GENERAL NOTES:

A. MECHANICAL CONTRACTOR WILL BE RESPONSIBLE TO REVIEW ACCESSIBILITY TO AREAS OUTSIDE THE CONSTRUCTION LIMITS TO DETERMINE APPROXIMATE AMOUNT OF OVERTIME REQUIRED TO PERFORM ALL MECHANICAL WORK INDICATED. COORDINATION OF SCHEDULES WITH ADJACENT DEPARTMENTS AND CLEANING OF ALL DEBRIS AFTER EACH WORK SHIFT SHOULD BE ASSUMED IN THE BASE BID SCOPE.

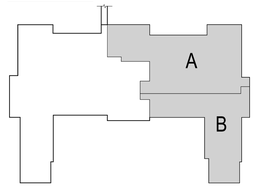
B. ANY MAJOR OUTAGES INDICATED ON THESE DRAWINGS SHALL BE SCHEDULED TO BE PERFORMED AFTER NORMAL BUSINESS HOURS OR DURING WEEKEND PERIODS TO MINIMIZE DISRUPTION.

C. WHERE MECHANICAL SYSTEMS TO REMAIN ARE DAMAGED, OR DISTURBED, DURING THE COURSE OF CONSTRUCTION THE CONTRACTOR WILL BE RESPONSIBLE TO REMOVE DAMAGED PORTIONS AND INSTALL NEW PRODUCTS OF EQUAL QUALITY AND FUNCTIONALITY.

KEY NOTES:

1. CONVECTOR UNIT TO REMAIN. REMOVE EXISTING CONTROL VALVE AND REPLACE WITH NEW DDC VALVE.
2. DEMOLISH CONVECTOR UNIT AND ALL ASSOCIATED VALVES, CONTROLS AND LOW PRESSURE STEAM AND CONDENSATE PIPING DOWN TO FLOOR BELOW. OPEN WALL FOR REMOVAL OF DEAD LEG STEAM AND CONDENSATE PIPING UP TO FLOOR ABOVE (WHERE APPLICABLE). DO NOT ABANDON ANY OLD PIPING WITHIN WALL CAVITIES, REFER TO LOWER LEVEL FOR REMOVAL OF RISERS UP TO MAIN AND CAP AS CLOSE AS POSSIBLE. PATCH ALL FLOOR PENETRATIONS AS REQUIRED TO MAINTAIN FLOOR SEPARATION RATING.
3. DEMOLISH VAV BOX AND ALL HEATING WATER SUPPLY AND RETURN PIPING TO VAV BOXES. COORDINATE REMOVAL OF ALL ASSOCIATED CONTROL WIRING/TUBING AND THERMOSTAT AS REQUIRED.
4. DEMOLISH VAV BOX AND ASSOCIATED HEATING WATER SUPPLY AND RETURN PIPING (BOTH BRANCH AND MAIN LINES) BACK TO POINT OF ENTRY INTO AREA. MECHANICAL CONTRACTOR TO FIELD VERIFY EXISTING PIPING AND REMOVE COMPLETELY, ALL EXISTING PIPING NOT SHOWN ON THESE DRAWINGS. COORDINATE REMOVAL OF ALL ASSOCIATED CONTROL WIRING/TUBING AND THERMOSTAT AS REQUIRED.
5. DEMOLISH REFRIGERANT PIPING UP TO AHU-05 AND DOWN TO BASEMENT DURING PHASE 1 OF AIR HANDLING UNIT REPLACEMENT IN ATTIC.
6. REMOVE CROSS-OVER LOOP FOR CONNECTION OF NEW REHEAT WATER PIPING TO SERVE THIS FLOOR LEVEL.
7. EXISTING 6" HEATING WATER SUPPLY AND RETURN AND 2" LOW PRESSURE STEAM UP AND DOWN.

KEY PLAN



1 FIRST FLOOR PIPING DEMOLITION PLAN
1/8" = 1'-0"

Revision#	Description	Date:

CONSULTANT

DUNHAM
50 South Sixth Street / Suite 1100
Minneapolis, Minnesota 55402-1540
PHONE 612.465.7550 FAX 612.465.7551
WEB dunhameng.com
mechanical + electrical consulting engineering
0420950-007-00

ARCHITECT/ENGINEER OF RECORD

ANDERSON
13605 1st Ave. N. #100 Plymouth, MN 55441
P 763.412.4000 | F 763.412.4090 | ae-mn.com
Anderson Engineering of Minnesota, LLC | Proj # Project Number

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I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Name Jason R. Gottwalt, P.E.
Date 05/22/2020 Reg. No. 41360

Project Title	RENOVATE BUILDING 28 FIRST FLOOR EAST RRTP
Location	SAINT CLOUD, MN
Phase	CONSTRUCTION DOCUMENTS
Drawing Title	FIRST FLOOR PIPING DEMOLITION PLAN
Issue Date	MAY 22, 2020
Checked	JRG
Drawn	TNH
Project Number	656-19-306
Building Number	28
Drawing Number	MDP111

U.S. Department of Veterans Affairs
Veterans Health Administration
St. Cloud VA Health Care System

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VA FORM 08 - 6231

1 FIRST FLOOR PIPING PLAN
1/8" = 1'-0"

GENERAL NOTES:

A. MECHANICAL CONTRACTOR WILL BE RESPONSIBLE TO REVIEW ACCESSIBILITY TO AREAS OUTSIDE THE CONSTRUCTION LIMITS TO DETERMINE APPROXIMATE AMOUNT OF OVERTIME REQUIRED TO PERFORM ALL MECHANICAL WORK INDICATED. COORDINATION OF SCHEDULES WITH ADJACENT DEPARTMENTS AND CLEANING OF ALL DEBRIS AFTER EACH WORK SHIFT SHOULD BE ASSUMED IN THE BASE BID SCOPE.

B. ANY MAJOR OUTAGES INDICATED ON THESE DRAWINGS SHALL BE SCHEDULED TO BE PERFORMED AFTER NORMAL BUSINESS HOURS OR DURING WEEKEND PERIODS TO MINIMIZE DISRUPTION.

C. COORDINATE ALL NEW PIPE ROUTING WITH ALL OTHER TRADES TO ENSURE ADEQUATE CLEARANCES FOR DUCTWORK, ELECTRICAL CONDUIT, STRUCTURAL SUPPORTS, PIPING, ETC. ANY UNAVOIDABLE CONFLICTS SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT/ENGINEER OF RECORD. PROVIDE ALL OFFSETS AND TRANSITIONS AS REQUIRED FOR A CLEAN INSTALLATION.

D. SUPPORT ALL PIPING DIRECTLY TO STRUCTURE. DO NOT SUPPORT ANY PIPING FROM DUCTWORK, CONDUIT, OR OTHER PIPING ENCOUNTERED.

E. WHERE MECHANICAL SYSTEMS TO REMAIN ARE DAMAGED, OR DISTURBED, DURING THE COURSE OF CONSTRUCTION THE CONTRACTOR WILL BE RESPONSIBLE TO REMOVE DAMAGED PORTIONS AND INSTALL NEW PRODUCTS OF EQUAL QUALITY AND FUNCTIONALITY.

F. ALL EXISTING PIPING THROUGH NEW FIRE RATED WALLS SHALL BE ADEQUATELY FIRE SEALED AS REQUIRED.

G. THE MECHANICAL CONTRACTOR SHALL MAINTAIN ACCURATE RECORD DRAWINGS SHOWING ALL DISCREPANCIES WITH ANY EXISTING PIPING INDICATED OR REVISIONS TO THE NEW PLUMBING LAYOUTS. ALL CHANGES WILL BE UPDATED WITHIN THE FINAL RECORD DRAWING SET.

H. THE SMALLEST ALLOWABLE PIPE SIZE FOR HEATING WATER SUPPLY AND RETURN WILL BE 3/4".

I. UNLESS NOTED OTHERWISE, HEATING WATER SUPPLY AND RETURN PIPING TAKE-OFFS TO REHEAT COILS SHALL BE 3/4" DIAMETER.

J. HEATING WATER SUPPLY AND RETURN PIPING TAKE-OFFS SHALL BE OFF THE TOP OF MAIN.

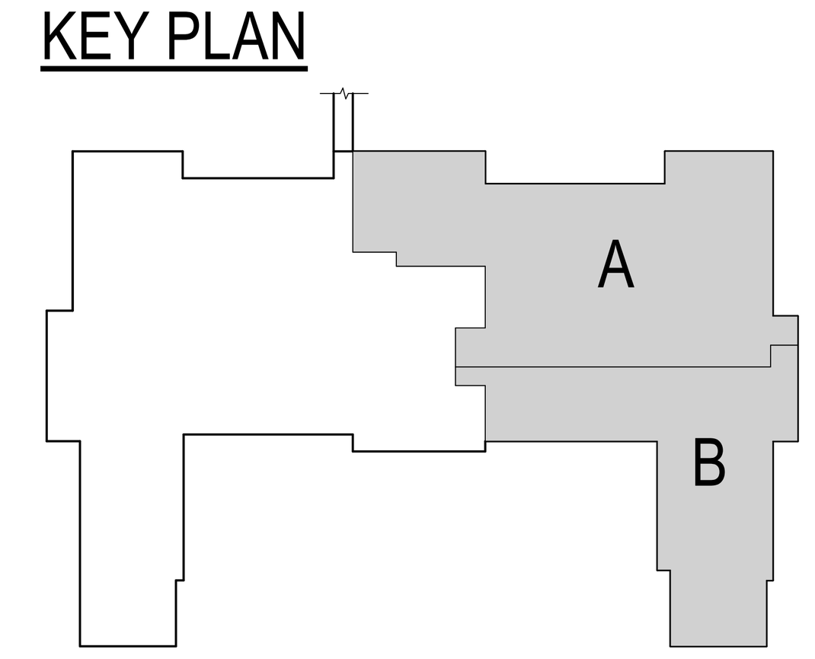
K. PROVIDE 1/2" DRAIN VALVE AT NEW HEATING WATER SUPPLY AND RETURN PIPE LOW POINTS, DOWNSTREAM OF ISOLATION VALVES.

L. ALL VALVES TO BE LOCATED ABOVE LAY-IN CEILING FOR ACCESSIBILITY. WHERE VALVES MUST BE LOCATED ABOVE GYPSUM BOARD CEILINGS, MECHANICAL CONTRACTOR SHALL COORDINATE LOCATIONS OF 24"x24" ACCESS PANELS WITH GENERAL CONTRACTOR.

KEY NOTES:

1. EXISTING 6" HEATING WATER SUPPLY AND RETURN AND 2" LOW PRESSURE STEAM UP AND DOWN.
2. ROUTE 3/4" HEATING WATER SUPPLY AND RETURN DOWN IN WALL AND CONNECT TO EXISTING CONVECTOR.
3. ROUTE 3/4" HEATING WATER SUPPLY AND RETURN DOWN IN WALL AND CONNECT TO NEW CONVECTOR(S). INCLUDE WORK ASSOCIATED WITH OPENING UP EXTERIOR WALL FOR PIPING INSTALLATION (AND DEMO OF OLD STEAM PIPING RISERS WHERE APPLICABLE). NOTE THAT CONTROL VALVE, STRAINER, BALANCING AND ISOLATION VALVES SHALL ALL BE LOCATED OUTSIDE OF THE PATIENT ROOM IN LOCATION WITH DIRECT ACCESS TO CORRESPONDING VAV REHEAT COIL CONTROL VALVE.
4. DASHED SQUARE BOX REPRESENTS 24"X24" ACCESS AREA FOR BOTH VAV BOX ACTUATOR, AND THE REHEAT COIL PIPING COMPONENTS SHOWN ON DETAIL 10/MH500. NOTE THAT VA'S PREFERENCE IS TO PROVIDE PRE-PIPED VALVE KITS AS SPECIFIED IN EQUIPMENT SCHEDULE. VERIFY THERE IS ENOUGH CLEARANCE FOR INSTALLATION OF THESE KITS, OR MODIFY THEM AS REQUIRED.
5. PROVIDE 24” x 24” ACCESS PANEL IN GYPSUM CEILING. COORDINATE LOCATION WITH GENERAL CONTRACTOR.
6. BALANCE TO 1 GPM.
7. BALANCE TO 2 GPM.
8. BALANCE TO 3 GPM.
9. BALANCE TO 4 GPM.
10. 2-1/2" HEATING WATER SUPPLY AND RETURN PIPING CAPPED AND VALVED FOR FUTURE EXPANSION LOOP TO WEST SIDE OF BUILDING.
11. LOCATE CONTROL VALVES AND ASSOCIATED PIPING COMPONENTS IN CORRIDOR CEILING PLENUM. SHOWN HERE FOR CLARITY.
12. CONTRACTOR TO OPEN RATED CHASE/SHAFT TO ALLOW ACCESS TO INSTALL NEW CHILLED WATER PIPING RISERS NEXT TO EXISTING HEATING WATER RISERS. COORDINATE EXACT CONFIGURATION OF CHASE TO DETERMINE AMOUNT OF DEMOLITION AND REBUILDING OF RATED SHAFT WALL IS REQUIRED. ALL RISER PIPING FLOOR PENETRATIONS TO BE PROVIDED WITH FLOOR SLEEVE RAISED 2" ABOVE FLOOR LEVEL TO PREVENT POTENTIAL WATER/FLOODING FROM PENETRATING INTO LOWER LEVELS.
13. COORDINATE EXTENSION OF NEW CHILLED WATER RISERS UP TO ATTIC SPACE. REFER TO BASEMENT LEVEL BELOW, AND SECOND FLOOR ABOVE, PIPING PLANS FOR CONTINUATION.

KEY PLAN



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CONSULTANT

DUNHAM
50 South Sixth Street / Suite 1100
Minneapolis, Minnesota 55402-1540
PHONE 612.465.7550 FAX 612.465.7551
WEB dunhameng.com
mechanical + electrical consulting engineering
0420950-007-00

ast

ARCHITECT/ENGINEER OF RECORD

ANDERSON
13605 1st Ave. N. #100 Plymouth, MN 55441
P 763.412.4000 | F 763.412.4090 | ae-mn.com
Anderson Engineering of Minnesota, LLC | Proj # Project Number

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Name Jason R. Gottwalt, P.E.
Date 05/22/2020 Reg. No. 41360

Project Title: RENOVATE BUILDING 28 FIRST FLOOR EAST RRTP	Project Number: 656-19-306
Location: SAINT CLOUD, MN	Building Number: 28
Phase: CONSTRUCTION DOCUMENTS	Drawing Number: MP111
Drawing Title: FIRST FLOOR PIPING PLAN	
Issue Date: MAY 22, 2020 / Checked: JRG / Drawn: TNH	

VA
U.S. Department of Veterans Affairs
Veterans Health Administration
St. Cloud VA Health Care System

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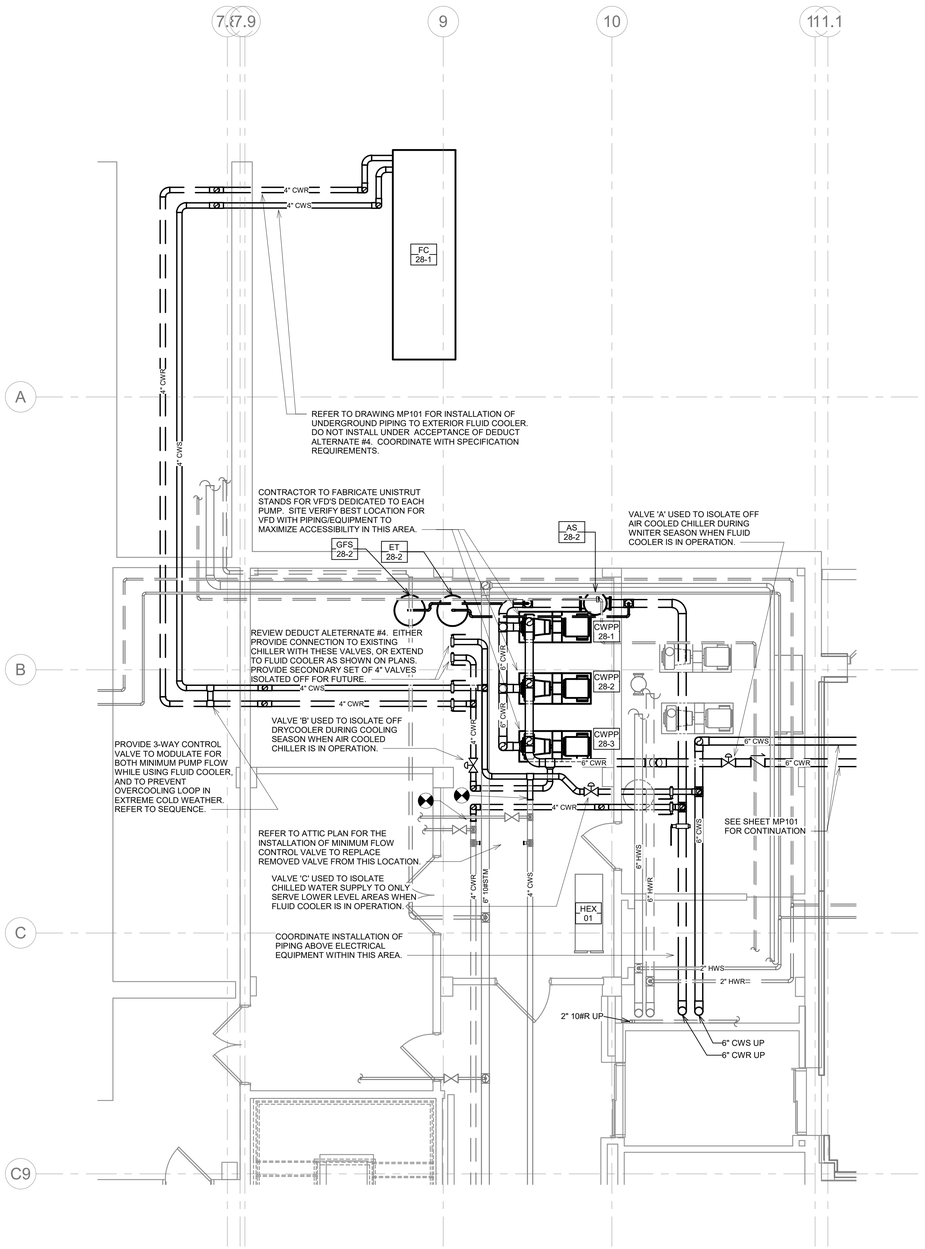
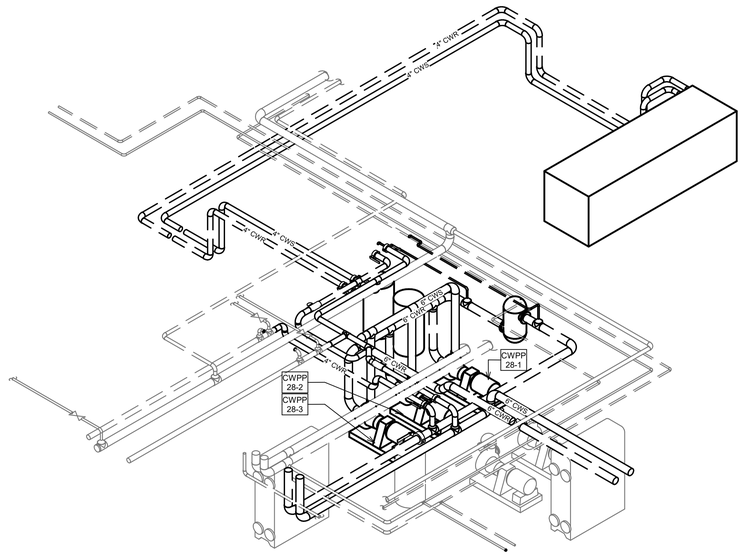


1 ENLARGED CHILLER ROOM
1/4" = 1'-0"



2 ENLARGED CHILLER ROOM
NO SCALE

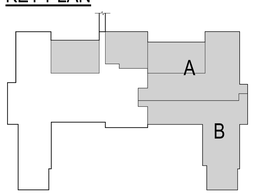
GENERAL NOTES:

A. NOT NOT USED.

KEY NOTES:

1 NOTE NOT USED

KEY PLAN



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CONSULTANT

DUNHAM
DUNHAM
50 South Sixth Street / Suite 1100
Minneapolis, Minnesota 55402-1540
PHONE 612.465.7550 FAX 612.465.7551
WEB dunhameng.com
mechanical + electrical consulting engineering
0420950-007-00

AST

ARCHITECT/ENGINEER OF RECORD

ANDERSON
13605 1st Ave. N. #100 Plymouth, MN 55441
P 763.412.4000 | F 763.412.4090 | ae-mn.com
Anderson Engineering of Minnesota, LLC | Proj # Project Number

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Name Jason R. Gottwalt, P.E.
Date 05/22/2020 Reg. No. 41360

Project Title: RENOVATE BUILDING 28 FIRST FLOOR EAST RRTP	Project Number: 656-19-306
Location: SAINT CLOUD, MN	Building Number: 28
Phase: CONSTRUCTION DOCUMENTS	Drawing Number: MH400
Drawing Title: ENLARGED CHILLER ROOM PLAN	
Issue Date: MAY 22, 2020 / Checked: JRG / Drawn: TNH	

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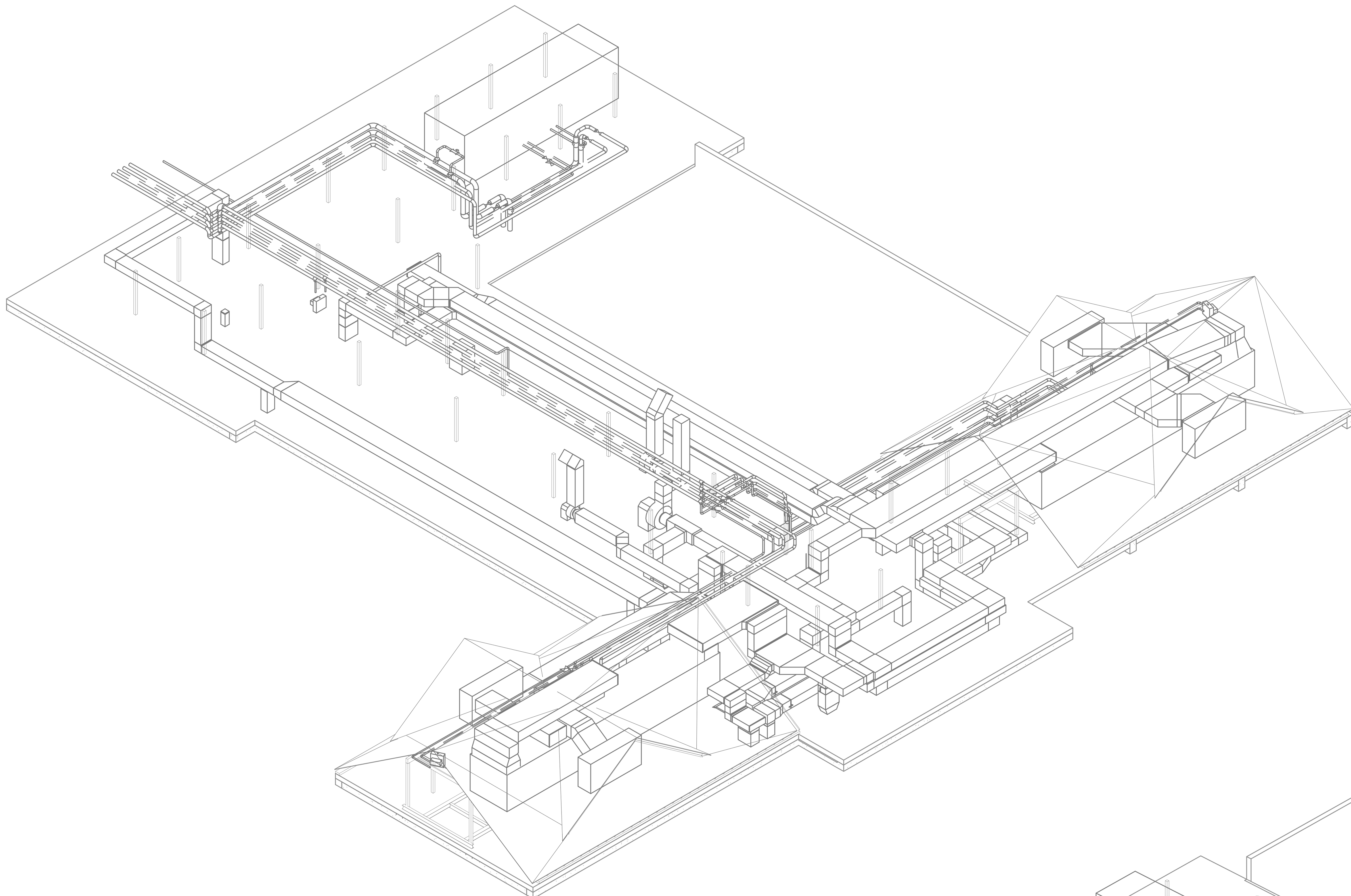
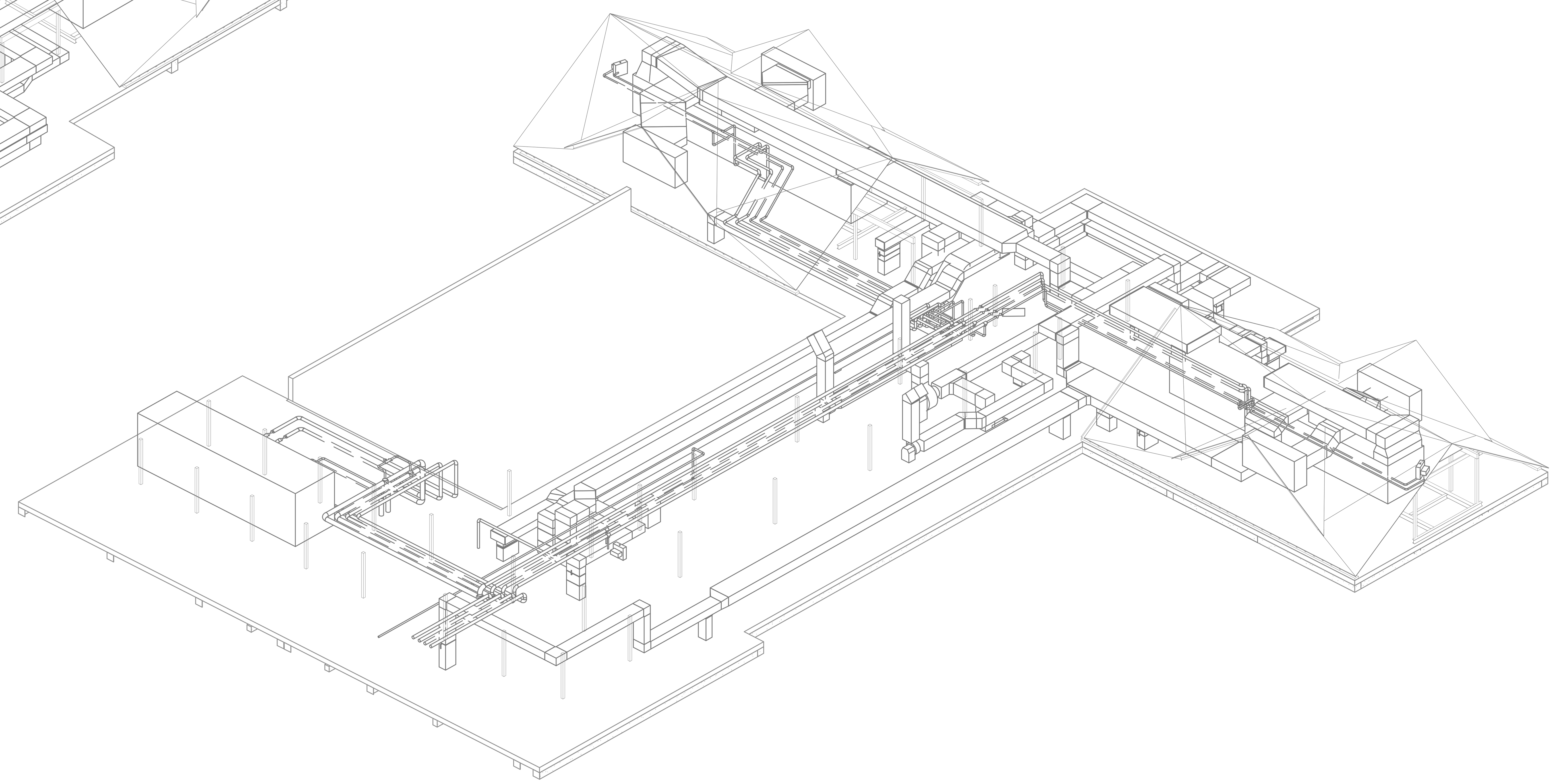


1 MECHANICAL ISOMETRIC - ATTIC LEVEL PHASES 1 & 2



2 MECHANICAL ISOMETRIC - ATTIC LEVEL PHASES 1 & 2

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CONSULTANT

DUNHAM
50 South Sixth Street / Suite 1100
Minneapolis, Minnesota 55402-1540
PHONE 612.465.7550 FAX 612.465.7551
WEB dunhameng.com
mechanical + electrical consulting engineering
0420950-007-00

ARCHITECT/ENGINEER OF RECORD

ANDERSON
13605 1st Ave. N. #100 Plymouth, MN 55441
P 763.412.4000 | F 763.412.4090 | ae-mn.com
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Date 05/22/2020 Reg. No. 41360

Project Title: RENOVATE BUILDING 28 FIRST FLOOR EAST RRTP
Location: SAINT CLOUD, MN
Phase: CONSTRUCTION DOCUMENTS
Drawing Title: ATTIC ISOMETRICS - PHASES 1 AND 2
Issue Date: MAY 22, 2020 | Checked: JRG | Drawn: TNH
Project Number: 656-19-306
Building Number: 28
Drawing Number: MH401

U.S. Department of Veterans Affairs
Veterans Health Administration
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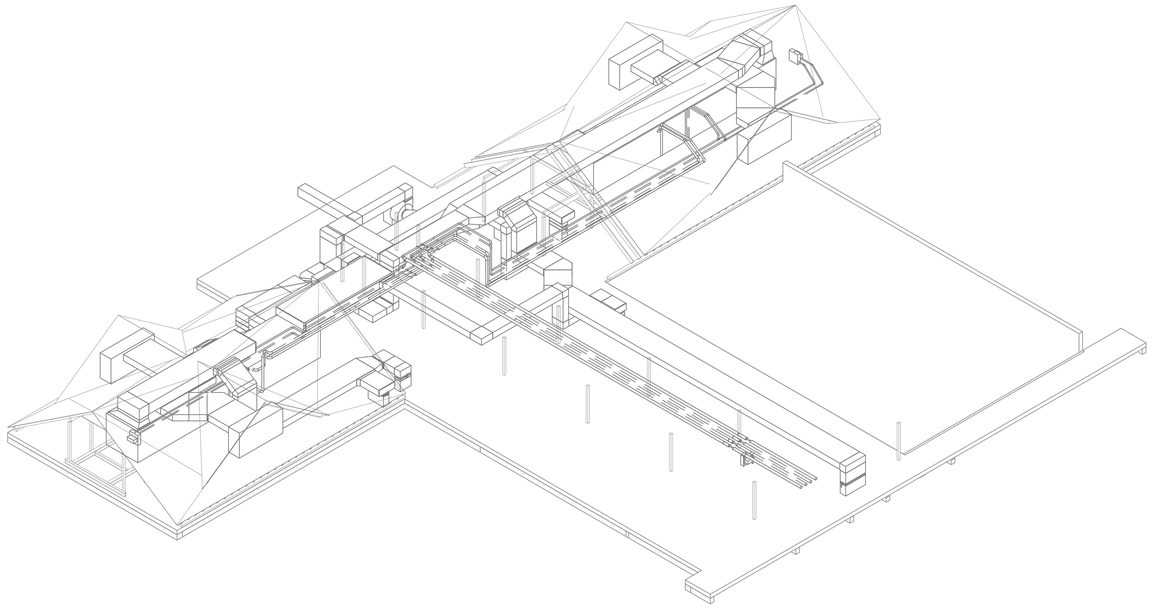
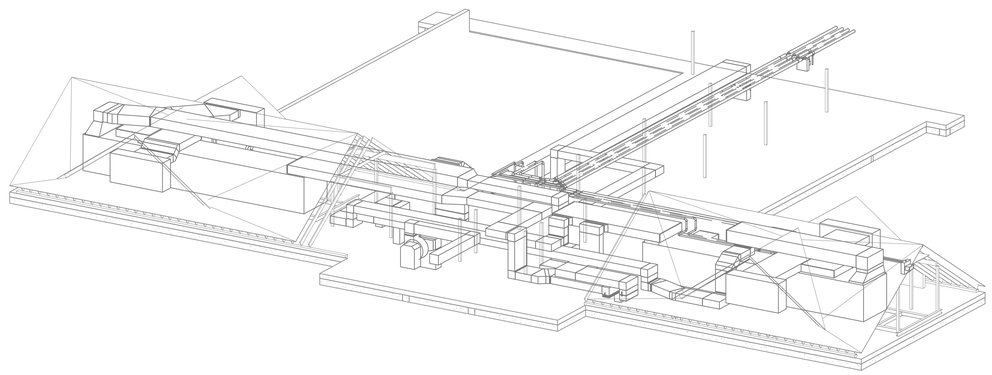


1 MECHANICAL ISOMETRIC - ATTIC LEVEL 3 & 4



2 MECHANICAL ISOMETRIC - ATTIC LEVEL PHASES 3 & 4

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CONSULTANT

DUNHAM

DUNHAM
50 South Sixth Street / Suite 1100
Minneapolis, Minnesota 55402-1540
PHONE 612.465.7550 FAX 612.465.7551
WEB dunhameng.com
mechanical + electrical consulting engineering
0420950-007-00

ARCHITECT/ENGINEER OF RECORD

ANDERSON

13605 1st Ave. N. #100 Plymouth, MN 55441
P 763.412.4000 | F 763.412.4090 | ae-mn.com
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Name Jason R. Gottwalt, P.E.

Date 05/22/2020 Reg. No. 41360

Project Title	RENOVATE BUILDING 28 FIRST FLOOR EAST RRTP
Location	SAINT CLOUD, MN
Phase	CONSTRUCTION DOCUMENTS
Drawing Title	ATTIC ISOMETRICS - PHASES 3 AND 4
Issue Date	MAY 22, 2020
Checked	JRG
Drawn	TNH
Project Number	656-19-306
Building Number	28
Drawing Number	MH402

U.S. Department of Veterans Affairs
Veterans Health Administration
St. Cloud VA Health Care System

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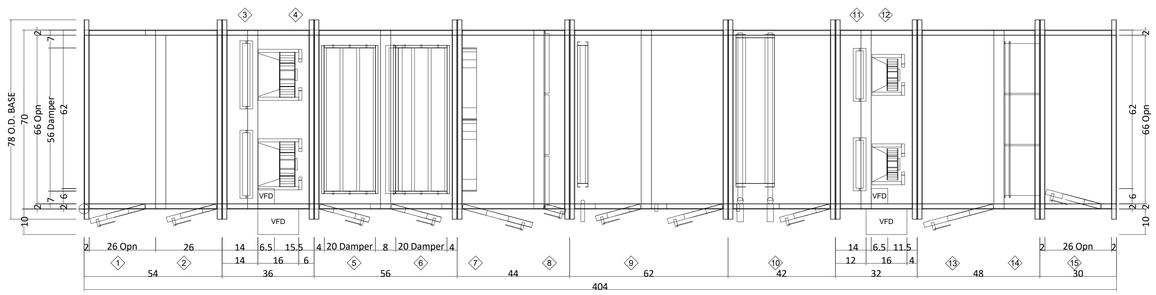
MATRIX OF RESPONSIBILITIES FOR BUILDING AUTOMATION CONTROLS COMPONENTS

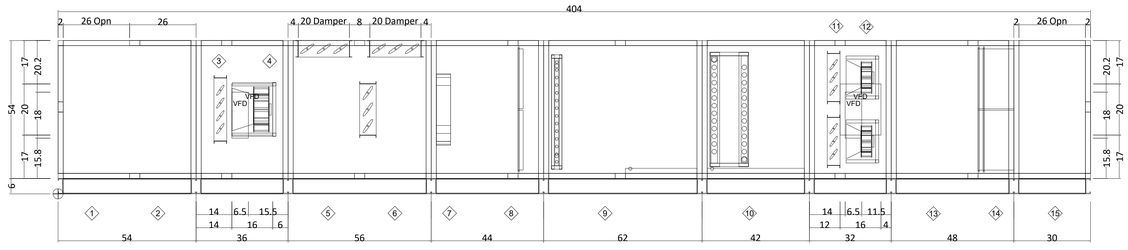
ITEM #	DESCRIPTION	FURNISHED BY:	INSTALLED BY:	LOW VOLTAGE (WIRE AND CONDUIT)	LINE POWER (WIRE AND CONDUIT)	OTHER NOTES
1	BUILDING AUTOMATION CONTROL PANELS (INCLUDES UNITARY CONTROLLERS & MCU)	CC	CC	CC	CC (SEE NOTE)	HIGH VOLTAGE WIRING VIA LICENSED ELECTRICIAN PAID THROUGH CC BID
2	VAV BOX ACTUATOR	CC	MC/EM (NOTE 1)	CC	CC/EC (SEE NOTE 2)	1) MC MAY OPT TO HAVE VAV CONTROLLER FACTORY MOUNTED, OR FIELD INSTALLED AT EXPENSE OF MC 2) CC TO INCLUDE ALL ELECTRIAL COSTS FOR 120/1 CONNECTIONS TO 24 VOLT TRANSFORMER
3	VAV BOX CONTROLLER	CC	CC	CC	CC/EC (SEE NOTE)	CC TO INCLUDE ALL ELECTRICAL COSTS FOR 120/1 CONNECTIONS TO 24 VOLT TRANSFORMER
4	AUTOMATIC CONTROL DAMPERS (DUCT OR PLENUM MOUNTED)	CC	MC	CC	EC (SEE NOTE)	CC TO SUBCONTRACT EC FOR WIRING 120/1 DAMPER ACTUATORS, ALL LOW VOLTAGE BY CC
5	AUTOMATIC CONTROL DAMPERS (AHU OR EQUIPMENT MOUNTED)	EM (WITHIN MC BID)	EM	CC	EC (SEE NOTE)	CC TO SUBCONTRACT EC FOR WIRING 120/1 DAMPER ACTUATORS, ALL LOW VOLTAGE BY CC
6	MANUAL ISOLATION VALVES	PC	PC	NA	NA	-
7	AUTOMATIC CONTROL VALVES	CC	PC	CC	EC (SEE NOTE)	CC TO SUBCONTRACT EC FOR WIRING TO 120/1 VALVE ACTUATORS, ALL LOW VOLTAGE BY CC
8	PIPE INSERTION DEVICES AND TAPS (THERMOWELLS, FLOW OR PRESS. SENSORS)	CC	PC	CC	NA	CC TO COORDINATE INSTALLED LOCATION WITH PC FOR WELL, OR TAP INSTALLATION
9	DUCT MOUNTED SENSORS (TEMPERATURE, HUMIDSTAT, ETC.)	CC	CC/MC (SEE NOTE)	CC	NA	MC TO SEAL ALL DUCT PENETRATIONS AS REQUIRED FOR DUCT LEAKAGE RATING
10	AIR HANDLING UNIT MOUNTED SENSORS (TEMPERATURE, HUMIDSTAT, ETC.)	CC	CC/MC (SEE NOTE)	CC	NA	MC TO INSURE PENETRATIONS THROUGH AIR HANDLER CASING WILL NOT IMPACT LEAKAGE RATING
11	DUCT MOUNTED AIRFLOW SENSORS	CC	CC/MC (SEE NOTE)	CC	NA	MC TO SEAL ALL DUCT PENETRATIONS AS REQUIRED FOR DUCT LEAKAGE RATING
12	AHU/FAN MOUNTED AIRFLOW SENSORS	EM (WITHIN MC BID)	EM (SEE NOTE)	CC	NA	EQUIPMENT MANUFACTURER TO INSTALL/POSITION AND PROVIDE SITE CALIBRATION INSTRUCTIONS
13	CURRENT SWITCHES	CC	CC	CC	EC (SEE NOTE)	EC TO COORDINATE HIGH VOLTAGE WIRING INSTALLATION WITH CC FOR PLACEMENT OF SENSOR
14	VARIABLE FREQUENCY DRIVES (PUMPS, INDIV. FANS, ETC.)	CC	EC	CC	EC (SEE NOTE)	EC TO COORDINATE HIGH VOLTAGE WIRING INSTALLATION WITH CC FOR PLACEMENT OF SENSOR
15	VARIABLE FREQUENCY DRIVES (AHU OR FACTORY MOUNTED EQUIPMENT)	EM (WITHIN MC BID)	EC (NOTE1)	CC	EC (NOTE 2)	1) EC TO CONFIRM SINGLE OR MULTIPLE POINT CONNECTION SUBMITTALS 2) EC TO COORDINATE HIGH VOLTAGE WIRING INSTALLATION WITH DRWINGS/CC PRIOR TO BID
16	BOILER CONTROL PACKAGES	EM (SEE NOTE)	EM/PC	CC	EC	EM TO VERIFY PACKAGES CONTROLS ARE COMPATIBLE WITH CC SYSTEMS. EM RESPONSIBLE FOR ANY GATEWAYS, SENSORS OR PROTOCOL CONVERSION REQUIRED FOR FULL INTEGRATION TO BAC.
17	CHILLER CONTROL INTERFACE	EM (SEE NOTE)	EM/PC	CC	EC	EM TO VERIFY PACKAGES CONTROLS ARE COMPATIBLE WITH CC SYSTEM. EM RESPONSIBLE FOR ANY GATEWAYS, SENSORS OR PROTOCOL CONVERSION REQUIRED FOR FULL INTEGRATION TO BAC.
18	CHILLER/BOILER PROVIDED FLOW SWITCHES AND EXTERNALLY MOUNTED SAFETY DEVICES	EM	PC	CC	EC	ALL TRADES TO COORDINATE WITH EQUIPMENT SUPPLIER PRIOR TO BIDS.
19	COOLING TOWER BASIN HEATERS	EM	PC	CC	EC	ALL TRADES TO COORDINATE WITH EQUIPMENT SUPPLIER PRIOR TO BIDS
20	REFRIGERANT MONITORS	CC	CC	CC	EC (SEE NOTE)	CC TO INCLUDE ALL ELECTRICAL COSTS ASSOCIATED 120/1 CONNECTIONS TO CONTROL PANEL
21	BOILER SHUT DOWN SWITCH(ES)	CC	CC	CC	EC (SEE NOTE)	CC TO PAY ALL ELECTRICAL COSTS ASSOCIATED WITH HIGH VOLTAGE CONNECTION TO SHUNT TRIP BREAKER
22	ROOM PRESSURE MONITORS	CC	CC	CC	NA	CC TO INTEGRATE ALL ROOM PRESSURE MONITORS INTO BAC FOR REMOTE ALARM MONITORING
23	MEDICAL GAS ALARM PANELS (FOR BOTH AREA OR MASTER)	PC	PC	MC OR PC	EC (SEE NOTE)	EC TO INCLUDE ALL ELECTRICAL COSTS ASSOCIATED WITH 120 CONNECTIONS TO ALARM PANEL. PC TO INCLUDE ALL LOW VOLTAGE WIRING BETWEEN ALARM PANEL AND REMOTE SENSORS.
24	COMPUTER ROOM COOLING UNIT (WITH FACTORY MOUNTED CONTROLS)	EM (WITHIN MC BID)	EM/MC	CC	NA	EM TO CONFIRM COMPATIBILITY WITH CC SYSTEM. ANY REQUIRED GATEWAYS (SITELINK PANELS), OR NETWORK INTEGRATION CARDS TO BE INCLUDED WITH MANUFACTURER'S QUOTE IF NECESSARY.
25	PACKAGED RTU CONTROLS	EM (WITHIN MC BID)	EM/MC	CC	NA	EM TO CONFIRM COMPATIBILITY WITH CC SYSTEM. ANY REQUIRED GATEWAYS (SITELINK PANELS), OR NETWORK INTEGRATION CARDS TO BE INCLUDED WITH MANUFACTURER'S QUOTE.
26	FIRE/SMOKE DAMPERS (WITH DUCT MOUNTED SMOKE DETECTORS)	MC	MC (NOTE 1)	FAC	EC (NOTE 2)	1) DAMPER AND ANY LOOSE DUCT DETECTORS TO BE INSTALLED/MOUNTED BY MC. 2) DAMPERS WITH 120/1 VOLT POWER CONNECTIONS BY EC. MC TO COORDINATE DURING BID.
27	FIRE/SMOKE DAMPERS (CONTROLLED FROM AREA DETECTORS)	MC	MC (NOTE 1)	FAC	EC (NOTE 2)	1) DAMPER AND ANY LOOSE DUCT DETECTORS TO BE INSTALLED/MOUNTED BY FAC. 2) DAMPERS WITH 120/1 VOLT POWER CONNECTIONS BY EC. MC TO COORDINATE DURING BID.
28	AHU SMOKE DETECTORS	MC	MC	CC/FAC (SEE NOTE)	NA	CC TO MOUNT SENSORS AND WIRE INTO BAC. FAC TO PROVIDE MODULE TO INTEGRATE INTO FIRE ALARM SYSTEM TO DIRECTLY SHUT-DOWN UNIT.
29	DAMPER END SWITCHES (BOTH MOTORIZED CONTROL DAMPERS)	CC	MC	CC	EC (SEE NOTE)	CC TO SUBCONTRACT EC FOR WIRING TO 120/1 DAMPER ACTUATORS, ALL LOW VOLTAGE BY CC.
30	DAMPER END SWITCHES (FIRE/SMOKE DAMPERS)	MC	MC	CC (SEE NOTE)	NA	CC TO COORDINATE ANY ADDITIONAL INTEGRATION WITH FAC AS REQUIRED.
31	STARTERS AND HOA SWITCHES	EC	EC	CC	EC	EC AND CC TO COORDINATE TYPE AND LOCATION FOR EACH PIECE OF EQUIPMENT IDENTIFIED.

KEY:
CC = CONTROLS CONTRACTOR *
MC = MECHANICAL CONTRACTOR **
EC = ELECTRICAL CONTRACTOR
PC = PIPING OR PLUMBING CONTRACTOR **
GC = GENERAL CONTRACTOR
EM = EQUIPMENT MANUFACTURER
FAC = FIRE ALARM CONTRACTOR
OWN = OWNER'S FACILITY ENGINEERS

*CONTROLS CONTRACTOR MAY BE SUBCONTRACTED OR DIRECT CONTRACT TO OWNER, ALL ITEMS WITH TABLE APPLY IN EITHER SCENARIO.
*** MECHANICAL AND PIPING/PLUMBING CONTRACTS COMBINE INTO SINGLE CONTRACT IN MOST PROJECTS.

NOTE = MANUFACTURER'S PROVIDING LOOSE CONTROL COMPONENTS (FLOW SWITCHES, TEMP SENSORS, ETC.) WILL BE COMPLETELY MOUNTED/WIRED/ INSTALLED BY THE CONTRACTOR PURCHASING THAT EQUIPMENT. ONLY LOW VOLTAGE CONNECTIONS TO BAC BY CC.





1 AHU DETAIL
1/2" = 1'-0"

KEY NOTES:

1. RETURN AIR OPENING. (TOP)
2. ACCESS DOOR.
3. DAMPER. (RF ISOLATION (2))
4. RETURN FAN. (2)
5. RELIEF AIR OPENING.
6. OUTSIDE AIR OPENING.
7. BLENDER.
8. PRE-FILTER.
9. HOT WATER COIL (PLUS SPACE FOR FUTURE AUXILLARY COIL)
10. CHILLED WATER COIL.
11. DAMPER. (SF ISOLATION (4))
12. SUPPLY FAN. (4)
13. ACCESS DOOR.
14. FINAL FILTER.
15. SUPPLY AIR OPENING. (TOP)

Revision#	Description	Date:

CONSULTANT

DUNHAM

DUNHAM
50 South Sixth Street / Suite 1100
Minneapolis, Minnesota 55402-1540
PHONE 612.465.7550 FAX 612.465.7551
WEB dunhameng.com
mechanical + electrical consulting engineering
0420950-007-00

AST

ARCHITECT/ENGINEER OF RECORD

ANDERSON

13605 1st Ave. N. #100 Plymouth, MN 55441
P 763.412.4000 | F 763.412.4090 | ae-mn.com
Anderson Engineering of Minnesota, LLC | Proj # Project Number

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Name Jason R. Gottwalt, P.E.
Date 05/22/2020 Reg. No. 41360

Project Title	RENOVATE BUILDING 28 FIRST FLOOR EAST RRTP
Location	SAINT CLOUD, MN
Phase	CONSTRUCTION DOCUMENTS
Drawing Title	AHU DETAIL
Issue Date	MAY 22, 2020
Checked	JRG
Drawn	TNH
Project Number	656-19-306
Building Number	28
Drawing Number	MH403

VA | U.S. Department of Veterans Affairs
Veterans Health Administration
St. Cloud VA Health Care System

VA FORM 08 - 6231

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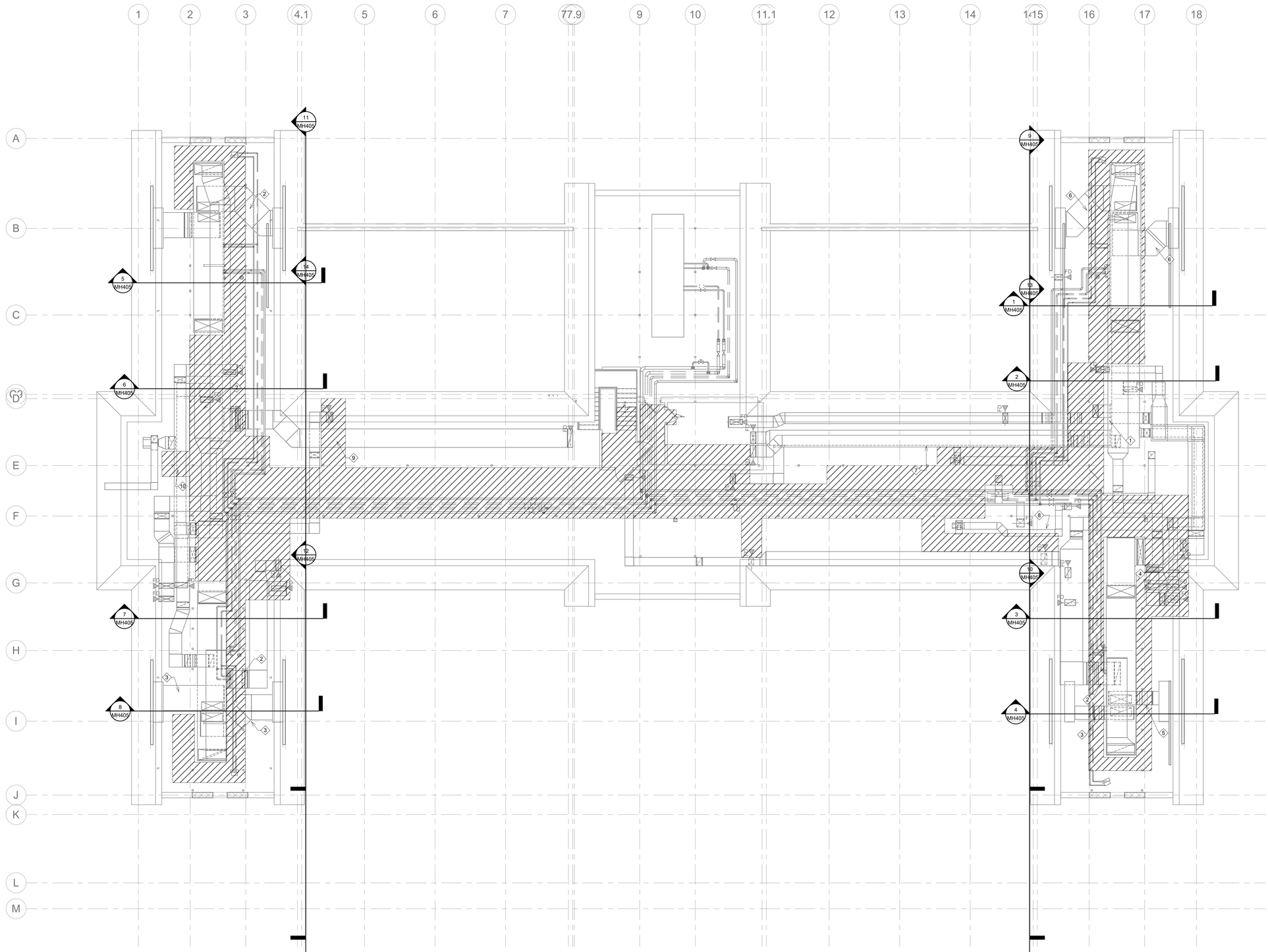

1 SERVICE ACCESS PLAN
1/8" = 1'-0"

GENERAL NOTES:

A. ANY MAJOR VENTILATION OUTAGES INDICATED ON THESE DRAWINGS SHALL BE SCHEDULED TO BE PERFORMED AFTER NORMAL BUSINESS HOURS OR DURING WEEKEND PERIODS TO MINIMIZE DISRUPTION.

B. COORDINATE ALL NEW DUCTWORK ROUTING WITH ALL OTHER TRADES TO INSURE ADEQUATE CLEARANCES FOR PLUMBING, ELECTRICAL CONDUIT, STRUCTURAL SUPPORTS, PIPING, ETC. ANY UNAVOIDABLE CONFLICTS SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT/ENGINEER OF RECORD. PROVIDE ALL OFFSETS AND TRANSITIONS AS REQUIRED FOR A CLEAN INSTALLATION.

C. SUPPORT ALL DUCTWORK DIRECTLY TO STRUCTURE. DO NOT SUPPORT ANY DUCTS FROM DUCTWORK, CONDUIT, OR OTHER PIPING ENCOUNTERED.

D. WHERE MECHANICAL SYSTEMS TO REMAIN ARE DAMAGED, OR DISTURBED, DURING THE COURSE OF CONSTRUCTION THE CONTRACTOR WILL BE RESPONSIBLE TO REMOVE DAMAGED PORTIONS AND INSTALL NEW PRODUCTS OF EQUAL QUALITY AND FUNCTIONALITY.

E. ALL EXISTING DUCTWORK THROUGH NEW FIRE RATED WALLS SHALL BE ADEQUATELY FIRE SEALED AS REQUIRED.

F. ALL EXISTING RETURN/EXHAUST DUCTWORK NOT TEMPORARILY CAPPED SHALL BE PROTECTED WITH REMOVABLE FILTER MEDIA TO PROTECT EXISTING DUCT SYSTEMS FROM CONSTRUCTION DEBRIS. ALL NEW DUCTWORK SHALL BE PROTECTED AS REQUIRED AND CLEANED PRIOR TO START-UP. IF CONSTRUCTION DEBRIS IS FOUND INSIDE UNPROTECTED DUCTWORK THAN DUCT CLEANING OF THE ENTIRE SYSTEM SHALL BE PERFORMED AT THE CONTRACTOR'S EXPENSE.

G. ALL NEW FIRE, SMOKE, AND COMBINATION FIRE/SMOKE DAMPERS INSTALLED IN SHAFT WALLS SHALL BE INSTALLED TO ALLOW FOR SERVICE OF THEIR FUSABLE LINK/ACTUATOR PER FACILITY STANDARDS. ANY CONFLICTS WHICH WILL PREVENT ACCESS SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT AND ENGINEER OF RECORD.

KEY NOTES:

1. LOW DUCT AT APPROXIMATELY 48" CLEARANCE UNDER.
2. LOW DUCT AT APPROXIMATELY 66" CLEARANCE UNDER.
3. LOW DUCT AT APPROXIMATELY 55" CLEARANCE UNDER.
4. LOW DUCT AT APPROXIMATELY 36" CLEARANCE UNDER.
5. LOW DUCT AT APPROXIMATELY 56" CLEARANCE UNDER.
6. LOW DUCT AT APPROXIMATELY 60" CLEARANCE UNDER.
7. LOW DUCT AT APPROXIMATELY 30" CLEARANCE UNDER.
8. CONTRACTOR TO PROVIDE PLATFORM AND STAIRS TO STEP OVER 16" x 16". SITE VERIFY FINAL DUCT ELEVATION FOR INSTALL.
9. CONTRACTOR TO PROVIDE PLATFORM AND STAIRS TO STEP OVER 24" x 48". SITE VERIFY FINAL DUCT ELEVATION FOR INSTALL.
10. CONTRACTOR TO PROVIDE PLATFORM AND STAIRS TO STEP OVER 61" x 62". SITE VERIFY FINAL DUCT ELEVATION FOR INSTALL.

FOR REFERENCE ONLY

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CONSULTANT

DUNHAM
DUNHAM
50 South Sixth Street / Suite 1100
Minneapolis, Minnesota 55402-1540
PHONE 612.465.7550 FAX 612.465.7551
WEB dunhameng.com
mechanical + electrical consulting engineering
0420950-007-00

ARCHITECT/ENGINEER OF RECORD

ANDERSON
13605 1st Ave. N. #100 Plymouth, MN 55441
P 763.412.4000 | F 763.412.4090 | ae-mn.com
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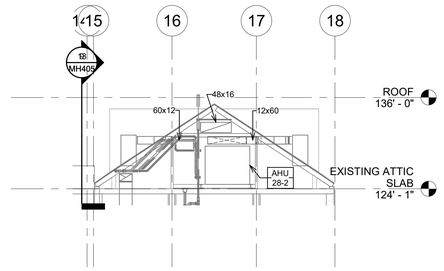
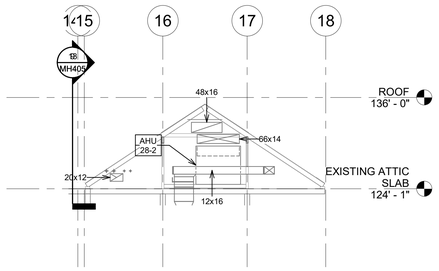
Name Jason R. Gottwalt, P.E.
Date 05/22/2020 Reg. No. 41360

Project Title	RENOVATE BUILDING 28 FIRST FLOOR EAST RRTP
Location	SAINT CLOUD, MN
Phase	CONSTRUCTION DOCUMENTS
Drawing Title	SERVICE ACCESS PLAN
Issue Date	MAY 22, 2020
Checked	JRG
Drawn	TNH
Project Number	656-19-306
Building Number	28
Drawing Number	MH404

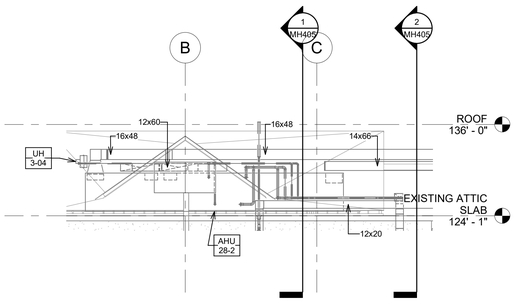
U.S. Department of Veterans Affairs
Veterans Health Administration
St. Cloud VA Health Care System



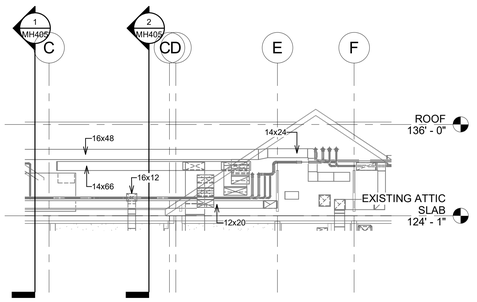
1 AHU 28-2
1/8" = 1'-0"



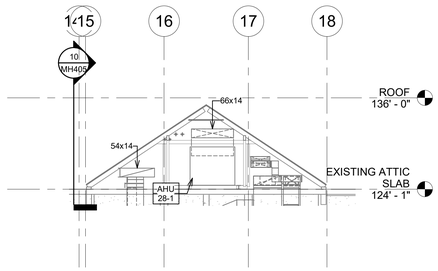
2 AHU 28-2
1/8" = 1'-0"



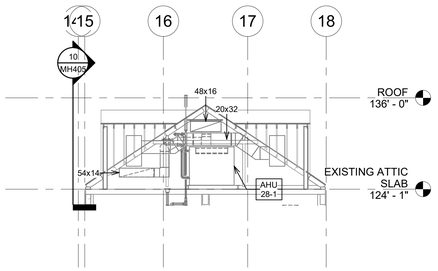
9 EAST
1/8" = 1'-0"



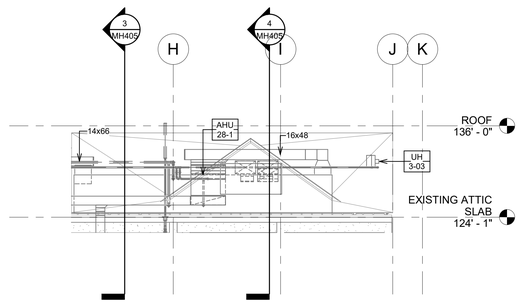
13 EAST
1/8" = 1'-0"



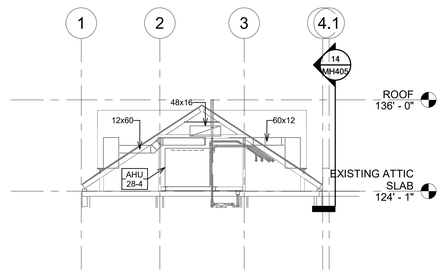
3 AHU 28-1
1/8" = 1'-0"



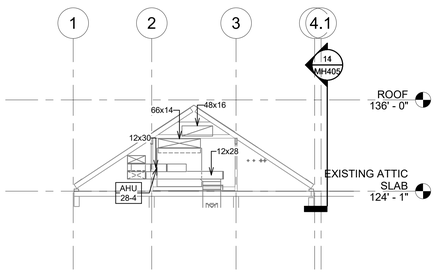
4 AHU 28-1
1/8" = 1'-0"



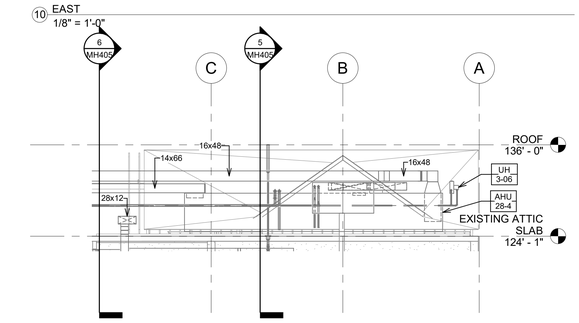
10 EAST
1/8" = 1'-0"



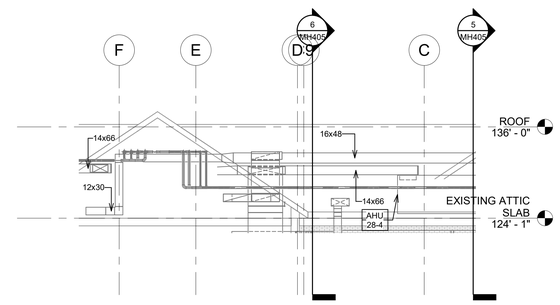
5 AHU 28-3
1/8" = 1'-0"



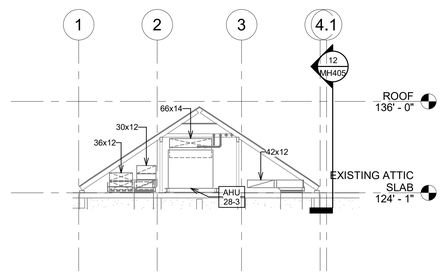
6 AHU 28-3
1/8" = 1'-0"



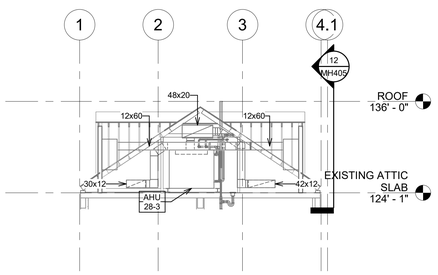
11 WEST
1/8" = 1'-0"



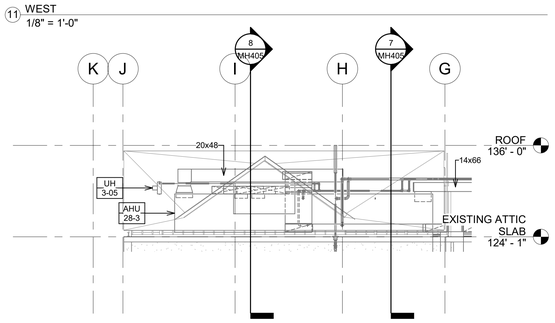
14 WEST
1/8" = 1'-0"



7 AHU 28-4
1/8" = 1'-0"



8 AHU 28-4
1/8" = 1'-0"



12 WEST
1/8" = 1'-0"

FOR REFERENCE ONLY

MECHANICAL NOTES:
A. DUE TO THE DEPTH OF SECTIONS STRUCTURAL ELEMENTS, DUCTWORK AND PIPING SHOW CONFLICTS.
B. PIPING SHOWN IN SECTIONS WILL BE INSTALLED CLOSER TOGETHER. SPACED PIPING SHOWN FOR CLARITY IN PLAN VIEW.

Revision#	Description	Date:

CONSULTANT

DUNHAM

DUNHAM
50 South Sixth Street / Suite 1100
Minneapolis, Minnesota 55402-1540
PHONE 612.465.7550 FAX 612.465.7551
WEB dunhameng.com
mechanical + electrical consulting engineering
0420950-007-00

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Name Jason R. Gottwalt, P.E.
Date 05/22/2020 Reg. No. 41360

Project Title: RENOVATE BUILDING 28 FIRST FLOOR EAST RRTP	Project Number: 656-19-306
Location: SAINT CLOUD, MN	Building Number: 28
Phase: CONSTRUCTION DOCUMENTS	Drawing Number: MH405
Drawing Title: SERVICE ACCESS SECTIONS	
Issue Date: MAY 22, 2020 / Checked: JRG / Drawn: TNH	

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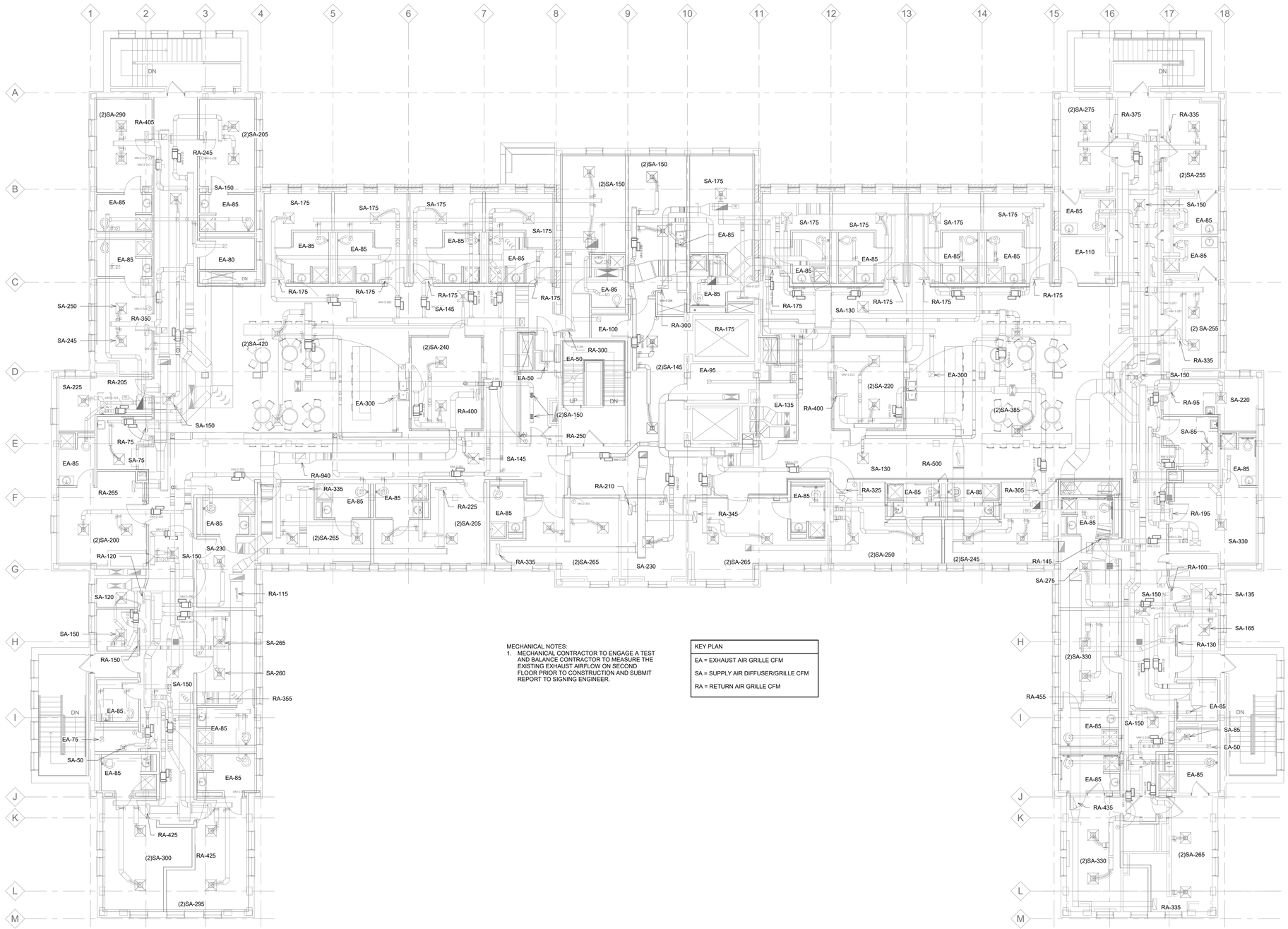

MECHANICAL NOTES:
1. MECHANICAL CONTRACTOR TO ENGAGE A TEST AND BALANCE CONTRACTOR TO MEASURE THE EXISTING EXHAUST AIRFLOW ON SECOND FLOOR PRIOR TO CONSTRUCTION AND SUBMIT REPORT TO SIGNING ENGINEER.

KEY PLAN
EA = EXHAUST AIR GRILLE CFM
SA = SUPPLY AIR DIFFUSER/GRILLE CFM
RA = RETURN AIR GRILLE CFM

1 SECOND FLOOR BALANCING PLAN
1/8" = 1'-0"

Revision#	Description	Date:

CONSULTANT

DUNHAM
DUNHAM
50 South Sixth Street / Suite 1100
Minneapolis, Minnesota 55402-1540
PHONE 612.465.7550 FAX 612.465.7551
WEB dunhameng.com
mechanical + electrical consulting engineering
0420950-007-00

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P 763.412.4000 | F 763.412.4090 | ae-mn.com
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Name Jason R. Gottwalt, P.E.
Date 05/22/2020 Reg. No. 41360

Project Title	RENOVATE BUILDING 28 FIRST FLOOR EAST RRTP
Location	SAINT CLOUD, MN
Phase	CONSTRUCTION DOCUMENTS
Drawing Title	SECOND FLOOR BALANCING PLAN
Issue Date	MAY 22, 2020
Checked	
Drawn	
Project Number	656-19-306
Building Number	28
Drawing Number	MH406

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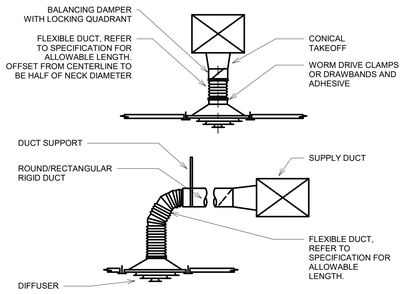
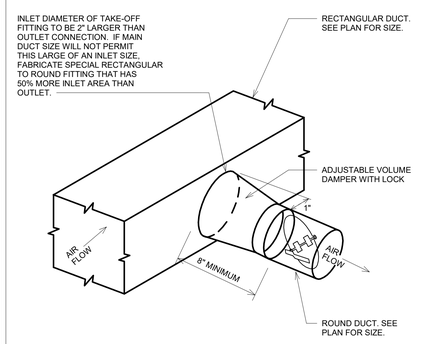


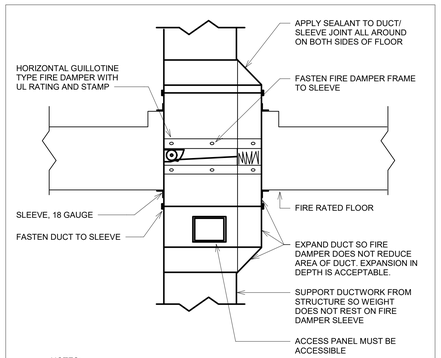
NOTES:

1. TOP DETAIL IS TO BE FOLLOWED WHEN CENTERLINE OF DIFFUSER IS UNDER THE DUCT ENOUGH TO PERMIT A BOTTOM TAKEOFF WITH A FLEXIBLE DUCT OFFSET OF LESS THAN HALF THE NECK DIAMETER. BOTTOM DETAIL TO BE USED IN ALL OTHER CASES.

1 CEILING DIFFUSER RUNOUT DETAIL
NO SCALE



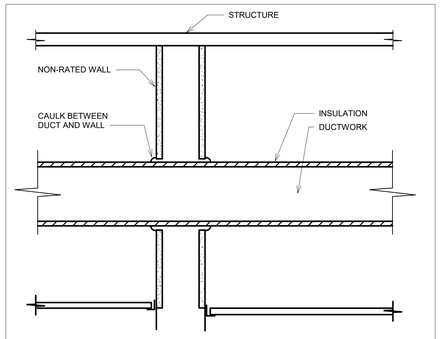
2 DUCT TAKE-OFF TO DIFFUSER DETAIL
NO SCALE



NOTES:

1. PROVIDE CLEARANCE ON ALL FOUR SIDES FOR EXPANSION.

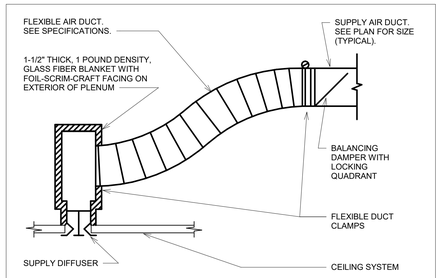
3 FIRE DAMPER AT FLOOR PENETRATION DETAIL
12" = 1'-0"



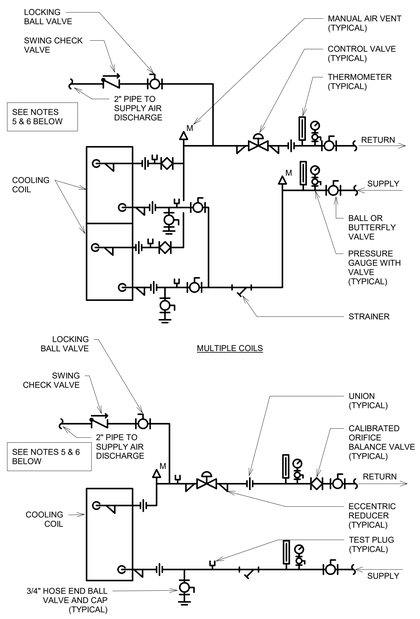
NOTES:

1. FINISH CAULKING WITH 1/4" MINIMUM BEAD OF CAULK APPLIED TO THE PERIMETER OF THE DUCT AT ITS EGRESS FROM THE WALL.

4 DUCT THROUGH NON-RATED WALL PENETRATION DETAIL
NO SCALE



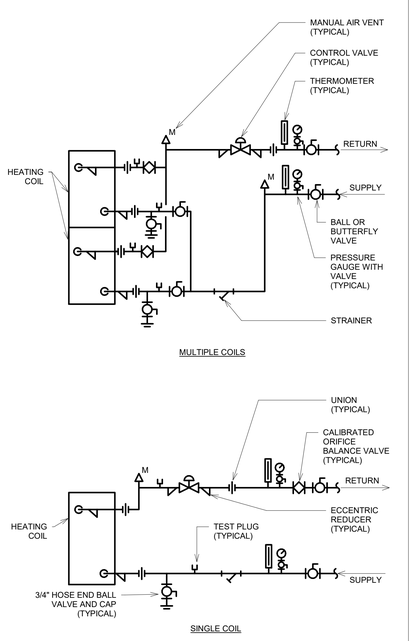
5 DUCT TO LINEAR DIFFUSER CONNECTION DETAIL
NO SCALE



NOTES:

1. PIPE COILS COUNTER-FLOW TO AIR FLOW. I.E. CHILLED WATER SUPPLY CONNECTION IS ON THE DISCHARGE SIDE OF THE COIL.
2. LOCATE UNIONS TO ALLOW FOR COIL REMOVAL.
3. MOUNT THERMOMETERS AND GAUGES NO MORE THAN 8'-0" A.F.F.
4. REDUCE TO CALIBRATED ORIFICE BALANCING VALVE AS REQUIRED.
5. WINTER OPERATION: CLOSE CWS AND CWR ISOLATION VALVES AT MAINS AND DRAIN CHILLED WATER COIL. LEAVE DRAIN VALVES OPEN. OPEN LOCKING BALL VALVE TO ALLOW AIR FROM AIR HANDLING UNIT TO DRY COIL.
6. COOLING SEASON: CLOSE LOCKING BALL VALVE AND DRAIN VALVES. OPEN CWS AND CWR ISOLATION VALVES AT MAINS.

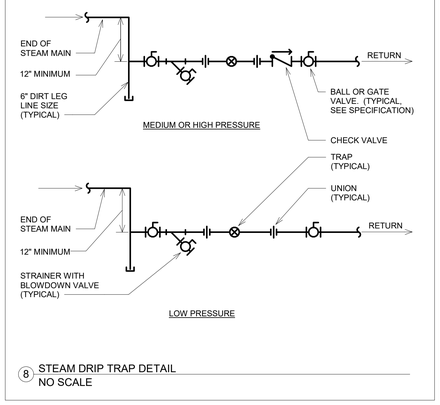
6 AIR HANDLING UNIT COOLING COIL PIPING DETAIL (2-WAY VALVE)
12" = 1'-0"



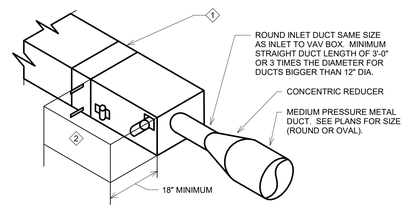
NOTES:

1. PIPE COILS COUNTER-FLOW TO AIR FLOW. I.E. HEATING WATER SUPPLY CONNECTION IS ON THE DISCHARGE SIDE OF THE COIL.
2. LOCATE UNIONS TO ALLOW FOR COIL REMOVAL.
3. MOUNT THERMOMETERS AND GAUGES NO MORE THAN 8'-0" A.F.F.
4. REDUCE TO CALIBRATED ORIFICE BALANCING VALVE AS REQUIRED.

7 AIR HANDLING UNIT HEATING COIL PIPING DETAIL (2-WAY VALVE)
12" = 1'-0"



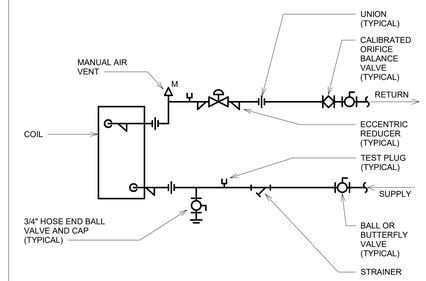
8 STEAM DRIP TRAP DETAIL
NO SCALE



KEY NOTES:

1. HEATING COIL PIPING AND VALVES SHALL BE ACCESSIBLE AND LOCATED CLEAR OF THE ACCESS AREAS REQUIRED FOR THE DAMPER AND AIR FLOW CONTROLS.
2. DAMPER AND AIR FLOW CONTROLS SHALL BE ACCESSIBLE FOR ADJUSTMENT AND MAINTENANCE. PIPING, DUCTWORK, CONDUIT, MAIN CEILING GRIDS, ETC., SHALL NOT BE LOCATED IN THE CLEAR AREA INDICATED.

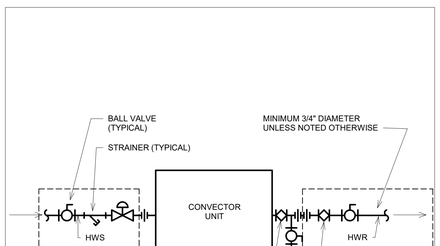
9 TERMINAL UNIT INSTALLATION DETAIL
NO SCALE



NOTES:

1. PIPE COILS COUNTER-FLOW TO AIR FLOW. I.E. HEATING WATER SUPPLY CONNECTION IS ON THE DISCHARGE SIDE OF THE COIL.
2. LOCATE UNIONS TO ALLOW FOR COIL REMOVAL.
3. REDUCE TO CALIBRATED ORIFICE BALANCING VALVE AS REQUIRED.

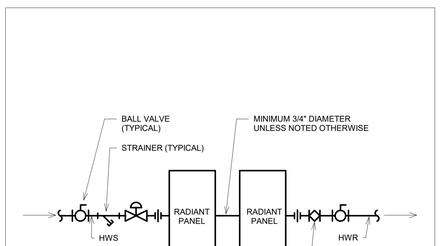
10 REHEAT COIL PIPING DETAIL (2-WAY VALVE)
12" = 1'-0"



NOTES:
PIPING COMPONENTS SHOWN ARE TO GENERALLY BE INSTALLED ABOVE CEILING

PROVIDE LOW POINT DRAIN WITHIN CONVECTOR UNIT FOR MAINTENANCE PURPOSES.

11 CONVECTOR PIPING DETAIL
NO SCALE



12 RADIANT PANEL DETAIL
12" = 1'-0"

Revision#	Description	Date:

CONSULTANT

DUNHAM
50 South Sixth Street / Suite 1100
Minneapolis, Minnesota 55402-1540
PHONE 612.465.7550 FAX 612.465.7551
WEB dunhameng.com
mechanical + electrical consulting engineering
0420950-007-00

ARCHITECT/ENGINEER OF RECORD

ANDERSON
13605 1st Ave. N. #100 Plymouth, MN 55441
P 763.412.4000 | F 763.412.4090 | ae-mn.com
Anderson Engineering of Minnesota, LLC | Proj # Project Number

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I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Name Jason R. Gottwalt, P.E.
Date 05/22/2020 Reg. No. 41360

Project Title: RENOVATE BUILDING 28 FIRST FLOOR EAST RRTP	Project Number: 656-19-306
Location: SAINT CLOUD, MN	Building Number: 28
Phase: CONSTRUCTION DOCUMENTS	Drawing Number: MH500
Drawing Title: MECHANICAL DETAILS	
Issue Date: MAY 22, 2020 / Checked: JRG / Drawn: TNH	

U.S. Department of Veterans Affairs
Veterans Health Administration
St. Cloud VA Health Care System

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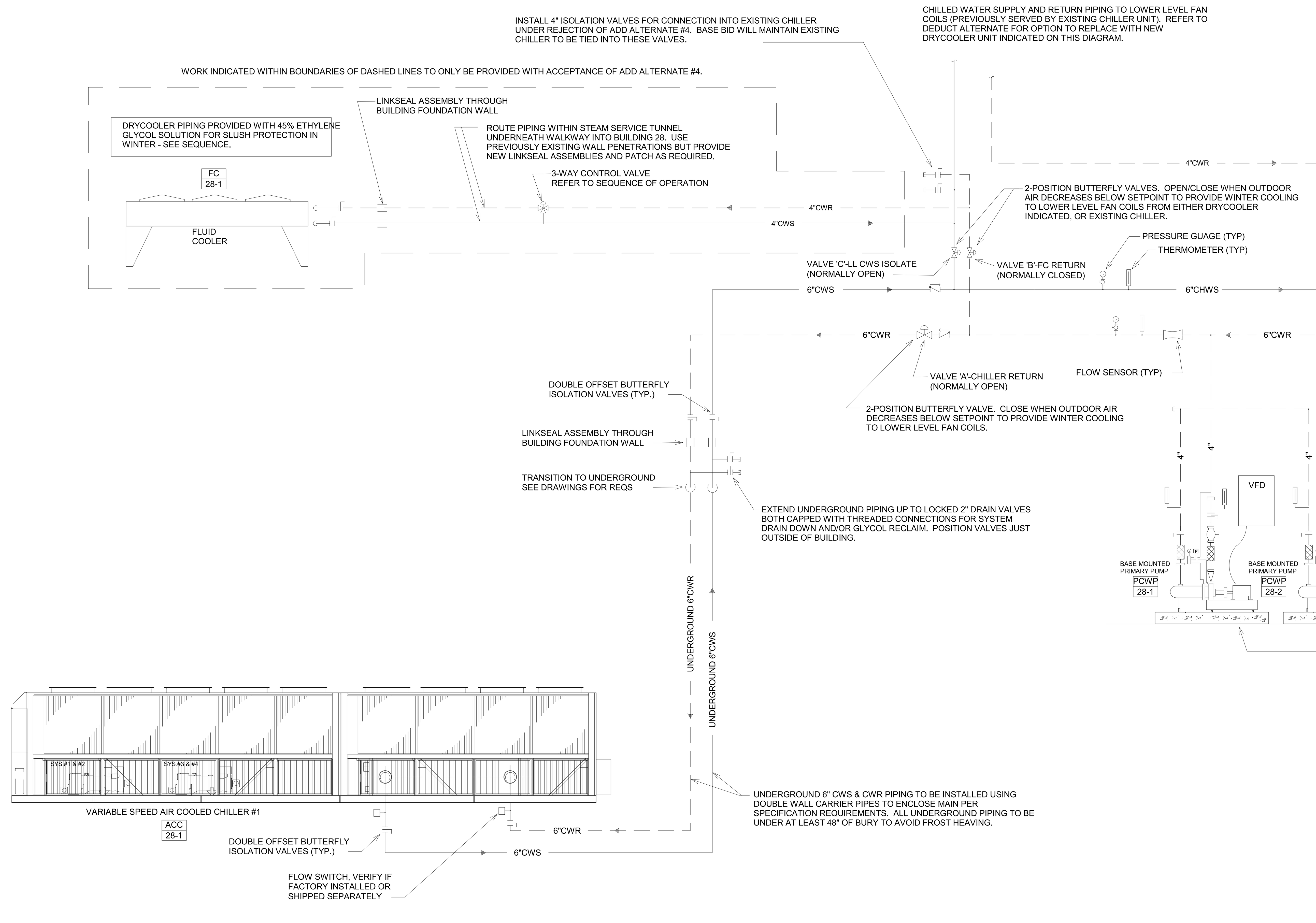
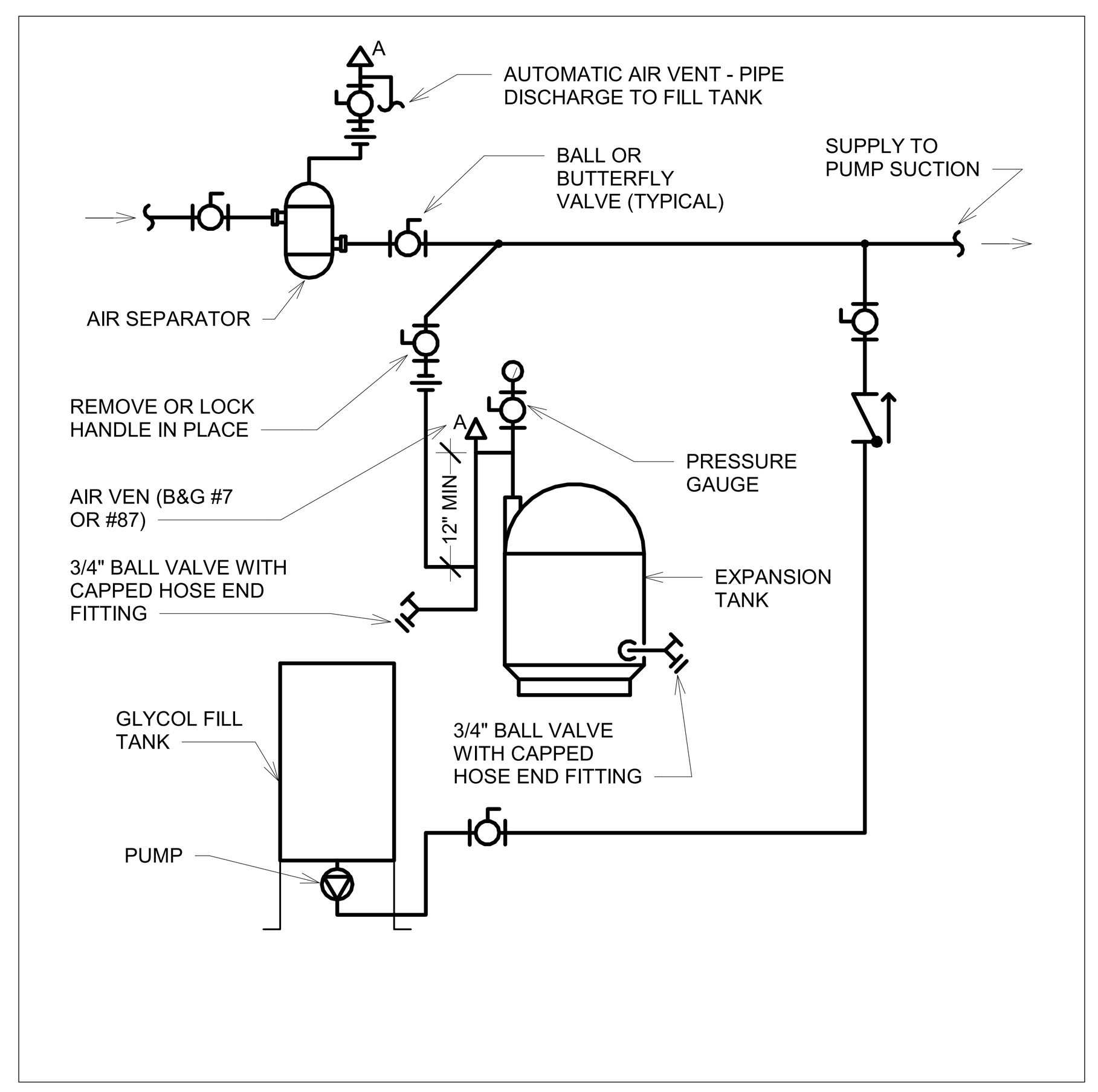
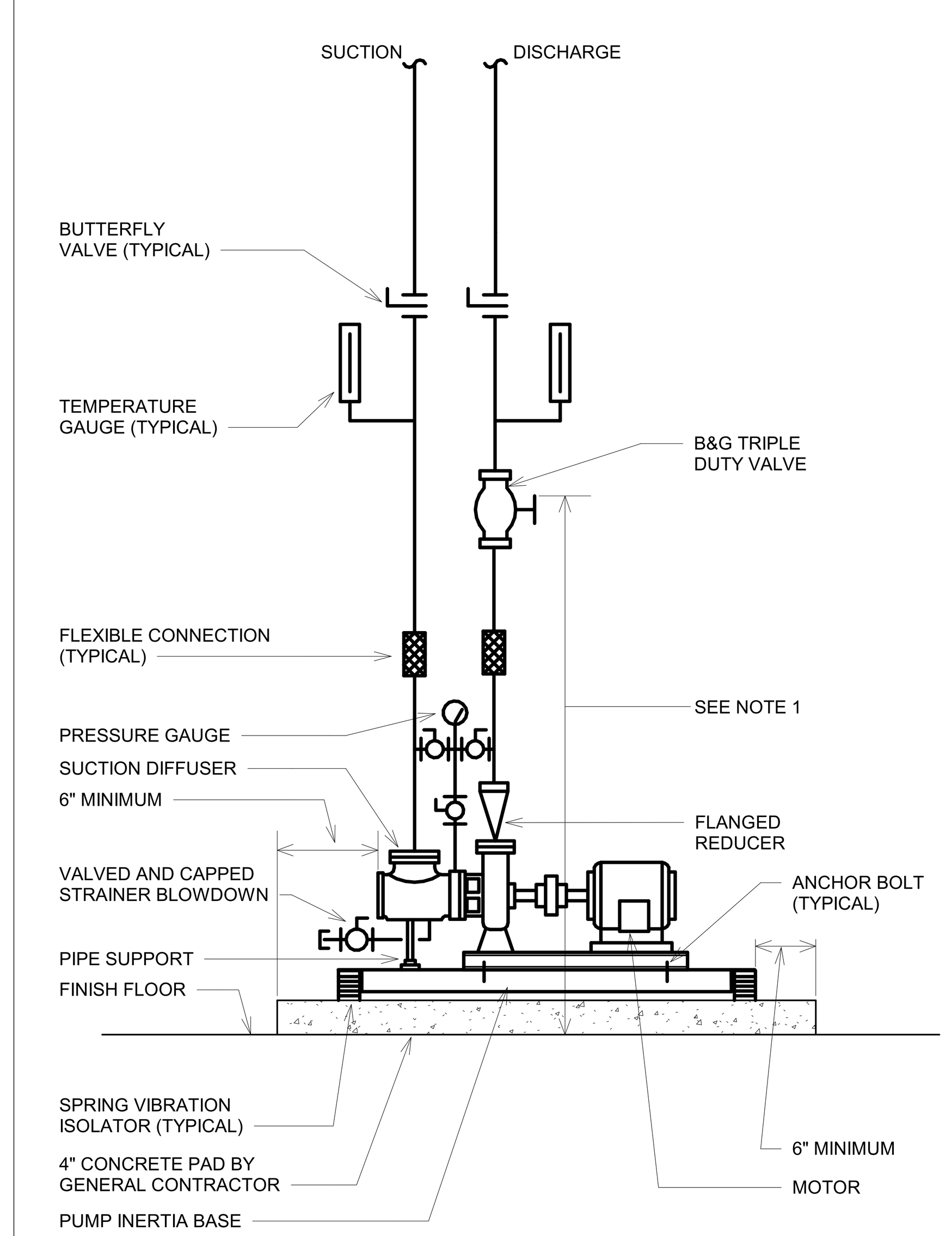


1 AIR COOLED CHILLER SYSTEM PLANT WITH VARIABLE PRIMARY PUMPING - PIPING DIAGRAM
NO SCALE



2 EXPANSION TANK, AIR SEPARATOR AND GLYCOL MAKE-UP UNIT PIPING DETAIL
12" = 1'-0"



NOTES:

1. TRIPLE DUTY VALVE CAN NOT BE MORE THAN 5'-0" ABOVE FINISH FLOOR.

3 END SUCTION PUMP WITH SUCTION DIFFUSER DETAIL
NO SCALE

Revision#	Description	Date:

CONSULTANT

DUNHAM
50 South Sixth Street / Suite 1100
Minneapolis, Minnesota 55402-1540
PHONE 612.465.7550 FAX 612.465.7551
WEB dunhameng.com
mechanical + electrical consulting engineering
0420950-007-00

ARCHITECT/ENGINEER OF RECORD

ANDERSON
13605 1st Ave. N. #100 Plymouth, MN 55441
P 763.412.4000 | F 763.412.4090 | ae-mn.com
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Name Jason R. Gottwalt, P.E.
Date 05/22/2020 Reg. No. 41360

Project Title: RENOVATE BUILDING 28 FIRST FLOOR EAST RRTP	Project Number: 656-19-306
Location: SAINT CLOUD, MN	Building Number: 28
Phase: CONSTRUCTION DOCUMENTS	Drawing Number
Drawing Title: CHILLED WATER SYSTEM - PIPING DIAGRAM	MH501
Issue Date: MAY 22, 2020 / Checked: JRG / Drawn: TNH	

VA
U.S. Department of Veterans Affairs
Veterans Health Administration
St. Cloud VA Health Care System

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SEQUENCES OF OPERATION

1.01 GENERAL

A. FAN & PUMP MOTOR CONTROL:
  a. 1-PHASE MOTORS START/STOP CONTROL:
    • WITH MAGNETIC STARTERS: CONTROL RELAY CONTACTS WIRED THROUGH "AUTO" LEG OF HAND-OFF-AUTO SWITCH IN CONTROL CIRCUIT OF MAGNETIC STARTER FURNISHED UNDER DIVISION 16 OR WITH EQUIPMENT.
    • WITHOUT MAGNETIC STARTERS: CONTACTOR, CONTROL RELAY, THERMOSTAT, MANUAL START/STOP STATION, OR OTHER DEVICE APPROPRIATE FOR SEQUENCE OF OPERATION WITH CONTACTS RATED FOR LOAD TO CONTROL MOTOR.
  b. 3-PHASE MOTORS:
    • CONSTANT SPEED:
      1. START/STOP CONTROL: CONTROL RELAY CONTACTS WIRED THROUGH "AUTO" LEG OF HAND-OFF-AUTO SWITCH IN CONTROL CIRCUIT OF MAGNETIC STARTER FURNISHED UNDER DIVISION 16 OR WITH EQUIPMENT.
      2. ABNORMAL POWER PROTECTION: 3-PHASE POWER MONITORS. WIRE CONTROL CONTACTS IN SERIES WITH MOTOR START/STOP CONTROL RELAY CONTACTS.
      3. ALARM: WIRE ALARM CONTACTS TO DDC SYSTEM POINTS SPECIFIED IN PART 2.
      4. SAFETIES: WIRE CONTACTS FOR SAFETY DEVICES SUCH AS FREEZE-PROTECTION THERMOSTATS, AND END SWITCHES IN SERIES WITH MOTOR START/STOP CONTROL RELAY CONTACTS.
      5. SMOKE DETECTOR OR FIRE ALARM INTERFACE: WIRE CONTACTS IN SERIES WITH MOTOR START/STOP CONTROL RELAY CONTACTS. VERIFY LOCATION OF CONTACTS PROVIDED UNDER FIRE ALARM CONTRACT.
    • VARIABLE SPEED:
      1. SPEED CONTROLLER: AS SPECIFIED IN SECTION 232923.
      2. MOTOR DISCONNECT AUXILIARY CONTACTS: WIRED TO PREVENT DRIVE OPERATION IF DISCONNECT IS OPEN.
      3. SAFETIES: WIRE CONTACTS FOR SAFETY DEVICES SUCH AS FREEZE-PROTECTION THERMOSTATS, AND END SWITCHES TO DISABLE DRIVE.
      4. SMOKE DETECTOR OR FIRE ALARM INTERFACE: WIRE CONTACTS TO DISABLE DRIVE. VERIFY LOCATION OF CONTACTS PROVIDED UNDER FIRE ALARM CONTRACT.
  c. SMOKE DAMPERS: PROVIDE WIRING FOR SMOKE DAMPERS AND COMBINATION FIRE/SMOKE DAMPERS PROVIDED UNDER THIS DIVISION.
  d. DATA BASE GENERATION: COMPLETE WITH DYNAMIC GRAPHIC DISPLAYS AND ALARM ASSIGNMENTS

2.01 AIR HANDLING UNIT OPERATING SEQUENCE (FOR 28-AH-01 THROUGH 05)

A. SYSTEMS' PERFORMANCE INTENT: THIS AHU PROVIDES VAV CONTROL FOR OCCUPIED FIRST AND SECOND FLOOR AREAS OF BUILDING 28. AHU IS EQUIPPED WITH CHILLED WATER COOLING COILS, GLYCOL HEATING COILS, FILTER SECTIONS, MIXING BOXES, SUPPLY FAN SECTION, AND INTERNAL RETURN FAN WITH AIRSIDE ECONOMIZER DAMPERS ALONG OTHER ELEMENTS AS SHOWN ON THIS DRAWING. UNITS SHALL HAVE VARIABLE VOLUME FLOW WITH CONSTANT MINIMUM OUTDOOR AIR INTAKES BASED ON SCHEDULED AIRFLOWS SHOWN ON DRAWINGS (EXCEPT IN ECONOMIZER MODE).

SUPPLY FAN MSC HARDWARE POINT SUMMARY:

DESCRIPTION	TYPE	FIELD INTERFACE
SUPPLY AIR CFM	ANALOG INPUTS	AIR FLOW STATIONS
SUPPLY FAN STATUS/SPEED **	ANALOG OUTPUT	MOTOR SPEED CONTROLLERS(MULTIPLE)
SUPPLY DUCT STATIC PRESSURE	ANALOG INPUT	PRESSURE SENSOR
HIGH LIMIT DUCT STATIC SAFETY	ANALOG INPUT	PRESSURE SENSOR
PREFILTER	ANALOG INPUT	DIFFERENTIAL PRESSURE SENSOR
FINAL FILTER	ANALOG INPUT	DIFFERENTIAL PRESSURE SENSOR
SAFETIES INTERLOCK	DIGITAL INPUTS	MULTIPLE CONTACTS
DUCT SMOKE DETECTOR	DIGITAL INPUT	FIRE ALARM CONTACT
VFD ENABLE/OFF **	DIGITAL INPUT	AHU CONTROLLER OUTPUT

RETURN FAN MSC HARDWARE POINT SUMMARY:

DESCRIPTION	TYPE	FIELD INTERFACE
RETURN AIR CFM	ANALOG INPUTS	AIR FLOW STATIONS
RETURN FAN STATUS/SPEED(X2)	ANALOG OUTPUT	MOTOR SPEED CONTROLLERS(MULTIPLE)
SAFETIES INTERLOCK	DIGITAL INPUT	MULTIPLE CONTACTS
MSC ENABLE/OFF	DIGITAL INPUT	AHU CONTROLLER OUTPUT

AIR HANDLING UNIT CONTROLLER HARDWARE POINT SUMMARY:

DESCRIPTION	TYPE	FIELD INTERFACE
DISCHARGE AIR TEMPERATURE	ANALOG INPUT	TEMPERATURE SENSOR
RETURN AIR TEMPERATURE	ANALOG INPUT	TEMPERATURE SENSOR
MIXED AIR TEMPERATURE	ANALOG INPUT	TEMPERATURE SENSOR
RETURN AIR HUMIDITY	ANALOG INPUT	HUMIDISTAT
LOW TEMPERATURE ALARM	ANALOG INPUT	FREEZESTAT
OUTSIDE AIR CFM	ANALOG INPUT	AIR FLOW STATION
OUTSIDE AIR TEMPERATURE	ANALOG INPUT	TEMPERATURE SENSOR
EXHAUST PLENUM PRESSURE	ANALOG INPUT	PRESSURE SENSOR
COOLING COIL VALVE	ANALOG OUTPUT	VALVE ACTUATOR
HEATING VALVE	ANALOG OUTPUT	VALVE ACTUATOR
HUMIDIFIER CONTROL	ANALOG OUTPUT	VALVE ACTUATOR
RETURN DAMPER	ANALOG OUTPUT	DAMPER ACTUATOR(S)
OUTSIDE AIR DAMPER	ANALOG OUTPUT	DAMPER ACTUATOR(S)
RELIEF DAMPER	ANALOG OUTPUTS	DAMPER ACTUATOR(S)
SMOKE ISOLATION DAMPERS	DIGITAL OUTPUT	FIRE/ALARM & DAMPER ACTUATORS
MSC ENABLE/OFF	DIGITAL OUTPUT	CONTROL RELAY
ISOLATION DAMPERS STATUS	DIGITAL INPUT	ACTUATOR END SWITCHES

MASTER CONTROL UNIT HARDWARE POINT SUMMARY:

DESCRIPTION	TYPE	FIELD INTERFACE
OUTSIDE AIR RELATIVE HUMIDITY	ANALOG INPUT	EXTERIOR RH SENSOR
OUTSIDE AIR TEMPERATURE	ANALOG INPUT	TEMPERATURE SENSOR
FIRE/SMOKE DAMPERS O/C	DIGITAL OUTPUT	CONTROL RELAY
FIRE/SMOKE DAMPER STATUS	DIGITAL INPUT	DAMPER END SWITCHES

** MULTIPLE UNIT FAN ARRAYS WILL HAVE MULTIPLE FANS OPERATING IN UNISON WITH SEPARATE CONTROL POINTS FOR EACH INDIVIDUAL FAN MODULE. COORDINATE WITH MANUFACTURER SHOP DRAWING WIRING DIAGRAMS.
** REFER TO EQUIPMENT SCHEDULE. WHERE INDICATED ECM MOTORS SHALL BE ALLOWED IN PLACE OF VFD CONTROLLERS.

A. MODE INDEXING
  a. OCCUPIED/UNOCCUPIED: THE OCCUPANCY MODE (OCCUPIED OR UNOCCUPIED) SHALL BE DETERMINED THROUGH A USER-ADJUSTABLE, GRAPHICAL, SEVEN-DAY SCHEDULE WITH A HOLIDAY SCHEDULE. THE START TIME SHALL BE ADJUSTED BY AN OPTIMUM START ROUTINE SUCH THAT THE UNIT IS STARTED AT THE LATEST POSSIBLE TIME TO ALLOW THE SPACE TEMPERATURES TO BE AT THE OCCUPIED SET POINT AT THE TIME OF OCCUPANCY.
  b. UNOCCUPIED: N/A - UNIT SHALL OPERATE IN OCCUPIED MODE 24/7.
  c. SHUTDOWN: BY COMMAND FROM MASTER CONTROL UNIT VIA SECONDARY CONTROL NETWORK, AND BY LOCAL SAFETY CONTROLS. WHENEVER THE SUPPLY FAN IS DE-ENERGIZED, AS SENSED BY THE STATUS SWITCH, THE RETURN FAN SHALL BE DE-ENERGIZED, THE OUTSIDE AND EXHAUST AIR DAMPERS SHALL BE CLOSED AND THE RETURN AIR DAMPER SHALL BE OPEN, THE HEATING AND COOLING VALVES SHALL BE CLOSED OR POSITIONED AS DESCRIBED BELOW

B. SUPPLY AND RETURN FAN OPERATION:
  a. CONTINUOUS DURING OCCUPIED MODE (REFER TO 'FAN SPEED' CONTROL SEQUENCES).

C. SYSTEM STARTUP SEQUENCE: COMMANDED BY MCU. THE SUPPLY FAN SHALL BE ENERGIZED. THE SUPPLY AIR DUCT STATIC PRESSURE SET POINT SHALL BE SLOWLY RAMPED FROM ZERO TO THE FINAL SET POINT VALUE WHEN THE SUPPLY FAN IS STARTED. THE AIR HANDLING UNIT SUPPLY FAN SPEED SHALL MODULATE TO MAINTAIN DUCT STATIC PRESSURE SET POINT THE SUPPLY FAN SPEED SHALL NOT DROP BELOW 30% (ADJUSTABLE) TO ASSURE ADEQUATE FAN MOTOR COOLING THE STATIC PRESSURE SET POINT SHALL BE RESET SO THAT AT LEAST ONE OF THE VAV BOXES IS AT 90% (ADJUSTABLE) OF ITS CFM FLOW SET POINT AND MAINTAINING ITS SPACE TEMPERATURE SET POINT.
  a. UNIT SMOKE ISOLATION DAMPERS: COMMANDED TO OPEN BY AHU CONTROLLER AND PROVED OPEN, VIA DAMPER END SWITCHES, BEFORE ENABLING FAN MOTOR SPEED CONTROLLERS.
  b. SYSTEM SMOKE DAMPERS: COMMANDED OPEN BY AHU CONTROLLER.
  c. FAN MOTOR SPEED CONTROLLERS: ENABLED BY AHU CONTROLLER.
  d. SUPPLY FAN VFD: ENABLED BY AHU CONTROLLER.
  e. MOTOR SPEED CONTROLLERS: RAMP UP FAN SPEEDS TO ACHIEVE INITIAL SET POINTS DOWNLOADED FROM AHU CONTROLLER. (INSTALL DUCT STATIC PRESSURE SENSOR 2/3 DOWN SUPPLY MAIN, VERIFY EXACT LOCATION WITH ENGINEER OF RECORD.)
  f. SUPPLY DUCT STATIC PRESSURE SET POINT: 1.50" W.G

D. SUPPLY FAN SPEED: REGULATED BY ITS VFD TO MAINTAIN SUPPLY DUCT STATIC PRESSURE SET POINT DOWNLOADED FROM MCU. IN THE EVENT OF LOSS OF COMMUNICATION WITH ONE OR MORE VAV CONTROLLERS THE SYSTEM SHALL REVERT TO MODULATING THE FAN SPEED TO MAINTAIN THE DUCT STATIC PRESSURE SET POINT OF 1.50" W.G. (ADJUSTABLE). A HIGH LIMIT FUNCTION SHALL REDUCE THE SUPPLY FAN SPEED TO KEEP THE SUPPLY DUCT PRESSURE FROM EXCEEDING 3.0" INCHES OF WATER REGARDLESS OF THE DEMAND FROM THE VAV BOXES. THE FINAL DUCT STATIC PRESSURE SET POINT SHALL BE DETERMINED IN CONSULTATION WITH THE BALANCING CONTRACTOR. WHEN THE SUPPLY FAN IS DE-ENERGIZED THE STATIC SET POINT SHALL BE ZERO.
  a. OPERATING SET POINT: OPTIMIZED USING AN ALGORITHM THAT REPEATEDLY POLLS VAV BOX CONTROLLERS TO DETERMINE MINIMUM PRESSURE THAT WILL SATISFY AIR FLOW DEMANDS. INITIAL STATIC PRESSURE SETPOINT SHALL BE 1.5" W.C. (ADJ).
  b. SAFETY HIGH LIMIT: DIFFERENTIAL PRESSURE SWITCH ACROSS FAN WIRED TO VFD SAFETY INTERLOCK TO CAUSE FAN SHUTDOWN WHEN DIFFERENTIAL PRESSURE EXCEEDS SET POINT.
    • INITIAL SET POINT: 6.0" W.G.

E. RETURN FAN SPEED: REGULATED BY ITS VFD TO MAINTAIN A FAN SPEED OFFSET DURING MINIMUM OUTDOOR AIR MODE (WITH ALL VAV'S AT MINIMUM POSITION) OF THE AHU DOWNLOADED FROM MCU. A SECOND MEASURED RECORDING (WITH ALL VAV'S AT MAXIMUM POSITION) WILL BE FURNISHED AND ADJUSTED ON A LINEAR RELATIONSHIP DEPENDING ON VAV POLLING OF AIRFLOW POSITIONS. IN THE EVENT OF LOSS OF COMMUNICATION WITH ONE OR MORE VAV CONTROLLERS THE SYSTEM SHALL REVERT TO MODULATING THE FAN SPEED OFFSET FOR A FIXED OFFSET MINIMUM OUTDOOR AIR MODE VALUE. ANOTHER OPERATING POINT OFFSET WITH AHU IN FULL ECONOMIZER MODE WILL BE ESTABLISHED AND ADJUSTED IN A LINEAR RELATIONSHIP WHILE ECONOMIZING. A HIGH LIMIT FUNCTION SHALL REDUCE THE RETURN FAN SPEED TO KEEP THE INCOMING PRESSURE FROM EXCEEDING -2.5 INCHES OF WATER REGARDLESS OF THE DEMAND SIGNAL FROM BAS. THE FINAL STATIC PRESSURE SET POINT SHALL BE DETERMINED IN CONSULTATION WITH THE BALANCING CONTRACTOR. WHEN THE SUPPLY FAN IS DE-ENERGIZED THE STATIC SET POINT SHALL BE ZERO.
  a. OPERATING SET POINT: WHENEVER THE SUPPLY FAN IS ENERGIZED, THE RETURN FAN SHALL BE ENERGIZED. THE RETURN FAN SPEED SHALL MODULATE TO MAINTAIN A FIXED VFD FREQUENCY OFFSET (ADJUSTABLE). BALANCING CONTRACTOR SHALL WORK CLOSELY WITH THE CONTROLS CONTRACTOR TO OBTAIN THE FOLLOWING OPERATIONAL POINTS WITH LINEAR RELATIONSHIPS DURING TRANSITION PERIODS.
    • MINIMUM OUTDOOR AIR MODE (ALL VAV'S IN MAXIMUM POSITION): VFD OFFSET = ________
    • MINIMUM OUTDOOR AIR MODE (ALL VAV'S IN MINNIMUM POSTION): VFD OFFSET = ________
    • FULL ECONOMIZER MODE OF OPERATION: VFD OFFSET = ________
      1. NOTE THAT ABOVE OFFSETS ARE INTENTIONALLY LEFT BLANK. BALANCING CONTRACTOR TO DETERMINE VALUES AND COORDINATE WITH CONTROLS CONTRACT.
  b. SAFETY HIGH LIMIT: DIFFERENTIAL PRESSURE SWITCH ACROSS FAN WIRED TO MSC SAFETY INTERLOCK TO CAUSE FAN SHUTDOWN WHEN DIFFERENTIAL PRESSURE EXCEEDS SET POINT.
    • INITIAL SET POINT: 3.0" W.G.

F. DISCHARGE AIR TEMPERATURE SET POINT: THE HEATING COIL VALVE, MIXED AIR DAMPERS, AND COOLING COIL VALVE SHALL MODULATE IN SEQUENCE TO MAINTAIN SUPPLY AIR TEMPERATURE SET POINT. PROVIDE DEADBAND BETWEEN HEATING AND ECONOMIZER COOLING.
  a. OUTPUT TO CONTROLLED DEVICES: RANGED FROM 0 TO 100% AS DISCHARGE TEMPERATURE VARIES THROUGH HEATING AND COOLING PROPORTIONAL BANDS.
  b. INTEGRAL FUNCTION: ADDED TO CONTROL LOOP TO ELIMINATE PROPORTIONAL BAND OFFSET.
  c. DISCHARGE AIR TEMPERATURE RESET UPWARD: IF MORE THAN 90% OF POLLED VAV BOXES ARE AT MINIMUM POSIITON (OR CONSTANT VOLUME VAV'S IN HEATING MODE) THAN ALLOW DISCHARGE AIR TEMPERATURE SET POINT TO ADJUSTED UP BY 1 DEGREE. INCLUDE ADEQUATE DELAY BETWEEN SETPOINT ADJUSTMENTS TO ACCOUNT FOR VAV REACTION TIME.
  d. DISCHARGE AIR TEMPERATURE RESET DOWNWARD: IF MORE THAN 90% OF POLLED VAV BOXES ARE AT MAXIMUM POSITION (OR CONSTANT VOLUME VAV REHEAT COILS MORE THAN 75% CLOSED) THAN ALLOW DISCHARGE AIR TEMPERATURE SET POINT TO BE ADJUSTED DOWN BY 1 DEGREE. INCLUDE ADEQUATE DELAY BETWEEN SETPOINT ADJUSTMENTS TO ACCOUNT FOR VAV REACTION TIME.
  e. HUMIDITY CONTROL: MAINTAIN DEWPOINT TEMPERATURE OF DISCHARGE AIR AT OR BELOW 50 DEGREES. IF OUTDOOR AIR DEWPOINT IS HIGHER DURING ECONOMIZER THAN THE COOLING COIL SHALL BE ENABLED TO ACT SIMULTANEOUSLY TO CONTROL HUMIDITY LEVELS WITHIN PHARMACY AREAS. IF DISCHARGE AIR SETPOINT IS BEING RAISED DUE TO VAV BOX POLLING, LIMIT TEMPERATURE INCREASE ALLOWED TO MAINTAIN DISCHARGE AIR DEWPOINT BELOW 50 DEGREES.
  f. DEFAULT DICHARGE AIR SETPOINT: 50 DEGREES

G. COOLING COIL VALVE:
  a. NORMAL POSITION: CLOSED.
  b. ACTION: INCREASING CHILLED WATER FLOW AS DISCHARGE AIR TEMPERATURE RISES THROUGH COOLING PROPORTIONAL BAND.

H. HEATING COIL VALVE:
  a. NORMAL POSITION: OPEN.
  b. ACTION: INCREASING HEATING WATER/GLYCOL FLOW TO FULL FLOW AS DISCHARGE AIR TEMPERATURE FALLS THROUGH HEATING PROPORTIONAL BAND.

I. OUTSIDE AIR ECONOMIZER CYCLE: ENABLED WHEN UNIT OUTSIDE AIR ENTHALPY IS BELOW RETURN AIR ENTHALPY SWITCH-OVER POINT MINUS A 1.0 BTU/LB. DIFFERENTIAL, AND OUTSIDE AIR DRY-BULB TEMPERATURE IS BELOW SWITCH-OVER SET POINT MINUS A 2°F DIFFERENTIAL. THE OA DAMPER SHALL HAVE AN ADJUSTABLE ABSOLUTE MINIMUM POSITION SET IN CONJUNCTION WITH THE BALANCE CONTRACTOR.
  a. SWITCH-OVER ENTHALPY SET POINT: RETURN AIR ENTHALPY MINUS 1.0 BTU/LB
  b. SWITCH-OVER TEMPERATURE SET POINT: 58 °F.
  c. ENTHALPY VALUE: CALCULATED USING OUTSIDE AIR DRY-BULB AND RELATIVE HUMIDITY VALUES.
  d. FAILURE MODE: ECONOMIZER OFF.
  e. DAMPER POSTIONS:
    • OUTSIDE AIR DAMPER: MODULATE OPEN
    • RELIEF AIR DAMPERS: MODULATE OPEN
    • RETURN AIR DAMPER: MODULATE CLOSED

J. MINIMUM OUTSIDE AIR DAMPER MODE:
  a. MODULATE DAMPER TO FULLY OPEN POSITION TO MAINTAIN MINIMUM AIRFLOW SETPOINT IN OCCUPIED MODE.
    • PROVIDE END SWITCH TO PROVE DAMPER IS FULLY OPEN (DURING MINIMUM OUTDOOR AIR MODE ONLY).
    • PROVIDE OUTDOOR AIRFLOW SENSOR TO BE USED FOR REFERENCE ONLY. NOTIFICATION ALARM SHOULD BE SENT IF AVERAGE O.A. OVER A 30 MINUTE PERIOD DRIFTS MORE THAN 25% FROM DESIGN VALUE.
  b. CLOSED IN SHUTDOWN MODE.

K. RETURN AIR AND RELIEF AIR DAMPERS: CONTROLLED TO REGULATE OUTSIDE AIR FLOW RATE TO SATISFY DEMANDS OF DISCHARGE AIR TEMPERATURE CONTROL LOOP (OUTSIDE AIR ECONOMIZER) AND MINIMUM OUTSIDE AIR FLOW RATE CONTROL LOOP.
  a. RETURN AIR DAMPER NORMAL POSITION: OPEN.
  b. RELIEF AIR DAMPERS NORMAL POSITION: CLOSED.
  c. OUTSIDE AIR FLOW RATE: MAINTAINED ABOVE LOW LIMIT SET POINT BY POSITIONING RETURN AIR AND RELIEF AIR DAMPERS WHEN UNIT IS OPERATING IN OCCUPIED MODE.
    • ACTION: INCREASING OUTSIDE AIR AS FLOW RATE FALLS THROUGH DEADBAND AROUND SET POINT INTO PROPORTIONAL BAND.
    • INTEGRAL FUNCTION: ADDED TO CONTROL LOOP TO ELIMINATE PROPORTIONAL BAND OFFSET.
    • MINIMUM OUTSIDE AIR FLOW SET POINT: REFER TO EQUIPMENT SCHEDULE

L. SYSTEM SMOKE DAMPERS (APPLIES TO ONLY NEW DAMPERS INSTALLED AS PART OF PROJECT):
  a. CLOSED WHENEVER UNIT IS OFF.
  b. PROVED OPEN VIA END SWITCHES BEFORE STARTING UNIT.

M. SAFETY SHUTDOWNS
  a. DUCT SMOKE DETECTION, SPACE SMOKE DETECTION, HIGH PRESSURE SAFETIES, LOW PRESSURE SAFETIES AND LOW TEMPERATURE LIMIT TRIPS SHALL DE-ENERGIZE THE AIR HANDLING UNIT AND CLOSE THE OUTSIDE AIR AND EXHAUST AIR DAMPERS. MANUAL RESET OF THE TRIPPED DEVICE SHALL BE REQUIRED TO RESTART THE SYSTEM.
  b. WHEN THE OA TEMPERATURE IS BELOW 40°F (ADJUSTABLE) AND THE AIR HANDLING UNIT HAS SHUT DOWN IN ALARM, THE HEATING AND COOLING VALVES SHALL FUNCTION AS DESCRIBED IN UNOCCUPIED MODE.

2.02 HEATING WATER CONVECTOR, ATTIC UNIT HEATERS, OR RADIANT PANEL OPERATING SEQUENCE

• GENERAL: MOST CONVECTORS ARE PAIRED AS FIRST STAGE HEATING WITH A CORRESPONDING VAV REHEAT COIL ZONE. CONTROL VALVES FOR BOTH REHEAT COIL AND CONVECTOR SHALL BE INDEPENDANTLY CONTROLLED AND LOCATED OUTSIDE OF PATIENT CARE AREAS (IDEALLY BOTH ACCESSIBLE FROM SAME ACCESS POINT). RADIANT PANELS ARE GENERALLY USED FOR HEATING TOILET ROOMS WITH EXPOSURE TO EXTERIOR WALL. DEDICTED THERMOSTATS SHALL MODULATE THESE RADIANT PANELS TO HOLD ROOM TEMPERATURE SETPOINT.
• OCCUPIED/UNOCCUPIED MODE INDEXING: BY MASTER CONTROL UNIT, WITH TIMED OVERRIDE OF UNOCCUPIED CYCLE INITIATED BY MANUAL SWITCH AT SPACE TEMPERATURE SENSOR.
  a. UNOCCUPIED HEATING: REHEAT WATER CONTTROL VALVE SHALL MODULATE TO MAINTAIN THE UNOCCUPIED SET POINT IN EACH ZONE AS DETERMINED BY THE OPERATOR.
  b. UNOCCUPIED COOLING: CONTROL VALVE TO FULLY SHUT
  c. OPERATION: DIRECT ACTING CONTROL WITH ADJUSTABLE DEAD BAND BETWEEN HEATING AND COOLING SET POINTS.
    • SPACE TEMPERATURE: COMPARED TO SET POINTS.
    • HEATING VALVE(S): MODULATE 2-WAY VALVES TO MAINTAIN SPACE TEMPERATURE HEATING SET POINT AS FOLLOWS;
      1. RADIANT PANELS IN TOILET ROOM TO BE ON INDEPENDANT TEMP SENSORS PER DRAWINGS.
      2. CONVECTORS ASSOCIATED WITH VAV REHEAT COIL SHALL ACT AS FIRST STAGE HEAT UP TO 50% VALVE POSITION. AFTER 50% VALVE POSITION IS REACHED THEY SHALL OPERATE IN UNISON WITH VAV REHEAT COIL CONTROL VALVE.
      3. UNIT HEATERS IN ATTIC SHALL MODULATE CONTROL VALVE TO MAINTAIN THERMOSTAT SETPOINT. ENEABLE FAN TO RUN CONTINUOUSLY WHILE IN HEATING MODE OF OPERATION.
  d. SET POINTS:
    • SPACE TEMPERATURE COOLING:
      1. OCCUPIED: 70°F OR AS ESTABLISHED BY USER.
      2. UNOCCUPIED: 74°F.
    • SPACE TEMPERATURE HEATING:
      1. OCCUPIED: COOLING SET POINT MINUS DEAD BAND.
      2. UNOCCUPIED: 64°F.
      3. SPACE TEMPERATURE DEAD BAND: 2°F.
      4. ATTIC UNIT HEATER: 60 DEGREES
    • CONTROL VALVE:
      1. PATTERN: 2-WAY
      2. ACTION: NORMALLY OPEN.
  e. CONTROLS CONTRACTOR TO PROGRAM ADJUSTABLE HIGH AND LOW LIMITS FOR EACH TEMPERATURE ZONE.
  f. ALARM NOTIFICATION: ATTIC UNIT HEATER SHALL SEND URGENT ALARM NOTIFICATION WHENEVER TEMPERATURE FALLS BELOW 10 DEGREES OF SETPOINT, OR UNDER 48 DEGREES, WHICHEVER APPLIES FIRST (ADJ).

C. DDC MINIMUM POINTS SUMMARY (PER CONVECTOR/RADIANT PANEL UNIT):

DESCRIPTION	TYPE	FIELD INTERFACE
SPACE TEMPERATURE	ANALOG INPUT	SPACE CONTROL MODULE
SPACE TEMPERATURE SET POINT	ANALOG INPUT	SPACE CONTROL MODULE
HEATING COIL VALVE	ANALOG OUTPUT	VALVE ACTUATOR
UNIT HEATER FAN START/STOP	DIGITAL OUTPUT	MOTOR STARTER

2.03 DDC SUPPLY AIR VAV BOX WITH REHEAT

A. GENERAL: PRESSURE INDEPENDENT CONTROL OF UNIT SUPPLY AIR QUANTITY BETWEEN MAXIMUM AND MINIMUM VOLUME SET POINTS BY MONITORING SPACE TEMPERATURE AND USING PID ALGORITHMS TO MAINTAIN SPACE TEMPERATURE SET POINTS BY MODULATING THE SUPPLY AIR DAMPER AND CONTROL VALVE(S) FOR REHEAT COIL.
  a. OCCUPIED/UNOCCUPIED MODE INDEXING: BY MASTER CONTROL UNIT, WITH TIMED OVERRIDE OF UNOCCUPIED CYCLE INITIATED BY MANUAL SWITCH AT SPACE TEMPERATURE SENSOR/CONTROLLER.
  b. OPERATION: DIRECT ACTING CONTROL WITH ADJUSTABLE DEAD BAND BETWEEN HEATING AND COOLING SET POINTS.
    • SPACE TEMPERATURE: COMPARED TO SET POINTS.
    • SUPPLY AIR DAMPER: MODULATED TO MAINTAIN FIXED AIRFLOW SET POINT (CONSTANT FLOW - REFER TO EQUIPMENT SCHEDULE FOR OCCUPIED/UNOCCUPIED AIRFLOW RATES)
    • SUPPLY AIR VOLUME: LIMITED BY FIXED AIRFLOW VOLUME SET POINTS.
    • HEATING VALVE(S): MODULATED TO MAINTAIN SPACE TEMPERATURE HEATING SET POINT.
  c. SET POINTS:
    • SPACE TEMPERATURE COOLING:
      1. OCCUPIED: 70°F OR AS ESTABLISHED BY USER.
    • SPACE TEMPERATURE HEATING:
      1. OCCUPIED: COOLING SET POINT MINUS DEAD BAND.
        A. SPACE TEMPERATURE DEAD BAND: 2°F
  d. UNOCCUPIED MODE: SUPPLY VAV BOX WILL REDUCE CONSTANT VOLUME AIRFLOW SETPOINT TO THE MINIMUM AIR POSITION INDICATED ON EQUIPMENT SCHEDULES. RETURN AIR VALVE WILL AUTOMATICALLY COMPENSATE TO MAINTAIN SAME DIFFERENTIAL PRESSURE SETTING FOR EACH PARTICULAR SPACE.
  e. CONTROLS CONTRACTOR TO PROGRAM ADJUSTABLE HIGH AND LOW LIMITS FOR EACH TEMPERATURE ZONE.

A. DDC POINTS SUMMARY:

DESCRIPTION	QUANTITY	TYPE	FIELD INTERFACE
SPACE TEMPERATURE	1/ZONE	ANALOG INPUT	SPACE CONTROL MODULE
SUPPLY AIR FLOW RATE	1/BOX	ANALOG INPUT	VAV BOX AIR FLOW SENSOR
SUPPLY DISCHARGE AIR TEMP	1/BOX	ANALOG INPUT	VAV BOX DUCT TEMP SENSOR
VAV BOX AIR DAMPER	1/BOX	ANALOG OUTPUT	VAV BOX DAMPER ACTUATOR
SPACE TEMPERATURE SET POINT	1/ZONE	ANALOG INPUT	SPACE CONTROL MODULE
HEATING VALVE(S)	1/BOX	ANALOG OUTPUT	VALVE ACTUATOR(S)

ADDITIONAL NOTES: CONTROLS CONTRACTOR SHOULD REFER TO DRAWING KEY NOTES FOR SOME SPACE THERMOSTATS TO BE PROVIDED AS SENSORS ONLY WITH REMOTE ADJUSTABLE SETTINGS VIA BUILDING AUTOMATION.

2.04 EXHAUST FAN CONTROL SEQUENCES

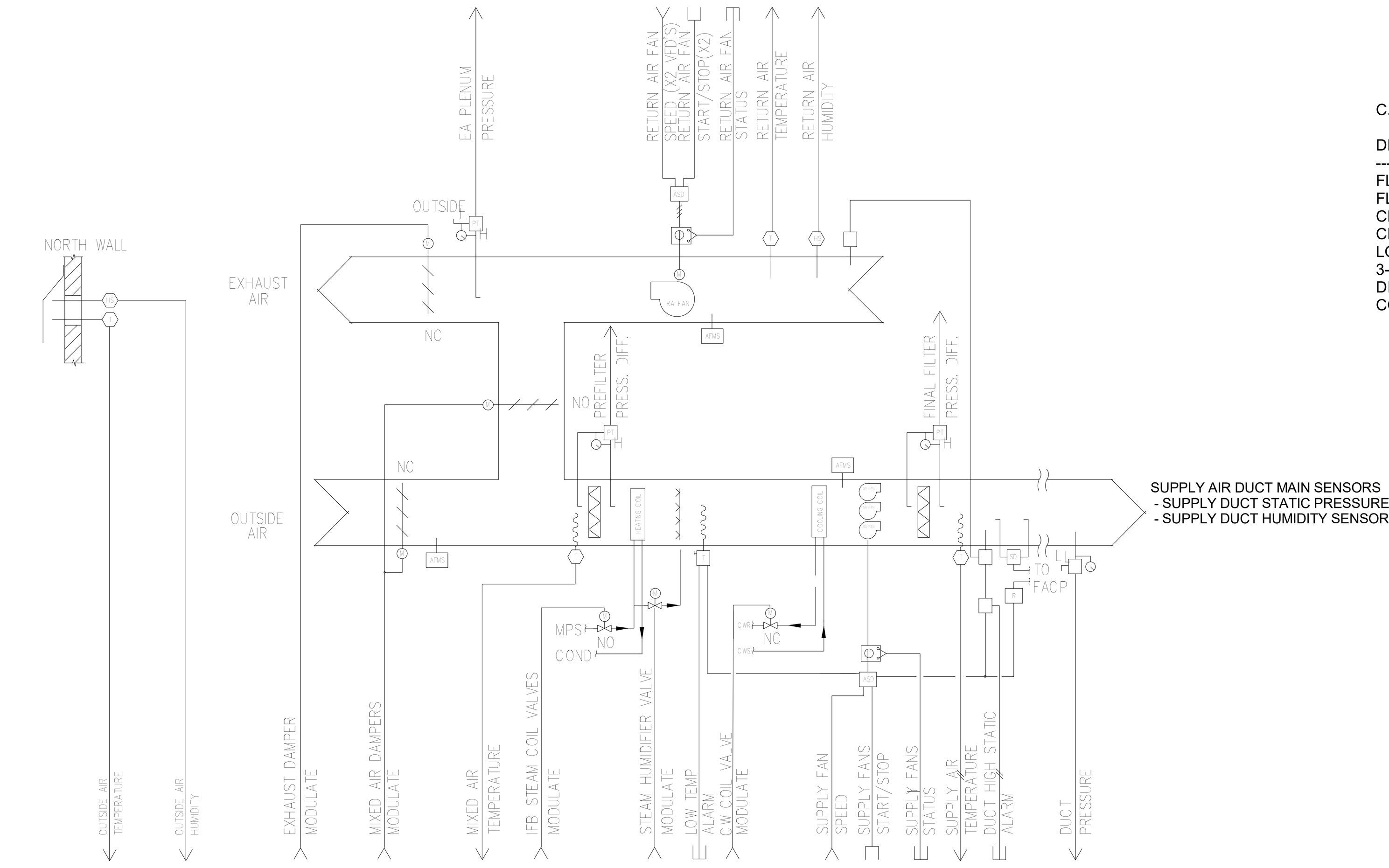
A. EXHAUST FANS EF 28-01 AND EF 28-02
  • IS AN UTILITY SET TYPE FANS SERVING GENERAL EXHAUST REQUIREMENTS.
  • SHALL BE OPERATED CONTINUOUSLY AND OFF ONLY FOR MAINTENANCE AND REPAIR ONLY.
  • INCLUDE A VFD FOR BALANCING PURPOSES AND SHOULD INTEGRATE INTO BAS.
  • BAS SHALL ALARM ON FAILURE OF EXHAUST FAN.
  • BAS SHALL INDICATE STATUS AND REMOTE ENABLE/DISABLE FUNCTIONALITY
  • INCLUDE AN ISOLATION DAMPER INTELOCKED WITH FAN OPERATION.
    1. DAMPER END SWITCH SHALL PROVE OPEN BEOFRE ALLOWING FAN TO START

C. DDC MINIMUM POINTS SUMMARY (EACH FAN AS REQUIRED):

DESCRIPTION	TYPE (QUANTITY)	FIELD INTERFACE
FAN STATUS	DIGITAL INPUT	FAN MOTOR CURRENT SENSOR
FAN START/STOP	DIGITAL OUTPUT	MOTOR STARTER OR VFD
FAN SPEED	ANALOG OUTPUT	VFD CONTROLLER
ISOLATION DAMPER	DIGITAL OUTPUT	DAMPER ACTUATOR
DAMPER POSTION	DIGITAL INPUT	END SWITCH

3.01 CONTROL CONTRACTOR ASSISTANCE IN COMMISSIONING OF ALL SYSTEMS

A. GENERAL: CONTROLS CONTRACTOR WILL BE REQUIRED TO FULLY PARTICIPATE IN ALL COMMISSIONING ACTIVITIES. COORDINATE SCHEDULE WITH BOTH COMMISSIONING AGENT AND MECHANICAL CONTRACTOR FOR TESTING OF ALL SYSTEMS EITHER NEWLY INSTALLED, OR SIGNIFICANTLY MODIFIED, AS PART OF THIS PROJECT.



1 CONTROL DIAGRAM FOR AHU's 28-1 thru 28-4
NO SCALE

2.05 CHILLED WATER SYSTEM CONTROL SEQUENCES

A. GENERAL OVERVIEW: THE CHILLED WATER PLANT CONSISTS OF ONE(1) 200 NOMINAL TON (185 NET TONS) VARIABLE SPEED AIR-COOLED CHILLERS PLUS ONE FLUID COOLER SERVING YEAR ROUND COOLING NEEDS OF LOWER LEVEL WITH FREE COOLING CAPABILITIES. THREE(3) DEDICATED VARIABLE PRIMARY PUMPS WITH VFD SET POINTS BALANCED FOR CHILLER OPERATION WITH CONTROL VALVES TO AUTOMATICALLY DIVERT FLOW TO FLUID COOLER OPERATION (SEE DRYCOOLER SEQUENCE OF OPERATION). THE OVERALL CHILLED WATER SYSTEM WILL OPERATE ON AN OPERATOR ADJUSTABLE SCHEDULE, AS WELL AS SYSTEM DEMAND AND OUTDOOR CONDITIONS.

B. CHILLED WATER PLANT OPERATING CONDITIONS
  1. THE NEW 200 TON AIR-COOLED CHILLER (ACC 28-1) ALONG WITH VARIABLE PRIMARY PUMPS PCWP 28-1, PCWP 28-2 AND PCWP 28-3 SHALL BE INCLUDED WITHIN SEQUENCE OF OPERATIONS FOR BRINGING THE CHILLERS ONLINE AND OFFLINE UTILIZING CHILLER CURRENT DRAW AS THE STAGING POINT. VFD'S FOR THOSE PRIMARY PUMPS SHALL ADJUST VARIABLE WATER FLOW BETWEEN ONE OPERATIONAL CHILLER TO MAINTAIN SYSTEM PRESSURE DIFFERENTIAL AT MOST REMOTE LOAD.
  2. BUILDING AUTOMATION SHALL CONNECT TO THE CHILLER CONTROL PANEL VIA A BACNET COMMUNICATION CARD SET TO RELAY ALL CONTROL POINTS, SAFETY/ALARM NOTIFICATIONS, AND ADJUSTABLE SET POINTS TO THE REMOTE AUTOMATION COMPUTER. COORDINATE THE CHILLER PANEL COMMUNICATIONS TYPE FOR COMPATIBILITY WITH THE BUILDING AUTOMATION SYSTEM.
  3. INTEGRATE THE GRAPHICS FOR THE NEW DEVICES INTO THE BAS CHILLED WATER PLANT GRAPHICS.

C. CHILLER PLANT ENABLE/DISABLE
  1. THE CHILLER PLANT SHALL BE ENABLED AND DISABLED EITHER MANUALLY BY AN OPERATOR COMMAND, OR AUTOMATICALLY THROUGH THE BAS. IN AUTOMATIC MODE, THE BAS SHALL ENABLE THE CHILLER PLANT WHENEVER THE OUTDOOR AIR DRY-BULB TEMPERATURE (OAT) EXCEEDS THE CHILLER PLANT ENABLE SET POINT, AND DISABLE THE CHILLER PLANT WHEN THE OAT IS LESS THAN THE CHILLER PLANT ENABLE SET POINT MINUS A DIFFERENTIAL (ADJ). WHEN THE CHILLER PLANT IS DISABLED, ALL PUMPS AND DEVICES SHALL BE COMMANDED OFF AND ALL CORRESPONDING ISOLATION VALVES SHALL CLOSE.
  2. INITIAL CHILLER START-UP
    a. COMMAND ISOLATION VALVE FOR THE CHILLER TO CYCLE OPEN
    b. ONCE VALVE POSITION HAS BEEN PROVEN OPEN, COMMAND THE DESIGNATED LEAD PRIMARY PUMP TO START
    c. PROVIDE PUMP RUNNING STATUS VIA FLOW SWITCH. AFTER A 60 SECOND (ADJ) STABILIZATION DELAY, COMMAND THE FIRST STAGE OF CHILLER TO START
    d. WHEN SECOND STAGE OF CHILLER IS ACTIVATED INCREASE FLOW RATE FROM THE PRIMARY PUMPING SYSTEM TO INCREASED FLOW RATE FOR BOTH COMPRESSOR STAGES TO ENSURE MINIMUM FLOW. ENGAGE SECOND PRIMARY PUMP IF REQUIRED (SEE PUMP STAGING SEQUENCE).

D. MINIMUM FLOW CONTROL VALVE
  1. IF CHILLER'S LOW LIMIT FLOW SWITCH APPROACHES MINIMUM VALUE, THEN MODULATE OPEN THIS BYPASS VALVE TO MAINTAIN SAFE LEVEL OF WATER FLOW AT ALL TIMES.

E. PRIMARY CHILLED WATER PUMP CONTROL
  1. PCWP 0-01, 0-02, & 0-03: THESE PUMPS EACH HAVE VFD CONTROLLERS AND ARE EQUALLY SIZED EACH AT 50% FULL SYSTEM LOAD WITH THE THIRD PUMP REDUNDANT OF THE OTHER TWO. THE BUILDING AUTOMATION SYSTEM (BAC) SHALL ASSIGN EACH OF THESE PUMPS AS LEAD/LAG DESIGNATION AND SWAP THAT DESIGNATION ON A DAILY BASIS TO ALLOW EQUAL RUN TIME BETWEEN EACH PUMP. UPON CHILLER ENABLE THE LEAD PUMP SHALL RAMP UP TO A SINGLE CHILLER FLOW RATE THROUGH ITS VFD CONTROLLER AFTER THE APPROPRIATE ISOLATION VALVES HAVE BEEN PROVEN OPEN.
    1. CHILLED WATER PRESSURE DIFFERENTIAL SET POINT: **15 PSI**, ADJUSTABLE.
    2. CHILLED WATER TEMPERATURE SET POINT: **42°F**, ADJUSTABLE.
    3. VERIFY THAT VALVE 'A' IS OPEN, VALVE 'B' IS CLOSED, AND VALVE 'C IS OPEN TO ENSURE FLOW THROUGH ENTIRE SYSTEM WHILE ISOLATING OUT FLUID COOLER WHEN AIR COOLED CHILLER IS OPERATIONAL. (REFER TO DRAWINGS)
    4. START-UP: THE PUMPS SHALL BE SOFT-STARTED THROUGH THEIR VARIABLE SPEED DRIVES. NORMAL POSITION SHALL BE ZERO RPM. PUMP ACCELERATION AND DECELERA- TION RATES SHALL BE ADJUSTABLE AT THE VARIABLE SPEED DRIVE.
    5. PUMPS SHALL MODUATE BASED ON DIFFERENTIAL PRESSURE SETPOINT REQUIRED AT EACH OF FOUR(4) AHU'S IN PENTHOUSE. BALANCING CONTRACTOR SHALL DETERMINE PRESSURE REQUIRED FOR FULL DESIGN FLOW AT EACH COIL AND ASSIGN THAT VALUE TO EACH DIFFERENTIAL PRESSURE SENSOR (X4) POSITIONED AT INLET/OUTLET OF EACH CORRESPONDING COOLING COIL. MODULATE PUMPS TO SATISFY MOST DEMANDING SETPOINT, NOTIFICATION ALARM TO BE SENT IF ANY OF THE 4 DIFFERENTIAL PRESSURE SENSORS INDICATE MORE THAN +/-50% DIFFERENCE FROM THE OTHER 3 INDICATING A POSSIBLE ISSUE OR CALIBRATION ERROR.
    6. A PIPE WELL MOUNTED TEMPERATURE SENSOR, LOCATED IN THE CHILLED WATER RETURN LINE SHALL MONITOR THE RETURN WATER TEMPERATURE.
    7. PROGRAM ALARM FOR SENSIBLE CHILLED WATER SUPPLY TEMPERATURE DEVIATION FROM SET POINT OF 2 °F (+/-) FOR A PERIOD LONGER THAN 5 MINUTES (DEVIATION AND DURATION SETPOINTS ADJUSTABLE).
  B. MINIMUM FLOW/PRESSURE: BALANCING CONTRACTOR SHALL COORDINATE WITH THIS CONTRACTOR TO DETERMINE MINIMUM PRESSURE REQUIRED FOR DESIGN FLOW AT HYDRAULICALLY MOST REMOTE TERMINAL, AND SET MSC AT MINIMUM FLOW. MODULATE BYPASS CONTROL VALVE IN ATTIC AS REQUIRED TO REMAIN ABOVE MINIMUM FLOW ON LOW LOAD DAYS.

F. DDC MINIMUM POINTS SUMMARY FROM CHILLER CONTROLLER: REFER TO SPECIFICATION SECTION 23 6416 "CENTRIFUGAL WATER CHILLERS" FOR ADDITIONAL POINTS.

DESCRIPTION	TYPE (QUANTITY)	FIELD INTERFACE
POWER DEMAND	ANALOG INPUT	CHILLER CONTROL PANEL
POWER CONSUMPTION (KW/HR)	ANALOG INPUT	CHILLER CONTROL PANEL
CHW DISCHARGE TEMP SETPOINT	ANALOG INPUT	CHILLER CONTROL PANEL
CHILLER STATUS	DIGITAL INPUT	CHILLER CONTROL PANEL
COMMON TROUBLE ALARM	DIGITAL INPUT	CHILLER CONTROL PANEL
CHILLER START/STOP	DIGITAL OUTPUT	CHILLER CONTROL PANEL

G. DDC MINIMUM POINTS SUMMARY FROM BAS:

DESCRIPTION	TYPE (QUANTITY)	FIELD INTERFACE
PRIMARY CWS/CWR TEMPS	ANALOG INPUT(2)	PIPE WELL MOUNT TEMP SENSORS
CHILLER ACC 28-1 LOAD	ANALOG INPUT	CHILLER CONTROL PANEL
CHILLER ACC 28-1 FLOW	ANALOG INPUT	FLOW MONTIOR
PUMP STATUS (X3)	DIGITAL INPUT	AMP DRAW SENSOR
PUMP SPEED (X3)	ANALOG INPUT	VFD CONTROLLER
PUMP ENABLE (X3)	DIGITAL OUTPUT	VFD CONTROLLER
CHILLER ADD 28-1 ENABLE	DIGITAL OUTPUT	CHILLER CONTROL PANEL
MINIMUM FLOW CONTROL	ANALOG OUTPUT	VALVE ACTUATOR
CHILLER INLET/OUTLET TEMP (X2)	ANALOG INPUT	PIPE WELL MOUNT TEMP SENSORS
CHILLER ACC 28-1 ISOLATION VALVES	DIGITAL OUTPUT	VALVE ACTUATORS
DIFFERENTIAL PRESSURE SENSORS	ANALOG INPUT	DIFF PRESSURE SENSORS (X4)

2.06 FLUID COOLER FOR YEAR ROUND COOLING OF LOWER LEVEL

A. CONTROL FOR FLUID COOLER (FC 28-1) WITH FREE-COOLING
  1. WHEN OUTDOOR AIR DROPS BELOW 50 DEGREES (ADJ) THEN DISABLE AIR COOLED CHILLER AND OPEN CONTROL VALVES TO REDIRECT ALL WATER FLOW TO FLUID COOLER (OR EXISTING CHILLER TO REMAIN UNDER ACCEPTANCE OF DEDUCT ALTERNATE). REFER TO FLOW DIAGRAM FOR NUMBER OF ISOLATION VALVES AND POSITIONS OF EACH.
    A. OPEN VALVE 'B' AND CLOSE VALVES 'A' AND 'C' TO REDIRECT FLOW THROUGH FLUID COOLER AND LIMIT AREA SERVED TO LOWER LEVEL ONLY.(REFER TO DRAWINGS FOPR VALVE LOCATIONS)
  2. ONCE FLUID COOLER HAS BEEN ENABLED, THE DRYCOOLER SHALL ENTER ONE OF THESE OPERATING SEQUENCES BASED ON OUTDOOR AIR TEMPERATURE AND CURRENT SYSTEM DEMAND. ENABLE ONE OF THE TWO PRIMARY PUMPS DESIGNATED AS LEAD (ON A DAILY ROTATION).
    a. CYCLE FANS TO MAINTAIN 44-48 DEGREE WATER.
    b. FANS CYCLE OFF WHENEVER SUPPLY WATER TEMP DROPS BELOW 44 DEGREES.
    c. FANS RUN CONTINUOUSLY WHENEVER SUPPLY WATER TEMP EXCEEDS 52 DEGREES. PROVIDE HIGH TEMP ALARM NOTIFICATION TO BAS.

B. CIRCULATION PUMPS
  1. PUMPS SHALL OPERATE ON THE FOLLOWING OUTDOOR AIR CONDITIONS.
    a. OUTDOOR AIR ABOVE 40 DEGREES: RUN LEAD PUMP CONTINUOUSLY AND MODULATE BY VFD TO MAINTAIN DIFFERENTIAL PRESSURE (INSTALLED IN LOWER LEVEL PIPING) AT SET POINT ESTABLISHED BY BALANCING CONTRACTOR.
    b. OUTDOOR AIR BELOW 40 DEGREES: RUN LEAD PUMP CONTINUOUSLY UNTIL SUPPLY WATER TEMPERATURE DROPS BELOW 38 DEGREES. AT THAT POINT, MODULATE 3-WAY CONTROL VALVE TO HOLD INDOOR WATER TEMPS ABOVE 40 DEGREES.
      • 3-WAY CONTROL VALVE SHALL ALSO MODULATE TO INCREASE SYSTEM FLOW WHENEVER PUMP SPEED DROPS BELOW 20 HZ (ADJ).
  2. LEAD PUMP WILL BE ALTERNATED ON A DAILY BASIS TO ENSURE EQUAL RUN TIME.

C. DDC MINIMUM POINTS SUMMARY

DESCRIPTION	TYPE (QUANTITY)	FIELD INTERFACE
FLUID COOLER ENABLE	DIGITAL OUTPUT	MOTOR STARTER
FLUID COOLER STATUS	DIGITAL INPUT	AMP DRAW SENSOR
CHW DISCHARGE TEMP SETPOINT	ANALOG OUTPUT	SYSTEM INPUT
CHW SUPPLY TEMPERATURE	ANALOG INPUT	WELL MOUNT TEMP SENSOR
LOWER LEVEL DELTA-P	ANALOG INPUT	DIFFERENTIAL PRESSURE SENSOR
3-WAY BYPASS VALVE	ANALOG OUTPUT	VALVE ACTUATOR
DIFFERENTIAL PRESSURE SENSOR	ANALOG INPUT	DIFF PRESSURE SENSOR
COMMON TROUBLE ALARM	ANALONG OUTPUT(S)	SAFETY SETPOINTS

Revision#	Description	Date:

CONSULTANT

DUNHAM
50 South Sixth Street / Suite 1100
Minneapolis, Minnesota 55402-1540
PHONE 612.465.7550 FAX 612.465.7551
WEB dunhameng.com
mechanical + electrical consulting engineering
0420950-007-00

ARCHITECT/ENGINEER OF RECORD

ANDERSON
13605 1st Ave. N. #100 Plymouth, MN 55441
P 763.412.4000 | F 763.412.4090 | ae-mn.com
Anderson Engineering of Minnesota, LLC | Proj # Project Number

STAMP

I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Name Jason R. Gottwalt, P.E.
Date 05/22/2020 Reg. No. 41360

Project Title	RENOVATE BUILDING 28 FIRST FLOOR EAST RRTP
Project Number	656-19-306
Location	SAINT CLOUD, MN
Building Number	28
Phase	CONSTRUCTION DOCUMENTS
Drawing Title	MECHANICAL SEQUENCES OF OPERATION
Drawing Number	MH502
Issue Date	MAY 22, 2020
Checked	JRG
Drawn	TNH

VA | U.S. Department of Veterans Affairs
Veterans Health Administration
St. Cloud VA Health Care System

GRILLES, REGISTERS, AND DIFFUSERS SCHEDULE

MECHANICAL (233713)

EQUIPMENT TAG	APPLICATION	MOUNTING TYPE	DESCRIPTION	MATERIAL	ACCESSORIES	FINISH	MANUFACTURER	MODEL NUMBER	MECHANICAL NOTES
A	SUPPLY	SURFACE/LAY-IN	PERFORATED DIFFUSER	STEEL	NA	WHITE	TITUS	PSS	1
B	RETURN	SURFACE/LAY-IN	12x12" PERFORATED GRILLE	STEEL	NA	WHITE	TITUS	PAR	1, 2
C	EXHAUST	SURFACE/LAY-IN	12x12" PERFORATED GRILLE	STEEL	NA	WHITE	TITUS	PAR-AA	1, 2

MECHANICAL NOTES:

1. REFER TO DRAWINGS FOR NECK SIZE. PROVIDE BALANCING DAMPER AT DUCT TAKE-OFF, DO NOT USE INTEGRAL GRD DAMPERS.
2. WHERE INSTALLED WITHIN LEY-IN CEILING THE CONTRACTOR WILL CUT CEILING TILE AND SUPPORT GRILLE AS REQUIRED.

CONVECTOR UNIT SCHEDULE - HEATING WATER

MECHANICAL (238233)

EQUIPMENT TAG	TYPE	NUMBER OF ROWS	CABINET SIZE (INxIN)	EWT (F)	LWT (F)	GLYCOL TYPE	GLYCOL %	WPD/100 FT (FT)	GPM	TOTAL CAPACITY (MBH)	MANUFACTURER	MODEL NUMBER	MECHANICAL NOTES
CONV 01	RECESSED	1	48"X26"	180	160	PROPYLENE	35	1.25'	0.75 (1.25 future)	6.0 MBH	RITTLING	PL SERIES	1,2,3,4

MECHANICAL NOTES:

1. SELECTION BASED ON FULLY RECESSED CABINET THAT IS 6" DEEP. CONTRACTOR TO VERIFY AVAILABLE WALL DEPTH PRIOR TO RELEASING ORDER FOR CONVECTOR.
2. FUTURE GPM RATING IS ASSUMING 120 DEGREE ENTERING WATER TEMP WITH GEOTHERMAL CONVERSION. SIZE CONTROL VALVES ACCORDINGLY BUT BALANCE TO CURRENT FLOW
3. REFER TO HYDRONIC PLANS TO POSITION CONTROL VALVE, AND RELATED PIPING COMPONENTS, OUTSIDE OF PATIENT ROOMS FOR SERVICABILITY.
4. PROVIDE FRONT PANELS IN FACTORY STANDARD COLOR AS SELECTEDE BY ARCHITECT. UPGRADE TO HEAVIER GAUGE CONSTRUCTION (MINIMUM 16 GUAGE).

RADIANT CEILING PANEL SCHEDULE - MODULAR

MECHANICAL (238233)

EQUIPMENT TAG	MATERIAL	WIDTH (IN)	LENGTH (IN)	NUMBER OF PASSES	EWT (F)	LWT (F)	GLYCOL TYPE	GLYCOL %	WPD (FT)	CAPACITY PER PANEL (BTUH)	MANUFACTURER	MODEL NUMBER	MECHANICAL NOTES
RP 01	ALUMINUM	24	24	4	180	160	PROPYLENE	35	<1.0'	700 BTU/HR	STERLING/RITTLING	--	1,2,3,4

MECHANICAL NOTES:

1. FRONT PANEL SHALL BE CONSTRUCTED OF HEAVY GUAGE ALUMINUM (MINIMUM 18 GUAGE) AND BE COATED WITH WHITE POLYESTER FINISH.
2. 5/8" TUBING SHALL BE WELDED WITH HEAT SADDLES. COVER BACK OF PANELS WITH MINIMUM 1" INSULATION WITH FOIL FACING.
3. EACH PANEL REQUIRES MINIMAL WATER FLOW. BALANCE CIRCUIT SETTER AT 0.3 GPM REGARDLESS OF NUMBER OF PANELS IN TOILET ROOM.
4. PROVIDE MUD RING FOR INSTALLATIONS INTO GYPSUM CEILINGS. SEAL EDGES WITH SILICONE CAULKING AS REQUIRED.
5. UNDER SCENARIO WHERE BUILDING IS RETROFIT WITH GEOTHERMAL, THESE PANELS MAY REQUIRE REPLACEMENT WITH DIFFERENT HEAT SOURCE FOR TOILET ROOMS (FYI ONLY)

VARIABLE AIR VOLUME BOX SCHEDULE - HEATING WATER

MECHANICAL (233600)

EQUIPMENT TAG	UNIT SERVED	INLET SIZE (IN)	MAXIMUM CFM	MINIMUM CFM	MAXIMUM APD (IN.W.C.)	HEATING COIL											MANUFACTURER	MODEL NUMBER	MECHANICAL NOTES
						HEATING CFM	EAT (F)	LAT (F)	CAPACITY (MBH)	EWT (F)	LWT (F)	GPM	GLYCOL TYPE	GLYCOL %	MAXIMUM WPD (FT)	COIL ROWS			
VAV 1-01	AHU 28-2	8	550	275	0.35	275	55	95	11.9	180	150	0.9	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-08	1, 2, 3, 4, 5, 6
VAV 1-01 (FUTURE CONDITION)	AHU 28-2	8	550	275	0.35	275	55	95	11.9	120	105	1.9	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-08	1, 2, 3, 4, 5, 6
VAV 1-02	AHU 28-2	6	300	150	0.35	150	55	80	4.1	180	150	0.3	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-06	1, 2, 3, 4, 5, 6
VAV 1-02 (FUTURE CONDITION)	AHU 28-2	6	300	150	0.35	150	55	80	4.1	120	105	0.6	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-06	1, 2, 3, 4, 5, 6
VAV 1-03	AHU 28-2	6	230	115	0.35	115	55	95	5.0	180	150	0.4	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-06	1, 2, 3, 4, 5, 6
VAV 1-03 (FUTURE CONDITION)	AHU 28-2	6	230	115	0.35	115	55	95	5.0	120	105	0.8	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-06	1, 2, 3, 4, 5, 6
VAV 1-04	AHU 28-2	4	130	65	0.35	65	55	80	1.8	180	150	0.3	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-04	1, 2, 3, 4, 5, 6
VAV 1-04 (FUTURE CONDITION)	AHU 28-2	4	130	65	0.35	65	55	80	1.8	120	105	0.3	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-04	1, 2, 3, 4, 5, 6
VAV 1-05	AHU 5	6	270	135	0.35	135	55	95	5.9	180	150	0.5	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-06	1, 2, 3, 4, 5, 6
VAV 1-05 (FUTURE CONDITION)	AHU 5	6	270	135	0.35	135	55	95	5.9	120	105	0.9	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-06	1, 2, 3, 4, 5, 6
VAV 1-06	AHU 28-2	6	250	250	0.35	250	55	95	10.9	180	150	0.8	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-06	1, 2, 3, 4, 5, 6
VAV 1-06 (FUTURE CONDITION)	AHU 28-2	6	250	250	0.35	250	55	80	6.8	120	105	1.1	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-06	1, 2, 3, 4, 5, 6
VAV 1-07	AHU 5	6	290	145	0.35	145	55	95	6.3	180	150	0.5	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-06	1, 2, 3, 4, 5, 6
VAV 1-07 (FUTURE CONDITION)	AHU 5	6	290	145	0.35	145	55	95	6.3	120	105	1.0	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-06	1, 2, 3, 4, 5, 6
VAV 1-08	AHU 5	6	210	105	0.35	105	55	95	4.6	180	150	0.4	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-04	1, 2, 3, 4, 5, 6
VAV 1-08 (FUTURE CONDITION)	AHU 5	4	200	100	0.35	100	55	95	4.3	120	105	0.7	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-04	1, 2, 3, 4, 5, 6
VAV 1-09	AHU 28-2	8	475	240	0.35	240	55	80	6.4	180	150	0.5	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-08	1, 2, 3, 4, 5, 6
VAV 1-09 (FUTURE CONDITION)	AHU 28-2	8	475	240	0.35	240	55	80	6.4	120	105	1.0	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-08	1, 2, 3, 4, 5, 6
VAV 1-10	AHU 28-2	6	285	145	0.35	145	55	95	6.2	180	150	0.5	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-06	1, 2, 3, 4, 5, 6
VAV 1-10 (FUTURE CONDITION)	AHU 28-2	6	285	145	0.35	145	55	95	6.2	120	105	1.0	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-06	1, 2, 3, 4, 5, 6
VAV 1-11	AHU 28-2	8	390	195	0.35	195	55	95	8.5	180	150	0.7	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-08	1, 2, 3, 4, 5, 6
VAV 1-11 (FUTURE CONDITION)	AHU 28-2	8	390	195	0.35	195	55	95	8.5	120	105	1.3	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-08	1, 2, 3, 4, 5, 6
VAV 1-12	AHU 28-2	8	385	195	0.35	195	55	95	8.4	180	150	0.6	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-08	1, 2, 3, 4, 5, 6
VAV 1-12 (FUTURE CONDITION)	AHU 28-2	8	385	195	0.35	195	55	95	8.4	120	105	1.3	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-08	1, 2, 3, 4, 5, 6
VAV 1-13	AHU 28-2	6	225	115	0.35	115	55	80	3.1	180	150	0.3	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-06	1, 2, 3, 4, 5, 6
VAV 1-13 (FUTURE CONDITION)	AHU 28-2	6	225	115	0.35	115	55	80	3.1	120	105	0.5	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-06	1, 2, 3, 4, 5, 6
VAV 1-14	AHU 28-2	8	545	275	0.35	275	55	80	7.4	180	150	0.6	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-08	1, 2, 3, 4, 5, 6
VAV 1-14 (FUTURE CONDITION)	AHU 28-2	8	545	275	0.35	275	55	80	7.4	120	105	1.1	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-08	1, 2, 3, 4, 5, 6
VAV 1-15	AHU 28-2	6	220	110	0.35	110	55	95	4.8	180	150	0.4	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-06	1, 2, 3, 4, 5, 6
VAV 1-15 (FUTURE CONDITION)	AHU 28-2	6	220	110	0.35	110	55	95	4.8	120	105	0.7	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-06	1, 2, 3, 4, 5, 6
VAV 1-16	AHU 28-2	6	240	120	0.35	120	55	95	5.2	180	150	0.4	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-06	1, 2, 3, 4, 5, 6
VAV 1-16 (FUTURE CONDITION)	AHU 28-2	6	240	120	0.35	120	55	95	5.2	120	105	0.8	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-06	1, 2, 3, 4, 5, 6
VAV 1-17	AHU 28-2	6	215	215	0.35	215	55	80	5.8	180	150	0.5	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-04	1, 2, 3, 4, 5, 6
VAV 1-17 (FUTURE CONDITION)	AHU 28-2	4	195	100	0.35	100	55	80	2.6	120	105	0.4	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-04	1, 2, 3, 4, 5, 6
VAV 1-18	AHU 28-2	8	420	210	0.35	210	55	95	9.1	180	150	0.7	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-08	1, 2, 3, 4, 5, 6
VAV 1-18 (FUTURE CONDITION)	AHU 28-2	8	420	210	0.35	210	55	95	9.1	120	105	1.4	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-08	1, 2, 3, 4, 5, 6
VAV 1-19	AHU 28-2	6	335	170	0.35	170	55	95	7.3	180	150	0.6	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-06	1, 2, 3, 4, 5, 6
VAV 1-19 (FUTURE CONDITION)	AHU 28-2	6	335	170	0.35	170	55	95	7.3	120	105	1.1	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-06	1, 2, 3, 4, 5, 6
VAV 1-20	AHU 28-2	8	455	230	0.35	230	55	95	9.9	180	150	0.8	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-08	1, 2, 3, 4, 5, 6
VAV 1-20 (FUTURE CONDITION)	AHU 28-2	8	455	230	0.35	230	55	95	9.9	120	105	1.5	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-08	1, 2, 3, 4, 5, 6
VAV 1-21	AHU 28-2	6	350	175	0.35	175	55	80	4.7	180	150	0.4	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-06	1, 2, 3, 4, 5, 6
VAV 1-21 (FUTURE CONDITION)	AHU 28-2	6	350	175	0.35	175	55	80	4.7	120	105	0.7	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-06	1, 2, 3, 4, 5, 6
VAV 1-22	AHU 28-2	8	655	330	0.35	330	55	80	8.9	180	150	0.7	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-08	1, 2, 3, 4, 5, 6
VAV 1-22 (FUTURE CONDITION)	AHU 28-2	8	655	330	0.35	330	55	80	8.9	120	105	1.4	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-08	1, 2, 3, 4, 5, 6
VAV 1-23	AHU 28-2	8	400	200	0.35	200	55	95	8.7	180	150	0.7	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-08	1, 2, 3, 4, 5, 6
VAV 1-23 (FUTURE CONDITION)	AHU 28-2	8	400	200	0.35	200	55	95	8.7	120	105	1.3	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-08	1, 2, 3, 4, 5, 6
VAV 1-24	AHU 28-2	8	360	180	0.35	180	55	95	7.8	180	150	0.6	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-06	1, 2, 3, 4, 5, 6
VAV 1-24 (FUTURE CONDITION)	AHU 28-2	8	360	180	0.35	180	55	95	7.8	120	105	1.2	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-06	1, 2, 3, 4, 5, 6
VAV 1-25	AHU 28-2	6	220	110	0.35	110	55	95	4.8	180	150	0.4	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-06	1, 2, 3, 4, 5, 6
VAV 1-25 (FUTURE CONDITION)	AHU 28-2	4	200	100	0.35	100	55	95	4.3	120	105	0.7	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-06	1, 2, 3, 4, 5, 6
VAV 5-001	AHU 5	6	350	175	0.35	175	55	80	4.7	180	150	0.4	PROPYLENE	35	0.6	1	-	-	7
VAV 5-001 (FUTURE CONDITION)	AHU 5	6	350	175	0.35	175	55	95	7.6	120	105	1.2	PROPYLENE	35	4.5	2	-	-	7
VAV 5-002	AHU 5	8	600	300	0.35	300	55	95	13.0	180	150	1.0	PROPYLENE	35	4.5	2	-	-	7
VAV 5-002 (FUTURE CONDITION)	AHU 5	8	600	300	0.35	300	55	95	13.0	120	105	2.0	PROPYLENE	35	4.5	2	-	-	7
VAV 5-003	AHU 5	10	1000	500	0.35	500	55	95	21.7	180	150	1.7	PROPYLENE	35	4.5	2	-	-	7
VAV 5-003 (FUTURE CONDITION)	AHU 5	10	1000	500	0.35	500	55	95	21.7	120	105	3.4	PROPYLENE	35	4.5	2	-	-	7
VAV 5-004	AHU 5	8	450	225	0.35	225	55	95	9.8	180	150	0.8	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-08	1, 2, 3, 4, 5, 6
VAV 5-004 (FUTURE CONDITION)	AHU 5	8	450	225	0.35	225	55	95	9.8	120	105	1.5	PROPYLENE	35	4.5	2	JOHNSON CONTROL	TSS-WC-08	1, 2, 3, 4, 5, 6
VAV 5-005	AHU 5	8	400	200	0.35	200	55	80	5.4	180	150	0.4	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-08	1, 2, 3, 4, 5, 6
VAV 5-005 (FUTURE CONDITION)	AHU 5	8	400	200	0.35	200	55	95	8.7	120	105	1.3	PROPYLENE	35	0.6	3	JOHNSON CONTROL	TSS-WC-08	1, 2, 3, 4, 5, 6

MECHANICAL NOTES:

1. PROVIDE ALL VAV BOXES WITH PRE-PIPED PACKAGE (CODE 29; INCLUDES 2-WAY CONTROL VALVE, BALL VALVE WITH MEMORY STOP AND ADJUSTABLE FLOW SETTER).
2. ALL VAV BOXES SHALL HAVE CAM LATCH ACCESS PANELS ON BOTH SIDES OF REHEAT COIL FOR CLEANING PURPOSES. METAL PLATES SECURED WITH SHEET METAL SCREWS ARE NOT ACCEPTABLE.
3. PROVIDE VAV BOXES WITH INTERNAL FIBER-FREE CLOSED CELL INSULATION THAT IS WASHABLE SURFACE. EPOSED DEGES TO BE COVERED/CONCEALED WITH BOX CASING.
4. DAMPER ACTUATOR AND JCI CONTROLS TO BE FACTORY MOUNTED TO EACH BOX PRIOR TO ARRIVING ON SITE.
5. VERIFY RIGHT AND LEFT HAND ORIENTATION OF BOXES WITH DRAWINGS AND SITE CONDITIONS.
6. ALL VAV BOXES SHALL BE PROVIDED WITH SENSORS FOR AIRFLOW VOLUME, DISCHARGE AIR TEMP, DAMPER POSITION, VALVE POSITION, ROOM TEMP./SETPOINT AND AUXILIARY CONTROL OF CONVECTOR UNIT.
7. EXISTING VAV BOX. REPROGRAM MINIMUM, MAXIMUM AND HEATING CFM TO SCHEDULED VALUES. BALANCE COIL TO INDICATED FLOW. PROVIDE NEW BALANCING VALVE AS NEEDED.

three inches = one foot
one and one half inches = one foot
one inch = one foot
three quarters inch = one foot
one half inch = one foot
three eighths inch = one foot
one quarter inch = one foot
one eighth inch = one foot

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Revision#	Description	Date:

CONSULTANT

DUNHAM
DUNHAM
50 South Sixth Street / Suite 1100
Minneapolis, Minnesota 55402-1540
PHONE 612.465.7550 FAX 612.465.7551
WEB dunhameng.com
mechanical + electrical consulting engineering
0420950-007-00

AST

ARCHITECT/ENGINEER OF RECORD

ANDERSON
13605 1st Ave. N. #100 Plymouth, MN 55441
P 763.412.4000 | F 763.412.4090 | ae-mn.com
Anderson Engineering of Minnesota, LLC | Proj # Project Number

STAMP

I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Name Jason R. Gottwalt, P.E.
Date 05/22/2020 Reg. No. 41360

Project Title: RENOVATE BUILDING 28 FIRST FLOOR EAST RRTP
Location: SAINT CLOUD, MN
Phase: CONSTRUCTION DOCUMENTS
Drawing Title: MECHANICAL SCHEDULES
Issue Date: MAY 22, 2020 | Checked: JRG | Drawn: TNH
Project Number: 656-19-306
Building Number: 28
Drawing Number: MH600

U.S. Department of Veterans Affairs
Veterans Health Administration
St. Cloud VA Health Care System

VA FORM 08 - 6231

AIR HANDLING UNIT SCHEDULE

MECHANICAL (237313, 237316, 237333, 237339)

EQUIPMENT TAG	APPLICATION	FACE & BYPASS DAMPERS (YES/NO)	MIXING BOX (YES/NO)	CFM MAXIMUM	MINIMUM OUTDOOR AIR CFM	COOLING COIL	HEATING COIL	AIR PRE-FILTER	AIR FINAL-FILTER	HUMIDIFIER	AIR BLENDER	SUPPLY FAN	RETURN FAN	MANUFACTURER	MODEL NUMBER	MECHANICAL NOTES
AHU 28-1	SECOND FLOOR EAST	NO	YES	8000	4000	AHUCC 28-1	AHUHC 28-1	AHUPF 28-1	AHUFF 28-1	FUTURE	AHUAB 28-1	AHUSF 28-1	AHURF 28-1	DAIKIN	CAH024GDHM	1,2,3,4,5,6,7,8
AHU 28-2	FIRST FLOOR EAST	NO	YES	8000	4000	AHUCC 28-2	AHUHC 28-2	AHUPF 28-2	AHUFF 28-2	FUTURE	AHUAB 28-2	AHUSF 28-2	AHURF 28-2	DAIKIN	CAH024GDHM	1,2,3,4,5,6,7,8
AHU 28-3	SECOND FLOOR WEST	NO	YES	8000	4000	AHUCC 28-3	AHUHC 28-3	AHUPF 28-3	AHUFF 28-3	FUTURE	AHUAB 28-3	AHUSF 28-3	AHURF 28-3	DAIKIN	CAH024GDHM	1,2,3,4,5,6,7,8
AHU 28-4	FIRST FLOOR WEST	NO	YES	8000	4000	AHUCC 28-4	AHUHC 28-4	AHUPF 28-4	AHUFF 28-4	FUTURE	AHUAB 28-4	AHUSF 28-4	AHURF 28-4	DAIKIN	CAH024GDHM	1,2,3,4,5,6,7,8

GENERAL MECHANICAL NOTES:

A. REFER TO ELECTRICAL SECTION BELOW FOR CALCULATED SHORT-CIRCUIT CURRENT AT EQUIPMENT.

MECHANICAL NOTES:

1. REFER TO STRUCTURAL DRAWINGS FOR STEEL BEAM SUPPORTS TO BE FURNISHED FOR SUPPORT OF UNIT ONTO EXISTING STRUCTURE. MANUFACTURER TO VERIFY DIMENSIONS AND SUPPORT UNDER THE UNIT SPLITS AS REQUIRED.
2. ALL CONTROL DAMPERS ACTUATORS AND CONTROLS COMPONENTS TO BE FURNISHED BY CONTROLS CONTRACTOR. SUBMIT DRAWINGS WITH DETAILS OF UNIT FURNISHED DAMPERS AND COILS FOR FINAL SELECTIONS OF CONTROL VALVES AND ACTUATORS.
3. CABINET SHALL HAVE 2" CLOSED CELL FOAM INSULATION AND PAINTED EXTERIOR, REFER TO SPECIFICATION REQUIREMENTS. ANY DAMAGE TO PAINT DURING INSTALLATION OR TRANSPORT SHALL BE REPAIRED BY CONTRACTOR PRIOR TO TURNING OVER EQUIPMENT.
4. CONTRACTOR TO COORDINATE APPROPRIATE AMOUNT OF UNIT SPLITS REQUIRED FOR RIGGING AND TRANSPORT INTO FINAL LOCATION ON SITE. NOTE THAT UNITS MAY REQUIRE SEPARATE DELIVERY DATES BASED ON FINAL PHASING PLANS.
5. AHU'S 28-3 AND 28-4 SERVING WEST SIDE OF BUILDING SHALL BE ELIMINATED UNDER DEDUCT ALTERNATE. REFER TO DRAWINGS/SPECS FOR FULL DECRIPTION OF ALL WORK AFFECTED UNDER ACCEPTANCE OF THIS DEDUCT ALTERNATE.
6. AIR HANDLING UNITS ALL HAVE SOME AMOUNT OF FUTURE CAPACITY, AND ARE SHOWN AS IDENTICAL DESPITE HAVING SOME LOAD DISCREPANCIES. PARTS/COMPONENTS SHALL BE INTERCHANGABLE BETWEEN ALL FOUR(4) AHU'S.
7. NOTE THAT FAN SELECTIONS HAVE ADDITIONAL CAPACITY SHOWN TO ACCOUNT FOR DUCT LEAKAGE ON EXISTING SYSTEMS, AND FUTURE FLEXIBILITY. COMPONENTS ARE SELECTED AT LOWER AIRFLOWS. SEE PLANS FOR ACTUAL BALANCING DATA.
8. PROVIDE ALL AIR HANDLERS WITH OPEN SECTION FOR EITHER A FUTURE HUMIDIFER, OR SUPPLIMENTAL HEATING/COOLING COIL FOR POTENTIAL CONVERSION TO 100% OUTDOOR AIR IN FUTURE.

AIR HANDLING UNIT - RETURN FAN SCHEDULE

MECHANICAL (233416)

EQUIPMENT TAG	AHU SERVED	NUMBER OF FANS	TYPE	CLASS	CFM PER FAN	TOTAL CFM	ESP (IN W.C.)	TOTAL SP (IN W.C.)	WHEEL DIAMETER (IN)	VFD (YES/NO)	FAN RPM	BHP	DRIVE TYPE (BELT/DIRECT)	MANUFACTURER	MODEL NUMBER	MECHANICAL NOTES
AHURF 28-1	AHU 28-1	2	SWSI/1x2	AIRFOIL - N/A	3000 / 4500	6000 / 9000	1.5	2.0	17.7"	ECM	1752 / 1937	2.88	DIRECT	Q-PAC	-	1,2,3,4,5
AHURF 28-2	AHU 28-2	2	SWSI/1x2	AIRFOIL - N/A	3000 / 4500	6000 / 9000	1.5	2.0	17.7"	ECM	1752 / 1937	2.88	DIRECT	Q-PAC	-	1,2,3,4,5
AHURF 28-3	AHU 28-3	2	SWSI/1x2	AIRFOIL - N/A	3000 / 4500	6000 / 9000	1.5	2.0	17.7"	ECM	1752 / 1937	2.88	DIRECT	Q-PAC	-	1,2,3,4,5
AHURF 28-4	AHU 28-4	2	SWSI/1x2	AIRFOIL - N/A	3000 / 4500	6000 / 9000	1.5	2.0	17.7"	ECM	1752 / 1937	2.88	DIRECT	Q-PAC	-	1,2,3,4,5

GENERAL MECHANICAL NOTES:

A. REFER TO ELECTRICAL SECTION BELOW FOR CALCULATED SHORT-CIRCUIT CURRENT AT EQUIPMENT.

MECHANICAL NOTES:

1. PROVIDE Q-PAC FANS WITH PREMIUM CONTROL PACKAGE OPTION TO INCLUDE AIRFLOW MEASUREMENT AND FULL INTEGTRATION INTO BUILDING AUTOMATION.
2. PROVIDE EACH FAN WITH DEDICATED BACKDRAFT DAMPER SO IT CAN BE TAKEN OUT OF SERVICE WITHOUT AFFECTING OTHER FANS IN SYSTEM.
3. PROVIDE EACH FAN WITH SEPARATE DISCONNECT SWITCHES TO BE ABLE TO ISOLATE EACH INDIVIDUAL FAN FOR REMOVAL OF MOTOR FOR SERVICE WITHOUT AFFECTING REMAINING FAN ARRAY.
4. DURING CONTRACTOR START-UP THE MANUFACTURER SHALL TEST ALL FANS FOR VIBRATION AND NOISE TO FALL WITHIN ACCEPTABLE PARAMETERS.
5. RETURN FANS ARE SHOWN AT TWO OPERATING CONDITIONS. FIRST IS FOR NORMAL OPERATING MODE FOR STANDARD BUILDING PRESSURIZATION, THE SECOND CONDITION IS FOR A POTENTIAL NEGATIVE PRESSURIZATION MODE THAT MAY BE IMPLEMENTED IN FUTURE.

ELECTRICAL

					CONTROLLER				DISCONNECT AT MOTOR								
EQUIPMENT TAG	HP/LOAD	VOLTAGE	PHASE	CALCULATED AFC	TYPE	FURNISHED BY/ INSTALLED BY	LOCATION	CTRL WIRE BY	AMPS/TYPE	FUSE SIZE (AMPS)	NEMA TYPE	FURNISHED BY/ INSTALLED BY	LOCATION	PANEL	CIRCUIT NUMBER	CONDUIT/FEEDER SIZE	ELECTRICAL NOTES
AHUR 28-1A	4.8 HP	208 V	3	1209	VFD	DIV 23 / DIV 26	ATTIC	DIV 23	30/FUSED	15	NEMA 1	DIV 26 / DIV 26	ATTIC	28-LA-DP	1,3,5	3/4" C. / 3#8 AWG, 1#10 GND	
AHUR 28-1B	4.8 HP	208 V	3	1209	VFD	DIV 23 / DIV 26	ATTIC	DIV 23	30/FUSED	15	NEMA 1	DIV 26 / DIV 26	ATTIC	28-LA-DP	1,3,5	3/4" C. / 3#8 AWG, 1#10 GND	
AHUR 28-2A	4.8 HP	208 V	3	1209	VFD	DIV 23 / DIV 26	ATTIC	DIV 23	30/FUSED	15	NEMA 1	DIV 26 / DIV 26	ATTIC	28-LA-DP	13,15,17	3/4" C. / 3#8 AWG, 1#10 GND	
AHUR 28-2B	4.8 HP	208 V	3	1209	VFD	DIV 23 / DIV 26	ATTIC	DIV 23	30/FUSED	15	NEMA 1	DIV 26 / DIV 26	ATTIC	28-LA-DP	13,15,17	3/4" C. / 3#8 AWG, 1#10 GND	
AHUR 28-3A	4.8 HP	208 V	3	1209	VFD	DIV 23 / DIV 26	ATTIC	DIV 23	30/FUSED	15	NEMA 1	DIV 26 / DIV 26	ATTIC	28-LA-DP	2,4,6	3/4" C. / 3#8 AWG, 1#10 GND	
AHUR 28-3B	4.8 HP	208 V	3	1209	VFD	DIV 23 / DIV 26	ATTIC	DIV 23	30/FUSED	15	NEMA 1	DIV 26 / DIV 26	ATTIC	28-LA-DP	2,4,6	3/4" C. / 3#8 AWG, 1#10 GND	
AHUR 28-4A	4.8 HP	208 V	3	1209	VFD	DIV 23 / DIV 26	ATTIC	DIV 23	30/FUSED	15	NEMA 1	DIV 26 / DIV 26	ATTIC	28-LA-DP	14,16,18	3/4" C. / 3#10 AWG, 1#10 GND	
AHUR 28-4B	4.8 HP	208 V	3	1209	VFD	DIV 23 / DIV 26	ATTIC	DIV 23	30/FUSED	15	NEMA 1	DIV 26 / DIV 26	ATTIC	28-LA-DP	14,16,18	3/4" C. / 3#10 AWG, 1#10 GND	

GENERAL ELECTRICAL NOTES:

A. WHEN THE CONTROLLER TYPE IS A VFD OR MAGNETIC STARTER, REFER TO THE VARIABLE FREQUENCY DRIVE CONTROLLER SCHEDULE OR THE MAGNETIC STARTER SCHEDULE FOR MORE INFORMATION.
B. MECHANICAL EQUIPMENT AND CORRESPONDING ELECTRICAL DISCONNECTS/CONTROLLERS SHALL HAVE A STANDARD SHORT-CIRCUIT CURRENT RATING HIGHER THAN THE CALCULATED VALUE SHOWN IN THIS SCHEDULE, DETAILED BY THE "CALCULATED AFC" COLUMN.

CONTROLLER TYPES:

VFD - VARIABLE FREQUENCY MOTOR CONTROLLER
MMS - MANUAL MOTOR STARTER (WITH OVERLOADS)
CP - CONTROL PANEL
MAGS - MAGNETIC STARTER
MRS/MS - MOTOR RATED SWITCH (WITHOUT OVERLOADS)

ELECTRICAL NOTES:

AIR HANDLING UNIT - SUPPLY FAN SCHEDULE

MECHANICAL (233416)

EQUIPMENT TAG	AHU SERVED	NUMBER OF FANS	TYPE	CLASS	CFM PER FAN	TOTAL CFM	ESP (IN W.C.)	TOTAL SP (IN W.C.)	WHEEL DIAMETER (IN)	VFD (YES/NO)	FAN RPM	BHP	DRIVE TYPE (BELT/DIRECT)	MANUFACTURER	MODEL NUMBER	MECHANICAL NOTES
AHUSF 28-1	AHU 28-1	4	AIRFOIL / 2x2	N/A	2000	8000	2.50	6.11 / 6.81	12.4"	ECM	3740 / 3902	3.41 / 3.88	DIRECT	Q-PAC	-	1,2,3,4,5
AHUSF 28-2	AHU 28-2	4	AIRFOIL / 2x2	N/A	2000	8000	2.50	6.11 / 6.81	12.4"	ECM	3740 / 3902	3.41 / 3.88	DIRECT	Q-PAC	-	1,2,3,4,5
AHUSF 28-3	AHU 28-3	4	AIRFOIL / 2x2	N/A	2000	8000	2.50	6.11 / 6.81	12.4"	ECM	3740 / 3902	3.41 / 3.88	DIRECT	Q-PAC	-	1,2,3,4,5
AHUSF 28-4	AHU 28-4	4	AIRFOIL / 2x2	N/A	2000	8000	2.50	6.11 / 6.81	12.4"	ECM	3740 / 3902	3.41 / 3.88	DIRECT	Q-PAC	-	1,2,3,4,5

GENERAL MECHANICAL NOTES:

A. REFER TO ELECTRICAL SECTION BELOW FOR CALCULATED SHORT-CIRCUIT CURRENT AT EQUIPMENT.

MECHANICAL NOTES:

1. PROVIDE Q-PAC FANS WITH PREMIUM CONTROL PACKAGE OPTION TO INCLUDE AIRFLOW MEASUREMENT AND FULL INTEGRATION INTO CENTRAL BUILDING AUTOMATION.
2. PROVIDE EACH FAN WITH DEDICATED BACKDRAFT DAMPER SO IT CAN BE TAKEN OUT OF SERVICE WITHOUT AFFECTING OTHER FANS IN SYSTEM.
3. PROVIDE EACH FAN WITH SEPARATE DISCONNECT SWITCHES TO BE ABLE TO ISOLATE EACH INDIVIDUAL FAN FOR REMOVAL OF MOTOR FOR SERVICE WITHOUT AFFECT REMAINING FAN ARRAY.
4. DURING CONTRACTOR START-UP THE MANUFACTURER SHALL HAVE A TECHNICIAN MEASURE VIBRATION AND SOUND LEVELS TO CONFIRM THAT THEY ARE WITHIN ACCEPTABLE LEVELS. SUBMIT REPORT TO ENGINEER.
5. SECOND OPERATING CONDITION IS SHOWN FOR ADDITIONAL STATIC PRESSURE REQUIRED FOR POTENTIAL SUPPLIMENT COIL(S) IN FUTURE.

ELECTRICAL

					CONTROLLER				DISCONNECT AT MOTOR								
EQUIPMENT TAG	HP/LOAD	VOLTAGE	PHASE	CALCULATED AFC	TYPE	FURNISHED BY/ INSTALLED BY	LOCATION	CTRL WIRE BY	AMPS/TYPE	FUSE SIZE (AMPS)	NEMA TYPE	FURNISHED BY/ INSTALLED BY	LOCATION	PANEL	CIRCUIT NUMBER	CONDUIT/FEEDER SIZE	ELECTRICAL NOTES
AHUS 28-1C	4.2 HP	208 V	3	1588	VFD	DIV 23 / DIV 26	ATTIC	DIV 23	30/FUSED	15	NEMA 1	DIV 26 / DIV 26	ATTIC	28-LA-DP	7,9,11	1" C. / 3#4 AWG, 1#8 GND	
AHUS 28-1D	4.2 HP	208 V	3	1588	VFD	DIV 23 / DIV 26	ATTIC	DIV 23	30/FUSED	15	NEMA 1	DIV 26 / DIV 26	ATTIC	28-LA-DP	7,9,11	1" C. / 3#4 AWG, 1#8 GND	
AHUS 28-1E	4.2 HP	208 V	3	1588	VFD	DIV 23 / DIV 26	ATTIC	DIV 23	30/FUSED	15	NEMA 1	DIV 26 / DIV 26	ATTIC	28-LA-DP	7,9,11	1" C. / 3#4 AWG, 1#8 GND	
AHUS 28-1F	4.2 HP	208 V	3	1588	VFD	DIV 23 / DIV 26	ATTIC	DIV 23	30/FUSED	15	NEMA 1	DIV 26 / DIV 26	ATTIC	28-LA-DP	7,9,11	1" C. / 3#4 AWG, 1#8 GND	
AHUS 28-2C	4.2 HP	208 V	3	1588	VFD	DIV 23 / DIV 26	ATTIC	DIV 23	30/FUSED	15	NEMA 1	DIV 26 / DIV 26	ATTIC	28-LA-DP	19,21,23	1" C. / 3#4 AWG, 1#8 GND	
AHUS 28-2D	4.2 HP	208 V	3	1588	VFD	DIV 23 / DIV 26	ATTIC	DIV 23	30/FUSED	15	NEMA 1	DIV 26 / DIV 26	ATTIC	28-LA-DP	19,21,23	1" C. / 3#4 AWG, 1#8 GND	
AHUS 28-2E	4.2 HP	208 V	3	1588	VFD	DIV 23 / DIV 26	ATTIC	DIV 23	30/FUSED	15	NEMA 1	DIV 26 / DIV 26	ATTIC	28-LA-DP	19,21,23	1" C. / 3#4 AWG, 1#8 GND	
AHUS 28-2F	4.2 HP	208 V	3	1588	VFD	DIV 23 / DIV 26	ATTIC	DIV 23	30/FUSED	15	NEMA 1	DIV 26 / DIV 26	ATTIC	28-LA-DP	19,21,23	1" C. / 3#4 AWG, 1#8 GND	
AHUS 28-3C	4.2 HP	208 V	3	1588	VFD	DIV 23 / DIV 26	ATTIC	DIV 23	30/FUSED	15	NEMA 1	DIV 26 / DIV 26	ATTIC	28-LA-DP	8,10,12	3/4" C. / 3#6 AWG, 1#10 GND	
AHUS 28-3D	4.2 HP	208 V	3	1588	VFD	DIV 23 / DIV 26	ATTIC	DIV 23	30/FUSED	15	NEMA 1	DIV 26 / DIV 26	ATTIC	28-LA-DP	8,10,12	3/4" C. / 3#6 AWG, 1#10 GND	
AHUS 28-3E	4.2 HP	208 V	3	1588	VFD	DIV 23 / DIV 26	ATTIC	DIV 23	30/FUSED	15	NEMA 1	DIV 26 / DIV 26	ATTIC	28-LA-DP	8,10,12	3/4" C. / 3#6 AWG, 1#10 GND	
AHUS 28-3F	4.2 HP	208 V	3	1588	VFD	DIV 23 / DIV 26	ATTIC	DIV 23	30/FUSED	15	NEMA 1	DIV 26 / DIV 26	ATTIC	28-LA-DP	8,10,12	3/4" C. / 3#6 AWG, 1#10 GND	
AHUS 28-4C	4.2 HP	208 V	3	1588	VFD	DIV 23 / DIV 26	ATTIC	DIV 23	30/FUSED	15	NEMA 1	DIV 26 / DIV 26	ATTIC	28-LA-DP	20,22,24	3/4" C. / 3#6 AWG, 1#10 GND	
AHUS 28-4D	4.2 HP	208 V	3	1588	VFD	DIV 23 / DIV 26	ATTIC	DIV 23	30/FUSED	15	NEMA 1	DIV 26 / DIV 26	ATTIC	28-LA-DP	20,22,24	3/4" C. / 3#6 AWG, 1#10 GND	
AHUS 28-4E	4.2 HP	208 V	3	1588	VFD	DIV 23 / DIV 26	ATTIC	DIV 23	30/FUSED	15	NEMA 1	DIV 26 / DIV 26	ATTIC	28-LA-DP	20,22,24	3/4" C. / 3#6 AWG, 1#10 GND	
AHUS 28-4F	4.2 HP	208 V	3	1588	VFD	DIV 23 / DIV 26	ATTIC	DIV 23	30/FUSED	15	NEMA 1	DIV 26 / DIV 26	ATTIC	28-LA-DP	20,22,24	3/4" C. / 3#6 AWG, 1#10 GND	

GENERAL ELECTRICAL NOTES:

A. WHEN THE CONTROLLER TYPE IS A VFD OR MAGNETIC STARTER, REFER TO THE VARIABLE FREQUENCY DRIVE CONTROLLER SCHEDULE OR THE MAGNETIC STARTER SCHEDULE FOR MORE INFORMATION.
B. MECHANICAL EQUIPMENT AND CORRESPONDING ELECTRICAL DISCONNECTS/CONTROLLERS SHALL HAVE A STANDARD SHORT-CIRCUIT CURRENT RATING HIGHER THAN THE CALCULATED VALUE SHOWN IN THIS SCHEDULE, DETAILED BY THE "CALCULATED AFC" COLUMN.

CONTROLLER TYPES:

VFD - VARIABLE FREQUENCY MOTOR CONTROLLER
MMS - MANUAL MOTOR STARTER (WITH OVERLOADS)
CP - CONTROL PANEL
MAGS - MAGNETIC STARTER
MRS/MS - MOTOR RATED SWITCH (WITHOUT OVERLOADS)

AIR HANDLING UNIT - HEATING COIL SCHEDULE - HEATING WATER

MECHANICAL (238216)

			COIL				AIR				WATER									
EQUIPMENT TAG	AHU SERVED	CFM	NUMBER OF COILS	EACH COIL SIZE (W"xH")	ROWS	FINS PER INCH	EAT (F)	LAT (F)	FACE VELOCITY (FPM)	APD (IN W.C.)	EWT (F)	LWT (F)	GPM	GLYCOL TYPE	GLYCOL %	WPD (FT)	CAPACITY (MBH)	MANUFACTURER	MODEL NUMBER	MECHANICAL NOTES
AHUHC 28-1	AHU 28-1	8000	1	54"x42"	1	10	25.0	58.1	508	0.10"	160	139.6	29.3	PROPYLENE	35	11.5'	280.6	DAIKIN	5WQ1001B	1,2,3
AHUHC 28-2	AHU 28-2	8000	1	54"x42"	1	10	25.0	58.1	508	0.10"	160	139.6	29.3	PROPYLENE	35	11.5'	280.6	DAIKIN	5WQ1001B	1,2,3
AHUHC 28-3	AHU 28-3	8000	1	54"x42"	1	10	25.0	58.1	508	0.10"	160	139.6	29.3	PROPYLENE	35	11.5'	280.6	DAIKIN	5WQ1001B	1,2,3
AHUHC 28-4	AHU 28-4	8000	1	54"x42"	1	10	25.0	58.1	508	0.10"	160	139.6	29.3	PROPYLENE	35	11.5'	280.6	DAIKIN	5WQ1001B	1,2,3

MECHANICAL NOTES:

1. REFER TO PIPING DIAGRAMS FOR CONTROL VALVE, STRAINER, CIRCUIT SETTER, VENT/DRAIN AND OTHER PIPING COMPOENETS REQUIRED.
2. PROVIDE WITH FREEZESTAT INSTALLED ON SITE, REFER TO SEQUENCE OF OPERATION FOR SAFETY TRIP INFORMATION.
3. COILS ARE SIZED WITH ADDITIONAL CAPACITY FOR INCREASED OUTDOOR AIR INTAKE IF NECESSARY. BALANCE TO FULL GPM INDICATED.

AIR HANDLING UNIT - COOLING COIL SCHEDULE - CHILLED WATER

MECHANICAL (238216)

			COIL				AIR						WATER										
							EAT		LAT														
EQUIPMENT TAG	AHU SERVED	CFM	NUMBER OF COILS	EACH COIL SIZE (W"xH")	ROWS	FINS PER INCH	DB (F)	WB (F)	DB (F)	WB (F)	FACE VELOCITY (FPM)	APD (IN W.C.)	EWT (F)	LWT (F)	GPM	GLYCOL TYPE	GLYCOL %	WPD (FT)	SENSIBLE CAPACITY (MBH)	TOTAL CAPACITY (MBH)	MANUFACTURER	MODEL NUMBER	MECHANICAL NOTES
AHUCC 28-1	AHU 28-1	8000	1	57"x42"	10	9	83.5	70.0	53.9	53.7	481	1.07"	42.0	54.2	74.9	PROPYLENE	45	24.4'	252.0	413.9	DAIKIN	5WS0910B	1,2,3
AHUCC 28-2	AHU 28-2	8000	1	57"x42"	10	9	83.5	70.0	53.9	53.7	481	1.07"	42.0	54.2	74.9	PROPYLENE	45	24.4'	252.0	413.9	DAIKIN	5WS0910B	1,2,3
AHUCC 28-3	AHU 28-3	8000	1	57"x42"	10	9	83.5	70.0	53.9	53.7	481	1.07"	42.0	54.2	74.9	PROPYLENE	45	24.4'	252.0	413.9	DAIKIN	5WS0910B	1,2,3
AHUCC 28-4	AHU 28-4	8000	1	57"x42"	10	9	83.5	70.0	53.9	53.7	481	1.07"	42.0	54.2	74.9	PROPYLENE	45	24.4'	252.0	413.9	DAIKIN	5WS0910B	1,2,3

MECHANICAL NOTES:

1. ALL COOLING COILS SHALL HAVE 304 STAINLESS STEEEM CASINGS AND DOUBPLE SLOPED DRAIN PAN CONSTRUCTED OF 316 STAINLESS STEEL.
2. AIRFLOW VELOCITIES SHOWN ON SCHEDULE ARE AGRESSIVELY SIZED TO KEEP AHU CASING TO A REASONABLE SIZE. DO NOT EXCEED CASING SIZE INDICATE ON PLANS AND MAXIMIZE COIL TO NOT EXCEED VELOCITIES SHOWN.
3. AIR HANDLING UNITS ALL HAVE SOME AMOUNT OF FUTURE CAPACITY, AND ARE SHOWN AS IDENTICAL DESPITE HAVING SOME LOAD DISCREPANCIES. PARTS/COMPONENTS SHALL BE INTERCHANGABLE BETWEEN ALL FOUR(4) AHU'S.

AIR HANDLING UNIT - PREFILTER SCHEDULE

MECHANICAL (234100)

EQUIPMENT TAG	AHU SERVED	TYPE	CFM	NUMBER OF MODULES	SIZE PER MODULE (H"xL"xD")	EFFICIENCY (%)	MERV RATING	APD CLEAN (IN W.C.)	APD AT 50% LOADING (IN W.C.)	MANUFACTURER	MODEL NUMBER	MECHANICAL NOTES
AHUPF 28-1	AHU 28-1	2" PLEATED	8000	6	24"x20"x2"	30%	8	0.17	0.58	CAMFIL-FARR	30/30	1,2
AHUPF 28-2	AHU 28-2	2" PLEATED	8000	6	24"x20"x2"	30%	8	0.17	0.58	CAMFIL-FARR	30/30	1,2
AHUPF 28-3	AHU 28-3	2" PLEATED	8000	6	24"x20"x2"	30%	8	0.17	0.58	CAMFIL-FARR	30/30	1,2
AHUPF 28-4	AHU 28-4	2" PLEATED	8000	6	24"x20"x2"	30%	8	0.17	0.58	CAMFIL-FARR	30/30	1,2

MECHANICAL NOTES:

1. MANUFACTURER TO PROVIDE MAGNEHELIC GAUGE ACCORSS FILTER BANK FOR VISUAL INDICATION OF PRESSURE DROP.
2. FURNISH THREE(3) SET OF FILTERS. ONE FOR START-UP TESTING, ONE TO CHANGE OUT PRIOR TO OCCUPANCY, AND A FINAL SET FOR VA FACILITIES TO STORE.

AIR HANDLING UNIT - FINAL FILTER SCHEDULE

MECHANICAL (234133)

EQUIPMENT TAG	AHU SERVED	TYPE	CFM	NUMBER OF MODULES	SIZE PER MODULE (H"xL"xD")	EFFICIENCY (%)	MERV RATING	APD CLEAN (IN W.C.)	APD AT 50% LOADING (IN W.C.)	MANUFACTURER	MODEL NUMBER	MECHANICAL NOTES
AHUFF 28-1	AHU 28-1	12" CARTRIDGE	8000	6	24"x20"x12"	95%	14	0.54	1.02	AAF	VARICELL SH	1,2
AHUFF 28-2	AHU 28-2	12" CARTRIDGE	8000	6	24"x20"x12"	95%	14	0.54	1.02	AAF	VARICELL SH	1,2
AHUFF 28-3	AHU 28-3	12" CARTRIDGE	8000	6	24"x20"x12"	95%	14	0.54	1.02	AAF	VARICELL SH	1,2
AHUFF 28-4	AHU 28-4	12" CARTRIDGE	8000	6	24"x20"x12"	95%	14	0.54	1.02	AAF	VARICELL SH	1,2

MECHANICAL NOTES:

1. MANUFACTURER TO PROVIDE MAGNEHELIC GAUGE ACCORSS FILTER BANK FOR VISUAL INDICATION OF PRESSURE DROP.
2. FURNISH THREE(3) SET OF FILTERS. ONE FOR START-UP, ONE TO CHANGE OUT PRIOR TO OCCUPANCY, AND A FINAL SET FOR VA FACILITIES TO STORE.

AIR HANDLING UNIT - AIR BLENDER SCHEDULE

MECHANICAL (237313 & 237316)

EQUIPMENT TAG	AHU SERVED	QUANTITY	DESIGN CFM	MINIMUM APD (IN W.C.)	DESIGN APD (IN W.C.)	MINIMUM VELOCITY (FPM)	DESIGN VELOCITY (FPM)	MANUFACTURER	MODEL NUMBER	MECHANICAL NOTES
AHUAB 28-1	AHU 28-1	2	8000	0.05"	0.14"	500	1000	BLENDER PRODUCTS	MODEL IV	1,2
AHUAB 28-2	AHU 28-2	2	8000	0.05"	0.14"	500	1000	BLENDER PRODUCTS	MODEL IV	1,2
AHUAB 28-3	AHU 28-3	2	8000	0.05"	0.14"	500	1000	BLENDER PRODUCTS	MODEL IV	1,2
AHUAB 28-4	AHU 28-4	2	8000	0.05"	0.14"	500	1000	BLENDER PRODUCTS	MODEL IV	1,2

MECHANICAL NOTES:

1. REFER TO DRAWING MH403 FOR POSITION OF BLENDERS WITHIN CASING.
2. PROVIDE ONE(1) BLENDER IN EACH AHU WITH BLANK-OFF PANEL THAT COULD BE UTILIZED DURING LOW FLOW CONDITIONS.

I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Name Curtis D. Barlage, P.E.
Date 05/22/2020 Reg. No. 45914

Revision#	Description	Date:

CONSULTANT

DUNHAM
50 South Sixth Street / Suite 1100
Minneapolis, Minnesota 55402-1540
PHONE 612.465.7550 FAX 612.465.7551
WEB dunhameng.com
mechanical + electrical consulting engineering
0420950-007-00

ARCHITECT/ENGINEER OF RECORD

ANDERSON
13605 1st Ave. N. #100 Plymouth, MN 55441
P 763.412.4000 | F 763.412.4090 | ae-mn.com
Anderson Engineering of Minnesota, LLC | Proj # Project Number

STAMP

I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Name Jason R. Gottwalt, P.E.
Date 05/22/2020 Reg. No. 41360

Project Title: RENOVATE BUILDING 28 FIRST FLOOR EAST RRTP
Project Number: 656-19-306
Location: SAINT CLOUD, MN
Building Number: 28
Phase: CONSTRUCTION DOCUMENTS
Drawing Title: MECHANICAL/ ELECTRICAL SCHEDULES
Drawing Number: MH601
Issue Date: MAY 22, 2020
Checked
Drawn

VA | U.S. Department of Veterans Affairs
Veterans Health Administration
St. Cloud VA Health Care System

CHILLER SCHEDULE - AIR COOLED

MECHANICAL (236423 & 236426)

EQUIPMENT TAG	APPLICATION	TYPE	RATING POINT CAPACITY (TONS)	RATING POINT POWER (KW)	EVAPORATOR (WATER SIDE) GPM	EVAPORATOR GLYCOL TYPE	EVAPORATOR GLYCOL %	EVAPORATOR WPD (FT)	EVAPORATOR FOULING FACTOR	EVAPORATOR EWT (F)	EVAPORATOR LWT (F)	COMPRESSOR NUMBER OF COMPRESSORS	COMPRESSOR RLA (EACH)	SOUND POWER 250	SOUND POWER 500	SOUND POWER 1000	REFRIGERANT TYPE	VFD (YES/NO)	MANUFACTURER	MODEL NUMBER	MECHANICAL NOTES
CH 01	AIR-COOLED	SCROLL	185	228	430	PROPYLENE	45	13	0.0001	54	42	6	112 - 154	90	89	89	R410A	YES	DAIKIN	AGZ211E	1,2,3,4,5,6

GENERAL MECHANICAL NOTES:

A. REFER TO ELECTRICAL SECTION BELOW FOR CALCULATED SHORT-CIRCUIT CURRENT AT EQUIPMENT.

MECHANICAL NOTES:

1. VERIFY THAT CHILLER CONTROLLER IS COMPTABILBLE WITH BACNET COMMUNICATION WITH JOHNSON CONTROLS CAMPUS AUTOMATION SYSTEM. INTERLOCK PRIMARY PUMPS WITH CHILLER CONTROL PANEL VIA BAS, REFER TO SEQUENCE OF OPERATION.
2. INCLUDE VFD'S FOR ALL SCROLL COMPRESSORS FOR LOW PARTIAL LOAD CONDITIONS AT HIGH EFFICIENCY. REFER TO DRAWINGS FOR MINIM FLOW BYPASS VALVE SET FOR CHILLER MANUFACTUER'S LOW LIMIT REQUIREMENT.
3. INCLUDE COMPRESSOR BLANKET TO REDUCE SOUND OUTPUT POWER LEVELS FROM UNIT. REFER TO SPECIFICATIONS FOR MAXIMUM ALLOWABLE SOUND LEVELS.
4. PROVIDE WITH THERMAL DISPERSION TYPE WATER FLOOW INDICATOR. COORDINATE FIELD INSTALLATION WITH ALL AFFECTED CONTRACTORS.
5. PROVIDE WITH PRE-WIRED 115 VOLT CONVENIANCE OUTALET AND ASSOCIATED INTERNAL TRANSFORMER AND WIRING CONNECTIONS.
6. PROVIDE BASE RAIL WITH SPRING TYPE VIBRATION ISOLATOR KIT. REFERENCE PLANS FOR NEW CONCRETE EQUIPMENT PAD AND ANCHOR BOLT ALL SPRING ISOLATORS PER MANUFACTURER REQUIREMENTS.

ELECTRICAL

EQUIPMENT TAG	HP/LOAD	VOLTAGE	PHASE	CALCULATED AFC	CONTROLLER TYPE	CONTROLLER FURNISHED BY/ INSTALLED BY	CONTROLLER LOCATION	CONTROLLER CTRL WIRE BY	DISCONNECT AT MOTOR AMPS/TYPE	DISCONNECT FUSE SIZE (AMPS)	DISCONNECT NEMA TYPE	DISCONNECT FURNISHED BY/ INSTALLED BY	DISCONNECT LOCATION	PANEL	CIRCUIT NUMBER	CONDUIT/FEEDER SIZE	ELECTRICAL NOTES
CH 01	1000	208 V	3	17045	VFD	DIV 23 / DIV 26	OUTSIDE	DIV 23	1000	1000	NEMA 3R	DIV 26 / DIV 26	OUTSIDE	28 MSB-1	11	RISER	

GENERAL ELECTRICAL NOTES:

A. WHEN THE CONTROLLER TYPE IS A VFD OR MAGNETIC STARTER, REFER TO THE VARIABLE FREQUENCY DRIVE CONTROLLER SCHEDULE OR THE MAGNETIC STARTER SCHEDULE FOR MORE INFORMATION.
B. MECHANICAL EQUIPMENT AND CORRESPONDING ELECTRICAL DISCONNECTS/CONTROLLERS SHALL HAVE A STANDARD SHORT-CIRCUIT CURRENT RATING HIGHER THAN THE CALCULATED VALUE SHOWN IN THIS SCHEDULE, DETAILED BY THE "CALCULATED AFC" COLUMN.

CONTROLLER TYPES:

VFD - VARIABLE FREQUENCY MOTOR CONTROLLER
MMS - MANUAL MOTOR STARTER (WITH OVERLOADS)
CP - CONTROL PANEL
MAGS - MAGNETIC STARTER
MRS/MS - MOTOR RATED SWITCH (WITHOUT OVERLOADS)

ELECTRICAL NOTES:

HYDRONIC PUMP SCHEDULE

MECHANICAL (232123)

EQUIPMENT TAG	APPLICATION	TYPE	GPM	DISCHARGE HEAD (FT)	GLYCOL TYPE	GLYCOL %	NPSHR (FT)	RPM	BHP	SUCTION SIZE (IN)	DISCHARGE SIZE (IN)	TRIPLE DUTY VALVE MODEL NUMBER	TRIPLE DUTY VALVE PRESSURE DROP (PSI)	SUCTION DIFFUSER MODEL NUMBER	SUCTION DIFFUSER PRESSURE DROP (PSI)	VFD (YES/NO)	MANUFACTURER	MODEL NUMBER	MECHANICAL NOTES
CWPP 28-1	CHILLED WATER	END SUCTION	250	75'	PROPYLENE	45	8'	1750	6.5	3"	2.5"	3DS-3S		CC-3	1.0 PSI	YES	BELL & GOSSETT	SERIES E-1510-2.5BB	1,2,3,4
CWPP 28-2	CHILLED WATER	END SUCTION	250	75'	PROPYLENE	45	8'	1750	6.5	3"	2.5"	3DS-3S		CC-3	1.0 PSI	YES	BELL & GOSSETT	SERIES E-1510-2.5BB	1,2,3,4
CWPP 28-3	CHILLED WATER	END SUCTION	250	75'	PROPYLENE	45	8'	1750	6.5	3"	2.5"	3DS-3S		CC-3	1.0 PSI	YES	BELL & GOSSETT	SERIES E-1510-2.5BB	1,2,3,4

GENERAL MECHANICAL NOTES:

A. REFER TO ELECTRICAL SECTION BELOW FOR CALCULATED SHORT-CIRCUIT CURRENT AT EQUIPMENT.

MECHANICAL NOTES:

1. PROVIDE A 4" CONCRETE EQUIPMENT PAD FOR ALL FLOOR MOUNTED PUMPS. CONTRACTOR TO VERIFY FRAME TYPE AND SECURE WITH ANCHOR BOLTS WHILE SITTING ON TOP OF NEAPRENE PADS (INERTIA BASES WILL NOT BE REQUIRED FOR THIS SLAB ON GRADE INSTALLATION)
2. REFERENCE PIPING DIAGRAMS FOR INSTALLAITON OF ALL REQUIRED ISOLATION VALVE, PRESSURE GAUGES, TRIPLE DUTY VALVES, SUCTION DIFFUSERS, ECT FOR EACH PUMP INSTALLATION TO BE COMPLETE.
3. INCLUDE START-UP OF EACH PUMP BY A FACTORY CERTIFIED TECNICIAN . ENSURE THAT ALL PUMPS ARE NOT OVERLOADING BY EITHER ADJUSTING TRIPLE DUTY VALVE OR SETTING HIGH LIMIT SETPOINTS ON VFD CONTROLLER.
4. PUMP MANUFACTURER'S THAT HAVE OPTION TO FURNISH INTEGRAL VFD WITH PUMP MAY SUBMIT, WITH FINAL APPROVAL REQUIRED FROM VA AND ENGINEER. CONTROLS CONTRACTOR TO VERIFY COMPATIBILITY TO INTGRATE INTO THEIR JCI AUTOMATION SYSTEM.

ELECTRICAL

EQUIPMENT TAG	HP/LOAD	VOLTAGE	PHASE	CALCULATED AFC	CONTROLLER TYPE	CONTROLLER FURNISHED BY/ INSTALLED BY	CONTROLLER LOCATION	CONTROLLER CTRL WIRE BY	DISCONNECT AT MOTOR AMPS/TYPE	DISCONNECT FUSE SIZE (AMPS)	DISCONNECT NEMA TYPE	DISCONNECT FURNISHED BY/ INSTALLED BY	DISCONNECT LOCATION	PANEL	CIRCUIT NUMBER	CONDUIT/FEEDER SIZE	ELECTRICAL NOTES
CWPP 28-1	5	208 V	3	3650	VFD	DIV 23 / DIV 26	BASEMENT	DIV 23	20	20	NEMA 1	DIV 26 / DIV 26	BASEMENT	28 LB-7	13,15,17	3/4" C. / 3#10 AWG, 1#10 GND	
CWPP 28-2	5	208 V	3	3650	VFD	DIV 23 / DIV 26	BASEMENT	DIV 23	20	20	NEMA 1	DIV 26 / DIV 26	BASEMENT	28 LB-7	8,10,12	3/4" C. / 3#10 AWG, 1#10 GND	
CWPP 28-3	5	208 V	3	3650	VFD	DIV 23 / DIV 26	BASEMENT	DIV 23	20	20	NEMA 1	DIV 26 / DIV 26	BASEMENT	28 LB-7	1,3,5	3/4" C. / 3#10 AWG, 1#10 GND	

GENERAL ELECTRICAL NOTES:

A. WHEN THE CONTROLLER TYPE IS A VFD OR MAGNETIC STARTER, REFER TO THE VARIABLE FREQUENCY DRIVE CONTROLLER SCHEDULE OR THE MAGNETIC STARTER SCHEDULE FOR MORE INFORMATION.
B. MECHANICAL EQUIPMENT AND CORRESPONDING ELECTRICAL DISCONNECTS/CONTROLLERS SHALL HAVE A STANDARD SHORT-CIRCUIT CURRENT RATING HIGHER THAN THE CALCULATED VALUE SHOWN IN THIS SCHEDULE, DETAILED BY THE "CALCULATED AFC" COLUMN.

CONTROLLER TYPES:

VFD - VARIABLE FREQUENCY MOTOR CONTROLLER
MMS - MANUAL MOTOR STARTER (WITH OVERLOADS)
CP - CONTROL PANEL
MAGS - MAGNETIC STARTER
MRS/MS - MOTOR RATED SWITCH (WITHOUT OVERLOADS)

ELECTRICAL NOTES:

AIR SEPARATOR SCHEDULE

MECHANICAL (232113)

EQUIPMENT TAG	APPLICATION	GPM	WATER CONNECTION SIZE (IN)	WPD (FT)	STRAINER (YES/NO)	MANUFACTURER	MODEL NUMBER	MECHANICAL NOTES
AS 28-2	CHILLED WATER	450	6"	2.0'	YES	BELL & GOSSETT	R-6F	1,2

MECHANICAL NOTES:

1. REFER TO FLOW DIAGRAM FOR APPROXIMATE MOUNTING LOCATION. INCLUDE ALL OTHER PIPING COMPONENTS INDICATED.
2. INCLUDE WITH BLOWDOWN VALVE AND THREADED HOSE CONNECITON. CONTRACTOR TO CLEAN ALL STRAINERS PRIOR TO OCCUPANCY.

EXPANSION TANK SCHEDULE

MECHANICAL (232113)

EQUIPMENT TAG	APPLICATION	TYPE	TANK VOLUME (GAL)	ACCEPTANCE VOLUME (GAL)	PRECHARGE PRESSURE (PSIG)	ASME CERTIFIED (YES/NO)	SIZE DIAMETER (IN)	SIZE LENGTH (IN)	MANUFACTURER	MODEL NUMBER	MECHANICAL NOTES
ET 28-2	GLYCOL	DIAPHRAM	44	34	24	NO	22"	36"	BELL & GOSSETT	HFT-90V	1,2

MECHANICAL NOTES:

1. PROVIDE 4" CONCRETE EQUIPMENT PAD TO SUPPORT EXPANSION TANK ON FLOOR.
2. REFER TO PIPING DIAGRAM FOR INSTALLATION OF AIR SEPARATOR AND MAKE-UP WATER CONNECTION.

FLUID COOLER SCHEDULE - ADD ALTERNATE #4

MECHANICAL (236510)

EQUIPMENT TAG	LOCATION	APPLICATION	FAN NUMBER OF FANS	FAN NUMBER OF MOTORS	FAN MOTOR HP (EACH)	FAN TOTAL CFM	PERFORMANCE GPM	PERFORMANCE EWT (F)	PERFORMANCE LWT (F)	PERFORMANCE AMBIENT AIR DB (F)	PERFORMANCE WPD (FT)	GLYCOL TYPE	GLYCOL %	VFD (YES/NO)	MANUFACTURER	MODEL NUMBER	MECHANICAL NOTES
FC 28-1	BLDG 28	WINTER COOLING	2	2	3 KW	30,632	66.5	54	42	25 F	24.3'	PROPYLENE	45	YES	GUNTNER	S-GFH 090.3A-2-N(2)-G6/6P.M	1,2,3

GENERAL MECHANICAL NOTES:

A. REFER TO ELECTRICAL SECTION BELOW FOR CALCULATED SHORT-CIRCUIT CURRENT AT EQUIPMENT.

MECHANICAL NOTES:

1. PROVIDE FLUID COOLER WITH NEW CONCETE EQUIPMENT PAD INSTALLED AT LOCATION INDICATED ON PLANS. CONFIRM FINAL DIMENSIONS OF PAD WITH MANUFACTURER SHOP DRAWINGS.
2. INCLUDE VFD CONTROL FOR ALL FLUID COOLER FANS, REFER TO SEQUENCE OF OPERATION FOR FAN STAGING.
3. FAN GAURDS SHALL BE HAIL RESISTANT. POSITION FLUID COOLER FAR ENOUGH AWAY FROM BUILDING TO PROVECT AGAINST FALLING ICE.

ELECTRICAL

EQUIPMENT TAG	HP/LOAD	VOLTAGE	PHASE	CALCULATED AFC	CONTROLLER TYPE	CONTROLLER FURNISHED BY/ INSTALLED BY	CONTROLLER LOCATION	CONTROLLER CTRL WIRE BY	DISCONNECT AT MOTOR AMPS/TYPE	DISCONNECT FUSE SIZE (AMPS)	DISCONNECT NEMA TYPE	DISCONNECT FURNISHED BY/ INSTALLED BY	DISCONNECT LOCATION	PANEL	CIRCUIT NUMBER	CONDUIT/FEEDER SIZE	ELECTRICAL NOTES
FC 28-1	6 HP	208 V	3	2280	VFD	DIV 23 / DIV 26	OUTSIDE	DIV 23	60/FUSED	50	NEMA 3R	DIV 26 / DIV 26	OUTSIDE	28 MSB-1	13	3/4" C. / 3#6 AWG, 1#10 GND	

GENERAL ELECTRICAL NOTES:

A. WHEN THE CONTROLLER TYPE IS A VFD OR MAGNETIC STARTER, REFER TO THE VARIABLE FREQUENCY DRIVE CONTROLLER SCHEDULE OR THE MAGNETIC STARTER SCHEDULE FOR MORE INFORMATION.
B. MECHANICAL EQUIPMENT AND CORRESPONDING ELECTRICAL DISCONNECTS/CONTROLLERS SHALL HAVE A STANDARD SHORT-CIRCUIT CURRENT RATING HIGHER THAN THE CALCULATED VALUE SHOWN IN THIS SCHEDULE, DETAILED BY THE "CALCULATED AFC" COLUMN.

CONTROLLER TYPES:

VFD - VARIABLE FREQUENCY MOTOR CONTROLLER
MMS - MANUAL MOTOR STARTER (WITH OVERLOADS)
CP - CONTROL PANEL
MAGS - MAGNETIC STARTER
MRS/MS - MOTOR RATED SWITCH (WITHOUT OVERLOADS)

ELECTRICAL NOTES:

FAN SCHEDULE

MECHANICAL (233413, 233416, 233423)

EQUIPMENT TAG	APPLICATION	TYPE	CFM	ESP (IN W.C.)	BHP	FAN RPM	DRIVE TYPE	SONES	VFD (YES/NO)	MANUFACTURER	MODEL NUMBER	MECHANICAL NOTES
EF 01	GENERAL EXHAUST	UTILITY SET	1430	1	0.4	1559	DIRECT	64	NO	GREENHECK	USF-13	
EF 02	GENERAL EXHAUST	UTILITY SET	1370	1	0.37	1525	DIRECT	64	NO	GREENHECK	USF-13	

GENERAL MECHANICAL NOTES:

A. REFER TO ELECTRICAL SECTION BELOW FOR CALCULATED SHORT-CIRCUIT CURRENT AT EQUIPMENT.

MECHANICAL NOTES:

ELECTRICAL

EQUIPMENT TAG	HP/LOAD	VOLTAGE	PHASE	CALCULATED AFC	CONTROLLER TYPE	CONTROLLER FURNISHED BY/ INSTALLED BY	CONTROLLER LOCATION	CONTROLLER CTRL WIRE BY	DISCONNECT AT MOTOR AMPS/TYPE	DISCONNECT FUSE SIZE (AMPS)	DISCONNECT NEMA TYPE	DISCONNECT FURNISHED BY/ INSTALLED BY	DISCONNECT LOCATION	PANEL	CIRCUIT NUMBER	CONDUIT/FEEDER SIZE	ELECTRICAL NOTES
EF 01	1/2	120 V	1	600	SWITCH	DIV 23 / DIV 26	ATTIC	DIV 23	SWITCH		NEMA 3R	DIV 26 / DIV 26	ATTIC	28-LA-DP	25	2#10 AWG + 1#10 AWG GND	
EF 02	1/2	120 V	1	600	SWITCH	DIV 23 / DIV 26	ATTIC	DIV 23	SWITCH		NEMA 3R	DIV 26 / DIV 26	ATTIC	28-LA-DP	27	2#10 AWG + 1#10 AWG GND	

GENERAL ELECTRICAL NOTES:

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ELECTRICAL NOTES:

I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Name Curtis D. Barlage, P.E.
Date 05/22/2020 Reg. No. 45914

Revision#	Description	Date:

CONSULTANT

DUNHAM
50 South Sixth Street / Suite 1100
Minneapolis, Minnesota 55402-1540
PHONE 612.465.7550 FAX 612.465.7551
WEB dunhameng.com
mechanical + electrical consulting engineering
0420950-007-00

ARCHITECT/ENGINEER OF RECORD

ANDERSON
13605 1st Ave. N. #100 Plymouth, MN 55441
P 763.412.4000 | F 763.412.4090 | ae-mn.com
Anderson Engineering of Minnesota, LLC | Proj # Project Number

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I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Name Jason R. Gottwalt, P.E.
Date 05/22/2020 Reg. No. 41360

Project Title: RENOVATE BUILDING 28 FIRST FLOOR EAST RRTP
Project Number: 656-19-306
Location: SAINT CLOUD, MN
Building Number: 28
Phase: CONSTRUCTION DOCUMENTS
Drawing Title: MECHANICAL/ ELECTRICAL SCHEDULES
Drawing Number: MH602
Issue Date: MAY 22, 2020
Checked
Drawn

VA
U.S. Department of Veterans Affairs
Veterans Health Administration
St. Cloud VA Health Care System

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VARIABLE FREQUENCY MOTOR CONTROLLER SCHEDULE

MECHANICAL/ELECTRICAL (230923)

EQUIPMENT TAG	VOLTAGE	PHASE	ENCLOSURE TYPE (NEMA 1/4X/12)	ENCLOSURE PLENUM RATED (YES/NO)	SEISMIC BRACING (YES/NO)	VARIABLE TORQUE/ CONSTANT TORQUE	HARMONIC CONTROL		VFD BYPASS				MULTIPLE MOTOR CONTROL (YES/NO)	DAMPER CONTROL CIRCUIT (YES/NO)	ESSENTIAL SERVICE/ FIRE FIGHTER MODE (YES/NO)	LEED REQUIREMENTS (YES/NO)	NOTES
							INPUT AC LINE (YES/NO)	OUTPUT AC LINE (YES/NO)	BYPASS (YES/NO)	BYPASS TYPE (CONTACTOR/ VFD)	BYPASS CONTROL TYPE (MANUAL/ AUTOMATIC)	MOTOR STARTING IN BYPASS MODE (FULL/REDUCED VOLTAGE)					
AHUR 28-1A	208 V	3	NEMA 1	NO	NO	VT	YES	NO	YES	CONTACTOR	MANUAL	REDUCED VOLTAGE	NO	NO	NO	NO	
AHUR 28-1B	208 V	3	NEMA 1	NO	NO	VT	YES	NO	YES	CONTACTOR	MANUAL	REDUCED VOLTAGE	NO	NO	NO	NO	
AHUR 28-2A	208 V	3	NEMA 1	NO	NO	VT	YES	NO	YES	CONTACTOR	MANUAL	REDUCED VOLTAGE	NO	NO	NO	NO	
AHUR 28-2B	208 V	3	NEMA 1	NO	NO	VT	YES	NO	YES	CONTACTOR	MANUAL	REDUCED VOLTAGE	NO	NO	NO	NO	
AHUR 28-3A	208 V	3	NEMA 1	NO	NO	VT	YES	NO	YES	CONTACTOR	MANUAL	REDUCED VOLTAGE	NO	NO	NO	NO	
AHUR 28-3B	208 V	3	NEMA 1	NO	NO	VT	YES	NO	YES	CONTACTOR	MANUAL	REDUCED VOLTAGE	NO	NO	NO	NO	
AHUR 28-4A	208 V	3	NEMA 1	NO	NO	VT	YES	NO	YES	CONTACTOR	MANUAL	REDUCED VOLTAGE	NO	NO	NO	NO	
AHUR 28-4B	208 V	3	NEMA 1	NO	NO	VT	YES	NO	YES	CONTACTOR	MANUAL	REDUCED VOLTAGE	NO	NO	NO	NO	
AHUS 28-1C	208 V	3	NEMA 1	NO	NO	VT	YES	NO	YES	CONTACTOR	MANUAL	REDUCED VOLTAGE	NO	NO	NO	NO	
AHUS 28-1D	208 V	3	NEMA 1	NO	NO	VT	YES	NO	YES	CONTACTOR	MANUAL	REDUCED VOLTAGE	NO	NO	NO	NO	
AHUS 28-1E	208 V	3	NEMA 1	NO	NO	VT	YES	NO	YES	CONTACTOR	MANUAL	REDUCED VOLTAGE	NO	NO	NO	NO	
AHUS 28-1F	208 V	3	NEMA 1	NO	NO	VT	YES	NO	YES	CONTACTOR	MANUAL	REDUCED VOLTAGE	NO	NO	NO	NO	
AHUS 28-2C	208 V	3	NEMA 1	NO	NO	VT	YES	NO	YES	CONTACTOR	MANUAL	REDUCED VOLTAGE	NO	NO	NO	NO	
AHUS 28-2D	208 V	3	NEMA 1	NO	NO	VT	YES	NO	YES	CONTACTOR	MANUAL	REDUCED VOLTAGE	NO	NO	NO	NO	
AHUS 28-2E	208 V	3	NEMA 1	NO	NO	VT	YES	NO	YES	CONTACTOR	MANUAL	REDUCED VOLTAGE	NO	NO	NO	NO	
AHUS 28-2F	208 V	3	NEMA 1	NO	NO	VT	YES	NO	YES	CONTACTOR	MANUAL	REDUCED VOLTAGE	NO	NO	NO	NO	
AHUS 28-3C	208 V	3	NEMA 1	NO	NO	VT	YES	NO	YES	CONTACTOR	MANUAL	REDUCED VOLTAGE	NO	NO	NO	NO	
AHUS 28-3D	208 V	3	NEMA 1	NO	NO	VT	YES	NO	YES	CONTACTOR	MANUAL	REDUCED VOLTAGE	NO	NO	NO	NO	
AHUS 28-3E	208 V	3	NEMA 1	NO	NO	VT	YES	NO	YES	CONTACTOR	MANUAL	REDUCED VOLTAGE	NO	NO	NO	NO	
AHUS 28-3F	208 V	3	NEMA 1	NO	NO	VT	YES	NO	YES	CONTACTOR	MANUAL	REDUCED VOLTAGE	NO	NO	NO	NO	
AHUS 28-4C	208 V	3	NEMA 1	NO	NO	VT	YES	NO	YES	CONTACTOR	MANUAL	REDUCED VOLTAGE	NO	NO	NO	NO	
AHUS 28-4D	208 V	3	NEMA 1	NO	NO	VT	YES	NO	YES	CONTACTOR	MANUAL	REDUCED VOLTAGE	NO	NO	NO	NO	
AHUS 28-4E	208 V	3	NEMA 1	NO	NO	VT	YES	NO	YES	CONTACTOR	MANUAL	REDUCED VOLTAGE	NO	NO	NO	NO	
AHUS 28-4F	208 V	3	NEMA 1	NO	NO	VT	YES	NO	YES	CONTACTOR	MANUAL	REDUCED VOLTAGE	NO	NO	NO	NO	
CH 01	208 V	3	NEMA 3R	NO	NO	VT	YES	NO	YES	CONTACTOR	MANUAL	REDUCED VOLTAGE	NO	NO	NO	NO	
CWPP 28-1	208 V	3	NEMA 1	NO	NO	VT	YES	NO	YES	CONTACTOR	MANUAL	REDUCED VOLTAGE	NO	NO	NO	NO	
CWPP 28-2	208 V	3	NEMA 1	NO	NO	VT	YES	NO	YES	CONTACTOR	MANUAL	REDUCED VOLTAGE	NO	NO	NO	NO	
CWPP 28-3	208 V	3	NEMA 1	NO	NO	VT	YES	NO	YES	CONTACTOR	MANUAL	REDUCED VOLTAGE	NO	NO	NO	NO	
FC 28-1	208 V	3	NEMA 3R	NO	NO	VT	YES	NO	YES	CONTACTOR	MANUAL	REDUCED VOLTAGE	NO	NO	NO	NO	

GENERAL NOTES:

A. FOR VFD'S WITH BYPASS PROVISIONS, SEPARATE MOTOR OVERLOAD PROTECTION REQUIRED FOR EACH MOTOR, WHEN IN THE BYPASS POSITION.
B. VFD EQUIPMENT SHALL HAVE STANDARD SHORT-CIRCUIT CURRENT RATING HIGHER THAN THE CALCULATED VALUE SHOWN IN THE MOTOR SCHEDULE.
C. VFDS TO HAVE INTEGRAL DISCONNECT UNLESS NOTED OTHERWISE.

NOTES:

GLYCOL FILL STATION SCHEDULE

MECHANICAL (232113)

EQUIPMENT TAG	APPLICATION	PUMP						TANK CAPACITY (GAL)	MANUFACTURER	MODEL NUMBER	MECHANICAL NOTES
		NUMBER OF PUMPS	GPM (EACH)	DISCHARGE HEAD (FT)	MOTOR HP (EACH)	RPM (EACH)	VOLTAGE/PHASE (EACH)				
GFS 28-2	CHILLED WATER	1	10	70'	1/2	3600	120/1	55	BELL & GOSSETT	GMU-30	1,2,3

GENERAL MECHANICAL NOTES:

A. REFER TO ELECTRICAL SECTION BELOW FOR CALCULATED SHORT-CIRCUIT CURRENT AT EQUIPMENT.

MECHANICAL NOTES:

1. PROVIDE A 4" CONCRETE EQUIPMENT PAD POSITIONED CLOSE TO AN EXISTING FLOOR DRAIN. REFER TO PLANS FOR COORDINATION OF SERVICE ACCESS.
2. INCLUDE WITH LOW WATER CUT OFF SWITCH. STARTER TO BE PREWIRED FROM FACTORY FOR STANDARD PLUG INTO ELECTRICAL RECEPTACLE.
3. SET UP SYSTEM TO MAINTAIN 45% PROPYLENE GLYCOL WITHIN CHILLED WATER SYSTEM.

ELECTRICAL

EQUIPMENT TAG	HP/LOAD	VOLTAGE	PHASE	CALCULATED AFC	CONTROLLER				DISCONNECT AT MOTOR				PANEL	CIRCUIT NUMBER	CONDUIT/FEEDER SIZE	ELECTRICAL NOTES
					TYPE	FURNISHED BY/ INSTALLED BY	LOCATION	CTRL WIRE BY	AMPS/TYPE	FUSE SIZE (AMPS)	NEMA TYPE	FURNISHED BY/ INSTALLED BY	LOCATION			
GFS 28-2	1/2 HP	120 V	1	3650	INTEGRAL	DIV 23 / DIV 26	INTEGRAL	DIV 23	N/A	N/A	N/A	N/A	N/A	28 LB-7	14	2#10 AWG + 1#10 AWG GND	

GENERAL ELECTRICAL NOTES:

A. WHEN THE CONTROLLER TYPE IS A VFD OR MAGNETIC STARTER, REFER TO THE VARIABLE FREQUENCY DRIVE CONTROLLER SCHEDULE OR THE MAGNETIC STARTER SCHEDULE FOR MORE INFORMATION.
B. MECHANICAL EQUIPMENT AND CORRESPONDING ELECTRICAL DISCONNECTS/CONTROLLERS SHALL HAVE A STANDARD SHORT-CIRCUIT CURRENT RATING HIGHER THAN THE CALCULATED VALUE SHOWN IN THIS SCHEDULE, DETAILED BY THE "CALCULATED AFC" COLUMN.

ELECTRICAL NOTES:

CONTROLLER TYPES:

MMS - MANUAL MOTOR STARTER (WITH OVERLOADS)
CP - CONTROL PANEL
MAGS - MAGNETIC STARTER
MRS/MS - MOTOR RATED SWITCH (WITHOUT OVERLOADS)

UNIT HEATER SCHEDULE - HEATING WATER

MECHANICAL (238239)

EQUIPMENT TAG	APPLICATION	TYPE	FAN		COIL								MANUFACTURER	MODEL NUMBER	MECHANICAL NOTES
			CFM	MOTOR HP	EAT (F)	COIL ROWS	EWT (F)	LWT (F)	GPM	GLYCOL TYPE	GLYCOL %	WPD (FT)	CAPACITY (MBH)			
UH 3-01	ATTIC	HORIZONTAL	3500	1/3	60	-	180	150	11	PROPYLENE	35	0.5	161	STERLING	HS-240	1,2,3,4
UH 3-01 (FUTURE CONDITION)	ATTIC	HORIZONTAL	3500	1/3	60	-	120	105	17	PROPYLENE	35	1.06	76	STERLING	HS-240	
UH 3-02	ATTIC	HORIZONTAL	3500	1/3	60	-	180	150	11	PROPYLENE	35	0.5	161	STERLING	HS-240	1,2,3,4
UH 3-02 (FUTURE CONDITION)	ATTIC	HORIZONTAL	3500	1/3	60	-	120	105	17	PROPYLENE	35	1.06	76	STERLING	HS-240	
UH 3-03	ATTIC	HORIZONTAL	3500	1/3	60	-	180	150	11	PROPYLENE	35	0.5	161	STERLING	HS-240	1,2,3,4
UH 3-03 (FUTURE CONDITION)	ATTIC	HORIZONTAL	3500	1/3	60	-	120	105	17	PROPYLENE	35	1.06	76	STERLING	HS-240	
UH 3-04	ATTIC	HORIZONTAL	3500	1/3	60	-	180	150	11	PROPYLENE	35	0.5	161	STERLING	HS-240	1,2,3,4
UH 3-04 (FUTURE CONDITION)	ATTIC	HORIZONTAL	3500	1/3	60	-	120	105	17	PROPYLENE	35	1.06	76	STERLING	HS-240	
UH 3-05	ATTIC	HORIZONTAL	3500	1/3	60	-	180	150	11	PROPYLENE	35	0.5	161	STERLING	HS-240	1,2,3,4
UH 3-05 (FUTURE CONDITION)	ATTIC	HORIZONTAL	3500	1/3	60	-	120	105	17	PROPYLENE	35	1.06	76	STERLING	HS-240	
UH 3-06	ATTIC	HORIZONTAL	3500	1/3	60	-	180	150	11	PROPYLENE	35	0.5	161	STERLING	HS-240	1,2,3,4
UH 3-06 (FUTURE CONDITION)	ATTIC	HORIZONTAL	3500	1/3	60	-	120	105	17	PROPYLENE	35	1.06	76	STERLING	HS-240	

GENERAL MECHANICAL NOTES:

A. REFER TO ELECTRICAL SECTION BELOW FOR CALCULATED SHORT-CIRCUIT CURRENT AT EQUIPMENT.

MECHANICAL NOTES:

1. MANUFACTURER TO PROVIDE ALL MOUNTING HARDWARE TO SECURE UNIT HEATER TO COMBUSTIBLE WOOD FRAMING IN ATTIC SPACE. COORDINATE APPROPRIATE CLEARANCES FROM HOT COILS AND FAN CONNECTIONS.
2. CONTROLS CONTRACTOR TO PROVIDE DDC THERMOSTAT FOR EACH UNIT HEATER. CHOOSE APPROPRIATE LOCATION IN ATTIC AFTER ALL DUCTWORK AND PIPING IS INSTALLED TO ENSURE STAT IS IN LOCATION WITH FREE AIRFLOW FOR ACCURATE SAMPLING.
3. CONTROLS CONTRACTOR TO SELECT CONTROL VALVE FOR FUTURE WATER FLOW CONDITIONS (REPRESENTING POTENTIAL SWITCH TO GEOTHERMAL IN BUILDING). BUT INITIALLY BALANCE AND CONTROL ON CURRENT FLOW CONDITIONS SHOWN.
4. REFER TO DETAILS FOR ADDITIONAL PIPING COMPONENTS REQUIRED AT EACH UNIT HEATER LOCATION. PROVIDE ISOLATION VALVES AT TAKE-OFF CONNECTIONS FOR SERVICING.

ELECTRICAL

EQUIPMENT TAG	HP/LOAD	VOLTAGE	PHASE	CALCULATED AFC	CONTROLLER				DISCONNECT AT MOTOR					PANEL	CIRCUIT NUMBER	CONDUIT/FEEDER SIZE	ELECTRICAL NOTES
					TYPE	FURNISHED BY/ INSTALLED BY	LOCATION	CTRL WIRE BY	AMPS/TYPE	FUSE SIZE (AMPS)	NEMA TYPE	FURNISHED BY/ INSTALLED BY	LOCATION				
UH 3-01	1/3 HP	120 V	1	1423	INTEGRAL	DIV 23 / DIV 26	INTEGRAL	DIV 23	30/FUSED	15	NEMA 1	DIV 26 / DIV 26	ATTIC	28-LA-DP	26	2#10 AWG + 1#10 AWG GND	
UH 3-02	1/3 HP	120 V	1	1423	INTEGRAL	DIV 23 / DIV 26	INTEGRAL	DIV 23	30/FUSED	15	NEMA 1	DIV 26 / DIV 26	ATTIC	28-LA-DP	28	2#10 AWG + 1#10 AWG GND	
UH 3-03	1/3 HP	120 V	1	1423	INTEGRAL	DIV 23 / DIV 26	INTEGRAL	DIV 23	30/FUSED	15	NEMA 1	DIV 26 / DIV 26	ATTIC	28-LA-DP	30	2#10 AWG + 1#10 AWG GND	
UH 3-04	1/3 HP	120 V	1	1423	INTEGRAL	DIV 23 / DIV 26	INTEGRAL	DIV 23	30/FUSED	15	NEMA 1	DIV 26 / DIV 26	ATTIC	28-LA-DP	32	2#10 AWG + 1#10 AWG GND	
UH 3-05	1/3 HP	120 V	1	1423	INTEGRAL	DIV 23 / DIV 26	INTEGRAL	DIV 23	30/FUSED	15	NEMA 1	DIV 26 / DIV 26	ATTIC	28-LA-DP	34	2#10 AWG + 1#10 AWG GND	
UH 3-06	1/3 HP	120 V	1	1423	INTEGRAL	DIV 23 / DIV 26	INTEGRAL	DIV 23	30/FUSED	15	NEMA 1	DIV 26 / DIV 26	ATTIC	28-LA-DP	36	2#10 AWG + 1#10 AWG GND	

GENERAL ELECTRICAL NOTES:

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MRS/MS - MOTOR RATED SWITCH (WITHOUT OVERLOADS)

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Name Curtis D. Barlage, P.E.
Date 05/22/2020 Reg. No. 45914

Revision#	Description	Date:

CONSULTANT

DUNHAM

DUNHAM
50 South Sixth Street / Suite 1100
Minneapolis, Minnesota 55402-1540
PHONE 612.465.7550 FAX 612.465.7551
WEB dunhameng.com
mechanical + electrical consulting engineering
0420950-007-00

ARCHITECT/ENGINEER OF RECORD

ANDERSON

13605 1st Ave. N. #100 Plymouth, MN 55441
P 763.412.4000 | F 763.412.4090 | ae-mn.com
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Name Jason R. Gottwalt, P.E.
Date 05/22/2020 Reg. No. 41360

Project Title: RENOVATE BUILDING 28 FIRST FLOOR EAST RRTP
Location: SAINT CLOUD, MN
Phase: CONSTRUCTION DOCUMENTS
Drawing Title: MECHANICAL/ ELECTRICAL SCHEDULES
Issue Date: MAY 22, 2020 | Checked: JRG | Drawn: TNH
Project Number: 656-19-306
Building Number: 28
Drawing Number: MH603

U.S. Department of Veterans Affairs
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