



**ADDENDUM #3**

**November 8, 2018**

**UNC Charlotte Atkins Air Handler  
Charlotte, North Carolina  
SCO #18-18334**

This addendum is pursuant to the University of North Carolina General Administration Instructions to Bidders and General Conditions of the Contract in connection with the revision of Bidding Documents which have been previously issues.

Addenda are issued prior to execution of Contract. All instructions contained herein shall be reflected in the Contract Sum and this Addendum will be made a part of the Contract Documents, if, as and when a Construction Contract is awarded.

This Addendum forms a part of the Contract Documents and modifies the original documents dated October 17, 2018, as noted below. Acknowledge receipt of this Addendum in the space provided on the Form of Proposal. Failure to do so will subject the Bidder to disqualification.

**REVISIONS TO THE PROJECT MANUAL:**

1. Revise the project manual by replacing spec sheets/sections/individual pages with the following project manual sheets as follows:
  - a. SECTION 001200 - Notice to Bidders – Replace pages 1 thru 3 with attached pages.
  - b. Table of Contents – Replace page 2 with attached pages.
  
2. Revise the project manual by replacing entire existing spec sections with the following revised spec sections as follows:
  - a. SECTION 237313 – Replace pages 4-7. Paragraph 2.5.D added. Paragraph 2.7.B added. Paragraph 3.1.D added.
  
3. Revise the project manual by inserting entire existing spec sections with the following new spec sections as follows: Insert SECTION 283100 pages 1-7 as indicated by table of contents.

**REVISIONS TO DRAWINGS**

1. Replace Sheet E101 with attached Sheet E101.
2. Replace Sheet M001 with attached Sheet M001.
3. Replace Sheet M002 with attached Sheet M002.
4. Replace Sheet M003 with attached Sheet M003.
5. Replace Sheet M101 with attached Sheet M101.

**BIDDER CLARIFICATION REQUESTS**

#	RFI/ Substitution Request	Response
1	Confirm individual differential pressure transmitters required for each plenum fan inlet air flow monitor device.	Yes, that is correct. There will be a total of 16 Fans.
2	Confirm one VFD per fan in each fan array system and individual fan control.	Yes, that is correct. There will be a total of 16 VFDs.

3	One Building/space static pressure sensor?	Yes, that is correct.
4	One hot duct and one cold duct static pressure sensor?	Yes, that is correct.
5	Who provides AHU return, oda and exhaust dampers?	All AHU dampers are to be provided by air handling unit manufacturer.
6	Who provides min oda damper with flow monitor?	Min. outside air damper and return air damper with airflow monitoring stations are to be provided by air handling unit manufacturer.
7	Regarding the temporary ductwork, what type of material will be used? Will this be PVC Flexible Duct that often comes with the rental equipment or do you require that the duct be metal. Also, if metal is used, what are the insulation requirements?	Temporary ductwork can be PVC flexible duct provided by rental equipment company.
8	Will bolted bases be allowed in lieu of welded base as specified?	No, bolted bases will not be allowed. Welded bases shall be provided as specified.
9	Can the quantity of fans/motor horsepower be changed from what is shown on the AHU schedule?	No, base bid shall include fan quantities and motor horsepower as scheduled.

**ATTACHMENTS**

1. SECTION 001200 – NOTICE TO BIDDERS – PAGES 1-3.
2. SPECIFICATION SECTION 237313 – PAGES 4-7.
3. SPECIFICATION SECTION 283100 – PAGES 1-7.
4. SHEET E101 – ELECTRICAL FLOOR PLANS.
5. SHEET M001 – MECHANICAL NOTES AND LEGENDS
6. SHEET M002 – MECHANICAL DETAILS.
7. SHEET M003 – MECHANICAL CONTROLS DIAGRAMS.
8. SHEET M101 – MECHANICAL FLOOR PLANS.

END OF ADDENDUM #3

**SECTION 001200 - NOTICE TO BIDDERS**

## **NOTICE TO BIDDERS**

Sealed proposals will be received by The University of North Carolina at Charlotte, in Charlotte, NC, in Room 119 of the Facilities Management/Police Building (#55a on the campus map – <http://facilities.uncc.edu/maps>), on the UNC Charlotte campus up to **2:00 p.m. Thursday, November 15, 2018** and immediately thereafter publicly opened and read for the furnishing of labor, material and equipment entering into the construction of:

### **Atkins Air Handler**

**The project includes replacement of the built-up air handler unit that serves the Atkins Library. The Work includes demolition, hazardous materials abatement, new construction, and associated work on a 1-story, approximately 2,200 sf area of the main mechanical space in the building.**

Bids will be received for Single Prime Contract only. All proposals shall be lump sum.

### **Non-Mandatory Pre-Bid Meeting**

A non-mandatory pre-bid meeting will be held for all bidders on **Wednesday, October 24, 2018, at 2:00 p.m.** in Room 119, of the Facilities Management/Police Building (#55a on the campus map – <http://facilities.uncc.edu/maps>). Visitor parking is available in Lot 26 and 25. Please come to the second floor desk of Joyce Clay before the meeting to obtain a parking pass. Provide the following information; Vehicle owner's name, license tag number, state, vehicle description (make, style, color), and email address.

The meeting will address project specific questions, issues, bidding procedures, and bid forms. After the Pre-bid meeting there will be an optional walking tour to exam the project site. **This will be the only opportunity for contractors and their subcontractors to visit the building, as it is access controlled. Recommend you have all interested parties in attendance.**

In accordance with GS133-3 and SCO procedures there will be no preferred brand items considered as Alternates by the owner for this project.

Bidders' questions will be accepted in writing until 5:00 p.m. Monday, November 5, 2018. Address all questions to the designer, McVeigh & Mangum Engineering, Inc., Attn: Larry McWilliams at [lmcwilliams@mcveighmangum.com](mailto:lmcwilliams@mcveighmangum.com).

Final addendum will be issued by November 8, 2018.

Complete plans, specifications and contract documents will be open for inspection in the offices of:

1. McVeigh & Mangum Engineering, Inc., 916 West 5<sup>th</sup> Street, Charlotte, NC 28202. Bidders shall call Marissa Date at (704) 547-9035 to make an appointment to review documents twenty-four (24) hours in advance.

2. Owner: UNC Charlotte, Facilities Management/Police Building, 2<sup>nd</sup> floor – Capital Projects, 9151 Cameron Blvd., Charlotte, NC 28223, Phone: (704) 687-0615.

or may be obtained from McVeigh & Mangum Engineering, Inc. by those qualified as prime bidders, upon deposit of thirty dollars (\$30.00) in cash or certified check. The full plan deposit will be returned to those bidders provided all documents are returned in good, usable condition within ten (10) days after the bid date.

Electronic plans, specifications and contract documents will be provided electronically to all bidders. Contact McVeigh & Mangum Engineering, Inc. for electronic plans and specifications:

- a. Notify Larry McWilliams ([lmcwilliams@mcveighmangum.com](mailto:lmcwilliams@mcveighmangum.com)) by email with Subject line: "Atkins Air Handler (your company name); BID DOCUMENT REQUEST".
- b. Include your company name, contact information, email address, and phone number in the body of your email.

Electronic plans, specifications and contract documents are available at the following:

1. Construct Connect at [content@constructconnect.com](mailto:content@constructconnect.com), (800) 364-2059
2. North Carolina Offices of Dodge Data & Analytics (formerly McGraw-Hill Construction) – Customer Service – <http://dodgeprojects.construction.com>, (800) 393-6343
3. Metrolina Minority Contractors Association (MMCA) – [mmca@mmcaofcharlotte.org](mailto:mmca@mmcaofcharlotte.org) – (877) 526-6205

**NOTE:** The bidder shall include with the bid proposal the form *Identification of Minority Business Participation* identifying the minority business participation it will use on the project and shall include either *Affidavit A* or *Affidavit B* as applicable. Forms and instructions are included within the Proposal Form in the bid documents. Failure to complete these forms is grounds for rejection of the bid. (GS143-128.2c Effective 1/1/2002.)

All contractors are hereby notified that they must have proper license as required under the state laws governing their respective trades.

General contractors are notified that Chapter 87, Article 1, General Statutes of North Carolina, will be observed in receiving and awarding general contracts. General contractors submitting bids on this project must have license classification for Unlimited General Contractor.

**NOTE--SINGLE PRIME CONTRACTS:** Under GS 87-1, a contractor that superintends or manages construction of any building, highway, public utility, grading, structure or improvement shall be deemed a "general contractor" and shall be so licensed. Therefore, a single prime project that involves other trades will require the single prime contractor to hold a proper General Contractors license.

**EXCEPT:** On public buildings being bid single prime, where the total value of the general construction does not exceed 25% of the total construction value, contractors under GS87- Arts 2 and 4 (Plumbing, Mechanical & Electrical) may bid and contract directly with the Owner as the SINGLE PRIME CONTRACTOR and may subcontract to other properly licensed trades. GS87-1.1- Rules .0210

Each proposal shall be accompanied by a cash deposit or a certified check drawn on some bank or trust company, insured by the Federal Deposit Insurance Corporation, of an amount equal to

not less than five percent (5%) of the proposal, or in lieu thereof a bidder may offer a bid bond of five percent (5%) of the bid executed by a surety company licensed under the laws of North Carolina to execute the contract in accordance with the bid bond. Said deposit shall be retained by the owner as liquidated damages in event of failure of the successful bidder to execute the contract within ten days after the award or to give satisfactory surety as required by law.

A performance bond and a payment bond will be required for one hundred percent (100%) of the contract price.

Payment will be made based on ninety-five percent (95%) of monthly estimates and final payment made upon completion and acceptance of work.

No bid may be withdrawn after the scheduled closing time for the receipt of bids for a period of **60** days.

The owner reserves the right to reject any or all bids and to waive informalities.

Bidders who will not attend the Bid Opening need to ensure their sealed bids are delivered no later than **1:00 p.m. Thursday, November 15, 2018** to the following:

**Mailed Proposals:**

Attn: Ms. Joyce Clay – Capital Projects  
The University of North Carolina at Charlotte  
Facilities Management – Capital Projects  
9201 University City Boulevard  
Charlotte, NC 28223-0001

Or

**Hand Delivered:**

Attn: Ms. Joyce Clay – Capital Projects  
Facilities Management/ Police Building  
2<sup>nd</sup> Floor – Capital Projects  
9151 Cameron Boulevard  
Charlotte, NC 28223  
(704) 687-0615

Designer:

McVeigh & Mangum Engineering, Inc.  
916 West 5<sup>th</sup> Street  
Charlotte, NC 28202  
(704) 552-5800

Owner:

UNC Charlotte  
9201 University City Boulevard  
Charlotte, NC 28223-0001  
(704) 687-0615

230529	HANGERS & SUPPORTS FOR HVAC PIPING & EQUIP.	230529-1 thru 10
230553	IDENTIFICATION FOR HVAC PIPING & EQUIP.	230553-1 thru 5
230593	TESTING, ADJUSTING, AND BALANCING FOR HVAC	230593-1 thru 18
230713	DUCT INSULATION	230713-1 thru 8
230719	HVAC PIPING INSULATION	230719-1 thru 27
230800	COMMISSIONING OF HVAC SYSTEMS	230800-1 thru 6
232113	HYDRONIC PIPING	232113-1 thru 10
232116	HYDRONIC PIPING SPECIALTIES	232116-1 thru 4
232213	STEAM AND CONDENSATE HEATING PIPING	232213-1 thru 8
232216	STEAM AND CONDENSATE HEATING PIPING SPECIALTIES	232216-1 thru 5
233113	METAL DUCTS	233113-1 thru 10
233300	AIR DUCT ACCESSORIES	233300-1 thru 6
237313	INDOOR, CUSTOM AIR-HANDLING UNITS	237313-1 thru 6

#### **DIVISION 25 – INTEGRATED AUTOMATION**

255000	FACILITY MANAGEMENT AND CONTROL SYSTEM	255000-1 thru 32
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#### **DIVISION 26 - ELECTRICAL**

260500	ELECTRICAL GENERAL REQUIREMENTS	260500-1 thru 4
260519	CONDUCTORS	260519-1 thru 3
260526	GROUNDING AND BONDING	260526-1 thru 2
260529	FASTENINGS AND SUPPORTS	260529-1
260533	RACEWAY AND FITTINGS	260533-1 thru 4
260534	OUTLET & JUNCTION BOXES	260534-1 thru 2
262726	WIRING DEVICES	262726-1 thru 2
262816	DISCONNECTS	262816-1 thru 2

#### **DIVISION 28 – FIRE ALARM**

283100	ADDRESSABLE FIRE ALARM	283100-1 thru 7
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#### **BIDDING INFORMATION**

FORM OF PROPOSAL	4 pages
FORM OF CONSTRUCTION CONTRACT	3 pages
FORM OF PERFORMANCE BOND	2 pages
FORM OF PAYMENT BOND	2 pages
SHEET FOR ATTACHING POWER OF ATTORNEY	1 page
SHEET FOR ATTACHING INSURANCE CERTIFICATES	1 page
APPROVAL OF THE ATTORNEY GENERAL	1 page
CERT. BY THE OFFICE OF STATE BUDGET AND MANAGEMENT	1 page

- A. Supply blowers: AF, BI or BC blade direct drive plenum fans shall be provided with fan blades continuously welded to the wheelback. Fan wheels shall be constructed of aluminum or painted steel. Fans shall be certified to bear the AMCA seal for air and sound performance. Fan brake horsepower shall not exceed the scheduled brake horsepower at the total static pressure and airflow scheduled. Provide the number of fans scheduled, no exceptions. Fan motors must be selected to run at 90 Hz maximum at design conditions. Any fan/motor combination selected to run at a higher frequency will be rejected due to decreased motor life.
- B. Motors shall be 3 phase TEFC/ODP with a NEMA frame, cast iron construction and a 1.15 service factor. Motor brake horsepower shall not exceed scheduled values. Fan brake horsepower shall not exceed 90% of motor horsepower. All motors shall be premium efficiency with class F insulation. Shaft grounding will be provided on all VFD controlled motors 10 HP and larger.
- C. Isolation: Blower and motor shall be mounted on a unitary base with RIS isolators.
- D. Accessories:
  - 1. Variable frequency drives: Provide (1) variable speed drive for each supply fan in fan array. VFDs shall be factory provided and installed in a single panel shipped loose for field installation.
  - 2. Backdraft dampers shall be provided on fan inlet of each fan in array. Air handler manufacturers must account for any additional static pressure from BDD

## 2.5 DAMPERS

- A. Motorized dampers shall be low leakage type with galvanized steel construction, airfoil blades, vinyl edge seals, metal jamb seals, and synthetic bearings. Gravity dampers shall have aluminum frame, aluminum blades, extruded vinyl edge seals, and synthetic bearings.
- B. The following dampers shall be provided at a minimum (additional dampers may be required, please consult the sequence of operation to determine what is needed):
  - 1. Outside air control damper, actuators furnished by others.
  - 2. Recirculation air control dampers, actuators furnished by others.
  - 3. Exhaust air shut-off damper, actuators furnished by others.
- C. A minimum outside air damper/flow monitor shall be provided equivalent to the Greenheck AMD-33. A controller shall be provided with the damper to provide a 0-10VDC feedback for airflow, temperature, and position.
- D. A return air damper/flow monitor shall be provided equivalent to the Greenheck AMD-33. A controller shall be provided with the damper to provide a 0-10VDC feedback for airflow, temperature, and position.

## 2.6 FILTERS

- A. Return air filter: Provide 2" MERV 8 filter bank at the return air inlet. Mount in a galvanized steel side access slide rack and size for 500 fpm maximum face velocity. Filters must be rated per U.L. standard 900.
- B. Cartridge filter. Provide 4" MERV 13 cartridge filter bank in location shown on unit drawing. Mount in a galvanized steel side access rack and size for 500 fpm maximum face velocity. Filters must be rated per U.L. standard 900.
- C. Filter Pressure Monitoring: Magnahelic pressure gauges shall be provided across all filter racks

with a rain/sun shield provided on all outdoor mounted equipment. Filter differential pressure switches shall be provided across all filter racks.

## 2.7 HEATING

- A. Hot water coil: Provide ARI rated coil constructed of 0.006" thick aluminum fins, 0.02" wall seamless copper tubes, and galvanized casing. Stub coil connections through unit casing. Each coil is water immersion tested to 450 PSI prior to shipment.
- B. Steam Coil: Provide ARI rated non-freeze steam distributing coil constructed of 0.006" thick aluminum fins, 0.02" wall seamless copper tubes, and galvanized casing, pitched in casing for proper drainage. An internal pipe chase shall be provided in the floor of the unit. Each coil is water immersion tested to 450 PSI prior to shipment.

## 2.8 HUMIDIFICATION

- A. Steam Dispersion Manifold: A steam dispersion panel shall be provided with steam supply header, condensate collection header, and closely spaced steam dispersion tubes. Tubes and headers shall be 304 stainless steel. Each dispersion tube shall be fitted with two rows of discharge tubelets inserted into the tube wall. Assembly shall be contained within a galvanized metal casing. Steam provided by others. Control valve, strainer & trap provided by the equipment manufacturer and installed by the installing contractor.
- B. Humidifier manifold drain pan: All humidifier manifolds must be provided with stainless steel IAQ drain pans that start a minimum of 2" upstream of the humidifier manifold and extend a minimum of 12" past the humidifier manifold. Entire underside of the drain pan, including the piping run to the casing exterior, must be coated with no less than 2" of spray foam insulation to ensure no sweating occurs below. Coil must sit on "walk-on" stainless steel supports spaced a maximum of 6" apart to allow full access to the manifold without damage to the drain pan. The drain pan must be sloped in a minimum of 2 directions to ensure proper drainage.

## 2.9 COOLING

- A. Chilled water coil: Provide ARI rated coil with 0.02" thick seamless 5/8" diameter copper tubes and 0.006" thick aluminum fins, stainless casing. Provide internal pipe chase in the floor of the unit. Maximum face velocity is 500 FPM. Each coil is water immersion tested to 450 PSI prior to shipment.
- B. Cooling coil drain pan: All cooling coils must be provided with stainless steel IAQ drain pans that begin at the entering air side of the coil face and extend a minimum of 12" past the leaving air side of the coil face. Entire underside of the drain pan, including the piping run to the casing exterior, must be coated with no less than 2" of spray foam insulation to ensure no sweating occurs below. Coil must sit on "walk-on" stainless steel supports spaced a maximum of 6" apart to allow full access to the coil face without damage to the drain pan. The drain pan must be sloped in a minimum of 2 directions to ensure proper drainage. Intermediate drain pans shall be provided for all stacked chilled water coils.

## 2.10 ELECTRICAL

- A. Wire units according to NEC and ETL list the entire unit. ETL listing of electrical panel only is unacceptable. All major electrical components shall be UL listed. Factory wire unit for single point power connection. Enclose all power wiring in conduit.
- B. Provide non-fused disconnect, fan motor starters/protectors, contactors, control transformer, control circuit fusing, service switch, and terminal block. Units supplied with VFDs shall have individual branch fusing per drive. A motor protector shall be provided if equipment manufacturer's manual bypass is required.



- C. Provide NEMA 1 or NEMA 12 electrical/control panel.
- D. Factory test wiring and controls before shipment.
- E. Lights: Provide vapor proof marine fixtures with LED bulbs in all access sections. Wire lights to a single light switch. Mount light switch near the electrical panel and wire switch to a terminal strip in the electrical panel. Separate 120V power must be provided to the switch for indoor mounted equipment. A transformer will be provided to provide power to the lighting circuit for outdoor mounted equipment.

#### 2.11 DDC SYSTEM

- A. All controls shall be provided and installed in the field by the ATC contractor.

#### 2.12 ACCESSORIES

- A. Ultra-Violet Lights: UV Germicidal System shall kill bacteria, fungi, and mold growing on cooling coils and in drain pans. UV Germicidal System components shall be constructed to withstand typical HVAC environments and be ETL listed under UL Standard 1598. A door kill switch shall be provided to shut off lights when access door is open in addition to a manual wall switch.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Install unit per manufacturer's recommendations and instructions as described in the Installation, Operation and Maintenance (IOM) manual.
- B. Air handler manufacturer shall provide personnel employed by the factory for a minimum of 1-week to supervise reassembly of air handling unit. Factory personnel sent to the project site must have been involved in construction and assembly of the air handling unit at factory.
- C. Contractor shall NOT use the units to provide temporary heating, cooling or ventilation to the building during construction.
- D. All field cut openings in walls and/or floors shall be done per air handler manufacturer's requirements. All openings shall be sealed air and water tight.

#### 3.2 EXAMINATION

- A. After completing the installation, inspect the air handler for damage, dirt or debris. Remove all dirt, construction debris and repair any damage to the finish including chips, scratches or dents.
- B. Replace the filters used during the construction phase.

#### 3.3 FIELD QUALITY CONTROL

- A. After the equipment is installed, the manufacturer's representative shall inspect the installation and recommend any corrective actions. Do not startup the equipment until the following operations are completed:
  - 1. All controls are installed and fully operational.
  - 2. Power is connected to the unit.
  - 3. Shipping materials have been removed.
  - 4. Filtration media is installed and clean.
  - 5. Piping and duct connections are installed and operational.
  - 6. Leak checks are completed on all water connections.

7. All wiring, refrigerant piping, gasketing and hardware are properly installed on any multiple section units.

#### 3.4 DEMONSTRATION

- A. The manufacturer or manufacturer's representative shall instruct the owner's personnel in the proper use, operation and maintenance of the equipment.
- B. The manufacturer or manufacturer's representative shall train the owner's personnel in normal procedures to be followed in case of an operation failure or equipment malfunction.

END OF SECTION

## **SECTION 28 31 00**

### **ADDRESSABLE FIRE ALARM SYSTEMS**

#### **PART 1 – GENERAL**

##### **1.01 SCOPE**

- A. Contractor shall furnish and install as directed on the plan drawings, and as herein specified, a complete system of fire alarm and detection equipment.
  
- B. System shall include all devices, wiring, equipment, raceways, etc. required for a complete and satisfactorily operating system, whether or not every such item is specifically shown or mentioned.
  - 1. Each building shall be provided with a stand-alone fire alarm system that is capable of fully monitoring the respective building.
  - 2. Each building system shall communicate with a headend panel/system located in the landlord/amenity office. Communication of all systems' alarm, trouble and supervisory conditions shall be transmitted by the headend system to the Owner's selected UL listed central station monitoring agency.
  
- C. System components, installation and operation shall be in strict accordance with the Fire Marshal's requirements for fire detection & alarm systems. System supplier shall be required to review the drawings carefully and shall include all devices required to attain Certificate of Occupancy and to notify the electrical contractor of any additional requirements not shown on the drawings so that all labor shall be included in the bid.
  
- D. All fire and smoke detection and alarm systems shall comply with latest applicable editions of NFPA 72 and ADA. They must also comply with State and Local Building Code, including NFPA 1 Fire Safety Code, NFPA 70 National Electrical Code, NFPA 90A Installation of Air Conditioning and Ventilating Systems, Fire Safety Code and NFPA 101 Life Safety Code.
  
- E. The system shall be multiplexed addressable, nominal 24 VDC, non-coded, and fully supervised (including control circuits). All equipment supplied must be listed for the purpose for which it is used, and installed in accordance with any instructions included in its listing. It must also be new, with a warranty (parts & labor) of at least one year from the date of final inspection and acceptable by the State.
  
- F. The system shall be electrically supervised for open or (+/-) ground fault conditions in the detection circuits, the alarm circuits, and the system alarm and trouble relay coils. Removal of any detection device, alarm appliance, system module, or standby battery connection shall also result in a trouble signal. Fire alarm signal shall override trouble signals, but any pre-alarm trouble signal shall reappear when the panel is reset.

##### **1.02 SYSTEM FUNCTION**

- A. Upon activation of any manual station, smoke detector, flow switch or other alarm initiating device, the following functions shall occur automatically:
  - 1. The alarm condition shall be annunciated visually and audibly at the fire alarm control panel. Alphanumeric display shall indicate device type and location of alarm.
  - 2. The alarm signaling system shall be activated. Upon activation, the alarm signaling shall sound an alarm signal throughout the building via the audible/visual system. This evacuation signal shall sound continuously until such time as the manual station or automatic detector is restored to normal and the fire command station reset.
  - 3. The alarm condition shall be transmitted to Owner selected, UL listed central monitoring station via dual line digital communicator.
  
- B. Special functions shall be activated as required.
  - 1. At any time (except as defined above) it shall be possible for the operator to transmit an alarm signal.
  - 2. Activation of duct mounted smoke detectors shall cause HVAC shutdown. Coordinate interlock with the mechanical contractor.
    - a. Duct detectors shall transmit supervisory signal only and will not activate the evacuation signal system nor notify the fire response service.
    - b. Provide a toggle switch override of HVAC shutdown in the fire alarm panel with normal status indicated at the switch.
  - 3. Provide interconnection to elevator controllers as required.
    - a. Activation of the primary landing elevator lobby smoke detector shall signal the elevator controller to recall the elevator to the designated alternate level. If the elevator machine room access is directly adjacent to the primary landing elevator doors, machine room smoke detection shall also recall the elevator to the designated alternate level.
    - b. Activation of any other elevator lobby, machine room (not adjacent to the primary landing) or shaft smoke detector or heat detector shall signal the elevator controller to recall the elevator to the designated primary level.
  - 4. Activation of any alarm shall cause the release of any door hold open devices.
  - 5. Activation of any alarm shall cause the release of any door mag-lock access control devices.
  - 6. Coordinate with the sprinkler system subcontractor as required.
    - a. Verify exact location and quantity of all system flow switches and valves to be monitored by the fire alarm system.
    - b. Coordinate with sprinkler and elevator contractors for elevator shutdown (required when elevator shaft and/or machine room is sprinklered) as follows:
      - 1. Heat detectors shall be installed within 2'-0" of all sprinkler heads located in machine rooms and shafts.

### 1.03 SYSTEM SUPERVISION

- A. All functions of system shall be fully electrically supervised. Upon any system fault or component failure, appropriate audible and visible signals shall be activated to indicate the nature of the trouble.
  
- B. Individual trouble messages shall be provided for each alarm and indicating circuit.

- C. Upon application of primary power failure, the system shall automatically be in a normal supervisory condition. Systems which require operator intervention to reset manual controls following a primary power restoration shall not be acceptable.
  
- D. Upon power outage, the system shall signal "AC Failure" and sound an audible trouble signal. The entire system shall be provided with 24 hours of standby power in the supervisory mode and 5 minutes in the alarm mode. Note maximum number of devices system can accommodate in shop drawing submittal.

## PART 2 – PRODUCTS

### 2.01 MANUFACTURERS

- A. System components specified herein are those of Notifier and are intended to establish type and quality required. Similar equipment by Edwards System Technologies or Simplex are acceptable.

### 2.02 SYSTEM COMPONENTS

#### A. Fire Alarm Control Panel (FACP):

1. The Fire Alarm Control (FACP) Panel shall be fully solid state and of modular design, for ease of future system extension and/or modification. The front of the panel must have steady Power On indication and each alarm initiation device must have separate Alarm and Trouble indications.
2. The FACP power supply shall have a continuous rating adequate to power all devices and functions in full alarm continuously. Detection modules and alarm modules must be able to withstand prolonged short circuits in the field wiring, either line to line or line to ground, without damage.
4. The system must be equipped with the following protective devices to prevent damage or nuisance alarms by nearby lightning strikes, stray currents, or voltage transients:
  - a. On AC Input: GE 9L15ECA001, Leviton 51010-WM, or Square D Q02175SB, or equivalent.
5. The FAC panel must have an Alarm Silence switch with subsequent Alarm (alarm resound) feature.
6. All common modules, power supplies, amplifiers, control modules, relay and components as necessary to effect the fire alarm, detection, communication and control functions as herein specified and as indicated on the drawings shall be provided as required.
7. Surface mounted enclosure, with locked door.
8. System shall be provided with a separate and independent source of emergency power. Switching to emergency power during alarm shall not cause signal drop-out. Any batteries must meet the appropriate NFPA capacity requirements, with a 25% safety factor.
9. FACP is existing. When altered, re-acceptance testing is required in accordance with NFPA 72.

B. Remote Annunciator:

1. Remote annunciator shall be LCD type with wide viewing angle to indicate all alarm, trouble and supervisory conditions.

C. Wiring:

1. Wiring shall be, installed in conduit, tight to structure (tie wrapped at intervals not to exceed 4'-0" on center).
2. Conductors shall be copper. Conductors shall be #14 AWG solid THWN or XHHW.
3. All junction boxes shall be accessible. All junction box covers shall be painted red.
4. Addressable communications fire alarm wiring shall be shielded type as required by the system manufacturer.
5. Within the apartment units, wiring shall be as required by detector manufacturer.

D. Manual Stations:

1. Manual pull stations shall be double action, push/pull type with integral address module, red in color, with "FIRE" or "FIRE ALARM" printed in white letters.
2. Stations shall be Notifier NOT-BG12LX Type for semi-flush mounting.

E. Detectors:

1. Detector bases shall be for ceiling mounting and operate from 24 VDC power from control panel. Detectors shall have environmental compensating and adjustable sensitivity, condition indicator to be flashing LED for normal, continuous LED for alarm. Trouble condition shall not interfere with the operation of other detectors in the circuit. Smoke detectors shall be photoelectric type unless otherwise noted.
  - a. Photoelectric Smoke Detectors: Detectors shall be provided with insect screens and means to minimize entry of dust and air turbulence. Units shall be Notifier NP-100 for typical use.
  - b. Ionization Smoke Detectors: Detectors shall be dual chamber ionization type designed to sense both visible and invisible products of combustion. Unit shall be Notifier NI-100 Type. Ionization detectors shall be used in Electrical Equipment Rooms.
  - c. Heat Detectors: Detectors shall be combination rate of rise-fixed temperature type. Rate of rise shall be 15°F per minute with a fixed setting of 135°F. Unit shall be Notifier NH-100R Type.

F. Duct Detectors:

1. Duct Detectors shall be photoelectric type detectors, compatible with existing fire alarm system, in duct mount housing with 24 VDC power operated from control panel.
  - a. The Electrical Contractor shall verify with the Mechanical Contractor the tube lengths required and supply the complete units to the Mechanical Contractor for installation in the ducts. All wiring shall be by the Electrical Contractor.
  - b. HVAC shutdown shall be from the FACP in order to integrate shutdown override at the FACP. Coordinate with the mechanical contractor as required.

- c. Provide remote test switch with reset and indicating light installed in an accessible location near its associated detector, Notifier RTS451KEY.
- d. The connector head components shall be supervised so that their failure shall cause a trouble indication in the Fire Alarm Control Panel.

G. Signaling Devices:

1. Combination horn and visual strobe light shall be equal to Notifier HS24 series. Synchronization shall be provided for strobe lights in all areas where two or more devices are visible.
2. Mount combination horn/strobe or strobe only device 80" above finish floor to bottom of strobe lens or 6" below ceiling maximum when ceiling height is less than 7'-0".
3. Mount horn only device aligned with top of door frame.
4. Visual signals shall have side viewing lens, white in color with the words "FIRE" printed on each side.
5. Visual signal shall be 24 VDC Xenon flasher with built-in reflector and shall be in accordance with ADA requirements.
6. Coordinate signaling devices carefully with visual signal to provide a complete integral unit.

H. Battery Module:

1. Standby emergency power shall be provided to automatically power the system upon loss of 120 VAC input power.
  - a. Battery shall be sealed, maintenance free, lead calcium type.
  - b. After restoration of normal power, battery shall be automatically recharged and shall be continually float charged to maintain full power.
  - c. Module shall be fused to protect against over-current and accidental reversal of polarity.
  - d. Module shall be monitored to indicate low battery, battery disconnected or charge failure.

I. Sprinkler, Flow and Tamper Switches:

1. Provide addressable module for each flow and tamper switch in the sprinkler system. Switches are to be provided by sprinkler contractor, modules and required wiring to be provided by this contractor.

J. Spare Parts:

1. Provide two (2) fuses of each size used in the system.
2. Provide 4 additional glass rods for the fire alarm pull stations.
3. Provide two photoelectric smoke detectors
4. Provide twelve combination horn/strobe units.
5. Provide twenty strobe only units.
6. Provide twelve single station combination smoke and carbon monoxide units.
7. Provide six 120V remote strobe units.

## 2.03 VERIFICATION OF SYSTEM PERFORMANCE

- A. Upon completion of the installation, and prior to final inspections, the CONTRACTOR AND THE MANUFACTURER'S AUTHORIZED REPRESENTATIVE together shall test every alarm initiating device for proper response and zone indication, every alarm signaling appliance for effectiveness, and all auxiliary functions such as capture of elevators and control of smoke doors/dampers and HVAC systems. This will often require a coordinated effort involving several trades and contractors, since some of the things to be tested may have been furnished and/or installed by someone other than the Electrical Contractor.
- B. The Owner and the Engineer will be given the opportunity to witness these tests. An itemized Test Report will be submitted to the Consulting Engineer and the Owner, detailing and certifying all results, including the measured sensitivity of each smoke detector. The data for each smoke detector will include the Manufacturer's serial number, plus specific location information adequate to quickly pinpoint the device.
- C. In the event of any system malfunctions or nuisance alarms, the Contractor will take appropriate corrective action. However, this may necessitate a repeat of the response test, if the Owner so desires. Continued improper performance during warranty shall be cause to require the Contractor to remove the system.
- D. System Documentation, Training, and Maintenance
1. The contractor shall provide the Engineer with three (3) copies of the following, to be forwarded to the owner:
    - a. As-built wiring and conduit layout diagrams, incorporating wire color code and/or label numbers, and showing all inter-connections in the system.
    - b. Schematic wiring diagrams of all control panels, modules, communications panels, etc.
    - c. Technical literature on all major parts of the system, including detector heads, manual stations, signaling devices, alarm panels, and power supplies.
  2. The manufacturer's authorized representative must instruct the Owner's designated employees in proper operation of the system and all required periodic maintenance. This instruction will include two (2) copies of a written, bound summary, for future reference.
  3. Basic operating instructions shall be provided at the FACP. Programmed device descriptions shall note location per Owner designations. Contractor shall obtain from the architect a reduced scale drawing (11" x 17" or smaller) in order to note space designations.
  4. The contractor must have the manufacturer's authorized representative provide a quotation for regular preventative maintenance, in accordance with the recommendations of NFPA, 72H, "Guide for Testing Protective Signaling Systems." This will cover the first 12 months period after expiration of the standard warranty. This quotation will provide the owner with information on internal versus contract maintenance costs.

## PART 3 – EXECUTION

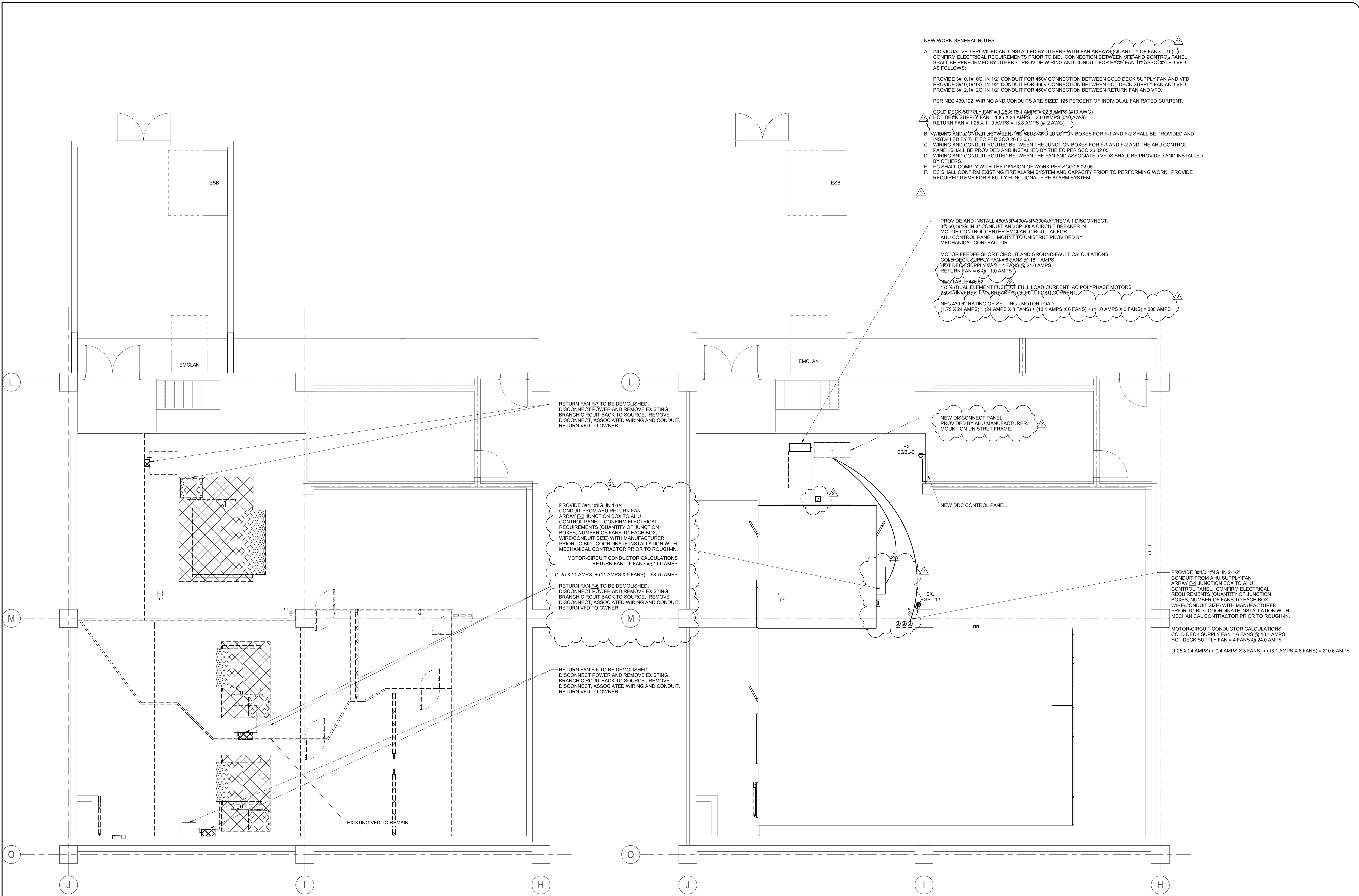


### 3.01 INSTALLATION

- A. All fire alarm wiring shall be installed in conduit. Under no circumstances shall any fire alarm detection/initiating circuit be combined in the same conduit run with other building circuits. Within FAC panel, AC control circuits shall be isolated/insulated away from other circuits and the enclosure shall have an appropriate warning label alerting service personnel of the presence of high voltage.
- B. No splicing or "wire-nut" connection of fire alarm wiring is permitted. All required terminations shall be continuous from device terminal to device terminal. If an intermediate termination is required, utilize Square-'D' TC series terminal strips suitable for wiring being used. Only one wire per terminal.
- C. No annunciation circuit shall be more than 70% loaded prior to final inspections to allow addition of audible and strobe devices as may be required per local Fire Marshal.
- D. All wiring shall be checked for shorts, grounds, and opens prior to termination at cabinets or detector heads. The minimum resistance to ground or between any two conductors shall be ten megohms, verified in writing, with "megger" headings.
- E. Electrical contractor shall coordinate with mechanical contractor as required to extend HVAC shutdown interlock wiring to unit controller as required. Final connection at HVAC controller shall be by mechanical contractor/controls contractor.
- F. Coordinate with the security/access control vendor for mag-lock interlock wiring. Electrical contractor to extend wiring to unit controllers. Final connection to controllers shall be by access control contractor.

**END OF SECTION**

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- NEW WORK GENERAL NOTES:**
- A. INDIVIDUAL VFD PROVIDED AND INSTALLED BY OTHERS WITH FAN ARRAYS (QUANTITY OF FANS = 16). CONFIRM ELECTRICAL REQUIREMENTS PRIOR TO BID. CONNECTION BETWEEN VFD AND SCHEMATIC PANEL SHALL BE PERFORMED BY OTHERS. PROVIDE WIRING AND CONDUIT FOR EACH FAN TO ASSOCIATED VFD AS FOLLOWS:  
 PROVIDE 3#10, 1#10G, IN 1/2" CONDUIT FOR 480V CONNECTION BETWEEN COLD DECK SUPPLY FAN AND VFD.  
 PROVIDE 3#10, 1#10G, IN 1/2" CONDUIT FOR 480V CONNECTION BETWEEN HOT DECK SUPPLY FAN AND VFD.  
 PROVIDE 3#12, 1#12G, IN 1/2" CONDUIT FOR 480V CONNECTION BETWEEN RETURN FAN AND VFD.  
 PER NEC 430.122, WIRING AND CONDUITS ARE SIZED 125 PERCENT OF INDIVIDUAL FAN RATED CURRENT.
  - B. COLD DECK SUPPLY FAN = 1.25 X 18 AMPS = 22.5 AMPS (#10 AWG)  
 HOT DECK SUPPLY FAN = 1.25 X 24 AMPS = 30.0 AMPS (#10 AWG)  
 RETURN FAN = 1.25 X 11.0 AMPS = 13.8 AMPS (#12 AWG)
  - C. WIRING AND CONDUIT BETWEEN THE VFD'S AND JUNCTION BOXES FOR F-1 AND F-2 SHALL BE PROVIDED AND INSTALLED BY THE EC PER SCO 26 02 05.
  - D. WIRING AND CONDUIT ROUTED BETWEEN THE JUNCTION BOXES FOR F-1 AND F-2 AND THE AHU CONTROL PANEL SHALL BE PROVIDED AND INSTALLED BY THE EC PER SCO 26 02 05.
  - E. WIRING AND CONDUIT ROUTED BETWEEN THE FAN AND ASSOCIATED VFD'S SHALL BE PROVIDED AND INSTALLED BY OTHERS.
  - F. EC SHALL COMPLY WITH THE DIVISION OF WORK PER SCO 26 02 05.
  - G. EC SHALL CONFIRM EXISTING FIRE ALARM SYSTEM AND CAPACITY PRIOR TO PERFORMING WORK. PROVIDE REQUIRED ITEMS FOR A FULLY FUNCTIONAL FIRE ALARM SYSTEM.

PROVIDE AND INSTALL 480V/3P-400A/3P-300A/AF/NEMA 1 DISCONNECT, 3#350, 1#4G, IN 3" CONDUIT AND 3P-300A CIRCUIT BREAKER IN MOTOR CONTROL CENTER EMCLAN, CIRCUIT AS FOR AHU CONTROL PANEL. MOUNT ON UNISTRUT PROVIDED BY MECHANICAL CONTRACTOR.

MOTOR FEEDER SHORT-CIRCUIT AND GROUND-FAULT CALCULATIONS  
 COLD DECK SUPPLY FAN = 6 FANS @ 18.1 AMPS  
 HOT DECK SUPPLY FAN = 4 FANS @ 24.0 AMPS  
 RETURN FAN = 6 @ 11.0 AMPS

NEC TABLE 430.52  
 175% (DUAL ELEMENT FUSE) OF FULL LOAD CURRENT, AC POLYPHASE MOTORS  
 250% (INVERSE TIME BREAKER) OF FULL LOAD CURRENT

NEC 430.62 RATING OR SETTING - MOTOR LOAD  
 (1.75 X 24 AMPS) + (24 AMPS X 3 FANS) + (18.1 AMPS X 6 FANS) + (11.0 AMPS X 6 FANS) = 300 AMPS

RETURN FAN F-2 TO BE DEMOLISHED. DISCONNECT POWER AND REMOVE EXISTING BRANCH CIRCUIT BACK TO SOURCE. REMOVE DISCONNECT, ASSOCIATED WIRING AND CONDUIT. RETURN VFD TO OWNER.

PROVIDE 3#4, 1#8G, IN 1-1/4" CONDUIT FROM AHU RETURN FAN ARRAY F-2 JUNCTION BOX TO AHU CONTROL PANEL. CONFIRM ELECTRICAL REQUIREMENTS (QUANTITY OF JUNCTION BOXES, NUMBER OF FANS TO EACH BOX, WIRE/CONDUIT SIZE) WITH MANUFACTURER PRIOR TO BID. COORDINATE INSTALLATION WITH MECHANICAL CONTRACTOR PRIOR TO ROUGH-IN.

MOTOR-CIRCUIT CONDUCTOR CALCULATIONS  
 RETURN FAN = 6 FANS @ 11.0 AMPS  
 (1.25 X 11 AMPS) + (11 AMPS X 5 FANS) = 68.75 AMPS

RETURN FAN F-6 TO BE DEMOLISHED. DISCONNECT POWER AND REMOVE EXISTING BRANCH CIRCUIT BACK TO SOURCE. REMOVE DISCONNECT, ASSOCIATED WIRING AND CONDUIT. RETURN VFD TO OWNER.

RETURN FAN F-6 TO BE DEMOLISHED. DISCONNECT POWER AND REMOVE EXISTING BRANCH CIRCUIT BACK TO SOURCE. REMOVE DISCONNECT, ASSOCIATED WIRING AND CONDUIT. RETURN VFD TO OWNER.

NEW DISCONNECT PANEL PROVIDED BY AHU MANUFACTURER. MOUNT ON UNISTRUT FRAME.

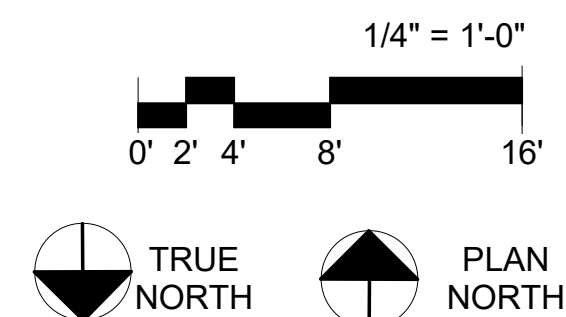
NEW DDC CONTROL PANEL.

PROVIDE 3#4/0, 1#4G, IN 2-1/2" CONDUIT FROM AHU SUPPLY FAN ARRAY F-1 JUNCTION BOX TO AHU CONTROL PANEL. CONFIRM ELECTRICAL REQUIREMENTS (QUANTITY OF JUNCTION BOXES, NUMBER OF FANS TO EACH BOX, WIRE/CONDUIT SIZE) WITH MANUFACTURER PRIOR TO BID. COORDINATE INSTALLATION WITH MECHANICAL CONTRACTOR PRIOR TO ROUGH-IN.

MOTOR-CIRCUIT CONDUCTOR CALCULATIONS  
 COLD DECK SUPPLY FAN = 6 FANS @ 18.1 AMPS  
 HOT DECK SUPPLY FAN = 4 FANS @ 24.0 AMPS  
 (1.25 X 24 AMPS) + (24 AMPS X 3 FANS) + (18.1 AMPS X 6 FANS) = 210.6 AMPS

1 ELECTRICAL FLOOR PLAN - DEMO  
 SCALE: 1/4" = 1'-0"

2 ELECTRICAL FLOOR PLAN - NEW WORK  
 SCALE: 1/4" = 1'-0"



NO.	DATE	DESCRIPTION	BY
1	10/20/18	ADDENDUM 1	
2	11/08/18	ADDENDUM 3	

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BID SET  
 SCO ID # 18-18334  
 CODE 41726 ITEM 303  
**ATKINS AIR HANDLER**  
 UNIVERSITY OF NORTH CAROLINA AT CHARLOTTE  
 9201 UNIVERSITY CITY BLVD, CHARLOTTE, NC 28223  
 ELECTRICAL FLOOR PLANS

DRAWN	LPM
DESIGNED	CDC
CHECKED	CDC
DATE	10-17-18
SCALE	AS NOTED
PROJECT NO.	CLT18128
SHEET	E101

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### AIR HANDLING UNIT SCHEDULE

COLD DECK SUPPLY FILTER											
CFM	HEIGHT (INCHES)	WIDTH (INCHES)	MERV	QUANTITY	DEPTH (INCHES)	FPM					
55,000	24	24	8	42	2	492					
	24	24	14	42	4	492					
HOT DECK SUPPLY FILTER											
CFM	HEIGHT (INCHES)	WIDTH (INCHES)	MERV	QUANTITY	DEPTH (INCHES)	FPM					
50,000	24	20	8	30	2	500					
	24	20	14	30	4	500					
COLD DECK SUPPLY FAN											
QTY	CFM	SIZE	CLASS	TSP (WC)	RPM	VFD FREQ (Hz)	BRAKE HP	MOTOR HP			
6	9,167	24	II	6.64	1800	68.1	13.1	15			
TOTAL	55,000	-	-	6.64	-	-	78.7	90.0			
ESP	4.00	SUPPLY FILTER LOADING (WC)		0.89	-		-				
CASING LOSS	0.30	SUPPLY FILTER CLEAN (WC)		0.72	CHILLED WATER COIL (WC)		0.73	TSP 6.64			
HOT DECK SUPPLY FAN											
QTY	CFM	SIZE	CLASS	TSP (WC)	RPM	VFD FREQ (Hz)	BRAKE HP	MOTOR HP			
4	12,500	27	II	5.88	1705	58.5	15.9	20			
TOTAL	50,000	-	-	5.88	-	-	63.4	80.0			
ESP	3.50	SUPPLY FILTER CLEAN (WC)		0.72	HOT WATER COIL (WC)		0.37	-			
CASING LOSS	0.30	SUPPLY FILTER LOADING (WC)		0.89	HUMIDIFIER MANIFOLD (WC)		0.10	TSP 5.88			
CHILLED WATER COIL											
CFM	FPM	EDB (°F)	LDB (°F)	MBH (T/S)	GPM	GLYCOL %	EWI (°F)	LWT (°F)	WPD (FT)	ROWS	FPI
55,000	333	81.0/66.0	47.9/47.8	2874.2/2001.3	572.8	0.0	44.0	54.0	9.3	8	10
HOT WATER COIL											
CFM	FPM	EDB (°F)	LDB (°F)	MBH (T/S)	GPM	GLYCOL %	EWI (°F)	LWT (°F)	WPD (FT)	ROWS	FPI
50,000	333	81.0/66.0	47.9/47.8	2874.2/2001.3	572.8	0.0	44.0	54.0	9.3	8	10
STEAM PREHEAT COIL											
CFM	FPM	EDB (°F)	LDB (°F)	MBH (T/S)	PSIG	COND. (LB/HR)	ROWS	FPI			
15,125	589	119.0	60.3	676	2.0	698.9	1	7			
HUMIDIFIER MANIFOLD											
CFM	STEAM (LB/HR)	A	ABSORPTION DISTANCE (IN)	STEAM (PSI)							
50,000	940	24									
RETURN FAN											
QTY	CFM	SIZE (in)	CLASS	TSP (WC)	RPM	VFD FREQ (Hz)	BRAKE HP	MOTOR HP			
6	12,084	30	-	1.80	995	51.0	5.0	7.5			
TOTAL	72,500	-	-	1.80	-	-	29.8	45.0			
ESP	1.50	CASING LOSS		0.30	-		TSP 1.8				
MINIMUM OUTSIDE AIR											
CFM	15,125										
ELECTRICAL INFORMATION:											
COMPONENT	VOLTS	PHASE	FREQ.	MOP	MCA						
UNIT	480	3	60								
	120	1	60	N/A	N/A						
AMP SUMMARY											
COLD DECK SUPPLY FAN	18.1 x 6	RETURN FAN	11.0 x 6	-	-	-					
HOT DECK SUPPLY FAN	24.0 x 4	-	-	Total	271	-					

### MECHANICAL DEMOLITION NOTES

- IT IS THE CONTRACTOR'S RESPONSIBILITY TO REPLACE ANY ITEM OR EQUIPMENT DAMAGED DURING DEMOLITION. ANY ITEM OR EQUIPMENT THAT IS REMOVED TO FACILITATE THE DEMOLITION SHALL BE REINSTALLED BACK TO ITS ORIGINAL CONDITION. PATCH ALL OPENINGS IN FLOOR, CEILINGS, AND WALLS MADE IN ADJACENT AREAS THAT ARE NOT BEING DEMOLISHED.
- REMOVE ALL HANGERS, SUPPORTS, AND ACCESSORIES ASSOCIATED WITH ITEMS OR EQUIPMENT BEING DEMOLISHED.
- EXISTING SERVICES ARE BASED ON ORIGINAL DRAWINGS AND LIMITED FIELD WORK. CONTRACTOR SHALL VERIFY EXISTING SERVICES PRIOR TO TIE-IN.
- RETURN AND EXHAUST GRILLES IN AREAS OF WORK SHALL BE COVERED WITH FILTER MEDIA DURING DEMOLITION.
- CONTRACTOR SHALL CONDUCT PRE AIR BALANCES ON EXISTING SYSTEMS BEING REUSED. NOTIFY ENGINEER OF ANY DISCREPANCIES. IF BALANCING DEVICES ARE NOT PRESENT IN EXISTING CONDITIONS CONTRACTOR SHALL PROVIDE AS REQUIRED.
- ROOMS IN THE CONSTRUCTION ZONE SHALL BE UNDER NEGATIVE PRESSURE IN RELATION TO OCCUPIED AREAS ADJOINING AREAS DURING OCCUPIED HOURS.
- CONTRACTOR SHALL COORDINATE WITH OWNER TO SCHEDULE ANY UTILITY SHUTDOWNS. PROVIDE TEMPORARY CONNECTIONS AS REQUIRED TO MAINTAIN ALL NECESSARY SERVICES.
- IF REQUIRED, CONTRACTOR SHALL COORDINATE WITH OWNER TO DETERMINE THE SALVAGE VALUE OF DEMOLISHED ITEMS. RECYCLABLE ITEMS WITHOUT SALVAGE VALUE SHALL BE PRESENTED TO RECYCLING FACILITY.

### GENERAL NOTES

- IN PREPARATION OF THESE PLANS, THE ENGINEER HAS USED CERTAIN ABBREVIATIONS, CONVENTIONS, AND SYMBOLS, THE MEANING OF WHICH ARE ILLUSTRATED AND EXPLAINED WITHIN THE LEGEND.
- PLANS ARE DIAGRAMMATIC ONLY. THEY ARE INTENDED TO INDICATE CAPACITY, SIZE, LOCATION, DIRECTION, AND GENERAL ARRANGEMENT, BUT NOT EXACT DETAILS OF CONSTRUCTION. THE FACT THAT ONLY CERTAIN FEATURES OF THE INSTALLATION ARE INDICATED MUST NOT BE TAKEN TO MEAN THAT OTHER FEATURES WILL NOT BE REQUIRED.
- COORDINATE WITH THE OTHER TRADES TO INSURE THAT EACH TRADE SHALL HAVE SUFFICIENT SPACE TO INSTALL THEIR EQUIPMENT (DUCTWORK, PIPING, ELECTRICAL WORK, ETC.).
- IN GENERAL, ALL PIPING AND DUCTWORK SHALL BE RUN IN THE CEILING SPACE UNLESS NOTED OR INDICATED OTHERWISE.
- VERIFY ALL DIMENSIONS FROM ARCHITECTURAL PLANS AND FIELD DIMENSIONS.
- DUCT DIMENSIONS SHOWN ON DRAWINGS ARE CLEAR INSIDE DIMENSIONS.
- ALL RISES AND DROPS IN PIPING AND DUCTWORK MAY NOT NECESSARILY HAVE BEEN SHOWN. CONTRACTOR TO VERIFY.
- PROVIDE ALL STRUCTURAL MEMBERS, SUPPORT BRACKETS, FLASHING, HARDWARE, ETC. REQUIRED TO INSTALL A COMPLETE SYSTEM.
- DIFFUSERS AND REGISTER LOCATIONS SHALL BE COORDINATED WITH LIGHT FIXTURE AND OTHER CEILING DEVICE LOCATIONS. FIELD VERIFY.
- MOUNT ALL THERMOSTATS AND/OR SENSORS 4 FEET ABOVE FINISHED FLOOR, UNLESS OTHERWISE NOTED.

### MECHANICAL SYMBOLS LEGEND

	CEILING SUPPLY DIFFUSER
	CEILING RETURN GRILLE
	CEILING EXHAUST GRILLE
	CEILING EXHAUST FAN
	IN-LINE EXHAUST FAN
	DYNAMIC FIRE DAMPER STYLE 'B' FIRE DAMPER STYLE 'SR' FIRE DAMPER FOR ROUND DUCTS
	DYNAMIC SMOKE DAMPER
	COMBINATION DYNAMIC FIRE/SMOKE DAMPER
	DUCT SMOKE DETECTOR
	RETURN/EXHAUST DUCT TURNING DOWN
	RETURN/EXHAUST DUCT TURNING UP
	SUPPLY DUCT TURNING DOWN
	SUPPLY DUCT TURNING UP
	EXISTING DUCT
	TRANSFER OPENING IN WALL ABOVE CEILING
	3/4" UNDERCUT BELOW DOOR
	RADIANT DAMPER (RD)
	CONNECT TO EXISTING
	SIDE WALL SUPPLY GRILLE
	SIDE WALL RETURN GRILLE
	AIR DEVICE TYPE AND SIZE 200 CFM
	THERMOSTAT
	REFRIGERANT PIPING (LINE SET)
	CONDENSATE DRAIN PIPING
	PIPE TURNING UP
	PIPE TURNING DOWN
	2 POSITION MOTORIZED DAMPER
	MANUAL VOLUME DAMPER
	CHILLED WATER SUPPLY PIPING
	CHILLED WATER RETURN PIPING
	HOT WATER SUPPLY PIPING
	HOT WATER RETURN PIPING
	GATE VALVE
	BALL VALVE
	CHECK VALVE
	STRAINER
	STRAINER WITH BLOW DOWN VALVE
	UNION
	NEEDLE VALVE WITH PRESSURE GAUGE
	THERMOMETER
	BUTTERFLY VALVE
	BALANCING VALVE
	FLEX CONNECTION
	MOTORIZED CONTROL VALVE
	TRIPLE DUTY VALVE
	VERTICAL IN-LINE PUMP (PLAN VIEW)
	PUMP
	AUTOMATIC AIR VENT

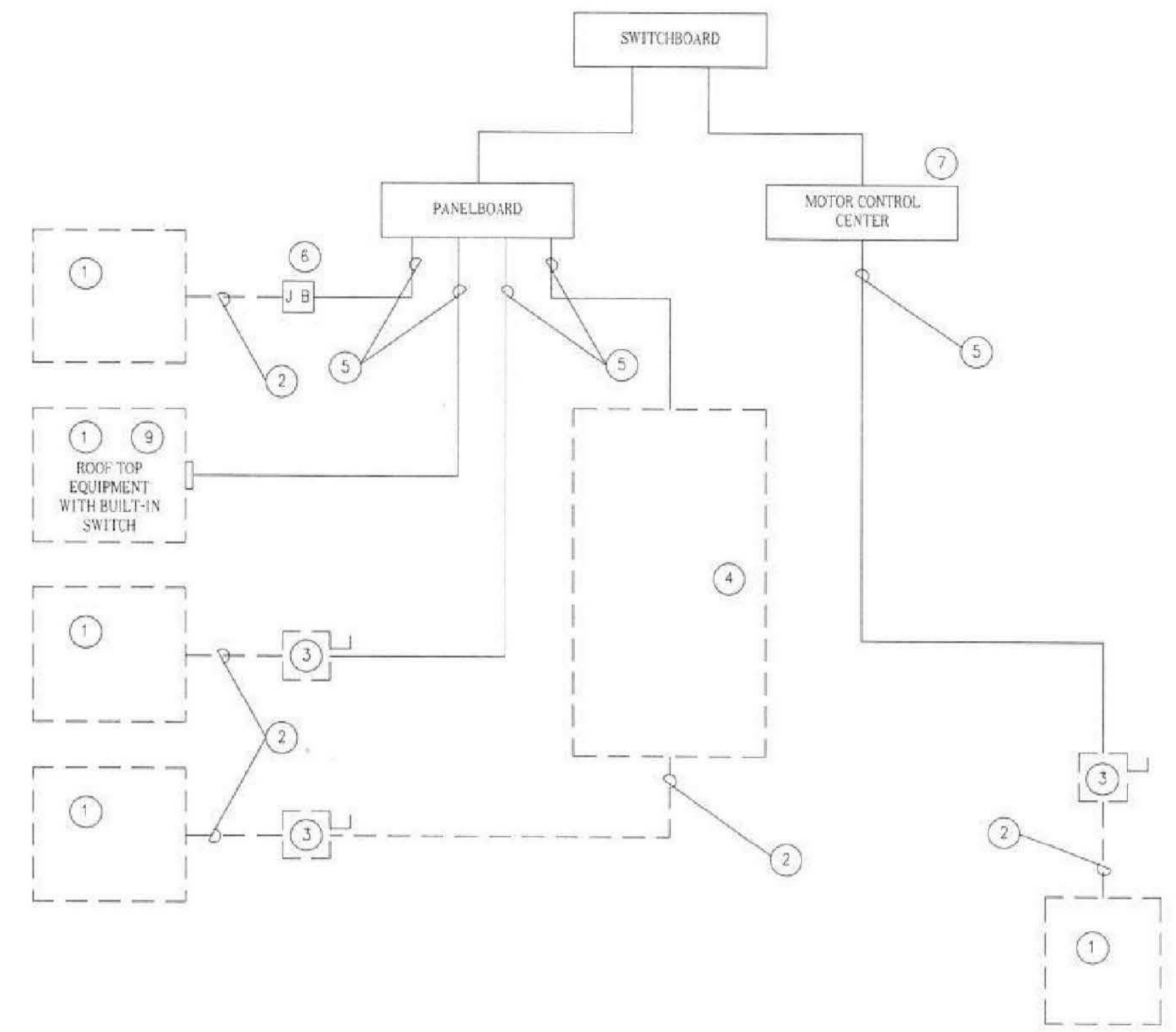
### ABBREVIATIONS

A	AMPERES
AFF	ABOVE FINISHED FLOOR
AHU	AIR HANDLING UNIT
BHP	BRAKE HORSEPOWER
BTUH	BRITISH THERMAL UNIT PER HOUR
CFM	CUBIC FEET PER MINUTE
CLG	CEILING
CD	CONDENSATE DRAIN
CU	CONDENSING UNIT
DB	DRY BULB
DN	DOWN
DX	DIRECT EXPANSION
EA	EXHAUST AIR
EAT	ENTERING AIR TEMPERATURE
EF	EXHAUST FAN
EL	ELEVATION
EXH	EXHAUST
EQUIP	EQUIPMENT
ESP	EXTERNAL STATIC PRESSURE
FB	FILTER BOX
FD	FIRE DAMPER
FLEX	FLEXIBLE
FLR OR FL	FLOOR
FPI	FINS PER INCH
FPM	FEET PER MINUTE
GALV	GALVANIZED
HP	HORSEPOWER
KW	KILOWATT
LBS	POUNDS
MAX	MAXIMUM
MBH	THOUSAND BTUH
MIN	MINIMUM
OA	OUTSIDE AIR
RA	RETURN AIR AND/OR ROOM AIR
RTU	ROOFTOP UNIT
SA	SUPPLY AIR
TEMP	TEMPERATURE
TYP	TYPICAL
UC	UNDERCUT
VD	MANUAL VOLUME DAMPER
V	VOLTS
WB	WET BULB
Ø	ROUND
OBD	OPPOSED BLADE DAMPER
SQFT	SQUARE FEET
TAD	TRANSFER AIR DUCT

### GENERAL SYMBOLS

	PLAN OR DETAIL NO SHEET NUMBER
	KEYED NOTE TO PLAN
	REVISION NUMBER
	NORTH ARROW

- ### ELECTRICAL NOTES:
- EQUIPMENT OF TRADES OTHER THAN ELECTRICAL.
  - CONDUIT & WIRING BY HVAC, PLUMBING CONTRACTOR, OR OTHER TRADES.
  - IF AN ADDITIONAL DISCONNECT IS REQUIRED BY NEC, IT SHALL BE PROVIDED AND INSTALLED BY THE EQUIPMENT CONTRACTOR.
  - A COMBINATION STARTER OR VFD MAY BE USED IN LIEU OF A SEPARATE DISCONNECT SWITCH AND STARTER. LOCATE ADJACENT TO EQUIPMENT.
  - FEEDER CIRCUIT WIRING AND CONDUIT IN ELECTRICAL WORK. SEE PANELBOARD SCHEDULES FOR WIRE AND BREAKER SIZES.
  - JUNCTION BOX MAY BE SHOWN ON ELECTRICAL PLANS FOR SOME EQUIPMENT. IF NO STARTER OR DISCONNECT IS SUPPLIED, A JUNCTION BOX SHALL BE INSTALLED ADJACENT TO EQUIPMENT. THE ELECTRICAL CONTRACTOR SHALL PROVIDE LINE SIDE WIRING TO THE JUNCTION BOX. LOAD SIDE WIRING WILL BE PROVIDED BY MECHANICAL CONTRACTOR OR OTHER TRADES.
  - PROJECTS UTILIZING AN MCC, THE STARTER, CB, OR VFD IN THE MCC ARE PROVIDED BY THE ELECTRICAL CONTRACTOR.
  - IN ALL CASES THE EQUIPMENT CONTRACTOR SHALL MAKE FINAL CONNECTIONS, START UP, AND TEST EQUIPMENT.
  - IF THE ROOF TOP FAN IS NOT PROVIDED WITH BUILT IN SWITCH, THE ELECTRICAL CONTRACTOR SHALL PROVIDE A DISCONNECT SWITCH.
  - IN A SINGLE PRIME CONTRACT, IT IS THE RESPONSIBILITY OF THE PRIME CONTRACTOR TO COORDINATE BETWEEN THE ELECTRICAL AND THE OTHER TRADES.



### ELECTRICAL EQUIPMENT CONNECTION

REVISIONS:	DRAWN BY:	DATE:	PROJECT NO.:	SHEET NO.:
	CHD:			E-18

NORTH CAROLINA  
 DEPARTMENT OF ADMINISTRATION  
**STATE CONSTRUCTION OFFICE**  
 301 N. WILMINGTON STREET, SUITE 450  
 RALEIGH, N.C. 27601-3227

### MECHANICAL SYSTEMS, SERVICE AND EQUIPMENT

METHOD OF COMPLIANCE:  PRESPECTIVE  PERFORMANCE  ENERGY COST BUDGET

CLIMATE ZONE	3
THERMAL ZONE	A
WINTER DRY BULB	20.5
SUMMER DRY BULB	94.1
INTERIOR DESIGN CONDITIONS	
WINTER DRY BULB	70
SUMMER DRY BULB	75
RELATIVE HUMIDITY	56
BUILDING HEATING LOAD	
BUILDING COOLING LOAD	
MECHANICAL SPACE CONDITIONING SYSTEM	
UNITARY	SEE EQUIPMENT SCHEDULES
DESCRIPTION OF UNIT	SEE EQUIPMENT SCHEDULES
HEATING EFFICIENCY	SEE EQUIPMENT SCHEDULES
COOLING EFFICIENCY	SEE EQUIPMENT SCHEDULES
HEAT OUTPUT OF UNIT	SEE EQUIPMENT SCHEDULES
COOLING OUTPUT OF UNIT	SEE EQUIPMENT SCHEDULES
BOILER	SEE EQUIPMENT SCHEDULES
TOTAL BOILER OUTPUT, IF OVER SIZED STATE REASON	SEE EQUIPMENT SCHEDULES
CHILLER	SEE EQUIPMENT SCHEDULES
TOTAL CHILLER OUTPUT, IF OVER SIZED STATE REASON	SEE EQUIPMENT SCHEDULES
LIST EQUIPMENT EFFICIENCIES	SEE EQUIPMENT SCHEDULES
EQUIP. SCHEDULES w/ MOTORS (MECHANICAL SYSTEMS)	
MOTOR HORSEPOWER	SEE EQUIPMENT SCHEDULES
NUMBER OF PHASES	SEE EQUIPMENT SCHEDULES
MINIMUM EFFICIENCY	SEE EQUIPMENT SCHEDULES
MOTOR TYPE	SEE EQUIPMENT SCHEDULES
# OF POLES	SEE EQUIPMENT SCHEDULES

BY: [ ]

NO. 11/08/18

DATE 11/08/18

DESCRIPTION ADDENDUM 3

**McVEIGH & MANGUM**  
 ENGINEERS ARCHITECTS INC.  
 9133 R.G. SUMNER PARKWAY  
 FENNER, NORTH CAROLINA 27504  
 CA 6330 ph: 919.485.2500 fax: 919.485.6464  
 email: mail@McVeighMangum.com  
 Eng. of Record: Larry J. McWilliams License No. 400237

SCO ID # 18-18334

ATKINS AIR HANDLER

UNIVERSITY OF NORTH CAROLINA AT CHARLOTTE

9201 UNIVERSITY CITY BLVD, CHARLOTTE, NC 28223

MECHANICAL NOTES AND LEGENDS

BID SET

DRAWN LPM

DESIGNED LPM

CHECKED SRC

DATE 10-17-18

SCALE AS NOTED

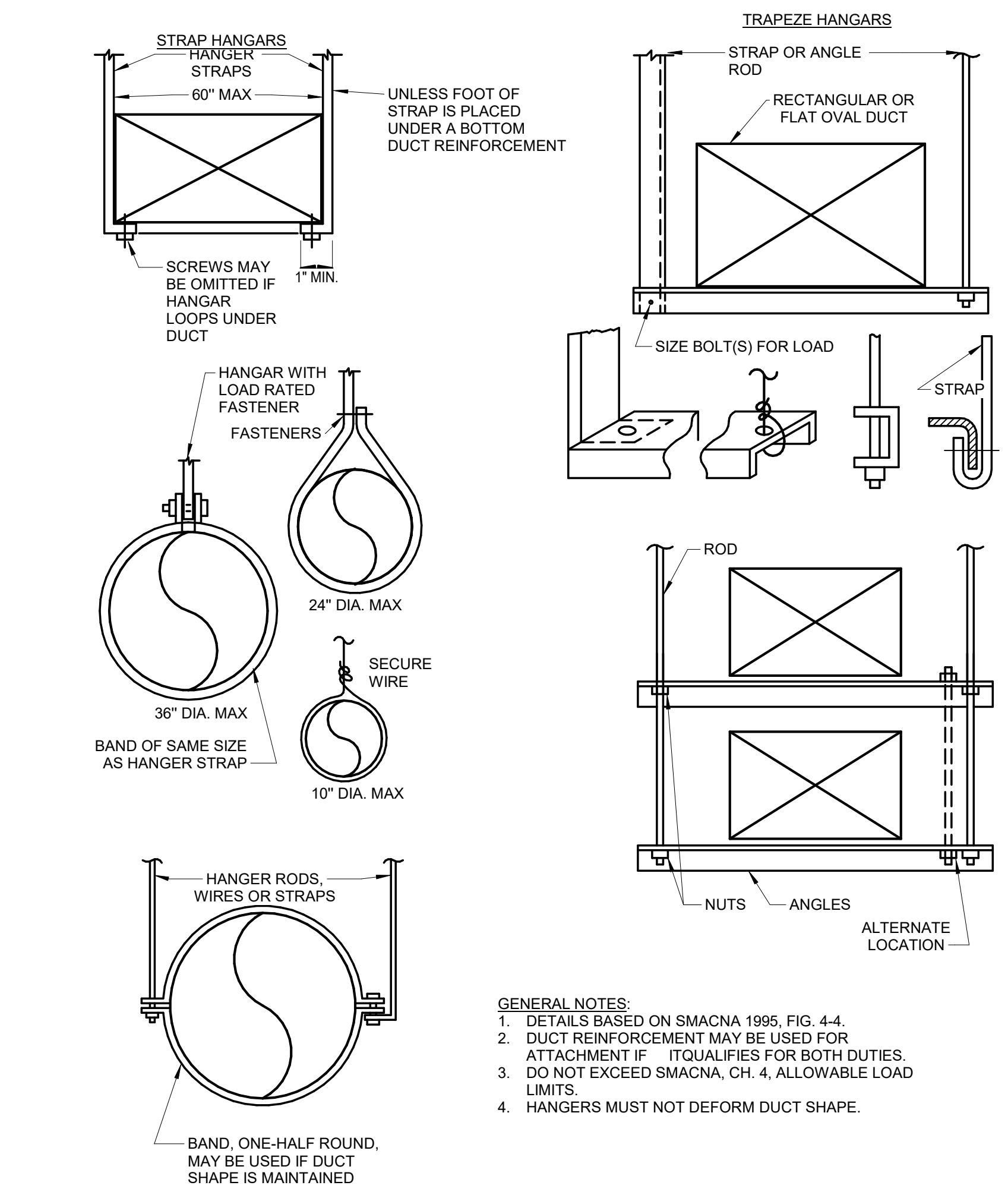
PROJECT NO CLT18128

SHEET **M001**

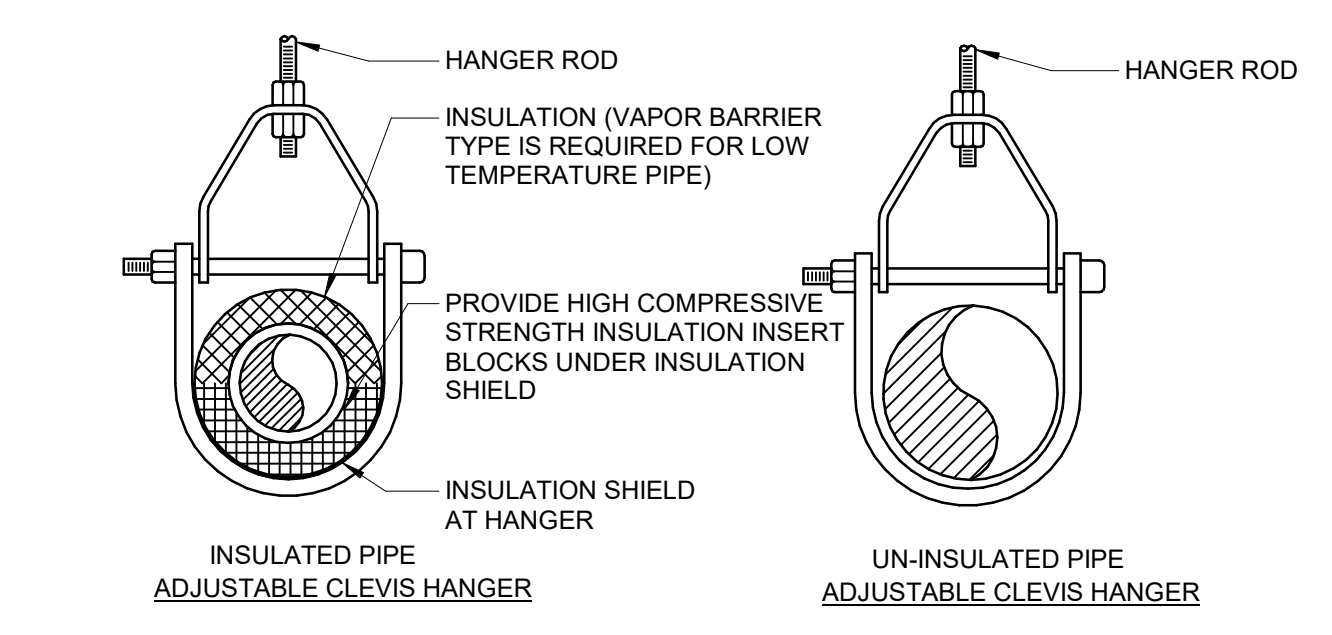
TRUE NORTH  
 PLAN NORTH



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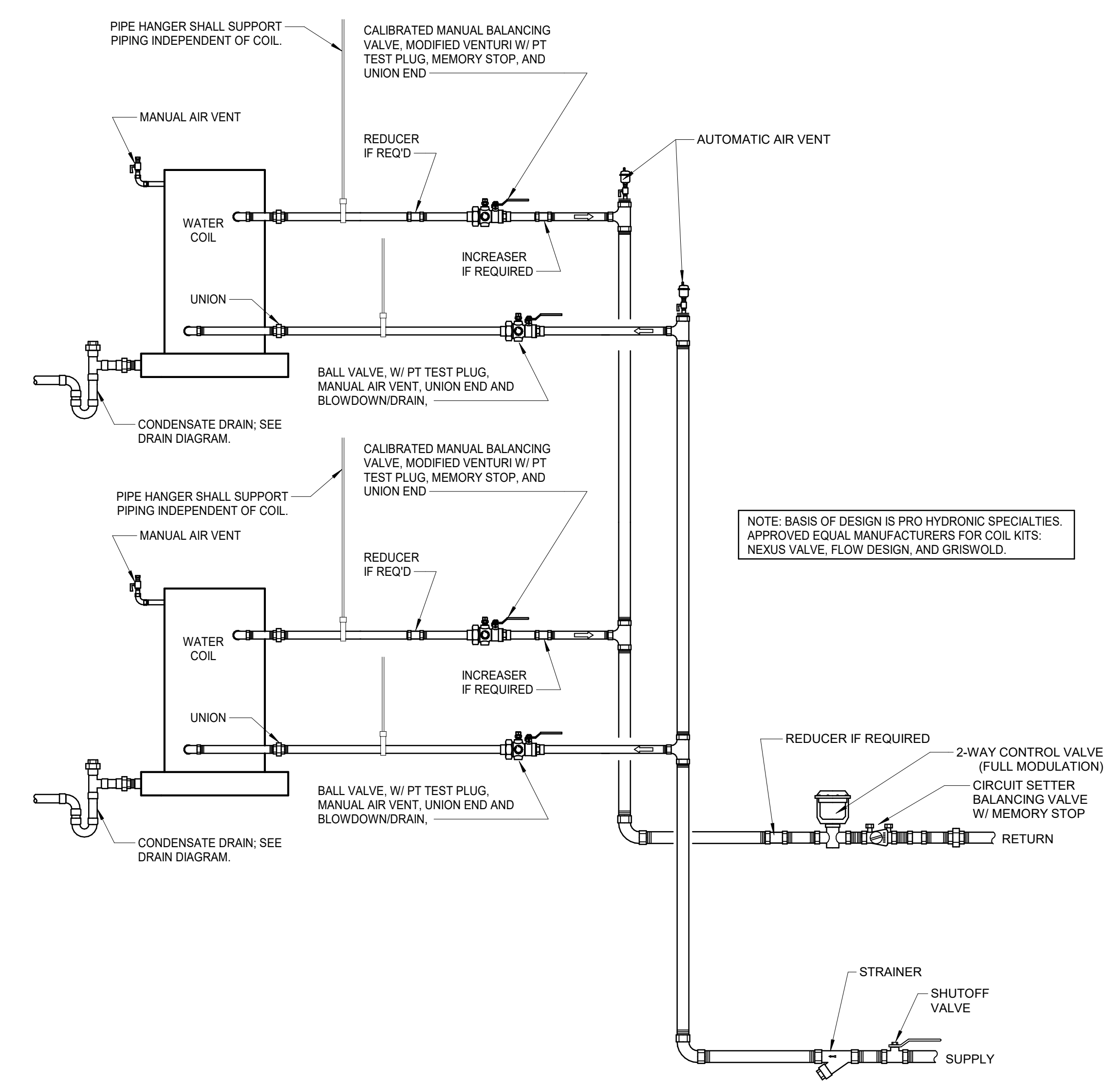


3 DUCT SUPPORT DETAIL  
 SCALE: NTS

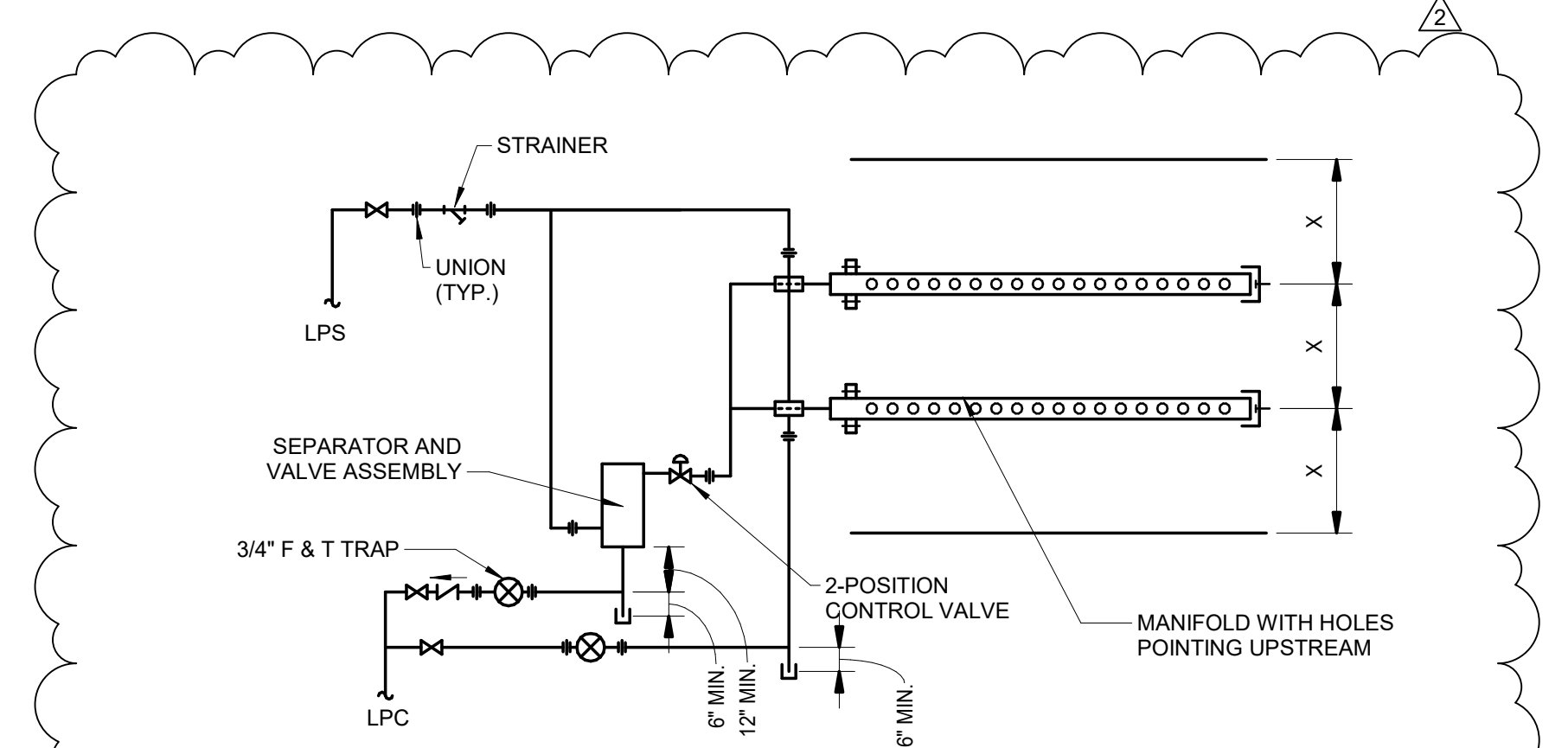


NOTE:  
 1. ALL PIPE HANGERS SHALL BE MANUFACTURED AND INSTALLED IN ACCORDANCE WITH THE INTERNATIONAL BUILDING CODE 2000 - PLUMBING.  
 A. ABOVE GRADE: PIPE HANGERS SHALL HAVE MANUFACTURER'S FINISH EXCEPT HANGERS IN CONTACT WITH COPPER PIPING SHALL BE COPPER PLATED.  
 B. BELOW GARAGE FIRST FLOOR: PIPE HANGERS AND ASSOCIATED PARTS SHALL BE STAINLESS STEEL.

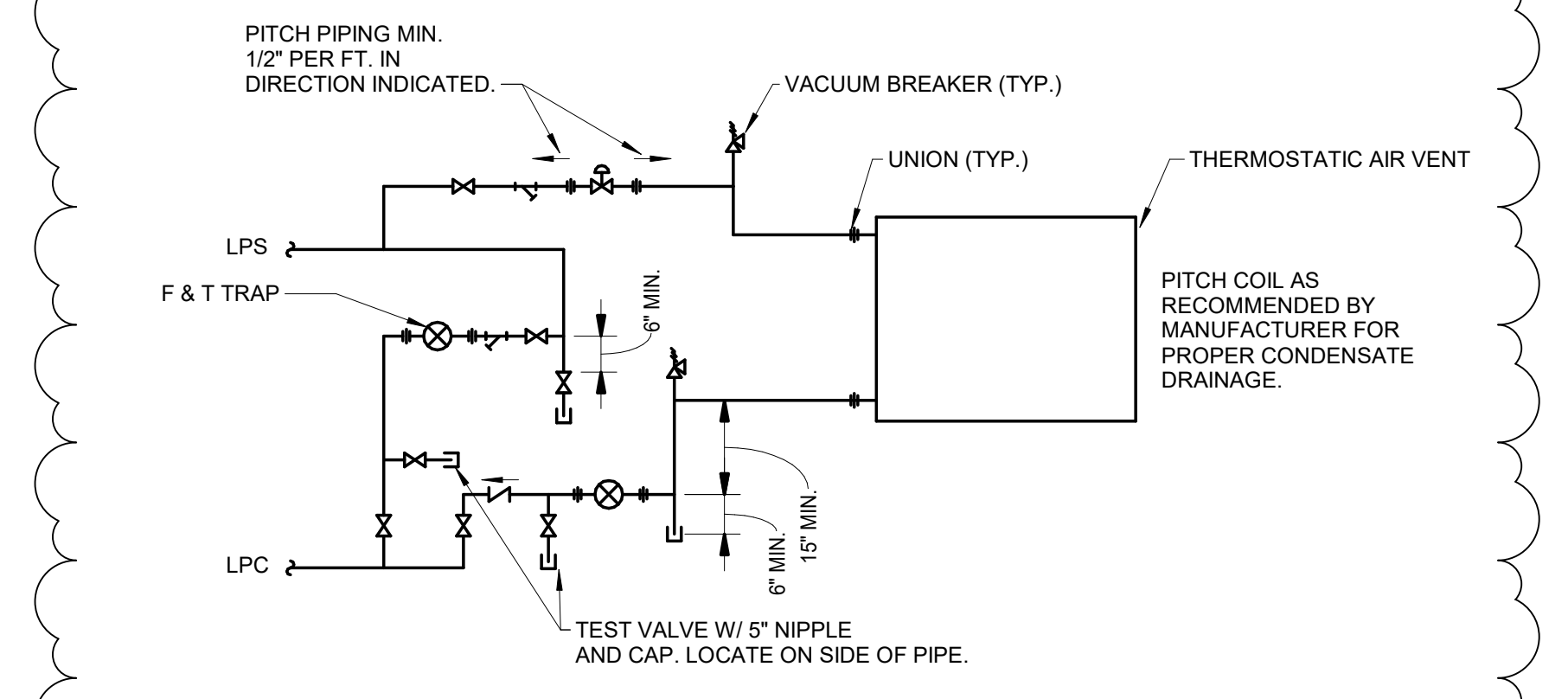
4 TYPICAL PIPE HANGER DETAILS  
 SCALE: NTS



1 AIR HANDLING UNIT SPLIT COIL PIPING DETAIL  
 SCALE: NTS



2 DUCT MOUNTED HUMIDIFIER  
 SCALE: NTS



5 STEAM PREHEAT COIL PIPING DETAIL  
 SCALE: NTS

NOTE: BASIS OF DESIGN IS PRO HYDRONIC SPECIALTIES. APPROVED EQUAL MANUFACTURERS FOR COIL KITS: NEXUS VALVE, FLOW DESIGN, AND GRISWOLD.



NO.	DATE	DESCRIPTION	BY
1	11/08/18	ADDENDUM 3	
2			

**McVEIGH & MANGUM**  
 ENGINEERING, INC.  
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BID SET  
 SCO ID # 18-18334  
 CODE 41726 ITEM 303  
**ATKINS AIR HANDLER**  
 UNIVERSITY OF NORTH CAROLINA AT CHARLOTTE  
 9201 UNIVERSITY CITY BLVD, CHARLOTTE, NC 28223  
 MECHANICAL DETAILS

DRAWN	LPM
DESIGNED	LPM
CHECKED	SRC
DATE	10-17-18
SCALE	AS NOTED
PROJECT NO	CLT18128
SHEET	M002

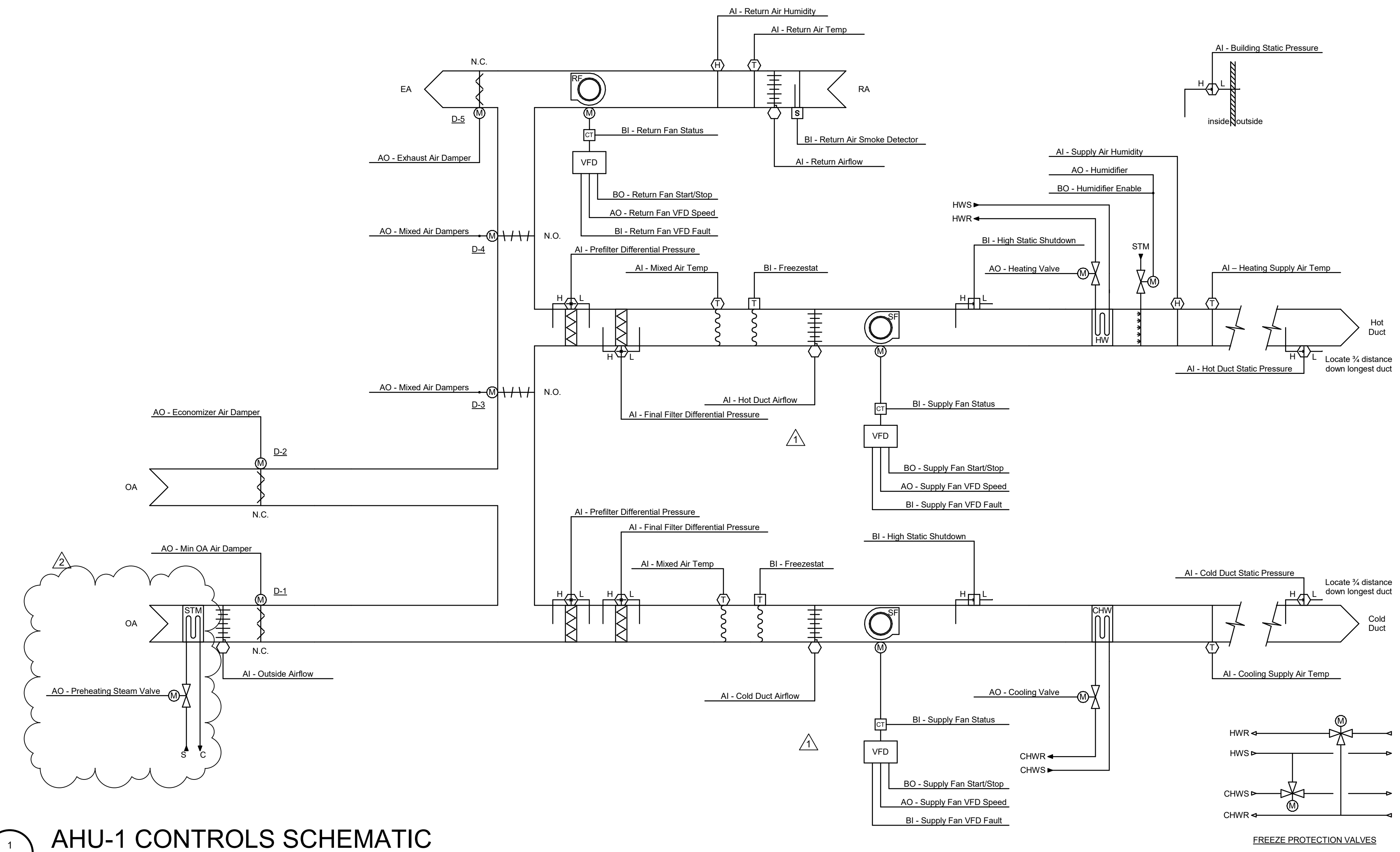


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Point Name	Hardware Points				Software Points				Show On Graphic	
	A I	A O	B I	B O	BV	Loop	Sched	Trend		Alarm
Building Static Pressure	x							x	x	x
Cold Duct Static Pressure	x							x	x	x
Cooling Supply Air Temp	x							x	x	x
Cold Duct Airflow (Per Fan)	x							x	x	x
Final Filter Differential Pressure	x							x		
Heating Supply Air Temp	x							x	x	x
Hot Duct Static Pressure	x							x	x	x
Hot Duct Airflow (Per Fan)	x							x	x	x
Mixed Air Temp	x							x	x	x
Outside Airflow	x							x	x	x
Prefilter Differential Pressure	x							x		
Return Air Humidity	x							x		
Return Air Temp	x							x		
Return Airflow	x							x	x	x
Supply Air Humidity	x							x		
Cooling Valve	x							x		
Exhaust Air Damper	x							x		
Heating Valve	x							x		
Humidifier	x							x		
Mixed Air Damper	x							x		
Return Fan VFD Speed (Per Fan)	x							x	x	x
Supply Fan VFD Speed (Per Fan)	x							x	x	x
Exhaust Air Damper Status	x							x		
Freezeostat	x							x	x	x
High Static Shutdown	x							x	x	x
Return Fan Stages (Per Fan)	x							x		
Return Fan VFD Fault (Per Fan)	x							x		
Return Air Smoke Detector	x							x	x	x
Supply Fan Status (Per Fan)	x							x		
Supply Fan VFD Fault (Per Fan)	x							x		
Humidifier Enable	x							x		
Return Fan Start/Stop (Per Fan)	x							x		
Supply Fan Start/Stop (Per Fan)	x							x		

Point Name	Hardware Points				Software Points				Show On Graphic	
	A I	A O	B I	B O	BV	Loop	Sched	Trend		Alarm
Building Static Pressure Setpoint					x					x
Cooling Supply Air Temp Setpoint					x				x	x
Economizer Mixed Air Temp Setpoint					x				x	
Heating Supply Air Temp Setpoint					x				x	
Humidifier Setpoint					x					x
Preheating Mixed Air Temp Setpoint					x				x	
Supply Air Static Pressure Setpoint per Deck										x
Schedule						x				
Exhaust Air Damper in Hand									x	
Exhaust Air Damper Failure									x	
Final Filter Change Required									x	x
High Cooling Supply Air Temp									x	
High Heating Supply Air Temp									x	
High Mixed Air Temp									x	
High Return Air Humidity									x	
High Return Air Temp									x	
High Supply Air Humidity									x	
High Supply Air Static Pressure									x	
Low Heating Supply Air Temp									x	
Low Mixed Air Temp									x	
Low Return Air Humidity									x	
Low Return Air Temp									x	
Low Supply Air Humidity									x	
Low Supply Air Static Pressure									x	
Prefilter Change Required									x	x
Return Fan Failure (Per Fan)									x	
Return Fan in Hand (Per Fan)									x	
Supply Fan Failure (Per Fan)									x	
Supply Fan in Hand (Per Fan)									x	

3 AHU-1 POINTS LIST  
 M003 SCALE: NTS



1 AHU-1 CONTROLS SCHEMATIC  
 M003 SCALE: NTS

**Run Conditions - Scheduled:**  
 The unit shall run based upon an operator adjustable schedule.

**Freeze Protection:**  
 The unit shall shut down and generate an alarm upon receiving a freezeostat status. Outside Air and Exhaust Air dampers shall close. Chilled Water and Hot Water control valves shall open to minimum position of 30% (adj.). Return Air damper shall maintain last position.

**High Static Shutdown:**  
 The unit shall shut down and generate an alarm upon receiving a high static shutdown signal.

**Return Air Smoke Detector:**  
 The unit shall shut down and generate an alarm upon receiving a supply air smoke detector status.

**AHU Optimal Start:**  
 The unit shall start prior to scheduled occupancy based on the time necessary for the zones to reach their occupied setpoints. The start time shall automatically adjust based on changes in outside air temperature and zone temperatures.

**Supply Fans:**  
 The supply fans shall run anytime the unit is commanded to run, unless shutdown on safeties. To prevent short cycling, the supply fan shall have a user definable (adj.) minimum runtime.

**Alarms shall be provided as follows:**

- Supply Fan Failure: Commanded on, but the status is off.
- Supply Fan in Hand: Commanded off, but the status is on.
- Supply Fan Runtime Exceeded: Status runtime exceeds a user definable limit (adj.).

**Supply Air Duct Static Pressure Control:**  
 The controller shall modulate the supply fan VFD speed to maintain the duct static pressure setpoint for each supply air deck. The speed shall not drop below 30% (adj.). The static pressure setpoint shall be reset based on zone cooling/heating requirements.

- The initial duct static pressure setpoint shall be 2.0 in H2O (adj.).
- As cooling/heating demand increases, the setpoint shall incrementally reset up to a maximum of 2.3 in H2O (adj.).
- As cooling/heating demand decreases, the setpoint shall incrementally reset down to a minimum of 1.8 in H2O (adj.).
- The reset sequence shall maintain the most open damper to open more than the minimum value (60%) but not more than the maximum value (90%). This is a dynamic calculation, which occurs every two minutes whenever the system is operating. It ensures that the supply static is sufficient to supply the required airflow at the worst case terminal but not more than necessary, so that the air terminals do not have to operate with a pressure drop greater than required to maintain the airflow set point of each individual terminal in the system. As the system operates, if the most open damper opens more than 90%, the system recalculates the pressure reduction variable and the amount of reset is reduced. If the most open damper closes to less than 60%, the system recalculates the pressure reduction variable and the reset is increased.

**Alarms shall be provided as follows:**

- High Supply Air Static Pressure: If the supply air static pressure is 25% (adj.) greater than setpoint.
- Low Supply Air Static Pressure: If the supply air static pressure is 25% (adj.) less than setpoint.
- Supply Fan VFD Fault.

**Return Fan:**  
 The return fan shall run whenever the supply fan runs.

**Alarms shall be provided as follows:**

- Return Fan Failure: Commanded on, but the status is off.
- Return Fan in Hand: Commanded off, but the status is on.
- Return Fan Runtime Exceeded: Status runtime exceeds a user definable limit (adj.).

**Return Fan Control:**  
 The return fan VFD shall modulate in unison with the supply air fans to maintain the return air cfm. Return air cfm shall equal hot deck supply cfm (+) cold deck supply cfm (-) general exhaust cfm (-) space offset cfm.

**Alarms shall be provided as follows:**

- Return Fan VFD Fault.

**Cold Deck - Cooling Supply Air Temperature Setpoint - Optimized:**  
 The cooling supply air temperature setpoint shall be reset based on outside air requirements as follows:

- The initial cooling supply air temperature setpoint shall be 55°F (adj.).
- As outside air temperature increases, the setpoint shall incrementally reset down to a minimum of 53°F (adj.). The supply air setpoint shall reach minimum by 75°F.
- As outside air temperature decreases, the setpoint shall incrementally reset up to a maximum of 72°F (adj.). The supply air setpoint shall reach maximum by 55°F.

If the return air humidity is between 65% and 70%, the supply air temperature shall be reset to its minimum value.

**Cold Deck - Heating Coil Valve:**  
 The controller shall measure the heating supply air temperature and modulate the heating coil valve to maintain its cooling setpoint.

The heating shall be enabled whenever:

- Outside air temperature is greater than 60°F (adj.).
- AND the economizer is disabled or fully open.
- AND the supply fan status is on.

The heating coil valve shall open to 50% (adj.) whenever the freezeostat (if present) is on.

**Alarms shall be provided as follows:**

- High Cooling Supply Air Temp: If the cooling supply air temperature is 5°F (adj.) greater than setpoint.

**Hot Deck - Heating Supply Air Temperature Setpoint - Optimized:**  
 The heating supply air temperature setpoint shall be reset based on zone heating requirements as follows:

- The initial heating supply air temperature setpoint shall be 82°F (adj.).
- As heating demand increases, the setpoint shall incrementally reset up to a maximum of 90°F (adj.).
- As heating demand decreases, the setpoint shall incrementally reset down to a minimum of 72°F (adj.).

**Hot Deck - Heating Coil Valve:**  
 The controller shall measure the heating supply air temperature and modulate the heating coil valve to maintain its setpoint.

The heating shall be enabled whenever:

- Outside air temperature is less than 65°F (adj.).
- AND the freezeostat is on.

The heating coil valve shall open whenever:

- Heating supply air temperature drops from 40°F to 35°F (adj.).
- OR the freezeostat is on.

**Alarms shall be provided as follows:**

- High Heating Supply Air Temp: If the heating supply air temperature is greater than 120°F (adj.).
- Low Heating Supply Air Temp: If the heating supply air temperature is 5°F (adj.) less than setpoint.

2 AHU-1 SEQUENCE OF OPERATION  
 M003 SCALE: NTS

**Building Static Pressure Control:**  
 The controller shall measure the building static pressure and modulate the exhaust air damper to maintain building static pressure setpoint of 0.05 in H2O (adj.). The exhaust air damper shall maintain a minimum position (adj.).

The exhaust air damper shall be enabled when the supply fan status is proven and close when the unit is off.

**Alarms shall be provided as follows:**

- High Building Static Pressure: If the building static pressure is 25% (adj.) greater than setpoint.
- Low Building Static Pressure: If the building static pressure is 25% (adj.) less than setpoint.

**Economizer:**  
 The controller shall measure the mixed air temperature and modulate the economizer dampers in sequence to maintain a setpoint 2°F less than the cooling supply air temperature setpoint. The minimum outside air dampers shall modulate to maintain minimum ventilation cfm as scheduled, whenever occupied.

The economizer shall be enabled whenever:

- Outside air temperature is less than 65°F (adj.).
- AND the outside air enthalpy is less than 22 Btu/lb (adj.).
- AND the outside air temperature is less than the return air temperature.
- AND the outside air enthalpy is less than the return air enthalpy.
- AND the supply fan status is on.

When the economizer is enabled, the dampers shall modulate as follows:

- D-1 shall be open to maximum position.
- D-2 and D-3 shall modulate to maintain cold deck mixed air temperature.
- D-4 and D-5 shall modulate to maintain building static pressure setpoint.

When the economizer is disabled, the dampers shall modulate as follows:

- D-1 shall modulate to maintain cfm setpoint.
- D-2 and D-3 shall be open.
- D-4 shall be closed.
- D-5 shall operate per building pressurization sequence.

The economizer shall close whenever:

- Mixed air temperature drops below 40°F (adj.).
- OR on loss of supply fan status.
- OR the freezeostat (if present) is on.

The outside and exhaust air dampers shall close and the return air damper shall open when the unit is off. If Optimal Start Up is available the mixed air damper shall operate as described in the occupied mode except that the outside air damper shall modulate to fully closed.

**Minimum Outside Air Ventilation:**  
 When in the occupied mode, the controller shall measure the outside airflow and modulate the outside air dampers to maintain the proper minimum outside air ventilation, overriding normal damper control. On dropping outside airflow, the controller shall modulate the outside air dampers open to maintain the scheduled outside air setpoint (adj.).

**Humidifier Control:**  
 The controller shall measure the return air humidity and modulate the humidifier to maintain a setpoint of 50% rh (adj.). The humidifier shall be enabled whenever the supply fan status is on.

The humidifier shall turn off whenever:

- Supply air humidity rises from 90% rh to 95% rh (adj.).
- OR on loss of supply fan status.

**Alarms shall be provided as follows:**

- High Supply Air Humidity: If the supply air humidity is greater than 90% rh (adj.).
- Low Supply Air Humidity: If the supply air humidity is less than 30% rh (adj.).

**Prefilter Differential Pressure Monitor:**  
 The controller shall monitor the differential pressure across the prefilter.

**Alarms shall be provided as follows:**

- Prefilter Change Required: Prefilter differential pressure exceeds a user definable limit (adj.).

**Final Filter Differential Pressure Monitor:**  
 The controller shall monitor the differential pressure across the final filter.

**Alarms shall be provided as follows:**

- Final Filter Change Required: Final filter differential pressure exceeds a user definable limit (adj.).

**Mixed Air Temperature:**  
 The controller shall monitor the mixed air temperature and use as required for economizer control.

**Alarms shall be provided as follows:**

- High Mixed Air Temp: If the mixed air temperature is greater than 90°F (adj.).
- Low Mixed Air Temp: If the mixed air temperature is less than 40°F (adj.).

**Return Air Humidity:**  
 The controller shall monitor the return air humidity and use as required for economizer control and/or humidity control.

**Alarms shall be provided as follows:**

- High Return Air Humidity: If the return air humidity is greater than 70% (adj.).
- Low Return Air Humidity: If the return air humidity is less than 35% (adj.).

**Return Air Temperature:**  
 The controller shall monitor the return air temperature and use as required for economizer control.

**Alarms shall be provided as follows:**

- High Return Air Temp: If the return air temperature is greater than 90°F (adj.).
- Low Return Air Temp: If the return air temperature is less than 45°F (adj.).

**Freeze Protection Valves:**  
 Whenever the outside air temperature is below 35°F (adj.) and the fan system smoke purge sequence is activated, the freeze protection valves shall gradually open (30 seconds) to allow hot water to flow through the chilled water coils. The chilled water control valves shall be fully open during this sequence.

**Preheating Coil Steam Valve:**  
 The controller shall measure the mixed air temperature and modulate the preheating coil steam valve to maintain a setpoint 4°F (adj.) less than the cooling supply air temperature setpoint.

The preheating shall be enabled whenever:

- Outside air temperature is less than 55°F (adj.).
- AND the economizer (if present) is disabled.
- AND the supply fan status is on.

The preheating coil steam valve shall open for freeze protection whenever:

- Mixed air temperature drops from 40°F to 35°F (adj.).
- OR the freezeostat (if present) is on.



BY: \_\_\_\_\_

NO. DATE DESCRIPTION

1 10/20/18 ADDENDUM 1

2 11/08/18 ADDENDUM 3

SCO ID # 18-18334  
 CODE 41726 ITEM 303

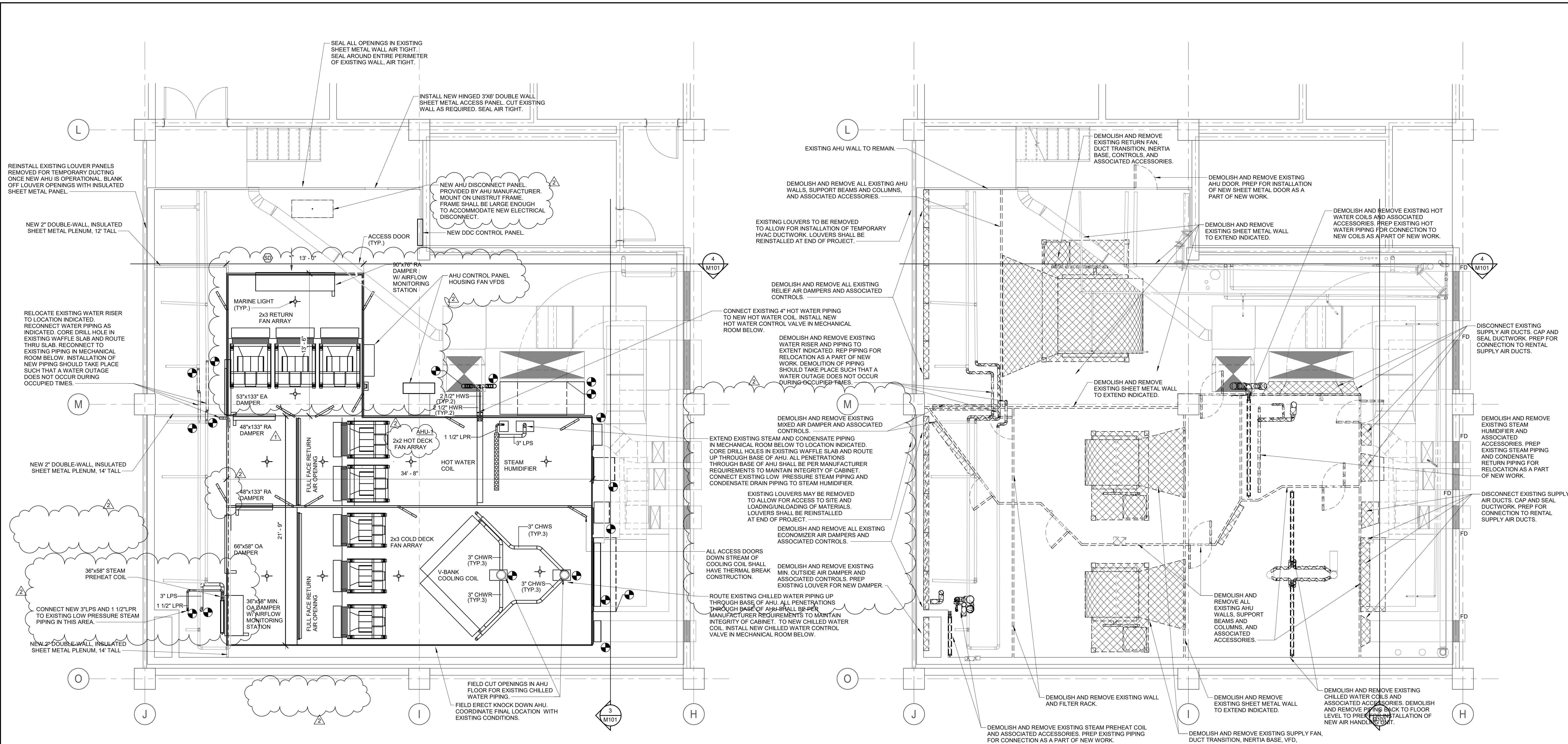
ATKINS AIR HANDLER  
 UNIVERSITY OF NORTH CAROLINA AT CHARLOTTE  
 9201 UNIVERSITY CITY BLVD, CHARLOTTE, NC 28223

MECHANICAL CONTROLS DIAGRAMS

DRAWN LPM  
 DESIGNED LPM  
 CHECKED SRC  
 DATE 10-17-18  
 SCALE AS NOTED  
 PROJECT NO CLT18128  
 SHEET M003

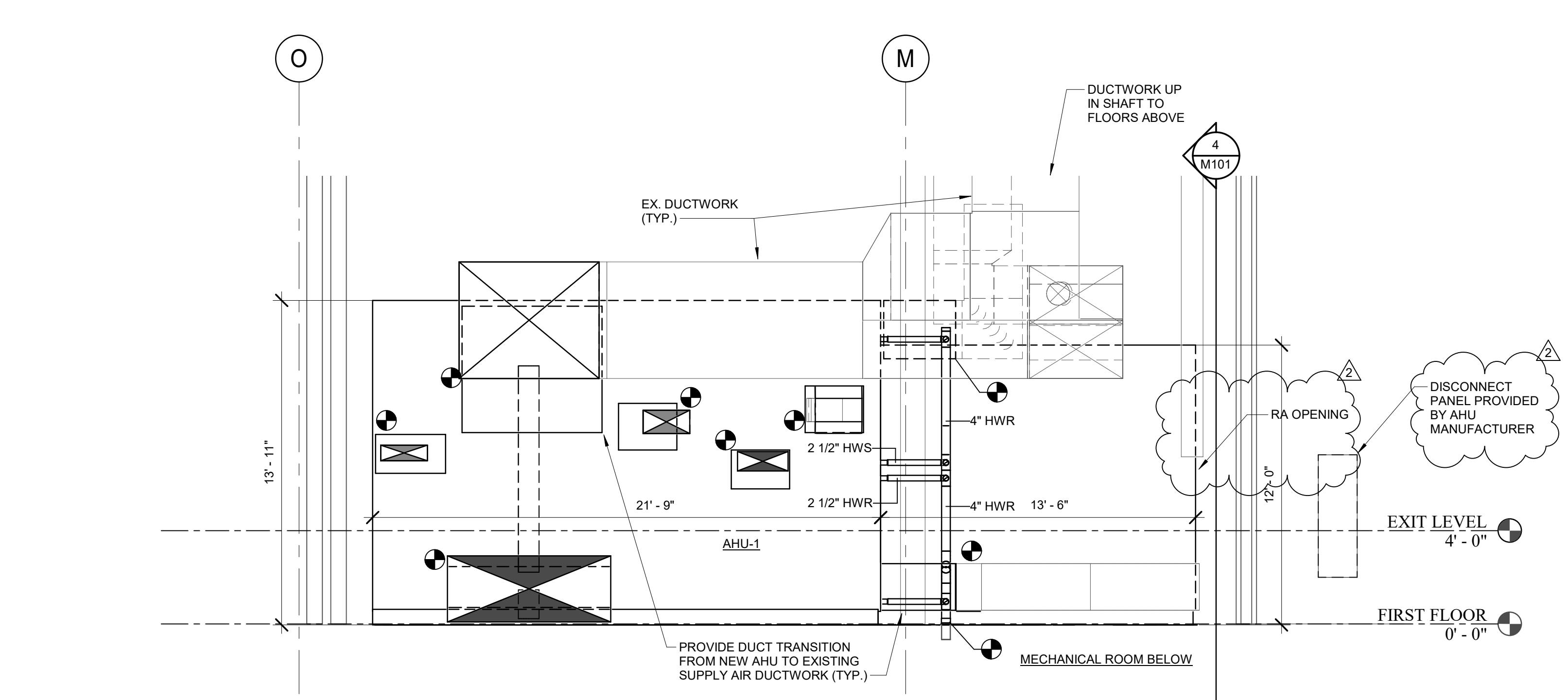


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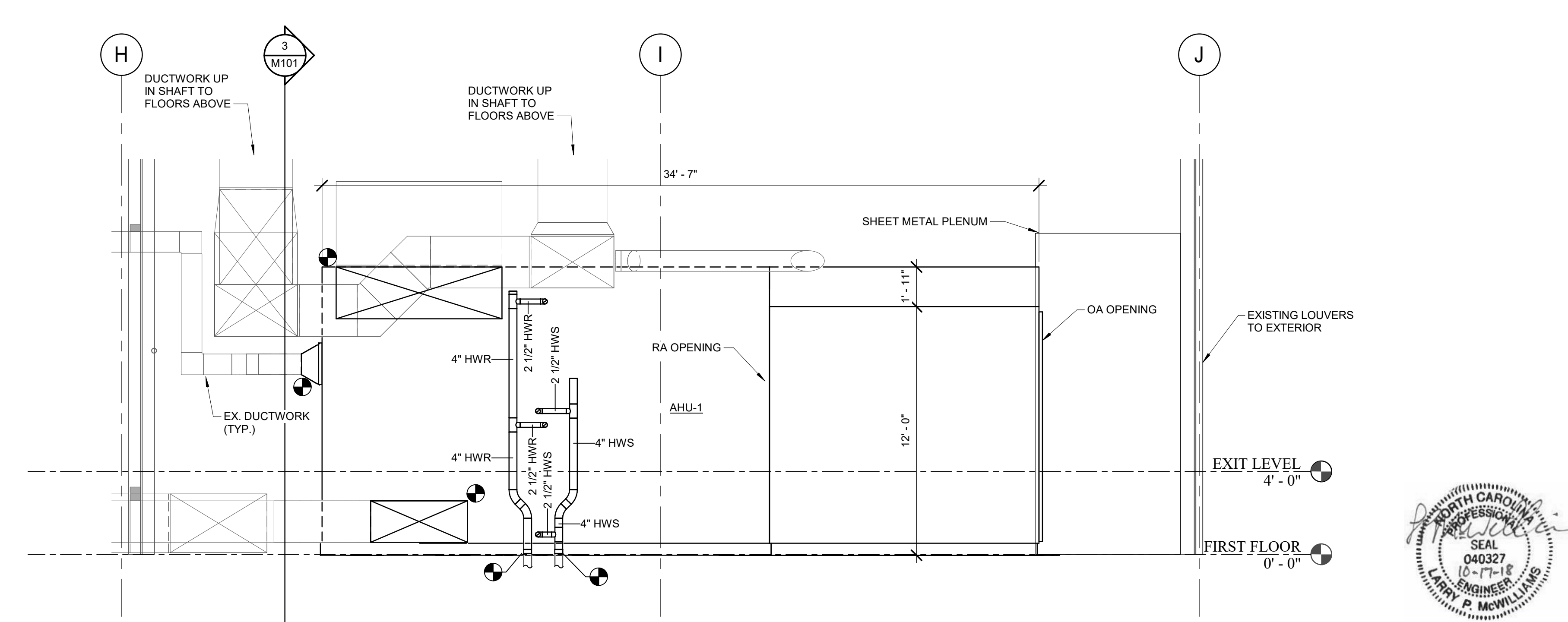


2 MECHANICAL FLOOR PLAN - NEW WORK  
 SCALE: 1/4" = 1'-0"

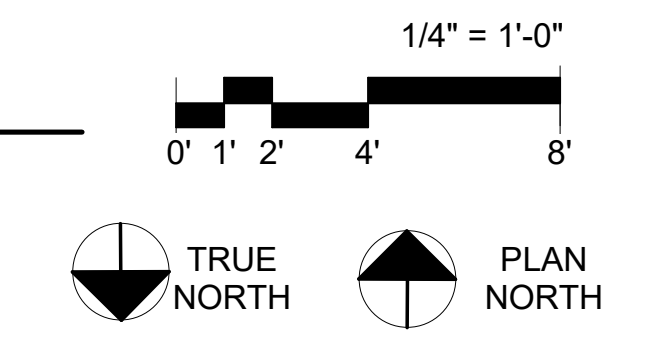
1 MECHANICAL FLOOR PLAN - DEMO  
 SCALE: 1/4" = 1'-0"



3 MECHANICAL SECTION  
 SCALE: 1/4" = 1'-0"



4 MECHANICAL SECTION  
 SCALE: 1/4" = 1'-0"



NO.	DATE	DESCRIPTION
1	10/20/18	ADDENDUM 1
2	11/08/18	ADDENDUM 3

**McVEIGH & MANGUM**  
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SCO ID # 18-18334  
 CODE 41726 ITEM 303  
**ATKINS AIR HANDLER**  
 UNIVERSITY OF NORTH CAROLINA AT CHARLOTTE  
 9201 UNIVERSITY CITY BLVD, CHARLOTTE, NC 28223  
 MECHANICAL FLOOR PLANS

BID SET	DRAWN LPM
	DESIGNED LPM
	CHECKED SRC
	DATE 10-17-18
	SCALE AS NOTED
	PROJECT NO CLT18128
SHEET	M101