DIVISION 23 - HEATING, VENTILATING, AND AIR-CONDITIONING

SECTION 23 05 00 - COMMON WORK RESULTS FOR HVAC

1.01 WORK INCLUDED

A. The work included by this division of the specifications includes furnishing all labor, materials, equipment, and services, including minor items omitted but necessary to construct and install the complete systems described by the Contract Documents and specified below. "Contractor" refers to the Mechanical Contractor. The general conditions of the specifications apply and are included in this part of this section.
   1. Heating, ventilating and air conditioning systems
   2. Temperature control system
   3. Kitchen supply and exhaust

1.02 CODES AND REGULATIONS

A. Comply with state and local codes, and utility company regulations. Final interpretations will be made by the local inspection authority. The Contractor to verify the governance of the following Codes, including any local amendments and supplementary codes such as the Codes of the National Fire Protection Association:
   1. Building Code: 2018 International Building Code
   2. Plumbing Code: 2018 International Plumbing Code
   3. Mechanical Code: 2018 International Mechanical Code
   4. Fire Code: 2018 International Fire Code
   5. Gas Code: 2018 International Fuel Gas Code
   6. Energy Code: 2018 International Energy Conservation Code
   7. Electrical Code 2020 National Electrical Code

1.03 EQUIPMENT AND MATERIALS STANDARDS

A. Equipment and materials shall be new, UL-listed for the use intended, and free from damage or defect. They shall comply with the latest industry standards.

1.04 CONTRACT DRAWINGS

A. Illustrate the general design and extent of performance required. All dimensions and locations shall be taken from the Architectural drawings. Consult with Architectural plans and locate all ceiling equipment where indicated on reflected ceiling plans

1.05 SHOP DRAWINGS

A. Submit products data and/or shop drawings as required by the Architect for the following:
   1. Insulation
   2. Air handling equipment
   3. Grilles, registers, diffusers, louvers
   4. Fire dampers
   5. Temperature controls, systems, and components
   6. Valves
   7. Pumps

B. Quality of specific equipment is established by manufacturer's catalog number. Alterations caused by any Substitution shall be accomplished at no additional expense to the Owner.

C. Manufacturers not listed may submit for acceptance as an "approved equivalent." Requests for an "equivalent" means "approved equivalent". Four copies of such submittal must be received by the Engineer seven (7) working days prior to bid date.

1.06 WARRANTY

A. The Contractor shall be responsible for the successful operation of mechanical systems, equipment, and materials installed under this Contract for a period of one year from the date of final acceptance. Defective equipment or materials shall be repaired or replaced at no expense to the Owner. Provide four complete service and maintenance calls spaced at equal intervals during the warranty period.

1.07 PRODUCT HANDLING AND CLEAN UP

A. Equipment shall be left clean and undamaged, to the satisfaction of the Owner. The General Conditions take precedence.

B. HVAC equipment shall not be used during construction as a means to heat or cool the space, unless specific approval is given by the owner. If such equipment is used, it must be completely cleaned and repaired as necessary. Cleaning involves replacing all filters; cleaning all coils and heat exchangers; inspecting fans, plenums, and ductwork and cleaning as directed by the owner.

1.08 CUTTING AND REPAIRING

A. The contractor shall be responsible for all cutting, drilling, welding, and repair required for his portion of the work. Coordinate with the Architect. The General Conditions take precedence.

1.09 OPERATING AND MAINTENANCE DATA

A. Provide the Owner with operating and maintenance instructions (four copies) required for operation of all mechanical systems. Bind the written instructions in a notebook. The General Conditions take precedence. The manuals shall include the following items:
   1. Operating manual and spare parts list for each piece of equipment.
   2. Preventive maintenance schedule for lubricating and checking each piece of equipment.
   3. Instructions on who to call for service during the warranty period.

1.10 PERMITS

A. The contractor shall pay for all fees, taxes, secure permits, licenses, and inspections required for the project.

1.11 TEMPORARY SERVICES

A. Provide temporary water service for construction, as required by the General Contractor.

1.12 COORDINATION

A. Coordinate outlet device and equipment locations with the Architectural Plans and work of other trades. Locate on horizontal and vertical lines to avoid interference and to provide functional use of all equipment. Verify electrical power characteristics before ordering equipment.

B. Electrical work performed by this contractor will conform to the standards of Division 26-28. Mechanical equipment motors and controls shall be furnished, set in place, and wired according with the following schedule unless otherwise noted or specified. MC = Division 21-23 EC = Division 26-28

Item	Furn By	Set By	Power Wiring	Control Wiring
Combination starters	MC	EC	EC	MC
Equipment motors	MC	MC	EC	--
Motor starters & O.L. relays	MC	EC	EC	MC
Disconnect switches	EC	EC	EC	MC
Thermal overload heaters (1)	EC	EC	EC	--
Variable Speed Drives	MC	EC	EC	MC
Control relays/transformers	MC	MC	EC	MC
Temperature control panels	MC	MC	EC	MC
Temp. Controls conduit/wiring	MC	MC	--	MC
Actuator and solenoid wiring	MC	MC	--	MC
Pushbuttons & pilot lights	MC	MC	--	MC
Room thermostats	MC	MC	--	MC
Thermostats: line voltage	EC	EC	EC	--

C. The general guideline for the division between control (by MC) wiring and power wiring (by EC) is that power wiring carries the current which energizes a motor, control wiring does not. Control wiring may be 120V, which would be the responsibility of the MC. Control motors are wired by the MC.

D. Examine the site and become aware of existing conditions, utilities, and other issues affecting the satisfactory completion of the project.

1.13 DELIVERY, STORAGE, HANDLING

A. Provide necessary hauling and hoisting equipment. Protect the materials of this Division before, during, and after installation.

1.14 AS-BUILT DRAWINGS

A. Keep a current set of "as-built" drawings on site. Upon completion of the work, furnish engineer with a reproducible prints showing the "as-built" installation.

1.15 PROJECT/SITE CONDITIONS

A. Visit the site to become familiar with location and the various conditions affecting the work, including existing utilities.

1.16 PLAN VERIFICATION

A. After completion of the bidding and selection process, prior to awarding the contract, the contractor must review and verify the contract documents in their entirety, including those of other trades. At this time, discrepancies, conflicts, omissions, etc in the contract documents must be documented. Alterations to the contract will be made at that time to include such items, as well other modifications which might be made by the Owner. After award of the contract, change orders caused by discrepancies, conflicts, omissions in the contract documents will not be allowed.

2.01 EXPANSION JOINTS, GUIDES, AND ANCHORS

A. Provide expansion joints or loops, guides, and anchors in piping to allow for expansion and contractions. Expansion joints shall be bellows type.

2.02 VALVES

A. Gate valves 2" and smaller shall be cast bronze, rising stem, solid disc, 200 PSI WOG
B. Ball valves 2" and smaller shall be cast bronze, full port, stainless steel ball, teflon sets, 400 PSI WOG.
C. Butterfly valves 2" and smaller shall be cast bronze, stainless steel disc, surrounding fluoroelastomer seal, 350 PSI WOG.
D. Check valves shall be horizontal, swing-cast bronze, bronze disc, 200 PSI WOG.
E. Valves shall be domestically manufactured by Milwaukee, Powell, Nibco, or equivalent.

2.03 RELIEF VALVES

A. Relief valves shall be all-bronze A.S.M.E. rated valves with external test levers, sized in accordance with the instructions of the appropriate manufacturer. Pipe discharge outside or to floor drain where possible and per code. Valves shall be manufactured by Watts or equivalent.

2.04 FLEXIBLE CONNECTORS

A. Connectors in piping shall be made with molded teflon or neoprene and nylon bellows, metal reinforcing rings, flanged ends and control rods, suitable for 40F to 200F temperature range and 125 lbs. pressure. Alternative shall be stainless steel inner hose with braided exterior sleeve for steel pipe or bronze inner hose with braided exterior sleeve for copper piping. Metra-flex Company, or equivalent.

2.05 SPECIALTIES

A. P/T Plugs: 1/4" diameter, brass with Nordel core, Sisco or equivalent.
B. Pressure Gauges: 4 1/2" dial type, aluminum housing. Ashcroft 1010 or equivalent.
C. Thermometers: 7" red reading mercury type. Palmer Instruments or equivalent.

2.06 ELECTRICAL

A. Lugs: Lugs for wiring connections shall be rated for copper and aluminum, nad shall have a minimum rating of 75C.
B. Electric motors shall be rated for the appropriate application: wet location (TEFC); submersible; explosion proof, VFD's, etc.

2.07 ACCESS PANELS

A. The Mechanical Contractor shall furnish and General Contractor shall install access panels where required for access to equipment. The Mechanical Contractor shall include the cost of installation in his bid. Access panels shall be adequately sized, of a type approved by the Architect and shall be fire or smoke-rated as required.

3.01 START-UP PROCEDURES

A. Follow manufacturer's recommended procedures in starting up the equipment; damage caused during start-up shall be replaced at no expense to the owner.

3.02 HANGERS AND SUPPORTS

A. Support piping and equipment from the structure to prevent sagging, pocketing, swaying, and vibrations, and arranged to provide for expansion and contraction. Brackets, clamps, and hangers shall be steel, except copper hangers will be used with copper piping. Hangers supporting vibrating equipment shall be provided with spring isolators. Chain, perforated iron or wire hangers are not permitted. Hangers will be of a type acceptable to the Engineer, and shall have a capacity and spacing as required by code.

3.03 EXCAVATION AND BACKFILLING

A. Provide excavating and backfilling for Mechanical Work. Backfill in 12" layers, mechanically tamp to 95% proctor standards. Protect according to OSHA standards. The General Conditions take precedence. Verify the location of underground utilities before excavation; the contractor is responsible for any damage to underground utilities. Restore existing paving, curbs, sod, bushes, etc to match surroundings.

3.04 PIPING INSTALLATION

A. Install piping plumb and straight, parallel with walls and partitions. Conceal piping within structure whenever practical. Provide drain valves at all low points, vents at all high points, to allow complete drainage.
B. Material and methods per ASME, ASTM, ASA, AWS, and National Plumbing Code Handbook
C. Provide unions or flanges in piping connections to each valve, device, or item of equipment. Install each union or flange to permit the removal of parts and equipment for inspection or cleaning, without disconnecting any piping, except unions or flanges.
D. Piping on the roof will be supported above the roof on roof pads. The pads shall be approximately 6"Wide by 6" high by the length as required. They shall be made of recycled rubber, rated for 500lbs/ft loading each. The pads will have galvanized steel "C" channel attached to the top, which can accommodate pipe clamps to secure the piping. This configuration of individual piping pads may be expanded to include two pads supporting a trapeze style support where multiple pipes are racked together. The pads are C-series manufactured by Cooper B-line, Erico, or approved equivalent.

3.05 PIPING TESTING

A. All piping systems shall be tested and witnessed by the Owner prior to concealment. Protect equipment and fixtures or equipment, isolating them during the test. DWV system, including vents and vent stacks shall be sealed and hold water without leaks for 24 hours. Pressure piping shall be tested at the maximum pressure rating of the lesser of piping or fittings. Copper domestic water and hydronic piping may be air tested or hydrostatically tested; PEX or CPVC water piping shall be hydrostatically tested; natural gas piping shall be air tested.

3.06 CLEANING AND STERILIZATION

A. After testing, water piping systems shall be filled, operated for a sufficient length of time to completely remove all foreign material, and flushed.
B. Sterilize the domestic hot and cold water piping in accordance with the local health authority standards. Flush the systems with clear water until the residual chlorine content is equal to that of clear water.
C. Where there is no water treatment contractor sterilize piping system with chlorine for 24 hours to 50 PPM. Completely flush to less than 1 PPM. Local health authority standards take precedence.

3.07 FLEXIBLE PIPE CONNECTIONS

A. Provide flexible pipe connection suitable to connect to adjoining piping as specified for pipe joints. Use sized pipe units. Install flexible pipe connectors on pipes connected to equipment supported by vibration isolation.

3.08 PIPE IDENTIFICATION

A. After completion of the piping or insulation, paint stenciled descriptive abbreviations, including directional arrows, on piping at equipment and approximately every 25'.

3.09 SLEEVES AND PLATES

A. Provide sleeves and inserts for all mechanical piping. The contractor shall be responsible for the cost of cutting and patching required for piping where sleeves and inserts were not installed or where incorrectly located. Sheetrock joint compound may be used to seal openings in non-rated walls(insulation to be continuous through walls.
B. Drill holes as required for the installation of hangers required for the mechanical work.
C. Where sleeves are placed in exterior walls below grade, the space between the pipe or conduit and the sleeves shall be made completely water-tight.
D. Seal all piping passing through fire-rated construction with approved material to maintain air-tight, fire-rated integrity, with a U.L. listed assembly compatible with the wall or floor assembly being penetrated.

3.10 LOW EMITTING MATERIALS

A. All sealants & adhesives required for the installation of mechanical & plumbing system within the building envelope shall meet the requirements for low emitting materials as set for in the South Coast Air Quality Management District (SCAQMD) Rule #1168 (or LEED new construction requirements), which includes but is not limited to:
   1. Metal to Metal adhesive: VOC limit of 30g/L.
   2. Fiberglass adhesive: VOC limit of 80g/L.
   3. Multipurpose construction adhesive: VOC limit of 70 g/L.

SECTION 23 05 93-TESTING, ADJUSTING, AND BALANCING

1.01 GENERAL

A. Balancing shall be done by an independent firm specializing solely in the discipline of balancing air and water systems, and a member of NEBB.. Firms desiring to furnish services for this project shall submit for written approval during bidding. All air and hydronic systems shall be balanced using applicable proportionate procedure.

2.01 TESTING CONDITIONS

A. (Air) Before adjustments are made, check the system for such items as dirty filters, duct and damper leakage, vibrations, etc. All diffusers, duct sections, etc shall be adjusted to deliver design quantities within 5%. Air quantities shall be tested simulating filters being 50% loaded. Adjust/replace sheaves and belts as required to achieve design air quantities. Replace thermal motor overloads as required.
B. (Hydronic) Before adjustments are made, check the system to make water treatment has been completed and glycol added. Also check for leaks, vibrations, etc. All circuit setters shall be adjusted to deliver design fluid flows within 5%. Verify that there is no pump cavitation, and that boilers and coolers are cycling at appropriate temperatures.

2.02 REPORT

A. After all adjustments are made, a detail written report shall be prepared and submitted for approval. Final acceptance of the project will not be made until a satisfactory report is received and field verified. The report shall detail the test equipment and balancing procedures being used; the general status of the system being tested including equipment details; provide data sheets indicating the required and actual CFM of all outlets and inlets.

SECTION 23 07 00 - INSULATION

1.01 QUALITY ASSURANCE

A. All insulation shall have a composite rating (insulation, jacket and adhesives) not exceeding flame spread 25 and smoke developed 50.

2.01 PIPE INSULATION FOR PIPING ABOVE GRADE

A. Insulation shall be closed-cell, elastomeric pipe insulation having a conductivity of 0.27 at 75 °F mean, with thicknesses as follows:

Pipe Sizes	1/2" - 1-1/2"	>1-1/2"
Hydronic hot water	1"	2"
Chilled water	1"	1-1/2"
Refrigeration (Suction Lines)	1"	1"

B. Insulation shall be Armacell "Armaflex" or equivalent by Johns-Mansville, Owens-Corning.
C. Exterior piping insulation will be painted with a white solvent based alkyd finish(Armaflex AB or equivalent), including all fittings, valves, etc. Jacket and insulation will be sealed weathertight and installed per manufacturers instructions. Where exposed to physical damage, exterior piping insulation will be covered with aluminum jacket, including all fittings, valves, etc. Jacket and insulation will be sealed weathertight and installed per manufacturers instructions.
D. All interior underground water(domestic and hydronic) piping shall be insulated with 1" Armaflex, except where noted.

2.02 PIPE INSULATION FOR PIPING BELOW GRADE

A. Insulation shall be closed-cell, elastomeric pipe insulation having a conductivity of 0.27 at 75 °F mean, with thicknesses as follows:

Pipe Sizes	1/2" - 1-1/2"	>1-1/2"
Refrigeration (Suction Lines)	1"	1"

B. Insulation shall be Armacell "Armaflex" or equivalent by Johns-Mansville, Owens-Corning.
C. Exterior piping insulation will be painted with a white solvent based alkyd finish(Armaflex AB or equivalent), including all fittings, valves, etc. Jacket and insulation will be sealed weathertight and installed per manufacturers instructions. Where exposed to physical damage, exterior piping insulation will be covered with aluminum jacket, including all fittings, valves, etc. Jacket and insulation will be sealed weathertight and installed per manufacturers instructions.
D. All interior underground water(domestic and hydronic) piping shall be insulated with 1" Armaflex, except where noted.

2.03 REFRIGERANT PIPE INSULATION

A. Insulation shall be 1" thick, closed-cell, elastomeric pipe insulation having a conductivity of 0.27 at 75 °F mean:
B. Exterior piping insulation will be painted with a white solvent based alkyd finish(Armaflex AB or equivalent), including all fittings, valves, etc. Jacket and insulation will be sealed weathertight and installed per manufacturers instructions. Where exposed to physical damage, exterior piping insulation will be covered with aluminum jacket, including all fittings, valves, etc. Jacket and insulation will be sealed weathertight and installed per manufacturers instructions.
C. Insulation shall be Armacell "Armaflex" or equivalent by Johns-Mansville, Owens-Corning.

2.04 DUCT INSULATION, WRAP

A. Duct wrap insulation shall be flexible fiberglass insulation, 1 pcf, with factory-applied, reinforced, aluminum foil vapor barrier. Insulation shall have a K-factor of .25 at 75 °F mean.
B. Duct wrap shall be installed as follows or as shown on the plans:
   1. Supply air ducts(heated space): 1-1/2"
   2. Supply air ducts(unheated space): 2"
C. Wrap shall be Johns-Manville "Microlite" or equivalent by Owens-Corning, Certainteed or Knauf.
D. At the contractor's option, the above specified duct wrap may be replaced with duct liner or equal or greater thickness.

2.05 DUCT LINER

A. Duct liner shall be 1-1/2 lb density (3.0lb for exterior ducts), constructed of glass fiber liner. The air stream surface is coated with black-coated mat surface. Liner shall have a "K" value of 0.24/inch at 75F mean.
B. Duct liner shall be installed as follows or as shown on the plans:
   1. Supply air ducts: 1".
   2. Exterior supply, return, or make up air ducts: 3"
   3. Return air ducts(within 15' of fan): 1/2"
   4. Outside air intakes within space: 1"
   5. Treated make up air within space: (not insulated)
C. Liner shall be Johns-Manville "Linacoustic" or equivalent by Owens-Corning, Certaineed or Knauf.

2.06 EXTERIOR DUCT INSULATION, BOARD

A. Duct insulation shall be ridge polystyrene board insulation. Insulation shall have a K-factor no greater than .23 at 75 °F mean.
B. Duct board shall be installed as follows or as shown on the plans:
   1. Supply air ducts(exterior): 2" 3"
C. Cover insulation board with metal jacket, secure with screws or bands. Seal jacket weather tight with silicone caulk.
D. Or at the contractors discretion: cover insulation with a self-adhering weather proof membrane. Polyguard or equiv. Install per manufacturer's recommendations.

3.01 PIPE(FIBERGLASS)

A. Secure cloth with adhesive applied to seal laps of cloth. Jacket overlap on longitudinal seams and ends of piping insulation shall be pasted down with a waterproof adhesive.
B. Provide pre-formed isocyanurate or calcium silicate rigid pipe support with metal shield at all pipe supports per manufacturers instructions. Insulation must not be interrupted for supports, etc.
C. Pipe saddles shall be type M-URSA as manufactured by Industrial Insulation Sales, or equivalent.

3.02 PIPE(ELASTOMERIC)

A. Insulation shall be solid slip-on installed prior to connection. Butt joints shall be sealed with manufacturer's adhesive. Where slit seams must be installed, seal the seam with manufacturer's adhesive. Fittings shall be insulated with meter-cut pieces of insulation according to manufacturer's instructions, or insulated with similar sheet insulation installed according to manufacturer's instructions.
B. Provide wood blocks and metal hanger shields at support strap locations on horizontal pipe runs. Insulation will not be interrupted for supports, etc.

3.03 DUCT WRAP

A. Wrap the fiberglass blanket around the ductwork with 2" overlapping flanges stapled at 6" on center. Strip the lap of insulation and staple the facing directly to the overlapped foil. Secure the insulation to the ductwork with 18-gauge galvanized wire at 12" on center. On ducts larger than 48", use mechanical fasteners on the bottom of the duct.
B. Tape all joints with 3" wide foil reinforced kraft tape. Tape all pin penetrations or punctures in the facing.

3.04 ACOUSTIC DUCT LINER

A. Liner shall be secured to all duct surfaces by pressing into wet adhesive, applied to 100% of the duct surface. In addition, liner shall be held in place with insulpins welded to duct and with clips slipped over the pins. Insulpins shall be located per SMACNA Standards. Liner shall be lapped and compressed in all four corners of the duct. Both upstream and downstream transverse edges shall be coated with adhesive, coated a minimum of 1" over the edge in all places.

SECTION 23 09 00 - AUTOMATIC TEMPERATURE CONTROLS

1.01 SCOPE

A. Furnish, install, and place in operation a complete system of automatic temperature controls. The temperature control contractor may be the mechanical contractor or approved sub-contractor.
B. Acceptable automatic temperature control equipment manufacturer's shall be Honeywell, Johnson Controls, or controls furnished by the specific equipment manufacturer.
C. The control system shall include all components and appurtenances necessary to provide a complete system. All wiring for automatic temperature controls, regardless of voltage shall be the responsibility of the ATC Contractor. 120VAC work shall be installed in conformance with requirements of Division 16. The Temperature Control Contractor shall coordinate all electrical work associated with his installation with the Electrical Contractor. Power wiring for all equipment, shall be the responsibility of the Electrical Contractor.

1.02 QUALITY ASSURANCE

A. Upon completion of the work, instruct the building operating personnel and provide two (2) complete sets of operating and maintenance instruction booklets.
B. Submit copies of complete temperature control diagrams with written "sequence of control" and factory-printed specification data sheets covering each control device proposed to be used, prior to installation of any equipment or part or system.

1.03 SERVICE AND GUARANTEE

A. The Contractor shall guarantee the control system installed under this section of the specification to be free from defects in workmanship and material under normal use, and agrees to provide service for one (1) year after acceptance by the Engineer or of beneficial occupancy of the building. Any defects in workmanship or material during this time shall be corrected at no charge to the Owner.

2.01 THERMOSTATS

A. HVAC unit thermostats shall be low-voltage, programmable, heating/cooling type with fan on-auto switch. Units shall be Honeywell TB7100A (or equivalent) with seven day programmable, 10 year program retention, 5 degree deadband, and manual override.

3.01 SEQUENCE OF OPERATION

A. HVAC units shall each be controlled by a heating/cooling thermostat.
B. Toilet exhaust fans shall be controlled with associated lights.
C. Dishwasher hood exhaust fan shall be controlled manually.
D. Kitchen hood exhaust fans shall be interlocked with MUA unit for simultaneous operation. Provide fire alarm interlock as required by local inspector and/or fire chief. Unless otherwise required as mentioned above, all will be de-energized by a signal from any hood fire protection system. Kitchen hood exhaust fans shall be automatically activated when cooking commences (via thermostat in hood collar by hood vendor).
E. Activation of a duct detector shall shut down its respective HVAC unit.

SECTION 23 21 00 - HYDRONIC PIPING SYSTEMS

1.01 WORK INCLUDED:

A. The work required is indicated on the drawings and includes, but is not necessarily limited to, a complete hydronic heating system, using a boiler as the heat source and fintube.

2.01 PIPING:

A. Piping shall be Type "L" copper with 50/50 solder joints or schedule 40 black steel with threaded or welded joints.

2.02 EXPANSION TANK:

A. The expansion tank shall be a welded steel, diaphragm type tank, ASME rated, sized as shown and sized on the drawings. The tank fitting shall include an air purger, air vent, and fill valve.

2.03 PUMPS:

A. Pumps shall be 1750 rpm single-stage, in-line, centrifugal oil-lubricated, sleeve-bearing pump bronze fitted with cast iron casting with flanged piping connections, and having mechanical seals.
B. Motor selections shall be such that they are non-overloading under all conditions of operation. Motors shall be open drip-proof type. Provide motor controller for each pump.
C. All pumps shall be by the same manufacturer, Bell & Gossett, Taco, Paco, or approved equal.

2.04 BOILER

A. The boiler will be of a sealed combustion low-pressure, 90%+ efficiency condensing boiler capable of developing full A.G.A. certified gross output capacity at 100 percent firing rate.
B. The boiler shall be stamped with the required official ASME symbol, hydrostatically pressure tested for 160 psig, ASME working pressure. Maximum working pressure will be 15 psig.
C. The boiler shall be furnished with a heavy-gauge aluminized steel base with aluminized steel curtain walls. The end, front, and back base panels shall be protected with high- temperature insulation board panels. The boiler base shall be factory packaged with burner manifolds, main burners, base panels, and insulation board panels.
D. Gas burners : The boiler shall be provided with stainless steel main burners which shall be manufactured of one-piece construction. The burner shall modulate down to 10%.
E. Controls:
   1. All electrical safety controls are to be of accepted quality manufacture and shall be U.L. and A.G.A. design certified.
   2. The boiler shall be equipped with intermittent electronic ignition pilot system.
   3. The inlet gas pressure to the boiler manual main shut-off gas valves should be no less than 5" water column or no more than 7" water column.
   4. Operating controls shall be as shown on the plans.
F. Water Boiler Standard Controls:
   1. Low-limit (operating) and high-limit temperature controls. The low-limit control shall be set according to the design requirements of the heating system. The high-limit control should be set at least 20oF higher than the low-limit control setting.
   2. ASME-certified pressure relief valves and the valves shall be set to relieve at the rated boiler ASME working pressure.
   3. Low water cut-off with manual reset, per the state boiler code.
G. The boiler will be manufactured by Triangle Tube, Teledyne Laars, Raypak, or equivalent.

2.05 WATER HEATER (HYDRONIC):

A. Provide a hydronic water heater, sized as shown on the plans. The heater shall be constructed of a polyethylene tank, insulated with urethane foam insulation, with a steel outer shell. The heat exchanger shall be made of coiled copper tubes, completely immersed within the tank. An immersion thermostat shall be provided with adjustable temperature control, including necessary interlocks and relays for the hydronic pump control interface. Provide a P/T relief, sized for the heater, piped full size to a nearby floor drain.

3.01 HYDRONIC HEAT PIPING SYSTEM:

A. Provide air vents at all high points where air pocket might form and drain valves with hose ends at low points.
B. No connections will be permitted that do not make ample and approved allowance for expansion, and provide for proper drainage at all times.
C. Provide isolation valves and balancing cocks on each supply and return connection from branches. Install terminal units: baseboard, fin tube, fan coil units, etc per manufacturers instructions.
D. Provide dielectric unions at all points of connection between steel and copper piping.

3.02 PUMPS:

A. In-line pumps shall be supported by hanging or welded floor supports. They shall not be supported by connecting piping.
B. Provide taps on the inlet and discharge of each pump to measure pressure differential.

3.03 BOILER:

A. The boiler shall be pre-assembled or assembled and installed per manufacturer's instructions.

SECTION 23 22 00 - WATER TREATMENT

1.01 WORK INCLUDED:

A. Provide materials, equipment, and services for the following systems:
   1. Hydronic system: hot water
   2. Chlorination of Domestic Water Lines:
   3. See Section 23 05 00 - Common Work Results For HVAC.

1.02 QUALITY ASSURANCE:

A. Chemical Treatment Contractor shall specialize in Water Treatment Service and have laboratory facilities, both central and field, available to service the Owner's account.

1.03 SUBMITTALS:

A. The Water Treatment Contractor shall provide a written Engineering Report on the results of the water treatment for the first year. One copy to the Owner and one copy to the Engineer and Architect.
B. Technical literature shall be delivered at turnover to the Owner's designated representative in duplicate for each chemical and piece of equipment provided.

1.04 MAINTENANCE:

A. Provide monthly service calls to instruct Contractor's and Owner's personnel in treatment, testing, and maintenance of the chemical treatment program from one month prior to turnover until the end of the one-year guarantee.
B. Written chemical test report and recommendations shall be made at each visit with one copy to the Owner's designated representative and one copy to the mechanical engineer.

2.01 CLOSED SYSTEMS WITH GLYCOL:

A. A buffered nitrite corrosion inhibitor compatible with 20% glycol solution shall be provided to initially treat the closed systems listed above. The Water Treating Contractor shall add and maintain in the system 500 to 1000 ppm. NaNO2.
B. After closed system has been cleaned and flushed it shall be filled with a solution of water and pure propylene glycol (20% by volume). The Water Treatment Contractor shall then add the Buffered Nitrite to the system to bring the residual up to 500 to 1000 ppm. NaNO2.
C. Solution tests for Glycol and Nitrite shall be submitted to the engineer and architect after the system has been filled by the Water Treatment Contractor.
D. Standard automotive antifreeze or any other solution with oil-base additives shall not be used.

2.02 TEST EQUIPMENT:

A. Closed Systems : Provide nitrite "Drop Test" test kit to test for nitrite in the closed systems.

3.01 CLEANING OF PIPE LINES:

A. The Chemical Treatment Contractor shall be responsible for supervising and furnishing the proper chemical for chemically cleaning the heating and domestic water lines water system.
B. The systems to be cleaned shall first be drained and then refilled with a solution of 10% by weight of a heavy-duty alkaline cleaner, capable of wetting and penetrating heavy soil deposits of an oily or greasy nature, and removing them from the system. This solution shall be circulated for a period of 16 hours, drained, and then filled with treated water.
C. In no case shall the system being cleaned be left in an untreated condition for more than eight (8) hours.
D. The Water Treatment Contractor shall certify that the system was cleaned as specified.

SECTION 23 30 00 - HVAC AIR DISTRIBUTION SYSTEMS

1.01 DUCTWORK

A. General All ductwork shall be constructed strictly according to the latest ASHRAE, SMACNA, and IMC standards. Duct sizes shown are inside clear dimensions; maintain sizes inside lining for lined ducts.
B. Sheet Metal:
   1. Sheet metal shall be constructed of coated galvanized steel of lock-forming grade conforming to ASTM Standards A-653/A653M and A-924. Reinforcement shall be constructed of galvanized steel.
   2. Duct thickness shall conform to the above standards. Where there is a discrepancy, the greater thickness shall apply. Reinforcement, joint type, spacing and thicknesses may be varied at the contractors discretion, in conformance with the above standards, except where specifically noted. Transfer ducts across rated corridors shall be 26 gauge, or as required by Code.
   3. Round ductwork exposed to the public will be galvanized steel, spiral wound, maintaining in a clean, shiny appearance, and not utilizing visible sealing material. Concealed round ductwork may spiral wound, or snap lock type galvanized steel ductwork.
   4. Sealing: All longitudinal and transverse joints in ductwork shall be sealed with Mon-Eco Industries Eco Duct Seal 44-50 or equivalent as follows:
      a. Main supply ductwork shall be sealed to SMACNA Class B Standards(3"W.G. or less).
      b. Return, exhaust, and supply ductwork shall be sealed to SMACNA Class B Standards(3"W.G. or less).
      c. Return, exhaust, and supply ductwork downstream of coils and VAV boxes shall be sealed to SMACNA Class C. (2"W.G. or less).
   5. Location: Sheet metal may be used throughout the project.
C. Flexible Ductwork (Polymer Liner):
   1. Flexible ductwork shall be constructed of a spring steel helix supporting a plastic core. It shall be insulated with 1" fiberglass having a density of 1 lb./cu.ft. The insulation is sheathed in an copolymer vapor barrier jacket.
   2. The duct shall be rated at 10" w.g., and a maximum velocity of 4000 fpm. The duct shall be listed in conformance with UL Standard 181, Class 1.
   3. Flexible duct shall be limited to a maximum length of 2', as a means of connecting boxes, diffusers, etc. to the duct system. Uninsulated flexduct may be used where the adjacent ductwork is uninsulated or unlined.
   4. Flexduct shall be manufactured by Hart & Cooley, Clevaflex or equivalent.

1.02 SPECIAL DUCT SYSTEMS

A. Kitchen hood exhaust.
   1. Duct shall be constructed strictly according to the latest ASHRAE and SMACNA standards. All duct work shall be constructed of 16-gauge steel or 304 stainless steel, 18-gauge minimum. All duct, and duct to hood joints, with longitudinal seams and transverse joints continuously butt welded. Slope exhaust duct at not less than ½"/ft, except where other code requirements require a steeper slope. Duct connections to fans shall be flanged and gasketed to be grease tight.
   2. Ducts shall be wrapped with a two layers of foil encapsulated, alumina/silica fibrous blanket, in strict accordance with the manufacturer's instructions, and in conformance with ASTM std 2336. Joints shall be butt joints with overlaps. The blanket shall be firmly secured to the duct using carbon steel bands. Blanket shall be 3M Firemaster , Ductwrap or Firewrap, or equivalent.
   3. Exterior ducts shall be painted with paint rated for 150F, color as selected by the Architect. The duct will be cleaned and primed prior to painting.
B. Flue Piping:
   1. All parts of flue vent system shall be Underwriter's Laboratories-listed, type B, double-wall, gas vent piping. The outer wall shall be galvanized steel; inner wall shall be 1100 alloy aluminum with built-in 1" air space. All flues shall terminate in a roof cap, as required by code.
   2. The flue vent piping shall be manufactured by Metalbestos. Approved equivalents are Heat-fab, Selkirk, or Hart and Cooley.
C. Dishmachine:
   1. The dishmachine exhaust duct shall be a waterproof duct system, suitable for use with saturated air. Where exposed in the kitchen, the duct system shall be constructed of burnished stainless steel with a smooth finish to match the adjacent dishmachine.
   2. The duct system shall used stainless steel with welded joints in all rectangular portions of the system.
   3. After the rectangular SST portion of the system transitions to round duct, the system may be made of aluminum with Fernco couplings, PVC pipe with solvent joints, or stainless steel with welded joints. Vertical portions must also be watertight, but aluminum ducts need not use Fernco couplings if properly configured. Submit alternate material or systems to the engineer for approval. Silicone sealant on conventional aluminum or SST ductwork is not allowed.

1.03 DUCT ACCESS DOORS

A. Where motorized dampers, fire dampers, control equipment, etc. are installed in ducts, and for cleaning ductwork, access doors shall be provided in the ducts, made air-tight with gasketed edges. Use Ventlok, or equal, sponge rubber or felt gasketing material. The doors shall be double-wall construction with 1" of rigid insulation fill and shall be attached to the duct with cam latches. Omit access door insulation and double-wall construction if ducts are not specified to be insulated. Access doors shall be constructed of the same materials as the ductwork.

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APPROVAL STAMPS:

REVIEWED FOR CODE COMPLIANCE
09/07/2022

No.	Date	Description
2	3/21/22	ISSUED FOR PERMIT & PRICING
1	02.14.22	ISSUED FOR PERMIT

SUBMISSIONS & REVISIONS

OWNER

MAY REIGLER PROPERTIES
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PROJECT LOCATION

STEAMBOAT BASECAMP PARTIAL RENOVATION & TENANT FIT-OUT
1901 CURVE PLAZA
STEAMBOAT SPRINGS, CO 80487

DRAWING TITLE

MECHANICAL SPECIFICATIONS

SEAL

COLORADO LICENSED PROFESSIONAL ENGINEER 38983 03/21/2022

DATE: 02/14/22
DRAWN BY:
CHECKED BY:
PROJECT NO: 20129

DRAWING NO: **M1.11**

B. Provide access panels where required for access to the "Duct Access Doors." If these access panels are placed in fire-rated walls or ceiling or floor, then the access panel shall have the same rating.

1.04 FLEXIBLE CONNECTIONS

A. All supply and exhaust fans and other air handling units with inlet and outlet duct or casing connections shall have a flexible connector in each connection. Connector shall be made of at least one layer of Ventglas, two-side, neoprene-coated, heavy glass fabric, Underwriters' approved and labeled as manufactured by Ventfabrics, Inc.

2.01 GRILLES, REGISTERS, AND DIFFUSERS

A. Provide grilles, registers, and diffusers of the size and type shown on the plans. Grilles, registers, and diffusers shall be made of steel with a baked white enamel finish, or extruded aluminum with clear finish, as indicated for each grille, register, or diffuser. Secure GRD's to structure where connected by flex ductwork, or where required by local code. Paint ductwork visible behind GRD's flat black. G R D's shall be manufactured by Titus, Price, Metallaire, or equivalent.

2.02 FIRE DAMPERS

A. Provide approved fire dampers in ducts wherever they pass through fire-rated walls, floors, and shaft enclosures and in any other locations required by code. All fire dampers shall be U.L. approved and labeled for 1-1/2 hour rating unless otherwise indicated on drawings. Dampers shall be fabricated of galvanized steel and shall be of such design and length as to function as a wall-mounting sleeve, which shall be part of the fire damper. Frames shall be secured, bolted construction. Damper sleeves shall be secured in wall with 2" x 1" x No. 14-gauge retaining-angle irons on the top, both sides and bottom of wall sleeve, and on each side of the fire wall. Dampers shall be Ruskin, United Sheet Metal, National Controlled Air, Louvers and Dampers, Inc., or approved equivalent. Dampers shall be Type B unless otherwise indicated.

2.03 COMBINATION SMOKE/FIRE DAMPERS

A. Each combination smoke/fire damper shall be 1-1/2 hour rated under U.L. Std 555, and a leakage rated smoke damper under U.L. Std.555S. U.L. linkage rating shall apply to all damper sizes; elevated temperature ratings shall apply to operators as well as dampers.

B. The damper shall have a fusible link and electric operator. damper and operator shall be supplied as a single entity.

C. Dampers shall be controlled by an adjacent duct or area detector, as appropriate to the situation. Installation shall include mounting of damper and detector, interconnecting wiring, etc. If there is a central building fire alarm system, the detector and interlock wiring will be provided by the electrical contractor. It is the responsibility of the mechanical contractor to assure that the damper operator is compatible with the fire alarm system; any modifications, transformers, relays, etc caused by incompatibility, will be the responsibility of the mechanical contractor.

D. Damper shall be a class II leakage rated damper, maximum 6"WC and 4,000 FPM, at 250F temperature: Ruskin FSD60 or equivalent

E. Damper shall be a class III leakage rated damper, maximum 2.5"WC and 1,500 FPM, at 250F temperature: Ruskin FSD35 or equivalent.

F. Dampers shall be manufactured by Prefco, Ruskin, National Controlled Air or equivalent.

G. Dampers shall be approved and listed by the State of California Fire Marshal. Provide State Fire Marshal with approval numbers before installation

2.04 DUCT DETECTORS

A. Duct smoke detectors shall be solid state photo-electric type. Detector shall include air sampling chamber with sampling tubes extending through the width of the air duct. LED Alarm status indicating lights shall be visible on the front of the detector. Key controller test and reset switches plus an easily accessible test jack shall be provided. They shall include alarm relay contacts (DPDT) capable of handling loads of up to five (5) amperes at 210 VAC or 28 VDC resistive. Unit shall have self-contained power supply requiring 120/220/240V power. Detector shall include a remote indicating light/test switch (this may be deleted if the unit is clearly visible and readily accessible). Provide necessary interlocks with air handlers, smoke dampers, etc as required by the local fire department, including relays, transformers, etc. Detectors Shall be listed by Underwriters' Laboratories for use in air conditioning and ventilating duct systems in compliance with the National Fire Protection Association and Underwriters' Laboratories, Standard UL 167.

2.05 EXHAUST FAN, CEILING

A. The ceiling exhaust fan shall have a steel housing with a galvanized or baked enamel finish. An automatic back-draft damper shall be located within the duct connector and have cushioned stops. The fan wheels shall be balanced centrifugal and shall operate at less than 1200 rpm. Fans shall bear the AMCA certified rating seal and the U.L. label. The entire fan, motor, and wheel assembly shall be removable without disturbing the housing. Fan motors shall be grounded and mounted on vibration isolators. Fans shall be Penn Zephyr, Greenheck, Cook Gemini, or approved equivalent.

2.06 EXHAUST FAN, ROOF (UPBLAST)

A. The roof-mounted exhaust fans shall have a spun aluminum housing with up-discharge outlet. The fan wheels shall be dynamically balanced, aluminum, centrifugal BI. The motor shall be belt-drive, open drip-proof type, mounted internally on vibration isolators. Fans shall bear the AMCA certified ratings seal and the U.L. labels for rating under L.L. Std. 762. Fans shall be controlled as scheduled in Section 23 09 00 Controls. Provide grease trough where shown. Fans shall be Greenheck, Penn, Cook, Acme, Ilg, Carnes, or approved equivalent.

2.07 EXHAUST FAN, UTILITY SET

A. Fan shall be centrifugal, belt-driven, SWSI with non-overloading backward-inclined air foil, aluminum wheel. The housing shall be continuously-welded steel with drain connection. Configure for vertical discharge. Bearings shall be permanently lubricated, sealed ball bearing pillow blocks. Motor and sheaves will be protected in a weatherproof enclosure. Construction shall be non-sparking, listed for use with a Class I kitchen hood. Fan shall be mounted on spring vibration isolators. Assembly will be mounted on a roof curb with galvanized sheetmetal cap, with ½" lip all around. Fans shall be manufactured by Acme, Greenheck, Penn Ventilator, Supreme, or equivalent.

2.08 EXHAUST FAN, ROOF

A. The roof-mounted exhaust fans shall have a spun-aluminum housing. The fan wheels shall be dynamically balanced, aluminum, centrifugal BI. The motor shall be belt-drive, open drip-proof type, mounted internally on vibration isolators. Fans shall bear the AMCA certified ratings seal and the U.L. labels for rating under U.L. Std. 762. Fans shall be controlled as scheduled in Section 23 09 00 Controls. Fans shall be Greenheck, Penn, Cook, Acme, Ilg, Carnes, or approved equivalent.

2.09 AIR INTAKE AND DISCHARGE LOUVERS

A. Exterior stationary louvers shall be anodized aluminum 4" blades on 2-7/8" centers at 30 deg with return bends. Louvers shall be weatherproof. Set in frame, secure, and caulk into opening. Provide galvanized steel 1/2", 19-gauge wire mesh behind louver. Size per the plans.

B. Approved manufacturer's shall be Louvers and Dampers, Airstream, Dowco, Ruskin, or Titus.

2.10 AIR FILTERS

A. Provide air filters where shown on the drawings. Filters shall be rigid, throw-away type, constructed of pleated fiber materials with metal mesh support maze across both faces of the media. Thickness will be 2", unless 1" is the maximum thickness allowable. Filters shall have a UL listing of Class II and an average 30% efficiency rating of ASHRAE Std. 52-76. Filters shall be Farr 30-30 or approved equivalent by Air Filters, Inc., Eco-Air, Cambridge, or American Air Filter.

2.11 HVAC UNITS

A. Furnish and install gas heating, DX cooling rooftop units as shown on the drawings. The cabinet shall be 20 gauge galvanized with 1" thick, 1-1/2 lb. density insulation, baked acrylic enamel finish. Evaporator coil will have a condensate drain pan with PVC trap. Unit will use 2" thick throw-away filters.

B. The cooling section shall consist of a hermetic scroll compressor(s) with five year warranty, condenser fan and motor, evaporator coil. Units with multiple compressors will have separate refrigeration circuits. The unit shall be furnished with an R-410 operating charge, thermal expansion valve, Hi-Low pressure control, accumulator dryer and all necessary relays and starters. Provide a float in the condensate pan, interlocked with the blower, where required by the local jurisdiction.

C. The heating section shall be furnished with an aluminized steel gas furnace, condensate drain, and 20 gauge weatherproof insulated cabinet, and limit controls. Furnace shall have a minimum efficiency of 80%, and shall be configured for use at altitudes above 5,000'.

D. The blower shall be a belt driven, forward curved, centrifugal fan, with oversize motor and drive kit. Blower controls shall be through a time delay blower relay. Single stage heating and cooling shall be available by means of the necessary controls, valves, and relays.

E. Provide economizer package as shown and specified on the drawings. Economizer shall have barometric relief

F. Provide a factory furnished hail guard.

G. Provide a 14" high, galvanized steel factory roof curb; mount unit perfectly level. Provide an automatic setback thermostat with fan on/auto switch as specified in Section 23 09 00.

H. The roof opening beneath the unit will be closed up and sealed tight; caulk or silicone duct penetrations.

I. Unit shall be manufactured by Lennox, Trane, or York. Alternate manufacturer's will be accepted if heating and cooling efficiencies meet or exceed that of the specified product.

2.12 WALL MOUNTED HEAT PUMP

A. Provide a factory assembled, single piece, through-the-wall heating and cooling heat pump, rated in accordance ARI standards and UL listed.

B. The compressor shall be hermetically sealed, with vibration isolation. The coils shall be copper with aluminum fins mechanically bonded, with all joints brazed.

C. Indoor fan shall be single-inlet, squirrel cage blower, dynamically balanced, with vertical discharge. Outdoor fan shall be dynamically balanced propeller type fan. Motors shall be totally enclosed, permanently lubricated, multiple speed.

D. Controls shall consist of automatic rest over temperature and overcurrent compressor protection. The heater shall have 2 overtemperature protectors. There will manual off/on switch in the unit. Control will occur from a remote thermostat.

E. The heat pump shall be as manufactured by Amana, Trane, Carrier, G.E., Singer or approved equivalent.

2.13 VENTILATING UNIT (CLIMATE WIZARD)

A. Provide a roof-mounted, air to air heat exchanger, 'dry'' evaporative cooler. The unit uses a Maisotenko cycle heat exchanger. The heat exchanger is made of cellulose blended fibers in ethyl vinyl acetate channels.

B. The housing is 22 gauge electro-plated steel. All components touching water are SST, with a 18ga. pan, and 16 gauge frame.

C. The unit will be provided with a removable filter.

D. The unit will have a water supply and drain. The supply will have a PRV valve and solenoid valve. There will be a discharge pipe available for extension to a drain.

E. The intake fan is a centrifugal single inlet fan mounted in a plug fan configuration. Provide the fan with an intake rain shield.

F. The exhaust discharge(working air stream) shall be provided with a weatherproof rain shield and ½" birdscreen.

G. The building air shall discharge to a plenum for connection to ductwork in various configurations.

H. The unit will be provided with a motorized discharge damper, which opens when the fan is energized, and fails closed.

I. The unit will be curb mounted on a field built curb. The unit must be mounted perfectly level to assure proper drainage.

J. Provide a fill-drain kit.

K. The unit will be as manufactured by Coolerado LLC, Arvada, Co. (303-375-0878)]

2.14 EVAPORATIVE COOLER

A. Air capacity shall have been established by actual air performance tests meeting the Air Movement and Control Association's Standard 210-74.

B. Cabinet, blower housing, support arms, blower wheel, and pad frames shall be constructed of hot-dipped, galvanized steel. The blower shall be a forward-curved blower wheel. Blower pulleys shall be cast iron. Bearings shall be permanently lubricated, sealed type. Single-phase motors shall be thermally protected (three-phase motors require a starter). Motor mounts shall be adjustable. Blower motors shall be two-speed.

C. Each pad section shall consist of a trough, media filter, and a rigid frame. The evaporative media shall be pads of chemically treated, compacted white aspen wood fibers enclosed in mesh netting, together with a layer of additional Microglass filtration. The evaporative media shall be (6")(12") thick impregnated cellulose modules. Pumps shall be evaporative cooler pumps which are UL-listed components. Pumps shall be grounded and overload protected. They shall be encased in corrosion-resistant, flame-retardant plastic.

D. Provide a manual control station, as furnished by the manufacturer. Provide a fill and drain kit, complete with all valves, sensors and controls.

E. Evaporative coolers will be manufactured by Phoenix, MasterCool, Adobe Air, Universal, Arctic Circle or equivalent.

2.15 MAKE-UP AIR UNIT (INDIRECT FIRED)

A. Provide a roof-mounted, natural gas, natural draft, down discharge, indirect fired make-up air unit, as shown on the plans. Housing shall be aluminized steel with painted enamel, and down discharge plenum.

B. Blower shall be centrifugal type with forward curved DWDI wheel, dynamically balanced. The drive sheave shall be adjustable. Motor shall be 1800 RPM, open drip-proof type. Bearings shall be permanently lubricated.

C. Furnace(s) shall be type 409 stainless steel. Burners shall be aluminized steel. Gas train shall consist of main gas cock, pressure regulator, and solenoid valve; pilot gas cock, pressure regulator, and solenoid valve. Provide spark ignition, high limit and control transformer. Main gas valve shall be modulating type, down to 30%.

D. Unit will have a factory furnished curb.

E. Unit will have a free-standing evaporative cooling section with 12" thick "munters fill" media, pump, float, fill/drain kit, and mesh intake screen. Intake section shall have a birdscreen and extended surface 2" filter. Unit intake will be a factory provided intake cowling.

F. Provide a remote control module, recessed mounted. The module will contain "burner on" and "blower on" indicating lamps. It will also contain a "heat-vent-cool" mode switch. The leaving air temperature control dial shall be mounted on the control module. The room override thermostat shall be mounted as shown on the drawings.

G. Provide a fill and drain kit, complete with all valves, sensors and controls.

H. Make-up air unit shall be RGB series, manufactured by Reznor or equivalent by Modine, Greenheck, or Captive Air.

2.16 MAKE-UP AIR UNIT (DIRECT FIRED)

A. Provide a roof-mounted, natural gas, horizontal or down discharge, direct fired make-up air unit, as shown on the plans. Housing shall be aluminized steel with painted enamel, and down discharge plenum.

B. Blower shall be centrifugal type with forward curved DWDI wheel, dynamically balanced. The drive sheave shall be adjustable. Motor shall be 1800 RPM, open drip-proof type. Bearings shall be permanently lubricated.

C. The burner shall be a cast iron burner with stainless steel mixing plate, and shall use a self contained or motorized modulating gas valve with a turn down ratio of 25:1. Burner shall limit the products of combustion to a maximum of 5 ppm carbon monoxide, and 0.5 ppm nitrogen dioxide. Provide an observation in the burner cabinet. Profile plates shall control proper air velocity across the burner. Unit shall have spark ignition.

D. Unit will have a factory furnished curb.

E. Unit will have a free-standing evaporative cooling section with 12" thick "munters fill" media, pump, float, fill/drain kit, and mesh intake screen. Intake section shall have a birdscreen and extended surface 2" filter. Unit intake will be a factory provided intake cowling.

F. Provide a remote control module, recessed mounted. The module will contain "burner on" and "blower on" indicating lamps. It will also contain a "heat-vent-cool" mode switch. The leaving air temperature control dial shall be mounted on the control module. The room override thermostat shall be mounted as shown on the drawings.

G. Provide a fill and drain kit, complete with all valves, sensors and controls.

H. Make-up air unit shall be ADF series, manufactured by Reznor or equivalent by Modine, Greenheck, or Captive Air.

2.17 FAN COIL UNIT(HEAT PUMP):

A. Provide a low profile, horizontal mounted air handler consisting of a cabinet, blower, DX coil, air filter, pump and controls as shown on the plans and specified below. The unit will be rated for use at 6,700' elevation.

B. The casing shall be designed for indoor installation, insulated with 1/2" insulation, and integral hinged access door with self-retained screws. The unit shall be completely factory assembled.

C. The fan shall consist of two forward curved DWDI centrifugal fans on a common shaft using one blower. It shall be dynamically balanced with vibration isolators. The blower shall be two speed(high cool; low-heat).

D. Refrigerant coil shall be copper with aluminum fins mechanically bonded to the tubes. The coil section is completely insulated and has a drain pan.

E. The unit shall have a filter rack with 1" pleated filters. Access to filters shall be through the hinged access door.

F. The unit will be furnished with electrical disconnect and all electrical connections.

G. The air handler shall be manufactured by Mitsubishi, Samsung, or equivalent.

2.18 CONDENSING UNIT

A. Provide a DX cooling coil and condensing unit to be used in conjunction with the furnace(s) specified above, and as shown on the drawings. SEER shall be 15.0 or greater. The condenser shall consist of a hermetic scroll compressor(s) with five year warranty, vertical discharge direct drive condenser fan and motor, and copper condenser coil with aluminum fins.

B. The compressor shall have high-low pressure control, 5 minute anti-short circuit timer, and crankcase heat. The unit shall be furnished with an R-410A operating charge, Hi-Low pressure control, filter-dryer and all necessary relays and starters. The cabinet shall be 18 gauge galvanized with baked acrylic enamel finish. The compressor shall be pre-charged.

C. Single stage cooling shall be available by means of the necessary controls, valves, and relays. Refrigeration system shall use an expansion valve for refrigerant flow control.

D. Provide a factory furnished hail guard.

E. Provide a low ambient kit for operation down to 30F.

F. Unit shall be manufactured by Lennox, Trane, Carrier, or York. Alternate manufacturer's will be accepted if heating and cooling efficiencies meet or exceed that of the specified product.

3.01 DUCTWORK

A. Provide duct system, connections, air balancing dampers (opposed blade dampers where the take-off is in inaccessible ceiling), dampers, duct turns, housing, hinged sheet metal doors, and necessary removable access doors for the complete supply, return, and exhaust systems. Provide access doors in ductwork wherever required for observation and maintenance of dampers.

B. Duct workmanship. Ductwork shall be constructed and erected in a workmanlike manner. Ducts shall be straight and smooth on the inside with neatly finished joints, air-tight, and free from vibration. The internal ends of slip joints shall be made in the direction of the air flow. The ducts shall be securely attached to the building construction in an approved manner. Changes in dimensions and shape of the ducts shall be gradual. Duct sizes fall within the limiting dimensions indicated on the drawings unless otherwise approved.

C. Duct turns. 90o elbows up to 18" wide and 45o elbows shall consist of an inside radius of not less than half the width of the duct, or be furnished with air foil type duct vanes with 2-1/4" blade spacing. Shop fabricated duct vanes shall conform to details of the Sheet Metal and Air Conditioning Contractors National Association manual.

D. All dimensions shown on drawing are inside dimensions. Contractor shall make allowances for internal lining where called for on drawings or elsewhere in this specification.

E. All junctions, bends, turns, or elbows in all ducts shall have a large radius (centerline radius equal to 1-1/2 times duct width) in the throat in order to minimize the frictional resistance. No short radius turn or junction will be allowed unless turning blades of approved design are provided. Single vane-turning vanes shall be provided for all square turns.

F. Galvanized or aluminum angle iron strips shall be installed at points where ducts penetrate walls to close off the space between the wall opening and the duct.

G. All fittings shall be tack welded on 3" centers and sealed with neoprene sealer to ensure that they do not leak more than 1% when transverse joints are sealed. Areas where galvanize has been burned off shall be painted. Branch takeoffs of main shall be 45 degree "wye" type where possible. Conical takeoffs allowed where "wye" won't fit. Paint the inside of ducts flat black, where visible through grilles, registers or diffusers.

H. Fittings for round or oval spiral wound ductwork shall be installed per the manufacturer's instructions.

3.02 ROOFTOP UNITS(HVAC, MUA, COND, ETC)

A. Mount rooftop units on 14" H curbs or as noted. Units will be mounted level. Where unit does not completely cover curb, provide galvanized metal cap for weatherproof seal.

B. For units with compressors (including HVAC units, condensing units, kitchen condensing units, etc) install at least two layers of ½" gypboard layered with R13 batt insulation for sound attenuation within the roofcurb, beneath the compressor section. Where curbs have been provided over concrete pads, this is not required.

C. For units with condensate drains, provide full size PVC traps. Route discharge so condensate freely drains away from unit.

D. For units with water and/or drain connections, route up within unit or curb where possible.

E. The roof opening beneath the unit will be closed up and sealed tight; caulk or silicone duct penetrations.

F. Provide flat working surface adjacent to unit, as required by code, including handrails, access doors, etc.

G. Label all units per the plans, or as directed by the Owner, using spray paint and 3" high stencils, or as directed by the building owner.

3.03 GREASE PROTECTION SYSTEM

A. Provide a grease protection system around grease fans. This system shall be at least 15" wide, completely around the fan. The system shall be Facilitec G2 Grease Guard XD or equivalent.

3.04 AIR FILTERS

A. Provide three complete sets of pleated, 30% efficient filters: construction phase, replacement just prior to balancing, and replacement set to the Owner.

B. Air handlers are not intended to be used during construction for heating or cooling. The construction set is intended to protect the equipment during initial startup and preliminary testing.

C. Filters shall be installed in factory-assembled filter banks. Enclosure shall be provided with access doors, gaskets to provide air-tight seal, and duct or equipment connections.

D. Filters shall be manufactured by Farr or American Air Filter.

3.05 CONDENSATE DRAIN

A. Provide condensate drain & overflow piping or provide condensate drain piping & overflow float in condensate pan, interlocked with the blower. Size condensate piping as noted on plans, or to match equipment drain outlet size, whichever is larger.

3.06 SPECIAL DUCT SYSTEMS

A. Kitchen:

1. Kitchen exhaust duct system shall comply with NFPA-96, and ASTM std 2336. Slope at a minimum of 1/4" per foot toward the hood to provide for drainage; for horizontal runs in excess of 75', slope at 1" per foot as required by code. Provide for expansion of 2.2"/10 feet. Provide a cleanout at each change of direction and at each floor. Cleanout door shall be tight fitting, gasketed, constructed to the standard as the ductwork, listed for the use.
2. Duct from kitchen hood shall be routed in a code-approved, fire-rated chase. Provide access door at each cleanout.
3. Supports shall be non-combustible, rigid and securely attached to structure, designed for gravity and seismic loads. Fasteners shall not penetrate the duct wall.
4. Paint exterior welded black steel with exterior grade paint, to match adjacent walls, or flat black.
5. Ducts exposed to view in the restaurant shall be stainless steel.
6. Ducts shall be installed in rated shafts, or wrapped with ductwrap. Ductwrap shall be installed in strict conformance with manufacturer's instructions, providing pins, sealing tape, through-penetration materials, access door protection, bands, packing materials, etc.

B. Flue Piping:

1. The gas vent piping shall be installed in full compliance with the terms of its listing, with the manufacturer's installation instructions. Maintain minimum clearance to combustibles.
2. Provide a vent cap above the roof as required by code.
3. Slope and offset flue pipe per code. Route in fire rated shafts where required. Provide a barometric damper where shown or required.

3.07 DUCTWORK TESTING

A. If leakage in excess of 5% of the system design flow is indicated after a balance and adjustment, reseal to eliminate excess leakage. Replace defective material or workmanship at the Contractor's expense and test until the same has met the approval of the Engineer.

B. All ductwork operating at static pressure in excess of 3" W.G. and exterior ductwork shall be leak-tested per SMACNA standards. A minimum 25% of all ductwork shall be tested and the maximum permitted leakage shall be LMAX = CLP0.65.

APPROVAL STAMPS:

REVIEWED FOR CODE COMPLIANCE
09/07/2022

No.	Date	Description
2	3/21/22	ISSUED FOR PERMIT & PRICING
1	02.14.22	ISSUED FOR PERMIT

SUBMISSIONS & REVISIONS

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GENERAL CONTRACTOR

CIVIL ENGINEER

LANDMARK ENGINEERING
141 9TH STREET, PO BOX 774943
STEAMBOAT SPRINGS, CO 80477
T: 970.879.1976

STRUCTURAL FRAMING ENGINEER

KL&A ENGINEERS & BUILDERS
1717 WASHINGTON AVE.
GOLDEN, CO 80401
T: 303.384.9910

M.E.P. ENGINEERS

BOULDER ENGINEERING
1717 15TH STREET
BOULDER, CO 80302
T: 303.444.6038

INTERIOR DESIGNER

JOHNSON NATHAN STROHE
1600 WYNKOOP ST., SUITE 100
DENVER, CO 80202
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PROJECT LOCATION

STEAMBOAT BASECAMP PARTIAL RENOVATION & TENANT FIT-OUT
1901 CURVE PLAZA
STEAMBOAT SPRINGS, CO 80487

DRAWING TITLE

MECHANICAL SPECIFICATIONS

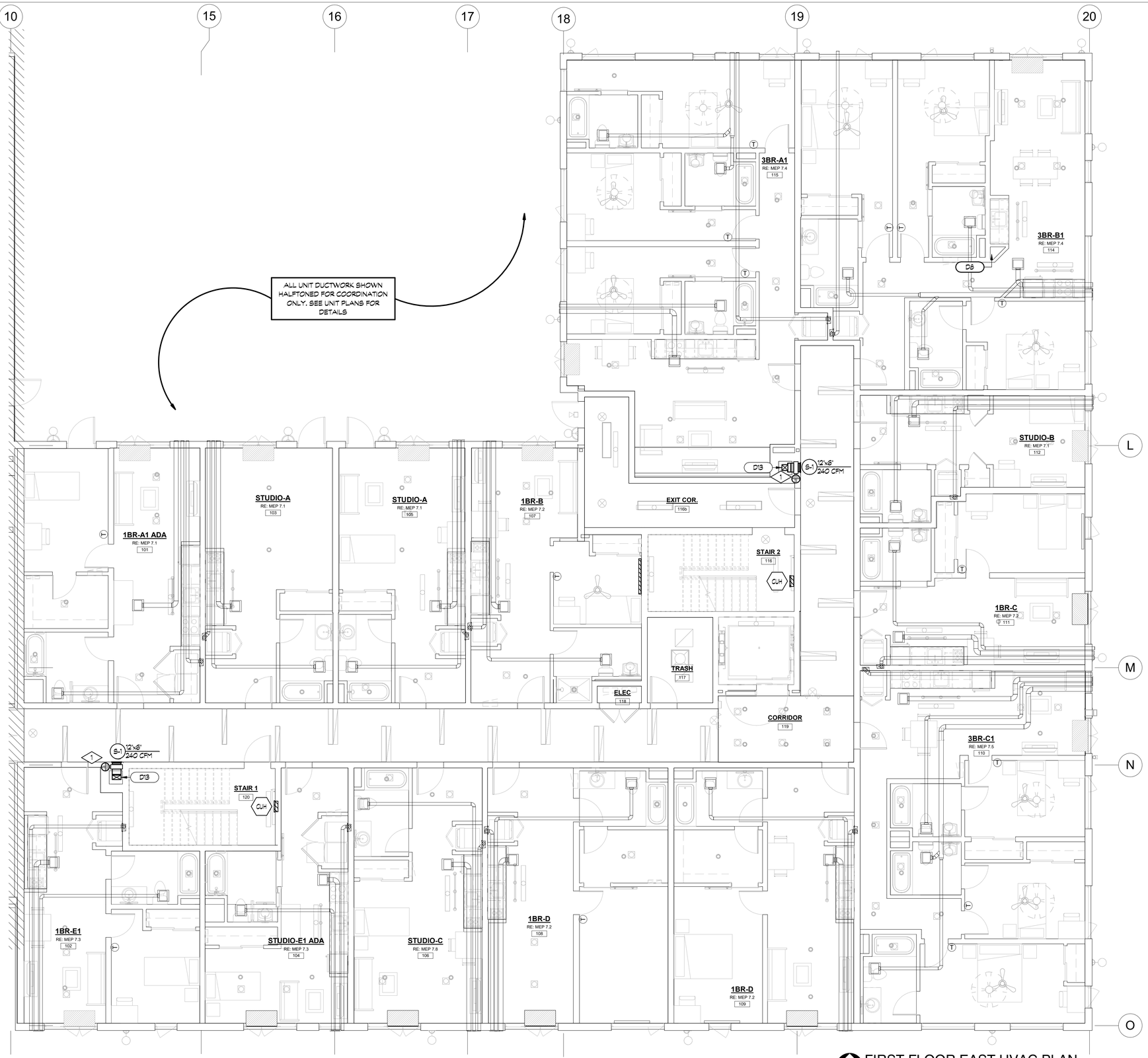
SEAL

COLORADO LICENSED
38983
03/21/2022
PROFESSIONAL ENGINEER

DATE: 02/14/22
DRAWN BY:
CHECKED BY:
PROJECT NO: 20129

DRAWING NO:
M1.12

3/23/2022 10:51:14 AM



FIRST FLOOR EAST HVAC PLAN
3/16" = 1'-0"

GENERAL NOTES

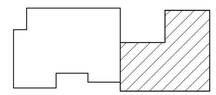
A. FLEX DUCT MAY NOT BE USED IN EXPOSED LOCATIONS. WHERE CONCEALED, FLEX DUCT RUNS NO LONGER THAN 2', REFER TO SPECIFICATIONS.

B. GRILLES, REGISTERS & DIFFUSERS & EXPOSED DUCTWORK TO MATCH ADJACENT CEILING/STRUCTURE COLOR. WHERE CEILING IS LIGHT COLOR, MAINTAIN WHITE GRDS. WHERE CEILING/STRUCTURE IS METAL FINISH OR DARK, PAINT GRDS TO MATCH. REFER TO ARCH PLANS FOR FINISHES.

DETAIL NOTES THIS SHEET

1. LOCATE FIRE-SMOKE DAMPER (AS SHOWN ON PLANS) IN WALL AT DUCT PENETRATION. SHOWN OFFSET FOR GRAPHIC CLARITY. FIRE-SMOKE DAMPER TO BE FRONT ACCESS TYPE FOR USE WITH GRILLE (RUSKIN MODEL FSD60FA OR EQUIVALENT).

KEY PLAN



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APPROVAL STAMPS:

REVIEWED FOR CODE COMPLIANCE
09/07/2022

No.	Date	Description
2	3/21/22	ISSUED FOR PERMIT & PRICING
1	02.14.22	ISSUED FOR PERMIT

SUBMISSIONS & REVISIONS

OWNER

MAY REIGLER PROPERTIES
2201 WISCONSIN AVE NW
SUITE 200
WASHINGTON DC 20007

ARCHITECT

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INTERIOR DESIGNER

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PROJECT LOCATION

STEAMBOAT BASECAMP PARTIAL RENOVATION & TENANT FIT-OUT
1901 CURVE PLAZA
STEAMBOAT SPRINGS, CO 80487

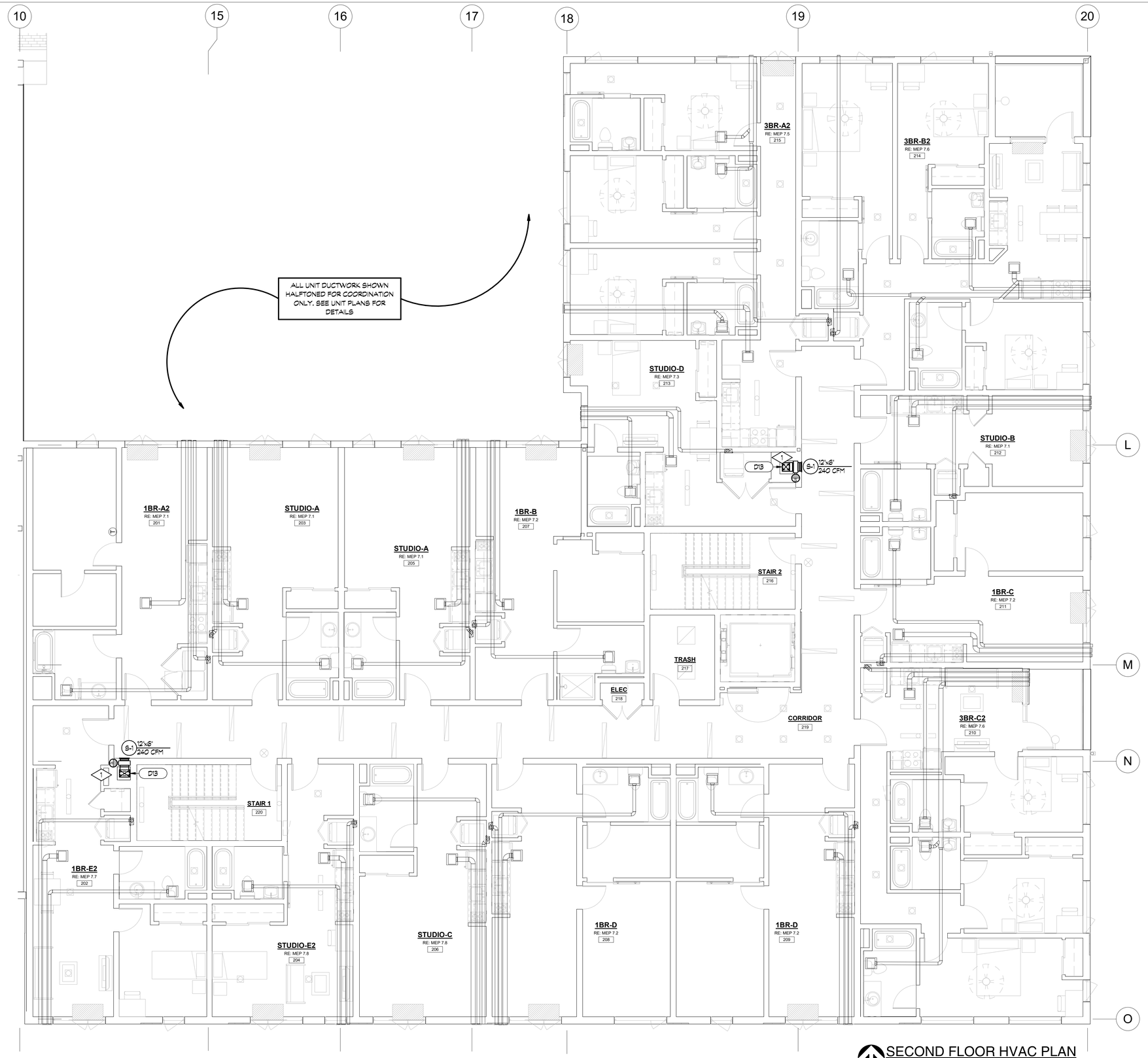
DRAWING TITLE

FIRST FLOOR EAST HVAC PLAN

SEAL

DATE: 02/14/22
DRAWN BY:
CHECKED BY:
PROJECT NO: 20129

DRAWING NO: **M2.11**

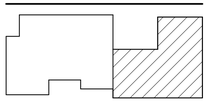


SECOND FLOOR HVAC PLAN
3/16" = 1'-0"

DETAIL NOTES THIS SHEET

1. LOCATE FIRE-SMOKE DAMPER (AS SHOWN ON PLANS) IN WALL AT DUCT PENETRATION. SHOWN OFFSET FOR GRAPHIC CLARITY. FIRE-SMOKE DAMPER TO BE FRONT ACCESS TYPE FOR USE WITH GRILLE (RUSKIN MODEL FSDSOFA OR EQUIVALENT).

KEY PLAN



APPROVAL STAMPS:

REVIEWED FOR CODE COMPLIANCE
09/07/2022

No.	Date	Description
2	3/21/22	ISSUED FOR PERMIT & PRICING
1	02.14.22	ISSUED FOR PERMIT

SUBMISSIONS & REVISIONS

OWNER

MAY REIGLER PROPERTIES
2201 WISCONSIN AVE NW
SUITE 200
WASHINGTON DC 20007

ARCHITECT

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GENERAL CONTRACTOR

CIVIL ENGINEER

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STRUCTURAL FRAMING ENGINEER

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T: 303.384.9910

M.E.P. ENGINEERS

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1717 15TH STREET
BOULDER, CO 80302
T: 303.444.6038

INTERIOR DESIGNER

JOHNSON NATHAN STROHE
1600 WYNKOOP ST., SUITE 100
DENVER, CO 80202
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PROJECT LOCATION

STEAMBOAT BASECAMP PARTIAL RENOVATION & TENANT FIT-OUT
1901 CURVE PLAZA
STEAMBOAT SPRINGS, CO 80487

DRAWING TITLE

SECOND FLOOR EAST HVAC PLAN

SEAL

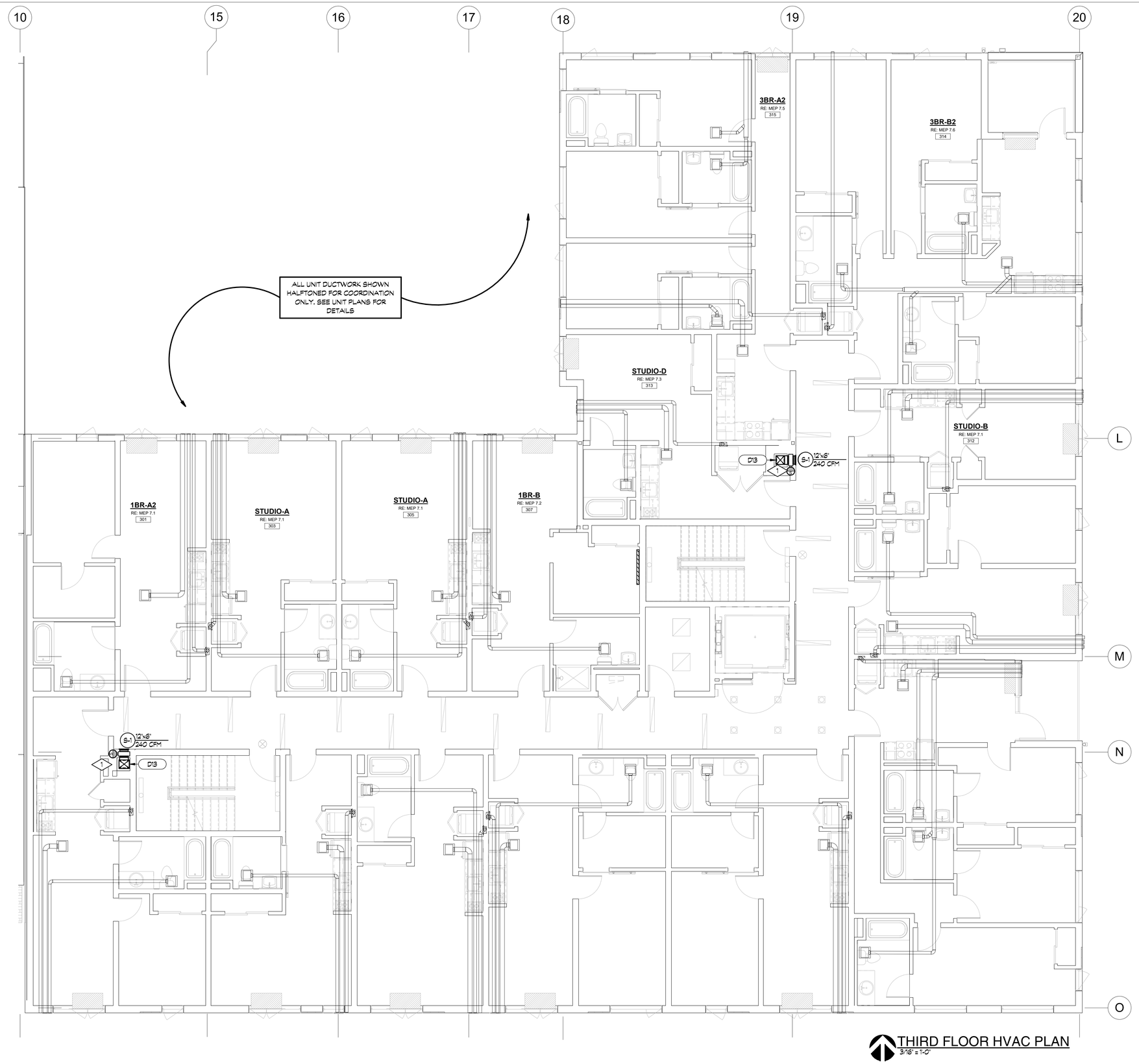
DATE: 02/14/22
DRAWN BY:
CHECKED BY:
PROJECT NO: 20129

DRAWING NO: **M2.21**

3/23/2022 10:51:23 AM

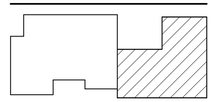
DETAIL NOTES THIS SHEET

1. LOCATE FIRE-SMOKE DAMPER (AS SHOWN ON PLANS) IN WALL AT DUCT PENETRATION. SHOWN OFFSET FOR GRAPHIC CLARITY. FIRE-SMOKE DAMPER TO BE FRONT ACCESS TYPE FOR USE WITH GRILLE (RUSKIN MODEL FSD60FA OR EQUIVALENT).



THIRD FLOOR HVAC PLAN
3/16" = 1'-0"

KEY PLAN



APPROVAL STAMPS:

REVIEWED FOR CODE COMPLIANCE
09/07/2022

No.	Date	Description
2	3/21/22	ISSUED FOR PERMIT & PRICING
1	02.14.22	ISSUED FOR PERMIT

SUBMISSIONS & REVISIONS

OWNER

MAY REIGLER PROPERTIES
2201 WISCONSIN AVE NW
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WASHINGTON DC 20007

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M.E.P. ENGINEERS

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INTERIOR DESIGNER

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T: 303.892.7062

PROJECT LOCATION

STEAMBOAT BASECAMP PARTIAL RENOVATION & TENANT FIT-OUT
1901 CURVE PLAZA
STEAMBOAT SPRINGS, CO 80487

DRAWING TITLE

THIRD FLOOR EAST HVAC PLAN

SEAL

COLORADO LICENSED MICHAEL DEWAYNE MAYER 38983 03/21/2022 PROFESSIONAL ENGINEER

DATE: 02/14/22
DRAWN BY:
CHECKED BY:
PROJECT NO: 20129

DRAWING NO:
M2.31

3/23/2022 10:51:26 AM

10 15 16 17 18 19 20

ALL UNIT DUCTWORK SHOWN HALFTONED FOR COORDINATION ONLY. SEE UNIT PLANS FOR DETAILS

3BR-A2 RE: MEP 7.5 415

3BR-B2 RE: MEP 7.6 414

STUDIO-D RE: MEP 7.3 413

STUDIO-B RE: MEP 7.1 412

D13 S-1 12"x6" 240 CFM

1BR-A2 RE: MEP 7.1 401

STUDIO-A RE: MEP 7.1 403

STUDIO-A RE: MEP 7.1 405

1BR-B RE: MEP 7.2 407

STAIR 2 416

1BR-C RE: MEP 7.2 411

TRASH 417

ELEC 418

CORRIDOR 419

3BR-C2 RE: MEP 7.6 410

S-1 12"x6" 240 CFM D13

STAIR 1 417

1BR-E2 RE: MEP 7.7 402

STUDIO-E2 RE: MEP 7.8 404

STUDIO-C RE: MEP 7.8 406

1BR-D RE: MEP 7.2 408

1BR-D RE: MEP 7.2 409

L M N O

FOURTH FLOOR HVAC PLAN
3/16" = 1'-0"

DETAIL NOTES THIS SHEET

1. LOCATE FIRE-SMOKE DAMPER (AS SHOWN ON PLANS) IN WALL AT DUCT PENETRATION. SHOWN OFFSET FOR GRAPHIC CLARITY. FIRE-SMOKE DAMPER TO BE FRONT ACCESS TYPE FOR USE WITH GRILLE (RUSKIN MODEL FSD60FA OR EQUIVALENT).

KEY PLAN

APPROVAL STAMPS:

REVIEWED FOR CODE COMPLIANCE
09/07/2022

No.	Date	Description
2	3/21/22	ISSUED FOR PERMIT & PRICING
1	02.14.22	ISSUED FOR PERMIT

SUBMISSIONS & REVISIONS

OWNER

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2201 WISCONSIN AVE NW
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WASHINGTON DC 20007

ARCHITECT

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M.E.P. ENGINEERS

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T: 303.444.6038

INTERIOR DESIGNER

JOHNSON NATHAN STROHE
1600 WYNKOOP ST., SUITE 100
DENVER, CO 80202
T: 303.892.7062

PROJECT LOCATION

STEAMBOAT BASECAMP PARTIAL RENOVATION & TENANT FIT-OUT
1901 CURVE PLAZA
STEAMBOAT SPRINGS, CO 80487

DRAWING TITLE

FOURTH FLOOR HVAC PLAN

SEAL: COLORADO LICENSED MICHAEL DEAN WARD 38983 03/21/2022 PROFESSIONAL ENGINEER

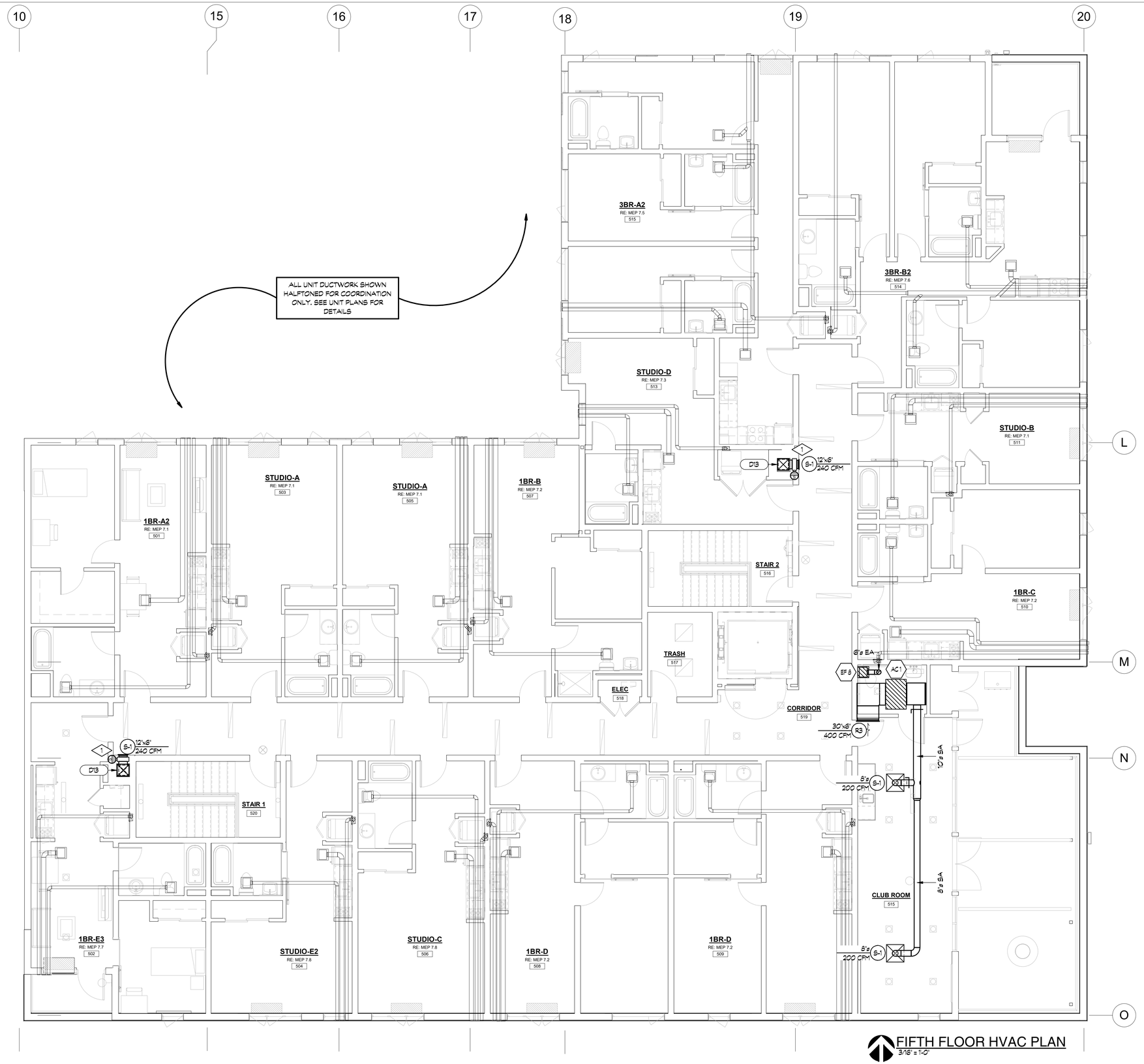
DATE: 02/14/22
DRAWN BY:
CHECKED BY:
PROJECT NO: 20129

DRAWING NO: **M2.41**

3/23/2022 10:51:29 AM

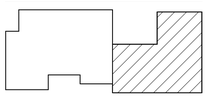
DETAIL NOTES THIS SHEET

1. LOCATE FIRE-SMOKE DAMPER (AS SHOWN ON PLANS) IN WALL AT DUCT PENETRATION. SHOWN OFFSET FOR GRAPHIC CLARITY. FIRE-SMOKE DAMPER TO BE FRONT ACCESS TYPE FOR USE WITH GRILLE (RUSKIN MODEL FSD60FA OR EQUIVALENT).



FIFTH FLOOR HVAC PLAN
3/16" = 1'-0"

KEY PLAN



APPROVAL STAMPS:

REVIEWED FOR CODE COMPLIANCE
09/07/2022

No.	Date	Description
2	3/21/22	ISSUED FOR PERMIT & PRICING
1	02.14.22	ISSUED FOR PERMIT

SUBMISSIONS & REVISIONS

OWNER

MAY REIGLER PROPERTIES
2201 WISCONSIN AVE NW
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WASHINGTON DC 20007

ARCHITECT

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GENERAL CONTRACTOR

CIVIL ENGINEER

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T: 970.879.1976

STRUCTURAL FRAMING ENGINEER

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M.E.P. ENGINEERS

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INTERIOR DESIGNER

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T: 303.892.7062

PROJECT LOCATION

STEAMBOAT BASECAMP PARTIAL RENOVATION & TENANT FIT-OUT
1901 CURVE PLAZA
STEAMBOAT SPRINGS, CO 80487

DRAWING TITLE

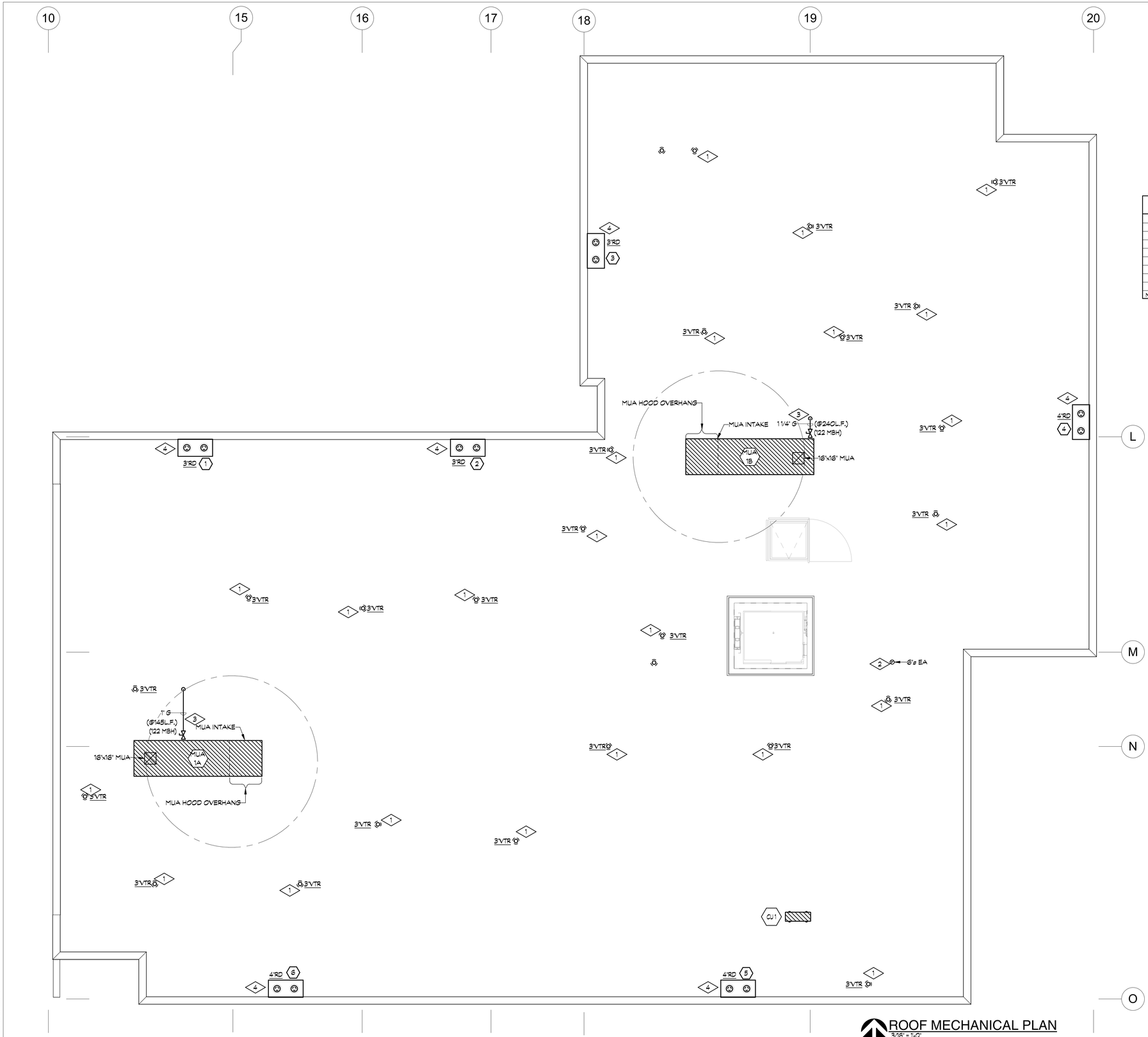
FIFTH FLOOR HVAC PLAN

SEAL

DATE: 02/14/22
DRAWN BY:
CHECKED BY:
PROJECT NO: 20129

DRAWING NO: **M2.51**

3/23/2022 10:51:33 AM



DETAIL NOTES THIS SHEET

1. VTR TO BE LOCATED A MINIMUM OF 10'0" FROM ANY BUILDING OPENING OR MECHANICAL EQUIPMENT AIR INTAKE. FIELD COORDINATE EXACT LOCATION AND ROOF PENETRATION WITH G.C.
2. MAINTAIN 10'-0" CLEARANCE FROM ANY BUILDING OPENING OR MECHANICAL INTAKE TO ALL EXHAUST.
3. CONNECT GAS PIPING TO MECHANICAL EQUIPMENT PER MANUFACTURER'S WRITTEN INSTRUCTIONS. PROVIDE GAS PRESSURE REGULATOR, GAS COCK, DIRT LEG AND UNION AS REQUIRED.
4. PROVIDE HEAT TRACE FOR SNOWMELT ON ROOF DRAINS.

STORM DRAIN SIZING TABLE

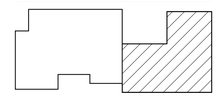
KEY	AREA SERVED (SQFT)	FLOW RATE (GPM)	DRAIN SIZE
1	1105	35	3'Ø
2	1353	43	3'Ø
3	1763	55	3'Ø
4	2102	66	4'Ø
5	1920	60	4'Ø
6	1731	56	4'Ø
7	194	6	2'Ø
8	270	9	2'Ø

NOTES: RAINFALL RATE = 3" PER HOUR

ROOF MECHANICAL PLAN

3/16" = 1'-0"

KEY PLAN



APPROVAL STAMPS:

REVIEWED FOR CODE COMPLIANCE
09/07/2022

No.	Date	Description
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1	02.14.22	ISSUED FOR PERMIT

SUBMISSIONS & REVISIONS

OWNER

MAY REIGLER PROPERTIES
2201 WISCONSIN AVE NW
SUITE 200
WASHINGTON DC 20007

ARCHITECT

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GENERAL CONTRACTOR

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M.E.P. ENGINEERS

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BOULDER, CO 80302
T: 303.444.6038

INTERIOR DESIGNER

JOHNSON NATHAN STROHE
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DENVER, CO 80202
T: 303.892.7062

PROJECT LOCATION

STEAMBOAT BASECAMP PARTIAL RENOVATION & TENANT FIT-OUT
1901 CURVE PLAZA
STEAMBOAT SPRINGS, CO 80487

DRAWING TITLE

ROOF MECHANICAL PLAN

SEAL

COLORADO LICENSED
MICHAEL DEAN NAPP
38983
03/21/2022
PROFESSIONAL ENGINEER

DATE: 02/14/22
DRAWN BY:
CHECKED BY:
PROJECT NO: 20129

DRAWING NO:

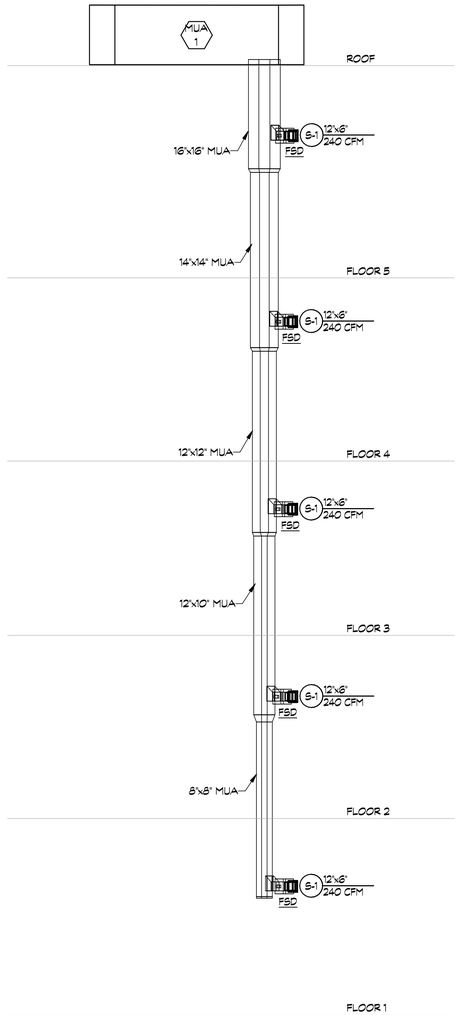
M2.61

3/23/2022 10:51:35 AM

NATURAL VENTILATION CALCULATION

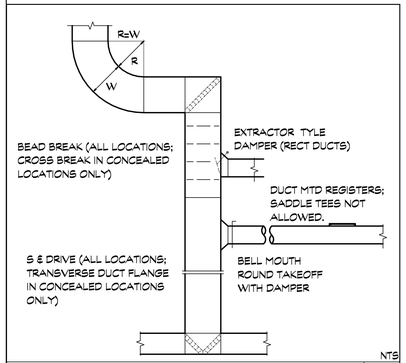
ROOM	ROOM AREA	REQUIRED AREA	ACTUAL AREA
UNIT TYPE 1 (LIVING ROOM)	280	11.6	
* WINDOW (44X54)			16.5
UNIT TYPE 1 (BEDROOM)	130	5.2	
* WINDOW (24X54)			9.0
UNIT TYPE 2 (STUDIO)	340	13.6	
* WINDOW (44X54)			16.5
UNIT TYPE 3 (STUDIO)	375	15.0	
* WINDOW (44X54)			16.5
UNIT TYPE 4 (LIVING ROOM)	450	18.0	
DOOR (36X84)			21.0
* WINDOW (44X54)			16.5
UNIT TYPE 4 (BEDROOM)	140	5.6	
* WINDOW (18X54)			6.8
UNIT TYPE 5 (LIVING ROOM)	440	17.6	
* WINDOW (48X56)			18.7
UNIT TYPE 5 (BEDROOM)	140	5.6	
* WINDOW (18X54)			6.8
UNIT TYPE 6 (STUDIO)	220	8.8	
* WINDOW (24X54)			9.0
UNIT TYPE 7 (LIVING ROOM)	255	10.2	
* WINDOW (44X54)			16.5
UNIT TYPE 7 (BEDROOM)	140	5.6	
* WINDOW (24X54)			9.0
UNIT TYPE 8 (LIVING ROOM)	350	14.0	
* WINDOW (44X54)			16.5
UNIT TYPE 8 (BEDROOM)	145	5.8	
* WINDOW (24X54)			9.0
UNIT TYPE 9 (LIVING ROOM)	285	11.4	
* WINDOW (44X54)			16.5
UNIT TYPE 9 (BEDROOM)	155	6.2	
* WINDOW (24X54)			9.0
UNIT TYPE 10 (STUDIO)	300	12.0	
* WINDOW (44X54)			16.5
UNIT TYPE 11 (LIVING ROOM)	275	11.0	
* WINDOW (44X54)			16.5
UNIT TYPE 11 (BEDROOM)	115	4.6	
* WINDOW (24X54)			9.0
UNIT TYPE 12 (STUDIO)	285	11.4	
* WINDOW (44X54)			16.5
UNIT TYPE 13 (LIVING ROOM)	235	9.4	
* WINDOW (44X54)			16.5
UNIT TYPE 13 (BEDROOM)	140	5.6	
* WINDOW (24X54)			9.0
UNIT TYPE 14 (LIVING ROOM)	300	12.0	
* WINDOW (44X54)			16.5
UNIT TYPE 14 (BEDROOM)	153	6.1	
* WINDOW (24X54)			9.0
UNIT TYPE 15 (LIVING ROOM)	290	11.6	
* WINDOW (44X54)			16.5
UNIT TYPE 15 (BEDROOM)	140	5.6	
* WINDOW (24X54)			9.0
UNIT TYPE 16 (LIVING ROOM)	310	12.4	
* WINDOW (44X54)			16.5
UNIT TYPE 16 (BEDROOM)	115	4.6	
* WINDOW (24X54)			9.0
5TH FLOOR CLUBROOM	370	14.8	
DOOR (36X84)			21.0
DOUBLE DOOR (66X84)			38.5

* DIMENSIONS ARE OPERABLE PORTION OF WINDOW.
ALL ROOMS MEET THE MINIUM 4% OPERABLE WINDOWS AND DOORS AREA AND 8% UNOBSTRUCTED OPENING FOR ADJOINING SPACES AS REQUIRED BY IMC 402



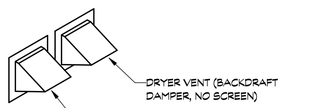
NTS

DUCT RISER DETAILS 3



NTS

LOW PRESSURE DUCT CONNECTIONS 4

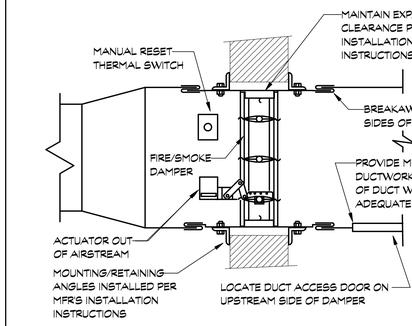


XVENT BOX EXHAUST BOX FOR ALL SIDEWALL TERMINATIONS

- MODEL DHEB-64-BR FOR ALL 4" & 6" SIDE BY SIDE
- MODEL 4SEB-BR FOR SINGLE 4" TERMINATIONS
- MODEL 6SEB-BR FOR SINGLE 6" TERMINATIONS

NTS

EXHAUST & DRYER VENT DETAIL 2



NOTES:
1. INSTALL ASSEMBLY IN STRICT ACCORDANCE WITH MFR'S INSTRUCTIONS.
2. PROVIDE AND INSTALL ADDITIONAL STEEL MULLIONS FOR MULTIPLE FIRE/SMOKE DAMPER ASSEMBLIES.
3. PROVIDE DUCT TRANSITIONS BETWEEN DAMPER AND DUCT.
4. PROVIDE RED IDENTIFICATION PAINT ON EXTERIOR OF DAMPER ASSEMBLY.

NTS

FIRE/SMOKE DAMPER INSTALLATION DIAGRAM 1

HVAC SCHEDULE

KEY	UNIT TYPE	DESCRIPTION	HEAT/G	COOL/G	FLOW	PRES.	WEIGHT	PWR	VOLT	MANUFACTURER/CAT. #
PTAC	PACKAGED TERMINAL HEAT PUMP	WALL MOUNTED HEAT PUMP W/ ELECTRIC STRIP HEAT	1.5 KW	9,000 BTU/H	360 CFM		112 LBS	6.8 A	208/1	AMANA PEH093G15AXXX
AC 1	MINI SPLIT	HORIZONTAL, DUCTED AIR CONDITIONING UNIT, CONDENSATE PAN OVERFLOW INTERLOCK, ELEC FED FROM COND 1	10.5 BTU	1 TON (NOM)	350 CFM	0.25"	60 LBS	1 A	120/1	MITSUBISHI PEAD-A12AA7
CU 1	CONDENSING UNIT	OUTDOOR CONDENSING UNIT, TWIN ROTARY COMP., R410A, 21.1 SEER		1 TON (NOM)			100 LBS	11 MCA	208/1	MITSUBISHI PUZ-A12NKA7
EF 7	ROOF EXHAUSTER	SPUN ALUMINUM, DIRECT DRIVE UPBLAST, CENTRIFUGAL, 1690 RPM, BACKDRAFT DAMPER			500 CFM		33 LBS	1/6 HP	208/1	GREENHECK CUE-090-VG (EAST BUILDING TRASH)
KF 1	KITCHEN EXHAUST FAN	SINGLE SPEED VENTILATION/ EXHAUST FAN, BACKDRAFT DAMPER, DC MOTOR, ENERGY STAR, VERTICAL, 1.3 SONES	-	-	100 CFM	0.25"		11.1 W	120/1	PANASONIC FV-05-10VS1
VF 1	VENTILATION EXHAUST FAN	SINGLE SPEED VENTILATION/ EXHAUST FAN, BACKDRAFT DAMPER, DC MOTOR, ENERGY STAR, VERTICAL, INTERMITTENT OPERATION, 4" OVAL TO 3'2 ROUND ADAPTER (FV-V5438R), 0.5 SONES	-	-	80 CFM	0.25"		7.2 W	120/1	PANASONIC FV-05-10VS1, AIR CYCLER SMART EXHAUST ROCKER SWITCH
CUH	ELECTRIC CABINET WALL HEATER	FLUSH MOUNTED, 14 GAUGE COVER, INTEGRAL DISCONNECT, LOW VOLTAGE RELAY FOR REMOTE T-STAT	4KW					4 KW	208/1	QMARK AWH-4408 LFK-SFC
BB	ELECTRIC HYDRONIC BASEBOARD	HYDRONIC FILLED ELECTRIC BASEBOARD HEATER	750W					750 W	120/1	QMARK HBB750
MUA 1A-B	MAKE UP AIR UNIT	INDIRECT FIRED, DX COOLED, DOWN DISCHARGE, MODULATING BURNER, DUCT STAT WITH ROOM OVERRIDE STAT, ROOF CURB, CONTROL STATION 2" FILTERS, ENERGY MANAGEMENT CONTROL PACKAGE	122 MBH	-	1200 CFM	0.5"	1343 LBS	3/4 HP	208/3	CAPTIVEAIRE A1-BT-150-15D-MPU

NOTES:
* BASE ASSUMPTION IS FOR ALL KITCHEN HOOD PACKAGE TO BE PROVIDED BY M.C. M.C. TO PROVIDE DEDUCT ALTERNATE PRICE FOR KITCHEN VENDOR TO PROVIDE. COORDINATE WITH G.C./KITCHEN VENDOR
* M.C. IS RESPONSIBLE FOR ALL ANCILLARY EQUIPMENT AND DUCTWORK NEEDED TO CONNECT EQUIPMENT.
IT IS THE CONTRACTORS RESPONSIBILITY TO COORDINATE ELECTRICAL CHANGES DUE TO EQUIPMENT SUBSTITUTIONS WITH EC.

GRILLE REGISTER DIFFUSER SCHEDULE

KEY	DESCRIPTION	CEIL/G	ACCESSORIES	MANUFACTURER/CAT #
S1	DOUBLE DEFLECTION SUPPLY REGISTER, FRONT BLADES PARALLEL TO SHORT DIMENSION, WHITE	GYP	OB DAMPER	TITUS 272

NOTES: COORDINATE DIFFUSER LOCATIONS WITH LIGHTS AND OTHER CEILING ELEMENTS

VENTILATION (IMC-2018)

SPACE NAME	SPACE TYPE	SQ FT	PEOPLE	CFM/P	CFM/ SF	Voz	Ez	Vdz	Vbz	Evz
MUA 1A + 1B (SERVES CORRIDORS)										
1ST FLOOR CORRIDORS	CORRIDORS	515	0	0	0.06	61	0.8	480	49	0.97
2ND FLOOR CORRIDORS	CORRIDORS	515	0	0	0.06	61	0.8	480	49	0.97
3RD FLOOR CORRIDORS	CORRIDORS	515	0	0	0.06	61	0.8	480	49	0.97
4TH FLOOR CORRIDORS	CORRIDORS	515	0	0	0.06	61	0.8	480	49	0.97
5TH FLOOR CORRIDORS	CORRIDORS	515	0	0	0.06	61	0.8	480	49	0.97
						Vot	%OA	Vps	Vou	Ev
	SYSTEM TOTAL	4075	0			251	10%	2400	245	0.97

NOTE: SYSTEM TOTAL IS CALCULATED USING PEAK POPULATION AND VENTILATION EFFICIENCIES AND IS THEREFORE NOT A SUM OF ALL ZONES SERVED. CALCULATION IS BASED ON ASHRAE APPENDIX A TO CALCULATE Ev FOR MULTI-ZONE.
NOTE: BALANCE AIR HANDLERS AND ROOF TOP UNITS TO 15% OUTSIDE AIR OR SYSTEM MINIMUM WHICHEVER IS GREATER.

Ez ZONE AIR EFFECTIVENESS
Vdz ZONE DESIGN SUPPLY
Vbz UNUSED OA TO BREATHING AREA
Voz UNUSED OA REQUIRED TO ZONE
Evz ZONE VENTILATION EFFICIENCY (APP A)

Vps PRIMARY SYSTEM AIR FLOW
Vou UNCORRECTED OA
Vot MIN OA REQUIRED FOR SYSTEM
Ev SYSTEM VENTILATION EFFICIENCY

APPROVAL STAMPS:

REVIEWED FOR CODE COMPLIANCE
09/07/2022

No.	Date	Description
2	3/21/22	ISSUED FOR PERMIT & PRICING
1	02.14.22	ISSUED FOR PERMIT

SUBMISSIONS & REVISIONS

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MAY REIGLER PROPERTIES
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PROJECT LOCATION
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1901 CURVE PLAZA
STEAMBOAT SPRINGS, CO 80487

DRAWING TITLE
MECHANICAL DETAILS & SCHEDULES

SEAL
COLORADO LICENSED PROFESSIONAL ENGINEER
38983
03/21/2022
PROFESSIONAL ENGINEER

DATE: 02/14/22
DRAWN BY:
CHECKED BY:
PROJECT NO: 20129

DRAWING NO: **M4.11**

3/23/2022 10:51:38 AM