BID ADDENDUM No. 2

PROJECT NAME	Niagara University Academic Innovation Hub Workforce Development Training 822 Cleveland Avenue Niagara Falls, NY 14305
LABELLA PROJECT No.:	2221723
DATE:	May 2, 2024
FROM:	LaBella Associates, D.P.C. 300 Pearl Street, Suite 130 Buffalo, NY 14202

TO: Prospective Bid Proposers:

All Bidders submitting proposals for the above named project shall take note of the following additions and changes which modify the original bidding documents. The instructions included in this Addendum have precedence over anything contrarily shown on the Drawings or described in the Specifications, and all such shall be taken into consideration and be included in the Proposal. Receipt of this Addendum shall be acknowledged by the Bidder in the space provided on the proposal form.

Joseph Rudniski

Issued By:

Joseph Rudniski, Associate AIA
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GENERAL INFORMATION:

1. Contractor Pre-bid walkthrough sign-in sheet provided. See attached.

CLARIFICATION:

1. See changes below to the Specification requirements for the Direct Digital Control System.

CHANGES TO THE PROJECT MANUAL/SPECIFICATIONS:

1. ADDED TO TABLE OF CONTENTS:
    a. Section 23 8216.14 – Electric-Resistance Air Coils.
    b. Section 019100 – Commissioning.

2. REVISE SPECIFICATION SECTION 230800 – COMMISSIONING OF HVAC
    a. REVISE paragraph 1.2.B.1 to read as follows:
    "1.2.B.1 Section 019000 –"Commissioning" for general commissioning requirements and Commissioning Coordinator responsibilities."

3. REPLACE SPECIFICATION SECTION 230923 – Direct Digital Control System for HVAC Section 1.1 Summary, Paragraph A in its entirety with the following:

A. Control system shall have separated pricing for work done on existing campus remote from this building.

    1. Base Bid 1 Scope: Provide labor, material, equipment, related services, and supervision required, to provide a complete and functional building automation system (also identified as BMS, Direct Digital Control System For HVAC) including all necessary hardware and all operating and applications software as required for the complete performance of the Work, as shown on the Drawings, as specified herein. Provide all power wiring required for system not shown on electrical drawings. Provide server and user interface for this system in the building. System shall be BAC-net compatible and be able to communicate to existing EcoStruxure Enterprise graphics system at the main campus via the Niagara Campus VPN. Upgrade of existing off-site graphics not in this scope but labor, software, coordination, and startup of interfacing the system is to be included in this base bid.

    2. Base Bid 2 Scope: Provide labor, software, related services, coordination, and supervision required to update the existing Niagara University Schneider Electric EcoStruxure Enterprise system and graphics to view the systems at the Academic innovation Hub via BAC-Net communication protocol over the Niagara Campus VPN.

4. REPLACE SPECIFICATION SECTION 230923 – Direct Digital Control System for HVAC Section 2.1 Manufacturers, Paragraph A in its entirety with the following:

A. Basis of Design Product. Subject to compliance with the requirements, provide products by one of the following pre-qualified manufacturers:
   1. Schneider Electric EcoStruxure furnished and installed by Stark Tech.
   2. Johnson Controls Metasys furnished and installed by Johnson Controls field office.
   3. Siemens Building Controls furnished and installed by Siemens field office.

5. REPLACE SPECIFICATION SECTION 237200 - Air to Air Energy Recovery Equipment in its entirety with attached section.

6. ADDED SPECIFICATION SECTION 238216.14 – Electric-Resistance Air Coils.

7. ADDED SPECIFICATION SECTION 019100 – Commissioning.

CHANGES TO THE DRAWINGS:

1. Drawing M101 – Mechanical Piping Plan: Refer to Detail 2 - Basement Piping Plan. Provide electric heater EH-1 in Storage 116. EH-1 shall be a Markel series 3200 wall heater or approved equivalent. Casing shall be 18-gauge powder coated steel. Heater shall have a 70 CFM fan and a 1000 watt finned tubular steel heater element with manual reset high limit. Unit shall be 120 Volts and draw 8.33 amps. Provide a surface mounting frame and integral thermostat with positive off. Thermostat range shall be 40-100 deg. F. Set unit at 40 deg. f. to keep space from freezing.

2. Drawing M102 – Mechanical Ductwork Plan: Refer to Detail 1 - Basement Ductwork Plan. Provide electric duct heater ED-2 in 24/10 supply duct in Room 103 Mens. Provide control sensor in duct downstream of heater per manufacturer's instructions. Coordinate location with soffit and other equipment. Maintain 36" clearance in front of control panel.

3. Drawing M103 – Mechanical Plan: Refer to Detail 2 – First Floor Ductwork Plan. Provide electric duct heater ED-1 in 8/8 supply duct in Corridor 228 approximately across from Entry 200. Provide control thermostat in duct downstream of heater per manufacturer's instructions. Coordinate other trades. Maintain 36" clearance in front of control panel.

4. Drawing M103 – Mechanical Plan: Refer to Detail 2 – First Floor Ductwork Plan. Provide electric duct heater ED-1 in 8/8 supply duct in Corridor 228 approximately across from Entry 200. Provide control thermostat in duct downstream of heater per manufacturer's instructions. Coordinate other trades. Maintain 36" clearance in front of control panel.

5. Drawing M103 – Mechanical Plan: Refer to Detail 2 – First Floor Ductwork Plan. Provide fire dampers in ductwork penetrating stairwell wall in Northwest stairwell.

Duct sizes are 16/16, 14/18, 8/8, and 8/8. Provide 16/16 access doors on each side of wall in ductwork. Provide drywall access doors in stairwell ceiling at each fire damper location.

6. Drawing M601 – Mechanical Schedules: Refer to Packaged Rooftop Energy Recovery Unit Schedule. Replace MAU-1 in its entirety with the following:

    a. NO. - MAU-1
    b. Location – Roof
    c. Supply Fan CFM – 2000
    d. ESP – 1.0
    e. Exhaust Fan CFM – 2000
    f. ESP – 1.0
    g. Energy Recovery HX Summer Performance:
        i. SA - 80.7 DB, 69.0 WB
        ii. RA – 75 DB, 63 WB
        iii. OA – 95 DB, 75 WB
        iv. Heat Recovery – 48.2 MBH
        v. Total Effectiveness – 53.2 %
    h. Energy Recovery HX Winter Performance:
        i. SA – 51.7 DB
        ii. RA – 72 DB
        iii. OA – 0 DB
        iv. Heat Recovery – 135.7 MBH
        v. Total Effectiveness – 71.6 %
    i. MCA – 23.2
    j. MOP – 25
    k. V-PH – 208/3
    l. Weight – 972 lbs.
    m. Manufacturer – Renewaire
    n. Model – HE3XRTV
    o. Notes:
        i. 1. Provide remote display for unit controls.
        ii. 2. Provide BAC-net interface for DDC control system.
        iii. 3. Provide Wind Rated Curb, 24" high, insulated. Anchor curb and unit to withstand 115 MPH winds.
        iv. 4. Provide VFD speed controls for fans.
        v. 5. Unit shall discharge and return through curb.
        vi. 6. Provide 8/8 Slip in electric duct heater, ED-1, 2.0 KW, 208V, 1 ph, two stage discharge air control to maintain 70 deg. F. discharge when enabled.
        vii. 7. Provide 24/10 slip in electric duct heater, ED-1, 10.0 KW, 208V, 3 ph., SCR control to maintain 70 deg. discharge air when enabled.

7. Drawing M703 – Mechanical Schedules: Refer to Detail 1 - Energy Recovery Ventilator Control Diagram. Add the following control points DO – ED-1 enable/disable, DO – ED-2 Enable Disable. Control system shall enable duct heaters whenever outside air temperature drops below 50 deg. F. (adj).

8. Drawing E101 – Lower-Level Power & Systems Plan: Replace the drawing in its entirety with the attached.

9. Drawing E600 – Electrical Schedules: Replace the drawing in its entirety with the attached.

10. Drawing E601 – Electrical Panel Schedules: Replace the drawing in its entirety with the attached.

11. Drawing E602 – Electrical Panel Schedules: Panel Schedule MDP, REVISE circuit breaker for LP-1 from 30A/3P to 100A/3P.

12. Drawing E700 – Electrical One-Line Diagrams: Power Distribution One-Line Diagram, REVISE circuit breaker to MAU-1 from 90A/3P to 30A/3P.

13. Drawing FP001 – Fire Protection Legend Sheet: Replace the drawing in its entirety with the attached.

14. Drawing FP101 – Fire Protection Plan: Replace the drawing in its entirety with the attached.

15. Drawing FP501 – Fire Protection Details and Schedules: Replace the drawing in its entirety with the attached.

CONTRACTOR QUESTIONS:

Environmental

1. Question: Reference dwg HM-101, note 1 & dwg AD101, note 21. To ensure complete removal, the wood subfloor cannot be salvaged. If you want the subfloor salvaged, we need to leave the mastic adhered to the wood. Trying to remove mastic from the wood substrate destroys it and will need to be replaced. Please clarify if you want to leave the flooring mastic to salvage the wood or if you want the mastic removed, we will need to remove & dispose of the wood, can't be salvaged.
    a. Response: The floor tile mastic was tested and found to be negative for asbestos and does not need to be removed under abatement conditions. HM drawings are asking for the floor tile to be removed under abatement conditions and the architectural drawings intent is to have the mastic mechanically removed under general conditions to allow the wood flooring to be refinished for reinstallation after salvaging efforts.

2. Question: Drawing S101 - What is the thickness of the existing concrete slab marked for demo?
    a. Response: Assume thickness to be minimum five (5) inches.

3. Question: Drawing S101 - How thick are the stone pavers/mud set marked for demo? Please provide a detail of the pavers.
    a. Response: Assume thickness of pavers to be minimum four (4) inches with a base to be minimum two (2) inches. No existing documentation or detail exists of the pavers and will not be provided at this time.

HVAC/Mechanical

1. Question: Will the HVAC contractor be responsible for pulling a permit for this project or will the University be pulling all the permits for this project?
    b. Response: All permitting shall be under the General Contractor (GC) including plumbing permits. Each trade shall coordinate with the GC to provide information and licensing required for permits.

2. Question: On MD101, Basement Removal Note #7, Some of the Radiators you are calling out to remove and store are connected in groups. Can we cut them apart in sections to make it easier to remove from the wall?
    a. Response: No, the intent is to maintain the integrity of the unit in case they need to be reused.

3. Question: On MD101, Basement Removal Note #7, you call out to remove and store. Will we be allowed to have a storage container on site to store these CI Radiators in?
    a. Response: Work out on site storage with general Contractor.

4. Question: In the PVF specs you do not mention the use of Valve Coil Kits. Would you allow Valve Coil Kits for the Terminal Units?
    a. Response: Coil kits will not be permitted for this project.

5. Question: In the pipe specs you are calling out Pro-Press Fittings but in the Valve Spec you do not call out a Pro-Press Valve. Would you allow Pro-Press Valves?
    a. Response: Full port Pro-Press valves that are equivalent to specified valves will be permitted.

6. Question: Are the EDA/Non-EDA line designations on the new drawings M001, M101and M102 carry over to the Demo Drawing MD101 because there are no line designations shown on that demo drawing. I just want to make sure that I am putting the right costs in the right proposals.
    a. Response: No delineating linework and text was provided on any of the demolition drawings due to all demolition and abatement is to be part of non-EDA work. EDA money is only covering NEW work scope related to the identified spaces from EDA.

7. Question: On drawing M101 Notes #1 and #2 you call out to reuse existing holes when installing the new HWS&R Pipe from the basement to the existing Cast Iron Radiators. These holes are not large holes and go through the existing green carpet. Our new HWS & HWR Piping that will be installed is ¾" with 1-1/2" insulation. The insulation spec 230719-15, D calls out for the insulation to go continuously through the floor. Our new pipe with insulation would be 3-3/4" so I would need to drill a 4" hole. Would you allow us to but the insulation to the floor without continuously going through the floor so we do not have to mess with the carpet and do the same through the basement. Or would you allow if there is enough space to use ½" Armaflex to be installed in the existing floor space? I just do not want to mess with cutting of new holes in the existing carpet.
    a. Response: Enlarge existing hole in floors for new pipe size only if necessary. Pipe should not rub on existing wood flooring/floor construction. Abut pipe insulation to top and underside of existing carpet and wood floor. If piping runs tight to existing joints, reduce or trim pipe insulation to accommodate tight clearances.

ATTACHMENTS:

1. Specification Section 237200 - Air to Air Energy Recovery Equipment.
2. Specification Section 238216.14 – Electric Resistance Air Coils.
3. Specification Section 019100 – Commissioning.
4. Drawing FP001 – Fire Protection Legend Sheet.
5. Drawing FP101 – Fire Protection Plan.
6. Drawing FP501 – Fire Protection Details and Schedules.
7. Drawing E101 – Lower-Level Power & Systems Plan.
8. Drawing E600 – Electrical Schedules.
9. Drawing E700– Electrical One-Line Diagrams.
10. Contractor Pre-Bid walkthrough Sign-in Sheet.

END OF BID ADDENDUM No. 2

SECTION 237200 - AIR-TO-AIR ENERGY RECOVERY EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Packaged fixed-plate energy recovery ventilators for rooftop installation.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, furnished specialties, and accessories. Include the following:
1. Unit performance data for both Supply Air and Exhaust Air, with system operating conditions indicated.
2. Enthalpy plate performance data for both summer and winter operation.
3. Motor ratings and unit electrical characteristics.
4. Dimensioned drawings for each type of installation, showing isometric and plan views, to include location of attached ductwork and service clearance requirements.
5. Estimated gross weight of each installed unit.
6. Filter types, quantities, and sizes
7. Installation, Operating and Maintenance manual (IOM) for each model.

B. Shop Drawings: For air-to-air energy recovery equipment. Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Wiring Diagrams: For power, signal, and control wiring.

1.3 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For air-to-air energy recovery equipment to include in maintenance manuals.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Filters: One set(s) of each type of filter specified.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. ARI Compliance:

1. Capacity ratings for air-to-air energy recovery equipment shall comply with ARI 1060, "Performance Rating of Air-to-Air Heat Exchangers for Energy Recovery Ventilation Equipment."
2. Capacity ratings for air coils shall comply with ARI 410, "Forced-Circulation Air- Cooling and Air-Heating Coils."

C. ASHRAE Compliance:

1. Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."
2. Manufacturer shall be able to provide evidence of independent testing of the core by Underwriters Laboratory (UL), verifying a maximum flame spread index (FSI) of 25 and a maximum smoke developed index (SDI) of 50 thereby meeting NFPA 90A and NFPA 90B requirements for materials in a compartment handling air intended for circulation through a duct system. The method of test shall be UL Standard 723.

D. UL Compliance:

1. Packaged heat recovery ventilators shall comply with requirements in UL 1812, "Ducted Heat Recovery Ventilators"; or UL 1815, "Nonducted Heat Recovery Ventilators." The unit must pass commercial flammability requirements and shall not be labeled “For Residential Use Only”.
2. Electric coils shall comply with requirements in UL 1995, "Heating and Cooling Equipment."

1.6 COORDINATION

A. Coordinate layout and installation of air-to-air energy recovery equipment and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

B. Coordinate sizes and locations of metal frames with actual equipment provided.

C. Coordinate sizes and locations of roof curbs, equipment supports, wall and roof penetrations with actual equipment provided.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of air-to-air energy recovery equipment that fail in materials or workmanship within specified warranty period.

1. Warranty Period for Packaged Energy Recovery Units: Two years.

PART 2 - PRODUCTS

2.1 PACKAGED AIR-TO-AIR ENERGY RECOVERY AIR HANDLING UNITS

A. General:

1. Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
2. Unit shall be ASHRAE 90.1 compliant.

B. Description:

1. Air-to-Air Energy Recovery Ventilators shall be fully assembled at the factory and consist of a fixed-plate cross-flow heat exchanger with no moving parts, an insulated double wall G90 galvanized 20-gauge steel cabinet, outdoor air hood with bird screen, motorized outside air intake damper, filter assemblies for both intake and exhaust air, enthalpy core, supply air blower assembly, motorized return air damper, exhaust air hood, exhaust air blower assembly and electrical control box with all specified components and internal accessories factory installed and tested and prepared for single-point high voltage connection. Entire unit with the exception of field-installed components shall be assembled and test operated at the factory.
2. All electrical components are UL or CSA certified
3. Electrical components are mounted in the electrical compartment accessible for the panel door

C. Cabinet:

1. Materials: Formed [single][double] wall insulated metal cabinet, fabricated to permit access to internal components for maintenance.
2. Outside casing: 20 gauge, galvanized (G90) steel meeting ASTM A653 for components that do not receive a painted finish.
3. Access doors shall be hinged with airtight closed cell foam gaskets. Door pressure taps, with captive plugs, shall be provided for cross-core pressure measurement allowing for accurate airflow measurement.
4. Unit shall have factory-installed duct flanges on all duct openings.
5. Cabinet Insulation: Unit walls and doors shall be insulated with 1 inch, 4 pound density, foil/scrim faced, high density fiberglass board insulation, providing a cleanable surface and eliminating the possibility of exposing the fresh air to glass fibers, and with a minimum R-value of 4.3 (hr-ft2-°F/BTU).
6. Enthalpy core: Energy recovery core shall be of the total enthalpy type, capable of transferring both sensible and latent energy between airstreams. Latent energy transfer shall be accomplished by direct water vapor transfer from one airstream to the other, without exposing transfer media in succeeding cycles directly to the exhaust air and then to the fresh air. No condensate drains shall be allowed. The energy recovery core shall be designed and constructed to permit cleaning and removal for servicing. The energy recovery core shall have a ten year warranty. Performance criteria are to be as specified in AHRI Standard 1060.

7. Control center / connections: Energy Recovery Ventilator shall have an electrical control center where all high and low voltage connections are made. Control center shall be constructed to permit single-point high voltage power supply connections to the [non-fused][fused] disconnect.
8. Passive Frost Control: The ERV core shall perform without condensing or frosting under normal operating conditions (defined as outside temperatures above -10ºF and inside relative humidity below 40%). Occasional more extreme conditions shall not affect the usual function, performance or durability of the core. No condensate drains will be allowed.
9. Motorized Isolation Damper(s): Return Air and Outside Air motorized damper(s)of an AMCA Class I low leakage type shall be factory installed.

D. BLOWER SECTION
1. Blower section construction, Supply Air and Exhaust Air: Blower assemblies consist of a 208-230V, 3 Phase 60 HZ, TEFC motor, and a belt driven forward-curved blower.
2. Blower assemblies: Shall be statically and dynamically balanced and designed for continuous operation at maximum rated fan speed and horsepower.

E. MOTORS
1. Blower motors shall be Premium Efficiency, EISA compliant for energy efficiency. The blower motors shall be totally enclosed (TEFC) and shall be supplied with factory installed motor starters.
2. Motors shall have shaft grounding rings.

F. UNIT CONTROLS
1. Fan control: Onboard VFD both airstreams.
2. Sensors: Dirty filter monitor for both airstreams.
3. Factory-installed microprocessor controller and sensors, Premium ERV controls that:
    a. Comply with requirements in Division 23 Section "Sequence of Operations for HVAC Controls"
    b. Has factory-installed hardware and software to enable the building automation interface via BACnet to monitor, control, and display status and alarms
    c. The microprocessor controller shall be capable of operating at temperatures between -20F to 160F
    d. The microprocessor controller shall be a DIN rail mounting type
    e. Factory-installed microprocessor controller shall come with backlit display that allows menu-driven display for navigation and control of unit
    f. The microprocessor controller shall have the ability to communicate with the BMS via BACnet MSTP/IP
    g. The microprocessor controller shall have integrated ethernet interface and a web server for displaying unit parameters
    h. The microprocessor shall have near field communication (NFC) capability for android devices
    i. The microprocessor controller shall have an internal programmable time clock that will allow the user to add up to different occupancy schedules and add holidays
    j. The microprocessor control shall be capable of integral diagnostics
    k. The microprocessor control shall be capable of IP or SI unit display
    l. The microprocessor controller shall have a battery powered clock
    m. The microprocessor controller shall at a minimum offer the ability for three modes of determining occupancy: a dry contact, the internal time clock or the BMS

n. A remote user terminal to allow for remote monitoring and adjustment of parameters, allowing ease of control access without going outdoors or into the mechanical room if desired by the user
o. The microprocessor controller shall have at a minimum (10) universal inputs/outputs (AI, DI, AO) and have (6) six relay outputs (DO)
p. The microprocessor controller shall have an integrated fieldbus port
q. The microprocessor controller shall have the capability for I/O expansion
r. The microprocessor controller shall have a micro USB port to load the application program, the unit parameters, saving logs, etc.
s. The sensors that will be required for control are:
    1) (2) Temperature sensor for fresh air and exhaust air
    2) (2) Temperature and humidity sensor for outside air, return air
    3) (2) Differential pressure sensors for filter alarms
    4) [(2) Differential pressure sensors for measuring pressure drop across energy recovery core and for determining airflow in both airstreams]
    5) (2) Adjustable current switches
    6) Field-installed duct static sensor

4. The microprocessor controller shall have the capability to monitor the unit conditions for alarm conditions. Upon detecting an alarm, the microprocessor controller shall have the capability to record the alarm description, time, date, available temperatures, and unit status for user review. A digital output shall be reserved for remote alarm indication. Alarms to be also communicated via BMS as applicable. Provide the following alarm functions:
    a. Outside air temperature sensor alarm
    b. Outside air humidity sensor alarm
    c. Return air temperature sensor alarm
    d. Return air humidity sensor alarm
    e. Fresh air sensor alarm
    f. Exhaust air sensor alarm
    g. Dirty filter alarm
    h. Supply and exhaust air proving alarm
    i. Duct static pressure sensor alarm
5. Display the following on the face of microprocessor controller:
    a. Unit on
    b. Outdoor air temperature
    c. Outdoor air humidity
    d. Return air temperature
    e. Return air humidity
    f. Supply air temperature
    g. Unit on/off
    h. Fan on/off
    i. Damper status
    j. Alarm digital display
6. The microprocessor controller shall have factory pre-programmed multiple operating sequences for control of the ERV. Factory default settings shall be fully adjustable in the field. Available factory pre-programmed sequences on operations are:

G. SEQUENCE OF OPERATIONS
    1. DDC CONTROLLER:

a. Controller with integral LCD readout for changing set points and monitoring unit operation.
b. Provided with required sensors and programming.
c. Factory programmed, mounted, and tested.
d. Integral USB and Ethernet ports for updating programs and retrieving log files.

2. BMS INTERFACE:
   a. BACnet MS/TP
   b. BACnet IP
3. GENERAL OPERATION
   a. POWER UP:
      1) When the unit main disconnect is closed a delay of 10 seconds (adjustable) occurs for the controller to come online.
   b. ERV UNIT START COMMAND:
      1) An input signal is required to enable the unit operation. The unit will be commanded on by:
         a) Digital input
         b) Enable via controller display
      2) All types of input that are enabled must be true before the unit will start.
         a) The exhaust fan starts after a 3 second delay (adjustable). The exhaust fan will not start until the damper actuator end switch closes.
         b) The supply fan starts after a 6 second delay (adjustable). The supply fan will not start until the damper actuator end switch closes.
         c) The supply fan, exhaust fan, are controlled based on the chosen unit operating modes and air conditions.
   c. ERV UNIT STOP COMMAND (OR DE-ENERGIZED):
      1) The unit can then be commanded off by:
         a) Digital input
         b) Disable via controller display
      2) Supply fan and exhaust fan are de-energized.
      3) All dampers are unpowered and spring return to their default position after a 10 second delay (adjustable).
   d. SUPPLY FAN OPERATION:
      1) The supply fan speed will be controlled for:
         a) Supply duct static pressure
      2) The unit will attempt to start the supply fan when the supply fan delay timer expires. When the supply fan starts the supply fan adjustable current switch should close and remain closed until the fan is turned off.
   e. SUPPLY FAN STATUS:
      1) Once the supply fan current switch closes [heating] operation is allowed. After a delay of 90 seconds (adjustable) from supply fan start signal, if the supply fan current switch is still open the supply fan alarm should be set to true and [heating] operation shall be prohibited. The supply fan status shall be set to true only when the supply fan output is on and supply fan current switch is closed. The supply fan status shall be false in all other circumstances.
   f. FIXED FAN SPEED OPTION:
      1) The analog voltage command to the supply fan VFD can be set from the unit controller display [or by the BMS]. The adjustable range of 0% to 100%

correspond to the minimum and maximum fan operating speed. This supply fan operation mode can be used to field balance the supply air flow rate.

g. SUPPLY DUCT STATIC PRESSURE CONTROL OPTION:
   1) The controller will adjust the supply fan VFD command to maintain the supply duct static pressure at a set point. The supply air duct static pressure set point is entered and adjusted from the unit controller display [or provided by the BMS]. The minimum and maximum values for supply air duct static pressure set point are unit dependent. An adjustable PI (proportional & integral) loop will compare the measured supply air duct static pressure to the static pressure set point and adjust the fan speed. If the measured static pressure varies from the desired static pressure by more than 0.05 inches water gauge (adjustable) for more than 60 seconds (adjustable) a supply air static pressure alarm will be set to true. This supply fan operation mode can be used to provide a constant supply duct pressure for VAV systems.

h. EXHAUST FAN OPERATION:
   1) The exhaust fan speed will be controlled for:
      a) [Supply fan command tracking]
   2) The unit will attempt to start the exhaust fan when the exhaust fan delay timer expires. When the exhaust fan starts the exhaust fan adjustable current switch should close and remain closed until the fan is turned off.

i. EXHAUST FAN STATUS:
   1) After a delay of 90 seconds (adjustable) from exhaust fan start signal, if exhaust fan current switch is still open the exhaust fan alarm should be set to true. The exhaust fan status shall be set to true only when the exhaust fan output is on and exhaust fan current switch is closed. The exhaust fan status shall be false in all other circumstances.

j. EXHAUST AIR FLOW CONTROL OPTION:
   1) The controller will adjust the exhaust fan VFD command to maintain the exhaust air flow rate at a set point. The exhaust air flow rate set point is entered and adjusted from the unit controller display [or provided by the BMS]. The minimum and maximum values for the exhaust air flow rate set point are unit dependent. An adjustable PI (proportional & integral) loop will compare the measured exhaust air flow to the air flow rate set point and adjust the fan speed. If the measured exhaust air flow rate varies from the desired air flow rate by more than 10% (adjustable) for more than 60 seconds (adjustable) an exhaust air flow rate alarm will be set to true. This exhaust fan operation mode can be used to provide a constant exhaust air flow rate as the unit filters become loaded.

k. SUPPLY FAN COMMAND TRACKING CONTROL OPTION:
   1) The controller will adjust the exhaust fan VFD command to track the supply fan command. The minimum (50%) and maximum (200%) tracking rates are adjustable. This exhaust fan operation mode can be used to maintain proportional supply and exhaust fan commands as the supply fan modulates.

l. FILTER SECTION
   1) ERV shall have 2" thick MERV 8 disposable pleated filters located in the outdoor air and exhaust airstreams. All filters shall be accessible from the exterior of the unit.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine casing insulation materials and filter media before air-to-air energy recovery equipment installation. Reject insulation materials and filter media that are wet, moisture damaged, or mold damaged.

C. Examine roughing-in for electrical services to verify actual locations of connections before installation.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install so supply and exhaust airstreams flow in opposite directions and rotation is away from exhaust side to purge section to supply side.

1. Install access doors in both supply and exhaust ducts, both upstream and downstream, for access to wheel surfaces, drive motor, and seals.
2. Install removable panels or access doors between supply and exhaust ducts on building side for bypass during startup.
3. Make final ductwork connections (outdoor air intake, ventilation air outlet, return air intake, exhaust air outlet) with flexible duct connector.
4. Install isolation dampers on outdoor air and exhaust air ductwork as close to louvers as possible. Route wiring from damper actuators back to unit controller. Make final terminations.
5. Mount programmable timeclock, where indicated, and route wiring from timeclock back to unit controller. Make final terminations.
6. Access doors and panels are specified in Section 233100 "Air Duct Accessories."
7. Install proper condensate drain piping to nearest drain

B. Equipment Mounting:

1. Install indoor air-to-air energy recovery equipment on field fabricated frames. Frames shall be designed to handle seismic loads.

2. Install outdoor air-to-air energy recovery equipment on insulated roof curbs, 24” minimum in height.

C. Install units with clearances for service and maintenance.

D. Install new filters at completion of equipment installation and before testing, adjusting, and balancing.

3.3 CONNECTIONS

A. Install piping adjacent to unit to allow service and maintenance.

B. Connect piping to units mounted on vibration isolators with flexible connectors.

C. Comply with requirements for ductwork specified in Section 233113 "Metal Ducts."

D. Install electrical devices furnished with units but not factory mounted.

E. Mount and wire programmable timeclocks. Provide low voltage control wiring from timeclock to associated unit. All wiring and accessories shall comply with requirements of Specification Sections within Division 26.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

B. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

C. Tests and Inspections:

1. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
2. Adjust seals and purge.
3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
4. Set initial temperature and humidity set points.
5. Set field-adjustable switches and circuit-breaker trip ranges as indicated.

D. Air-to-air energy recovery equipment will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.5 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain air-to-air energy recovery units.

3.6 SPARE PARTS

A. Turn over one (1) full set of filters to the Owner upon substantial completion.

3.7 SEQUENCE OF OPERATION

A. Unoccupied Mode:

1. During unoccupied hours, the outdoor air and exhaust air dampers shall be fully closed and the supply air and exhaust air fans shall be de-energized. The dampers shall not close until the respective fan is fully off.

B. Occupied Mode:

1. Fan Control:
   a. During occupied hours the supply fan and exhaust fan shall run continuously. The fans shall not start until their respective damper is fully open.
2. Damper Control:
   a. During normal operation, the outdoor air and exhaust air dampers shall be fully open. The bypass damper shall be fully closed.
   b. During economizer operation, the outdoor air and exhaust air dampers shall be fully open, and the bypass damper shall be fully open. The unit shall be in economizer mode when the outdoor air temperature is between 62 and 72°F.

END OF SECTION 237200

SECTION 238216.14 - ELECTRIC-RESISTANCE AIR COILS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes electric resistance air coils.

B. Perform all Work required to provide and install the electric duct heaters indicated by the Contract Documents with supplementary items necessary for proper installation.

C. Refer to Division 26 sections for the following Work:
1. Power supply wiring from power source to power connection on electric duct heater. Include, disconnects, and required electrical devices, except where specified as furnished, or factory-installed, by manufacturer.
2. Interlock wiring between electrically-operated duct heater and field-installed control devices.
3. Interlock wiring specified as factory-installed in work of this section.

D. Provide the following as Work of this Section, complying with requirements of Division 26 Sections:
1. Control wiring between field-installed controls, indicating devices, and electric duct heater control panels.

1.2 ACTION SUBMITTALS

A. Product Data:
1. Submit manufacturer's data for duct heaters showing dimensions, capacities, ratings, performance characteristics, electrical and control wiring, gages and finishes of materials, and installation instructions.
2. Submittal data shall consist of drawings showing coil dimensions, construction materials, watt density, ratings and performance including pressure drops on airside

B. Wiring Diagrams:
1. Furnish a separate, complete wiring diagram for each heater.
2. Diagram shall include recommended supply wire gauges per NEC, and fuse sizes.
3. Typical wiring diagrams are not acceptable.
4. Each heater shall be complete with clearly marked power and control terminals.

C. Control Box:
1. Verify control panel size, door swing and duct size with contractor supplied ductwork shop drawings prior to submittal, and ordering heaters.
2. Verify electrical characteristics and control requirements prior to order.

D. Record Documents:

1. Manufacturers wiring diagrams detailing electrical connection to duct heaters for wiring for power, signal, and control systems, differentiating clearly between manufacturer-installed wiring and field-installed wiring.

1.3 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

PART 2 - PRODUCTS

2.1 DESCRIPTION

A. ASHRAE Compliance: Comply with applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."

2.2 COILS

A. The UL approved electric heater shall be manufactured by RenewAire, or approved equivalent by Brasch, or Indeedco.

B. Testing Agency Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Coil Assembly: Comply with UL 1995.

D. Heating Elements: Coiled resistance wire of 80 percent nickel and 20 percent chromium; supported and insulated by ceramic bushings. Heating element support structure shall consist of galvanized steel wire formed and constructed to support ceramic bushings through which the heating element passes.

E. High-Temperature Coil Protection: Disk-type, automatically reset, thermal-cutout, safety device; serviceable through terminal box without removing heater from duct or casing.

1. Secondary Protection: Load-carrying, manually reset or manually replaceable, thermal cutouts; factory wired in series with each heater stage.

F. All duct heaters will require either a fan interlock circuit or an airflow switch. The airflow switch shall be diaphragm operated differential pressure switch to prevent duct heater from operating when there is no air flow.

G. Frames: Galvanized-steel channel frame, minimum 0.052 inch (1.3 mm) thick for slip-in flanged mounting.

H. Control Box: Control cabinet shall have a solid cover also of heavy gauge galvanized steel and held in place with hinges and interlocking disconnect switch.

I. Built-in components shall include disconnecting break magnetic contactors, transformer with primary fusing, pressure-type airflow switch set at 0.05" + 0.02" WC all as required by UL, branch circuit fuses per NEC, interlocking disconnect switch and a single terminal block to accept the number, type and size of conductors as required.

J. Orientation: Heaters shall be interchangeable for mounting in a horizontal or vertical duct.

K. Control Panel: Unit mounted with disconnecting means and overcurrent protection. Include the following controls:

1. Magnetic contactor.
2. Toggle switches; one per step.
3. Step controller or SCR controller as scheduled.
4. Time-delay relay.
5. Pilot lights; to indicate heater is energized.
6. Airflow proving switch.
7. 24V control voltage.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install coils level and plumb.

B. Install coils in metal ducts and casings constructed according to SMACNA's "HVAC Duct Construction Standards, Metal and Flexible."

C. Clean coils using materials and methods recommended in writing by manufacturers, and clean inside of casings and enclosures to remove dust and debris.

D. All installation shall be in accordance with manufacturer's published recommendations.

E. Inspect areas and conditions under which heater units are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to installer.

F. Maintain minimum working clearances around the heater electrical panel in accordance with NEC Article 110.

G.

3.2 CONNECTIONS

A. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

B. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

END OF SECTION 238216.14

SECTION 019100 - COMMISSIONING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Commissioning.
2. Submittals.
3. Commissioning services.
4. Commissioning responsibilities.
5. Commissioning meetings.
6. Commissioning reports.
7. Test equipment.
8. Verification check and startup procedures.
9. Functional performance test procedures.
10. Function performance test methods.
11. Deficiencies and test approvals.
12. Demonstration.

1.2 SUBMITTALS

A. Qualifications Data: For Commissioning Authority.

1.3 COMMISSIONING SUBMITTALS

A. Furnish Contract Documents to Commissioning Authority.

B. Furnish submittals directly to Commissioning Authority for review and approval in accordance with procedures specified in Section 013300.

1.4 CLOSEOUT SUBMITTALS

A. Commissioning Record: Required.

B. Final Commissioning Report: Required.

1.5 COMMISSIONING SERVICES

A. Employ and pay for services of an approved independent firm as Commissioning Authority.

B. Provide services in compliance with the latest edition of the 2020 Energy Conservation Construction Code of New York State.

C. Commission all Plumbing, Mechanical and Electrical systems required by Code.

1.6 SEQUENCING

A. Sequence work to complete commissioning, except for functional testing and Owner's personnel training, before Substantial Completion.

1.7 MAINTENANCE MATERIALS

A. Furnish one set of manufacturer's proprietary test equipment, tools, and instruments.

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT

A. Testing Equipment: Calibrated within last year.

B. Equipment Furnished by Contractor:

1. Standard testing equipment required to perform verification check and startup and required functional performance testing.
2. Two way radios for personnel performing commissioning.

C. Equipment furnished by Commissioning Authority:

1. Data logging equipment and software.

PART 3 - EXECUTION

3.1 VERIFICATION CHECK AND STARTUP PROCEDURES

A. Verification Check and Startup:

1. Perform verification check and startup.
2. Sign and date plan indicating completion of entire plan.

3.2 FUNCTIONAL PERFORMANCE TEST PROCEDURES

A. Commissioning Authority will direct, witness, and document results of functional performance tests.

B. Demonstrate each piece of equipment and system is operating according to documented design intent and Contract Documents.

C. Operate each piece of equipment and system through each specified mode of operation.

3.3 FUNCTIONAL PERFORMANCE TEST METHODS

A. Perform testing and verification by using manual testing or by monitoring performance and analyzing results from data loggers.

B. Perform each function and test under conditions simulating actual conditions as close as is practically possible.

C. Sampling: Multiple identical pieces of equipment may be functionally tested using sampling strategy.

3.4 DEFICIENCIES AND TEST APPROVALS

A. Deficiencies:

1. Commissioning Authority will record and report deficiencies to Owner.
2. Correct deficiencies at no cost to Owner.

B. Manufacturing Defects: Repair or replace equipment with manufacturing defects.

3.5 DEMONSTRATION

A. Demonstrate equipment and systems and train Owner's personnel.

END OF SECTION 019100

NIAGARA UNIVERSITY

ACADEMIC INNOVATION HUB WORKFORCE DEVELOPMENT TRAINING

LaBella
Powered by partnership.

Contractor Pre-bid Walkthrough

LaBella Project No: 2221723

Date: April 25, 2024

Time: 9:00 a.m.

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