

Addendum 01

DOCUMENT 00 9100

DATE: April 4, 2022

PROJECT: Miami County Courthouse 3rd Floor HVAC Renovations
215 West Main Street
Troy, Ohio 45373

PROJECT #: 21083.00

OWNER: Board of Miami County Commissioners
Contact: Chris Johnson
201 West Main Street
Troy, Ohio 45373

ARCHITECT: Garmann Miller
38 South Lincoln Drive
P.O. Box 71
Minster, Ohio 45865

TO: Prospective Bidders

This addendum form is a part of the Contract Documents and modifies the Bidding Documents dated March 22, 2022, with amendments and additions noted below.

Acknowledge receipt of this Addendum on the Bid Form. Failure to do so may disqualify the Bidder.

This addendum consists of 2 pages, 4 specification sections, and 2 re-issued drawing sheets.

CHANGES TO THE PROJECT MANUAL

1. Add section 01 9100 Commissioning in its entirety.
2. Add section 23 0514 Variable Frequency Drives in its entirety.
3. Add section 23 0800 Commissioning of HVAC in its entirety
4. Section 23 7313 Modular Air Handling Units:
 - a. Delete paragraph 2.09 Mixing Box Section in its entirety.
 - b. Delete paragraph 2.12 Variable Frequency Drives in its entirety.
 - c. Delete subparagraph B of Paragraph 2.13 Control Panel and Power Disconnects.



CHANGES TO THE DRAWINGS

1. Sheet M2.2: Reference revised sheet for added keynote 12.
2. Sheet M4.1:
 - a. Reference revised sheet for added detail 1/M4.1 air handler section.
 - b. Reference revised sheet for changes to air handler schedule.

ATTACHMENTS

The following attachments are included and are part of this addendum:

Specification Section 01 9100, 23 0514, 23 0800, and 23 7313.

Drawing Sheets M2.2 and M4.1.

END OF ADDENDUM



**SECTION 01 91 00
COMMISSIONING**

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections apply to this section.

1.02 SUMMARY

- A. General requirements that apply to implementation of the commissioning process.
- B. Commissioning Provider: ZHCx
Chris Zerhusen, CxA
chris@zhcommissioning.com
513-295-0904

1.03 RELATED SPECIFICATION SECTIONS

- A. 230800 – Commissioning of HVAC

1.04 GENERAL REQUIREMENTS

- A. Contractors shall include all labor, materials and equipment cost within their scope to complete their responsibilities within the commissioning process.

1.05 DEFINITIONS (ADAPTED FROM ASHRAE GUIDELINE 0-2019)

- A. Commissioning Plan - A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the Commissioning Process.
- D. Commissioning Provider (CxP) - An entity identified by the Owner who leads, plans, schedules and coordinates the commissioning team to implement the Commissioning Process.
- E. Commissioning Team - The individuals who through coordinated actions are responsible for implementing the Commissioning Process.
- F. Site Visit Report - A report issued by the commissioning agent documenting findings, observations and communication between commissioning team members during a site visit.
- G. Pre-Functional Performance Checklists - A form used to document equipment design data, submittal data and installation.
- H. Functional Performance Testing (FPT) - A set of tests that define the functionality and verify the behavior of a system. These tests are defined by the commissioning agent in order to verify that building systems are completed to satisfy the owner's project requirements and demonstrate functional performance.
- I. Resolution Tracking Form (RTF) - An ongoing record of issues and their associated resolution.

1.06 REFERENCES

- A. GENERAL
 1. ASHRAE Guideline 0-2019 (The Commissioning Process)
 2. ANSI/ASHRAE/IES Standard 202-2013 (Commissioning Process for Buildings and Systems)
 3. ACG Commissioning Guideline
 4. Energy Management Handbook – Sixth Edition

1.07 COMMISSIONING TEAM

- A. The commissioning team is composed of the following:
 1. Owner's Representative – Miami County
 2. Architect's Representative – Garmann/Miller Architects - Engineers
 3. Mechanical Engineer's Representative – Garmann/Miller Architects - Engineers

4. Electrical Engineer's Representative – Garmann/Miller Architects - Engineers
5. Commissioning Agent – Zerhusen Holten Commissioning (ZHCx)
6. The Prime Contractor
7. Mechanical Contractor
8. Controls Contractor
9. Testing and Balance Contractor

1.08 COMMUNICATION

- A. ZHCx is contracted directly with Garmann/Miller Architects-Engineers. ZHCx will send all communication pertinent to the commissioning process directly to the Garmann/Miller Architects-Engineers and the commissioning team will be copied.

1.09 SYSTEMS TO BE COMMISSIONED

- A. The following systems will be included in the commissioning process as part of the base bid.
 1. HVAC and Controls

1.10 SUBMITTALS

- A. The Prime Contractor shall submit a copy of the initial construction schedule and subsequent construction schedule updates to ZHCx.
- B. The Prime Contractor shall submit copies of the Construction Meeting Minutes, Answered Request for Information (RFIs), Owner Approved Supplemental Instructions and Change Orders to ZHCx.

PART 2 PRODUCTS

2.01 NOT USED

PART 3 EXECUTION

3.01 EXECUTION OF THE COMMISSIONING PROCESS

- A. The CxA for this project is ZHCx, who is responsible for administering the commissioning process and coordinating commissioning activities.
- B. Commissioning Plan: The commissioning plan is created by ZHCx. The commissioning plan defines the roles of the team members during the commissioning process, entwines the commissioning activities into the project schedule and provides guidance to the team in respect to commissioning throughout the project.
- C. Commissioning Specifications: Project specific commissioning specifications are developed to define the contractual obligations of the Prime Contractor and subcontractors.
- D. Commissioning Kick-Off Meeting: ZHCx organizes a commissioning team meeting with the owner, design team, prime contractor and subcontractors associated with the commissioning process. The commissioning plan will be the agenda for the meeting. All contractors and subcontractors associated with the commissioning process are required to attend.
- E. ZHCx Site Visit Reports: Following every site visit a commissioning progress report will be issued to the owner. The report will be sent to Garmann/Miller Architects-Engineers with copies of the progress report sent to all commissioning team members. The Prime Contractor is responsible for distribution of these reports to the subcontractors.
- F. Pre Functional Checklists: ZHCx utilizes project specific pre-functional checklists to document the designed and approved equipment is installed. These checklists are created by ZHCx and filled out by ZHCx. **Contractors and subcontractors are NOT required to fill out these checklists.** All checklists are in electronic format. These checklists are available for use by the contractor and subcontractor if requested. **ZHCx will not use any sampling technique for these reviews.**
- G. Job Site Visits: ZHCx will attend regularly scheduled construction meetings. During site visits the CxA will observe the current status of construction.

- H. Functional Performance Testing Checklists: ZHCx utilizes project specific functional performance testing checklists to document controls integration and performance of the systems at the equipment level and as a holistic system. These checklists are created by ZHCx and filled out by ZHCx. **Contractors and subcontractors are NOT required to fill out these checklist.** All checklists are in electronic format and are available for use by the contractor and subcontractor if requested.
- I. Point to Point Verification: After pre-functional checklists are completed, ZHCx completes a point to point check of the automatic control system. The intent of this test is to document control points exist and are adequately operating, sensing and communicating with the building automation system. Upon completion of the point to point verification the functional performance testing can occur. **ZHCx will not use any sampling technique for these reviews.**
- J. Functional Performance Testing: ZHCx will lead and document functional performance testing. For the HVAC system only, functional performance testing will not begin until the system testing and balancing is completed. Utilizing checklists developed by ZHCx the sequence of operation and performance of the installed equipment and systems is documented. Trending data is collected and analyzed as a supplement to the functional performance testing. Opposite season functional performance testing will occur as soon as weather permits. Monitoring the building throughout the entire year will enhance the functional performance testing process. **ZHCx is not using a sampling technique for functional performance testing.**
- K. Opposite Season Testing: ZHCx will return to the project site to complete testing of the HVAC system 3 months and 6 months following completion of the original functional performance testing.

END OF SECTION

**SECTION 23 05 14
VARIABLE FREQUENCY DRIVES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Variable frequency controllers.

1.02 RELATED REQUIREMENTS

- A. Section 01 3329 - Sustainable Design Reporting
- B. Section 23 0553 - HVAC Identification.
- C. Section 23 0593 - Testing, Adjusting, and Balancing.
- D. Section 23 0913 - Instrumentation / Control Devices.
- E. Section 23 7313 - Modular Indoor-Air Handling Units.

1.03 REFERENCE STANDARDS

- A. NEMA ICS 7.1 - Safety Standards for Construction and Guide for Selection, Installation, and Operation of Adjustable Speed Drive Systems; National Electrical Manufacturers Association; 1995.
- B. NEMA ICS 7 - Industrial Control and Systems: Adjustable Speed Drives; National Electrical Manufacturers Association; 1993.
- C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); National Electrical Manufacturers Association; 1997.
- D. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; 1999.
- E. ASHRAE Standard 135-2016 BACNet protocol.
- F. NFPA 70 - National Electrical Code; National Fire Protection Association; 1999.

1.04 SUMMARY

- A. Division 26 shall provide the following wiring:
 - 1. Power wiring to interconnect variable frequency drive and motors.
 - 2. Wiring between variable frequency drive and Division 26 provided disconnect where disconnect provided.
 - 3. Single point power connection to the VFD when VFD is provided with disconnect.
 - 4. It is the responsibility of the VFD manufacturer/provider to coordinate with the Division 26 drawings and specifications to match conductor materials and sizes
- B. Temperature Control Contractor shall provide signal to process control interface to allow controller to satisfy system requirements.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide catalog sheets showing voltage, controller size, ratings and size of switching and overcurrent protective devices, short circuit ratings, dimensions, and enclosure details.
- C. Shop Drawings: Indicate front and side views of enclosures with overall dimensions and weights shown; conduit entrance locations and requirements; and nameplate legends.
- D. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- E. Operation Data: NEMA ICS 7.1. Include instructions for starting and operating controllers, and describe operating limits that may result in hazardous or unsafe conditions.
- F. Maintenance Data: NEMA ICS 7.1. Include routine preventive maintenance schedule.

1.06 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years experience and with service facilities within 100 miles of Project.
- C. Products: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- B. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to components, enclosure, and finish.

1.08 WARRANTY

- A. Provide manufacturer standard warranty or a minimum of 2 years.

1.09 MAINTENANCE SERVICE

- A. Provide service and maintenance of controller for one year from Date of Substantial Completion.
- B. A factory trained representative shall provide a minimum of 8 hours on-site training to owner selected personnel on the operation and maintenance of each drive installed. Training shall be video-taped by the HVAC Contractor. Two copies shall be turned over to the owner's maintenance staff.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. ABB; Model ACH550
- B. Square D; Model S-Flex
- C. Yaskawa; Model Z1000
- D. ABB; Model ACH550
- E. Eaton; Model H-Max
- F. Franklin Controls; Q-Link
- G. Substitutions: See Section 01 6000 - Product Requirements.

2.02 DESCRIPTION

- A. Configured package shall contain VFD, input circuit breaker, 5 percent 3 phase input line reactor or DC link chokes, hand/off/auto switch, and disconnect. All components shall come in one common enclosure. Multiple enclosures will not be accepted.
- B. Variable Frequency Controllers: Enclosed controllers suitable for operating the indicated loads, in conformance with requirements of NEMA ICS 7. Select unspecified features and options in accordance with NEMA ICS 3.1.
 - 1. Employ a Bacnet certified microprocessor-based inverter logic isolated from power circuits.
 - 2. Manufacturer shall coordinate protocol required with successful Temperature Control Contractor.
 - 3. Each drive shall be microprocessor based, fully transistorized with 3-phase, full wave diode bridge input, and pulse-width-modulating sine coded output waveform.
 - 4. Design for ability to operate controller with motor disconnected from output.
 - 5. Design to attempt five automatic restarts (programmable from 0 to 5) following fault condition before locking out and requiring manual restart.

- C. Enclosures: NEMA 250, Type 1, suitable for equipment application in places restricted to persons employed on the premises.
- D. Finish: Molded plastic in a neutral color.

2.03 OPERATING REQUIREMENTS

- A. Rated Input Voltage: 480 volts, three phase, 60 Hertz unless noted otherwise on drawings.
- B. Motor Nameplate Voltage: 460 volts, three phase, 60 Hertz unless noted otherwise on drawings.
- C. Displacement Power Factor: Between 1.0 and 0.95, lagging, over entire range of operating speed and load.
- D. Operating Ambient: 32 degrees F to 104 degrees F.
- E. Minimum Efficiency at Full Load: 97 percent, 100 percent base speed. 80 percent at 50 percent speed, 12.5 percent load.
- F. Time to Stop: ramp to stop, coast to stop.
- G. Volts Per Hertz Adjustment: Plus or minus 10 percent.
- H. Current Limit Adjustment: 60 to 110 percent of rated.
- I. Acceleration Rate Adjustment: 3 to 600 seconds.
- J. Deceleration Rate Adjustment: 3 to 600 seconds.
- K. Input Signal: 0 to 10 mV DC or 4-20 milliamp output scaleability.
- L. Minimum 20 years MTBF required.
- M. Continued operation of drive at 80 percent of last speed reference input if control communication is lost.
- N. Must be equipped/programmed to restart automatically after power loss.
- O. Total Harmonic Distortion (THD) compliance:
 - 1. VFD manufacture shall have 5% line impedance for harmonic reduction. VFDs manufacturer shall analyze the electrical system so that the VFD will comply to IEEE 519 guidelines for the reduction of electrical harmonics.

2.04 COMPONENTS

- A. Display: Provide integral digital display to indicate Motor speed indication in RPM, percent speed, or other engineering units, speed reference signal, Alpha-numeric fault trip annunciation, output voltage, bus voltage, output frequency, and output current (accurate within plus or minus 3 percent regardless of frequency).
- B. Status Indicators: Separate indicators for overcurrent, VFD trip light, overvoltage, elapsed time meter (6 digits with tenths of hours), Run light, ground fault, overtemperature, and input power ON.
- C. Furnish HAND-OFF-AUTOMATIC selector switch and manual speed control.
- D. Include undervoltage release.
- E. Control Power Source: Separate circuit.
- F. Protection:
 - 1. Furnish Contactor
 - 2. Output current overload rating of 120% of drive's continuous current rating for 60 seconds.
 - 3. Current limited stall prevention during acceleration, deceleration, and run conditions.
 - 4. Isolated operator controls.
 - 5. Phase to phase short circuit protection for full voltage.
 - 6. Electronic ground fault protection.
 - 7. Electronic thermal motor overload protection (UL approved).
 - 8. Current limiting DC bus fuse.
 - 9. Heat sink over temperature protection.

- 10. Input/Output phase loss protection.
- 11. Non-reversing operation of the motor.
- G. Disconnecting Means: Include integral fused disconnect switch on the line side of each controller.
- H. Wiring Terminations: Match conductor materials and sizes indicated in the Division 26 drawings and specifications.

2.05 SOURCE QUALITY CONTROL

- A. Shop inspect and perform standard productions tests for each controller.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surface is suitable for controller installation.
- B. Do not install controller until building environment can be maintained within the service conditions required by the manufacturer.
- C. Verify that field measurements are as indicated on shop drawings.

3.02 INSTALLATION

- A. Install in accordance with NEMA ICS 7.1 and manufacturer's instructions.
- B. Tighten accessible connections and mechanical fasteners after placing controller.
- C. Provide fuses in fusible switches.
- D. Select and install overload heater elements in motor controllers to match installed motor characteristics.
- E. Neatly type label inside each motor controller door identifying motor served, nameplate horsepower, full load amperes, code letter, service factor, and voltage/phase rating. Place in clear plastic holder.
- F. During construction, all air intake openings on variable frequency drives shall be protected with a temporary filter. Contractor shall monitor and change filter as necessary to protect VFD from dirt infiltration. At completion of project, filters shall be removed.

3.03 MANUFACTURER'S FIELD SERVICES

- A. Provide the service of the manufacturer's field representative to prepare and start up controllers.

3.04 ADJUSTING

- A. Make final adjustments to installed controller to assure proper operation of load system. Obtain performance requirements from installer of driven loads.

3.05 DEMONSTRATION

- A. Demonstrate operation of controllers in automatic and manual modes.
- B. Training shall be video-taped by the Division 23 mechanical Contractor. Two copies shall be turned over to the owner.

END OF SECTION

**SECTION 23 0800
COMMISSIONING OF HVAC**

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Subcontract apply to this Section.

1.02 SECTION INCLUDES

- A. Prime Contractor and Subcontractors requirements for the successful implementation of commissioning the heating, ventilating and air conditioning (HVAC) systems, assemblies and components including building automation controls.

1.03 RELATED SECTIONS

- A. 019100 Commissioning
- B. Division 23 HVAC Sections

1.04 DESCRIPTION

- A. The purpose of commissioning is to ensure that work meets the owner's project requirements, satisfies the basis of design, is functioning in the manner as described in Division 23 HVAC Sections and the systems can be operated and maintained by a well-trained staff.

1.05 SYSTEMS TO BE COMMISSIONED

- A. Systems and equipment included in the base bid commissioning process:
 - 1. Air Handling Unit
 - 2. Variable Air Volume Boxes

1.06 SUBMITTALS

- A. Submit under provisions of Division 23 HVAC Sections.
- B. Submit responses to items listed on progress reports and resolution tracking forms where required response is by the mechanical contractor or temperature controls contractor.
- C. Submit a copy of the equipment start-up dates two weeks prior to actual start-up.
- D. Submit a copy of the water and air test and balance report prior to functional performance testing. A pencil copy is an acceptable submission prior to functional performance testing.
- E. Submit copies of the operation and maintenance manuals.
- F. Submit copies of all training agendas two weeks prior to the scheduled training.

1.07 COMMISSIONING TEAM

- A. The mechanical contractor shall designate an on-site individual to act on behalf of the entity they represent as the contact for the commissioning process.
- B. The automatic temperature controls contractor shall designate an on-site individual to act on behalf of the entity they represent as the contact for the commissioning process.

PART 2 PRODUCTS

2.01 NOT USED

PART 3 EXECUTION

3.01 COMMISSIONING KICK OFF MEETING

- A. This contractor and subcontractors shall attend the commissioning kick off meeting.

3.02 COMMISSIONING PROGRESS MEETINGS

- A. This contractor shall attend commissioning progress meetings as required by the commissioning agent. Commissioning meetings, if required, will occur after regularly scheduled construction project meetings.

3.03 COMMISSIONING PRE-INSTALLATION MEETING

- A. This contractor shall coordinate pre-installation meetings with manufacturer's representatives and notify ZHCx of meeting date, time and location.

3.04 PRE FUNCTIONAL PERFORMANCE TESTING CHECKLIST

- A. ZHCx will write project specific pre functional performance testing checklists.
- B. ZHCx will document the installation of the HVAC equipment during typical site visits utilizing pre functional performance testing checklists. **The designated HVAC contractor's representative or manufacturer's representatives are NOT required to fill out these checklists.**
- C. Deficiencies identified during the completion of the checklists will be identified in writing and distributed to the subcontractor through the prime contractor. This contractor shall respond to these items in writing back to the prime contractor. The response shall state the item is complete or rebut the finding from the commissioning agent.
- D. Pre-functional performance testing completion is required before functional performance testing can begin.

3.05 EQUIPMENT START UP

- A. ZHCx shall be notified the date and time of equipment start up. ZHCx anticipates attending start up for the following equipment.
 - 1. Air Handling Unit

3.06 TESTING, ADJUSTING AND BALANCING

- A. ZHCx shall be notified the commencement date and time of the testing and balancing. Notification shall be given to ZHCx within 5 working days of set date and time.

3.07 FUNCTIONAL PERFORMANCE TESTING

- A. The commissioning agent will work directly with the prime contractor and this subcontractor to schedule functional performance testing of the system.
- B. ZHCx will write project specific functional performance testing checklists.
- C. ZHCx will lead and document the functional performance testing using their checklists. The temperature control contractor shall be available to operate the system as instructed by ZHCx. The testing will start with a control point to point verification. After this is completed the programmed sequence of operations will be tested.
- D. ZHCx makes every attempt to allow deficiencies to be corrected during functional performance testing. If deficiencies identified during the testing cannot be corrected at the time of testing, they will be identified in writing and distributed to the contractor. This contractor shall respond to these items in writing, stating that the item is no longer deficient or rebutting the finding from the commissioning agent.

END OF SECTION

**SECTION 23 73 13
MODULAR AIR-HANDLING UNITS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Coil section.
- B. Modular Indoor Air Handling Units.

1.02 RELATED REQUIREMENTS

- A. Refer to Section 01 6000 - Product Requirements
- B. Section 23 0548 - Vibration and Seismic Controls.
- C. Section 23 0719 - HVAC Piping Insulation.
- D. Section 23 2113 - Hydronic Piping
- E. Section 23 2114 - Hydronic Specialties
- F. Section 23 3100 - HVAC Ducts and Casings

1.03 REFERENCE STANDARDS

- A. AMCA 99 - Standards Handbook 2016.
- B. AMCA 210 - Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating 2016.
- C. AMCA 300 - Reverberant Room Method for Sound Testing of Fans 2014.
- D. AMCA 301 - Methods for Calculating Fan Sound Ratings from Laboratory Test Data 2014.
- E. AHRI 410 - Standard for Forced-Circulation Air-Cooling and Air-Heating Coils; Air-Conditioning, Heating, and Refrigeration Institute; 2001 (R2005) .
- F. AHRI 430 - Standard for Central-Station Air-Handling Units; Air-Conditioning, Heating, and Refrigeration Institute; 2009.
- G. ARI Guideline D - Application and Installation of Central Station Air-Handling Units; Air-Conditioning and Refrigeration Institute; 1996.
- H. NEMA MG 1 - Motors and Generators 2018.
- I. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- J. UL (DIR) - Online Certifications Directory Current Edition.
- K. ASHRAE Standard 52.2-1999 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size (ANSI Approved).
- L. ASHRAE Standard 90.1 - Energy Standard for Buildings Except Low-Rise Residential Buildings.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data:
 - 1. Published Literature: Indicate dimensions, weights, capacities, ratings, gages and finishes of materials, and electrical characteristics and connection requirements.
 - 2. Filters: Data for filter media, filter performance data, filter assembly, and filter frames.
 - 3. Fans: Performance and fan curves with specified operating point clearly plotted, power, RPM.
 - 4. Sound Power Level Data: Fan outlet and casing radiation at rated capacity.
 - 5. Electrical Requirements: Power supply wiring including wiring diagrams for interlock and control wiring, clearly indicating factory-installed and field-installed wiring.
- C. Shop Drawings: Indicate assembly, unit dimensions, weight loading, required clearances, construction details, field connection details, and electrical characteristics and connection

requirements.

- D. Sound Data: Provide sound data in accordance to AHRI Standard 260, Sound rating of ducted air moving and conditioning equipment
 - 1. Data to be collected in a qualified and accredited reverberant laboratory.
 - 2. Sound ratings are to be in the form of octave band sound power levels (dB) from 63 to 8,000 Hz derived from one-third octave band measurements.
 - 3. Data provided must meet or exceed minimum requirements for use within ANSI 12.60-2010 calculations.
- E. Manufacturer's Instructions: Include installation instructions.
- F. Maintenance Data: Include instructions for lubrication, filter replacement, motor and drive replacement, spare parts lists, and wiring diagrams.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 - 2. Extra Filters: One set for each unit.

1.05 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. Do not operate units until ductwork is clean, filters are in place, bearings lubricated, condensate properly trapped, piping connections verified and leak tested, belts aligned and tensioned, all shipping braces have been removed, and fan has been test run under observation.

1.06 REGULATORY REQUIREMENTS

- A. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for the purpose specified and indicated.
- B. The air handling units may be used for temporary heating.
 - 1. Division 23 Mechanical Contractor shall be responsible for providing and replacing filters in units being used. This contractor shall replace the filters as needed but at a minimum the filters shall be replaced at least every 2 months during construction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Accept products on site in factory-fabricated protective containers, with factory-installed shipping skids and lifting lugs. Inspect for damage.
- B. Store in clean dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures, and finish.
- C. Do not operate units until ductwork is clean, filters are in place, bearings lubricated, and fan has been test run under observation.

1.08 EXTRA MATERIALS

- A. Supply one set of filters for each unit air handling unit at final completion of project.
- B. Provide additional sets of pre-filters as required during construction.
- C. Provide a sheave change so that the fan motor is producing it's full rated horsepower at VFD speed of 100% for all fans controlled by a VFD.

1.09 WARRANTY

- A. During first year following issuance of Substantial Completion, unit manufacturer shall guarantee components to be free from defects and failures and shall supply parts required to correct warranty failures. Division 23-Mechanical Contractor shall bear the cost of warranting equipment from the manufacturer's standard warranty to 1 year beyond the date of substantial completion. Mechanical Contractor shall supply labor, cartage, and supplies required to replace failed parts.
- B. The unit manufacturer's serviceman shall provide and complete manufacturer's check/test/start forms. One copy shall be sent to the Engineer and one copy to the manufacturer's factory. Completion of startup and filing of proper forms must be completed before start of warranty

period.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Daikin Applied: www.daikinapplied.com.
- B. Trane Inc: www.trane.com.
- C. Johnson Controls Inc
- D. Carrier Corporation.
- E. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 GENERAL DESCRIPTION

- A. Refer to drawings for unit configuration.
- B. AHU to be shipped in sections. Assembly of unit to be done in field by Division 23 Mechanical contractor. Base rail to be field assembled in field and attached to sections. The Division 23 contractor is required to coordinate the sizes of all the sections such that they can be moved through the available openings in the building. If additional splits are required by the manufacturer, it is the responsibility of the Division 23 contractor to order the units accordingly. If there are sections that are too large and not capable of being moved through the available openings, the contractor shall order such sections "broken down" into pieces that will fit through the available openings and shall complete the final assembly of the section on site. If this is determined to be required, it is the responsibility of the Division 23 contractor to order the units accordingly. If the manufacturer cannot provide the units "broken down", it shall be the responsibility of the contractor to disassemble and reassemble as required.

2.03 INDOOR UNIT CASING (AHU)

- A. The construction of the air handling unit shall consist of a complete structural frame with removable panels. Casing shall be supported in such a manner so that maximum allowable air leakage shall not exceed 1% and panel deflection shall not exceed a L/240 ratio when subjected to +/- 8 in w.g. static pressure. All panels shall be completely gasketed prior to shipment and shall be completely removable for unit access and removal of components. Removal of any or all panels shall not affect the structural integrity of the unit.
 - 1. Outside Casing:
 - a. Galvanized Steel: 18 gauge.
 - b. Frame Channel: 16 Gauge minimum.
 - 2. Inside Casing:
 - a. Galvanized Steel: Solid 20 gauge.
 - b. The entire fan sections shall have 18 gage perforated sound absorbing galvanized steel plate inner liner.
 - 3. Floor Plate:
 - a. Floor panel shall be double wall construction, designed to provide at most L/240 deflection based on 300lb concentrated load at mid-span. Interior liner of the floor panels shall be 20 gauge galvanized.
- B. Casing panels (top, sides, and bottom) shall be one piece double-wall construction with insulation sealed between the inner and outer panels. Panel assemblies shall not carry an R-value of less than 13. Insulation shall be a minimum of 2" at all locations. Insulation shall conform to NFPA 90A.
- C. Finish: G90 galvanized exceed 250-hr.
- D. Access Doors
 - 1. Access Doors shall be located as shown on drawings. At a minimum, doors shall be located on the fan sections and filter sections.
 - 2. Doors shall be double wall construction with a solid liner and a minimum thickness of 2 inches with spray foam insulation. Doors shall be continuously hinged and provide 180 degree open door swing. Latches shall be positive-action, creating an airtight seal between the door and unit.

3. Panels shall be completely gasketed with a closed-cell, neoprene gasket.
 4. All doors are to open against positive pressure.
 5. Access doors in the fan and damper sections shall include a 12"x12" inspection window.
- E. Removable Panels
1. All wall and roof panels shall be completely removable for unit access and removal of components. All panels shall be removable without affecting the structural unit frame. Panels shall be completely gasketed, with a Copolymer rubber sealant ribbon.
- F. Drain Pans:
1. The main coil drain pan shall be double-sloped with a condensate connection on the same side as the coil connection. The pan shall be of stainless steel double-wall construction, with spray foam insulation between walls.
 2. Coils with finned height greater than 48" shall have an intermediate drain channel to drain condensate to the main drain pans without flooding the lower coils or passing condensate through the airstream of the lower coil. The intermediate pans shall have drop tubes to guide condensate to the main drain pan.
 3. Drain pans shall be insulated double-wall stainless steel construction. The pan shall be sloped toward the drain connection. Drain pan shall have 1 1/2-in. MPT connection exiting through the hand side. One drain outlet shall be supplied for each cooling coil section. Drain pan shall allow no standing water and comply with ASHRAE (American Society of Heating, Refrigeration and Air-Conditioning Engineers). Standard 62.1-2010. Where 2 or more coils are stacked in a coil bank, intermediate drain pans shall be provided and the condensate shall be piped to the bottom drain pan. The bottom coil shall not serve as a drain path for the upper coil.
- G. Unit Base: The entire unit shall be provided with a full length, continuous, base rail channel. Base rail channels shall be formed of a minimum 16 gauge galvanized steel. All major components shall be supported from the base. Base to be a minimum of 6 inches tall. Integral lifting lugs will be provided to facilitate rigging and installation. Lifting lugs shall be suitable for use as unit tie down points.

2.04 MOTORS

- A. Motors shall be heavy duty, premium efficiency, and, where denoted on Drawings, designated for use with a frequency drive controller (VFD) and mounted to the fan assembly. When designated for use with a VFD, the motor shall be inverter duty type, having class F or class H insulation as rated by NEMA, and shall be built in accordance with the standards set forth in NEMA-MG-1 parts 30 and 31.
- B. Overload panel: Factory mounted and wired NEMA type 1 enclosure mounted on the AHU. The panel shall be designed to take one field VFD power input and distribute to 2, 4, or 6 fans as required. These fans shall be protected by manual motor protectors, one per fan. All wiring shall be included. Auxiliary contacts shall be wired in series to terminal block for generic trip signaling. Panel shall be rated for WYE power systems up to 600V.
- C. Motors where indicated on the drawings shall be direct drive.
- D. Motors shall have an adjustable base to permit drive belt tensioning.
- E. Sheaves shall be cast iron, heavy duty type. Vee-belt shall be static free and sized for 150 percent of BHP.
 1. Provide a sheave change so that the fan motor is producing its full rated horsepower at VFD speed of 100% for all fans controlled by a VFD.

2.05 FANS

- A. Fans shall be Class I, II, and III, as scheduled, selected to provide the airflow and pressure specified.
- B. Provide fan section with double width, double inlet multi-blade type forward curved fan design or airfoil type as scheduled.
- C. All fans shall bear the AMCA seal.

- D. Mounting: Fan and motor assembly shall be internally isolated from unit casing with spring isolators, bases (refer to Section 23 0548), furnished and installed by unit manufacturer. Fan scroll shall be attached to the unit casing by a flexible canvas duct. Provide spring thrust restraints between fan discharge to plenum wall.
- E. Fans shall be statically and dynamically balanced at the factory as a complete fan assembly across the entire operational range. Fan shafts shall not exceed 75 percent of the first critical speed as unit comes up to critical speed.
- F. Direct drive plenum fan sections shall have two single width single inlet (SWSI) airfoil fan wheel(s). Airfoil blades shall be double thickness design continuously welded to the back plate and the front plate. Fan wheel shall be constructed of aluminum. Airfoil blades shall be aluminum extrusions and shall be top welded to the back plate and front plate of the wheel. Fan wheel shall be dynamically balanced per ISO standard 1940 quality grade G6.3.
- G. Fan Accessories:
 - 1. Direct Drive Plenum Fans:
 - a. Variable frequency drives with integral disconnect
 - b. Motor protection box for motor current protection with a single VFD driving multiple motors.
 - c. Motor shaft grounding ring.
 - d. Inlet guard.
 - e. Blank off plate.

2.06 COIL SECTION

- A. Drain Pan: Stainless steel construction. 24 inch downstream of coil and down spouts for cooling coil banks more than one coil high.
- B. Air Coil: Certify capacities, pressure drops, and selection procedures in accordance with ARI 410.
- C. Fabrication:
 - 1. Coil shall be designed with aluminum plate fins and copper tubes.
 - 2. Fins shall have collars drawn, belled, and firmly bonded to the tubes.
 - 3. Coil shall be mounted in the unit casing to be accessible for service.
 - 4. Coil casings shall be constructed of 16 gauge galvanized steel. Complete coil and coil headers, connections, and return bends shall be tested at 300 psi under water.
 - 5. Configuration: Drainable, with threaded plugs for drain and vent; serpentine type with return bends on smaller sizes and return headers on larger sizes.
 - 6. Tubes: 5/8 inch OD seamless copper expanded into fins, brazed joints.
 - 7. Fins: Aluminum.
 - 8. Casing: Die formed channel frame of galvanized steel.
- D. Water Coils:
 - 1. Headers: Cast iron, seamless copper tube, or prime coated steel pipe with brazed joints.
 - 2. Configuration: Drainable, with threaded plugs for drain and vent; threaded plugs in return bends and in headers opposite each tube.

2.07 ACCESS SECTION

- A. Access section shall be provided where denoted on Drawings.
- B. Shall be sized as denoted on Drawings. Minimum size shall be 18" section.
- C. Shall include a removable access door.

2.08 FILTERS

- A. Frames shall be constructed from 16 gauge galvanized steel, one frame for prefilter system and one frame for primary filter system. Frames shall be sized to fit the filter size specified.
- B. Filter rack assembly shall allow side loading filter installation.
- C. Prefilters are to be mounted on the entering air face of the filter bank.

- D. High Efficiency Primary Filter:
1. The filter shall have a Minimum Efficiency Reporting Value of MERV 13 per ASHRAE Standard 52.2-2007. It shall have a MERV-A of 11 when tested under Appendix J of that standard.
 2. Initial resistance to airflow shall not exceed 0.41"w.g. at an airflow of 500 fpm for filters having a nominal depth of 12".
 3. Air filters shall consist of high density microfine glass fibers laminated to a reinforcing backing to form a lofted filter blanket.
 4. Filters shall incorporate a "pleat" type design which creates a wide space between adjacent pleats on the air leaving side.
 5. A wire grid shall be bonded to the air leaving side of the media to support the media.
 6. The media shall be bonded to the inside of the frame, forming a totally unitized construction and a positive seal against leakage of unfiltered air.
 7. The enclosing frame shall be constructed of galvanized steel with diagonal supports.
- E. Medium Efficiency Prefilter:
1. The filter shall be medium efficiency and have a Minimum Efficiency Reporting Value of MERV 8 when evaluated under the guidelines of ASHRAE Standard 52.2-2007. It shall also have a MERV-A of 8 when tested per Appendix J of the same standard. The media shall maintain or increase in efficiency over the life of the filter.
 2. Initial resistance to airflow shall not exceed 0.31"w.g. at an airflow of 500 fpm on 2" deep models respectively.
 3. Filter media shall be a cotton and synthetic blend, lofted to a uniform depth of 0.15", and formed into a uniform radial pleat. The prefilter shall be 2 inches thick of the proper size for each extended surface filter.
 4. A welded wire grid, spot-welded on one-inch centers and treated for corrosion resistance shall be bonded to the downstream side of the media to maintain radial pleats and prevent media oscillation.
 5. An enclosing frame of no less than 28-point high wet-strength beverage board shall provide a rigid and durable enclosure. The frame shall be bonded to the media on all sides to prevent air bypass. Integral diagonal support members on the air entering and air exiting side shall be bonded to the apex of each pleat to maintain uniform pleat spacing in varying airflows.
 6. The prefilters shall be installed in the holding frames without increasing the overall depth of the bank.
 7. Filters shall be equal to FARR 30/30 Class 2. Other acceptable manufacturer's include 3M, Airguard, Filtrete, and American Air filter.
- F. Prefilters shall be installed for use during construction. The filters shall be changed as needed or at a minimum every two months and changed at time of Substantial Completion. Primary filters shall not be installed until time of Substantial Completion. All filters shall be the responsibility of the mechanical contractor.

2.09 DAMPERS

- A. Provide internal dampers as indicated on the Drawings. Unit manufacturer shall size dampers per industry standards with a minimum air velocity through dampers of 1200 FPM.
- B. Dampers shall be double-skin airfoil design for minimal air leakage and pressure drop. Dampers shall be low-leak type, with leakage rate not to exceed 5 CFM/SF at 1 inch w.g. and 9 CFM/SF at 4 inch w.g. All leakage testing and pressure ratings shall be based on AMCA Publication 500. Manufacturer shall submit brand and model of damper(s) being furnished.
- C. Provide internal dampers to allow air-bypass around the energy recovery wheel. Unit manufacturer shall size dampers per industry standards with a minimum air velocity through dampers of 1200 FPM.

2.10 CONTROL PANEL AND POWER DISCONNECTS

- A. Temperature control devices shall be supplied, mounted, and wired by Temperature Control Contractor unless otherwise herein specified.

- B. Disconnects shall be supplied, mounted, and wired by the Division 26-Electrical Contractor for modular air handlers unless herein specified.

2.11 LIGHTS AND RECEPTACLES

- A. Lights & GFI Receptacle - Vapor tight lights shall be provided in access compartments as shown on the General Arrangement drawing. Lights shall be wired to a single switch on the unit exterior. A GFI receptacle shall be mounted next to the light switch. A separate 120 volt power connection shall be required at the GFI receptacle to provide power for the lights and receptacle.

PART 3 EXECUTION

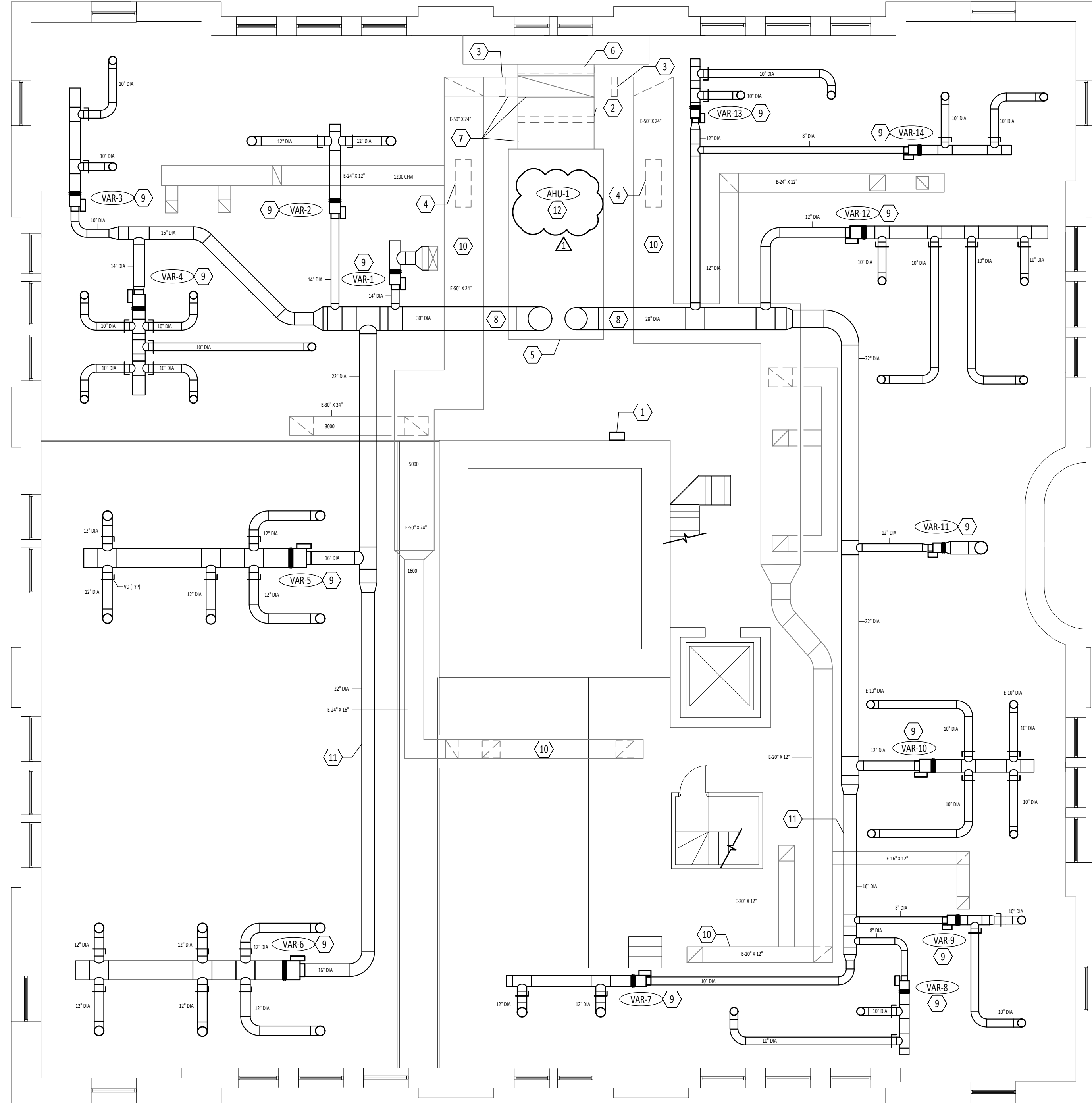
3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Bolt sections together with gaskets.
- C. Isolate fan section from supply duct connection with flexible duct connections.
- D. Install flexible duct connections between fan outlet and discharge ductwork.
- E. Make connections to coils with unions or flanges.
- F. Hydronic Coil:
 - 1. Pipe coil as shown on drawings.
 - 2. Ensure water coil is drainable and provide drain connection at low point.
- G. Startup and training shall be provided by factory-trained service technician.
- H. Prefilters shall be installed for use during construction and changed by Contractor at time of Substantial Completion. Primary filters shall not be installed until time of Substantial Completion.

3.02 STARTUP

- A. Startup and owner training shall be provided by factory trained service technician.
- B. All training shall be video taped by the Division 23 Mechanical Contractor. Two copies shall be turned over to the owner's maintenance staff.

END OF SECTION



ROOM INDEX - THIRD FLOOR			
ROOM NUMBER	ROOM NAME	AREA	OCCUPANCY
C301	STAIRS	173 SF	55
C302	CORRIDOR		
C303	CLERK'S ADMINISTRATION		
C304	CLERK'S OFFICE		
C305	STORAGE		
C306	CLERK OF COURTS		
C307	CLOSET		
C308	COURTROOM 1		
C309	STAIRS		
C310	CORRIDOR		
C311	TOWER STAIRS		
C312	ADMINISTRATION		
C313	ANTEROOM		
C314	TOILET		
C315	JUDGE		
C316	ANTEROOM		
C317	PASSAGE		
C318	COURTROOM 3		
C319	TOILET		
C320	PASSAGE		
C321	BAIFFIFFS		
C322	WORKROOM		
C323	GPS OFFICE		
C324	BAIFFIFF		
C325	CORRIDOR		
C326	ATRIUM		
C327	STAFF RESTROOM		
C328	COURTROOM 2		
C329	TOILET		
C330	ADMINISTRATION		
C331	JUDGE		

MECHANICAL GENERAL NOTES

- A DIVISION 23 MECHANICAL CONTRACTOR IS REQUIRED TO COORDINATE DIFFUSER AND GRILLE LOCATIONS WITH ARCHITECTURAL REFLECTED CEILING PLANS.
- B ALL EQUIPMENT LOCATED ABOVE CEILING REQUIRING MAINTENANCE SHALL BE INSTALLED WITHIN (2) FEET OF THE CEILING FOR MAINTENANCE PURPOSES. DO NOT INSTALL UNITS ABOVE LIGHTS AND CEILING SPEAKERS. COORDINATE LOCATION WITH ARCHITECTURAL REFLECTED CEILING PLAN AND GENERAL CONTRACTOR.

KEYNOTE SCHEDULE

#	KEYNOTE DESCRIPTION
1	VAV POWER SUPPLY UNIT SHALL BE PROVIDED AND INSTALLED BY TEMPERATURE CONTROL CONTRACTOR. DIVISION 26 ELECTRICAL CONTRACTOR SHALL PROVIDE 115V/1PH POWER SUPPLY TO UNIT AND WIRE. TEMPERATURE CONTROL CONTRACTOR SHALL PROVIDE LOW VOLTAGE WIRING FROM POWER SUPPLY TO VAV BOXES. A MAXIMUM OF 30 VAV BOXES (6 PER CIRCUIT) SHALL BE WIRED TO ONE POWER SUPPLY. POWER SUPPLY SHALL BE EQUAL TO RIB MODEL PSH500A. COORDINATE EXACT PANEL LOCATION WITH DIVISION 26 ELECTRICAL CONTRACTOR.
2	APPROXIMATE LOCATION OF DUCT MOUNTED SMOKE DETECTOR. SMOKE DETECTOR SHALL BE PROVIDED BY DIVISION 26 ELECTRICAL CONTRACTOR.
3	APPROXIMATE LOCATION OF DUCT MOUNTED RETURN AIR CONTROL DAMPER. RETURN AIR CONTROL DAMPER SHALL BE PROVIDED BY TEMPERATURE CONTROL CONTRACTOR AND INSTALLED BY THE DIVISION 23 MECHANICAL CONTRACTOR.
4	EXISTING RELIEF AIR DUCT OPENING AND DAMPER TO SPACE TO REMAIN. MODIFY AS REQUIRED TO ACCOMMODATE NEW CONTROLS.
5	MODIFY EXISTING AIR HANDLER CONCRETE PAD AS REQUIRED TO ACCOMMODATE NEW AIR HANDLER.
6	AIRFLOW MONITORING STATION IN OUTDOOR AIR DUCT. AFMS SHALL BE PROVIDED BY TEMPERATURE CONTROL CONTRACTOR AND MOUNTED IN THE DUCT BY THE DIVISION 23 MECHANICAL CONTRACTOR.
7	MODIFY EXISTING RETURN AIR AND OUTDOOR AIR DUCTWORK AS REQUIRED TO ACCOMMODATE CONNECTION TO NEW AIR HANDLER. VERIFY SIZE, TYPE, AND LOCATION ON-SITE.
8	ROUTE MAIN SUPPLY DUCTWORK A MINIMUM OF 7'-0" AFF. COORDINATE WORK WITH ALL OTHER EXISTING TRADES.
9	VAV BOX SHALL BE INSTALLED NEAR THE ATTIC FLOOR SUCH THAT THE CONTROL BOX CAN BE EASILY ACCESSED AND MAINTAINED.
10	PER SPECIFICATION 23 0130.S1, PROVIDE DUCT CLEANING FOR EXISTING RETURN AIR DUCTWORK.
11	PER SPECIFICATION 23 0993, INSTALL STATIC PRESSURE SENSOR TWO-THIRDS DISTANCE FROM THE SUPPLY FAN IN APPROXIMATE LOCATION.
12	PER SPECIFICATION 23 7313, COORDINATE THE MOVING AND INSTALLATION OF THE AIR HANDLING UNIT BASED ON FIELD CONDITIONS AND RESTRICTIONS.



RENOVATION OF
MIAMI COUNTY COURTHOUSE
3RD FLOOR HVAC RENO

ISSUANCES/REVISIONS	
BID DOCUMENTS	03/22/2022
ADDENDUM #01	04/01/2022

PROJECT NUMBER:	DRAWN BY:	CHECKED BY:
21083-00	DIL	CSM

SHEET TITLE:
4TH FLOOR - MECHANICAL PLAN

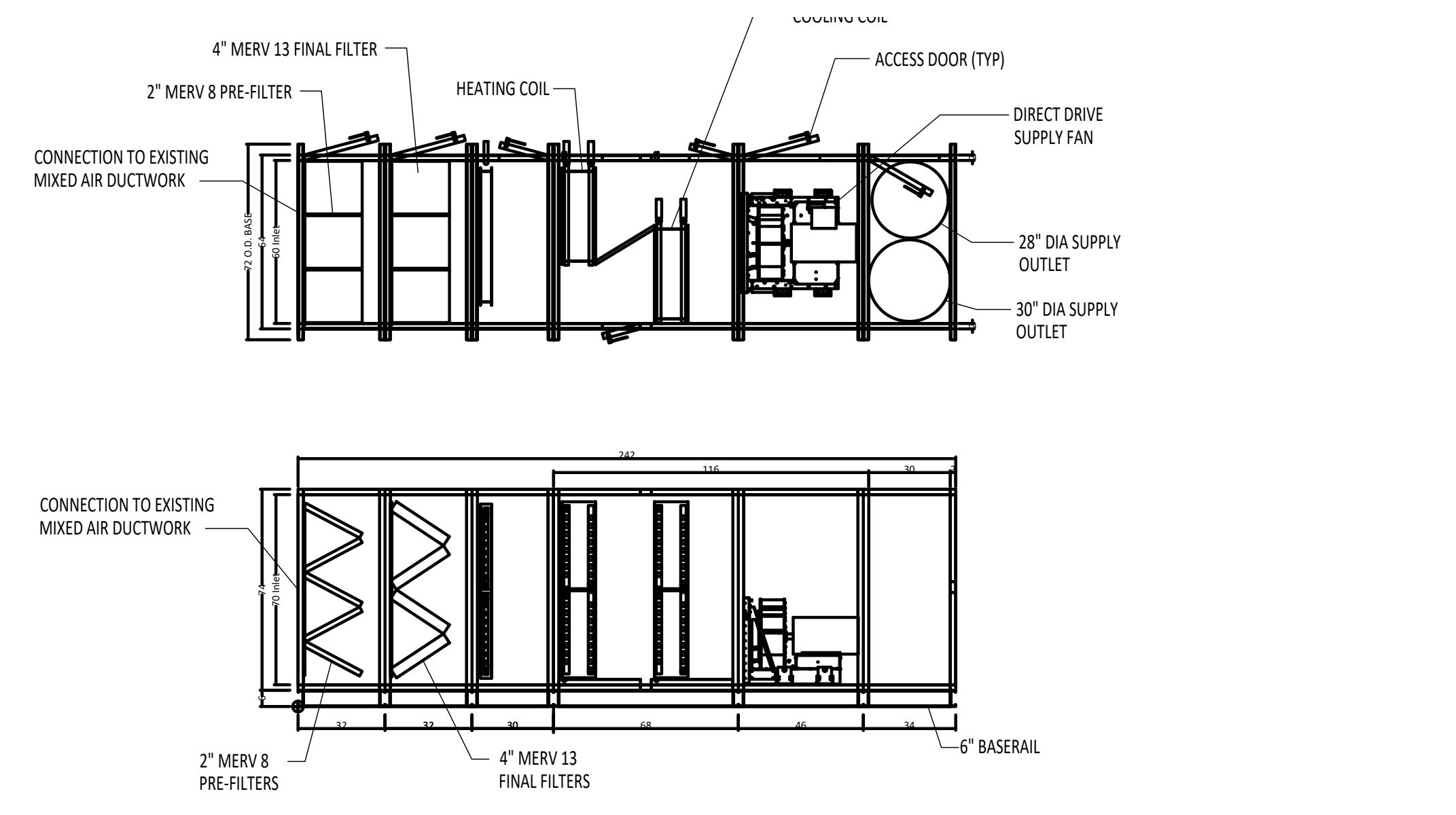
SHEET NUMBER:
M2.2



AIR HANDLING UNIT SCHEDULE table with columns: MARK, MFG, MODEL, TYPE, AIRFLOW (SUPPLY, OUTSIDE, TSP, ESP), SUPPLY FAN (NUMBER OF FANS, HP, VOLT, PH, RPM, FAN SIZE / TYPE), DESIGN OA CONDITIONS (OA COOLING, OA HEATING, TOTAL CAPACITY, EAT, LAT, EWT, LWT, WPD, FLUID TYPE, AIR VELOCITY, APD), HEATING COIL (WPD, FLUID TYPE, AIR VELOCITY, APD), COOLING COIL (WPD, FLUID TYPE, AIR VELOCITY, APD), FILTER (PRE FILTER, FINAL FILTER), BASERAIL HEIGHT, WEIGHT (LBS).

VAV REHEAT SCHEDULE table with columns: MARK, LOCATION/ROOM, MFG, MODEL, INLET, AIRFLOW (CFM, MIN CFM, APD), HEATING COIL (HEATING CFM, MBH, EAT, LAT, EWT, WTD, GPM, WPD, COIL ROWS, DISCH NC, RAD NC), SOUND (RAD NC), WEIGHT (LBS), ELECTRICAL (VOLT).

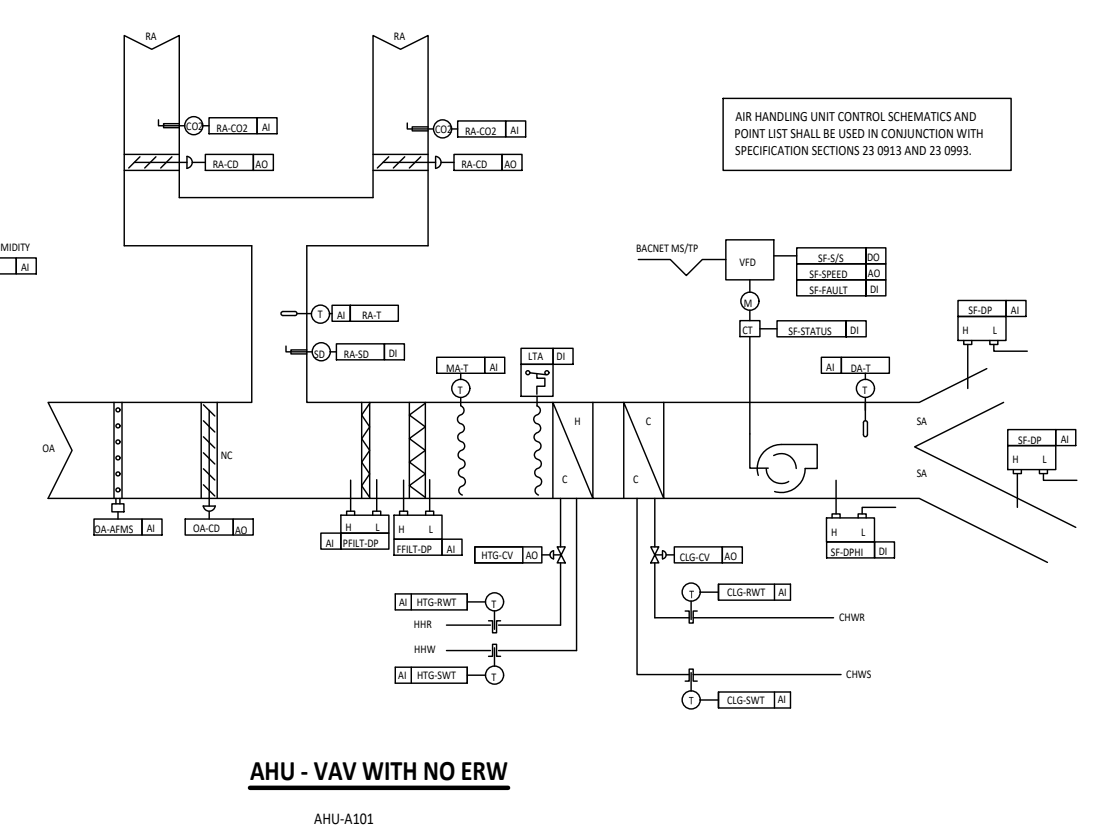
OUTSIDE AIR CALCULATION table with columns: ROOM NO., ROOM NAME, FLOOR AREA (SQ. FT.), SELECTED AIRFLOW (CFM), NO. OF PEOPLE (#), R_p OA/PERSON (CFM), R_a OA/SF (CFM), BREATHING ZONE OA (Vbz) (CFM), Effectiveness E_t, ZONE OA (Voz) (CFM), ZONE PRIMARY AIR (Vpz) (CFM).



SUPPLY DIFFUSER AND RETURN GRILLE SCHEDULE table with columns: MARK, SYSTEM, LENGTH, WIDTH, NECK SIZE, MOUNT, MFG, MODEL, MAX NC, FINISH.

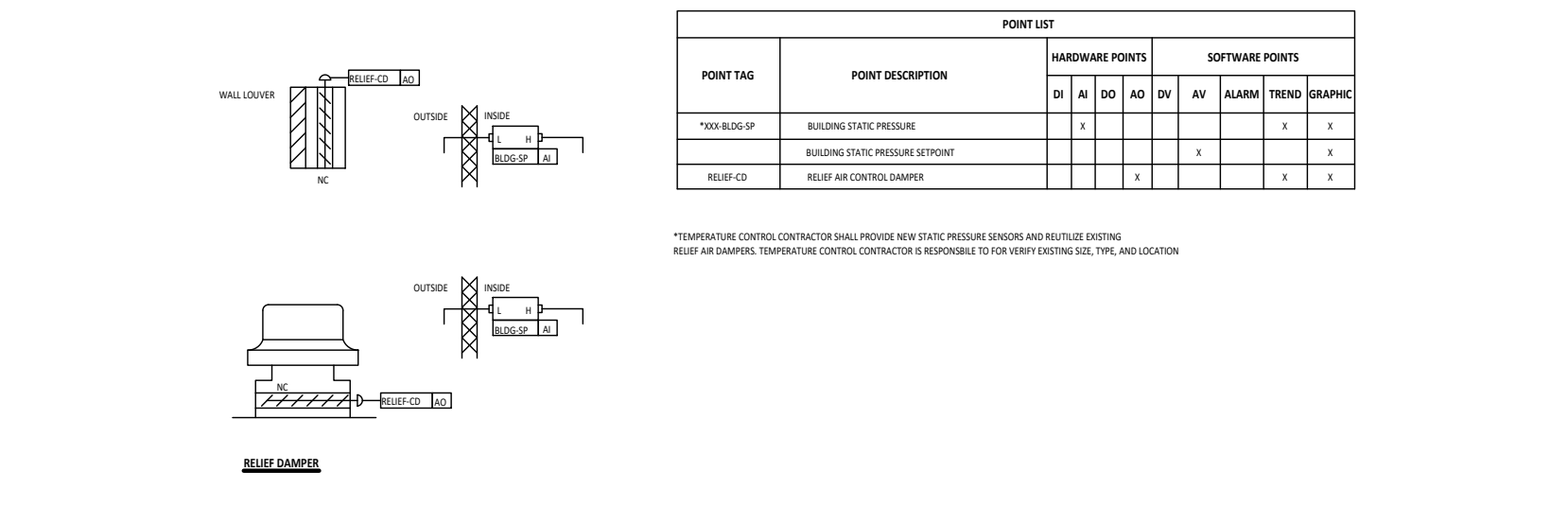
ABBREVIATIONS table listing symbols and descriptions for various HVAC components like airflow sensor, control damper, filter, and fan.

1 AHU-1 M4.1 NTS

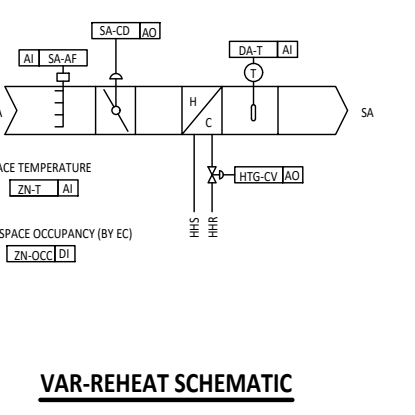


POINT LIST tables for AHU-1 VAV with no ERV, detailing hardware and software points for various components like coils, fans, and sensors.

2 AHU W/ VAV CONTROL SCHEMATIC M4.1 NTS



3 RELIEF DAMPER BOX CONTROL SCHEMATIC M4.1 NTS



4 VARIABLE AIR REHEAT (VAR) BOX CONTROL SCHEMATIC M4.1 NTS

GARMANN MILLER logo and address: MINSTER, OHIO | COLUMBUS, OHIO | INDIANAPOLIS, INDIANA | 215 WEST MAIN STREET - TROY, OH 45373

MIAMI COUNTY COURTHOUSE 3RD FLOOR HVAC RENO

ISSUANCES/REVISIONS table with columns: NUMBER, DESCRIPTION, DATE.

PROJECT NUMBER, DRAWN BY, CHECKED BY table.

SHEET TITLE: MECHANICAL SCHEDULES AND MECHANICAL DETAILS

SHEET NUMBER: M4.1