

SECTION 220000 - PLUMBING

DESCRIPTION:
• THE WORK OF THIS SECTION INCLUDES, BUT IS NOT LIMITED TO THE PLUMBING SYSTEM.

QUALITY ASSURANCE: COMPLY WITH THE CURRENT:
• INTERNATIONAL PLUMBING CODE (IPC)
• INTERNATIONAL ENERGY CONSERVATION CODE (IECC)
• CABO A117; ADA ANSI A117.1; NSF 61 FOR POTABLE WATER DEVICES; NFPA 70; UL LISTING.
• PRESSURE TEST PIPING SYSTEMS FOR INSPECTION AND APPROVAL PRIOR TO CONCEALING PER CODE AND AHJ.

SUBMITTALS:
• PRODUCT DATA FOR EQUIPMENT
• WARRANTIES AND GUARANTEES
• OWNERS OPERATIONAL AND MAINTENANCE MANUALS.
• RECORD DRAWINGS: DELIVER TO OWNER AT THE COMPLETION OF THE PROJECT A SET OF PRINTS OF THE DRAWINGS MARKED IN RED SHOWING CHANGES IN LOCATIONS, MODELS AND CAPACITIES OF THE SYSTEM.

PIPING AND FITTINGS:
• GENERAL: PROVIDE DIELECTRIC FITTINGS AND UNIONS FOR ALL PIPE CONNECTIONS OF DISSIMILAR METALS.
• EARTHWORK: PROVIDE TRENCHING (AND SHORING WHERE REQUIRED FOR DEPTH), #1 STONE BEDDING 6" BELOW AND 6" ABOVE PIPES, AND CLEAN BACKFILL COMPACTED IN 6" LAYERS FOR ALL BURIED PIPING UNDER BUILDING SLAB AND WHERE SHOWN, EXTENDED TO CONNECTION BY SITE CONTRACTOR, SEE GENERAL CONSTRUCTION SPECIFICATIONS FOR SPECIFIC REQUIREMENTS.
• HOT AND COLD WATER: ABOVE GRADE, RUN IN TYPE L RIGID COPPER TUBING WITH WROUGHT COPPER FITTINGS WITH SILVER (NO LEAD) SOLDER OR PRO-PRESS FITTINGS BY VIEGA, CPVC SCHEDULE 40, ASTM D 2846, NSF, FLAME/SMOKE RATING OF LESS THAN 25/50, 100 PSI AT 180°F OR ASTM F876 PEX-A TUBING WITH ASTM F1960 COLD EXPANSION (NO CALZ) FITTINGS, NSF, 160 PSI AT 73.4°F. BELOW GRADE, RUN IN TYPE K SOFT COPPER TUBING WITH WROUGHT COPPER FITTINGS WITH SILVER (NO LEAD) SOLDER.
• SANITARY SEWER AND VENT BELOW GROUND: RUN IN PVC SCH 40 DWV PIPING AND SOLVENT WELDED JOINTS. FOR SANITARY USE WYE FITTINGS ONLY. FOR VENT USE SANITARY TEES OR WYE FITTINGS ONLY.
• SANITARY SEWER AND VENT ABOVE GROUND: RUN IN SERVICE WEIGHT CAST IRON PIPE AND FITTINGS WITH NO-HUB JOINTS IN AIR PLENUMS OR PVC SCH 40 DWV PIPING AND SOLVENT WELDED JOINTS ELSEWHERE. FOR SANITARY USE WYE FITTINGS ONLY. FOR VENT USE SANITARY TEES OR WYE FITTINGS ONLY.

INSULATION:
• DOMESTIC HOT WATER (HW & HWR) AND COLD WATER (CW): ASTM E84, UL181 PREFORMED ELASTOMERIC FOAM PLASTIC INSULATION (ARMAFLEX) (K=0.25 @ 75°F, R=4 /IN). APPLY 1.5" INS FOR 1.5" AND LARGER HW & HWR PIPES, 1" INS FOR SMALLER HW & HWR PIPES. APPLY 0.5" INS FOR ALL CW PIPE SIZES. SEAL JOINTS WITH MASTIC VAPOR TIGHT. PROVIDE PVC JACKET FOR EXPOSED PIPING.

ESCUTCHEONS:
• PROVIDE CLIP-ON CHROME-PLATED ESCUTCHEONS AT ALL EXPOSED WALL, FLOOR AND CEILING PENETRATIONS.

SLEEVES:
• PROVIDE STEEL PIPE SLEEVES IN MASONRY WALL PENETRATIONS AND SHEET METAL SLEEVES (TIGHTLY FITTED TO THE CUT OPENING) IN WOOD PENETRATIONS.
• PROVIDE 3M FIRE CAULKING IN ALL SLEEVES IN WALL AND FLOOR PENETRATIONS.

CAULKING:
• PROVIDE 100% SILICONE CAULKING FOR PLUMBING FIXTURES AT WALL, FLOOR AND COUNTER TOPS

IDENTIFICATION:
• PROVIDE PERMANENT LABELS ON ALL EQUIPMENT WITH DRAWING TAG AND NORMAL SETTINGS AS SPECIFIED.
• PROVIDE PIPE LABELS SHOWING TYPE OF DUTY (I.E. "COLD WATER" AND DIRECTION OF FLOW) AT 15 FOOT INTERVALS.

HANGERS AND SUPPORTS:
• PROVIDE CLEVIS HANGERS SIZED TO INCLUDE INSULATION WITH INSULATION SHIELDS.
• PROVIDE JOIST HANGERS AND ALL-THREAD RODS.
• PROVIDE PIPE CLAMPS TO SUPPORT VERTICAL PIPING THROUGH FLOOR.
• FOR ROOF PIPE PENETRATIONS, PROVIDE RUBBER BOOT PIPE PORTALS AND CURB ASSSEMBLY FOR MULTIPLE PIPES BY PATE OR SIMILAR.
• INSTALL SUPPORTS FOR VERTICAL PVC & CPVC PIPING EVERY 48 INCHES AND INSTALL HANGERS FOR HORIZONTAL PIPING WITH THE FOLLOWING MAXIMUM SPACING AND MINIMUM ROD DIAMETERS:
➢ NPS 1" AND SMALLER: 36" SPAN & 3/8" ROD, NPS 1-1/4" TO 2": 48" SPAN & 3/8" ROD, NPS 2-1/2" TO 3-1/2": 48" SPAN & 1/2" ROD, NPS 4" TO 5": 48" SPAN & 5/8" ROD, NPS 6" & 8": 48" SPAN & 3/4" ROD.
• INSTALL SUPPORTS FOR VERTICAL COPPER TUBING EVERY 10 FEET AND INSTALL HANGERS FOR HORIZONTAL TUBING WITH THE FOLLOWING MAXIMUM SPACING AND MINIMUM ROD DIAMETERS:
➢ NPS 3/4" & SMALLER: 60" SPAN & 3/8" ROD, NPS 1" & 1.25": 72" SPAN & 3/8" ROD, NPS 1.5" & 2": 96" SPAN & 3/8" ROD, NPS 2-1/2": 108" SPAN & 1/2" ROD, NPS 3" TO 5": 120" SPAN 1/2" ROD.
• INSTALL SUPPORTS FOR VERTICAL STEEL & CAST IRON PIPING EVERY 10 FEET AND INSTALL HANGERS FOR HORIZONTAL PIPING WITH THE FOLLOWING MAXIMUM SPACING AND MINIMUM ROD DIAMETERS:
➢ NPS 1" & SMALLER: 96" SPAN & 3/8" ROD, NPS 1-1/4" TO 2": 108" SPAN & 3/8" ROD, NPS 2-1/2" TO 3-1/2": 120" SPAN & 1/2" ROD, NPS 4" & LARGER: 120" SPAN & 5/8" ROD.

VALVES:
• BALL VALVES: PROVIDE FOR SHUT-OFF OR THROTTLING APPLICATIONS, NIBCO MODEL S-580 OR S-590-Y FOR WATER. FOR NATURAL GAS OR PROPANE GAS PROVIDE UL LISTED ANSI/ ASME B16.33 RATED GAS SERVICE VALVE FULL PORT UP TO 1" NIBCO T-585-70 UL, CONVENTIONAL PORT 1-1/4" TO 3" NIBCO T-580-70-UL OR SIMILAR.
• CHECK VALVES: PROVIDE WHERE ONE WAY FLOW IS REQUIRED, NIBCO MODEL S-413.

ELECTRICAL REQUIREMENTS:
• GENERAL: PROVIDE WIRING, METAL CONDUIT, STARTERS, RELAYS, CONTROLS, SWITCHES, MEANS OF DISCONNECT, JUNCTION BOXES, CONTROLLERS, ET CETERA REQUIRED FOR A COMPLETE FUNCTIONING SYSTEM. FOLLOW THE REQUIREMENTS OF THE ELECTRICAL SECTION OF THE SPECIFICATION.
• MOTORS: PROVIDE MOTORS FOR MECHANICAL EQUIPMENT SUPPLIED BY THE EQUIPMENT MANUFACTURER WHEN POSSIBLE. PROVIDE MOTORS OF PHASE AND VOLTAGE INDICATED ON DRAWINGS AND SUITABLE FOR THE LOADING AND ENVIRONMENT. PROVIDE OPEN DRIP PROOF (ODP) MOTOR ENCLOSURES FOR NORMAL USE OR TOTALLY ENCLOSED FAN COOLED (TEFC) ENCLOSURES FOR OUTDOOR USE, HAZARDOUS OR DIRTY ENVIRONMENTS. PROVIDE MOTORS WITH 1.15 SERVICE FACTOR, INSULATION CLASS F, AND PRE-LUBRICATED BALL BEARINGS RATED FOR CONTINUOUS DUTY UP TO 105°F AMBIENT TEMPERATURE AND 3300 FT ALTITUDE. POLY-PHASE MOTORS SHALL BE PREMIUM EFFICIENCY AND WHEN USED WITH VARIABLE SPEED DRIVES, SHALL BE RATED FOR INVERTER DUTY. SINGLE PHASE MOTORS LARGER THAN 1/6HP SHALL BE OPEN-CAPACITOR START, CAPACITOR RUN TYPE UNLESS OTHERWISE INDICATED. SINGLE PHASE MOTORS 1/6HP AND SMALLER MAY BE SPLIT PHASE START, CAPACITOR RUN TYPE OR PERMANENT-SPLIT CAPACITOR TYPE.
• STARTERS: PROVIDE EACH MOTOR WITH A MOTOR STARTER OF PROPER DESIGN TO MEET THE REQUIREMENTS OF THE MOTOR AND DRIVE. STARTER TYPES SHALL INCLUDE MAGNETIC, MANUAL, SOLID-STATE REDUCED VOLTAGE, OR VARIABLE SPEED DRIVE. COORDINATE STARTER REQUIREMENTS WITH THE EQUIPMENT AND CONTROL SEQUENCE. PROVIDE ACCESSORIES SUCH AS CONTACTS, OVERLOADS, EXTERNAL RESETS, CONTROL CIRCUIT TRANSFORMERS, PILOT LIGHTS, PUSH BUTTONS, HOA AND OTHER SELECTOR SWITCHES AS NEEDED FOR THE SPECIFIED OPERATION.

THERMOMETERS AND GAUGES:
• PROVIDE STICK TYPE THERMOMETERS AT WATER HEATER.
• PROVIDE ROUND DIAL TYPE PRESSURE GAUGE BEFORE AND AFTER EACH WATER METER AND EACH BACKFLOW PREVENTER.

RECIRCULATION PUMPS:
• INLINE: BRONZE BODY, CLOSE COUPLED, BRONZE OR STAINLESS STEEL IMPELLER SIZED OR TRIMMED FOR SPECIFIED PERFORMANCE, BUNA/CARBON CERAMIC MECHANICAL SEAL, 175 PSI, 225°F MAX.

PLUMBING SPECIALTIES:
• WATER HAMMER ARRESTERS: ZURN MODEL Z-1700 POI SIZE PER SCHEDULE AND PIPING PLAN.
• EXPANSION TANK: ASME DIAPHRAM TYPE, BELL & GOSSETT PTA-12 OR AMTROL ST-12.
• FLOOR DRAINS: CAST IRON, 9" DIA NICKEL BRONZE TOP, ZURN 4" MODEL: ZN4158Z.
• TRENCH DRAINS: 6" WIDE REVEAL 4" THROAT FIBER REINFORCED POLYMER TRENCH DRAIN SYSTEM WITH 0.75% BUILT-IN SLOPE, 10 FT SECTIONS, HEAVY-DUTY CARBON STEEL FRAME WITH MIN 12-4 LONG CONCRETE REBAR ANCHORS, ZURN MODEL: 2806 WITH ACCESSORIES PER SCHEDULE AND CLASS 'C' DUCTILE IRON SLOTTED GRATE AS STANDARD, ZURN GRATE OPTION: DGC.
• CATCH BASIN: 24X24X24 (WXLXD) FIBER REINFORCED POLYESTER FIBERGLASS WITH HEAVY-DUTY CARBON STEEL FRAME, 4-4 LONG CONCRETE REBAR ANCHORS, ZURN MODEL: 2817-24 WITH ACCESSORIES PER SCHEDULE AND CLASS 'C' DUCTILE IRON SLOTTED GRATE AS STANDARD, ZURN GRATE OPTION: DGC.
• CLEANOUTS: ADJUSTABLE CAST IRON ZURN MODEL ZN1400 WITH BRONZE COVER.

PLUMBING FIXTURES:
• WATER CLOSET WC-1A (ADA): VITREOUS CHINA, TWO PIECE TOILET, 16-1/2" HIGH BOWL, ELONGATED SIPHON ACTION BOWL AND TANK, INTERNAL TRAPWAY AREA, OPEN FRONT PLASTIC SEAT, 2 BOLT CAPS, TRIP LEVER ON OPEN SIDE, LOW CONSUMPTION 1.6GPF, MODEL: PER DRAWING SCHEDULE.
• WATER CLOSET WC-1: VITREOUS CHINA, TWO PIECE TOILET, 15" HIGH BOWL, ELONGATED SIPHON ACTION BOWL AND TANK, INTERNAL TRAPWAY AREA, OPEN FRONT PLASTIC SEAT, 2 BOLT CAPS, TRIP LEVER ON OPEN SIDE, LOW CONSUMPTION 1.6GPF, MODEL: PER DRAWING SCHEDULE.
• URINAL UR-1A (ADA): VITREOUS CHINA, FLUSHING RIM, INTEGRAL STRAINER, 3/4" INLET SPUD, WALL HANGER, LOW CONSUMPTION 1.0 GPF, 14" MOUNTING HEIGHT, FLUSH VALVE SLOAN ROYAL #186-1, MODEL: PER DRAWING SCHEDULE.
• URINAL UR-1: VITREOUS CHINA, FLUSHING RIM, INTEGRAL STRAINER, 3/4" INLET SPUD, WALL HANGER, LOW CONSUMPTION 1.0 GPF, 17" MOUNTING HEIGHT, FLUSH VALVE SLOAN ROYAL #186-1, MODEL: PER DRAWING SCHEDULE.
• LAVATORY L-1 (ADA): COUNTERTOP, VITREOUS CHINA CONSTRUCTION, SELF-RIMMING OVAL COUNTERTOP, FRONT OVERFLOW, FAUCET HOLES ON 4" CENTERS, MODEL: PER DRAWING SCHEDULE. FAUCET: SOLID BRASS CONSTRUCTION, CERAMIC DISC VALVE CARTRIDGES, ALL BRASS DRAIN BODY, GRID STRAINER, SINGLE LEVER ADA HANDLE ANSI A117.1, AND NSF 61 COMPLIANT, MODEL: PER DRAWING SCHEDULE.
• SINK S-1 (SINGLE BOWL, ADA): COUNTERTOP SELF RIMMING, 20 GAUGE STAINLESS STEEL, 6" DEEP BOWL, SINGLE FAUCET HOLE, AND BASKET STRAINER, MODEL: PER DRAWING SCHEDULE. FAUCET: BRASS BODY AND CAST BRASS SWING SPOUT, WASHERLESS CERAMIC DISC VALVE CARTRIDGES, AND NSF 61 COMPLIANT, MODEL: PER DRAWING SCHEDULE.
• MOP SERVICE BASIN MSB-1: 24X24X10, ONE PIECE BASIN, WALL MIN 1" WIDE, STAINLESS STEEL DRAIN BODY, COMBINATION DOME STRAINER AND LINT BASKET, MODEL: PER DRAWING SCHEDULE. FAUCET: CHROME PLATED WITH VACUUM BREAKER, INTEGRAL STOPS, ADJUSTABLE WALL BRACE, PAIL HOOK, 3/4" HOSE THREAD ON SPOUT, 8" CENTER TO CENTER FOUR ARM HANDLES, MODEL: PER DRAWING SCHEDULE. HOSE AND HOSE BRACKET, MOP STRAINER, STAINLESS STEEL WALL GUARD.
• SHOWER SH-1A (ADA): 36"X36"X76" INTERIOR DIMENSION, FIBERGLASS REINFORCED POLYESTER GELCOAT FINISH SHOWER ENCLOSURE WITH L-SHAPED GRAB BAR, L-SHAPED FOLD UP CUSHIONED SEAT, HAND HELD SHOWER, 24" SLIDE BAR, VACUUM BREAKER AND 60" HOSE, PRESSURE BALANCING MIXING VALVE, SOAP DISH, CURTAIN ROD AND SHOWER CURTAIN, BRASS DRAIN, MODEL: PER DRAWING SCHEDULE.
• ICE MAKER BOX IMB-1: RECESSED WALL MOUNTED WHITE POWDER COATED BOX, 1/2" LEAD FREE DOMESTIC QUARTER TURN VALVE, MODEL: PER DRAWING SCHEDULE.
• WALL HYDRANT WH-1: ENCASED, NON-FREEZE, ANTI-SIPHON, AUTOMATIC DRAINING, MODEL: PER DRAWING SCHEDULE.
• SERVICE SINK SS-1: MOLDED STRUCTURAL PLASTIC POLYMER, FLOOR MOUNTED, 20 GALLON CAPACITY, WHITE BAKED ENAMEL STEEL ANGLE LEGS IN FOUR CORNERS, INTEGRAL MOLDED DRAIN, PLASTIC STOP, 4" LEDGE INTEGRALLY MOLDED INTO THE UNIT, SOAP DISH LOCATIONS, FAUCET HOLES ON 4" CENTERS, MODEL: PER DRAWING SCHEDULE. FAUCET: CHROME PLATED BRASS FAUCET WITH 4" CENTER SET AND SWING SPOUT, MODEL: PER DRAWING SCHEDULE.
• EMERGENCY EYEWASH EEW-1: WALL MOUNTED EYE WASH WITH STAINLESS STEEL BOWL, 1/2" CHROME PLATED BRASS STAY OPEN BALL VALVE, POWDER COATED CAST ALUMINUM FLAG HANDLE AND WALL BRACKET, (2) POLYPROPYLENE 'GS PLUS' SPRAY HEADS WITH INTEGRAL "FLIP-TOP" DUST COVERS, FILTERS AND 1.8 GPM FLOW CONTROL ORIFICES MOUNTED ON A CHROME PLATED BRASS EYEWASH ASSEMBLY. THE EMERGENCY EYE/FACE WASH MIXING VALVE SHALL CONTROL AND MAINTAIN THE TEMPERATURE OF THE WATER TO THE STATION. UNIT SHALL BE SELF CONTAINED AND INCLUDE A THERMOSTATIC WATER MIXING VALVE, A DIAL THERMOMETER ON THE OUTLET, ANGLE CHECKSTOPS, WALL MOUNTING BRACKET AND PIPING FACTS AND TESTED, TOP OR BOTTOM INLETS AND TOP OUTLET, UNIT SET FOR 85°F (29°C) AND A MAXIMUM TEMPERATURE OF 90°F (32°C). UNIT MUST BE ABLE TO BE SET TO THE CORRECT TEMPERATURE FOR THE SPECIFIC CONTAMINANT BUT MUST BE LOCKED IN PLACE TO PREVENT CHANGING OF THE TEMPERATURE BY ACCIDENT. UNIT SHALL INCLUDE ANSI COMPLIANT SIGN AND SHALL BE FULLY FACTORY ASSEMBLED AND HYDROSTATICALLY TESTED TO MEET OR EXCEED ANSI Z358.1-2009 AND SHALL BE ABLE TO FLOW A MINIMUM FLOW OF 1.8 GPM (15 L/MIN).
• WATER COOLER EWC-1 (ADA): 8GPH CAPACITY, BUILT-IN 100 MICRON STRAINER, STAINLESS STEEL TOP, GALVANIZED STEEL FRAME, REFRIGERANT R-134A, THREE PUSH PAD ACTIVATION, SANDSTONE POWDER COATED PAINT ON GALVANIZED STEEL, 5 YEAR WARRANTY, MODEL: PER DRAWING SCHEDULE.

RESIDENTIAL ELECTRIC WATER HEATER:
150PSI WORKING PRESSURE, PORCELAIN ENAMEL LINED TANK, POLYURETHANE FOAM INSULATION, SURFACE MOUNTED THERMOSTAT, HIGH LIMIT CONTROL, 3 YEAR LIMITED WARRANTY AGAINST LEAKS, MODEL: PER DRAWING SCHEDULE.

SECTION 230000 - HVAC

DESCRIPTION:
• THE WORK OF THIS SECTION INCLUDES, BUT IS NOT LIMITED TO, THE HVAC SYSTEM.

QUALITY ASSURANCE: COMPLY WITH THE CURRENT:
• INTERNATIONAL MECHANICAL (IMC), BUILDING CODE (IBC), ENERGY CODE (IECC); LOCAL CODES AND AMMENDMENTS
• NFPA 70; UL LISTING; NFPA 90A & 90;

SUBMITTALS:
• PRODUCT DATA FOR HEATING AND COOLING UNITS AND FANS ONLY.
• WARRANTIES AND GUARANTEES
• OWNERS OPERATIONAL AND MAINTENANCE MANUALS.
• BALANCING REPORTS: SUBMIT PRE-TEST VERIFICATION AND BALANCING DATA REPORTS.
• RECORD DRAWINGS: DELIVER TO OWNER AT THE COMPLETION OF THE PROJECT A SET OF PRINTS OF THE DRAWINGS MARKED IN RED SHOWING CHANGES IN LOCATIONS, MODELS, AND CAPACITIES OF THE SYSTEM.

PIPING AND INSULATION:
• GENERAL: PROVIDE STEEL PIPE SLEEVES FOR MASONRY WALL PENETRATIONS, TIGHT FITTING SHEET METAL SLEEVES IN WOOD PENETRATIONS AND 3M FIRE STOPPING IN RATED WALL OR FLOOR PENETRATIONS. PROVIDE DIELECTRIC FITTINGS OR UNIONS IN ALL PIPE CONNECTIONS OF DISSIMILAR METALS.
• COOLING COIL CONDENSATE: RUN IN PVC PIPING AND SOLVENT WELDED JOINTS EXCEPT PLENUM AREAS RUN IN TYPE L RIGID COPPER TUBING WITH SOLDERED WROUGHT COPPER FITTINGS. INSULATE WITH 1/2" CLOSED CELL FOAM (ARMAFLEX).
• REFRIGERANT PIPING SHALL BE DRAWN AND ANNEALED (MAX. O.D. 0.625") ACR COPPER TUBE WITH WROUGHT COPPER BRAZED FITTINGS (PRESS TYPE FITTINGS ARE NOT ACCEPTABLE). INSULATE WITH CLOSED CELL FOAM (AF ARMAFLEX FS OR EQUAL), 1" THICK FOR 1.5" AND LARGER PIPES, 0.5" THICK FOR SMALLER PIPES. SEAL INSULATION JOINTS WITH MASTIC VAPOR TIGHT. BRAZE WITH INERT GAS PROTECTION, CHARGE WITH NITROGEN & EVACUATE TO 200 MICRONS OR LESS IN MULTIPLE CYCLES AS RECOMMENDED BY EQUIPMENT MANUFACTURER. PRESSED TYPE FITTINGS ARE NOT ACCEPTABLE.

HANGERS AND SUPPORTS:
• PROVIDE CLEVIS HANGERS SIZED TO INCLUDE INSULATION WITH INSULATION SHIELDS.
• PROVIDE JOIST HANGERS AND ALL-THREAD RODS.
• PROVIDE PIPE CLAMPS TO SUPPORT VERTICAL PIPING THROUGH FLOOR.
• INSTALL SUPPORTS FOR VERTICAL PVC & CPVC PIPING EVERY 48 INCHES AND INSTALL HANGERS FOR HORIZONTAL PIPING WITH THE FOLLOWING MAXIMUM SPACING AND MINIMUM ROD DIAMETERS:
➢ NPS 1" AND SMALLER: 36" SPAN & 3/8" ROD, NPS 1-1/4" TO 2": 48" SPAN & 3/8" ROD, NPS 2-1/2" TO 3-1/2": 48" SPAN & 1/2" ROD, NPS 4" TO 5": 48" SPAN & 5/8" ROD, NPS 6" & 8": 48" SPAN & 3/4" ROD.
• INSTALL SUPPORTS FOR VERTICAL COPPER TUBING EVERY 10 FEET AND INSTALL HANGERS FOR HORIZONTAL TUBING WITH THE FOLLOWING MAXIMUM SPACING AND MINIMUM ROD DIAMETERS:
➢ NPS 3/4" & SMALLER: 60" SPAN & 3/8" ROD, NPS 1" & 1.25": 72" SPAN & 3/4" ROD, NPS 1.5" & 2": 96" SPAN & 3/8" ROD, NPS 2-1/2": 108" SPAN & 1/2" ROD, NPS 3" TO 5": 120" SPAN 1/2" ROD.
• INSTALL SUPPORTS FOR VERTICAL STEEL & CAST IRON PIPING EVERY 10 FEET AND INSTALL HANGERS FOR HORIZONTAL PIPING WITH THE FOLLOWING MAXIMUM SPACING AND MINIMUM ROD DIAMETERS:
➢ NPS 1" & SMALLER: 96" SPAN & 3/8" ROD, NPS 1-1/4" TO 2": 108" SPAN & 3/8" ROD, NPS 2-1/2" TO 3-1/2": 120" SPAN & 1/2" ROD, NPS 4" & LARGER: 120" SPAN & 5/8" ROD.

PUMPS:
• INLINE: CAST IRON BODY, CLOSE COUPLED, BRONZE IMPELLER SIZED OR TRIMMED FOR SPECIFIED PERFORMANCE, BUNA/ CARBON CERAMIC MECHANICAL SEAL, 175 PSI, 225°F MAX.

IDENTIFICATION:
• GENERAL: PROVIDE PERMANENT LABELS ON ALL EQUIPMENT WITH DRAWING TAG, CAPACITY, AND ELECTRICAL CHARACTERISTICS.
• OUTDOOR EQUIPMENT: PROVIDE STAMPED METAL NAMEPLATES.

ELECTRICAL REQUIREMENTS:
• GENERAL: PROVIDE STARTERS, VARIABLE SPEED DRIVES, TRANSFORMERS, RELAYS, 120V POWER FOR ACTUATORS, SWITCHES, DISCONNECTS, AND CONTROLS AS LISTED BELOW FOR A COMPLETE SYSTEM. FOLLOW THE REQUIREMENTS OF THE ELECTRICAL SECTION OF THE SPECIFICATION.
• MOTORS: PROVIDE MOTORS FOR MECHANICAL EQUIPMENT SUPPLIED BY THE EQUIPMENT MANUFACTURER WHEN POSSIBLE. PROVIDE MOTORS OF PHASE AND VOLTAGE INDICATED ON DRAWINGS AND SUITABLE FOR THE LOADING AND ENVIRONMENT. PROVIDE OPEN DRIP PROOF (ODP) MOTOR ENCLOSURES FOR NORMAL USE OR TOTALLY ENCLOSED FAN COOLED (TEFC) ENCLOSURES FOR OUTDOOR USE, HAZARDOUS OR DIRTY ENVIRONMENTS. PROVIDE MOTORS WITH 1.15 SERVICE FACTOR, INSULATION CLASS F, AND PRE-LUBRICATED BALL BEARINGS RATED FOR CONTINUOUS DUTY UP TO 105°F AMBIENT TEMPERATURE AND 3300FT ALTITUDE. POLY-PHASE MOTORS SHALL BE PREMIUM EFFICIENCY AND WHEN USED WITH VARIABLE SPEED DRIVES, SHALL BE RATED FOR INVERTER DUTY. SINGLE PHASE MOTORS LARGER THAN 1/6HP SHALL BE OPEN-CAPACITOR START, CAPACITOR RUN TYPE UNLESS OTHERWISE INDICATED. SINGLE PHASE MOTORS 1/6HP AND SMALLER MAY BE SPLIT PHASE START, CAPACITOR RUN TYPE OR PERMANENT-SPLIT CAPACITOR TYPE.
• STARTERS: PROVIDE EACH MOTOR WITH A MOTOR STARTER OF PROPER DESIGN TO MEET THE REQUIREMENTS OF THE MOTOR AND DRIVE. STARTER TYPES SHALL INCLUDE MAGNETIC, MANUAL, SOLID-STATE REDUCED VOLTAGE, OR VARIABLE SPEED DRIVE. COORDINATE STARTER REQUIREMENTS WITH THE EQUIPMENT AND CONTROL SEQUENCE. PROVIDE ACCESSORIES SUCH AS CONTACTS, OVERLOADS, EXTERNAL RESETS, CONTROL CIRCUIT TRANSFORMERS, PILOT LIGHTS, PUSH BUTTONS, HOA AND OTHER SELECTOR SWITCHES AS NEEDED FOR THE SPECIFIED OPERATION.

HEAT PUMP AIR HANDLER:
• DESCRIPTION: HORIZONTAL OR VERTICAL WITH DOWNFLOW CONVERSION KIT WHERE REQUIRED, SPLIT SYSTEM HEATING AND COOLING DIRECT EXPANSION (DX) COIL (R454B OR R32) WITH COPPER TUBES EXPANDED INTO ALUMINUM FINS, DRAIN PAN, TXV VALVE, CENTRIFUGAL MULTI-SPEED DIRECT DRIVE FAN, TIME DELAY RELAY, FACTORY OR FIELD INSTALLED OPTIONAL ELECTRIC HEAT, INSULATED (R4.2) STEEL CABINET WITH ENAMEL FINISH AND 2% MAX LEAKAGE AT 1"WC PRESSURE.

HEAT PUMP CONDENSING UNITS:
• PROVIDE HIGH EFFICIENCY R454B OR R32 SPLIT SYSTEM CONDENSING UNIT WITH SCROLL COMPRESSOR(S) MODEL AND CAPACITY AS SCHEDULED.

FANS, VENTILATORS, AND LOUVERS:
• CEILING CENTRIFUGAL CABINET FAN: EXHAUSTER WITH METAL GRILLE, FAN AND MOTOR, CORD DISCONNECT, AND BACK DRAFT DAMPER. MODEL AND CAPACITY AS INDICATED ON DRAWING.
• LOUVERS: PROVIDE 4" DOUBLE DRAINABLE STORM PROOF LOUVERS WITH 45° EXTRUDED ALUMINUM BLADES AND CLEAR ANODIZED ALUMINUM FINISH. RUSKIN MODEL ELF 375DX. PROVIDE ALUMINUM MESH INSECT SCREENS IN REMOVABLE FRAMES.

ELECTRIC HEATER:
• PROVIDE ELECTRIC FAN FORCED WALL HEATER WITH CONCEALED CONTROLS, DISCONNECT, AND INTEGRAL TAMPER PROOF THERMOSTAT. SURFACE MOUNTED OR RECESSED, MODEL AND CAPACITY AS INDICATED ON DRAWING.
• PROVIDE ELECTRIC FAN FORCED HORIZONTAL HEATER WITH CONCEALED CONTROLS, DISCONNECT, AND REMOTE THERMOSTAT. SURFACE MOUNTED OR RECESSED, MODEL AND CAPACITY AS INDICATED ON DRAWING.

DUCTWORK, ACCESSORIES AND INSULATION:
• DUCTWORK: GALVANIZED G90 SHEET METAL FABRICATED AND SEALED WITH MASTIC IN ACCORDANCE WITH SMACNA STANDARDS AND FOR THE PRESSURE CLASS OF THE SYSTEM TO EXCEED THE SPECIFIED FAN PRESSURE. PROVIDE LEAKAGE TESTING FOR HIGH PRESSURE SYSTEMS 3"WC AND ABOVE ACCORDING TO ASHRAE AND THE IECC. RETURN AIR SYSTEMS SHALL BE CONSTRUCTED AND TESTED TO -2.0" WC PRESSURE CLASS UNLESS OTHERWISE NOTED. PROVIDE DOUBLE-WALL SPIRAL LOCKSEAM CONSTRUCTION FOR EXPOSED ROUND DUCTS. PROVIDE PVC COATED ROUND DUCTS BELOW GRADE.
• DUCT LINER: GLASS FIBER DUCT LINER (K=0.24, R=4.2 /IN) WITH EROSION AND MICROBIAL RESISTANT COATING, THOROUGHLY COAT ALL PENETRATIONS AND EXPOSED EDGES WITH MASTIC. SOUND ABSORPTION COEFFICIENTS (125 HZ) 0.08, (250 HZ) 0.31, (500 HZ) 0.64, (1000 HZ) 0.84, (2000 HZ) 0.97, (4000 HZ) 1.03, NRC=0.70.
• BLANKET INSULATION (FIBERGLASS): 3/4 LB/CF GLASS FIBERS BONDED WITH A THERMOSETTING RESIN (UNCOMPRESSED K=0.24, R=4.1 /IN), ASTM C 1290 TYPE III WITH ASTM C 1136 TYPE II FOIL REINFORCED KRAFT (FRK) LOW PERMEANCE VAPOR RETARDER FACING.
• BOARD INSULATION: 3 LB/CF GLASS FIBERS BONDED WITH A THERMOSETTING RESIN (MIN R-4.1 /IN), ASTM C 612 WITH ASTM C 1136 TYPE II FOIL REINFORCED KRAFT (FRK) LOW PERMEANCE VAPOR RETARDER FACING.
• INSULATION APPLICATION: APPLY INSULATION AS FOLLOWS:
➢ INDOOR CONCEALED SUPPLY: 1" THICK FIBERGLASS LINER OR 1-1/2" BLANKET WITH VAPOR BARRIER.
➢ INDOOR EXPOSED SUPPLY: 1" THICK FIBERGLASS LINER OR 1" BOARD WITH VAPOR BARRIER.
➢ INDOOR RETURN AND TRANSFER: 1" THICK DUCT LINER.
➢ INDOOR CONCEALED OUTSIDE AIR DUCTS: 2" THICK FIBERGLASS LINER OR 2" BLANKET WITH VAPOR BARRIER.
➢ INDOOR EXPOSED OUTSIDE AIR DUCTS: 2" THICK FIBERGLASS LINER OR 2" BOARD WITH VAPOR BARRIER.
➢ INDOOR CONCEALED SUPPLY & RETURN IN UNCONDITIONED SPACES: 2" THICK FIBERGLASS LINER OR 3" BLANKET WITH VAPOR BARRIER.
➢ OUTDOOR SUPPLY AND RETURN DUCTWORK: 1" DUCT LINER PLUS 2" THICK CLOSED CELL FOAM EXTERNAL INSULATION WITH 60 MIL ADHERED RUBBER (EDPM) OR ALUMINUM Faced ADHESIVE VENTURECLAD WATERPROOF JACKET.
• BALANCING DAMPERS: PROVIDE GALVANIZED STEEL MANUAL BALANCING DAMPERS WITH GALVANIZED STEEL SHAFTS AND STEEL BEARINGS.
• TURNING VANES: SINGLE WALL, 2" RADIUS, 1-1/2" SPACING. PROVIDE IN ALL DUCT ELBOWS UNLESS NOTED OTHERWISE. PROVIDE GALVANIZED STEEL, STAINLESS STEEL OR ALUMINUM TO MATCH DUCT MATERIAL. FABRICATED IN ACCORDANCE WITH SMACNA STANDARDS.
• CONTROL DAMPERS: PROVIDE ULTRA-LOW LEAK GALVANIZED STEEL DAMPERS GALVANIZED STEEL SHAFTS AND STEEL BEARINGS, NEOPRENE BLADE AND EDGE SEALS.
• FLEXIBLE DUCTWORK IN UNCONDITIONED SPACE: VINYL LINER, 1-1/4" FIBERGLASS INSULATION (MIN R-4.2) WITH STEEL WIRE REINFORCEMENT AND VINYL JACKET, MEETING FLAME SPREAD AND SMOKE DEVELOPED REQUIREMENTS OF UL 181.
• FLEXIBLE DUCTWORK IN UNCONDITIONED SPACE: VINYL LINER, 2" FIBERGLASS INSULATION (MIN R-6.0) WITH STEEL WIRE REINFORCEMENT AND VINYL JACKET, MEETING FLAME SPREAD AND SMOKE DEVELOPED REQUIREMENTS OF UL 181.
• AIR DEVICES:
➢ CONSTRUCTION: PROVIDE REGISTERS, GRILLES, AND DIFFUSERS WITH BAKED WHITE ENAMEL ALUMINUM OR STEEL CONSTRUCTION, SUITABLE FOR FIELD PAINTING.
➢ CEILING DIFFUSERS: ASPIRATING TYPE, SQUARE FACE, WITH ROUND NECK OR SQUARE TO ROUND TRANSITION AND OPPOSED BLADE DAMPER. PRICE MODEL SCD 4-WAY MODEL SMD OR AMD FOR 2-3 WAY OR SIMILAR.
➢ GRILLES & REGISTERS: HORIZONTAL FACE BARS WITH 45° DEFLECTION ON 1/2" CENTERS, OPPOSED BLADE DAMPER FOR REGISTERS. PRICE SERIES 600 OR EQUAL.

CONTROLS:
• PROVIDE DIGITAL CONTROLLERS, SENSORS AND CONTROL DEVICES, SWITCHES, RELAYS, ACTUATORS, ENGINEERING AND

COMMISSIONING FOR COMPLETE SYSTEM AND SEQUENCES OF OPERATION LISTED BELOW.
• PROVIDE POWER FOR CONTROLLERS WITH TRANSFORMER AND DISCONNECT FED FROM HVAC UNIT POWER OR UNIT MOUNTED RECEPTACLE AHEAD OF THE MAIN DISCONNECT.
• PROVIDE 120V POWER FOR CONTROL PANELS, DAMPER ACTUATORS AND VALVE ACTUATORS FROM THE NEAREST 120V OR 120-208V ELECTRICAL DISTRIBUTION PANEL INCLUDING BREAKER, DISCONNECTS, WIRE AND CONDUIT.
• PROVIDE CONTROL RELAYS FOR INTERLOCKING FANS, AND DAMPERS WITH LOW VOLTAGE SWITCHES AND THERMOSTATS.
• PROGRAMMABLE THERMOSTATS: 7 DAY, 24 HOUR PROGRAM, AUTOMATIC HEATING/COOLING CHANGEOVER AND 5 DEGREE DEADBAND, WITH FAN OFF-AUTO-SUB-BASE, AUXILIARY CONTACTS, AND BATTERY BACKUP.
• CO SENSOR/ CONTROLLER: SENSOR WITH FAN AND ALARM RELAYS, INDICATOR STATUS LIGHT AND MICROPROCESSOR CONTROLLED. FAN RELAY ACTIVATES AT 35 PPM OF CO AVERAGED OVER 5 MINUTES, 25 PPM SELECTABLE. SOLID STATE SENSOR DOES NOT REQUIRE PERIODIC CALIBRATION. ALARM RELAY ACTIVATES AT 100 PPM OF CO AFTER 30 MINUTES OR 200 PPM AFTER 10 MINUTES. 5 AMP SPDT FAN RELAY, CONTROLS STARTERS OF EXHAUST FANS. 1/2 AMP N.O. ALARM RELAY CONNECTS TO WARNING DEVICES OR CONTROL PANELS. 5000 SF COVERAGE AREA PER SENSOR. MACURCO CM-21A OR EQUAL.
• NO2 SENSOR/ CONTROLLER: SENSOR WITH FAN AND ALARM RELAYS, INDICATOR STATUS LIGHT AND MICROPROCESSOR CONTROLLED. DIGITAL DISPLAY FROM 0-9 PPM NO2. 5000 SF COVERAGE AREA PER SENSOR. ADJUSTABLE FAN AND ALARM SETTINGS. MACURCO ND-1 OR EQUAL.

SEQUENCE OF OPERATION: (ALL SETPOINTS SHALL BE ADJUSTABLE)

SPLIT SYSTEM HEAT PUMP/AIR HANDLER:
• OCCUPIED HOURS OF OPERATION: BASED ON STAND-ALONE REMOTE TEMPERATURE CONTROLLER: THE SUPPLY FAN SHALL OPERATE CONTINUOUSLY AND ASSOCIATED OUTSIDE AIR DAMPER SHALL BE OPEN TO ITS MINIMUM POSITION. ON A RISE IN SPACE TEMPERATURE ABOVE THE COOLING SET POINT, CYCLE THE COMPRESSOR IN COOLING MODE TO SATISFY THE THERMOSTAT. ON A FALL IN SPACE TEMPERATURE BELOW THE HEATING SET POINT, CYCLE THE COMPRESSOR IN HEATING MODE TO SATISFY THE THERMOSTAT.
• UNOCCUPIED HOURS OF OPERATION: BASED ON STAND-ALONE REMOTE TEMPERATURE CONTROLLER: THE SUPPLY FAN SHALL OPERATE UPON A CALL FOR HEATING OR COOLING AND ASSOCIATED OUTSIDE AIR DAMPER SHALL BE CLOSED. ON A RISE IN SPACE TEMPERATURE ABOVE THE COOLING SET POINT, CYCLE THE COMPRESSOR IN COOLING MODE TO SATISFY THE THERMOSTAT. ON A FALL IN SPACE TEMPERATURE BELOW THE HEATING SET POINT, CYCLE THE COMPRESSOR IN HEATING MODE TO SATISFY THE THERMOSTAT.

TOILET EXHAUST FANS:
• INTERLOCK FAN WITH LIGHT SWITCH, WIRING BY EC.

HEAT REMOVAL FANS:
• OPERATE ON A RISE IN SPACE TEMPERATURE TO MAINTAIN THE SETPOINT.
VENTILATION FANS:
• FAN SHALL OPERATE CONTINUOUSLY DURNING OCCUPIE HOURS OF OPERATION.

BALANCING:
• VERIFY ALL NECESSARY BALANCING COMPONENTS ARE INSTALLED SUCH AS BALANCING VALVES AND DAMPERS.
• BALANCE AIR SYSTEMS TO WITHIN 0 TO + 10% OF INDICATED VALUES.
• SUBMIT REPORTS SPECIFIED UNDER SUBMITTALS.

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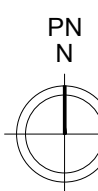
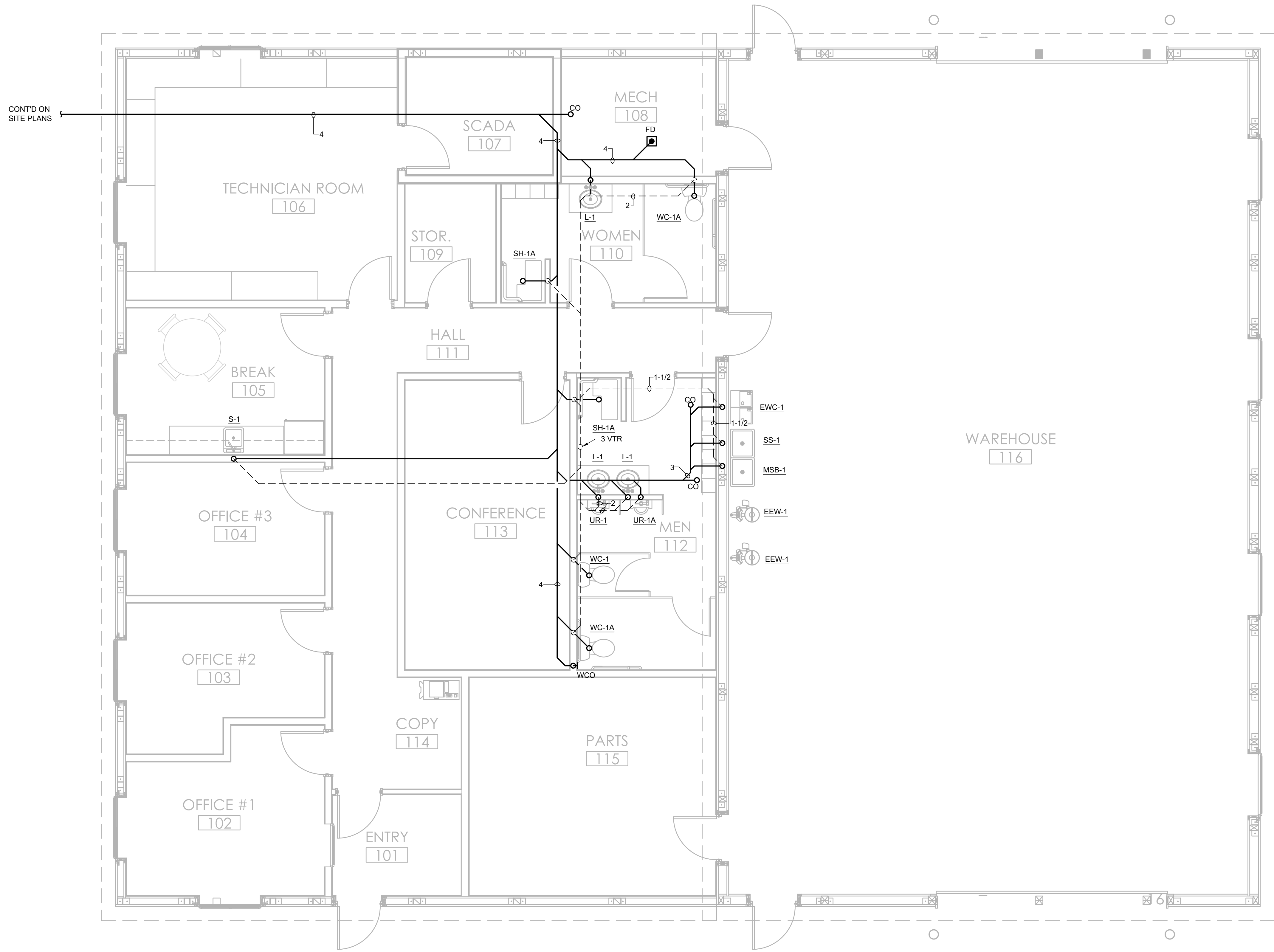
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SPECS. & DETAILS
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OF: M2.1



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M1.1

FLOOR PLAN - SANITARY & VENT

1/4" = 1'-0"



50% PROGRESS SUBMISSION

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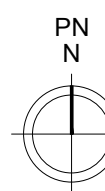
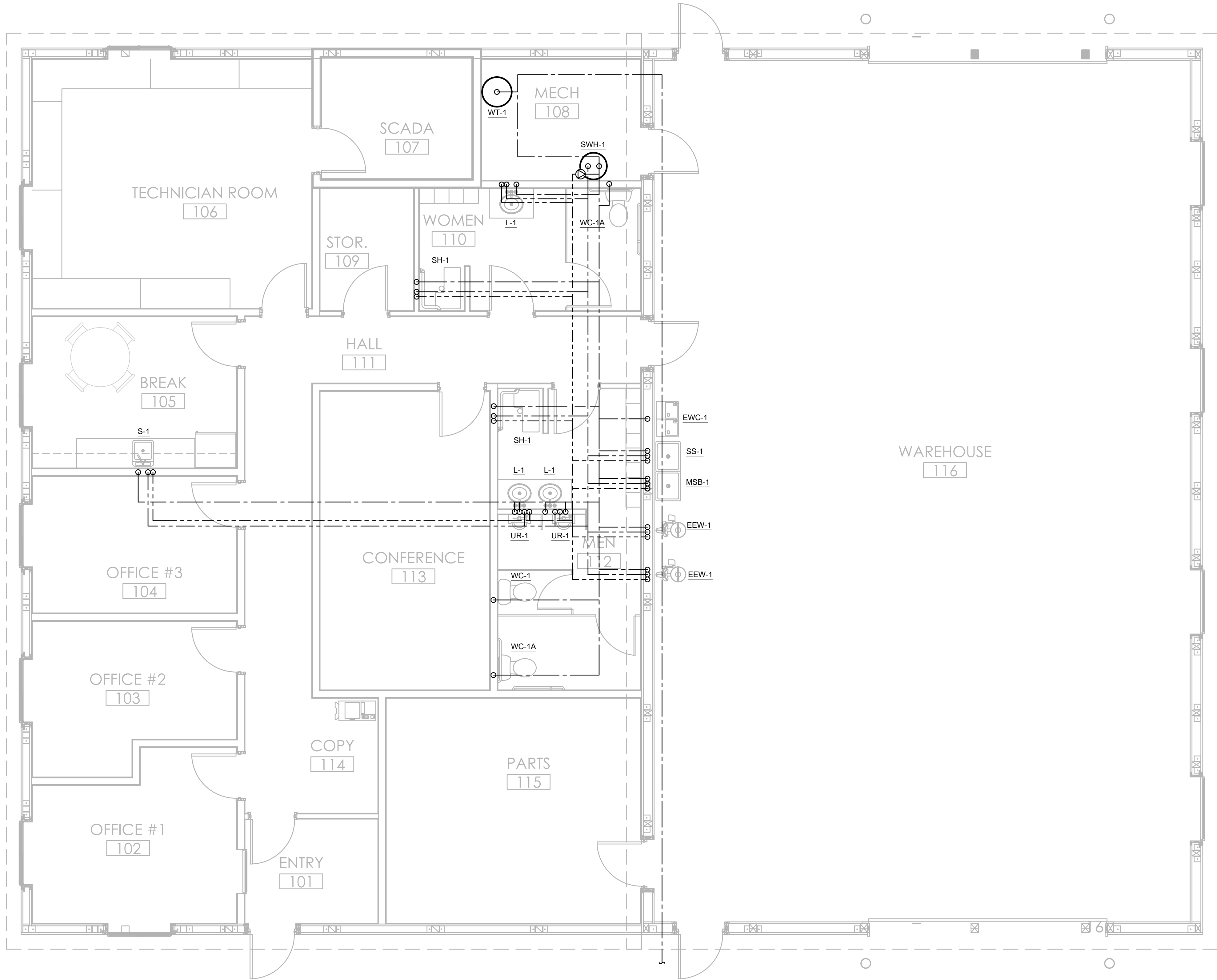
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SHEET NO: M1.1
OF: M2.1

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M1.2

FLOOR PLAN - DOMESTIC WATER

1/4" = 1'-0"

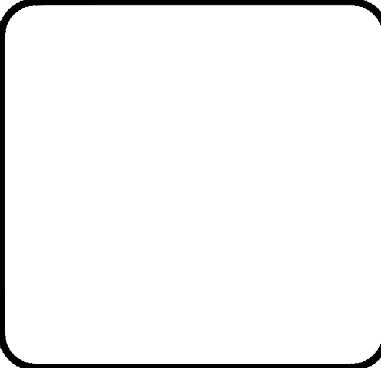


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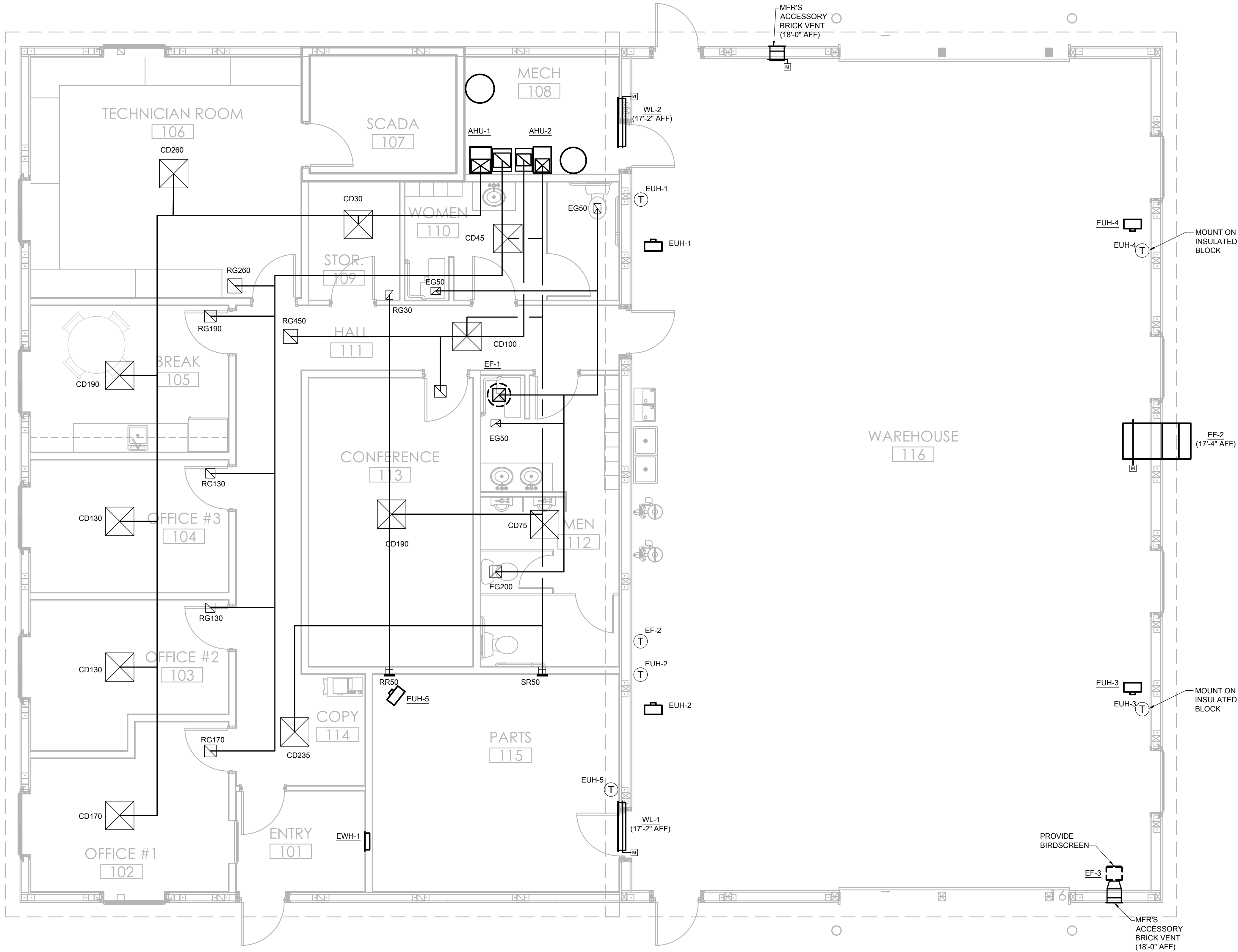
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SHEET NAME: FLOOR PLAN - DOMESTIC WATER
SHEET NO.: M1.2 OF: M2.1

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CEILING DIFFUSER SCHEDULE							
CFM	NECK	FLEX SIZE	MAX NC	THROW (FT) MAX. (50 FPM) - MIN. (100 FPM)			
				4-WAY	3-WAY	2-WAY	1-WAY
0-100	6x6	6	30	6-3	6/7 - 3/4	9-4	12-6
101-250	9x9	8	25	9-5	9/12 - 5/7	14-7	18-9
251-400	12x12	10	25	12-6	12/15 - 6/7	15-8	18-9
401-600	15x15	12	25	13-6	13/18 - 6/8	18-8	19-9
601-900	18x18	14	25	13-6	13/18 - 6/8	18-8	19-9

GRILLE, REGISTER & DIFFUSER KEY

CD 0x0 000
(1) (2) (3)

- NOTES
(1) ABBREVIATION FOR GRILLE, REGISTER OR DIFFUSER.
(2) NECK SIZE, SEE GRILLE, REGISTER, OR DIFFUSER SCHEDULE WHERE OMITTED.
(3) BALANCE AIRFLOW, SEE PLANS FOR AIRFLOW DIRECTION(S)

GRILLES & REGISTERS

CFM	SIZE	APD	NC
0-100	8x6	0.10	30
101-150	8x8	0.10	30
151-250	10x10	0.08	30
251-400	12x12	0.08	25
401-600	18x12	0.08	25
601-900	18x18	0.08	25
901-2000	24x24	0.10	30

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M2.1
FLOOR PLAN - HVAC
1/4" = 1'-0"

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FLOOR PLAN - HVAC
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OF:
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