

ADDENDUM NO. 04

Issued: 01.03.24

Project: Ridgeview Elementary School
701 Thornton Street, Liberty, Missouri 64068

Project No. 23026

Owner: Liberty Public Schools
8 Victory Lane
Liberty, MO 64068

Bidding Documents Issued: 11.30.23

This Addendum includes these 2 pages and the following attachments:

Project Manual:

Reissued Section 000105 "Certifications Page" consisting of 2 pages.
Reissued Section 000110 "Table of Contents" consisting of 4 pages.
Reissued Section 237433 – "Dedicated Outdoor Air Units" consisting of 6 pages

Drawings:

Revised Architectural Sheets: A001

PROJECT MANUAL REVISIONS

A1 SECTION 000005 – CERTIFICATIONS PAGE

A1.1 REPLACE existing Section 000005 "Certifications Page" with the attached revised Section 000005 "Certifications Page", dated January 03, 2024.

A2 SECTION 000110 - TABLE OF CONTENTS

A2.1 REPLACE existing Section 000110 "Table of Contents" with the attached revised Section 000110 "Table of Contents", dated January 03, 2024.

A3 SECTION 102113 – TOILET COMPARTMENTS

A3.1 REVISE Paragraph 2.2.B.4 in Section 102113 "Toilet Compartments" as follows:

4. Door/Panel Height: ~~As scheduled and indicated on the Drawings.~~ **62 inches.**

A3.2 REVISE Paragraph 2.2.B.5 in Section 102113 "Toilet Compartments" as follows:

5. Pilaster Height: ~~As scheduled and indicated on the Drawings.~~ **62 inches.**

A4 SECTION 237433 – DEDICATED OUTDOOR AIR UNITS

A4.1 REPLACE existing Section 237433 "Dedicated Outdoor Air Units" with the attached revised Section 237433, "Dedicated Outdoor Air Units" dated November 2023



DRAWINGS REVISIONS

A5 SHEET A001 GENERAL ARCHITECTURAL INFORMATION

A5.1 REMOVED Door 1B205 from Door Schedule

END OF ADDENDUM NO. 04



HENDERSON
ENGINEERS

ADDENDUM NO 04

January 3rd, 2024

ISSUED BY

Henderson Engineers, Inc.
8345 Lenexa Dr.
Lenexa, KS 66214

ISSUED FOR

Hollis + Miller
1828 Walnut Street Suite 922
Kansas City, MO 64108

NOTICE TO ALL BIDDERS FOR THE

Liberty Public Schools Ridgeview Elementary School

You are instructed to read and to note the following described changes, corrections, clarifications, omissions, deletions, additions, approvals, and statements pertinent to the Contract Bid and Construction Documents.

This addendum is part of the Contract Bid and Construction Documents and shall govern in the performance of the Work.

SPECIFICATIONS

1. 237433 Dedicated Outdoor Air Units
 - a. Added AAON as approved manufacturer in section 2.1.A.

BIDDERS QUESTIONS

1. Can you please provide the manufacturer/model of the existing fire alarm systems in each school?
 - a. For Liberty Ridgeview Elementary, the existing fire alarm system is an Edwards EST-4 Voice Fire Alarm System.

SECTION 000105 - CERTIFICATIONS PAGE

ARCHITECT

I HEREBY, PURSUANT TO RSMO 327.411, STATE THAT THE SPECIFICATIONS INTENDED TO BE AUTHENTICATED BY MY SEAL ARE LIMITED TO SPECIFICATIONS LISTED BELOW:

DIVISION 1 SECTIONS:	011000, 012100, 012200, 012300, 012500, 013100, 013200, 013233, 013300, 014000, 014200, 014529, 016000, 017310, 017419, 017419, 017700, 017823, 017839, 017900.
DIVISION 2 SECTION:	024119.
DIVISION 6 SECTIONS:	061000, 061600, 064023.
DIVISION 7 SECTIONS:	072500, 076200, 078413, 078446, 079200.
DIVISION 8 SECTIONS:	081113, 081416, 083113, 084113, 085613, 087100, 088000.
DIVISION 9 SECTIONS:	092116, 092900, 093000, 095113, 096513, 096519, 096723, 096813, 099123, 099600.
DIVISION 10 SECTIONS:	101423, 102113 , 102123, 102600, 102800.
DIVISION 12 SECTIONS:	123200, 123666.

I HEREBY DISCLAIM ANY RESPONSIBILITY FOR ALL OTHER SPECIFICATIONS, DRAWINGS, ESTIMATES, REPORTS, OR OTHER DOCUMENTS OR INSTRUMENTS RELATING TO OR INTENDED TO BE USED FOR ANY PART OR PARTS OF THE ARCHITECTURAL OR ENGINEERING PROJECT OR SURVEY.

KEVIN NELSON

JANUARY 03, 2024

ARCHITECT

DATE



JANUARY 3, 2024

DOCUMENT 000110 – TABLE OF CONTENTS

Project Name: Ridgeview Elementary School Renovations
Project No.: 23026
Site Address 701 Thornton Street, Liberty, Missouri 64068
City, State Zip Liberty, Missouri 64068

Revisions	Date
Addendum 01	12.08.2023
Addendum 04	01.03.2024

Latest Revision Original Issue

INTRODUCTORY INFORMATION

000101	Project Team Directory		11.22.2023
000105	Certifications and Seals	01.03.2024	11.22.2023
000110	Table of Contents	01.03.2024	11.22.2023

BIDDING REQUIREMENTS

(Refer to Construction Manager's Front End Manual for additional Bidding Requirements)

DIVISION 1 – GENERAL REQUIREMENTS

011000	Summary		11.22.2023
012100	Allowances		11.22.2023
012200	Unit Prices		11.22.2023
012300	Alternates		11.22.2023
012500.1	Substitution Procedures		11.22.2023
012500.2	Substitution Procedures Form		11.22.2023
013100	Project Management and Coordination		11.22.2023
013200	Construction Progress Documentation		11.22.2023
013233	Photographic Documentation		11.22.2023
013300	Submittal Procedures		11.22.2023
014000	Quality Requirements		11.22.2023
014200	References		11.22.2023
014529	Testing and Inspections		11.22.2023
016000	Product Requirements		11.22.2023
017310	Cutting and Patching		11.22.2023
017419	Construction Waste Management and Disposal		11.22.2023
017700	Closeout Procedures		11.22.2023
017823	Operation and Maintenance Data		11.22.2023
017839	Project Record Documents		11.22.2023
017900	Demonstration and Training		11.22.2023

DIVISION 2 – EXISTING CONDITIONS

024119	Selective Demolition		11.22.2023
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DIVISION 3 – CONCRETE

033000	Cast-in-Place Concrete		11.22.2023
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DIVISION 4 - MASONRY

042200	Concrete Unit Masonry		11.22.2023
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DIVISION 5 - METALS

051200	Structural Steel Framing		11.22.2023
053100	Steel Decking		11.22.2023
054000	Cold-Formed Metal Framing		11.22.2023

DIVISION 6 – WOOD AND PLASTICS

061000	Rough Carpentry		11.22.2023
061600	Sheathing		11.22.2023
064023	Interior Architectural Woodwork		11.22.2023

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

072500	Weather Barriers		11.22.2023
076200	Sheet Metal Flashing and Trim		11.22.2023
078413	Penetration Firestopping		11.22.2023
078446	Fire Resistive Joint Systems		11.22.2023
079200	Joint Sealants		11.22.2023

DIVISION 8 - DOORS AND WINDOWS

081113	Hollow Metal Doors and Frames		11.22.2023
081416	Flush Wood Doors		11.22.2023
083113	Access Doors and Frames		11.22.2023
084113	Aluminum Framed Entrances and Storefronts		11.22.2023
085613	Transom Windows		11.22.2023
087100	Door Hardware	12.08.2023	11.22.2023
088000	Glazing		11.22.2023

DIVISION 9 - FINISHES

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092900	Gypsum Board		11.22.2023
093000	Tiling		11.22.2023
095113	Acoustical Panel Ceilings		11.22.2023
096513	Resilient Base and Accessories		11.22.2023
096519	Resilient Tile Flooring		11.22.2023
096723	Resinous Flooring		11.22.2023
096813	Tile Carpeting		11.22.2023
099123	Interior Painting		11.22.2023
099600	High-Performance Coatings		11.22.2023

DIVISION 10 – SPECIALTIES

101423	ADA and Code Signage		11.22.2023
102113	Toilet Compartments	01.03.2024	11.22.2023
102123	Cubicle Curtains and Track		11.22.2023
102600	Wall and Door Protection		11.22.2023
102800	Toilet, Bath & Laundry Accessories		11.22.2023

DIVISION 12 - FURNISHINGS

123200	Manufactured Wood Casework		11.22.2023
123666	Solid Surfacing Countertops		11.22.2023

DIVISION 22 - PLUMBING

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220015	Coordination		11.22.2023
220500	Common Work Results for Plumbing		11.22.2023
220515	Basic Piping Materials and Methods		11.22.2023
220523	General Duty Valves for Plumbing Piping		11.22.2023
220529	Hangers and Supports for Plumbing Piping		11.22.2023
220553	Identification for Plumbing Piping and Equipment		11.22.2023
220700	Plumbing Insulation		11.22.2023

	Latest Revision	Original Issue
221100	Water Distribution Piping and Specialties	11.22.2023
221111	Mechanically Joined Plumbing Piping Systems	11.22.2023
221300	Sanitary Drainage and Vent Piping Specialties	11.22.2023
224000	Plumbing Fixtures	11.22.2023
227000	Natural Gas Systems	11.22.2023
227010	Mechanically Joined Natural Gas Piping Systems	11.22.2023

DIVISION 23 - HEATING, VENTILATING AND AIR CONDITIONING

230010	General Mechanical Requirements	11.22.2023
230015	Electrical Coordination for Mechanical Equipment	11.22.2023
230500	Common Work Results for HVAC	11.22.2023
230510	Basic Piping Materials and Methods	11.22.2023
230513	Common Motor Requirements for HVAC Equipment	11.22.2023
230514	Variable Frequency Drives	11.22.2023
230519	Meters and Gages for HVAC Piping	11.22.2023
230523	General Duty Valves for HVAC Piping	11.22.2023
230529	Hangers and Supports for HVAC Piping and Equipment	11.22.2023
230550	Vibration Isolation for HVAC	11.22.2023
230553	Identification for HVAC Piping and Equipment	11.22.2023
230593	Testing, Adjusting, and Balancing for HVAC	11.22.2023
230700	HVAC Insulation	11.22.2023
230913	Instrumentation and Control Devices for HVAC	11.22.2023
230923	Direct Digital Control (DDC) System for HVAC	11.22.2023
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233113	Metal Ducts	11.22.2023
233300	Air Duct Accessories	11.22.2023
233423	HVAC Power Ventilators	11.22.2023
233713	Diffusers, Registers, and Grilles	11.22.2023
237313	Central-Station Air Handling Units	11.22.2023
237433	Dedicated Outdoor-Air Units	11.22.2023
238200	Terminal Heating & Cooling	11.22.2023

DIVISION 26 - ELECTRICAL

260010	General Electrical Requirements	11.22.2023
260500	Common Work Results for Electrical	11.22.2023
260502	Equipment Wiring Systems	11.22.2023
260504	Provisions for Electrical Utility Service	11.22.2023
260519	Low-Voltage Electrical Power Conductors and Cables	11.22.2023
260526	Grounding and Bonding for Electrical Systems	11.22.2023
260529	Hangers and Supports for Electrical Systems	11.22.2023
260533	Raceway and Boxes for Electrical Systems	11.22.2023
260923	Lighting Control Devices	11.22.2023
262416	Panelboards	11.22.2023
262726	Wiring Devices	11.22.2023
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262816	Enclosed Switches and Circuit Breakers	11.22.2023
265100	Interior Lighting	11.22.2023

DIVISION 27 – COMMUNICATIONS

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270500	Common Work Results for Communications	11.22.2023

		Latest Revision	Original Issue
271000	Structured Cabling System		11.22.2023
271100	Telecommunications Equipment Room Fittings		11.22.2023
271500	Communications Horizontal Cabling		11.22.2023
274100	Audio Video Systems		11.22.2023
DIVISION 28 - ELECTRONIC ACCESS CONTROL AND INTRUSION DETECTION			
280010	General Electronic Safety and Security Requirements		11.22.2023
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281300	Access Control Software and Database Management		11.22.2023
284600	Fire Detection and Alarm		11.22.2023

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SECTION 237433 - DEDICATED OUTDOOR AIR UNITS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Package rooftop mounted units capable of supplying 100 percent outdoor air.

1.2 SUBMITTALS

- A. Product Data: Provide manufacturer's technical product data, including rated capacities of selected model clearly indicated, dimensions, required clearances, weights, and furnished specialties and accessories. Provide short circuit current rating of units with factory mounted starter or variable frequency drive.
- B. Sustainable Design Documentation: Submit manufacturer's product data on refrigerant used, showing compliance with specified requirements.
- C. Shop Drawings:
 - 1. Submit manufacturer's assembly-type shop drawings indicating dimensions, required clearances, and methods of assembly of components
 - 2. Submit shop drawings detailing the mounting, securing, and flashing of the roof curb to the roof structure. Indicate coordinating requirements with roof membrane system.
- D. Wiring Diagrams: Submit wiring diagrams detailing the manufacturer's electrical requirements for power supply wiring for dedicated outdoor air heating and cooling units. Submit manufacturer's ladder-type wiring diagrams for interlock and control wiring. Clearly differentiate between portions of wiring that are factory-installed and portions to be field-installed.
- E. Manufacturer's Instructions: Indicate assembly, support details, connection requirements, and include start-up instructions.
- F. Operation and Maintenance Data: Submit maintenance data and parts list for each dedicated outdoor air unit, including "trouble-shooting" maintenance guide, servicing guide and preventative maintenance schedule and procedures. Include this data in maintenance manual; in accordance with requirements of Division 1.
- G. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

1.3 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- B. Codes and Standards:
 - 1. Gas-fired furnace section construction shall be in accordance with AGA safety standards. Furnace section shall bear the AGA label.
 - 2. AHRI Compliance:
 - a. Testing and rating of dedicated outdoor air units capacity shall be in accordance with AHRI 920 "Performance Rating of DX Dedicated Outdoor Air System Units".
 - b. Capacity ratings for air-to-air energy recovery equipment shall comply with AHRI 1060 "Performance Rating of Air-to-Air Heat Exchangers for Energy Recovery Ventilation Equipment".
 - c. Capacity ratings for water coils shall comply with AHRI 410 "Forced-Circulation Air- Cooling and Air-Heating Coils".
 - d. Sound testing and rating of units shall be in accordance with AHRI 270 "Sound Performance Rating of Outdoor Unitary Equipment". Units shall bear Certified Rating Seal.
 - 3. Refrigerating system construction of dedicated outdoor air units shall be in accordance with ASHRAE 15 "Safety Code for Mechanical Refrigeration".

4. Integrated Seasonal Moisture Removal Efficiency (ISMRE) and Integrated Seasonal Coefficient of Performance (ISCOP) of dedicated outdoor air units shall be equal to or greater than prescribed by ASHRAE 90.1 "Energy Standard For Buildings Except Low-Rise Residential Buildings".
5. Dedicated outdoor air units shall be listed by UL and have UL label as a unit. Comply with UL 1995 "Heating and Cooling Equipment".
6. Dedicated outdoor air units shall be designed, manufactured, and tested in accordance with UL requirements.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Accept products, with factory-installed shipping skids and lifting lugs. Comply with manufacturer's installation instructions for rigging, unloading, and transporting units. Inspect for damage.
- B. Protect units from physical damage by storing off site or in locked, protected area until roof mounting curbs are in place, ready for immediate installation of units.

1.5 SPECIAL WARRANTY

- A. Warranty on Compressor and Gas Heat Exchanger: Provide written warranty, signed by manufacturer, agreeing to replace/repair, within warranty period, compressors and gas heat exchangers with inadequate and defective materials and workmanship, including leakage, breakage, improper assembly, or failure to perform as required; provided manufacturer's instructions for handling, installing, protecting, and maintaining units have been adhered to during warranty period. Replacement is limited to component replacement only, and does not include labor for removal and reinstallation.
 1. Warranty Period: 5 years from date of substantial completion.

1.6 SPARE PARTS

- A. General: Furnish to Owner, with receipt, the following spare parts for each dedicated outdoor air unit.
 1. One set of matched fan belts for each belt driven fan.
 2. One set of spare filters of each type required for each unit. Obtain receipt from Owner that spare filters have been provided. In addition to the spare set of filters, install new filters at completion of installation work, and prior to testing, adjusting, and balancing work.
 3. If HVAC equipment is used during the construction period, Contractor shall provide one set of filters (if system is designed to include pre-filters and after-filters, provide only pre-filters) when the unit is started and replace filters when needed, but not less than every month. On the day of substantial completion, the Contractor shall clean the unit and provide a new set of filters at each location in the unit.

PART 2 - PRODUCTS AND MATERIALS

2.1 PACKAGED ROOFTOP UNITS

- A. Manufacturers
 1. Trane.
 2. Lennox.
 3. Daikin.
 4. CaptiveAire
 5. **AAON**
- B. Manufactured Units
 1. General: Roof or slab mounted units, factory assembled, prewired and tested,
 2. Description: Self-contained, packaged unit consisting of compressors, condensers, evaporator coils, heating system, condenser and evaporator fans, energy recovery device, refrigeration and temperature controls, filters, and dampers. Capacities and electrical characteristics shall be as scheduled on the Drawings.
 3. Refrigerant: Provide dedicated outdoor air units designed to operate with refrigerant as scheduled on the drawings.
- C. Fabrication
 1. Cabinet: Provide manufacturer's standard double wall casing construction with fiberglass or foam-injected insulation that provides a minimum R-6 R value. Incorporate a thermal break such that there is no through metal path between the interior and exterior surface of the unit casing at all panel frames, joining mullions, or

- corners. Provide corrosion protection coating and exterior finish that meets ASTM B117 salt spray test of minimum 500 hours. Provide removable panels or access doors for inspection and access to internal parts, knockouts for electrical and piping connections, an exterior condensate drain connection and lifting lugs.
- a. Bottom Duct Connections: Provide steel or aluminum walking grate on structural supports where connections are located in sections accessible by personnel for maintenance.
 2. Condensate Drain Pan: Provide galvanized or stainless steel condensate drain pan sloped to drain connection.
 3. Filters Section: Provide filter housing of material matching the unit casing with gasketed filter media holding frames. Size housing to accommodate the filters scheduled on the drawings. Provide access panel(s) large enough for filter replacement with continuous gasketing and positive locking devices.
 4. Roof Curbs: Refer to Section "Hangers and Supports for HVAC" for pre-engineered roof equipment supports and Section "Vibration Isolation for HVAC Piping and Equipment" for vibration isolated equipment support bases.
- D. Fans
1. Supply Fans:
 - a. Provide forward-curved or backward inclined, centrifugal fan wheel, V-belt drive with adjustable variable pitch motor pulley or direct drive, rubber isolated hinge mounted high efficiency motor and permanently lubricated motor bearings.
 - b. Provide plenum fan with airfoil blade wheel with heavy gauge spun aluminum inlet cone.
 2. Exhaust Fan: Provide a forward curved exhaust fan(s) with adjustable V-belt drive and a backdraft damper.
 3. Condenser Fans: Provide propeller-type, direct-driven fans, resiliently mounted with fan guard, with permanently lubricated bearings.
- E. Motors:
1. Refer to Section "Common Motor Requirements for HVAC Equipment" for requirements.
- F. Air Filtration
1. Pre-Filters Section: Provide fiberglass throwaway pleated filters in filter rack, with maximum face velocity of 400 fpm. Provide filters of thickness and minimum MERV rating per ASHRAE 52.2as scheduled on the drawings.
- G. Gas-Fired Heat Exchangers:
1. Provide aluminized steel construction for gas-fired heat exchangers and burners with entering air temperatures higher than 50 F. Provide stainless steel construction for gas-fired heat exchangers and burners with entering air temperatures less than or equal to 50 F or have airstreams that are corrosive. Provide heat exchangers and burners designed for staged or modulating operation as scheduled or noted on the drawings with minimum efficiency of 80 percent. Provide single gas connection.
 2. Gas Burner: Atmospheric or power-vented type burner with adjustable combustion air supply, pressure regulator, gas valves, manual shut-off, intermittent spark or glow coil ignition, flame sensing device, and automatic 100 percent shut-off pilot.
 3. Operating Controls: Provide the following controls for the gas-fired heat exchangers:
 - a. Intermittent pilot ignition;
 - b. Electronic spark ignition system;
 - c. High limit cutout;
 - d. Forced draft proving switch;
 - e. Flame roll-out switch.
- H. Evaporator DX Coils
1. Provide copper tube aluminum fin coil assembly with galvanized drain pan and connection.
 2. Provide equalizing type vertical distributor to ensure each coil circuit receives the same amount of refrigerant.
 3. Provide interlaced coils in multiple stage units to ensure full coverage over coil face.
 4. Coils shall be proof (450 psig) and leak (300 psig) tested with air pressure under water, then cleaned, dehydrated, and sealed with a holding charge of refrigerant.
 5. Provide 1 inch factory installed flexible elastomeric insulation around the suction and liquid lines not directly located above a condensate drain pan. If any piping is exposed to sunlight, provide UV protective coating.
- I. Hot Gas DX Reheat Coils:
1. Provide hot gas reheat coil with staged or modulating control for reheat during dehumidification operation. Size hot gas reheat coil capacity to maintain supply air temperature when unit is operating in the dehumidification mode. Refer to control drawings.

- J. Compressors
1. Provide serviceable, semi-hermetic, or fully hermetic compressors, complete with integral vibration isolators and crankcase heaters which de-energize during compressor operation.
 2. Units shall have the following capacity control measures to prevent excessive compressor short cycling and prevent evaporator coil from freezing:
 - a. Digital scroll compressor as the first stage.
 - b. Inverter scroll compressor as the first stage.
 3. Heat Pump Units: Provide reversing valve with a replaceable magnetic coil, suction line accumulator, flow control check valve, and solid state defrost control utilizing thermistors. Refrigerant system shall have a pump-down cycle.
 4. Accessories: Thermal expansion valves, filter dryers, sight glasses, compressor service valves, liquid line service valves; minimum of 2 refrigerant circuits for units having 2 or more compressors.
- K. Condenser Coils
1. Provide copper tube aluminum fin coil assembly with subcooling rows and coil guard.
 2. Provide corrosion protective coating where scheduled.
 3. Provide refrigerant pressure switches to cycle condenser fans,
- L. Air Connections
1. Dampers: Dampers and their operators shall comply with performance requirements specified in Division 23 Section "Instrumentation and Control Devices for HVAC."
 2. Supply Air: Provide flanged connection with gasket to minimize air leakage.
 3. Outdoor Air: Provide intake hood or louver designed to inhibit wind-driven rain and snow from entering unit.
 - a. Provide complete with birdscreen, 1/2" mesh aluminum or stainless steel.
 - b. Dampers: Provide outside air damper constructed of extruded aluminum, hollow core, airfoil blades with rubber edge seals and aluminum end seals. Damper blades shall be gear driven.
- M. Energy Recovery Devices.
1. Energy Recovery Wheel: Provide a factory mounted, wired, and tested energy recovery wheel. The energy recovery wheel shall have latent and sensible recovery capacities as required to meet or exceed the capacities scheduled on the drawings.
 - a. Mount the energy recovery wheel in a rigid frame containing the wheel drive motor, redundant drive belts, wheel seals, and bearings.
 - b. Provide an energy recovery wheel constructed of a light weight polymer material with permanently bonded desiccant coating. The wheel shall be removable from the cabinet and cleanable using hot water or light detergent without degrading the latent efficiency.
 - c. Provide a filter bank on the upstream side of each air stream with 2" thick fiberglass throwaway filters in filter rack, with maximum face velocity of 400 fpm and minimum MERV rating per ASHRAE 52.2 of MERV 8.
 - d. Bypass Dampers: Provide bypass dampers for economizer control. The energy recovery wheel shall be sized for the full airflow as scheduled.
- N. Operating Controls:
1. Provide solid-state control board and components that contain at a minimum the following features:
 - a. Supply fan on/off delay.
 - b. Default control to ensure proper operation after power interruption.
 - c. Service relay output.
 - d. Unit diagnostics and diagnostic code storage.
 - e. Field-adjustable control parameters.
 - f. Minimum run time.
 - g. Fan-proving switch to lock out unit if fan fails.
 2. DDC Interface: Install stand-alone control module providing link between unit controls and DDC system. Control module shall be compatible with temperature-control system specified in Division 23 section "Direct Digital Control for HVAC."
- O. Safety Controls: Provide manual reset type safety controls for:
1. Low pressure cutout;
 2. High pressure cutout;
 3. Compressor motor overload protection.
 4. Anti-recycling timing device;
 5. Adjustable low-ambient lockout;
 6. Oil pressure switch.

- P. Electrical:
1. Provide a 125 VAC, 20 amp duplex convenience receptacle mounted to unit ready for field wiring through the curb with a cover UL listed for wet and damp locations when in use.
 2. Unit power connection shall be either through unit cabinet or within roof curb perimeter.
 3. Dedicated outdoor air units shall be designed to meet a minimum short-circuit withstand rating as specified on the drawings.
- Q. Accessories: Units shall include the following accessories where scheduled or shown on the drawings:
1. Anti-recycling control to automatically prevent compressor restart for 5-minutes after shutdown.
 2. Provide guards to protect the condenser coil from hail or other damage.
 3. Provide smoke detector factory installed in supply air.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas and conditions under which dedicated outdoor air units are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of units.
- B. Examine roughing-in for dedicated outdoor air units to verify actual locations of piping and duct connections before equipment installation.
- C. For roof installed units, verify that roof is ready to receive work and opening dimensions are as indicated on shop drawings.
- D. Do not proceed with work until unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF DEDICATED OUTDOOR AIR UNITS

- A. General: Install dedicated outdoor air units in accordance with manufacturer's installation instructions. Install units plumb and level, firmly anchored in locations indicated, and maintain manufacturer's recommended clearances.
- B. Secure roof-mounted units to roof equipment supports and grade-mounted units to curbs or base. Refer to the drawings for the type of support required for each dedicated outdoor air unit.
1. Refer to Section "Hangers and Supports for HVAC Piping and Equipment" for standard roof curbs.
 2. Refer to Section "Vibration Isolation For HVAC" for vibration isolation curbs.
- C. Support suspended units from structural steel support frame using threaded steel rods and spring hangers. Comply with Division 23 section "Vibration Isolation For HVAC Piping and Equipment".
- D. Electrical Wiring: Install electrical devices furnished by manufacturer but not specified to be factory-mounted. Furnish copy of manufacturer's wiring diagram submittal to electrical installer.
1. Verify that electrical wiring installation is in accordance with manufacturer's submittal and installation requirements of Division-26 sections. Do not proceed with equipment start-up until wiring installation is acceptable to equipment Installer.
- E. Ductwork: Refer to Division-23 section "Metal Ducts". Connect supply and return ducts to unit with flexible duct connections. Provide transitions to exactly match unit duct connection size.
- F. Piping: Piping installation requirements are specified in other Division 23 sections. The Drawings indicate the general arrangement of piping, valves, fittings, and specialties.
- G. Connect condensate drain piping to the unit with appropriate trap. Verify that the piping material and installation is in accordance with Division 22 requirements.
- H. Connect gas piping to gas-fired heat exchanger according to requirements of Division 22 section "Natural Gas Systems." Provide union with sufficient clearance for burner removal and service

3.3 ADJUSTING, CLEANING, AND PROTECTING

- A. Adjust fan for required airflow in accordance with Section "Testing, Adjusting and Balancing for HVAC." Tighten belts as required for proper operation.
- B. Adjust damper linkages for proper damper operation.
- C. Clean the entire unit including cabinet interiors just prior to substantial completion to remove foreign material and construction dirt and dust. Vacuum clean fan wheel, fan cabinet, intake plenum cabinet, heat exchange surfaces, cooling/heating coil sections, filter sections, access sections, etc.

3.4 STARTUP

- A. Final Checks Before Start-Up: Perform the following operations and checks before start-up:
 - 1. Remove shipping, blocking, and bracing.
 - 2. Verify unit is secure on mountings and supporting devices and that connections for piping, ductwork, and electrical are complete. Verify proper thermal overload protection is installed in motors, starters, and disconnects.
 - 3. Perform cleaning and adjusting specified in this Section.
 - 4. Disconnect fan drive from motor and verify proper motor rotation direction and verify fan wheel free rotation and smooth bearings operations. Reconnect fan drive system, align belts, and install belt guards.
 - 5. Lubricate bearings, pulleys, belts, and other moving parts with factory-recommended lubricants.
 - 6. Comb coil fins for parallel orientation.
 - 7. Install clean filters. Do not operate air handling unit without pre-filters installed.
 - 8. Verify manual and automatic volume control, and fire and smoke dampers in connected ductwork systems are in the full-open position.
 - 9. Disable automatic temperature control operators.
- B. Start-Up Services: Provide the services of a factory-authorized service representative to start-up dedicated outdoor air units in accordance with manufacturer's written start-up instructions. Do not operate units without filters installed. Test controls and demonstrate compliance with requirements. Replace damaged or malfunctioning controls and equipment.
 - 1. Energize motor, verify proper operation of motor, drive system, and fan wheel. Adjust fan to indicated RPM.
 - a. Replace fan and motor pulleys as required to achieve design conditions.
 - b. Measure and record motor electrical values for voltage and amperage.
 - c. Shut unit down and reconnect automatic temperature control operators.
 - d. Refer to Division 23 Section "Testing, Adjusting, and Balancing for HVAC" for procedures for system testing, adjusting, and balancing.

3.5 TRAINING

- A. General: At a time mutually agreed upon between the Owner and Contractor, provide the services of a factory trained and authorized representative to train Owner's designated personnel for a minimum of two hours on the operation and maintenance of the equipment provided under this section.
- B. Content: Training shall include but not be limited to:
 - 1. Overview of the system and/or equipment as it relates to the facility as a whole.
 - 2. Operation and maintenance procedures and schedules related to startup and shutdown, troubleshooting, servicing, preventive maintenance and appropriate operator intervention.
 - 3. Review data included in the operation and maintenance manuals. Refer to Division 1 Section "Operating and Maintenance Data."
- C. Certification: Contractor shall submit to the Engineer a certification letter stating that the Owner's designated representative has been trained as specified herein. Letter shall include date, time, attendees and subject of training. The certification letter shall be signed by the Contractor and the Owner's representative indicating agreement that the training has been provided.
- D. Schedule: Schedule training with Owner with at least 7 days' advance notice.

END OF SECTION 237433

