

SECTION 150000 - BASIC MECHANICAL REQUIREMENTS

PART 1 GENERAL

- A. GENERAL CONDITIONS OTHER CONTRACT DOCUMENTS
- 1. THE GENERAL CONDITIONS AND OTHER CONTRACT DOCUMENTS AS SET FORTH HEREBY ARE TO BE INCORPORATED INTO AND BECOME A PART OF THE SPECIFICATIONS FOR THE WORK UNDER THIS DIVISION.
- B. CODES AND PERMITS
- 1. COMPLY WITH RULES, REGULATIONS OF STATE, COUNTY, AND CITY AUTHORITIES HAVING JURISDICTION OVER THE PREMISES, INCLUDING SAFETY REQUIREMENTS. DO NOT OBTAIN PERMITS UNLESS THE RELIEVING CONTRACTOR FROM COMPLYING WITH SPECIFICATIONS WHICH EXCEED CODE REQUIREMENTS AND NOT IN CONFLICT THEREWITH.
- 2. SECURE AND PAY FOR ALL PERMITS AND CERTIFICATES OF INSPECTION REQUIRED. MAKE PAYMENTS TO ALL PUBLIC UTILITIES FOR WORK PERFORMED BY THEM IN PROVIDING SERVICE CONNECTIONS.
- C. LOCAL CONDITIONS
- 1. VISIT SITE, BECOME FAMILIAR WITH CONDITIONS AFFECTING THIS WORK. NO ADDITIONAL PAYMENT WILL BE MADE ON CLAIMS THAT ARISE FROM LACK OF KNOWLEDGE OF EXISTING CONDITIONS.
- 2. THIS CONTRACTOR SHALL BE HELD TO HAVE EXAMINED THE PREMISES AND SITE SO AS TO COMPARE THEM WITH THE DRAWINGS AND SPECIFICATIONS. NO ALLOWANCES SHALL BE MADE TO THE CONTRACTOR BY REASON OF HIS FAILURE TO HAVE MADE SUCH EXAMINATION OR OF ANY ERROR ON HIS PART.
- D. DRAWINGS
- 1. DRAWINGS AND SPECIFICATIONS ARE TO BE CONSIDERED AS SUPPLEMENTING EACH OTHER. WORK SPECIFIED SHALL BE PERFORMED OR FURNISHED AS THOUGH MENTIONED IN BOTH SPECIFICATIONS AND DRAWINGS.
- 2. THE DRAWINGS ARE SCHEMATIC ONLY AND ARE INTENDED TO SHOW THE APPROXIMATE LOCATIONS. DO NOT SCALE.
- E. SHOP DRAWINGS
- 1. THIS CONTRACTOR SHALL SUBMIT SHOP DRAWINGS ON THE ITEMS OF EQUIPMENT AND SYSTEMS AS NECESSARY TO CLEARLY SHOW EQUIPMENT AND CONSTRUCTION.
- F. SUPERVISION
- 1. THIS CONTRACTOR SHALL HAVE IN CHARGE OF THE WORK, A COMPETENT SUPERINTENDENT WITH EXPERIENCE IN THE WORK TO BE INSTALLED UNDER THIS CONTRACT.
- G. COORDINATION
- 1. THIS CONTRACTOR SHALL COORDINATE HIS WORK AND COOPERATE WITH THE OTHER CONTRACTORS. HE SHALL ARRANGE HIS WORK WITH THEIRS SO THAT THERE WILL BE NO DELAY IN THE PROPER INSTALLATION.
- 2. EXAMINE WORK OF OTHER TRADES WHICH COMES IN CONTACT WITH OR IS COVERED BY THIS WORK. DO NOT ATTACH TO, COVER, OR FINISH AGAINST ANY DEFECTIVE WORK, OR INSTALL WORK OF THIS DIVISION IN A MANNER WHICH WILL PREVENT OTHER TRADES FROM PROPERLY INSTALLING THEIR WORK. CONSULT ALL DRAWINGS, SPECIFICATIONS AND DETAILS OF OTHER DIVISIONS OF THE WORK.
- H. GUARANTEE AND WARRANTIES
- 1. WARRANT THAT EQUIPMENT AND ALL WORK IS INSTALLED IN ACCORDANCE WITH GOOD ENGINEERING PRACTICE AND THAT ALL EQUIPMENT WILL MEET REQUIREMENTS SPECIFIED. ANY EQUIPMENT FAILING TO PERFORM OR FUNCTION AS SPECIFIED SHALL BE REPLACED WITH COMPLYING EQUIPMENT, WITHOUT COST TO THE OWNER.
- 2. GUARANTEE AGAINST DEFECTS IN WORKMANSHIP AND MATERIALS; MAKE GOOD REPAIR OR REPLACE ANY DEFECTIVE WORK, MATERIAL OR EQUIPMENT WITHIN ONE YEAR FROM DATE OF ACCEPTANCE.
- PART 2 PRODUCTS - NOT USED
- PART 3 EXECUTION - NOT USED
- END OF SECTION

SECTION 150500 - BASIC MECHANICAL MATERIALS AND METHODS

PART 1 GENERAL

- A. REFER TO INDIVIDUAL PIPING SYSTEM SPECIFICATION SECTIONS FOR PIPE, FITTING, JOINING MATERIALS AND METHODS. PIPE THREADS SHALL COMPLY WITH ASME B1.20.1 FOR FACTORY-THREADED PIPE AND PIPE FITTINGS.
- B. FURNISH AND INSTALL MANUFACTURED ESCUTCHEONS FOR EXPOSED WALL AND CEILING PENETRATIONS. INSTALL DIELECTRIC UNIONS WHEREVER JOINING DISSIMILAR METALS TO PREVENT GALVANIC ACTION AND CORROSION.
- C. FURNISH AND INSTALL SLEEVES FOR WALL, FLOOR SLAB AND ROOF PENETRATIONS WITH A MIN. TWO SIZES LARGER THAN PIPE OR INSULATION: STEEL PIPE: ASTM A53, GRA. SCH. 40 GALV. PLAIN ENDS. PVC PLASTIC PIPE: ASTM D1785, SCH. 40.
- D. FURNISH AND INSTALL EQUIPMENT NAMEPLATES IDENTIFYING UNIT NUMBER AND AREA SERVICED BY UNIT. PIPING SYSTEMS SHALL HAVE SNAP-ON PLASTIC PIPE MARKERS TO INDICATE SERVICE AND FLOW DIRECTION.
- E. INSTALL PIPING FREE OF SAGS AND BENDS TIGHT TO SLABS, TRUSSES, JOISTS, COLUMNS, WALLS, AND OTHER BUILDING COMPONENTS. ALLOW SUFFICIENT SPACE ABOVE REMOVABLE LAY-IN CEILINGS FOR PANEL REMOVAL.
- F. REFER TO DIVISION 9 SECTION "PAINTING" FOR FIELD PAINTING REQUIREMENTS.
- G. VALVES:
- 1. BALL VALVES, 2" AND SMALLER: RATED FOR 400 PSI WOG - TWO PIECE CONSTRUCTION WITH TEFLON SEATS AND SEALS. VALVES SHALL BE NIBCO MODEL 5-580R OR APPROVED EQUAL.
- 2. PLUG VALVES, 2 1/2" AND LARGER: RATED AT 175 PSI WOG, LUBRICATED PLUG TYPE, SEMI-STEEL BODY, WRENCH OPERATED WITH FLANGED ENDS. VALVES SHALL BE NORDSTROM 143 OR APPROVED EQUAL.
- 3. CHECK VALVES, 2" AND SMALLER: RATED AT 200 PSI WOG, CAST BRONZE BODY, HORIZONTAL SWING, Y-PATTERN AND BRONZE DISC. VALVES SHALL BE NIBCO MODEL 5413 OR APPROVED EQUAL.
- 4. OTHER APPROVED MANUFACTURERS: CRANE, HAMMOND, JAMESBURY, JENKINS, KEYSTONE, POWELL, STOCKHAM, AND WATTS.
- H. HANGERS AND SUPPORT COMPONENTS SHALL BE FACTORY FABRICATED OF MATERIALS, DESIGN AND MANUFACTURER COMPLYING WITH MSS SP-58.
- 1. DOMESTIC WATER PIPING 2 1/2" DIA. AND SMALLER: GRINNELL FIG. NO. CT-69 TUBING HANGER WITH FIG. NO. 167 PROTECTION SHIELD.
- 2. STORM/SANITARY WASTE AND VENT PIPING: GRINNELL FIG. NO. 260 ADJ STEEL CLEVIS HANGER FOR HORIZONTAL PIPING, GRINNELL FIG. NO. 261 STEEL RISER CLAMP FOR VERTICAL PIPING WHERE PIPING IS SUPPORTED FORM OVERHEAD WOOD TRUSSES, USE GRINNELL FIG. NO. 153 PIPE HANGER FLANGE.
- 3. HANGER RODS SHALL BE ASTM A-107 CONTINUOUS THREADED WITH THE FOLLOWING LOADING: 3/8" - 610 LBS., 1/2" - 1130 LBS., 5/8" - 1810 LBS. AND 3/4" - 2710 LBS.
- 4. HANGER SPACING AS FOLLOWS:
 - a. STEEL PIPE - AT INTERVALS NOT EXCEEDING 12'-0".
 - b. COPPER PIPE - 1'-1 1/4" AND SMALLER 6'-0" INTERVALS 1'-1 1/2" AND LARGER 10'-0" INTERVALS.
 - c. CAST IRON PIPE - AT INTERVALS NOT EXCEEDING 10'-0".
 - d. PLASTIC SCH. 40 PIPE - AT INTERVALS NOT EXCEEDING 4'-0".
- 5. HANGERS MANUFACTURED BY FEE AND MASON, B LINE AND HYDRA-ZORB ARE ALSO ACCEPTABLE.
- 6. MISCELLANEOUS STEEL PLATES, SHAPES AND BARS: ASTM A36.
- I. PIPE SUPPORTS
- 1. COPPER TUBING: ADJUSTABLE STEEL CLEVIS HANGER, B-LINE B3104CT.
- 2. UNINSULATED PIPING: ADJUSTABLE STEEL CLEVIS HANGER, B-LINE B3104 OR B3100.
- 3. INSULATED HOT PIPING (2 INCH AND SMALLER): ADJUSTABLE STEEL CLEVIS HANGER WITH GALVANIZED SHEET METAL SHIELD, B-LINE B3100 WITH B3151 SERIES.
- 4. INSULATED COLD PIPING (4 INCH AND SMALLER): ADJUSTABLE STEEL CLEVIS HANGER WITH GALVANIZED SHEET METAL SHIELD, B-LINE B3100 WITH B3151 SERIES.
- 5. PLASTIC PIPING: ADJUSTABLE V-BOTTOM STEEL CLEVIS HANGER WITH GALVANIZED 18 GAUGE CONTINUOUS SUPPORT CHANNEL, B-LINE B3106 WITH B3106V SERIES. MANUFACTURERS: B-LINE, ANVIL (GRINNELL), MICHIGAN, PHD, HILTI, HOLDRITE OR APPROVED EQUAL.

- J. MULTIPLE OR TRAPEZE HANGERS: 12 GAUGE, ROLL FORMED, ASTM A570 GRADE 33 STRUCTURAL STEEL CHANNEL, 1/8 INCH X 1 5/8 INCH COATED STEEL CHANNELS WITH SPACERS AND HANGER RODS, B-LINE B22 STRUT OR STRONGER AS REQUIRED. MOUNT PIPES TO TRAPEZE WITH TWO-PIECE PIPE STRAPS SIZED FOR OUTSIDE DIAMETER OF PIPE/INSULATION, B-LINE B2000 SERIES. MANUFACTURERS: B-LINE, UNISTRUT, SUPERSTRUT OR APPROVED EQUAL.
- K. WALL SUPPORT: (PIPE SIZES TO 3 INCH): CARBON STEEL HOOK, B-LINE B3191, MICHIGAN, PHD, HILTI, HOLDRITE OR APPROVED EQUAL.
- L. VERTICAL SUPPORT: STEEL RISER CLAMP SIZED TO FIT OUTSIDE DIAMETER OF PIPE, B-LINE B3373, MICHIGAN, PHD, HILTI, HOLDRITE OR APPROVED EQUAL.
- M. FLOOR SUPPORT (HOT PIPE SIZES TO 6 INCH AND ALL COLD PIPE SIZES): CARBON STEEL ADJUSTABLE PIPE SADDLE (SCREWED OR WELDED TO APPROPRIATE BASE STAND) AND NIPPLE ATTACHED TO STEEL BASE STAND SIZED FOR PIPE ELEVATION, B-LINE B3093, B3088T, B3090 OR B3088, MICHIGAN, PHD, HILTI, HOLDRITE OR APPROVED EQUAL.
- N. HANGERS SHALL BE DESIGNED TO IMPEDE DISENGAGEMENT BY MOVEMENT OF SUPPORTED PIPE.
- O. PROVIDE STONEMAN TRISOLATORS OR EQUIVALENT OR 1/4 INCH THICK HAIR FELT AT ALL COPPER PIPE HANGERS OR SUPPORTS, EXCEPT NONE REQUIRED FOR INSULATED HOT PIPES.
- P. HANGERS AND CLAMPS FOR SUPPORT OF BARE COPPER TUBING SHALL BE COATED WITH COPPER-COLORED EPOXY PAINT. AN ADDITIONAL PVC COATING OF THE EPOXY-COATED HANGER SHALL BE APPLIED WHERE REQUIRED BY THE TENANT'S AUTHORIZED REPRESENTATIVE.
- Q. HANGERS FOR OTHER THAN BARE COPPER PIPING SHALL BE ZINC PLATED IN ACCORDANCE WITH ASTM B633-SC3 OR SHALL HAVE AN ELECTRO-DEPOSITED GREEN EPOXY FINISH.
- R. STRUT CHANNELS SHALL BE PRE-GALVANIZED IN ACCORDANCE WITH ASTM A653-G90 OR HAVE AN ELECTRO-DEPOSITED EPOXY FINISH.
- S. ROOF SUPPORTS FOR PIPE SIZES TO 3 INCH: POLYCARBONATE RESIN ROLLER AND NYLON ROD SITUATED IN A POLYCARBONATE RESIN BASE, "U" SHAPED CRADLE, GUIDE HOLES PROVIDED FOR MOUNTING STRAP (USING 1/2 INCH #10 SCREWS) AND SPACERS AS REQUIRED, SPACED MAXIMUM 10'-0" ON CENTER, MIRO 24-R OR APPROVED EQUAL.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 152500 - MECHANICAL INSULATION

PART 1 GENERAL

- FURNISH AND INSTALL INSULATION FOR DUCTWORK AND PIPING AS DESCRIBED IN CONTRACT DOCUMENTS. SUBMIT PRODUCT DATA FOR EACH TYPE OF MECHANICAL INSULATION FOR THE PROJECT, IDENTIFYING R-VALUE, THICKNESS, AND ACCESSORIES.
- 1. INSULATION SHALL HAVE A FLAME SPREAD RATING OF 25 OR LESS AND A SMOKE DEVELOPED RATING OF 50 OR LESS.
- 2. SCHEDULE INSULATION APPLICATION AFTER DUCT AND PIPING TESTS HAVE BEEN COMPLETED.
- PART 2 PRODUCTS
- 1. GLASS FIBER: INORGANIC GLASS FIBERS, BONDED WITH A THERMOSETTING RESIN.
 - a. BULKWET: 1-1/2" THICK WITH ALUMINIUM FOL. SCRIM KRAFT FACING AND 1 LB./CU. FT. DENSITY. OWENS-CORNING AEROFLEX.
 - b. PREFORMED PIPE INSULATION: 1" THICK WITH REINFORCED ALL SERVICE VAPOR RETARDER JACKETING. OWENS-CORNING FIBERGLASS ASJ.
 - c. DUCT LINER: 1" THICK COATED WITH A BLACK PIGMENTED FIRE-RESISTANT COATING ON THE AIRSTREAM SIDE AND 1-1/2 LB./CU. FT. DENSITY. OWENS-CORNING AEROFLEX.
 - d. OTHER APPROVED MANUFACTURERS: CERTANTEED, KNAUF, AND MANVILLE.
- PART 3 EXECUTION
- 1. SELECT ACCESSORIES COMPATIBLE WITH MATERIALS SUITABLE FOR THE SERVICE THAT DO NOT CORRODE, SOFTEN, OR OTHERWISE ATTACK THE INSULATION OR JACKET.
- 2. SLIP INSULATION ON THE COLD AND HOT WATER PIPE AND SEAL JOINTS WITH ADHESIVE WHERE THE SLIP ON TECHNIQUE IS NOT POSSIBLE, CUT ONE SIDE LONGITUDINALLY AND APPLY TO THE PIPE. SEAL SEAMS AND JOINTS WITH ADHESIVE.
- 3. INSULATE FINISHED PLUMBING LINES TO FIXTURES ACCESSIBLE TO THE DISABLED WITH 3/8" ARMSTRONG ARMAFLEX OR EQUAL.
- 4. DUCTWORK APPLICATION:
 - a. ALL RETURN AIR DUCTWORK IS TO BE LINED WITH DUCT LINER.
 - b. ALL SUPPLY DUCTWORK LOCATED IN CONCEALED AREAS OR ABOVE THE CEILING IS TO BE WRAPPED WITH BLANKET INSULATION. THE FIRST 15'-0" OF THE SUPPLY DUCTWORK FROM THE ROOFTOP UNIT IS TO BE LINED WITH DUCT LINER. WRAP INSULATION CAN BE OMITTED ON SECTIONS OF DUCTWORK INSTALLED WITH DUCT LINER.
 - c. ALL SUPPLY DUCTWORK IN STOCKROOM IS TO BE UN-INSULATED.
 - d. FOR THE EXPOSED DUCTWORK IN THE SALES AREA, THE FIRST 15'-0" OF THE SUPPLY DUCTWORK FROM THE ROOFTOP UNIT IS TO BE LINED WITH DUCT LINER. IF CONCENTRIC DIFFUSERS ARE MOUNTED DIRECTLY BELOW THE ROOFTOP UNIT, ALL OF THE SUPPLY DUCTWORK SHOULD BE LINED TO THE CONCENTRIC DIFFUSERS.
- 5. DOMESTIC COLD AND HOT WATER PIPING IS TO BE INSULATED WITH 1" PREFORMED PIPE INSULATION.

SECTION 154100 - PLUMBING PIPING

PART 1 GENERAL

- FURNISH AND INSTALL PLUMBING PIPING AS SHOWN ON DWGS.
- FURNISH AND INSTALL WATER METER (IF REQUIRED) IN COMPLIANCE WITH THE LOCAL WATER UTILITY COMPANY'S STANDARDS.
- A. SUMMARY
- 1. THIS SECTION INCLUDES PLUMBING PIPING SYSTEMS AS SHOWN ON DWGS. AND CONNECTING INTO SYSTEMS AS REQUIRED. SYSTEMS INCLUDE THE FOLLOWING:
 - a. POTABLE WATER DISTRIBUTION, INCLUDING COLD AND HOT WATER SUPPLY.
 - b. DRAINAGE AND VENT SYSTEMS, INCLUDING SANITARY AND STORM.
- PART 2 PRODUCTS
- A. DOMESTIC WATER PIPING SYSTEMS
- 1. ALL ABOVE-GROUND PIPING SHALL BE TYPE "L" HARD DRAWN COPPER WITH WROUGHT COPPER FITTINGS.
- 2. SWEAT COPPER JOINTS WITH 95% TIN-ANTIMONY SOLDER FOR ABOVE GROUND PIPING.
- B. SOIL, WASTE, AND VENT PIPING
- 1. PIPE AND FITTINGS:
 - a. ABS (ASTM D2898) OR PVC (ASTM D2665) PLASTIC PIPE & FITTINGS. PROVIDE APPROVED CLEANER & GLUE FOR ABS OR PVC FITTINGS.
 - b. VENT PIPING SHALL BE TYPE "L" HARD COPPER WITH WROUGHT COPPER FITTINGS OR STEEL PIPING WITH NO HUB CONNECTIONS WHERE RETURN AIR PLENUM IS UTILIZED.
- PART 3 EXECUTION
- A. VALVES
- 1. SECTIONAL VALVES: INSTALL SECTIONAL VALVES CLOSE TO MAIN ON EACH BRANCH OR EQUIPMENT CONNECTIONS AND WHERE INDICATED. USE BALL VALVES FOR SECTIONAL VALVES 2 INCHES AND SMALLER.
- 2. SHUTOFF VALVES: INSTALL SHUTOFF VALVES ON INLET TO EACH PLUMBING EQUIPMENT ITEM, ON EACH SUPPLY TO EACH PLUMBING FIXTURE NOT HAVING STOPS ON SUPPLIES, AND ELSEWHERE AS INDICATED. FOR SHUTOFF VALVES 2 INCHES AND SMALLER, USE BALL VALVES.
- B. CONNECTIONS
- 1. SUPPLY RUNOUTS TO FIXTURES: INSTALL HOT AND COLD WATER SUPPLY PIPING RUNOUTS OF SIZES INDICATED, BUT NOT SMALLER THAN REQUIRED BY PLUMBING CODE TO FIXTURES.
- 2. DRAINAGE RUNOUTS TO FIXTURES: PROVIDE DRAINAGE AND VENT PIPING RUNOUTS, WITH APPROVED TRAP, OF SIZES INDICATED, BUT NOT SMALLER THAN REQUIRED BY PLUMBING CODE, TO PLUMBING FIXTURES AND DRAINS.

C. FIELD QUALITY CONTROL

- 1. INSPECT WATER DISTRIBUTION PIPING AND DRAINAGE PIPING.
 - a. DO NOT ENCLOSE, COVER, OR PUT INTO OPERATION WATER DISTRIBUTION PIPING UNTIL IT HAS BEEN INSPECTED AND APPROVED BY THE AUTHORITY HAVING JURISDICTION.
- 2. TEST WATER DISTRIBUTION PIPING AS FOLLOWS:
 - a. TEST FOR LEAKS AND DEFECTS IN NEW WATER DISTRIBUTION PIPING SYSTEM.
 - b. CAP AND SUBJECT THE PIPING SYSTEM TO A STATIC WATER PRESSURE TWICE THE OPERATING PRESSURE WITHOUT EXCEEDED THIS RATING OF PIPING SYSTEM MATERIALS. ISOLATE TEST SOURCE AND ALLOW TO STAND FOR 4 HOURS. LEAKS AND LOSS IN TEST PRESSURE CONSTITUTE DEFECTS THAT MUST BE REPAIRED.
 - c. REPAIR LEAKS AND DEFECTS WITH NEW MATERIALS AND RETEST SYSTEM OR PORTION THEREOF UNTIL SATISFACTORY RESULTS ARE OBTAINED.
- 3. DRAINAGE AND VENT PIPING TEST:
 - a. TEST DRAINAGE AND VENT SYSTEM ACCORDING TO PROCEDURES OF AUTHORITY HAVING JURISDICTION.

END OF SECTION

SECTION 154400 - PLUMBING FIXTURES

PART 1 GENERAL

- PROVIDE PLUMBING FIXTURES AND TRIM, FITTINGS, OTHER COMPONENTS AND SUPPORTS AS SPECIFIED ON THE DRAWINGS IN THE PLUMBING FIXTURE SCHEDULE.
- FAUCETS: UNLESS OTHERWISE SPECIFIED, PROVIDE FAUCETS THAT ARE STRUT CHANNELS SHALL BE PRE-GALVANIZED IN ACCORDANCE WITH ASTM A653-G90 OR HAVE AN ELECTRO-DEPOSITED EPOXY FINISH.
- FURNISH WALL CARRIERS FOR THE FOLLOWING FIXTURES:
 - a. WALL HUNG LAVATORIES AND SINKS
- PART 2 PRODUCTS
- 1. ORDER PRODUCTS AS INDICATED ON DRAWINGS.
- 2. INSPECT EACH INSTALLED FIXTURE FOR DAMAGE. REPLACE DAMAGED FIXTURES AND COMPONENTS.
- 3. SUBMIT SHOP DRAWINGS TO DESIGNER FOR SUBSTITUTION APPROVAL.
- PART 3 EXECUTION
- 1. OPERATE AND ADJUST FAUCETS AND CONTROLS. REPLACE DAMAGED AND MALFUNCTIONING FIXTURES, FITTINGS, AND CONTROLS.
- 2. ADJUST WATER PRESSURE AT FAUCETS, AND FLUSHOMETERS HAVING CONTROLS, TO PROVIDE PROPER FLOW AND STREAM.
- 3. REPLACE WASHERS OF LEAKING AND DRIPPING FAUCETS AND STOPS.
- 4. CLEAN FIXTURES, FITTINGS, AND SPOUT AND DRAIN STRAINERS WITH MANUFACTURERS' RECOMMENDED CLEANING METHODS AND MATERIALS.
- 5. PROVIDE PROTECTIVE COVERING FOR INSTALLED FIXTURES AND FITTINGS.
- 6. DO NOT ALLOW USE OF FIXTURES AS TEMPORARY FACILITIES.

END OF SECTION

SECTION 154600 - PLUMBING EQUIPMENT

PART 1 GENERAL

- THIS SECTION INCLUDES DOMESTIC WATER HEATERS
- TANKLESS RACK SYSTEM WALL MOUNTED GAS WATER HEATER.
- SMALL ELECTRIC DOMESTIC WATER HEATER.
- PART 2 PRODUCTS
- A. TANKLESS RACK SYSTEM: NAVIEN MODEL NPE240A.
- 1. PROVIDE TANKLESS RACK SYSTEM OF SIZE, FLOW RATE AND TEMPERATURE RISE AS SPECIFIED ON THE DRAWINGS.
- 2. TO BE CONSTRUCTED OF MARINE GRADE POWDER COATED ALUMINUM.
- 3. WATER AND GAS PIPING MANIFOLD ASSEMBLED ON THE DRAWINGS OR AS FACTORY AND DELIVERED TO BE INSTALLED BY THE CONTRACTOR ON SITE. SPECIFY LENGTH WHEN ORDERING.
- 4. UNITS WATER TRUNK LINES ARE CONSTRUCTED OF TWO (2) 2-1/2" DIAMETER RIGID COPPER. UNITS GAS LINE IS 1-1/4" - 1-1/2" DIA NPT POWDER COATED SCHEDULE 40 STEEL. SPECIFY SIZE WHEN ORDERING.
- 5. CONCENTRIC VENTING SYSTEM IS PROVIDED BY THE MANUFACTURER AND SHIPPED LOOSE TO BE INSTALLED BY THE CONTRACTOR ON SITE. SPECIFY LENGTH WHEN ORDERING.
- 6. APPROVED ALTERNATE MANUFACTURERS
 - 6.1. RINNAI MODEL: C199I
 - 6.2. AO SMITH MODEL: ATI-CRS2WN-N
 - 6.3. STATE MODEL: GTS-CRS-2WM-MI
- B. INSTANT HOT WATER HEATER
- 1. STORES WITH ONLY PET WASH PROVIDE TANKLESS WATER HEATER BELOW LAVATORY IN RESTROOMS.

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 154900 - NATURAL GAS SYSTEMS

PART 1 GENERAL

- FURNISH AND INSTALL GAS PIPING AS SHOWN ON DRAWINGS, AND IN COMPLIANCE WITH NFPA 54.
- PURCHASE GAS METER (IF REQUIRED) IN COMPLIANCE WITH GAS COMPANY'S STANDARDS. LOCATE AS SHOWN ON DWGS.
- PART 2 PRODUCTS
- 1. PIPING SHALL BE ASTM A53, SCHEDULE 40 BLACK STEEL PIPE. PROVIDE THREADED PIPE FOR 2" AND UNDER PIPING, PROVIDE PLAIN END PIPE FOR 2-1/2" AND OVER PIPING.
- 2. FITTINGS SHALL BE 150# MALLEABLE IRON FOR 2" AND UNDER. FITTINGS SHALL BE ASTM A-234 BUTT WELD FOR 2-1/2" AND OVER.
- 3. USE AN APPROVED PIPE DOPE AT CONNECTIONS.
- 4. EQUAL SIZE PIPE, LEG, GAS COCK, AND UNION WITHIN 72 INCHES OF EACH CONNECTION TO EQUIPMENT.
- B. VALVES - SEE SECTION 150500
- PART 3 EXECUTION
- 1. COMPLY WITH NFPA 54 "NATIONAL FUEL GAS CODE" FOR GAS PIPING MATERIALS AND COMPONENTS, INSTALLATIONS, AND INSPECTION TESTING AND PURGING.
- 2. LISTING AND LABELING: PROVIDE EQUIPMENT AND ACCESSORIES THAT ARE LISTED AND LABELED.
- A. FIELD QUALITY CONTROL
- 1. INSPECT, LEAK TEST, AND PURGE NATURAL GAS SYSTEMS ACCORDING TO LOCAL GAS COMPANY STANDARDS.
- 2. REPAIR LEAKS AND DEFECTS WITH NEW MATERIALS, AND RETEST SYSTEM UNTIL SATISFACTORY RESULTS ARE OBTAINED.
- 3. REPORT TEST RESULTS PROMPTLY AND IN WRITING TO THE ARCHITECT AND THE AUTHORITY HAVING JURISDICTION.
- 4. VERIFY CAPACITIES AND PRESSURE RATINGS OF GAS METERS, REGULATORS, VALVES, AND SPECIALTIES.
- 5. VERIFY CORRECT PRESSURE SETTINGS FOR PRESSURE REGULATORS.
- 6. VERIFY THAT SPECIFIED PIPING TESTS ARE COMPLETE.
- 7. INSTALL SHUT-OFF VALVE, UPSTREAM FROM GAS METER, OUTSIDE BUILDING AT GAS SERVICE ENTRANCE.

END OF SECTION

SECTION 156000 - ROOFTOP HEATING AND COOLING UNITS

PART 1 GENERAL

- INSTALL ROOFTOP HEATING AND COOLING UNITS AS SCHEDULED ON THE DRAWINGS. UNITS SHALL BE RATED BY ARI STANDARD 240 FOR CAPACITY AND ARI STANDARD 270 FOR SOUND. UNITS SHALL BE DESIGNED, MANUFACTURED AND TESTED IN ACCORDANCE WITH UL REQUIREMENTS AND HAVE THE UL LABEL. UNITS SHALL CARRY A 5-YEAR WARRANTY ON COMPRESSORS, A 10-YEAR WARRANTY ON HEAT EXCHANGERS, AND A 1-YEAR WARRANTY ON ALL OTHER PARTS.
- PART 2 PRODUCTS
- 1. EQUIPMENT SHALL BE YORK MANUFACTURED BY JOHNSON CONTROLS - NO EXCEPTIONS. UNITS SHALL BE COMPLETELY FACTORY ASSEMBLED AND TESTED. UNITS SHALL INCLUDE THE FOLLOWING: CONDENSER FANS, COILS AND MOTOR, INTERCONNECTING WIRING AND CONTROL PANEL, FILTER SECTION, COMPRESSORS AND COMPLETE REFRIGERATION SYSTEM, CENTRIFUGAL COMPRESSOR FAN AND MOTOR, GAS-FIRED FURNACE SECTION, AND AUTOMATIC CONTROLS AS SCHEDULED ON DRAWINGS.

END OF SECTION

SECTION 156000 - ROOFTOP HEATING AND COOLING UNITS

PART 1 GENERAL

- INSTALL ROOFTOP HEATING AND COOLING UNITS AS SCHEDULED ON THE DRAWINGS. UNITS SHALL BE RATED BY ARI STANDARD 240 FOR CAPACITY AND ARI STANDARD 270 FOR SOUND. UNITS SHALL BE DESIGNED, MANUFACTURED AND TESTED IN ACCORDANCE WITH UL REQUIREMENTS AND HAVE THE UL LABEL. UNITS SHALL CARRY A 5-YEAR WARRANTY ON COMPRESSORS, A 10-YEAR WARRANTY ON HEAT EXCHANGERS, AND A 1-YEAR WARRANTY ON ALL OTHER PARTS.
- PART 2 PRODUCTS
- 1. EQUIPMENT SHALL BE YORK MANUFACTURED BY JOHNSON CONTROLS - NO EXCEPTIONS. UNITS SHALL BE COMPLETELY FACTORY ASSEMBLED AND TESTED. UNITS SHALL INCLUDE THE FOLLOWING: CONDENSER FANS, COILS AND MOTOR, INTERCONNECTING WIRING AND CONTROL PANEL, FILTER SECTION, COMPRESSORS AND COMPLETE REFRIGERATION SYSTEM, CENTRIFUGAL COMPRESSOR FAN AND MOTOR, GAS-FIRED FURNACE SECTION, AND AUTOMATIC CONTROLS AS SCHEDULED ON DRAWINGS.

- 2. FACTORY-INSTALLED OPTIONS SHALL INCLUDE INTELLISPEED VARIABLE FREQUENCY DRIVE (VFD), INTELLISPEED CONTROL OF THE VFD BASED ON STAGES OF COOLING (PROVIDES SINGLE ZONE VAV FAN OPERATION AS DEFINED BY ASHRAE 90.1 SECTION 6.4.3.10), DRY BULB LOW LEAK ECONOMIZER W/BAROMETRIC RELIEF AND WITH ECONOMIZER FAULT DETECTION & DIAGNOSTIC (MEETS ASHRAE 90.1-2013, IECC 2015, CALIFORNIA TITLE 24, AMCA 511), 3 HP HIGH STATIC BELT DRIVE BLOWER, STANDARD 2" THROWAWAY FILTERS, SIMPLICITY® SE CONTROLLER INCLUDING DISCHARGE AIR, RETURN AIR, AND OUTDOOR AIR TEMPERATURE SENSORS, POWERED CONVENIENCE OUTLET (110 VAC / 15 AMP), HACR CIRCUIT BREAKER/DISCONNECT, RETURN AIR SMOKE DETECTOR (BOTTOM RETURN ONLY), PHASE MONITOR, MICRO-CHANNEL "ALL-ALUMINUM" CONDENSER COIL, COPPER TUBE/ALUMINUM FIN EVAPORATOR COIL, AND COMPOSITE DRAIN PAN.
- 3. FIELD-INSTALLED ACCESSORIES SHALL INCLUDE 14" HIGH ROOF CURB, CO2 SENSE/WALL MOUNT SENSOR, AND YORK PROGRAMMABLE THERMOSTAT.

PART 3 EXECUTION

- 1. INSTALL UNITS ON ROOF CURBS WITH 3/4" X 1-3/4" WIDE GASKETING MATERIAL SUPPLIED BY UNIT MANUFACTURER.

END OF SECTION

SECTION 158000 - POWER VENTILATORS

PART 1 GENERAL

- INSTALL YORK (PENNBARRY) VENTILATORS AS DESCRIBED IN CONTRACT DRAWINGS.
- PART 2 PRODUCTS
- 1. AS SCHEDULED ON DRAWINGS. OTHER APPROVED MANUFACTURERS INCLUDE BROAN, CARNES, GREENHECK, AND PENN.
- 2. CAST BRASS WITH POLISHED CHROME-PLATED FINISH. ACoustically INSULATED WITH A SOUND LEVEL RATING OF 4.6 SONES MAXIMUM. PROVIDE EXHAUST GRILLE, SHATTERPROOF BACK DRAFT DAMPER, ROOF CAP AND RUBBER - IN SHEAR VIBRATION ISOLATORS.

PART 3 EXECUTION

- 1. INSTALL FANS LEVEL AND PLUMB, IN ACCORDANCE WITH MANUFACTURERS WRITTEN INSTRUCTIONS. SECURE UNITS TO STRUCTURE OR CURB.
- 2. CHECK EXHAUST FANS FOR ANYTHING THAT WILL AFFECT ITS OPERATION AND TAKE CORRECTIVE ACTION BEFORE START-UP.

END OF SECTION

SECTION 159000 - METAL DUCTWORK

PART 1 GENERAL

- FURNISH AND INSTALL RECTANGULAR AND ROUND METAL DUCTS AND PLENUMS FOR HVAC SYSTEMS PER THE CONTRACT DOCUMENTS.
- FURNISH AND INSTALL DUCT LINER IN ALL RETURN AIR DUCTWORK. MAINTAIN AIR WAY DIMENSIONS ON DRAWINGS.
- COMPLY WITH NFPA 90A, "STANDARD FOR THE INSTALLATION OF AIR CONDITIONING AND VENTILATING SYSTEM."
- PART 2 PRODUCTS
- 1. FABRICATE DUCTS OF LOCK FORMING QUALITY, ASTM A 527, COATING DESIGNATION G90, IN CONFORMANCE WITH ALL "SMACNA" STANDARDS. PROVIDE MILL PHOSPHATIZED FINISH FOR EXPOSED SURFACES OF DUCTS EXPOSED TO VIEW. SEAL JOINTS AND SEAMS WITH UNITED DUCT SEAL OR EQUAL.
- 2. SEE SECTION 152500 FOR DUCT LINER SPECIFICATION.
- 3. VOLUME DAMPERS IN MAIN AND BRANCH DUCTS SHALL BE FACTORY FABRICATED MULTIPLE OPPOSED BLADE DESIGN WITH STANDARD LEAKAGE RATING, LOCKING QUADRANT AS MANUFACTURED BY AIR CONTROL PRODUCTS TCD-0B OR EQUAL.
- 4. FIRE DAMPERS SHALL BE "RUSKIN" IBD2 TYPE B, 165°F FUSIBLE LINK, 1 1/2" DIA. RATED 165°F. UNLESS OTHERWISE NOTED ON THE DRAWINGS OR AS REQUIRED BY LOCAL BUILDING CODE, REGULATIONS.
- 5. DUCT HANGERS SHALL BE 1" X 18 GA. GALV. STEEL STRAPS SPACED NOT MORE THAN 8 FT. APART.
- 6. PROVIDE TURNING VANES IN ALL S.A. AND R.A. ELBOWS. TURNING VANES SHALL BE SINGLE BLADE VANES WITH TRAILING EDGE, 1-1/4" WIDE VANE RAIL.
- 7. FLEXIBLE DUCTS SHALL COMPLY WITH U.L. 181, CLASS I, FACTORY-FABRICATED, INSULATED ROUND DUCT WITH AN OUTER GLASS-REINFORCED SILVER MYLAR JACKET ENCLOSING 1-1/2" THICK GLASS FIBER INSULATION AROUND A CONTINUOUS INNER LINER. REINFORCEMENT SHALL BE A STEEL-WIRE HELIX ENCAPSULATED IN THE POLYETHYLENE FILM INNER LINER.
- 8. MAXIMUM FLEXIBLE DUCT RUN TO BE 5'-0".
- PART 3 EXECUTION
- 1. CONSTRUCT AND INSTALL EACH DUCT SYSTEM FOR THE SPECIFIC DUCT PRESSURE CLASSIFICATION INDICATED PER SMACNA AND LOCAL CODE. INSTALL DUCTS CLOSE TO WALLS, OVERHEAD CONSTRUCTION, COLUMNS, AND OTHER PERMANENT ELEMENTS OF THE BUILDING.
- 2. ADJUST VOLUME CONTROL DAMPERS AS REQUIRED BY THE TESTING AND BALANCING PROCEDURES. VACUUM DUCT SYSTEMS PRIOR TO FINAL ACCEPTANCE.
- 3. ALL SUPPORTS FOR FLEXIBLE DUCT SHALL INCORPORATE A 1" WIDE BAND CLAMP. SUPPORT SYSTEM MUST NOT DAMAGE NEW DUCT OR CAUSE OUT OF ROUND SHAPE. MAXIMUM LENGTH OF FLEXIBLE DUCTS SHALL BE 5'-0".
- 4. INSTALL ONLY RIGID METAL DUCTWORK WHERE IT IS EXPOSED TO VIEW.

PART 3 EXECUTION

END OF SECTION

SECTION 159500 - AIR OUTLETS AND INLETS

PART 1 GENERAL

- INSTALL TUTTLE AND BAILEY CEILING AIR DIFFUSERS AND GRILLES AS DESCRIBED IN CONTRACT DOCUMENTS. AIR OUTLETS AND INLETS SHALL COMPLY WITH ARI 650 STANDARD.
- PART 2 PRODUCTS
- 1. AS SCHEDULED ON DRAWINGS. OTHER APPROVED MANUFACTURERS INCLUDE: ANEMOSTAT, CARNES, KRUEGER, TUTTLE AND BAILEY.
- 2. ALL DIFFUSERS SHALL HAVE BORDER STYLES COMPATIBLE WITH ADJACENT CEILING SYSTEMS.
- 3. REGISTER, DIFFUSERS, AND GRILLES SHALL HAVE A SEMI-GLOSS WHITE ENAMEL FACTORY FINISH UNLESS NOTED OTHERWISE.

PART 3 EXECUTION

- 1. INSTALL AIR OUTLETS AND INLETS IN ACCORDANCE WITH MANUFACTURERS' WRITTEN INSTRUCTIONS. COORDINATE LOCATION OF CEILING DIFFUSERS AND GRILLES WITH THE REFLECTED CEILING PLAN. ANCHOR SECURELY INTO OPENINGS.
- 2. REPORT TEST RESULTS PROMPTLY AND IN WRITING TO THE ARCHITECT AND THE AUTHORITY HAVING JURISDICTION.
- 3. VERIFY CAPACITIES AND PRESSURE RATINGS OF GAS METERS, REGULATORS, VALVES, AND SPECIALTIES.
- 4. VERIFY CORRECT PRESSURE SETTINGS FOR PRESSURE REGULATORS.
- 5. VERIFY THAT SPECIFIED PIPING TESTS ARE COMPLETE.
- 6. INSTALL SHUT-OFF VALVE, UPSTREAM FROM GAS METER, OUTSIDE BUILDING AT GAS SERVICE ENTRANCE.

END OF SECTION

SECTION 159900 - TESTING, ADJUSTING, AND BALANCING

PART 1 GENERAL

- FURNISH TESTING, BALANCING, AND ADJUSTING OF HEATING, COOLING AND EXHAUST SYSTEMS. TESTING AGENCY SHALL HAVE FIVE YEARS EXPERIENCE WITH PROJECTS OF SIMILAR SIZE AND SCOPE.
- SUBMIT FOUR COPIES OF COMPLETE TEST DATA FOR EVALUATION AND APPROVAL. SUBMIT FORMS PREPARED BY AABC.
- TEST, ADJUST, AND BALANCE THE AIR CONDITIONING SYSTEM DURING THE SUMMER SEASON AND HEATING SYSTEM DURING THE WINTER SEASON.
- HVAC CONTRACTOR TO PERFORM COMPLETE TEST AND BALANCE ON NEW OR UPDATED HVAC SYSTEM AND SUBMIT TO GC AND BUILDING OFFICIAL IF REQUIRED.
- PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

- PERFORM TESTING AND BALANCING IN COMPLETE ACCORDANCE WITH THE ASSOCIATED AIR BALANCE COUNCIL "STANDARDS FOR FIELD MEASUREMENTS AND INSTRUCTIONS."
- INSTRUMENTS USED BY AGENCY SHALL BE ACCURATELY CALIBRATED AND MAINTAINED IN GOOD WORKING ORDER.
- AIR TESTING AND BALANCING PROCEDURE
 - a. CHECK FILTERS. DO NOT PROCEED WITHOUT CORRECT, CLEAN FILTERS.
 - b. TEST AND ADJUST BLOWER RPM TO DESIGN REQUIREMENTS.
 - c. TEST AND RECORD MOTOR FULL LOAD AMPS.
 - d. TEST AND RECORD SUPPLY AIR, RETURN AIR AND EXHAUST AIR CFM, STATIC PRESSURES, SUCTION AND DISCHARGE.
 - e. TEST AND RECORD ENTERING AND LEAVING AIR TEMPERATURES, BOTH HEATING AND COOLING.
 - f. TEST AND ADJUST EACH DIFFUSER, GRILLE, AND REGISTER TO WITHIN 10% OF DESIGN REQUIREMENTS. IDENTIFY EACH DIFFUSER, GRILLE, AND REGISTER BY MANUFACTURER, TYPE, SIZE, AND COMPARISON BETWEEN REQUIRED CFM AND TESTED.
- REPORT IS PART OF THE REQUIRED CLOSEOUT PACKAGE AND MUST BE POSTED TO NATIONAL ACCOUNT VENDOR.

END OF SECTION

SECTION 159900 - TESTING, ADJUSTING, AND BALANCING

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- HVAC CONTRACTOR TO PERFORM COMPLETE TEST AND BALANCE ON NEW OR UPDATED HVAC SYSTEM AND SUBMIT TO GC AND BUILDING OFFICIAL IF REQUIRED.
- PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

- 1. INSTALL AIR OUTLETS AND INLETS IN ACCORDANCE WITH MANUFACTURERS' WRITTEN INSTRUCTIONS. COORDINATE LOCATION OF CEILING DIFFUSERS AND GRILLES WITH THE REFLECTED CEILING PLAN. ANCHOR SECURELY INTO OPENINGS.
- 2. REPORT TEST RESULTS PROMPTLY AND IN WRITING TO THE ARCHITECT AND THE AUTHORITY HAVING JURISDICTION.
- 3. VERIFY CAPACITIES AND PRESSURE RATINGS OF GAS METERS, REGULATORS, VALVES, AND SPECIALTIES.
- 4. VERIFY CORRECT PRESSURE SETTINGS FOR PRESSURE REGULATORS.
- 5. VERIFY THAT SPECIFIED PIPING TESTS ARE COMPLETE.
- 6. INSTALL SHUT-OFF VALVE, UPSTREAM FROM GAS METER, OUTSIDE BUILDING AT GAS SERVICE ENTRANCE.

END OF SECTION

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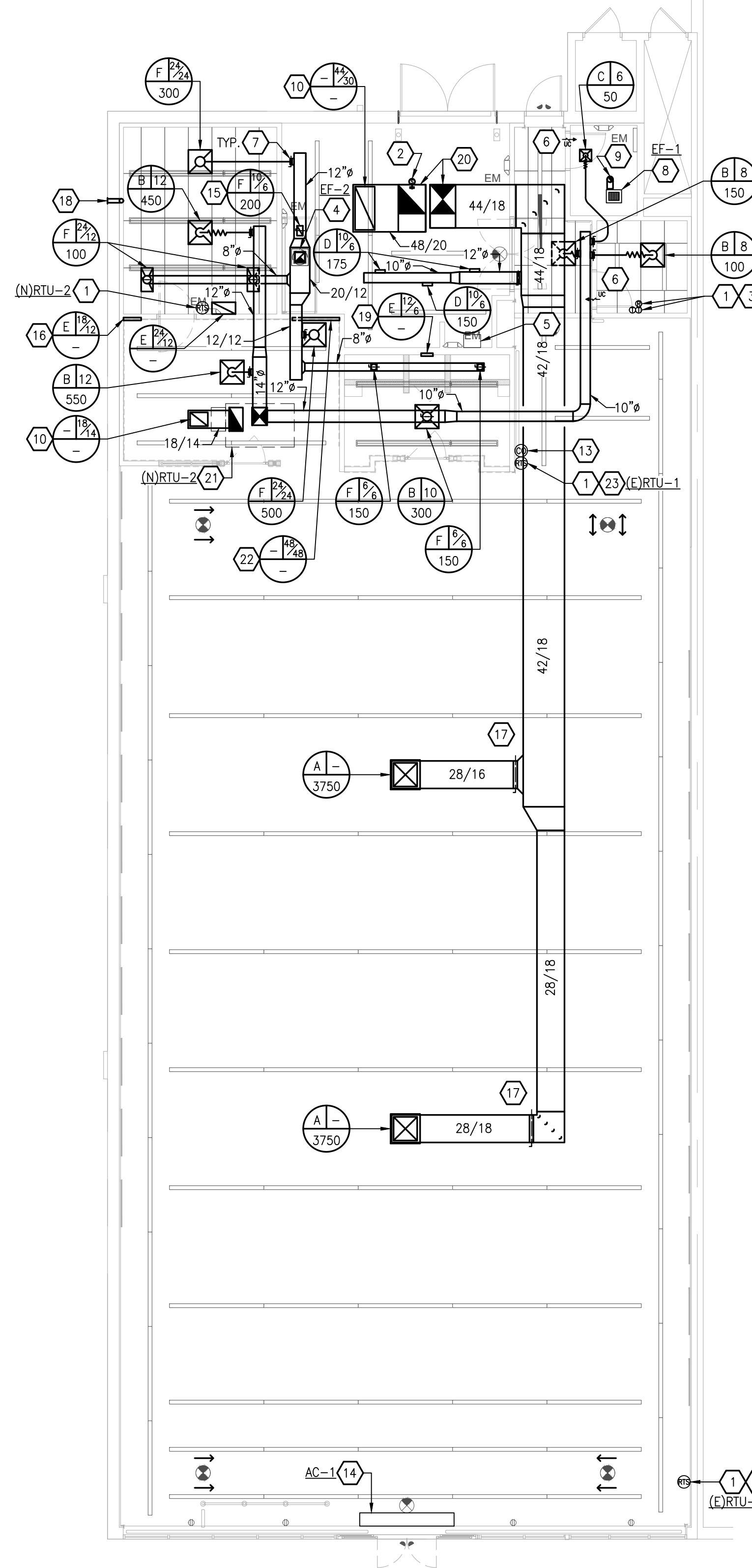
CODED NOTES

1. MECHANICAL CONTRACTOR TO PROVIDE, INSTALL AND WIRE SMART THERMOSTAT WITH REMOTE SENSOR FOR EACH HVAC UNIT. SENSOR SHALL BE LOCATED ON COLUMN OR CORNER OF WALL AND THERMOSTAT TO BE LOCATED IN OFFICE. MOUNT TEMPERATURE SENSOR ON COLUMN OR WALL AT 8'-0" ABOVE FINISHED FLOOR WITH LOCKED, VENTED, METAL OR PLASTIC ENCLOSURE. MECHANICAL CONTRACTOR SHALL LABEL ALL THERMOSTATS AND SENSOR WITH RESPECTIVE RTU. COORDINATE EXACT LOCATION WITH ARCHITECT AND OWNER PRIOR TO ROUGH-IN. PROVIDE CONTROL WIRING AS REQUIRED.
2. VERIFY EXISTENCE & OPERATION OF SMOKE DETECTOR FOR EXISTING PACKAGED HVAC SYSTEM IN FIELD. IN THE EVENT ONE IS NOT EXISTING OR EXISTING IS DAMAGED PROVIDE NEW. MECHANICAL CONTRACTOR TO COORDINATE FINAL CONNECTION TO HVAC UNIT WITH ELECTRICAL CONTRACTOR AS NECESSARY. WIRING BY ELECTRICAL CONTRACTOR TO SHUT DOWN CORRESPONDING AIR HANDLING UNIT UNDER ALARM CONDITIONS. ALL WIRING SHALL BE IN CONDUIT PER N.E.C.
3. MECHANICAL CONTRACTOR TO PROVIDE AND MOUNT SMOKE DETECTOR REMOTE KEY STATUS AND TEST STATIONS (WITH AUDIO AND VISUAL ALARM) NEXT TO UNIT THERMOSTAT. M.C. TO LABEL DETECTOR SERVING RESPECTIVE ROOFTOP UNIT. ALL WIRING SHALL BE BY ELECTRICAL CONTRACTOR IN CONDUIT PER N.E.C. REMOTE STATION SHALL BE A SYSTEM SENSOR MODEL DH100ACDCLP OR EQUAL.
4. ROOF MOUNTED EXHAUST FAN. SEE DETAIL AND SCHEDULE FOR REQUIREMENTS.
5. EXTEND FACTORY PROVIDED CONCENTRIC VENT FROM TANKLESS WATER HEATER THRU ROOF OF BUILDING. CONFIRM LENGTH PRIOR TO ORDERING. COORDINATE WITH G.C. & P.C.
6. UNDERCUT DOOR 3/4" FOR MAKE UP AIR. COORDINATE WITH DOOR SCHEDULE ON SHEET A9.0.
7. MANUAL VOLUME CONTROL DAMPERS SHALL BE LOCK-TYPE (TYPICAL FOR ALL).
8. EXHAUST FAN LOCATED ON CEILING. SEE ELECTRICAL DRAWINGS FOR EXACT LOCATION.
9. 8"Ø EXHAUST AIR DUCT UP THRU ROOF. TERMINATE ON ROOF WITH GOOSE NECK AND BIRD SCREEN.
10. RETURN AIR OPENING ON TOP OF RETURN AIR DUCT. SEE DETAIL ON M2.0 FOR MORE INFO.
11. NOT USED.
12. NOT USED.
13. VERIFY SALES FLOOR EXISTING UNIT'S ECONOMIZER DAMPER CAN BE CONTROLLED VIA CO2 CONTROL. IN THE EVEN THIS IS POSSIBLE, PROVIDE & MOUNT CARBON DIOXIDE SENSOR AT 5'-0" A.F.F. ONE SENSOR SHALL CONTROL OUTDOOR AIR FLOW FROM SALES FLOOR HVAC UNITS.
14. MOUNT AIR CURTAIN CENTERED ABOVE DOOR ABOVE WINDOW HEAD. COORDINATE EXACT MOUNTING HEIGHT WITH ARCHITECTURAL DRAWINGS.
15. DUCT MOUNTED EXHAUST GRILLE SHALL BE CENTERED ABOVE SHELVING UNIT FOR FEEDER MICE.
16. PROVIDE AIR TRANSFER OPENING THRU WALL FROM CEILING TRANSFER GRILLE. PROVIDE GRILLE ON FINISHED SIDE. TRANSFER GRILLE SHALL HAVE PAINTABLE FINISH & BE INSTALLED 13'-0" A.F.F.
17. DUCTWORK SHALL BE CENTERED BETWEEN SALES FLOOR LIGHT FIXTURES (WHERE POSSIBLE).
18. ROUTE RIGID ALUMINUM DRYER VENT FROM DRYER UP INTO CEILING SPACE AND TERMINATE THRU WALL OF BUILDING WITH DRYER VENT HOOD. PROVIDE DRYER VENT HOOD WITH BIRD SCREEN AT TERMINATION. MAINTAIN A MINIMUM OF 10'-0" FROM ANY FRESH AIR OPENINGS.
19. PROVIDE 2 TRANSFER GRILLES ON PUBLIC PET WASH SIDE OF WALL. MOUNT 1 GRILLE AT 12' AFF. AND 1 AT 12' AFF W/BLADES POINTED UP. GRILLES ARE TO BE LOCATED IN THE SPACE BETWEEN 2 WALL STUDS, SUCH THAT AIR MAY BE TRANSFERRED BETWEEN THEM. FIELD COORDINATE THE EXACT LOCATION OF THE GRILLES AND ENSURE THAT THERE IS TO BE NO HORIZONTAL FRAMING, OR OTHER OBSTRUCTIONS IN THE STUD SPACE.
20. EXISTING ROOFTOP UNIT & ASSOCIATED COMPONENTS (CONTROLS, ELECTRICAL/GAS CONNECTIONS, ETC.) IN THIS AREA TO REMAIN. PROVIDE REFURBISHMENT SCOPE AS NOTED ON SHEET M3.0. REMOVE EXISTING SUPPLY/RETURN DUCT MAINS BACK TO ROOF DROPS & EXTEND NEW AS SHOWN. THE FIRST 10'-0" OF BOTH SUPPLY AND RETURN MAIN DUCTS SHALL BE ACOUSTICALLY LINED. SET UNIT OUTSIDE AIR QUANTITY AS LISTED ON ROOFTOP UNIT SCHEDULE. FANS TO RUN CONTINUOUS DURING OCCUPIED HOURS.
21. PROVIDE AND INSTALL NEW ROOFTOP UNIT, PROVIDE WITH ROOF CURB. FULL SIZE SUPPLY & RETURN DUCTWORK DOWN THROUGH ROOFTOP TO CEILING SPACE & EXTEND AS SHOWN. THE FIRST 10'-0" OF BOTH SUPPLY AND RETURN MAIN DUCTS SHALL BE ACOUSTICALLY LINED. SET UNIT OUTSIDE AIR QUANTITY AS LISTED ON ROOFTOP UNIT SCHEDULE. FANS TO RUN CONTINUOUS DURING OCCUPIED HOURS.
22. PROVIDE AIR TRANSFER OPENING THRU WALL HIGH IN JOIST SPACE FOR SALES FLOOR RETURN AIR. PROVIDE GRILLE ON FINISHED SIDE OF WALL. TRANSFER GRILLE SHALL HAVE PAINTABLE FINISH.
23. CONTRACTOR TO PROVIDE TWO REMOTE THERMOSTATS WITH SPACE AVERAGING FOR SALES FLOOR HVAC UNIT.

GENERAL NOTES

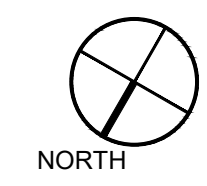
- A. CONTRACTOR SHALL VISIT SITE PRIOR TO BIDDING PROCESS AND BE FAMILIAR WITH THE SCOPE OF WORK.
- B. MECHANICAL CONTRACTOR SHALL DISCONNECT, DISASSEMBLE, AND REMOVE EXISTING EQUIPMENT, ASSOCIATED DUCTWORK, DIFFUSERS, GRILLES, SUPPORTS, PIPING, AND ASSOCIATED CONTROLS, ETC., NOT OTHERWISE INDICATED TO BE REUSED ON DRAWINGS. ALL OPENINGS IN PIPING AND DUCTS THAT REMAIN SHALL BE PLUGGED/CAPPED AND PROPERLY SECURED. ANY EQUIPMENT DESIGNATED BY OWNER TO BE SALVAGED SHALL BE PROTECTED DURING DEMOLITION AND DELIVERED TO OWNER ON SITE. OTHERWISE, CONTRACTOR SHALL DISPOSE OF LEGALLY AS DIRECTED BY OWNER.
- C. MECHANICAL CONTRACTOR SHALL TAKE ALL INTERFERENCES INTO CONSIDERATION. PROVIDE ALL NECESSARY OFFSETS OR TRANSITIONS WITH EQUIVALENT AREAS TO MATCH DUCT SIZES AS INDICATED ON DRAWINGS.
- D. CONTRACTOR SHALL BE FAMILIAR WITH OWNER'S STANDARDS, RULES AND REGULATIONS. ALL OWNER'S CRITERIA SHALL BE COMPLIED WITH AND INCLUDED IN THIS BID.
- E. ALL DUCTWORK SHALL BE INSTALLED TIGHT TO UNDERSIDE OF STRUCTURE OR AS HIGH AS POSSIBLE ABOVE FINISHED CEILING TO AVOID OBSTRUCTIONS.
- F. MAINTAIN ALL MANUFACTURER'S RECOMMENDED SERVICE CLEARANCES FOR ALL EQUIPMENT.
- G. HVAC DUCTWORK SHALL BE FABRICATED AND ERECTED IN ACCORDANCE WITH ASHRAE AND LATEST SMACNA STANDARDS. PROVIDE TURNING VANES ON ALL ELBOWS.
- H. ALL SUPPLY AND EXHAUST BRANCH DUCTWORK SHALL HAVE MANUAL VOLUME DAMPERS IN CORRESPONDING RUNOUTS NEAR CONNECTION TO MAIN DUCT.
- I. NO THERMOSTATS OR SENSOR ARE TO BE LOCATED OVER HEAT PRODUCING EQUIPMENT.
- J. THE CONTRACTOR SHALL OBTAIN AND PAY FOR ALL PERMITS, LICENSES, DOCUMENTS AND SERVICES RELATED TO INSTALLATION OF WORK.
- K. CONDUIT IN EXPOSED TO VIEW AREAS TO BE PAINTED TO MATCH ROOF DECK AND/OR WALL COLOR.
- L. MECHANICAL CONTRACTOR SHALL PATCH ALL OPENINGS IN EXISTING WALLS, FLOORS, AND CEILINGS REMAINING AFTER COMPLETION OF ALL DEMOLITION WORK FOR PROJECT. CONTRACTOR SHALL PATCH ALL OPENINGS TO MATCH SURROUNDING SURFACE FINISHES.
- M. EXISTING SPRINKLERS TO BE MODIFIED AS REQUIRED TO ACCOMMODATE NEW ROOM/REFLECTED CEILING LAYOUT. SPRINKLERS SHALL BE IN ACCORDANCE WITH N.F.P.A. 13. PER REQUIRED OCCUPANCY HAZARDS.
- N. FILTERS FOR ALL HVAC UNITS ARE TO BE REPLACED AT THE END OF CONSTRUCTION. CONTRACTOR SHALL SUPPLY (1) ADDITIONAL SET OF FILTERS LABELED FOR THE RESPECTIVE HVAC UNIT TO OWNER AT THE END OF CONSTRUCTION.
- O. ALL ROOF WORK TO BE DONE BY LANDLORD APPROVED ROOFING CONTRACTOR TO MAINTAIN ROOF WARRANTY.
- P. ANY EXISTING CEILING ITEMS THAT ARE TO REMAIN (FOR EXAMPLE: EXISTING DUCTWORK OR ANY OTHER EXISTING BUILDING SYSTEM ELEMENTS) ARE TO BE RAISED AS REQUIRED FOR LIGHT FIXTURE INSTALLATION. G.C. TO COORDINATE AS REQUIRED.
- Q. MECHANICAL CONTRACTOR TO PERFORM COMPLETE TEST AND BALANCE OF NEW OR UPDATED HVAC SYSTEM AND SUBMIT TO GC AND BUILDING OFFICIAL IF REQUIRED.

SUPPLY BRANCH DUCTWORK SIZING		RETURN BRANCH DUCTWORK SIZING	
CFM	DUCT SIZE	CFM	DUCT SIZE
0-100	6"	0-75	6"
101-250	8"	76-225	8"
251-400	10"	226-375	10"
401-650	12"	376-650	12"



REFER TO REFLECTED CEILING FOR ALL REQUIRED HEIGHTS. VERIFY ALL CLEARANCES FOR LIGHTING/DUCTWORK PRIOR TO DUCT FABRICATION.

CONTRACTOR MUST VERIFY ALL CLEARANCES AND DIMENSIONS IN FIELD



SCALE: 1/8" = 1'-0"

MECHANICAL LEGEND

SYMBOL	DESCRIPTION
	TURNING VANE
	AIR EXTRACTOR
	OPPOSED BLADE VOLUME DAMPER
	SUPPLY DUCT
	RETURN DUCT
	EXHAUST DUCT
	FLEXIBLE DUCT CONNECTION
	THERMOSTAT
	SMOKE DETECTOR TEST STATION
	CARBON MONOXIDE SENSOR
	REMOTE THERMOSTAT
	DUCT SMOKE DETECTOR TO SHUT DOWN UNIT UNDER ALARM
	UNDERCUT DOOR (BY G.C.)
	CONNECT TO EXISTING

ABBREVIATIONS

SR SUPPLY REGISTER	G.C. GENERAL CONTRACTOR
RC RETURN GRILLE	M.C. MECHANICAL CONTRACTOR
SA SUPPLY AIR	P.C. PLUMBING CONTRACTOR
RA RETURN AIR	E.C. ELECTRICAL CONTRACTOR
VD VOLUME DAMPER	CLG., CEIL. CEILING
FD FIRE DAMPER	A.F.F. ABOVE FINISHED FLOOR
UCD UNDERCUT DOOR	(E) EXISTING TO REMAIN



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SEAL



PET SUPPLIES PLUS

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1316 ROMBACH AVE
WILMINGTON, OH 45177

DATE	ISSUE/REVISION
5/05/2023	OWNER REVIEW
5/31/2023	BID PERMIT

MECHANICAL PLAN
DRAWING NUMBER

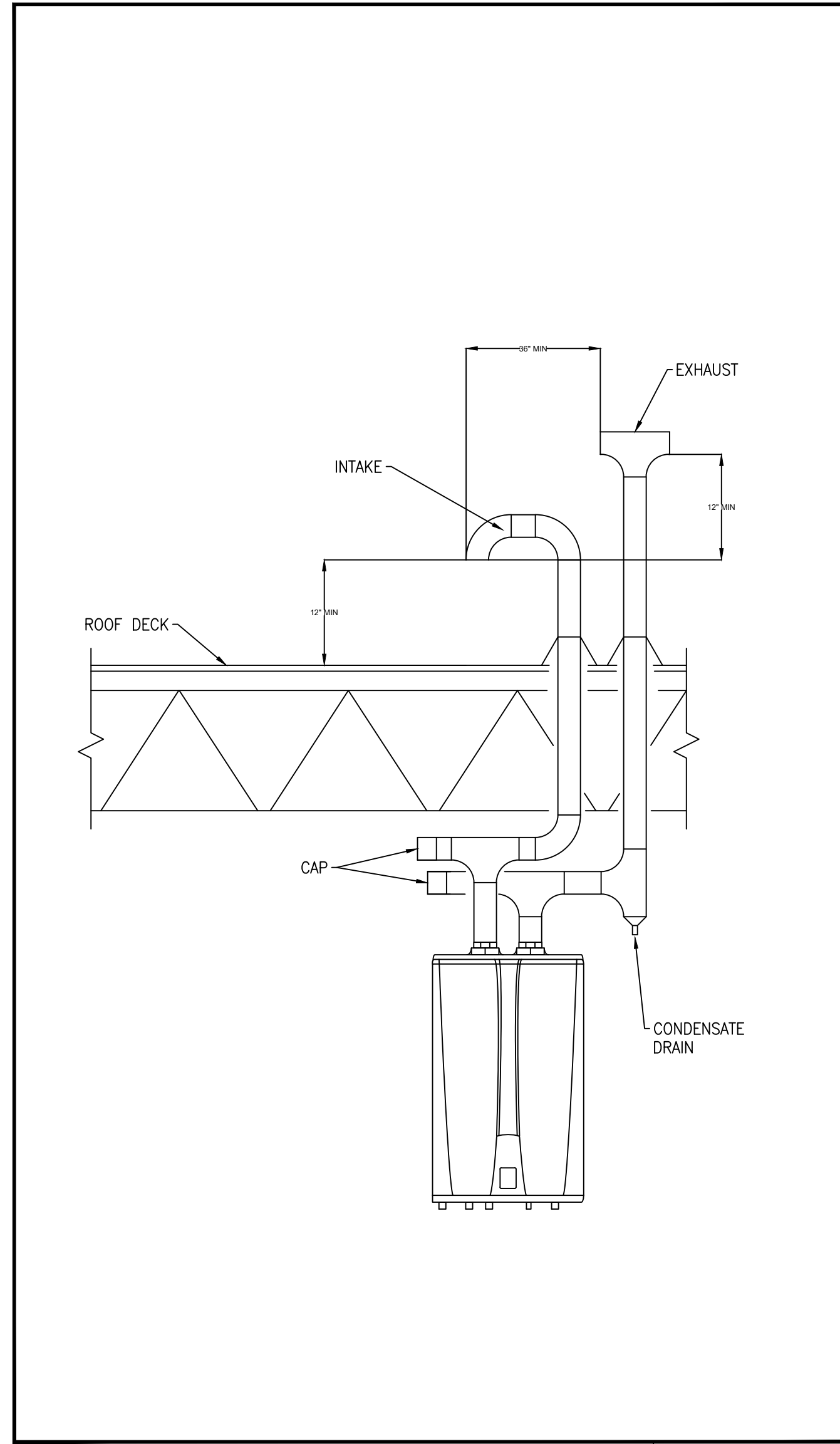
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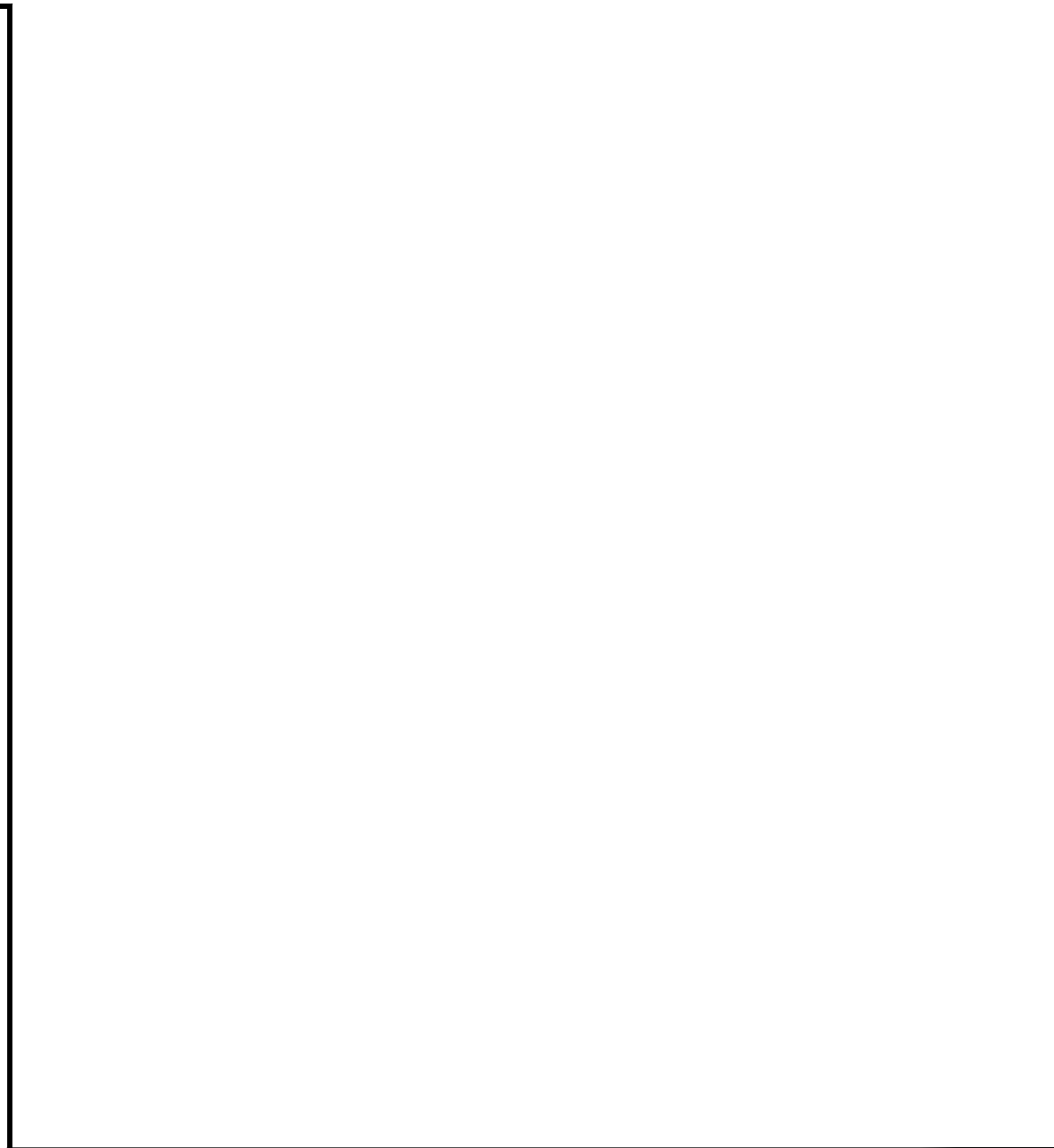
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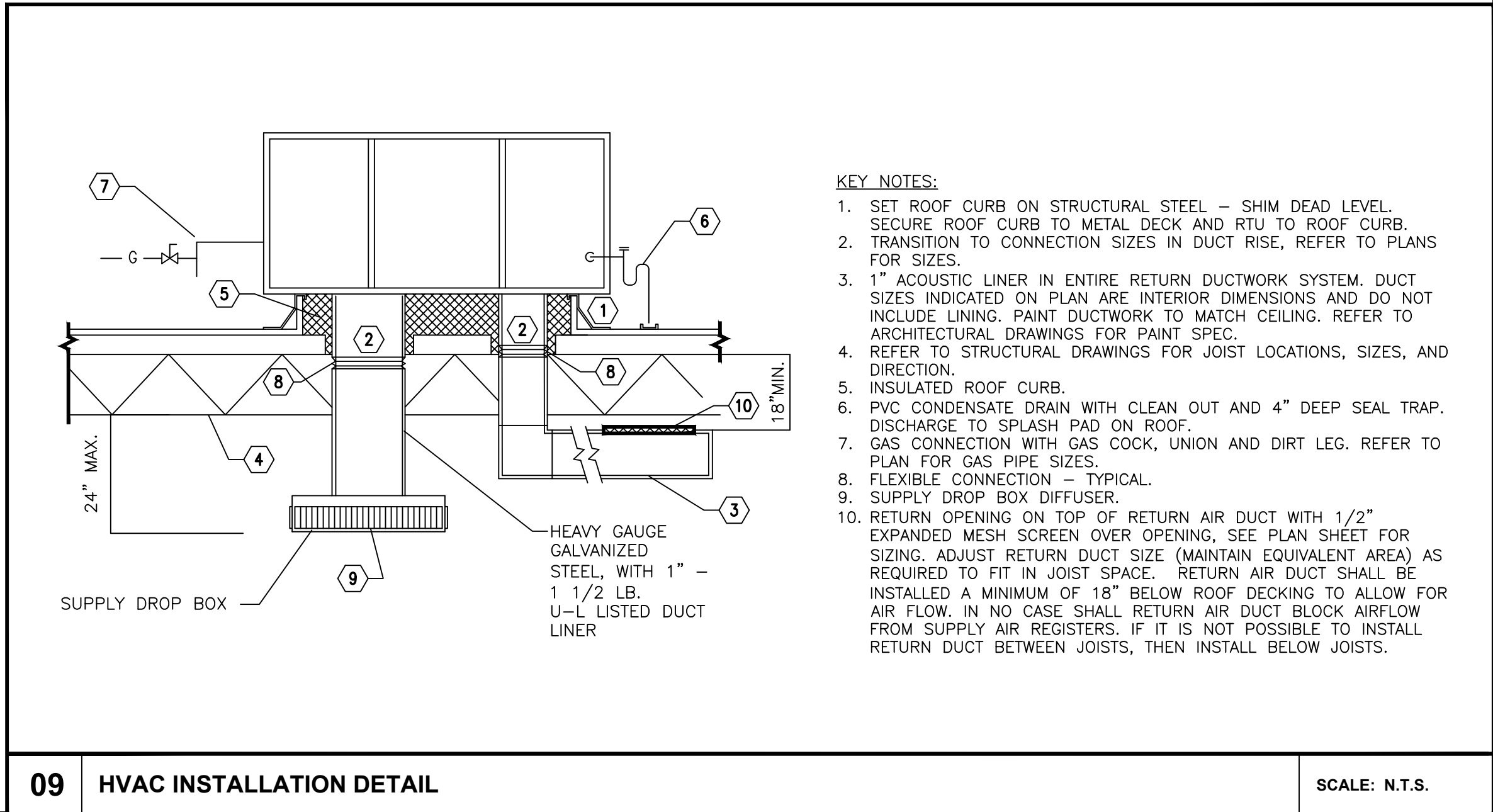
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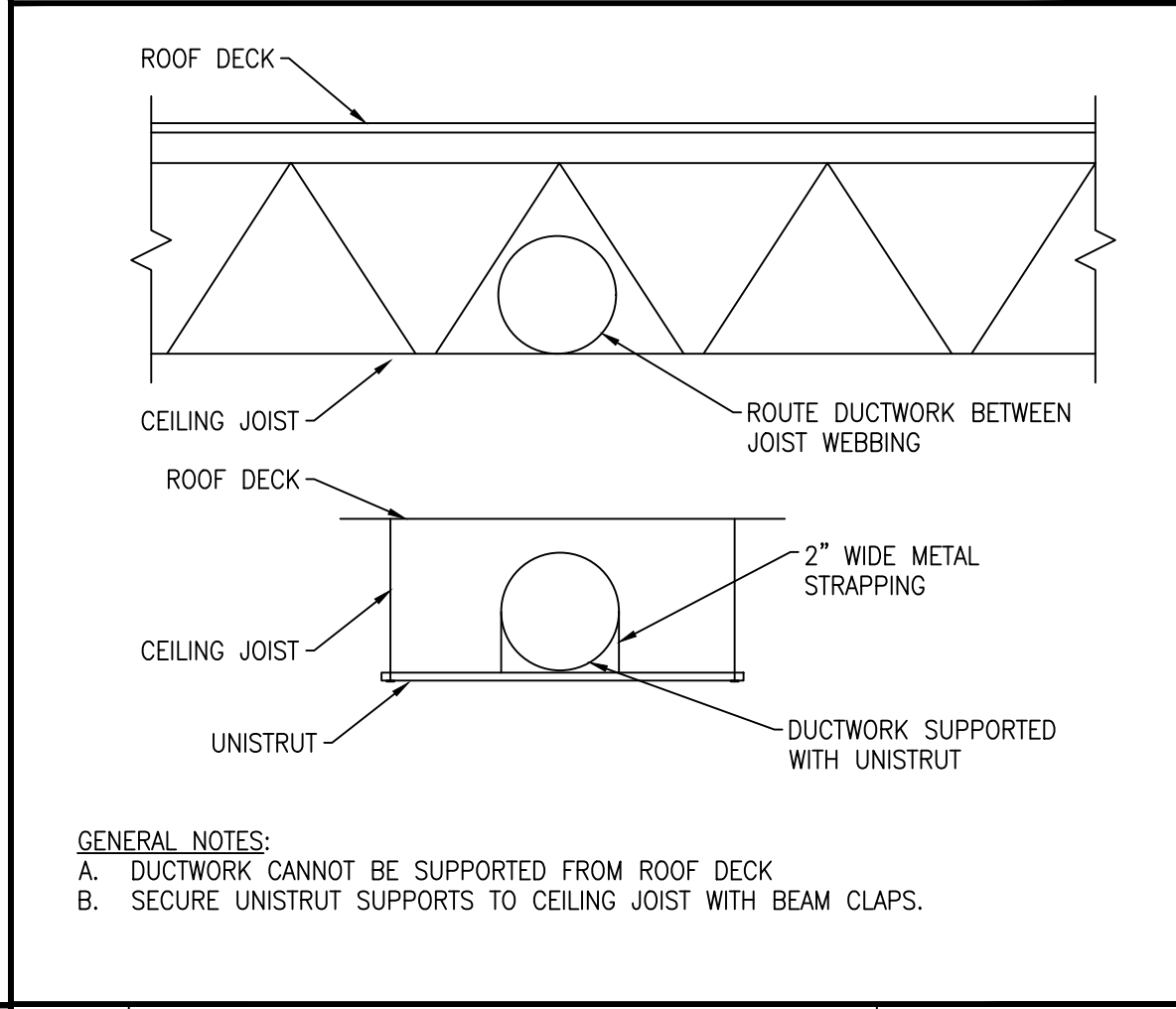
08 WATER HEATER VENT DETAIL SCALE: N.T.S.



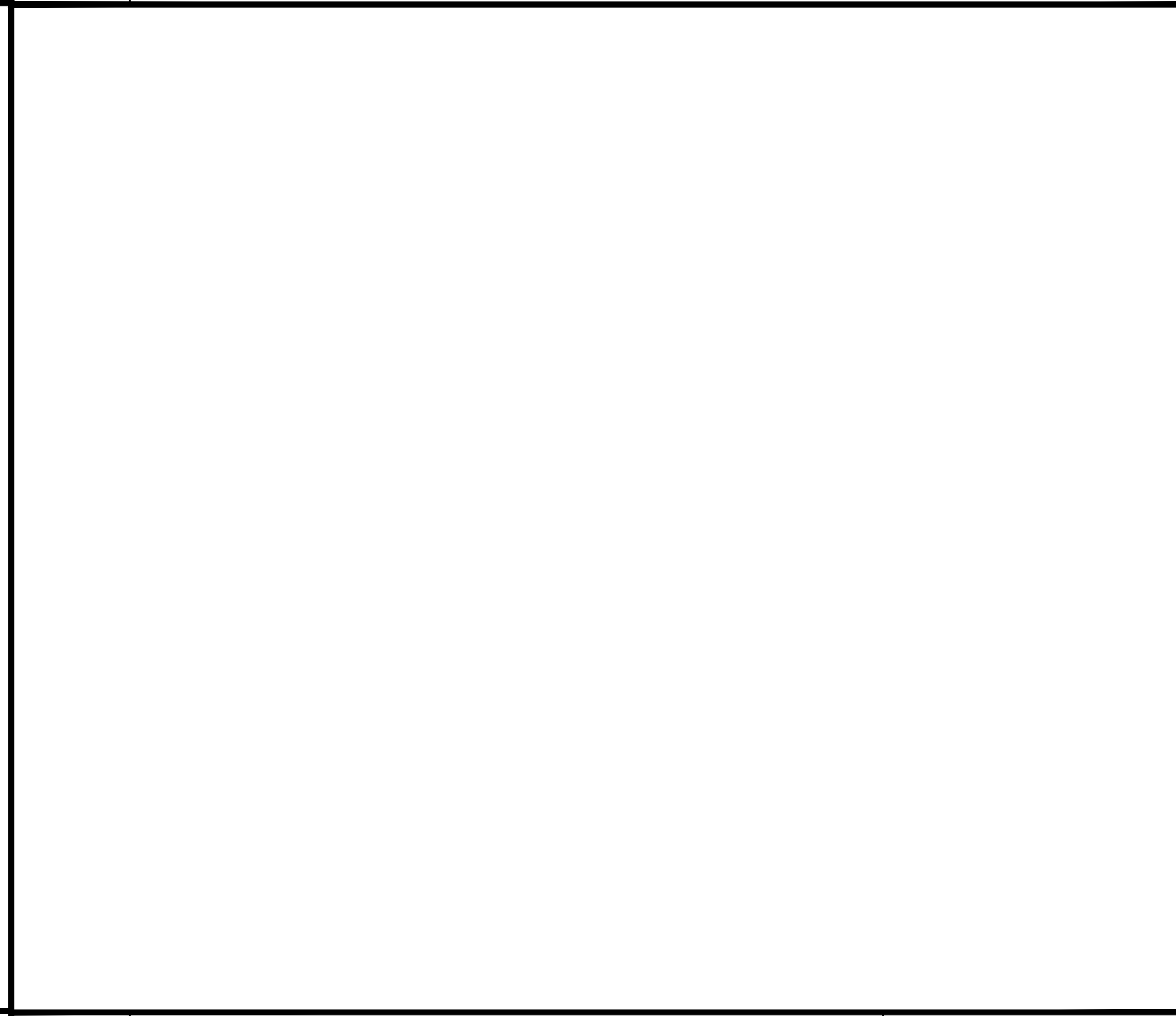
09 HVAC INSTALLATION DETAIL SCALE: N.T.S.



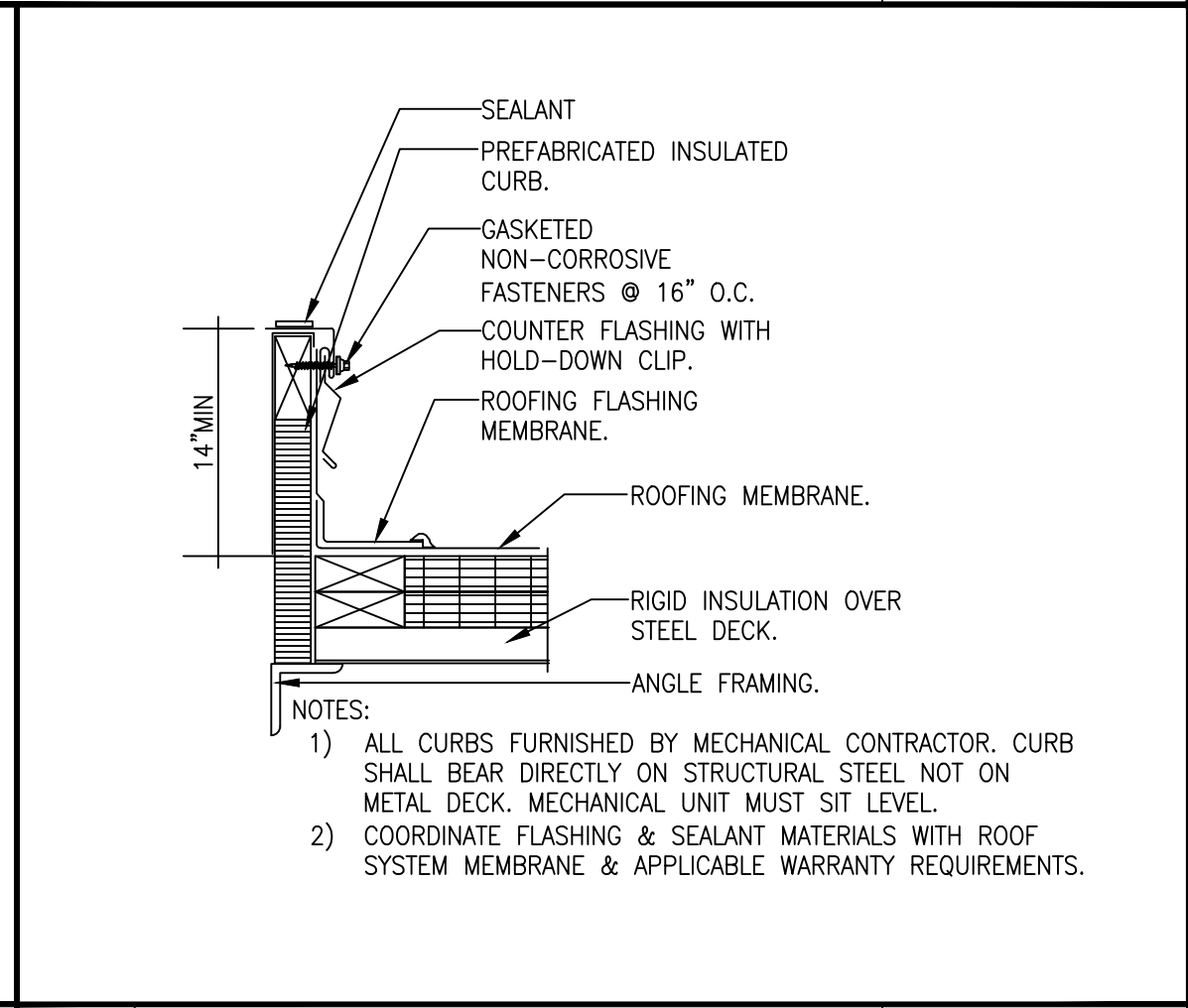
- KEY NOTES:**
1. SET ROOF CURB ON STRUCTURAL STEEL - SHIM DEAD LEVEL. SECURE ROOF CURB TO METAL DECK AND RTU TO ROOF CURB. TRANSITION TO CONNECTION SIZES IN DUCT RISE, REFER TO PLANS FOR SIZES.
 2. 1" ACOUSTIC LINER IN ENTIRE RETURN DUCTWORK SYSTEM. DUCT SIZES INDICATED ON PLAN ARE INTERIOR DIMENSIONS AND DO NOT INCLUDE LINING. PAINT DUCTWORK TO MATCH CEILING. REFER TO ARCHITECTURAL DRAWINGS FOR PAINT SPEC.
 3. REFER TO STRUCTURAL DRAWINGS FOR JOIST LOCATIONS, SIZES, AND DIRECTION.
 4. INSULATED ROOF CURB.
 5. PVC CONDENSATE DRAIN WITH CLEAN OUT AND 4" DEEP SEAL TRAP. DISCHARGE TO SPLASH PAD ON ROOF.
 6. GAS CONNECTION WITH GAS COCK, UNION AND DIRT LEG. REFER TO PLAN FOR GAS PIPE SIZES.
 7. FLEXIBLE CONNECTION - TYPICAL.
 8. SUPPLY DROP BOX DIFFUSER.
 9. RETURN OPENING ON TOP OF RETURN AIR DUCT WITH 1/2" EXPANDED MESH SCREEN OVER OPENING. SEE PLAN SHEET FOR SIZING. ADJUST RETURN DUCT SIZE (MAINTAIN EQUIVALENT AREA) AS REQUIRED TO FIT IN JOIST SPACE. RETURN AIR DUCT SHALL BE INSTALLED A MINIMUM OF 18" BELOW ROOF DECKING TO ALLOW FOR AIR FLOW. IN NO CASE SHALL RETURN AIR DUCT BLOCK AIRFLOW FROM SUPPLY AIR REGISTERS. IF IT IS NOT POSSIBLE TO INSTALL RETURN DUCT BETWEEN JOISTS, THEN INSTALL BELOW JOISTS.



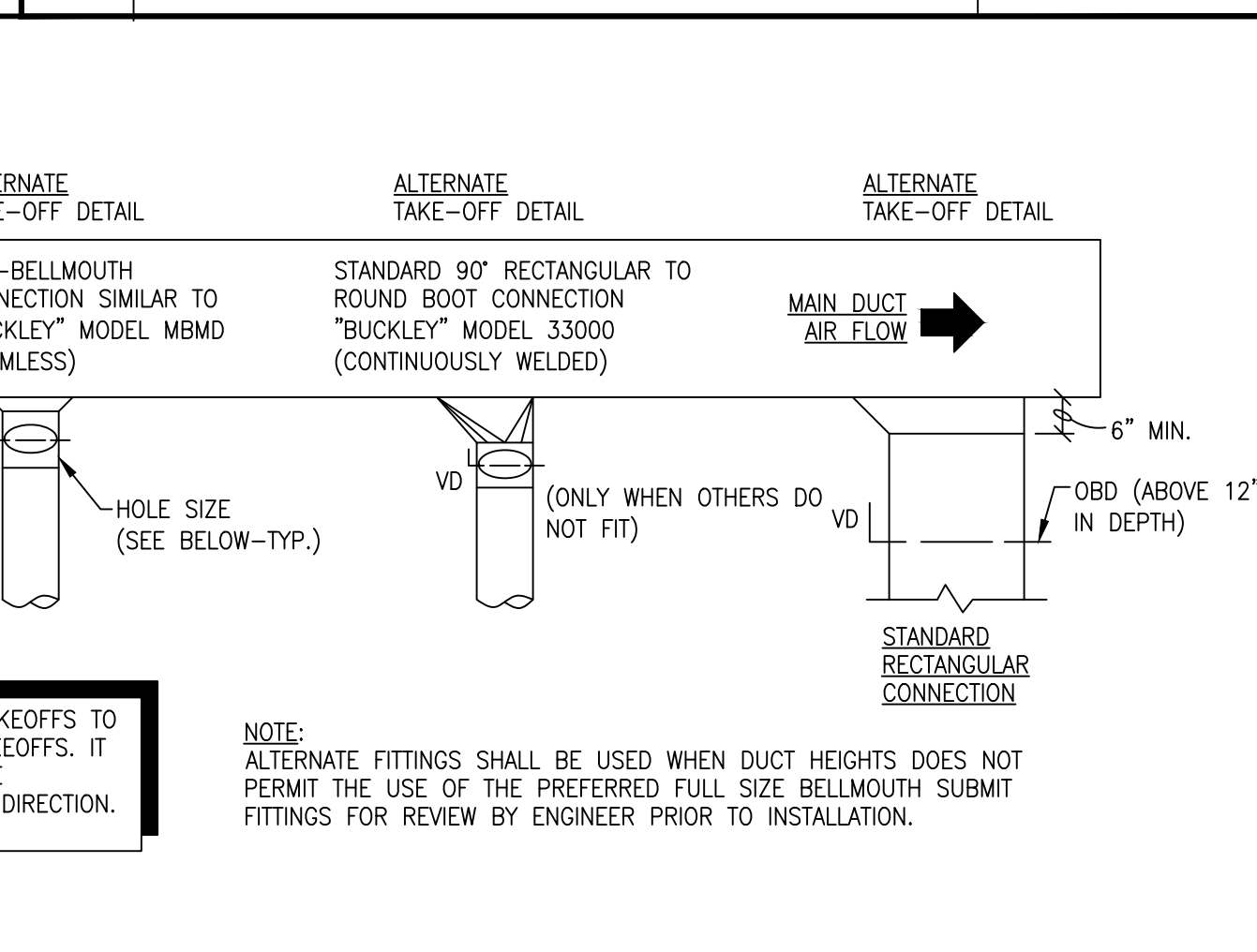
07 DUCT ROUTING BETWEEN CEILING JOIST DETAIL SCALE: N.T.S.



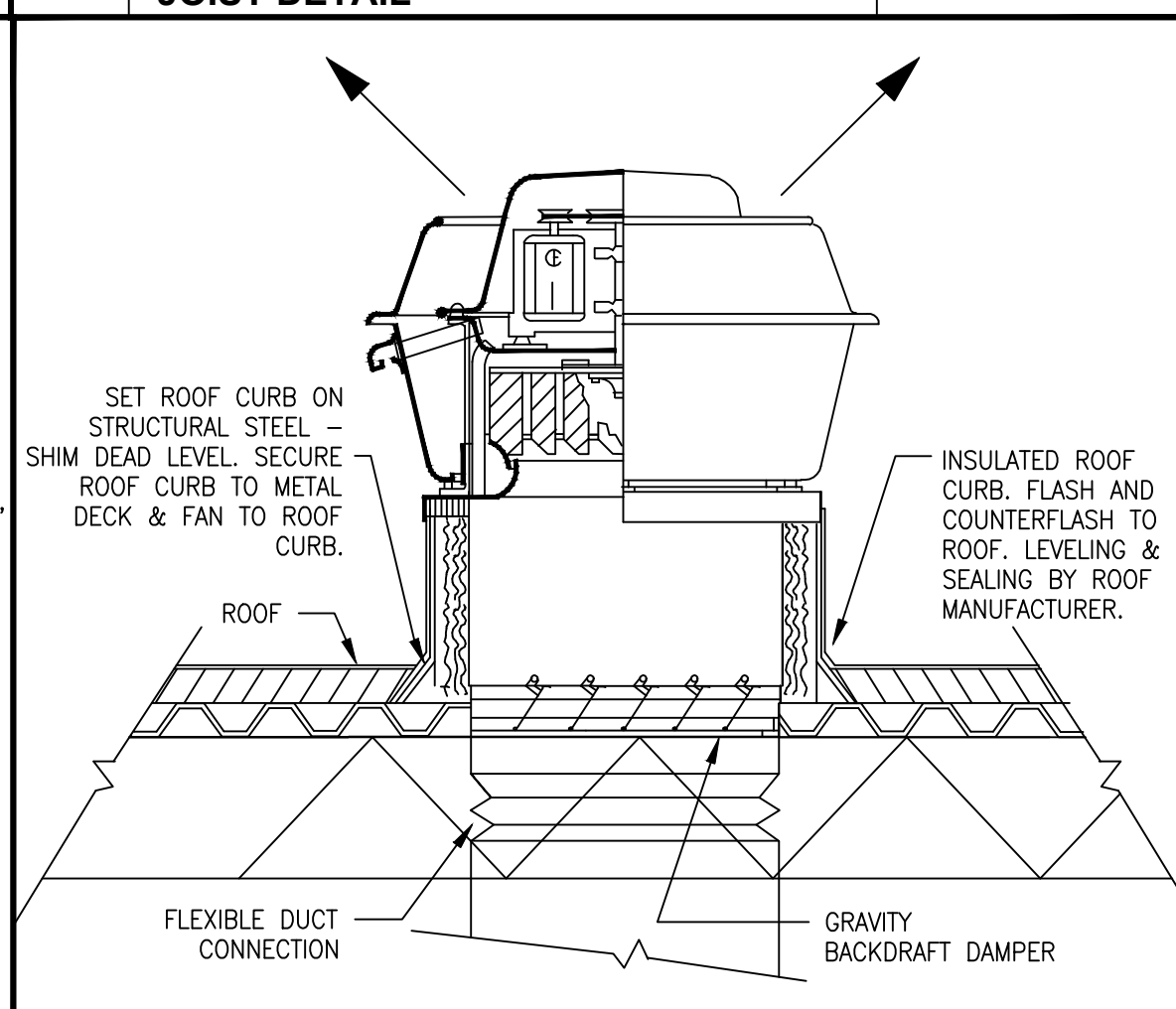
06 NOT USED SCALE: N.T.S.



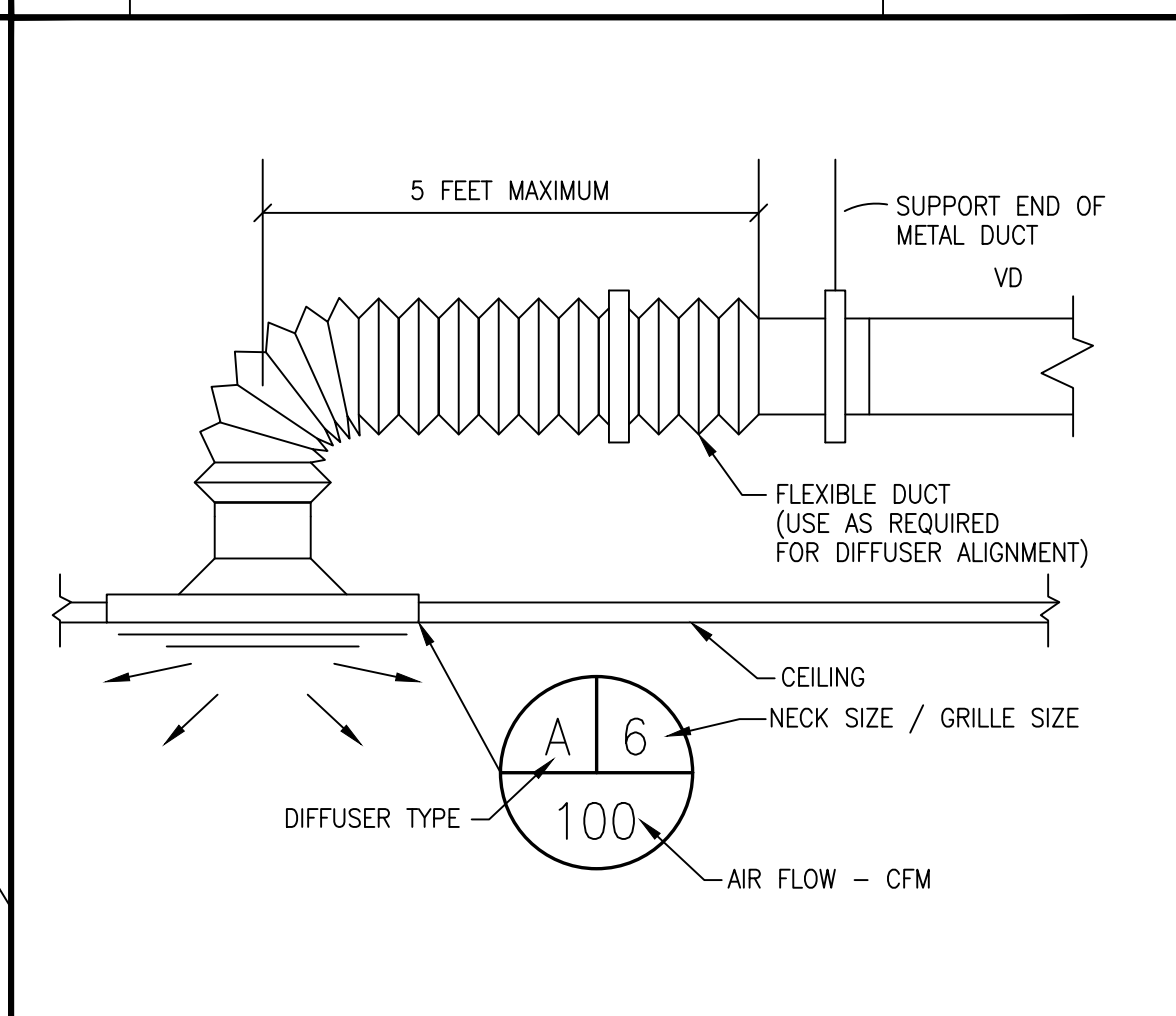
- NOTES:**
- 1) ALL CURBS FURNISHED BY MECHANICAL CONTRACTOR. CURB SHALL BEAR DIRECTLY ON STRUCTURAL STEEL NOT ON METAL DECK. MECHANICAL UNIT MUST SIT LEVEL.
 - 2) COORDINATE FLASHING & SEALANT MATERIALS WITH ROOF SYSTEM MEMBRANE & APPLICABLE WARRANTY REQUIREMENTS.



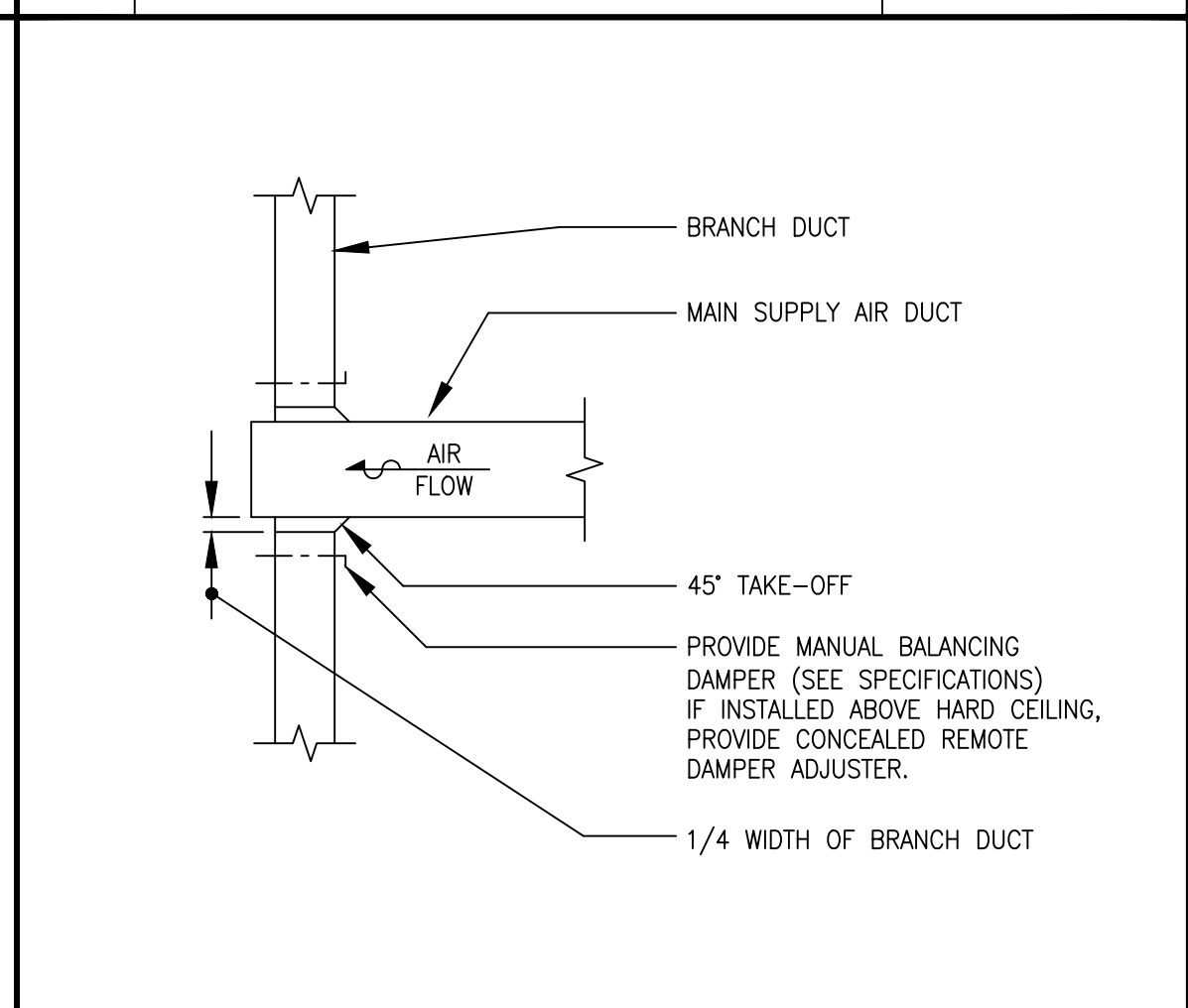
04 DUCT TAKEOFFS AND ELBOW SCALE: N.T.S.



03 ROOF MOUNTED EXHAUST FAN DETAIL SCALE: N.T.S.



02 CEILING DIFFUSER BRANCH DUCTS WITH FLEX CONNECTION SCALE: N.T.S.



01 LOW PRESSURE END OF SUPPLY AIR DUCT DETAIL SCALE: N.T.S.

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DATE	ISSUE/REVISION
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MECHANICAL DETAILS
DRAWING NUMBER
M2.0

AIR BALANCE					
UNIT	SUPPLY AIR	OUTSIDE AIR SUPPLY	%OSA	RETURN AIR	EXHAUST AIR
ERTU-1	8000	1500	19%	8000	-
NJRTU-2	1600	300	19%	1600	-
EF-1	-	-	-	-	75
EF-2	-	-	-	-	1500
TOTAL	9600	1800		9600	1575

BUILDING PRESSURE: 225 POSITIVE

EXISTING ROOFTOP UNIT REFURBISH SCOPE

- MECHANICAL CONTRACTOR SHALL REFURBISH EXISTING ROOFTOP UNITS TO LIKE NEW CONDITION. VERIFY EXISTING CONDITIONS OF UNIT IN FIELD & REPORT TO TENANT/OWNER FOR ANY MAJOR COMPONENTS REQUIRED REPLACEMENT.
- REPLACE FILTERS AT COMPLETION OF CONSTRUCTION.
- LUBRICATE FAN & SHAFT BEARINGS.
- CLEAN FAN WHEEL.
- RECALIBRATE & CLEAN OUTSIDE AIR DAMPER & LINKAGE.
- RECALIBRATE & CLEAN RETURN & RELIEF AIR DAMPER & LINKAGE.
- CLEAN EXTERIOR FINNS.
- REPLACE FAN MOTOR BELTS.
- CLEAN ALL ACCESS SECTIONS.
- CLEAN AUXILIARY DRAIN PAN.
- REMOVE ALL FOREIGN DEBRIS, VACUUM & CLEAN INTERIOR FLOOR OF UNIT.
- REPAIR ALL ACCESS DOORS AS REQUIRED.
- CLEAN MAIN SUPPLY & RETURN AIR DUCTS.
- CHECK FOR REFRIGERANT LEAKS & CHARGE UNIT. REPAIR LEAKS AS REQUIRED.
- CHECK CONDENSER FAN MOTOR FOR PROPER OPERATION.
- CHECK ALL CONTACTS, RELAYS AND CONTROLS FOR PROPER OPERATION.
- POWER WASH & CHEMICALLY CLEAN EVAPORATOR & CONDENSER COILS.
- CHECK SMOKE DETECTOR FOR PROPER OPERATION, REPLACE IF REQUIRED.

Ventilation Calculation For (E)RTU-1												
Space Name	Designation	Floor Area (A _f)	Zone Population (P _z)	Area Outdoor Air Rate (R _a)	People Outdoor Air Rate (R _p)	Area Exhaust Air Rate (R _e)	Breathing Zone Outdoor Airflow (V _{bz})	Zone Outdoor Airflow (V _{zo})	Minimum Exhaust (R _{ex})	Zone Primary Airflow (V _{pr})	Primary Outdoor Air Fraction (Z _{pr})	
Sales Area	Sales	4532	68	0.12	7.5	-	1054	1317	0	7500	0.18	
BOH Backroom	Storage Rooms	345	-	0.12	-	-	41	52	0	500	0.10	
Total:							1095	1369	0	8000		

Maximum Primary Outdoor Air Fraction (Z _{pr})	0.18
System Ventilation Efficiency (E _v)	0.97
Breathing Zone Outdoor Airflow (V _{bz})	1095
Outdoor Air Intake Flow (V _{oa})	1124

Ventilation Calculation For (N)RTU-2												
Space Name	Designation	Floor Area (A _f)	Zone Population (P _z)	Area Outdoor Air Rate (R _a)	People Outdoor Air Rate (R _p)	Area Exhaust Air Rate (R _e)	Breathing Zone Outdoor Airflow (V _{bz})	Zone Outdoor Airflow (V _{zo})	Minimum Exhaust (R _{ex})	Zone Primary Airflow (V _{pr})	Primary Outdoor Air Fraction (Z _{pr})	
Restroom Hallway	Corridors	95	-	0.06	-	-	6	7	0	150	0.05	
Grooming	Pet Shops (Animal Areas)	221	2	0.18	7.5	0.9	55	68	198.9	550	0.12	
Holding/Bathing	Pet Shops (Animal Areas)	206	2	0.18	7.5	0.9	52	65	185.4	450	0.14	
Office	Office Spaces	61	1	0.06	5	-	9	11	0	100	0.11	
Public Petwash	Pet Shops (Animal Areas)	124	1	0.18	7.5	-	30	37	111.6	300	0.12	
Restroom	Toilet Rooms - Public	44	-	-	-	70/Fixture	0	0	70	50	0.00	
Total:							151	189	566	1600		

Maximum Primary Outdoor Air Fraction (Z _{pr})	0.14
System Ventilation Efficiency (E _v)	1.00
Breathing Zone Outdoor Airflow (V _{bz})	151
Outdoor Air Intake Flow (V _{oa})	151

ROOFTOP UNIT SCHEDULE (ELECTRIC COOLING/GAS HEATING)

TAG	TONNAGE	CFM	OUTSIDE AIR	ESP	SUPPLY FAN B.H.P.	ELECTRICAL INFO		COOLING CAPACITY		HEATING CAPACITY		MANUFACTURER & MODEL NO.	SEER/EER/IEER	WEIGHT	REMARKS
						VOLTAGE	MCA/MOCP	TOTAL	SENSIBLE	MBH INPUT	MBH OUTPUT				
BELT EXISTING (E)RTU-1	20	8000	1500	-	-	208V/3ø	109/125	-	-	360	120/84	BRYANT 579FPV240	-/-/-	-	2,3
DD NEW (N)RTU-2	4	1600	300	0.8	0.7	208V/3ø	26/35	49	39	100/70	81/56.7	TRANE YSC048-3RM	14/12/-	750	1

- REMARKS:
- PROVIDE WITH 14" ROOF CURB, INTELLISPEED VFD FOR UNITS 6 TONS AND OVER, ECONOMIZER, BAROMETRIC RELIEF, DISCONNECT SWITCH, NON-POWERED CONVENIENCE OUTLET, PHASE MONITOR, 2-STAGE GAS HEAT AND THRU THE CURB CONNECTION FOR GAS PIPING (AS AVAILABLE).
 - VERIFY CONDITION OF EXISTING ROOFTOP PACKAGED HVAC UNIT IN FIELD AND PROVIDE MAINTENANCE AS NOTED IN REFURBISHMENT SCOPE ON THIS SHEET.
 - VERIFY EXISTING UNIT'S ECONOMIZER DAMPER CAN BE CONTROLLED VIA CO2 CONTROL. IN THE EVENT THIS IS POSSIBLE, PROVIDE WITH CO2 CONTROL FOR OUTDOOR AIR OPERATION. MINIMUM 5% OUTDOOR AIR DURING OCCUPIED MODE WITH 1100 PPM MAX BUILD UP IN SPACE. ECONOMIZER SHALL MODULATE OPEN AS CO2 LEVELS RISE ABOVE 1100 PPM.
- ACCEPTABLE ALTERNATIVE MANUFACTURERS: CARRIER, YORK, LENNOX, DIKIN

GRILLE & DIFFUSER SCHEDULE

TAG	MANUFACTURER & MODEL NO.	DAMPER NUMBER	FRAME/BORDER	CFM	MODULE SIZE	PATTERN	FINISH	REMARKS
A	RUSKIN ROOFTOP SYSTEMS 1-575-2010	--	DUCT MOUNT	AS NOTED	30"x30"	4-WAY	WHITE	SUPPLY
B	TITUS TMS	OBD	LAY-IN/ DUCT	AS NOTED	24"x24"	4-WAY	WHITE	SUPPLY
C	TITUS TMS	OBD	LAY-IN/ SURFACE	AS NOTED	12"x12"	4-WAY	WHITE	SUPPLY
D	TITUS 300RL	ASD	DUCT MOUNT	AS NOTED	AS NOTED	DOUBLE DEFLECTION	WHITE	SUPPLY
E	TITUS 350RL	--	LAY-IN/ WALL	AS NOTED	AS NOTED	35° DEFLECTION	WHITE	RETURN
F	TITUS 350RL	--	LAY-IN/ SURFACE	AS NOTED	AS NOTED	35° DEFLECTION	WHITE	EXHAUST

- REMARKS:
- MODEL NUMBERS SHALL NOT BE CONSIDERED COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER AND MODEL NUMBERS ONLY. REVIEW THE COMPLETE DESCRIPTION, NOTES AND SPECIFICATIONS TO DETERMINE THE EXACT MATERIAL AND ACCESSORIES TO BE ORDERED.

EXHAUST FAN SCHEDULE

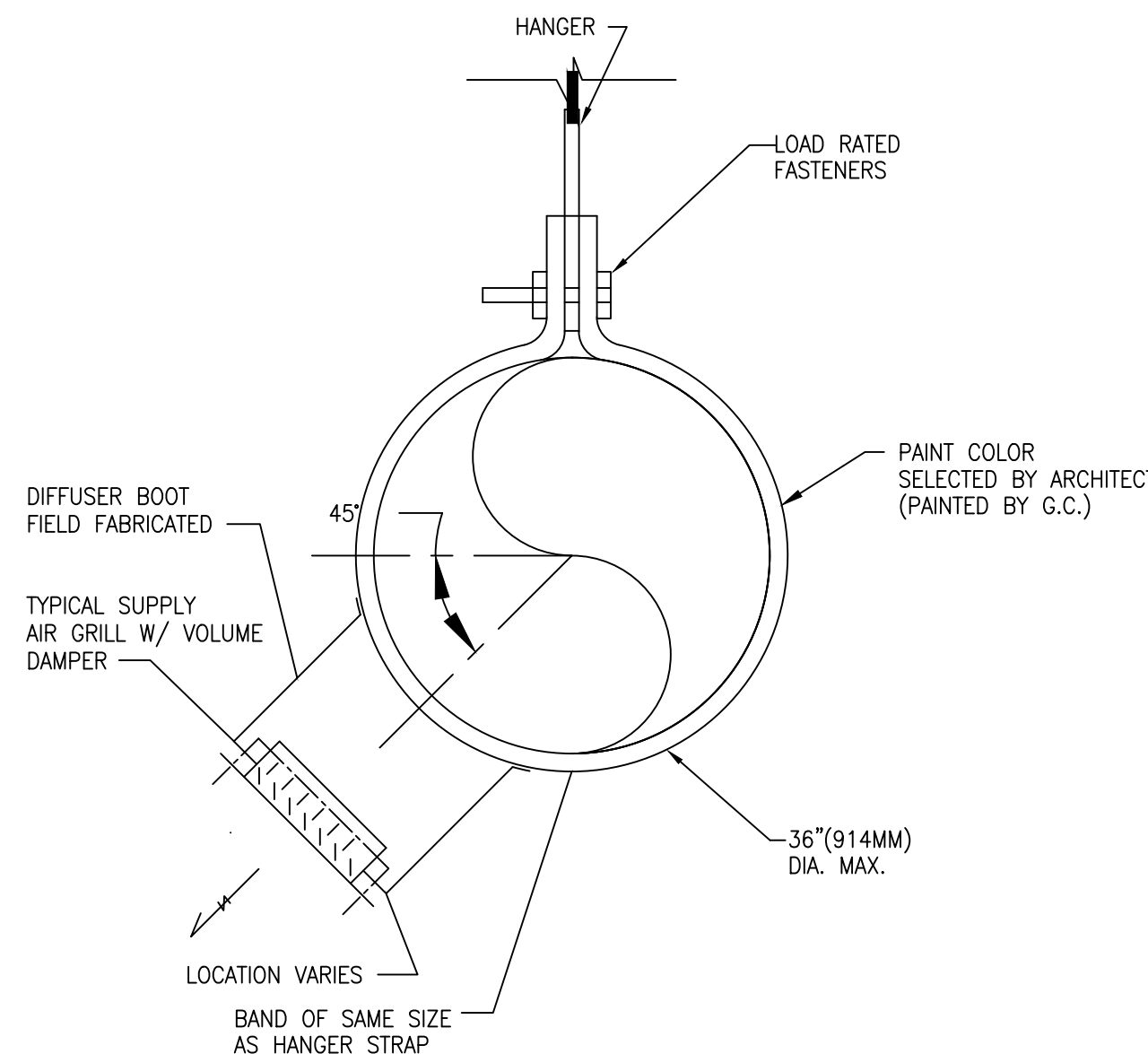
NO.	SERVICE	CFM	S.P.	RPM/MOTOR HP	ELECT.	MANUF. & MODEL NO.	REMARKS
EF-1	RESTROOM	70	0.35	950/100W	120V/1ø	YORK (PENNBARRY) CU1	1
EF-2	PET AREAS	1500	0.35	1550/0.33	120V/1ø	YORK (PENNBARRY) EVD16R	2

- REMARKS:
- DISCONNECT SWITCH, GRAVITY BACKDRAFT DAMPER, FLEXIBLE DUCT COLLAR CONNECTION AND VIBRATION ISOLATION KIT.
 - DISCONNECT SWITCH, GRAVITY BACKDRAFT DAMPER, ROOF CURB.

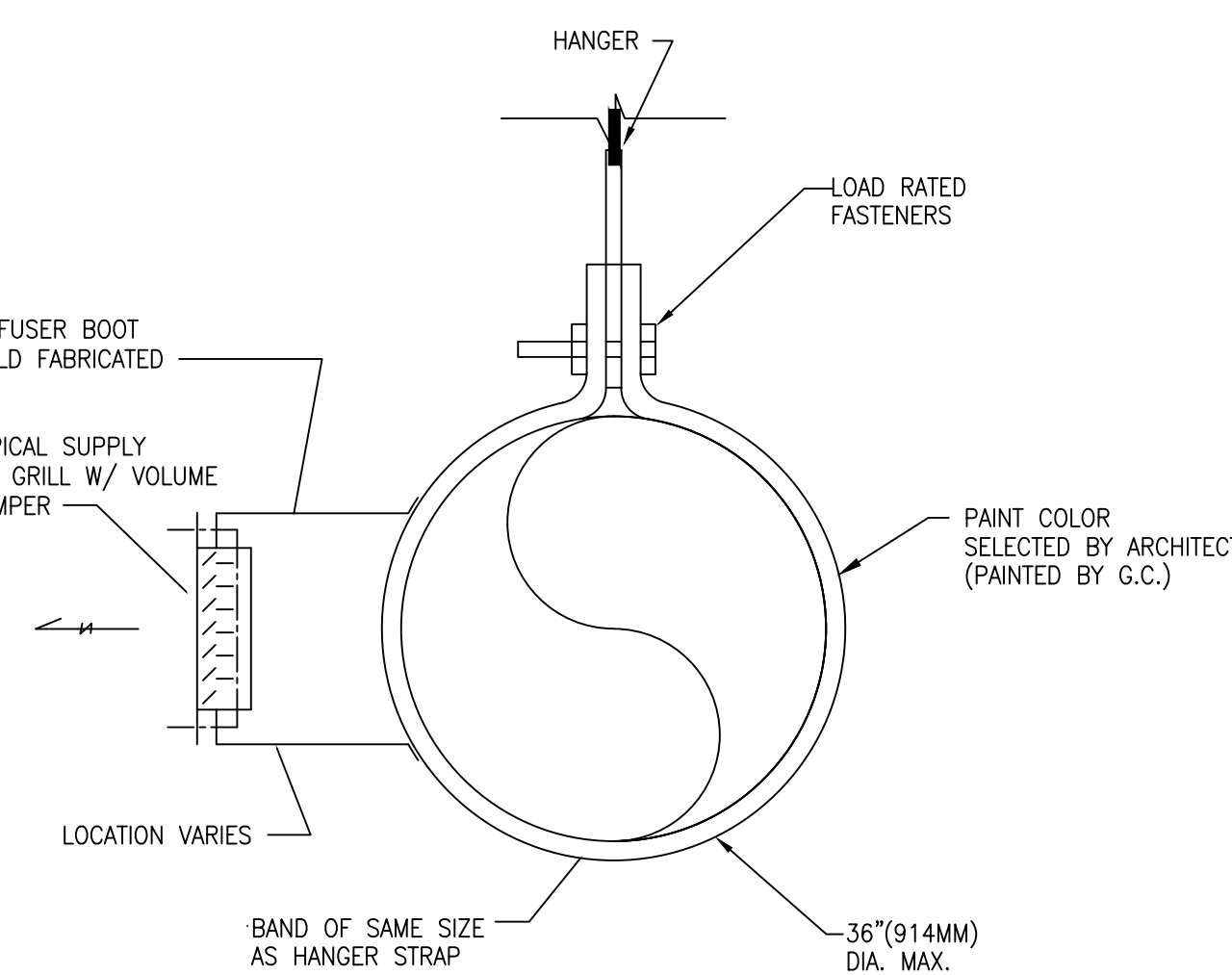
AIR CURTAIN SCHEDULE

TAG	LENGTH	MAXIMUM VELOCITY AT NOZZLE (FPM)	ELECTRICAL INFO		MANUF. & MODEL NO.	REMARKS
			VOLTAGE/PHASE	MCA/MOCP		
AC-1	8'	5.8.8	208V/1ø	8.6/15	BERNER AHD10-2-096A	1-2

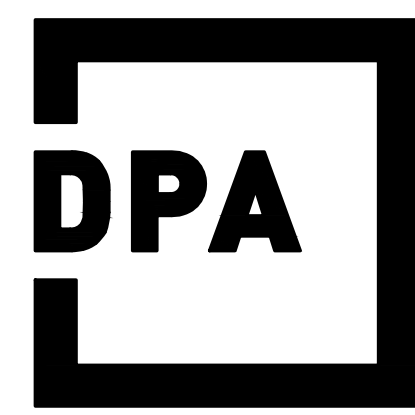
- REMARKS:
- FACTORY INSTALLED FAN SWITCH.
 - OPTIONAL WASHABLE FILTER.



SIDEWALL DIFFUSER DETAIL MOUNTED ABOVE 10'-0"
NO SCALE



SIDEWALL DIFFUSER DETAIL MOUNTED BELOW 10'-0"
NO SCALE



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SEAL



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DATE	ISSUE/REVISION
5/05/2023	OWNER REVIEW
5/31/2023	BID PERMIT

MECHANICAL SCHEDULES
DRAWING NUMBER
M3.0