT TO THE EMS. THE UNIT SHALL BE SHUT DOWN, THE OUTSIDE AIR ACTUATOR SHALL BE COMMANDED CLOSED, AND ALL CONTROL VALVES WILL BE COMMANDED CLOSED.

GENERAL NOTES:

- CONTROL VALVES, FLOW METERS, THERMOWELLS, AND TAPS ARE PROVIDED BY DIVISION 230900 AND INSTALLED BY DIVISION 23 IN LOCATIONS INDICATED BY THE CONTROL DIAGRAMS AND AS SPECIFIED.
- ALL CONTROLLERS, ACTUATORS, SENSORS, SWITCHES, TUBING, AND POINTS INDICATED ON THE PLANS ARE PROVIDED AND INSTALLED BY DIVISION 230900, UNLESS NOTED OTHERWISE. CONTROL VALVES AND THERMOWELLS ARE PROVIDED BY DIVISION 230900, INSTALLED BY DIVISION 23. TRANSFORMERS ARE PROVIDED BY DIVISION 230900, INSTALLED BY DIVISION 26.
- ALL POINTS INDICATED ON THE CONTROL DRAWINGS ARE NEW, PROVIDED BY DIVISION 230900, UNLESS INDICATED OTHERWISE.
- A SINGLE TRANSFORMER CAN BE PROVIDED FOR UP TO 10 CONTROLLERS PROVIDED LENGTH OF RUNS AND ZONING IS TAKEN INTO CONSIDERATION.
- ATC CONTRACTOR SHALL TUNE ALL LOOPS AND TABLES FOR SMOOTH, STABLE OPERATION. NUMBERS INDICATED IN THESE DIAGRAMS ARE FOR A STARTING POINT ONLY. THESE DIAGRAMS REPRESENT THE BASIC FUNCTION OF THE CONTROLS SEQUENCE AND IS NOT ALL INCLUSIVE. THE ATC CONTRACTOR IS STILL REQUIRED TO PROVIDE, DEFINE, AND INDICATE ALL ALARMS, SET POINTS, AND FUNCTIONS REQUIRED TO ACHIEVE THE INTENT OF THE SEQUENCE, AND MAINTAINED ALL EQUIPMENT MANUFACTURER REQUIREMENTS. EQUIPMENT PROVIDED WITH CONTROLLERS (BOILERS, VARIABLE FREQUENCY DRIVES, ETC) SHALL COMMUNICATE DIRECTLY WITH THE BAS. ALL REQUIRED GATEWAYS AND ROUTERS SHALL BE PROVIDED WITH EQUIPMENT WHERE AVAILABLE. ALL AVAILABLE POINTS SHALL BE OBTAINED FROM THE EQUIPMENT CONTROLLER AND THE BAS SHALL PROVIDE SET POINTS, COMMANDS, ETC. TO THE EQUIPMENT PER THE SEQUENCE OF OPERATIONS.
- EQUIPMENT SHALL HAVE DEDICATED GRAPHICS PER SPECIFICATIONS. ALL COMMUNICATED POINTS SHALL BE AVAILABLE IN A LIST FORMAT WITH COMPLETE DESCRIPTIONS OF THE POINT, INCLUDING ALARMS. THE OPERATOR SHALL NOT HAVE TO REFER TO DOCUMENTATION TO DETERMINE WHAT THE POINT IS.
- VARIABLE FREQUENCY DRIVES SHALL INDICATE HAND, OFF, AUTO, AND BYPASS STATUS.
- CONTROL VALVES SHALL BE SELECTED WITH PROPER AUTHORITY FOR THEIR GIVEN APPLICATION.
- ATC CONTRACTOR SHALL MEET ALL REQUIREMENTS OF THE EQUIPMENT MANUFACTURER.
- IF EQUIPMENT (BOILERS, PUMPS, ETC.) IS DISABLED DUE TO MAINTENANCE SHUTDOWN OR A FAULT CONDITION, THE LEAD, LAG, LAG#1, ... STATUS OF THE REMAINING EQUIPMENT SHALL MOVE UP IN THE STAGING QUEUE AUTOMATICALLY. STAGING BASED ON RUN TIME. THE COMPONENT SHALL BE HIGHLIGHTED, OUTLINED, FLASH, OR CHANGE COLORS.
- THIS DIAGRAM, GRAPHICAL SEQUENCE, THE SCHEDULES, AND TABLES (ALARMS, SET POINTS, MODES OF OPERATION, ETC.) SHALL BE REPRESENTED AS A GRAPHIC ON THE BAS INCLUDING THE RESULTS OF AS-BUILT PROGRAMMING. THE GRAPHIC IS TO BE POPULATED WITH LIVE VALUES. SET POINTS SHALL BE ADJUSTABLE FROM THIS GRAPHIC AND LINKS SHALL BE PROVIDED TO TRENDDING GROUPS.
- THE SCHEDULES AND TABLES INDICATED ON THIS SHEET (ALARMS, SET POINTS, MODES OF OPERATION, ETC) SHALL BE PROVIDED AS GRAPHICS, EDITABLE FROM THE GRAPHICS.
- ALL POINTS ARE TO BE TRENDED AT 15 MINUTE INTERVALS AND BACKED UP AS SPECIFIED.
- TRENDDING GROUPS ARE IDENTIFIED ON THE SEQUENCE BY HEX NOTES. CONTRACTOR SHALL SET UP A TRENDDING GROUP GRAPHIC FOR THE HEX NOTE DESIGNATIONS LISTED. EACH TRENDDING GROUP SHALL CONTAIN ALL OF THE TRENDS WITH LIKE HEX NOTES. TRENDDING GROUPS SHALL BE TRENDED AT A MINIMUM OF 30 SECOND INTERVALS FOR A DURATION OF 48 HOURS.
- COORDINATE AIR FLOW MEASURING STATION LOCATION WITH SITE CONDITIONS AND MANUFACTURER'S REQUIREMENTS / RECOMMENDATIONS.

I/O POINT MATRIX	I/O COUNT	INPUT DEVICE										OUTPUT DEVICE				TRACKING	
		ANALOG	DIGITAL	ANALOG	DIGITAL	P	ANALOG	DIGITAL	DIGITAL	DIGITAL	DIGITAL	DIGITAL	DIGITAL	DIGITAL	DIGITAL	DIGITAL	DIGITAL
JOB NAME: VARIABLE AIR VOLUME AHU																	
SYSTEM / DESCRIPTION																	
OUTSIDE AIR TEMPERATURE		X															15 min
DAMPER COMMAND			X														10 min
FILTER ALARM				X													X
MIXED AIR TEMPERATURE		X			X												5 min
PREHEAT VALVE OUT			X														5 min
LOW LIMIT ALARM				X													X
PREHEAT TEMPERATURE		X															5 min
COOLING COIL OUT			X														5 min
CHILL WATER RET TEMPERATURE		X															10 min
VFD START STOP			X														5 min
VFD FAN STATUS			X														X
DISCHARGE AIR TEMPERATURE		X															5 min
DISCHARGE DUCT PRESSURE		X															5 min
RETURN AIR TEMPERATURE		X															10 min
RETURN AIR CO2		X															5 min

Moisture Switch, DI, Auxiliary Contact, COV Trend

GENERAL NOTE: THESE STANDARD SYSTEM DIAGRAMS AND SEQUENCES ARE DEVELOPED AS THE BASIS FOR DESIGN AND MAY NOT BE DIRECTLY APPLICABLE AS IS DUE TO EXISTING EQUIPMENT OR SYSTEM CAPABILITIES, OR DUE TO SYSTEM OR EQUIPMENT ARRANGEMENTS. IT IS THE RESPONSIBILITY OF THE ENGINEER OF RECORD TO MODIFY THESE DOCUMENTS AS REQUIRED FOR THE SPECIFIC CONDITIONS OF A PROJECT. REFER TO THE RFP DOCUMENTS FOR MODIFICATION PROCEDURES.

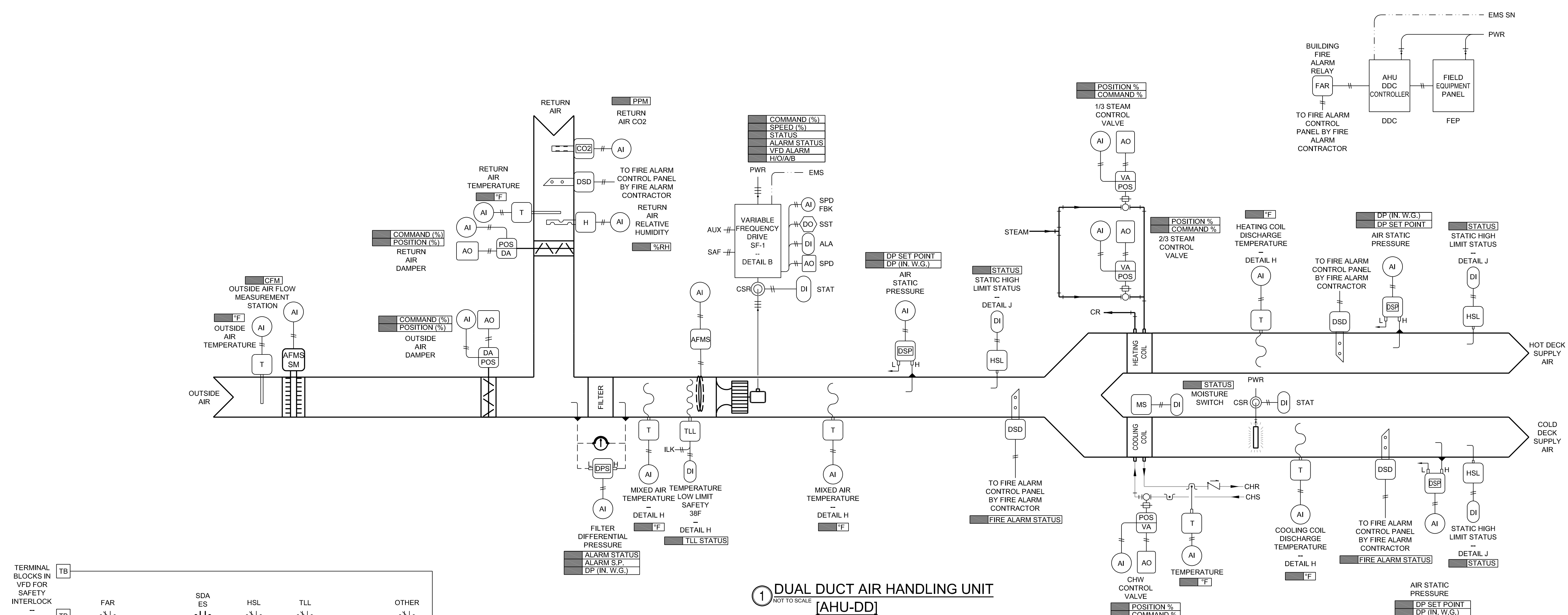
FINAL BID SET

CORPORATE SEAL

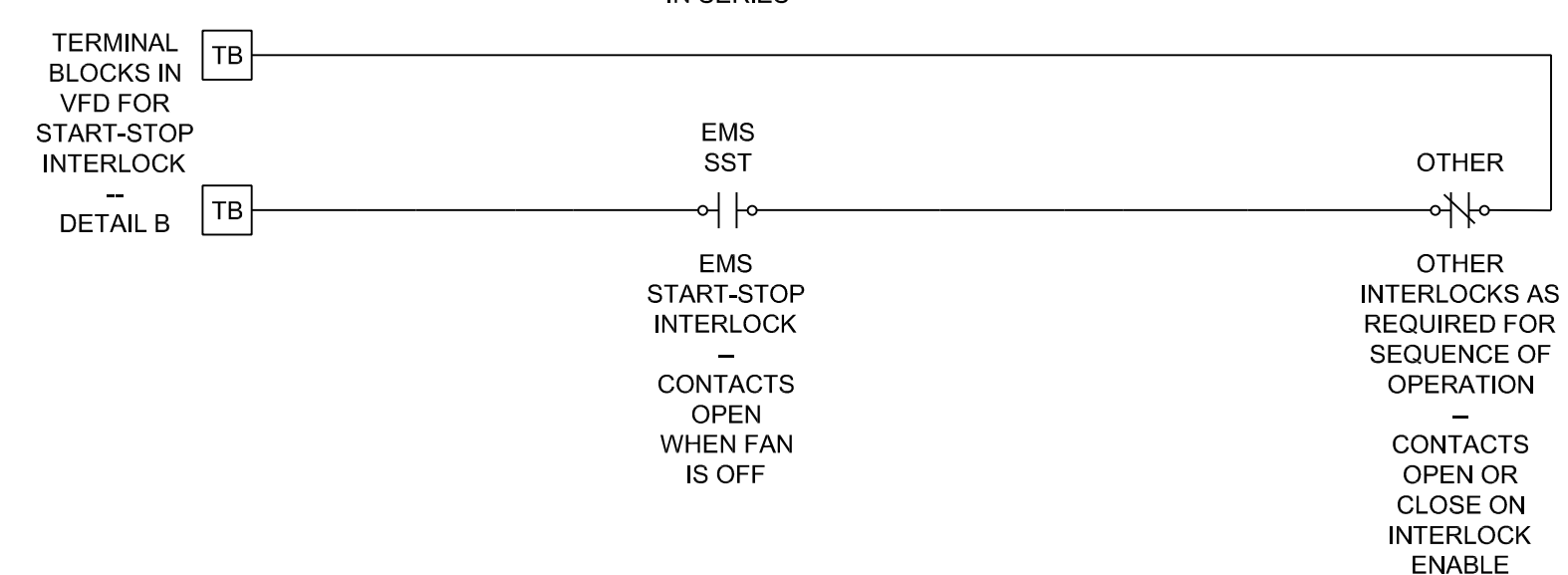
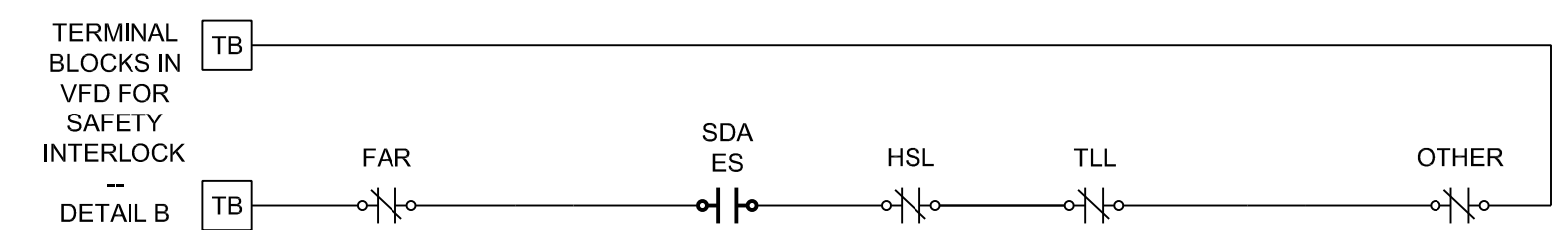
ENGINEER SEAL

IDIQ CONTROL DRAWINGS

UNIVERSITY OF ARKANSAS
FAYETTEVILLE, ARKANSAS



1 DUAL DUCT AIR HANDLING UNIT
[AHU-DD]
NOT TO SCALE



2 SUPPLY FAN VFD INTERLOCKS
NOT TO SCALE

SEQUENCE OF OPERATION:

SUPPLY FAN: THE SUPPLY FAN SHALL BE STARTED AND STOPPED BY THE LOCAL-OFF-AUTOMATIC SELECTOR AT THE VARIABLE FREQUENCY DRIVE (VFD). WHEN THE SWITCH IS IN THE LOCAL MODE THE FAN SHALL BE STARTED AND STOPPED LOCALLY AT THE VFD. WHEN THE SWITCH IS IN THE AUTO MODE THE FAN SHALL BE STARTED AND STOPPED BY THE DIGITAL CONTROLLER. THE FAN SHALL BE ON EXCEPT IN THE UNOCCUPIED MODE. WHEN UNOCCUPIED, IF THE SPACE TEMPERATURE EXCEEDS 74 DEGREES OR DECREASES BELOW 65 DEGREES AS SENSED BY ANY DUAL DUCT BOX SPACE SENSOR, THE UNIT SHALL CYCLE ON UNTIL SETPOINT HAS BEEN ACHIEVED. THE SUPPLY FAN SHALL ALSO BE AUTOMATICALLY STOPPED BY THE UNITS SMOKE DETECTORS, LOW LIMIT, OR HIGH STATIC PRESSURE ALARM WHENEVER AN UNSAFE CONDITION OCCURS THROUGH THE VFD SAFETY CIRCUIT. STATUS OF THE SUPPLY FAN SHALL BE MONITORED BY THE DIGITAL CONTROLLER. THE SPEED OF THE SUPPLY FAN SHALL BE MODULATED BY THE DIGITAL CONTROLLER AS REQUIRED TO MAINTAIN THE DUCT STATIC PRESSURE (LOWEST PRESSURE OF TWO DUCTS) AT SETPOINT (ADJUSTABLE). THE STATIC PRESSURE SET POINT SHALL BE RESET TO MAINTAIN THE MOST OPEN TERMINAL DAMPER AT 95%. ALL TERMINALS SHALL HAVE THE ABILITY TO BE EXCLUDED FROM THE CALCULATION.

HOT DECK: THE STEAM CONTROL VALVES SHALL BE MODULATED IN SEQUENCE BY THE DIGITAL CONTROLLER ANALOG OUTPUT TO MAINTAIN THE HOT DECK TEMPERATURE AT SETPOINT. SETPOINT SHALL BE RESET BASED ON OUTSIDE AIR TEMPERATURE FROM 110 DEGREES AT 40 DEGREES OUTSIDE AIR TO 80 DEGREES AT 70 DEGREES OUTSIDE AIR.

COLD DECK: THE CHILL WATER CONTROL VALVE SHALL BE MODULATED BY THE DIGITAL CONTROLLER ANALOG OUTPUT TO MAINTAIN THE COLD DECK TEMPERATURE AT SEPOINT (65 DEGREES ADJUSTABLE). THE SUPPLY AIR TEMPERATURE SHALL BE RESET TO MAINTAIN THE HIGHEST TERMINAL COOLING LOOP OUTPUT AT 95%. ALL TERMINALS SHALL HAVE THE ABILITY TO BE EXCLUDED FROM THIS CALCULATION. THE SUPPLY AIR TEMPERATURE SHALL ALSO BE CAPABLE OF BEING RESET IN ORDER TO MAINTAIN THE RETURN AIR HUMIDITY BELOW 55%. THE UNIT SHALL OPERATE TO THE LOWER SET POINT FROM THE TWO CONTROL METHODS.

OUTSIDE AIR DAMPER: THE OUTSIDE AIR DAMPER SHALL PROVIDE THE SCHEDULED AMOUNT OF OUTSIDE AIR (SET BY THE TEST AND BALANCE CONTRACTOR). THE RETURN AIR CO2 SENSOR SHALL MODULATE THE OUTSIDE AIR DAMPER TO MAINTAIN SET POINT. THE MIXED AIR SENSOR SHALL OVERRIDE THE OUTSIDE DAMPER CLOSED TO MAINTAIN A MINIMUM SET POINT (65 DEGREES, ADJUSTABLE). THE OUTSIDE AIR DAMPER SHALL CLOSE WHEN THE UNIT IS NOT IN OPERATION, IF CONDITIONS ALLOW FOR ECONOMIZER OPERATION. THE OUTSIDE AIR DAMPER SHALL MODULATE IN TOGETHER IN SEQUENCE TO MEET THE MIXED AIR TEMPERATURE SETPOINT, WHICH WILL BE RESET BASED ON THE DISCHARGE AIR TEMPERATURE SETPOINT REQUIREMENTS. ECONOMIZER OPERATION WILL BE SUBJECT TO OVERRIDE BY PRIORITY OF THE MIXED AIR LOW-LIMIT SEQUENCE.

FILTERS: THE FILTER PRESSURE DROP SHALL BE MONITORED BY THE DIGITAL CONTROLLER DIGITAL INPUT FROM A DIFFERENTIAL PRESSURE SWITCH. IF THE PRESSURE DROP EXCEEDS THE SETPOINT (0.5WVG ADJUSTABLE) AN ALARM SHALL BE GENERATED.

EXHAUST FAN: EXHAUST FAN SHALL BE COMMANDED ON WHEN AHU IS ON AND OFF WHEN AHU IS OFF.

MOISTURE DETECTOR: UPON ACTIVATION OF THE MOISTURE DETECTION SENSOR AN ALARM WILL BE GENERATED AND SENT TO THE EMS. THE UNIT SHALL BE SHUT DOWN. THE OUTSIDE AIR ACTUATOR SHALL BE COMMANDED CLOSED, AND ALL CONTROL VALVES WILL BE COMMANDED CLOSED.

GENERAL NOTES:

- CONTROL VALVES, FLOW METERS, THERMOWELLS, AND TAPS ARE PROVIDED BY DIVISION 230900 AND INSTALLED BY DIVISION 23 IN LOCATIONS INDICATED BY THE CONTROL DIAGRAMS AND AS SPECIFIED.
- ALL CONTROLLERS, ACTUATORS, SENSORS, SWITCHES, TUBING, AND POINTS INDICATED ON THE PLANS ARE PROVIDED AND INSTALLED BY DIVISION 230900, UNLESS NOTED OTHERWISE. CONTROL VALVES AND THERMOWELLS ARE PROVIDED BY DIVISION 230900, INSTALLED BY DIVISION 23. TRANSFORMERS ARE PROVIDED BY DIVISION 230900, INSTALLED BY DIVISION 26.
- ALL POINTS INDICATED ON THE CONTROL DRAWINGS ARE NEW, PROVIDED BY DIVISION 230900, UNLESS INDICATED OTHERWISE.
- A SINGLE TRANSFORMER CAN BE PROVIDED FOR UP TO 10 CONTROLLERS PROVIDED LENGTH OF RUNS AND ZONING IS TAKEN INTO CONSIDERATION.
- ATC CONTRACTOR SHALL TUNE ALL LOOPS AND TABLES FOR SMOOTH, STABLE OPERATION. NUMBERS INDICATED IN THESE DIAGRAMS ARE FOR A STARTING POINT ONLY. THESE DIAGRAMS REPRESENT THE BASIC FUNCTION OF THE CONTROL SEQUENCE AND IS NOT ALL INCLUSIVE. THE ATC CONTRACTOR IS STILL REQUIRED TO PROVIDE, DEFINE, AND INDICATE ALL ALARMS, SET POINTS, AND FUNCTIONS REQUIRED TO ACHIEVE THE INTENT OF THE SEQUENCE, AND MAINTAINED ALL EQUIPMENT MANUFACTURER REQUIREMENTS.
- EQUIPMENT PROVIDED WITH CONTROLLERS (BOILERS, VARIABLE FREQUENCY DRIVES, ETC) SHALL COMMUNICATE DIRECTLY WITH THE BAS. ALL REQUIRED GATEWAYS AND ROUTERS SHALL BE PROVIDED WITH EQUIPMENT WHERE AVAILABLE. ALL AVAILABLE POINTS SHALL BE OBTAINED FROM THE EQUIPMENT CONTROLLER AND THE BAS SHALL PROVIDE SET POINTS, COMMANDS, ETC. TO THE EQUIPMENT PER THE SEQUENCE OF OPERATIONS.
- EQUIPMENT SHALL HAVE DEDICATED GRAPHICS PER SPECIFICATIONS. ALL COMMUNICATED POINTS SHALL BE AVAILABLE IN A LIST FORMAT WITH COMPLETE DESCRIPTIONS OF THE POINT, INCLUDING ALARMS. THE OPERATOR SHALL NOT HAVE TO REFER TO DOCUMENTATION TO DETERMINE WHAT THE POINT IS.
- VARIABLE FREQUENCY DRIVES SHALL INDICATE HAND, OFF, AUTO, AND BYPASS STATUS.
- CONTROL VALVES SHALL BE SELECTED WITH PROPER AUTHORITY FOR THEIR GIVEN APPLICATION.
- ATC CONTRACTOR SHALL MEET ALL REQUIREMENTS OF THE EQUIPMENT MANUFACTURER.
- IF EQUIPMENT (BOILERS, PUMPS, ETC.) IS DISABLED DUE TO MAINTENANCE SHUTDOWN OR A FAULTY CONDITION, THE LEAD, LAG, LAG1, ... STATUS OF THE REMAINING EQUIPMENT SHALL MOVE UP IN THE STAGING QUEUE AUTOMATICALLY. STAGING BASED ON RUN TIME. THE COMPONENT SHALL BE HIGHLIGHTED, OUTLINED, FLASH, OR CHANGE COLORS.
- THIS DIAGRAM, GRAPHICAL SEQUENCE, THE SCHEDULES, AND TABLES (ALARMS, SET POINTS, MODES OF OPERATION, ETC) SHALL BE PROVIDED AS GRAPHICS, EDITABLE FROM THE GRAPHICS.
- ALL POINTS ARE TO BE TRENDED AT 15 MINUTE INTERVALS AND BACKED UP AS SPECIFIED.
- TRENDING GROUPS ARE IDENTIFIED ON THE SEQUENCE BY HEX NOTES. CONTRACTOR SHALL SET UP A TREND GROUP GRAPHIC FOR THE HEX NOTE DESIGNATIONS LISTED. EACH TREND GROUP SHALL CONTAIN ALL OF THE TRENDS WITH LIKE HEX NOTES. TREND GROUPS SHALL BE TRENDED AT A MINIMUM OF 30 SECOND INTERVALS FOR A DURATION OF 48 HOURS.
- COORDINATE AIR FLOW MEASURING STATION LOCATION WITH SITE CONDITIONS AND MANUFACTURER'S REQUIREMENTS / RECOMMENDATIONS.

GENERAL NOTE: THESE STANDARD SYSTEM DIAGRAMS AND SEQUENCES ARE DEVELOPED AS THE BASIS FOR DESIGN AND MAY NOT BE DIRECTLY APPLICABLE AS IS DUE TO EXISTING EQUIPMENT OR SYSTEM CAPABILITIES, OR DUE TO SYSTEM OR EQUIPMENT ARRANGEMENTS. IT IS THE RESPONSIBILITY OF THE ENGINEER OF RECORD TO MODIFY THESE DOCUMENTS AS REQUIRED FOR THE SPECIFIC CONDITIONS OF A PROJECT. REFER TO THE RFP DOCUMENTS FOR MODIFICATION PROCEDURES.

JOB NAME: DUAL DUCT AHU	I/O COUNT		INPUT DEVICE										OUTPUT DEVICE										TRACKING	
	ANALOG	DIGITAL	ANALOG	DIGITAL	P	ANALOG	DIGITAL	P	ANALOG	DIGITAL	P	ANALOG	DIGITAL	P	ANALOG	DIGITAL	P	TOTAL	MONTY					
SYSTEM / DESCRIPTION																								
OUTSIDE AIR TEMPERATURE	X																							
DAMPER COMMAND		X																						
FILTER ALARM		X																						
VFD SPEED OUT		X																						
VFD START STOP		X																						
VFD FAN STATUS		X																						
MIXED AIR TEMPERATURE		X																						
DISCHARGE HIGH PRESSURE ALARM		X																						
STEAM VALVE OUTPUT		X																						
COOLING COIL OUT		X																						
HOT DUCT STATIC PRESSURE		X																						
COLD DUCT STATIC PRESSURE		X																						
RETURN AIR TEMPERATURE		X																						
CHILL WATER RET TEMPERATURE		X																						
DISCHARGE DUCT PRESSURE		X																						
DISCHARGE AIR TEMPERATURE		X																						

Moisture Switch, DI, Auxiliary Contact, COV Trend

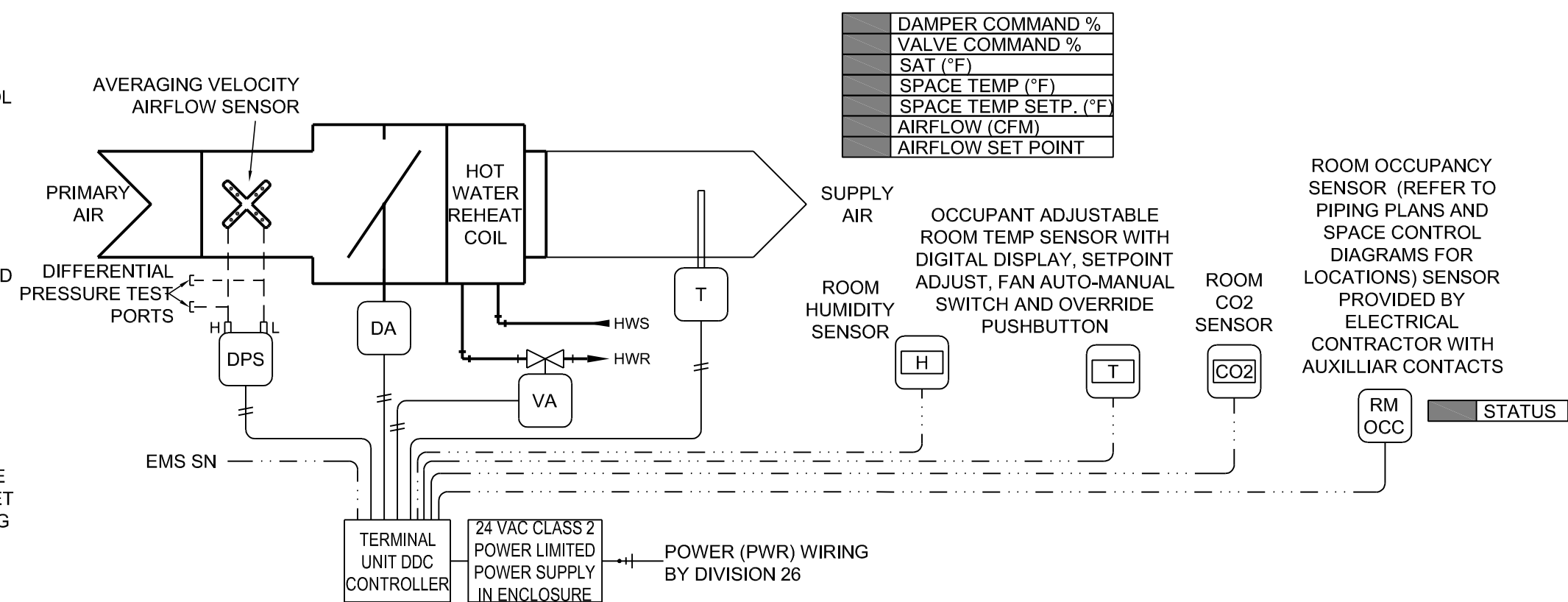
MARK	DATE	DESCRIPTION
ISSUE DATE:	03/20/19	
PROJECT NUMBER:	04-18-0072	

SHEET TITLE:
DUAL DUCT AIR HANDLING UNIT

SHEET NUMBER:
ATC4.03

GENERAL NOTES:

- POWER WIRING BY DIVISION 26.
- CONTROL WIRING BY DIVISION 230900.
- ALL CONTROLLERS, ACTUATORS, SENSORS, SWITCHES, TUBING, AND POINTS INDICATED ON THE PLANS ARE PROVIDED AND INSTALLED BY DIVISION 230900, UNLESS NOTED OTHERWISE. CONTROL VALVES AND THERMOWELLS ARE PROVIDED BY DIVISION 230900, INSTALLED BY DIVISION 23. TRANSFORMERS ARE PROVIDED BY DIVISION 230900, INSTALLED BY DIVISION 26.
- ALL POINTS INDICATED ON THE CONTROL DRAWINGS ARE NEW, PROVIDED BY DIVISION 230900, UNLESS INDICATED OTHERWISE.
- A SINGLE TRANSFORMER CAN BE PROVIDED FOR UP TO 10 CONTROLLERS PROVIDED LENGTH OF RUNS AND ZONING IS TAKEN INTO CONSIDERATION.
- REFER TO MECHANICAL SHEETS FOR FINAL COUNTS, LOCATIONS, PIPE SIZES, AND DUCT SIZES.
- IF MULTIPLE TERMINALS SERVE THE SAME AREA, ONE OF THE CONTROLLERS WILL BE DESIGNATED AS THE MASTER CONTROLLER AND ALL OTHER CONTROLLERS WILL BE DESIGNATED AS SLAVE CONTROLLERS. VALVE AND DAMPER ACTUATORS OF THE SLAVE CONTROLLERS WILL TRACK THOSE OF THE MASTER TERMINAL.
- IF COMPONENT IS DISABLED DUE TO MAINTENANCE SHUTDOWN OR A FAULT CONDITION, COMPONENT SHALL BE HIGHLIGHTED, OUTLINED, FLASH, OR CHANGE COLORS.
- THIS GRAPHIC SHALL BE REPRESENTED ON THE BAS, INCLUDING THE RESULTS OF AS-BUILT CONDITIONS. THE GRAPHIC IS TO BE POPULATED WITH LIVE VALUES. SET POINTS SHALL BE ADJUSTABLE FROM THIS GRAPHIC AND LINKS SHALL BE PROVIDED TO TRENDING GROUPS.
- THIS GRAPHICAL SEQUENCE SHALL BE REPRESENTED AS A GRAPHIC ON THE BAS, INCLUDING THE RESULTS OF AS-BUILT PROGRAMMING. THE GRAPHIC IS TO BE POPULATED WITH LIVE VALUES. SET POINTS SHALL BE ADJUSTABLE FROM THIS GRAPHIC AND LINKS SHALL BE PROVIDED TO TRENDING GROUPS.
- THE SCHEDULES AND TABLES INDICATED ON THIS SHEET (ALARMS, SET POINTS, MODES OF OPERATION, ETC) SHALL BE PROVIDED AS GRAPHICS, EDITABLE FROM THE GRAPHICS.
- ALL POINTS ARE TO BE TRENDED AT 15 MINUTE INTERVALS AND BACKED UP AS SPECIFIED.
- TRENDING GROUPS ARE IDENTIFIED ON THE SEQUENCE BY HEX NOTES. CONTRACTOR SHALL SET UP A TREND GROUP GRAPHIC FOR THE HEX NOTE DESIGNATIONS LISTED. EACH TREND GROUP SHALL CONTAIN ALL OF THE TRENDS WITH LIKE HEX NOTES. TREND GROUPS SHALL BE TRENDED AT A MINIMUM OF 30 SECOND INTERVALS FOR A MINIMUM DURATION OF 48 HOURS.
- ATC CONTRACTOR SHALL TUNE ALL LOOPS AND TABLES FOR SMOOTH, STABLE OPERATION. NUMBERS INDICATED IN THESE DIAGRAMS ARE FOR A STARTING POINT ONLY. THESE DIAGRAMS REPRESENT THE BASIC FUNCTION OF THE CONTROLS SEQUENCE AND IS NOT ALL INCLUSIVE. THE ATC CONTRACTOR IS STILL REQUIRED TO PROVIDE, DEFINE, AND INDICATE ALL ALARMS, SET POINTS, AND FUNCTIONS REQUIRE TO ACHIEVE THE INTENT OF THE SEQUENCE, AND MAINTAINED ALL EQUIPMENT MANUFACTURER REQUIREMENTS.



① VAV SUPPLY TERMINAL WITH HOT WATER REHEAT - OFFICE/CORRIDOR
NOT TO SCALE
[VAV-OFF/CORR]

SEQUENCE OF OPERATION:

MODES OF OPERATION: AIR TERMINAL MODE OF OPERATION IS EITHER "OCCUPIED", "STANDBY", OR "UNOCCUPIED". OCCUPIED AND UNOCCUPIED MODES ARE DETERMINED BASED ON A CALENDAR AND TIME OF DAY SCHEDULE. STANDBY MODE IS DETERMINED DURING THE OCCUPIED MODE WITH INPUT FROM OCCUPANCY SENSOR. UNOCCUPIED MODE CAN BE OVERRIDDEN TO OCCUPIED MODE BY EITHER BUTTON AT THERMOSTAT FOR 2 HOURS (ADJUSTABLE) OR BY OCCUPANCY SENSOR. TERMINAL CONTROLLER SHALL MODULATE THE TERMINAL DAMPER AND THE HEATING SUPPLY CONTROL VALVE AS REQUIRED TO MAINTAIN THE SPACE TEMPERATURE AT SETPOINT.

OCCUPIED MODE: DURING THE "OCCUPIED" MODE OF OPERATION, THE SET POINT SHALL BE ADJUSTED THROUGH THE DDC CONTROL PANEL BETWEEN A MINIMUM OF 71 DEG. F AND MAXIMUM OF 75 DEG. F. THERE SHALL BE A 1 DEG. F. DEAD BAND ON EITHER SIDE OF THE SETPOINT. ON A CALL FOR COOLING, THE TERMINAL DAMPER SHALL BE MODULATED BETWEEN THE COOLING MINIMUM AND THE COOLING MAXIMUM AIR FLOW RATES SCHEDULED. ON A CALL FOR HEATING, THE CONTROL VALVE SHALL BE MODULATED FROM CLOSED TO OPEN, THEN THE TERMINAL DAMPER SHALL BE MODULATED BETWEEN THE HEATING MINIMUM AND THE MAXIMUM AIR FLOW RATES SCHEDULED. IF THE LEAVING HEATING SUPPLY TEMPERATURE EXCEEDS THE SPACE TEMP BY 15 DEG. F. (ADJ), THE SUPPLY AIR SHALL BE MODULATED UP TO MAXIMUM AIRFLOW RATE AS REQUIRED TO PREVENT THE 15 DEG. F. SET POINT FROM BEING EXCEEDED.

STANDBY MODE: WHEN A SPACE MOTION DETECTOR IS PRESENT AND SENSES OCCUPANCY, MODE OF OPERATION SHALL BE "OCCUPIED". IF SENSOR DOES NOT SENSE OCCUPANCY, THEN SPACE WILL BE IN STANDBY MODE. DURING THE "STANDBY" MODE OF OPERATION, THE SET POINT SHALL BE ADJUSTED THROUGH THE DDC CONTROL PANEL BETWEEN A MINIMUM OF 71 DEG. F AND MAXIMUM OF 75 DEG. F. THERE SHALL BE A 3 DEG. F. DEAD BAND ON EITHER SIDE OF THE SETPOINT. ON A CALL FOR COOLING, THE TERMINAL DAMPER SHALL BE MODULATED BETWEEN THE COOLING MINIMUM AND THE COOLING MAXIMUM AIR FLOW RATES SCHEDULED. ON A CALL FOR HEATING, THE CONTROL VALVE SHALL BE MODULATED FROM CLOSED TO OPEN, THEN THE TERMINAL DAMPER SHALL BE MODULATED BETWEEN THE HEATING MINIMUM AND THE MAXIMUM AIR FLOW RATES SCHEDULED. IF THE LEAVING HEATING SUPPLY TEMPERATURE EXCEEDS THE SPACE TEMP BY 15 DEG. F. (ADJ), THE SUPPLY AIR SHALL BE MODULATED UP TO MAXIMUM AIRFLOW RATE AS REQUIRED TO PREVENT THE 15 DEG. F. SET POINT FROM BEING EXCEEDED.

UNOCCUPIED MODE: DURING THE "UNOCCUPIED" MODE OF OPERATION, THE SET POINT SHALL BE ADJUSTED THROUGH THE DDC CONTROL PANEL BETWEEN A MINIMUM OF 71 DEG. F AND MAXIMUM OF 75 DEG. F. THERE SHALL BE A 6 DEG. F. DEAD BAND ON EITHER SIDE OF THE SETPOINT. ON A CALL FOR COOLING, THE TERMINAL DAMPER SHALL BE MODULATED BETWEEN THE COOLING MINIMUM AND THE COOLING MAXIMUM AIR FLOW RATES SCHEDULED. ON A CALL FOR HEATING, THE CONTROL VALVE SHALL BE MODULATED FROM CLOSED TO OPEN, THEN THE TERMINAL DAMPER SHALL BE MODULATED BETWEEN THE HEATING MINIMUM AND THE MAXIMUM AIR FLOW RATES SCHEDULED. IF THE LEAVING HEATING SUPPLY TEMPERATURE EXCEEDS THE SPACE TEMP BY 15 DEG. F. (ADJ), THE SUPPLY AIR SHALL BE MODULATED UP TO MAXIMUM AIRFLOW RATE AS REQUIRED TO PREVENT THE 15 DEG. F. SET POINT FROM BEING EXCEEDED.

DEHUMIDIFICATION OPERATION: IF THE ZONE SERVED BY TERMINAL UNIT CONTAINS A HUMIDITY SENSOR, THE SPACE HUMIDITY SENSOR SHALL BE UTILIZED TO DROP THE SUPPLY TEMPERATURE AIR SET POINT AT THE AHU.

IO POINT MATRIX	I/O COUNT	INPUT DEVICE												OUTPUT DEVICE					TRACKING																
		ANALOG	DIGITAL						P	ANALOG	DIGITAL																								
JOB NAME: AIR TERMINAL UNIT WITH HOT WATER REHEAT - OFFICE/CORRIDOR	ANALOG INPUT	DIGITAL INPUT	TEMPERATURE	HUMIDITY	PRESSURE	CO2 SENSOR	FLOW	UNIT TERM	NETWORKED INPUT	DRY CONTACT	CURRENT SWITCH	RELAY	LOW TEMP. CUTOFF	PRESSURE SWITCH	DUCT SMOKE	AUXILIARY CONTACT	UNIT TERM	NETWORKED POINT	0-10V/2-20mA	DAMPER ACTUATOR	VALVE ACTUATOR	PNEUMATIC TRANSDUCER	UNIT TERM	RELAY	DAMPER ACTUATOR	VALVE ACTUATOR	UNIT TERM	EP RELAY	TRENDING	COV TREND	TOTALIZE	TOTALIZE MONTHLY			
SYSTEM / DESCRIPTION																																			
SUPPLY AIRFLOW	X																																	15 min	
DAMPER COMMAND		X																			X	X												10 min	
DISCHARGE AIR TEMPERATURE		X		X																														10 min	
ZONE TEMPERATURE		X																																	
REHEAT VALVE OUTPUT			X																		X	X												5 min	
REMOTE SETPOINT		X																																	
MOTION SENSOR		X																																	

FINAL BID SET

ENGINEER SEAL

IDIQ CONTROL DRAWINGS
UNIVERSITY OF ARKANSAS
FAYETTEVILLE, ARKANSAS

MARK	DATE	DESCRIPTION
ISSUE DATE:	03/20/19	
PROJECT NUMBER:	04-18-0072	
SHEET TITLE: AIR TERMINAL UNIT WITH HOT WATER REHEAT - OFFICE/CORRIDOR		
SHEET NUMBER: ATC5.05		

GENERAL NOTE: THESE STANDARD SYSTEM DIAGRAMS AND SEQUENCES ARE DEVELOPED AS THE BASIS FOR DESIGN AND MAY NOT BE DIRECTLY APPLICABLE AS IS DUE TO EXISTING EQUIPMENT OR SYSTEM CAPABILITIES, OR DUE TO SYSTEM OR EQUIPMENT ARRANGEMENTS. IT IS THE RESPONSIBILITY OF THE ENGINEER OF RECORD TO MODIFY THESE DOCUMENTS AS REQUIRED FOR THE SPECIFIC CONDITIONS OF A PROJECT. REFER TO THE RFP DOCUMENTS FOR MODIFICATION PROCEDURES.

FINAL BID SET

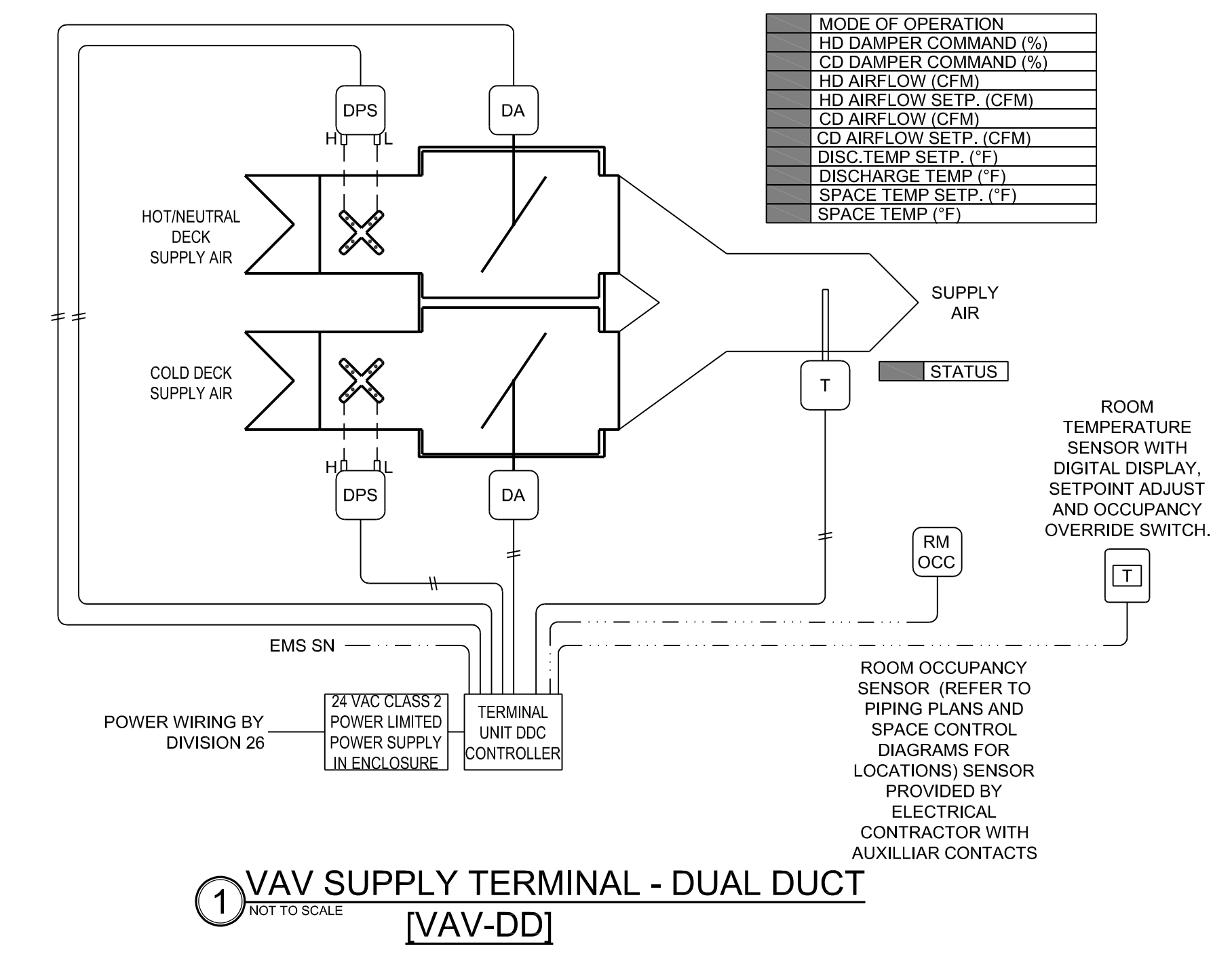
CORPORATE SEAL

ENGINEER SEAL

IDIQ CONTROL DRAWINGS
UNIVERSITY OF ARKANSAS
FAYETTEVILLE, ARKANSAS

GENERAL NOTES:

- POWER WIRING BY DIVISION 26.
- CONTROL WIRING BY DIVISION 23/9000.
- ALL CONTROLLERS, ACTUATORS, SENSORS, SWITCHES, TUBING, AND POINTS INDICATED ON THE PLANS ARE PROVIDED AND INSTALLED BY DIVISION 23/9000, UNLESS NOTED OTHERWISE. CONTROL VALVES AND THERMOWELLS ARE PROVIDED BY DIVISION 23/9000, INSTALLED BY DIVISION 23. TRANSFORMERS ARE PROVIDED BY DIVISION 23/9000, UNLESS INDICATED OTHERWISE.
- ALL POINTS INDICATED ON THE CONTROL DRAWINGS ARE NEW, PROVIDED BY DIVISION 23/9000, UNLESS INDICATED OTHERWISE.
- A SINGLE TRANSFORMER CAN BE PROVIDED FOR UP TO 10 CONTROLLERS PROVIDED LENGTH OF RUNS AND ZONING IS TAKEN INTO CONSIDERATION.
- REFER TO MECHANICAL SHEETS FOR FINAL COUNTS, LOCATIONS, PIPE SIZES, AND DUCT SIZES.
- IF MULTIPLE TERMINALS SERVE THE SAME AREA, ONE OF THE CONTROLLERS WILL BE DESIGNATED AS THE MASTER CONTROLLER AND ALL OTHER CONTROLLERS WILL BE DESIGNATED AS SLAVE CONTROLLERS. VALVE AND DAMPER ACTUATORS OF THE SLAVE CONTROLLERS WILL TRACK THOSE OF THE MASTER TERMINAL.
- IF COMPONENT IS DISABLED DUE TO MAINTENANCE SHUTDOWN OR A FAULT CONDITION, COMPONENT SHALL BE HIGHLIGHTED, OUTLINED, FLASH, OR CHANGE COLORS.
- THIS GRAPHIC SHALL BE REPRESENTED ON THE BAS, INCLUDING THE RESULTS OF AS-BUILT CONDITIONS. THE GRAPHIC IS TO BE POPULATED WITH LIVE VALUES. SET POINTS SHALL BE ADJUSTABLE FROM THIS GRAPHIC AND LINKS SHALL BE PROVIDED TO TRENDING GROUPS.
- THIS GRAPHICAL SEQUENCE SHALL BE REPRESENTED AS A GRAPHIC ON THE BAS, INCLUDING THE RESULTS OF AS-BUILT PROGRAMMING. THE GRAPHIC IS TO BE POPULATED WITH LIVE VALUES. SET POINTS SHALL BE ADJUSTABLE FROM THIS GRAPHIC AND LINKS SHALL BE PROVIDED TO TRENDING GROUPS.
- THE SCHEDULES AND TABLES INDICATED ON THIS SHEET (ALARMS, SET POINTS, MODES OF OPERATION, ETC) SHALL BE PROVIDED AS GRAPHICS, EDITABLE FROM THE GRAPHICS.
- ALL POINTS ARE TO BE TRENDED AT 15 MINUTE INTERVALS AND BACKED UP AS SPECIFIED.
- TRENDING GROUPS ARE IDENTIFIED ON THE SEQUENCE BY HEX NOTES. CONTRACTOR SHALL SET UP A TREND GROUP GRAPHIC FOR THE HEX NOTE DESIGNATIONS LISTED. EACH TREND GROUP SHALL CONTAIN ALL OF THE TRENDS WITH LIKE HEX NOTES. TREND GROUPS SHALL BE TRENDED AT A MINIMUM OF 30 SECOND INTERVALS FOR A MINIMUM DURATION OF 48 HOURS.
- ATC CONTRACTOR SHALL TUNE ALL LOOPS AND TABLES FOR SMOOTH, STABLE OPERATION. NUMBERS INDICATED IN THESE DIAGRAMS ARE FOR A STARTING POINT ONLY. THESE DIAGRAMS REPRESENT THE BASIC FUNCTION OF THE CONTROLS SEQUENCE AND IS NOT ALL INCLUSIVE. THE ATC CONTRACTOR IS STILL REQUIRED TO PROVIDE, DEFINE, AND INDICATE ALL ALARMS, SET POINTS, AND FUNCTIONS REQUIRED TO ACHIEVE THE INTENT OF THE SEQUENCE, AND MAINTAINED ALL EQUIPMENT MANUFACTURER REQUIREMENTS.



SEQUENCE OF OPERATION:

MODES OF OPERATION: AIR TERMINAL MODE OF OPERATION IS EITHER "OCCUPIED", "STANDBY", OR "UNOCCUPIED". OCCUPIED AND UNOCCUPIED MODES ARE DETERMINED BASED ON A CALENDAR AND TIME OF DAY SCHEDULE. STANDBY MODE IS DETERMINED DURING THE OCCUPIED MODE WITH INPUT FROM OCCUPANCY SENSOR. UNOCCUPIED MODE CAN BE OVERRIDDEN TO OCCUPIED MODE BY EITHER BUTTON AT THERMOSTAT FOR 2 HOURS (ADJUSTABLE) OR BY OCCUPANCY SENSORS.

OCCUPIED MODE: DURING THE "OCCUPIED" MODE OF OPERATION, THE SET POINT SHALL BE ADJUSTED THROUGH THE DDC CONTROL PANEL BETWEEN A MINIMUM OF 71 DEGF AND MAXIMUM OF 75 DEGF. THERE SHALL BE A 1 DEGF DEAD BAND ON EITHER SIDE OF THE SETPOINT. ON AN INCREASE IN SPACE TEMPERATURE ABOVE THE COOLING SETPOINT, THE HOT DUCT DAMPER SHALL BE CLOSED AND THE COLD DUCT DAMPER SHALL BE MODULATED FROM THE COOLING MINIMUM AIR FLOW (10%) TO THE COOLING MAXIMUM AIR FLOW (100% OF DESIGN AIR FLOW). ON A DECREASE IN SPACE TEMPERATURE BELOW THE COOLING SET POINT, THE HOT DUCT DAMPER SHALL REMAIN CLOSED AND THE COLD DUCT DAMPER SHALL BE MODULATED AS REQUIRED TO MAINTAIN THE COLD DUCT AIRFLOW AT THE COOLING MINIMUM (10%). ON A FURTHER DECREASE IN SPACE TEMPERATURE BELOW THE THERMOSTAT SETTING, THE COLD DUCT DAMPER SHALL BE CLOSED AND THE HOT DUCT DAMPER SHALL BE MODULATED AS REQUIRED TO MAINTAIN THE HOT DUCT AIR FLOW AT THE HEATING MINIMUM (10%). ON A FURTHER DECREASE IN SPACE TEMPERATURE BELOW THE HEATING SETPOINT, THE COLD DUCT DAMPER SHALL REMAIN CLOSED, AND THE HOT DUCT DAMPER SHALL BE MODULATED FROM THE HEATING MINIMUM (10%) TO THE HEATING MAXIMUM (MAXIMUM HEATING CFM OR 60% OF MAXIMUM COOLING CFM IF MAX HEATING CFM IS NOT SPECIFIED).

STANDBY MODE: WHEN A SPACE MOTION DETECTOR IS PRESENT AND SENSES OCCUPANCY, MODE OF OPERATION SHALL BE "OCCUPIED". IF SENSOR DOES NOT SENSE OCCUPANCY, THEN SPACE WILL BE IN STANDBY MODE. DURING THE "STANDBY" MODE OF OPERATION, THE SET POINT SHALL BE ADJUSTED THROUGH THE DDC CONTROL PANEL BETWEEN A MINIMUM OF 71 DEGF AND MAXIMUM OF 75 DEGF. THERE SHALL BE A 3 DEGF DEAN BAND ON EITHER SIDE OF THE SETPOINT. ON AN INCREASE IN SPACE TEMPERATURE ABOVE THE COOLING SETPOINT, THE HOT DUCT DAMPER SHALL BE CLOSED AND THE COLD DUCT DAMPER SHALL BE MODULATED FROM THE COOLING MINIMUM AIR FLOW (10%) TO THE COOLING MAXIMUM AIR FLOW (100% OF DESIGN AIR FLOW). ON A DECREASE IN SPACE TEMPERATURE BELOW THE COOLING SET POINT, THE HOT DUCT DAMPER SHALL REMAIN CLOSED AND THE COLD DUCT DAMPER SHALL BE MODULATED AS REQUIRED TO MAINTAIN THE COLD DUCT AIRFLOW AT THE COOLING MINIMUM (10%). ON A FURTHER DECREASE IN SPACE TEMPERATURE BELOW THE THERMOSTAT SETTING, THE COLD DUCT DAMPER SHALL BE CLOSED AND THE HOT DUCT DAMPER SHALL BE MODULATED AS REQUIRED TO MAINTAIN THE HOT DUCT AIR FLOW AT THE HEATING MINIMUM (10%). ON A FURTHER DECREASE IN SPACE TEMPERATURE BELOW THE HEATING SETPOINT, THE COLD DUCT DAMPER SHALL REMAIN CLOSED, AND THE HOT DUCT DAMPER SHALL BE MODULATED FROM THE HEATING MINIMUM (10%) TO THE HEATING MAXIMUM (MAXIMUM HEATING CFM OR 60% OF MAXIMUM COOLING CFM IF MAX HEATING CFM IS NOT SPECIFIED).

UNOCCUPIED MODE: DURING THE "UNOCCUPIED" MODE OF OPERATION, THE SET POINT SHALL BE ADJUSTED THROUGH THE DDC CONTROL PANEL BETWEEN A MINIMUM OF 71 DEGF AND MAXIMUM OF 75 DEGF. THERE SHALL BE A 3 DEGF DEAD BAND ON EITHER SIDE OF THE SETPOINT. ON AN INCREASE IN SPACE TEMPERATURE ABOVE THE COOLING SETPOINT, THE HOT DUCT DAMPER SHALL BE CLOSED AND THE COLD DUCT DAMPER SHALL BE MODULATED FROM THE COOLING MINIMUM AIR FLOW (0%) TO THE COOLING MAXIMUM AIR FLOW (100%). ON A DECREASE IN SPACE TEMPERATURE BELOW THE HEATING SETPOINT, THE COLD DUCT DAMPER SHALL BE CLOSED AND THE HOT DUCT DAMPER SHALL BE MODULATED FROM THE HEATING MINIMUM AIR FLOW (0%) TO THE HEATING MAXIMUM AIR FLOW (MAXIMUM HEATING CFM OR 60% OF MAXIMUM COOLING CFM IF MAX HEATING CFM IS NOT SPECIFIED).

TEMPORARY OVERRIDE: IF THE ZONE IS UNOCCUPIED, AND THE OVERRIDE BUTTON ON THE THERMOSTAT IS DEPRESSED, THE SPACE TEMPERATURE OF THAT ZONE SHALL SELECT WHICH UNIT (COOLING OR HEATING) SHALL BE STARTED. IF THE SPACE TEMPERATURE IS ABOVE THE COOLING SET POINT, START THE COOLING UNIT ONLY. IF THE SPACE TEMPERATURE IS BELOW THE HEATING SET POINT, START THE HEATING UNIT ONLY. IF THE SPACE TEMPERATURE CROSSES OVER SET POINT DURING THE 2 HOUR OVERRIDE TIME, ENABLE THE OTHER UNIT AND LEAVE BOTH ON UNTIL THE END OF THE TEMPORARY OVERRIDE CYCLE.

I/O POINT MATRIX	I/O COUNT	INPUT DEVICE										OUTPUT DEVICE				TRACKING	
		ANALOG	DIGITAL	P	ANALOG	DIGITAL	RELAY	VALVE	UNIT TERM	RELAY	VALVE	UNIT TERM	TRENDING	CON TREN	TOTAL	MONTHLY	
ANALOG INPUT																	
DIGITAL INPUT																	
ANALOG OUTPUT																	
DIGITAL OUTPUT																	
TEMPERATURE																	
HUMIDITY																	
PRESSURE																	
CUR. SENSOR																	
CO2 SENSOR																	
AIR FLOW																	
LEVEL																	
UNIT TERM																	
NETWORKED INPUT																	
DRY CONTACT																	
UNIT SWITCH																	
CURRENT SWITCH																	
RELAY																	
LOW TEMP. OUTPUT																	
PRESSURE SWITCH																	
DUCT SMOKE																	
AUXILIARY CONTACT																	
UNIT TERM																	
NETWORKED POINT																	
DS-10/4-20ma																	
DAMPER ACTUATOR																	
VALVE ACTUATOR																	
PNEUMATIC TRANSDUCER																	
UNIT TERM																	
RELAY																	
DAMPER ACTUATOR																	
VALVE ACTUATOR																	
UNIT TERM																	
EP RELAY																	
TRENDING																	
CON TREN																	
TOTAL																	
MONTHLY																	

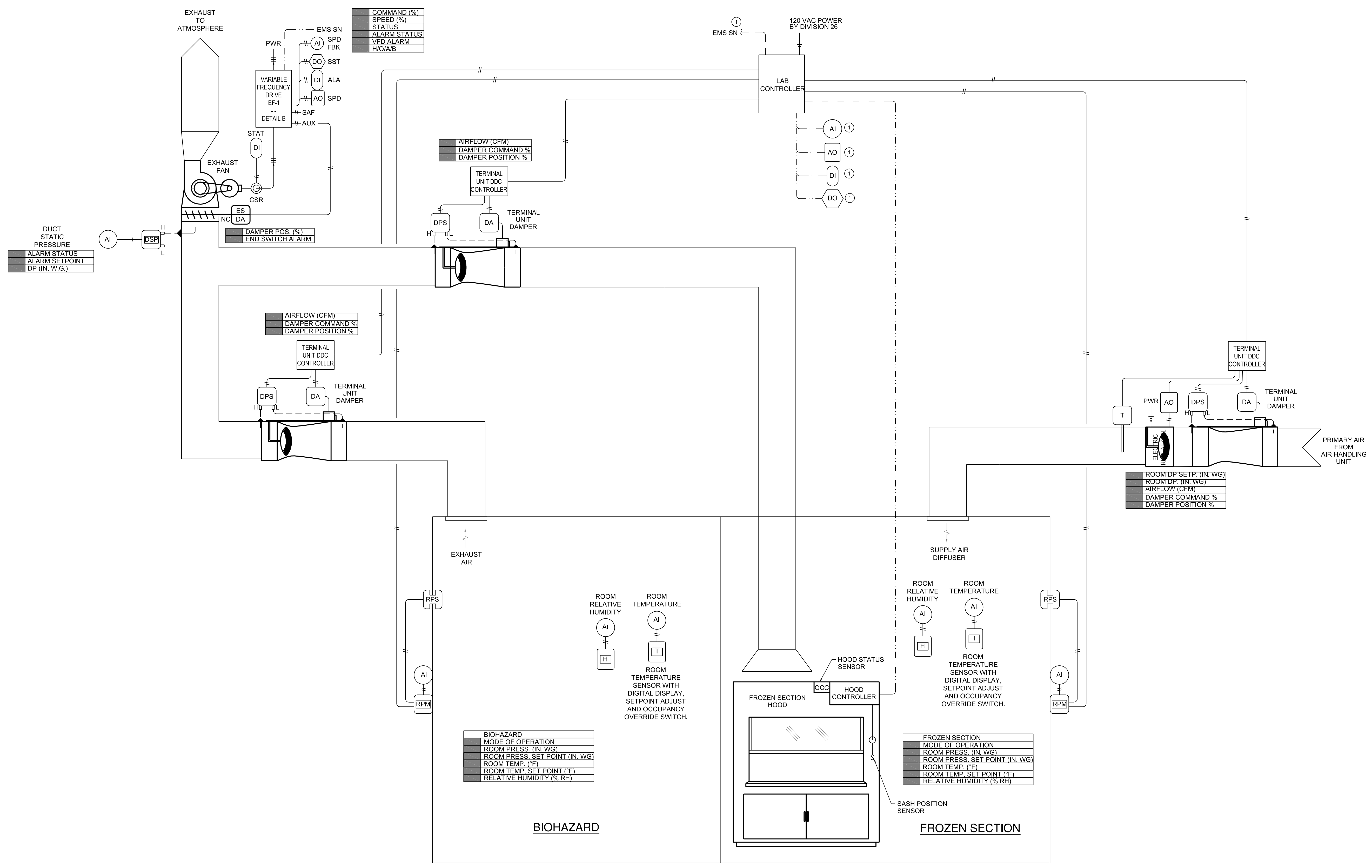
GENERAL NOTE: THESE STANDARD SYSTEM DIAGRAMS AND SEQUENCES ARE DEVELOPED AS THE BASIS FOR DESIGN AND MAY NOT BE DIRECTLY APPLICABLE AS IS DUE TO EXISTING EQUIPMENT OR SYSTEM CAPABILITIES, OR DUE TO SYSTEM OR EQUIPMENT ARRANGEMENTS. IT IS THE RESPONSIBILITY OF THE ENGINEER OF RECORD TO MODIFY THESE DOCUMENTS AS REQUIRED FOR THE SPECIFIC CONDITIONS OF A PROJECT. REFER TO THE RFP DOCUMENTS FOR MODIFICATION PROCEDURES.

MARK	DATE	DESCRIPTION
ISSUE DATE:	03/20/19	
PROJECT NUMBER:	04-18-0072	
SHEET TITLE:		
VAV SUPPLY TERMINAL - DUAL DUCT		
SHEET NUMBER:		
ATC5.07		

CORPORATE SEAL
FINAL BID SET

ENGINEER SEAL

IDIQ CONTROL DRAWINGS
UNIVERSITY OF ARKANSAS
FAYETTEVILLE, ARKANSAS



1 LAB CONTROL DIAGRAM
NOT TO SCALE

GENERAL NOTES:

- CONTROL VALVES, FLOW METERS, THERMOWELLS, AND TAPS ARE PROVIDED BY DIVISION 230900 AND INSTALLED BY DIVISION 23 IN LOCATIONS INDICATED BY THE CONTROL DIAGRAMS AND AS SPECIFIED.
- ALL CONTROLLERS, ACTUATORS, SENSORS, SWITCHES, TUBING, AND POINTS INDICATED ON THE PLANS ARE PROVIDED AND INSTALLED BY DIVISION 230900, UNLESS NOTED OTHERWISE. CONTROL VALVES AND THERMOWELLS ARE PROVIDED BY DIVISION 230900, INSTALLED BY DIVISION 23. TRANSFORMERS ARE PROVIDED BY DIVISION 230900, INSTALLED BY DIVISION 26.
- ALL POINTS INDICATED ON THE CONTROL DRAWINGS ARE NEW, PROVIDED BY DIVISION 230900, UNLESS INDICATED OTHERWISE.
- A SINGLE TRANSFORMER CAN BE PROVIDED FOR UP TO 10 CONTROLLERS PROVIDED LENGTH OF RUNS AND ZONING IS TAKEN INTO CONSIDERATION.
- ATC CONTRACTOR SHALL TUNE ALL LOOPS AND TABLES FOR SMOOTH, STABLE OPERATION. NUMBERS INDICATED IN THESE DIAGRAMS ARE FOR A STARTING POINT ONLY. THESE DIAGRAMS REPRESENT THE BASIC FUNCTION OF THE CONTROLS SEQUENCE AND IS NOT ALL INCLUSIVE. THE ATC CONTRACTOR IS STILL REQUIRED TO PROVIDE, DEFINE, AND INDICATE ALL ALARMS, SET POINTS, AND FUNCTIONS REQUIRE TO ACHIEVE THE INTENT OF THE SEQUENCE, AND MAINTAINED ALL EQUIPMENT MANUFACTURER REQUIREMENTS.
- EQUIPMENT PROVIDED WITH CONTROLLERS (BOILERS, VARIABLE FREQUENCY DRIVES, ETC) SHALL COMMUNICATE DIRECTLY WITH THE BAS. ALL REQUIRED GATEWAYS AND ROUTERS SHALL BE PROVIDED WITH EQUIPMENT WHERE AVAILABLE. ALL AVAILABLE POINTS SHALL BE OBTAINED FROM THE EQUIPMENT CONTROLLER AND THE BAS SHALL PROVIDE SET POINTS, COMMANDS, ETC. TO THE EQUIPMENT PER THE SEQUENCE OF OPERATIONS.
- EQUIPMENT SHALL HAVE DEDICATED GRAPHICS PER SPECIFICATIONS. ALL COMMUNICATED POINTS SHALL BE AVAILABLE IN A LIST FORMAT WITH COMPLETE DESCRIPTIONS OF THE POINT, INCLUDING ALARMS. THE OPERATOR SHALL NOT HAVE TO REFER TO DOCUMENTATION TO DETERMINE WHAT THE POINT IS.
- VARIABLE FREQUENCY DRIVES SHALL INDICATE HAND, OFF, AUTO, AND BYPASS STATUS.
- CONTROL VALVES SHALL BE SELECTED WITH PROPER AUTHORITY FOR THEIR GIVEN APPLICATION.
- ATC CONTRACTOR SHALL MEET ALL REQUIREMENTS OF THE EQUIPMENT MANUFACTURER.
- IF EQUIPMENT (BOILERS, PUMPS, ETC.) IS DISABLED DUE TO MAINTENANCE SHUTDOWN OR A FAULT CONDITION, THE LEAD, LAG, LAGOFF, ... STATUS OF THE REMAINING EQUIPMENT SHALL MOVE UP IN THE STAGING QUEUE AUTOMATICALLY. STAGING BASED ON RUN TIME. THE COMPONENT SHALL BE HIGHLIGHTED, OUTLINED, FLASH, OR CHANGE COLORS.
- THIS DIAGRAM, GRAPHICAL SEQUENCE, THE SCHEDULES, AND TABLES (ALARMS, SET POINTS, MODES OF OPERATION, ETC), SHALL BE REPRESENTED AS A GRAPHIC ON THE BAS, INCLUDING THE RESULTS OF AS-BUILT PROGRAMMING. THE GRAPHIC IS TO BE POPULATED WITH LIVE VALUES. SET POINTS SHALL BE ADJUSTABLE FROM THIS GRAPHIC AND LINKS SHALL BE PROVIDED TO TRENDS GROUPS.
- THE SCHEDULES AND TABLES INDICATED ON THIS SHEET (ALARMS, SET POINTS, MODES OF OPERATION, ETC) SHALL BE PROVIDED AS GRAPHICS, EDITABLE FROM THE GRAPHICS.
- ALL POINTS ARE TO BE TRENDED AT 15 MINUTE INTERVALS AND BACKED UP AS SPECIFIED.
- TRENDS GROUPS ARE IDENTIFIED ON THE SEQUENCE BY HEX NOTES. CONTRACTOR SHALL SET UP A TREND GROUP GRAPHIC FOR THE HEX NOTE DESIGNATIONS LISTED. EACH TREND GROUP SHALL CONTAIN ALL OF THE TRENDS WITH LIKE HEX NOTES. TREND GROUPS SHALL BE TRENDED AT A MINIMUM OF 30 SECOND INTERVALS FOR A DURATION OF 48 HOURS.
- COORDINATE AIR FLOW MEASURING STATION LOCATION WITH SITE CONDITIONS AND MANUFACTURER'S REQUIREMENTS / RECOMMENDATIONS.
- ATC CONTRACTOR SHALL TUNE ALL LOOPS AND TABLES FOR SMOOTH, STABLE OPERATION. NUMBERS INDICATED IN THESE DIAGRAMS ARE FOR A STARTING POINT ONLY. THESE DIAGRAMS REPRESENT THE BASIC FUNCTION OF THE CONTROLS SEQUENCE AND IS NOT ALL INCLUSIVE. THE ATC CONTRACTOR IS STILL REQUIRED TO PROVIDE, DEFINE, AND INDICATE ALL ALARMS, SET POINTS, AND FUNCTIONS REQUIRE TO ACHIEVE THE INTENT OF THE SEQUENCE, AND MAINTAINED ALL EQUIPMENT MANUFACTURER REQUIREMENTS. PROVIDE OCC SENSOR(S) AS REQUIRED FOR FULL COVERAGE OF SPACE.
- ATC CONTRACTOR SHALL TUNE ALL LOOPS AND TABLES FOR SMOOTH, STABLE OPERATION. NUMBERS INDICATED IN THESE DIAGRAMS ARE FOR A STARTING POINT ONLY. THESE DIAGRAMS REPRESENT THE BASIC FUNCTION OF THE CONTROLS SEQUENCE AND IS NOT ALL INCLUSIVE. THE ATC CONTRACTOR IS STILL REQUIRED TO PROVIDE, DEFINE, AND INDICATE ALL ALARMS, SET POINTS, AND FUNCTIONS REQUIRE TO ACHIEVE THE INTENT OF THE SEQUENCE, AND MAINTAINED ALL EQUIPMENT MANUFACTURER REQUIREMENTS. PROVIDE OCC SENSOR(S) AS REQUIRED FOR FULL COVERAGE OF SPACE.
- PROVIDE OCC SENSOR(S) AS REQUIRED FOR FULL COVERAGE OF SPACE.

KEYED NOTES:

- BAS SHALL RECEIVE ALL POINTS AVAILABLE FROM HOOD CONTROLLER. COORDINATE WITH ENGINEER OF RECORD ALL INFORMATION THAT IS TO BE DISPLAYED IN GRAPHICS, DAMPER POSITION, ROOM DP SET POINT, ROOM DP, AIRFLOW, AIRFLOW SET POINT, ALARMS, ETC.

SEQUENCE OF OPERATION:

LABORATORY AREA CONTROLS:
UNLESS SPECIFICALLY SHOWN OTHERWISE ON MECHANICAL ENGINEERING DRAWINGS, TEMPERATURE, HUMIDITY, PRESSURIZATION, AND FUME HOOD CONTROLS FOR LABORATORY AREAS SHALL BE PROVIDED BY LABORATORY HVAC AND CONTROL SYSTEM VENDOR. SUPPLY, GENERAL EXHAUST, AND FUME EXHAUST AIR TERMINALS ARE PROVIDED BY LABORATORY HVAC AND CONTROL SYSTEM VENDOR.
ATC SYSTEM VENDOR SHALL PROVIDE INTERFACE WITH LABORATORY HVAC CONTROLS THAT PROVIDES READ AND WRITE CAPABILITY TO AVAILABLE POINTS.

IO POINT MATRIX	I/O COUNT		INPUT DEVICE										OUTPUT DEVICE					TRACKING																				
	ANALOG INPUT	DIGITAL INPUT	ANALOG OUTPUT	DIGITAL OUTPUT	TEMPERATURE	HUMIDITY	PRESSURE	CURRENT SENSOR	CO2 SENSOR	FLOW	LEVEL	UNIT TERM	NETWORKED INPUT	DRY CONTACT	CURRENT SWITCH	RELAY	LOW TEMP. CUTOUT	PRESSURE SWITCH	DUCT SMOKE	AUXILIARY CONTACT	UNIT TERM	NETWORKED POINT	PULSE	IO-10/120mA	DAMPER ACTUATOR	PNEUMATIC TRANSDUCER	UNIT TERM	RELAY	DAMPER ACTUATOR	VALVE ACTUATOR	UNIT TERM	EP RELAY	TRENDING	LOW TREND	TOTAL USE	TOTALSE MONTHLY		
JOB NAME: LAB AREA CONTROLS																																						
SYSTEM / DESCRIPTION																																						
	X																							X	X													
		X																																				
			X																																			
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GENERAL NOTE: THESE STANDARD SYSTEM DIAGRAMS AND SEQUENCES ARE DEVELOPED AS THE BASIS FOR DESIGN AND MAY NOT BE DIRECTLY APPLICABLE AS IS DUE TO EXISTING EQUIPMENT OR SYSTEM CAPABILITIES, OR DUE TO SYSTEM OR EQUIPMENT ARRANGEMENTS. IT IS THE RESPONSIBILITY OF THE ENGINEER OF RECORD TO MODIFY THESE DOCUMENTS AS REQUIRED FOR THE SPECIFIC CONDITIONS OF A PROJECT. REFER TO THE RFP DOCUMENTS FOR MODIFICATION PROCEDURES.

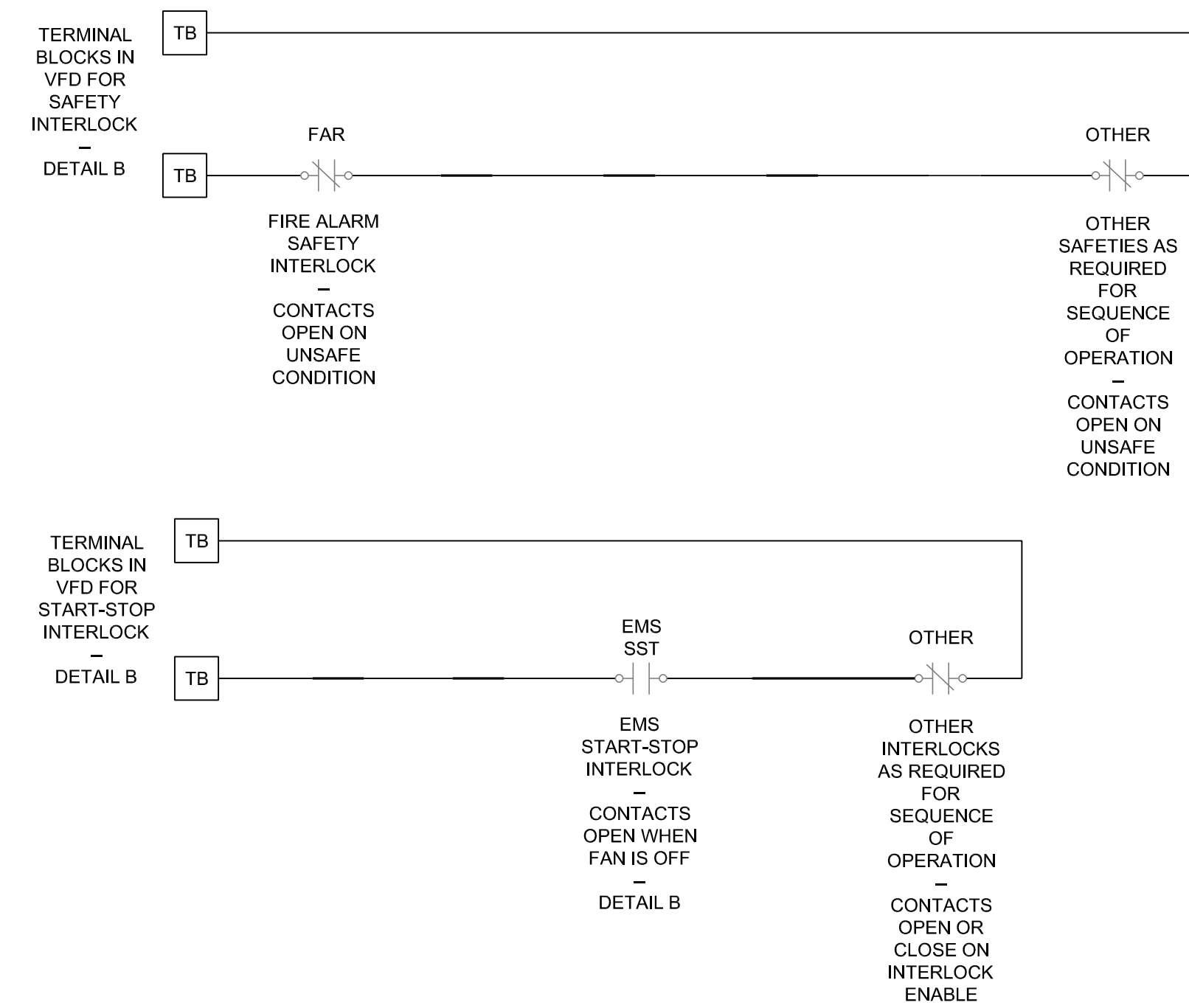
MARK	DATE	DESCRIPTION
ISSUE DATE:	03/20/19	
PROJECT NUMBER:	04-18-0072	
SHEET TITLE: LAB CONTROL DIAGRAM		
SHEET NUMBER: ATC6.00		

FINAL BID SET

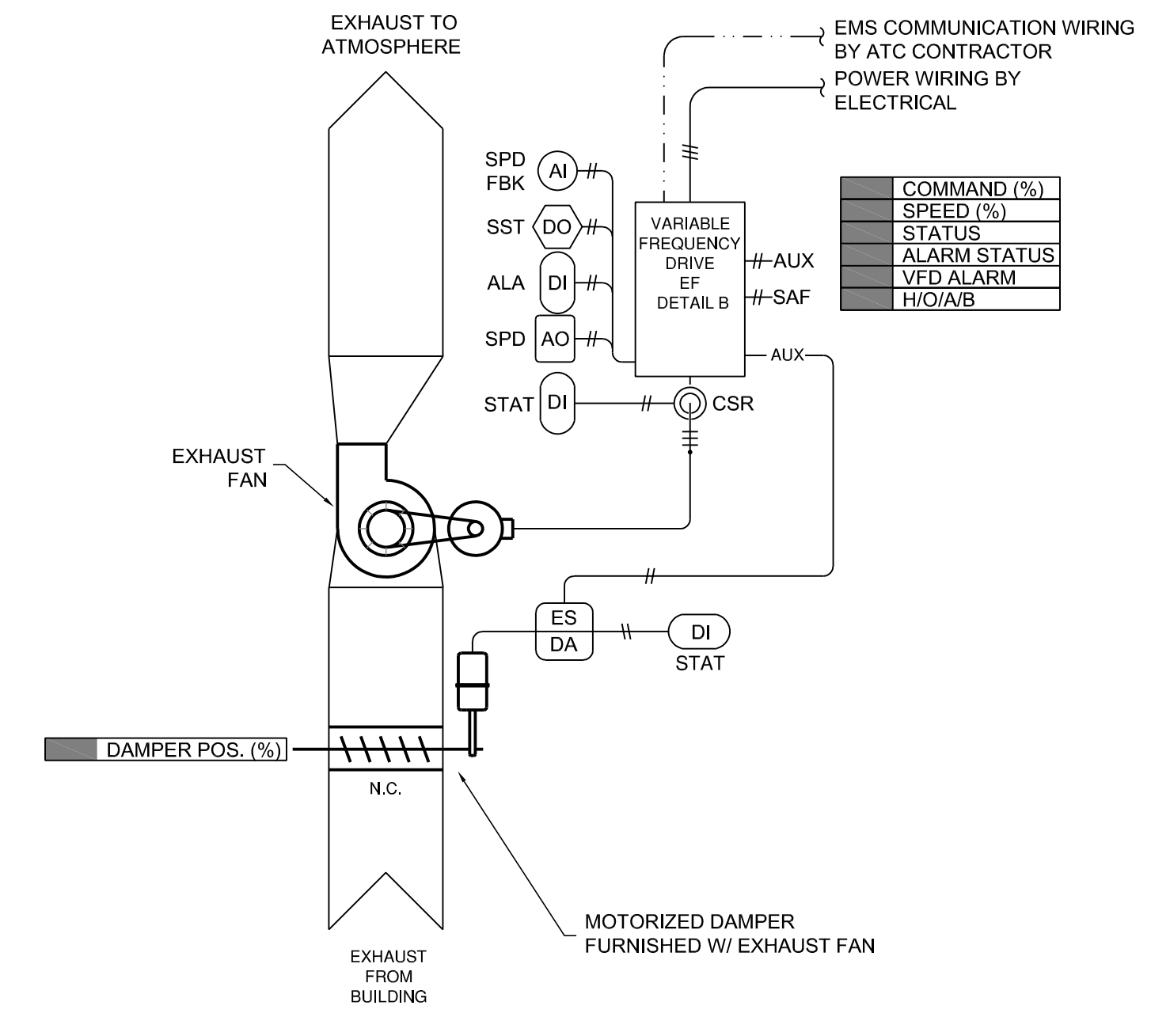
CORPORATE SEAL

ENGINEER SEAL

IDIQ CONTROL DRAWINGS
UNIVERSITY OF ARKANSAS
FAYETTEVILLE, ARKANSAS



2 EXHAUST FAN VFD INTERLOCKS
NOT TO SCALE



1 EXHAUST FAN CONTROL DIAGRAM
NOT TO SCALE [EXH-D]

SEQUENCE OF OPERATION:

EXHAUST FAN SHALL BE STARTED AND STOPPED BY THE DDC CONTROLLER. THE MOTORIZED DAMPER SHALL OPEN AND WHEN OPEN ITS INTERNAL END SWITCH SHALL START THE EXHAUST FAN.

THE EXHAUST FAN SHALL BE STARTED AND OPERATED WHENEVER ITS ASSOCIATED AIR HANDLING UNIT IS IN OPERATION. EXHAUST FAN SHALL NOT BE OPERATED UNLESS AT LEAST ONE ASSOCIATED AIR HANDLING UNIT IS IN OPERATION.

IO POINT MATRIX	I/O COUNT		INPUT DEVICE														OUTPUT DEVICE				TRACKING	
	ANALOG INPUT	DIGITAL INPUT	ANALOG	DIGITAL	P	ANALOG	DIGITAL	RELAY	VALVE	ACTUATOR	TRANSducer	UNIT TERM	RELAY	VALVE	ACTUATOR	UNIT TERM	TRENDING	COV TEND	TOTALIZE	MONTHLY		
JOB NAME: EXHAUST FAN																						
SYSTEM / DESCRIPTION																						
DAMPER END SWITCH		X																			X	
DAMPER OUTPUT			X																		X	
FAN START STOP				X																	X	
FAN SPEED		X																			15 min	
FAN STATUS		X																			X	

GENERAL NOTE: THESE STANDARD SYSTEM DIAGRAMS AND SEQUENCES ARE DEVELOPED AS THE BASIS FOR DESIGN AND MAY NOT BE DIRECTLY APPLICABLE AS IS DUE TO EXISTING EQUIPMENT OR SYSTEM CAPABILITIES, OR DUE TO SYSTEM OR EQUIPMENT ARRANGEMENTS. IT IS THE RESPONSIBILITY OF THE ENGINEER OF RECORD TO MODIFY THESE DOCUMENTS AS REQUIRED FOR THE SPECIFIC CONDITIONS OF A PROJECT. REFER TO THE RFP DOCUMENTS FOR MODIFICATION PROCEDURES.

MARK DATE DESCRIPTION

ISSUE DATE: 03/20/19

PROJECT NUMBER: 04-18-0072

SHEET TITLE:
EXHAUST FAN CONTROL DIAGRAM

SHEET NUMBER:

ATC7.00

Appendix 6 – Excel Spreadsheet – Cost Proposal Worksheet

Proposal Cost Worksheet
Indefinite Delivery Indefinite Quantity (IDIQ)
Automatic Temperature Control Systems - New and Existing Buildings University of Arkansas Campus
 Fayetteville, Arkansas

Standard System Pricing (Input in shaded boxes)

The line item cost MUST INCLUDE ALL product materials, labor, installation (including engineering, shop drawings, and start-up assistance), testing, performance and payment bond, and sales tax if applicable for this project. See RFP for further information.

Date: 3/20/19

Standard Drawing Sheet Number	System Description	Total Installed Cost	Tax	Total Installed Cost Including Taxes	Additional Unit Cost For Comissioning	Total installed cost with Cx Including Taxes
ATC2.00	CHILLED WATER SYSTEM BUILDING ENTRY			\$0.00		\$0.00
ATC3.00	HEATING WATER SYSTEM BUILDING ENTRY			\$0.00		\$0.00
ATC3.01	STEAM HEAT EXCHANGER CONTROL DIAGRAM			\$0.00		\$0.00
ATC3.02	STEAM SYSTEM MONITORING CONTROL DIAGRAM			\$0.00		\$0.00
ATC3.03	STEAM CONDENSATE RETURN PUMP CONTROL DIAGRAM			\$0.00		\$0.00
ATC3.04	BOILER EMERGENCY POWER OFF CONTROL DIAGRAM			\$0.00		\$0.00
ATC4.00	CONSTANT VOLUME AIR HANDLING UNIT WITH PREHEAT			\$0.00		\$0.00
ATC4.01	CONSTANT VOLUME AIR HANDLING UNIT W/ PREHEAT, REAHEAT, & HUMIDIFIER			\$0.00		\$0.00
ATC4.02	VARIABLE AIR VOLUME AIR HANDLING UNIT WITH PREHEAT			\$0.00		\$0.00
ATC4.03	DUAL DUCT AIR HANDLING UNIT			\$0.00		\$0.00
ATC4.04	ENERGY RECOVERY AIR HANDLING UNIT			\$0.00		\$0.00
ATC4.05	CONSTANT VOLUME AIR HANDLING UNIT 100% OSA WITH PREHEAT			\$0.00		\$0.00
ATC5.00	FAN COIL UNIT - 2 PIPE			\$0.00		\$0.00
ATC5.01	FAN COIL UNIT - 4 PIPE			\$0.00		\$0.00
ATC5.02	FAN COIL UNIT - 4 PIPE RETURN AIR CONTROL			\$0.00		\$0.00
ATC5.03	FAN COIL UNIT - 3 SPEED WITH DEHUMIDIFICATION			\$0.00		\$0.00
ATC5.04	BLOWER COIL UNIT - COOLING ONLY			\$0.00		\$0.00
ATC5.05	VAV SUPPLY TERMINAL WITH HOT WATER REHEAT - OFFICE/CORRIDOR			\$0.00		\$0.00
ATC5.06	VAV SUPPLY TERMINAL - COOLING ONLY			\$0.00		\$0.00
ATC5.07	VAV SUPPLY TERMINAL - DUAL DUCT			\$0.00		\$0.00
ATC5.08	VAV SUPPLY TERMINAL WITH HOT WATER REHEAT - PARALLEL FAN POWERED			\$0.00		\$0.00
ATC5.09	VAV SUPPLY TERMINAL WITH HOT WATER REHEAT - SERIES FAN POWERED			\$0.00		\$0.00
ATC5.10	CHILLED BEAM - COOLING ONLY			\$0.00		\$0.00
ATC5.11	FINNED TUBE CONVERTER			\$0.00		\$0.00
ATC5.12	VAV SUPPLY TERMINAL WITH HOT WATER REHEAT & FINNED TUBE			\$0.00		\$0.00
ATC6.00	LAB CONTROL DIAGRAM (Base)			\$0.00		\$0.00
	Additive Alt #1: Add one fast acting supply terminal			\$0.00		\$0.00
	Additive Alt #2: Add one fast acting exhaust terminal			\$0.00		\$0.00
	Additive Alt #3: Add one fume hood			\$0.00		\$0.00
	Additive Alt #4: Add one exahust fan.			\$0.00		\$0.00
ATC7.00	EXHAUST FAN CONTROL DIAGRAM			\$0.00		\$0.00

Proposal Cost Worksheet
Indefinite Delivery Indefinite Quantity (IDIQ)
Automatic Temperature Control Systems - New and Existing Buildings University of Arkansas Campus
 Fayetteville, Arkansas

Standard Materials and Equipment Pricing (Uninstalled) - Input in Shaded Boxes

The line item cost shall include delivery but not installation.

Date: 3/20/19

Item Number	Description	List Price	Discounted Price to UA Including Delivery	Taxes	Total Cost
1	Modulating Electric Damper Actuator (Sized for 36"x36" Return Air Damper)				\$0.00
2	Electric Damper Actuator (Sized for a 10" Round VAV Box)				\$0.00
3	Digital Room Thermostat				\$0.00
4	Duct Mounted Temperature Sensor				\$0.00
5	Pipe Mounted Temperature Sensor				\$0.00
6	Electro-Pneumatic Pressure Transducer				\$0.00
7	Wet Differential Pressure Transmitter				\$0.00
8	Air Terminal Controller				\$0.00
9	Fan Coil Unit Controller				\$0.00
10	Electric Valve Actuator (Sized for a 3" Valve)				\$0.00
11	Pneumatic Valve Actuator (Sized for a 6" Valve)				\$0.00
12	1/2" 3-Way Pneumatic Control Valve				\$0.00
13	Pneumatic Electric Switch				\$0.00
14	Strap-On Temperature Sensor				\$0.00
15	Differential Pressure Switch				\$0.00
16	End Switch				\$0.00
17	Current Switch				\$0.00
18	Static Pressure Switch				\$0.00
19	Duct Static Pressure Transmitter				\$0.00
20	Duct Humidity Transmitter				\$0.00
21	Pneumatic Room Thermostat				\$0.00
22	Software License and Installation per Workstation				\$0.00
23	Annual Software Maintenance Agreement				\$0.00
24	JCI N2 Integration License				\$0.00
25	Building Level Control Panel				\$0.00
TOTAL					\$0.00

Cost Worksheet						
Indefinite Delivery Indefinite Quantity (IDIQ)						
Automatic Temperature Control Systems - New and Existing Buildings University of Arkansas Campus						
Fayetteville, Arkansas						
Summary of Pricing for Prototype Building 1 - Classrooms/Offices						Date: 3/20/19
Description	Standard Drawing Number	Quantity	System Unit Cost (From Standard System Page)	Total Cost	Unit Cost For Cx (From Stanard System Page)	Additional Fee For Comissioning
Ground Floor						
Chill Water Entry	ATC2.00	1	\$ -	\$ -	\$ -	\$ -
Steam Service Entry with Building Heat	ATC3.00	1	\$ -	\$ -	\$ -	\$ -
Constant Volume Air Unit	ATC4.00	1	\$ -	\$ -	\$ -	\$ -
Exhaust Fan	ATC7.00	2	\$ -	\$ -	\$ -	\$ -
Hot Water Convector	ATC5.11	4	\$ -	\$ -	\$ -	\$ -
Blower Coil Unit	ATC5.04	2	\$ -	\$ -	\$ -	\$ -
First Floor						
VAV Air Handling Unit	ATC4.02	1	\$ -	\$ -	\$ -	\$ -
Supply Terminal With Reheat	ATC5.05	26	\$ -	\$ -	\$ -	\$ -
Parallel Fan Powered Terminal	ATC5.08	8	\$ -	\$ -	\$ -	\$ -
Series Fan Powered Terminal	ATC5.09	2	\$ -	\$ -	\$ -	\$ -
Second Floor						
Make-up Air Unit	ATC4.05	1	\$ -	\$ -	\$ -	\$ -
Chilled Beams	ATC5.10	20	\$ -	\$ -	\$ -	\$ -
Hot Water Convectors	ATC5.11	10	\$ -	\$ -	\$ -	\$ -
Supply Terminal With Reheat	ATC5.05	6	\$ -	\$ -	\$ -	\$ -
Parallel Fan Powered Terminal	ATC5.08	8	\$ -	\$ -	\$ -	\$ -
Third Floor						
VAV Air Handling Unit	ATC5.04	1	\$ -	\$ -	\$ -	\$ -
Supply Terminal With Reheat	ATC5.05	26	\$ -	\$ -	\$ -	\$ -
Parallel Fan Powered Terminal	ATC5.08	8	\$ -	\$ -	\$ -	\$ -
Series Fan Powered Terminal	ATC5.09	2	\$ -	\$ -	\$ -	\$ -
Roof						
Exhaust Fan	ATC7.00	4	\$ -	\$ -	\$ -	\$ -
SUBTOTAL COST PROTOTYPE 1				\$ -		\$ -
Building Level Control Panel(s)		4	\$ -	\$ -		
TOTAL COST PROTOTYPE 1				\$ -		\$ -

Cost Worksheet						
Indefinite Delivery Indefinite Quantity (IDIQ)						
Automatic Temperature Control Systems - New and Existing Buildings University of Arkansas Campus						
Fayetteville, Arkansas						
Summary of Pricing for Prototype Building 2 - Residence Hall						Date: 3/20/19
Description	Standard Drawing Number	Quantity	System Unit Cost (From Standard System Page)	Total Cost	Unit Cost For Cx (From Standard System Page)	Additional Fee For Commissioning
Ground Floor						
Chill Water Entry	ATC2.00	1	\$ -	\$ -	\$ -	\$ -
Heating Water Entry	ATC3.00	1	\$ -	\$ -	\$ -	\$ -
Constant Volume Air Unit	ATC4.00	4	\$ -	\$ -	\$ -	\$ -
Exhaust Fan	ATC7.00	4	\$ -	\$ -	\$ -	\$ -
Blower Coil Unit	ATC5.04	2	\$ -	\$ -	\$ -	\$ -
First Floor						
Fan Coil Unit	ATC5.00	36	\$ -	\$ -	\$ -	\$ -
Blower Coil Unit	ATC5.04	2	\$ -	\$ -	\$ -	\$ -
Second Floor						
Fan Coil Unit	ATC5.01	24	\$ -	\$ -	\$ -	\$ -
Fan Coil Unit	ATC5.02	8	\$ -	\$ -	\$ -	\$ -
Fan Coil Unit	ATC5.03	8	\$ -	\$ -	\$ -	\$ -
Third Floor						
Fan Coil Unit	ATC5.01	28	\$ -	\$ -	\$ -	\$ -
Fan Coil Unit	ATC5.02	8	\$ -	\$ -	\$ -	\$ -
Fan Coil Unit	ATC5.03	8	\$ -	\$ -	\$ -	\$ -
Penthouse						
Energy Recovery Air Unit	ATC4.04	1	\$ -	\$ -	\$ -	\$ -
Fan Coil Unit	ATC5.01	2	\$ -	\$ -	\$ -	\$ -
Roof						
Exhaust Fan	ATC7.00	4	\$ -	\$ -	\$ -	\$ -
SUBTOTAL COST PROTOTYPE 2				\$ -		\$ -
Building Level Control Panel(s)		4	\$ -	\$ -		\$ -
TOTAL COST PROTOTYPE 2				\$ -		\$ -

Cost Worksheet						
Indefinite Delivery Indefinite Quantity (IDIQ)						
Automatic Temperature Control Systems - New and Existing Buildings University of Arkansas Campus						
Fayetteville, Arkansas						
Summary of Pricing for Prototype Building 3 - Science Building						Date: 3/20/19
Description	Standard Drawing Number	Quantity	System Unit Cost (From Standard System Page)	Total Cost	Unit Cost For Cx (From Standard System Page)	Additional Fee For Commissioning
Ground Floor						
Chill Water Entry	ATC2.00	1	\$ -	\$ -	\$ -	\$ -
Steam Service Entry with Building Heat	ATC3.01	1	\$ -	\$ -	\$ -	\$ -
Air Handling Unit	ATC4.03	1	\$ -	\$ -	\$ -	\$ -
Dual Duct Terminals	ATC5.07	16	\$ -	\$ -	\$ -	\$ -
Hot Water Convector	ATC5.11	4	\$ -	\$ -	\$ -	\$ -
Blower Coil Unit	ATC5.04	2	\$ -	\$ -	\$ -	\$ -
First Floor						
VAV Air Handling Unit	ATC4.02	1	\$ -	\$ -	\$ -	\$ -
Supply Terminal With Reheat	ATC5.05	8	\$ -	\$ -	\$ -	\$ -
Lab System	ATC6.00 (BASE)	10	\$ -	\$ -	\$ -	\$ -
	ATC 6.00 (ATL:1)	2	\$ -	\$ -	\$ -	\$ -
	ATC 6.00 (ATL:2)	2	\$ -	\$ -	\$ -	\$ -
	ATC 6.00 (ATL:3)	2	\$ -	\$ -	\$ -	\$ -
	ATC 6.00 (ATL:4)	2	\$ -	\$ -	\$ -	\$ -
Second Floor						
VAV Air Handling Unit	ATC4.02	1	\$ -	\$ -	\$ -	\$ -
Supply Terminal With Reheat	ATC5.05	8	\$ -	\$ -	\$ -	\$ -
Lab System	ATC6.00 (BASE)	10	\$ -	\$ -	\$ -	\$ -
Penthouse						
Heat Recovery Air Unit	ATC4.04	1	\$ -	\$ -	\$ -	\$ -
Roof						
Exhaust Fan	ATC7.00	6	\$ -	\$ -	\$ -	\$ -
SUBTOTAL COST PROTOTYPE 3				\$ -		\$ -
Building Level Control Panel(s)		4	\$ -	\$ -		
TOTAL COST PROTOTYPE 3				\$ -		\$ -