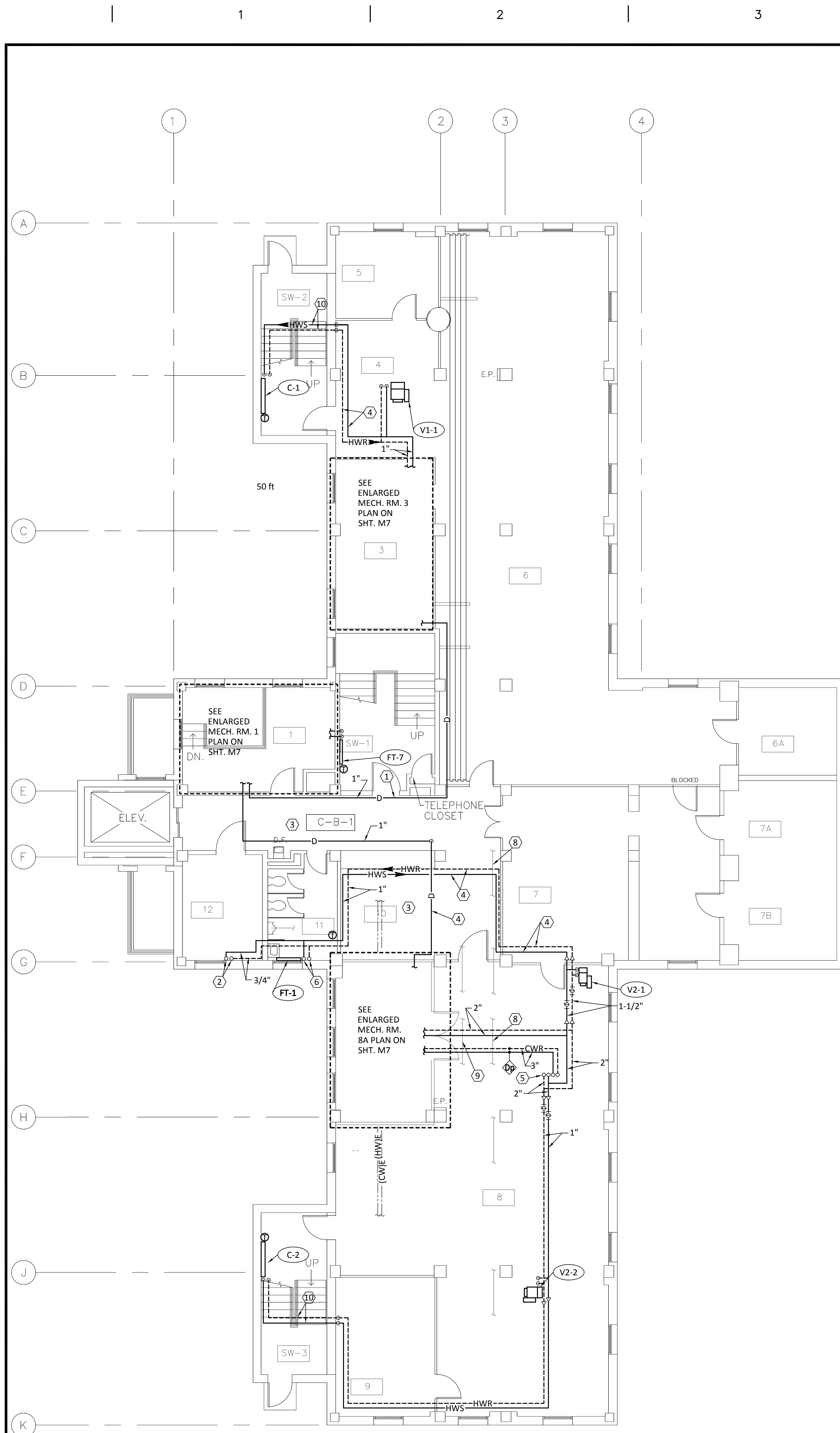


0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
three eighths inch = one foot
one quarter inch = one foot
one eighth inch = one foot
three sixteenths inch = one foot
one half inch = one foot
one inch = one foot
three quarters inch = one foot
one inch = one foot
one and one half inches = one foot
two inches = one foot
three inches = one foot



BASEMENT FLOOR HVAC PIPING PLAN
SCALE: 1/8"=1'-0"

DESIGNER/ENGINEER CAD OPERATOR CHECKER/REVISOR	01/18/2013 01/31/2013
95% OWNER REVIEW DOCUMENTS ISSUED FOR BID DOCUMENTS	
Revisions	Date

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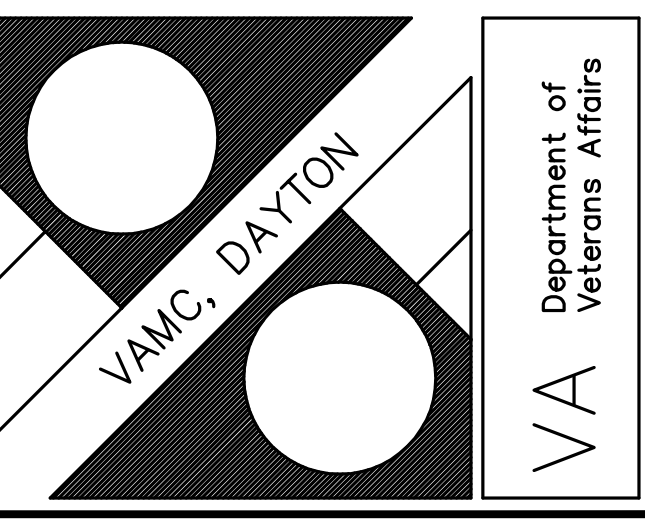


Revised By:	
Approved: Project Engineer Philip Kirk	

Drawing Title BASEMENT FLOOR HVAC DUCT AND PIPING PLANS
Approved: Project Engineer Philip Kirk

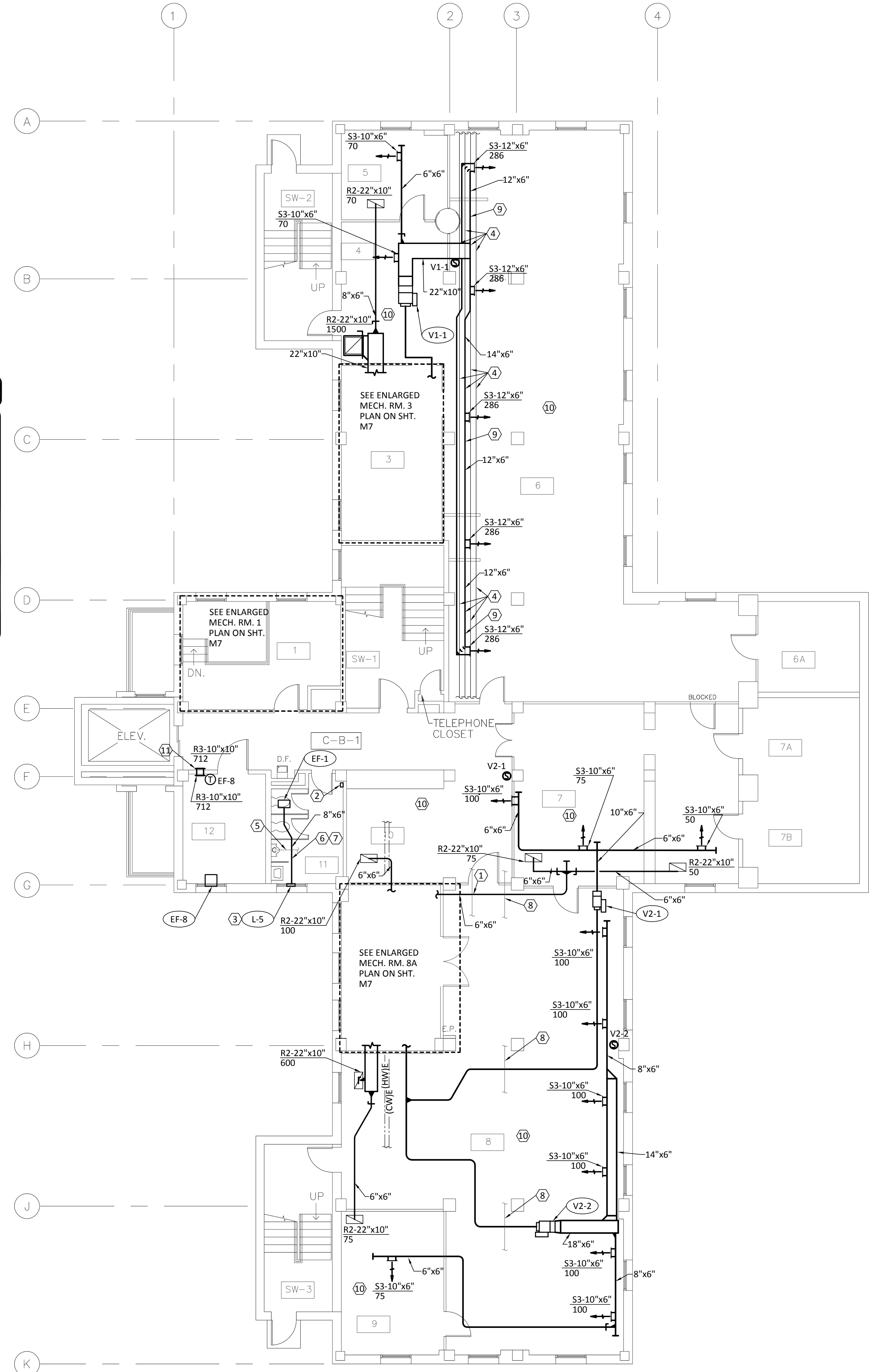
Project Title MODERNIZE HVAC, B-115
Building Number B-115 115
Location 4100 WEST THIRD ST DAYTON, OH 45428

Date 01-31-2013 Project No. 552-13-301
Drawing No. M4



- ### PIPING PLAN NOTES
- 1.-COORDINATE EXACT LOCATION OF AC CONDENSATE DRAIN PIPING WITH EXISTING PIPING.
 - 2.-3/4" HWS AND HWR UP. COORDINATE EXACT LOCATION WITH NEW FINNED TUBE ON FIRST FLOOR AND BUILDING STRUCTURE (RIBBED SLAB).
 - 3.-CLOSELY COORDINATE ALL PIPING IN THIS AREA.
 - 4.-MOUNT ALL NEW PIPING AS HIGH AS POSSIBLE.
 - 5.-HWS,HWR, CWS, AND CWR UP. COORDINATE LOCATION WITH CHASE ABOVE AND WITH BUILDING STRUCTURE (RIBBED SLAB).
 - 6.-3/4" HWS AND HWR UP. COORDINATE EXACT LOCATION WITH NEW FINNED TUBE ON FIRST FLOOR AND BUILDING STRUCTURE (RIBBED SLAB). EXTEND 3/4" HWS AND HWR PIPING DOWN TO FINNED TUBE ON THIS FLOOR.
 - 7.-COORDINATE ALL NEW INSTALLATIONS WITH EXISTING PIPING AND CONDUIT.
 - 8.-RELOCATE DATA CABLE TRAY TIGHT TO CEILING TO ALLOW INSTALLATION OF NEW PIPING.
 - 9.-RELOCATE CONDUIT TIGHT TO CEILING TO ALLOW INSTALLATION OF NEW PIPING.
 - 10.-MOUNT PIPING TIGHT TO LANDING WALL WITH BOTTOM AT 12" A.F.F.

- ### INSTALLATION NOTES
- 1.- UNLESS NOTED OTHERWISE, ALL NEW DUCTWORK AND PIPING IS TO BE MOUNTED ABOVE EXISTING LAY-IN CEILINGS. CONTRACTOR SHALL PROVIDE ALL LABOR AND MATERIALS TO REMOVE AND RE-INSTALL EXISTING CEILING TILES AS REQUIRED TO INSTALL THE NEW DUCTWORK AND PIPING AND DEMO EXISTING PIPING AND DUCTWORK ABOVE THE CEILING. ANY EXISTING CEILING TILES THAT ARE DAMAGED DURING CONSTRUCTION ARE TO BE REPLACED AT NO ADDITIONAL COST TO THE OWNER.
 - 2.- PROVIDE NEW CEILING TILES TO REPLACE LOCATIONS WHERE AIR DEVICE IS BEING REMOVED AND NOT REPLACED WITH A NEW ONE IN THE SAME LOCATION. SEE HVAC DEMOLITION DRAWINGS AND HVAC DUCT PLANS FOR DIFFUSER LOCATIONS.
 - 3.- PROVIDE OPENINGS IN PLASTER CEILINGS AS REQUIRED FOR INSTALLATION OF DUCTWORK AND PIPING HANGERS (HANGERS MUST BE SUPPORTED FROM BUILDING STRUCTURE). PROVIDE PATCHING AND REPAIR AS NECESSARY TO LOCATE STRUCTURE. PROVIDE PATCHING AND REPAIR OF PLASTER CEILINGS WHERE HANGERS PENETRATE CEILINGS. PLASTER CEILINGS EXIST ABOVE LAY-IN CEILINGS.



BASEMENT FLOOR HVAC DUCT PLAN
SCALE: 1/8"=1'-0"

- ### HVAC DUCT PLAN NOTES
- 1.-RAISE EXISTING PIPING ABOVE NEW DUCTWORK AT THIS AREA.
 - 2.-EXHAUST FAN ON/OFF SWITCH.
 - 3.-INSTALL LOUVER IN NEW INSULATED PANEL. SEE SHEET A1.
 - 4.-RELOCATE EXISTING PIPING (2) AND DATA CABLE TRAY (1) TO THE EAST TO ACCOMMODATE NEW DUCTWORK. MOUNT PIPING AND CABLE TRAY AS HIGH AS POSSIBLE (TIGHT TO STRUCTURE). PROVIDE ASBESTOS ABATEMENT FOR PIPING AS NECESSARY.
 - 5.-COORDINATE NEW DUCT LOCATION WITH EXISTING DCW LINE.
 - 6.-MOUNT EXHAUST FAN AND DUCTWORK AS HIGH AS POSSIBLE. PAINT DUCTWORK AND FAN TO MATCH EXISTING CEILING COLOR.
 - 7.-PAINT ALL EXPOSED DUCTWORK TO MATCH EXISTING CEILING COLOR.
 - 8.-RELOCATE DATA CABLE TRAY TIGHT TO CEILING TO ALLOW INSTALLATION OF DUCTWORK.
 - 9.-EXPOSED DUCTWORK IN THIS AREA TO BE INSULATED WITH DUCT WRAP. MOUNT DUCTWORK WITH BOTTOM OF DUCT AT MIN. 7'-6" A.F.F.
 - 10.-ALL PIPING AND DUCTWORK IS EXPOSED IN THIS AREA.
 - 11.-INSTALL TRANSFER DUCT AND GRILLES AT 12" A.F.F.

- ### INSTALLATION NOTES
- 1.- UNLESS NOTED OTHERWISE, ALL NEW DUCTWORK AND PIPING IS TO BE MOUNTED ABOVE EXISTING LAY-IN CEILINGS. CONTRACTOR SHALL PROVIDE ALL LABOR AND MATERIALS TO REMOVE AND RE-INSTALL EXISTING CEILING TILES AS REQUIRED TO INSTALL THE NEW DUCTWORK AND PIPING AND DEMO EXISTING PIPING AND DUCTWORK ABOVE THE CEILING. ANY EXISTING CEILING TILES THAT ARE DAMAGED DURING CONSTRUCTION ARE TO BE REPLACED AT NO ADDITIONAL COST TO THE OWNER.
 - 2.- PROVIDE NEW CEILING TILES TO REPLACE LOCATIONS WHERE AIR DEVICE IS BEING REMOVED AND NOT REPLACED WITH A NEW ONE IN THE SAME LOCATION. SEE HVAC DEMOLITION DRAWINGS AND HVAC DUCT PLANS FOR DIFFUSER LOCATIONS.
 - 3.- PROVIDE OPENINGS IN PLASTER CEILINGS AS REQUIRED FOR INSTALLATION OF DUCTWORK AND PIPING HANGERS (HANGERS MUST BE SUPPORTED FROM BUILDING STRUCTURE). PROVIDE PATCHING AND REPAIR AS NECESSARY TO LOCATE STRUCTURE. PROVIDE PATCHING AND REPAIR OF PLASTER CEILINGS WHERE HANGERS PENETRATE CEILINGS. PLASTER CEILINGS EXIST ABOVE LAY-IN CEILINGS.

ROOM SCHEDULE	
NO.	NAME
1	MECH ROOM
3	FILES
4	FILES
5	FILES
6	FILES
6A	UNFINISHED
7	STORAGE
7A	UNFINISHED
7B	UNFINISHED
8	FILES
9	STORAGE
10	FILES
11	STORAGE
12	TRANSFORMER ROOM
SW-1	STAIR
SW-2	STAIR
SW-3	STAIR



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Professional Seal

Revised By:

SECOND FLOOR HVAC DUCT PLAN

SCALE: 1/8"=1'-0"

ROOM SCHEDULE

NO.	NAME
200	OFFICE
201	CORRIDOR
202A	OFFICE
202B	OFFICE
202C	FUTURE OFFICE
202D	FUTURE OFFICE
203	OFFICE
204	OFFICE
205	OFFICE
206	OFFICE
207	CHAPLIN'S OFFICE
208	CHAPLIN'S OFFICE
209	CHAPLIN'S OFFICE
210	CHAPLIN'S OFFICE
211	CORRIDOR
212	
212A	STORAGE
212B	MEN
213	
214	WOMEN
215	CONFERENCE ROOM
216	OFFICE
SW-1	STAIR
SW-2	STAIR
SW-3	STAIR

VA
Department of
Veterans Affairs

DESIGNER/ENGINEER	SH
CAD OPERATOR	SH
QA/QC/CHECKER	SS

95% OWNER REVIEW DOCUMENTS
ISSUED FOR BID DOCUMENTS

01/18/2013	
01/31/2013	

Revisions

Date _____

VA FORM 08-6231, OCT 1978

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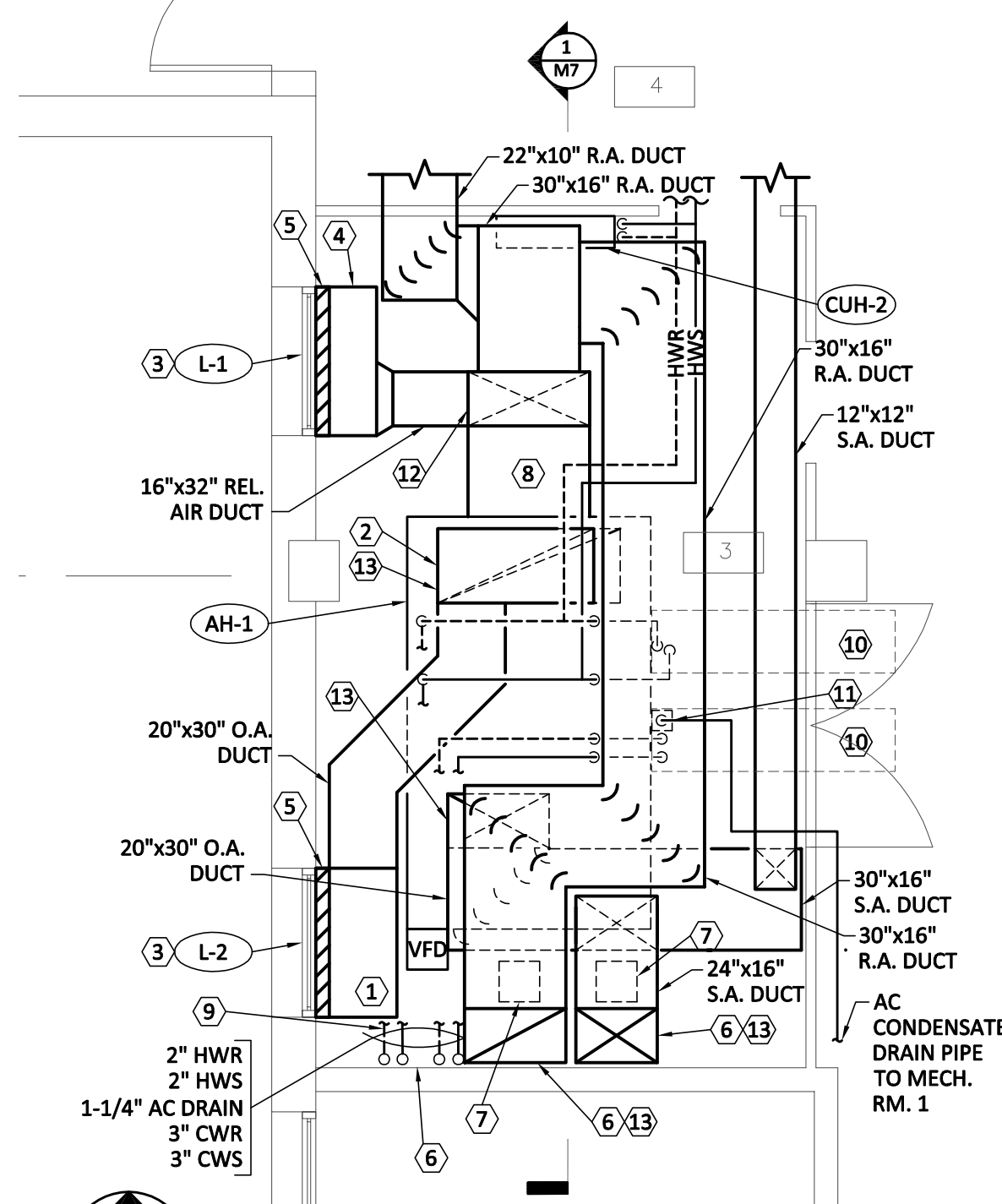
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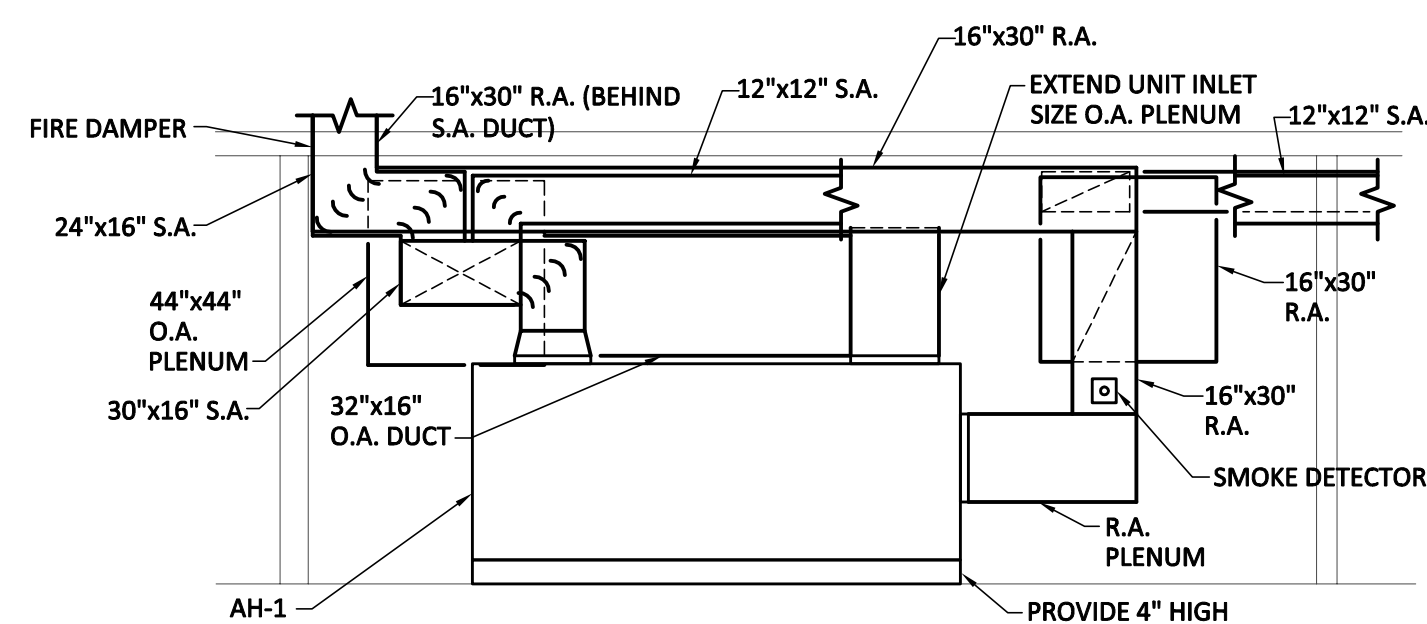
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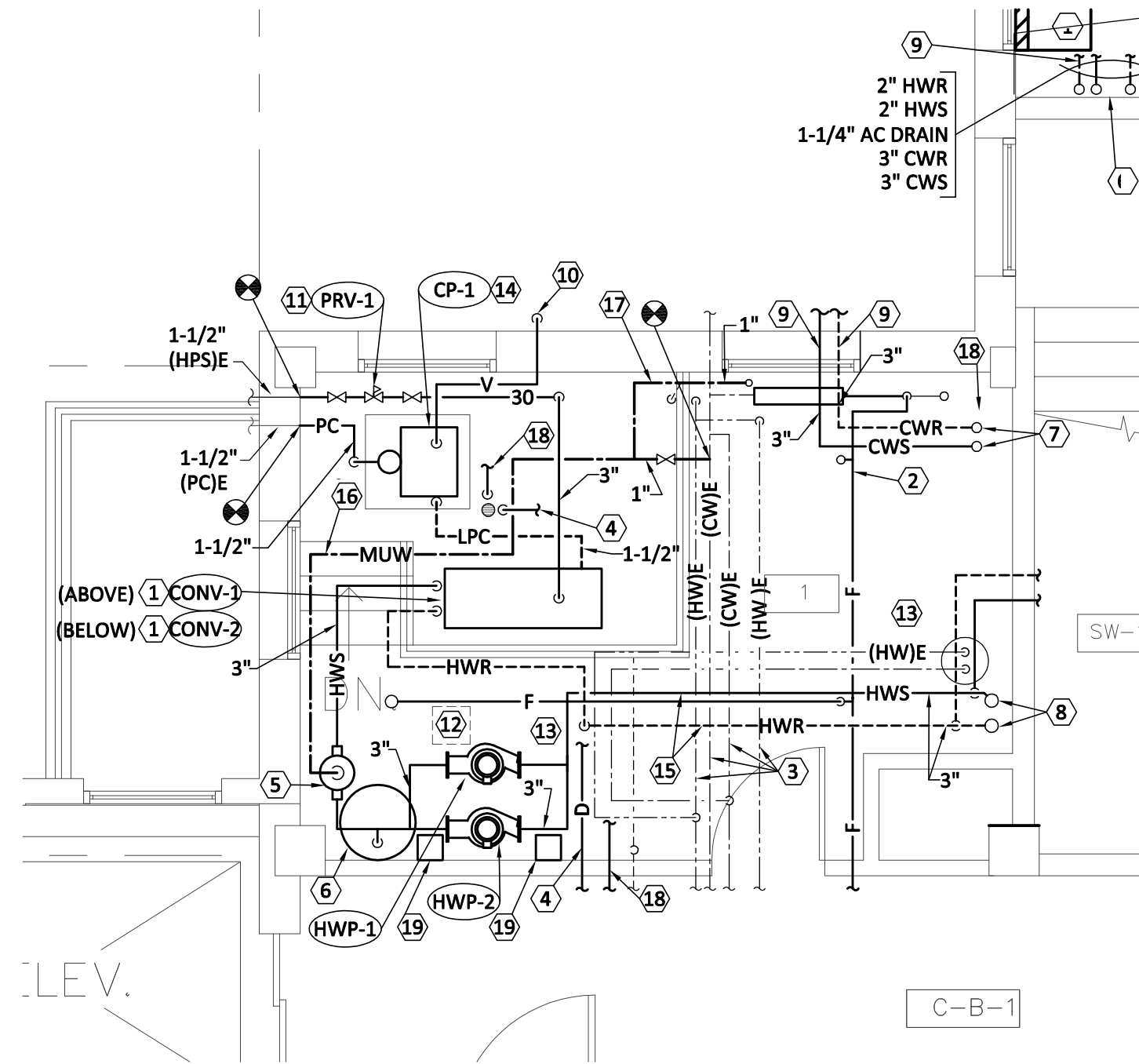
ENLARGED MECH. RM. 3 PLAN
SCALE: 1/4"=1'-0"

ENLARGED MECH. RM 3 PLAN NOTES

- 1.- EXTEND 44"x44" (FIELD-VERIFY SIZE) O.A. PLENUM FROM NEW LOUVER AS SHOWN.
- 2.-EXTEND UNIT O.A. INTAKE OPENING SIZE PLENUM FROM AIR HANDLER.
- 3.-REMOVE EXISTING WINDOW AND FRAME. INSTALL NEW LOUVER. SEE SHEET A1. FIELD-VERIFY EXISTING WINDOW OPENING SIZE.
- 4.-EXTEND 44"x44" (FIELD-VERIFY SIZE) RELIEF AIR PLENUM FROM NEW LOUVER AS SHOWN.
- 5.-INTERLOCK MOTORIZED DAMPER WITH AH CONTROLS.
- 6.-SUPPLY AND RETURN DUCT UP THRU FLOOR. COORDINATE EXACT LOCATION WITH BUILDING STRUCTURE (RIBBED SLAB) AND NEW CHASE ON FIRST FLOOR. PROVIDE FIRE DAMPER AT FLOOR PENETRATIONS.
- 7.-PROVIDE ACCESS DOORS FOR ALL FIRE DAMPERS.
- 8.-EXTEND UNIT RETURN AIR SIZED PLENUM FROM BACK OF UNIT.
- 9.-MOUNT PIPING TIGHT TO CEILING STRUCTURE.
- 10.-MAINTAIN COIL PULL CLEARANCE
- 11.- PROVIDE AC CONDENSATE DRAIN PUMP.
- 12.-PROVIDE SMOKE DETECTOR IN RETURN DUCT.
- 13.- DUCT PENETRATION SHOULD BE MADE BETWEEN STRUCTURAL RIBS. DEMOLISH EXISTING PLASTER CEILING AND FIELD-VERIFY EXISTING STRUCTURAL RIB LOCATION. COORDINATE WITH COR TO ADJUST CHASE LOCATIONS AS NECESSARY BEFORE ANY NEW WORK IS STARTED.



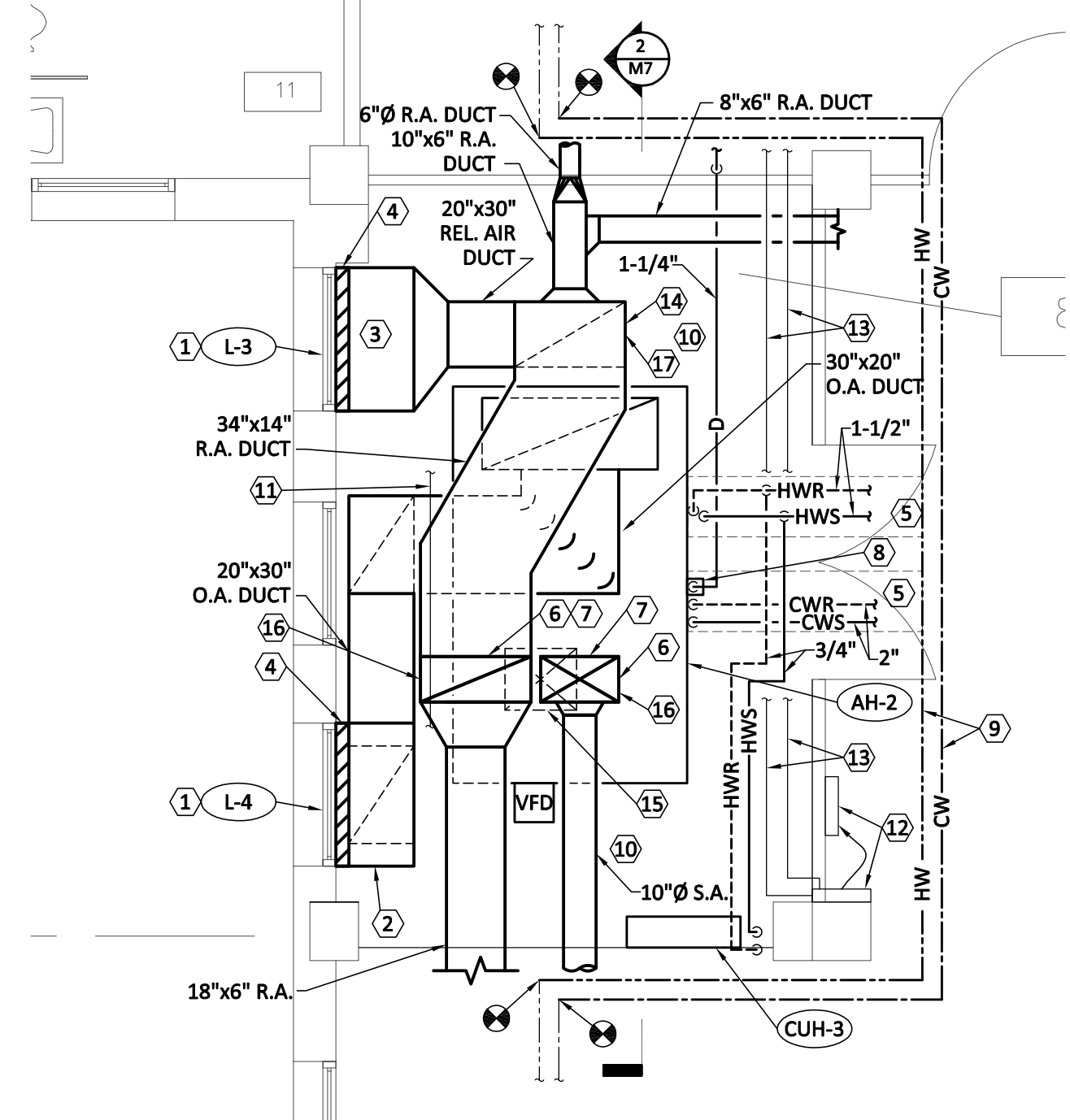
SECTION 1



ENLARGED MECH. RM. 1 PLAN
SCALE: 1/4"=1'-0"

ENLARGED MECH. RM. 1 PLAN NOTES

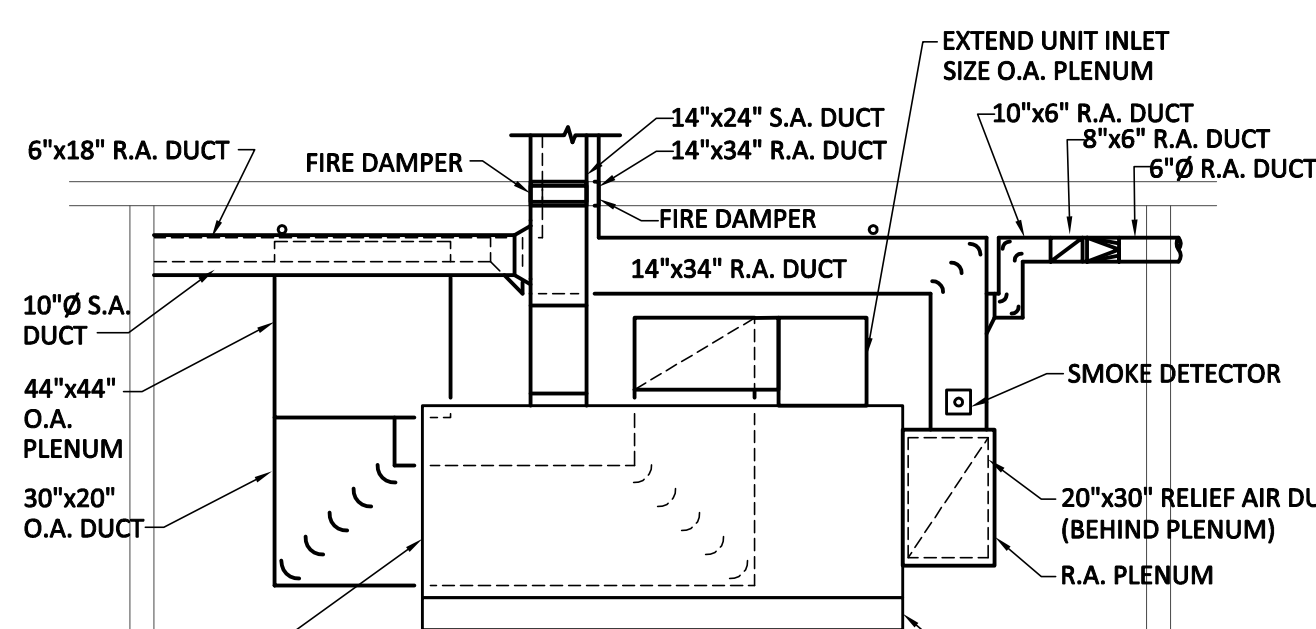
- 1.-STACK CONVERTERS ON WELDED STEEL FRAME.
- 2.-RELOCATE ALL EXISTING CONDUIT AND WIRING AS REQUIRED FOR INSTALLATION OF NEW PIPING.
- 3.-RELOCATE EXISTING PIPING - DROP BELOW NEW AS REQUIRED FOR INSTALLATION OF NEW PIPING. PROVIDE ASBESTOS ABATEMENT AS REQUIRED.
- 4.-FIELD-ROUTE 1" AC CONDENSATE DRAIN LINE FROM AH-2 CONDENSATE DRAIN PUMP TO FLOOR DRAIN.
- 5.-AIR SEPERATOR.
- 6.-FLOOR MOUNTED EXPANSION TANK.
- 7.-CWS AND CWR UP TO MECH. RM. 100. COORDINATE EXACT LOCATION WITH BUILDING STRUCTURE (RIBBED SLAB).
- 8.-HWS AND HWR UP TO MECH. ROOM 100. COORDINATE EXACT LOCATION WITH BUILDING STRUCTURE (RIBBED SLAB).
- 9.-NEW EXTERIOR WALL PENETRATION. SEAL EXTERIOR WALL PENETRATION WEATHER TIGHT.
- 10.-2" VENT FROM CONDENSATE PUMP. TERMINATE AT 12" ABOVE GRADE WITH 90 DEG. ELBOW DOWN.
- 11.-NEW PRV STATION. SEE DETAILS ON SHEET M02.
- 12.-RELOCATE JUNCTION BOX TIGHT TO CEILING STRUCTURE.
- 13.-RELOCATE ALL EXISTING EQUIPMENT, CONDUIT, AND PIPING IN THIS ROOM AS NECESSARY TO ALLOW FOR INSTALLATION OF NEW EQUIPMENT, DUCTWORK, AND PIPING. MOUNT PIPING AS HIGH AS POSSIBLE.
- 14.-INSTALL CONDENSATE PUMP ON 4" HIGH CONCRETE PAD.
- 15.-INSTALL NEW HWS AND HWR PIPING ABOVE EXISTING PIPING. RELOCATE EXISTING PIPING AS NECESSARY.
- 16.-1" MAKE-UP WATER CONNECTION FOR HEATING HOT WATER SYSTEM. SEE HOT WATER SYSTEM SCHEMATIC FOR DETAILS.
- 17.-1" MAKE-UP WATER CONNECTION FOR CHILLED WATER SYSTEM. SEE CHILLED WATER SYSTEM SCHEMATIC FOR DETAILS.
- 18.-FIELD-ROUTE 1" AC CONDENSATE DRAIN LINE FROM AH-1 CONDENSATE PUMP TO FLOOR DRAIN.
- 19.-HOT WATER PUMP VARIABLE FREQUENCY DRIVE.



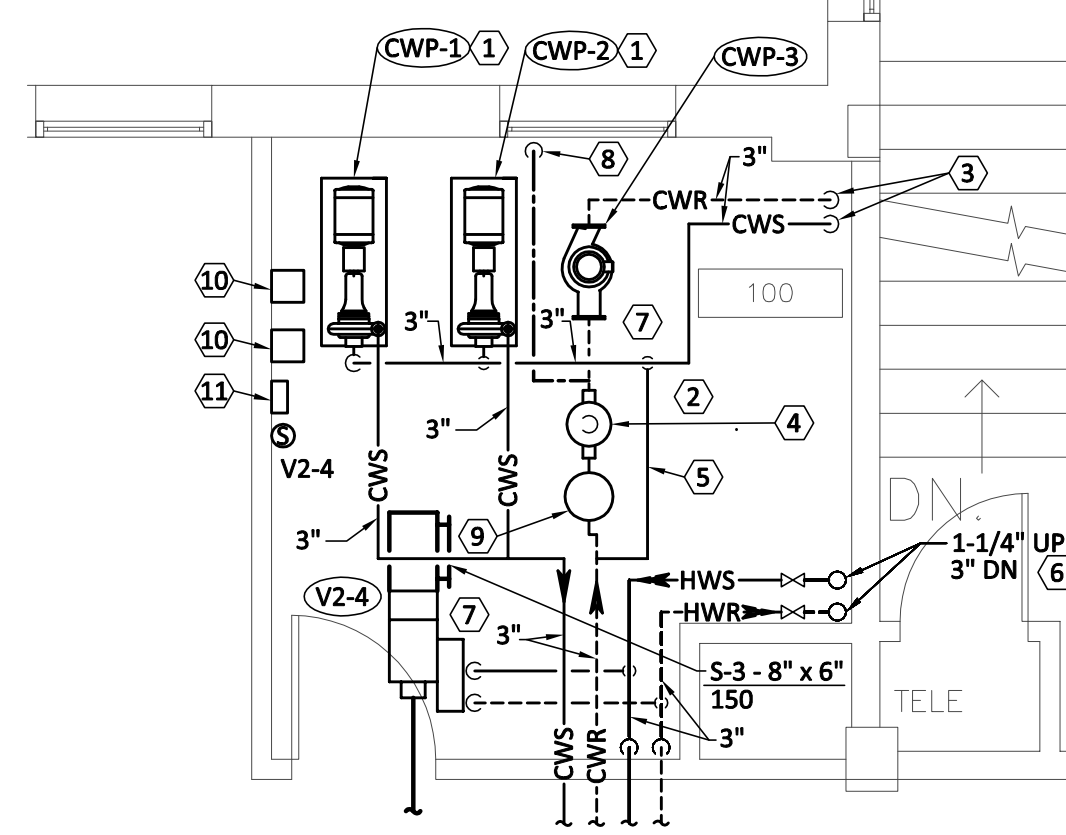
ENLARGED MECH. RM. 8A PLAN
SCALE: 1/4"=1'-0"

ENLARGED MECH. RM. 8A PLAN NOTES

- 1.-REMOVE EXISTING WINDOW AND FRAME. INSTALL NEW LOUVER. SEE SHEET A1. FIELD-VERIFY WINDOW OPENING SIZE.
- 2.-EXTEND 44"x44" (FIELD-VERIFY SIZE) O.A. PLENUM FROM NEW LOUVER AS SHOWN.
- 3.-EXTEND 44"x44" (FIELD-VERIFY SIZE) RELIEF AIR PLENUM FROM NEW LOUVER AS SHOWN.
- 4.-INTERLOCK MOTORIZED DAMPER WITH AIR HANDLER CONTROLS.
- 5.-MAINTAIN CLEARANCE FOR COIL PULL.
- 6.-34"x14" SUPPLY AND 34"x14" RETURN DUCT UP THRU FLOOR. COORDINATE EXACT LOCATION WITH BUILDING STRUCTURE (RIBBED SLAB) AND NEW CHASE ON FIRST FLOOR. PROVIDE FIRE DAMPERS AT FLOOR PENETRATION.
- 7.-PROVIDE ACCESS DOORS FOR ALL FIRE DAMPERS.
- 8.-PROVIDE AC CONDENSATE DRAIN PUMP.
- 9.-PROVIDE NEW CW AND HW PIPING TO REPLACE EXISTING THAT RUNS THRU LOCATION OF NEW MECHANICAL ROOM.
- 10.-RELOCATE ALL EXISTING EQUIPMENT, CONDUIT, AND PIPING IN THIS ROOM AS NECESSARY TO ALLOW FOR INSTALLATION OF NEW EQUIPMENT, DUCTWORK, AND PIPING. MOUNT PIPING AS HIGH AS POSSIBLE.
- 11.-RELOCATE 2 ELECTRICAL CONDUITS AS NECESSARY FOR INSTALLATION OF NEW DUCTWORK.
- 12.-RELOCATE EXISTING ELECTRICAL PANEL TO NEW WALL.
- 13.-RELOCATE EXISTING CONDUITS TO JUST EAST OF COLUMN TO ACCOMMODATE NEW PIPING AND EQUIPMENT.
- 14.-PROVIDE SMOKE DETECTOR IN RETURN DUCT.
- 15.-OFFSET SUPPLY DUCT IN VERTICAL AS NECESSARY TO INSTALL FLOOR PENETRATION AS SHOWN.
- 16.-DUCT PENETRATION SHOULD BE MADE BETWEEN STRUCTURAL RIBS. DEMOLISH EXISTING PLASTER CEILING AND FIELD-VERIFY EXISTING STRUCTURAL RIB LOCATION. COORDINATE WITH COR TO ADJUST CHASE LOCATIONS AS NECESSARY BEFORE ANY NEW WORK IS STARTED.



SECTION 2



ENLARGED MECH. RM. 100 PLAN
SCALE: 1/4"=1'-0"

ENLARGED MECH. RM 100 PLAN NOTES

- 1.-INSTALL PUMP ON INERTIA BASE.
- 2.-SUSPEND ALL PIPING IN THIS ROOM FROM CEILING STRUCTURE.
- 3.-CWS AND CWR PIPING DOWN THRU FLOOR SEE ENLARGED MECHANICAL ROOM PLAN FOR CONTINUATION. COORDINATE EXACT LOCATION WITH BUILDING STRUCTURE (RIBBED SLAB).
- 4.-AIR SEPARATOR.
- 5.-3" BYPASS LINE.
- 6.-1-1/4" HWS AND HWR UP. 2" HWS AND HWR DOWN. COORDINATE EXACT LOCATION WITH BUILDING STRUCTURE (RIBBED SLAB).
- 7.-RELOCATE ALL EXISTING EQUIPMENT, CONDUIT, AND PIPING IN THIS ROOM AS NECESSARY TO ALLOW FOR INSTALLATION OF NEW EQUIPMENT, DUCTWORK, AND PIPING. MOUNT PIPING AS HIGH AS POSSIBLE.
- 8.-1" MAKE-UP WATER CONNECTION FOR CHILLED WATER SYSTEM. SEE CHILLED WATER SYSTEM SCHEMATIC FOR DETAILS.
- 9.-CHILLED WATER BUFFER TANK. TANK TO BE 100 GALLONS, 24" DIAMETER, 60" HIGH. INCLUDE LEG STANDS. INSTALL 1" THICK INSULATION.
- 10.-CHILLED WATER PUMP VARIABLE FREQUENCY DRIVE.
- 11.-LOCATION OF BAS CONTROL PANELS.

INSTALLATION NOTES

- THESE NOTES APPLY TO ALL PLANS SHOWN ON THIS SHEET:
- 1.- UNLESS NOTED OTHERWISE, ALL NEW DUCTWORK AND PIPING IS TO BE MOUNTED ABOVE EXISTING LAY-IN CEILINGS. CONTRACTOR SHALL PROVIDE ALL LABOR AND MATERIALS TO REMOVE AND RE-INSTALL EXISTING CEILING TILES AS REQUIRED TO INSTALL THE NEW DUCTWORK AND PIPING AND DEMO EXISTING PIPING AND DUCTWORK ABOVE THE CEILING. ANY EXISTING CEILING TILES THAT ARE DAMAGED DURING CONSTRUCTION ARE TO BE REPLACED AT NO ADDITIONAL COST TO THE OWNER.
 - 2.- PROVIDE NEW CEILING TILES TO REPLACE LOCATIONS WHERE AIR DEVICE IS BEING REMOVED AND NOT REPLACED WITH A NEW ONE IN THE SAME LOCATION. SEE HVAC DEMOLITION DRAWINGS AND HVAC DUCT PLANS FOR DIFFUSER LOCATIONS.
 - 3.- PROVIDE OPENINGS IN PLASTER CEILINGS AS REQUIRED FOR INSTALLATION OF DUCTWORK AND PIPING HANGERS (HANGERS MUST BE SUPPORTED FROM BUILDING STRUCTURE). PROVIDE PATCHING AND REPAIR AS NECESSARY TO LOCATE STRUCTURE. PROVIDE PATCHING AND REPAIR OF PLASTER CEILINGS WHERE HANGERS PENETRATE CEILINGS. PLASTER CEILINGS EXIST ABOVE LAY-IN CEILINGS.

DESIGNER/ENGINEER
CAD OPERATOR
QA/QC CHECKER

95% OWNER REVIEW DOCUMENTS
ISSUED FOR BID DOCUMENTS

01/18/2013
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Revised By:

Drawing Title
**ENLARGED
HVAC DUCT AND PIPING PLANS**

Approved: Project Engineer
Philip Kirk

Project Title
MODERNIZE HVAC, B-115

Building Number
B-115 115

Location
4100 WEST THIRD ST
DAYTON, OH 45428

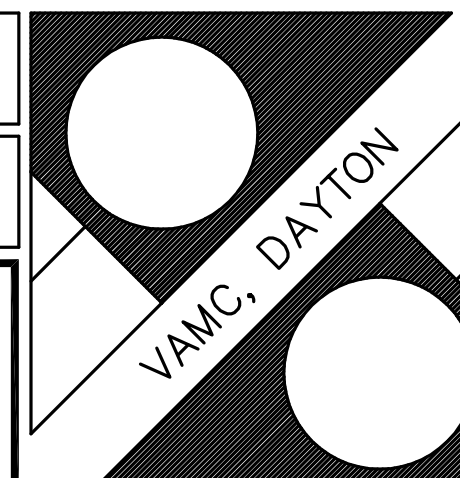
Date
01-31-2013

Project No.
552-13-301

Drawing No.
M7

Checked
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Drawn
SHSH



Department of
Veterans Affairs
VA

CONTROLS DIAGRAM - AH-1 AND AH-2 - VARIABLE AIR VOLUME

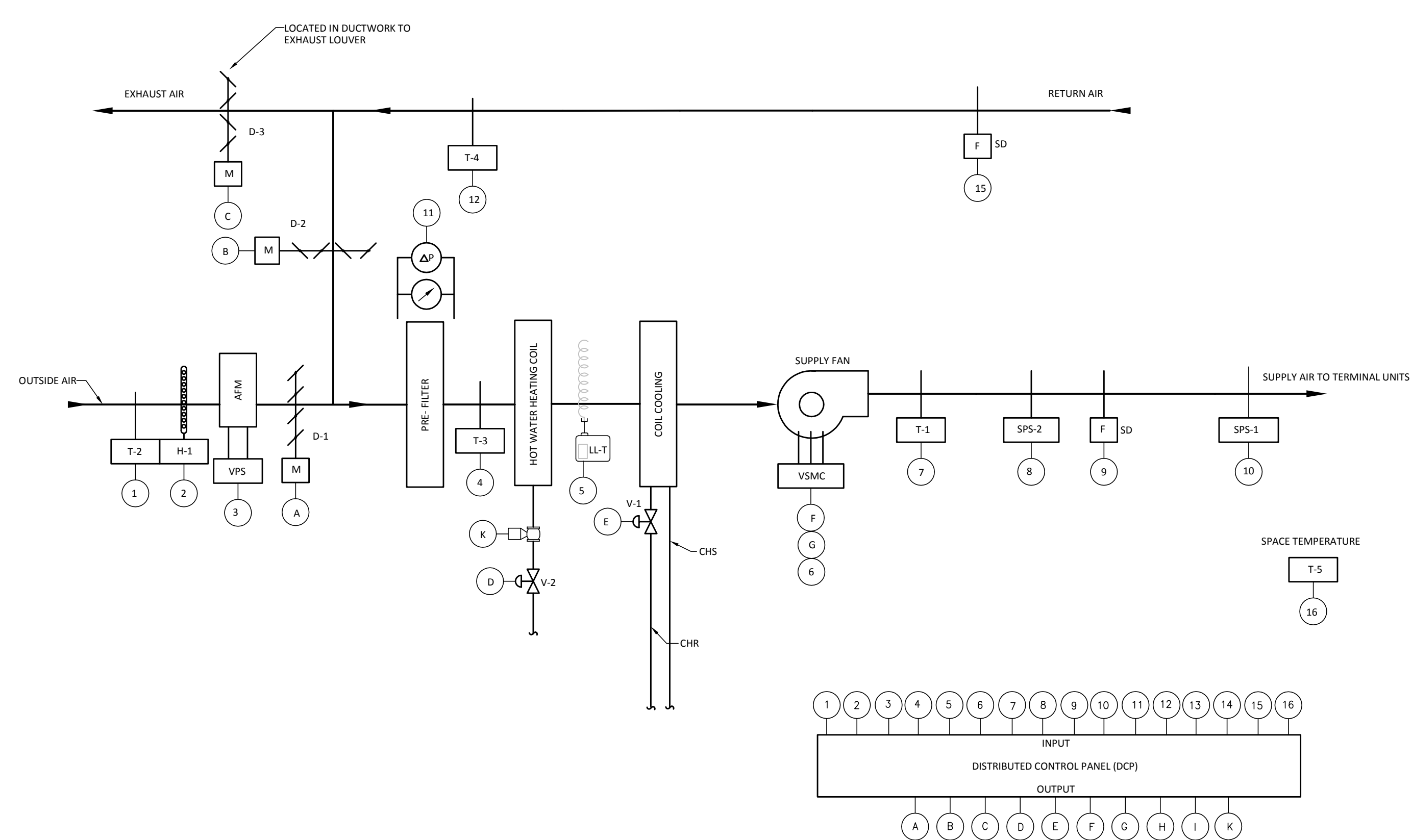
SEQUENCE OF OPERATIONS

- A. GENERAL**
- ALL SETPOINTS SHALL BE ADJUSTABLE.
 - UNIT IS NORMALLY STARTED AND STOPPED BY THE DCP OR REMOTELY AT THE ECC.
- B. SAFETIES**
- ALL CONTROLS SHALL INCORPORATE THE FOLLOWING HARDWIRED SAFETIES WHERE APPLICABLE:
 - A LOW TEMPERATURE UNIT SAFETY "FREEZE STAT" SHALL BE PROVIDED AND INSTALLED ON THE DISCHARGE OF THE FIRST COIL IN THE AIR STREAM (UNLESS OTHERWISE NOTED) AND SHALL STOP THE AIR HANDLING UNIT FANS IF A TEMPERATURE BELOW 40° F IS DETECTED.
 - SMOKE DETECTORS FOR THE UNIT SHALL BE PROVIDED, INSTALLED, AND INTERLOCKED TO STOP THE AIR HANDLING UNIT FANS WHEN SMOKE IS DETECTED.
 - A SUPPLY AND RETURN DUCT HIGH STATIC PRESSURE SAFETY SHALL BE PROVIDED AND INSTALLED ON THE UNIT. PROVIDE A MANUALLY RESET TYPE DUCT STATIC PRESSURE SWITCH, SET AT THE MAXIMUM WORKING PRESSURE OF THE DUCTWORK, TO STOP THE AIR HANDLING UNIT FANS WHEN THE SYSTEM PRESSURE EXCEEDS SETPOINT.
 - WHenever the unit is indexed to start, the following sequence shall be executed:
 - THE SUPPLY FAN SHALL START.
 - ONCE FAN STATUS HAS BEEN PROVEN, THE MIXED AIR CONTROL, MINIMUM OUTDOOR AIRFLOW CONTROL, RETURN AIRFLOW CONTROL, DISCHARGE AIR CONTROL, AND STATIC PRESSURE CONTROL SHALL BE ENAGED.
 - WHENEVER THE UNIT IS DE-ENERGIZED, DUE TO EITHER A SCHEDULED SHUTDOWN OR A SAFETY TRIP, THE FOLLOWING SEQUENCE SHALL BE EXECUTED:
 - THE OUTSIDE AND EXHAUST AIR DAMPERS SHALL FULLY CLOSE AND THE RETURN AIR DAMPER SHALL FULLY OPEN.
 - THE COOLING COIL VALVE SHALL FULLY CLOSE TO THE COIL.
 - THE PREHEAT COIL VALVE SHALL FULLY OPEN TO THE COIL.
 - IF THE LOW TEMPERATURE UNIT SAFETY START HAS TRIPPED, THE HEATING COIL VALVE SHALL FULLY OPEN TO THE COIL.
- C. FAN CONTROL**
- THE AIR HANDLING UNIT SHALL BE CAPABLE OF PRE-OCCUPIED CONTROL AND PROGRAMMED FOR THE OCCUPIED, AND UNOCCUPIED MODES.
 - THE OPERATING MODES SHALL BE AUTOMATICALLY INITIATED THROUGH TIME-OF-DAY SCHEDULES, APPLICATION PROGRAMS, OR THROUGH OPERATOR COMMANDS.
 - WITHIN EACH MODE THE UNIT SHALL OPERATE AS DESCRIBED BELOW.
- D. MODE CONTROL**
- THE AIR HANDLING UNIT SHALL BE CONTROLLED ON ITS OWN OCCUPIED/UNOCCUPIED TIME SCHEDULE AS DEFINED AT THE OPERATOR WORKSTATION. THE BAS SHALL INDEX THE UNIT TO START IN ADVANCE OF THE SCHEDULED OCCUPIED TIME, VIA AN ADAPTIVE OPTIMAL START SEQUENCE. THE UNIT SHALL ENTER A MORNING WARM-UP OR COOL-DOWN MODE.
 - MORNING WARM-UP
 - DURING THE WARM-UP MODE, THE UNIT SHALL OPERATE SIMILAR TO THE OCCUPIED MODE WITH THE FOLLOWING EXCEPTIONS:
 - THE DISCHARGE AIR SETPOINT SHALL BE INCREASED TO 95° F.
 - THE OUTSIDE AIR DAMPERS AND EXHAUST AIR DAMPERS SHALL REMAIN FULLY CLOSED. THE RETURN AIR DAMPER SHALL REMAIN FULLY OPEN.
 - COOLING SHALL BE DISABLED.
 - THIS MODE SHALL CONTINUE UNTIL THE SPACE REACHES ITS TARGETED OCCUPIED SETPOINT OR THE SCHEDULED OCCUPIED START TIME IS REACHED.
 - MORNING COOL-DOWN
 - DURING THE COOL-DOWN MODE, THE UNIT SHALL OPERATE SIMILAR TO THE OCCUPIED MODE WITH THE FOLLOWING EXCEPTIONS:
 - THE MINIMUM OUTDOOR AIR CONTROL LOOP SHALL BE DISABLED.
 - THIS MODE SHALL CONTINUE UNTIL THE SCHEDULED OCCUPIED START TIME IS REACHED.
 - SHOULD THE SPACE TEMPERATURE NOT REACH THE OCCUPIED SETPOINT BEFORE TO THE SCHEDULED OCCUPIED TIME, OR REACH THE SETPOINT TOO EARLY, THE ADAPTIVE OPTIMAL START SEQUENCE SHALL AUTOMATICALLY ADJUST ITSELF FOR SUBSEQUENT STARTS.
- E. PRE-OCCUPIED MODE**
- THE AIR HANDLING UNIT SHALL BE CONTROLLED ON ITS OWN OCCUPIED/UNOCCUPIED TIME SCHEDULE AS DEFINED AT THE OPERATOR WORKSTATION. THE BAS SHALL INDEX THE UNIT TO START IN ADVANCE OF THE SCHEDULED OCCUPIED TIME, VIA AN ADAPTIVE OPTIMAL START SEQUENCE. THE UNIT SHALL ENTER A MORNING WARM-UP OR COOL-DOWN MODE.
 - MORNING WARM-UP
 - DURING THE WARM-UP MODE, THE UNIT SHALL OPERATE SIMILAR TO THE OCCUPIED MODE WITH THE FOLLOWING EXCEPTIONS:
 - THE DISCHARGE AIR SETPOINT SHALL BE INCREASED TO 95° F.
 - THE OUTSIDE AIR DAMPERS AND EXHAUST AIR DAMPERS SHALL REMAIN FULLY CLOSED. THE RETURN AIR DAMPER SHALL REMAIN FULLY OPEN.
 - COOLING SHALL BE DISABLED.
 - THIS MODE SHALL CONTINUE UNTIL THE SPACE REACHES ITS TARGETED OCCUPIED SETPOINT OR THE SCHEDULED OCCUPIED START TIME IS REACHED.
 - MORNING COOL-DOWN
 - DURING THE COOL-DOWN MODE, THE UNIT SHALL OPERATE SIMILAR TO THE OCCUPIED MODE WITH THE FOLLOWING EXCEPTIONS:
 - THE MINIMUM OUTDOOR AIR CONTROL LOOP SHALL BE DISABLED.
 - THIS MODE SHALL CONTINUE UNTIL THE SCHEDULED OCCUPIED START TIME IS REACHED.
 - SHOULD THE SPACE TEMPERATURE NOT REACH THE OCCUPIED SETPOINT BEFORE TO THE SCHEDULED OCCUPIED TIME, OR REACH THE SETPOINT TOO EARLY, THE ADAPTIVE OPTIMAL START SEQUENCE SHALL AUTOMATICALLY ADJUST ITSELF FOR SUBSEQUENT STARTS.
- F. OCCUPIED MODE**
- MINIMUM OUTDOOR AIRFLOW CONTROL
 - OUTSIDE AIRFLOW MEASURING STATION WILL MONITOR AND ADJUST OUTSIDE AIRFLOW TO THE UNIT. THE UNIT WILL MAINTAIN THE SCHEDULED VALUE OF OUTSIDE AIR FLOW. THIS OUTSIDE AIR FLOW VALUE SHALL BE ADJUSTABLE AT THE ECC.
 - MIXED AIR CONTROL
 - WHEN THE OUTSIDE AIR ENTHALPY FALLS BELOW 28 BTU/LB, THE UNIT SHALL BE IN "ECONOMIZER MODE".
 - DURING ECONOMIZER MODE, THE MIXED AIR DAMPERS SHALL BE ALLOWED TO MODULATE BEYOND MINIMUM AIRFLOW CONTROL, IN SEQUENCE WITH THE COIL VALVES TO MAINTAIN THE DISCHARGE AIR SETPOINT.
 - DURING THE ECONOMIZER MODE, THE RETURN FAN SHALL BE CONTROLLED TO MAINTAIN A DIFFERENTIAL SETPOINT.
 - A MIXED AIR SENSOR AND MIXED AIR LOW LIMIT CONTROL LOOP SHALL PREVENT THE MIXED AIR TEMPERATURE FROM FALLING BELOW 45° F. AS THE MIXED AIR TEMPERATURE APPROACHES THE LOW LIMIT, THE OUTSIDE AIR DAMPER SHALL BE MODULATED TOWARD THE FULLY CLOSED POSITION AND THE RETURN AIR DAMPER TOWARD THE FULLY OPEN POSITION.
 - DISCHARGE AIR CONTROL
 - DURING THE OCCUPIED MODE, THE UNIT SHALL MAINTAIN THE DISCHARGE AIR SETPOINT.
 - THE MIXING DAMPERS (ECONOMIZER MODE) HEATING AND COOLING COIL VALVES SHALL BE MODULATED IN SEQUENCE TO MAINTAIN THE DISCHARGE AIR SETPOINT.
 - STATIC PRESSURE CONTROL
 - THE SUPPLY FAN VFD SHALL BE MODULATED TO MAINTAIN A SUPPLY STATIC PRESSURE SETPOINT OF 1.5" W.C. AS SENSED BY A STATIC PRESSURE SENSOR LOCATED 2/3 DISTANCE FROM THE SUPPLY FAN TO THE FARTHEST OUTLET. APPROXIMATELY LOCATE SENSORS AS INDICATED ON THE DRAWINGS. IF MULTIPLE SENSORS ARE SHOWN, THE SENSOR WITH THE LOWEST STATIC PRESSURE READING SHALL BE USED.
 - UNOCCUPIED CONTROL
 - WHEN THE SCHEDULED UNOCCUPIED TIMES, THE SUPPLY FAN SHALL BE OFF.
 - NIGHT SETBACK HEATING
 - WHEN THE UNOCCUPIED SPACE TEMPERATURE SERVED BY THE UNIT DROPS BELOW THE UNOCCUPIED HEATING SETPOINT OF 55° F, THE UNIT SHALL BE INDEXED TO START AND SHALL CONTINUE TO RUN FOR A MINIMUM OF 5 MINUTES AFTER SATISFACTION OF THE ZONE SETPOINT.
 - NIGHT SETUP COOLING
 - WHEN THE UNOCCUPIED SPACE TEMPERATURE SERVED BY THE UNIT RISES ABOVE THE UNOCCUPIED COOLING SETPOINT OF 85° F, THE UNIT SHALL BE INDEXED TO START AND SHALL CONTINUE TO RUN FOR A MINIMUM OF 5 MINUTES AFTER SATISFACTION OF THE SPACE SETPOINT.
 - THE UNIT SHALL OPERATE AS IN THE MORNING COOL-DOWN MODE.

LEGENDS

SPS-1	STATIC PRESSURE SENSOR	SENSES AND TRANSMITS DUCT STATIC PRESSURE TO DCP.
SPS-2	HIGH LIMIT STATIC PRESSURE SWITCH	SENSES DUCT STATIC PRESSURE AT THE AHU. SHUTS DOWN FANS WHEN STATIC EXCEEDS LIMIT. SENDS ALARM TO DCP.
T-1	SUPPLY AIR TEMPERATURE SENSOR	SENSES AND TRANSMITS SUPPLY AIR DRY BULB TEMPERATURE TO DCP FOR CONTROL AND INDICATION.
T-2,H-1	OUTSIDE AIR TEMPERATURE SENSOR AND HUMIDITY SENSOR	SENSES AND TRANSMITS OUTSIDE AIR DRY BULB TEMPERATURE AND HUMIDITY TO DCP FOR CONTROL AND INDICATION.
T-3	MIXED AIR TEMPERATURE SENSOR	SENSES AND TRANSMITS MIXED AIR DRY BULB TEMPERATURE IN RESPONSE TO DCP.
T-4	RETURN AIR TEMPERATURE	SENSES AND TRANSMITS RETURN AIR DRY BULB TEMPERATURE TO DCP FOR CONTROL AND INDICATION.
T-5	UNOCCUPIED SPACE TEMPERATURE SENSOR	SENSES AND TRANSMITS SPACE TEMPERATURE TO DCP FOR UNOCCUPIED CONTROL.
LL-T	LOW LIMIT TEMPERATURE SWITCH	SNAP ACTION THERMOSTAT DISABLES FANS TO PREVENT FREEZING. ONE SET OF CONTACTS ALARMS ECC.
V-1	CHILLED WATER CONTROL VALVE, 3-WAY MODULATING TYPE	VARIES CHILLED WATER FLOW TO COOLING COIL IN RESPONSE TO DCP.
V-2	HOT WATER CONTROL VALVE, 3-WAY MODULATING	VARIES HOT WATER FLOW TO PREHEAT COIL IN RESPONSE TO DCP.
DM	ELECTRONIC DAMPER MOTOR	MODULATES DAMPER IN RESPONSE TO DCP.
VSMC	VARIABLE SPEED MOTOR CONTROLLER WITH MOTOR STARTER	CONTROLS SUPPLY AND RETURN FANS MOTOR SPEED IN RESPONSE TO DCP. FAN COMMAND AND STATUS.
AFM	AIR FLOW MEASURING DEVICE	TRANSMITS VELOCITY PRESSURE TO DCP.
ΔP	DIFFERENTIAL PRESSURE SENSOR	TRANSMITS DIFFERENTIAL PRESSURE TO DCP TO INDICATE FILTER CONDITIONS.
DCP	DISTRIBUTED CONTROL PANEL	CONTROLS OPERATION OF AIR HANDLING UNITS IN ACCORDANCE WITH THE SEQUENCE OF OPERATION.
D-1	OUTSIDE AIR DAMPER, MODULATING	VARIES OUTSIDE AIR FLOW IN RESPONSE TO SUPPLY AIR TEMP AND MINIMUM OA AIRFLOW CONDITIONS.
D-2	RETURN AIR DAMPER, MODULATING	VARIES RETURN AIR FLOW IN RESPONSE TO SUPPLY AIR.
D-3	RELIEF AIR DAMPER, MODULATING	VARIES RELIEF AIR FLOW IN RESPONSE TO DCP.
ECC	ENGINEERING CONTROL CENTER	WORK STATION FOR MONITORING OF SYSTEMS OPERATIONS, CONNECTED TO ECC.
SD	DUCT SMOKE DETECTORS (FURNISHED AND WIRED TO FIRE ALARM PANEL BY ELECTRICAL)	PROVIDE SMOKE SIGNAL TO DCP.

FLOW DIAGRAM



CONTROLS DIAGRAM - VARIABLE AIR VOLUME TERMINAL UNIT

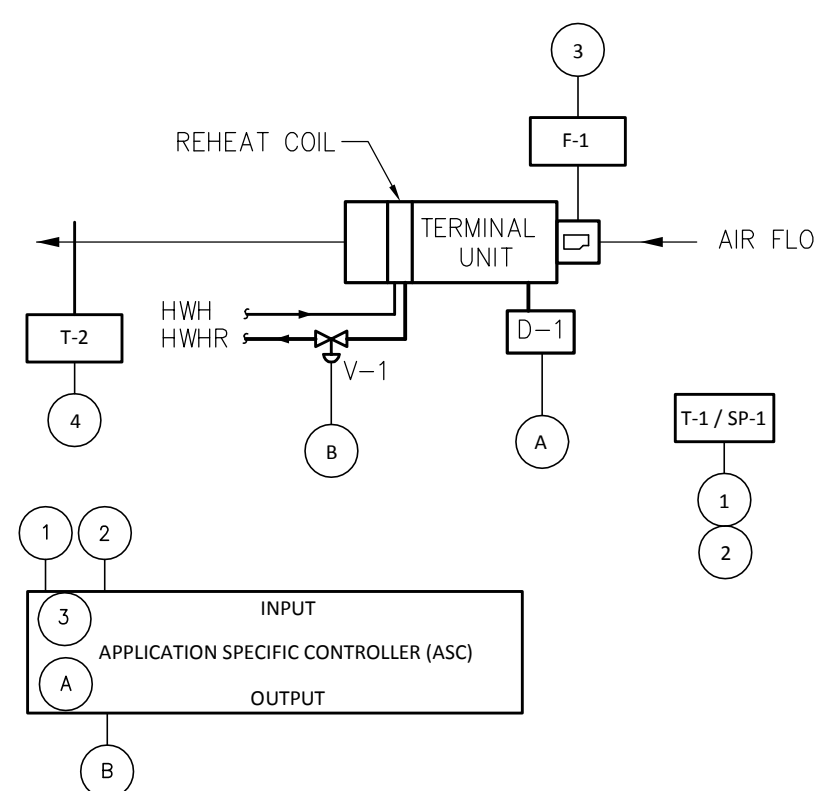
SEQUENCE OF OPERATIONS

- A. A VOLUME CONTROLLER SHALL CONTROL FOR AN AIRFLOW VOLUME SETPOINT. THE AIRFLOW SETPOINT SHALL BE RESET BY THE SPACE TEMPERATURE BASED ON THE MODE OF THE TERMINAL UNIT. ALL AIRFLOW VALUES SHALL BE SET AS INDICATED ON THE DRAWINGS.**
- B. THE OPERATING MODE OF THE TERMINAL UNIT SHALL BE CONTROLLED IN CONJUNCTION WITH THE OPERATING MODE OF THE ASSOCIATED AIR HANDLING UNIT.**
- C. OCCUPIED MODE**
- THE SPACE SHALL BE CONTROLLED FOR THE OCCUPIED TEMPERATURE SETPOINTS.
 - AS THE SPACE TEMPERATURE RISES ABOVE THE OCCUPIED COOLING SETPOINT (75°-78°), THE VOLUME SETPOINT SHALL BE RESET FROM THE MAXIMUM AIRFLOW TOWARD THE MAXIMUM COOLING AIRFLOW. THE REHEAT COIL VALVE SHALL BE FULLY CLOSED.
 - AS THE TEMPERATURE FALLS BELOW THE OCCUPIED HEATING SETPOINT (70°-72°), THE AIRFLOW SETPOINT SHALL BE SET AT THE MINIMUM AIRFLOW, AND THE REHEAT VALVE SHALL BE MODULATED TOWARD THE OPEN POSITION.
 - IF HOT WATER IS AVAILABLE, THE REHEAT VALVE IS AT ITS FULL OPEN POSITION, AND THE SPACE TEMPERATURE SETPOINT IS STILL NOT SATISFIED, THE AIRFLOW SETPOINT SHALL BE INCREASED TOWARD THE MAXIMUM HEATING AIRFLOW.
- D. UNOCCUPIED MODE**
- NIGHT SETBACK: THE UNIT SHALL BE CONTROLLED IN A SIMILAR MANNER AS DESCRIBED IN THE WARM-UP MODE, USING THE UNOCCUPIED TEMPERATURE SETPOINT (55°).
 - NIGHT SETUP: THE UNIT SHALL BE CONTROLLED IN A SIMILAR MANNER AS DESCRIBED IN THE OCCUPIED MODE, USING THE UNOCCUPIED TEMPERATURE SETPOINT OF 85°.
 - AN OVERRIDE BUTTON SHALL BE PROVIDED AT EACH SENSOR TO OVERRIDE THE UNOCCUPIED MODE AND RETURN THE UNIT TO THE OCCUPIED MODE FOR A FIXED PROGRAMMABLE TIME.
- E. WARM-UP MODE**
- THE SPACE SHALL BE CONTROLLED FOR THE OCCUPIED TEMPERATURE SETPOINTS. THE AIR HANDLER SHALL BE DELIVERING WARM AIR.
 - AS THE SPACE TEMPERATURE RISES ABOVE THE OCCUPIED COOLING SETPOINT, THE VOLUME SETPOINT SHALL BE RESET TOWARD ZERO AIRFLOW. THE REHEAT COIL VALVE SHALL BE FULLY CLOSED.
 - AS THE TEMPERATURE FALLS BELOW THE OCCUPIED HEATING SETPOINT, THE AIRFLOW SETPOINT SHALL BE RESET FROM THE MINIMUM WARM-UP AIRFLOW TOWARD THE MAXIMUM AIRFLOW. THE REHEAT VALVE SHALL BE IN THE FULL OPEN POSITION.

LEGENDS

T-1/SP-1	SPACE TEMPERATURE SENSOR AND REMOTE SETPOINT ADJ.	SENSES AND TRANSMITS SPACE TEMPERATURE AND REMOTE SETPOINT TO CTLR. FOR CONTROL AND INDICATION.
T-2	TERMINAL UNIT DISCHARGE AIR TEMPERATURE SENSOR	SENSES AND TRANSMITS DISCHARGE DRY BULB TEMPERATURE TO CTLR.
F-1	TERMINAL UNIT SUPPLY AIR FLOW TRANSMITTER	SENSES AND TRANSMITS AIR FLOW VELOCITY PRESSURE TO CTLR. FOR AIRFLOW CALCULATION.
D-1	SUPPLY AIR DAMPER MODULATING TYPE	VARIES SUPPLY AIR FLOW IN RESPONSE TO SUPPLY AIR SETPOINT.
V-1	REHEAT CONTROL VALVE MODULATING TYPE	VARIES HEATING HOT WATER FLOW TO REHEAT COIL.

FLOW DIAGRAM



CONTROLS DIAGRAM - HOT WATER STEAM CONVERTERS

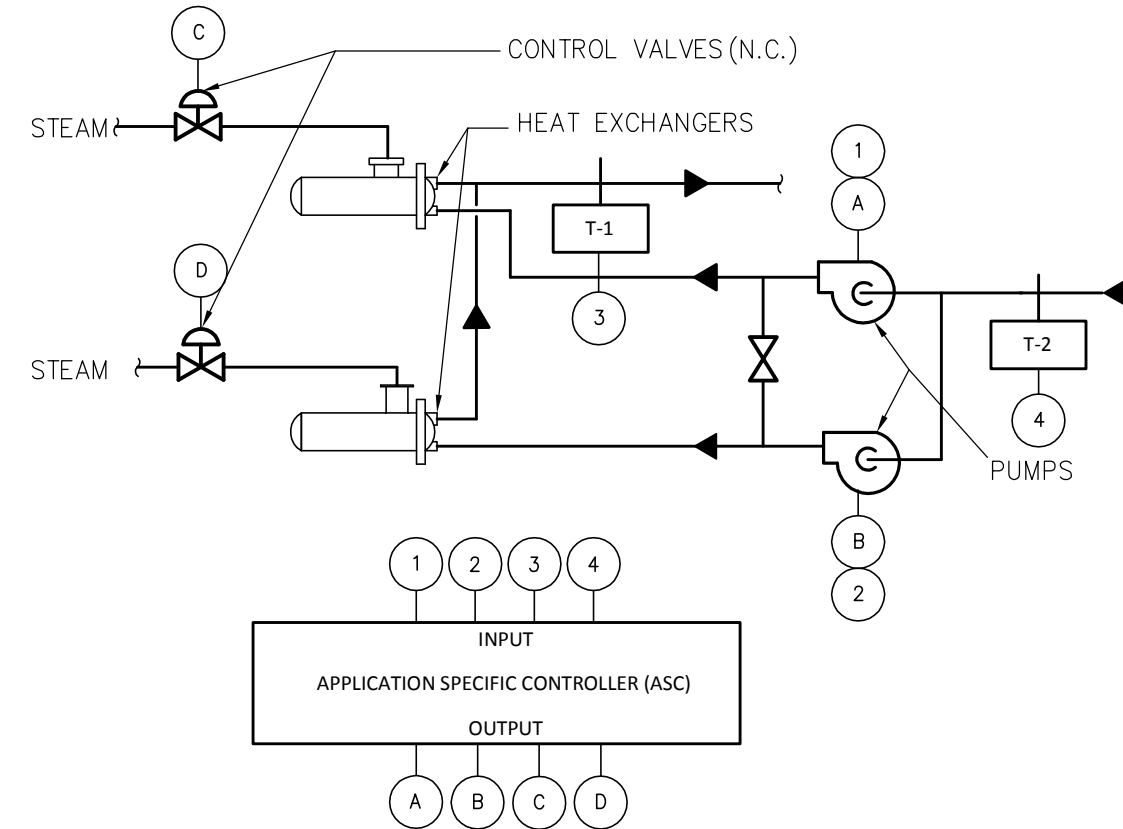
SEQUENCE OF OPERATIONS

- A. THE HEAT EXCHANGERS AND THEIR ASSOCIATED PUMPS SHALL OPERATE ON A LEAST-ANDRY BASIS. THE LEAD HEAT EXCHANGER SHALL BE OPERATOR SELECTABLE AND SHALL AUTOMATICALLY ALTERNATE ON A MONTHLY BASIS.**
- B. WHEN THE HEAT EXCHANGER SYSTEM IS INDEXED TO START, THE LEAD HEAT EXCHANGER'S PUMP SHALL BE STARTED AND SHALL RUN CONTINUOUSLY. PUMPS SHALL RUN AT CONSTANT VOLUME. VARIABLE FREQUENCY DRIVE SHALL BE USED FOR BALANCING.**
- C. ONCE THE LEAD HEAT EXCHANGER'S PUMP STATUS HAS BEEN PROVEN, THE MODULATING STEAM CONTROL VALVE SHALL BE CONTROLLED TO MAINTAIN THE FOLLOWING OUTSIDE AIR RESET SCHEDULE:**
- D. IF THE LEAD HEAT EXCHANGER'S PUMP FAILS TO PROVE STATUS DURING ITS OPERATIVE, THE HEAT EXCHANGER'S STEAM VALVES SHALL FULLY CLOSE. ITS PUMP SHALL BE STOPPED, AND THE STANDBY HEAT EXCHANGER SHALL OPERATE IN ITS PLACE. AN ALARM SHALL BE INITIATED AT THE OPERATOR WORKSTATION.**

LEGENDS

T-1	HEATING HOT WATER SUPPLY TEMPERATURE	SENSES AND TRANSMITS HEATING HOT WATER SUPPLY TEMPERATURE TO CTLR.
T-2	HEATING HOT WATER RETURN TEMPERATURE	SENSES AND TRANSMITS HEATING HOT WATER RETURN TEMPERATURE TO CTLR.

FLOW DIAGRAM



DESIGNER/ENGINEER
CAD OPERATOR
CHECKED/REVIEWER

95% OWNER REVIEW DOCUMENTS
ISSUED FOR BID DOCUMENTS

01/18/2013
01/31/2013

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Revised By:

Drawing Title
HVAC CONTROLS

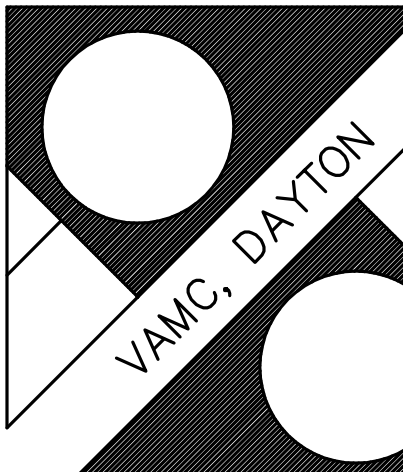
Approved: Project Engineer
Philip Kirk

Project Title
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DAYTON, OH 45428

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