



May 24, 2024

**GS# 217-008 Career - Technical Education Program Expansions
Mississippi Delta Community College – Greenville Higher Education Center
Greenville, Mississippi**

Addendum No. 2

This Addendum forms part of the Contract Documents for the above referenced project. All other requirements of the original Contract Documents shall remain in effect except as specifically modified in this Addendum. Bidder is to acknowledge receipt of this Addendum with their bid proposal. Failure to do so may subject the Bidder to disqualification. This Addendum is issued to all known Plan Holders.

1. Clarifications:

- a. The wind screen can be omitted from the temporary construction fence.
- b. Temporary Utilities: Regarding the required Utility Agreement with the Using Agency, for electricity the Contractor shall install a temporary meter and be responsible for the electricity Service to the job site until the building is transferred to MDCC. For water service, the rate is \$75 per month, payable to MDCC.
- c. Contract Time: Following acceptance of bid, the Contractor is encouraged to produce submittals for long lead time items as quickly as possible. Once submittals are approved, the Contractor is to order the items with predicted long lead times. The BoB asks the contractor to provide correspondence from respective suppliers which speaks to delays and expected delivery times for the offer of additional contract time via Change Order thereafter.

2. Drawings:

- a. Sheet C100 is revised to add removal of trees required. See attached C100R.
- b. Sheet A400, Resilient Plank to be provided in 18"x36" size.
- c. Sheet A400, OMIT Room 203.

3. Specifications:

- a. Specifications, Section 08 71 00 Door Hardware: Card Readers indicated and cabling shall be provided as part of this contract. The new access control shall be Lenel S2 Netbox system. Provide power supplies, cabling, card readers, and all other components necessary for a complete install compatible with server to be provided by Owner.
- b. Specifications, Section 236213 - Air Cooled Condensing Unit: Replace entire section with attached revised Section 236213 - Air Cooled Condensing Unit. Updated warranty requirements.
- c. Specifications, Section 237213 - Split System Gas Furnace with DX Coil: Replace entire section with attached revised Section 237213 - Split System Gas Furnace with DX Coil. Updated warranty requirements.
- d. Specifications, Section 237313 - Central Station Air Handler: Replace entire section with attached revised Section 237313 - Central Station Air Handler. Updated warranty requirements.



OFFICE OF ARCHITECTURE

Contents: This addendum consists of **30 (8 ½" x 11") sheets and 1 (24" x 36") sheets.**



End of Addendum No. 2 for: GS# 217-008 Career - Technical Education Program Expansions

May 22, 2024

ADDENDUM NO. 2

PROJECT: MDCC GHEC Career Tech
Mississippi Delta Community College
Moorhead, Mississippi

FROM: Dewberry Engineers, Inc.
1900 Lakeland Drive
Jackson, Mississippi 39216

The following additions, changes, clarifications and/or substitutions to the Project Drawings/Specifications as indicated are hereby made a part of the Contract Documents. Acknowledge receipt of this Addendum by inserting its number and date in the Proposal Form where indicated.

Mechanical

- Item No. 1: Specifications, Section 236213 - Air Cooled Condensing Unit: Replace entire section with attached revised Section 236213 - Air Cooled Condensing Unit. Updated warranty requirements.
- Item No. 2: Specifications, Section 237213 - Split System Gas Furnace with DX Coil: Replace entire section with attached revised Section 237213 - Split System Gas Furnace with DX Coil. Updated warranty requirements.
- Item No. 3: Specifications, Section 237313 - Central Station Air Handler: Replace entire section with attached revised Section 237313 - Central Station Air Handler. Updated warranty requirements.

END OF ADDENDUM NO. 2



SECTION 23 62 13 - AIR COOLED CONDENSING UNITS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Condensing unit package.
- B. Charge of refrigerant and oil.
- C. Controls and control connections.
- D. Refrigerant piping connections.
- E. Motor starters.
- F. Electrical power connections.

1.02 REFERENCES

- A. ANSI/ASHRAE/IES 90.1 - Energy Standard for buildings except low rise residential buildings.
- B. ANSI/AHRI 340/360- Performance rating of commercial and industrial unitary air-conditioning and heat pump equipment (heat pumps and condensing units greater than 65,000BTUh and below 250,000Btuh)
- C. UL1995 - Unitary Air Conditioning Standard for safety requirements.
- D. California Energy Commission Administrative Code - Title 20/24 - Establishes the minimum efficiency requirements for HVAC equipment installed in new buildings in the State of California.
- E. AHRI 270 - Sound Rating of Outdoor Unitary Equipment, (units less than 135,000 Btuh).
- F. AHRI 370 - Sound Rating of Large Outdoor Refrigerating and Air Conditioning Equipment (equipment above 135,000 Btuh).

1.03 SUBMITTALS

- A. Submit unit performance data including: capacity, nominal and operating performance.
- B. Submit Mechanical Specifications for unit and accessories describing construction, components and options.
- C. Submit shop drawings indicating overall dimensions as well as installation, operation and service clearances. Indicate lift points and recommendations and center of gravity. Indicate unit shipping, installation and operating weights including dimensions.

- D. Submit data on electrical requirements and connection points. Include recommended wire and fuse sizes or MCA, sequence of operation, safety and start-up instructions.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Comply with manufacturer's installation instructions for rigging, unloading, and transporting units.
- B. Protect units on site from physical damage. Protect coils.

1.05 WARRANTY

- A. Provide five (5) year parts and labor warranty from the date of Owner's acceptance.
- B. Provide five (5) year compressor warranty from the date of Owner's acceptance.
- C. Provide five (5) year refrigerant warranty from date of Owner's acceptance.

1.06 Maintenance Service

- A. Furnish complete parts and labor service and maintenance of unit(s) or one year from Date of Substantial Completion by contractor.

1.07 REGULATORY REQUIREMENTS

- A. Unit shall conform to UL 1995 for construction of packaged air conditioner.

1. In the event the unit is not UL approved, the manufacturer must, at his expense, provide for a field inspection by a UL representative to verify conformance to UL standards. If necessary, contractor shall perform modifications to the unit to comply with UL, as directed by the UL representative, at no additional expense to the Owner.

PART 2 PRODUCTS

2.01 SUMMARY

- A. The contractor shall furnish and install air-cooled condensing units as shown as scheduled on the contract documents. The unit(s) shall be installed in accordance with this specification and perform at the specified conditions as scheduled.

- B. APPROVED MANUFACTURERS

- Trane, Daikin, Lennox and approved equals.

2.02 GENERAL UNIT DESCRIPTION

- A. Provide self-contained, packaged, factory-assembled and pre-wired units suitable for outdoor use consisting of cabinet, compressor(s), condensing coil and fan(s), integral subcooling circuit(s), filter drier(s), and controls. Provide expansion valve(s) and check valves for split system heat pump unit(s).

- B. Performance Ratings: Energy Efficiency Rating (EER) [and Coefficient of Performance (COP)] not less than prescribed by ANSI/ASHRAE 90.1

2.03 CASING

- A. House components in heavy gauge galvanized steel frame and panels with weather resistant, baked enamel finish. Units surface shall be tested 672 hours in salt spray test.
- B. Casing shall have removable single side maintenance access panels, lifting handles, and provision for forklift and/or crane lifting.
- C. Mount controls in weatherproof panel provided with removable panels and/or access doors with quick opening fasteners.

2.04 CONDENSER COILS

- A. Coils: Microchannel-Parallel flow aluminum tubes that are mechanically brazed to enhanced aluminum fins. Provide subcooling circuit(s). Factory leak test (at supplier), and vacuum dehydrate. Seal with holding charge of nitrogen.

2.05 FANS AND MOTORS

- A. Vertical discharge direct driven propeller type condenser fans with fan guard on discharge. Fans shall be statically and dynamically balanced.
- B. Weatherproof motors suitable for outdoor use, with permanently lubricated open air over (OAO) motors shall be provided and shall have built in thermal overload protection. Motors shall be rated IPX4 and shall have full contact ball bearings.

2.06 COMPRESSORS

- A. Compressors: Provide two passively manifolded, direct drive scroll compressors with integral centrifugal oil pump. Provide suction gas cooled motor with winding temperature limits and compressor overloads. Provide external high and low pressure cutout devices.

2.07 CONTROLS

- A. The control shall be a centralized microprocessor with indoor and outdoor temperature sensors that drive algorithms, making decisions for all heating, cooling, and ventilation.
 1. Unit shall be provided with factory unit controller.
 2. The control shall have an integrated anti-short-cycle timer and integrated time delay between compressors.
 3. Connectors shall be colored and keyed with colored wires.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide for connection to electrical service.
- C. Install units on vibration isolation.
- D. Install units on concrete base as indicated.
- E. Provide connection to refrigeration piping system and evaporators.

END OF SECTION

SECTION 23 72 13 - SPLIT SYSTEM GAS FURNACE WITH DX COIL

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Condensing unit package.
- B. Charge of refrigerant and oil.
- C. Controls and control connections.
- D. Refrigerant piping connections.
- E. Motor starters.
- F. Electrical power connections.

1.2 RELATED SECTIONS

- A. Section 232300 - Refrigeration Piping and Specialties.

1.3 REFERENCES

- A. ANSI/ASHRAE/IES 90.1 - Energy Standard for buildings except low rise residential buildings.
- B. ANSI/AHRI 340/360- Performance rating of commercial and industrial unitary air-conditioning and heat pump equipment (heat pumps and condensing units greater than 65,000BTUh and below 250,000Btuh)
- C. UL1995 - Unitary Air Conditioning Standard for safety requirements.
- D. California Energy Commission Administrative Code - Title 20/24 - Establishes the minimum efficiency requirements for HVAC equipment installed in new buildings in the State of California.
- E. AHRI 270 - Sound Rating of Outdoor Unitary Equipment, (units less than 135,000 Btuh).
- F. AHRI 370 - Sound Rating of Large Outdoor Refrigerating and Air Conditioning Equipment (equipment above 135,000 Btuh).

1.4 SUBMITTALS

- A. Submit unit performance data including: capacity, nominal and operating performance.
- B. Submit Mechanical Specifications for unit and accessories describing construction, components and options.
- C. Submit shop drawings indicating overall dimensions as well as installation, operation and service clearances. Indicate lift points and recommendations and center of gravity. Indicate unit shipping, installation and operating weights including dimensions.

- D. Submit data on electrical requirements and connection points. Include recommended wire and fuse sizes or MCA, sequence of operation, safety and start-up instructions.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Comply with manufacturer's installation instructions for rigging, unloading, and transporting units.
- B. Protect units on site from physical damage. Protect coils.

1.6 WARRANTY

- A. Provide five (5) year parts and labor warranty from date of Owner's acceptance.
- B. Provide five (5) year limited compressor warranty from date of Owner's acceptance.
- C. Provide five (5) year refrigerant warranty from date of Owner's acceptance.

1.7 REGULATORY REQUIREMENTS

- A. Unit shall conform to UL 1995 for construction of packaged air conditioner.
 - 1. In the event the unit is not UL approved, the manufacturer must, at his expense, provide for a field inspection by a UL representative to verify conformance to UL standards. If necessary, contractor shall perform modifications to the unit to comply with UL, as directed by the UL representative, at no additional expense to the Owner.

PART 2 PRODUCTS

2.1 SUMMARY

- A. The contractor shall furnish and install air-cooled condensing units as shown as scheduled on the contract documents. The unit(s) shall be installed in accordance with this specification and perform at the specified conditions as scheduled.
- B. APPROVED MANUFACTURERS
 - 1. Trane, Daikin, Carrier
 - 2. Substitutions: [prior approval required] as indicated under the general and/or supplemental conditions of these specifications.

2.2 Outdoor Unit

- A. Provide self-contained, packaged, factory-assembled and pre-wired units suitable for outdoor use consisting of cabinet, compressor(s), condensing coil and fan(s), integral subcooling circuit(s), filter drier(s), and controls. Provide expansion valve(s) and check valves for split system heat pump unit(s).
- B. Performance Ratings: Energy Efficiency Rating (EER) [and Coefficient of Performance (COP)] not less than prescribed by ANSI/ASHRAE 90.1. Unit shall meet most recent SEER2

requirements.

2.3 CASING

- A. Unit casing is constructed of heavy gauge, galvanized steel and painted with a weather-resistant powder paint finish on all louvered panels and the fan top panel. The corner panels are pre-painted. All panels are subjected to our 1,000 hour salt spray test. The base is made of a CMBP-G30 weatherproof material to resist corrosion.
- B. Casing shall have removable single side maintenance access panels, lifting handles, and provision for forklift and/or crane lifting.
- C. Mount controls in weatherproof panel provided with removable panels and/or access doors with quick opening fasteners.

2.4 CONDENSER COILS

- A. Coils: Aluminum fins mechanically bonded to seamless copper tubing. Provide subcooling circuit(s). Factory leak test in helium chamber, and vacuum dehydrate. Seal with holding charge of nitrogen.

2.5 FANS AND MOTORS

- A. Vertical discharge direct driven propeller type condenser fans with fan guard on discharge. Fans shall be statically and dynamically balanced.
- B. Weatherproof motors suitable for outdoor use, with permanently lubricated open air over (OAO) motors shall be provided and shall have built in thermal overload protection. Motors shall be rated IPX4 and shall have full contact ball bearings.

2.6 COMPRESSORS

- A. Compressor(s): Provide direct-drive scroll compressor(s) with centrifugal oil pump providing positive lubrication to moving parts. Motor shall be suction gas-cooled with internal temperature and current sensitive motor overloads. External high and low pressure cutout devices shall be provided.

2.7 CONTROLS

- A. Refrigeration system controls include condenser fan, compressor contactor and low and high pressure switches. A factory supplied, field installed liquid line drier should be standard.
- B. Unit shall be provided with an auto-changeover 7-day programmable thermostat and all other necessary hardware required to provide a fully functioning control system.

2.8 INDOOR GAS-FIRED FURNACE

- A. Furnace must be of the condensing type with 96% AFUE.
- B. Must have Stainless steel primary and secondary heat exchangers.

- C. Must have 9-tap constant torque ECM Blower motor.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide for connection to electrical service.
- C. Install units on concrete base as indicated.
- D. Provide connection to refrigeration piping system and evaporators.

END OF SECTION

SECTION 23 73 13 - CENTRAL STATION AIR HANDLER

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Applied Air Handling Units.

1.02 REFERENCES

- A. AMCA Publication 99 - Standards Handbook.
- B. AMCA Publication 611 - Certified Ratings Program - Airflow Measurement Performance
- C. AMCA Standard 500-D - Laboratory Methods of Testing Dampers for Rating.
- D. ANSI/ABMA Standard 9 - Load Ratings and Fatigue Life for Ball Bearings.
- E. ANSI/AMCA Standard 204 - Balance Quality and Vibration Levels for Fans.
- F. ANSI/AMCA Standard 610 - Laboratory Methods of Testing Airflow Measuring Stations for Rating.
- G. ANSI/AHRI Standard 410 - Forced Circulation Air-Cooling and Air-Heating Coils.
- H. ANSI/AHRI Standard 430 - Central Station Air Handling Units.
- I. ANSI/AHRI Standard 1060 - Rating Air-To-Air Energy Recovery Ventilation Equipment
- J. ANSI/ASHRAE Standard 52.2 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size.
- K. ANSI/ASHARE Standard 62.1 - Ventilation for Acceptable Indoor Air Quality.
- L. ANSI/ASHARE Standard 90.1 - Energy Standard for Buildings Except Low-Rise Residential Buildings.
- M. ANSI/NEMA MG 1 - Motors and Generators.
- N. ANSI/UL 900 - Standard for Safety Air Filter Units.
- O. AHRI Standard 260 - Sound rating of Ducted Air Moving and Conditioning Equipment.
- P. ASHRAE Standard 84 - Method of Testing Air-to-Air Heat Exchangers.
- Q. ASHRAE Standard 111 - Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems.
- R. ASTM B117 - Standard Practice for Operation Salt Spray Apparatus.

- S. ASTM C1338 - Standard Test Method for Determining Fungi Resistance of Insulation Material and Facings.
- T. ASTM E477 - Standard Test Method for Measure Acoustical and Airflow Performance of Duct Liner
- U. NFPA 70 - National Electrical Code
- V. NFPA 90A - Standard for the Installation of Air Conditioning and Ventilation Systems.
- W. UL 1995 - Standard for Safety Heating and Cooling Equipment

1.03 QUALITY ASSURANCE

- A. Air Coils: Certify capacities, pressure drops and selection procedures in accordance with current AHRI Standard 410.
- B. Air handling units with fan sections utilizing single fans shall be rated and certified in accordance with AHRI Standard.
- C. Air handling units with fan sections utilizing multiple fans shall be rated in accordance with AHRI Standard 430 for airflow, static pressure, and fan speed performance.
- D. Airflow monitoring station: Certify airflow measurement station performance in accordance with AMCA 611.

1.04 SUBMITTALS

- A. No equipment shall be fabricated or delivered until the receipt of approved shop drawings from the Owner or Owner's approved representative.
- B. AHU manufacturer shall provide the following information with each shop drawing/product data submission:
 - 1. All electrical, piping, and ductwork requirements, including sizes, connection locations, and connection method recommendations.
 - 2. Each component of the unit shall be identified, and mechanical specifications shall be provided for unit and accessories describing construction, components, and options.
 - 3. All performance data, including capacities and airside and waterside pressure drops, for components.
 - 4. Fan curves shall be provided for fans with the design operating points indicated. Data shall be corrected to actual operating conditions, temperatures, and altitudes.
 - 5. For units utilizing multiple fans in a fan section, a fan curve shall be provided showing the performance of the entire bank of fans at design conditions. In addition, a fan curve shall be provided showing the performance of each

individual fan in the bank of fans at design conditions. Also, a fan curve shall be provided showing the performance of the bank of fans, if one fan is down. The percent redundancy of the bank of fans with one fan down shall be noted on the fan curve or in the tabulated fan data.

6. A filter schedule must be provided for each air handling unit supplied by the air handling unit manufacturer. Schedule shall detail unit tag, unit size, corresponding filter section location within the AHU, filter arrangement (e.g. angled/flat), filter depth, filter type (e.g. pleated media), MERV rating, and filter quantity and size.
7. A schedule detailing necessary trap height shall be provided for each air handling unit. Schedule shall detail unit tag, unit size, appropriate trap schematic with recommended trap dimensions, and unit supplied base rail height. Contractor shall be responsible for additional trap height required for trapping and insulation beyond the unit supplied base rail height by adequate housekeeping pad.
8. Sound data shall be provided using AHRI 260 test methods. Unit discharge, inlet, and radiated sound power levels in dB shall be provided for 63, 125, 250, 500, 1000, 2000, 4000 and 8000Hz.

C. The AHU manufacturer shall provide appropriate sets of submittals as referenced in the General Conditions and shall submit to the Owner electronic copies of the IOM.

D. The AHU manufacturer shall list any exceptions to the specification.

1.05 REGULATOR REQUIREMENTS

A. Agency Listings/Certifications

1. Unit shall be manufactured to conform to UL 1995 and shall be listed by either UL/CUL or ETL. Units shall be provided with listing agency label affixed to the unit. In the event the unit is not UL/CUL or ETL approved, the contractor shall, at his/her expense, provide for a field inspection by a UL/CUL or ETL representative to verify conformance. If necessary, contractor shall perform modifications to the unit to comply with UL/CUL or ETL as directed by the representative, at no additional expense to the owner.
2. Air handling units with multiple direct drive plenum fans, or direct drive plenum fans incorporated with ECM style motors are outside the scope of AHRI 430. These fans however are rated in accordance with AHRI 430.
3. Certify air handling units in accordance with AHRI Standard 430. Units shall be provided with certification label affixed to the unit. If air handling units are not certified or fans are not rated in accordance with AHRI Standard 430 contractor shall be responsible for expenses associated with testing of units after installation to verify performance of fan(s). Any costs incurred to adjust fans to meet scheduled capacities shall be the sole responsibility of the contractor.
4. Certify air handling coils in accordance with AHRI Standard 410. Units shall be provided with certification label affixed to the unit. If air handling coils are not

certified in accordance with AHRI Standard 410, contractor shall be responsible for expenses associated with testing of coils after installation to verify performance of coil(s). Any costs incurred to adjust coils to meet scheduled capacities shall be the sole responsibility of the contractor.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Comply with manufacturer's installation instructions for rigging, unloading, and transporting units.
- B. Units shall ship fully assembled up to practical shipping and rigging limitations. Units not shipped fully assembled shall have tags and airflow arrows on each section to indicate location and orientation in direction of airflow. Shipping splits shall be clearly defined on submittal drawings. Cost associated with non-conformance to shop drawings shall be the responsibility of the manufacturer. Each section shall have lifting lugs for field rigging, lifting and final placement of AHU section(s). AHU's less than 100-inches wide shall allow for forklift transport and maneuverability on the jobsite.
- C. Deliver units to jobsite with fan motor(s), sheave(s), and belt(s) completely assembled and mounted in units.
- D. Unit shall be shipped in a clear shrink-wrap or stretch-wrap to protect unit from in-transit rain and debris per ASHRAE 62.1 recommendations.
- E. Installing contractor shall be responsible for storing AHU in a clean, dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures, and finish.

1.07 START-UP AND OPERATING REQUIREMENTS

- A. Do not operate units for any purpose, temporary or permanent, until ductwork is clean, filters in place, bearings lubricated (if applicable), condensate properly trapped, piping connections verified and leak-tested, belts aligned and tensioned, all shipping braces removed, bearing set screws torqued, and fan has been test run under observation.
- B. **Start-up and programming shall be performed by Manufacturer.**

1.08 WARRANTY

- A. AHU Manufacturer shall provide, at no additional cost, **Manufacturer's Parts, Labor and Refrigerant Warranty** that covers a period of five (5) years from Owner's acceptance. This warrants that all products are free from defects in material and workmanship and shall meet the capacities and ratings set forth in the equipment manufacturer's catalog and bulletins.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Approved manufacturer shall be Trane or approved equal.

- B. Manufacturer must clearly define any exceptions made to Plans and Specifications. Any deviations in layout or arrangement shall be submitted to consulting engineer prior to bid date. Acceptance of deviation(s) from specifications shall be in the form of written approval from the consulting engineer. Mechanical Contractor is responsible for expenses that occur due to exceptions made.
- C. Approved Manufacturers:
 - 1. Trane Performance Climate Changer
 - 2. York Solution XT High Performance
 - 3. Daikin McQuay Vision Custom

2.02 GENERAL

- A. Manufacturer to provide a full perimeter integral base frame for either ceiling suspension of units or to support and raise all sections of the unit for proper trapping. Base frame will either be bolted construction or welded construction. Refer to schedule for base height and construction type. Contractor will be responsible for providing a housekeeping pad when unit base frame is not of sufficient height to properly trap unit. Unit base frames not constructed of galvanized steel shall be chemically cleaned and coated with both a rust-inhibiting primer and finished coat of rust-inhibiting enamel. Unit base height to be included in total height required for proper trap height.

2.03 UNIT CASING

- A. Unit manufacturer shall ship unit in segments as specified by the contractor for ease of installation in tight spaces. The entire air handler shall be constructed of galvanized steel. Casing finished to meet ASTM B117 250-hour salt-spray test. The removal of access panels or access doors shall not affect the structural integrity of the unit. All removable panels shall be gasketed. All doors shall have gasketing around full perimeter to prevent air leakage. Contractor shall be responsible to provide connection flanges and all other framework that is needed to properly support the unit.
- B. Casing performance - Casing air leakage shall not exceed leak class 6 (CL = 6) per ASHRAE 111 at specified casing pressure, where maximum casing leakage (cfm/100 ft² of casing surface area) = CL X P^{0.65}.
- C. Air leakage shall be determined at 1.00 times maximum casing static pressure up to 8 inches w.g. Specified air leakage shall be accomplished without the use of caulk. Total estimated air leakage shall be reported for each unit in CFM, as a percentage of supply air, and as an ASHRAE 111 Leakage Class.
- D. Under 55F supply air temperature and design conditions on the exterior of the unit of 81F dry bulb and 73F wet bulb, condensation shall not form on the casing exterior. The AHU manufacturer shall provide tested casing thermal performance for the scheduled supply air temperature plotted on a psychrometric chart. The design condition on the exterior of the unit shall also be plotted on the chart. If tested casing thermal data is not available, AHU manufacturer shall provide, in writing to the Engineer and Owner, a guarantee against condensation forming on the unit exterior at

the stated design conditions above. The guarantee shall note that the AHU manufacturer will cover all expenses associated with modifying units in the field should external condensate form on them. In lieu of AHU manufacturer providing a written guarantee, the installing contractor must provide additional external insulation on AHU to prevent condensation.

- E. Unit casing (wall/floor/roof panels and doors) shall be able to withstand up to 1.5 times design static pressure, or 8-inch w.g., whichever is less, and shall not exceed 0.0042 per inch of panel span (L/240).
- F. Floor panels shall be double-wall construction and designed to support a 300-lb load during maintenance activities and shall deflect no more than 0.0042 per inch of panel span.
- G. Unit casing panels shall be 2-inch double-wall construction, with solid galvanized exterior and solid galvanized interior, to facilitate cleaning of unit interior.
- H. Unit casing panels (roof, walls, floor) and doors shall be provided with a minimum thermal resistance (R-value) of 13 Hr*Ft²*°F/BTU.
- I. Unit casing panels (roof, walls, floor) and external structural frame members shall be completely insulated filling the entire panel cavity in all directions so that no voids exist. Panel insulation shall comply with NFPA 90A.
- J. Casing panel inner liners must not extend to the exterior of the unit or contact the exterior frame. A mid-span, no-through-metal, internal thermal break shall be provided for all unit casing panels.
- K. Access panels and/or access doors shall be provided in all sections to allow easy access to drain pan, coil(s), motor, drive components and bearings for cleaning, inspection, and maintenance.
- L. Access panels and doors shall be fully removable without the use of specialized tools to allow complete access of interior surfaces.

2.04 ACCESS DOORS

- A. Provide access door fans, filters and to both sides of all coils.
- B. Access doors shall be 2-inch double-wall construction. Interior and exterior shall be of the same construction as the interior and exterior wall panels.
- C. All doors downstream of the cooling coil shall be provided with a thermal break construction of door panel and door frame.
- D. Gasketing shall be provided around the full perimeter of the doors to prevent air leakage.
- E. Door hardware shall be surface-mounted to prevent through-cabinet penetrations that could likely weaken the casing leakage and thermal performance.

- F. Handle hardware shall be designed to prevent unintended closure.
- G. Access doors shall be hinged and removable without the use of specialized tools.
- H. Hinges shall be interchangeable with the door handle hardware to allow for alternating door swing in the field to minimize access interference due to unforeseen job site obstructions. Hinges shall be constructed of <<HINGES>>
- I. Door handle hardware shall be adjustable and visually indicate locking position of door latch external to the section.
- J. All doors shall be a 60-inch high when sufficient unit height is available, or the maximum height allowed by the unit height.
- K. Multiple door handles shall be provided for each latching point of the door necessary to maintain the specified air leakage integrity of the unit.

2.05 PRIMARY DRAIN PANS

- A. All cooling coil sections shall be provided with an insulated, double-wall, galvanized drain pan.
- B. The drain pan shall be designed in accordance with ASHRAE 62.1 being of sufficient size to collect all condensation produced from the coil and sloped in two planes, pitched toward drain connections, promoting positive drainage to eliminate stagnant water conditions when unit is installed level and trapped per manufacturer's requirements. See section 2.07, paragraph F through H for specifications on intermediate drain pans between cooling coils.
- C. The outlet shall be located at the lowest point of the pan and shall be sufficient diameter to preclude drain pan overflow under any normally expected operating condition.
- D. All drain pan threaded connections shall be visible external to the unit. Threaded connections under the unit floor shall not be accepted.
- E. Drain connections shall be of the same material as the primary drain pan and shall extend a minimum 2-1/2-inch beyond the base to ensure adequate room for field piping of condensate traps.
- F. The installing contractor is responsible to ensure the unit is installed level, trapped in accordance with the manufacturer's requirements, and visually inspected to ensure proper drainage of condensate.
- G. Coil support members inside the drain pan shall be of the same material as the drain pan and coil casing.
- H. If drain pans are required for heating coils, access sections, or mixing sections they will be indicated in the plans.

2.06 FANS

- A. Fan sections shall have a minimum of one hinged and latched access door located on the drive side of the unit to allow inspection and maintenance of the fan, motor, and drive components. Construct door(s) per Section 2.04.
- B. Provide direct drive plenum fans. Fan shafts shall be solid steel, coated with a rust-inhibiting coating, and properly designed so that fan shaft does not pass through first critical speed as unit comes up to rated RPM. All fans shall be statically and dynamically tested by the manufacturer for vibration and alignment as an assembly at the operating RPM to meet design specifications. Fans that are selected with inverter balancing shall first be dynamically balanced at design RPM. The fans then will be checked in the factory from 25% to 100% of design RPM to insure they are operating within vibration tolerance specifications, and that there are no resonant frequency issues throughout this operating range. Inverter balancing that requires lockout frequencies inputted into a variable frequency drive to in order to bypass resonant frequencies shall not be acceptable. If supplied in this manner by the unit manufacturer, the contractor will be responsible for rebalancing in the field after unit installation. Fans selected with inverter balancing shall have a maintenance free, circumferential conductive microfiber shaft grounding ring installed on the fan motor to discharge shaft currents to ground.
- C. Direct drive plenum fans with integral frame motors, shall be mounted on isolation bases. Fan shall be dynamically balanced throughout the operating range to a BV-3 (0.20 in/s) per AMCA 204 test standard. Fan and motor shall be internally isolated with spring isolators. A flexible connection shall be installed between fan and unit casing to ensure complete isolation. Flexible connection shall comply with NFPA 90A and UL 181 requirements. If fans and motors are not internally isolated, then the entire unit shall be externally isolated from the building, including supply and return duct work, piping, and electrical connections. External isolation shall be furnished by the installing contractor in order to avoid transmission of noise and vibration through the ductwork and building structure.
- D. MOTORS AND DRIVES
 1. All motors and drives shall be factory-installed and run tested.
 2. Motors shall meet or exceed all NEMA Standards Publication MG 1 - 2006 requirements and comply with NEMA Premium efficiency levels when applicable. Motors shall comply with applicable requirements of NEC and shall be UL Listed.
 3. Fan Motors shall be heavy duty, open drip-proof. If applicable, motor efficiency shall meet or exceed NEMA Premium efficiencies.
 4. Direct driven fans utilizing integral frame motors shall use 2-pole (3600 rpm), 4-pole (1800 rpm) or 6-pole (1200 rpm) motors, NEMA Design B, with Class B insulation capable to operate continuously at 104 deg F (40 deg C) without tripping overloads.
 5. Motors shall have a +/- 10 percent voltage utilization range to protect against voltage variation.

2.07 COILS

- A. Coils section header end panel shall be removable to allow for removal and replacement of coils without impacting the structural integrity of the unit.
- B. Install coils such that headers and return bends are enclosed by unit casing to ensure that if condensate forms on the header or return bends, it is captured by the drain pan under the coil.
- C. Coils shall be manufactured with plate fins to minimize water carryover and maximize airside thermal efficiency. Fin tube holes shall have drawn and belled collars to maintain consistent fin spacing to ensure performance and air pressure drop across the coil as scheduled. Tubes shall be mechanically expanded and bonded to fin collars for maximum thermal conductivity. Use of soldering or tinning during the fin-to-tube bonding process is not acceptable due to the inherent thermal stress and possible loss of bonding at that joint.
- D. Construct coil casings of galvanized steel. End supports and tube sheets shall have belled tube holes to minimize wear of the tube wall during thermal expansion and contraction of the tube.
- E. All coils shall be completely cleaned prior to installation into the air handling unit. Complete fin bundle in direction of airflow shall be degreased and steam cleaned to remove any lubricants used in the manufacturing of the fins, or dirt that may have accumulated, in order to minimize the chance for water carryover.
- F. When two or more cooling coils are stacked in the unit, an intermediate drain pan shall be installed between each coil. The intermediate drain pan shall be designed being of sufficient size to collect all condensation produced from the coil and sloped to promote positive drainage to eliminate stagnant water conditions. The intermediate drain pan shall be constructed of the same material as the sections primary drain pan.
- G. The intermediate drain pan shall begin at the leading face of the water-producing device and be of sufficient length extending downstream to prevent condensate from passing through the air stream of the lower coil.
- H. Intermediate drain pan shall include downspouts to direct condensate to the primary drain pan. The intermediate drain pan outlet shall be located at the lowest point of the pan and shall be sufficient diameter to preclude drain pan overflow under any normally expected operating condition.
- I. Refrigerant Cooling and Hot Gas Reheat Coils
 - 1. Refrigerant suction and liquid connections shall be clearly labeled on unit exterior.
 - 2. Coils shall be proof tested to 450 psig and leak tested to 300 psig air pressure under water. After testing, insides of tubes shall be air dried, charged with dry nitrogen or dry air, and sealed to prevent contamination.
 - 3. Refrigerant suction and liquid headers shall be constructed of copper tubing. Suction and liquid connections shall penetrate unit casings to allow for sweat

connections to refrigerant lines.

4. Tubes shall be 1/2-inch O.D., minimum .016-inch-thick copper. Fins shall be aluminum.
5. Coils shall have equalizing type vertical distributors sized in conjunction with capacities of coils.

2.08 FILTERS

- A. Provide factory-fabricated filter section of the same construction and finish as unit casings. Filter section shall have side access filter guides and access door(s) extending the full height of the casing to facilitate filter removal. Construct doors in accordance with Section 2.04. Provide fixed filter block offs as required to prevent air bypass around filters. Block offs shall not need to be removed during filter replacement. Filters to be of size, and quantity needed to maximize filter face area of each particular unit size.
- B. Filter type, MERV rating, and arrangement shall be provided as defined in project plans and schedule. Provide 2" minimum MERV 13 filters, if not specified on plans.
- C. Manufacturer shall provide one set of startup filters.

2.09 FACE AND BYPASS DAMPERS

- A. Dampers shall be internally mounted in the AHU, and all bypass air shall be internal to AHU. Dampers shall be premium ultra-low leak. Face and bypass dampers shall be located at the hot gas reheat coil to direct air through the hot gas reheat coils or bypass that coil, to allow control of leaving air temperature.

2.10 ACCESS SECTIONS

- A. Access sections shall be provided where indicated in the schedule and plans to allow additional access for inspection, cleaning, and maintenance of unit components. The unit shall be installed for proper access. Procedure for proper access, inspection and cleaning of the unit shall be provided in the AHU manufacturer's maintenance manual. Access section doors shall be constructed per Section 2.04.

2.11 VARIABLE FREQUENCY DRIVES (VFDS – IF SCHEDULED)

- A. Variable frequency drives shall be provided, mounted, and wired by the AHU manufacturer for the supply air fan. All standard and optional features shall be included within the VFD enclosure, unless otherwise specified. The VFDS shall be UL listed. The listing shall allow mounting in plenum or other air handling compartments.
- B. The VFD shall convert incoming fixed frequency three-phase AC power into a variable frequency and voltage for controlling the speed of three-phase AC motors. The motor current shall closely approximate a sine wave. Motor voltage shall be varied with frequency to maintain desired motor magnetization current suitable for centrifugal pump and fan control and to eliminate the need for motor derating.
- C. With the motor's rated voltage applied to the VFD input, the VFD shall allow the motor

to produce full rated power at rated amps, RMS fundamental volts, and speed without using the motor's service factor. VFDs utilizing sine weighted/coded modulation (with or without 3rd harmonic injection) must provide data verifying that the motors will not draw more than full load current during full load and full speed operation.

- D. The VFD shall include an input full-wave bridge rectifier and maintain a fundamental power factor near unity regardless of speed or load.
- E. The VFD and options shall be tested to ANSI/UL Standard 508. The complete VFD, including all specified options, shall be assembled by the manufacturer, which shall be UL 508 certified for the building and assembly of option panels. Assembly of separate panels with options by a third-party is not acceptable. The appropriate UL stickers shall be applied to both the VFD and option panel, in the case where these are not contained in one panel.
- F. The VFD shall have DC link reactors on both the positive and negative rails of the DC bus to minimize power line harmonics. VFDs without DC link reactors shall provide a minimum 3% impedance line reactor.
- G. The VFDs full load amp rating shall meet or exceed NEC Table 430-150. The VFD shall be able to provide full rated output current continuously, 110% of rated current for 60 seconds and 160% of rated current for up to 0.5 second while starting.
- H. The VFD shall be able to provide full torque at any selected frequency from 28 Hz to base speed to allow driving direct drive fans without derating.
- I. An automatic energy optimization selection feature shall be provided standard in the VFD. This feature shall automatically and continually monitor the motors speed and load and adjust the applied voltage to maximize energy savings and provide up to an additional 3% to 10% energy savings.
- J. Input and output power circuit switching shall be able to be accomplished without interlocks or damage to the VFD. Switching rate may be up to 1 time per minute on the input and unlimited on the output.
- K. An automatic motor adaptation test algorithm shall measure motor stator resistance and reactance to optimize performance and efficiency. It shall not be necessary to run the motor or de-couple the motor from the load to run the test.
- L. Galvanic and/or optical isolation shall be provided between the VFDs power circuitry and control circuitry to ensure operator safety and to protect connected electronic control equipment from damage caused by voltage spikes, current surges, and ground loop currents. VFDs not including either galvanic or optical isolation on both analog I/O and discrete I/O shall include additional isolation modules.
- M. The VFD shall minimize the audible motor noise using an adjustable carrier frequency. The carrier frequency shall be automatically adjusted to optimize motor and VFD efficiencies while reducing motor noise.
- N. Protective Features
 - 1. Protection shall be provided against input transients, loss of AC line phase,

output short circuit, output ground fault, overvoltage, undervoltage, VFD overtemperature and motor overtemperature. The VFD shall display all faults as words. Codes are not acceptable.

2. The VFD shall be protected from sustained power or phase loss. The VFD shall provide full rated output with an input voltage as low as 90% of the nominal. The VFD shall continue to operate with reduced output with an input voltage as low as 164 V AC for 208/230-volt units, 313 V AC for 460-volt units, and 394 volts for 600 volts units.
3. The VFD shall incorporate a motor preheat circuit to keep the motor warm and prevent condensation build up in the stator.
4. The VFD package shall include semi-conductor rated input fuses to protect power components.
5. To prevent breakdown of the motor winding insulation, the VFD shall be designed to comply with IEC Part 34-17. Otherwise the AHU manufacturer shall ensure that inverter rated motors are supplied.
6. The VFD shall include a "signal loss detection" circuit to sense the loss of an analog input signal such as 4 to 20 mA or 2 to 10 V DC, and shall be programmable to react as desired in such an instance.
7. The VFD shall function normally when the keypad is removed while the VFD is running and continue to follow remote commands. No warnings or alarms shall be issued as a result of removing the keypad.
8. The VFD shall catch a rotating motor operating forward or reverse up to full speed.
9. The VFD shall be rated for 100,000-amp interrupting capacity (AIC).
10. The VFD shall include current sensors on all three output phases to detect and report phase loss to the motor. The VFD shall identify which of the output phases is low or lost.
11. The VFD shall continue to operate without faulting until input voltage reaches 300 V AC on 208/230-volt units, 539 V AC on 460-volt units, and 690 volts on 600-volt units.

O. Interface Features

1. Hand/Start, Off/Stop and Auto/Start selector switches shall be provided to start and stop the VFD and determine the speed reference. On units with bypass, a VFD/Off/Bypass selector switch shall be provided.
2. The VFD shall be able to be programmed to provide a 24 V DC output signal to indicate that the VFD is in Auto/Remote mode.

3. The VFD shall provide digital manual speed control. Potentiometers are not acceptable.
4. A lockable, alphanumeric backlit display keypad shall be provided. The keypad shall be remotely mountable up to 10 feet away using standard 9-pin cable.
5. The keypads for all sizes of VFDs shall be identical and interchangeable.
6. To set up multiple VFDs, it shall be possible to upload all setup parameters to the VFDs keypad, place that keypad on all other VFDs in turn and download the setup parameters to each VFD. To facilitate setting up VFDs of various sizes, it shall be possible to download from the keypad only size independent parameters.
7. The display shall be programmable to display in English, Spanish and French at a minimum.
8. A red FAULT light, a yellow WARNING light and a green POWER-ON light shall be provided. These indications shall be visible both on the keypad and on the VFD when the keypad is removed.
9. A quick setup menu with factory preset typical HVAC parameters shall be provided on the VFD eliminating the need for macros.
10. The VFD shall include a standard EIA-485 communications port and capabilities to be connected at a future date to a Johnson Controls N2 Metasys or Siemens FLN system at no additional cost to the owner. The connection shall be software selectable by the user.
11. At a minimum, the following points shall be controlled and/or accessible:
 - a. VFD Start/Stop
 - b. Speed reference
 - c. Fault diagnostics
 - d. Meter points
12. Four additional Form C 230-volt programmable relays shall be available for field installation within the VFD
13. LonWorks® communication shall be available for factory or field installation within the VFD.
14. Two set-point control interfaces (PID control) shall be standard in the unit. The VFD shall be able to look at two feedback signals, compare with two set-points and make various process control decisions.
15. Floating point control interface shall be provided to increase/decrease speed in response to contact closures.
16. Four simultaneous displays shall be available. They shall include frequency or speed, run time, output amps, and output power. VFDs unable to show these four displays simultaneously shall provide panel meters.

17. Sleep mode shall be provided to automatically stop the VFD when its speed drops below set ζ sleep ζ level for a specified time. The VFD shall automatically restart when the speed command exceeds the set ζ wake ζ level.
18. The sleep mode shall be functional in both follower mode and PID mode.
19. A run permissive circuit shall be provided to accept a ζ system ready ζ signal to ensure that the VFD does not start until dampers or other auxiliary equipment are in the proper state for VFD operation. The run permissive circuit shall also be capable of sending an output signal as a start command to actuate external equipment before allowing the VFD to start.
20. The following displays shall be accessible from the control panel in actual units: Reference Signal Value, Output Frequency in Hz or percent, Output Amps, Motor HP, Motor kW, kWhr, Output Voltage, DC Bus Voltage, VFD Temperature in degrees, and unit CFM.
21. The display shall be programmed to read in inches of water column (in-wg).
22. The VFD shall be able to be programmed to sense the loss of load and signal a no load/broken belt warning or fault.
23. If the temperature of the VFDs heat sink rises to 80°C, the VFD shall automatically reduce its carrier frequency to reduce the heat sink temperature. If the temperature of the heat sink continues to rise the VFD shall automatically reduce its output frequency to the motor. As the VFDs heat sink temperature returns to normal, the VFD shall automatically increase the output frequency to the motor and return the carrier frequency to its normal switching speed.
24. The VFD shall have temperature-controlled cooling fans for quiet operation and minimized losses.
25. The VFD shall store in memory the last 10 faults and related operational data.
26. Eight programmable digital inputs shall be provided for interfacing with the systems control and safety interlock circuitry.
27. Two programmable relay outputs, one Form C 240 V AC, one Form A 30 V AC, shall be provided for remote indication of VFD status.
28. Three programmable analog inputs shall be provided and shall accept a direct-or-reverse acting signal. Analog reference inputs accepted shall include two voltage (0 to 10 V DC, 2 to 10 V DC) and one current (0 to 20 mA, 4 to 20 mA) input.
29. Two programmable 0 to 20 mA analog outputs shall be provided for indication of VFD status. These outputs shall be programmable for output speed, frequency, current and power. They shall also be programmable to provide a selected 24V DC status indication.
30. Under fire mode conditions, the VFD shall be able to be programmed to automatically default to a preset speed.

P. Adjustments

1. The VFD shall have an adjustable carrier frequency in steps of not less than 0.1 kHz to allow tuning the VFD to the motor.
2. A minimum of sixteen preset speeds shall be provided.
3. Four acceleration and four deceleration ramps shall be provided. Accel and decel time shall be adjustable over the range from 0 to 3,600 seconds to base speed. The shape of these curves shall be automatically contoured to ensure no-trip acceleration and deceleration.
4. Four current limit settings shall be provided.
5. If the VFD trips on one of the following conditions, the VFD shall be programmable for automatic or manual reset: undervoltage, overvoltage, current limit, and inverter overload.
6. The number of restart attempts shall be selectable from 0 through 20 or infinitely and the time between attempts shall be adjustable from 0 through 600 seconds.
7. An automatic ζ on delay ζ shall be selectable from 0 to 120 seconds.

Q. Service Conditions

1. VFDs shall provide full output in an ambient temperature from -10 to 50°C (14 to 104°F).
2. VFDs shall provide full output in a relative humidity from 0 to 95%, non-condensing.
3. VFDs shall provide full output up to 3,300 feet elevation without derating.
4. VFDs shall provide full output with an AC line voltage variation from -10 to +10% of nominal voltage.
5. No side clearance shall be required for cooling of any units. All power and control wiring shall be done from the bottom.

R. Warranty

1. The VFD shall be warranted by the manufacturer for a period of 42 months from date of shipment, or 36 months from start-up, whichever occurs first. The warranty shall include parts, labor, travel costs and living expenses incurred by the manufacturer to provide factory-authorized on-site service.

2.12 FACTORY-INSTALLED MOTOR WIRE TERMINATION, VFD, AND COMBINATION STARTER/DISCONNECT ENCLOSURES

- A. VFDs shall be factory mounted on the drive side of the fan section. VFD may be

mounted on the interior of the unit, accessible from the unit exterior through an access door, or on the casing exterior in a NEMA Type 1 enclosure for indoor units. If not mounted on the fan section due to NEC disconnect height limitations or serviceability constraints in the mechanical equipment room, VFD may be mounted in another location other than the fan.

- B. Any welds shall be properly finished with no rough edges. Enclosures shall house circuit breaker disconnects, bypass circuitry, Drive-OFF-Bypass switches, manual speed controls, and control transformers. VFDs and starter/disconnects shall have an external disconnect located on the outside of the access door.

2.13 OPERATING CONTROLS

- A. All unit controls shall be factory mounted on the Air handling unit. Unit controller shall control cooling, gas fired heat and hot gas reheat. Controller shall control all condensing units serving the Air handling unit.
- B. Provide microprocessor unit mounted control (UCM) which when used with an electronic discharge air sensor mounted on the DX coil provides proportional, integral, and derivative supply air control. This UCM shall perform all unit functions by making all heating, cooling, and ventilating decisions through resident software logic. The microprocessor shall include several temperature functions. A discharge air sensor mounted after the evaporator coil shall maintain the specified dehumidification temperature. The second temperature sensor shall modulate the hot gas reheat coil face and bypass damper to maintain the specified supply or space air temperature. The third temperature sensor shall monitor suction temperature and lockout compressors to keep the evaporator coil from freezing. The fourth temperature sensor shall monitor liquid line temperature to modulate condenser fans to maintain head pressure. The fifth sensor is a space adjustable temperature or humidity input. The last temperature sensor monitors outdoor air temperature and makes the decision on when to lock out the compressors. All functions of the microprocessor shall be fully programmable and have the capability to be monitored and adjusted thru a laptop computer and/or remote LCD keypad. The UCM shall be BACnet compatible.

2.14 INDIRECT GAS HEAT SECTION

- A. Indirect-fired gas heaters shall be provided as indicated on the schedule and drawings. Indirect-fired gas heaters shall be completely factory assembled, piped, and operationally fire tested at the factory prior to shipment. The industrial / commercial burner shall be UL listed, forced draft, and fully modulating. The control panel shall be equipped with flame management controls and appropriate safeties. The gas heat section construction shall match the rest of the air handling unit and be an integral part of the unit. All burner and control components shall be housed in a burner vestibule with an access door. Heater shall be modulating type with 10:1 turndown ratio. The entire section shall bear a UL or CUL label for Commercial-Industrial Gas Heating Equipment (ANSI / UL Standard) and Industrial Gas-Fired Package Furnaces.
- B. Burner combustion shall be clean and odor-free throughout the entire operating range. Complete gas train shall be factory installed. Factory installed forced draft fan shall be provided.

PART 3 EXECUTION

3.01 SHIPPING

- A. Paper copies of the IOM shall also be shipped with each AHU.
- B. The AHU manufacturer shall identify all shipments with the order number. Enough information shall be provided with each shipment to enable the Mechanical Contractor to confirm the receipt of units when they are received. For parts too small to mark individually, the AHU manufacturer shall place them in containers.
- C. To protect equipment during shipment and delivery, all indoor units shall be completely stretch or shrink wrapped. Wrap shall be a minimum of 7 mil plastic. Pipe ends and pipe connection holes in the casing shall be capped or plugged prior to shipment
- D. After loading the equipment for shipment, the AHU manufacturer shall contact the shipping contact on the order and provide the name of the carrier, description of equipment, order number, shipping point, and date of shipment.

3.02 ON-SITE STORAGE

- A. If equipment is to be stored for a period of time prior to installation, the Mechanical Contractor shall remove all stretch or shrink wrap from units upon receipt to prevent unit corrosion and shall either place the units in a controlled indoor environment or shall cover the units with canvas tarps and place them in a well-drained area. Covering units with plastic tarps shall not be acceptable.

3.03 FIELD EXAMINATION

- A. The Mechanical Contractor shall verify that the mechanical room and/or roof are ready to receive work and the opening dimensions are as indicated on the shop drawings and contract documents.
- B. The Mechanical Contractor shall verify that the proper power supply is available prior to starting of the fans.

3.04 INSTALLATION

- A. The Mechanical Contractor shall be responsible to coordinate ALL his installation requirements with the Owner and the Owners selected Mechanical Contractor to ensure that a complete installation for each unit is being provided. Coordination efforts shall include such items as unloading and hoisting requirements, field wiring requirements, field piping requirements, field ductwork requirements, requirements for assembly of field-bolted or welded joints, and all other installation and assembly requirements.
- B. The AHU manufacturer shall provide all screws and gaskets for joining of sections in the field.
- C. The Mechanical Contractor shall verify that the following items have been completed prior to scheduling the AHU manufacturer's final inspection and start up:

1. All spring-isolated components have had their shipping restraints removed and the components have been leveled.
2. On all field-joined units, that all interconnections have been completed, i.e., electrical and control wiring, piping, casing joints, bolting, welding, etc.
3. All water and steam piping connections have been completed and hydrostatically tested and all water flow rates have been set in accordance with the capacities scheduled on the Drawings.
4. All ductwork connections have been completed and all ductwork has been pressure tested for its intended service.
5. All power wiring, including motor starters and disconnects, serving the unit has been completed.
6. All automatic temperature and safety controls have been completed.
7. All dampers are fully operational.
8. All shipping materials have been removed.
9. All (clean) filter media has been installed in the units.

3.05 LEVELING

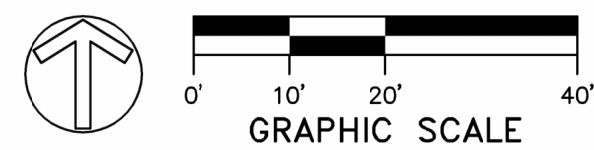
- A. The Mechanical Contractor shall level all unit sections in accordance with the unit manufacturer's instructions. The Mechanical Contractor shall provide and install all necessary permanent shim material to ensure individual sections and entire assembled units are level.

3.06 FINAL INSPECTION AND START UP SERVICE

- A. After the Mechanical Contractor has provided all water and steam piping connections, ductwork connections, and field control wiring, and Electrical Contractor has provided all the field power wiring, the Mechanical Contractor shall inspect the installation. The Mechanical Contractor shall then perform startup of the equipment.
- B. The Automatic Temperature Control (Building Direct Digital Control) Contractor shall be scheduled to be at the job site at the time of the equipment start up.
- C. The Mechanical Contractor, shall perform the following tests and services and submit a report outlining the results:
 1. Record date, time, and person(s) performing service.
 2. Lubricate all moving parts.
 3. Check all motor and starter power lugs and tighten as required.
 4. Verify all electrical power connections.

5. Conduct a startup inspection per the AHU manufacturer's recommendations.
6. Record fan motor voltage and amperage readings.
7. Check fan rotation and spin wheel to verify that rotation is free and does not rub or bind.
8. Check fan for excessive vibration.
9. Check V belt drive or coupling for proper alignment.
10. Check V belt drive for proper tension. Tighten the belts in accordance with the AHU manufacturer's directions. Check belt tension during the second- and seventh-day's operation and re-adjust belts, as may be required, to maintain proper tension as directed by the AHU manufacturer.
11. Remove all foreign loose material in ductwork leading to and from the fan and in the fan itself.
12. Disengage all shipping fasteners on vibration isolation equipment.
13. Check safety guards to insure they are properly secured.
14. Secure all access doors to the fan, the unit, and the ductwork.
15. Switch electrical supply "on" and allow fan to reach full speed.
16. Physically check each fan at start up and shut down to insure no abnormal or problem conditions exist.
17. Check entering and leaving air temperatures (dry bulb and wet bulb) and simultaneously record entering and leaving chilled water temperatures and flow, steam pressures and flow, and outside air temperature.
18. Check all control sequences.

END OF SECTION



DEMOLITION LEGEND

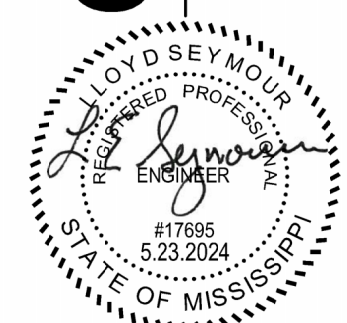
- DENOTES SAW-CUTTING AND REMOVAL OF EXISTING CONCRETE PAVEMENT
- DENOTES UNDERCUT TO PROVIDE A MINIMUM 2 FT THICK BUFFER UNDER EXTERIOR PAVEMENT AREAS
- DENOTES UNDERCUT TO PROVIDE A MINIMUM 4 FT THICK BUFFER UNDER PROPOSED BUILDING FOOTPRINT

DEMOLITION NOTES

1. INFORMATION GIVEN WAS TAKEN FROM TOPOGRAPHICAL SURVEY SUPPLIED BY OWNER. CONTRACTOR IS TO FIELD VERIFY ALL DIMENSIONS AND CONDITIONS AND REPORT ANY DISCREPANCIES, CONFLICTS, OR OTHER UNSATISFACTORY CONDITIONS TO THE ARCHITECT/ENGINEER PRIOR TO CONSTRUCTION.
2. THE CONTRACTOR SHALL CALL THE MISSISSIPPI DAMAGE PREVENTION NUMBER (1-800-227-6477) BY LAW TO LOCATE ALL EXISTING UTILITIES ON SITE PRIOR TO THE START OF HIS WORK.
3. SEE ARCHITECTURAL, MECHANICAL, & ELECTRICAL PLANS FOR ADDITIONAL INFORMATION.
4. EROSION CONTROL: THE CONTRACTOR SHALL MAINTAIN EROSION AND SEDIMENT CONTROLS DURING THE ENTIRE COURSE OF WORK AS DETAILED ON EROSION CONTROL PLAN AND IN ACCORDANCE WITH THE SPECIFICATIONS.
5. SITE UTILITIES: CONTRACTOR IS TO FIELD VERIFY ALL SUBSURFACE UTILITIES PRIOR TO STARTING ANY CONSTRUCTION AND CONTACTING THE ASSOCIATED UTILITY COMPANY AND COORDINATING ANY REQUIRED DISCONNECTS AND/OR CONNECTION TO EXISTING UTILITIES.

SITE EXCAVATION NOTES

1. GEOTECHNICAL REPORT: PREPARED BY BURNS COOLEY DENNIS, INC. DATED SEPTEMBER 22, 2023 (REPORT NO. 230492). IT IS RECOMMENDED THAT THE CONTRACTOR BECOME FAMILIAR WITH THE SUBSURFACE CONDITIONS THAT WILL BE ENCOUNTERED AND OBTAIN A COPY OF THE GEOTECHNICAL REPORT AND ANY SUPPLEMENTAL REPORTS. THE REPORT(S) MAY BE INCLUDED AS A REFERENCE DOCUMENT WITHIN THE CONSTRUCTION DOCUMENTS. OTHERWISE THE CONTRACTOR SHALL CONTACT THE OWNER TO OBTAIN A COPY OF THE REPORT(S).
2. EROSION CONTROL MEASURES: THE INITIAL STEP FOR SITE PREPARATION SHALL BE TO ESTABLISH EROSION AND SEDIMENT CONTROL MEASURES.
3. DRAINAGE: EFFECTIVE DRAINAGE, INCLUDING DITCHING AND/OR POSITIVE GRADING, SHOULD BE ESTABLISHED AT THE START OF SITE DEVELOPMENT AND MODIFIED AS NECESSARY DURING CONSTRUCTION. SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
4. CLEARING: UPON COMPLETION OF DEMOLITION WORK THE CONTRACTOR SHALL VERIFY THAT ALL EXISTING PAVEMENTS, SLABS, FOUNDATIONS, SIDEWALKS, ABANDONED UTILITIES, AND OTHER MISCELLANEOUS DEBRIS HAVE BEEN COMPLETELY REMOVED TO AT LEAST A MINIMUM OF 5 FEET BEYOND THE PROPOSED BUILDING FOOTPRINTS AND NEW PAVEMENT AREAS.
5. STRIPPING: ONCE ALL PAVEMENTS, FOUNDATION AND DEBRIS HAVE BEEN REMOVED, STRIPPING EXCAVATIONS SHOULD BE CONTINUED TO APPROXIMATELY 6" BELOW EXISTING GRADE. STRIPPING EXCAVATION SHALL BE CARRIED OUT TO AT LEAST A MINIMUM OF 5 FEET BEYOND THE PROPOSED BUILDING FOOTPRINTS AND NEW PAVEMENT AREAS.
6. TOPSOIL: CONTRACTOR SHALL STOCKPILE TOPSOIL AND OTHER SUITABLE FILL MATERIAL TO BE REUSED ON SITE. ALL UNSUITABLE SOILS SHALL BE REMOVED FROM THE SITE.
7. OVER-EXCAVATION: AS AN INITIAL STEP OF SITE PREPARATION, UNDERCUTTING SHOULD BE PERFORMED WITHIN THE BUILDING AND PAVEMENT AREAS AS REQUIRED TO REMOVE THE EXPANSIVE CLAY (CH) IN ORDER TO CREATE A BUFFER. THE RECOMMENDED MINIMUM BUFFER THICKNESS FOR THE BUILDING AREAS IS 4 FT AND THE MINIMUM BUFFER THICKNESS FOR THE PAVEMENT AREAS IS 2 FT. UNDERCUTTING TO REMOVE THE EXPANSIVE CLAYS (CH) SHOULD EXTEND LATERALLY NOT LESS THAN 4 FT BEYOND THE BUILDING AREAS AND NOT LESS THAN 2 FT FROM THE PAVEMENT EDGES.
8. SUB-GRADE PREPARATION: ONCE ALL TOPSOIL, ORGANIC MATERIALS, AND/OR OTHER UNSUITABLE SOILS HAVE BEEN REMOVED, THE FILL AREAS SHOULD BE LEVELED AND SEATED USING A STATIC ROLLER AND THEN PROOF-ROLLED USING A LOADED TANDEM AXLE DUMP TRUCK WEIGHING AT LEAST 20 TONS TO IDENTIFY AREAS OF WEAK SOIL.
9. SUB-GRADE PROTECTION: REPEATED TRAFFIC ON THE EXPOSED EXISTING SOILS WITH HEAVY EQUIPMENT OR TRUCKS MAY CAUSE INSTABILITY PARTICULARLY AFTER INCLEMENT WEATHER. TO AVOID REPEATED REMEDIATION AND EXPEDITE CONSTRUCTION, IT IS RECOMMENDED THAT THE EXISTING SUB-GRADE BE TREATED WITH HYDRATED LIME. REFER TO GEOTECHNICAL REPORT FOR GUIDANCE.
10. MUCK: WHEN EXCAVATIONS ENCOUNTER UNSUITABLE MATERIALS BELOW THE BOTTOM OF THE STRIPPING AND UNDERCUT EXCAVATIONS, THE CONTRACTOR WILL BE REQUIRED TO REMOVE THE MATERIAL AND BACKFILL WITH APPROPRIATE FILL MATERIAL AS APPROVED BY THE ENGINEER. THE DEPTH AND WIDTH OF MUCK EXCAVATION WILL BE AS DIRECTED OR APPROVED BY THE ENGINEER. THE CONTRACTOR WILL NOT BE COMPENSATED FOR EXCAVATION BEYOND THE DIMENSIONS AND ELEVATIONS AS SHOWN ON THE PLANS OR EXCAVATION THAT HAS NOT BEEN DIRECTED OR APPROVED BY THE ENGINEER.
11. THE CONTRACTOR SHALL ALLOW IN HIS BASE BID PRICE FOR THE REMOVAL OF UNSUITABLE MATERIAL AND THE REPLACEMENT WITH STRUCTURAL FILL MATERIAL IN THE AMOUNT OF 200 CUBIC YARDS (FIELD MEASURED).
12. SUB-GRADE STABILITY: DENSITY AND STABILITY OF SUB-GRADES SHALL BE CONFIRMED OR RE-ESTABLISHED IMMEDIATELY PRIOR TO CONSTRUCTION OF FOUNDATIONS AND PAVEMENTS.
13. STRUCTURAL FILL: IMPORTED FILL SOILS SHOULD CONSIST OF SELECT, NON-ORGANIC AND DEBRIS-FREE SILTY CLAYS (CL) HAVING A PLASTICITY INDEX (PI) WITHIN THE RANGE OF 10 TO 24, A LIQUID LIMIT LESS THAN 45, AND NOT LESS THAN 70 PERCENT PASSING THE NO. 200 SIEVE.
14. COMPACTION: MATERIALS SHOULD BE COMPACTED TO A MINIMUM OF 95% OF MAXIMUM DRY DENSITY PER STANDARD PROCTOR (ASTM D 698). COMPACTION SHOULD BE ACHIEVED PRIOR TO PLACING SUBSEQUENT LIFTS. FILL SOILS SHOULD BE PLACED IN MAXIMUM LOOSE LIFTS OF 9" AT A MOISTURE CONTENT COMPARABLE (±3%) TO THE OPTIMUM MOISTURE CONTENT ESTABLISHED IN THE LABORATORY.
15. TESTING: IN PLACE DENSITY TESTS SHOULD BE MADE PER 2,500 SQUARE FEET PER LIFT WITHIN THE BUILDING FOOTPRINT AND ONE TEST PER LIFT FOR EVERY 200 FT OF DRIVE ALIGNMENT.



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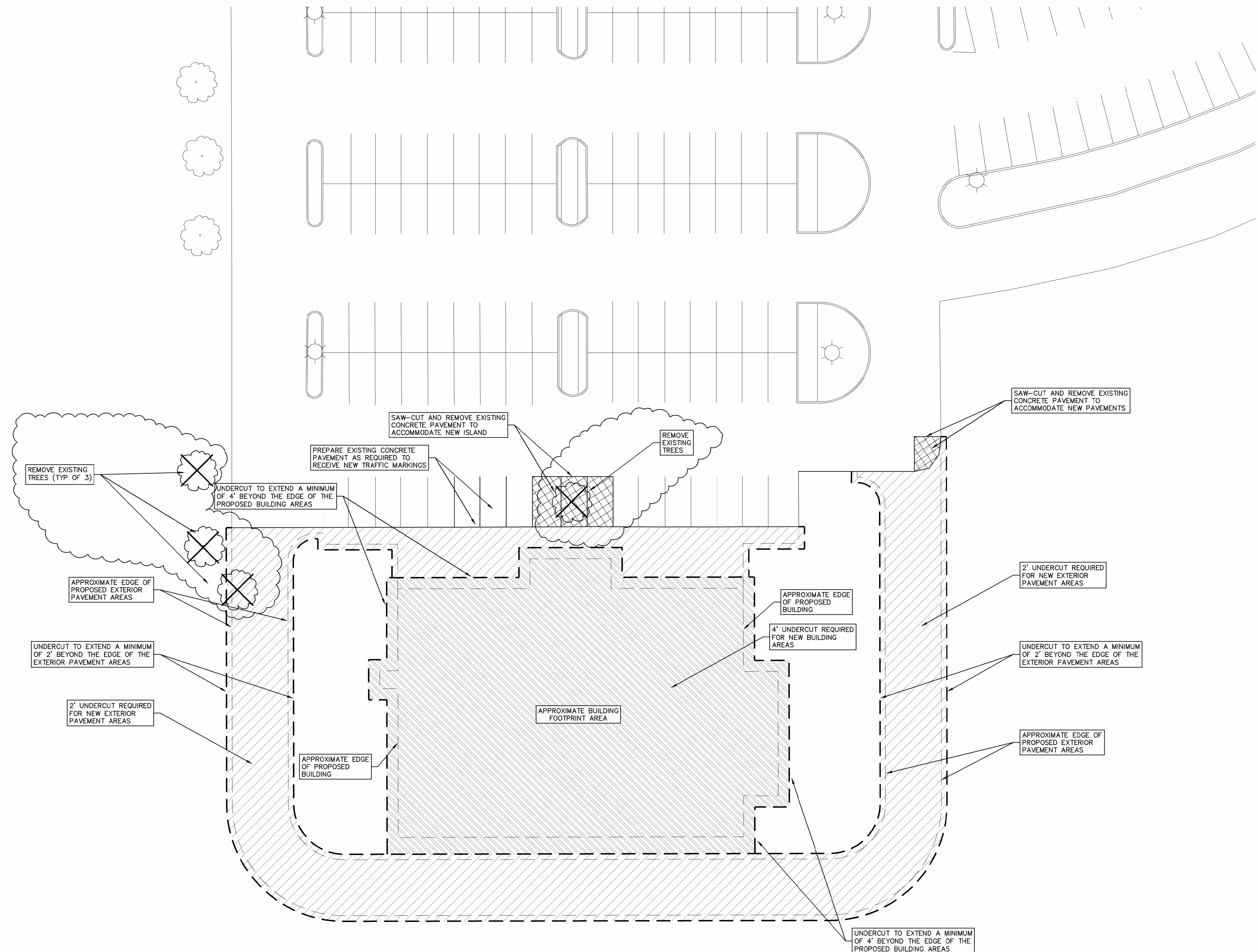
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SHEET **C100R**

SITE DEMOLITION PLAN

DATE: 5-23-2024
 SZZARCH#: 2112
 DRAWN BY: DMI
 CHECKED BY: LES

REVISIONS:



1 SITE DEMOLITION PLAN
 C100 SCALE: 1" = 20'