

MULTI-ZONE VAV AIR HANDLING UNIT	
LOCAL DDC CONTROLLER	
INPUTS	
AI1	OUTSIDE AIR FLOWMETER (F-1)
AI2	RETURN AIR FLOWMETER (F-2)
AI3	RETURN AIR TEMPERATURE SENSOR (T/H-1)
AI4	RETURN AIR HUMIDITY SENSOR (T/H-1)
AI5	RETURN AIR STATIC PRESSURE SENSOR (SPS-1)
AI6	MIXED AIR TEMPERATURE SENSOR (T-2)
AI7	HEATING COIL STEAM CONTROL VALVE (V-1A)
AI8	HEATING COIL STEAM CONTROL VALVE (V-1B)
AI9	HEATING COIL DISCHARGE AIR TEMPERATURE SENSOR (T-4)
AI10	COOLING COIL CHILLED WATER FLOWMETER
AI11	CHILLED WATER CONTROL VALVE (V-2)
AI12	COOLING COIL DISCHARGE AIR TEMPERATURE SENSOR (T-5)
AI13	HUMIDIFIER STEAM CONTROL VALVE (V-4)
AI14	SUPPLY FAN VFD STATUS
AI15	SUPPLY DISCHARGE AIR STATIC PRESSURE SENSOR (SPS-2)
AI16	SUPPLY DISCHARGE AIR TEMPERATURE SENSOR (T/H-2)
AI17	SUPPLY DISCHARGE AIR HUMIDITY SENSOR (T/H-2)
AI18	ZONE 2 SUPPLY AIR FLOWMETER (F-4)
AI19	ZONE 1 SUPPLY AIR FLOWMETER (F-3)
AI20	AMBIENT AIR SENSOR (T-7)
DI1	OUTSIDE AIR DAMPER (D-1) STATUS
DI2	RETURN AIR DAMPER (D-2) STATUS
DI3	AIR PRE-FILTER STATUS (DPS-1)
DI4	RETURN AIR HIGH LIMIT TEMPERATURE SENSOR (T-1) STATUS
DI5	AIR FILTER STATUS (DPS-2)
DI6	RETURN AIR SMOKE DETECTOR (SD-1) STATUS
DI7	HEATING COIL DISCHARGE AIR LOW LIMIT TEMPERATURE SENSOR (T-3) STATUS
DI8	HUMIDIFIER ON/OFF STEAM CONTROL VALVE (V-3) STATUS
DI9	SUPPLY FAN STATUS
DI10	SUPPLY DISCHARGE AIR SMOKE DETECTOR (SD-2)
DI11	SUPPLY DISCHARGE AIR HIGH LIMIT TEMPERATURE SENSOR (T-6) STATUS
DI12	SUPPLY DISCHARGE AIR HIGH LIMIT STATIC PRESSURE SENSOR (SPS-3) STATUS
DI13	ZONE 2 SUPPLY AIR HIGH LIMIT STATIC PRESSURE SENSOR (SPS-4) STATUS
OUTPUTS	
AO1	HEATING COIL STEAM CONTROL VALVE (V-1A)
AO2	HEATING COIL STEAM CONTROL VALVE (V-1B)
AO3	CHILLED WATER CONTROL VALVE (V-2)
AO4	HUMIDIFIER STEAM CONTROL VALVE (V-4)
AO5	SUPPLY FAN VFD SPEED
DO1	OUTSIDE AIR DAMPER (D-1)
DO2	RETURN AIR DAMPER (D-2) STATUS
DO3	HUMIDIFIER ON/OFF STEAM CONTROL VALVE (V-3)
DO4	SUPPLY FAN START/STOP

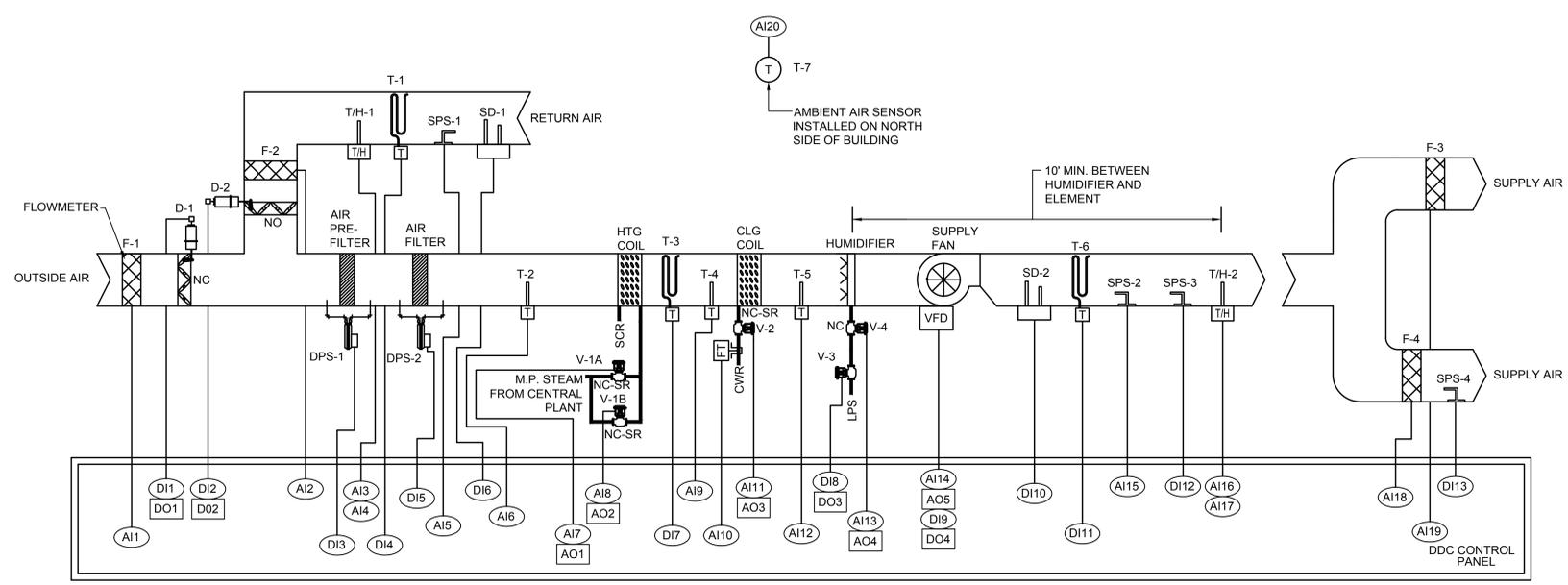
SEQUENCE OF OPERATION

- START/STOP CONTROL
 - TE-AHU-7-2 IS NORMALLY STARTED AND STOPPED REMOTELY AT THE ECC. H-O-A SWITCH SHALL BE KEPT IN THE "AUTO" POSITION. "HAND" AND "OFF" POSITIONS SHALL BE USED ONLY FOR MAINTENANCE. WHEN FAN RUN STATUS IS PROVEN VIA A CURRENT SENSING RELAY, CONTROL LOOPS SHALL BE ENERGIZED. STOPPING THE UNIT SHALL DE-ENERGIZE THE CONTROL LOOPS AND ALL VALVES SHALL GO TO THE CLOSED POSITION. THE OUTSIDE AIR DAMPER SHALL CLOSE, AND THE RETURN AIR DAMPER SHALL OPEN. OUTSIDE AIR SHALL BE METERED TO MONITOR AND MAINTAIN CONSTANT MIN. O.A. AIRFLOW BY MODULATING THE RETURN AND OUTSIDE AIR CONTROL DAMPERS.
- TEMPERATURE CONTROL
 - A TEMPERATURE SENSOR IN THE UNIT SUPPLY AIR SHALL TRANSMIT TEMPERATURE CHANGES TO THE ASC. THE ASC SHALL MODULATE THE 2-WAY COOLING COIL VALVE TO MAINTAIN SUPPLY AIR SETPOINT AT 55°F (ADJUSTABLE). A TEMPERATURE SENSOR IN THE PREHEAT COIL DISCHARGE SHALL TRANSMIT TEMPERATURE CHANGES TO THE ASC. THE ASC SHALL MODULATE THE 2-WAY STEAM VALVE PREHEAT COIL VALVE TO MAINTAIN PREHEAT SETPOINT (ADJUSTABLE).
- DEHUMIDIFICATION CONTROL
 - HUMIDITY SENSOR, (1% ACCURACY), SHALL MEASURE RETURN AIR HUMIDITY AT THE AHU. THE BAS SHALL AVERAGE THE POSITION OF THE VAV BOX AIR VALVES AND SHALL ADJUST THE AIR TEMPERATURE UPWARD OR DOWNWARD TO MAXIMIZE THE SUPPLY AIR TEMPERATURE THAT SHALL ALLOW FOR THE MOST EFFICIENT (HIGHEST) SUPPLY AIR TEMPERATURE TO SATISFY VAV BOX OPERATION DURING THE OCCUPIED PERIOD OF OPERATION. IF THE RETURN AIR HUMIDITY RISES TO 60% (NOMINAL, ADJUSTABLE), THE SUPPLY AIR TEMPERATURE OF THE AHU SHALL BE LIMITED (LOWERED) SO AS TO KEEP THE RETURN AIR HUMIDITY AT OR BELOW 60% (ADJUSTABLE). ALSO, SYSTEM SHALL UTILIZE CALCULATED R.A. DEWPOINT TEMPERATURE TO COMPARE WITH A MAX. DEWPOINT SETPOINT OF 55°F (ADJUSTABLE). IN ADDITION TO HUMIDITY, TO OVERRIDE CHW VALVE FOR DEHUMIDIFICATION.
- HUMIDIFICATION CONTROL
 - RETURN AIR HUMIDITY SHALL BE MONITORED. HUMIDIFIER STEAM VALVE SHALL MODULATE TO SUPPLY STEAM TO AHU MOUNTED DIRECT-INJECTION STEAM MANIFOLD REQUIRED TO MAINTAIN THE RETURN AIR RELATIVE HUMIDITY SETPOINT OF 30% (ADJUSTABLE AT ECC) AS SENSED BY THE RETURN RELATIVE HUMIDITY SENSOR. PRIOR TO ACTIVATION OF MODULATING STEAM CONTROL VALVE, THE ON/OFF CONTROL VALVE SHALL BE ENABLED THROUGH ECC AND JACKET TEMPERATURE SENSING BY HIGH TEMPERATURE SENSOR SHALL BE WARM ENOUGH TO PREVENT CONDENSATION. THE HIGH LIMIT HUMIDITY SENSOR, LOCATED IN THE SUPPLY AIR DUCT 10' AWAY FROM THE HUMIDIFIER, SHALL DISABLE THE HUMIDIFIER AND GIVE AN ALARM SIGNAL TO THE ECC. IF THE SUPPLY AIR HUMIDITY EXCEEDS 85% RH (ADJUSTABLE), THE AIRFLOW SWITCH SHALL PROVE AIRFLOW BEFORE HUMIDITY CONTROLS ARE ACTIVATED. NORMALLY CLOSED HUMIDIFIER STEAM SUPPLY VALVES SHALL OPEN WHEN OUTSIDE AIR TEMPERATURE DROPS BELOW 60°F AND SHALL CLOSE ABOVE 62°F OUTSIDE AIR TEMPERATURE OR WHEN SUPPLY FAN IS OFF. TEMPERATURE SWITCH SHALL KEEP HUMIDIFIER VALVE CLOSED UNTIL CONDENSATE DRIP LEG REACHES OPERATING TEMPERATURE.
- STATIC PRESSURE AND AIRFLOW CONTROL
 - THE SUPPLY AIR FAN FLOW SHALL BE CONTROLLED BY THE DIGITAL CONTROL PANEL MODULATING FAN'S INDIVIDUAL ADJUSTABLE SPEED MOTOR CONTROLLER TO MAINTAIN 1.0" OF DUCT STATIC PRESSURE (FIELD ADJUSTABLE), AS SENSED BY THE DUCT STATIC PRESSURE SENSOR LOCATED AT ¼ DISTANCE DOWN LONGEST DUCT MAIN. RESET STATIC PRESSURE BASED ON ACTUAL BUILDING LOAD BY POLLING ALL VAV TERMINAL UNITS.
 - FILTER STATUS SHALL BE MONITORED AT EACH PRE-FILTER AND AFTER-FILTER BANK.

6. FREEZE PROTECTION

- IF THE AIR TEMPERATURE AS SENSED BY PREHEATED MIXED AIR SENSOR (FREEZESTAT) UPSTREAM OF COOLING COIL FALLS BELOW 45°F, AN ALARM SIGNAL SHALL INDICATE AT THE DIGITAL CONTROL PANEL AND ECC. IF THIS TEMPERATURE FALLS BELOW 40°F, AS SENSED BY THE LOW TEMPERATURE SWITCH, THE SUPPLY FAN SHALL SHUT DOWN AND A CRITICAL ALARM SHALL INDICATE AT THE DIGITAL CONTROL PANEL AND ECC. THE LOW TEMPERATURE SWITCH SHALL BE HARDWIRED TO THE SUPPLY FAN VFD, AND THE UNIT SHALL BE SHUTDOWN IN HAND, AUTO, OR BYPASS MODE WHENEVER THERE IS A LOW TEMPERATURE ALARM. THE LOW TEMPERATURE SWITCH SHALL REQUIRE MANUAL RESET AT THE DEVICE.
- HIGH DUCT STATIC PROTECTION
 - A DUCT HIGH PRESSURE SENSOR LOCATED AT THE SUPPLY FAN DISCHARGE SHALL PREVENT THE SUPPLY FAN FROM DEVELOPING OVER 3" OF STATIC PRESSURE (FIELD ADJUSTABLE) IN THE SUPPLY DUCT. IF STATIC PRESSURE DOES EXCEED SET LIMIT, THE SUPPLY FAN SHALL STOP. DUCT HIGH PRESSURE SENSOR SHALL BE HARDWIRED TO THE SUPPLY FAN VFD AND THE UNIT SHALL BE SHUTDOWN IN HAND, AUTO OR BYPASS MODE WHENEVER THERE IS A HIGH DUCT PRESSURE ALARM. THE DUCT HIGH STATIC PRESSURE SENSOR SHALL REQUIRE MANUAL RESET AT DEVICE.
- SMOKE PROTECTION AND AUTOMATIC SHUTDOWN/RESTART
 - A SUPPLY AIR SMOKE DETECTOR IN THE SUPPLY AIR DUCT SHALL STOP THE UNIT AND TRANSMIT A SIGNAL TO FIRE ALARM SYSTEM UPON DETECTION OF PRODUCTS OF COMBUSTION IN THE DUCT AND CLOSE THE UNIT ISOLATION SMOKE DAMPERS LOCATED IN SUPPLY AND RETURN DUCT MAINS ADJACENT TO THE UNIT. RE: ELECTRICAL FOR ADDITIONAL REQUIREMENTS. EXHAUST FANS SERVING THE AREA OF THE SUPPLY FAN SHALL CONTINUE TO RUN. THE SUPPLY FAN SHALL RESTART AND SMOKE DAMPERS SHALL OPEN WHEN FIRE ALARM IS RESET.
 - FIRESTATS SHALL BE PROVIDED FOR ANY FAN HANDLING 600CFM OR MORE. FIRESTATS SHALL STOP ASSOCIATED FAN ON A RISE IN AIR TEMPERATURE ABOVE 125°F.
- EMERGENCY CONSTANT SPEED OPERATION
 - UPON FAILURE OF VFD, THE SUPPLY FAN SHALL BE STARTED/STOPPED MANUALLY AT THE DDC OR THE ECC THROUGH THE BYPASS STARTER. FANS SHALL THEN BE OPERATED AT CONSTANT SPEED.

NOTES:
 1. THESE DRAWINGS ARE REPRESENTATIVE OF THE DESIGN DRAWINGS FOR THE BUILDING 7 EXPANSION CURRENTLY ON GOING AND ARE FOR REFERENCE ONLY.
 2. ALL EQUIPMENT IN THIS PROJECT WILL BE CONTROLLED BY THE CAMPUS SIEMENS SYSTEM. MIGRATE ALL CONTROLS TO NEW SERVER.



1 BUILDING 7 EXPANSION AHU 7-2 CONTROL SCHEMATIC & SEQUENCE
 SCALE: NOT TO SCALE

Revisions	No.	Date	Remarks

VETERANS HEALTH CARE SYSTEM
 Alexandria, Louisiana

Hernandez Consulting
 ALBERT ARCHITECTURE

Allen&Hoshall
 engineering since 1915

Approved:	Title	Signature

Drawing Title	AHU 7-2 CONTROL SCHEMATIC & SEQUENCE
Approved: Service Engineer	
Approved: Service Director	

Project Title	A&E Design - Upgrade Energy Management Control Systems
Building Number	7 EXPANSION
Checked	WLP
Drawn	NMT
Location	Alexandria, LA

Date	October 30, 2013
Project No.	VA256-12-C-0253
Drawing No.	M7-400
Drawn	1 OF 1

U.S. Department of Veterans Affairs

STATE OF LOUISIANA
 WILLIAM LEE PALMER
 REG. NO. 6640
 PROFESSIONAL ENGINEER
 10-30-13 IN

MULTI-ZONE VAV AIR HANDLING UNIT	
LOCAL DDC CONTROLLER	
INPUTS	
AI1	OUTSIDE AIR FLOWMETER (F-1)
AI2	RETURN AIR FLOWMETER (F-2)
AI3	RETURN AIR TEMPERATURE SENSOR (T/H-1)
AI4	RETURN AIR HUMIDITY SENSOR (T/H-1)
AI5	RETURN AIR STATIC PRESSURE SENSOR (SPS-1)
AI6	MIXED AIR TEMPERATURE SENSOR (T-2)
AI7	HEATING COIL STEAM CONTROL VALVE (V-1)
AI8	HEATING COIL DISCHARGE AIR TEMPERATURE SENSOR (T-4)
AI9	COOLING COIL CHILLED WATER FLOWMETER
AI10	CHILLED WATER CONTROL VALVE (V-2)
AI11	COOLING COIL DISCHARGE AIR TEMPERATURE SENSOR (T-5)
AI12	HUMIDIFIER STEAM CONTROL VALVE (V-4)
AI13	SUPPLY FAN VFD STATUS
AI14	SUPPLY DISCHARGE AIR STATIC PRESSURE SENSOR (SPS-2)
AI15	SUPPLY DISCHARGE AIR TEMPERATURE SENSOR (T/H-2)
AI16	SUPPLY DISCHARGE AIR HUMIDITY SENSOR (T/H-2)
AI17	ZONE 2 SUPPLY AIR FLOWMETER (F-4)
AI18	ZONE 1 SUPPLY AIR FLOWMETER (F-3)
DI1	OUTSIDE AIR DAMPER (D-1) STATUS
DI2	RETURN AIR DAMPER (D-2) STATUS
DI3	AIR PRE-FILTER STATUS (DPS-1)
DI4	RETURN AIR HIGH LIMIT TEMPERATURE SENSOR (T-1) STATUS
DI5	AIR FILTER STATUS (DPS-2)
DI6	RETURN AIR SMOKE DETECTOR (SD-1) STATUS
DI7	HEATING COIL DISCHARGE AIR LOW LIMIT TEMPERATURE SENSOR (T-3) STATUS
DI8	HUMIDIFIER ON/OFF STEAM CONTROL VALVE (V-3) STATUS
DI9	SUPPLY FAN STATUS
DI10	SUPPLY DISCHARGE AIR SMOKE DETECTOR (SD-2)
DI11	SUPPLY DISCHARGE AIR HIGH LIMIT TEMPERATURE SENSOR (T-6) STATUS
DI12	SUPPLY DISCHARGE AIR HIGH LIMIT STATIC PRESSURE SENSOR (SPS-3) STATUS
DI13	ZONE 2 SUPPLY AIR HIGH LIMIT STATIC PRESSURE SENSOR (SPS-4) STATUS
OUTPUTS	
AO1	HEATING COIL STEAM CONTROL VALVE (V-1A)
AO2	HEATING COIL STEAM CONTROL VALVE (V-1B)
AO3	CHILLED WATER CONTROL VALVE (V-2)
AO4	HUMIDIFIER STEAM CONTROL VALVE (V-4)
AO5	SUPPLY FAN VFD SPEED
DO1	OUTSIDE AIR DAMPER (D-1)
DO2	RETURN AIR DAMPER (D-2) STATUS
DO3	HUMIDIFIER ON/OFF STEAM CONTROL VALVE (V-3)
DO4	SUPPLY FAN START/STOP

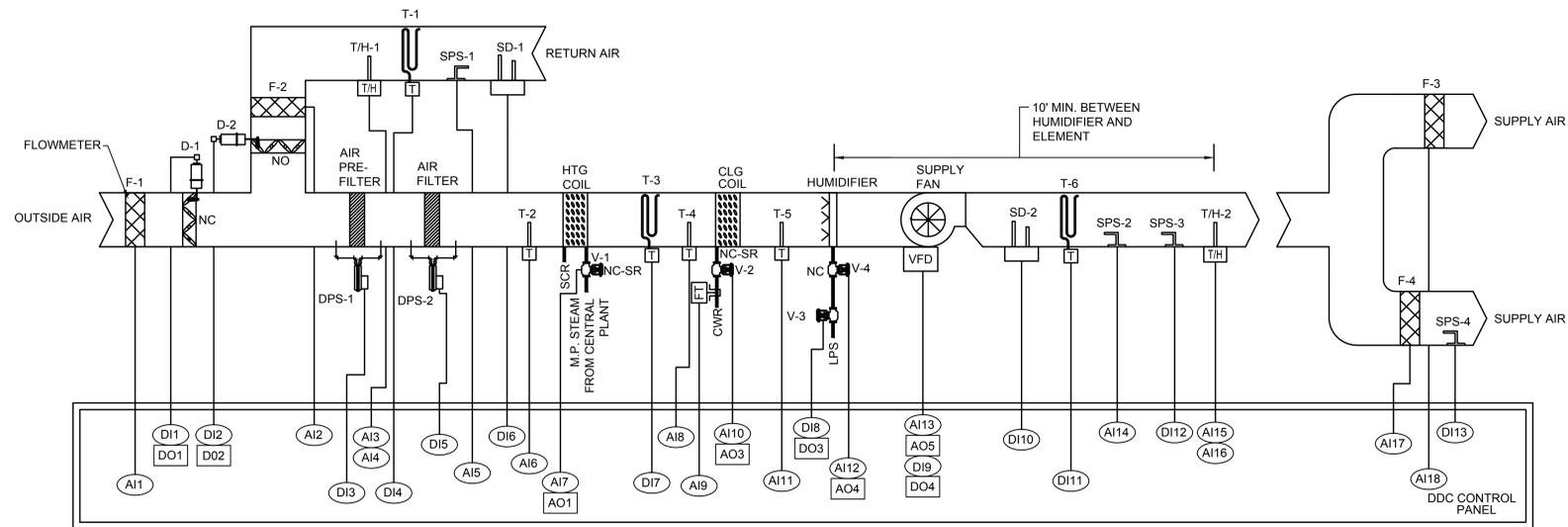
SEQUENCE OF OPERATION

- START/STOP CONTROL
 - 7E-AHU-7-3 IS NORMALLY STARTED AND STOPPED REMOTELY AT THE ECC. H-O-A SWITCH SHALL BE KEPT IN THE "AUTO" POSITION. "HAND" AND "OFF" POSITIONS SHALL BE USED ONLY FOR MAINTENANCE. WHEN FAN RUN STATUS IS PROVEN VIA A CURRENT SENSING RELAY, CONTROL LOOPS SHALL BE ENERGIZED. STOPPING THE UNIT SHALL DE-ENERGIZE THE CONTROL LOOPS AND ALL VALVES SHALL GO TO THE CLOSED POSITION. THE OUTSIDE AIR DAMPER SHALL CLOSE, AND THE RETURN AIR DAMPER SHALL OPEN. OUTSIDE AIR SHALL BE METERED TO MONITOR AND MAINTAIN CONSTANT MIN. O.A. AIRFLOW BY MODULATING THE RETURN AND OUTSIDE AIR CONTROL DAMPERS.
- TEMPERATURE CONTROL
 - A TEMPERATURE SENSOR IN THE UNIT SUPPLY AIR SHALL TRANSMIT TEMPERATURE CHANGES TO THE ASC. THE ASC SHALL MODULATE THE 2-WAY COOLING COIL VALVE TO MAINTAIN SUPPLY AIR SETPOINT AT 55°F (ADJUSTABLE). A TEMPERATURE SENSOR IN THE PREHEAT COIL DISCHARGE SHALL TRANSMIT TEMPERATURE CHANGES TO THE ASC. THE ASC SHALL MODULATE THE 2-WAY STEAM VALVE PREHEAT COIL VALVE TO MAINTAIN PREHEAT SETPOINT (ADJUSTABLE).
- DEHUMIDIFICATION CONTROL
 - HUMIDITY SENSOR, (1% ACCURACY), SHALL MEASURE RETURN AIR HUMIDITY AT THE AHU. THE BAS SHALL AVERAGE THE POSITION OF THE VAV BOX AIR VALVES AND SHALL ADJUST THE AIR TEMPERATURE UPWARD OR DOWNWARD TO MAXIMIZE THE SUPPLY AIR TEMPERATURE THAT SHALL ALLOW FOR THE MOST EFFICIENT (HIGHEST) SUPPLY AIR TEMPERATURE TO SATISFY VAV BOX OPERATION DURING THE OCCUPIED PERIOD OF OPERATION. IF THE RETURN AIR HUMIDITY RISES TO 60% (NOMINAL, ADJUSTABLE), THE SUPPLY AIR TEMPERATURE OF THE AHU SHALL BE LIMITED (LOWERED) SO AS TO KEEP THE RETURN AIR HUMIDITY AT OR BELOW 60% (ADJUSTABLE). ALSO, SYSTEM SHALL UTILIZE CALCULATED R.A. DEWPOINT TEMPERATURE TO COMPARE WITH A MAX. DEWPOINT SETPOINT OF 55°F (ADJUSTABLE). IN ADDITION TO HUMIDITY, TO OVERRIDE CHW VALVE FOR DEHUMIDIFICATION.
- HUMIDIFICATION CONTROL
 - RETURN AIR HUMIDITY SHALL BE MONITORED. HUMIDIFIER STEAM VALVE SHALL MODULATE TO SUPPLY STEAM TO AHU MOUNTED DIRECT-INJECTION STEAM MANIFOLD REQUIRED TO MAINTAIN THE RETURN AIR RELATIVE HUMIDITY SETPOINT OF 30% (ADJUSTABLE AT ECC) AS SENSED BY THE RETURN RELATIVE HUMIDITY SENSOR. PRIOR TO ACTIVATION OF MODULATING STEAM CONTROL VALVE, THE ON/OFF CONTROL VALVE SHALL BE ENABLED THROUGH ECC AND JACKET TEMPERATURE SENSED BY HIGH TEMPERATURE SENSOR SHALL BE WARM ENOUGH TO PREVENT CONDENSATION. THE HIGH LIMIT HUMIDITY SENSOR, LOCATED IN THE SUPPLY AIR DUCT 10' AWAY FROM THE HUMIDIFIER, SHALL DISABLE THE HUMIDIFIER AND GIVE AN ALARM SIGNAL TO THE ECC. IF THE SUPPLY AIR HUMIDITY EXCEEDS 85% RH (ADJUSTABLE), THE AIRFLOW SWITCH SHALL PROVE AIRFLOW BEFORE HUMIDITY CONTROLS ARE ACTIVATED. NORMALLY CLOSED HUMIDIFIER STEAM SUPPLY VALVES SHALL OPEN WHEN OUTSIDE AIR TEMPERATURE DROPS BELOW 60°F AND SHALL CLOSE ABOVE 62°F OUTSIDE AIR TEMPERATURE OR WHEN SUPPLY FAN IS OFF. TEMPERATURE SWITCH SHALL KEEP HUMIDIFIER VALVE CLOSED UNTIL CONDENSATE DRIP LEG REACHES OPERATING TEMPERATURE.
- STATIC PRESSURE AND AIRFLOW CONTROL
 - THE SUPPLY AIR FAN FLOW SHALL BE CONTROLLED BY THE DIGITAL CONTROL PANEL MODULATING FAN'S INDIVIDUAL ADJUSTABLE SPEED MOTOR CONTROLLER TO MAINTAIN 1.0" OF DUCT STATIC PRESSURE (FIELD ADJUSTABLE), AS SENSED BY THE DUCT STATIC PRESSURE SENSOR LOCATED AT ¼ DISTANCE DOWN LONGEST DUCT MAIN. RESET STATIC PRESSURE BASED ON ACTUAL BUILDING LOAD BY POLLING ALL VAV TERMINAL UNITS.
 - FILTER STATUS SHALL BE MONITORED AT EACH PRE-FILTER AND AFTER-FILTER BANK.

- FREEZE PROTECTION
 - IF THE AIR TEMPERATURE AS SENSED BY PREHEATED MIXED AIR SENSOR (FREEZESTAT) UPSTREAM OF COOLING COIL FALLS BELOW 45°F, AN ALARM SIGNAL SHALL INDICATE AT THE DIGITAL CONTROL PANEL AND ECC. IF THIS TEMPERATURE FALLS BELOW 40°F, AS SENSED BY THE LOW TEMPERATURE SWITCH, THE SUPPLY FAN SHALL SHUT DOWN AND A CRITICAL ALARM SHALL INDICATE AT THE DIGITAL CONTROL PANEL AND ECC. THE LOW TEMPERATURE SWITCH SHALL BE HARDWIRED TO THE SUPPLY FAN VFD, AND THE UNIT SHALL BE SHUTDOWN IN HAND, AUTO, OR BYPASS MODE WHENEVER THERE IS A LOW TEMPERATURE ALARM. THE LOW TEMPERATURE SWITCH SHALL REQUIRE MANUAL RESET AT THE DEVICE.
- HIGH DUCT STATIC PROTECTION
 - A DUCT HIGH PRESSURE SENSOR LOCATED AT THE SUPPLY FAN DISCHARGE SHALL PREVENT THE SUPPLY FAN FROM DEVELOPING OVER 3" OF STATIC PRESSURE (FIELD ADJUSTABLE) IN THE SUPPLY DUCT. IF STATIC PRESSURE DOES EXCEED SET LIMIT, THE SUPPLY FAN SHALL STOP. DUCT HIGH PRESSURE SENSOR SHALL BE HARDWIRED TO THE SUPPLY FAN VFD AND THE UNIT SHALL BE SHUTDOWN IN HAND, AUTO OR BYPASS MODE WHENEVER THERE IS A HIGH DUCT PRESSURE ALARM. THE DUCT HIGH STATIC PRESSURE SENSOR SHALL REQUIRE MANUAL RESET AT DEVICE.
- SMOKE PROTECTION AND AUTOMATIC SHUTDOWN/RESTART
 - A SUPPLY AIR SMOKE DETECTOR IN THE SUPPLY AIR DUCT SHALL STOP THE UNIT AND TRANSMIT A SIGNAL TO FIRE ALARM SYSTEM UPON DETECTION OF PRODUCTS OF COMBUSTION IN THE DUCT AND CLOSE THE UNIT ISOLATION SMOKE DAMPERS LOCATED IN SUPPLY AND RETURN DUCT MAINS ADJACENT TO THE UNIT. RE: ELECTRICAL FOR ADDITIONAL REQUIREMENTS. EXHAUST FANS SERVING THE AREA OF THE SUPPLY FAN SHALL CONTINUE TO RUN. THE SUPPLY FAN SHALL RESTART AND SMOKE DAMPERS SHALL OPEN WHEN FIRE ALARM IS RESET.
 - FIRESTATS SHALL BE PROVIDED FOR ANY FAN HANDLING 600CFM OR MORE. FIRESTATS SHALL STOP ASSOCIATED FAN ON A RISE IN AIR TEMPERATURE ABOVE 125°F.
- EMERGENCY CONSTANT SPEED OPERATION
 - UPON FAILURE OF VFD, THE SUPPLY FAN SHALL BE STARTED/STOPPED MANUALLY AT THE DDC OR THE ECC THROUGH THE BYPASS STARTER. FANS SHALL THEN BE OPERATED AT CONSTANT SPEED.

NOTES:

- THESE DRAWINGS ARE REPRESENTATIVE OF THE DESIGN DRAWINGS FOR THE BUILDING 7 EXPANSION CURRENTLY ON GOING AND ARE FOR REFERENCE ONLY.
- ALL EQUIPMENT IN THIS PROJECT WILL BE CONTROLLED BY THE CAMPUS SIEMENS SYSTEM. MIGRATE ALL CONTROLS TO NEW SERVER.



1 BUILDING 7 EXPANSION AHU 7-3 CONTROL SCHEMATIC & SEQUENCE
SCALE: NOT TO SCALE

Revisions	No.	Date	Remarks

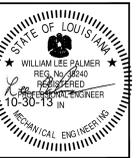
VETERANS HEALTH CARE SYSTEM
Alexandria, Louisiana

Hernandez Consulting
ALBERT ARCHITECTURE
Allen&Hoshall
engineering since 1915

Approved:	Title	Signature

Drawing Title	AHU 7-3 CONTROL SCHEMATIC & SEQUENCE
Project Title	7 EXPANSION
Approved: Service Engineer	Checked: WLP
Approved: Service Director	Drawn: NMT
Location	Alexandria, LA

Date	October 30, 2013
Project No.	VA256-12-C-0253
Drawing No.	M7-401
Dwg.	1 OF 1



SEQUENCE OF OPERATION

1. START/STOP CONTROL

1.1. 7E-AHU-7-AC103 IS NORMALLY STARTED AND STOPPED REMOTELY AT THE ECC. H-O-A SWITCH SHALL BE KEPT IN THE "AUTO" POSITION. "HAND" AND "OFF" POSITIONS SHALL BE USED ONLY FOR MAINTENANCE. WHEN FAN RUN STATUS IS PROVEN VIA A CURRENT SENSING RELAY, CONTROL LOOPS SHALL BE ENERGIZED. STOPPING THE UNIT SHALL DE-ENERGIZE THE CONTROL LOOPS AND ALL VALVES SHALL GO TO THE CLOSED POSITION. THE OUTSIDE AIR DAMPER SHALL CLOSE, AND THE RETURN AIR DAMPER SHALL OPEN. OUTSIDE AIR SHALL BE METERED TO MONITOR AND MAINTAIN CONSTANT MIN. O.A. AIRFLOW BY MODULATING THE RETURN AND OUTSIDE AIR CONTROL DAMPERS.

2. TEMPERATURE CONTROL

2.1. A TEMPERATURE SENSOR IN THE UNIT SUPPLY AIR SHALL TRANSMIT TEMPERATURE CHANGES TO THE ASC. THE ASC SHALL MODULATE THE 2-WAY COOLING COIL VALVE TO MAINTAIN SUPPLY AIR SETPOINT AT 55°F (ADJUSTABLE). A TEMPERATURE SENSOR IN THE PREHEAT COIL DISCHARGE SHALL TRANSMIT TEMPERATURE CHANGES TO THE ASC. THE ASC SHALL MODULATE THE 2-WAY STEAM VALVE PREHEAT COIL VALVE TO MAINTAIN PREHEAT SETPOINT (ADJUSTABLE).

3. DEHUMIDIFICATION CONTROL

3.1. HUMIDITY SENSOR, (1% ACCURACY), SHALL MEASURE RETURN AIR HUMIDITY AT THE AHU. THE BAS SHALL AVERAGE THE POSITION OF THE VAV BOX AIR VALVES AND SHALL ADJUST THE AIR TEMPERATURE UPWARD OR DOWNWARD TO MAXIMIZE THE SUPPLY AIR TEMPERATURE THAT SHALL ALLOW FOR THE MOST EFFICIENT (HIGHEST) SUPPLY AIR TEMPERATURE TO SATISFY VAV BOX OPERATION DURING THE OCCUPIED PERIOD OF OPERATION. IF THE RETURN AIR HUMIDITY RISES TO 60% (NOMINAL, ADJUSTABLE), THE SUPPLY AIR TEMPERATURE OF THE AHU SHALL BE LIMITED (LOWERED) SO AS TO KEEP THE RETURN AIR HUMIDITY AT OR BELOW 60% (ADJUSTABLE). ALSO, SYSTEM SHALL UTILIZE CALCULATED R.A. DEWPOINT TEMPERATURE TO COMPARE WITH A MAX. DEWPOINT SETPOINT OF 55°F (ADJUSTABLE), IN ADDITION TO HUMIDITY, TO OVERRIDE CHW VALVE FOR DEHUMIDIFICATION.

4. HUMIDIFICATION CONTROL

4.1. RETURN AIR HUMIDITY SHALL BE MONITORED. HUMIDIFIER STEAM VALVE SHALL MODULATE TO SUPPLY STEAM TO AHU MOUNTED DIRECT-INJECTION STEAM MANIFOLD REQUIRED TO MAINTAIN THE RETURN AIR RELATIVE HUMIDITY SETPOINT OF 30% (ADJUSTABLE AT ECC) AS SENSED BY THE RETURN RELATIVE HUMIDITY SENSOR. PRIOR TO ACTIVATION OF MODULATING STEAM CONTROL VALVE, THE ON/OFF CONTROL VALVE SHALL BE ENABLED THROUGH ECC AND JACKET TEMPERATURE SENSED BY HIGH TEMPERATURE SENSOR SHALL BE WARM ENOUGH TO PREVENT CONDENSATION. THE HIGH LIMIT HUMIDITY SENSOR, LOCATED IN THE SUPPLY AIR DUCT 10' AWAY FROM THE HUMIDIFIER, SHALL DISBALE THE HUMIDIFIER AND GIVE AN ALARM SIGNAL TO THE ECC. IF THE SUPPLY AIR HUMIDITY EXCEEDS 85% RH (ADJUSTABLE), THE AIRFLOW SWITCH SHALL PROVE AIRFLOW BEFORE HUMIDITY CONTROLS ARE ACTIVATED. NORMALLY CLOSED HUMIDIFIER STEAM SUPPLY VALVES SHALL OPEN WHEN OUTSIDE AIR TEMPERATURE DROPS BELOW 60°F AND SHALL CLOSE ABOVE 62°F OUTSIDE AIR TEMPERATURE OR WHEN SUPPLY FAN IS OFF. TEMPERATURE SWITCH SHALL KEEP HUMIDIFIER VALVE CLOSED UNTIL CONDENSATE DRIP LEG REACHES OPERATING TEMPERATURE.

5. STATIC PRESSURE AND AIRFLOW CONTROL

5.1. THE SUPPLY AIR FAN FLOW SHALL BE CONTROLLED BY THE DIGITAL CONTROL PANEL MODULATING FAN'S INDIVIDUAL ADJUSTABLE SPEED MOTOR CONTROLLER TO MAINTAIN 1.0" OF DUCT STATIC PRESSURE (FIELD ADJUSTABLE), AS SENSED BY THE DUCT STATIC PRESSURE SENSOR LOCATED AT ¾ DISTANCE DOWN LONGEST DUCT MAIN. RESET STATIC PRESSURE BASED ON ACTUAL BUILDING LOAD BY POLLING ALL VAV TERMINAL UNITS.

5.2. FILTER STATUS SHALL BE MONITORED AT EACH PRE-FILTER AND AFTER-FILTER BANK.

6. FREEZE PROTECTION

6.1. IF THE AIR TEMPERATURE AS SENSED BY PREHEATED MIXED AIR SENSOR (FREEZESTAT) UPSTREAM OF COOLING COIL FALLS BELOW 45°F, AN ALARM SIGNAL SHALL INDICATE AT THE DIGITAL CONTROL PANEL AND ECC. IF THIS TEMPERATURE FALLS BELOW 40°F, AS SENSED BY THE LOW TEMPERATURE SWITCH, THE SUPPLY FAN SHALL SHUT DOWN AND A CRITICAL ALARM SHALL INDICATE AT THE DIGITAL CONTROL PANEL AND ECC. THE LOW TEMPERATURE SWITCH SHALL BE HARDWIRED TO THE SUPPLY FAN VFD, AND THE UNIT SHALL BE SHUTDOWN IN HAND, AUTO, OR BYPASS MODE WHENEVER THERE IS A LOW TEMPERATURE ALARM. THE LOW TEMPERATURE SWITCH SHALL REQUIRE MANUAL RESET AT THE DEVICE.

7. HIGH DUCT STATIC PROTECTION

7.1. A DUCT HIGH PRESSURE SENSOR LOCATED AT THE SUPPLY FAN DISCHARGE SHALL PREVENT THE SUPPLY FAN FROM DEVELOPING OVER 3" OF STATIC PRESSURE (FIELD ADJUSTABLE) IN THE SUPPLY DUCT. IF STATIC PRESSURE DOES EXCEED SET LIMIT, THE SUPPLY FAN SHALL STOP. DUCT HIGH PRESSURE SENSOR SHALL BE HARDWIRED TO THE SUPPLY FAN VFD AND THE UNIT SHALL BE SHUTDOWN IN HAND, AUTO OR BYPASS MODE WHENEVER THERE IS A HIGH DUCT PRESSURE ALARM. THE DUCT HIGH STATIC PRESSURE SENSOR SHALL REQUIRE MANUAL RESET AT DEVICE.

8. SMOKE PROTECTION AND AUTOMATIC SHUTDOWN/RESTART

8.1. A SUPPLY AIR SMOKE DETECTOR IN THE SUPPLY AIR DUCT SHALL STOP THE UNIT AND TRANSMIT A SIGNAL TO FIRE ALARM SYSTEM UPON DETECTION OF PRODUCTS OF COMBUSTION IN THE DUCT AND CLOSE THE UNIT ISOLATION SMOKE DAMPERS LOCATED IN SUPPLY AND RETURN DUCT MAINS ADJACENT TO THE UNIT. RE: ELECTRICAL FOR ADDITIONAL REQUIREMENTS. EXHAUST FANS SERVING THE AREA OF THE SUPPLY FAN SHALL CONTINUE TO RUN. THE SUPPLY FAN SHALL RESTART AND SMOKE DAMPERS SHALL OPEN WHEN FIRE ALARM IS RESET.

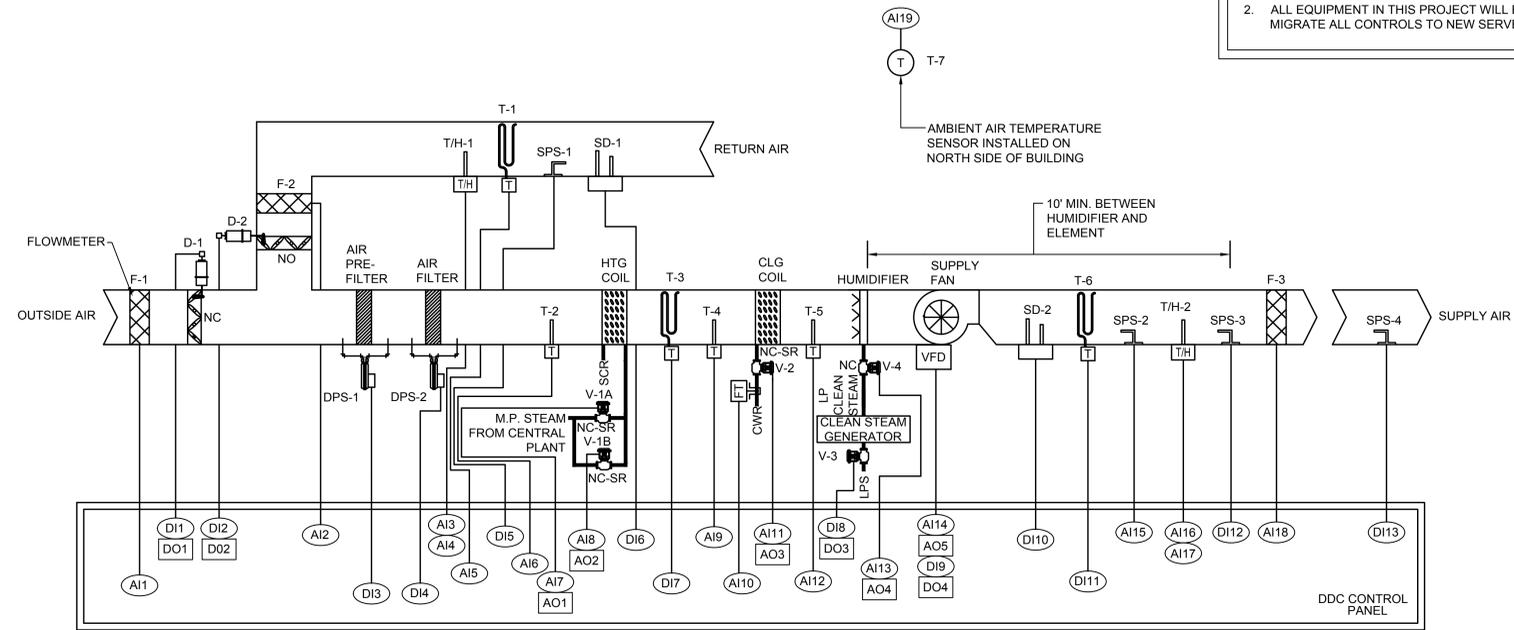
8.2. FIRESTATS SHALL BE PROVIDED FOR ANY FAN HANDLING 600CFM OR MORE. FIRESTATS SHALL STOP ASSOCIATED FAN ON A RISE IN AIR TEMPERATURE ABOVE 125°F.

9. EMERGENCY CONSTANT SPEED OPERATION

9.1. UPON FAILURE OF VFD, THE SUPPLY FAN SHALL BE STARTED/STOPPED MANUALLY AT THE DDC OR THE ECC THROUGH THE BYPASS STARTER. FANS SHALL THEN BE OPERATED AT CONSTANT SPEED.

NOTES:
 1. THESE DRAWINGS ARE REPRESENTATIVE OF THE DESIGN DRAWINGS FOR THE BUILDING 7 EXPANSION CURRENTLY ON GOING AND ARE FOR REFERENCE ONLY.
 2. ALL EQUIPMENT IN THIS PROJECT WILL BE CONTROLLED BY THE CAMPUS SIEMENS SYSTEM. MIGRATE ALL CONTROLS TO NEW SERVER.

VAV AIR HANDLING UNIT	
LOCAL DDC CONTROLLER	
INPUTS	
AI1	OUTSIDE AIR FLOWMETER (F-1)
AI2	RETURN AIR FLOWMETER (F-2)
AI3	RETURN AIR TEMPERATURE SENSOR (T/H-1)
AI4	RETURN AIR HUMIDITY SENSOR (T/H-1)
AI5	RETURN AIR STATIC PRESSURE SENSOR (SPS-1)
AI6	MIXED AIR TEMPERATURE SENSOR (T-2)
AI7	HEATING COIL STEAM CONTROL VALVE (V-1A)
AI8	HEATING COIL STEAM CONTROL VALVE (V-1B)
AI9	HEATING COIL DISCHARGE AIR TEMPERATURE SENSOR (T-4)
AI10	COOLING COIL CHILLED WATER FLOWMETER
AI11	CHILLED WATER CONTROL VALVE (V-2)
AI12	COOLING COIL DISCHARGE AIR TEMPERATURE SENSOR (T-5)
AI13	HUMIDIFIER STEAM CONTROL VALVE (V-4)
AI14	SUPPLY FAN VFD STATUS
AI15	SUPPLY DISCHARGE AIR STATIC PRESSURE SENSOR (SPS-2)
AI16	SUPPLY DISCHARGE AIR TEMPERATURE SENSOR (T/H-2)
AI17	SUPPLY DISCHARGE AIR HUMIDITY SENSOR (T/H-2)
AI18	SUPPLY DISCHARGE AIR FLOWMETER (F-3)
AI19	AMBIENT AIR TEMPERATURE SENSOR (T-7)
DIGITAL	
DI1	OUTSIDE AIR DAMPER (D-1) STATUS
DI2	RETURN AIR DAMPER (D-2) STATUS
DI3	AIR PRE-FILTER STATUS (DPS-1)
DI4	AIR FILTER STATUS (DPS-2)
DI5	RETURN AIR HIGH LIMIT TEMPERATURE SENSOR (T-1) STATUS
DI6	RETURN AIR SMOKE DETECTOR (SD-1) STATUS
DI7	HEATING COIL DISCHARGE AIR LOW LIMIT TEMPERATURE SENSOR (T-3) STATUS
DI8	HUMIDIFIER ON/OFF STEAM CONTROL VALVE (V-3) STATUS
DI9	SUPPLY FAN STATUS
DI10	SUPPLY DISCHARGE AIR SMOKE DETECTOR (SD-2)
DI11	SUPPLY DISCHARGE AIR HIGH LIMIT TEMPERATURE SENSOR (T-6) STATUS
DI12	SUPPLY DISCHARGE AIR HIGH LIMIT STATIC PRESSURE SENSOR (SPS-3) STATUS
DI13	SUPPLY AIR HIGH LIMIT STATIC PRESSURE SENSOR (SPS-4) STATUS
OUTPUTS	
ANALOG	
AO1	HEATING COIL STEAM CONTROL VALVE (V-1A)
AO2	HEATING COIL STEAM CONTROL VALVE (V-1B)
AO3	CHILLED WATER CONTROL VALVE (V-2)
AO4	HUMIDIFIER STEAM CONTROL VALVE (V-4)
AO5	SUPPLY FAN VFD SPEED
DIGITAL	
DO1	OUTSIDE AIR DAMPER (D-1)
DO2	RETURN AIR DAMPER (D-2)
DO3	HUMIDIFIER ON/OFF STEAM CONTROL VALVE (V-3)
DO4	SUPPLY FAN START/STOP



1 BUILDING 7 EXPANSION AHU 7-AC103 CONTROL SCHEMATIC & SEQUENCE
 SCALE: NOT TO SCALE

Revisions	No.	Date	Remarks

VETERANS HEALTH CARE SYSTEM
 Alexandria, Louisiana

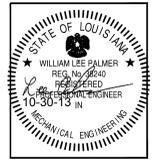
Hernandez Consulting
 ALBERT ARCHITECTURE
 Allen&Hoshall
 engineering since 1915

Approved: _____
 Title: _____
 Signature: _____

Project Title: AHU 7-AC103 CONTROL SCHEMATIC & SEQUENCE
 Building Number: 7 EXPANSION
 Location: Alexandria, LA

Client: A&E Design - Upgrade Energy Management Control Systems
 Checked: WLP
 Drawn: NMT

Date: October 30, 2013
 Project No.: VA256-12-C-0253
 Drawing No.: M7-403
 Dwg. 1 OF 1



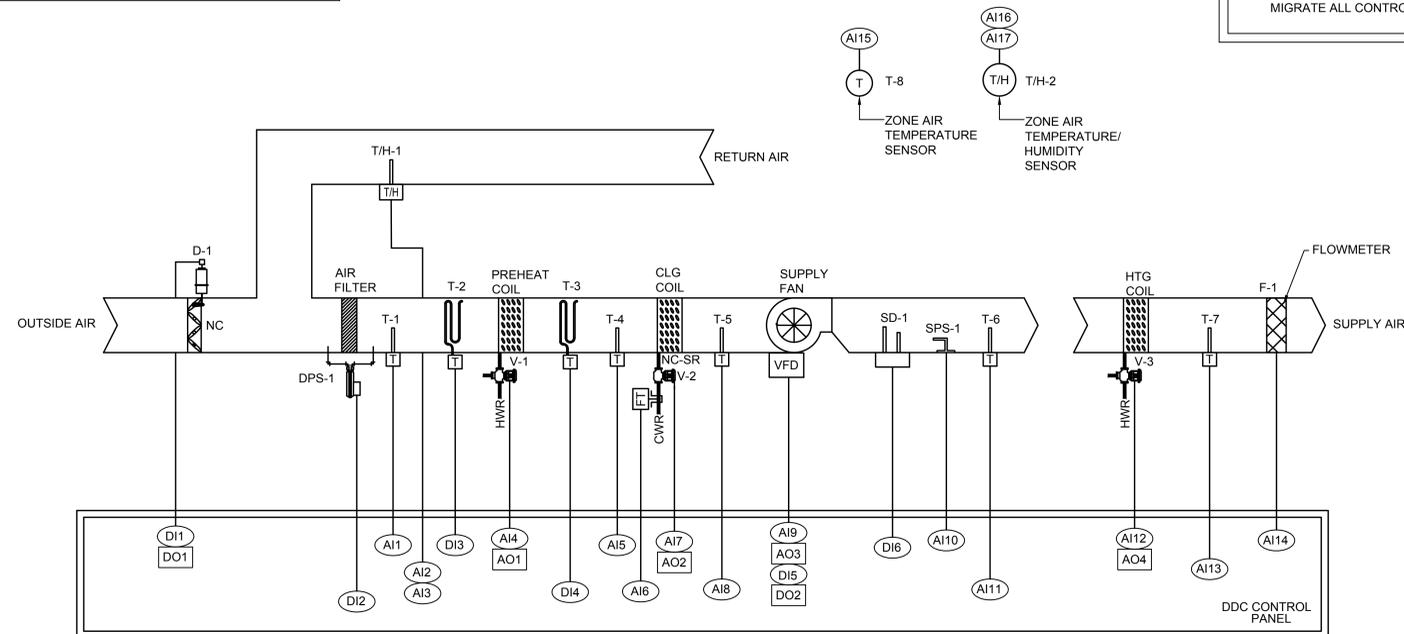
VAV AIR HANDLING UNIT	
LOCAL DDC CONTROLLER	
INPUTS	
ANALOG	AI1 MIXED AIR TEMPERATURE SENSOR (T-1)
	AI2 RETURN AIR TEMPERATURE SENSOR (T/H-1)
	AI3 RETURN AIR HUMIDITY SENSOR (T/H-1)
	AI4 PREHEAT COIL HOT WATER CONTROL VALVE (V-1)
	AI5 PREHEAT COIL DISCHARGE AIR TEMPERATURE SENSOR (T-4)
	AI6 COOLING COIL CHILLED WATER FLOWMETER
	AI7 CHILLED WATER CONTROL VALVE (V-2)
	AI8 COOLING COIL DISCHARGE AIR TEMPERATURE SENSOR (T-5)
	AI9 SUPPLY FAN VFD STATUS
	AI10 SUPPLY DISCHARGE AIR STATIC PRESSURE SENSOR (SPS-1)
	AI11 SUPPLY DISCHARGE AIR TEMPERATURE SENSOR (T-6)
	AI12 REHEAT COIL HOT WATER CONTROL VALVE (V-3)
	AI13 REHEAT COIL DISCHARGE AIR TEMPERATURE SENSOR (T-7)
	AI14 SUPPLY AIR FLOWMETER
	AI15 ZONE AIR TEMPERATURE SENSOR (T-8)
	AI16 ZONE AIR TEMPERATURE SENSOR (T/H-2)
	AI17 ZONE AIR HUMIDITY SENSOR (T/H-2)
DIGITAL	DI1 OUTSIDE AIR DAMPER (D-1) STATUS
	DI2 AIR FILTER STATUS (DPS-1)
	DI3 MIXED AIR LOW LIMIT TEMPERATURE SENSOR (T-1) STATUS
	DI4 PREHEAT COIL DISCHARGE AIR LOW LIMIT TEMPERATURE SENSOR (T-1) STATUS
	DI5 SUPPLY FAN STATUS
	DI6 SUPPLY DISCHARGE AIR SMOKE DETECTOR (SD-1)
OUTPUTS	
ANALOG	AO1 HEATING COIL STEAM CONTROL VALVE (V-1A)
	AO2 HEATING COIL STEAM CONTROL VALVE (V-1B)
	AO3 CHILLED WATER CONTROL VALVE (V-2)
	AO4 SUPPLY FAN VFD SPEED
DIGITAL	DO1 OUTSIDE AIR DAMPER (D-1)
	DO2 SUPPLY FAN START/STOP

SEQUENCE OF OPERATION

- START/STOP CONTROL
 - 7E-AHU-7-4 IS NORMALLY STARTED AND STOPPED REMOTELY AT THE ECC. H-O-A SWITCH SHALL BE KEPT IN THE "AUTO" POSITION. "HAND" AND "OFF" POSITIONS SHALL BE USED ONLY FOR MAINTENANCE. WHEN FAN RUN STATUS IS PROVEN VIA A CURRENT SENSING RELAY, CONTROL LOOPS SHALL BE ENERGIZED. STOPPING THE UNIT SHALL DE-ENERGIZE THE CONTROL LOOPS, ALL VALVES SHALL GO TO THE CLOSED POSITION, AND THE OUTSIDE AIR DAMPER SHALL CLOSE.
- SAFETIES
 - AN INTELLIGENT DUCT SMOKE DETECTOR IN THE PURE SUPPLY AIR (RE: ELECTRICAL) SHALL STOP THE UNIT UPON DETECTION OF PRODUCTS OF COMBUSTION.
 - ELECTRIC LOW LIMIT THERMOSTAT IN THE MIXED AIR SHALL STOP THE UNIT UPON DETECTION OF TEMPERATURE BELOW ITS SETPOINT.
 - FIRESTATS SHALL BE PROVIDED FOR ANY FAN HANDLING 600 CFM OR MORE. FIRESTATS SHALL STOP ASSOCIATED FAN ON A RISE IN AIR TEMPERATURE ABOVE 125°F.
- TEMPERATURE CONTROL
 - SPACE TEMPERATURE SENSOR LOCATED AS SHOWN THE PLANS SHALL TRANSMIT TEMPERATURE CHANGES TO THE DDC. THE DDC SHALL MODULATE THE 2-WAY CHILLED WATER AND 3-WAY HOT WATER PREHEAT VALVE IN SEQUENCE TO MAINTAIN SPACE TEMPERATURE SETPOINT.
- HUMIDIFICATION CONTROL
 - PROVIDE SPACE HUMIDISTAT THAT SHALL OVERRIDE THE THERMOSTAT AND CONTROL THE COOLING VALVE TO MAINTAIN 55°F LEAVING AIR. THE THERMOSTAT SHALL CONTROL SPACE TEMPERATURE AT SETPOINT THROUGH THE MODULATION OF THE REHEAT POSITIONED HEATING HOT WATER COIL VALVE.
- FILTER STATUS
 - FILTER STATUS SHALL BE MONITORED AT EACH PRE-FILTER AND AFTER-FILTER BANK.

NOTES:

- THESE DRAWINGS ARE REPRESENTATIVE OF THE DESIGN DRAWINGS FOR THE BUILDING 7 EXPANSION CURRENTLY ON GOING AND ARE FOR REFERENCE ONLY.
- ALL EQUIPMENT IN THIS PROJECT WILL BE CONTROLLED BY THE CAMPUS SIEMENS SYSTEM. MIGRATE ALL CONTROLS TO NEW SERVER.



1 BUILDING 7 EXPANSION AHU 7-4 CONTROL SCHEMATIC & SEQUENCE
SCALE: NOT TO SCALE

No.	Date	Remarks

VETERANS HEALTH CARE SYSTEM
Alexandria, Louisiana

Hernandez Consulting
ALBERT ARCHITECTURE

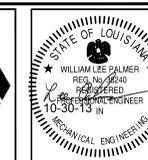
Allen & Hoshall
engineering since 1915

Approved:	Title	Signature

Drawing Title	AHU 7-4 CONTROL SCHEMATIC & SEQUENCE
Project Title	A&E Design - Upgrade Energy Management Control Systems
Approved: Service Engineer	
Approved: Service Director	

Date	October 30, 2013
Project No.	VA256-12-C-0253
Building Number	7 EXPANSION
Checked	WLP
Drawn	NMT
Location	Alexandria, LA

Drawings No.	M7-404
Dwg.	1 OF 1



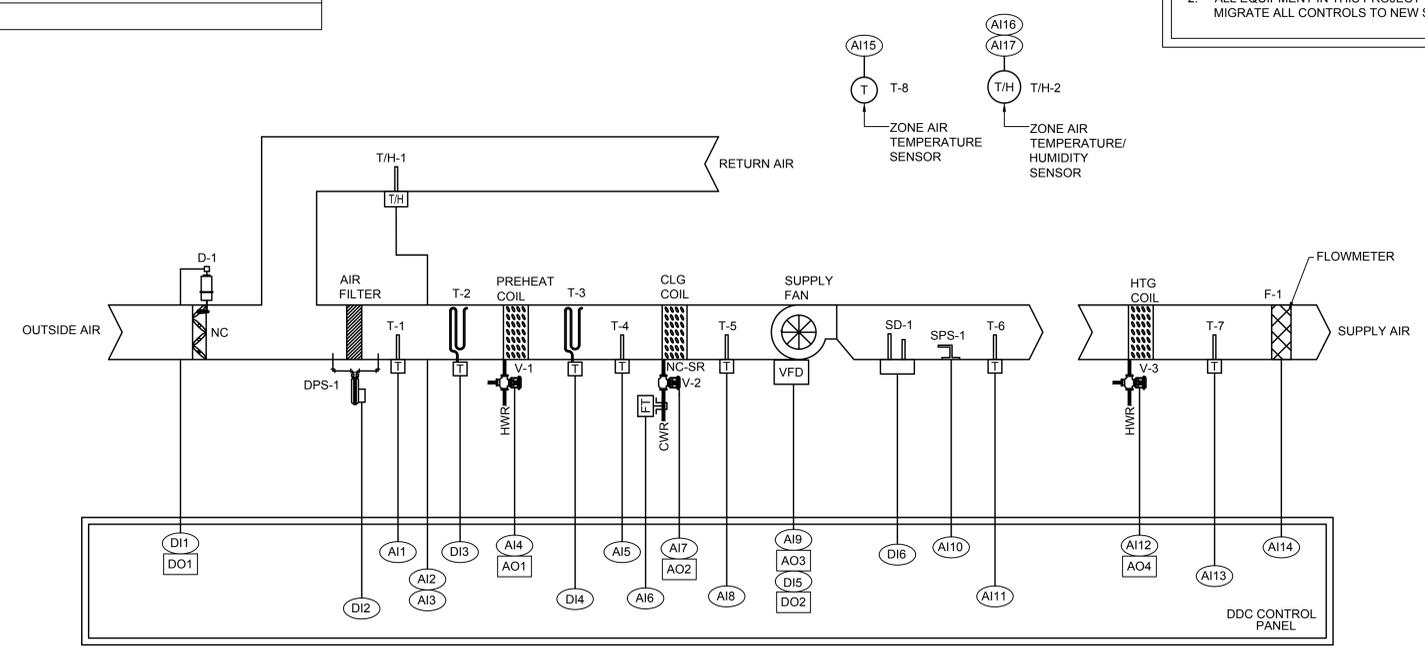
VAV AIR HANDLING UNIT	
LOCAL DDC CONTROLLER	
INPUTS	
AI1	MIXED AIR TEMPERATURE SENSOR (T-1)
AI2	RETURN AIR TEMPERATURE SENSOR (T/H-1)
AI3	RETURN AIR HUMIDITY SENSOR (T/H-1)
AI4	PREHEAT COIL HOT WATER CONTROL VALVE (V-1)
AI5	PREHEAT COIL DISCHARGE AIR TEMPERATURE SENSOR (T-4)
AI6	COOLING COIL CHILLED WATER FLOWMETER
AI7	CHILLED WATER CONTROL VALVE (V-2)
AI8	COOLING COIL DISCHARGE AIR TEMPERATURE SENSOR (T-5)
AI9	SUPPLY FAN VFD STATUS
AI10	SUPPLY DISCHARGE AIR STATIC PRESSURE SENSOR (SPS-1)
AI11	SUPPLY DISCHARGE AIR TEMPERATURE SENSOR (T-6)
AI12	REHEAT COIL HOT WATER CONTROL VALVE (V-3)
AI13	REHEAT COIL DISCHARGE AIR TEMPERATURE SENSOR (T-7)
AI14	SUPPLY AIR FLOWMETER
AI15	ZONE AIR TEMPERATURE SENSOR (T-8)
AI16	ZONE AIR TEMPERATURE SENSOR (T/H-2)
AI17	ZONE AIR HUMIDITY SENSOR (T/H-2)
DIGITAL	
DI1	OUTSIDE AIR DAMPER (D-1) STATUS
DI2	AIR FILTER STATUS (DPS-1)
DI3	MIXED AIR LOW LIMIT TEMPERATURE SENSOR (T-1) STATUS
DI4	PREHEAT COIL DISCHARGE AIR LOW LIMIT TEMPERATURE SENSOR (T-1) STATUS
DI5	SUPPLY FAN STATUS
DI6	SUPPLY DISCHARGE AIR SMOKE DETECTOR (SD-1)
OUTPUTS	
ANALOG	
AO1	HEATING COIL STEAM CONTROL VALVE (V-1A)
AO2	HEATING COIL STEAM CONTROL VALVE (V-1B)
AO3	CHILLED WATER CONTROL VALVE (V-2)
AO4	SUPPLY FAN VFD SPEED
DIGITAL	
DO1	OUTSIDE AIR DAMPER (D-1)
DO2	SUPPLY FAN START/STOP

SEQUENCE OF OPERATION

- START/STOP CONTROL
 - 7E-AHU-7-4 IS NORMALLY STARTED AND STOPPED REMOTELY AT THE ECC. H-O-A SWITCH SHALL BE KEPT IN THE "AUTO" POSITION. "HAND" AND "OFF" POSITIONS SHALL BE USED ONLY FOR MAINTENANCE. WHEN FAN RUN STATUS IS PROVEN VIA A CURRENT SENSING RELAY, THE CONTROL LOOPS SHALL BE ENERGIZED. STOPPING THE UNIT SHALL DE-ENERGIZE THE CONTROL LOOPS AND ALL VALVES SHALL GO TO THE CLOSED POSITION, THE OUTSIDE AIR DAMPER SHALL CLOSE. SUPPLY AIR SHALL BE METERED TO MONITOR AIRFLOW.
- SAFETIES
 - AN INTELLIGENT DUCT SMOKE DETECTOR IN THE PURE SUPPLY AIR (RE: ELECTRICAL) SHALL STOP THE UNIT UPON DETECTION OF PRODUCTS OF COMBUSTION.
 - ELECTRIC LOW LIMIT THERMOSTAT IN THE MIXED AIR SHALL STOP THE UNIT UPON DETECTION OF TEMPERATURE BELOW ITS SETPOINT.
 - FIRESTATS SHALL BE PROVIDED FOR ANY FAN HANDLING 600 CFM OR MORE. FIRESTATS SHALL STOP ASSOCIATED FAN ON A RISE IN AIR TEMPERATURE ABOVE 125°F.
- TEMPERATURE CONTROL
 - SPACE TEMPERATURE SENSOR LOCATED AS SHOWN THE PLANS SHALL TRANSMIT TEMPERATURE CHANGES TO THE DDC. THE DDC SHALL MODULATE THE 2-WAY CHILLED WATER AND 3-WAY HOT WATER PREHEAT VALVE IN SEQUENCE TO MAINTAIN SPACE TEMPERATURE SETPOINT.
- HUMIDIFICATION CONTROL
 - PROVIDE SPACE HUMIDISTAT THAT SHALL OVERRIDE THE THERMOSTAT AND CONTROL THE COOLING VALVE TO MAINTAIN 55°F LEAVING AIR. THE THERMOSTAT SHALL CONTROL SPACE TEMPERATURE AT SETPOINT THROUGH THE MODULATION OF THE REHEAT POSITIONED HEATING HOT WATER COIL VALVE.
- FILTER STATUS
 - FILTER STATUS SHALL BE MONITORED AT EACH PRE-FILTER AND AFTER-FILTER BANK.

NOTES:

- THESE DRAWINGS ARE REPRESENTATIVE OF THE DESIGN DRAWINGS FOR THE BUILDING 7 EXPANSION CURRENTLY ON GOING AND ARE FOR REFERENCE ONLY.
- ALL EQUIPMENT IN THIS PROJECT WILL BE CONTROLLED BY THE CAMPUS SIEMENS SYSTEM. MIGRATE ALL CONTROLS TO NEW SERVER.



1 BUILDING 7 EXPANSION AHU 7-5 CONTROL SCHEMATIC & SEQUENCE
SCALE: NOT TO SCALE

No.	Date	Remarks

VETERANS HEALTH CARE SYSTEM
Alexandria, Louisiana

Hernandez Consulting
ALBERT ARCHITECTURE

Allen&Hoshall
engineering since 1915

Approved: _____
Title: _____
Signature: _____

Drawing Title: **AHU 7-5 CONTROL SCHEMATIC & SEQUENCE**

Approved: Service Engineer: _____
Approved: Service Director: _____

Project Title: **A&E Design - Upgrade Energy Management Control Systems**

Building Number: **7 EXPANSION** | Checked: **WLP** | Drawn: **NMT**

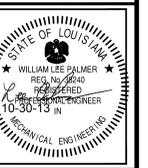
Location: **Alexandria, LA**

Date: **October 30, 2013**

Project No.: **VA256-12-C-0253**

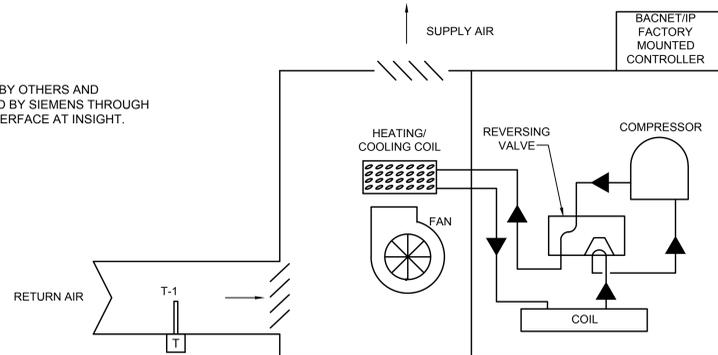
Drawings No.: **M7-405**

Dwg. 1 OF 1



NOTES:

1. CONTROLS BY OTHERS AND INTEGRATED BY SIEMENS THROUGH BACNET INTERFACE AT INSIGHT.



1 BUILDING 7 EXPANSION AC-7-1 CONTROL SCHEMATIC & SEQUENCE
SCALE: NOT TO SCALE

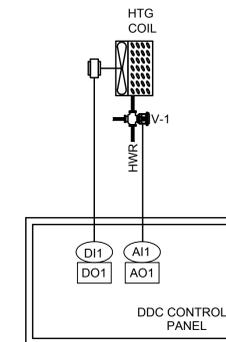
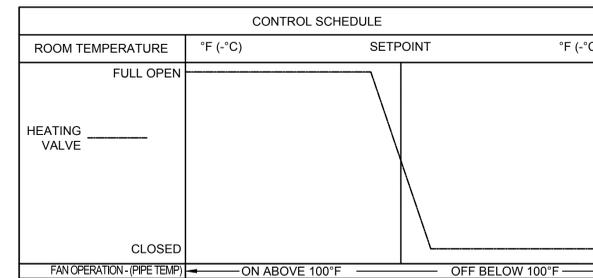
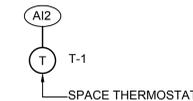
HEATING HOT WATER UNIT HEATER	
LOCAL DDC CONTROLLER	
INPUTS	
AI1	HOT WATER CONTROL VALVE (V-1)
AI2	ZONE AIR TEMPERATURE SENSOR (T-1)
DI1	FAN STATUS
OUTPUTS	
AO1	HOT WATER CONTROL VALVE (V-1)
DO1	FAN START/STOP

SEQUENCE OF OPERATION

1. START/STOP CONTROL
 - 1.1. UNIT IS NORMALLY STARTED AND STOPPED REMOTELY AT THE ECC.
 - 1.2. H-O-A SWITCH SHALL BE KEPT IN THE "AUTO" POSITION. "HAND" AND "OFF" POSITIONS SHALL BE USED ONLY FOR MAINTENANCE. WHEN DAN IS COMMANDED TO RUN, THE CONTROL LOOPS SHALL BE ENERGIZED, OPENING COOLING COIL VALVE. STOPPING THE UNIT SHALL DE-ENERGIZE THE CONTROL LOOPS AND COOLING COIL VALVE SHALL GO TO CLOSED POSITION.
2. TEMPERATURE CONTROL
 - 2.1. SPACE THERMOSTAT LOCATED AS SHOWN ON THE PLANS SHALL TRANSMIT TEMPERATURE CHANGES TO THE DCP. THE DCP SHALL MODULATE THE 3-WAY HOT WATER VALVE TO MAINTAIN TEMPERATURE SETPOINT.

NOTES:

1. TYPICAL FOR HWUH 7-1 (RM 1E-138) & HWUH 7-3 (1G-138).



2 BUILDING 7 EXPANSION HEATING HOT WATER UNIT HEATERS HWUH#7-1 & 7-3 CONTROL SCHEMATIC & SEQUENCE
SCALE: NOT TO SCALE

NOTES:

1. THESE DRAWINGS ARE REPRESENTATIVE OF THE DESIGN DRAWINGS FOR THE BUILDING 7 EXPANSION CURRENTLY ON GOING AND ARE FOR REFERENCE ONLY.
2. ALL EQUIPMENT IN THIS PROJECT WILL BE CONTROLLED BY THE CAMPUS SIEMENS SYSTEM. MIGRATE ALL CONTROLS TO NEW SERVER.

Revisions	No.	Date	Remarks

VETERANS HEALTH CARE SYSTEM
Alexandria, Louisiana

Hernandez Consulting
ALBERT ARCHITECTURE

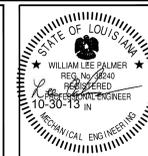
Allen&Hoshall
engineering since 1915

Approved:	Title	Signature

Project Title	Building Number	Checked	Drawn
AC-7-1 & HEATING HOT WATER UNIT HEATER CONTROL SCHEMATICS & SEQUENCES	7 EXPANSION	WLP	NMT
Approved: Service Engineer			
Approved: Service Director			

Project Title	Location
A&E Design - Upgrade Energy Management Control Systems	Alexandria, LA

Date	Project No.	Drawings No.
October 30, 2013	VA256-12-C-0253	M7-408
Dwg. 1 OF 1		



NOTES:
 1. THESE DRAWINGS ARE REPRESENTATIVE OF THE DESIGN DRAWINGS FOR THE BUILDING 7 EXPANSION CURRENTLY ON GOING AND ARE FOR REFERENCE ONLY.
 2. ALL EQUIPMENT IN THIS PROJECT WILL BE CONTROLLED BY THE CAMPUS SIEMENS SYSTEM. MIGRATE ALL CONTROLS TO NEW SERVER.

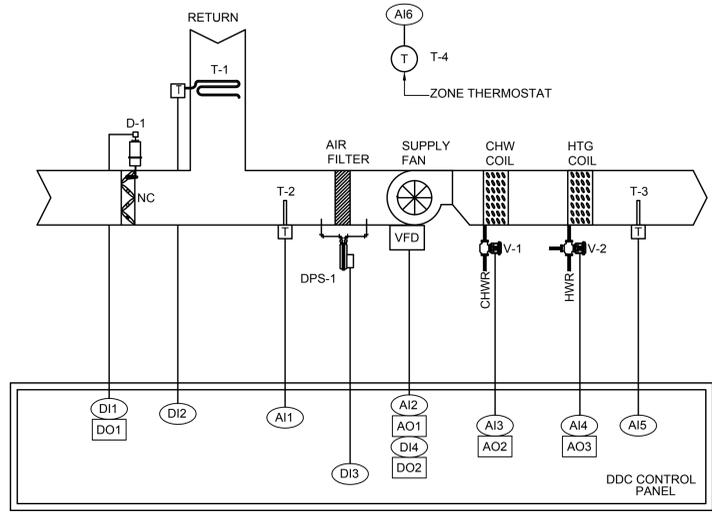
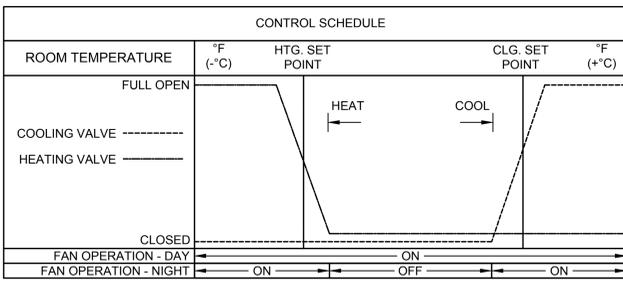
FAN COIL UNIT (FCU#7-4 & 7-5)	
LOCAL DDC CONTROLLER	
INPUTS	
ANALOG	AI1 SUPPLY FAN VFD STATUS
	AI2 CHILLED WATER CONTROL VALVE (V-1)
	AI3 ZONE AIR TEMPERATURE SENSOR (T-1)
DI	DI1 SUPPLY FAN STATUS
OUTPUTS	
ANALOG	AO1 SUPPLY FAN VFD SPEED
	AO2 CHILLED WATER CONTROL VALVE (V-1)
DI	DO1 SUPPLY FAN START/STOP

FAN COIL UNIT (FCU#7-1, 7-2 & 7-3)	
LOCAL DDC CONTROLLER	
INPUTS	
ANALOG	AI1 MIXED AIR TEMPERATURE SENSOR (T-2)
	AI2 SUPPLY FAN VFD STATUS
	AI3 CHILLED WATER CONTROL VALVE (V-1)
	AI4 HOT WATER CONTROL VALVE (V-2)
	AI5 SUPPLY AIR TEMPERATURE SENSOR (T-3)
	AI6 ZONE AIR TEMPERATURE SENSOR (T-4)
DIGITAL	DI1 OUTSIDE AIR DAMPER STATUS (D-1)
	DI2 RETURN AIR HIGH LIMIT TEMPERATURE SENSOR (T-1)
	DI3 AIR FILTER STATUS (DPS-1)
	DI4 SUPPLY FAN STATUS
OUTPUTS	
ANALOG	AO1 SUPPLY FAN VFD SPEED
	AO2 CHILLED WATER CONTROL VALVE (V-1)
	AO3 HOT WATER CONTROL VALVE (V-2)
DIGITAL	DO1 OUTSIDE AIR DAMPER (D-1)
	DO2 SUPPLY FAN START/STOP

- SEQUENCE OF OPERATION: FCU#7-1, 7-2, & 7-3
- START/STOP CONTROL:
 - UNIT IS NORMALLY STARTED AND STOPPED REMOTELY AT THE ECC. H-O-A SWITCH SHALL BE KEPT IN THE "AUTO" POSITION. "HAND" AND "OFF" POSITIONS SHALL BE USED ONLY FOR MAINTENANCE. WHEN FAN RUN STATUS IS PROVEN VIA A CURRENT SENSING RELAY, THE CONTROL LOOPS SHALL BE ENERGIZED, OPENING ALL VALVES AND OUTSIDE AIR DAMPER. STOPPING THE UNIT SHALL DE-ENERGIZE THE CONTROL LOOPS AND ALL VALVES SHALL GO TO THE CLOSED POSITION AND THE OUTSIDE AIR DAMPER SHALL CLOSE.
 - SAFETIES:
 - AN INTELLIGENT DUCT SMOKE DETECTOR IN THE PURE SUPPLY AIR (RE: ELECTRICAL) SHALL STOP THE UNIT UPON DETECTION OF PRODUCTS OF COMBUSTION. ELECTRIC LOW LIMIT THERMOSTAT IN THE MIXED AIR SHALL STOP THE UNIT UPON DETECTION OF TEMPERATURE BELOW ITS SETPOINT. FIRESTATS SHALL BE PROVIDED FOR ANY FAN HANDLING 600 CFM OR MORE. FIRESTATS SHALL STOP ASSOCIATED FAN ON A RISE IN AIR TEMPERATURE ABOVE 125°F.
 - TEMPERATURE CONTROL:
 - SPACE TEMPERATURE SENSOR LOCATED AS SHOWN ON THE PLANS SHALL TRANSMIT TEMPERATURE CHANGES TO THE DCP. THE DCP SHALL MODULATE THE 2-WAY CHILLED WATER AND 3-WAY HOT WATER PREHEAT VALVE IN SEQUENCE TO MAINTAIN SPACE TEMPERATURE SETPOINT.
 - FILTER STATUS:
 - FILTER STATUS SHALL BE MONITORED AT EACH FILTER BANK.

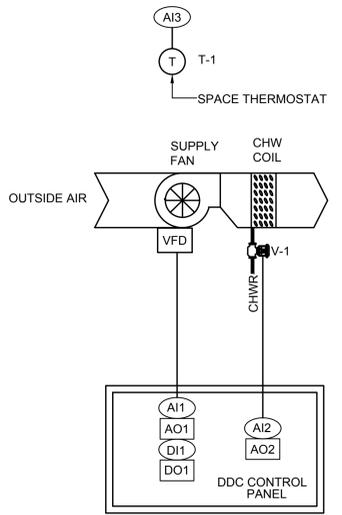
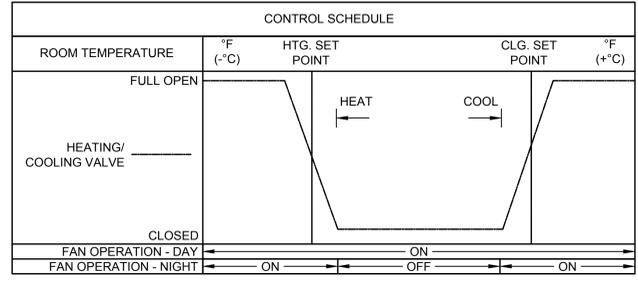
- SEQUENCE OF OPERATION: FCU#7-4 & 7-5
- START/STOP CONTROL:
 - UNIT IS NORMALLY STARTED AND STOPPED REMOTELY AT THE ECC.
 - H-O-A SWITCH SHALL BE KEPT IN THE "AUTO" POSITION. "HAND" AND "OFF" POSITIONS SHALL BE USED ONLY FOR MAINTENANCE. WHEN DAN IS COMMANDED TO RUN, THE CONTROL LOOPS SHALL BE ENERGIZED, OPENING COOLING COIL VALVE. STOPPING THE UNIT SHALL DE-ENERGIZE THE CONTROL LOOPS AND COOLING COIL VALVE SHALL GO TO CLOSED POSITION.
 - TEMPERATURE CONTROL:
 - SPACE THERMOSTAT LOCATED AS SHOWN ON THE PLANS SHALL TRANSMIT TEMPERATURE CHANGES TO THE DCP. THE DCP SHALL MODULATE THE 2-WAY CHILLED WATER VALVE TO MAINTAIN TEMPERATURE SETPOINT.

NOTES:
 1. TYPICAL OF 3 FCUS: 7E-1, 7E-2, & 7E-3.



1 BUILDING 7 EXPANSION FAN COIL UNITS FCU#7-1, 7-2, & 7-3 CONTROL SCHEMATIC & SEQUENCE
 SCALE: NOT TO SCALE

NOTES:
 1. TYPICAL OF 3 FCUS: 7E-4 & 7E-5.



2 BUILDING 7 EXPANSION FAN COIL UNITS FCU#7-4 & 7-5 CONTROL SCHEMATIC & SEQUENCE
 SCALE: NOT TO SCALE

Revisions	No.	Date	Remarks

VETERANS HEALTH CARE SYSTEM
 Alexandria, Louisiana

Hernandez Consulting
 ALBERT ARCHITECTURE

Allen&Hoshall
 engineering since 1915

Approved: _____
 Title: _____ Signature: _____

Project Title: FAN COIL UNITS FCU #7-1, 7-2, 7-3, 7-4, & 7-5 CONTROL SCHEMATIC & SEQUENCE

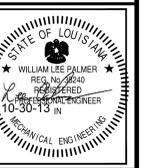
Approved: Service Engineer: _____
 Approved: Service Director: _____

Project Title: A&E Design - Upgrade Energy Management Control Systems

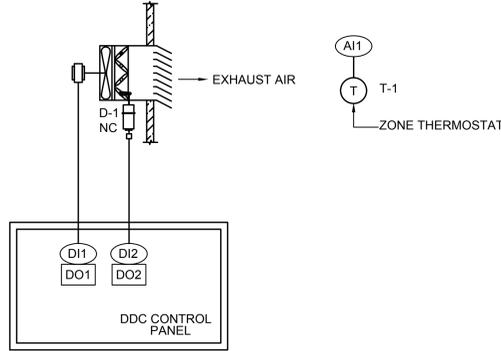
Building Number: 7 EXPANSION
 Checked: WLP
 Drawn: NMT

Location: Alexandria, LA

Date: October 30, 2013
 Project No.: VA256-12-C-0253
 Drawing No.: M7-409
 Dwg. 1 OF 1

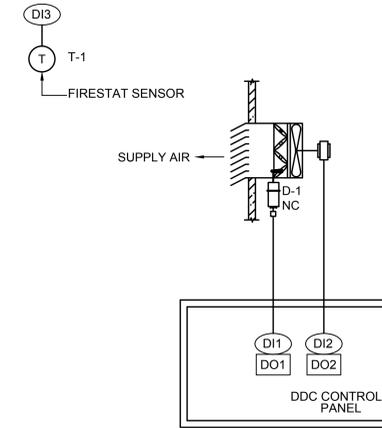


EXHAUST FAN 7-EF-127	
LOCAL DDC CONTROLLER	
INPUTS	
ANALOG	(AI1) ZONE AIR TEMPERATURE SENSOR (T-1)
DIGITAL IN	(DI1) UNIT FAN STATUS
	(DI2) AIR DAMPER (D-1) STATUS
OUTPUTS	
DIGITAL	(DO1) UNIT FAN START/STOP
	(DO2) AIR DAMPER (D-1)



1 BUILDING 7 EXPANSION EXHAUST FAN 7-EF-127 CONTROL SCHEMATIC & SEQUENCE
SCALE: NOT TO SCALE

NOTES:
 1. THESE DRAWINGS ARE REPRESENTATIVE OF THE DESIGN DRAWINGS FOR THE BUILDING 7 EXPANSION CURRENTLY ON GOING AND ARE FOR REFERENCE ONLY.
 2. ALL EQUIPMENT IN THIS PROJECT WILL BE CONTROLLED BY THE CAMPUS SIEMENS SYSTEM. MIGRATE ALL CONTROLS TO NEW SERVER.



SUPPLY FAN 7-SF-115	
LOCAL DDC CONTROLLER	
INPUTS	
DIGITAL	(DI1) AIR DAMPER (D-1) STATUS
	(DI2) UNIT FAN STATUS
	(DI3) FIRESTAT SENSOR (T-1) STATUS
OUTPUTS	
DIGITAL	(DO1) AIR DAMPER (D-1)
	(DO2) UNIT FAN START/STOP

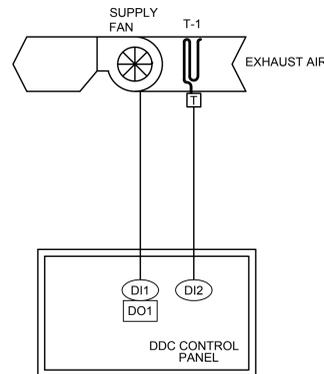
2 BUILDING 7 EXPANSION SUPPLY FAN 7-SF-115 CONTROL SCHEMATIC & SEQUENCE
SCALE: NOT TO SCALE

SEQUENCE OF OPERATION

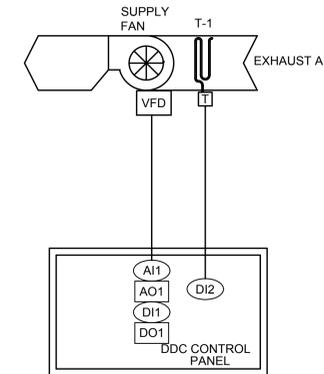
- START/STOP CONTROL
 - ALL FANS SHALL BE START/STOPPED ON A TIME OF DAY SCHEDULE BY THE DDC SYSTEM AND LOCAL OPERATING DEVICE (SWITCH, ETC). WHERE APPROPRIATE, A ROOM THERMOSTAT SHALL CYCLE THE FAN TO MAINTAIN ROOM TEMPERATURE SETPOINT.
- TEMPERATURE CONTROL
 - ALARM IF SPACE TEMPERATURE RISES OUT OF RANGES.
- FIRESTATS
 - FIRESTATS SHALL BE PROVIDED FOR ANY FAN HANDLING 600 CFM OR MORE. FIRESTATS SHALL STOP ASSOCIATED FAN ON A RISE IN AIR TEMPERATURE ABOVE 125°F.

EXHAUST FANS: EF#7-5 & EF#7-7	
LOCAL DDC CONTROLLER	
INPUTS	
DIGITAL	(DI1) SUPPLY FAN STATUS
	(DI2) INTAKE AIR HIGH LIMIT TEMPERATURE SENSOR (T-1)
OUTPUTS	
DI	(DO1) SUPPLY FAN START/STOP

- NOTES:
 1. TYPICAL OF EF#7-5 & 7-7.



3 BUILDING 7 EXPANSION EXHAUST FAN EF#7-5 & 7-6 CONTROL SCHEMATIC & SEQUENCE
SCALE: NOT TO SCALE



EXHAUST FANS EF#7-6	
LOCAL DDC CONTROLLER	
INPUTS	
ANALOG	(AI1) SUPPLY FAN VFD STATUS
DIGITAL IN	(DI1) SUPPLY FAN STATUS
	(DI2) INTAKE AIR HIGH LIMIT TEMPERATURE SENSOR (T-1)
OUTPUTS	
AN	(AO1) SUPPLY FAN VFD SPEED
DI	(DO1) SUPPLY FAN START/STOP

4 BUILDING 7 EXPANSION EXHAUST FAN EF#7-6 CONTROL SCHEMATIC & SEQUENCE
SCALE: NOT TO SCALE

Revisions		
No.	Date	Remarks

VETERANS HEALTH CARE SYSTEM
 Alexandria, Louisiana

Hernandez Consulting
 ALBERT ARCHITECTURE
 Allen&Hoshall
 engineering since 1915

Approved:	
Title	Signature

Drawing Title	
SUPPLY FAN 7-SF-115 & EXHAUST FANS 7-EF-127, EF#7-5, 7-6, & 7-7 CONTROL SCHEMATICS & SEQUENCE	
Approved: Service Engineer	
Approved: Service Director	

Project Title			
A&E Design - Upgrade Energy Management Control Systems			
Building Number	Checked	Drawn	
7 EXPANSION	WLP	NMT	
Location			
Alexandria, LA			

Date	
October 30, 2013	
Project No.	VA256-12-C-0253
Drawings No.	M7-410
Dwg. 1 OF 1	

