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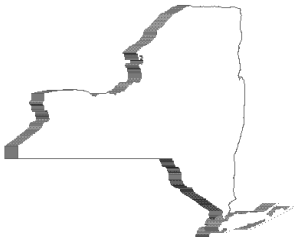

ADDENDUM NO. 4 TO PROJECT NO. 44500

HVAC WORK, ELECTRIC WORK
REHABILITATE HEATING SYSTEM
BUILDING NO. 18
AUBURN CORRECTIONAL FACILITY
135 STATE STREET
AUBURN, NEW YORK

March 20, 2014

NOTE: This Addendum forms a part of the Contract Documents. Insert it in the Project Manual. Acknowledge receipt of this Addendum in the space provided on the Bid Form.

HVAC WORK SPECIFICATIONS

1. SECTION 000110 TABLE OF CONTENTS: Add "230719 Ductwork Insulation."
2. SECTION 000110 TABLE OF CONTENTS: Add "237314 Air to Air Heat Exchanger"
3. SECTION 230719 DUCTWORK INSULATION: Add this section in its entirety. Section is attached to this addendum.
4. SECTION 237314 AIR TO AIR HEAT EXCHANGER: Add this section in its entirety. Section is attached to this addendum.

HVAC WORK DRAWINGS

5. DRAWING M-001, Abbreviations: Add "ASW-PM = AS-PWM = VSC = VSD = VARIABLE-SPEED DRIVE = ADJUSTABLE SPEED MOTOR CONTROLLERS"
6. DRAWING M-302, DETAILS 1/M-302 and 2/M-302: Add note to each detail: "PROVIDE CONTINUOUS 18" HIGH FTR AND PIPING ENCLOSURES AROUND ALL BUILDING COLUMNS AND OBSTRUCTIONS, WITH MINIMUM 5" DEPTH DIMENSION FROM BACKER PLATE TO FRONT OF ENCLOSURE."
7. DRAWING M-302, DETAILS 1/M-302 and 2/M-302: For each detail, change note from "EXTENDED STEEL SECURITY COVER WITH FRONT ACCESS PANEL WITH TAMPER-PROOF FITTINGS TO ALLOW ACCESS TO VALVES, VENTS AND EXPANSION COMPENSATORS", to "EXTENDED STEEL SECURITY COVER WITH FRONT ACCESS PANEL WITH TAMPER-PROOF FASTENERS TO ALLOW ACCESS TO VALVES, VENTS, DRAINS AND STRAINERS",

END OF ADDENDUM

Margaret F. Larkin
Acting Executive Director

SECTION 230719

DUCTWORK INSULATION

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Through Penetration Firestops: Section 078400.

B. Painting: Section 099103.

C. Metal Ductwork: Section 233113.

1.02 ABBREVIATIONS

A. FS: Federal Specification.

B. K: Thermal Conductivity, i.e., maximum Btu per inch thickness per hour per square foot.

C. pcf: Pounds per cubic foot.

D. PVC: Polyvinylchloride.

1.03 SUBMITTALS

A. Product Data:
   1. Manufacturer's catalog sheets, specifications and installation instructions for insulation materials.
   2. Materials Schedule: Itemize insulation materials and thicknesses for each specified application in Insulation Material Schedules in Part 3 of this Section. Where optional materials are specified, indicate option selected.

B. Quality Control Submittals:
   1. Installers Qualification Data:
      a. Name of each person who will be performing the Work, and their employer's name, business address and telephone number.
      b. Furnish names and addresses of the required number of similar projects that each person has worked on which meet the qualifications.

1.04 QUALITY ASSURANCE

A. Qualifications: The persons installing the Work of this Section and their Supervisor shall be personally experienced in mechanical insulation work and shall have been regularly employed by a company installing mechanical insulation for a minimum of 5 years.

B. Regulatory Requirements:
   1. Insulation installed inside buildings, including duct lining materials, laminated jackets, mastics, sealants and adhesives shall have a Fire Spread/Smoke Developed Rating of 25/50 or less based on ASTM E 84.

PART 2 PRODUCTS

2.01 INSULATION

A. Fibrous Glass (Mineral Fiber) Insulation: Composed principally of fibers manufactured from rock, slag, or glass, with or without binders, and asbestos free.
   1. Block or Board Insulation: Minimum density 3.0 pcf and 6.0 pcf as specified; ASTM C 612:
      a. Type IA or IB (Suitable for Temperatures Up to 450 degrees F): K of 0.26 at 75 degrees F.
   2. Blanket Insulation:
      a. For Ductwork (Suitable for Temperatures Up to 450 Degrees F): Minimum density 1.0 pcf, K of 0.31 at 75 degrees F; ASTM C 553, Type II.

B. Flexible Elastomeric Foam Insulation:
   1. FM tested and approved, meeting the following:
      a. Maximum Water Vapor Transmission: 0.10 perm - inch based on ASTM E 96, Procedure A.
      b. K of 0.27 at 75 degrees F based on ASTM C 518 or C 177.
      c. Fire Spread/Smoke Developed Rating: 25/50 or less based on ASTM E 84.
   2. Sheet Insulation for Ductwork and Equipment: ASTM C 534, Type II, smooth skin one side.
   3. Polyethylene and polyolefin insulation is not acceptable.

C. High Density Jacketed Insulation Inserts for Hangers and Supports:
   1. For Use with Fibrous Glass Insulation:
      a. Ductwork: Fibrous glass board, minimum density 6 pcf, K of 0.26 at 75 degrees F, conforming to ASTM C 612, Type IA or IB.
   2. For Use with Flexible Elastomeric Foam Insulation:
      a. Ductwork: Hardwood dowels and blocks, length or thickness equal to insulation thickness, other dimensions as specified or required.

D. Cements:
   1. Fibrous Glass Thermal Insulating Cement: Asbestos free; ASTM C 195.
   2. Fibrous Glass Hydraulic Setting Thermal Insulating and Finishing Cement: ASTM C 449/C 449M.

2.03 ADHESIVES, MASTICS, AND SEALERS

A. Vapor Lap Seal Adhesive (Fibrous Glass Insulation): Childers' CP-82, Epolux's Cadoprene 400, Foster's 85-60 or 85-20.

B. Vapor Barrier Mastic (Fibrous Glass Insulation): Permeance shall be .03 perms or less at 45 mils dry per ASTM E 96. Childers' CP-34, Epolux's Cadalar 670, Foster's 30-65 .

C. Adhesive (Fiberglass duct liner): Childers' Chil Quik CP-127, Foster Vapor Fas 85-60. Must comply with ASTM C 916, Type II

D. Weather Barrier Breather Mastic (Reinforcing Membrane): Childers' VI-CRYL CP-10/11, Foster's Weatherite 46-50.

E. Reinforcing Membrane: Childers' Chil Glas #10, Foster Mast a Fab, Pittsburgh Corning PC 79

2.04 MISCELLANEOUS MATERIALS

A. Insulation Fasteners for Ductwork and Equipment:
   1. Acceptable Manufacturers: Duro-Dyne Corp.; Erico Fastening Systems, Inc.
   2. Type: Weld pins, complete with self-locking insulation retaining washers.

B. Pressure Sensitive Tape for Sealing Laminated Jackets:
   1. Acceptable Manufacturers: Alpha Associates, Ideal Tape, Morgan Adhesive.
   2. Type: Same construction as jacket.

C. Wire, Bands, and Wire Mesh:
   1. Binding and Lacing Wire: Nickel copper alloy or copper clad steel, gage as specified.
   2. Bands: Galvanized steel, 1/2 inch wide x 0.015 inch thick, with 0.032 inch thick galvanized wing seals.
   3. Wire Mesh: Woven 20 gage steel wire with 1 inch hexagonal openings, galvanized after weaving.

D. Metal Corner Angles: Galvanized steel, 2 x 2 inch 28 gage.

E. Reinforcing Membrane: Glass or Polyester, 10 x 10 mesh. Alpha Associates Style 59, Childer's Chil-Glas, Foster's MAST-A-FAB.

PART 3 EXECUTION

3.01 PREPARATION

A. Perform the following before starting insulation Work:
   1. Install hangers, supports and appurtenances in their permanent locations.
   2. Complete testing of ductwork, and equipment.
   3. Clean and dry surfaces to be insulated.

3.02 INSTALLATION, GENERAL

A. Install the Work of this Section in accordance with the manufacturer's printed installation instructions unless otherwise specified.

3.03 INSTALLATION AT HANGERS AND SUPPORTS

A. Reset and realign hangers and supports if they are displaced while installing insulation.

B. Install high density jacketed insulation inserts at hangers and supports for insulated ductwork and equipment.

C. Insulation Inserts For Use with Fibrous Glass Insulation:
   1. Ductwork: Install 6 pcf density jacketed fibrous glass board, same thickness as adjoining insulation, sized for full bearing on supporting trapeze member, and as required to enable abutting to adjoining insulation and overlapping of jacketing.

D. Insulation Inserts For Use with Flexible Elastomeric Foam Insulation:
   1. Ductwork: Install hardwood block, same thickness as adjoining insulation, sized for full bearing on supporting trapeze member and as required to abutt and seal vapor tight with adjoining insulation.

3.04 INSTALLATION OF DUCTWORK INSULATION

A. Fibrous Glass Board Insulation Application:
   1. Secure insulation to ductwork, with duct insulation fasteners spaced 3 inch in from all corners of ducts, with intermediate fasteners on maximum 16 inch centers in all directions.
   2. Butt edges of insulation and fill voids with similar insulation.
   3. Seal minimum 1-1/2 inch wide longitudinal jacket laps continuously with vapor seal adhesive.
   4. Lap circumferential joints with 4 inch wide jacket material and seal laps continuously with vapor barrier lap adhesive, or seal continuously with minimum 3 inch wide pressure sensitive sealing tape, of same material as jacket.
   5. Install metal corner angles over the jacketed insulated corners. Seal exposed ends of insulation with vapor barrier mastic.
   6. Vapor seal breaks in vapor barrier jacketing, exposed surfaces of duct insulation fasteners and metal corner angles, with pressure sensitive sealing tape of same material as jacket or coat with vapor barrier mastic.
   7. Field apply 6 oz canvas jacket over the vapor barrier jacketed insulation where indicated on Ductwork Service Insulation Material Schedule in Part 3 of this Section.
      a. Apply canvas jacket with lagging adhesive, with a 2 inch lap on circumferential and longitudinal seams.

b. Outward clinching staples may be utilized for additional securement of canvas to bottom of ducts in excess of 48 inch in width.
c. Apply heavy coat of lagging adhesive to entire canvas surface.

8. Place trapeze hangers, fabricated of steel rods and structural steel channels or angles, outside of jacketed insulated ducts.
   a. Install high density insulation inserts, of thickness equal to insulation, minimum of 4 inch in width by the bottom dimension of the duct, at points of support.
   b. Continuously jacket insulated ducts and filler pieces through supports.

B. Fibrous Glass Blanket Insulation Application:
1. Cut insulation to stretch-out dimensions as recommended by insulation manufacturer.
2. Remove 2 inch wide strip of insulation material from the jacketing on the longitudinal and circumferential joint edges to form an overlapping staple/tape flap.
3. Install insulation with jacketing outside so staple/tape flap overlaps insulation and jacketing on other end.
4. Butt ends of insulation tightly together.
   a. Rectangular and Square Ductwork: Do not compress insulation at duct corners.
5. Staple longitudinal and circumferential joints with outward clinching staples minimum 6 inches on center, and seal with pressure sensitive sealing tape.
6. Cut off pretruding ends of fasteners flush with insulation surface and seal with pressure sensitive sealing tape.
7. Install duct insulation fasteners on bottom side of horizontal duct runs, when bottom dimension of the duct is in excess of 24 inches in width.
8. Install duct insulation fasteners on sides of duct risers having a dimension over 24 inches in size.
9. Seal tears, punctures, and penetrations of insulation jacketing with sealing tape and coat with vapor barrier mastic.
10. Secure insulation to ductwork with fasteners spaced in accordance with the following schedule:

DUCT DIMENSION	SPACING OF FASTENERS (MINIMUM)
Up to 24 inches	None required.
24 inches to 48 inches	Horizontal Runs: 2 rows - 16 inches on center. Risers: 16 inches on center, all directions.
49 inches to 60 inches	Horizontal Runs: 3 rows - 16 inches on center. Risers: 16 inches on center, all directions.
61 inches and over	Horizontal Runs: 16 inches on center, all directions. Risers: 16 inches on center, all directions.

C. Bench Insulated Ductwork:
1. Insulate ducts prior to erection in place when ducts are required to be installed proximate to walls, ceilings, equipment or other ductwork,

which will not permit adequate space for installation of insulation after ducts are installed.

2. Line interior surfaces of ducts with thermal and acoustic board insulation, when the specified application of exterior insulation is impractical.
   a. Written permission from the Director must be received, prior to the substitution of lined ducts for exterior insulated ducts.
   b. Maintain interior cross-sectional areas of ducts, as noted on drawings.

D. Flexible Elastomeric Foam Insulation on Ductwork Exposed to the Elements, Exterior to a Building:
   1. Apply 2 inch thick flexible elastomeric foam sheet insulation to ductwork with adhesive.
      a. Insulate sheet metal duct seams, angle bracing, and reinforcing with same insulation thickness specified for ductwork.
   2. Apply reinforcing membrane around ductwork insulation with adhesive or mastic.
   3. Adhesive Applied System: Apply 2 coats of finish. See Section 099103.
   4. Mastic Applied System: Apply another coat of mastic over reinforcing membrane.

3.05 DUCTWORK SERVICE INSULATION SCHEDULE

A. Insulate all ductwork service except where otherwise specified.

B. Do not insulate the following ductwork service items:
   1. Exhaust ductwork, unless otherwise shown.
   2. Return fans.
   3. Exhaust fans.
   4. Interior lined ductwork.
   5. Flexible ductwork connections.
   6. Ductwork located within equipment.
   7. Ductwork where design temperature difference between interior and exterior of duct or plenum does not exceed 15 degrees F.

3.06 DUCTWORK SERVICE INSULATION MATERIAL SCHEDULE

LOCATION	SERVICE	INSUL. MATERIAL	MINIMUM INSUL. THICKNESS	JACKET TYPE	MINIMUM REQUIRED R VALUE
Exposed, inside building insul. envelope.	Air Conditioning Supply Under 65 F, 100% Outside Air, Heating Supply Over 85 F.	Fibrous Glass Board	1-1/2	I with Canvas Outer Jacket	R-5
Inside building but exposed to outside air temp., e.g., ventilated attic.	Air Conditioning Supply, Heating Supply, All Returns including returns mixed with outside air.	Fibrous Glass Blanket	2-1/2	I or II	R-8
		Fibrous Glass Board	2	I or II	

A. **NOTES:**

1. Equipment: Insulate air handling equipment, not furnished with factory applied insulated jacket or internal insulation, with minimum 1-1/2 inch thick fibrous glass board with an ASTM C 1136 Type I jacket, installed and finished as specified for exposed ductwork in finished spaces.

END OF SECTION

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SECTION 237314

AIR TO AIR HEAT EXCHANGER

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Removals, Cutting and Patching: Section 017329.

B. Metal Ductwork: Section 233113.

C. Insulation: Section 230719.

D. Direct Digital Building Control System: Section 230923

1.02 SUBMITTALS

A. Shop Drawings: Show fabrication details and connections to adjacent Work.

B. Product Data: Manufacturer's catalog sheets, specifications, and installation instructions for each item specified.

C. Contract Closeout Submittals:
   1. Operation and Maintenance Data: Deliver 2 copies, covering the installed products, to the Director's Representative.
   2. Spare filters for 2 complete change outs; boxed.

1.03 QUALITY ASSURANCE

A. ETL listed.

B. Heat Exchanger performance certified by independent testing lab according to ASHRAE Testing Standard 84-1991.

C. Provide field quality control per Company Field Advisor

PART 2 PRODUCTS

2.01 AIR TO AIR HEAT EXCHANGER

A. Unit Construction:
   1. Unit to include aluminum flat plate exchanger. The exchanger shall be constructed of rigid, seamless, leak proof air channels that eliminate cross-contamination between airflows. Exposed folded / crimped edges are not acceptable. The exchanger corrugations shall be bonded to the flat plates and be capable of withstanding pressure differentials of up to 15" w.g. without deforming air passages. The face of the exchanger shall be reinforced by rigid aluminum extrusions to protect the exchanger from damage during installation, cleaning, or maintenance. The entire exchanger including the frame shall be made of aluminum.

2. Welded steel hanging frame with metal threaded rod hangers attached to ceiling concrete by anchor bolts. Heavy duty formed corners, 18 gage galvanized heavy duty case. Double wall constructed of 20 gage galvanized steel. Access doors with galvanized hinges and handles. 1" thick 3 lb. density hardboard fiberglass insulation with reinforced aluminum lining secured with metal clips and sealed with aluminum tape and silicone sealant. Welded structural steel base supports. Lifting lugs shall be integral part of the base. G90 galvanized finish.
3. The exchanger plates shall be rigidly secured to allow vertical or horizontal installation without crushing or settling of individual plates. The entire heat transfer surface shall be capable of visible inspection and cleaning. The Exhaust air channel shall be totally open with absolutely no obstructions that will accumulate dust, dirt or debris and be capable of physical cleaning. Unit shall have virtually no cross-over of air from exhaust airstream to make up side.

B. Accessories:
1. Include accessories required to perform the functions specified and indicated on the drawings.
2. Exhaust Air Filters:
   a. Six, factory supplied 2" pleated 30/30 filters, sized to match unit selection, installed on return side of unit.
3. Dampers:
   a. 2 position outside air shutoff, exhaust opening. Provided separately.
   b. 2 position outside air shutoff, outside air opening. Provided separately.
   c. Modulating outside air face and bypass unit with plenum and bypass supply duct.
   d. 16 gauge galvanized hat channel frames and blades with ½" cadmium plated shafts and bronze bearings. Vinyl blade seals and stainless steel jamb seals. .
4. Motor and Unit Controls.
   a. Factory provided controls, controller and panel. Remote fan and damper motor controls.
5. Condensate drain pan with drain connections (NPT):
   a. Equip unit with full length and width drain pan, minimum of 3 inches deep. Double sloped to drain pipe thread connection. Inspection doors to allow for cleaning.
6. Aluminum Flat Plate Heat Exchanger Cell:
   a. Stationary flat plate type transfer surface operating up to 220 degrees F.

2.02 MOTOR AND UNIT CONTROLS

A. Supply fan motor controls.

B. Exhaust fan motor controls.

C. Remote or unit mounted Panel, as directed:

1. Low limit lights/ Warm up cycle indicator.
2. Fan indicator lights.
3. Dirty filter lights.
4. On-Off switch.
5. Current sensor failure light.

D. Temperature Controls:
   1. Electric Damper Actuators:
      a. Actuators shall be factory selected, mounted and tested for proper operation based on unit size, type, and torque requirements.
      b. Electric/Electronic, positive positioning, spring return, sized to stroke damper smoothly throughout its range.
         1) All outdoor air dampers shall fail closed upon electric power loss.
      c. Actuator response shall be linear in response to sensed load.
      d. Voltage to suit system voltage.
      e. Actuators shall have either built –in end switches or externally mounted end switches.
   2. Auto Frost Control – modulating face and bypass.
   3. Warm Weather Economizer.
   4. Summer Recovery Changeover – modulating face and bypass.
   5. Reheat Coil – modulating control valve on a reheat setpoint.
   6. Spare relays for activation of existing equipment and external equipment
   7. DDC Control input and output signal- connectability to BACnet system.

2.04 WIRING

A. Internally factory mounted wired; for any field mounted external wiring see Section 260523-WIRING FOR MOTORS AND MOTOR CONTROLLERS.

2.05 APPROVED MANUFACTURERS AND MODELS:

A. Heat-X-Changer: by XeteX, Inc., 9405 Holly Street NW, Minneapolis, MN 55433. Contacts: www.xetexinc.com (612) 724-3101.

B. Z-Duct by Munters Corporation, 79 Monroe Street P.O. Box 640, Amesbury, MA 01913. Contacts: www.munters.us/en/us/ (978) 241-1100.

C. RenewAire LLC, 4510 Helgesen Drive Madison, WI 53718. Contacts: www.renewaire.com (800) 627-4499.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with the manufacturer's printed installation instructions.
   1. Provide all necessary relays, mounting brackets, gages, switches and accessories required, even though not specifically indicated, to result in a

complete workable system capable of performing with indicated capacity and control sequences.

B. Temperature or humidity control equipment installed on insulated surfaces: Provide extension pieces or rigid insulating mounting back plates, of depth as required, so that equipment backs finish flush with final insulated surface.

3.02 FIELD QUALITY CONTROL

A. Preliminary Requirements: Provide the services of the field service representative of the Heat Exchanger manufacturer or manufacturer's authorized representative for 2.75 days, 22 man hours, for the following:
   1. Inspect heat exchanger, fans and connective ductwork to include accessory items installation prior to start-up. Inspect the installation and notify the Director's Representative of any Work which must be done or modified prior to starting.
   2. Supervise initial start-up of HX unit. Recommend any adjustments.
   3. Supervise testing and acceptance.
   4. Instruction of State Personnel.
   5. Service, if requested.

B. Preliminary System Test:
   l. Preparation: Have the Company Field Advisor adjust the completed system and then operate it long enough to assure that it is performing properly.
   2. Run a preliminary test for the purpose of:
      a. Determining whether the system is in a suitable condition to conduct an acceptance test.
      b. Checking and adjusting equipment.
   3. Also perform a witnessed validation demonstration consisting of:
      a. Using the interface panel keypad and display to acknowledge alarms, set points and display the equipment status.

C. System Acceptance Test:
   l. Preparation: Notify the Director's Representative at least 3 working days prior to the test so arrangements can be made to have a Facility Representative witness the test.
   2. Make the following tests:
      a. Test system operational functions step by step as summarized in the detailed description of system sequence of operation, Section 011000, Summary of the Work.
      b. Test monitor and control devices.
      c. Test all remote devices such as valve and damper actuators to demonstrate full range of motion in the "controllable range".
   3. Supply any dedicated equipment necessary for system adjustment and testing.
   4. Submit written report of test results on company letterhead signed by Company Field Advisor and by the Heating Contractor certifying that the equipment is fully functioning and operating within expected parameters at full capacity.

D. Instruction of State Personnel: The Company Field Advisor shall instruct duly authorized State Personnel in the operation and maintenance of the Heat Exchanger, Fans, controls and all accessories. Provide a minimum of 2 man hours for instruction purposes, exclusive of all pre-start-up, start-up and service call time.

END OF SECTION

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