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 BOTH MAU-5-01 (NFS KITCHEN AND SUPPORT) AND MAU-5-02 (VCS SERVING AND RETAIL) – NOTE SLIGHT VARIANCES WITHIN SEQUENCES BELOW

A. SYSTEMS PERFORMANCE INTENT - MAU-5-01: MAU-5-01 PROVIDES MAKE-UP AIR FOR THE NFS KITCHEN AND NFS SUPPORT SPACES. AHU IS EQUIPPED WITH A DX COOLING COIL, HEATING WATER COIL, FILTER SECTIONS, SUPPLY FAN SECTION, AND EXHAUST FAN SECTION WITH AIRSIDE ECONOMIZER DAMPERS ALONG OTHER ELEMENTS AS SHOWN ON THIS DRAWING. UNIT IS 100% MAKE-UP AIR CONSTANT VOLUME WITH TURN-DOWN FOR UNOCCUPIED MODE.
B. SYSTEMS PERFORMANCE INTENT - MAU-5-02: MAU-5-02 PROVIDES MAKE-UP AIR FOR THE VCS SERVING AND DINING, AND VCS RETAIL SPACES. AHU IS EQUIPPED WITH A DX COOLING COIL, HEATING WATER COIL, FILTER SECTIONS, SUPPLY FAN SECTION, AND EXHAUST FAN SECTION WITH AIRSIDE ECONOMIZER DAMPERS ALONG OTHER ELEMENTS AS SHOWN ON THIS DRAWING. UNIT IS 100% MAKE-UP AIR CONSTANT VOLUME WITH TURN-DOWN FOR UNOCCUPIED MODE.
C. CONTROLS LISTED BELOW ARE TYPICAL FOR BOTH AIR HANDLING UNITS. BOTH UNITS ARE INTENDED TO RUN AT THE SAME TIME UNLESS ONE UNIT FAILS OR IS SHUTDOWN FOR MAINTENANCE.
D. NETWORK ARCHITECTURE: AIR HANDLING UNIT CONTROLLER, SUPPLY FAN MOTOR SPEED CONTROLLER AND EXHAUST FAN MOTOR SPEED CONTROLLER CONNECTED VIA COMMON SECONDARY CONTROL NETWORK SUPERVISED BY A MASTER CONTROL UNIT.

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

EXHAUST FAN MSC HARDWARE POINT SUMMARY:

DESCRIPTION	TYPE	FIELD INTERFACE
EXHAUST AIR CFM	ANALOG INPUTS	AIR FLOW STATIONS
EXHAUST FAN STATUS/SPEED**	ANALOG OUTPUT	MOTOR SPEED CONTROLLERS(MULTIPLE)
EXHAUST DUCT STATIC PRESSURE	ANALOG INPUT	PRESSURE SENSOR
HIGH LIMIT DUCT STATIC SAFETY	ANALOG INPUT	PRESSURE SENSOR
SAFETIES INTERLOCK	DIGITAL INPUT	MULTIPLE CONTACTS
VFD 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
SUPLY AIR TEMPERATURE	ANALOG INPUT	TEMPERATURE SENSOR
MIXED AIR TEMPERATURE	ANALOG INPUT	TEMPERATURE SENSOR
RETURN AIR HUMIDITY	ANALOG INPUT	HUMIDISTAT (DUCT MOUNTED)
SUPPLY AIR TEMPERATURE	ANALOG INPUT	HUMIDISTAT (DUCT MOUNTED)
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
DX COOLING COIL VALVE	ANALOG OUTPUT	VALVE ACTUATOR
HEATING COIL VALVE	ANALOG OUTPUT	VALVE ACTUATOR
VALVE END SWITCHES (OPEN/CLOSED)	DIGITAL INPUT	ACTUATOR END SWITCHES
RETURN DAMPER	ANALOG OUTPUT	DAMPER ACTUATOR(S)
OUTSIDE AIR DAMPER	ANALOG OUTPUT	DAMPER ACTUATOR(S)
RELIEF DAMPER	ANALOG OUTPUTS	DAMPER ACTUATOR(S)
DAMPER END SWITCHES (OPEN/CLOSED)	DIGITAL INPUTS	ACTUATOR END SWITCHES (X3 PER AHU)
SUPPLY AIR STATIC (HIGH LIMIT)	ANALOG INPUT	DUCT STATIC SENSOR
SUPPLY AIR HUMIDITY (HIGH LIMIT)	ANALOG INPUT	DUCT MOUNTED HUMIDISTAT
SMOKE ISOLATION DAMPERS	DIGITAL OUTPUT	FIRE/ALARM & DAMPER ACTUATORS
MSC ENABLE/OFF VIA FIRE ALARM	DIGITAL OUTPUT	CONTROL RELAY
SMOKE ISOLATION DAMPERS STATUS	DIGITAL INPUT	ACTUATOR END SWITCHES
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.

A. MODE INDEXING
   - 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. OCCUPANCY MODE CAN ALSO BE TRIGGERED BY ACTIVATION OF THE CORRESPONDING KITCHEN EXHAUST FANS, EF 5-01, EF 5-02, EF 5-07 AND EF 5-08 AS LISTED BELOW.
   - OCCUPIED MODE 1: MAU 5-01 RUNNING CONTINUOUS AT FULL AIRFLOW WITH BOTH EXHAUST FANS EF 5-01 AND EF 5-02 RUNNING. (MAU 5-02 RUNNING CONTINUOUS AT FULL AIRFLOW WITH BOTH EXHAUST FANS EF 5-07 AND EF 5-08 RUNNING.)
     - MAU 5-01 VAV BOXES ALL AT MAXIMUM AIRFLOW VOLUME LEVELS (VAV 1-01 = 2000 CFM, AND VAV 1-02 = 3100 CFM)
     - MAU 5-02 REHEAT COILS OPERATING AT FULL AIRFLOW VOLUME LEVELS (RHC 2-01 = 2650 CFM AND RHC 2-02 = 3450 CFM)
   - OCCUPIED MODE 2: MAU 5-01 RUNNING CONTINUOUS AT REDUCED AIRFLOW WITH EF 5-01 RUNNING AND EF 5-02 OFF. (MAU 5-02 RUNNING CONTINUOUS AT REDUCED AIRFLOW WITH EF 5-07 RUNNING AND EF 5-08 OFF.)
     - MAU 5-01 SHALL ADJUST CORRESPONDING AIRFLOWS AS FOLLOWS (VAV 1-01 = 560 CFM AND VAV 1-02 = 940 CFM)
     - MAU 5-02 SHALL ADJUST CORRESPONDING AIRFLOWS AS FOLLOWS (RHC 2-01 = 2000 CFM AND RHC 2-02 = 1400 CFM)
     - NOTE THAT THE TWO SCENARIOS ABOVE ARE NOT CONNECTED OR INTERLOCKED. EITHER CAN OCCUR INDEPENDANTLY OF EACH OTHER.
   - OCCUPIED MODE 3: MAU 5-01 RUNNING CONTINUOUS AT REDUCED AIRFLOW WITH EF 5-01 OFF AND EF 5-02 RUNNING. (MAU 5-02 RUNNING CONTINUOUS AT REDUCED AIRFLOW WITH EF 5-07 OFF AND EF 5-08 RUNNING.)
     - MAU 5-01 SHALL ADJUST CORRESPONDING AS FOLLOWS (VAV 1-01 = 1250 CFM AND VAV 1-02 = 2850 CFM)
     - MAU 5-02 SHALL ADJUST CORRESPONDING AIRFLOWS AS FOLLOWS (RHC 2-01 = 2650 CFM AND RHC 2-02 = 700 CFM)
     - NOTE THAT THE TWO SCENARIOS ABOVE ARE NOT CONNECTED OR INTERLOCKED. EITHER CAN OCCUR INDEPENDANTLY OF EACH OTHER.
   - OCCUPIED MODE 4: MAU 5-01 RUNNING CONTINUOUS AT REDUCED AIRFLOW WITH BOTH EXHAUST FANS EF 5-01 AND EF 5-02 OFF. (MAU 5-02 RUNNING CONTINUOUS AT REDUCED AIRFLOW WITH BOTH EXHAUST FANS EF 5-07 AND EF 5-08 OFF.)
     - MAU 5-01 SHALL ADJUST CORRESPONDING AS FOLLOWS (VAV 1-01 = 200 CFM AND VAV 1-02 = 300 CFM)
       1. NOTE THAT UNDER THIS SCENARIO ALL DISH ROOM AND CART WASH EXHAUST REMAIN OPERATIONAL AND MAKE-UP AIR WOULD ALL BE INDIRECTLY TRANSFERRED THROUGH THE KITCHEN AREA FROM ADJACENT SPACES.
     - MAU 5-02 SHALL OPEN RETURN AIR DAMPER AND OPERATE IN A RECIRCULATION MODE WITH ALL AIRFLOWS AT MAXIMUM (OCCUPIED) VOLUME.
     - NOTE THAT THE TWO SCENARIOS ABOVE ARE NOT CONNECTED OR INTERLOCKED. EITHER CAN OCCUR INDEPENDANTLY OF EACH OTHER.
   - OCCUPIED MODE 5: ONLY ONE MAU RUNNING AT FULL AIRFLOW WITH CROSS CONNECT DAMPER FULLY OPEN, DURING MAINTENANCE OR FAILURE OF OTHER UNIT.
   - UNOCCUPIED MODE: MAU 5-01 AND MAU 5-02 RUNNING CONTINUOUS AT REDUCED RECIRCULATION AIRFLOW.
     - REFER TO 'UNOCCUPIED MINIMUM AIRFLOWS' ON VAV AND REHEAT COIL SCHEDULES WITHIN DRAWING M500.
   - SHUTDOWN: BY COMMAND FROM MASTER CONTROL UNIT VIA SECONDARY CONTROL NETWORK, AND BY LOCAL SAFETY CONTROLS. WHENEVER THE SUPPLY FAN IS 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
   - TESTING AND BALANCING: CONTROLS CONTRACTOR SHALL COORDINATE CLOSELY WITH BALANCING CONTRACTOR TO TEST BOTH ACCURACY OF AIRFLOW SENSORS, AND SPACE PRESSURE RELATIONSHIPS, DURING EACH MODE OF OPERATION LISTED ABOVE. PROVIDE A COMPREHENVSIVE REPORT SHOWING TRANSITION BETWEEN EACH MODE OF OPERATION ALONG WITH TOTAL AIRFLOW READING AND RECORDED ROOM PRESSURIZATION RELATIONSHIPS BETWEEN EACH SPACE, REFER TO AIRFLOW DIAGRAMS ON DRAWING M3091 FOR ADDITIONAL DIRECTION.

B. SUPPLY AND EXHAUST 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. MCR 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. (ACROSS FAN - LIMIT SUPPLY DISCHARGE TO 4" PRESSURE CLASS OF DUCT)

E. EXHAUST FAN SPEED: REGULATED BY ITS VFD TO MAINTAIN AN AIRFLOW OFFSET DURING MINIMUM OUTDOOR AIR MODE SEQUENCE OF THE AHU DOWNLOADED FROM MCU. DURING THIS MODE OF OPERATION THE RETURN FAN WILL OPERATE AT SUPPLY AIR VOLUME LESS THE MINIMUM OUTDOOR AIR INTAKE WITH THE RELIEF DAMPER IS FULLY CLOSED AND OUTDOOR AIR DAMPER FULLY OPEN. NOTE THAT THIS SAME AIRFLOW OFFSET WILL BE MAINTAINED THROUGHOUT THE ECONOMIZER CYCLE TO MANAGE BUILDING PRESSURIZATION REQUIREMENTS BY MAINTAINING THAT SAME MINIMUM OUTDOOR AIRFLOW OFFSET. 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 AND ALARM MAINTENANCE THAT AIRFLOW SENSOR MAY BE FOULED FROM DEBRIS AND IN NEED OF CLEANING.
   a. 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: 4.0" W.G. (ACROSS FAN - OR LIMIT EXHAUST TO 2" PRESSURE CLASS OF DUCT)

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 POSITION (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 54 DEGREES. IF OUTDOOR AIR DEWPOINT IS HIGHER DURING ECONOMIZER THAN THE COOLING COIL SHALL BE ENABLED TO ACT SIMULTANEOUSLY TO CONTROL HUMIDITY LEVELS WITHIN AREAS SERVED. IF DISCHARGE AIR SETPOINT IS BEING RAISED DUE TO VAV BOX POLLING, LIMIT TEMPERATURE INCREASE ALLOWED TO MAINTAIN DISCHARGE AIR DEWPOINT BELOW 54 DEGREES.
   f. DEFAULT DICHARGE AIR SETPOINT: 54 DEGREES

G. HEATING COIL VALVES:
   a. NORMAL POSITION: OPEN.
   b. ACTION: INCREASING HEATING WATER TO FULL FLOW AS DISCHARGE AIR TEMPERATURE FALLS THROUGH HEATING PROPORTIONAL BAND.

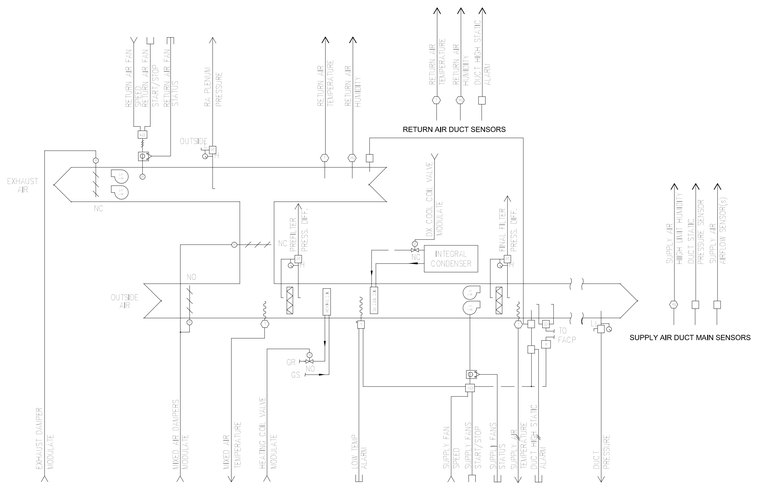
H. DX COOLING COIL VALVE:
   a. NORMAL POSITION: CLOSED.
   b. ACTION: MODULATE UNIT TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT.

I. 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.

J. 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

K. SYSTEM FIRE AND/OR SMOKE DAMPERS (APPLIES TO ALL DAMPERS ON EACH AHU SYSTEM):
   a. CLOSED WHENEVER UNIT IS OFF.
   b. PROVED OPEN VIA END SWITCHES BEFORE STARTING UNIT.

L. 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.

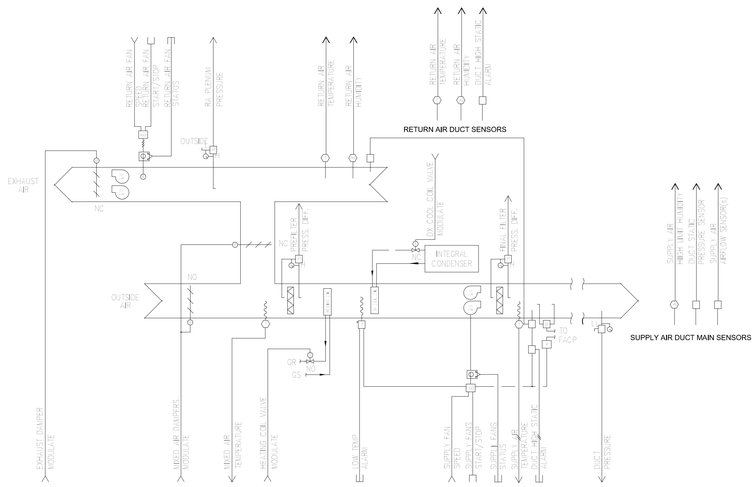


1 CONTROL DIAGRAM FOR AHU-5-01 (NFS KITCHEN AND SUPPORT)
NO SCALE

JOB: VA#438-21-112
BUILDING: VA KITCHEN RENOVATION
PAGE:

SYSTEM: VAV AIR HANDLER

SYSTEM COMPONENT:	POINT TYPE	ABBREVIATION	REMARKS
Return air Temperature	AI-1	RAT	
Return Air Humidity	AI-2	RAH	
Return Air Flow (cfm)	AI-3	RAF	
Mixed Air Temperature	AI-4	MAT	
Pre-Heat Temperature	AI-5	PHT	
Cooiling Coil Temperature	AI-6	CCT	
Discharge Air Temperature	AI-7	DAT	
Discharge Static Pressure	AI-8	DASP	
Discharge Air Humidity	AI-9	DAH	
Supply Air Flow (cfm)	AI-10	SAF	
OUTSIDE AIR TEMPERATURE	AI-11	OAT	
RETURN LOW PRESSURE	BI-1	RLP	
EXHAUST FAN STATUS	BI-2	EF-STS	
SUPPLY FAN STATUS	BI-3	SF-STS	
MIXED AIR LOW LIMIT	BI-4	TSL-1	
STATIC PRESSURE HIGH LIMIT	BI-5	SPS-2	
HUMIDITY HIGH LIMIT	BI-6	HHL	
SUPPLY FAN VSMC ALARM	BI-7	SF-ALA	
EXHAUST FAN VSMC ALARM	BI-8	EF-ALA	
EXHAUST FAN VSMC	AO-1	EF-SPD	FULL COMMUNICATION
SUPPLY FAN VSMC	AO-2	SF-SPD	FULL COMMUNICATION
OUTSIDE AIR DAMPER	AO-3	OAD	
RETURN AIR DAMPER	AO-4	RAD	
EXHAUST AIR DAMPER	AO-5	EAD	
MINIMUM OUTSIDE AIR DAMPER	AO-7	MIN-OAD	
HEATING VALVE V-2	AO-8	PHT-V1	
COILING VALVE V-1	AO-9	CLG-V1	
EXHAUST FAN START/STOP	BO-1	EF-SST	
SUPPLY FAN START/STOP	BO-2	SF-SST	



2 CONTROL DIAGRAM FOR AHU-5-02 (VCS SERVING AND RETAIL)
NO SCALE

Revision#	Description	Date:
1	ISSUE SET	08/18/2026

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08-18-2026

Office of Construction and Facilities Management
VA U.S. Department of Veterans Affairs

Drawing Title: SEQUENCE OF OPERATIONS
Phase:
Approved:
Project Title: RENOVATE FIRST FLOOR FOR NEW KITCHEN FOR THE SIOUX FALLS VA MEDICAL CENTER
Project Number: VA #438-21-403 SGA #201956
Building Number: 5
Location: SIOUX FALLS, SOUTH DAKOTA
Issue Date: 08-18-2026
Checked: JG
Drawn: EC/TM
Drawing Number: M600

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2.02. EXHAUST FAN CONTROL SEQUENCE (23 34 00)

A. EXHAUST FAN, EF 5-01 (HOOD 69 - NFS LA MINUTE COOKING), EF 5-02 (HOOD 76 - NFS HOT PRODUCTION), EF 5-07 (HOOD 216 - VCS PREP), EF 5-08 (HOOD 238 - VCS GRILL)
- ARE UPBLAST PRV TYPE FANS SERVING TYPE 1 KITCHEN GREASE EXHAUST HOODS.
- SHALL BE ENABLED/DISABLED MANUALLY THROUGH THE KITCHEN EXHAUST HOOD CONTROLLER.
  1. NOTE THAT HEAT DETECTOR ASSOCIATED WITH EACH HOOD CONTROLLER SHALL BE ABLE TO OVER-RIDE AND ENABLE FAN ON DETECTION OF HEAT (COOKING).
  2. NOTE THAT ENABLING OR DISABLING EACH HOOD SHALL ADJUST/MODIFY FAN SPEED OF ASSOCIATED MAKE-UP AIR UNIT. REFER TO MAKE-UP AIR UNIT SEQUENCE OF OPERATION.

B. EXHAUST FAN, EF 5-03, EF 5-05 (GENERAL EXHAUST)
- ARE DOWNBLAST PRV TYPE FANS SERVING GENERAL EXHAUST REQUIREMENTS.
- SHALL BE OPERATED CONTINUOUSLY AND OFF ONLY FOR MAINTENANCE AND REPAIR ONLY.

C. EXHAUST FAN, EF 5-04 (DISHWASHER EXHAUST)
- IS AN UPBLAST PRV TYPE FAN SERVING THE DISHWASHER EXHAUST HOOD.
- SHALL BE INTERLOCKED WITH ASSOCIATED MAU 5-01 OPERATION TO RUN CONTINUOUSLY WHILE SPACE IS IN OCCUPIED MODE
- FAN SHALL BE LOCKED OFF DURING UNOCCUPIED MODE OPERATION OF MAU 5-01
- FAN SHALL BE ALLOWED FOR MANUAL SHUT-DOWN FOR MAINTENANCE AND REPAIR. PROVIDE BAS ALARM NOTIFICATION.

D. EXHAUST FAN, EF 5-06 (CART WASH GENERAL EXHAUST)
- IS AN UPBLAST PRV TYPE FAN SERVING THE CART WASH AREA EXHAUST REQUIREMENTS.
- SHALL BE INTERLOCKED WITH ASSOCIATED MAU 5-01 OPERATION TO RUN CONTINUOUSLY WHILE SPACE IS IN OCCUPIED MODE
- FAN SHALL BE LOCKED OFF DURING UNOCCUPIED MODE OPERATION OF MAU 5-01
- FAN SHALL BE ALLOWED FOR MANUAL SHUT-DOWN FOR MAINTENANCE AND REPAIR. PROVIDE BAS ALARM NOTIFICATION.

E. EXHAUST FAN REQUIREMENTS (EACH FAN AS REQUIRED):
- INCLUDE DIRECT DRIVE ECM MOTOR WITH SPEED CONTROL FOR BALANCING PURPOSES.
- BAS SHALL ALARM ON FAILURE OF EXHAUST FAN.
- BAS SHALL INDICATE STATUS AND REMOTE ENABLE/DISABLE FUNCTIONALITY.
- INCLUDE AN ACTUATOR FOR ISOLATION DAMPER TO BE INTERLOCKED WITH FAN OPERATION (EXCEPT FOR TYPE 1 GREASE HOOD FANS - NOT ALLOWED).
  1. INCLUDE A DAMPER END SWITCHES TO PROVE OPEN BEFORE ALLOWING FAN TO START, AND PROVE CLOSED ON SHUT-DOWN

F. 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 POSITION	DIGITAL INPUT	END SWITCH(ES)

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 BETWEEN MIN/MAX AIRFLOW VALUES BASED ON OCCUPANCY STATUS (CONSTANT VOLUME).
- REHEAT COIL VALVE(S): ENABLE WITH VAV DAMPER AT SET POSITION WITH ADDITIONAL CALL FOR HEATING. MODULATE VALVE TO MAINTAIN SPACE TEMPERATURE HEATING SET POINT.
- AUXILIARY HEAT: ENABLED WHENEVER OUTDOOR AIR TEMPERATURES ARE BELOW 40 DEGREES (ADJ). MODULATE AUXILIARY HEATING VALVE ASSOCIATE WITH VAV ZONE ONCE PRIMARY REHEAT COIL HAS REACHED A 30% OPEN POSITION.

c. SET POINTS:
- SPACE TEMPERATURE COOLING:
  1. OCCUPIED: 70°F OR AS ESTABLISHED BY USER.
  2. UNOCCUPIED (SUMMER): 78 DEGREES (ADJ)
- SPACE TEMPERATURE HEATING:
  1. OCCUPIED: COOLING SET POINT MINUS DEAD BAND.
     A. SPACE TEMPERATURE DEAD BAND: 2°F
  2. UNOCCUPIED (WINTER): 62 DEGREES (ADJ)

d. UNOCCUPIED MODE: SUPPLY VAV BOX WILL REDUCE CONSTANT VOLUME AIRFLOW SETPOINT TO THE MINIMUM AIR POSITION INDICATED ON EQUIPMENT SCHEDULES. RETURN AIR VOLUME 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.

B. 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. HEAT PUMPS CONTROL SEQUENCE (23 81 46)

A. GENERAL: HEAT PUMP SHALL BE CONTROLLED BY THEIR PACKAGED CONTROLS PROVIDED WITH THE EQUIPMENT. COORDINATE COMMUNICATION INTERFACES WITH THIS EQUIPMENT WITH THE MANUFACTURER CONTROLLERS. BRING ALL AVAILABLE POINTS FROM THIS EQUIPMENT INTO THE BAS FOR MONITORING.

B. TEMPERATURE CONTROL: EACH HEAT PUMP SHALL HAVE A CORRESPONDING DDC THERMOSTAT TO CONTROL HEATING OR COOLING OUTPUT REQUIRED TO SATISFY SPACE TEMPERATURE SETPOINT. RESET SPACE TEMPERATURE SETPOINT BASED ON SCHEDULE BELOW.
a. OCCUPIED SETPOINT: USER DEFINED SETPOINT (SOFTWARE LIMITED TO 68 - 74 DEGREES - ADJ)
b. UNOCCUPIED SETPOINT (WINTER): 62 DEGREES (ADJ)
c. UNOCCUPIED SETPOINT (SUMMER): 78 DEGREES (ADJ)

C. CONDENSATE DRAIN OVERFLOW PROTECTION: PROVIDE EACH HEAT PUMP DRAIN PAN WITH A FLOAT SWITCH HARD-WIRED TO SHUT-OFF HEAT PUMP EVAPORATOR FAN UPON REACHING A LEVEL ABOVE THE DISCHARGE DRAIN (INDICATED A CLOGGED DRAIN/PIPE). PROVIDE REMOTE ALARM NOTIFICATION TO BUILDING AUTOMATION.

D. DDC POINTS SUMMARY:

DESCRIPTION	QUANTITY	TYPE	FIELD INTERFACE
SPACE TEMPERATURE	1/ZONE	ANALOG INPUT	SPACE CONTROL MODULE
SPACE TEMPERATURE SETPOINT	1/ZONE	ANALOG INPUT	DDC THERMOSTAT SETPOINT
EVAPORATOR FAN STATUS/SPEED	1/HP	ANALOG OUTPUT	HEAT PUMP CONTROLLER
COMPRESSOR MOTOR	1/HP	DIGITAL OUTPUT	HEAT PUMP CONTROLLER
REVERSING VALVE	1/HP	DIGITAL OUTPUT	HEAT PUMP CONTROLLER
SUPPLY DISCHARGE AIR TEMP	1/HP	ANALOG INPUT	DUCT TEMP SENSOR
SPACE TEMPERATURE SET POINT	1/ZONE	ANALOG INPUT	SPACE CONTROL MODULE
CONTROL VALVE(S)	1/HP	ANALOG OUTPUT	VALVE ACTUATOR(S)
CONDENSATE DRAIN OVERFLOW	1/HP	DIGITAL OUTPUT	FLOAT SWITCH

2.05. REHEAT COILS CONTROL SEQUENCE (23 82 16)

A. GENERAL: CONSTANT VOLUME DUCT REHEAT COIL.
a. REHEAT COIL VALVE(S): MODULATE 2-POSITION CONTROL VALVE TO MAINTAIN SPACE TEMPERATURE HEATING SET POINT.
b. SET POINTS:
- SPACE TEMPERATURE HEATING:
  1. OCCUPIED: 70°F (OR AS ESTABLISHED BY USER) SET POINT MINUS DEAD BAND.
     A. SPACE TEMPERATURE DEAD BAND: 2°F

c. CONTROLS CONTRACTOR TO PROGRAM ADJUSTABLE HIGH AND LOW LIMITS FOR EACH TEMPERATURE ZONE.
d. REFER TO MAKE-UP AIR UNIT CONTROL SEQUENCE FOR MODULATION OF AIRFLOW CONTROL DAMPER TO ADJUST VOLUME THROUGH EACH COIL USING CORRESPONDING AIRFLOW SENSOR.

B. DDC POINTS SUMMARY:

DESCRIPTION	QUANTITY	TYPE	FIELD INTERFACE
SPACE TEMPERATURE	1/ZONE	ANALOG INPUT	SPACE CONTROL MODULE
SUPPLY DISCHARGE AIR TEMP	1/COIL	ANALOG INPUT	REHEAT COIL DUCT TEMP SENSOR
SPACE TEMPERATURE SET POINT	1/ZONE	ANALOG INPUT	SPACE CONTROL MODULE
HEATING VALVE(S)	1/COIL	ANALOG OUTPUT	VALVE ACTUATOR(S)
CONTROL DAMPER	1/COIL	ANALOG OUTPUT	DAMPER ACTUATOR(S)
AIRFLOW SENSOR	1/COIL	ANALOG INPUT	AIRFLOW SENSOR (EBTRON GOLD SERIES)

2.06. DRY COOLERS CONTROL SEQUENCE (23 65 10)

A. GENERAL: DRY COOLER SHALL BE CONTROLLED BY EITHER THEIR PACKAGED CONTROLS PROVIDED WITH THE EQUIPMENT AND COMMUNICATE ALL SETPOINTS AND SENSOR OUTPUTS TO BUILDING AUTOMATION SYSTEM FOR REMOTE MONITORING, OR HAVE INDIVIDUAL COMPONENTS/SENSORS PROVIDED BY CONTROLS CONTRACTOR (COORDINATE WITH DIV 23). CONTROL FANS TO HOLD LEAVING WATER TEMPERATURE SET POINT PROVIDED BY BAS. SET POINT WILL BE DEPENDANT ON OUTDOOR AIR TEMPERATURE RESET SCHEDULE. COORDINATE COMMUNICATION INTERFACES WITH THIS EQUIPMENT WITH THE MANUFACTURERS. BRING ALL AVAILABLE POINTS FROM THIS EQUIPMENT INTO THE BAS FOR MONITORING.

B. FLUID COOLER LWT RESET SCHEDULE: SET POINT SHALL BE 5 DEGREES ABOVE OUTDOOR AMBIENT TEMPERATURE UNTIL REACHING 50 DEGREES (MEANING THAT ANY OUTDOOR AIR TEMPERATURE BELOW 45 DEGREES SHALL BE LOCKED AT A 50 LWT TARGET).
- MODULATE FAN SPEED CONTROLLERS TO MAINTAIN DISCHARGE SETPOINT. UPON LWT REACHING 2 DEGREES BELOW SETPOINT FOR 5 MINUTES (ADJ) THEN SHUT OF FANS COMPLETELY
- FANS WILL BE COMMANDED BACK ONLINE ONCE LWT EXCEEDS 2 DEGREES ABOVE SETPOINT FOR 5 MINUTES (ADJ).

b. PROVIDE ALARM NOTIFICATION IF LWT FROM FLUID COOLER DROPS BELOW 25 DEGREES (ADJ), AND 3-WAY VALVE IS IN A POSITION DELIVERING WATER TO FLUID COOLER.

C. FLOW ALARM: PROVIDE FLOW SENSOR ON SUPPLY WATER INTO DRYCOOLER TO PROVIDE ALARM NOTIFICATION IF NO FLOW IS DETECTED WHILE 3-WAY VALVE IS IN POSITION OF PROVIDING WATER FLOW TO FLUID COOLER. (NOTE THAT THIS CONDITION WOULD LIKELY BE CAUSED BY 'GELLING' OF GLYCOL TO A THICK VISCOSITY TO DIFFICULT TO PUSH THROUGH FLUID COOLER TUBING. SEE OPTIONAL SEQUENCE BELOW IF ENCOUNTERED ON REGULAR BASIS.)
a. ANTI-GELLING SEQUENCE: THE OPTIONAL SEQUENCE SHALL BE ENABLED/DISABLED BY BAS OPERATOR.
- UPON OUTDOOR AIR DROPPING BELOW 0 DEGREES (ADJ) THE FOLLOWING SEQUENCE SHALL OCCUR TO KEEP FLUID COOLERS FLOWING IF NEEDED.
- EVERY 30 MINUTES (ADJ) OPEN 3-WAY VALVE TO ALLOW APPROXIMATELY 25% FLOW THROUGH FLUID COOLER FOR 2 MINUTES (ADJ).
- IF NO FLOW IS SENSED DURING INTERVAL OUTLINED ABOVE, THEN PROVIDE 'NO FLOW' ALARM NOTIFICATION TO BAS.
- IF OUTDOOR AIR INCREASES ABOVE 0 DEGREES (ADJ) THEN DISABLE THIS OPTIONAL ANTI-GELLING SEQUENCE
- DO NOT ALLOW ANY FLUID COOLER FANS TO OPERATE DURING THIS SEQUENCE, REGARDLESS OF LWT MEASURED.

D. DDC POINTS SUMMARY:

DESCRIPTION	QUANTITY	TYPE	FIELD INTERFACE
LEAVING WATER TEMPERATURE (LWT)	1/ZONE	ANALOG INPUT	TEMPERATURE SENSOR (WELL)
ENTERING WATER TEMPERATURE (EWT)	1/ZONE	ANALOG INPUT	TEMPERATURE SENSOR (WELL)
OUTDOOR AIR TEMPERATURE	PER BAS	ANALOG INPUT	GLOBAL TEMPERATURE SENSOR
INCOMING FLOW TO FLUID COOLER	1/FLUID COOLER	ANALOG INPUT	WATER FLOW METER
3-WAY DIVERTING VALVE	1/FLUID COOLER	ANALOG OUTPUT	3-WAY VALVE ACTUATOR
FAN SPEED CONTROL	1/FLUID COOLER	ANALOG OUTPUT	VFD MOTOR SPEED CONTROLLER

2.07. HEATING/COOLING WATER DISTRIBUTION SYSTEM CONTROL SEQUENCES

A. GENERAL OVERVIEW: THE HEATING DISTRIBUTION SYSTEM CONSISTS OF A STEAM REDUCING STATION TO CONVERT 110 PSI INCOMING SERVICE DOWN TO 15 PSI. REDUNDANTLY SIZED STEAM TO HOT WATER HEAT EXCHANGERS FOR GENERATING HEATING WATER, TWO(2) DEDICATED VARIABLE PRIMARY PUMPS WITH VFD SET POINTS BALANCED FOR HEATING WATER OPERATION, AND TWO PLATE AND FRAME HEAT EXCHANGERS PIPED TO GLYCOL DISTRIBUTION LOOPS.

B. PRIMARY HEATING WATER PUMP CONTROL:
1. HWPP 5-01 & 5-02: THESE PUMPS EACH HAVE VFD CONTROLLERS AND ARE EQUALLY SIZED EACH AT 50% FULL SYSTEM LOAD. THE BUILDING AUTOMATION SYSTEM (BAS) 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 ENABLE THE LEAD PUMP SHALL RAMP UP TO A SINGLE FLOW RATE THROUGH ITS VFD CONTROLLER AFTER THE APPROPRIATE ISOLATION VALVES HAVE BEEN PROVEN OPEN.
   1. HEATING WATER PRESSURE DIFFERENTIAL SET POINT: **15 PSI**, ADJUSTABLE.
   2. HEATING WATER TEMPERATURE SET POINT: **180°F**, ADJUSTABLE.
   3. START-UP: THE PUMPS SHALL BE SOFT-STARTED THROUGH THEIR VARIABLE SPEED DRIVES. NORMAL POSITION SHALL BE ZERO RPM. PUMP ACCELERATION AND DECELERATION RATES SHALL BE ADJUSTABLE AT THE VARIABLE SPEED DRIVE.
   4. PUMPS SHALL MODULATE BASED ON DIFFERENTIAL PRESSURE SETPOINT REQUIRED AT REMOTE POINT IN EACH OF THE TWO (2) CIRCULATION LOOPS. BALANCING CONTRACTOR SHALL DETERMINE PRESSURE REQUIRED FOR FULL DESIGN FLOW AT EACH HEAT EXCHANGER AND ASSIGN THAT VALUE TO EACH DIFFERENTIAL PRESSURE SENSOR IN THOSE LOOPS. MODULATE PUMPS TO SATISFY THE PRESSURE DIFFERENTIAL SETPOINT IN ANY OF THE LOOPS NOT MAINTAINING THAT MINIMUM SETPOINT.
   5. A PIPE WELL MOUNTED TEMPERATURE SENSOR, LOCATED IN THE HEATING WATER SUPPLY/RETURN LINE SHALL MONITOR THE SUPPLY/RETURN WATER TEMPERATURES.

C. STEAM REDUCING STATION: PROVIDE MONITORING POINTS FOR STEAM REDUCING STATION VALVES, OUTPUT READINGS/TRENDING FROM STEAM FLOW METERS, ALONG WITH ALARM NOTIFICATION ON INCOMING/OUTGOING PRESSURES.

D. STEAM TRAP MONITORS: ALL STEAM TRAPS, WITH THE EXCEPTION OF THOSE BEING USED AS BACK-UP/REDUNDANT TRAPS, SHALL BE PROVIDED WITH STEAM MONITORS THROUGHOUT THIS BUILDING. CONTROLS CONTRACTOR TO MONITOR AND PROVIDE NOTIFICATION ALARMS FOR ALL TRAPS THROUGH BUILDING AUTOMATION SYSTEM.

E. DDC MINIMUM POINTS SUMMARY FROM BAS:

DESCRIPTION	TYPE (QUANTITY)	FIELD INTERFACE
PRIMARY HWS/HWR TEMPS	ANALOG INPUT(2)	PIPE WELL MOUNT TEMP SENSORS
PUMP STATUS (X3)	DIGITAL INPUT	AMP DRAW SENSOR
PUMP SPEED (X3)	ANALOG INPUT	VFD CONTROLLER
PUMP ENABLE (X3)	DIGITAL OUTPUT	VFD CONTROLLER
DIFFERENTIAL PRESSURE SENSORS (X3)	ANALOG INPUT	DIFF PRESSURE SENSOR
STEAM PRESSURE(IN/OUT)	ANALOG INPUT	PRESSURE SENSOR
STEAM FLOW/ENERGY METER	ANALOG INPUT	FLOW METER
STEAM TRAP MONITORS (MULTIPLE)	DIGITAL INPUT	TRAP MONITORS

2.08. HEATING WATER SHELL AND TUBE HEAT EXCHANGERS - CONTROL AND DISTRIBUTION:

A. GENERAL: THE HEATING SYSTEM HEATING SYSTEM CONSISTS OF TWO HEAT EXCHANGERS AND TWO SECONDARY HEATING WATER PUMPS IN A 100%-100% CONFIGURATION.
1. DURING NORMAL OPERATION, THE LEAD HEAT EXCHANGER TO MAINTAIN DISCHARGE WATER TEMPERATURE WHILE THE BACKUP HEAT EXCHANGER AND BACKUP PUMP(S) ARE AVAILABLE IN CASE OF EMERGENCY OR MAINTENANCE.

B. HEAT EXCHANGER START SEQUENCE:
1. OPEN THE HEATING WATER ISOLATION VALVE FOR LEAD HEAT EXCHANGER AND START LEAD PUMP (AS DESCRIBED BELOW).
   a. THE STEAM VALVE AND THE HEATING WATER ISOLATION SUPPLY VALVE OF THE BACKUP HEAT EXCHANGER SHALL BE CLOSED.
2. ON PROOF-OF-FLOW, MODULATE 1/3RD STEAM VALVE TO MAINTAIN SUPPLY WATER DISCHARGE TEMPERATURE SETPOINT OF 180°F. (ADJ).
3. IF THE SUPPLY WATER DISCHARGE TEMPERATURE FALLS BELOW SETPOINT FOR 30 SECONDS (ADJ), MODULATE OPEN THE 2/3RD STEAM VALVE.
4. ALARM BAS AND ACTIVATE THE BACKUP HEAT EXCHANGER IF THE SYSTEM IS UNABLE TO MAINTAIN SETPOINT FOR MORE THAN 2 MINUTES (ADJ) WITH THE STEAM CONTROL VALVE OF THE LEAD HEAT EXCHANGER COMMANDED 100% OPEN.
5. MONITOR THE SUPPLY WATER DISCHARGE TEMPERATURE FROM THE HEAT EXCHANGER. ALARM BAS IF THE SUPPLY WATER TEMPERATURE REACHES 200°F.

C. HEAT EXCHANGER STOP SEQUENCE:
1. CLOSE STEAM VALVE(S).
2. AFTER THE STEAM VALVE(S) HAVE BEEN PROVEN CLOSED, CLOSE HEATING WATER ISOLATION VALVE AFTER THE PUMP HAS STOPPED (AS DESCRIBED BELOW).

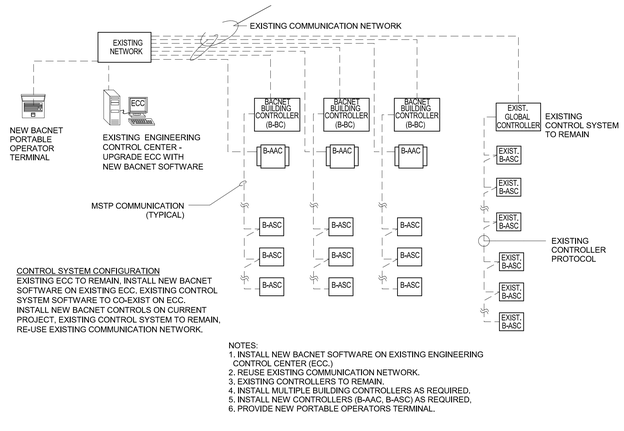
D. LEAD/BACKUP OPTIMIZATION:
1. PROVIDE PROGRAM TO SELECT LEAD/BACKUP HEAT EXCHANGER AND PUMP TO EQUALIZE RUN TIME. INITIALLY SET PROGRAM TO SWITCH LEAD DESIGNATION EVERY 1000 OPERATING HOURS (ADJ).
2. OPERATOR SHALL ALSO HAVE THE CAPABILITY TO SELECT THE LEAD HEAT EXCHANGER AND/OR LEAD PUMP FROM THE OPERATOR'S WORKSTATION.
3. RUN TIME SHALL BE MONITORED ON AN HOURLY BASIS.

E. DDC POINTS SUMMARY:

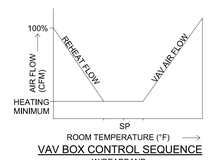
DESCRIPTION	QUANTITY	TYPE	FIELD INTERFACE
SUPPLY WATER TEMPERATURE	1	ANALOG INPUT	TEMPERATURE TRANSMITTER
RETURN WATER TEMPERATURE	1	ANALOG INPUT	TEMPERATURE TRANSMITTER
1/3 STEAM VALVE MODULATION	2	ANALOG OUTPUT	VALVE ACTUATOR
2/3 STEAM VALVE MODULATION	2	ANALOG OUTPUT	VALVE ACTUATOR
HX ISOLATION VALVE OPEN/CLOSE	2	DIGITAL OUTPUT	VALVE ACTUATOR
SYSTEM FLOW (GPM)	1	ANALOG INPUT	FLOW METER

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.

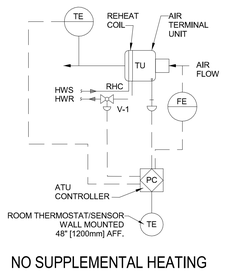


1 BACNET SYSTEM ARCHITECTURE
NTS



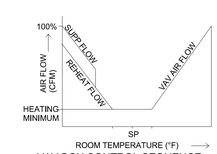
VAV BOX CONTROL SEQUENCE
W/DEADBAND

A. SET POINTS SHALL BE SET AS FOLLOWS:
COOLING 72°F (ADJ)
HEATING 70°F(ADJ)
DEADBAND OF 2° F BETWEEN HEATING AND COOLING SET POINTS WILL BE MAINTAINED.
B. UPON FALL IN SPACE TEMPERATURE THE VAV DAMPER WILL MODULATE TO MINIMUM POSITION.
C. UPON FURTHER DROP IN SPACE TEMPERATURE VALVE V-1 WILL MODULATE TO MAINTAIN SET POINT ± .5° F. THE ADJUSTABLE TOLERANCE OF ± .5° F HAS BEEN SELECTED TO PREVENT VALVE HUNTING
D. THE REVERSE SHALL OCCUR ON THE RISE IN SPACE TEMPERATURE.



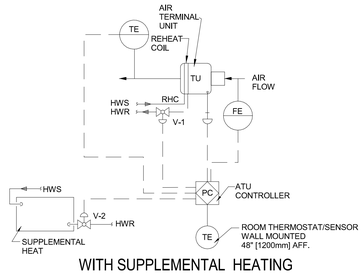
NO SUPPLEMENTAL HEATING

2 VARIABLE VOLUME AIR TERMINAL UNIT CONTROL DIAGRAM
NTS



VAV BOX CONTROL SEQUENCE
W/DEADBAND

A. SET POINTS SHALL BE SET AS FOLLOWS:
COOLING 72°F (ADJ)
HEATING 70°F(ADJ)
DEADBAND OF 2° F BETWEEN HEATING AND COOLING SET POINTS WILL BE MAINTAINED.
B. UPON FALL IN SPACE TEMPERATURE THE VAV DAMPER WILL MODULATE TO MINIMUM POSITION.
C. UPON FURTHER DROP IN SPACE TEMPERATURE VALVE V-1 WILL MODULATE TO MAINTAIN SET POINT ± .5° F. THE ADJUSTABLE TOLERANCE OF ± .5° F HAS BEEN SELECTED TO PREVENT VALVE HUNTING
D. VALVE V-2 SHALL BE ENABLED WHEN OUTSIDE AIR FALLS BELOW 40° F (ADJ) AND VALVE V-1 HAS BEEN MODULATED OPEN ABOVE 30% (ADJ), VALVE V-2 SHALL MAINTAIN SET POINT ± .5° F. THE ADJUSTABLE TOLERANCE OF ± .5°F HAS BEEN SELECTED TO PREVENT VALVE HUNTING.
E. THE REVERSE SHALL OCCUR ON THE RISE IN SPACE TEMPERATURE.



WITH SUPPLEMENTAL HEATING

3 DUAL HEAT EXCHANGER CONTROLS (HEATING SYSTEM)
NTS

SEQUENCE OF OPERATION:
1. STEAM CONTROL VALVE SHALL MODULATE TO MAINTAIN THE LEAVING HOT WATER TEMPERATURE AT SET POINT.

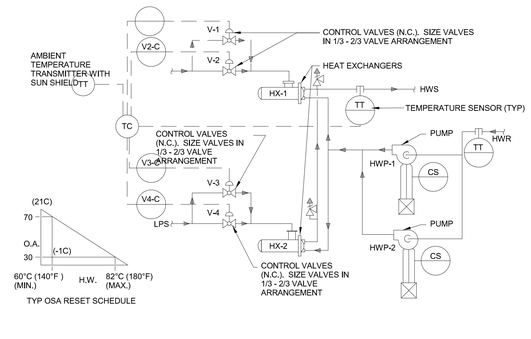
2. THE LEAVING HOT WATER TEMPERATURE SHALL BE RESET INVERSELY WITH THE OUTDOOR TEMPERATURE AS SCHEDULED.

3. THE LEAD AND LAG PUMPS AND HEAT EXCHANGERS SHALL BE SEQUENTIAL BY THE OPERATOR CONTROLS AT THE PRE-DETERMINED INTERVAL (USUALLY 7 DAYS), IN THE EVENT THE PUMP FAILS TO START WITHIN 30 SECONDS, AN ALARM SHALL BE INITIATED AND THE SECOND PUMP SHALL START AUTOMATICALLY.

VALVE SEQUENCE:
1. SUGGESTED VALVE SEQUENCE. DELETE THIS SEQUENCE FROM THIS DETAIL IF SEQUENCE IS SHOWN ON CONTROLS DRAWINGS OR SPECS.

2. V-1 (1/3) MODULATES TO MAINTAIN HW TEMPERATURE AT SETPOINT. WHEN V-1 HAS REACHED FULLY OPEN POSITIONS, V-2 (2/3) STARTS TO MODULATE OPEN.

3. IF HX-2, V-3 AND V-4 ARE NOT REDUNDANT BACKUP, THEN THE STAGING ABOVE CONTINUES AS FOLLOWS: PROVIDE, ADDITIONAL MOTORIZED ISOLATION VALVES AT THE THE HWS AND HWR FOR EACH HX'S. WHEN V-2 HAS REACHED FULLY OPEN POSITION, THE ISOLATION VALVES AT HX-2 HWS HWS AND HWR LINES FULLY OPEN, AFTER WHICH V-3 (1/3) STARTS TO MODULATE OPEN. WHEN V-3 HAS REACHED FULLY OPEN POSITION, V-4 (2/3) STARTS TO MODULATE OPEN.



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08-18-2026

Office of Construction and Facilities Management
VA U.S. Department of Veterans Affairs

Drawing Title: SEQUENCE OF OPERATIONS	Phase:	Project Title: RENOVATE FIRST FLOOR FOR NEW KITCHEN FOR THE SIOUX FALLS VA MEDICAL CENTER	Project Number: VA #438-21-403 SGA #201956
Approved:		Location: SIOUX FALLS, SOUTH DAKOTA	Building Number: 5
		Issue Date: 08-18-2026 / Checked: JG / Drawn: EC/TM	Drawing Number: M601

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VA FORM 08 - 6231

KEY NOTES:

A. PROVIDE 175# PRESSURE RATED PIPING AND FITTINGS.

B. REVISE / REPLACE EXISTING FIRE SPRINKLER PIPING, SPRINKLER HEAD TYPES & LOCATIONS, AND SYSTEM ACCESSORIES AS REQUIRED TO ACCOMMODATE NEW FLOOR LAYOUT, CEILINGS, AND SYSTEM REQUIREMENTS. ALL AREAS OF CONSTRUCTION SHALL BE FULLY SPRINKLED.

C. THE FIRE SPRINKLER SYSTEM SHALL BE FABRICATED, INSTALLED AND TESTED IN ACCORDANCE WITH THE FOLLOWING CRITERIA:
1. REGULATIONS OF THE LOCAL FIRE PROTECTION AUTHORITIES.
2. REQUIREMENTS OF THE OWNER'S INSURANCE CARRIER.
3. NFPA STANDARDS, INCLUDING BUT NOT LIMITED TO, STANDARD NO. 13 - SPRINKLER SYSTEMS, AND NO. 241 - SAFEGUARDING CONSTRUCTION, ALTERATION AND DEMOLITION OPERATION.
4. THE CONSTRUCTION DOCUMENTS.

D. THE REMODELED AREAS SHALL BE PROVIDED WITH AN AUTOMATIC WET FIRE SPRINKLER SYSTEM SIZED IN ACCORDANCE WITH THE APPLICABLE NFPA STANDARDS AND SHALL PROVIDE 100 PERCENT PROTECTION UNLESS INDICATED OTHERWISE.

E. SPRINKLER SYSTEM DESIGN CRITERIA:
1. LIGHT HAZARD OCCUPANCY - PATIENT CARE, DINING ROOM, ADMINISTRATIVE AREAS, AND PUBLIC AREAS.
2. ORDINARY HAZARD 1 - MECHANICAL EQUIPMENT ROOMS, TRANSFORMER ROOMS, ELECTRICAL SWITCHGEAR AND CLOSETS.
3. ORDINARY HAZARD 2 - STORAGE ROOMS, TRASH ROOMS, CLEAN ~~AND SOILED LINEN ROOMS~~, STORAGE AREAS, FILE STORAGE, AND KITCHEN AND DISHWASHING AREAS.

AREAS OF SPECIAL DESIGN CONSIDERATION INCLUDE, BUT ARE NOT LIMITED TO THE FOLLOWING:

F. 1. QUICK RESPONSE SPRINKLERS SHALL BE INSTALLED IN ALL ROOMS.
2. SPRINKLERS SHALL BE INSTALLED IN ALL SPACES EXCEPT AS NOTED ON THE DRAWINGS.
3. SPRINKLERS SHALL BE LOCATED IN THE CENTER OF THE CEILING TILES.
4. SEE ARCHITECTURAL CEILING PLANS FOR SPECIFIC AESTHETIC CONSIDERATIONS FOR LOCATING SPRINKLERS. FINAL SPRINKLER LOCATIONS WILL BE COORDINATED DURING SUBMITTAL REVIEW.

SPRINKLER WORK INCLUDES THE DESIGN AND CONSTRUCTION

G. NECESSARY TO PROVIDE A FULLY SPRINKLED LAYOUT. CONTRACTOR SHALL FIELD VERIFY THE ACCURACY OF THE SHOP DRAWINGS FOR EXISTING AREAS. CONTRACTOR SHALL OBTAIN A CURRENT HYDRANT FLOW TEST AND PERFORM HYDRAULIC CALCULATIONS, AND VERIFY EXACT LOCATION OF THE EXISTING OVERHEAD SYSTEM PRIOR TO DESIGN AND CONSTRUCTION.

KEY NOTES:

H. SPRINKLER DESIGN DENSITIES / DEMAND CRITERIA NFPA 13, UNLESS OTHERWISE NOTED:
1. LIGHT HAZARD - 0.10 GPM / SQ.FT. OVER THE MOST REMOTE 1,500 SQ.FT.
2. ORDINARY HAZARD 1 - 0.15 GPM / SQ.FT. OVER THE MOST REMOTE 1,500 SQ.FT.
3. ORDINARY HAZARD 2 - 0.20 GPM / SQ.FT. OVER THE MOST REMOTE 1,500 SQ.FT.

I. OBTAIN CERTIFIED TEST RESULTS FOR THE RECORD OF ALL ACCEPTANCE TESTS AS REQUIRED BY NFPA 13 FOR THE INSTALLED SPRINKLER SYSTEM. THE TEST RESULTS SHALL BE REPORTED USING NFPA STANDARD FORMS.

J. SPRINKLER HEAD TYPES: PROVIDE QUICK RESPONSE, SEMI-RECESSED, PENDENT SPRINKLERS WITH CHROME ESCUTCHEON. SEE SPECIFICATION FOR ADDITIONAL INFORMATION.

K. CONTRACTOR SHALL PROVIDE APPROVED PENETRATION MATERIAL FOR FIRE RATED WALLS AS REQUIRED AND INSTALL FIREPROOFING MATERIALS AS REQUIRED.

L. CONTRACTOR SHALL PROVIDE PIPE SLEEVES AT ALL FLOOR AND STRUCTURAL WALL OPENINGS, PENETRATIONS THROUGH FLOORS SHALL INCLUDE A 1" WATERPROOFING LIP TO PREVENT WATER FROM PASSING FROM ONE LEVEL TO ANOTHER. ANNULAR SPACE SHALL BE FILLED PER SPECIFICATION.

M. SHOP DRAWINGS SHALL BE ROUTED TO ENGINEER ONLY AFTER ALL OTHER PARTIES HAVE REVIEWED AND STAMPED THEM.

N. FM UNDERWRITERS DOES NOT RECOGNIZE CONCEALED HEADS AS QUICK RESPONSE, AND SO THEREFORE VA WILL NOT ALLOW.

O. CONTRACTOR WILL BE RESPONSIBLE FOR CONTINUOUS 24/7 MONITORING AND RECORD KEEPING OF FIRE WATCH DOCUMENTATION DURING ANY SCHEDULED SPRINKLER OUTAGE. FIRE PROTECTION CONTRACTOR SHALL INCLUDE TEMPORARY SPRINKLER COVERAGE VIA UPRIGHT SPRINKLER HEADS FOR FULL COVERAGE WITHIN ALL IMPACTED AREAS DURING CONSTRUCTION (UNLESS A 1-HOUR CONSTRUCTION BARRIER IS PROVIDED AROUND ENTIRE PERIMETER).

KEY NOTES:

1. PROVIDE NEW ZONE VALVE ASSEMBLY WITH OS&Y ISOLATION VALVE AND TAMPER SWITCH, FLOW SWITCH, INSPECTOR'S TEST STATIONS, AND DRAIN ASSEMBLY. REFER TO FIRE ALARM PLANS FOR FINAL CONNECTIONS AND TESTING PRIOR TO OCCUPANCY.

2. ROUTE 1.5" DRAIN TO BUILDING EXTERIOR, INCLUDE ISOLATION VALVE WITH AIR VENT PRIOR TO WALL PENETRATION.

3. NOTE THIS AREA IS HEAVILY CONGESTED WITH LOW STRUCTURE HEIGHT. FIRE PROTECTION CONTRACTOR WILL BE RESPONSIBLE TO CLOSELY COORDINATE INSTALLATION OF MAIN WITH ALL OTHER TRADES, NO EXISTING PIPING IS TO BE REUTILIZED WITHIN THE PROJECT AREA.

4. PENETRATE OLD EXTERIOR WALL AND TRANSITION FIRE PROTECTION MAIN UP TIGHT TO UNDERSIDE OF JOIST ONCE INSIDE NEWER BUILDING EXPANSION WITH HIGHER FLOOR TO STRUCTURE HEIGHT.

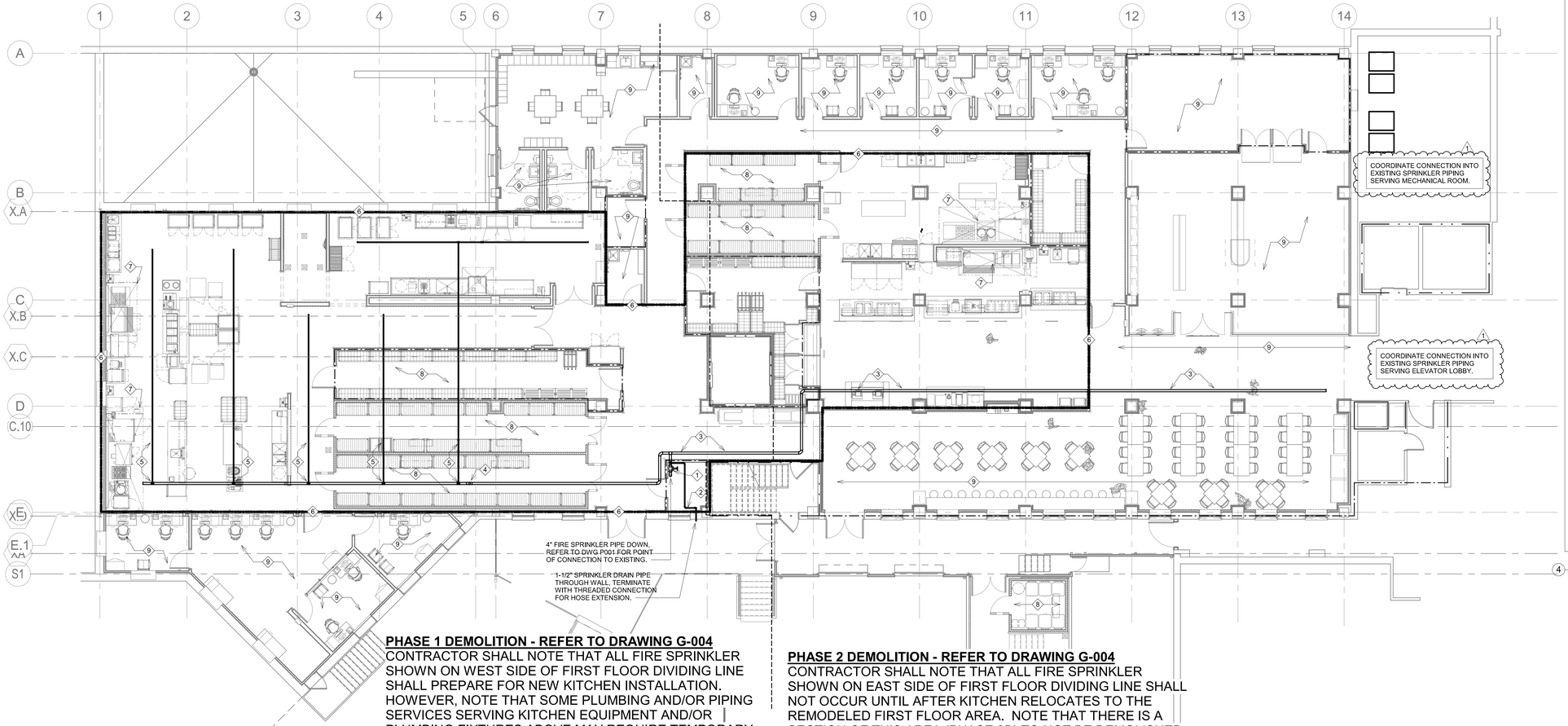
5. TAKE-OFF ALL BRANCH PIPING FROM TOP OF FIRE MAIN OR BRANCH AND ROUTE UP WITHIN JOIST SPACE. NOTE THAT FIRE PROTECTION CONTRACTOR WILL BE REQUIRED TO PROVIDE UPRIGHT HEADS TO PROVIDE FULL COVERAGE WITHIN CONSTRUCTION BOUNDARIES. CONTINUAL FIRE WATCH RECORD LOG KEEPING WILL BE THE RESPONSIBILITY OF CONTRACTOR DURING ANY SPRINKLER OUTAGE.

6. UTILIZE HIGH TEMPERATURE SPRINKLER HEADS THROUGHOUT THE KITCHEN AND DISHWASHING AREAS WHERE DIRECT CONTACT WITH STEAM GENERATED BY EQUIPMENT IS POSSIBLE. ALL SPRINKLER HEADS WITHIN EACH OPEN AREA SHALL MATCH IN BOTH TEMPERATURE RATING, AND RESPONSE TIME, WITHOUT EXCEPTIONS.

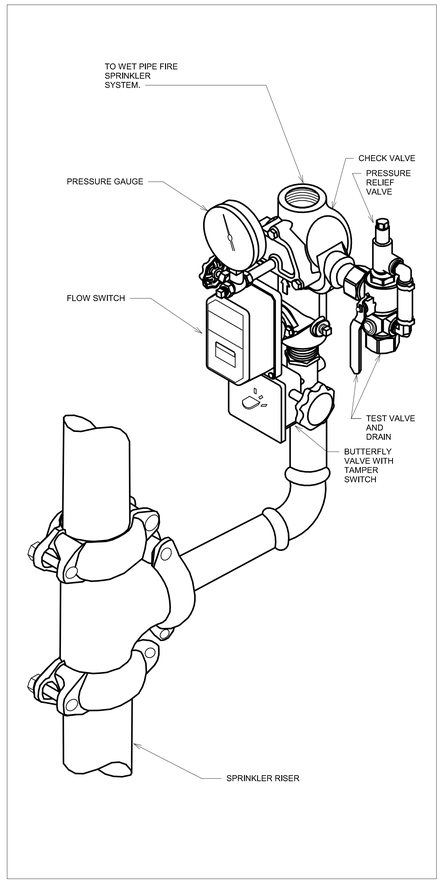
7. NOTE THAT ALL TYPE 1 GREASE HOODS (4 TOTAL) WILL BE PROVIDED WITH WET CHEMICAL SYSTEMS BY FOOD SERVICE EQUIPMENT VENDOR FOR SITE INSTALLATION BY FIRE PROTECTION CONTRACTOR. CONNECT ALL CANISTERS/PIPING AS REQUIRED BY MANUFACTURER AND INTERLOCK RELEASE MECHANISM TO SHUT-OFF NATURAL GAS ISOLATION VALVE AND SHUNT-TRIP BREAKER, SEE PLUMBING PLANS.

8. NOTE THAT ALL WALK-IN COOLERS AND FREEZERS SHALL BE PROVIDED WITH FREEZEPROOF HEAD EXTENSIONS. COORDINATE LOCATIONS OF PENETRATIONS THROUGH CASING WITH FOOD SERVICE EQUIPMENT VENDOR DRAWINGS.

9. ALL AREAS OUTSIDE OF KITCHEN MAY BE CONSIDERED AS LIGHT HAZARD OCCUPANCY. BRANCH PIPING SHALL ALL BE PROVIDED AS NEW, DO NOT REUTILIZE ANY EXISTING PIPING WITHIN PROJECT AREA. NOTE THAT FLOOR-TO-FLOOR STRUCTURE IS VERY TIGHT IN THESE AREAS AND WILL REQUIRE CLOSE COORDINATION WITH ALL TRADE INVOLVED. FIRE PROTECTION CONTRACTOR SHOULD INCLUDE METHOD OF PROVIDING TEMPORARY SPRINKLER SERVICE THROUGHOUT CONSTRUCTION AREAS OR BE RESPONSIBLE FOR FIRE WATCH ACTIVITIES, SEE GENERAL NOTES.



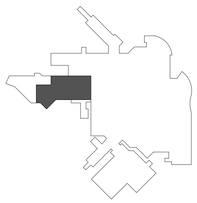
1 FIRST FLOOR FIRE PROTECTION PLAN
1/8" = 1'-0"



4 WET SPRINKLER SYSTEM ZONE CONTROL ASSEMBLY DETAIL
NO SCALE

PHASE 1 DEMOLITION - REFER TO DRAWING G-004
CONTRACTOR SHALL NOTE THAT ALL FIRE SPRINKLER SHOWN ON WEST SIDE OF FIRST FLOOR DIVIDING LINE SHALL PREPARE FOR NEW KITCHEN INSTALLATION. HOWEVER, NOTE THAT SOME PLUMBING AND/OR PIPING SERVICES SERVING KITCHEN EQUIPMENT AND/OR PLUMBING FIXTURES ABOVE MAY REQUIRE TEMPORARY CONNECTIONS UNTIL AFTER RELOCATION OCCURS.

PHASE 2 DEMOLITION - REFER TO DRAWING G-004
CONTRACTOR SHALL NOTE THAT ALL FIRE SPRINKLER SHOWN ON EAST SIDE OF FIRST FLOOR DIVIDING LINE SHALL NOT OCCUR UNTIL AFTER KITCHEN RELOCATES TO THE REMODELED FIRST FLOOR AREA. NOTE THAT THERE IS A SECTION OF THIS AREA (PHASE 2B) TO NOT BE DEMOLISHED UNTIL AFTER RELOCATION OF VCS RETAIL SPACE.



KEYPLAN
NTS
NORTH

Revision#	Description	Date:
1	ISSUE SET	08/18/2026

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REGISTERED PROFESSIONAL ENGINEER
REG. NO. 14944
JASON R. GOTTWALT
08-18-2026

Office of Construction and Facilities Management
VA U.S. Department of Veterans Affairs

Drawing Title: FIRST FLOOR FIRE PROTECTION PLAN
Phase:
Approved:
Project Title: RENOVATE FIRST FLOOR FOR NEW KITCHEN FOR THE SIOUX FALLS VA MEDICAL CENTER
Location: SIOUX FALLS, SOUTH DAKOTA
Project Number: VA #438-21-403 SGA #201956
Building Number: 5
Drawing Number: F101
Issue Date: 08-18-2026
Checked: JG
Drawn: EC/TM

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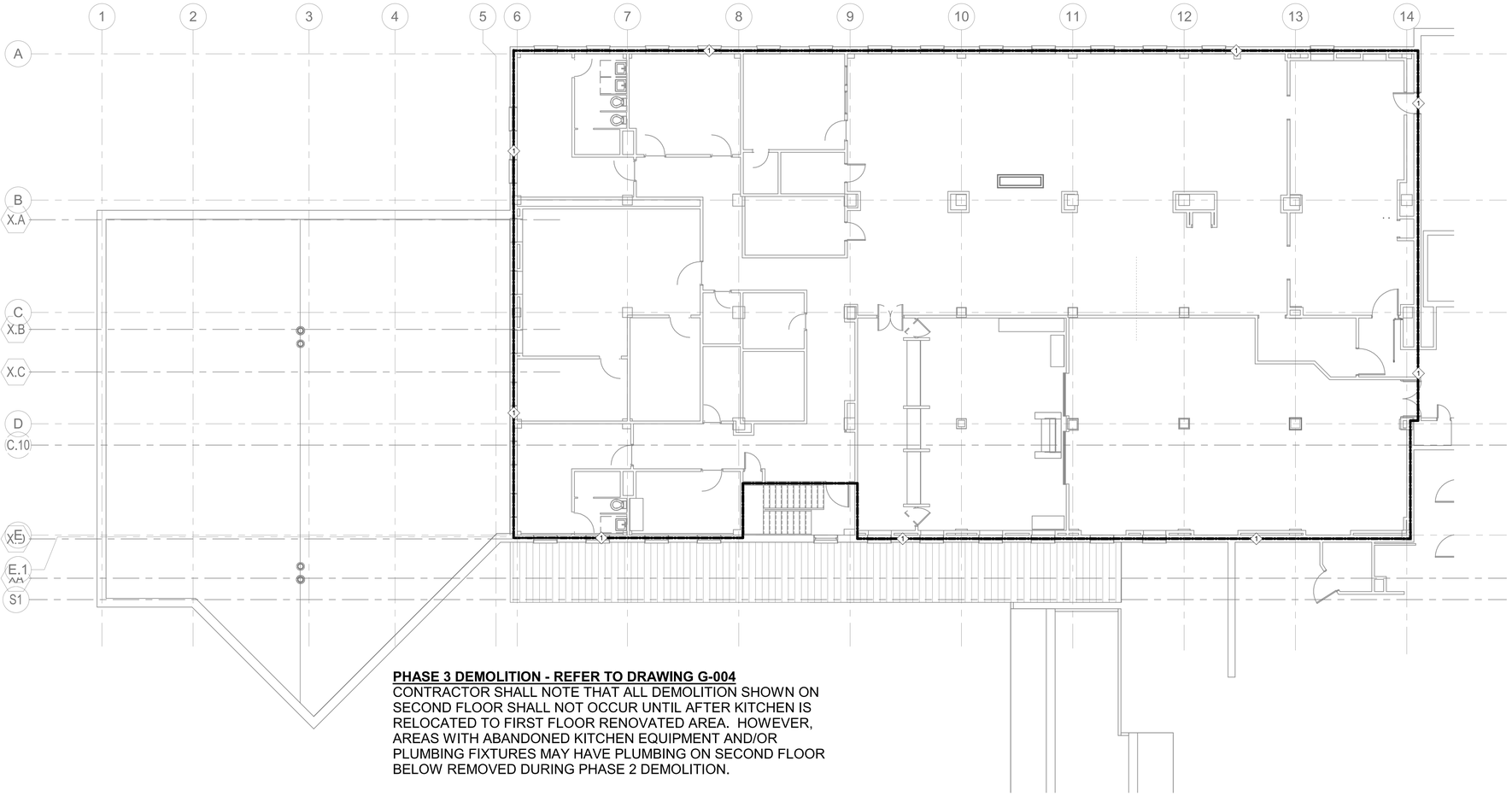
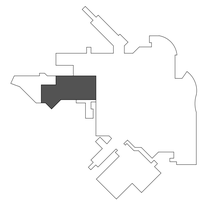
KEY NOTES:

1 AFTER COMPLETION OF FIRST FLOOR KITCHEN, AND RELOCATION OF ALL STAFF AND EQUIPMENT OCCURS, THIS SPACE SHALL BE FULLY DEMOLISHED TO A SHELL SPACE CONDITION. FIRE PROTECTION CONTRACTOR SHALL FULLY REMOVE ALL SPRINKLER MAIN AND BRANCH PIPING (EXCEPT FOR MAINS TRAVELING THROUGH THIS AREA TO ADJACENT ZONES). FIRE PROTECTION CONTRACTOR SHALL PROVIDE NEW MAIN AND BRANCH PIPING TO UPRIGHT HEADS SPACED FOR A LIGHT HAZARD OCCUPANCY THROUGHOUT THIS AREA. NOTE THAT THERE WILL BE SMALL AMOUNT OF TEMPORARY UNIT HEATERS FOR SPACE CONDITIONING AND/OR STRUCTURAL OBSTRUCTIONS TO REMAIN. FIRE PROTECTION CONTRACTOR SHALL PHASE NEW PIPING AND UPRIGHT SPRINKLER HEAD INSTALLATION WITH DEMOLITION OF EXISTING ACTIVE MAINS IN A WAY THAT LIMITS, OR ELIMINATES, ANY FIRE SPRINKLER OUTAGES IN THIS AREA. TYPICIAL OF APPROXIMATELY 10,000 SQ FT OF AFFECTED AREA SHOWN ON THIS DRAWING.



PHASE 3 DEMOLITION - REFER TO DRAWING G-004
CONTRACTOR SHALL NOTE THAT ALL DEMOLITION SHOWN ON SECOND FLOOR SHALL NOT OCCUR UNTIL AFTER KITCHEN IS RELOCATED TO FIRST FLOOR RENOVATED AREA. HOWEVER, AREAS WITH ABANDONED KITCHEN EQUIPMENT AND/OR PLUMBING FIXTURES MAY HAVE PLUMBING ON SECOND FLOOR BELOW REMOVED DURING PHASE 2 DEMOLITION.

1 SECOND FLOOR FIRE PROTECTION PLAN
1/8" = 1'-0"



KEYPLAN NTS — NORTH

1	ISSUE SET	08/18/2026
Revision#	Description	Date:

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Office of Construction and Facilities Management
VA U.S. Department of Veterans Affairs

Drawing Title: SECOND FLOOR FIRE PROTECTION PLAN
Phase:
Approved:
Project Title: RENOVATE FIRST FLOOR FOR NEW KITCHEN FOR THE SIOUX FALLS VA MEDICAL CENTER
Location: SIOUX FALLS, SOUTH DAKOTA
Project Number: VA #438-21-403 SGA #201956
Building Number: 5
Issue Date: 08-18-2026
Checked: JG
Drawn: EC/TM
Drawing Number: F201

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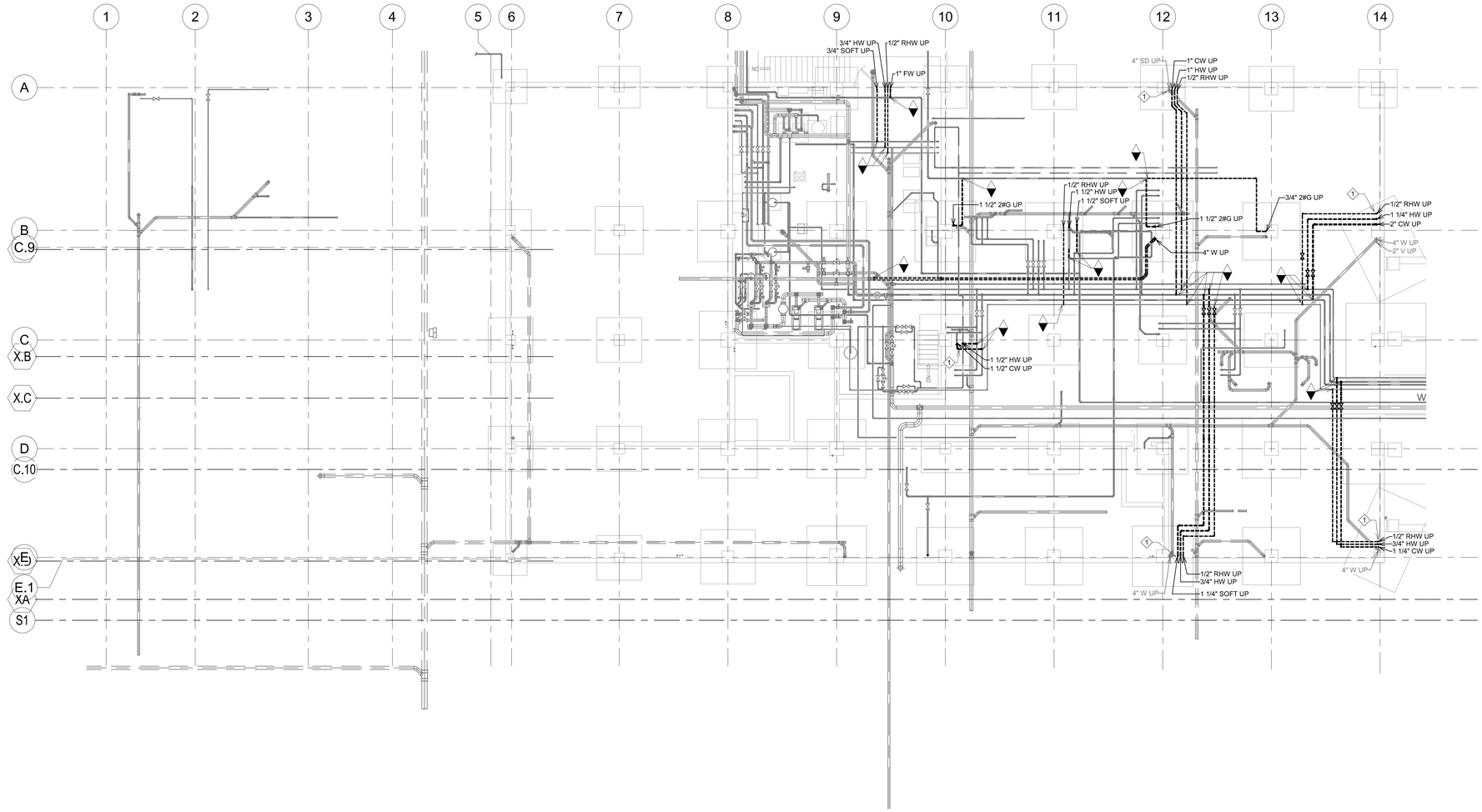

1 PIPE BASEMENT PLUMBING POST-DEMOLITION PLAN
1/8" = 1'-0"

GENERAL NOTES:

A. CONTRACTOR SHALL REFER TO THE VA MASTER SPECIFICATION MANUAL EDITED FOR THIS PROJECT ALONG WITH ANY APPLICABLE STANDARDS WITHIN THE VA DESIGN GUIDES. ALL REQUIREMENTS OF THOSE MANUALS SHALL BE MAINTAINED IN ADDITION TO ALL NOTES AND DESCRIPTIONS INDICATED WITHIN THESE DRAWINGS. ANY CONFLICTS BETWEEN THE DOCUMENTS SHOULD BE BROUGHT TO THE ATTENTION OF THE ENGINEER FOR INTERPRETATION.

B. 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.

C. ANY MAJOR OUTAGES INDICATED ON THESE DRAWINGS SHALL BE SCHEDULED TO BE PERFORMED AFTER NORMAL BUSINESS HOURS OR DURING WEEKEND PERIODS TO MINIMIZE HOSPITAL DISRUPTION. VA HOSPITAL FACILITIES WILL REQUIRE A MINIMUM OF TWO (2) WEEKS NOTICE PRIOR TO ANY SUCH OUTAGE.

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

E. THE EXACT LOCATION OF EQUIPMENT ROUGH-INS SHALL BE VERIFIED WITH THE STAMPED APPROVED SHOP DRAWINGS PRIOR TO ANY FIELD INSTALLATION.

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

G. 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.

H. ALL EXISTING PIPING THROUGH NEW FIRE RATED WALLS SHALL BE ADEQUATELY FIRE SEALED AS REQUIRED. PIPING PENETRATIONS THROUGH INTERSTITIAL FLOOR SHALL BE DRILLED OR CUT BY THE CONTRACTOR AND FIRE SEALED AS REQUIRED.

I. ALL CORE DRILLING OR ANY ACTIVITIES CAUSING EXTREME VIBRATION OR NOISE SHALL BE COORDINATED TO BE PERFORMED AFTER BUSINESS HOURS TO NOT AFFECT CRITICAL HOSPITAL FUNCTIONS WITHIN ADJACENT AREAS. COORDINATE WITH VA REPRESENTATIVE AS REQUIRED.

J. FIELD VERIFY EXISTING WATER, WASTE, VENT OR OTHER PIPING SYSTEMS FOR CONNECTIONS TO FIXTURES THAT MAY NOT BE IDENTIFIED ON PLANS PRIOR TO SERVICE OUTAGES, DEMOLITION OR ALTERATIONS OF EXISTING PIPE ROUTING. COORDINATE UNKNOWN SERVICE WITH FACILITIES AND ENGINEER OF RECORD.

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

L. ALL CONTRACTORS TO REFERENCE THE INFECTION CONTROL NOTES IDENTIFIED WITHIN THE VENTILATION GENERAL NOTES ON THESE DRAWINGS. CONFORM TO ALL ICRA REQUIREMENTS.

M. THE PLUMBING CONTRACTOR SHALL PROVIDE ALL PIPING, FITTINGS, VALVES & ACCESSORIES AS REQUIRED FOR INSTALLATION OF OWNER PROVIDED EQUIPMENT PER MANUFACTURER'S RECOMMENDATIONS.

N. REFER TO PLUMBING FIXTURE SCHEDULE AND PLUMBING RISER DIAGRAMS FOR INDIVIDUAL BRANCH SIZES TO FIXTURES.

O. 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.

P. PROVIDE CLEANOUTS AT BASE OF EVERY STORM DRAIN LEADER.

KEY NOTES:

1 CONTRACTOR TO PERFORM DISCONNECT AND RECONNECT OF EXISTING DOMESTIC WATER RISERS DURING PREMIUM OVERTIME HOURS AS COORDINATED BY VA FACILITIES. NOTE THAT DURATION OF OUTAGE SHOULD BE AS SHORT AS POSSIBLE, AND ALL AFFECTING PIPING SHOULD BE THOROUGHLY FLUSHED ON COMPLETION. REFER TO DRAWING P201 FOR RECONNETION TO NEW PIPING MAINS FROM SECOND FLOOR LEVEL.

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Drawing Title: PIPE BASEMENT PLUMBING PHASE 3 DEMOLITION PLAN
Phase:
Approved:
Project Title: RENOVATE FIRST FLOOR FOR NEW KITCHEN FOR THE SIOUX FALLS VA MEDICAL CENTER
Location: SIOUX FALLS, SOUTH DAKOTA
Project Number: VA #438-21-403 SGA #201956
Building Number: 5
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Issue Date: 08-18-2026
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