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23-0000 HVAC As-built

MECHANICAL SPECIFICATIONS

- 1) Provide all heating, ventilation and air conditioning items indicated on the drawings, described in this specification or required for a complete and proper installation.
- 2) Comply with all pertinent codes, ordinances and regulations. Refer to website for Dept. of Community Affairs for current Codes Editions.
- 3) The contractor shall not attempt to precisely scale dimensions from these drawings to obtain construction dimensions and clearances. The contractor shall verify all actual dimensions and clearances. Although these plans are diagrammatic in nature, they shall be followed as closely as site conditions, new construction, and work by other trades shall permit. Deviations from these drawings, which are required to conform to the available space or the actual building construction, shall be made at no additional cost to the owner.
- 4) Furnish without extra charge, any additional material and labor required to comply with the above codes and standards, even though the work may not be described in the contract documents. Where the requirements of the contract documents exceed the requirements of the above codes and standards, the contract documents shall take precedence.
- 5) All equipment and material shall be new and of first quality. Equipment and material shall be the same or equal to the basis of design listed on these drawings and shall be UL listed.
- 6) Cooperate and coordinate with other trades in order that all systems in the work may be installed in the best arrangement.
- 7) Examine the areas and conditions under which work of this section will be installed. Correct conditions detrimental to the proper and timely completion of the work. Notify Architect of any discrepancies. Do not proceed until unsatisfactory conditions have been corrected.
- 8) Avoid interference with structure, and with work of other trades. Install all equipment per manufacturer's instructions. Install accessible parts, including equipment, coils, valves, dampers, controls, and filters with adequate clearance for inspection, adjustments, repair and replacement.
- 9) All other materials not specifically described but required for a complete and proper installation shall be as selected by the contractor subject to acceptance by the Engineer.
- 10) All ductwork shall be fabricated from galvanized steel metal duct and conform to SMACNA "HVAC Duct Construction Standards--Metal and Flexible. Seal all joints in ductwork with mastic sealant.
- 11) Flexible duct: Flex master; Atco UPC#36(R-6.0); Atco UPC#31 (R-8) or Thermaflex, Type 3, insulated. 5'-0" Maximum length unless noted otherwise. Class 1 rating with R-value of 6.0 when located inside building insulation envelope and R-8 when located outside building insulation envelope. Install with no more than 135 degrees maximum of total bends per run. Maximum individual bend shall not exceed 45 degrees each. Support at five feet on centers with hangers having at least 2-inches of width at duct contact points. Flexible connectors shall not pass through any wall floor or ceiling weather rated or not. Provide 36--inches of metal duct at penetration of draft stops, fire walls and smoke walls
- 12) Duct Liner: Owens Corning Aeroflex Plus, or equivalent. Incombustible glass fiber complying with ASTM C 1071; flexible blanket; impregnated surface and edges coated with acrylic polymer shown to be fungus and bacteria resistant by testing to ASTM G 21. Apparent Thermal Conductivity: Maximum of 0.31 at 75 degrees F. Service Temperature: 250 degrees F. Density: 1.5 pounds/cubic foot. Install using adhesive (50% coverage) and galvanized steel fasteners with welded press-on head Thickness: 1--inch
- 13) Ductwork & Sealants:
- MATERIALS
- A. Galvanized Steel Ducts: Hot-dipped galvanized steel sheet, ASTM A 653/A 653M FS Type B, with G90/Z275 coating.
- B. Steel Ducts: ASTM A 1008/A 1008M, Designation C5, cold-rolled commercial steel.
- D. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.
- Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.
 - Surface Burning Characteristics: Flame spread of zero, smoke developed of zero, when tested in accordance with ASTM E 84.
 - Manufacturers: Hard coat Sure Grip 404, Marathon, Miracle D-618, MMM-800, Tuff-Bond No.29, United McGill United.
 - Non-hardening, water resistant, fire resistive, compatible with mating materials; liquid used alone or with tape, or heavy mastic.

DUCTWORK FABRICATION

- A. Fabricate and support in accordance with SMACNA HVAC Duct Construction Standards -- Metal and Flexible, and as indicated. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated. Install as shown and detailed.
- B. All dimensions are net inside metal measurements in inches unless otherwise shown.
- C. Duct sizes shown include allowance for liner thickness unless otherwise noted, except sizes shown for lined round spiral and flat oval duct are sizes of perforated inner liner
- D. Longitudinal seams for Rectangular Duct: Fig 2-2 L-1(Pittsburgh) or L-2(button punch snap lock) for corner seams. Do not use L-2 seam for ducts over 18 inches. Seal L-2 seams with duct sealant. Fig 2-2 L-3 seam for seams other than corner.
- E. Where rectangular elbows and Ts are used, provide turning vanes in accordance with Figs 4-3 and 4-4.
- F. Supply branch connections:
- Low Pressure Rectangular Branch and Rectangular Diffuser Runouts: Fig 4-6, 45-degree entry with flange and gasket for connection to trunk with a minimum of six screws.
 - Low Pressure Round Runouts from Rectangular ducts: Manufactured fitting with 45-degree entry, flanged & gasket for connection to trunk with a minimum of six screws. Provide volume control damper with locking quadrant at branch connection in Ductwork Pressure Class 2 inch or less, unless over inaccessible ceiling (Refer to Grille Schedule on Drawings).
 - Branches from Medium Pressure Trunks: Conical tees (round and rectangular ducts). For branches less than 20% of the upstream volume, provide 45-degree entry branches, Figure 4-6, welded construction. For divisions greater than 20% of upstream volume, provide divided flow splitters, fig. 4-5, in rectangular ducts without volume dampers.
 - Medium Pressure Round runouts from round ducts: Manufactured conical tee fitting, conical tap, Fig 3-6; or 45-degree conical lateral fitting, Fig 3-5 as indicated on drawings.
 - Round runouts to diffusers from round duct shall be manufactured fittings, conical tee fitting, conical tap, Fig 3-6; or 45-degree conical lateral fitting, Fig 3-5 as indicated on drawings.
 - Runout to Sidelwall Grille/Register: Fig 4-6, 45 Degree entry.
 - Volume Control Dampers: Provide volume control damper with locking quadrant at branch connection fitting for runout to diffuser, unless:
 - Fitting is located over inaccessible ceiling (Refer to Grille Schedule on Drawings for neck mounted volume dampers).
 - Where otherwise noted.
- K. Branch Duct Split: Fig 4-5 with volume control dampers.
- L. Transitions (unless otherwise noted): Fig 4-7; Changes in duct sizes shall be made by transitions. Increase duct sizes gradually, not exceeding 15 degrees divergence whenever possible; maximum 30 degree divergence upstream of equipment and 45 degrees convergence downstream. Transitions shall be provided between equipment and duct where sizes are not the same.

MEDIUM PRESSURE DUCTWORK AND FITTINGS (Spiral and Rectangular Duct)

- A. Manufacture or shop fabricate in accordance with SMACNA HVAC Duct Construction Standards -- Metal and Flexible, and as indicated. Provide duct material, gages, reinforcing, and sealing for operating pressures as scheduled.

INSTALLATION

Install in accordance with manufacturer's instructions. Duct sizes indicated are net metal sizes, except for medium pressure rectangular, flat oval and spiral ducts. Duct sizes for runouts to Air Terminals and grilles, registers and diffusers shall match the size of the device unless otherwise noted. Install and seal metal and flexible ducts in accordance with SMACNA HVAC Duct Construction Standards -- Metal and Flexible. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities. Seal all transverse joints in metal supply, exhaust and return ducts. Connect diffusers to concealed low pressure ducts with 5 feet maximum length of flexible duct held in place with metal strap or clamp. Secure flexible ducts to metal ducts with adhesive (except at terminal unit connection) and draw band or clamp.

SCHEDULES

- A. Ductwork Material:
- 1.Low Pressure Supply: Galvanized Steel.
- 2.Medium Pressure Supply: Galvanized Steel, manufactured duct.
- B. Ductwork Pressure Class:
- Supply System downstream of Terminal Units: (Low Pressure) 2 inches.
 - Supply System upstream of Air Terminal Units: (Medium Pressure) 6 inches with Class A seal.
 - Return and Relief: 2 inch positive and negative.
 - General Exhaust: 2 inch negative.

- 14) Thermostats: New thermostat shall be provided by building HVAC control provider for the added terminal units. For existing to remain units' thermostats shall remain and relocated per plan. Where new thermostats are provided contractor shall integrate thermostat to building automation system (BMS).
- 15) Provide fire and smoke rated flexible connections between fans and ducts. Material shall comply with NFPA 90A requirements for material in supply air stream.
- 16) Install all equipment in accordance with manufacturer's instructions and recommendations including clearances recommended for proper operation or service. All filters and serviceable parts shall be readily accessible.
- 17) Indoor duct insulation: Foil-faced fiberglass, Owens Corning type 75 or equal, 2.2" thick(R-6), unless the insulated duct is outside building insulation envelope (attic, crawlspace or unconditioned space) in which case the duct insulation thickness shall be 3P thick(R-8). Duct shall have a flame spread rating of not more than 25 and smoke developed rating of not more than 50. Glass-Fiber Insulation: All service duct walls with foil scrim and having backing and a k-value of 0.30 at 75° F mean temperature and an average maximum density of 0.75 lb./cu. ft.

- 18) Outside duct insulation: Insulate ducts and fittings with two, staggered layers of 7--inch foamed plastic sheet insulation, (Arma-Flex sheets) 6-pound density, having a thermal conductivity of not more than 0.28 at 75°F. Apply insulation with smooth side out of coating both surfaces to be joined completely with a thin coat of waterproof instant bonding adhesive. Adjacent sheets shall fit under compression. Apply a 16-mil embossed aluminum jacket with a 2--inch overlap at longitudinal and transverse joints, secured in place with 7--inch by .015--inch aluminum bands on 18--inch centers. Overall insulation value must be R-8 for exterior duct as per ASHRAE 90.1 & IECC.
- 19) All supply air ducts shall be insulated. Install acoustical duct liner on the interior surface of the first five (5) linear feet of supply duct downstream of all terminal units and fan powered units. Omit duct liner where five feet of downstream ductwork have not been removed. Insulate the concealed tops of all ceiling mounted supply air diffusers with foil-faced fiberglass, 1.5#/cubic foot density, 27 thick. Seal edges to ceiling grid with foil faced tape to provide vapor tight seal.
- 20) All low--pressure duct branches shall contain manual balancing dampers. Manual balancing dampers shall also be installed in the continuation of the main, if the main duct is smaller or the same size as the branch duct, or if the continuation of the main serves only one device.
- 21) Duct sizes shown on plans are clear, interior dimensions. Duct sizes shown has been enlarged to allow for liner at locations of interior liner.
- 22) Do not cut into or reduce the size of any structural member without the permission of the Architect.
- 23) Provide weather--proof flashing at all duct and pipe penetrations through the building walls and roof. As a minimum, flashings shall be designed and installed in accordance with SMACNA standards. Flashings shall be guaranteed weatherproof.
- 24) Support all HVAC units, ductwork, piping and other appurtenances from structure, provide vibration isolation at all fans which are not internally isolated. Provide hanger rod with built in rubber--in--shear isolator. Between drain pan and unit provide 4 each rubber--in--shear isolator. Do not attach vibration isolator to drain pan. Do not screw or drive fasteners into non--structural components such as roof decks or non--load bearing walls.
- 25) Thoroughly clean all components and remove all dirt, scale, oil, and other foreign substances. Provide clean air filters for all equipment.
- 26) Perform all tests necessary to demonstrate the integrity of the complete installation to the approval of the Engineer and all other authorities having jurisdiction. Make all adjustments necessary and balance the completed system in accordance with the data shown. Balance the systems in accordance with NEBB or AABC standards. Acceptable tolerances shall be minus ten percent to plus five percent of all measurements. Balancing shall be done by an independent licensed (by NEBB or AABC) TAB contractor. Make the following tests and submit reports to the Architect:
- a) Airflow rate at each supply, return and exhaust outlet or inlet.
- b) Total airflow rate and total static pressure for each supply and exhaust fan. Test exhaust fans with room doors closed.
- c) Motor speed, for multiple speed fans (e.g. high, medium, low).
- d) For direct drive fans, provide speed settings and actual rpm, including EOM motor driven fans
- e) Provide fan and motor rpm for belt driven fans. Provide sheave sizes.
- f) Outside airflow rate to each HVAC unit and supply fan.
- g) Motor current (and compare with nameplate data) at all motors.
- h) Entering and leaving air dry-bulb and wet-bulb conditions at all cooling coils.
- i) Heat output capacity for unit heaters, heating devices and coils (kW or MBH).
- j) Manufacturer, model and serial number for each piece of HVAC equipment scheduled on drawings.
- k) Calibrate thermostats to be within one degree of actual temperature at thermostat.
- l) Verify that all HVAC devices operate as scheduled or indicated (i.e. ON--OFF, 2--stage, variable output (SCR heaters), etc.

27) The entire system shall be warranted for a period of one (1) year beginning with Owner's acceptance of the work. Compressors shall include a minimum of five (5) year parts only warranty from the manufacturer. All labor and materials necessary to repair or replace the system or portions thereof, during that time shall be warranted for a period of one (1) year from the repair or replacement.

28) SUBMITTALS AND SUBMITTAL PROCEDURES:

- a. Contractor shall review the submittal data and check for the purpose of compliance with safety requirements, verification of dimensions, contract documents and methods and means prior to submitting to design professional. Contractor shall indicate approval by indicating such on the submittal.
- b. Transmit each submittal electronically in PDF format.
- c. Sequentially number submittal files and transmittal form. Revise submittals with original number and a sequential alphabetic suffix. File names shall describe item included in file.
- d. Identify Project, the Contractor, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate on each copy. Each file shall include an index of items included in file.
- e. Apply the Contractor's stamp, signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.
- f. Submittal data for all items in project shall be submitted at one time. Submittal shall be divided into groups with file sizes not exceeding 6 MB. If there is unavailable data such as control submittal, etc., these may be submitted later if not doing so would delay project progress. Data shall include capacities, complete installation instructions, dimensional data and electrical data, BHP, motor HP, operating weights and load distribution at mounting points.
- g. Deliver submittals electronically to the Design Professional.
- h. Schedule submittals to expedite the Project, and coordinate submission of related items.
- i. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.
- j. Identify variations from Contract Documents and Product or system limitations that may be detrimental to successful performance of the completed Work.
- k. Provide space for the Contractor and the Architect/ review stamps.
- l. When revised for resubmission, identify all changes made since previous submission.
- m. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.
- n. Submittals not requested will not be recognized or processed.
- o. Provide files containing only related items (such as piping, equipment, air distribution, etc.)

29) Instruct Owner's representative in the operation of the systems, using the operation and maintenance manual as a teaching aid.

30) Provide an operation and maintenance manual. As a minimum, the manual shall contain:

- a. A complete list of all equipment and appurtenances with equipment designations (per Drawings), manufacturers, and catalog numbers.
- b. Copies of manufacturers' brochures and instructions for operation and maintenance of all mechanical equipment, including replacement parts lists.
- c. Typed system operation and maintenance instructions, including inspection, lubrication, and service instructions and schedules.
- d. List of names, addresses and phone numbers of distributors of all equipment and appurtenances.
- e. Manufacturers' warranties.

31) Fire damper; curtain type with blades outside air stream except when located behind grilles when blades may be in air stream. Provide 1--1/2 hr class unless noted otherwise, vertical or horizontal mounting as shown on drawings with re--placeable, rated, fusible link. Duct--Mounted Access Doors: Provide access doors for access to fire or smoke dampers having fusible links, doors shall be pressure relief access doors; and shall be outward operation for access doors installed upstream from dampers and inward operation for access doors installed downstream from dampers adjacent to and close enough to fire or smoke dampers, to reset or reinstall fusible links. Fabricate access panels according to SMACNA's "HVAC Duct Construction Standards -- Metal and Flexible"; Figures 2-10, "Duct Access Doors and Panels," and 2-11, "Access Panels -- Round Duct."

32) Grilles, Registers and Diffusers: Grilles, registers, and diffusers as indicated on the drawings have been selected from the catalog of the manufacturer noted as the basis of design. Sizes, types, and performance of the devices to be provided must be coordinated to insure conformity with design basis. Sidelwall supply grilles and registers shall have vertical front blades; sidelwall return grilles shall have horizontal blades. Grilles and registers with borders shall have felt or rubber gaskets cemented to the back face and holding screws not over 18 inches on centers around the perimeter. Holding screws shall be counter--sunk to fit flush with face of grille or register. Grilles passing air through partitions shall be as described for wall return grilles, one for each side of partition. Register dampers shall be of the gong--operated, opposed blade type, operated through the face of the register. Operating mechanism shall not project through the register face. Mounting frame shall be coordinated with architectural reflected ceiling plans. Construction shall be of steel or aluminum as scheduled, with frame type to match ceiling construction. Sidelwall supply grilles and registers shall be double--deflection type, with vertical front vanes. Construction shall be of steel, with 3/4--inch blade spacing. Return air grilles, return air registers, exhaust grilles, exhaust registers and transfer air grilles located in ceilings shall be constructed of aluminum with "egg--crate" design, with 1/2--inch x 1/2--inch x 1/2--inch grids. Frame style shall be compatible with ceiling construction. Install wall grilles and registers with horizontal edges parallel to ceiling. Concaotic diffuser assemblies at roof top units shall have paint--ready exterior finish and 1--inch lined supply and return ducts that transition to diffuser size within 24 inches vertically of the bottom of roof top unit curb.

33) Basic motor requirements: basic requirements apply to mechanical equipment motors, unless otherwise indicated. Motors 1/2 hp and larger: Polyphase, unless otherwise scheduled. Motors smaller than 1/2 hp: single phase. Frequency rating: 60 Hz. Service factor: according to NEMA MG 1, general purpose continuous duty, design type "B." Enclosure: open drip--proof, unless otherwise indicated. Efficiency: motors shall have a higher efficiency rating than industry standard average motor as delineated in IEEE Standard 112, test method 13. Thermal protection: where indicated or required, internal protection automatically opens power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal protection device automatically resets when motor temperature returns to normal range, unless otherwise indicated.

34) Hangers and supports: Building attachments: concrete inserts or structural--steel fasteners appropriate for building materials, and beam clamps. Hanger materials: galvanized, sheet steel or round, threaded steel rod. Hangers installed in corrosive atmospheres: electrogalvanized, all--thread rod or galvanized rods with threads painted after installation. Straps and rod sizes: comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for sheet steel width and thickness and for steel rod diameters. Duct attachments: sheet metal screws, blind rivets, or self--tapping metal screws; compatible with duct materials. Trapeze and riser support galvanized steel shapes and plates: steel shapes complying with ASTM A 36/A 36M.

35) Packaged Units: Outdoor packaged units, ground mounted, electrically controlled, electric cooling with supplemental electric heat units, as scheduled, utilizing inverter (for cooling) scroll hermetic compressor(s) with continuous unloading for cooling duty. Heating shall be accomplished with an electric heat section for supplemental heat. For unit with hot--gas reheat coil heating shall be done via electric heating coil. Unit shall discharge supply air horizontally. Unit shall exceed ASHRAE 90.1--2001 Energy Standards, be rated in accordance with ARI Standards 210/240 or 360 and 270, in accordance with UL Standard 1995, conform to ASHRAE 15, tested resistant, be UL--tested and certified in accordance with ANSI Z21.47 Standards. Factory assembled, single--piece heating and cooling unit. Contained within the unit enclosure shall be all factory wiring, piping, controls, refrigerant charge, and thermal expansion valve. Unit cabinet shall be constructed of phosphatized/bowderized galvanized steel coated with a baked enamel finish on all externally exposed surfaces. Coating shall be capable of withstanding 500 hours in salt spray. Coils shall have aluminum fins mechanically bonded to copper tubing. Evaporator fan compartment interior cabinet surfaces shall be insulated with a minimum 1/2--in. thick, 1 lb. density, flexible fiberglass insulation, neoprene coated on the or side. Cabinet insulation shall meet ASHRAE Standard 62P. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation. Cabinet panels shall be easily removable for servicing. Condenser coils shall have factory mounted, protective louvered guards. Unit shall have a factory--installed, sloped condensate drain pan made of a non--corrosive material, with a minimum 3/4--inch connection and comply with ASHRAE Standard 62. Unit shall have 1--inch pleated MERV 7 removable, disposable filters and filter access panel to provide filter unit controls shall consist of a self--contained low voltage control circuit. Provide crankcase heater. Refer to schedule for layout basis. Substitutions shall match the features of specified model. Provide condensate overflow switch (Rector seal Safe--T--Switch Model SSI or equivalent) wired to shut unit down in case of condensate overflow. Provide economizer with Honeywell W7220 controller for 2--stage operation. Refer to Schedule on Drawings for additional specifications.

36) All HVAC equipment such as AH, CU, EF, AC, HP, and RTU shall have visible nameplates with their associated marks on them.

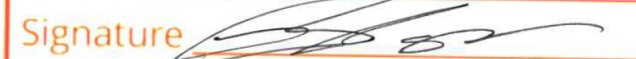
1) SINGLE DUCT VARIABLE VOLUME UNITS

- A. Manufacturers:
- 1.Titus ESV
- 2.Other acceptable manufacturers offering equivalent products: Aerostat VF--PMM, Buenos BTUO, Envirotech SDRWC, Krueger LMHS, Metal-Aire TH, EH Price, Trane VC, Tuttle Bailey SDV, Nallor Model 3001.
- B. Basic Assembly:
1. Coatings: Minimum 22 gage galvanized steel.
2. Lining: Minimum 1/2--inch--thick neoprene or vinyl coated fibrous glass insulation, 1.5 lb./cu ft density, meeting NFPA 90A requirements and UL 181 erosion requirements.
3. Plenum Air Inlets: Round stub connections for duct attachment.
4. Plenum Air Outlets: S slip and drive connections.
- C. Basic Unit:
1. Configuration: Air volume damper assembly inside unit casing. Locate control components inside protective metal shroud.
- 2.Volume Damper: Construct of galvanized steel with peripheral gasket and self--lubricating bearings; maximum damper leakage: 2 percent of design air flow at 6 inches inlet static pressure.
3. Airflow Sensor: All terminals shall be equipped with a factory furnished and mounted multi--point, flow ring or cross arrangement inlet averaging aluminum or stainless--steel sensor which will provide a differential pressure signal that represents actual air flow within an accuracy of +5% regardless of inlet configuration. This accuracy shall be maintained when inlet duct varies from straight up to 90 elbow entrance conditions for both flexible and rigid metal duct applications. Straight inlet duct shall not be required for specified accuracy.
- D. Electric Heating Coil:
1. Construction: ETL listed, slip--in type, proportionally modulated, open coil design 80/20 nickel/chrome elements, integral control box factory wired and installed on the terminal by the terminal manufacturer.
2. Controls:
- a. Door interlock disconnect switch
- b. Line and Control terminal blocks
- c. Auto reset primary and manual reset secondary over temperature protection
- d. Proportional electronic airflow proof sensor integrated with SCR controller
- e. Control transformer.
- f. Heater control panel housed in a NEMA 1 enclosure with hinged access door. Door shall be sized to allow easy access to all control components
3. Proportional SCR Controller:
- a. Airflow sensor: Proportional electronic airflow sensor shall be totally independent of the duct static pressure sensors/controls. Controller shall accept input from Building Automation System (BAS) to adjust the heater capacity based on the available airflow and heating demand. The heaters shall deliver up to maximum heating capacity (controlled by input signal from BAS) when air flow is at scheduled minimum with 55 degree entering air temperature. BAS shall reduce capacity (regardless of control signal) to limit leaving air temperature to a maximum of 95 degrees F.
- b. Capacity control: Proportional SCR controller shall modulate the heater output according to the temperature control (BAS) signal. Controller shall be able to utilize at least one of the following control signals as input to modulate heater: Variable 0--10 volts, pulse width modulation or variable 2--20 mA variable current.
- E. Automatic Damper Operator:
1. Electric Actuator: Modulating 24 volt with high limit.
- F. Controller:
1. Digital: Factory mount DDC controller and damper actuator supplied by building automation control manufacturer within unit mounted enclosure.
2. Wiring:
- a. Factory mount and wire controls. Mount electrical components in control box with removable cover. Incorporate single point electrical connection to power source.
- b. Factory mount transformer for control voltage on electric and electronic control units. Provide terminal strip in control box for field wiring of thermostat and power source.
- c. Wiring Terminations: Wire controls to terminal strip. Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70.
- d. Provide transformer to power DDC controller. Wire to power circuit for system.

2) Ceiling Ventilator shall have corrosion resistant galvanized steel housing with four--point mounting capability. It shall be ducted to a cap on wall or roof using round ductwork. Blower assembly shall be removable, have a centrifugal--type blower wheel and a permanently lubricated motor designed for continuous operation. Non--metallic damper/duct connector shall be included. Fan and heater shall be separately controllable. Fan shall contain electric heater Air delivery shall be no less than scheduled and sound level no greater than listed in the schedule. All air and sound ratings shall be certified by HVI.

3) Acceptable Manufacturers are:

- Air Handlers & Heat Pumps, Packaged Units: Carrier, Trane, York, Lennox
- Grilles, Registers & Diffusers: Titus, Nallor, Price, Tuttle & Bailey, Krueger, Metal Aire
- Fans: Twin--City, Cook, Greenheck, Penn Barry, Acme, American Cool Air, Captive Air.
- Dampers/Fire Dampers: United Enertech, Greenheck, Ruskin, Arrow United, Lloyd Industries, Air Balance
- Controls--provided with unit: Provide thermostats by building control system provider
- Controls--VAV: Existing building control provider. Coordinate with owner.

AS-BUILT	
CHANGES REQUIRED	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>
Name (Print)	Brian Porter
Signature	
Company (Print)	Mechanical Repair Service
Date	11/25/2025

GM
Architect

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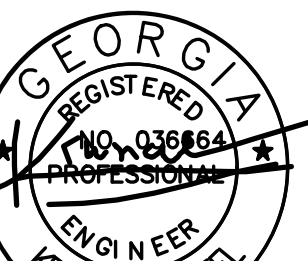
ARCHITECT

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TOTAL
ENGINEERS

169 New Street, Macon, GA 31201
(478)741-4632 - T.E. project # 24-008
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CONSULTANT



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SUNBEL
BUILDERS

MECHANICAL SPECIFICATIONS

Administrative Building Renovations
Centralize Storage Facility
Newton County Board of Commissioners

Covington, Georgia 30014

1113 Usher Street

JOB NO.:	02320
DRAWN BY:	JWK & KMP
CHECKED BY:	KMP
DESCRIPTION:	SCM--REVIEW
DATE:	02.27.24
DESCRIPTION:	DD--REVIEW
DATE:	00.00.24
DESCRIPTION:	CD--REVIEW
DATE:	4.09.24
DESCRIPTION:	BID--CONSTRUCTION
DATE:	00.00.24
REVISIONS:	

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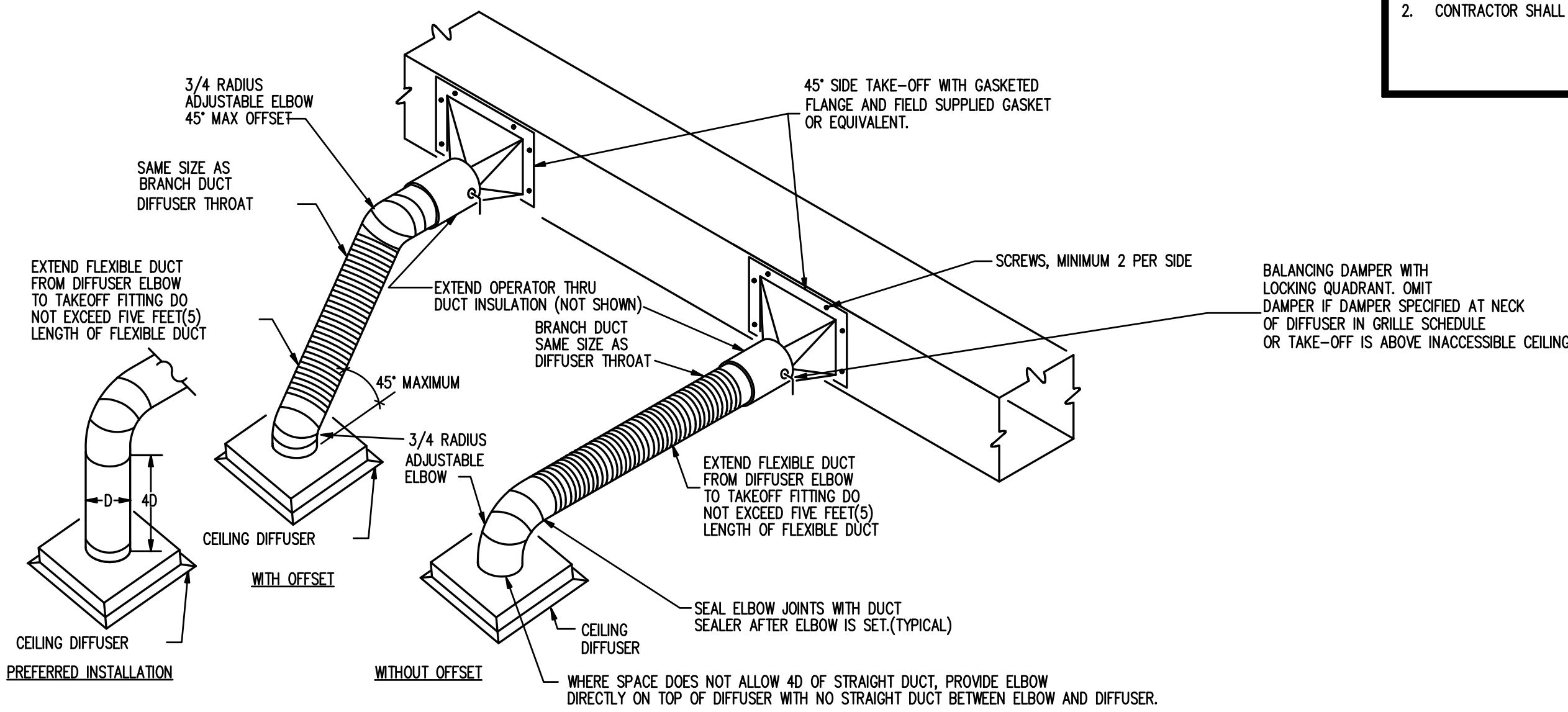
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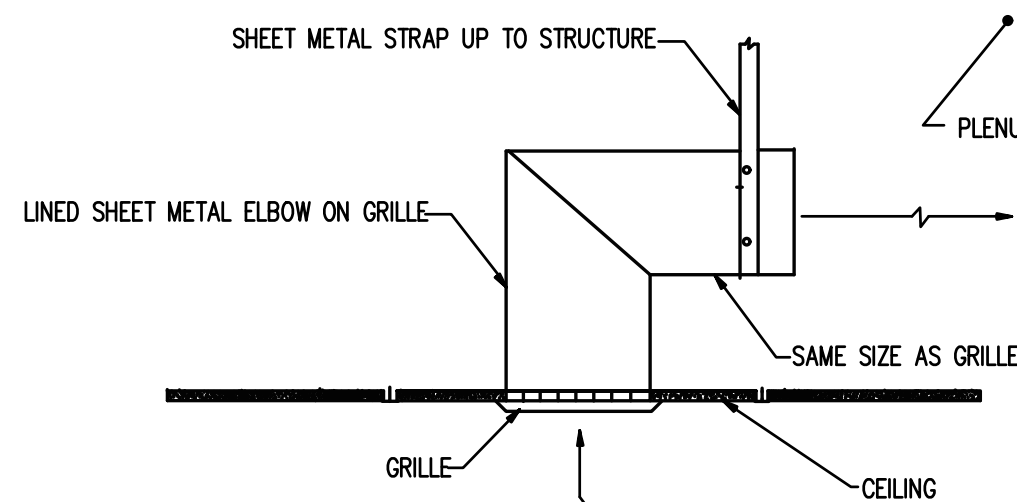
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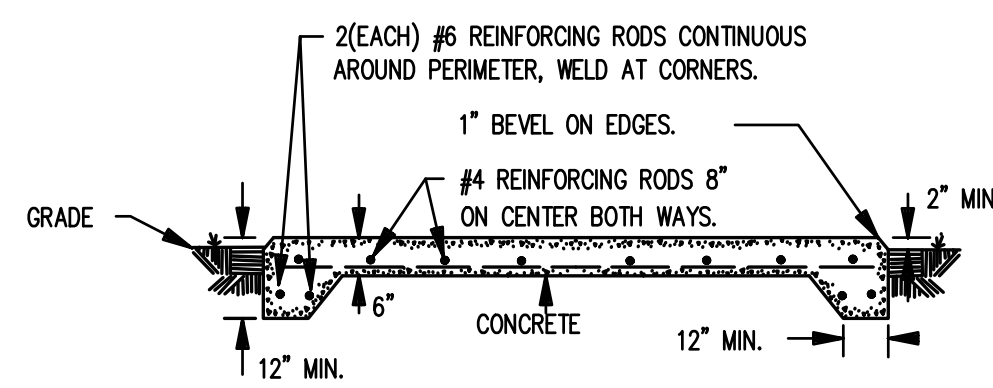
ALPHA BLDG SET 08-21-2024



1 DIFFUSER RUN OUT DETAIL
SCALE: N.T.S.



2 RETURN AIR GRILLE DETAIL
SCALE: N.T.S.



3 EXTERIOR BASE FOR GROUND MOUNTEE PACKAGED UNIT DETAIL
SCALE: N.T.S.

TERMINAL UNIT SCHEDULE							
MARK	TITUS SIZE	MAX. CFM	MIN. CFM	MIN. INLET DUCT SIZE	COIL KW	MIN. # STAGES	VOLTAGE
TU 1-17	12	1,160	350	12	4.0	SCR	277/1
TU 2-15	10	750	250	10	2.0	SCR	277/1
GENERAL NOTES: 1. CONTRACTOR SHALL COORDINATE WITH BUILDING CONTROL SYSTEM(BMS) PROVIDE BEFORE ORDERING TERMINAL UNITS. 2. CONTRACTOR SHALL COORDINATE WITH CONTROL SYSTEM PROVIDER TO INTEGRATE TERMINAL UNITS WITH DDC BMS SYSTEM.							

GROUND MOUNTED PACKAGED UNIT SCHEDULE																			
MARK	AIRFLOW	SUPPLY AIR CFM	MIN OUTSIDE AIR CFM	EXT. SP. IN. W.G.	NOMINAL TONS	EVAP. COIL ENTERING AIR DESIGN CONDITIONS		EVAP. COIL LEAVING AIR DESIGN CONDITIONS		SYSTEM COOLING MAX. REQUIREMENTS (WBH)		OUTSIDE AIR TEMP. CONDITIONS	HEAT PUMP HEATING CAP. MBH	ELEC. HEAT KW	POWER VAC/PH	SERVES	BASIS OF DESIGN: CARRIER	WEIGHT LBS	NOTES
			DB F	WB F	DB F	WB F	DB F	WB F	TOTAL SENSIBLE	DB F									
PU-1	HORIZONTAL	1750	250	0.60	5.0	77.6	64.7	55.0	54.0	57.5	43.5	95	----	12.0	208/3	103 STORAGE	50JC-W06M2A5-3ADAO	900	1:2:3:4:5:6
1. PROVIDE FILTERS, CONDENSATE TRAP AND PIPING, FLEXIBLE CONNECTIONS, SIDE CONNECTIONS, PROGRAMMABLE T-STAT, AND CONDENSATE P-TRAP TO DISCHARGE INTO ROOF DRAIN. 2. VERIFY ELECTRIC POWER REQUIREMENTS WITH ELECTRICAL PLANS, WHICH TAKE PRECEDENCE OVER THIS INFORMATION. 3. PROVIDE MANUFACTURER'S CONDENSATE OVERFLOW SWITCH AND SUPPLY AIR SMOKE DETECTOR. ELECTRICAL SHALL INTERLOCK SMOKE DETECTOR WITH BUILDING FIRE ALARM SYSTEM. 4. PROVIDE MANUFACTURER'S ECOLBLUE DIRECT DRIVE MEDIUM STATIC ECM MOTOR WITH VANE AXIAL INDOOR FAN. PROVIDE MOTORIZED OUTSIDE AIR DAMPER INTERLOCK TO OPEN WITH EVAPORATOR FAN. PROVIDE HORIZONTAL LOW LEAK ECONOMIZER WITH BAROMETRIC RELIEF. 5. PROVIDE MANUFACTURER'S HUMID-MIXER NOT GAS REHEAT COIL. UNDER HEATING EVAPORATOR FAN SHALL BE AT 100% OF SUPPLY AIR VOLUME. 6. VARIABLE SPEED COMPRESSOR COOLING ONLY UNIT. PROVIDE PHASE MONITOR/PROTECTION AND MANUFACTURER'S SYSTEM VU CONTROLS.																			

MECHANICAL SYMBOLS & ABBREVIATIONS LEGEND	
NEW PIPE, DUCTWORK OR EQUIPMENT	
DUCT SIZE: FIRST DIMENSION IS SIDE DRAWN	
FLEXIBLE ROUND DUCTWORK	
FIRE DAMPER, SMOKE DAMPER, SMOKE DETECTOR	
CEILING SUPPLY DIFFUSER	
CEILING RETURN OR EXHAUST AIR	
S.A. DUCT OUT OF TU BOX WITH DUCT LINER FOR THR FIRST FIVE FEET OF DUCT OUT OF TU BOX	
SIDEWALL REGISTER OR GRILLE	
CHANGE IN PIPE OR DUCT SIZE OR SHAPE	
REFRIGERANT PIPING	
CONDENSATE OR OTHER DRAIN PIPING	
ELBOW TURNED DOWN OR TURNED UP IN PIPING	
THERMOSTAT, ARROW SHOWS CONTROL WIRING PATH	
TIME CLOCK	
DIAMETER	
UNDER-CUT DOOR 3/4", UNLESS OTHER SIZE NOTED	
INDICATES EQUIPMENT ON PLANS; TOP ITEM SHOWS TYPE OF EQUIPMENT AND BOTTOM ITEM SHOWS SPECIFIC MARK NUMBER	
ITEM IN HEXAGON SHOWS AIR DEVICE MARK NUMBER. ITEM ABOVE LINE SHOWS NECK SIZE, ITEM BELOW LINE SHOWS AIR FLOW THROUGH DEVICE, AND NUMBER IN FRONT SHOWS QUANTITY IF MORE THAN ONE	
ABOVE FINISHED FLOOR	
AIR HANDLING UNIT	
BYPASS DAMPER	
BTU/H, MBH	
CAPACITY	
CUBIC FEET PER MINUTE	
CEILING	
CONDENSING UNIT	
DB, WB	
DRY BULB TEMPERATURE, WET BULB TEMPERATURE	
EA, EG	
EXHAUST AIR, EXHAUST GRILLE	
EF	
EXTERNAL STATIC PRESSURE (USUALLY EXPRESSED IN INCHES OF WATER IN GAGE)	
EXT SP	
HEAT PUMP UNIT	
MVD, VD	
MANUAL VOLUME DAMPER	
OA	
OUTSIDE AIR	
RA, RG	
RETURN AIR, RETURN GRILLE	
RTU	
PACKAGED ROOFTOP UNIT	
SA	
SUPPLY AIR	
VAC, PH	
VOLTS ALTERNATING CURRENT, NUMBER OF PHASES	
W, KW	
WATTS, KILOWATTS	
UH	
UNIT HEATER	
AUDIBLE/VISUAL ALARM DEVICE CONNECTED TO DUCT SMOKE DETECTOR	
ACCESS DOOR	
RADIUS ELBOW (R=1.5)	
VANED ELBOW	
MANUAL VOLUME DAMPER (MVD), MOTOR OPERATED DAMPER (MOD)	

DUCTED DEHUMIDIFICATION UNIT							
MARK	CFM	POWER AMPS	CONDENSATION PPDB06F/600RH	REFRIGERANT	POWER/PHASE	BASIS OF DESIGN	NOTES
DH-1	310	8.3A	130	R410A	115/1	APRILAIRE 8191	1:2:3:4:5:6:7:8:9
DH-2	310	8.3A	130	R410A	115/1	APRILAIRE 8191	1:2:3:4:5:6:7:8:9

1. PROVIDE CORD AND PLUG FOR DISCONNECT. PROVIDE MODEL 76 WALL MOUNTED ELECTRONIC HUMIDISTAT/CONTROLLER. MOUNT AT 4'-0" AFF. PROVIDE BUILT IN DIGITAL CONTROL WITH DISPLAY.
2. VERIFY ELECTRIC POWER REQUIREMENTS WITH ELECTRICAL PLANS, WHICH TAKE PRECEDENCE OVER THIS INFORMATION.
3. INLET AIR OPERATING CONDITIONS(DEHUMIDIFICATION) : 50°-90°.
4. NON-DUCTED DEHUMIDIFIER. UNIT WEIGHT 115 LBS.
5. ROUTE CONDENSATE DRAIN AS SHOWN ON DRAWING.
6. A NORMALLY CLOSED DAMPER APRILAIRE MODEL 6506 SHALL BE INSTALLED IN THE INTAKE DUCT.
7. PROVIDE INLET GRILL WITH FREE FLOW DISCHARGE. SUSPEND UNIT AT 9'-0" AFF.
8. PROVIDE COIL OUTLET SWITCH WIRED IN SERIES WITH FLOAT ACTIVATED SWITCH LOCATED AT DRAIN PAN. REFER TO DETAIL PROVIDED.
9. FLOAT ACTIVATED AND COIL OUTLET CONDENSATE SWITCHES SHALL BE PROVIDED AND INSTALLED BY HVAC CONTRACTOR.

FAN SCHEDULE							
MARK	CFM	EXT. SP IN W.G.	DRIVE TYPE	MOTOR WATTS/HP	MAX FAN SPEED (RPM)	POWER/PHASE	NOTES
EF-1	70	0.25	DIRECT	20 W	690	115/1	GREENHECK SP-B90

1. VERIFY ELECTRIC POWER REQUIREMENTS WITH ELECTRICAL PLANS, WHICH TAKE PRECEDENCE OVER THIS INFORMATION.
2. FAN SHALL BE INTERLOCKED WITH LIGHT SUCH THAT FAN CONES ON WHEN LIGHTS ARE ON. PROVIDE 15 MINUTE TIME DELAY.
3. CENTRIFUGAL CEILING MOUNTED FAN. PROVIDE MANUFACTURER'S GRILLE, ROUND DUCT CONNECTION, SOLID STATE SPEED CONTROL AND MOTOR WITH THERMAL OVERLOAD.

AIR DEVICE SCHEDULE							
MARK	SERVICE	NECK SIZE	FACE SIZE	MATERIAL	TYPE	PATTERN	NOTES
S1	SUPPLY	SEE PLANS	24"x24"	STEEL	SQUARE CONC.	4-WAY	1:2:3
S2	SUPPLY	SEE PLANS	NECK + 1-3/4"	STEEL	DOUBLE DEFLECTION REGISTER	2-WAY	1:3:4
S3	SUPPLY	SEE PLANS	24"x24"	STEEL	SQUARE CONC.	4-WAY	1:2:3
R1	RETURN	SEE PLANS	24"x24"	ALUMINUM	EGGGRATE	---	1:5
R2	RETURN	SEE PLANS	24"x12"	ALUMINUM	EGGGRATE	---	1:5
R3	RETURN	SEE PLANS	24"x24"	ALUMINUM	EGGGRATE	---	1:5
R4	RETURN	SEE PLANS	NECK + 1-3/4"	ALUMINUM	FULL LOUVERED FACE	---	1:2
E1	RETURN	SEE PLANS	24"x12"	ALUMINUM	EGGGRATE	---	1:6

1. PROVIDE STANDARD WHITE FINISH.
2. INSULATE BACK OF DEVICE.
3. BALANCE AIRFLOW TO QUANTITY SHOWN.
4. PROVIDE MANUFACTURER'S FACE OPERATED DAMPER THAT IS ACCESSIBLE FROM THE FACE OF DIFFUSER. PROVIDE 22.5-DEGREES DOUBLE DEFLECTION. OMIT FACE DAMPER WHERE NOTED ON DRAWINGS.
5. PROVIDE FULL SIZE LINED ELBOW ON TOP OF GRILL.
6. PROVIDE FULL SIZE PLENUM ON TOP OF GRILL FOR DUCT CONNECTION.

AS-BUILT	
CHANGES REQUIRED	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>
Name (Print)	Brian Porter
Signature	
Company (Print)	Mechanical Repair Service
Date	11/25/2025

ALPHA BLDG SET 08-21-2024

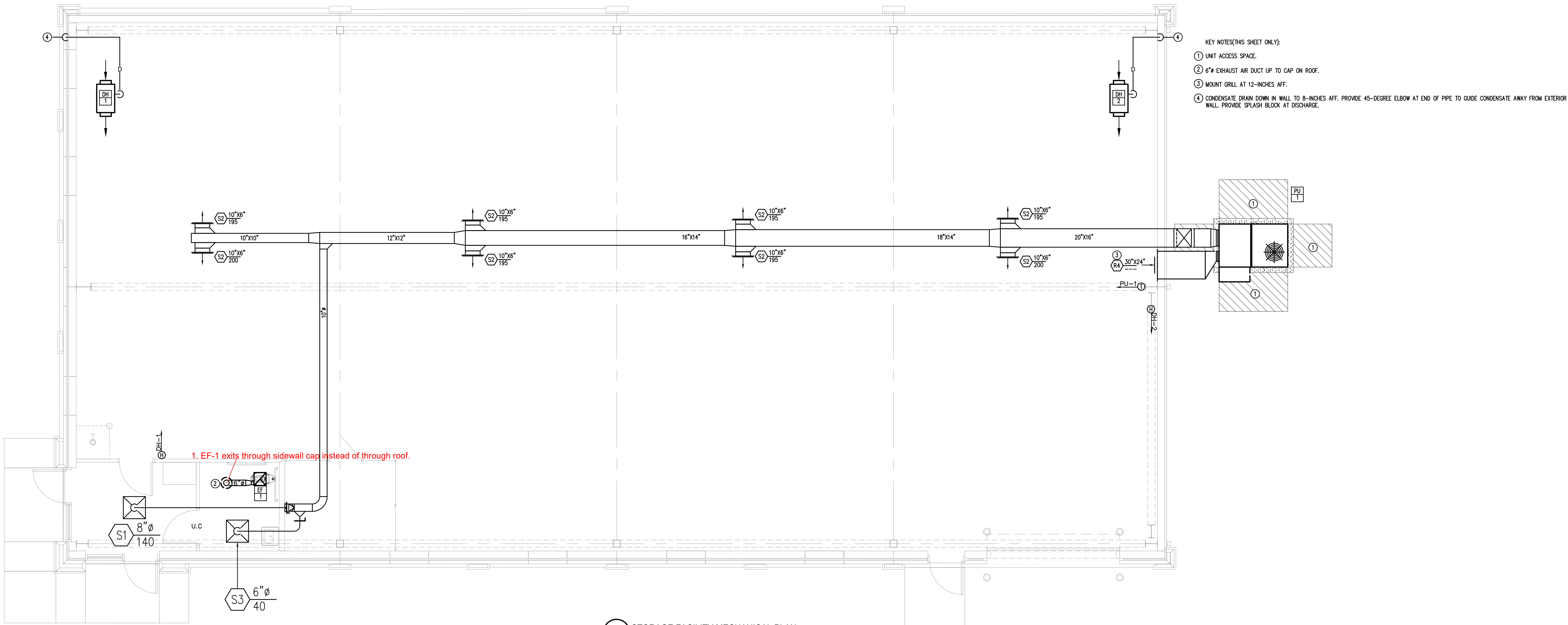
JOB NO.:	02320
DRAWN BY:	JWK & KMP
CHECKED BY:	KMP
DESCRIPTION:	SCM-REVIEW
DATE:	02.27.24
DESCRIPTION:	DD-REVIEW
DATE:	00.00.24
DESCRIPTION:	CD-REVIEW
DATE:	4.09.24
DESCRIPTION:	BID-CONSTRUCTION
DATE:	00.00.24
REVISIONS:	
1	00.00.24
2	05.24.24
3	07.09.24 VE
4	
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6	
7	

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SHEET

M0.2

OF



1. EF-1 exits through sidewall cap instead of through roof.

2. Exhaust fan added to morgue.

1 STORAGE FACILITY MECHANICAL PLAN
SCALE: 1/4"=1'-0"

- KEY NOTES (THIS SHEET ONLY):
- ① UNIT ACCESS SPACE.
 - ② 6" EXHAUST AIR DUCT UP TO CAP ON ROOF.
 - ③ MOUNT GRILL AT 12-INCHES AFF.
 - ④ CONDENSATE DRAIN DOWN IN WALL TO 8-INCHES AFF. PROVIDE 45-DEGREE ELBOW AT END OF PIPE TO GUIDE CONDENSATE AWAY FROM EXTERIOR WALL. PROVIDE SPLASH BLOCK AT DISCHARGE.

AS-BUILT	
CHANGES REQUIRED	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>
Name (Print)	Blane Porello
Signature	
Company (Print)	Mechanical Repair Service
Date	11/25/2025

ALPHA BLDG SET 08-21-2024

JOB NO.:	02320
DRAWN BY:	JWK & KMP
CHECKED BY:	KMP
DESCRIPTION:	SCH-REVIEW
DATE:	02.27.24
DESCRIPTION:	DD-REVIEW
DATE:	00.00.24
DESCRIPTION:	CD-REVIEW
DATE:	4.09.24
DESCRIPTION:	BID-CONSTRUCTION
DATE:	00.00.24
REVISIONS:	
1	00.00.24
2	05.24.24
3	07.09.24 VE
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SHEET

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