

MECHANICAL SPECIFICATIONS

1. GENERAL PROVISIONS:
- A. PROVIDE ALL LABOR, MATERIALS, EQUIPMENT, NECESSARY FOR THE COMPLETE INSTALLATION OF THE PLUMBING AND MECHANICAL SYSTEMS OUTLINED.
- B. OBTAIN ALL PERMITS, FEES, LICENSES, INSPECTIONS, AND CERTIFICATES OF COMPLIANCE OR APPROVAL AS REQUIRED BY THE AUTHORITIES.
- C. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH ALL APPLICABLE LAWS, CODES AND REGULATIONS OF GROOVED/ENDLINED, BODIES HAVING JURISDICTION OVER THE SITE.
- D. ALL TESTING REQUIRED BY AUTHORITIES SHALL BE CONSIDERED PART OF THIS WORK.
- E. DURING CONSTRUCTION, ALL FIXTURES, EQUIPMENT, PIPE, DUCT, ETC. SHALL BE COVERED, PLUGGED, OR CAPPED AS REQUIRED TO KEEP CLEAN AND UNDAMAGED. ALL DAMAGED ITEMS SHALL BE RESTORED TO ORIGINAL CONDITION OR REPLACED. ALL PROTECTIVE COVERINGS SHALL BE REMOVED BEFORE FINAL ACCEPTANCE.
- F. PROVIDE ALL NECESSARY CUTTINGS AND PATCHING OF WALLS, FLOORS, CEILINGS, AND ROOFS AS NECESSARY. PATCH AROUND ALL OPENINGS SHALL MATCH ADJACENT AREA. COORDINATE ALL ROOFING WORK WITH OWNER OR RESPONSIBLE PARTY, SO THAT THE EXISTING ROOFING WARRANTY WILL BE MAINTAINED.
- G. CONTRACTOR SHALL GUARANTEE ALL WORK AND MATERIALS AGAINST DEFECTS FOR A PERIOD OF ONE YEAR FROM FINAL ACCEPTANCE.
2. OPERATION AND MAINTENANCE MANUALS:
- A. DURING THE COURSE OF CONSTRUCTION, COLLECT AND COMPILE OPERATING INSTRUCTIONS, WIRING DIAGRAMS, CATALOGS, QUTS, LUBRICATION AND PREVENTIVE MAINTENANCE INSTRUCTIONS, PARTS LISTS, ETC. FOR ALL EQUIPMENT FURNISHED UNDER THIS CONTRACT.
- B. ALL LITERATURE AND INSTRUCTIONS SHIPPED WITH THE EQUIPMENT SHALL BE SAVED FOR INCLUSION IN THE OPERATION AND MAINTENANCE MANUALS.
- C. ALL LITERATURE LISTED ABOVE AND ALL PAPERS LISTING WARRANTIES, ETC. SHALL BE BOUND IN A 3-RING BINDER AND LABELED WITH THE PROJECT NAME, ADDRESS, ARCHITECT, ENGINEER, CONTRACTORS, ETC.
3. MANUFACTURERS:
- A. MANUFACTURERS, MODEL NUMBERS, ETC. INDICATED OR SCHEDULED ON THE DRAWINGS SHALL BE INTERPRETED AS HAVING ESTABLISHED A STANDARD OF QUALITY AND SHALL NOT BE CONSIDERED AS A WATER COMPROMISE, ETC. OF EQUAL QUALITY BY MANUFACTURERS SHALL BE ACCEPTABLE, SUBJECT TO STRUCTURAL AND ELECTRICAL CONSTRAINTS OF THE PROJECT DESIGN, UNLESS NOTED OTHERWISE.
4. MOTORS:
- A. PROVIDE THERMAL OVERLOAD PROTECTION FOR EACH MOTOR PROVIDED BY THIS WORK.
5. TESTING, BALANCING, AND CLEANING:
- A. ALL PIPING SHALL BE TESTED FOR LEAKS BEFORE BEING CONCEALED IN WALL CONSTRUCTION OR COVERED WITH INSULATION.
- B. SEWER AND VENT PIPING SHALL BE HYDROSTATICALLY TESTED WITH NO LESS THAN 10 FEET OF HEAD DEVELOPED FOR NOT LESS THAN 15 MINUTES, PER THE LOCAL PLUMBING CODE, WITH NO LEAKS.
- C. FIRE PROTECTION PIPING SHALL BE TESTED IN ACCORDANCE WITH THE REQUIREMENTS OF NFPA.
- D. DOMESTIC WATER PIPING SHALL BE HYDROSTATICALLY TESTED AT A PRESSURE OF NOT LESS THAN 1-1/2 TIMES THE OPERATING PRESSURE, BUT NOT LESS THAN 40 PSI, FOR A PERIOD OF NOT LESS THAN 2 HOURS, WITH NO LEAKS.
- E. NATURAL GAS PIPING SHALL BE PNEUMATICALLY TESTED AT A PRESSURE OF NOT LESS THAN 1-1/2 TIMES THE OPERATING PRESSURE, BUT NOT LESS THAN 50 PSI, FOR A PERIOD OF NOT LESS THAN 2 HOURS, WITH NO LEAKS.
- F. DUCTWORK AND PIPING SHALL BE BALANCED BY QUALIFIED INDEPENDENT BALANCING PERSONNEL, WHO HAVE PREVIOUS EXPERIENCE WITH BALANCING PROCEDURES AND ARE CERTIFIED BY THE ASSOCIATED AIR BALANCE COUNCIL (AABC) OR NATIONAL ENVIRONMENTAL BALANCING BUREAU (NEBB).
- 1) BALANCING SHALL INCLUDE THE BALANCING OF THE EQUIPMENT AND AIR DISTRIBUTION SYSTEMS TO PROVIDE DESIGN QUANTITIES INDICATED AND VERIFICATION OF PERFORMANCE OF ALL EQUIPMENT AND AUTOMATIC CONTROLS.
- 2) WITH IN 30 DAYS OF THE COMPLETION OF THE TESTING AND BALANCING WORK, SUBMIT THE TEST AND BALANCING REPORT TO THE SIGNATORY OF THE TEST AND BALANCE ENGINEER. THE REPORTS SHALL BE CERTIFIED PROOF THAT THE SYSTEMS HAVE BEEN TESTED, ADJUSTED, AND BALANCED IN ACCORDANCE WITH THE REFERENCED STANDARDS; ARE AN ACCURATE REPRESENTATION OF HOW THE SYSTEMS ARE INSTALLED AND ARE OPERATING. REPORTS SHALL BE BOUND IN A VINYL BINDER AND THE BINDER LABELED OR MAY BE AN ELECTRONIC PDF SUBMITTAL.
6. BEFORE DOMESTIC WATER PIPING IS PLACED IN SERVICE, ALL DOMESTIC WATER DISTRIBUTION SYSTEMS, INCLUDING THOSE FOR COLD WATER AND HOT WATER SYSTEMS, SHALL BE FLUSHED, RINSED, AND DECONTAMINATED IN ACCORDANCE WITH HEALTH DEPARTMENT REGULATIONS. THE SYSTEMS SHALL BE THOROUGHLY FLUSHED OF ALL DIRT AND FOREIGN MATTER, THEN FILLED WITH WATER TREATED WITH 50 PPM OF CHLORINE. DURING THE FILLING PROCESS, VALVES AND FAUCETS SHALL BE OPENED SEVERAL TIMES TO ASSURE TREATMENT OF THE ENTIRE SYSTEM. THE TREATED WATER SHALL BE LEFT IN THE SYSTEM FOR 24 HOURS AFTER WHICH TIME THE SYSTEM SHALL BE FLUSHED, IF THE RESIDUAL CHLORINE IS NOT LESS THAN 10 PPM, THE FLUSHING SHALL BE REPEATED. AFTER STERILIZATION, SAMPLES OF WATER IN THE SYSTEM SHALL BE APPROVED BY THE BOARD OF HEALTH.
7. PLUMBING:
- A. PROVIDE AN APPROVED WATER HAMMER ARRESTOR FOR EACH PLUMBING FIXTURE SUPPLY AS REQUIRED BY FIXTURE MANUFACTURER.
- B. ALL EXPOSED WATER PIPE SHALL BE CHROME PLATED BRASS PIPE, NO FERROUS PIPE.
- C. PROVIDE CLEANOUTS AT EACH CHANGE OF DIRECTION AND AT 100 FOOT INTERVALS IN STRAIGHT RUNS.
- D. PROVIDE ACCESS PANELS FOR ALL CONCEALED VALVES AND TRAPS.
- E. CLEANOUTS:
- 1) VINYL TILE FLOOR: JR SMITH #4140, OR EQUAL.
- 2) QUARRY TILE FLOOR: JR SMITH #4220, OR EQUAL.
- 3) CARPETED FLOOR: JR SMITH #4202/1, OR EQUAL.
- 4) UNFINISHED FLOOR: JR SMITH #4202, OR EQUAL.
- 5) WALL: JR SMITH #4412, OR EQUAL, 2" ABOVE THE FLOOR.
- 6) GARAGE: JR SMITH #4286, OR EQUAL, WITH HEAVY DUTY CAST IRON BODY AND COVER.
- F. PROVIDE DIELECTRIC UNIONS WITH APPROPRIATE END CONNECTIONS TO MATCH THE PIPE SYSTEM IN WHICH INSTALLED (SCREWED, SOLDERED, OR FLANGED). PROVIDE DIELECTRIC UNIONS ON ALL PIPING CONNECTIONS TO HOT WATER HEATERS AND EXPANSION TANKS.
8. WATER HEATERS:
- 1) EVERY WATER HEATER SHALL HAVE AN APPROVED MEANS INSTALLED ON THE COLD WATER SUPPLY LINE ABOVE THE EQUIPMENT PERMITTED SUPPLY MAINS TO PERMIT ISOLATION OF WATER HEATER OR TANK.
- 2) BOTTOM FED WATER HEATERS AND TANKS CONNECT TO WATER HEATERS SHALL HAVE A VACUUM RELIEF VALVE INSTALLED, ANSI Z21.22.
- 3) STORAGE HEATERS OPERATING ABOVE ATMOSPHERIC PRESSURE SHALL HAVE AN APPROVED PRESSURE RELIEF VALVE AND/OR TEMPERATURE RELIEF VALVE.
- H. ALL SEWER PIPING LOCATED INSIDE THE BUILDING SHALL BE INSTALLED WITH THE FOLLOWING SLOPES.
- 1) INSTALL 2-1/2" AND SMALLER PIPE AT 1/4" PER FOOT FALL.
- 2) INSTALL 3" AND LARGER PIPE AT 1/8" PER FOOT FALL.
- I. ALL SEWER PIPING LOCATED EXTERIOR TO THE BUILDING SHALL BE INSTALLED WITH THE FOLLOWING SLOPES.
- 1) INSTALL 4" AND SMALLER PIPE AT A MINIMUM OF 2% SLOPE.
9. PIPING:
- A. DOMESTIC COLD AND HOT WATER (ABOVEGROUND):
- 1) TYPE L HARD DRAWN COPPER TUBING, ASTM B-88.
- a) WROUGHT COPPER SOLDERED FITTINGS, ASTM B75 ALLOY C12200, ANSI B16.22, MSS SP-104.
- b) MECHANICAL PRESS COPPER FITTINGS FOR USE IN PLUMBING OR MECHANICAL APPLICATIONS, ASME B16.22, ASME B16.51, OR ASME B16.18. MECHANICAL PRESS COPPER FITTINGS SHALL CONFORM TO AFPM P5-111 OR ASME B16.51.
- 2) PEK HIGH-DENSITY CROSS-LINKED POLYETHYLENE TUBING SHALL BE MANUFACTURED TO THE REQUIREMENTS OF ASTM F876 AND MEET THE STANDARD GRADE HYDROSTATIC PRESSURE RATINGS FROM PLASTIC PIPE INSTITUTE IN ACCORDANCE WITH TR-4/25.
- a) PEK-A AND PEK-B MEETING ANSISF61 AND ANSISF312 STANDARDS FOR POTABLE WATER SAFETY AND LEAD-FREE STANDARDS AND MUST BE MARKED WITH "PP-A-G", "NSF-61-G" OR OTHER NSF-APPROVED MARKING, ASTM F2023 FOR USE WITH CHLORINATED WATER.
- b) PEK MECHANICAL GRIMP/INSERT OR EXPANSION FITTINGS INSTALLED IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS. PIPE SIZES GIVEN ON THE DRAWINGS ARE NOMINAL COPPER PIPE SIZE. INCREASE PEK PIPING SIZE TO EQUAL OR EXCEED COPPER PIPE INSIDE DIAMETER FOR SUPPLY MAINS.
- 3) VALVES
- a) TO BE INSTALLED ON THE FIXTURE SUPPLY TO EACH PLUMBING FIXTURE.
- b) TO BE INSTALLED ON THE WATER SUPPLY SIDE TO EACH APPLIANCE OR MECHANICAL EQUIPMENT.
- 1) TYES.
1. GATE VALVE: JOMAR T/S-3016 OR EQUAL, LEAD-FREE NSF 61, ANSI B120.1.
2. GLOBE VALVE: JOMAR TSS OR EQUAL.
3. BALL VALVE: JOMAR JF009P OR EQUAL, COMPACT LEAD FREE BRASS BALL VALVE, UL242, CSA 331-12 & 331-42, FM, CALIFORNIA CODE AB193, NSF61 ANNEX G APPROVED.
4. BALL VALVE: JOMAR T-100NE OR EQUAL, UL242, FM, CSA NSF 61-8, MSS SP-110.
- B. DOMESTIC COLD WATER (UNDERGROUND):
- 1) TYPE L HARD DRAWN COPPER TUBING, ASTM B-88.
- a) WROUGHT COPPER SOLDERED FITTINGS, ASTM B75 ALLOY C12200, ANSI B16.22, MSS SP-104.
- b) MECHANICAL PRESS COPPER FITTINGS FOR USE IN PLUMBING OR MECHANICAL APPLICATIONS, ASME B16.22, ASME B16.51, OR ASME B16.18. MECHANICAL PRESS COPPER FITTINGS SHALL CONFORM TO AFPM P5-111 OR ASME B16.51.
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- b) PEK MECHANICAL GRIMP/INSERT OR EXPANSION FITTINGS INSTALLED IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS. PIPE SIZES GIVEN ON THE DRAWINGS ARE NOMINAL COPPER PIPE SIZE. INCREASE PEK PIPING SIZE TO EQUAL OR EXCEED COPPER PIPE INSIDE DIAMETER FOR SUPPLY MAINS.
- 3) HDPE, PIGMENTED BLUE THROUGHOUT, CTS SIZES: 1"-2" ANNA C201 4110 DR11 PC250 IPS SIZES 2"-3", ANNA C201 4110 DR11 PC200.
- C. DOMESTIC WATER SERVICE, 1"-3"
- 1) TYPE K SOFT DRAWN COPPER TUBING, ASTM B-88.
- a) Cast Copper Alloy Fittings for Flared Copper Tube, ASME/ANSI B16.26:
- 1) HDPE, PIGMENTED BLUE THROUGHOUT, CTS SIZES: 1"-2" ANNA C201 4110 DR11 PC250 IPS SIZES 2"-3", ANNA C201 4110 DR11 PC200 MATERIAL AND INSTALLATION MUST CONFORM TO WATER DEPARTMENT REQUIREMENTS.
- D. WATER (FIRE) SERVICE, 3" OR LARGER:
- 1) DUCTILE IRON PIPE 4 FITTINGS, ANNA C151 CLASS 80, CEMENT LINING, SEALCOATED, ANNA C104, THRUST BLOCKS IN ACCORDANCE WITH NFPA 24.

MECHANICAL SPECIFICATIONS (CONTINUED)

- 2) HDPE IPS SIZES PIGMENTED BLUE THROUGHOUT, 3" ANNA C201 4110 DR11 PC200 4" AND LARGER, ANNA C208 4110 DR15 PC160.
- a) STIFFENERS MUST BE IN THE ENDS OF THE HDPE, APPROVED TRACE WIRE MUST BE USED * 12 AWG COPPERHEAD REINFORCED TRACE WIRE (BLUE IN COLOR).
- b) MATERIAL AND INSTALLATION MUST CONFORM TO WATER DEPARTMENT REQUIREMENTS.
- 3) POLYVINYL CHLORIDE (PVC) PIPE, ANNA C200, CLASS 200, WITH BELL END AND ELASTOMERIC GASKET, WITH IRON END FOR CAST-IRON OR DUCTILE-IRON FITTINGS, OR PVC ELASTOMERIC GASKET FITTINGS.
- a) PVC COUPLINGS AND FITTINGS: ANNA C200, WITH ASTM F 411 ELASTOMERIC SEAL, GASKETS, ASTM F 411, ELASTOMERIC SEAL.
- b) DUCTILE-IRON AND CAST-IRON FITTINGS: ANNA C110, DUCTILE-IRON OR CAST-IRON, 250-PSI PRESSURE RATING, OR ANNA C155, DUCTILE-IRON OR CAST-IRON, 350-PSI PRESSURE RATING, OF DIMENSION TO MATCH PIPE OUTSIDE DIAMETER. ANNA C104, CEMENT MORTAR LINING, GASKETS PER ANNA C111, RUBBER.
- 4) THRUST BLOCKS IN ACCORDANCE WITH NFPA 24.
- E. LEAD CONTENT OF WATER SUPPLY PIPE AND FITTINGS:
- 1) PIPE AND PIPE FITTINGS, INCLUDING VALVES AND FAUCETS, UTILIZED IN THE WATER SUPPLY SYSTEM SHALL NOT HAVE MORE THAN 5% LEAD CONTENT.
- 2) PIPE, PIPE FITTINGS, JOINTS, VALVES, FAUCETS, AND FIXTURE FITTINGS UTILIZED TO SUPPLY WATER FOR DRINKING OR COOKING PURPOSES SHALL COMPLY WITH NSF 312 AND SHALL HAVE A HEIGHTED AVERAGE LEAD CONTENT OF 0.25% OR LESS.
- F. STORM SEWER, SANITARY SEWER, AND VENTS (UNDERGROUND, INTERIOR TO BUILDINGS):
- 1) POLYVINYLCHLORIDE (PVC) DWN PIPE, SCHEDULE 40, SOLVENT JOINT (WHERE APPROVED BY LOCAL CODES).
- 2) SERVICE HEIGHT, BELL-AND-SPIGOT, COATED CAST IRON, ASTM A-74.
- 3) ACRYLONITRILE-BUTADIENE-STYRENE (ABS) SEWER PIPE, ASTM D 2751-83S.
- 4) "NO-HUB" CAST IRON, NEOPRENE GASKETS, STAINLESS STEEL CLAMPS.
- G. STORM SEWER AND SANITARY SEWER (EXTERIOR TO BUILDINGS):
- 1) SERVICE HEIGHT, BELL-AND-SPIGOT, COATED CAST IRON, ASTM A-74.
- 2) DUCTILE IRON GRAVITY SEWER PIPE 4 FITTINGS, ASTM A146/141, CLASS 50 OR B1, SEALCOATED, MECHANICAL OR PUSH-ON JOINTS, DIP COATING, NEOPRENE OR SYNTHETIC RUBBER GASKETS.
- 3) ACRYLONITRILE-BUTADIENE-STYRENE (ABS) SEWER PIPE, SDR-25 OR SCHEDULE 40, SOLVENT JOINT (WHERE APPROVED BY LOCAL CODES).
- 4) POLYVINYLCHLORIDE (PVC) PIPE, SDR-26, SOLVENT OR ELASTOMERIC JOINT (WHERE APPROVED BY LOCAL CODES).
- H. STORM SEWER, SANITARY SEWER, AND VENTS (ABOVEGROUND):
- 1) SERVICE HEIGHT, BELL-AND-SPIGOT, COATED CAST IRON, ASTM A-74.
- 2) DWN, WROUGHT COPPER, ANSI B16.22.
- 3) GALVANIZED STEEL PIPE, WITH MALLEABLE IRON, THREADED FITTINGS, DRAINAGE PATTERN FOR SEWERS.
- 4) "NO-HUB" CAST IRON, NEOPRENE GASKETS, STAINLESS STEEL CLAMPS.
- 5) POLYVINYLCHLORIDE (PVC) DWN PIPE, SCHEDULE 40, SOLVENT JOINT (WHERE APPROVED BY LOCAL CODES). (NOT FOR USE IN A RETURN AIR FLEAM).
- I. CONDENSATE DRAINS & INDIRECT WASTE (ABOVEGROUND):
- 1) DWN, WROUGHT COPPER, ANSI B16.22 (CONDENSATE INSIDE BUILDINGS).
- 2) POLYVINYLCHLORIDE (PVC) DWN PIPE, SCHEDULE 40, SOLVENT JOINT (INDIRECT WASTE).
- J. REFRIGERANT:
- 1) ASTM B 280, TYPE ACR, HARD-DRAWN STRAIGHT LENGTHS, AND SOFT-ANNEALED COILS, SEAMLESS COPPER TUBING.
- 2) WROUGHT COPPER, ANSI B16.22, STREAMLINED PATTERN, FITTINGS: BRAZED JOINTS, ANS A 5.8, CLASSIFICATION 100 (S1) (S18).
- 3) TUBING SHALL BE FACTORY CLEANED, READY FOR INSTALLATION, AND HAVE ENDS CAPPED TO PROTECT CLEANLINESS OF PIPE INTERIORS PRIOR TO SHIPING.
- 4) SIZE AND INSTALLATION OF PIPE SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
- K. NATURAL GAS:
- 1) BLACK STEEL PIPE, SCHEDULE 40, ASTM A53.
- a) PIPE 3" AND SMALLER, 150 LB. MALLEABLE IRON, THREADED FITTINGS.
- b) PIPE 4" AND SMALLER: VESGA MEGA PRESS 6 FOR WATER AND GAS, CSA L64, TS&A/ASME B31 FOR USE WITH ASTM A53 SCHEDULE 40 BLACK IRON PIPE.
- c) PIPE 2-1/2" AND LARGER, WELDED.
- d) FLUG VALVE: ROCKWELL NORDSTROM FIGURE NO. 142 OR 143.
- e) BALL VALVE: JOMAR T-100NE, APPROVALS: UL242, FM, CSA, NSF 61-8, MSS SP-110.
- 2) GAS PIPING LABELING:
- a) ALL ELEVATED PRESSURE GAS PIPING SHALL BE LABELED EVERY 40 FEET WITH SIGNS INDICATING "ELEVATED PRESSURE".
- 3) GAS PIPING PAINTING:
- a) ALL BLACK STEEL GAS PIPING LOCATED EXTERIOR TO THE BUILDINGS SHALL BE PRIME AND PAINTED TO EITHER MATCH ADJACENT EXTERIOR WHERE LOCATED OR ON NEAR EXTERIOR WALL AND PAINTED SAFFTY YELLOW WHERE LOCATED ON THE ROOF.
- L. ALL PIPE HANGERS AND SUPPORTS SHALL BE STANDARD PRODUCTS OF GRINNELL, FEE AND MASON, OR ELGEN. HANGER SPACING SHALL BE IN ACCORDANCE WITH MSS SP-64.
- M. SLEEVES
- 1) PROVIDE SET, AND PROPERLY LOCATE PIPE SLEEVES AS REQUIRED FOR THIS WORK. ALL SLEEVES SHALL BE OF SET, AND PROPERLY LOCATE PIPE MOVEMENT DUE TO EXPANSION AND CONTRACTION AND TO ACCOMMODATE PIPE INSULATION.
- 2) INTERIOR PARTITIONS: 16 GAGE GALVANIZED STEEL, PACK BETWEEN PIPE AND SLEEVE WITH FIRE RESISTANT SEALANT.
- 3) ROOF: PROSET OR EQUAL, MANUFACTURED PVC SCHEDULE 40 PIPE SLEEVE WITH WATERPROOF SEAL, COORDINATE WITH ROOFING CONTRACTOR AND FLASH AS REQUIRED TO MAINTAIN ROOF WARRANTY.
- 4) PROTECTION AGAINST CONTACT: METALLIC PIPING, EXCEPT FOR CAST IRON, DUCTILE IRON AND GALVANIZED STEEL, SHALL NOT BE PLACED IN DIRECT CONTACT WITH STEEL FRAMING MEMBERS, CONCRETE, OR OTHER WALLS AND FLOORS OR OTHER MASONRY. METALLIC PIPING SHALL NOT BE PLACED IN DIRECT CONTACT WITH CORROSIVE SOIL. SHEATHING USED TO PREVENT DIRECT CONTACT SHALL HAVE A THICKNESS OF GREATER THAN .005, AND THE SHEATHING SHALL BE INSTALLED WITH THE PIPE. IF THE PIPE IS LOCATED IN A FOUNDATION WALL OR FOOTING, SHALL BE PROVIDED WITH A RELIEVING ARCH, OR A PIPE SLEEVE SHALL BE BUILT INTO THE FOUNDATION WALL. THE SLEEVE SHALL BE TWO SIZES GREATER THAN THE PIPE PASSING THROUGH THE WALL OR FOOTING.
- 5) PLUMBING VENTS: FLASH ROOF VENT INTO ROOFING SYSTEM AS REQUIRED BY THE ROOFING CONTRACTOR. PROVIDE ROOFING ROOF WARRANTY. ALL PLUMBING VENT TERMINALS SHALL TERMINATE A MINIMUM OF 12" ABOVE ROOF OR EQUAL TO HEIGHT OF PARAPET, WHICHEVER IS GREATER.
- N. PROVIDE CHROME PLATED ESCUTCHEONS ON ALL PIPE ENTERING FINISHED AREAS.
- O. WATER HEATERS
- A. COMMERCIAL, LIGHT-DUTY, STORAGE, ELECTRIC, DOMESTIC-WATER HEATERS:
1. STANDARD: UL 174
2. STORAGE-TANK CONSTRUCTION: STEEL, VERTICAL ARRANGEMENT.
3. PRESSURE RATINGS: 150 PSIG.
4. INTERIOR FINISH: COMPLY WITH NSF 61 AND NSF 312 BARRIER MATERIALS FOR POTABLE-WATER TANK LININGS, INCLUDING EXTENDING LINING MATERIAL INTO TAPPINGS.
5. FACTORY-INSTALLED: STORAGE-TANK APPURTENANCES:
- a. ANODE ROD: REPLACEABLE MAGNESIUM.
- b. DIP TUBE: REQUIRED UNLESS COLD-WATER INLET IS NEAR BOTTOM OF TANK.
- c. DRAIN VALVE: CORROSION-RESISTANT METAL WITH HOSE-END CONNECTION.
- d. INSULATION: COMPLY WITH ASHRAE/IES 90.1.
- e. JACKET: STEEL WITH ENAMELED FINISH OR HIGH-IMPACT COMPOSITE MATERIAL.
- f. HEAT-TRAP FITTINGS: INLET TYPE IN COLD-WATER INLET AND OUTLET TYPE IN HOT-WATER OUTLET.
- g. HEATING ELEMENTS: ELECTRIC, SCREW-IN IMMERSION TYPE.
- h. TEMPERATURE CONTROL: ADJUSTABLE THERMOSTAT.
- i. SAFETY CONTROL: HIGH-TEMPERATURE LIMIT, SHUTOFF DEVICE OR SYSTEM.
- j. RELIEF VALVE: ASME RATED AND STAMPED FOR COMBINATION TEMPERATURE-AND-PRESSURE RELIEF VALVES, INCLUDE RELIEVING CAPACITY AT LEAST AS GREAT AS HEAT INPUT, AND INCLUDE PRESSURE SETTINGS LESS THAN WORKING-PRESSURE RATINGS OF DOMESTIC-WATER HEATER. SELECT RELIEF VALVE WITH SENSING ELEMENT THAT EXTENDS INTO STORAGE TANK.
- B. DOMESTIC-WATER EXPANSION TANKS:
1. DESCRIPTION: STEEL, PRESSURE-RATED TANK CONSTRUCTED WITH WELDED JOINTS AND FACTORY-INSTALLED BUTYL-RUBBER DIAPHRAGM, INCLUDE AIR PRECHARGE TO MINIMUM SYSTEM-OPERATING PRESSURE AT TANK.
2. CONSTRUCTION:
- a. TAPPINGS: FACTORY-FABRICATED STEEL, WELDED TO TANK BEFORE TESTING AND LABELING, INCLUDE ASME B120.1 PIPE THREAD.
- b. INTERIOR FINISH: COMPLY WITH NSF 61 AND NSF 312 BARRIER MATERIALS FOR POTABLE-WATER TANK LININGS, INCLUDING EXTENDING FINISH MATERIAL INTO THROUGH-TANK FITTINGS AND OUTLETS.
- c. AIR-CHARGING VALVE: FACTORY INSTALLED.
3. CAPACITY AND CHARACTERISTICS:
- a. WORKING-PRESSURE RATINGS: 150 PSIG.
- b. FIRE PROTECTION (NET PIPE SPRINKLER SYSTEM):
- A. PROVIDE A "NET-PIPE" SPRINKLER SYSTEM WITH AUTOMATIC SPRINKLERS AND CONNECTED TO A SUFFICIENT WATER SUPPLY.
- B. THE SYSTEM DESIGN SHALL BE BASED ON LIGHT HAZARD CLASSIFICATION, NFPA 13.
- C. THE NET PIPE SPRINKLER SYSTEM SHALL CONFORM TO ALL REQUIREMENTS OF THE OWNER'S INSURANCE CARRIER AND LOCAL AUTHORITIES. PROVIDE SYSTEM DRAWINGS WITH A PROFESSIONAL ENGINEER'S STAMP ON THE DRAWINGS FOR REVIEW BY THE OWNER'S INSURANCE CARRIER AND LOCAL AUTHORITIES PRIOR TO INSTALLATION OF PIPING.
- D. THE NET PIPE SPRINKLER SYSTEM SHALL BE HYDRAULICALLY DESIGNED, BASED ON A WATER FLOW DATA OBTAINED FROM THE LOCAL WATER OR FIRE DEPARTMENT.
- E. PIPE AND TUBING MATERIALS:
- 1) STEEL PIPE, SMALLER THAN 2".
- a) ASTM A 53/A 53M STANDARD, SCHEDULE 40, SEAMLESS, BLACK STEEL PIPE.
- b) ASTM A 135, ASTM A 786/A 786M, OR ASME B36.10M, WALL THICKNESS GREATER THAN OR EQUAL TO SCHEDULE 50 AND LESS THAN SCHEDULE 40, BLACK STEEL PIPE.
- c) ASTM A 135 OR ASTM A 786/A 786M, THREADED, WALL THICKNESS LESS THAN SCHEDULE 50 AND GREATER THAN SCHEDULE 10, BLACK-STEEL PIPE.
- d) ASTM A 135 OR ASTM A 786/A 786M SCHEDULE 5 STEEL PIPE.

MECHANICAL SPECIFICATIONS (CONTINUED)

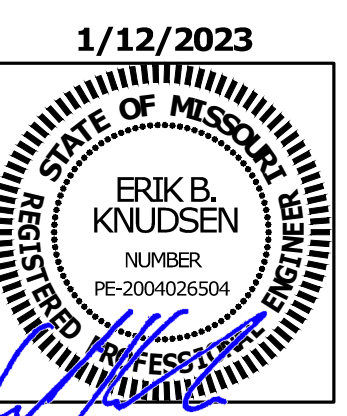
- F. FITTINGS:
- 1) CAST-IRON THREADED FITTINGS: ANSI B16.4, CLASS 125, STANDARD PATTERN, FOR THREADED JOINTS. THREADS SHALL CONFORM TO ANSI B1.20.1.
- 2) MALLEABLE-IRON THREADED FITTINGS: ANSI B16.3, CLASS 150, STANDARD PATTERN, FOR THREADED JOINTS. THREADS SHALL CONFORM TO ANSI B1.20.1.
- 3) STEEL FITTINGS: ASTM A 234, SEAMLESS OR WELDED, FOR WELDED JOINTS.
- 4) GROOVED MEDIUM-BORED END FITTINGS: ASTM A 856, GRADE 45-45-12, WITH IRON, ASTM A 47 GRADE 32510 MALLEABLE IRON, OR ASTM A83, TYPE F, E, OR S, GRADE B FABRICATED STEEL FITTINGS WITH GROOVES OR SHOULDERS DESIGNED TO ACCEPT GROOVED END COUPLINGS, IN ACCORDANCE WITH ITS LISTING.
- G. HANGERS AND SUPPORTS:
- 1) HANGERS, ANCHORS, AND SUPPORTS FOR FIRE PROTECTION PIPING AND EQUIPMENT SHALL BE IN ACCORDANCE WITH NFPA 13. HANGERS, ANCHORS, SUPPORTS, AND COMPONENTS SHALL BE LISTED BY UL AND ANY OTHER AGENCIES REQUIRED BY THE LOCAL FIRE AUTHORITIES AND THE OWNER'S INSURANCE CARRIER.
- H. AUTOMATIC SPRINKLERS:
- 1) SPRINKLER HEADS: TYPE AS INDICATED OR REQUIRED BY THE APPLICATION. UNLESS OTHERWISE REQUIRED, PROVIDE QUICK RESPONSE HEADS WITH NOMINAL 1/2 INCH DISCHARGE ORIFICE, FOR "LIGHT HAZARD" TEMPERATURE RANGE.
- 2) SPRINKLER HEADS SHALL BE OF THE FOLLOWING CONSTRUCTION, CONFIGURATIONS, AND FINISH FOR THE AREAS INDICATED:
- a) FINISHED AREAS: SEMI-RECESSED PENDANT, CHROME PLATED, CHROME ESCUTCHEON CUP.
- b) UNFINISHED AREAS: UPRIGHT, ROUGH BRASS.
- 3) FURNISH THREE EXTRA SPRINKLER HEADS OF EACH TYPE INCLUDED IN THE PROJECT, AND PROVIDE A SPRINKLER HEAD CABINET AND ANY SPECIAL KRENCHES TO REMOVE OR INSTALL SPRINKLER HEADS.
- 4) FURNISH QUICKSTOP TALON SPRINKLER TOOL, QUICKSTOP TALON SHALL STOP 1/2" AND 3/4" HEADS. THE TOOL SHALL FEATURE A FUSIBLE LINK TO RELEASE THE TOOL IF HEATED AND SHALL BE 100% WATER TIGHT UP TO 350 PSI.
- I. ALARM DEVICES:
- 1) WATER FLOW INDICATORS: VANE TYPE WATERFLOW DETECTOR, RATED TO 250 PSIG, DESIGNED FOR HORIZONTAL OR VERTICAL INSTALLATION, HAVE 2-SPDT CIRCUIT SWITCHES TO PROVIDE ISOLATED ALARM AND AUXILIARY CONTACTS, 1 AMPERE 125 VOLTS AC AND 0.25 AMPERE 24 VOLTS DC, COMPLETE WITH FACTORY SET FIELD ADJUSTABLE RETARD ELEMENT TO PREVENT FALSE SIGNALS, AND TAMPER-PROOF COVER WHICH SENDS A SIGNAL WHEN COVER IS REMOVED.
- 2) SUPERVISORY SWITCHES: SPST, NORMALLY CLOSED CONTACTS, DESIGNED TO SIGNAL VALVE IS IN OTHER THAN FULL OPEN POSITION.
- J. INSULATION AND DUCT LINING:
- A. ALL INSULATIONS AND ACCESSORIES SHALL HAVE A FIRE HAZARD CLASSIFICATION WITH A FLAME SPREAD RATINGS OF NOT OVER 25, A FUEL CONTRIBUTION RATING OF NOT OVER 50, AND A SMOKE DEVELOPED RATING OF NOT OVER 10, IN ACCORDANCE WITH NFPA.
- B. PIPE INSULATION - ABOVE GRADE:
- 1) THE PIPING INSULATION USED SHALL HAVE A THERMAL CONDUCTIVITY OF 0.21 BTU PER IN/H/FT/24HR/IN² OR LESS.
- 2) FIBERGLASS INSULATION WITH FACTORY APPLIED VAPOR BARRIER, ASJ JACKET, FACTORY APPLIED PRESSURE SEALING LONGITUDE LAP JOINT, NO STAPLES, ZEPSTON PREMOLDED PIPE FITTING COVERS. INSTALLATION SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
- 3) FLEXIBLE CLOSED CELL ELASTOMERIC THERMAL INSULATION, UNSUT OR PRESUT WITH PRESSURE SENSITIVE ADHESIVE SYSTEM FOR GLOUSE AND VAPOR SEALING, EQUAL TO ARMBONTEX AP ARMAFLEX OR ARMAFLEX 2000.
- 4) FOR NON CIRCULATING SYSTEMS, THE FIRST 5 FEET OF INLET AND OUTLET PIPING BETWEEN THE TANK AND THE HEAT TRAP (INCLUDING THE HEAT TRAP) MUST BE INSULATED.
- 5) FOR CIRCULATING SYSTEMS, ALL HOT WATER PIPING IN THE CIRCULATION LOOP MUST BE INSULATED AS SPECIFIED BELOW.
- 6) INSULATION SCHEDULE:
- a) DOMESTIC COLD WATER 1/2"
- b) DOMESTIC HOT WATER 1" FOR PIPING UP TO 1-1/4", 1-1/2" FOR PIPING 1-1/2" AND LARGER
- c) CONDENSATE DRAINS 3/4" FOR PIPING UP TO 1-1/4", 1" FOR PIPING 1-1/2" AND LARGER
- d) REFRIGERANT SUCTION 3/4" FOR PIPING UP TO 1-1/4", 1" FOR PIPING 1-1/2" AND LARGER
- e) HORIZONTAL STORM PIPE 1/2"
- f) ROOF DRAINS 1" INSULATION SHALL BE PROVIDED AT ROOF DRAIN BODY AND A MINIMUM OF 10' OF HORIZONTAL PIPING OR A MINIMUM OF 5' IF COMBINATION OF HORIZONTAL AND VERTICAL STORM PIPING DOWNSTREAM OF ROOF DRAIN BODY.
- G. EQUIPMENT INSULATION:
- 1) FLEXIBLE FIBERGLASS GLASS FIBER INSULATION, ASTM C 553, TYPE I, CLASS B-4, SEMI-RIGID BOARD, WITH FACTORY LAMINATED KRAFT ALUMINUM FOL (ALL SERVICE JACKET), VAPOR BARRIER, OVENS/CORNING PIPE AND TANK INSULATION.
- D. DUCTWORK: ACoustICAL INSULATION
- 1) DUCT LINING: 2 LEVEL THICKNESS AS SCHEDULED, AIR STREAM SIDE COATED, INSTALL PER SMACNA STANDARDS.
- a) DUCT LINING SCHEDULE:
- (1) RECTANGULAR SUPPLY DUCT 1/2": THROUGHOUT THE FIRST 10 FEET OF DUCT.
- (2) RETURN AIR DUCT 1/2": THROUGHOUT THE FIRST 10 FEET OF DUCT.
- E. DUCTWORK: THERMAL INSULATION
- 1) DUCT COVERING: 3/4" LEV OF, FIBERGLASS BLANKET WITH FACTORY APPLIED VAPOR BARRIER AND FACINGS, THICKNESS AS SCHEDULED, INSTALLATION IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
- a) DUCT COVERING SCHEDULE: MINIMUM R-6
- (1) ROUND SUPPLY DUCT 2"
- (2) RECTANGULAR SUPPLY DUCT 2"
- (3) RETURN AIR DUCT 2"
- (4) OUTDOOR AIR 2"
11. DUCTWORK:
- A. ALL DUCTWORK, UNLESS OTHERWISE INDICATED, SHALL BE FABRICATED FROM GALVANIZED SHEET STEEL CONFORMING WITH ASTM A137, WITH 90 DEGREE ELBOWS WITH DOUBLE WALL, STREAMLINE VANES.
- B. WHERE DUCTWORK IS INDICATED TO BE EXPOSED TO VIEW IN OCCUPIED SPACES, PROVIDE MATERIALS WHICH ARE FREE FROM DISCOLORATIONS AND OTHER DEFECTS, INCLUDING THOSE WHICH WOULD IMPAIR PAINTING.
- C. DUCTWORK, METAL GAUGES, REINFORCEMENTS, ETC. SHALL BE CONSTRUCTED IN ACCORDANCE WITH SMACNA "HVAC DUCT CONSTRUCTION STANDARDS", LATEST EDITION FOR A 2 INCH WATER VAPOR STATIC PRESSURE.
- 1) RECTANGULAR DUCT:
- a) ELBOWS, UNLESS INDICATED OTHERWISE SHALL BE CONSTRUCTED WITH CENTERLINE RADIUS OF NOT LESS THAN 15 DUCT WIDTH OR SQUARE ELBOW WITH DOUBLE WALL, STREAMLINE VANES.
- b) RETURN AIR ACoustICAL ELBOWS AND SOUND BOOTS SHALL BE A SQUARE ELBOW WITH NO TURNING VANES.
- c) SLOPES FOR TRANSITIONS OR OTHER CHANGES IN DIMENSIONS SHALL BE MINIMUM 1 TO 3.
- 2) ROUND DUCT:
- a) PROVIDE RADIUS TYPE FITTINGS FABRICATED OF MULTIPLE SECTIONS WITH MAXIMUM 15 DEGREE CHANGE OF DIRECTION PER SECTION. UNLESS SPECIFICALLY DETAIL OTHERWISE, USE 45 DEGREE LATERALS FOR BRANCH TAKEOFF CONNECTIONS. WHERE 90 DEGREE BRANCHES ARE INDICATED PROVIDE CONICAL TYPE TEES.
- b) SLOPES FOR TRANSITIONS OR OTHER CHANGES IN DIMENSIONS SHALL BE MINIMUM 1 TO 3.
- c) AS AN OPTION, PROVIDE FACTORY-FABRICATED DUCT AND FITTINGS, N LEV OF SHOP, FABRICATED DUCT AND FITTINGS.
- (1) ELBOWS: ONE PIECE CONSTRUCTION FOR 90 DEGREES AND 45 DEGREE ELBOWS 14" AND SMALLER, PROVIDE MULTIPLE GORE CONSTRUCTION FOR LARGER DIAMETERS WITH STANDING SEAM/CONFERENTIAL JOINT.
- (2) DIVIDED FLOW FITTINGS: 90 DEGREE TEES, CONSTRUCTED WITH SADDLE TAP SPOT WELDED AND BONDED TO DUCT FITTING BODY.
- d) ROUND LONGITUDINAL BEAM DUCT: USE FOR RIGID METAL DUCT ON LEAVING SIDE OF DUCT IN CONCEALED LOCATIONS FOR EXTENSION TO FLEX FOR DIFFUSERS, UNLESS OTHERWISE INDICATED.
- D. DUCT SIZES SHOWN ON THE DRAWINGS ARE SHEETMETAL SIZES, ALLOWANCE FOR DUCT LINER HAS BEEN MADE WHERE APPLICABLE.
- E. INSTALLATION OF METAL DUCTWORK:
- 1) GENERAL: ASSEMBLE AND INSTALL DUCTWORK IN ACCORDANCE WITH RECOGNIZED INDUSTRY PRACTICES WHICH WILL ACHIEVE AIR-TIGHT SYSTEMS (MAXIMUM 5% LEAKAGE) WITH MINIMUM OBJECTABLE NOISE, AND CAPABLE OF PERFORMING INDICATED SERVICE. INSTALL EACH RUN WITH MINIMUM NUMBER OF JOINTS. ALIGN DUCTWORK ACCURATELY WITH INTERNAL SURFACES. SMOOTH, SUPPORT DUCTS REGULARLY WITH SUITABLE STRAPS, BRACES, HANGERS AND ANCHORS IN ACCORDANCE WITH SMACNA "HVAC DUCT CONSTRUCTION STANDARDS", LATEST EDITION. DUCT HANGERS SHALL BE OF THE TYPE WHICH WILL HOLD DUCT TRUE TO TRUE-TO-SHAPE AND TO PREVENT BUCKLING. SUPPORT VERTICAL DUCTS AT EVERY FLOOR.
- 2) AUXILIARY STEEL: PROVIDE AUXILIARY STEEL AS REQUIRED TO ADEQUATELY SUPPORT DUCTWORK.
- 3) ROUTING: LOCATE DUCTWORK RUNS, EXCEPT AS OTHERWISE INDICATED, VERTICALLY AND HORIZONTALLY AND AVOID DIAGONAL RUNS WHEREVER POSSIBLE. LOCATE RUNS AS INDICATED BY DIAGRAMS, DETAILS AND PERMANENT ENCLOSURE ELEMENTS OF BUILDING, WHEREVER POSSIBLE IN FINISHED AND OCCUPIED SPACES, CONCEAL DUCTWORK FROM VIEW BY LOCATING IN MECHANICAL SHUTTLER, CONCEAL DUCTWORK ABOVE SUSPENDED CEILING, DO NOT ENCASE HORIZONTAL RUNS IN SOLID PARTITIONS, EXCEPT AS SPECIFICALLY SHOWN. COORDINATE LAYOUT WITH SUSPENDED CEILINGS AND LIGHTING LAYOUTS AND SIMILAR FINISHED WORK.
- 4) DO NOT ROUTE DUCTWORK THROUGH ELECTRICAL EQUIPMENT SPACES AND ENCLOSURES, UNLESS INDICATED OTHERWISE.
- 5) PENETRATIONS:
- a) WHERE DUCTS PASS THROUGH INTERIOR PARTITIONS OR EXTERIOR WALLS, AND ARE EXPOSED TO VIEW, CONCEAL SPACE BETWEEN OPENING AND DUCT OR DUCT INSULATION WITH SHEET METAL FLANGES OF SAME GAGE AND DUCT OVERLAP OPENING ON 4 SIDES BY AT LEAST 1-1/2" BETWEEN DUCT AND WALL.
- b) WHERE DUCTS PASS THROUGH FIRE-RATED FLOORS, WALLS, OR PARTITIONS, PROVIDE FIRESTOPPING BETWEEN DUCT AND WALL.
- 6) COORDINATION: COORDINATE DUCT INSTALLATIONS WITH INSTALLATION OF ACCESSORIES, DAMPERS, COLL TRAVEL, EXHAUST, CONTROLS, AND OTHER ASSOCIATED WORK OF THE DUCTWORK SYSTEM.
- 7) INSTALLATION: INSTALL METAL DUCTWORK IN ACCORDANCE WITH SMACNA "HVAC DUCT CONSTRUCTION STANDARDS", LATEST EDITION.

MECHANICAL SPECIFICATIONS (CONTINUED)

- F. EQUIPMENT CONNECTIONS:
- 1) CONNECT METAL DUCTWORK TO EQUIPMENT AS INDICATED, PROVIDE FLEXIBLE CONNECTION FOR EACH DUCTWORK CONNECTION TO EQUIPMENT MOUNTED ON VIBRATION ISOLATORS, AND/OR EQUIPMENT CONTAINING ROTATING MACHINERY. PROVIDE ACCESS DOORS AS REQUIRED.
6. SEAL ALL CONCEALED DUCTWORK JOINTS WITH NON-HARDENING, NON-MIGRATING MASTIC SEALANT, AS RECOMMENDED FOR USE IN DUCTWORK. GUL BASE GASKETING AND GLASS GASKETING COMPOUNDS SHALL NOT BE ACCEPTABLE. DUCTS SHALL BE SEALED TO THE GLASS LEVEL LISTED BELOW.
- | UNCONDITIONED SPACES | CLASS B | CLASS A | CLASS C | CLASS B |
|--------------------------------|------------------|------------------|---------|---------|
| 2) CONDITIONED SPACES (PLENUM) | CLASS B | CLASS A | CLASS B | CLASS C |
| | SUPPLY 1/2" W.G. | SUPPLY 1/2" W.G. | EXHAUST | RETURN |
12. FLEXIBLE DUCT:
- A. ATCO 1026 (R-6), OR EQUAL.
- B. FACTORY APPLIED INSULATION AND VAPOR BARRIER, 1-1/2" THICK.
- C. MAXIMUM LENGTH OF 5'-0".
13. FLUES AND ACCESSORIES:
- A. FLUE FOR GAS FIRED CONDENSING WATER HEATER OR FURNACE SHALL BE AS RECOMMENDED BY THE GAS APPLIANCE MANUFACTURER. FLUES SHALL BE SCHEDULE 40, PVC OR CPVC PIPE PER THE MANUFACTURER'S INSTALLATION REQUIREMENTS.
- B. PROVIDE MANUFACTURER'S STANDARD ACCESSORY ITEMS INCLUDING BIRD PROOF TOP, STORM COLLAR, ROOF THIMBLE, ETC. AS REQUIRED FOR A COMPLETE INSTALLATION. ROOF THIMBLES THROUGH THE BUILDING ROOF SHALL BE SUITABLE FOR USE WITH THE ROOF PROVIDED.
14. EXHAUST FANS:
- A. CENTRIFUGAL TYPE FAN WITH CHARACTERISTICS AND CAPACITY AS SCHEDULED, ELECTRICALLY POWERED, SUITABLE FOR MOUNTING ON ROOF CURB, DIRECT OR BELT DRIVEN, HEAVY GAUGE BRUN-ALUMINUM WEATHERPROOF HOUSINGS OF THE HOODED DOWN OR UP/BLAST TYPE. PROVIDE PERMANENT SPLIT, CAPACITOR TYPE MOTOR FOR DIRECT DRIVEN FANS, AND CAPACITOR-START, INDUCTION-RUN TYPE MOTOR FOR BELT DRIVEN FANS.
- B. CENTRIFUGAL CELLULOSE EXHAUSTERS SHALL BE ELECTRICALLY POWERED CENTRIFUGAL TYPE FAN SUITABLE FOR MOUNTING IN THE CEILING WITH A PERFORATED OFF-WHITE METAL GRILLE WITH A THUMBSCREW ATTACHMENT FOR EASY ACCESS TO FAN HOUSING. UNIT SHALL CONSIST OF A GALVANIZED STEEL HOUSING LINED WITH ACoustICAL INSULATION, AN INTEGRAL BAGGAPPAIT DAMPER ON FAN DISCHARGE, MOTOR SHALL BE A PERMANENT SPLIT-CAPACITOR TYPE MOTOR, PERMANENTLY LUBRICATED, WITH THERMAL OVERLOAD PROTECTION. PROVIDE DISCONNECT SWITCH OR OTHER MEANS OF DISCONNECT AT MOTOR IN FAN HOUSING.
15. FURNACE AND CONDENSING UNIT:
- A. CONDENSING FURNACES:
- 1) GAS FIRED FURNACE SHALL BE FACTORY ASSEMBLED, PRE-WIRED UNIT CONSISTING OF SHEETMETAL CASING, SUPPLY FAN, GAS FIRED HEAT EXCHANGER, AND CONTROLS. CAPACITY SHALL BE AS SCHEDULED.
- 2) THE PRIMARY HEAT EXCHANGER SHALL BE ALUMINIZED STEEL CONSTRUCTION WITH A STAINLESS STEEL SECONDARY HEAT EXCHANGER.
- 3) THE FURNACE SHALL BE OF THE CONDENSING TYPE, UTILIZING A SEALED COMBUSTION CHAMBER. UNIT SHALL INCLUDE FINNED CAST IRON HEAT EXCHANGER, ALUMINIZED STEEL EXHAUST DISCONNECT SECTION, AND FINNED STAINLESS STEEL TUBE CONDENSER SECTION.
- 4) THE UNIT SHALL BE EQUIPPED WITH THE MANUFACTURER'S STANDARD CONTROLS INCLUDING 24VOLT CONTROL TRANSFORMER, AUTOMATIC SPARK IGNITER, AUTOMATIC GAS VALVE TRIM, HIGH TEMPERATURE LIMIT SWITCH, AND FAN TIME DELAY RELAY.
- 5) RETURN AIR INLET ON UNIT SHALL BE PROVIDED WITH A 1" THROUGHWAY TYPE FILTER AND SLIDE IN FRAME, MOUNTED ON THE UNIT.
- 6) FAN SHALL BE A DIRECT DRIVE MULTI-SPEED BLOWER, RESISTENTLY MOUNTED IN THE CASING. MOTOR SHALL BE PROVIDED WITH AUTOMATIC THERMAL OVERLOAD PROTECTION.
- 7) FURNACE SHALL BE AS A SPECIFIED.
- B. CONDENSING UNIT SHALL BE FACTORY-ASSEMBLED AND TESTED AIR-COOLED CONDENSING UNIT, CONSISTING OF COMPRESSOR, CONDENSER COIL, FAN MOTOR, REFRIGERANT RESERVOIR, OPERATING CONTROLS, ETC. CAPACITY AND ELECTRICAL CHARACTERISTICS SHALL BE AS SCHEDULED.
- 1) COMPRESSOR: HERMETICALLY SEALED WITH BUILT-IN OVERLOADS AND VIBRATION ISOLATION. COMPRESSOR MOTOR, SHAFT, AND INLET WITH SENSITIVE OVERLOAD DEVICES, INTERNAL HIGH-PRESSURE PROTECTION, HIGH AND LOW PRESSURE CUTOFF SWITCHES, START CAPACITOR AND RELAY, 3-PHASE CONTACTOR, CRANKCASE HEATER, AND TEMPERATURE ACTUATED SWITCH AND THERM TO PREVENT COMPRESSOR RAPID CYCLING.
- 2) COIL SHALL BE COPPER TUBING WITH ALUMINUM FINS, COMPLETE WITH LIQUID ACCUMULATOR AND LIQUID SUBCOOLER. UNIT SHALL INCLUDE FILTER DRYER, SIGHT GLASS, COMPRESSOR SERVICE VALVE, LIQUID LINE SERVICE VALVE, AND REFRIGERANT PIPING EXTENDED TO EXTERIOR OF CASING.
16. CONTROL WIRING:
- A. ELECTRICAL WIRING AND WIRING CONNECTIONS REQUIRED FOR THE INSTALLATION OF THE TEMPERATURE CONTROL SYSTEM, SHALL BE PROVIDED BY THIS CONTRACTOR, UNLESS SPECIFICALLY SHOWN ON THE ELECTRICAL DRAWINGS OR SPECIFICATIONS.
- B. INSTALL CONTROL WIRING, WITHOUT SPLICES BETWEEN TERMINAL POINTS, COLOR CODED, INSTALL IN NEAT WORKMANLIKE MANNER, SECURELY FASTENED. INSTALL IN ACCORDANCE WITH NATIONAL ELECTRICAL CODE AND THE ELECTRICAL SPECIFICATIONS.
- 1) INSTALL CIRCUITS OVER 25 VOLT WITH COLOR CODED NUMBER 12 WIRE.
- 2) INSTALL CIRCUITS UNDER 25 VOLT WITH COLOR CODED NUMBER 18 WIRE WITH 0.023 INCH HIGH TEMPERATURE 105 DEGREES F PLASTIC INSULATION ON EACH CONDUCTOR AND PLASTIC SHEATH OVER ALL.
- 3) INSTALL ELECTRONIC CIRCUITS WITH COLOR CODED NUMBER 22 WIRE WITH 0.023 INCH POLYETHYLENE INSULATION ON EACH CONDUCTOR WITH PLASTIC JACKETED COPPER SHEATH OVER ALL.
- 4) INSTALL LOW VOLTAGE CIRCUITS, LOCATED IN CONCRETE SLABS AND MASONRY WALLS, OR EXPOSED IN OCCUPIED AREAS, IN CONSTRUCTION CONDUIT.
- 5) ALL WIRING IN AREAS USED AS AIR PLenums SHALL BE IN ELECTRIC CONDUIT EXCEPT THAT LOW VOLTAGE WIRING MAY BE TEFLON COATED, ALUMINUM SHIELDED CABLE OR OTHER WIRE SPECIFICALLY APPROVED FOR INSTALLATION IN AIR PLenums, WHERE ACCEPTED BY LOCAL CODES.
- 6) ALL WIRING IN AREAS NOT USED FOR AIR MOVEMENT SHALL BE IN ELECTRIC METALLIC TUBING EXCEPT LOW VOLTAGE WIRING MAY BE IN APPROVED SIGNAL CABLE WHERE ACCEPTED BY LOCAL CODES.
- C. THERMOSTATIC CONTROLS TO HAVE A 5°F DEADBAND AND SETPOINT OVERLAP RESTRICTIONS.
- 1) TEMPERATURE CONTROLS SETBACK TO BE 55°F (HEAT) AND 55° (COOL), 2-HOUR OCCUPANT OVERRIDE, 10-HOUR BACKUP.



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LEE'S SUMMIT, MO



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ASSOCIATES

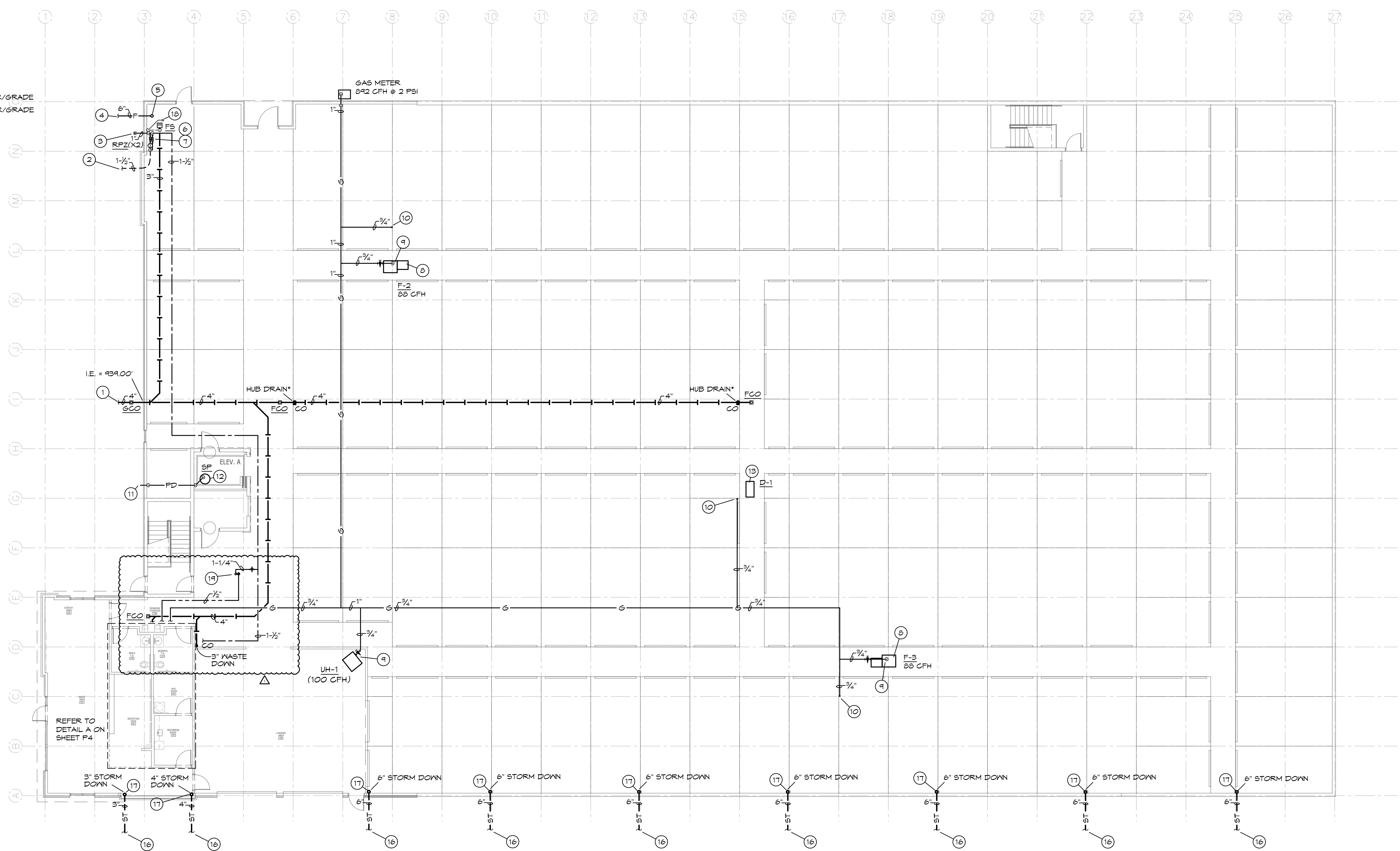
1100 Rhode Island
Lawrence, Kansas
66044
785 - 749 - 5806
FAX 785 - 749 - 1515

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Drawn by: DS/LC
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P1

PLUMBING SYMBOLS

- SOIL AND WASTE PIPING BELOW FLOOR/GRADE
- SOIL AND WASTE PIPING ABOVE FLOOR/GRADE
- SANITARY VENT PIPING ABOVE GRADE
- SANITARY VENT PIPING BELOW GRADE
- DOMESTIC COLD WATER PIPING
- DOMESTIC HOT WATER PIPING
- GAS PIPING
- FIRE LINE
- PIPING TURNING DOWN
- PIPING TURNING UP
- TEE TOP CONNECTION
- UNION
- BACKFLOW PREVENTER
- FLOOR DRAIN
- FLOOR CLEAN OUT
- WALL CLEAN OUT
- GRADE CLEAN OUT
- VALVE
- PRESSURE REGULATOR
- CHECK VALVE
- I.E. INVERT ELEVATION OF PIPE
- MATCH MARKS ON PLUMBING RISER DIAGRAM



PLUMBING 1ST FLOOR PLAN
SCALE: 3/32" = 1'-0"
F.F.E. = 942.00'

PLUMBING PLAN NOTES:

- SEE CIVIL PLAN FOR CONTINUATION OF 4" SANITARY SEWER. MAINTAIN MIN 30" COVER.
- SEE CIVIL PLAN FOR CONTINUATION OF 1-1/2" DOMESTIC C.W. MAINTAIN MIN 48" COVER.
- STUB OUT 1" LINE AND CAP FOR FUTURE CONNECTION BY IRRIGATION CONTRACTOR.
- 6" FIRE LINE, SEE CIVIL PLANS FOR CONTINUATION. MAINTAIN A MINIMUM 48" BURY FOR FREEZE PROTECTION.
- 6" FIRE LINE THRU FLOOR. PROVIDE DOUBLE CHECK VALVE ASSEMBLY (DCVA) AND THE MAIN DRAIN VENTED TO DAYLIGHT. SEAL EXTERIOR WALL PENETRATION WEATHER TIGHT AS REQUIRED. COORDINATE WITH SPRINKLER CONTRACTOR FOR PROPER INSTALLATION. COORDINATE WITH WATER DEPARTMENT FOR SERVICE FLUSHING REQUIREMENTS. CAP LINE FOR FUTURE CONTINUATION BY SPRINKLER CONTRACTOR.
- PROVIDE 1-1/2" DOMESTIC RPZ BACKFLOW PREVENTER AND INSTALL 24" A.F.F. & 6" FROM WALL. ROUTE DRAIN FROM RPZ BFP TO FLOOR SINK WITH AN AIR GAP.
- PROVIDE 1" DEDUCT METER AND 1" IRRIGATION RPZ BACKFLOW PREVENTER AND INSTALL BELOW DOMESTIC BACKFLOW. ROUTE DRAIN FROM RPZ BFP TO FLOOR DRAIN WITH AIR GAP.
- CONNECT CONDENSATE TO FURNACE FLUE AND COIL AS REQUIRED AND AS DETAILED. ROUTE TO NEAREST DRAIN WITH AIR GAP OR TO DAYLIGHT.

PLUMBING PLAN NOTES (CONTINUED):

- CONNECT GAS TO EQUIPMENT AS REQUIRED AND AS DETAILED.
- ROUTE 3/4" GAS PIPING UP TO FLOOR ABOVE. SEE SHEET P2 FOR CONTINUATION.
- 2" PUMP DISCHARGE TO DAYLIGHT. SEAL PENETRATION WEATHERTIGHT.
- IN THE EVENT OF A RELEASE OF ANY QUANTITY OF HYDRAULIC FLUID OR OTHER FLUIDS PROHIBITED FROM DISCHARGE, THE RELEASED MATERIAL SHOULD BE IMMEDIATELY CONTAINED, CAPTURED AND DISPOSED OF AT AN EPA-APPROVED TREATMENT STORAGE AND DISPOSAL FACILITY.
- CONNECT CONDENSATE TO DEHUMIDIFIER AS REQUIRED AND AS DETAILED. ROUTE TO NEAREST DRAIN WITH AIR GAP OR TO DAYLIGHT.
- SEE CIVIL PLAN FOR CONTINUATION OF STORM PIPING. MAINTAIN MIN 24" COVER.
- INSTALL CLEANOUT AT BASE OF RISER.
- SEE CIVIL PLAN FOR CONTINUATION OF STORM PIPING. MAINTAIN MIN 24" COVER.
- INSTALL CLEANOUT AT BASE OF RISER.
- ROUTE 2" VENT PIPING UP TO FLOOR ABOVE. REFER TO SHEET P2 FOR CONTINUATION.
- ROUTE 1-1/4" CW & 1/2" HW PIPING UP TO FLOOR ABOVE. REFER TO SHEET P2 FOR CONTINUATION.

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MISSOURI PE COA #2009003629
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BC ENGINEERS
INCORPORATED
5720 Reeder Shawnee, KS 66203 (913)262-1772



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4101 NE PORT DRIVE
LEE'S SUMMIT, MO

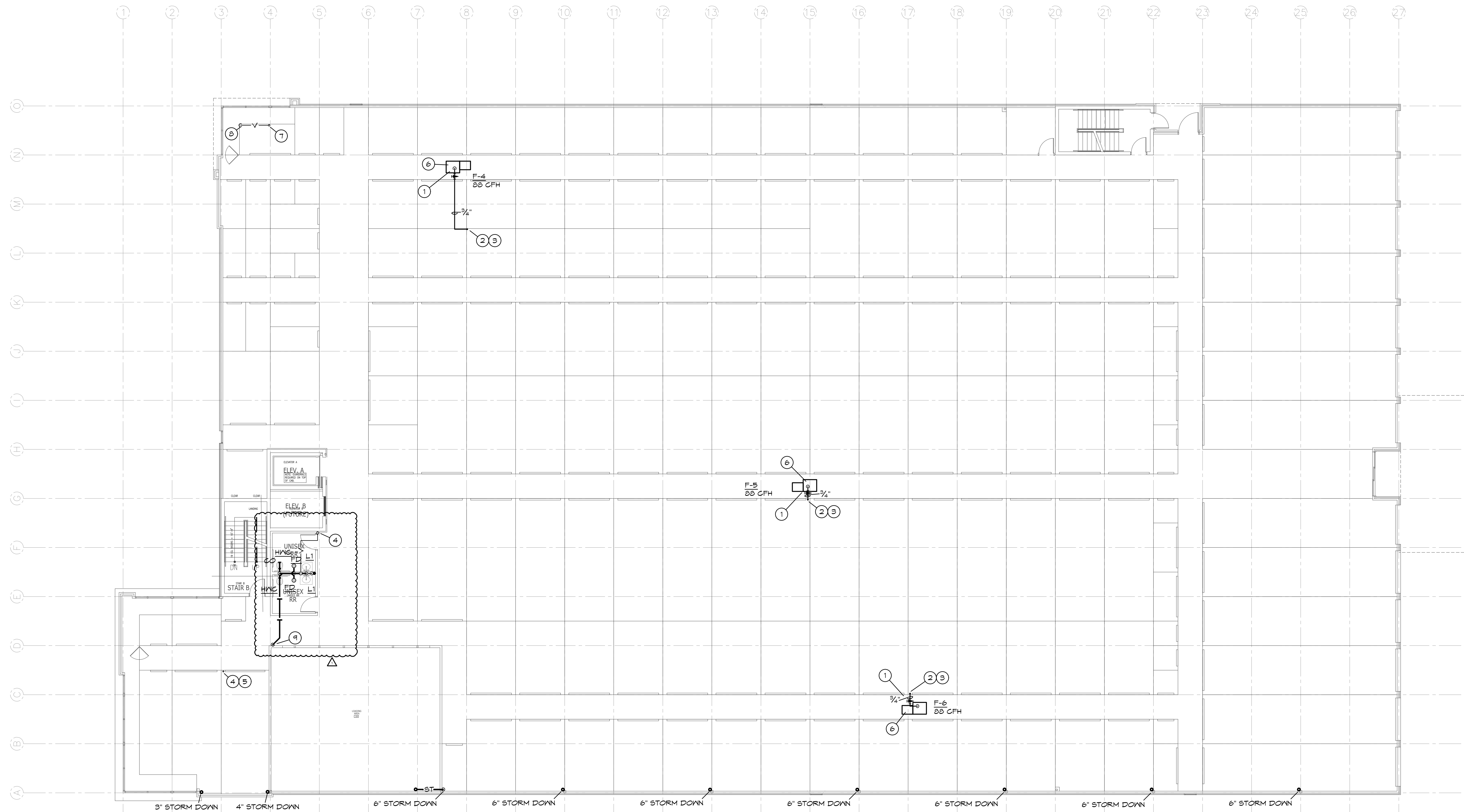


Hernly
ASSOCIATES

1100 Rhode Island
Lawrence, Kansas
66044
785 - 749 - 5806
FAX 785 - 749 - 1515

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Revisions: 1 2023/1/12

P2



PLUMBING 2ND FLOOR PLAN
SCALE: 3/32" = 1'-0"
NORTH

PLUMBING PLAN NOTES:

- ① CONNECT GAS TO EQUIPMENT AS REQUIRED AND AS DETAILED.
- ② ROUTE 3/4" GAS PIPING UP FROM FLOOR BELOW. REFER TO SHEET P1 FOR CONTINUATION.
- ③ ROUTE 3/4" GAS PIPING UP TO FLOOR ABOVE. REFER TO SHEET P3 FOR CONTINUATION.
- ④ ROUTE 3" VENT PIPING UP TO FLOOR ABOVE. REFER TO SHEET P3 FOR CONTINUATION.
- ⑤ ROUTE 3" VENT PIPING UP FROM FLOOR BELOW. REFER TO SHEET P1 FOR CONTINUATION.
- ⑥ CONNECT CONDENSATE TO FURNACE FLUE AND COIL AS REQUIRED AND AS DETAILED. ROUTE TO NEAREST DRAIN WITH AIR GAP OR TO DAYLIGHT.
- ⑦ ROUTE 2" VENT PIPING UP TO FLOOR ABOVE. REFER TO SHEET P3 FOR CONTINUATION.
- ⑧ ROUTE 2" VENT PIPING UP FROM FLOOR BELOW. REFER TO SHEET P1 FOR CONTINUATION.
- ⑨ ROUTE 3" WASTE PIPING DOWN TO FLOOR BELOW. REFER TO SHEET P1 FOR CONTINUATION.

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5720 Reeder Shawnee, KS 66203 (913)262-1772



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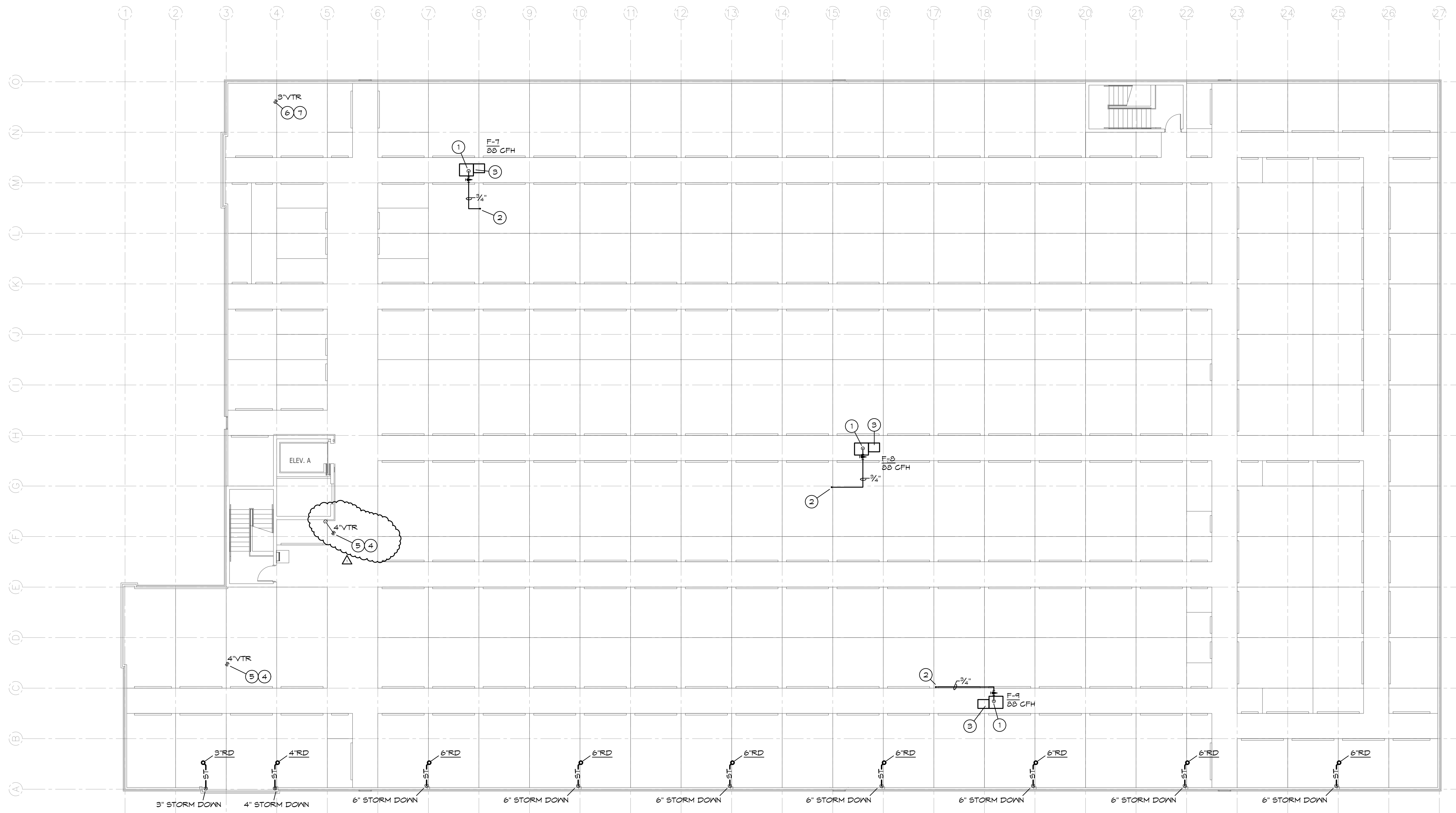


Hernly
ASSOCIATES

1100 Rhode Island
Lawrence, Kansas
66044
785 - 749 - 5806
FAX 785 - 749 - 1515

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Revisions: 1 2023/1/12

P3



 **PLUMBING 3RD FLOOR PLAN**
SCALE: 3/32" = 1'-0"

PLUMBING PLAN NOTES:

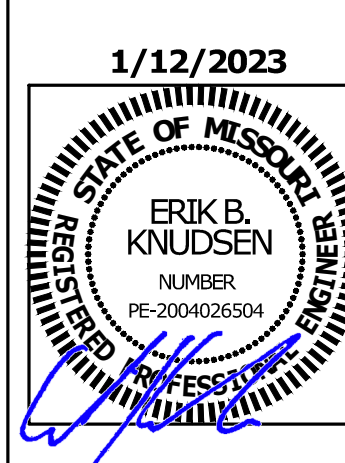
- 1 CONNECT GAS TO EQUIPMENT AS REQUIRED AND AS DETAILED.
- 2 ROUTE 3/4" GAS PIPING UP FROM FLOOR BELOW. REFER TO SHEET P2 FOR CONTINUATION.
- 3 CONNECT CONDENSATE TO FURNACE FLUE AND COIL AS REQUIRED AND AS DETAILED. ROUTE TO NEAREST DRAIN WITH AIR GAP OR TO DAYLIGHT.
- 4 ROUTE 3" VENT PIPING UP FROM FLOOR BELOW. REFER TO SHEET P2 FOR CONTINUATION.
- 5 LOCATION OF 4" VTR. VERIFY 10' CLEARANCE FROM ALL OUTDOOR AIR INTAKES. SEAL PENETRATION WEATHERTIGHT.
- 6 ROUTE 2" VENT PIPING UP FROM FLOOR BELOW. REFER TO SHEET P2 FOR CONTINUATION.
- 7 LOCATION OF 3" VTR. VERIFY 10' CLEARANCE FROM ALL OUTDOOR AIR INTAKES. SEAL PENETRATION WEATHERTIGHT.

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MISSOURI PE COA #2009003629
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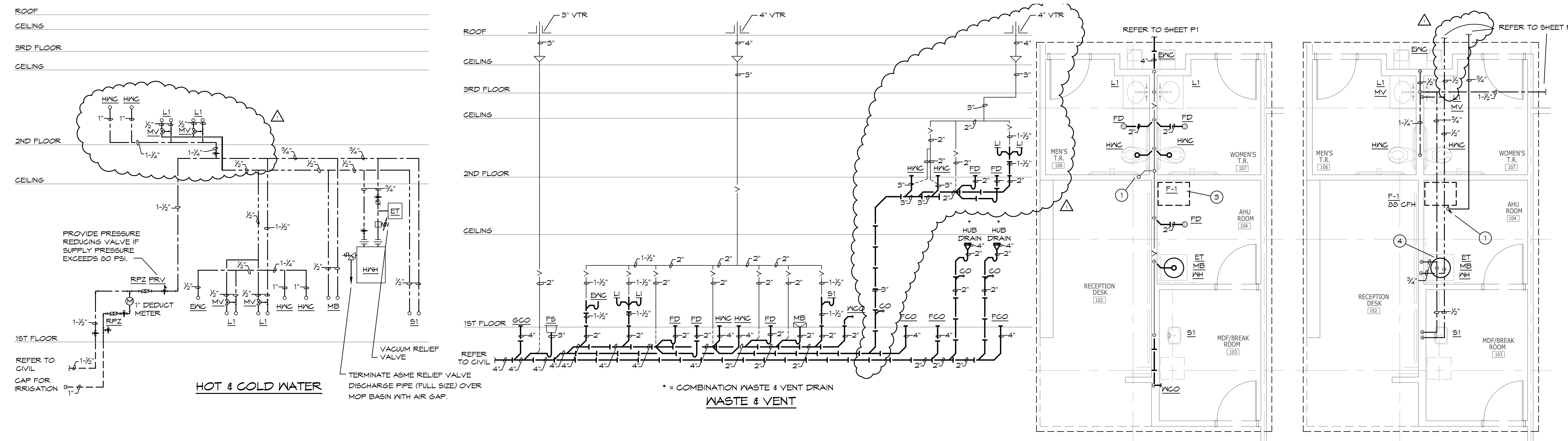


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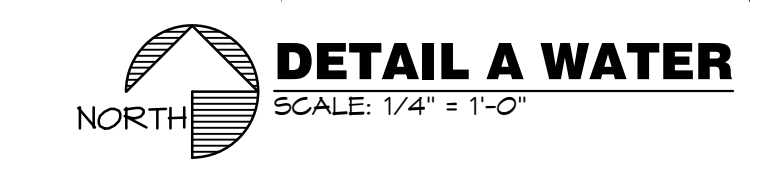
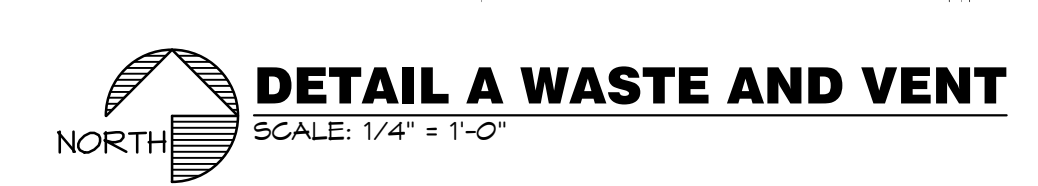
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Revisions: 2023/1/2

P4



PLUMBING RISER DIAGRAMS
SCALE: NONE



- PLUMBING PLAN NOTES:**
- ROUTE 3" VENT PIPING UP TO FLOOR ABOVE. SEE SHEET P2 FOR CONTINUATION.
 - CONNECT GAS TO EQUIPMENT AS REQUIRED AND AS DETAILED.
 - CONNECT CONDENSATE TO FURNACE FLUE AND COIL AS REQUIRED AND AS DETAILED. ROUTE TO FLOOR DRAIN WITH AIR GAP.
 - MOUNT WATER HEATER ABOVE MOP BASIN AND SUPPORT AS REQUIRED.

PLUMBING FIXTURE SCHEDULE: (OR EQUAL)

HWC	WATER CLOSET (HANDICAPPED): TOTO, #CT10BELN, VITREOUS CHINA, FLOOR MOUNTED, FLOOR OUTLET, 11-1/2" HIGH ELONGATED BOWL, SIFON-JET ACTION, #MTILN-32 FLUSH VALVE, 1.28 GAL/FLUSH, #SCB34 WHITE OPEN FRONT ELONGATED SEAT WITH CHECK HINGE. HANDLE ON WIDE SIDE OF FIXTURE.
L1	HANDICAP LAVATORY, WALL HUNG: TOTO #LT307, 20"x 18", VITREOUS CHINA FRONT OVERFLOW, EQUIPMENT SUPPLIER PROVIDED FAUCET, OFFSET GRID ELBOW DRAIN AND 1-1/4" TAILPIECE, CHROME PLATED CAST BRASS P-TRAP WITH CLEANOUT (MOUNTED PARALLEL WITH WALL), CHROME PLATED LOOSE KEY ANGLE STOPS AND RISERS, FLOOR MOUNTED CONCEALED ARM LAVATORY SUPPORT, INSULATE EXPOSED DRAIN, WATER SUPPLIES, AND VALVES WITH PROWRAP SEAMLESS MOLDED CLOSED CELL VINYL INSULATION.
ENC	ELECTRIC WATER COOLER: ELKAY, #EZSTL8C, BARRIER FREE TWO-STATION WATER COOLER, 8.0 GPH, 50 DEGREES F WATER WITH 90 DEGREES F AIR TEMPERATURE, 120 VOLT, COLOR TO BE SELECTED BY ARCHITECT AFTER AWARD OF CONTRACT, FRONT AND SIDE PUSH BARS, CHROME PLATED CAST BRASS F-TRAP WITH CLEANOUT, CHROME PLATED LOOSE KEY ANGLE STOP AND FLOOR MOUNTED CARRIER.
FD	FLOOR DRAIN: SIOUX CHIEF, #842, PVC FLOOR DRAIN WITH ADJUSTABLE TOP AND CAST BRASS STRAINER, PROVIDE SURE SEAL PRE-ASSEMBLED INLINE FLOOR DRAIN TRAP SEALER, FLOOR RATING ASSE - 1012 AF-GN.
WH	HOT WATER HEATER: RHEEM #E6SF20, 20 GALLON STORAGE, 208 VOLT, 1 PHASE, 4500 WATT ELEMENT, ASME TEMPERATURE AND PRESSURE RELIEF VALVE. SET TO 130°F.
ET	HOT WATER EXPANSION TANK: AMTROL, #ST-5, 2 GALLON EXPANSION TANK WITH DIAPHRAGM.
MV	MIXING VALVE: MATTS, #LFUS6-B, THERMOSTATIC CONTROLLED MIXING VALVE, LEAD FREE BRONZE BODY, LOCKED TEMPERATURE ADJUSTMENT GAP (VANDAL RESISTANT), COPPER ENCAPSULATED THERMOSTAT ASSEMBLY WITH BRASS SHUTTLE, STAINLESSSTEEL SPRINGS, INTEGRAL CHECK VALVES ON HOT AND COLD INLETS. (SET TO 110°F). ASSE 1070 LISTED.
RPZ	REDUCED ZONE PRESSURE BACKFLOW PREVENTOR: MATTS #LF009, LEAD FREE BRONZE BODY CONSTRUCTION, TWO, IN-LINE INDEPENDENT CHECK VALVES, REPLACEABLE CHECK SEATS WITH AN INTERMEDIATE RELIEF VALVE, AND BALL VALVE TEST COCKS.
SP	SUBVERSIBLE SUMP PUMP: ZOELLER, #1188, 100 GPM @ 42 FT HEAD, 1/2 HP, 200 VOLT, 16.9 AMPS, 3450 RPM, FLOAT SWITCH, 20' CORD WITH PLUG AND CHECK VALVE, PROVIDE SIMPLEX OIL GUARD PANEL, OIL SMART LIQUID ALARM SWITCH, 115 VOLT, 30 AMP MOTOR START RELAY, TOP MOUNTED ALARM BEACON LIGHT, ALARM HORN. PUMP TO BE LOCATED IN SUMP PIT AS DEFINED BY ARCHITECT.
MB	MOP BASIN: FIAT, #M5B-2424, MOLDED STONE MOP BASIN, 2" DRAIN, 24"x 24" BASIN, VINYL BUMPER GUARD, STERN WILLIAMS #T-10-VB FAUCET, SPRINGS CHECKS, VACUUM BREAKER, INTEGRAL STOPS, WALL BRACE & PAIL HOOK, WALL BRACKET WITH 30" HOSE.
FS	FLOOR SINK: SIOUX CHIEF, #861 SQUARE PVC FLOOR SINK WITH STAINLESS STEEL MESH DEBRIS SCREEN, PVC HALF OPEN STRAINER.

PIPE HANGER SCHEDULE		
PIPE MATERIAL	MAXIMUM HANGER SPACING	HANGER ROD DIAMETER
ABS (All sizes)	4'	3/8"
PVC (All Sizes)	4'	3/8"
CPVC, 1 inch and smaller	3'	1/2"
CPVC, 1-1/4 inches and larger	4'	1/2"
Cast Iron (All Sizes)	5'	5/8"
Cast Iron (All Sizes) with 10 foot length of pipe	10'	5/8"
Copper Tube, 1-1/4 inches and smaller	6'	1/2"
Copper Tube, 1-1/2 inches and larger	10'	1/2"
Steel, 3 inches and smaller	12'	1/2"
Steel, 4 inches and larger	12'	5/8"
Pex, 1" and below without support channel	32"	3/8"
Pex, 1-1/4" and above without support channel	48"	3/8"
Pex 3/4" and below with support channel	6'	3/8"
Pex 1" and above with support channel	8'	3/8"

PLUMBING FIXTURE WATER COUNT							
FIXTURE	QUANTITY	CW FU	CW TOTAL FU	HW FU	TOTAL FU	COMBINED FU	COMBINED TOTAL FU
WATER CLOSETS	2	10	20	0	0	10	20
SINKS	1	2.25	2.25	2.25	2.25	3	3
LAVATORIES	2	1.5	3	1.5	3	2	4
ELECTRIC WATER COOLER	2	0.25	0.5	0	0	0.25	0.5
MOP BASIN	1	2.25	2.25	2.25	2.25	3	3
		20 FU		7.5 FU			30.5 FU
COLD WATER MAIN - 1-1/2" HOT WATER MAIN - 1"							

PLUMBING FIXTURE BRANCH PIPING SCHEDULE				
FIXTURE	WASTE	VENT	CW	HW
WATER CLOSET (FLUSH VALVE)	4"	2"	1"	--
LAVATORY	1-1/4"	1-1/4"	1/2"	1/2"
FLOOR DRAIN	2"x3"	2"	--	--
ELECTRIC WATER COOLER	1-1/2"	1-1/2"	1/2"	--
MOP BASIN	2"	2"	1/2"	1/2"

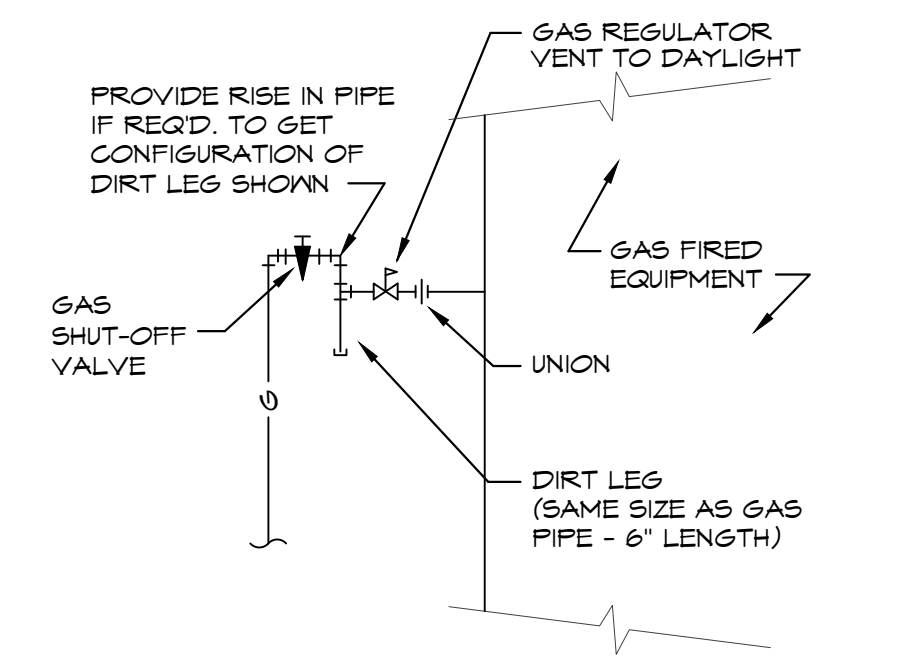
NOTE: INDIVIDUAL VENTS FOR FIXTURES ON PLANS AND RISER DIAGRAMS HAVE BEEN INCREASED WHERE HORIZONTAL VENT LENGTH IS IN EXCESS OF THE MAXIMUM DISTANCE INDICATED BY THE CODE.

PEX PIPING REQUIREMENTS

PIPE SIZES GIVEN ON THE DRAWINGS ARE NOMINAL COPPER PIPE SIZE. IF PEX PIPING IS USED, INCREASE PEX PIPING ONE SIZE ABOVE LISTED SIZES AS REQUIRED TO EQUAL OR EXCEED COPPER PIPE INSIDE DIAMETER.

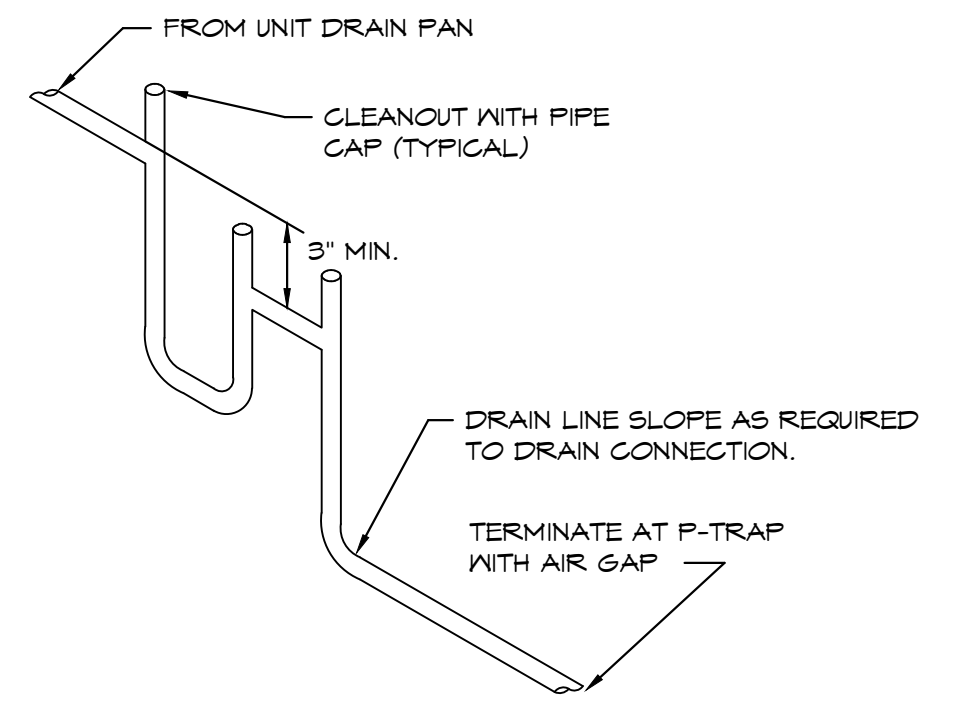
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GAS PRESSURE REGULATORS FOR FURNACES AND MAKE-UP AIR UNITS (MAU) SHALL BE SENSUS #143-80-2, 2 PSI INLET / 1" WC OUTLET PRESSURE WITH THE ORIFICE & SPRING SIZE AS RECOMMENDED BY THE MANUFACTURER.

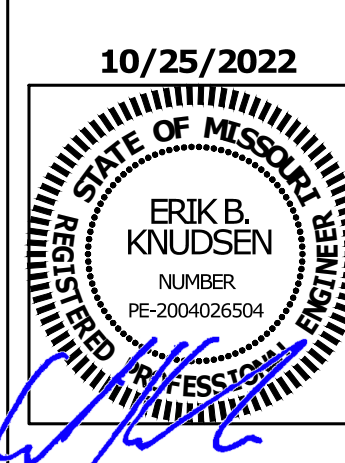
GAS CONNECTION DETAIL
SCALE: NONE



CONDENSATE DRAIN DETAIL
SCALE: NONE



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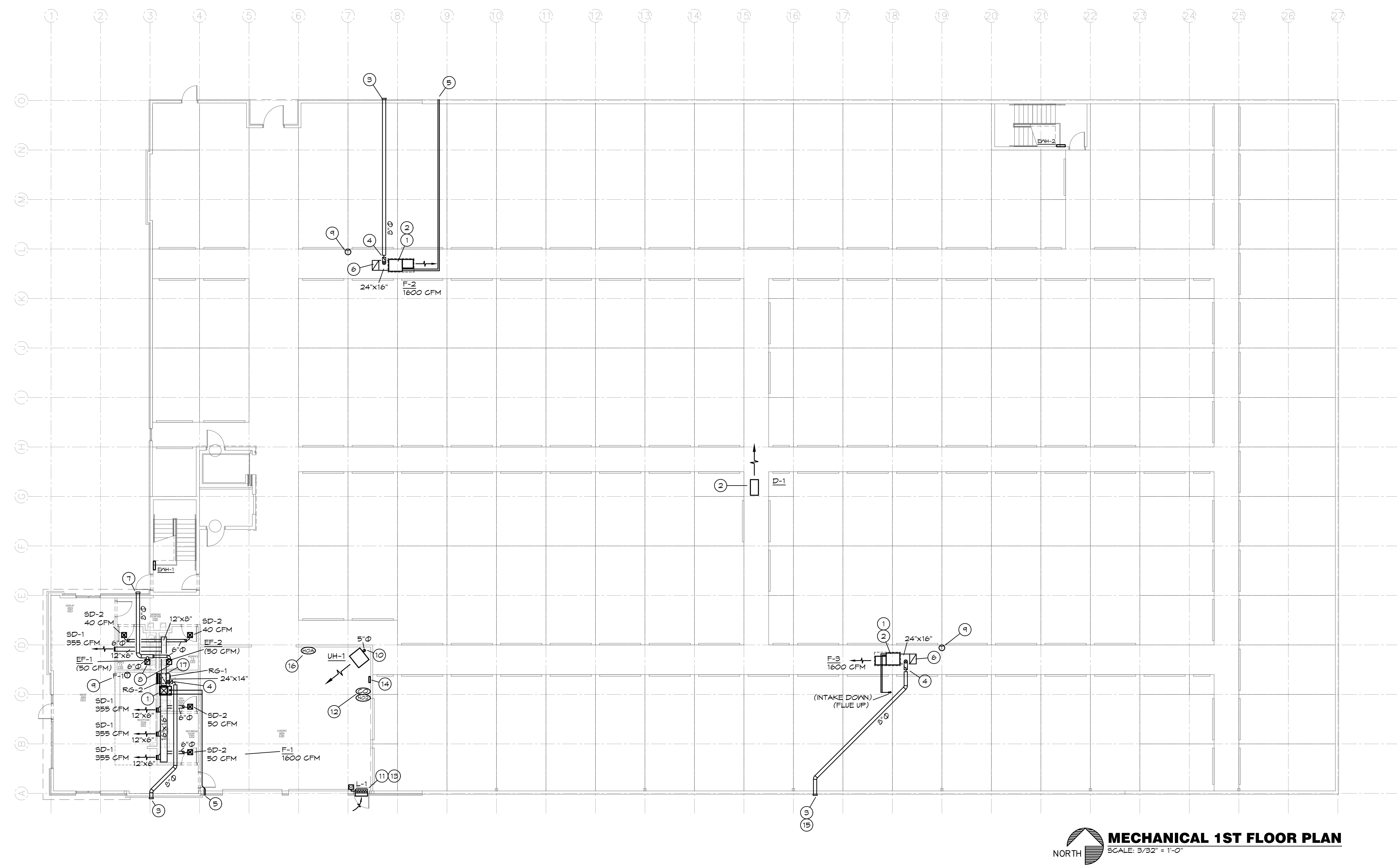
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ASSOCIATES

1100 Rhode Island
Lawrence, Kansas
66044
785 - 749 - 5806
FAX 785 - 749 - 1515

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Checked by: DS/EK
Revisions:

M1

- MECHANICAL SYMBOLS**
- NEW SUPPLY DIFFUSER
 - EXHAUST GRILLE/FAN
 - REMOTE TEMPERATURE SENSOR
 - THERMOSTAT, MOUNTED AT 48" AFF
 - DUCT-MOUNTED SMOKE DETECTOR
 - AIR QUALITY SENSOR - CO/ NO2
 - HAND/OFF/AUTO SWITCH
 - MOTORIZED DAMPER/LOUVER
 - NEW DUCTWORK
 - 32"x14" SIZE OF RECTANGULAR DUCT
 - 6" Ø SIZE OF ROUND DUCT
 - FLEXIBLE DUCTWORK
 - FLOOR PLAN NOTE DESIGNATION
 - S.A. SUPPLY AIR
 - R.A. RETURN AIR
 - EXH. EXHAUST AIR
 - TRANSITION IN DUCT SIZE
 - MANUAL VOLUME DAMPER
 - MOTORIZED CONTROL DAMPER
 - SUPPLY AIR DUCT UP/DOWN
 - RETURN AIR DUCT UP/DOWN
 - EXHAUST AIR DUCT UP/DOWN
 - SCHEDULED MECHANICAL EQUIPMENT



MECHANICAL GENERAL NOTES:

- COORDINATE ALL WORK WITH OTHER TRADES AND EXISTING CONDITIONS AS REQUIRED TO PROPERLY INSTALL ALL SYSTEMS AS INTENDED, WITHIN THE CONFINES OF THE SPACES AVAILABLE, AND WITHOUT INTERFERENCES.
- THIS CONTRACTOR SHALL PERFORM ALL WORK INDICATED AND/OR AS REQUIRED FOR THE PROPER INSTALLATION AND OPERATION OF THE MECHANICAL SYSTEMS.
- REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR EXACT LOCATIONS OF DIFFUSERS.
- INSTALL ALL DUCT, PIPE, ETC. AS HIGH AS POSSIBLE.
- DUCT SIZES SHOWN ARE ACTUAL SHEET METAL SIZES AND INCLUDE AN ALLOWANCE FOR DUCT LINER WHERE APPLICABLE.
- PROVIDE FLEXIBLE CONNECTION BETWEEN DUCTWORK AND ROOFTOP UNITS, EXHAUST FANS, AND OTHER MOTORIZED EQUIPMENT.
- NO DUCT SHALL BE ROUTED OVER THE TOP OF ELECTRICAL PANELS.

MECHANICAL PLAN NOTES:

- CONNECT REFRIGERANT PIPING TO CONDENSING UNIT & COIL AS REQUIRED BY THE MANUFACTURER. PROVIDE AND INSTALL REFRIGERANT PIPING FOR CONDENSING UNIT AS REQUIRED BY MANUFACTURER. SEAL WALL / ROOF PENETRATION WEATHERTIGHT.
- SUPPORT UNIT FROM STRUCTURE AND PROVIDE VIBRATION ISOLATION AS REQUIRED BY THE MANUFACTURER. PROVIDE ADDITIONAL SUPPORT STEEL AS REQUIRED.
- PROVIDE WALL VENT CAP FOR OUTDOOR INTAKE WITH BIRD SCREEN. CAULK PENETRATIONS WEATHERTIGHT.
- CONNECT OUTDOOR AIR DUCT WITH BALANCING DAMPER TO RETURN AIR DUCT. REFER TO OUTDOOR AIR CALCULATIONS FOR MINIMUM OUTDOOR AIR VOLUME.
- 3"Ø CPVC FLUE & COMBUSTION AIR INTAKE THROUGH SIDEWALL TO MANUFACTURER'S VENT TERMINATION AS REQUIRED. OFFSET AS REQUIRED TO MAINTAIN 10' CLEARANCE FROM ALL OUTDOOR AIR INTAKES. SEAL PENETRATIONS WEATHER TIGHT.
- OPEN RA DUCT WITH BIRD SCREEN OVER OPENING.
- PROVIDE WALL VENT CAP WITH BACKDRAFT DAMPER FOR EXHAUST FAN. CAULK PENETRATIONS WEATHERTIGHT.
- SUPPORT FAN FROM STRUCTURE AS REQUIRED BY THE MANUFACTURER.
- PROVIDE T-DAY COOL/HEAT/AUTO CHANGEOVER THERMOSTAT MOUNTED AT 48" A.F.F.

MECHANICAL PLAN NOTES: (CONT.)

- 3"Ø FLUE UP TO SECOND FLOOR, SEE SHEET M2 FOR CONTINUATION.
- NORMALLY CLOSED MOTORIZED DAMPER ON L-1, TO OPEN WHEN EF-1 IS ENERGIZED. COORDINATE WITH E.C. TO INTERLOCK WITH CO/NO2 SYSTEM AS REQUIRED. PROVIDE AND MOUNT TX-D-ND NO SENSOR 12'-18" BELOW DECK AS REQUIRED. PROVIDE AND MOUNT CM-6 CO SENSOR 5' AFF AS REQUIRED.
- LOCATION OF AIR QUALITY SENSOR FOR GAS SENSING SYSTEM. INSTALL PER THE MANUFACTURERS REQUIREMENTS. INTERLOCK WITH EF-3 AND L-1.
- INSTALL BOTTOM OF LOUVER 8" ABOVE GRADE.
- PROVIDE MACURGO #DVP-120 CONTROLLER FOR CM-6 CARBON MONOXIDE AND TX-6-ND NITROGEN DIOXIDE FIXED SENSORS FOR THE DETECTION OF CARBON MONOXIDE AND NITROGEN DIOXIDE IN SPACE.
- INSTALL 8"Ø OUTDOOR AIR DUCT MINIMUM 18" ABOVE GRADE.
- LOCATION OF HAND/OFF/AUTO SWITCH, MOUNT AT 48" AFF.
- 24"x14" RETURN DUCT BELOW 12"x8" SUPPLY DUCT. ROUTE 24"x14" RETURN DUCT UP AS HIGH AS POSSIBLE.

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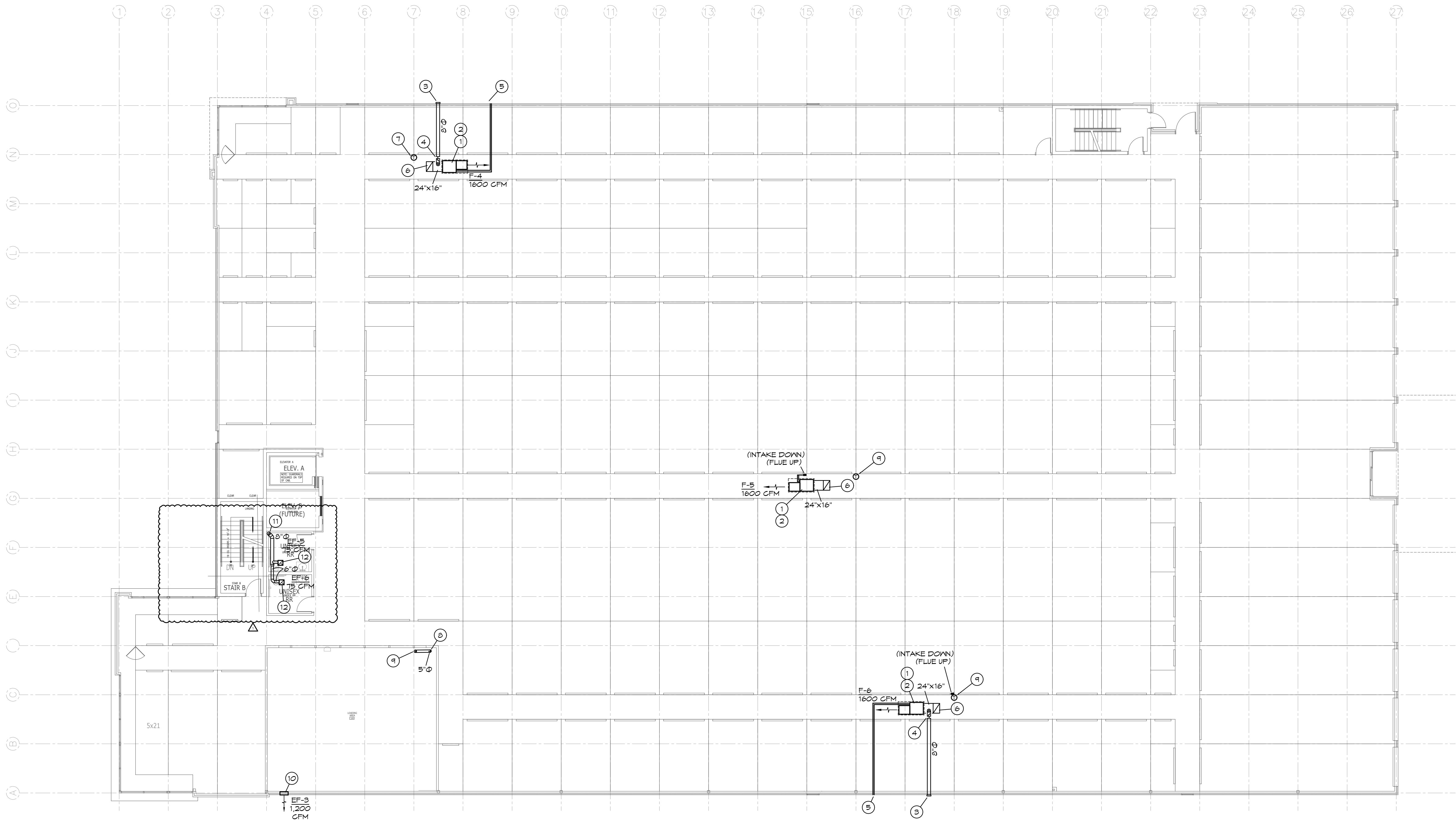


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1100 Rhode Island
Lawrence, Kansas
66044
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Revisions: 2023/1/12

M2



MECHANICAL 2ND FLOOR PLAN
NORTH
SCALE: 3/32" = 1'-0"

MECHANICAL PLAN NOTES:

- CONNECT REFRIGERANT PIPING TO CONDENSING UNIT & COIL AS REQUIRED BY THE MANUFACTURER. PROVIDE AND INSTALL REFRIGERANT PIPING FOR CONDENSING UNIT AS REQUIRED BY MANUFACTURER. SEAL WALL / ROOF PENETRATION WEATHERTIGHT.
- SUPPORT UNIT FROM STRUCTURE AND PROVIDE VIBRATION ISOLATION AS REQUIRED BY THE MANUFACTURER. PROVIDE ADDITIONAL SUPPORT STEEL AS REQUIRED.
- PROVIDE WALL VENT CAP FOR OUTDOOR INTAKE WITH BIRD SCREEN. CAULK PENETRATIONS WEATHERTIGHT.
- CONNECT OUTDOOR AIR DUCT WITH BALANCING DAMPER TO RETURN AIR DUCT. REFER TO OUTDOOR AIR CALCULATIONS FOR MINIMUM OUTDOOR AIR VOLUME.
- 3"Ø CPVC FLUE & COMBUSTION AIR INTAKE THROUGH SIDEWALL TO MANUFACTURE'S VENT TERMINATION AS REQUIRED. OFFSET AS REQUIRED TO MAINTAIN 10' CLEARANCE FROM ALL OUTDOOR AIR INTAKES. SEAL PENETRATIONS WEATHER TIGHT.
- OPEN RA DUCT WITH BIRD SCREEN OVER OPENING.
- PROVIDE T-DAY COOL/HEAT/AUTO CHANGEOVER THERMOSTAT MOUNTED AT 48" A.F.F.
- 5"Ø TYPE 'B' DOUBLE FLUE UP FROM FLOOR BELOW. SEE SHEET M1 FOR CONTINUATION.
- 5"Ø TYPE 'B' DOUBLE FLUE UP TO FLOOR ABOVE. SEE SHEET M3 FOR CONTINUATION.
- INSTALL EF AS HIGH AS POSSIBLE. COORDINATE WITH E.G. TO INTERLOCK WITH CO/ NO2 SYSTEM AND L-1.
- ROUTE 8" EXHAUST DUCT UP TO 3RD FLOOR
- SUPPORT FAN FROM STRUCTURE AS REQUIRED BY THE MANUFACTURER.

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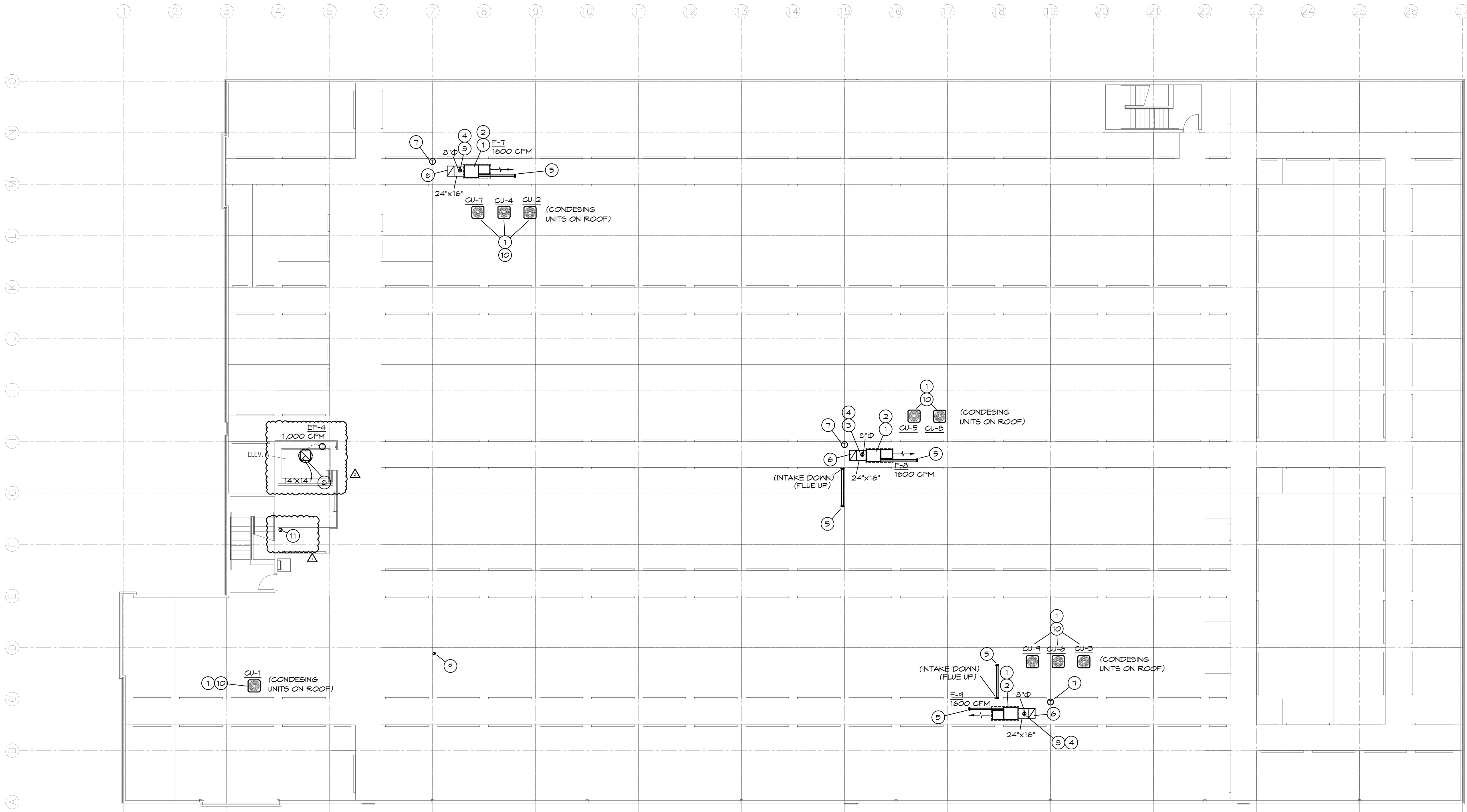
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Revisions: 2023/1/12
2023/2/10

M3



MECHANICAL PLAN NOTES:

- CONNECT REFRIGERANT PIPING TO CONDENSING UNIT & COIL AS REQUIRED BY THE MANUFACTURER. PROVIDE AND INSTALL REFRIGERANT PIPING FOR CONDENSING UNIT AS REQUIRED BY MANUFACTURER. SEAL WALL / ROOF PENETRATION WEATHERTIGHT.
- SUPPORT UNIT FROM STRUCTURE AND PROVIDE VIBRATION ISOLATION AS REQUIRED BY THE MANUFACTURER. PROVIDE ADDITIONAL SUPPORT STEEL AS REQUIRED.
- ROUTE 8" Ø OUTDOOR AIR DUCT UP THROUGH ROOF TO ROOF VENT CAP WITH BIRD SCREEN. SEAL PENETRATIONS WEATHERTIGHT.
- CONNECT OUTDOOR AIR DUCT WITH BALANCING DAMPER TO RETURN AIR DUCT. REFER TO OUTDOOR AIR CALCULATIONS FOR MINIMUM OUTDOOR AIR VOLUME.
- 3" Ø CPVC FLUE & COMBUSTION AIR INTAKE THROUGH ROOF TO MANUFACTURER'S VENT TERMINATION AS REQUIRED. OFFSET AS REQUIRED TO MAINTAIN 10' CLEARANCE FROM ALL OUTDOOR AIR INTAKES. SEAL PENETRATIONS WEATHER TIGHT.
- OPEN RA DUCT WITH BIRD SCREEN OVER OPENING.
- PROVIDE 1-DAY COOL/HEAT/AUTO CHANGEOVER THERMOSTAT MOUNTED AT 48" A.F.F.
- ROOF MOUNTED EXHAUST FAN IS TO BE DUCTED INTO ELEVATOR HOISTWAY AND TIED TO THERMOSTAT FOR HOISTWAY TEMPERATURE CONTROL.
- 5" Ø TYPE 'B' DOUBLE FLUE UP FROM FLOOR BELOW, SEE SHEET M2 FOR CONTINUATION. ROUTE UP THROUGH ROOF TO MANUFACTURER'S VENT TERMINATION AS REQUIRED. OFFSET AS REQUIRED TO MAINTAIN 10' CLEARANCE FROM ALL OUTDOOR AIR INTAKES. SEAL PENETRATION WEATHER TIGHT.
- REFRIGERANT PIPING THROUGH ROOF. SEAL PENETRATION WEATHERTIGHT. ROUTE TO UNITS.
- 8" UP FROM FLOOR BELOW, ROUTE 8" EXHAUST DUCT UP THRU ROOF TO WEATHER HEAD WITH BACK DRAFT DAMPER. SEAL PENETRATION WETHER TIGHT.



MECHANICAL 3RD FLOOR PLAN

SCALE: 3/32" = 1'-0"



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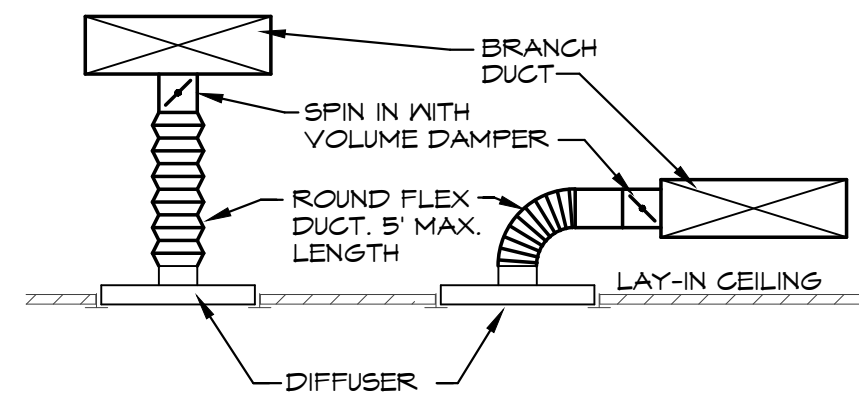
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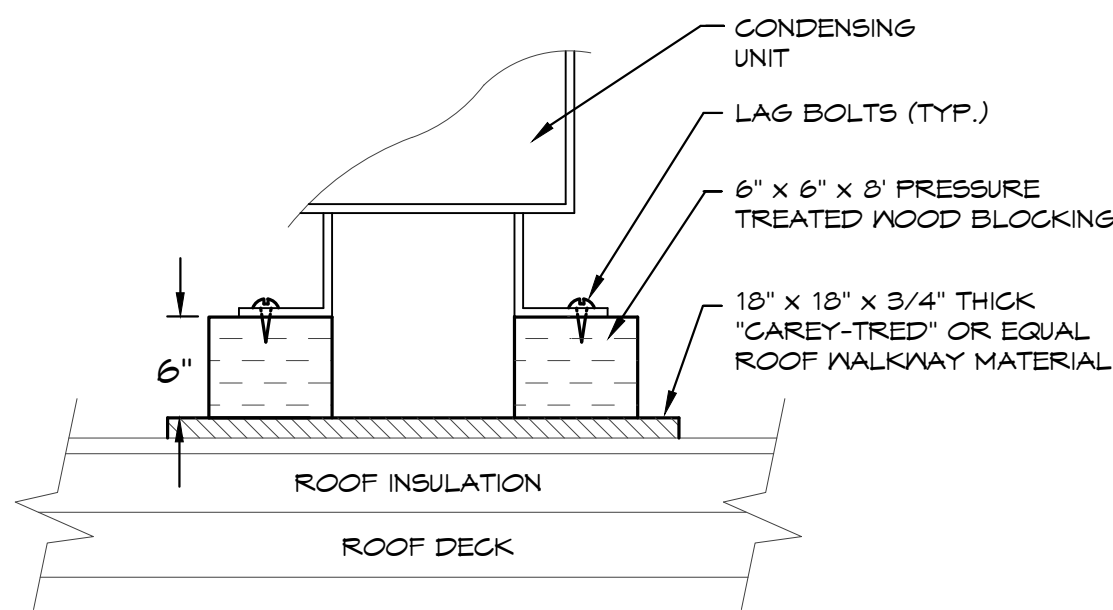
M4

OUTDOOR AIR CALCULATIONS

UNIT	Area (sqft)	OCCUPANCY CLASSIFICATION	Occupant Density #/1000 sqft	People outdoor airflow rate in breathing zone, (Rp) cfm/person	Area outdoor airflow rate in breathing zone, (Ra) cfm/sqft	Exhaust airflow rate cfm/sqft	Breathing zone outdoor airflow (Vbz) cfm/sqft	Zone air effectiveness (Ez)	Zone outdoor airflow (cfm)
F-1	750	Office spaces	5	5	0.06		64	0.8	80
	78	Break Room	25	5	0.06		14	0.8	18
	132	Toilet rooms public	0	0	0	50%	0	0.8	0
	63	Storage rooms	0	0	0.12		8	0.8	9
Total									107
F-2,3	5858	Corridors	0	0	0.06		351	0.8	439
Total									439
F-4,5,6	6312	Corridors	0	0	0.06		379	0.8	473
Total									473
F-7,8,9	7720	Corridors	0	0	0.06		463	0.8	579
Total									579
EF-3/L-1	996	Repair garages, enclosed parking garages	0	0	0	.75	0	0.8	747
EF-3 780 CFM									747



DIFFUSER DETAIL
SCALE: NONE



CONDENSING UNIT SUPPORT DETAIL
SCALE: NONE

GAS FIRED UNIT HEATER SCHEDULE

MARK	MFG'R	MODEL	CFM	HEATING (GAS)		ELECTRICAL		NOTES
				BTUH INPUT	BTUH OUTPUT	VOLT/Ø/HZ	HP	
UH-1	LENNOX	LF24-100A	1,900	100,000	80,500	120/1/60	1/8	1,2

- NOTES: 1. PROVIDE EACH UNIT ELECTRONIC PILOT IGNITION & ALUMINIZED STEEL HEAT EXCHANGER.
2. PROVIDE EACH UNIT WITH UNIT MOUNTED THERMOSTAT & CONTROL VOLTAGE TRANSFORMER.

ELECTRIC WALL HEATER SCHEDULE

MARK	MFG'R	MODEL NO.	BTUH	ELECTRICAL		NOTES
				VOLT/Ø/HZ	WATTS	
EAH-1	RAYMALL	AFG8130T	10,239	208/1/60	3 KW	1,2
EAH-2						

- NOTES: 1. UNITS SHALL BE SURFACE MOUNTED.
2. PROVIDE INTEGRAL DISCONNECT & INTEGRAL THERMOSTAT FOR EACH UNIT.

LOUVER SCHEDULE

MARK	MFG'R	MODEL	FRAME	SIZE	NOTES
L-1	RUSKIN	ELF375X	STD	24"x18"	1,2

- NOTES: 1. PROVIDE WITH BIRDSCREEN.
2. PROVIDE 120 VOLT, NORMALLY CLOSED MOTORIZED DAMPER TO OPEN WHEN ENERGIZED. SEE PLAN NOTE 8 ON SHEET M1.

DIFFUSER SCHEDULE

MARK	MFG'R	MODEL	NECK SIZE	FACE SIZE	FINISH	NOTES
SD-1	TITUS	300RS	12"x6"	-	WHITE	1
SD-2		TMS/3	6"Ø	12"x12"	-	-
						-
RG-1		35ORL	6"x6"	-	-	-
RG-2			24"x14"	-	-	-

- NOTES: 1. PROVIDE O.B. DAMPER IN NECK.

FURNACE SCHEDULE

MARK	MFG'R	MODEL NO.	CFM	EXT. STATIC P. IN. WG.	HEATING (GAS)		ELECTRICAL		OUTSIDE AIR (CFM)	NOTES
					BTUH INPUT	BTUH OUTPUT	VOLT/Ø/HZ	HP		
F-1	LENNOX	ML196UH090X60C	1,600	0.5	88,000	85,600	120/1/60	1	150	1,2,3,4
F-2									225	1,2,3,4,5
F-3									225	1,2,3,4,5
F-4									225	1,2,3,4,5
F-5									-	1,2,3,4,5
F-6									225	1,2,3,4,5
F-7									200	1,2,3,4,5
F-8									200	1,2,3,4,5
F-9									200	1,2,3,4,5

- NOTES: 1. PROVIDE 1" THICK THROWAWAY TYPE FILTER WITH HOLDING FRAME FOR EACH UNIT.
2. PROVIDE EACH UNIT WITH 7-DAY PROGRAMMABLE HEAT/COOL/AUTO CHANGEOVER THERMOSTAT.
3. CONDENSING UNITS, COOLING COILS, AND FURNACES SHALL ALL BE OF THE SAME MANUFACTURER.
4. EXTERNAL STATIC PRESSURE LISTED REPRESENTS STATIC PRESSURE REQUIRED FOR DUCTWORK AND DIFFUSERS OUTSIDE THE HVAC UNIT COMPLETELY INDEPENDENT OF ANY PRESSURE DROP THROUGH THE HVAC EQUIPMENT INCLUDING BUT NOT LIMITED TO FILTERS AND COILS.
5. PROVIDE GALVANIZED WATERTIGHT DRAIN PAN AND CONDENSATE FLOAT SWITCH TO DE-ENERGIZE THE FURNACE IF THE DRAIN PAN FILLS WITH WATER.

CONDENSING UNIT SCHEDULE

MARK	MFG'R	MODEL NO.	COOLING		ELECTRICAL		MIN. MCA (AMPS)	MIN. MOCP (AMPS)	EVAP. COIL MODEL NO.	SEER	NOTES
			TOTAL BTUH	AMB. DB/WB	EVAP. EAT DB/WB	VOLT/Ø/HZ					
CU-1	LENNOX	TS4048S4	48,000	75	80/67	480/3/60	8.8	15	CH35-48C	14	1,2,3
CU-2											
CU-3											
CU-4											
CU-5											
CU-6											
CU-7											
CU-8											
CU-9											

- NOTES: 1. PROVIDE TIME DELAY ON COMPRESSOR RE-START, CRANKCASE HEATER, AND COMPRESSOR LOCK-OUT WITH AMBIENT BELOW 35 °F. PROVIDE INDOOR COIL WITH THERMAL EXPANSION VALVE (TXV).
2. MECHANICAL CONTRACTOR SHALL COORDINATE ALL UNIT MOCP'S OF ACTUAL INSTALLED EQUIPMENT WITH ELECTRICAL CONTRACTOR.
3. PROVIDE HAIL GUARDS FOR EACH UNIT.

EXHAUST FAN SCHEDULE

MARK	MFG'R	MODEL	CFM	EXTERNAL STATIC P. IN. WG.	RPM	ELECTRICAL		FAN TYPE	CONTROLS	NOTES
						VOLT/Ø/HZ	POWER			
EF-1	COOK	GC-126	50	0.1	550	120/1/60	21 W	CEILING EXH.	INTERLOCK WITH LIGHTS	1
EF-2					550					1
EF-3		10XN40D15	780		1,550		1/5 HP	SIDEWALL EXH.	SENSOR	4
EF-4		120C15D	1,000	0.15	1047		1/4 HP	ROOF EXH.	THERMOSTAT	2,3
EF-5		GC-146	75	0.2	900		36 W	CEILING EXH.	SWITCH	5
EF-6		GC-146	75	0.2	900		36 W	CEILING EXH.	SWITCH	5

- NOTES: 1. PROVIDE CEILING GRILLE, INTEGRAL BACK DRAFT DAMPER, VARI-SPEED CONTROLLER (NEAR FAN AND ABOVE CEILING), AND WEATHER HEAD.
2. PROVIDE INSULATED 18" HIGH (AT LOWEST POINT) PREFABRICATED ROOF CURB, BACKDRAFT DAMPER, BIRD SCREEN, UNIT MOUNTED VARIABLE SPEED CONTROLLER.
3. PROVIDE XFMR, HEAT & COOL THERMOSTAT WITH AUTO CHANGE OVER FOR CONTROL OF FAN. SET TO TURN FAN ON AT 30°F AND 80°F. COORDINATE WITH ELECTRICAL FOR POSSIBLE CONTRACTORS OR RELAY REQUIRED.
4. PROVIDE WALL SLEEVE, REAR GUARD HOUSING, BACKDRAFT DAMPER, BIRD SCREEN, AND HAND/OFF/AUTO SWITCH.
5. PROVIDE CEILING GRILLE, INTEGRAL BACK DRAFT DAMPER, VARI-SPEED CONTROLLER (NEAR FAN AND ABOVE CEILING), AND WALL CAP.

DEHUMIDIFIER SCHEDULE

MARK	MFG'R	MODEL NO.	WATER REMOVAL	CFM	ELECTRICAL		NOTES
					VOLT/Ø/HZ	AMP	
D-1	LENNOX	NHD-3-130	130 PINTS/DAY	270	208/1/60	15	1,2,3

- NOTES: 1. PROVIDE WITH HUMIDISTAT SET TO 45% RH.
2. INSTALL PER MANUFACTURER'S REQUIREMENTS FOR HANGING FROM STRUCTURE.
3. PROVIDE AND INSTALL ANY/ALL COMPONENTS FOR COMPLETE INSTALLATION.

BC PROJECT #: 22573
MISSOURI PE COA #2009003629
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BC ENGINEERS
INCORPORATED

5720 Reeder Shawnee, KS 66203 (913)262-1772



LAKEWOOD STORAGE
4101 NE PORT DRIVE
LEE'S SUMMIT, MO

10/26/2022



Hernly
ASSOCIATES

1100 Rhode Island
Lawrence, Kansas
66044
785 - 749 - 5806
FAX 785 - 749 - 1515

ELECTRICAL SPEC

Date: 2022/10/25
Drawn by : DS/LC
Checked by : DS/EK
Revisions :

E0.0

ELECTRICAL SPECIFICATIONS

1. GENERAL PROVISIONS:

- PROVIDE ALL LABOR, MATERIALS, EQUIPMENT, NECESSARY FOR THE COMPLETE INSTALLATION OF THE ELECTRICAL SYSTEMS OUTLINED.
- OBTAIN ALL PERMITS, FEES, LICENSES, INSPECTIONS, AND CERTIFICATES OF COMPLIANCE OR APPROVAL AS REQUIRED BY THE AUTHORITIES.
- ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE LATEST APPROVED EDITION OF THE NATIONAL ELECTRICAL CODE (NEC), AND ALL APPLICABLE LAWS, CODES AND REGULATIONS OF THE GOVERNMENTAL BODIES HAVING JURISDICTION OVER THE SITE.
- ALL TESTING REQUIRED BY AUTHORITIES SHALL BE CONSIDERED PART OF THIS WORK.
- DURING CONSTRUCTION, ALL FIXTURES, EQUIPMENT, CONDUIT, ETC. SHALL BE COVERED, PLUGGED, OR CAPPED AS REQUIRED TO KEEP CLEAN AND UNDAMAGED. ALL DAMAGED ITEMS SHALL BE RESTORED TO ORIGINAL CONDITION OR REPLACED. ALL PROTECTIVE COVERING SHALL BE REMOVED BEFORE FINAL ACCEPTANCE.
- PROVIDE ALL NECESSARY CUTTING AND PATCHING OF WALLS, FLOORS, CEILINGS, AND ROOFS AS NECESSARY. PATCH AROUND ALL OPENINGS SHALL MATCH ADJACENT AREA. COORDINATE ALL ROOFING WORK WITH OWNER OR RESPONSIBLE PARTY, SO THAT THE EXISTING ROOFING WARRANTY WILL BE MAINTAINED.
- CONTRACTOR SHALL GUARANTEE ALL WORK AND MATERIALS AGAINST DEFECTS FOR A PERIOD OF ONE YEAR FROM FINAL ACCEPTANCE.
- CONTRACTOR SHALL PROVIDE ACCESS PANELS WHERE NECESSARY FOR CONCEALED ELECTRICAL COMPONENTS.

2. OPERATION AND MAINTENANCE MANUALS:

- DURING THE COURSE OF CONSTRUCTION, COLLECT AND COMPILE OPERATING INSTRUCTIONS, WIRING DIAGRAMS, CATALOG CUTS, LUBRICATION AND PREVENTIVE MAINTENANCE INSTRUCTIONS, PARTS LISTS, ETC. FOR ALL EQUIPMENT FURNISHED UNDER THIS CONTRACT.
- ALL LITERATURE AND INSTRUCTIONS SHIPPED WITH THE EQUIPMENT SHALL BE SAVED FOR INCLUSION IN THE OPERATION AND MAINTENANCE MANUALS.
- ALL LITERATURE LISTED ABOVE AND ALL PAPERS LISTING WARRANTIES, ETC. SHALL BE COLLATED AND LABELED WITH THE PROJECT NAME, ADDRESS, ARCHITECT, ENGINEER, CONTRACTORS, ETC. CONTRACTORS, ETC. DOCUMENTS SHALL BE COMPILED AND BOUND IN DIGITAL FILE OR 3 RING BINDER.

3. MANUFACTURERS:

- MANUFACTURERS, MODEL NUMBERS, ETC. INDICATED OR SCHEDULED ON THE DRAWINGS SHALL BE INTERPRETED AS HAVING ESTABLISHED A STANDARD OF QUALITY AND SHALL NOT BE CONSTRUED AS LIMITING COMPETITION. ARTICLES, FIXTURES, ETC. OF EQUAL QUALITY BY MANUFACTURERS SHALL BE ACCEPTABLE, SUBJECT TO STRUCTURAL AND ELECTRICAL CONSTRAINTS OF THE PROJECT DESIGN, UNLESS NOTED OTHERWISE.

4. TESTING, AND BALANCING:

- ALL CIRCUITS SHALL BE TESTED FOR CONTINUITY, SHORTS, AND GROUNDS BEFORE CONNECTING TO THE PROPER PHASE AS DESIGNED TO BALANCE THE LOADING BETWEEN PHASES.
- POWER AND LIGHTING PANELS SHALL BE PROPERLY PHASED TO DISTRIBUTE THE LOAD AND SHALL BE CONNECTED AND ADJUSTED TO OPERATE AS SPECIFIED.
- ALL MOTORS AND SIMILAR EQUIPMENT SHALL BE CHECKED FOR PROPER PHASE ROTATION AND OPERATION.

5. RACEWAYS:

- CONDUIT INSIDE THE BUILDING SHALL BE METALLIC TUBING (EMT), BEARING THE UL LABEL, WITH COMPRESSION TYPE FITTINGS OR SCREW SET FITTINGS.
- CONDUIT EXPOSED TO THE WEATHER, INSTALLED UNDERGROUND, IN CONCRETE, OR USED FOR SERVICE ENTRANCE SHALL BE STANDARD RIGID CONDUIT (GALVANIZED) WITH THREADED FITTINGS.
- UNDERGROUND CONDUIT MAY BE POLY-VINYL CHLORIDE WITH A DEFLECTION TEMPERATURE UNDER LOAD AT 264 PSI, OF 78 DEGREES C, AND A TENSILE STRENGTH OF 5,300 PSI. JOINTS SHALL BE FLUSH SOLVENT WELDED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS. CONDUIT SHALL BE EQUAL TO CARLON POWER AND COMMUNICATIONS DUCT TYPE DB (DIRECT BURIAL). CONDUIT AND FITTINGS SHALL BE PRODUCED BY THE SAME MANUFACTURER.
- FLEXIBLE METAL CONDUIT SHALL ONLY BE USED FOR CONNECTIONS TO MOTORS, TRANSFORMERS, AND LIGHT FIXTURES. MAXIMUM LENGTH SHALL BE 6'-0".

6. CONDUCTORS:

- WIRES SHALL BE CONTINUOUS WITHOUT SPLICES OR TAPS IN CONDUIT RUNS. ALL SPLICES SHALL BE MADE IN JUNCTION, PULL, OR OUTLET BOXES. ALL WIRES SHALL BE INSTALLED IN CONDUIT, WIREWAYS, OR OTHER PROTECTIVE COVER SANCTIONED BY CODES.
- CONDUCTORS FOR LIGHTING AND POWER SHALL BE COPPER, MINIMUM NO. 12 AWG., 600 VOLT.
- NO. 10 GAUGE AND SMALLER CONDUCTORS SHALL BE TYPE THIN (NET LOCATIONS) OR THIN (DRY LOCATIONS), SOLID CONDUCTOR, UNLESS OTHERWISE INDICATED.
- NO. 8 GAUGE AND LARGER CONDUCTORS SHALL BE TYPE THIN (NET LOCATIONS) OR THIN (DRY LOCATIONS), STRANDED, UNLESS OTHERWISE INDICATED.
- SERVICE ENTRANCE AND PANEL FEEDER CONDUCTORS, NO. 3 GAUGE AND LARGER SHALL BE TYPE XHHW-2 (NET LOCATIONS) OR THIN (DRY LOCATIONS), STRANDED COPPER, UNLESS OTHERWISE INDICATED.

7. MC CABLE:

- MC CABLE SHALL CONSIST OF INTERLOCK ARMORED CABLE MADE OF THREE OR FOUR TYPE THIN SOLID (NO AWG AND LARGER MAY BE STRANDED) COPPER CONDUCTORS RATED 600V FOR DRY LOCATIONS, WITH NYLON OR EQUIVALENT UL LISTED JACKET, PER UL STANDARD 83. THE THREE CONDUCTORS SHALL BE TWISTED TOGETHER WITH THE COPPER GROUNDING CONDUCTOR, SUITABLE FILERS, AND WRAPPED IN BINDER TAPE. THE ASSEMBLY SHALL BE ARMORED WITH SPIRALLY WRAPPED INTERLOCKED ARMOR OF ALUMINUM OR GALVANIZED STEEL.
- CABLES SHALL BE TESTED IN ACCORDANCE WITH UL STANDARD 1664 FOR TYPE MC CABLE AND RATED AT 600 VOLTS, 90 DEG. C FOR DRY LOCATIONS AND 75 DEG. C FOR NET LOCATIONS.

8. WIRING DEVICES:

- WALL SWITCHES SHALL BE SPECIFICATION GRADE, QUIET TYPE, FLUSH TOGGLE SWITCH, RATED FOR 20 AMPS, WITH THERMOPLASTIC COVER PLATES.
 - SINGLE POLE: HUBBELL ICS1221-X, OR EQUAL.
 - THREE WAY: HUBBELL ICS1223-X, OR EQUAL.
 - AS SPECIFIED ON PLANS.
- RECEPTACLES SHALL BE SPECIFICATION GRADE, DUPLEX, GROUNDING, THREE-WIRE TYPE, RATED FOR 20 AMPS, WITH THERMOPLASTIC COVER PLATES. HUBBELL ICS3352-X, OR EQUAL.
- GROUND FAULT INTERRUPTER RECEPTACLES (GFI) SHALL BE HUBBELL ICSF20-XL. DEVICE COVER PLATES SHALL BE AS HEREBEFORE SPECIFIED.
- ISOLATED GROUND RECEPTACLES (IG) SHALL BE HUBBELL ICS3352IG, ORANGE COLOR. DEVICE COVER PLATES SHALL BE AS HEREBEFORE SPECIFIED.
- RECEPTACLES OUTSIDE BUILDINGS AND WHERE NOTED AS WEATHERPROOF, SHALL BE LISTED WEATHER-RESISTANT HUBBELL ICSFTR20-X OR EQUAL AND SHALL BE INSTALLED IN A WEATHERPROOF ENCLOSURE WHICH SHALL BE INTERMATIC IMPT0100X2 OR IMPT0100XND DECATAL METAL WEATHERPROOF RECEPTACLE COVER. COVER SHALL BE WEATHER PROOF RATED WHILE IN USE.
- VERIFY DEVICES AND DEVICE COVERPLATES COLOR WITH ARCHITECT.

9. BOXES:

- HOT DIPPED GALVANIZED STEEL BOXES. PROVIDE TYPE TO SUIT CONDITIONS FOR INSTALLATION.
- ALL BOXES SHALL BE FLUSH MOUNTED, UNLESS INDICATED OTHERWISE.

10. PANELBOARDS:

- FURNISH AND INSTALL CIRCUIT BREAKER PANELBOARDS AS SHOWN ON THE DRAWINGS. PANELBOARDS SHALL BE LISTED BY UL AND SO LABELED, AND SHALL BE FULLY RATED FOR THE VOLTAGE AND CURRENT CAPACITY INDICATED ON THE PANEL SCHEDULE. PANELBOARDS SHALL BE EQUAL TO GENERAL ELECTRIC TYPE AS WITH BOLT IN TYPE BREAKERS. PANELBOARD LUGS SHALL BE RATED AT 75°C.
 - CIRCUIT BREAKER INTERRUPTING CAPACITIES SHALL MEET OR EXCEED THE AVAILABLE RMS SYMMETRICAL FAULT CURRENTS INDICATED AND AS REQUIRED TO MEET OR EXCEED THE AVAILABLE FAULT CURRENT FROM LOCAL UTILITY.
- CIRCUIT BREAKERS SHALL MEET APPLICABLE PORTIONS OF UL STANDARD 484 AND NEMA AB-1. CIRCUIT BREAKERS SHALL BE BOLT-ON, GROUP MOUNTED, AMBIENT MAGNETIC, WITH COMMON TRIP, UL RATED TO CARRY 80% OF NAMEPLATE RATING CONTINUOUSLY IN FREE AIR AT 40°C. CIRCUIT BREAKERS SHALL BE TRIP INDICATING AND FULLY INTERCHANGEABLE WITHOUT DISTURBING ADJACENT UNITS. WIRE TERMINALS SHALL BE RATED 75 DEGREES C. THE OPERATING MECHANISM SHALL BE TRIP-FREE SO THAT CONTACTS CANNOT BE HELD CLOSED AGAINST ANY ABNORMAL OVERCURRENT OR SHORT CIRCUIT CONDITION.
 - BREAKERS SHALL MEET APPLICABLE NEMA AND/OR UL SPECIFICATIONS.
- PANELBOARD BOXES SHALL BE GALVANIZED SHEET STEEL WITH AMPLE WIRING GUTTER SPACE IN ACCORDANCE WITH NEC. FRONTS SHALL BE OF SHEET STEEL PAINTED LIGHT GREY OVER A SUITABLE RUST INHIBITOR PRIMER. PANELBOARDS SHALL BE EQUIPPED WITH ONE PIECE DOOR, CYLINDER TURNBLES TYPE LOCK, DIRECTORY CARD-HOLDER AND QUARTER-TURN ADJUSTABLE TRIM CLAMPS.
- PANELBOARD INTERIORS SHALL CONSIST OF REINFORCED GALVANIZED SHEET STEEL FRAMES WITH ALUMINUM BUS BARS AND CIRCUIT BREAKERS, PROPERLY SUPPORTED TO PREVENT VIBRATIONS AND BREAKAGE IN HANDLING. BUS BARS SHALL BE SEQUENCE PHASED. PANELBOARD SHALL HAVE A FULL SIZED SOLID

ELECTRICAL SPECIFICATIONS (CONTINUED)

10. PANELBOARDS (CONTINUED):

- BUS BAR BRACING SHALL BE UL LISTED AS INDICATED ON DRAWINGS. ADDITIONAL BRACING SHALL BE PROVIDED AS REQUIRED TO MEET OR EXCEED INDICATED AVAILABLE FAULT CURRENTS.
 - DIRECTORY CARDS SHALL BE COMPLETELY FILLED IN BY TYPEWRITER, LISTING CIRCUIT NUMBERS AND LOAD SERVED, INCLUDING EXISTING CIRCUITS. CIRCUIT BREAKERS SHALL BE IDENTIFIED BY CIRCUIT NUMBER LABELS AS HEREBEFORE SPECIFIED.
- ### 11. DISCONNECTS:
- DISCONNECTS SHALL BE EXTERNALLY OPERATED, QUICK-MAKE, QUICK-BREAK, SAFETY, WITH PROVISIONS FOR PAD LOCKING. FUSED AND NON-FUSED DISCONNECT SWITCHES SHALL BE PROVIDED AS INDICATED.
 - INDOOR SWITCHES SHALL BE NEMA 1 AND OUTDOOR SWITCHES SHALL BE NEMA 3R, UNLESS INDICATED OTHERWISE.
- ### 12. FUSES:
- FUSES PROTECTING CIRCUIT BREAKER PANELS SHALL BE CURRENT LIMITING UL CLASS RK-1 FUSES WITH 200,000 AMPERES RMS SYM INTERRUPTING CAPACITY. FUSING ELEMENTS SHALL BE SILVER FOR RATINGS ABOVE 60 AMPERES.
 - ALL OTHER FUSES SHALL BE UL CLASS RK-5, DUAL-ELEMENT WITH A MINIMUM TIME-DELAY OF 10 SECONDS AT 500% RATINGS. FUSES SHALL HAVE CURRENT-LIMITING SHORT-CIRCUIT LINKS AND 200,000 AMPERES RMS SYM INTERRUPTING CAPACITY. FUSING ELEMENTS SHALL BE COPPER.
- ### 13. LIGHT FIXTURES:
- WHERE LIGHT FIXTURES ARE MOUNTED IN A LAY-IN CEILING, PROVIDE A MINIMUM OF 2 SUPPORT WIRES ATTACHED DIRECTLY BETWEEN EACH LIGHT FIXTURE AND THE BUILDING STRUCTURE. SUPPORT WIRES SHALL BE A MINIMUM OF 12 GAUGE GALVANIZED STEEL WIRE, SOFT ANNEALED.
 - FIXTURES ARE REQUIRED AT ALL LIGHTING OUTLETS SHOWN ON THE DRAWINGS. APPROVED LIGHTING FIXTURE WIRE IS REQUIRED IN ALL FIXTURES AND FIXTURE RACEWAYS. WEATHERPROOF WIRING IS REQUIRED FOR EXTERIOR FIXTURES. ALL PARTS OF FIXTURES AND WIRING SHALL BE IN ACCORDANCE WITH NEC REQUIREMENTS.
 - ALL FIXTURES SHALL CARRY UL AND ETL LABELS. ALL FLUORESCENT FIXTURE BALLASTS SHALL BE HIGH FREQUENCY ELECTRONIC BALLASTS WITH A TOTAL HARMONIC DISTORTION OF LESS THAN 20%, REGARDLESS OF THE NUMBER OF LAMPS CONNECTED TO EACH BALLAST AND SHALL HAVE CBM LABEL. ALL FLUORESCENT FIXTURES INSTALLED SHALL INCORPORATE BALLAST PROTECTION. ALL FLUORESCENT BALLASTS SHALL HAVE AN AUDIBLE NOISE RATING OF "CLASS A" OR BETTER. ALL FLUORESCENT BALLASTS SHALL HAVE A STANDARD BALLAST FACTOR UNLESS SPECIFIED OTHERWISE.

14. SLEEVES:

- PROVIDE, SET, AND PROPERLY LOCATE PIPE SLEEVES AS REQUIRED FOR THIS WORK.
- INTERIOR PARTITIONS, 16 GAUGE GALVANIZED STEEL, PACK BETWEEN CONDUIT AND SLEEVE WITH FIRE SAFING AND CAULK AT EACH END WITH FIRE RESISTANT SEALANT.
- ROOF: PROSET OR EQUAL, MANUFACTURED PVC, SCHEDULE 40 PIPE SLEEVE WITH WEATHERPROOF SEAL. COORDINATE WITH ROOFING CONTRACTOR AND FLASH AS REQUIRED TO MAINTAIN ROOF WARRANTY.

15. GROUNDING:

- GROUND ALL ELECTRICAL APPARATUS IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE (NEC) 250, AND ANY LOCAL REQUIREMENTS. INSURE CONTINUOUS BOND WHERE FLEXIBLE CONDUIT IS USED. PROVIDE BONDING JUMPER INSIDE ALL FLEXIBLE CONDUIT.
- BOND METAL PIPING SYSTEMS IN COMPLIANCE WITH NEC 250.4(A)(4).

16. DRY TYPE TRANSFORMERS:

- DRY TYPE TRANSFORMERS SHALL BE ENCLOSED IN DRIPPROOF METALLIC ENCLOSURES DESIGNED TO PROVIDE FOR AIR COOLING AND PREVENT ACCIDENTAL CONTACT WITH LIVE CONDUCTORS. MATERIALS AND FINAL PERFORMANCE SHALL COMPLY WITH APPLICABLE IEEE, ANSI AND NEMA STANDARDS. TRANSFORMERS SHALL BE FULLY RATED TWO WINDINGS UNITS CAPABLE OF CARRYING THE LOADS INDICATED. TRANSFORMERS SHALL BE EQUAL TO SQUARE D TYPE EP.
- TRANSFORMERS SHALL BE CAPABLE OF OPERATING AT 100% NAMEPLATE KVA RATINGS CONTINUOUSLY WHILE IN A 40°C AMBIENT WITHOUT EXCEEDING THE RATED AVERAGE WINDING TEMPERATURE RISE OF THE ANSI INSULATION USED. INSULATION SHALL BE CLASS 155C FOR TRANSFORMERS 5 KVA TO 25 KVA AND CLASS 220C FOR TRANSFORMERS 30 KVA TO 500 KVA. TRANSFORMERS SHALL BE UL APPROVED. TRANSFORMERS SHALL HAVE OVER-LOAD CAPACITY TO COMPLY WITH ANSI C57.160L WITH NORMAL LIFE MAINTAINED. SOUND RATINGS SHALL NOT EXCEED MAXIMUM VALUES FOR KVA RATINGS AS MEASURED PER ANSI C64.1.
- TRANSFORMERS 30 KVA AND LARGER SHALL BE EQUIPPED WITH TWO 2-1/2% FULL CAPACITY TAPS ABOVE AND FOUR 2-1/2% TAPS BELOW NORMAL RATED VOLTAGE. IN ADDITION, TRANSFORMERS OF THESE RATINGS SHALL BE PROVIDED WITH CLAMP-TYPE SOLDERLESS CONNECTORS SUITABLE FOR USE WITH COPPER OR ALUMINUM CABLES. THE CONNECTORS SHALL BE MOUNTED ON A TERMINAL BOARD WITH HIGH-VOLTAGE AND LOW-VOLTAGE TERMINALS HELD IN A FIXED POSITION AND CLEARLY MARKED. TRANSFORMER LUGS SHALL BE RATED AT 75°C. TRANSFORMERS 30 KVA AND LARGER SHALL BE PROVIDED WITH NEOPRENE RUBBER ISOLATION PADS MOUNTED BETWEEN THE CORE AND COIL ASSEMBLY AND ENCLOSURE TO ISOLATE SOUND AND VIBRATION.

17. FIRE ALARM SYSTEM:

- ELECTRICAL CONTRACTOR SHALL PROVIDE DESIGN BUILD ENGINEERED SHOP DRAWINGS OF FIRE ALARM SYSTEM TO BE INSTALLED. PROVIDE DEVICES, CONDUIT, WIRES, CABLE, PROGRAMMING AND TESTING AS DIRECTED BY EQUIPMENT MANUFACTURER AND LOCAL FIRE DEPARTMENT FOR A CODE COMPLIANT FIRE ALARM/DETECTION SYSTEM. MATERIALS, EQUIPMENT, AND WORKMANSHIP SHALL MEET PREVAILING CODES. THE SYSTEM SHALL BE COMPLETE AND OPERABLE. SUBMIT ONE LINE DIAGRAM OF SYSTEM WITH SIZES AND BATTERY CALCULATIONS. EQUIPMENT TO BE NEW AND SHALL BE STAMPED, SIGNED, CALIBRATION AND TESTED BY FACTORY CERTIFIED TECHNICIAN. FIRE ALARM DEVICES ARE SHOWN FOR INTENT ONLY FOR PERMITTING PURPOSES. CONTRACTOR IS RESPONSIBLE FOR INCLUDING IN BID DESIGN ALL NECESSARY DEVICES (ANNUNCIATOR(S)), NOTIFICATION APPLIANCES, INITIATING DEVICES, AND ADDITIONAL COMPONENTS.

ELECTRICAL SYMBOLS LIST

CIRCUITING & NOTES

146"	SPECIAL MOUNTING HEIGHT FOR ASSOCIATED DEVICE (CENTERLINE OF DEVICE)
GFI	GROUND FAULT CIRCUIT INTERRUPTER DEVICE
WP	WEATHERPROOF ENCLOSURE ON DEVICE
WR	WEATHERPROOF RESISTANT DEVICE
IG	ISOLATED GROUND DEVICE
EM	EMERGENCY BATTERY BACKUP
TR	TAMPER RESISTANT OUTLET
(TIE)	PARTIAL HOMERUN. REFER TO PLANS FOR ADDITIONAL DEVICES CONNECTED TO THIS CIRCUIT.
	ELECTRICAL FLOOR PLAN NOTE WITH DESIGNATION
	CONDUIT CONCEALED WHERE POSSIBLE OR AS NOTED, ARROWS INDICATE HOME RUN TO PANEL. CIRCUIT NUMBERS INDICATED
	#12 WIRE IN CONDUIT, UNLESS NOTED OTHERWISE ON DRAWINGS OR SPECIFICATION
	GROUNDING CONDUCTOR, #12 WIRE UNLESS NOTED OTHERWISE ON DRAWINGS OR SPECIFICATION
	CONDUIT ROUTED UNDER FLOOR/GRADE

LIGHTING

	EMERGENCY TWIN HEAD LIGHT FIXTURE
	EXIT LIGHT WITH DIRECTIONAL ARROWS INDICATED
	STRIP FIXTURE WITH TYPE DESIGNATION
	RECESSED OR SURFACE MOUNTED FIXTURE WITH TYPE DESIGNATION
	NIGHT LIGHT, CONNECT TO UNSWITCHED CIRCUIT
	CEILING OR RECESSED FIXTURE WITH TYPE DESIGNATION
	WALL MOUNTED FIXTURE WITH TYPE DESIGNATION

POWER DEVICES

	DUPLEX RECEPTACLE, BOTTOM OF BOX AT 16" AFF, UNLESS NOTED OTHERWISE
	FOURPLEX RECEPTACLE, BOTTOM OF BOX AT 16" AFF, UNLESS NOTED OTHERWISE
	DEVICE MOUNTED ABOVE COUNTER AND/OR SPLASH GUARD
	HEAVY DUTY OUTLET - NEMA CONFIGURATION SIZE PER EQUIPMENT MANUFACTURER'S RECOMMENDATION
	PANEL BOARD, TOP OF BOX 6'-0" AFF
	JUNCTION BOX
	NON-FUSED DISCONNECT SWITCH
	FUSED DISCONNECT SWITCH
	MOTOR WITH DESIGNATION

CONTROLS

S	SINGLE POLE WALL SWITCH, TOP OF BOX AT 48" AFF
S _m	MANUAL MOTOR STARTER WITH OVERLOADS

OCCUPANCY SENSORS

1. DUAL TECHNOLOGY/ULTRASONIC CEILING SENSORS SHALL BE MOUNTED 6' FROM SUPPLY/EXHAUST AIR DIFFUSERS.	
2. LOW VOLTAGE CEILING SENSORS SHALL BE PROVIDED WITH 6' SLACK CONDUCTOR COILED AT SENSOR.	
S _o	INFRARED OCCUPANCY SENSOR, WATT STOPPER #FW-100, TOP OF BOX AT 48" AFF
	DUAL TECHNOLOGY CEILING MOUNT OCCUPANCY SENSORS, WATTSTOPPER UT-300-3 HALLWAY COVERAGE PATTERN OR EQUAL
	OCCUPANCY SENSOR POWER PACK, WATTSTOPPER BZ-150 OR EQUAL, PROVIDE LOW VOLTAGE WIRING TO OCCUPANCY SENSORS AND MOMENTARY SWITCHES

COMMUNICATIONS

	DATA/TELEPHONE OUTLET WITH 3/4" CONDUIT STUBBED UP TO ABOVE ACCESSIBLE CEILING, BOTTOM OF BOX AT 16", UNLESS NOTED OTHERWISE. PROVIDE WITH PULL STRING
--	--

FIRE ALARM

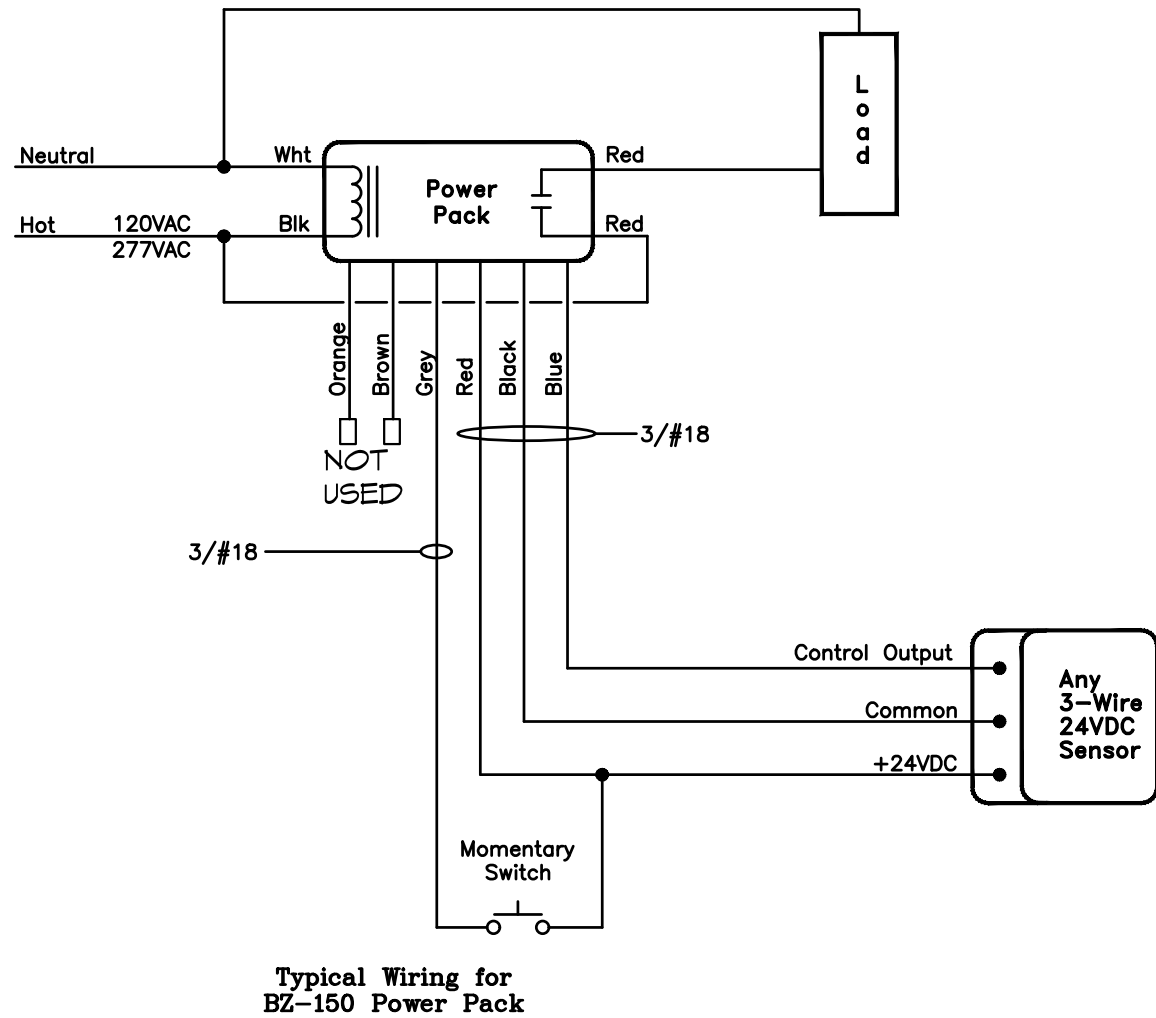
	CEILING MOUNT SMOKE DETECTOR
	DUCT MOUNT SMOKE DETECTOR
	CEILING MOUNT HEAT DETECTOR
	FIRE ALARM PULL STATION, TOP OF BOX AT 48" AFF
	EXTERIOR FIRE ALARM BELL, CENTERLINE 11'-8" ABOVE GRADE
	WATER FLOW SWITCH
	TAMPER SWITCH

MISCELLANEOUS

	LINE VOLTAGE THERMOSTAT PROVIDED BY MECHANICAL CONTRACTOR. ELECTRICAL CONTRACTOR TO PROVIDE AND INSTALL WIRING
--	--

ELECTRICAL GENERAL NOTES:

- COORDINATE ALL WORK WITH OTHER TRADES AND EXISTING CONDITIONS AS REQUIRED TO PROPERLY INSTALL ALL SYSTEMS AS INTENDED, WITHIN THE CONFINES OF THE SPACES AVAILABLE, AND WITHOUT INTERFERENCES.
- IT IS THE ELECTRICAL CONTRACTORS RESPONSIBILITY TO PROPERLY BALANCE ALL BRANCH CIRCUITS BETWEEN THE PHASES OF THE SYSTEM REGARDLESS OF CIRCUITING INDICATED.
- ELECTRICAL CONTRACTOR TO COORDINATE MANUFACTURER ELECTRICAL REQUIREMENTS FOR HVAC EQUIPMENT BEING FURNISHED WITH MECHANICAL CONTRACTOR PRIOR TO ROUGH-IN. EQUIPMENT DISCONNECTS TO BE PROVIDED BY ELECTRICAL CONTRACTOR UNLESS NOTED OTHERWISE IN MECHANICAL SCHEDULES.
- ALL MATERIALS EXPOSED WITHIN PLENUMS SHALL BE NONCOMBUSTIBLE OR SHALL HAVE A FLAME SPREAD INDEX OF NOT MORE THAN 25 AND A SMOKE-DEVELOPED INDEX OF NOT MORE THAN 50 WHEN TESTED IN ACCORDANCE WITH ASTM E 84.
- EACH BRANCH CIRCUIT SHALL HAVE A DEDICATED NEUTRAL PER NEC 210.4.
- ALL BRANCH CIRCUITS SHALL BE SIZED TO ALLOW FOR A MAXIMUM OF 3% VOLTAGE DROP. ALL FEEDERS SHALL BE SIZED TO ALLOW FOR A MAXIMUM OF 2% VOLTAGE DROP. ELECTRICAL CONTRACTOR SHALL VERIFY WIRING INDICATED IS SUFFICIENT AND INCREASE CONDUCTOR SIZE AS REQUIRED BASED OFF ACTUAL INSTALLED LENGTH OF CONDUCTORS.



CEILING OCCUPANCY SENSOR WIRING DIAGRAM

SCALE: NONE

BC PROJECT #: 22573
MISSOURI PE COA #2009003629

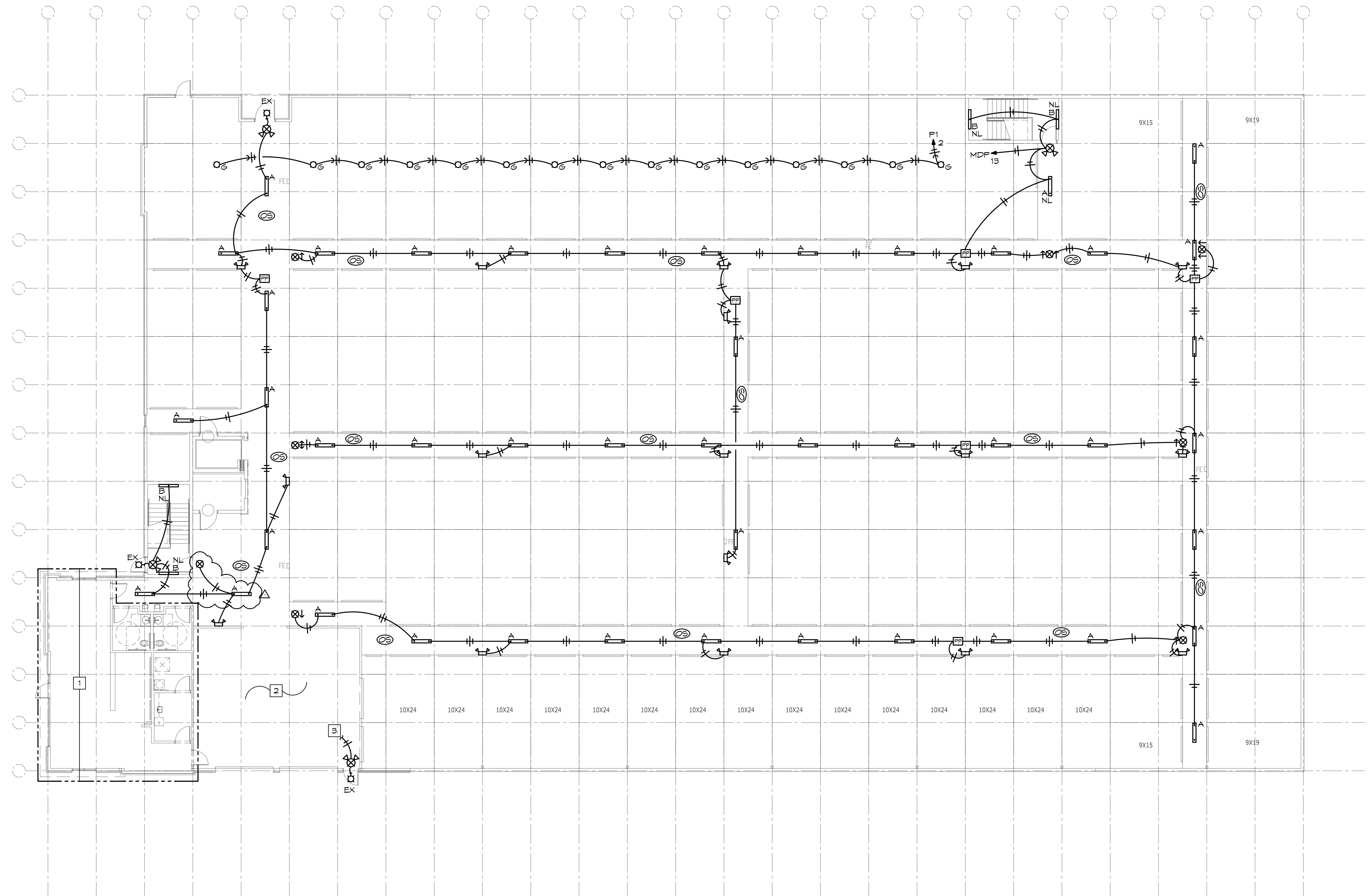
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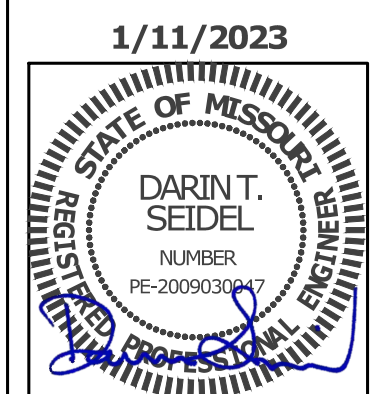
- ELECTRICAL PLAN NOTES:
- 1 SEE ENLARGED PLAN ON SHEET E3.1 FOR WORK IN THIS AREA.
 - 2 AREA OPEN TO FLOOR ABOVE. SEE SHEET E1.2 FOR LIGHTING IN THIS AREA.
 - 3 SEE SHEET E1.2 FOR CONTINUATION.



FIRST FLOOR LIGHTING PLAN
SCALE: 3/32" = 1'-0"
NORTH

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Lawrence, Kansas
66044
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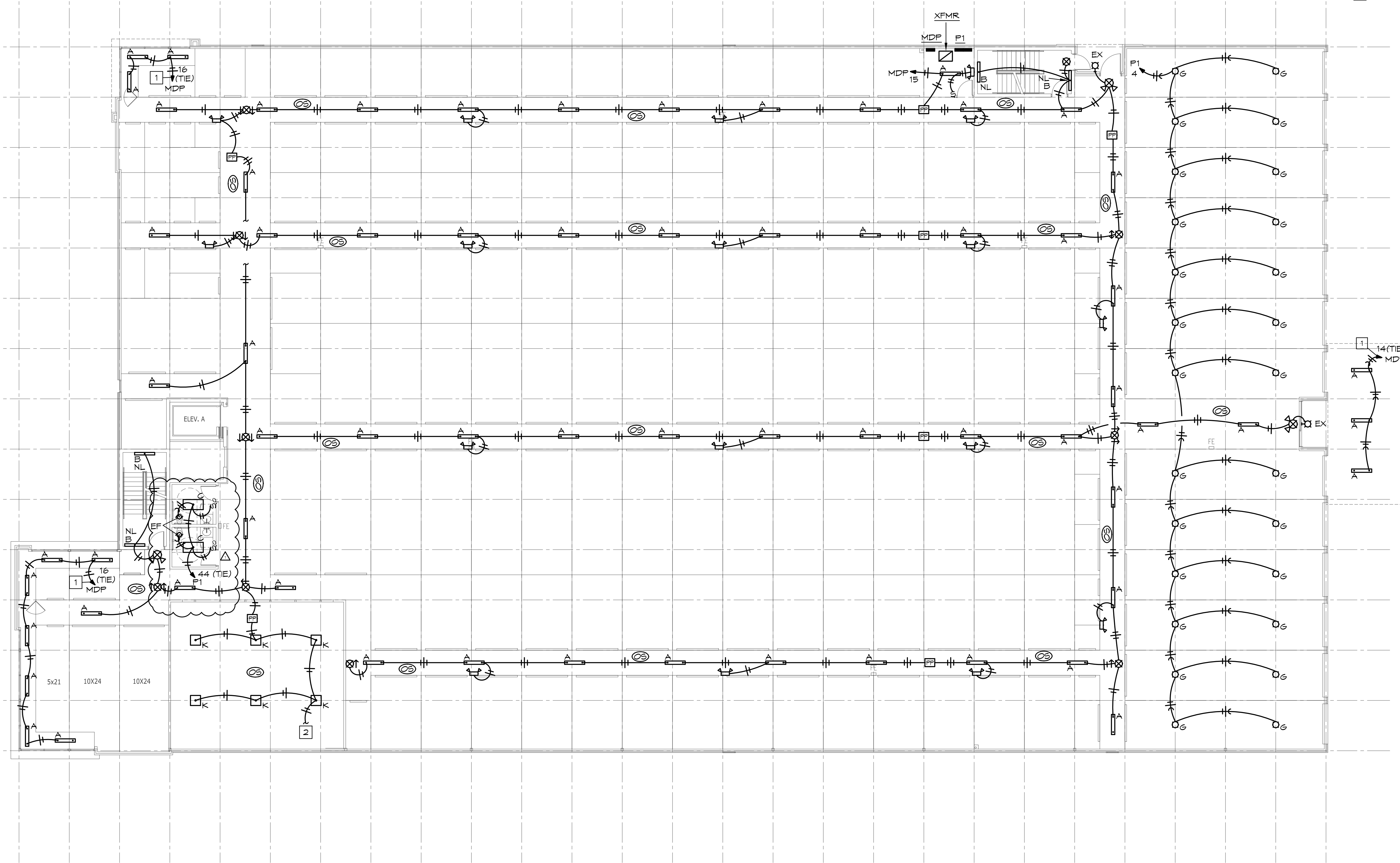
1ST FLR LIGHTING PLAN

Date: 2022/10/25
Drawn by: DS/LC
Checked by: DS/EK
Revisions: 2023/1/2

E1.1



- ELECTRICAL PLAN NOTES:
- 1 ROUTE CIRCUIT TO PANEL VIA EXTERIOR LIGHTING CONTROLS - SEE DETAIL, SHEET 1.3.
 - 2 DOWN TO EXIT SIGN - SEE SHEET E1.1



SECOND FLOOR LIGHTING PLAN
SCALE: 3/32" = 1'-0"

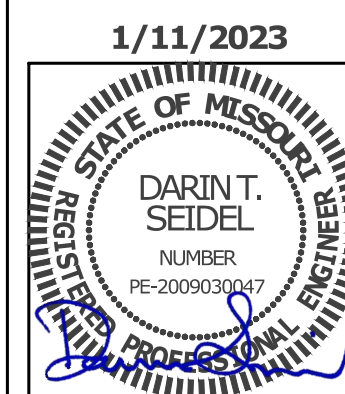
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Revisions: 1 2023/1/2



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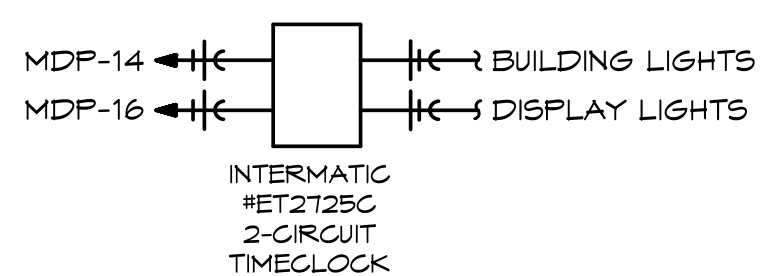
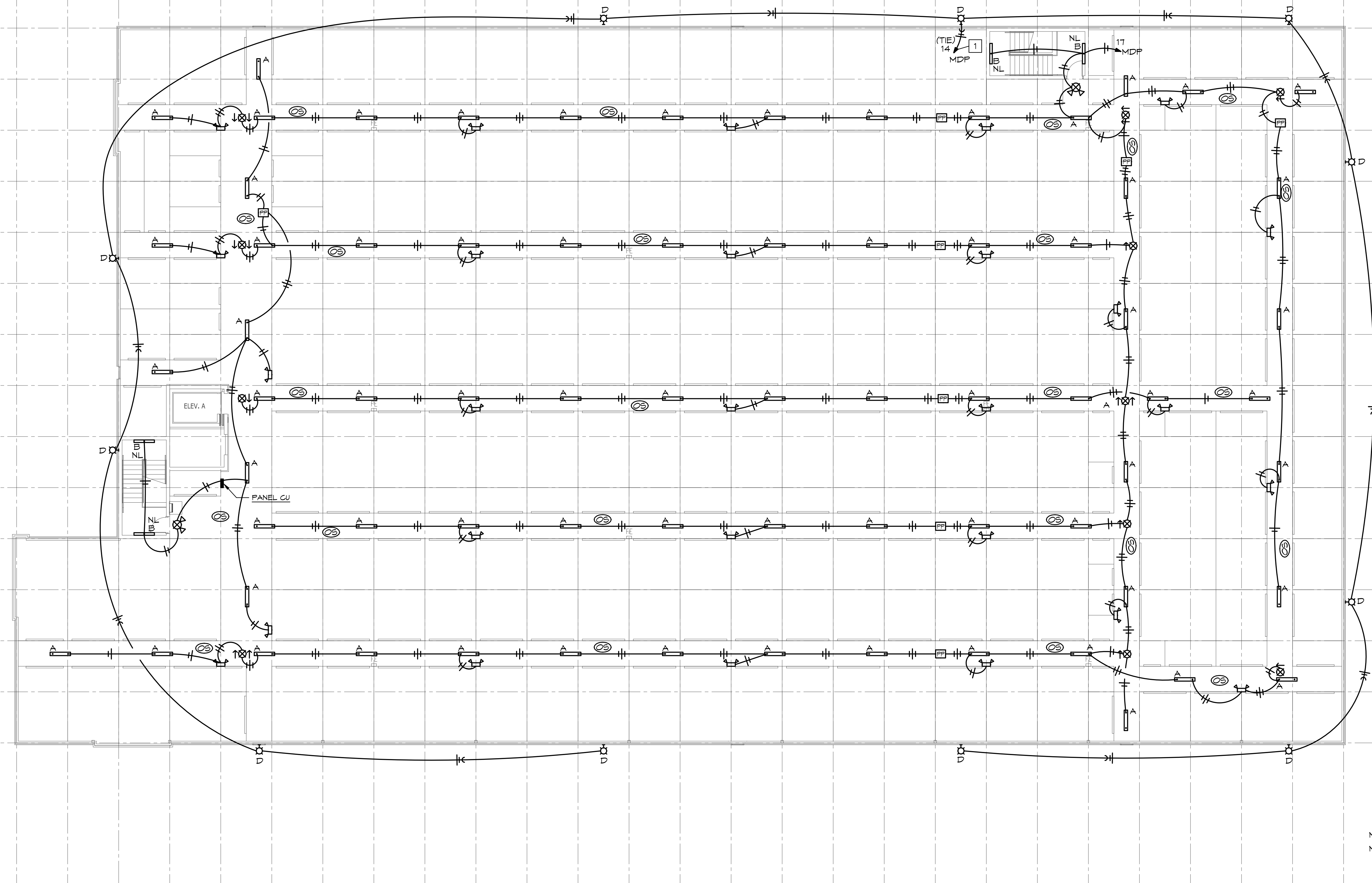
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2ND FLOOR LIGHTING PLAN

E1.2



ELECTRICAL PLAN NOTES:
1 ROUTE CIRCUIT TO PANEL VIA EXTERIOR LIGHTING CONTROLS. INTERMATIC #ET2725C OR EQUAL PROGRAMMABLE TIMECLOCK. SEE DETAIL, THIS SHEET.



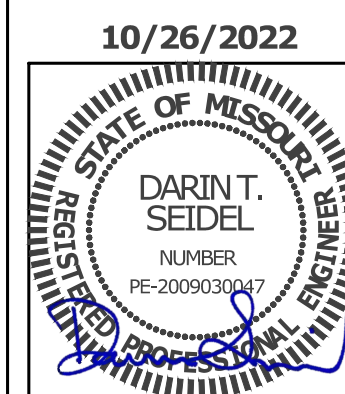
THIRD FLOOR LIGHTING PLAN
SCALE: 3/32" = 1'-0"
NORTH

EXTERIOR LIGHTING CONTROL DIAGRAM
SCALE: NONE

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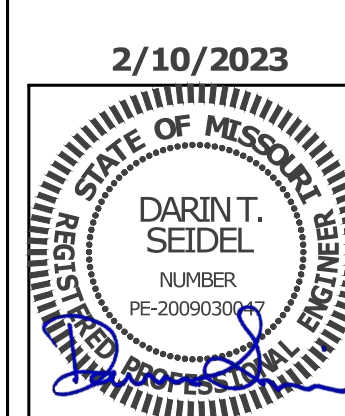
3RD FLOOR LIGHTING PLAN

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E1.3



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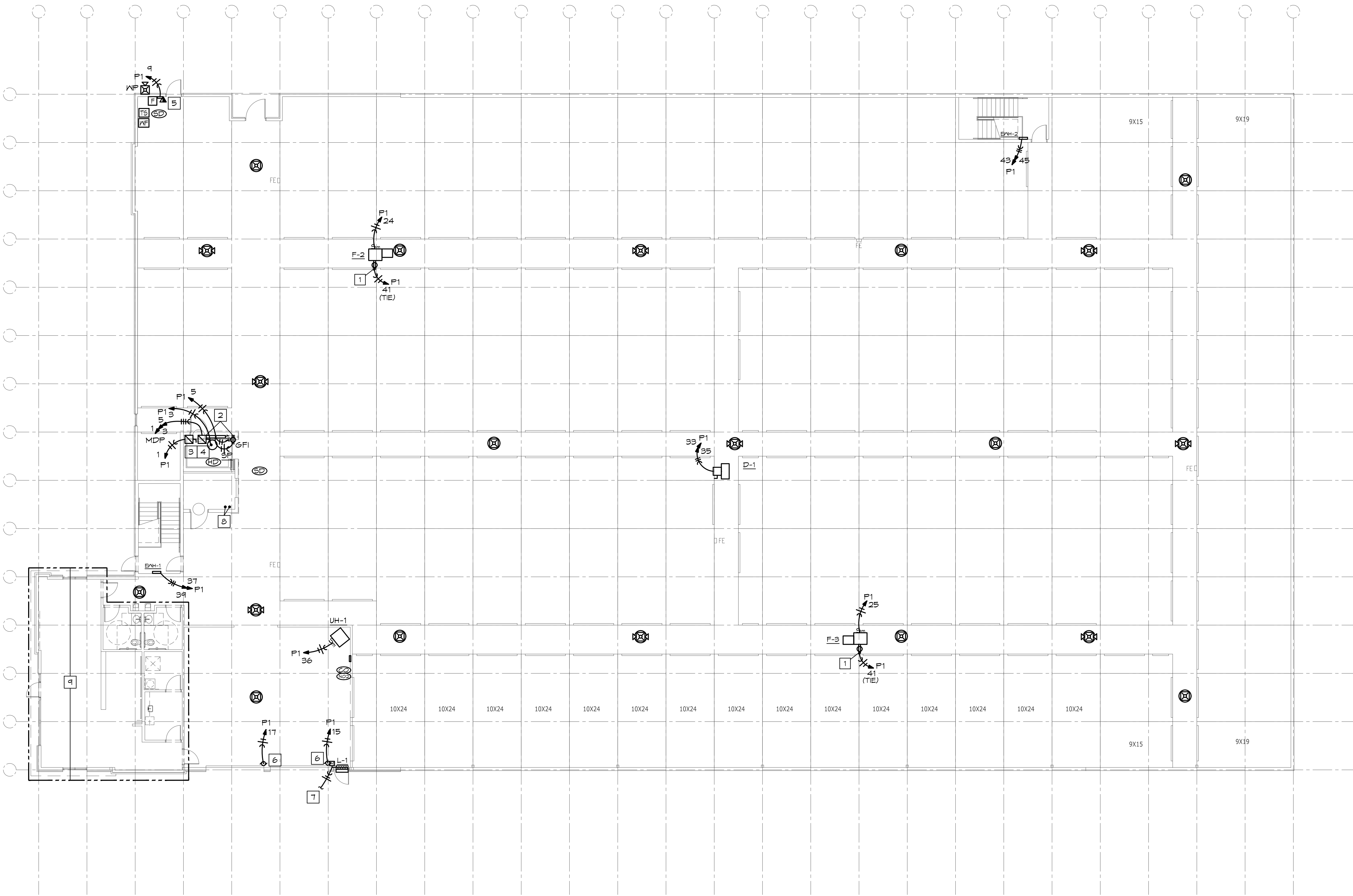
1ST FLOOR POWER PLAN

Date: 2022/10/25
Drawn by: DS/LC
Checked by: DS/EK
Revisions: 2023/1/12
2023/2/10

E2.1

POWER PLAN NOTES:

- 1 DUPLEX RECEPTACLE MOUNTED IN JOIST SPACE WITHIN 25' OF UNIT FOR HVAC EQUIPMENT SERVICE PER NEC.
- 2 DUPLEX GFCI RECEPTACLE AND VAPOR-TIGHT LIGHT WITH SWITCH MOUNTED IN ELEVATOR PIT PER NEC.
- 3 FUSED DISCONNECT SWITCHES FOR POWER TO ELEVATOR CAB LIGHTS. COORDINATE EXACT LOCATION & REQUIREMENTS WITH ELEVATOR EQUIPMENT SUPPLIER.
- 4 BUSSMAN #PS2-T48-R2-B-F1 OR EQUAL ELEVATOR POWER MODULE DISCONNECT WITH AUXILIARY CONTACTS AND SHUNT TRIP CAPABILITY. VERIFY EXACT LOCATION & REQUIREMENTS WITH ELEVATOR EQUIPMENT SUPPLIER.
- 5 POWER AND DATA FOR FIRE ALARM PANEL - VERIFY REQUIREMENTS.
- 6 CONNECT TO OVERHEAD DOOR OPERATION PER MANUFACTURER'S INSTRUCTIONS. PROVIDE CONTROL WIRING AND PUSHBUTTONS AS DIRECTED BY OWNER.
- 7 INTERLOCK WITH EXHAUST FAN - SEE 2ND FLOOR ELECTRICAL PLAN FOR LOCATION.
- 8 (1) 1" C AND (1) 2" C TO MDP FOR FUTURE SECOND ELEVATOR.
- 9 SEE ENLARGED PLAN ON SHEET E3.1 FOR WORK IN THIS AREA



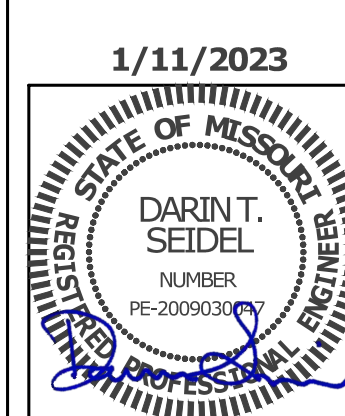
FIRST FLOOR POWER PLAN
SCALE: 3/32" = 1'-0"
NORTH

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MISSOURI PE COA #2009003629
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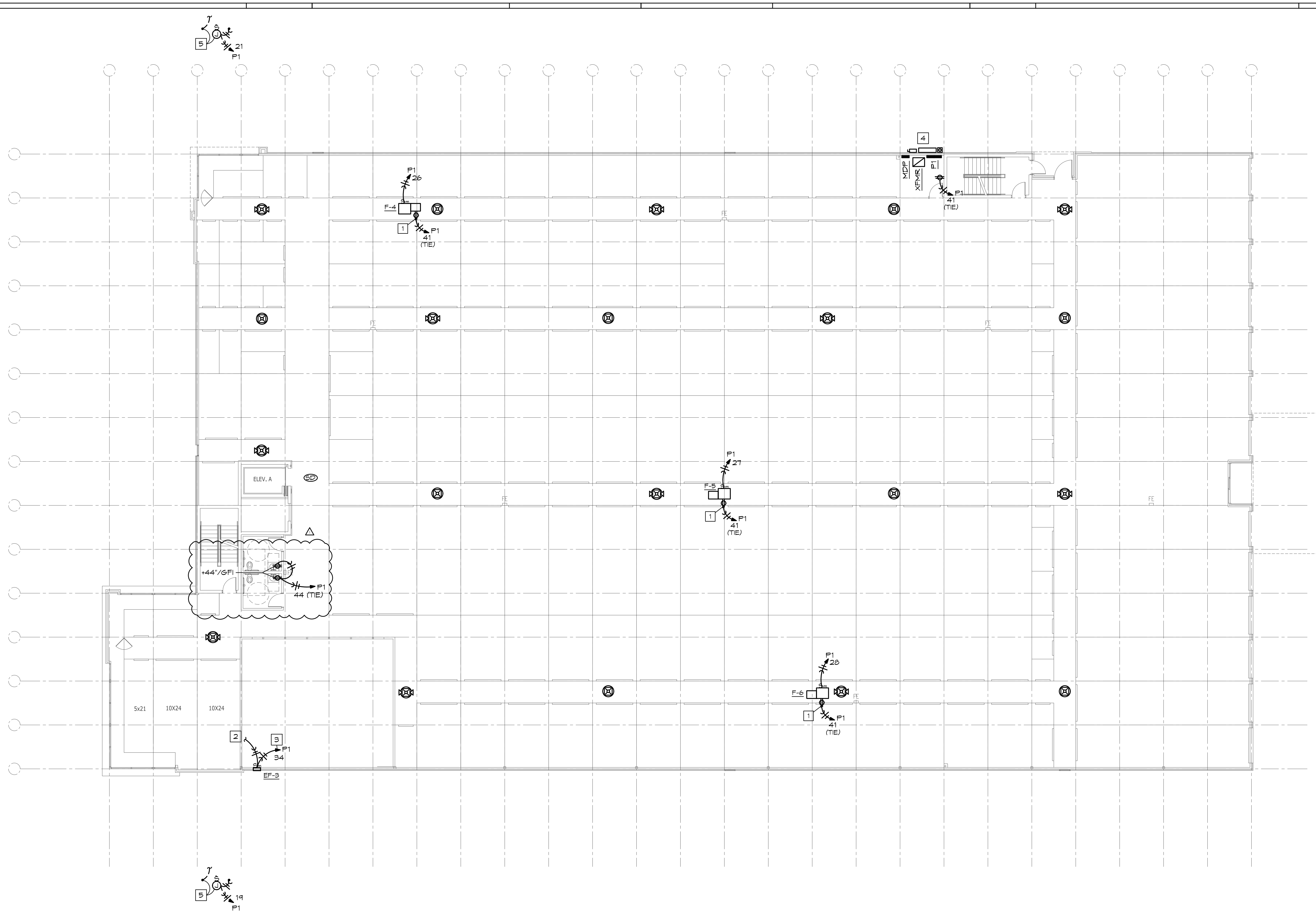
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2ND FLOOR POWER PLAN

Date: 2022/10/25
Drawn by: DS/LC
Checked by: DS/EK
Revisions: 2023/1/2

E2.2

- ELECTRICAL PLAN NOTES:**
- 1 DUPLEX RECEPTACLE MOUNTED IN CEILING SPACE NEAR FURNACES FOR EQUIPMENT SERVICE.
 - 2 INTERLOCK EXHAUST FAN WITH MOTORIZED LOUVER ON FIRST FLOOR. SEE SHEET E1.1
 - 3 ROUTE CIRCUIT THROUGH CARBON MONOXIDE DETECTOR FOR AUTOMATIC OPERATION. SEE SHEET E1.1 FOR LOCATION AND MECHANICAL DRAWINGS FOR SEQUENCE OF OPERATION.
 - 4 BUILDING MOUNTED ELECTRICAL SERVICE EQUIPMENT. SEE RISER DIAGRAM.
 - 5 PROVIDE POWER AND 1" C WITH FULL STRING TO OFFICE TELEPHONE BOARD FOR MOTORIZED ACCESS GATE OPERATOR AND ACCESS CONTROL WIRING. REFER TO CIVIL PLANS FOR GATE LOCATION. COORDINATE ALL REQUIREMENTS WITH GATE SUPPLIER.
 - 6 PROVIDE RELAY TO OPERATE 120V EXHAUST FAN WITH 27TV RESTROOM LIGHTING.



SECOND FLOOR POWER PLAN
SCALE: 3/32" = 1'-0"

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10/26/2022



DARIN T. SEIDEL
NUMBER
PE-2009030047

1100 Rhode Island
Lawrence, Kansas
66044
785 - 749 - 5806
FAX 785 - 749 - 1515

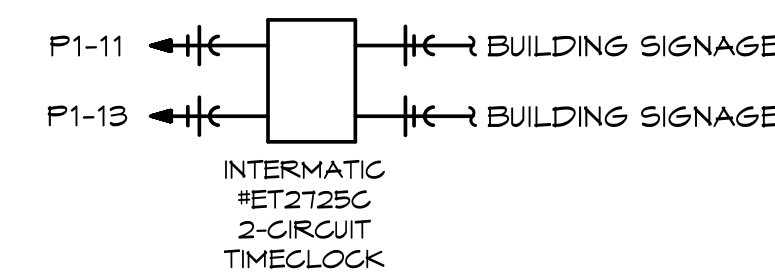
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 Revisions :

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2 DUPLEX RECEPTACLE
MOUNTED IN CEILING SPACE
NEAR FURNACES FOR
EQUIPMENT SERVICE.

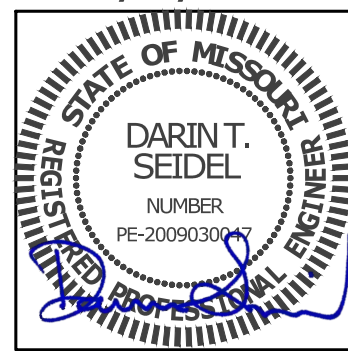


 **THIRD FLOOR POWER PLAN**
SCALE: 3/32" = 1'-0"



LAKEWOOD STORAGE
4101 NE PORT DRIVE
LEE'S SUMMIT, MO

2/10/2023



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ELECTRICAL
SCHEDULES & DETAILS

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Drawn by: DS/LC
Checked by: DS/EK
Revisions: 2023/1/12
2023/2/10

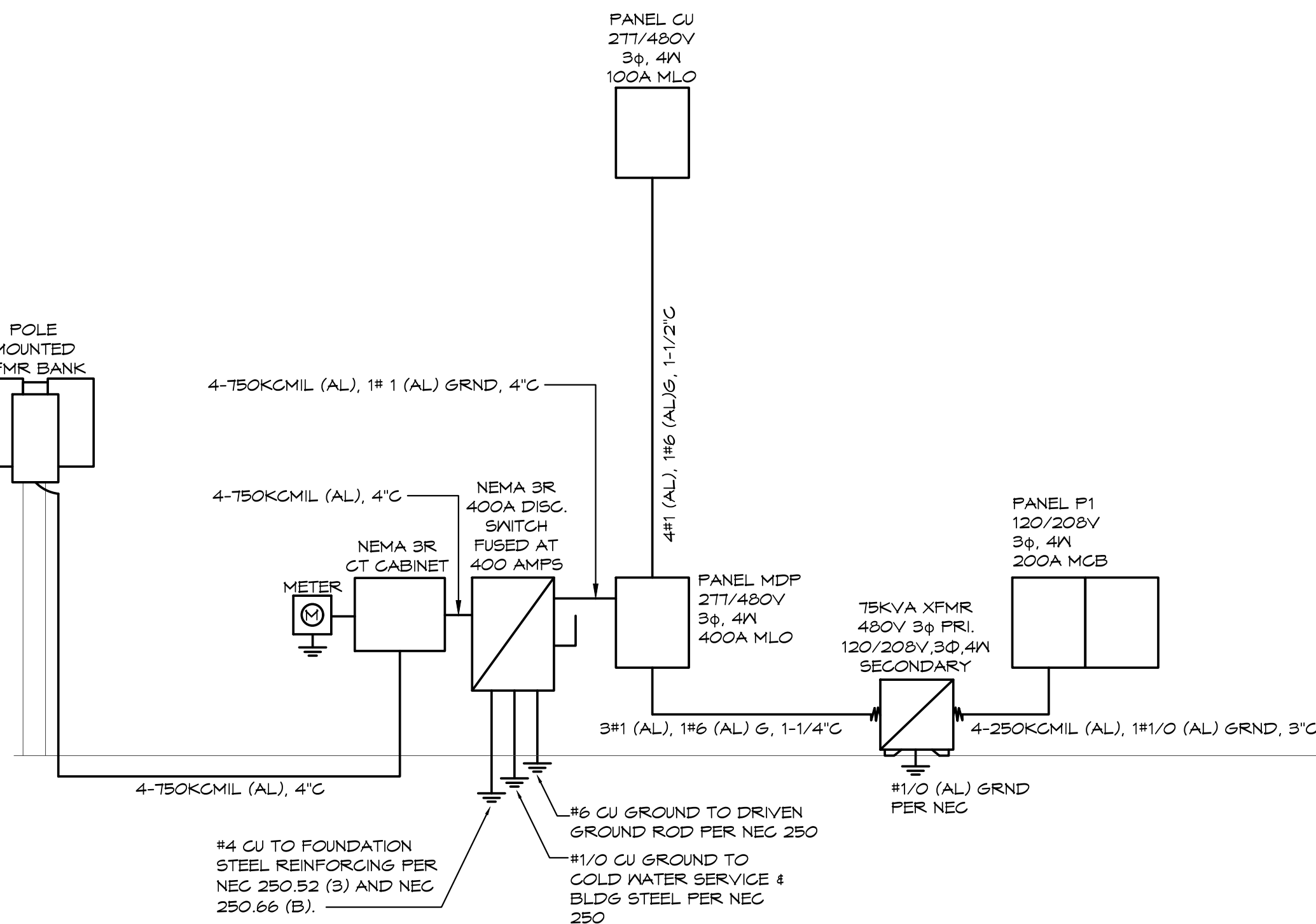
E3.0

LIGHT FIXTURE SCHEDULE

MARK NO.	MANUFACTURER & CATALOG NUMBER	VOLTS WATTS	LIGHT SOURCE	DESCRIPTION	EQUIVALENT MANUFACTURERS
A	HE WILLIAMS 75-4-LSO/840-DIM-UNV	UNV 44	LED 5000 LUM 4000K	4' LED STRIP LIGHT WITH UNIVERSAL VOLTAGE DRIVER	DAY BRITE LITHONIA OR EQUAL
B	HE WILLIAMS 75-4-LSO/840-DIM-UNV-EM/10VLP	UNV 44	LED 5000 LUM 4000K	4' LED STRIP LIGHT WITH UNIVERSAL VOLTAGE DRIVER AND INTEGRAL 10A EMERGENCY BATTERY BACKUP	DAY BRITE LITHONIA OR EQUAL
C	LITHONIA EPANL-2X4-4800LM-80CRI-40K-MIN10-ZT-MVOLT	UNV 44	LED 4800LUM 4000K	2'X4' LED FLAT PANEL WITH UNIVERSAL VOLTAGE DRIVER	DAY BRITE COLUMBIA OR EQUAL
D	LITHONIA DSXW2-LED-30C-1000-30K-T2-MVOLT-DBLXD	UNV 109	LED 10,000LUM 3000K	WALL MOUNTED FULL CUTOFF LED AREA LIGHT WITH TYPE II DISTRIBUTION. WALL MOUNT 28" ABOVE GRADE - REFER TO ARCHITECTURAL ELEVATIONS.	HUBBELL KIM OR EQUAL
G	LAMP HOLDER: LEVITON 8829-CW2 LAMP SYLVANIA LED6A19F82T10YVRP4 SENSOR: FIRST ALERT FIR125	120 6	LED 450LUM 2700K	KEYLESS LIGHT FIXTURE IV, 100W EQ LED LAMP ON MOTION SENSOR	COLUMBIA LITHONIA OR EQUAL
K	LITHONIA CPHB-18LM-MVOLT-40K	UNV 134	LED 18,000LUM 4000K	COMPACT LED HIGH-BAY WITH UNIVERSAL VOLTAGE DRIVER	HUBBELL KIM OR EQUAL
L	LITHONIA ELMLT-X-LP06VS-LTP	UNV 1	INCL	EMERGENCY LIGHT WITH TWIN ADJUSTABLE LED HEADS AND LITHIUM IRON PHOSPHATE BATTERY. MOUNT AT T-6"±, TO CLEAR OBSTACLES. (PROVIDES 1 FC AVG. ON 54" CENTER FIXTURE SPACING), WHITE FINISH	SURE-LITES DUAL-LITE OR EQUAL
M	DUAL-LITE EVE-U-R-N-E	UNV 1	INCL	EXIT LIGHT WITH LED LAMPS, RED LETTERS ON WHITE BACKGROUND, UNIVERSAL MOUNT, BATTERY BACKUP	SURE-LITES LITHONIA OR EQUAL
N	LITHONIA LHQM-LED-R-HO-SD WITH ELA-TQWPF-L0309	UNV 5	INCL	COMBINATION EMERGENCY/EXIT LIGHT WITH LED LAMPS, RED LETTERS ON WHITE BACKGROUND, TWIN 6W EMERGENCY LIGHT HEADS, UNIVERSAL MOUNT, HIGH CAPACITY BATTERY BACKUP AND REMOTE TWIN HEAD OUTDOOR RATED FIXTURE	SURE-LITES DUAL LITE OR EQUAL
EX	LITHONIA AFN-DB-EXT	UNV 21	LED INCL 4000K	ARCHITECTURAL EXTERIOR LED EMERGENCY LIGHT WITH COLD WEATHER BATTERY, COORDINATE FINISH TO MATCH BUILDING	SURE-LITES DUAL LITE OR EQUAL

PANEL: CU		VOLTS: 277/480V			PH: 3Ø		WIRE: 4W		LOCATION: 3RD FLOOR			MOUNTING: SURFACE					
BUS: 125A		MAIN: 100A MLO			IG: 14,000		RMS SYM AMPS						FEEDER: SEE RISER DIAGRAM				
CKT	DESCRIPTION	AMPS	POLE	WIRE	ØA	ØB	ØC	ØA	ØB	ØC	WIRE	POLE	AMPS	DESCRIPTION	CKT NO		
1	CU-1	15	3	12	2,256			2,256			12	3	15	CU-2	2		
3						2,256			2,256							4	
5							2,256			2,256							6
7							2,256			2,256							8
9	CU-3	15	3	12		2,256			2,256		12	3	15	CU-4	10		
11							2,256			2,256							12
13							2,256			2,256							14
15							2,256			2,256							16
17	CU-5	15	3	12		2,256			2,256		12	3	15	CU-6	18		
19							2,256			2,256							20
21							2,256			2,256							22
23							2,256			2,256							24
25	CU-7	15	3	12		2,256			2,256		12	3	15	CU-8	26		
27							2,256			2,256							28
29							2,256			2,256							30
31							2,256			2,256							32
33	SPARE	20	1									1	20	SPARE	34		
35	SPARE	20	1									1	20	SPARE	36		
37	SPARE	20	1									1	20	SPARE	38		
39	SPARE	20	1									1	20	SPARE	40		
41	SPARE	20	1									1	20	SPARE	42		
NOTES:					11,280	11,280	11,280	9,024	9,024	9,024	TOTAL CONNECTED LOAD: 60,912 VA						
					20,304		20,304		20,304							NEG DEMAND LOAD: 60,912 VA	
										DEMAND AMPS @ 480 VOLT / 3Ø: 78.21							

PANEL: MDP		VOLTS: 277/480V		PH: 3Ø		WIRE: 4W		LOCATION: ELEC RM		MOUNTING: SURFACE						
BUS: 400A		MAIN: 400A MLO		IG: 35,000		RMS SYM AMPS				FEEDER: SEE RISER DIAGRAM						
CKT NO.	DESCRIPTION	AMPS	VOLTS	WIRE	ØA	ØB	ØC	ØA	ØB	ØC	WIRE	POLE	AMPS	DESCRIPTION	CKT NO.	
1	△ ELEVATOR	200	3	3/0	32,686			32,686					3	200	SPARE (FUTURE ELEVATOR)	2
3					32,686			32,686				4				
5						32,686			32,686							6
7					4,782			20,304								8
9	XFMR / PANEL P1	100	3	3		15,130			20,304			3	3	100	PANEL CU	10
11							13,020			20,304						12
13	1ST FLOOR LIGHTS	20	1	12	2,156			1,191			10	1	20	EXTERIOR LIGHTS	14	
15	2ND FLOOR LIGHTS	20	1	12		3,288			440		12	1	20	DISPLAY LIGHTS	16	
17	3RD FLOOR LIGHTS	20	1	12			3,300					1	20	SPARE	18	
19	SPARE	20	1									1	20	SPARE	20	
21	SPARE	20	1									1	20	SPARE	22	
23	SPARE	20	1									1	20	SPARE	24	
25	SPARE	20	1									1	20	SPARE	26	
27	SPARE	20	1									1	20	SPARE	28	
29	SPARE	20	1									1	20	SPARE	30	
NOTES:					49,666	51,904	49,008	54,184	53,430	52,110	TOTAL CONNECTED LOAD: 311,185 VA					
					109,895		105,334		101,916		NEG DEMAND LOAD: 297,066 VA					
										DEMAND AMPS @ 480 VOLT / 3Ø: 351.32 A						



ELECTRICAL RISER DIAGRAM
SCALE: NONE

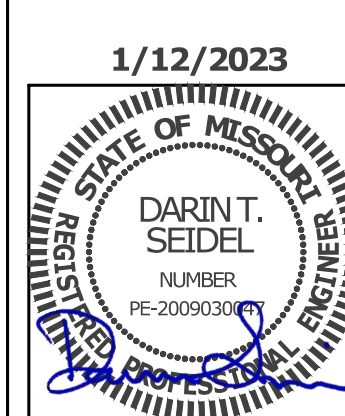
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MISSOURI PE COA #2009003629
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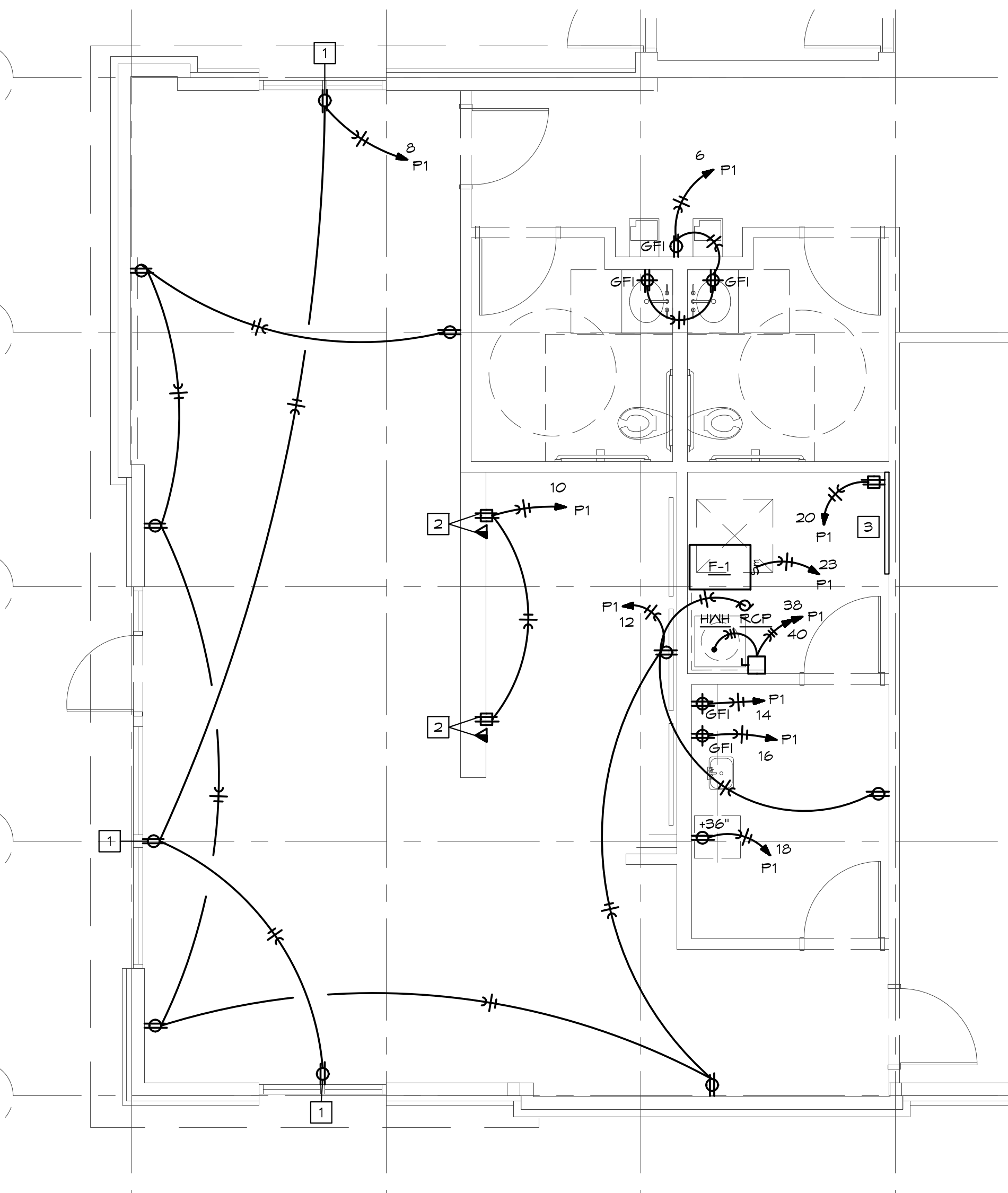


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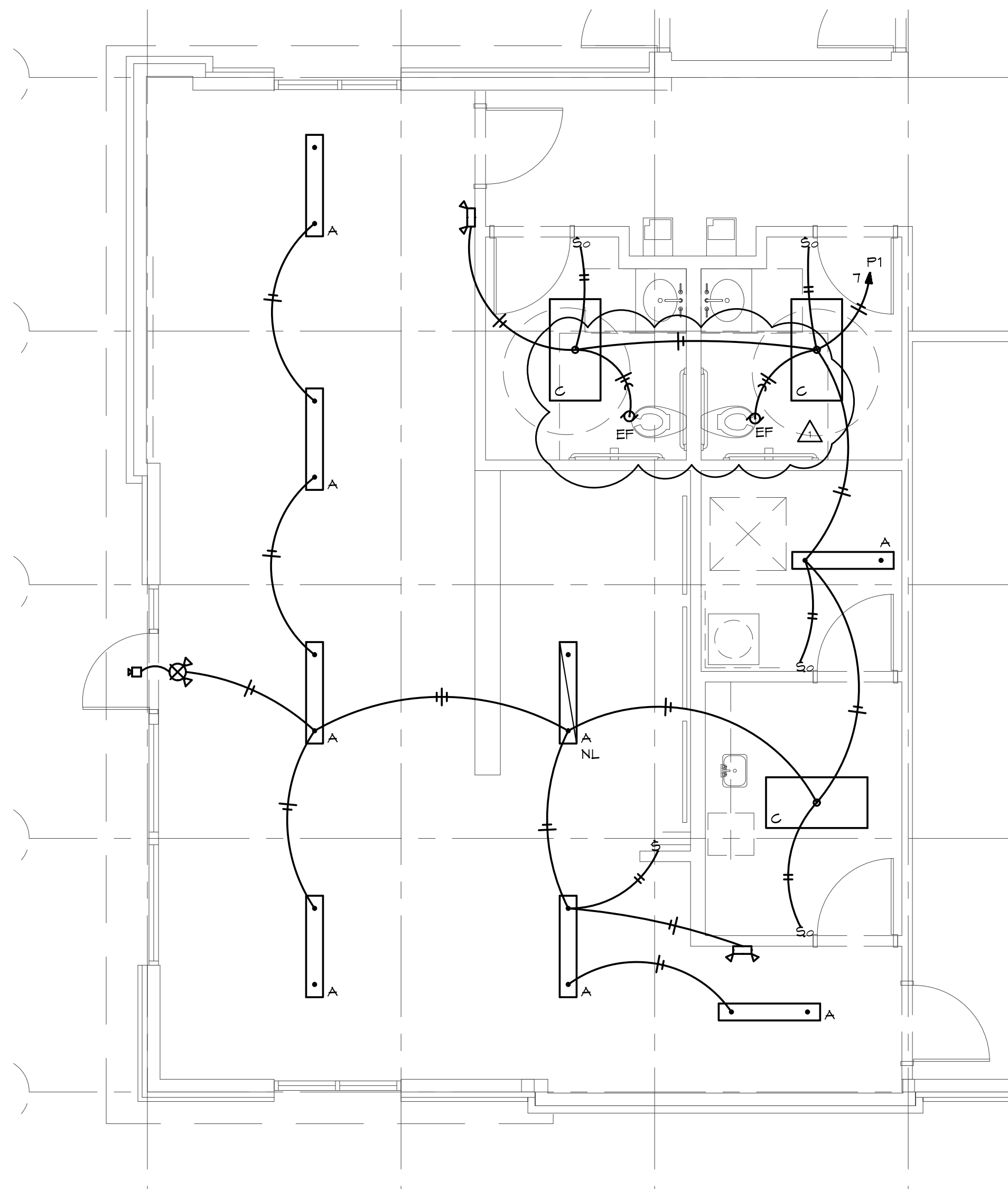
ENLARGED ELECTRICAL
PLANS

Date: 2022/10/25
Drawn by: DS/LC
Checked by: DS/EK
Revisions: 2023/1/2

E3.1



OFFICE ELECTRICAL POWER PLAN
SCALE: 1/4" = 1'-0"



OFFICE ELECTRICAL LIGHTING PLAN
SCALE: 1/4" = 1'-0"

ELECTRICAL PLAN NOTES:

- 1 DUPLEX RECEPTACLE MOUNTED ABOVE STOREFRONT GLASS FOR DISPLAY WINDOW SIGNAGE PER NEG.
- 2 DEVICES MOUNTED IN RECEPTION DESK CASEWORK. COORDINATE LOCATIONS WITH CASEWORK VENDOR. ROUTE ALL WIRING CONCEALED.
- 3 4'X8'X3/4" FIRE-RETARDANT PLYWOOD TELECOMM BACKBOARD WITH GROUND BAR AND #6CU BOND TO BUILDING ELECTRODE SYSTEM. PROVIDE (2) 4" TO PROPERTY LINE FOR TELECOMM & INTERNET SERVICE. TERMINATE CONDUITS AS DIRECTED BY LOCAL SERVICE PROVIDER.

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MISSOURI PE COA #2009003629
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