ADDENDUM No. 1

RFP No. 22-34

WTP HVAC Improvements – Phase II

Due: May 10, 2022 at 2:00 P.M. (local time)

The information contained herein shall take precedence over the original documents and all previous addenda (if any), and is appended thereto. **This Addendum includes nine (9) pages.**

The Proposer is to acknowledge receipt of this Addendum No. 1, including all attachments in its Proposal by so indicating in the proposal that the addendum has been received. Proposals submitted without acknowledgement of receipt of this addendum may be considered non-conforming.

The following forms provided within the RFP Document should be included in submitted proposal:

- **Attachment D - Prevailing Wage Declaration of Compliance**
- **Attachment E - Living Wage Declaration of Compliance**
- **Attachment G - Vendor Conflict of Interest Disclosure Form**
- **Attachment H - Non-Discrimination Declaration of Compliance**

Proposals that fail to provide these completed forms listed above upon proposal opening may be rejected as non-responsive and may not be considered for award.

I. CORRECTIONS/ADDITIONS/DELETIONS

Changes to the RFP documents which are outlined below are referenced to a page or Section in which they appear conspicuously. Offerors are to take note in its review of the documents and include these changes as they may affect work or details in other areas not specifically referenced here.

Section/Page(s)	Change
Specification 01 11 13, SUMMARY	On Table 1, Air Handler Shutdown line, Change Maximum Duration from 2 calendar days to 4 calendar days per AHU. On Water Quality Lab Construction (AHU 6) line, change Maximum Duration from 2 calendar days to 5 calendar days.
Specification 05 51 36, METAL WALKWAYS	Delete specification
Drawing M-103	On the Chemical Feed Building Fourth Floor/Mezzanine Plan, change Keynote 11 and limit of demolition symbol leader lines to point to the east exterior side of the duct chase.
Drawing M-104	Reissued

Drawing M-204	On the Chemical Feed Building Fourth Floor/Mezzanine Plan, change Keynote 2 and connection symbol leader lines to point to the east exterior side of the duct chase.
Drawing M-501	Detail 5 removed
Drawing M-701	In Sequence of Operations, change that' "alarms shall be sent to the SCADA system," to, "alarms shall be sent to the plant BMS system."
Drawing M-702	In AHU-1 Controls Diagram and Sequence of Operations, change EF-18 to EF-A4.
Drawing M-703	Reissued
Drawing M-704	Reissued

II. QUESTIONS AND ANSWERS

The following Questions have been received by the City. Responses are being provided in accordance with the terms of the RFP. Respondents are directed to take note in its review of the documents of the following questions and City responses as they affect work or details in other areas not specifically referenced here. These questions and answers are provided for clarity and do not modify the bidding documents.

Question 1: Are new variable frequency drives to be provided?
Answer 1: Air flow control devices are intrinsic to equipment specified. Additional devices are not to be included in the bid.

Question 2: Electrical drawings (general notes) ask for disconnects on equipment where there are no existing disconnects.
Answer 2: As indicated in the general notes, new disconnects are to be provided.

Question 3: Can you provide a key that matches drawings to individual lines in the bid tab?
Answer 3: See below:

- Item 2 Ventilation Improvements (Lime Rooms, Filter Gallery, Ammonia Building, Sodium Hydroxide Vault) drawings M-106, M-107, M-108, M-208 & M-301 / E-206, E-207 & E-208.
- Item 3 AHU Replacement & Roofing Repairs (AHU'S 1 through 4)- drawings M-101, M-102, M-103, M-201, M-202, M-203, M-204, M-205, M-901 & M-902 /E-201, E-202 & E-203.
- Item 4 AHU Replacement & Roofing Repairs (AHU-6 & FCU-1 / HP-1)- drawings M-104 & M-206 / E-204 & E-209 and Siemens software conversion.
- Item 5 AHU Replacement & Roofing Repairs (Ozone Building AHU'S 1, 2 & 3)- drawings M-105 M-207 / E-205.
- Item 6 Roofing Replacement (Administration Building)- drawings A-101, AD-101 & A-501.

Question 4: Can the pre-bid meeting sign-in sheet be provided?
Answer 4: Attached.

Question 5: Will the contractor have access to the freight elevator? What is are the internal dimensions and capacity (lbs) of the elevator?

Answer 5: Yes, the contractor will have use of the freight elevator. The freight elevator door opening is 84" W x 96" H. The interior dimensions of the elevator are 69" D x 100" W x 100" H. The elevator is rated for 10,000 pounds.

Question 6: Are there any roofing warranties in any of the work areas? If so, identify roofing manufacturers.

Answer 6: Roof within area(s) of work is not under warranty.

Question 7: Is the steam hydronic system drained in warmer months? If not, please confirm the contractor will not be draining, refilling, and/or commissioning the hydronic system.

Answer 7: Yes, the hydronic system is drained in the summer months. The contractor is responsible for commissioning the new air handling units utilizing the hydronic system and verifying heating operations. City staff will prepare the hydronic system prior to work and refill it prior to start-up.

Question 8: Where openings are being enlarged in existing masonry walls, is a new lintel to be installed?

Answer 8: Yes. Refer to architectural detail for lintel information.

Question 9: How does the contractor gain access to the duct chase shown on M-103?

Answer 9: Limit of demolition is at duct chase wall, connect to existing at duct chase wall.

Question 10: Is a drawing of the duct work required to be demolished for the lab bio-hood, per note 3 on M-104, available?

Answer 10: M-104 is reissued in Addendum #1.

Question 11: How do you access the lower chemical roof area, the area where the new condensing units will sit?

Answer 11: There is a ladder and roof hatch in the fourth floor sludge pump room that leads to the lower roof.

Question 12: Are the contract allowances Provisional Allowances subject to contractor mark-up?

Answer 12: The permit allowance will not be eligible for contractor mark-up. Depending on the nature of the work, the Contractor likely will be allowed to mark-up subcontractors and realize a profit margin on self-perfomed work completed from the Temporary HVAC and Miscellaneous Allowances.

Question 13: The administration AHU-6 will require a shut down of 5 days, can the allowable shut down time be extended to accommodate this?

Answer 13: 5 days is acceptable. See CORRECTIONS/ADDITIONS/DELETIONS.

Question 14: There is a metal walkways specification 05 51 36, where are there metal walkways on the project?

Answer 14: No metal walkways needed. See CORRECTIONS/ADDITIONS/DELETIONS.

Question 15: 01 11 13 1.02c reads "Suggested sequence for work is (work shall start demonstration period by end of specified ranges)" Does this mean that the performance, and/or operational testing is included in or excluded from the time frames listed in subpart C? If performance testing is included in suggested sequence of work time frames, then the durations listed are not feasible and the timeline will need to be extended to by approximately two weeks per area, with the mezzanine area extended an additional week. The substantial completion will need to be extended accordingly.

Answer 15: Demonstration period can occur after these dates.

Question 16: Regarding the “Summary of Shutdown Notices” what constitutes a unit being back online? What is the minimum amount of functionality required to be back online?
Answer 16: A unit would be considered to be back online when it is providing heating and cooling to the space in “Automatic Mode” while communicating to the plant BMS System.

Question 17: Does the Siemens scope of work include conduit and wire?
Answer 17: Coordinate with Siemens.

Question 18: Only one duct smoke detector is shown on the drawings, please confirm no other new duct detectors are required. If new duct smoke detectors are required, please identify the location of both the detector and the panel they are to be integrated into.
Answer 18: Duct smoke detectors are required for AHU-6, AHU-2, AHU-O2, AHU-O3, and existing AHU-5. AHU-6 and AHU-2 will alarm back to the BMS system that the unit is off. AHU-O2 and AHU-O3 will not alarm to a panel, only shut down the unit. AHU-5 will alarm to the fire control panel as indicated on drawings.

Question 19: Referring to M-702, is AHU-1 interlocked with EF-18 or EF-A4?
Answer 19: AHU-1 is interlocked with EF-A4.

Question 20: Do the alarms from AHU-6, AHU-2, and AHU-3 go to the plant’s SCADA system or the building BMS?
Answer 20: Alarms will go to the building BMS system.

Question 21: Is there a vault hatch associated with exhaust fan EF-AM1?
Answer 21: Yes, there is an existing hatch to access the ammonia hydroxide vault.

Question 22: Do any of the buildings for this project require explosion-proof sensors or enclosures?
Answer 22: No.

Question 23: Do any of the buildings for this project have corrosive environments requiring specialty sensors or enclosures?
Answer 23: No.

Question 24: The schedule for AHU-6 on drawing M-601 calls for the supply and exhaust fans to be two fan arrays. Will these arrays have individual VFDs for each fan in the array or one VFD for both fans in the array?
Answer 24: Single VFD to control both supply fans, single VFD to control both exhaust fans.

Question 25 Please provide the location of the IT drops for all of the buildings to provide communication with the existing site Siemens building management system.
Answer 25: Administration, chemical building and ozone buildings will be connected to the BMS. The locations of IT connections was discussed with Siemens outside of this Q&A.

Question 26: For the CU and EF units mounted outside, per the NEC section 440, a disconnect should be within sight of the equipment. The CU and EF units would require a NEMA 3R rated enclosure instead of a NEMA 12 enclosure.
Answer 26: Provide NEMA enclosure rated for outdoor applications.

Offerors are responsible for any conclusions that they may draw from the information contained in the Addendum.

Pre-Bid Meeting
Sign-In

Project: AA WTP HVAC Improvements – Phase II **Date** April 19, 2022

Name	Company or Agency	Phone	~~Fax~~ Email
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Trey Lim	Siemens	734.928.9071	Trey.Lim@Siemens.com
JEFF KOEPP	A.F. SMITH ELECTRIC	734.482-0977	W.JKOEPP@AFSMITH.COM
Jason Axelson	Weiss Construction Co	313 567 4500	JAxelson@Weiss-Construction.com
Bedkr AL-MuPti	AIC Building System, Inc.	248-941-4293	A-CBS@att.net
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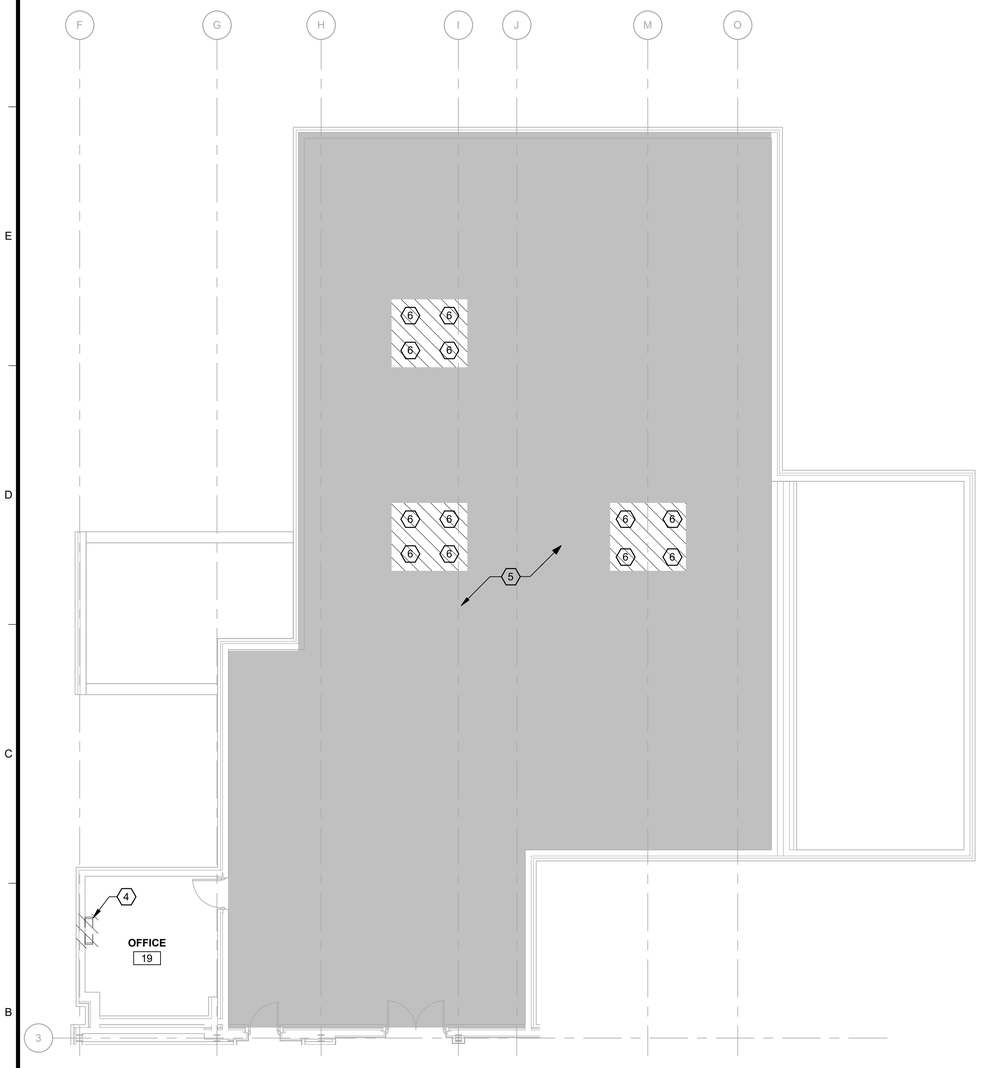
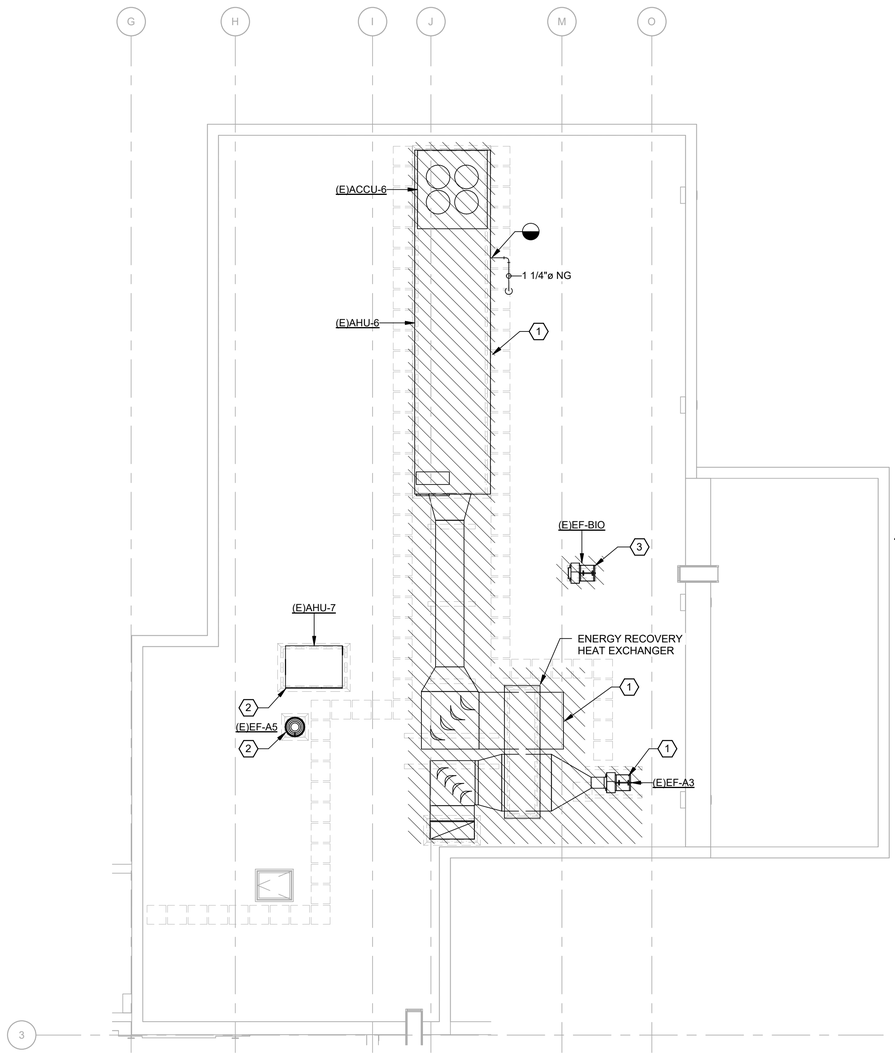
Doug Cundiff	Huron Valley Electric	734-548-4475	dcundiff@huronvalleyelectric.com



MECHANICAL DEMOLITION - ADMINISTRATION BUILDING - GROUND FLOOR

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



MECHANICAL DEMOLITION - ADMINISTRATION BUILDING - ROOF

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

GENERAL NOTES

A. ALL ANCHORING EQUIPMENT ON EXTERIOR OF BUILDING IS TO BE OF STAINLESS STEEL CONSTRUCTION. .
B. UNDER NO CIRCUMSTANCES SHALL THE CONTRACTOR ROLL EQUIPMENT OR MATERIALS OVER ROOF.
C. SIZE, QUANTITY, AND LOCATION OF PIPING SHOWN IS APPROXIMATE. ANY SIZES INDICATED ARE TO AID CONTRACTOR IN ESTABLISHING DEMOLITION SCOPE ONLY. CONTRACTOR SHALL FIELD VERIFY ALL EXISTING PIPING LOCATIONS AND SIZES PRIOR TO DEMOLITION. MEANS AND METHODS SHALL BE LEFT UP TO THE CONTRACTOR AT CONTRACTOR'S DISCRETION.
D. CONTRACTOR SHALL ASSUME THERE ARE NO EXISTING ISOLATION VALVES OR THAT EXISTING ISOLATION VALVES ARE NON-FUNCTIONAL WHEN CONNECTING NEW PIPING INTO EXISTING. CONTRACTOR SHALL INCLUDE COST TO FREEZE OR HOT TAP PIPING, CUT AND PROVIDE ISOLATION VALVES SUCH THAT NEW WORK AND FUTURE MAINTENANCE CAN BE PERFORMED.
E. CONTRACTOR SHALL COORDINATE ALL DISRUPTIVE OR "NOISY" WORK WITH OWNER AND OBTAIN OWNERS PERMISSION PRIOR TO PERFORMING DISRUPTIVE WORK. PERFORM WORK DURING OFF-HOURS IF NECESSARY. NOISY WORK MAY BE CONSIDERED, SAW CUTTING, CONCRETE DRILLING, GRINDER CUTTING, ETC. IF CONTRACTOR IS UNSURE WHAT WORK CONSTITUTES "NOISY" WORK, SUBMIT RFI TO OWNER FOR CLARIFICATION.

(#) KEYNOTES

1 DEMOLISH ROOF MOUNTED AIR HANDLING UNIT AHU-6, ASSOCIATED CONDENSING UNIT ACCU-6, ENERGY RECOVERY HEAT EXCHANGER, EXHAUST FAN EF-A3, AND ALL ASSOCIATED DUCTWORK, ACCESSORIES, AND SUPPORTS. COORDINATE WITH ELECTRICAL FOR EXTENT OF DEMOLITION OF CONTROLS AND WIRING. DEMOLISH SUPPLY AND RETURN DUCTWORK TO BELOW ROOF, ROOF PENETRATIONS ARE TO REMAIN. NATURAL GAS PIPING ABOVE ROOF IS TO REMAIN. DEMOLISH STEAM HUMIDIFICATION PIPING TO BELOW ROOF, CUT AND CAP. PATCH PIPING ROOF PENETRATIONS IN COORDINATION WITH ARCHITECTURAL ROOF WORK. CONTRACTOR IS TO INSPECT ROOF CURB, ROOFING, STRUCTURAL STEEL, ETC. BENEATH AND AROUND DEMOLISHED UNIT FOR EVIDENCE OF WATER LEAKAGE. CONSULT WITH ENGINEER AND OWNER ON RECOMMENDED REPAIRS AND LEAK PREVENTION SOLUTIONS PRIOR TO NEW CONSTRUCTION.

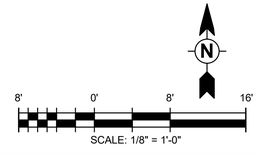
2 AIR HANDLING UNIT AHU-7 AND EXHAUST FAN EF-A5 SERVING BASEMENT LEVEL OF ADMINISTRATION BUILDING ARE TO REMAIN.

3 DEMOLISH EXHAUST FAN SERVING BIO-HOOD IN LABORATORY AREA AND ALL ASSOCIATED ACCESSORIES, SUPPORTS, CONTROLS AND WIRING. DEMOLISH DUCTWORK TO BELOW ROOF, PATCH ROOF PENETRATION IN COORDINATION WITH ARCHITECTURAL ROOF WORK.

4 DEMOLISH FAN COIL UNIT IN ENCLOSED OFFICE AND ALL ASSOCIATED ACCESSORIES, OUTDOOR EQUIPMENT, PIPING, AND SUPPORTS. COORDINATE WITH ELECTRICAL FOR EXTENT OF DEMOLITION OF CONTROLS AND WIRING.

5 EXISTING LABORATORY AREA, CORRIDORS, STORAGE, ENCLOSED OFFICE, AND OTHER SPACES ARE TO MAINTAIN CURRENT DUCTWORK ROUTING, AIR TERMINAL PLACEMENT, AND SYSTEM BALANCING. INSTALL NEW THERMOSTAT FOR RTU-6 IN SAME OR SIMILAR LOCATION AS EXISTING THERMOSTAT.

6 DEMOLISH CEILING MOUNTED EXHAUST SNORKELS AND ALL MOUNTING EQUIPMENT. EXHAUST DUCTWORK, ACCESSORIES, AND ACOUSTIC CEILING TILES ARE TO REMAIN.



TETRA TECH
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ANN ARBOR, MI 48108
TEL: (734) 665-6000

ISSUED FOR BID

NOT FOR CONSTRUCTION

MARK	DATE	DESCRIPTION	BY
1	05/05/22	BID ADDENDUM #1	JRJ

CITY OF ANN ARBOR, MICHIGAN
WTP HVAC IMPROVEMENTS - PHASE II

MECHANICAL DEMOLITION - ADMINISTRATION BUILDING LAB & ROOF

PROJ:	200-31537-21005
DESN:	JRJ
DRWN:	JRJ
CHKD:	KK

M-104

Bar measures 1 inch, otherwise drawing is not to scale

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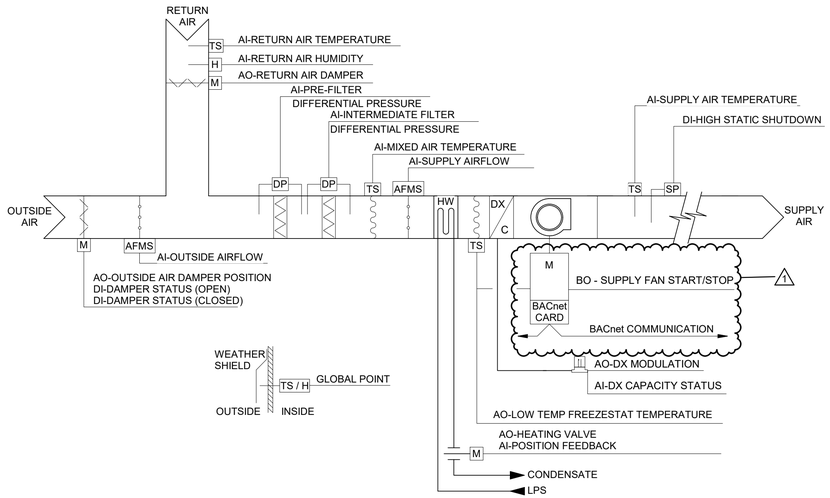


AIR HANDLING UNIT (AHU-3, AHU-4) SEQUENCE OF OPERATIONS

AIR HANDLING UNIT SEQUENCE OF OPERATIONS (AHU-3, AHU-4)

MANUFACTURER SHALL PROVIDE THE UNIT WITH A STAND-ALONE UNIT CONTROLLER CAPABLE OF THE FOLLOWING SEQUENCES OF OPERATIONS AND MINIMUM FEATURES. ALL CONTROL SENSORS AND DEVICES INDICATED SHALL EITHER BE PROVIDED BY MANUFACTURER OR CONTROLS CONTRACTOR IN ORDER TO MEET THE INTENT OF THESE SEQUENCES.

THE CONTROL OF AHU-3 AND AHU-4, INSTRUMENTS, GAGES, CONTROL VALVES, AND ACCESSORIES SHALL UTILIZE THE CONTROL SYSTEM PROVIDED BY THE CONTRACTOR. CONTRACTOR SHALL PROVIDE ALL NECESSARY WIRING AND CONDUIT, DEVICES, CONTROLLERS, INTERLOCKS, AND SWITCHES AS NECESSARY TO MEET THE INTENT OF THESE SEQUENCES AND THE CONTROL DIAGRAMS SHOWN. CONTRACTOR SHALL COORDINATE FOR A FULLY FUNCTIONAL SYSTEM.

OCCUPIED MODE:
THE OUTSIDE AIR DAMPER AND EXHAUST AIR DAMPER SHALL OPEN AND PROVIDE PROOF OF OPEN STATUS. THE RETURN AIR DAMPER SHALL CLOSE AND PROVIDE PROOF OF STATUS. THE SUPPLY AIR FAN AND EXHAUST FAN SHALL START UPON PROOF OF DAMPERS AND RUN CONTINUOUSLY UNLESS SHUT DOWN BY OPERATOR OR SAFETIES. THE UNIT CONTROLLER SHALL MAINTAIN THE OCCUPIED SPACE TEMPERATURE SETPOINT.

UNOCCUPIED MODE:
WHEN THE UNIT SWITCHES FROM OCCUPIED TO UNOCCUPIED MODE, THE SUPPLY AND EXHAUST FAN SHALL STOP, THE OUTSIDE AND EXHAUST AIR DAMPERS SHALL CLOSE AND THE RETURN AIR DAMPER SHALL OPEN. IF SPACE TEMPERATURE FALLS BELOW OR RISES ABOVE THE UNOCCUPIED HEATING OR COOLING SETPOINTS, THE SUPPLY FAN SHALL START. THE UNIT CONTROLLER SHALL MAINTAIN THE UNOCCUPIED SPACE TEMPERATURE SETPOINTS. IF SPACE TEMPERATURE IS SATISFIED THE SUPPLY FAN SHALL STOP AND HEATING AND COOLING SHALL BE DISABLED.

OPTIMAL START:
THE UNIT CONTROLLER SHALL MONITOR THE SCHEDULED OCCUPIED TIME, OCCUPIED SPACE SETPOINTS AND SPACE TEMPERATURE TO CALCULATE WHEN THE OPTIMAL START OCCURS.

OPTIMAL STOP:
THE UNIT CONTROLLER SHALL MONITOR SCHEDULED UNOCCUPIED TIME, OCCUPIED SETPOINTS AND SPACE TEMPERATURE TO CALCULATE WHEN OPTIMAL STOP OCCURS. WHEN OPTIMAL STOP MODE IS ACTIVE, UNIT CONTROLLER SHALL MAINTAIN SPACE TEMPERATURE TO THE SPACE TEMPERATURE OFFSET SETPOINT.

HEATING MODE:
IF SPACE TEMPERATURE FALLS BELOW THE SETPOINT MINUS THE DEADBAND THE HEATING SHALL BE ENABLED BY THE UNIT CONTROLLER. UPON PROOF OF INTERNAL SAFETIES THE STEAM HEATING VALVE SHALL MODULATE TO MAINTAIN THE SPACE TEMPERATURE SETPOINT.

COOLING MODE:
IF SPACE TEMPERATURE RISES ABOVE THE SETPOINT PLUS THE DEADBAND THE DX COOLING SYSTEM SHALL BE ENABLED BY THE UNIT CONTROLLER. THE UNIT CONTROLLER SHALL MODULATE THE COOLING SYSTEM TO MAINTAIN THE SPACE TEMPERATURE SETPOINT.

AIR HANDLING UNIT SEQUENCE OF OPERATIONS (AHU-3, AHU-4) CONT.

OCCUPIED BYPASS:
THE UNIT CONTROLLER SHALL MONITOR STATUS OF "ON" AND "CANCEL" BUTTONS OF THE SPACE TEMPERATURE SENSORS. WHEN OCCUPIED BYPASS REQUEST IS RECEIVED FROM A SPACE SENSOR, THE UNIT SHALL TRANSITION FROM CURRENT OCCUPANCY MODE TO OCCUPIED BYPASS MODE AND UNIT SHALL MAINTAIN SPACE TEMPERATURE TO OCCUPIED SETPOINTS (ADJ.)

SUPPLY FAN:
THE SUPPLY FAN SHALL ENABLE WHILE IN OCCUPIED MODE AND CYCLED ON DURING UNOCCUPIED MODE. A DIFFERENTIAL PRESSURE SWITCH SHALL MONITOR DIFFERENTIAL PRESSURE ACROSS THE FAN. IF THE SWITCH DOES NOT OPEN WITHIN 40 SECONDS AFTER REQUEST FOR FAN OPERATION, A FAN FAILURE ALARM SHALL BE ANNUNCIATED AT THE UNIT CONTROLLER, THE UNIT SHALL STOP, REQUIRING A MANUAL RESET.

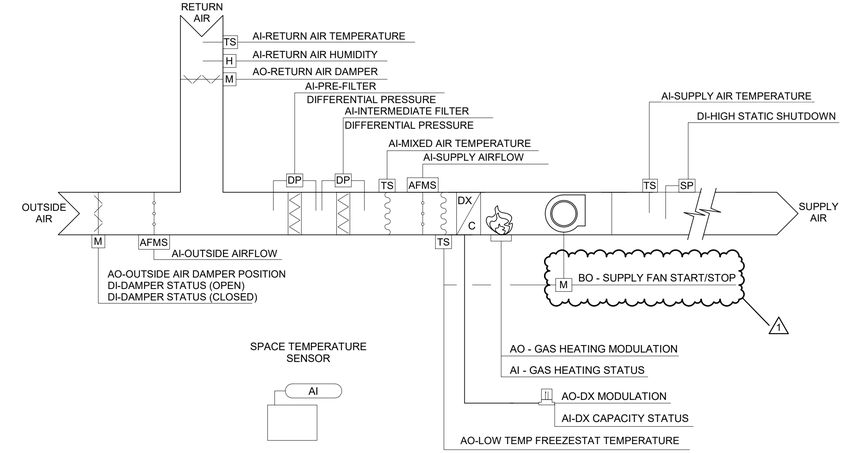
SUPPLY & EXHAUST FAN HIGH PRESSURE LIMIT OPERATION:
IF SUPPLY DUCT STATIC PRESSURE REACHES 4.00 INCHES OF W.C. (ADJ.), THE HIGH LIMIT PRESSURE SWITCH SHALL SHUT DOWN THE UNIT, REQUIRING A MANUAL RESET TO RE-START THE UNIT. SUPPLY AND EXHAUST FANS ARE INTERLOCKED VIA SOFTWARE; A FAILURE OF EITHER SHALL DISABLE BOTH.

FILTER STATUS:
A DIFFERENTIAL PRESSURE SWITCH SHALL MONITOR DIFFERENTIAL PRESSURE ACROSS THE FILTER WHEN THE FAN IS RUNNING. IF THE SWITCH CLOSES FOR 2 MINUTES AFTER A REQUEST FOR FAN OPERATION, A DIRTY FILTER ALARM SHALL BE ANNUNCIATED AT THE BAS.

SETPOINTS:
- OCCUPIED COOLING SETPOINT: 75
- OCCUPIED HEATING SETPOINT: 70
- UNOCCUPIED COOLING SETPOINT: 80
- UNOCCUPIED HEATING SETPOINT: 65
- DEADBAND: 2 DEGREES
- ALL SETPOINTS ADJUSTABLE AT UNIT CONTROLLER.

OCCUPIED HOURS (ADJ.)
MONDAY - FRIDAY 7AM - 6PM

UNOCCUPIED HOURS (ADJ.)
FRIDAY 6PM - MONDAY 7AM
MONDAY - FRIDAY: 6PM - 7AM



PACKAGED ROOF TOP UNIT (AHU-O1) SEQUENCE OF OPERATIONS

PACKAGED ROOF TOP UNIT SEQUENCE OF OPERATIONS (AHU-O1)

MANUFACTURER SHALL PROVIDE THE UNIT WITH A STAND-ALONE UNIT CONTROLLER CAPABLE OF THE FOLLOWING SEQUENCES OF OPERATIONS AND MINIMUM FEATURES. ALL CONTROL SENSORS AND DEVICES INDICATED SHALL EITHER BE PROVIDED BY MANUFACTURER OR CONTROLS CONTRACTOR IN ORDER TO MEET THE INTENT OF THESE SEQUENCES.

THE CONTROL OF AHU-O1, INSTRUMENTS, GAGES, CONTROL VALVES, AND ACCESSORIES SHALL UTILIZE THE CONTROL SYSTEM PROVIDED BY THE CONTRACTOR. CONTRACTOR SHALL PROVIDE ALL NECESSARY WIRING AND CONDUIT, DEVICES, CONTROLLERS, INTERLOCKS, AND SWITCHES AS NECESSARY TO MEET THE INTENT OF THESE SEQUENCES AND THE CONTROL DIAGRAMS SHOWN. CONTRACTOR SHALL COORDINATE FOR A FULLY FUNCTIONAL SYSTEM.

HEATING MODE:
IF SPACE TEMPERATURE FALLS BELOW THE SETPOINT MINUS THE DEADBAND THE HEATING SHALL BE ENABLED BY THE UNIT CONTROLLER. UPON PROOF OF INTERNAL SAFETIES THE GAS BURNER SHALL START AND MODULATE TO MAINTAIN THE SPACE TEMPERATURE SETPOINT.

COOLING MODE:
IF SPACE TEMPERATURE RISES ABOVE THE SETPOINT PLUS THE DEADBAND THE DX COOLING SYSTEM SHALL BE ENABLED BY THE UNIT CONTROLLER. THE UNIT CONTROLLER SHALL MODULATE THE COOLING SYSTEM TO MAINTAIN THE SPACE TEMPERATURE SETPOINT.

PACKAGED ROOF TOP UNIT SEQUENCE OF OPERATIONS (AHU-O1)

SUPPLY FAN:
THE SUPPLY FAN SHALL CYCLED ON DURING UNIT OPERATION. A DIFFERENTIAL PRESSURE SWITCH SHALL MONITOR DIFFERENTIAL PRESSURE ACROSS THE FAN. IF THE SWITCH DOES NOT OPEN WITHIN 40 SECONDS AFTER REQUEST FOR FAN OPERATION, A FAN FAILURE ALARM SHALL BE ANNUNCIATED AT THE UNIT CONTROLLER, THE UNIT SHALL STOP, REQUIRING A MANUAL RESET.

SUPPLY & EXHAUST FAN HIGH PRESSURE LIMIT OPERATION:
IF SUPPLY DUCT STATIC PRESSURE REACHES 4.00 INCHES OF W.C. (ADJ.), THE HIGH LIMIT PRESSURE SWITCH SHALL SHUT DOWN THE UNIT, REQUIRING A MANUAL RESET TO RE-START THE UNIT. SUPPLY AND EXHAUST FANS ARE INTERLOCKED VIA SOFTWARE; A FAILURE OF EITHER SHALL DISABLE BOTH.

FILTER STATUS:
A DIFFERENTIAL PRESSURE SWITCH SHALL MONITOR DIFFERENTIAL PRESSURE ACROSS THE FILTER WHEN THE FAN IS RUNNING. IF THE SWITCH CLOSES FOR 2 MINUTES AFTER A REQUEST FOR FAN OPERATION, A DIRTY FILTER ALARM SHALL BE ANNUNCIATED AT THE BAS.

SETPOINTS:
- OCCUPIED COOLING SETPOINT: 75
- OCCUPIED HEATING SETPOINT: 70
- UNOCCUPIED COOLING SETPOINT: 80
- UNOCCUPIED HEATING SETPOINT: 65
- DEADBAND: 2 DEGREES
- ALL SETPOINTS ADJUSTABLE AT UNIT CONTROLLER.

OCCUPIED HOURS (ADJ.)
MONDAY - FRIDAY 7AM - 6PM

UNOCCUPIED HOURS (ADJ.)
FRIDAY 6PM - MONDAY 7AM
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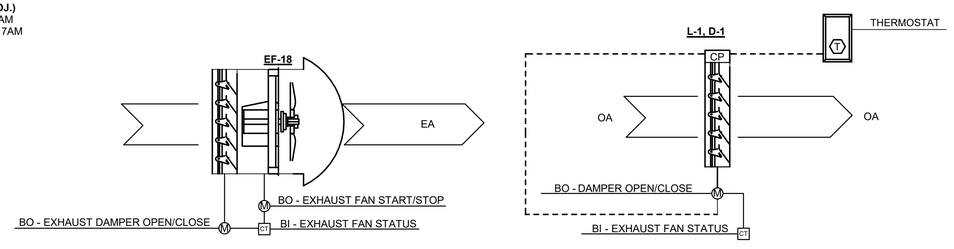

LIME AGING AND SLAKING COOLING AND VENTILATION (L-1, EF-18)

SEQUENCE SUMMARY:
L-1 IN CONJUNCTION WITH EF-18 SHALL PROVIDE COOLING AND VENTILATION TO THE FILTER GALLERY. WHEN THE TEMPERATURE IN THE SPACE REACHES 85°F (ADJ.) EF-18 SHALL TURN ON AND D-1 SHALL OPEN IN CONJUNCTION TO PROVIDE NATURAL VENTILATION TO THE ROOM. ALL BINARY INPUTS AND OUTPUTS TO BE WIRED BACK TO MAIN HV CONTROL PANEL.

THE CONTROL OF L-1 AND EF-18, INSTRUMENTS, GAGES, CONTROL VALVES, AND ACCESSORIES SHALL UTILIZE THE CONTROL SYSTEM PROVIDED BY THE CONTRACTOR. CONTRACTOR SHALL PROVIDE ALL NECESSARY WIRING AND CONDUIT, DEVICES, CONTROLLERS, INTERLOCKS, AND SWITCHES AS NECESSARY TO MEET THE INTENT OF THESE SEQUENCES AND THE CONTROL DIAGRAMS SHOWN. CONTRACTOR SHALL COORDINATE FOR A FULLY FUNCTIONAL SYSTEM.

COOLING:
MOTORIZED CONTROL DAMPER D-1 ON L-1 WILL OPEN. ONCE D-2 IS PROVED TO BE OPEN, EF-18 SHALL BE ACTIVATED TO INDUCE FAN COOLING IF THE TEMPERATURE (MEASURED VIA SPACE THERMOSTAT) IN THE SPACE REACHES ABOVE 85 °F.

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- SUPPLY FAN FAILURE: COMMANDED ON BUT THE STATUS IS OFF.
- SUPPLY FAN IN HAND: COMMANDED OFF BUT THE STATUS IS ON.

EXHAUST FAN (EF-18):
THE CONTROLLER SHALL MONITOR THE ZONE TEMPERATURE.

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- HIGH ZONE AIR TEMP: IF THE ZONE AIR TEMPERATURE IS GREATER THAN 110 °F (ADJ.)
- LOW ZONE AIR TEMP: IF THE ZONE AIR TEMPERATURE IS LESS THAT 45 °F (ADJ.)

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- EXHAUST FAN FAILURE: COMMANDED ON BUT THE STATUS IS OFF.
- EXHAUST FAN IN HAND: COMMANDED OFF BUT THE STATUS IS ON.

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MARK	DATE	DESCRIPTION	BY
1	05/05/22	BID ADDENDUM #1	JRJ

CITY OF ANN ARBOR, MICHIGAN
WTP HVAC IMPROVEMENTS - PHASE II

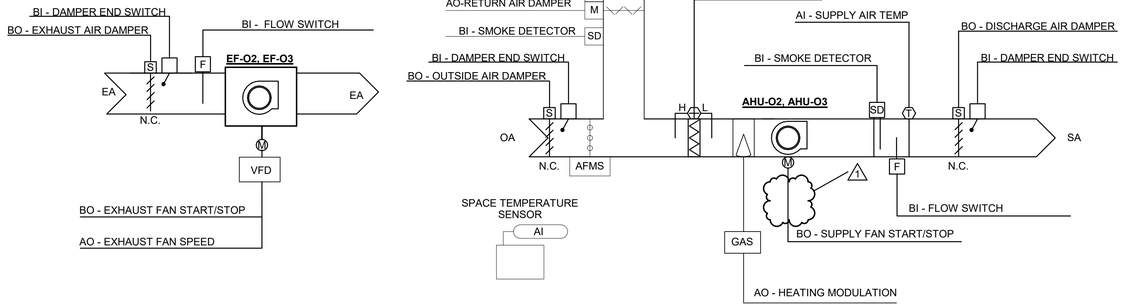
MECHANICAL CONTROLS

PROJ:	200-31537-21005
DESN:	JRJ
DRWN:	JRJ
CHKD:	KK

M-703

5/4/2022 8:14:09 AM BIM 360://200-31537-21005 AA WTP Roofing/M_AA WTP AHU REPLACEMENT_2021.rvt

Bar measures 1 inch, otherwise drawing is not to scale



OZONE BUILDING HEATING AND VENTILATION (AHU-O2, AHU-O3, EF-O2, EF-O3)

SEQUENCE SUMMARY:
MANUFACTURER SHALL PROVIDE THE UNIT WITH A STAND-ALONE UNIT CONTROLLER CAPABLE OF THE FOLLOWING SEQUENCES OF OPERATIONS AND MINIMUM FEATURES. ALL CONTROL SENSORS AND DEVICES INDICATED SHALL EITHER BE PROVIDED BY MANUFACTURER OR CONTROLS CONTRACTOR IN ORDER TO MEET THE INTENT OF THESE SEQUENCES.

THE CONTROL OF AHU-O2, AHU-O3, EF-O2, AND EF-O3, INSTRUMENTS, GAUGES, CONTROL VALVES, AND ACCESSORIES SHALL UTILIZE THE CONTROL SYSTEM PROVIDED BY THE CONTRACTOR. CONTRACTOR SHALL PROVIDE ALL NECESSARY WIRING AND CONDUIT, DEVICES, CONTROLLERS, INTERLOCKS, AND SWITCHES AS NECESSARY TO MEET THE INTENT OF THESE SEQUENCES AND THE CONTROL DIAGRAMS SHOWN. CONTRACTOR SHALL COORDINATE FOR A FULLY FUNCTIONAL SYSTEM.

RUN CONDITIONS
AHU-O2 AND AHU-O3 SHALL CYCLE ON AND OFF TO MAINTAIN SPACE TEMPERATURE, UNLESS SHUT DOWN ON SAFETIES OR TURNED OFF MANUALLY AT THE UNIT CONTROLLERS, MOTOR STARTERS, OR DISCONNECTS. IN THE EVENT OF HIGH OZONE LEVELS DETECTED BY OZONE MONITOR WITHIN THE SPACE, AHU-O2 AND AHU-O3 OUTSIDE AIR DAMPER WILL OPEN 100% AND EF-O2 AND EF-O3 WILL TURN ON TO PURGE THE SPACE OF EXCESS OZONE. ONCE THE OZONE LEVEL WITHIN THE SPACE IS BELOW PERMISSIBLE LIMITS AND THE ALARM HAS BEEN CLEARED, EF-O2 AND EF-O3 WILL TURN OFF AND AHU-O2 AND AHU-O3 OUTSIDE AIR DAMPERS WILL MODULATE TO 10% OPEN.

STATUS = ON (DEFAULT): OUTSIDE AIR DAMPERS OPEN FOR 10% OUTSIDE AIR, AHU-O2 AND AHU-O3 SUPPLY AND RETURN FAN ON, EF-O2 AND EF-O3 OFF, GAS BURNER MODULATES AS INITIALIZED BY DISCHARGE TEMPERATURE SENSOR.

STATUS = ON (HIGH OZONE): OUTSIDE AIR DAMPERS OPEN FOR 100% OUTSIDE AIR, AHU-O2 AND AHU-O3 SUPPLY FAN ON, AHU-O2 AND AHU-O3 RETURN FAN OFF, EF-O2 AND EF-O3 ON, GAS BURNER MODULATES AS INITIALIZED BY DISCHARGE TEMPERATURE SENSOR.

STATUS = OFF: ALL DAMPERS CLOSED, ALL FANS OFF.

FILTER DIFFERENTIAL PRESSURE MONITOR:
THE CONTROLLER SHALL MONITOR THE DIFFERENTIAL PRESSURE ACROSS THE FILTER.

ALARMS SHALL BE PROVIDED AS FOLLOWS:
FILTER CHANGE REQUIRED: WHEN THE DIFFERENTIAL PRESSURE ACROSS THE FILTER EXCEEDS THE MEAN PRESSURE DROP (150% OF THE CLEAN FILTER PRESSURE DROP).

FAN STATUS FLOW SWITCH:
PROVIDE A FLOW SWITCH IN THE DISCHARGE OF THE AHU-O2 AND AHU-O3 AND ON THE INTAKE OF THE EXHAUST FANS EF-O2 AND EF-O3. FLOW SWITCH SHALL BE WIRED TO CONTROLLER AND IF NO FLOW IS DETECTED VISUAL AND AUDIBLE ALARMS SHALL BE COMMUNICATED TO THE SCADA OPERATOR DISPLAY.

FREEZE PROTECTION:
IF THE SUPPLY AIR TEMPERATURE IS BELOW 30 °F AND THE FANS HAVE BEEN RUNNING FOR 5 MINUTES THE OUTSIDE AIR DAMPER SHALL CLOSE, THE UNIT SHALL SHUT DOWN AND AN ALARM SHALL BE PROVIDED. UNITS SHALL REQUIRE MANUAL RESTART ON FREEZE PROTECTION.

SMOKE DETECTION:
THE UNIT SHALL SHUT DOWN AND GENERATE AN ALARM UPON RECEIVING A SMOKE DETECTOR STATUS. UNIT SHALL REQUIRE A MANUAL RESTART.

OUTSIDE AND DISCHARGE AIR DAMPER:
THE OUTSIDE AND DISCHARGE AIR DAMPERS SHALL OPEN ANYTIME AHU-O2 AND AHU-O3 RUN AND SHALL CLOSE ANYTIME THE UNIT STOPS. THE SUPPLY FAN SHALL START ONLY AFTER THE STATUS OF BOTH DAMPERS IS "OPEN". THE OUTSIDE AIR DAMPER SHALL CLOSE 15 SEC (ADJ.) AFTER THE SUPPLY FAN STOPS.

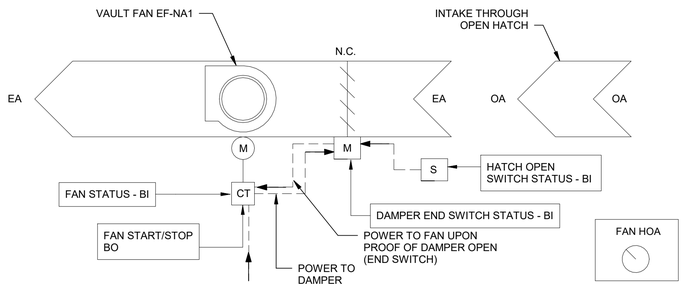
SUPPLY FAN:
THE SUPPLY FAN SHALL RUN TO MAINTAIN SPACE TEMPERATURE AND VENTILATION UNLESS SHUT DOWN ON SAFETIES AND SHALL DEFAULT TO RUN AT 100% DESIGN SPEED.

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- OUTSIDE OR DISCHARGE AIR DAMPER FAILURE: COMMANDED OPEN BUT THE STATUS IS CLOSED.
- OUTSIDE OR DISCHARGE AIR DAMPER IN HAND: COMMANDED CLOSED, BUT THE STATUS IS OPEN.
- HIGH SUPPLY AIR TEMP: IF THE SUPPLY AIR TEMPERATURE IS GREATER THAN 110 °F (ADJ.).
- LOW SUPPLY AIR TEMP: IF THE SUPPLY AIR TEMPERATURE IS LESS THAN 40 °F (ADJ.) AFTER 5 MINUTES.
- SUPPLY FAN FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.
- SUPPLY FAN IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.

EXHAUST FAN (EF-O2 AND EF-O3):
THE EXHAUST FANS SHALL RUN WHENEVER OZONE LEVELS ABOVE PERMISSIBLE LIMIT ARE DETECTED AND SHALL DEFAULT TO RUN AT 100% OF DESIGN SPEED.

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- EXHAUST FAN FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.
- EXHAUST FAN IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.

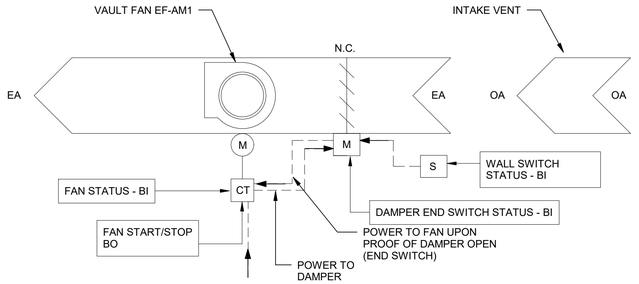
SUPPLY AIR TEMPERATURE:
THE CONTROLLER SHALL MONITOR THE SUPPLY AIR TEMPERATURE AND SHALL RELAY THIS POINT TO THE UNIT CONTROLLER.



SODIUM HYDROXIDE VAULT EXHAUST FAN (EF-NA1) SEQUENCE OF OPERATIONS

THE CONTROL OF EF-NA1, INSTRUMENTS, GAGES, CONTROL VALVES, AND ACCESSORIES SHALL UTILIZE THE CONTROL SYSTEM PROVIDED BY THE CONTRACTOR. CONTRACTOR SHALL PROVIDE ALL NECESSARY WIRING AND CONDUIT, DEVICES, CONTROLLERS, INTERLOCKS, AND SWITCHES AS NECESSARY TO MEET THE INTENT OF THESE SEQUENCES AND THE CONTROL DIAGRAMS SHOWN. CONTRACTOR SHALL COORDINATE FOR A FULLY FUNCTIONAL SYSTEM.

A. FAN SHALL RUN CONTINUOUSLY WHEN FAN IS IN AUTO MODE, SODIUM HYDROXIDE VAULT HATCH IS OPEN, AND THE VAULT IS OCCUPIED. FAN WILL ALSO RUN CONTINUOUSLY WHEN FAN IS SET TO HAND MODE, EVEN IF HATCH IS CLOSED.
B. WHEN THE VAULT HATCH IS OPENED (OR FAN IS IN HAND MODE), THE FAN SHALL BE COMMANDED TO RUN. THE EXHAUST DAMPER SHALL OPEN. UPON HARDWIRE PROOF OF DAMPER OPEN (ENDSWITCH), THE FAN SHALL START.
C. WHEN THE VAULT HATCH IS CLOSED, THE FAN SHALL BE COMMANDED TO STOP. THE FAN SHALL STOP AND THE DAMPER SHALL CLOSE (POWER INTERLOCK).
D. ALARMS:
   a. IF THE VAULT HATCH STATUS IS "OPEN" AND STATUS OF FAN IS "OFF" OR DAMPER IS "CLOSED".
   b. IF THE VAULT HATCH STATUS IS "CLOSED" AND STATUS OF FAN IS "ON" OR DAMPER IS "OPEN"

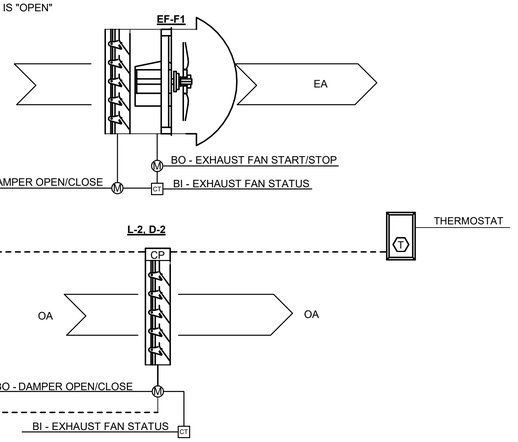


AMMONIA BUILDING EXHAUST FAN (EF-AM1) SEQUENCE OF OPERATIONS

THE CONTROL OF EF-AM1, INSTRUMENTS, GAGES, CONTROL VALVES, AND ACCESSORIES SHALL UTILIZE THE CONTROL SYSTEM PROVIDED BY THE CONTRACTOR. CONTRACTOR SHALL PROVIDE ALL NECESSARY WIRING AND CONDUIT, DEVICES, CONTROLLERS, INTERLOCKS, AND SWITCHES AS NECESSARY TO MEET THE INTENT OF THESE SEQUENCES AND THE CONTROL DIAGRAMS SHOWN. CONTRACTOR SHALL COORDINATE FOR A FULLY FUNCTIONAL SYSTEM.

A. FAN SHALL RUN CONTINUOUSLY WHEN MANUAL SWITCH IS ON AND THE BUILDING IS OCCUPIED
B. WHEN THE MANUAL SWITCH IS ON, THE FAN SHALL BE COMMANDED TO RUN. THE EXHAUST DAMPER SHALL OPEN. UPON HARDWIRE PROOF OF DAMPER OPEN (ENDSWITCH), THE FAN SHALL START.
C. WHEN THE MANUAL SWITCH IS OFF, THE FAN SHALL BE COMMANDED TO STOP. THE FAN SHALL STOP AND THE DAMPER SHALL CLOSE (POWER INTERLOCK).
D. ALARMS:
   a. IF THE VAULT HATCH STATUS IS "OPEN" AND STATUS OF FAN IS "OFF" OR DAMPER IS "CLOSED".
   b. IF THE VAULT HATCH STATUS IS "CLOSED" AND STATUS OF FAN IS "ON" OR DAMPER IS "OPEN"

THE AMMONIA BUILDING IS ALSO SERVED BY A PACKAGED HIGH STATIC GAS FIRED UNIT HEATER THAT CONDITIONS THE SPACE. FIELD VERIFY THAT THIS EQUIPMENT OPERATES INDEPENDENTLY FROM THE EXHAUST FAN AND INTAKE VENT SHOWN ABOVE.



FILTER GALLERY COOLING AND VENTILATION (L-2, EF-F1)

SEQUENCE SUMMARY:
L-2 IN CONJUNCTION WITH EF-2 SHALL PROVIDE COOLING AND VENTILATION TO THE FILTER GALLERY. WHEN THE TEMPERATURE IN THE SPACE REACHES 85°F (ADJ.) EF-2 SHALL TURN ON AND D-2 SHALL OPEN IN CONJUNCTION TO PROVIDE NATURAL VENTILATION TO THE ROOM. ALL BINARY INPUTS AND OUTPUTS TO BE WIRED BACK TO MAIN HV CONTROL PANEL.

THE CONTROL OF L-2 AND EF-2, INSTRUMENTS, GAGES, CONTROL VALVES, AND ACCESSORIES SHALL UTILIZE THE CONTROL SYSTEM PROVIDED BY THE CONTRACTOR. CONTRACTOR SHALL PROVIDE ALL NECESSARY WIRING AND CONDUIT, DEVICES, CONTROLLERS, INTERLOCKS, AND SWITCHES AS NECESSARY TO MEET THE INTENT OF THESE SEQUENCES AND THE CONTROL DIAGRAMS SHOWN. CONTRACTOR SHALL COORDINATE FOR A FULLY FUNCTIONAL SYSTEM.

COOLING:
MOTORIZED CONTROL DAMPER D-2 ON L-2 WILL OPEN. ONCE D-2 IS PROVED TO BE OPEN, EF-F1 SHALL BE ACTIVATED TO INDUCE FAN COOLING IF THE TEMPERATURE (MEASURED VIA SPACE THERMOSTAT) IN THE SPACE REACHES ABOVE 85 °F.

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- SUPPLY FAN FAILURE: COMMANDED ON BUT THE STATUS IS OFF.
- SUPPLY FAN IN HAND: COMMANDED OFF BUT THE STATUS IS ON.

EXHAUST FAN (EF-F1):
THE CONTROLLER SHALL MONITOR THE ZONE TEMPERATURE.

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- HIGH ZONE AIR TEMP: IF THE ZONE AIR TEMPERATURE IS GREATER THAN 110 °F (ADJ.)
- LOW ZONE AIR TEMP: IF THE ZONE AIR TEMPERATURE IS LESS THAT 45 °F (ADJ.)

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- EXHAUST FAN FAILURE: COMMANDED ON BUT THE STATUS IS OFF.
- EXHAUST FAN IN HAND: COMMANDED OFF BUT THE STATUS IS ON.

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