HVAC REQUIREMENTS

1. Provide all equipment as shown or noted on the plans. Provide all accessories, controls, or other items as necessary for complete and operating systems. All equipment shall be labeled, bearing designation as shown on the drawings. Labels shall be engraved, white on black laminated plastic plates.
2. All temporary valves, dampers, disconnects, etc. not indicated, but required by phasing, shall be included in the base bid.
3. Provide canvas connections for all duct systems at fan or unit connections.
4. Set floor-mounted air equipment with rotating parts on 3" x 3" x 2" neoprene isolator pads.
5. All ductwork sizes shown on the drawings represent free area. Adjust sheetmetal sizes accordingly to accommodate insulation.
6. Round low pressure air conditioning supply ducts, shall receive an exterior wrap of Certain-Teed SoftTouch, type 150, FSK faced, 1.5 pcf, 1½" thick, R= 6.2, with an installed R-value of 4.8 at 25% compression.
7. Outdoor ductwork shall receive an exterior wrap of 2" thick ArmaTuff White laminated Armaflex sheet and roll insulation. All seams shall be installed in compression and sealed per the manufacturer's instructions.
8. Provide all sheet metal work as specified and indicated on the drawings. All duct construction, gauges, methods of construction, and methods for hanging and supporting shall conform to SMACNA "HVAC Duct Construction Standards" and all applicable codes.
9. Low pressure ducts shall conform to SMACNA Tables 1-5 (2" w.g.) and Tables 1-10 through 1-13. Additional reinforcing shall be installed where necessary to eliminate excessive movement and vibration. All rectangular branch takeoffs in supply ductwork shall be the 45° entry design with a manual damper. Low pressure round ducts 10" and smaller in diameter shall be constructed per SMACNA Table 3-2, 2" w.g. Low pressure round ducts 12" and larger in diameter, and all exposed round ducts, shall be of spiral construction.
10. Flexible ductwork is acceptable where indicated in low pressure ductwork and shall be Flexmaster Type 8M, or approved equal, UL_181 Class I air duct, insulated, flexible duct with manufacturer's minimum working pressure rating of 6" W.G. The use of flexible duct run shall be limited to 6' on any single duct run. INSTALL FLEXIBLE DUCT AS STRAIGHT AS POSSIBLE WITHOUT SAGGING. MAKE BENDS WITH MAXIMUM RADIUS POSSIBLE.
11. Fire dampers, combination fire/smoke dampers, and smoke dampers shall be provided as required per code and where shown on the drawings. Dampers shall be in full compliance with local codes. Provide access doors for access to dampers
12. Provide flues where shown on the drawings. Flue construction shall conform to SMACNA Standards and applicable codes.
13. Drain lines shall be graded at 1/8" per foot. All drains shall be provided with a trap of proper depth in accordance with prevailing system static pressures.
14. All piping shall be concealed in walls, below floors, or above ceilings unless indicated otherwise or shown running through areas with exposed structure. Pipe shall be installed parallel or perpendicular to building surfaces.
15. Provide chrome plated escutcheons on exposed pipes where they pass through walls, ceilings, and base cabinet penetrations.
16. Refrigeration piping:
    - A. Shall be Type L ACR hard copper with silfos joints, or continuous flexible line sets. All elbow fittings, except suction line oil traps, shall be long radius type. Suction line oil traps shall be comprised of short radius elbows to minimize the quantity of oil retained. All refrigerant lines shall be clean and provided with suction line oil traps as recommended by the manufacturer so as to assure proper oil return to the compressor.
    - B. All refrigerant lines shall be charged with nitrogen during all sweating and heating operations.
    - C. All refrigerant systems shall be evacuated with a vacuum pump prior to charging.
    - D. Provide 3/4" closed-cell, elastomeric insulation on refrigeration suction lines.
    - E. Paint all exterior foam insulation with UV resistant finish.
    - F. Refrigerant piping from the BC controller to the individual VRF evaporators shall be pre-manufacturer, pre-insulated line sets. Suction lines shall be supported per section 23 05 29. Liquid lines shall be support from, and secured to, the suction lines with a clamp (taping will not be acceptable) - ONLY FOR VRF SYSTEMS
17. Pipe hangers for lines 1/2" to 2" shall be adjustable swivel ring hangers. Pipe hangers for lines 2 1/2" to 4" shall be light duty clevis hangers. Pipe hangers for lines 6" and larger shall be standard clevis hangers. Provide riser clamps at each floor and at other locations where vertical support is necessary.
18. Before testing begins, the contractor shall: clean ductwork, coils, fans, etc. in the air system to remove all construction dust and debris; provide new air filters.
19. Provide HVAC identification as specified and indicated on the drawings. Equipment Markers shall be engraved, color-coded laminated plastic.
    - A. Duct Markers: Vinyl, 2-inch minimum character height, with permanent pressure sensitive adhesive. Include direction and quantity of airflow and duct service (such as supply, return, and exhaust).
20. Piping Identification Devices
    - A. Manufactured Pipe Markers, General: Preprinted, color-coded, with lettering indicating service, and showing direction of flow.
    - B. Valve Schedules: For each piping system, on standard-size bond paper. Tabulate valve number, piping system, system abbreviation (as shown on temperature control drawings), location of valve (room or space), normal-operating position (open, closed, or modulating) and variations for identification. Mark valves for emergency shutoff and similar special uses.
21. Duct Insulation, refer to Duct Insulation schedule on Mechanical Details sheet.
22. Carbon Monoxide System
    - A. Supply, install and connect at locations ACME Series 01-01E3R (or 01-01E3RE) Detection and control unit with remote sensors. Interconnection between sensor and control unit shall be 6 #18 low voltage wires between identified terminals.
    - B. Units shall be fully electronic incorporating solid state circuitry with electronic board, factory calibrated at LOW (35PPM), HIGH (100PPM) and ALARM (100PPM w/30 min. delay, adjustable 1-60 min.) gas levels. Electronic board shall incorporate LED visual indicators seen through unit cover for "power on", operating status and sensor trouble functions.
    - C. The fail-safe feature of the circuitry shall force the LOW CO operating level to be energized upon a "SENSOR TROUBLE" condition so that the fan(s) will run until trouble is corrected.
    - D. The LOW LEVEL (35PPM) operating level shall close an independent SPDT contact with visual status indicator on unit.
    - E. The HIGH LEVEL (100PPM) operating level shall close another independent SPDT contact with additional visual status indicator on unit.
    - F. The ALARM LEVEL (100PPM w/ 30 min. delay) operating level shall provide visual and audible alarms and also close an independent SPDT contact. Nuisance alarms caused by temporary conditions shall be avoided by providing a field-selectable (30 min. standard) time delay between operating of HIGH and ALARM levels.
23. Nitrogen Dioxide System
    - A. Supply, install and connect at locations shown on plans ACME Series NO2-EN Detection and control unit with either A11 area sampling head or D11 duct sampling head. Connections between control unit and detection head shall be ½" FPT.
    - B. The LOW LEVEL (1PPM) operating level shall close an independent SPDT contact with visual status indicator on unit.
    - C. The MEDIUM LEVEL (2PPM) operating level shall close another independent SPDT contact with additional visual status indicator on unit.
    - D. The HIGH LEVEL (3PPM) operating level shall close another independent SPDT contact with additional visual status indicator on unit.
    - E. The ALARM LEVEL (5PPM) operating level shall provide visual and audible alarms and also close an independent SPDT contact
24. Air Diffusers, Registers and Grills
    - A. Except as otherwise indicated, provide manufacturer's standard ceiling air diffusers where shown; of size, shape, capacity and type indicated; constructed of materials and components as indicated, and as required for complete installation.
    - B. Provide ceiling air diffusers that have, as minimum, temperature and velocity traverses, throw and drop, and noise criteria ratings for each size device as listed in manufacturer's current data.
    - C. Provide diffusers with border styles that are compatible with adjacent ceiling systems, and that are specifically manufactured to fit into ceiling module with accurate fit and adequate support. Refer to general construction drawings and specifications for types of ceiling systems which will contain each type of ceiling air diffuser.
    - D. Provide ceiling diffusers of type, capacity, and with accessories and finishes as listed on diffuser schedule.
25. Roof Curbs
    - A. Roof curbs shall be Pate, #PC-2b, 18" high with treated nailer, for field installation.
    - B. Curbs shall be constructed of heavy gauge galvanized steel, utilized, full mitered corners, all seams welded, 1½ " thick rigid fiberglass insulation, pressure treated wood nailer strip. All curbs are internally reinforced in larger size dimensions.

      On **b** style curbs overhang is ½" thick unless otherwise specified.
26. Pipe Portals
    - A. Pipe portals for refrigerant lines passing through roof shall be RPS Corp., 14 gauge G90 galvanized steel, 18" tall roof curb with ABS plastic curb cover with integral EPDM rubber pipe caps with stainless steel clamps.
27. Equipment Support Curb
    - A. Roof mounted condensing unit support curbs shall be Pate, ES-2b, 8" wide, 18" high, and 14 gauge with treated nailer for field insulation.
    - B. Curbs shall be set directly upon structural slab and not insulation.
    - C. Mechanical contractor shall provide shims within the deck flutes per structural plans.
28. Roof Mounted Air Tunnel
    - A. Air tunnel shall be constructed from standard full perimeter style roof curbs, Pate #PC-2b, in heights and dimensions as indicated on plans.
    - B. Air tunnel top shall be constructed of pre-finished sheet steel (in color selected by architect) and shall be pitched to drain water. Top shall include flashing and drip edge. Provide 1" Styrofoam insulation fully adhered to underside of top.

FIRE PROTECTION REQUIREMENTS

1. The fire protection contract includes all labor, materials and equipment required for the complete fire suppression system(s) as shown and herein specified.
2. Provide all devices and accessories as necessary for complete and working systems.
    - A. Install all equipment in strict accordance with NFPA requirements, the manufacturer's recommendations, and the shop drawings reviewed by the Engineer.
3. Above Grade Piping and Fittings (Steel)
    - A. Schedule 40 grade, ASTM A-53, black steel pipe shall be used for all Fire Protection Piping. Victaulic UL listed and FMG approved fittings and couplings shall be used for all joints and fittings. Schedule 10 black steel pipe shall be permitted in lieu of Schedule 40 steel pipe to meet N.F.P.A. 13 requirements, however joining methods will be strictly limited to Victaulic couplings and fittings. The use of threaded lightwall piping (Allied XL), and the use of lightwall materials, is strictly prohibited.
    - B. Rigid type couplings shall be fully installed at visual pad-to-pad offset contact. Tongue and recess couplings, or any couplings that require exact gapping of housings on each side of the coupling at specified torques, are not permitted.
        - a. 1-1/4" through 4": Factory assembled for direct stab installation without field disassembly. Victaulic Style 009 EZ.
        - b. 5" through 8": Victaulic FireLock™ Style 005.
        - c. 10" and Larger: Victaulic Zero-Flex® Style 07.
    - C. Flexible Type: For use in locations where vibration attenuation and stress relief are required, and for seismic applications. Victaulic Style 75 and 77.
4. CPVC Piping: CPVC pipe and fittings (Has be approvied by owner and Engineer prior to bidding) shall be listed by UL and also either rULC or C-UL for use in:
    - A. Light Hazard Occupancies as defined by NFPA 13. Ordinary hazard rooms of otherwise light hazard occupancies where the room does not exceed 400 ft., per section 6.3.6.2 of NFPA 13, Latest adopted Edition.
    - B. Residential Occupancies up to four stories in height as defined by NFPA 13R.
    - C. One and two family dwellings and manufactured homes as defined by NFPA 13D.
    - D. Air handling (plenum) spaces as defined by NFPA 90A.
    - E. Underground water pressure service as defined by NFPA 24.
    - F. Maximum design temperature/pressure rating shall not be less than175 psi at 150°F.
    - G. Refer to UL and FM** (if applicable).
    - H. Refer to CPVC pipe and fitting manufacturers' installation instructions.
5. Sprinkler System:
    - A. The piping indicated on the plans are schematic in nature and are provided mainly for coordination purposes. The actual design and final head placement shall be determined by the fire protection engineer designing the system.
    - B. Provide sprinkler system as indicated. System shall contain, but not be limited to, all piping, valves, test lines, drains and etc., as shown or required by NFPA-13 and NFPA-13R for a complete system.
    - B. Provide a freestanding type polished brass Fire Department connection, equal to Fire End and Croker No. 6510, 2-way clapper, 4" x (2) 2-1/2", where indicated on the Drawings, with hose threads complying with local Fire Department Standards. Installation shall include check valve and ball drip assembly, pipe to drain or discharge onto grade. Connection shall be labeled "Standpipe and Sprinkler".
    - C. Heads shall be Central Sprinkler as listed below. Equivalent sprinkler heads by Viking, Star, Grinnell or Reliable are acceptable for the heads specified. Head temperature ratings shall be 165°F unless otherwise specified. Sprinkler heads in elevator shafts and machine rooms shall be 212° F temperature activated.
    - D. Upright Sprinklers: Central Sprinkler Model GBQR upright automatic sprinkler, rough bronze finish
    - E. Upright Sprinklers with Shields: Central Sprinkler Model GBQR with WSG-2 Guard and Assembly,upright automatic sprinkler, rough bronze finish
    - F. Semi-Recessed Pendants: Central Sprinkler Model GBQR recessed automatic sprinkler, flat white finish, adjustable 2-piece escutcheon
    - G. Fully Recessed Sprinklers: Central Sprinkler Model GB4-FR (concealed) adjustable flush-concealed auto sprinkler, cover plate with flat white finish.
    - H. Side Wall Sprinklers: Central Sprinkler Model GB Sidewall, flat white finish
    - I. Sprinkler heads in areas with sheet rock ceilings shall be fully recessed head type.
    - J. Sprinkler heads in lay-in ceilings shall be located in the center of ceiling tiles with a tolerance of +/- 2 inches.
    - K. All control valves in the sprinkler system shall be provided with supervisory switches. Switches will alarm when a valve is not in its normal operating position.
    - L. Provide water flow alarm apparatus for the system. Alarm device shall be a listed alarm check valve with all necessary attachments required to give an alarm. Flow alarm devices shall be installed per NFPA requirements.
    - M. Provide flow switches as indicated on the drawings and as required by NFPA.
    - N. At the Contractors option, sprinkler system final connections may be FlexHead Industries Inc. flexible piping connections. The flexible connection shall include a fully welded, braided and leak tested connector with a one-piece ceiling bracket, attachment hub and self-securing integrated ceiling grid mounting bracket. The flexible piping system shall be UL listed and FM approved suitable for their intended use.
6. Design and install: a complete automatic sprinkler system for fire protection. All elements and components of the system shall be in compliance with NFPA Pamphlet 13 and 13R, "Standard for the Installation of Sprinkler Systems". Components shall be listed in current Underwriters Laboratories "Fire Protection Equipment List". Final acceptance shall be based on submission of test certificates, and completion of all regulatory body recommendations submitted following their final inspection.Sprinkler head spacing, pipe sizing and flow calculations shall be hydraulically calculated. Design criteria shall be as follows:
    - A. For **Light Hazard**, provide a water density of 0.1 GPM per square foot over the most hydraulically remote 1500 square feet. Light hazard shall be installed in all areas of the building except mechanical rooms, storage rooms, and janitor's closets or others required by NFPA 13.
    - B. For **Ordinary Hazard Group I**, provide a water density of 0.15 GPM per square foot over the most hydraulically remote 1500 square feet. Ordinary hazard, group I includes the following area types: mechanical rooms, storage rooms, janitors closets, restaurant Service areas (Kitchens), Automotive Show rooms/parking areas and as listed in NFPA 13.
    - C. For **Ordinary Hazard Group II**, provide a water density of 0.2 GPM per square foot over the most hydraulically remote 1500 square feet. Ordinary hazard, group II includes Mercantile, Library stack rooms up to 12' in height, manufacturing areas, repair garages, machine shops and as listed in NFPA 13.
    - D. For **Extra Hazard Group I** provide a water density of 0.3 GPM per square foot over the most hydraulically remote 2500 square feet. Refer to NFPA for occupancy area requirements.
    - E. For **Extra Hazard Group II** provide a water density of 0.4 GPM per square foot over the most hydraulically remote 2500 square feet. Refer to NFPA for occupancy area requirements.
    - F. For **Residential Areas** per NFPA 13R and head manufacturers design requirements.
    - C. Size sprinkler piping by hydraulic calculations in accordance with NFPA Standard 13, Chapter 7. Hydraulic calculations shall include inside and outside hose requirements. Hose requirements shall be inserted at the locations in the system per NFPA. Pipe sizing shall provide an allowance of 10 psig in excess of base requirements. Head locations shall conform to the spacing shown on the Mechanical Drawings, Architectural Drawings, the Architectural Details, and elsewhere as required to provide a fully sprinklered building.
    - D. Orifice size, "K" factor, temperature rating, and model identification of installed heads shall be identical to system hydraulic calculation design data. Provide the final design and layout and hydraulic calculations required for the approval of the fire protection systems in accordance with requirements of the insurance interest having jurisdiction, state and local codes. Velocity pressure shall not be considered in the hydraulic calculations.
    - E. Submittals shall be provided showing detailed fire protection drawings and hydraulic calculations per NFPA-13 requirements including complete sprinkler system layout drawings with hydraulic calculation reference points and area of application indicated.
    - F. Sprinklers shall be shown on drawings and submittals and shall be specifically identified with the applicable style or series designation as published in the appropriate agency listing or approval. Trade names or other abbreviated designations are not permitted. The systems shall be designed and installed by a licensed Sprinkler Contractor in full accordance with NFPA and all codes and standards. Shop drawings, layout and design shall be approved by the Local Authority Having Jurisdiction and the Engineer prior to installation.

GENERAL MEP REQUIREMENTS

1. The contract includes all labor, material, and equipment required for the complete systems as shown and specified. Provide all devices and accessories as necessary for complete and working systems.
2. The contractors shall become familiar with the work of all other trades and shall fully coordinate their work prior to ordering equipment or installation of systems.
3. The materials, products and equipment described in these specifications or on the drawings establish a standard of required function, dimension, appearance, and quality to be met by any proposed substitution. Listing of these manufacturers shall in no way be construed as a device intended to limit the bidders to those specifically listed.
4. Reference to any article, device, product, material, fixture, form or type of construction by name, make, or catalog number, 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 listed in this specification for the applicable use, shall be acceptable, subject to performance, spatial, structural, and electrical constraints of the project design. The Engineer reserves last opinion as to a product's equality or superiority to that specified.
5. Shop drawings shall be submitted for all equipment and major materials supplied and shall include: manufacturer, model number, materials, and miscellaneous data as required to describe the equipment; capacity, voltage, phase, ampacity, and other miscellaneous data to quantify the size of the equipment; dimensional drawings showing layout, connection points, and detailed layout of components; electrical full load amps and minimum circuit ampacities; and other pertinent information needed for complete review by the engineer. Conspicuously mark on each submittal the exact model, fittings, accessories, and devices to be supplied. When a schedule is shown on the drawings or in the specifications, provide a copy of that schedule with the submittal. Contractor shall check all shop drawings to verify that they meet the requirements of the drawings and specifications before forwarding to the architect and engineer. All shop drawings submitted shall bear the stamp of the contractor to show that they have been reviewed in detail. No work shall be fabricated and no equipment ordered until the architect and engineer have returned acceptable reviewed shop drawings.
6. Locations of equipment, piping, and other work are indicated diagrammatically on the drawings. Each contractor shall coordinate exact locations subject to structural conditions, work of other contractors, access requirements, and the approval of the architect and engineer.
7. Drawings and specifications indicate minimum construction standards, but should any work indicated be sub-standard, to any ordinances, laws, codes, rules, or regulations bearing on work, the contractor shall execute work in accordance with such without increased cost to the owner, but not until he has referred such variances to the engineer.
8. The contractors shall secure and pay for the necessary permits and certificates of inspection for their trade. Keep record of all permits and inspections and submit two copies to the engineer with request for final inspection.
9. The owner shall be provided with training on each piece of equipment as to startup, shutdown, normal maintenance, seasonal changeover, and other pertinent information as recommended by the manufacturer.
10. This contractor shall warrant that the complete systems installed under this contract shall be free of defects in workmanship and materials for a period of one (1) year from the date of substantial completion by the arch/owner. If defects occur during the one year guarantee period, this contractor shall repair or replace such defects at no expense to the owner and to the satisfaction of the owner and engineer.
11. Provide 3-1/2" concrete bases for all floor mounted equipment unless shown or noted otherwise. Provide 6x6 welded wire fabric reinforcing minimum or as required by the structural engineer.
12. Adequately protect equipment from damage after delivery to the jobsite. Cover with heavy polyethylene plastic. Elevate equipment when there is danger of water damage. Equipment damaged will be rejected.
13. Any scratches to factory finishes shall be touched up using factory supplied paint before final acceptance. If extensive damage to factory finishes has occurred, equipment panels shall be replaced to the satisfaction of the engineer. If rust has formed, remove as recommended by the manufacturer prior to touch-up.
14. Install all equipment in strict accordance with the manufacturer's recommendations and the shop drawings reviewed by the Engineer. The complete installation shall function as designed and intended with respect to efficiency, capacity, and noise level, etc. Any abnormal noise caused by rattling equipment, conduit, or fixtures will not be acceptable.
15. Contractor shall perform initial start-up of systems and shall provide necessary supervision and labor to make the first seasonal change-over of systems. Owner's operating personnel shall be present during this operation.
16. It is the contractor's responsibility to provide materials and trim which fit properly the types of ceiling, wall, or floor finishes actually installed. Model numbers in specifications or shown on drawings are not intended to designate the required trim.
17. Contractor shall provide all miscellaneous steel, etc., for the proper installation of the systems specified and/or indicated on the plans. Any item connecting to building structure shall be done in a manner accepted by the structural engineer. When bar joists are used for steel construction, items shall be supported from angle iron spanning the top chord of the joists.
18. Periodically during construction and prior to Owner acceptance of the building, Contractor shall remove from the premises and dispose of all packing material and debris.
19. Before submitting his bid, the Contractor shall visit the actual location of the job and shall fully understand the scope of the work to be done and the conditions under which it is to be performed. In no case shall additional compensation be granted when existing conditions could reasonably be determined.
20. Locate and mark all known utilities prior to proceeding with work. Proceed with caution since unmarked utilities may exist on site. Should any existing utilities be damaged or disrupted, immediately notify owner and repair to existing conditions.
21. The Contractor shall closely coordinate all utility downtime with the Owner and Architect giving a minimum fourteen (14) day notice prior to downtime. Downtimes are to be held to a minimum duration with the Owner being notified as to the extent of said downtime. Any work that will affect the building occupants in any way shall be coordinated with that tenant. Such work shall be performed in a satisfactory manner to those affected.
22. The Electrical Contractor shall provide all conduit and wiring and shall connect complete and ready for operation all electrical motors and equipment in the other contracts. The other contractors shall furnish to the Electrical Contractor all switches, electrical controls, and other accessories required. Installation of all motors, equipment, etc., shall be made by the Contractor furnishing the equipment, unless otherwise indicated.
23. Unless integral to the equipment supplied or noted otherwise, the Electrical Contractor shall provide disconnect switches, motor starters, and variable frequency drives as required by code and/or as shown on the drawings. The contractors responsible for installing the associated equipment shall coordinate with the Electrical Contractor to ensure devices of the proper size are furnished. Further, the other trades shall furnish all electric control items needed to the Electrical Contractor for installation and connection.
24. The contractor shall provide openings and chases, cutting and patching, excavation and backfilling, and pipe sleeves as needed for proper execution of the work.
25. The Contractor shall do all excavation and backfilling necessary to complete work under this contract. Trenches close to walls and columns of the building shall not be excavated without the Architect's prior consent. As a minimum, backfill in 6" lifts, compacting to a minimum of 90%. The first 12" of fill above any buried item outside the building shall be sand in order to contrast with other fill material. Provide a yellow warning tape at the top of the sand layer.
26. Sleeves are required in all penetrations through new exterior walls, masonry walls, floors and fire rated gypboard walls. Sleeves shall be either Schedule 5 steel pipe, EMT conduit, field fabricated from minimum 16 gauge steel with 2" overlap at the seam, or as required by UL listed fire-stopping system. Sleeves will not be required in existing wall penetrations of masonry construction when such openings are made by "core-drilling." Space between sleeves and pipe in outside walls shall be sealed using link seals. Space between sleeves and pipe in other wall construction shall be the diameter necessary to provide the clearance required by the UL listed fire stopping method chosen by the contractor.
27. All sidewalks, streets, or alley surfaces that are broken in connection with this contract shall be patched to the satisfaction of the owner.
28. Provide fire stopping to maintain the fire rating of walls, floors, ceilings, or other building component. Fire stopping shall be composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the fire stopping under conditions of service and application, as demonstrated by the fire stopping manufacturer based on testing and field experience. Firestop system installation must meet requirements of ASTM E-814, UL Standard 1479 or UL Standard 2079 tested assemblies that provide a fire rating equal to that of construction being penetrated.
29. All installation shall conform with the latest adopted Building Codes and Justification amendments.
30. Description of Work
    - A. The Mechanical Contract includes all labor, materials and equipment required for the complete mechanical systems as shown and herein specified.
    - B. Provide all devices and accessories as necessary for complete and working systems.
    - C. The contractors shall become familiar with the work of all other trades and shall fully coordinate their work prior to ordering equipment or installation of systems.
    - D. The contractors shall become familiar with the work of all other trades and shall fully coordinate their work prior to ordering equipment or installation of systems.
    - E. The Contractor shall coordinate his work with that of all other trades in order to eliminate interferences. He shall examine the drawings in advance to determine the location of sprinklers, electrical systems, ducts, piping, structures, conduits, alarms, and other equipment and services to be installed, and properly coordinate the installation of his work to avoid interferences. The Engineers have considered existing interferences in making the drawings, but it is the responsibility of the Contractor to include in his bid proposal adequate allowances to modify, offset, or otherwise accommodate all equipment to the structure, utilities, and apparatus.
31. Definitions
    - A. Furnish: The term "furnish" is used to mean "supply and deliver to the project site, ready for unloading, unpacking, assembly, installation and similar operations."
    - B. Install: The term "install" is used to describe operations at the project site including the actual "unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations."
    - C. Provide: The term "provide" means "to furnish and install, complete and ready for the intended use."
    - D. Furnished by Owner or Furnished by Others: The item will be furnished by the Owner or Others. It is to be installed and connected under the requirements of this Division, complete and ready for operation, including all items incidental to the Work, including all services necessary for proper installation and operation. The Installation shall be included under the guarantee required by this Division.
32. Operation and Maintenance Manuals
    - A. Before project close-out, submit three copies of installation, operating, maintenance instructions, and parts lists for equipment provided. Include in the manual a list of emergency service organizations capable of rendering service for each piece of equipment.
    - B. Keep in a safe place all keys, wrenches, and other specialty tools furnished with equipment. Present to owner at project close-out and receive a receipt showing he has received the same.
    - C. At the completion of the project furnish to the Architect for the Owner, Operation and Maintenance Manuals in PDF format on CR-ROM and three (3) copies of brochures in three ring notebook form, divided and tabbed, containing all data, diagrams, capacities, spare part numbers, manufacturers service and maintenance data, warranties, guarantees, etc., including local contacts and escalation schedule complete with addresses and telephone numbers, of all equipment, apparatus, and system components furnished and installed under this Division of the specifications.
33. Codes and Ordinances
    - A. All work shall be in accordance with applicable codes, rules, ordinances, and regulations of local, state, and federal governments and other authorities having jurisdiction.
    - B. Drawings and specifications indicate minimum construction standards, but should any work indicated be sub-standard, to any ordinances, laws, codes, rules, or regulations bearing on work, the contractor shall execute work in accordance with such without increased cost to the owner, but not until he has referred such variances to the engineer.
34. Where other than first named products are used, it shall be the responsibility of the contractor to determine prior to bid time that his proposed materials and equipment selections do not require adjustments in the mechanical, electrical , structural, or architectural requirements as shown on the drawings. The contractor shall include in his bid all costs associated with any required adjustments
35. Instillation
    - A. Install all equipment in strict accordance with the manufacturer's recommendations and the shop drawings reviewed by the Engineer.
    - B. Locations of equipment, piping, and other work are indicated diagrammatically on the drawings. Each contractor shall coordinate exact locations subject to structural conditions, work of other contractors, access requirements, and the approval of the architect and engineer.
    - C. item interfering with proper placement of other work shall be removed and relocated without extra cost if reasonable coordination would have eliminated the interference. Damage to other work caused by this contractor shall be restored as specified for new work.
    - D. Final acceptance of work shall be subject to the condition that all systems, equipment, apparatus, and appliances operate satisfactorily as designed and intended. Work shall include required adjustment of systems and control equipment installed under this specification.
    - E. Contractor shall perform initial start-up of systems and shall provide necessary supervision and labor to make the first seasonal change-over of systems. Owner's operating personnel shall be present during this operation.
    - F. It is the contractor's responsibility to provide materials and trim which properly fit the types of ceiling, wall, or floor finishes actually installed. Model numbers in specifications or shown on drawings are not intended to designate the required trim.
    - I. This contractor shall provide all miscellaneous steel, etc., for the proper installation of the systems specified and/or indicated on the plans.
36. Connections to Building Structure
    - A. Any item connecting to building structure shall be done in a manner accepted by the structural engineer.
    - B. When bar joists are used for steel construction, items shall be supported from angle iron spanning the top chord of the joists.

FIRE ALARM REQUIREMENTS

1. Furnish and install a complete Fire Alarm System as described herein and as shown on the plans; to be wired, connected, and left in first class operating condition. The system shall use closed loop initiating device circuits with individual zone supervision, individual notification appliance circuit supervision, incoming and standby power supervision. Include a control panel, manual pull stations (fire alarm boxes), automatic fire detectors, horns, annunciator, remote control devices, all wiring, connections to devices, outlet boxes, junction boxes, and all other necessary material for a complete operating system.
2. Fire Alarm Wiring
    - A. Fire alarm wiring shall be solid, unstranded power limited cable as follows:
        - Non-Plenum Mapnet: West Penn D975, 1PR, 18GA shielded
        - Plenum Network and Mapnet: West Penn 60975, 1PR, 18GA shielded
        - 16GA Non-Plenum: West Penn 991, 1PR unshielded
        - 16GA Plenum: West Penn 60990B, 1PR shielded
        - 14GA Non-Plenum: West Penn 994, 1PR shielded
        - 14GA Plenum: West Penn 60993B, 1PR unshielded
    - B. All wiring shall be installed in strict compliance with all the provisions of National Electrical Code, Article 760 A and C, Power_Limited Fire Protective Signaling Circuits or if required may be reclassified as non_power limited and wired in accordance with National Electrical Code, Article 760 A and B. All required wiring shall have a minimum insulation rating of 600 volts.
    - C. Fire alarm wiring for this system shall be Fire Alarm plenum rated cable, or run in EMT, or ridged conduit. All wiring in walls shall be in conduit with rough-in boxes. All cables located in environmental air plenum will be plenum rated cables.
3. Fire alarm system indicated on plans is a schematic design only, Contractor shall provide Engineered signed and sealed plans by a NICET company specializing in the detection of detection and alarm systems. Provide documentation verifying compliance with the specified certification, that all persons involved with this project shall be NICET Level III certified in the field of "Fire Protection Engineering Technology, 003", and the sub field of "Fire Alarm Systems, 03". This documentation shall be submitted as a part of the submittal package for "approved" suppliers, and shall be submitted as a part of the "request for approval" by all potential suppliers not pre-approved.
4. Plan size, CAD produced system drawings shall include:
    - A. Wiring diagrams/Locations of all equipment.
    - B. Individual device addresses, indicated at all addressable device.
    - C. Interconnection details of all devices, controls and interfaces to equipment supplied by others.
    - D. Complete product data sheets for equipment proposed, with highlighted, or arrowed identifications of component descriptions, finishes, UL listings, and any other pertinent system information.
    - E. Complete sequence of operations of all functions of the system.
    - F. Standby battery sizing documentation. Provide a complete chart, or spreadsheet, listing all components, indicating individual and cumulative power requirements by type, and showing battery standby required, verses actual.
    - G. Any additional documentation required to properly describe all functions and components needed to configure a complete and operable system.

HVAC GENERAL NOTES

- A GENERAL NOTES APPLY TO HVAC SHEETS.
- B WORK SHALL COMPLY WITH STATE AND LOCAL CODE REQUIREMENTS AS APPROVED AND AMENDED BY THE AUTHORITY HAVING JURISDICTION, INCLUDING APPLICABLE SECTIONS OF NFPA, THE MECHANICAL CODE, AND ANY INTERIM AMENDMENTS AT THE TIME OF THE PROPOSAL. PURCHASE PERMITS ASSOCIATED WITH THE WORK. OBTAIN INSPECTIONS REQUIRED BY CODE. SEE ARCHITECTURAL SHEETS FOR THE PREVAILING CODES.
- C CONTRACTOR AND SUBCONTRACTORS SHALL REVIEW A COMPLETE SET OF THE CONSTRUCTION DOCUMENTS.
- D COORDINATE WORK WITH THE WORK OF OTHER TRADES, EQUIPMENT FURNISHED BY OTHERS, REQUIREMENTS OF THE OWNER, AND OF THE EXISTING CONDITIONS AT THE PROJECT SITE.
- E DRAWINGS FOR THE MECHANICAL WORK ARE DIAGRAMMATIC, SHOWING THE GENERAL LOCATION, TYPE, LAYOUT, AND EQUIPMENT REQUIRED. THE DRAWING SHALL NOT BE SCALED FOR EXACT MEASUREMENTS, REFER TO ARCHITECTURAL DRAWINGS FOR DIMENSIONS. REFER TO MANUFACTURER'S STANDARD INSTALLATION DRAWINGS FOR EQUIPMENT CONNECTIONS AND INSTALLATION REQUIREMENTS. PROVIDE DUCTWORK, CONNECTIONS, OFFSETS, ACCESSORIES, AND MATERIALS NECESSARY FOR A COMPLETE SYSTEM.
- F DUCT DIMENSIONS ON PLANS INDICATE DIMENSIONS OF INTERNAL FREE AREA.
- G PERFORATED CEILING DIFFUSERS SHALL BE 4-WAY UNLESS NOTED OTHERWISE.
- H COORDINATE ROOF WORK WITH THE OWNER'S CONSTRUCTION MANAGER PRIOR TO CONSTRUCTION.
- I UNLESS NOTED OTHERWISE RECTANGULAR DUCT ELBOWS GREATER THAN 45° SHALL BE MITERED ELBOWS WITH DOUBLE-THICKNESS TURNING VANES AND RECTANGULAR DUCT ELBOWS 45° OR LESS SHALL BE RADIUSED ELBOWS WITH AN INSIDE RADIUS OF AT LEAST 1/2 THE WIDTH OF THE DUCT.
- J REPLACE AIR FILTERS WITH NEW, CLEAN MERV 8 AIR FILTERS AT TURNOVER.
- K THE TERM "FURNISH" MEANS SUPPLY AND DELIVER TO THE PROJECT SITE, READY FOR UNLOADING, UNPACKING, ASSEMBLY, INSTALLATION, AND SIMILAR OPERATIONS. THE TERM "INSTALL" DESCRIBES THE OPERATIONS AT THE PROJECT SITE INCLUDING THE ACTUAL UNLOADING, UNPACKING, ASSEMBLY, ERECTING, PLACING, ANCHORING, APPLYING, WORKING TO DIMENSION, FINISHING, CURING, PROTECTING, CLEANING, AND SIMILAR OPERATIONS. THE TERM "PROVIDE" MEANS TO FURNISH AND INSTALL, COMPLETE AND READY FOR THE INTENDED USE.
- L PROVIDE P3000 12 GA. UNISTRUT WITH PG FINISH FOR DUCT SUPPORTS AND OTHER UNISTRUT IN AREAS EXPOSED TO VIEW. SLOTTED UNISTRUT AND OTHER UNISTRUT WITH HOLES IS NOT ACCEPTABLE.
- M FIRE PROTECTION SYSTEM IS REQUIRED PER NFPA 13R. CONTRACTOR SHALL PROVIDE A DESIGN BUILD SYSTEM.

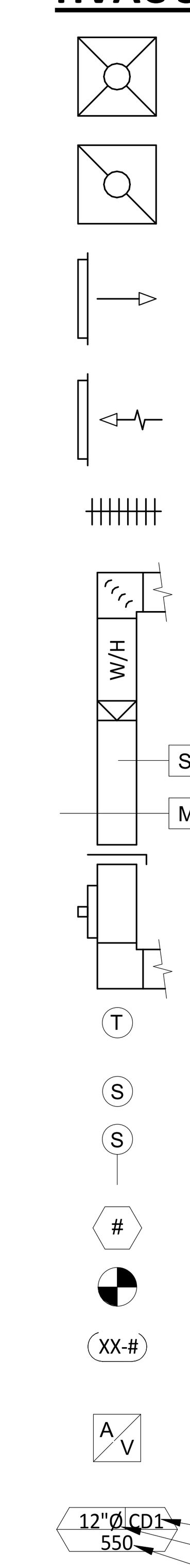
HVAC MATERIAL SCHEDULE

	APPLICATION	ALLOWABLE MATERIAL
DUCT		
	CONCEALED, GENERAL EXHAUST	RECT. OR ROUND AS SHOWN
	CONCEALED, RETURN	RECT. OR ROUND AS SHOWN, LINED OR INSULATED
	CONCEALED, SUPPLY	RECT. OR ROUND AS SHOWN, LINED OR INSULATED
	CONCEALED, TYPE I HOOD EXHAUST	RECTANGULAR 16 GA. BLACK IRON W/ WRAP OR UL 1978 FACTORY-MANUFACTURED DUCT W/ WRAP (SUBMIT SHOP DRAWINGS FOR FACTORY-MANUFACTURED DUCT PRIOR TO ORDERING FOR APPROVAL)
	EXPOSED GENERAL EXHAUST	RECTANGULAR, NO EXPOSED DUCT-SEALING MASTIC
	EXPOSED RETURN	RECTANGULAR, NO EXPOSED DUCT-SEALING MASTIC
	EXPOSED SUPPLY	RECT. LINED OR ROUND AS SHOWN, NO EXPOSED DUCT-SEALING MASTIC

HVAC ABBREVIATIONS

(E)	EXISTING
ABV	ABOVE
ADA	AMERICANS WITH DISABILITIES ACT
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AHJ	AUTHORITY HAVING JURISDICTION
BFF	BELOW FINISHED FLOOR
BFG	BELOW FINISHED GRADE
CLG	CEILING
CTE	CONNECT TO EXISTING
DN	DOWN
EXG	EXISTING
FLR	FLOOR
GYP	GYPSUM BOARD
NTS	NOT TO SCALE
O/H	OVERHEAD
OBD	OPPOSED BLADE DAMPER
TYP	TYPICAL
U/G	UNDERGROUND
UNO	UNLESS NOTED OTHERWISE
VFD	VARIABLE FREQUENCY DRIVE
VSC	VARIABLE SPEED CONTROLLER
W/	WITH
C02AS	CO2 ALARM SUPPLIER
GC	GENERAL CONTRACTOR
HES	TENANT'S HVAC EQUIPMENT SUPPLIER
LL	LANDLORD
TAB	TENANT'S TEST AND BALANCE VENDOR
TDC	TENANT'S DUCT CLEANER
TEMS	TENANT'S ENERGY MANAGEMENT SYSTEM SUPPLIER
TPS	TENANT'S PANELBOARD SUPPLIER
TSV	TENANT'S SIGN VENDOR
WHS	TENANT'S WATER HEATER SUPPLIER

HVAC SYMBOLS



CEILING DIFFUSER
CEILING-MOUNTED RETURN OR EXHAUST REGISTER
SUPPLY REGISTER
RETURN GRILLE
FLEXIBLE DUCT
MITERED CORNER WITH TURNING VANES
DUCTWORK INTERNAL FREE DIMENSIONS (WIDTH/HEIGHT)
RECTANGULAR TO ROUND DUCT TRANSITION
DUCT-MOUNTED SMOKE DETECTOR
MOTOR-OPERATED DAMPER
MANUAL VOLUME DAMPER
GREASE DUCT CLEANOUT
MITERED CORNER WITHOUT TURNING VANES
GRIDPOINT THERMOSTAT
GRIDPOINT ZONE SENSOR MODULE
GRIDPOINT SUPPLY PROBE
PLAN NOTE: SEE PLAN NOTES LISTED ON THE SAME SHEET FOR NOTE MEANING
CONNECT TO EXISTING
EQUIPMENT TAG: SEE EQUIPMENT SCHEDULE ON SHEET M600 FOR EQUIPMENT INFORMATION
AUDIO/VISUAL REMOTE SMOKE DETECTOR ANNUNCIATOR WITH REMOTE KEY OPERATED RESET
GRILL, REGISTER, OR DIFFUSER TAG:
TAG
NECK SIZE
AIRFLOW [CFM]

NEW BUILDING FOR:
LS MANAGEMENT SERVICES, LLC
STREET ADDRESS TBD
LEE'S SUMMIT, MO

Blanchard AE Group
1425 WAKARUSA DR. STE B
LAWRENCE, KS 66049
Ph:785-993-0300

INSIGHT DESIGN iDeA ARCHITECTS
112 S. Main St., Nixa, MO 65714 Ph:417-724-8553
NATHAN RAPP, ARCHITECT #A-2008008201

REISSUE DATE

ADDENDUM 1 - 05/02/2025
ADDENDUM 2 - 05/15/2025
ADDENDUM 3 - 05/27/2025

PROFESSIONAL OF RECORD

STATE OF MISSOURI
LAURA MICHELLE BLANCHARD
NUMBER PE-2007032416
PROFESSIONAL ENGINEER
5.15.2025

ARCHITECT	RAPP
PROJECT NO.	241121
DATE	04/14/2025
DRAWING TITLE	HVAC SPECIFICATIONS
SHEET NO.	M010

HVAC PLAN NOTES

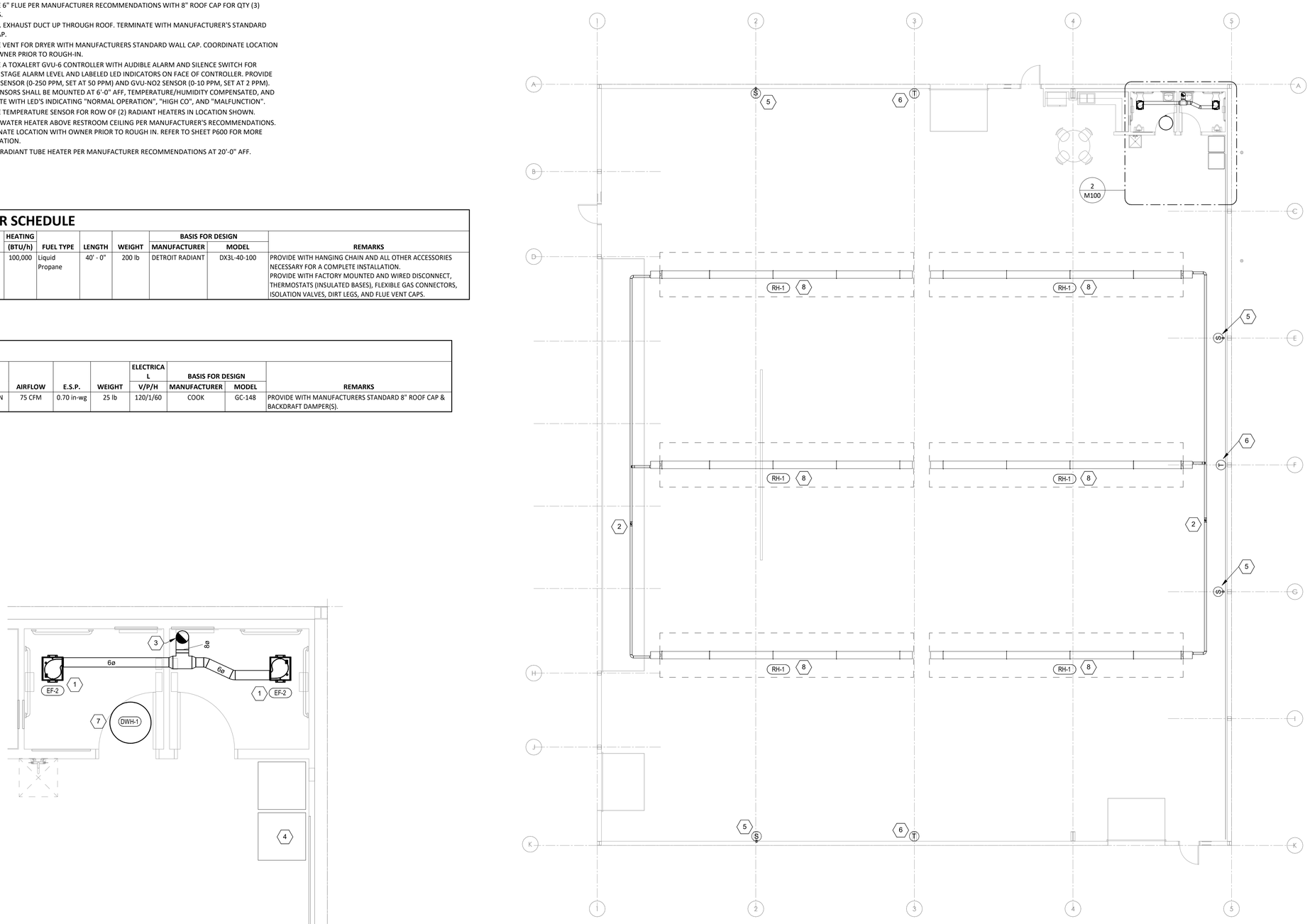
1 INSTALL RESTROOM EXHAUST FAN PER MANUFACTURER RECOMMENDATIONS. UNDERCUT RESTROOM DOOR FOR PRESSURIZATION.
2 PROVIDE 6" FLUE PER MANUFACTURER RECOMMENDATIONS WITH 8" ROOF CAP FOR QTY (3) HEATERS.
3 8" DIAM. EXHAUST DUCT UP THROUGH ROOF. TERMINATE WITH MANUFACTURER'S STANDARD ROOF CAP.
4 PROVIDE VENT FOR DRYER WITH MANUFACTURERS STANDARD WALL CAP. COORDINATE LOCATION WITH OWNER PRIOR TO ROUGH-IN.
5 PROVIDE A TOXALERT GVU-6 CONTROLLER WITH AUDIBLE ALARM AND SILENCE SWITCH FOR SECOND STAGE ALARM LEVEL AND LABELED LED INDICATORS ON FACE OF CONTROLLER. PROVIDE GVU-CO SENSOR (0-250 PPM, SET AT 50 PPM) AND GVU-NO2 SENSOR (0-10 PPM, SET AT 2 PPM). BOTH SENSORS SHALL BE MOUNTED AT 6'-0" AFF, TEMPERATURE/HUMIDITY COMPENSATED, AND COMPLETE WITH LED'S INDICATING "NORMAL OPERATION", "HIGH CO", AND "MALFUNCTION".
6 PROVIDE TEMPERATURE SENSOR FOR ROW OF (2) RADIANT HEATERS IN LOCATION SHOWN.
7 INSTALL WATER HEATER ABOVE RESTROOM CEILING PER MANUFACTURER'S RECOMMENDATIONS. COORDINATE LOCATION WITH OWNER PRIOR TO ROUGH IN. REFER TO SHEET P600 FOR MORE INFORMATION.
8 MOUNT RADIANT TUBE HEATER PER MANUFACTURER RECOMMENDATIONS AT 20'-0" AFF.

RADIANT HEATER SCHEDULE

TAG	DESCRIPTION	HEATING (BTU/h)	FUEL TYPE	LENGTH	WEIGHT	BASIS FOR DESIGN MANUFACTURER	BASIS FOR DESIGN MODEL	REMARKS
RH-1	RADIANT TUBE HEATER	100,000	Liquid Propane	40' - 0"	200 lb	DETROIT RADIANT	DX3L-40-100	PROVIDE WITH HANGING CHAIN AND ALL OTHER ACCESSORIES NECESSARY FOR A COMPLETE INSTALLATION. PROVIDE WITH FACTORY MOUNTED AND WIRED DISCONNECT, THERMOSTATS (INSULATED BASES), FLEXIBLE GAS CONNECTORS, ISOLATION VALVES, DIRT LEGS, AND FLUE VENT CAPS.

FAN SCHEDULE

TAG	DESCRIPTION	AIRFLOW	E.S.P.	WEIGHT	ELECTRICAL V/P/H	BASIS FOR DESIGN MANUFACTURER	BASIS FOR DESIGN MODEL	REMARKS
EF-2	RESTROOM EXHAUST FAN	75 CFM	0.70 in-wg	25 lb	120/1/60	COOK	GC-148	PROVIDE WITH MANUFACTURERS STANDARD 8" ROOF CAP & BACKDRAFT DAMPER(S).



2 M100 **ENLARGED HVAC PLAN**
3/8" = 1'-0"

1 M100 **HVAC FLOOR PLAN**
1/8" = 1'-0"

NEW BUILDING FOR:
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NATHAN RAPP, ARCHITECT #A-2008026201

REISSUE DATE

ADDENDUM 1 - 05/02/2025
ADDENDUM 2 - 05/15/2025
ADDENDUM 3 - 05/27/2025

PROFESSIONAL OF RECORD

STATE OF MISSOURI
LAURA MICHELLE BLANCHARD
NUMBER PE-2007032414
PROFESSIONAL ENGINEER
5.15.2025

ARCHITECT: RAPP
PROJECT NO.: 241121
DATE: 04/14/2025
DRAWING TITLE: HVAC PLAN
SHEET NO.: M100

PLUMBING REQUIREMENTS

1. This Contractor shall provide all service piping and accessories required for complete and operating utilities if not furnished by the serving utility. It is the responsibility of this Contractor to coordinate with the serving utility company regarding the items furnished, the work performed, inspections required, and any associated permits.
2. This Contractor shall provide gas, water, storm, and sewer line utility connections required and/or indicated on the drawings. All interior or exterior connections to "mains" and existing service lines shall be installed complete and in strict compliance with the requirements of the codes having jurisdiction and the serving utility involved. This Contractor shall verify the exact location of all utility mains, service lines, and connection points requiring connection in the field, and he shall work in conjunction with the utility involved in the installation of all services.
3. The Contractor shall pay any and all required utility service fees associated with this project.
4. Provide unions or grooved mechanical couplings at all equipment connections, at points where disconnection of piping will be required, and at other locations show on the drawings.
5. Bronze or brass ball valves rated at 150 psi SWP and 600 psi WOG, shall have two or three piece stainless steel, cast bronze, or brass bodies with TFE seats, stainless steel full port ball, separate packing nut with adjustable stem packing, and anti-blowout stem shall be used in 3" and smaller copper and steel lines for domestic water duties.
6. Bronze body, globe style manual valve with flow measuring taps shall be used for all balancing valves 2" and smaller for domestic water duties.
7. All insulated horizontal piping shall be supported from outside the insulation. Provide inserts and saddles as recommended by the insulation manufacturer.
8. Pipe hangers for lines 1/2" to 2" shall be adjustable swivel ring. Pipe hangers for lines 2 1/2" to 4" shall be light duty clevis. Pipe hangers for lines 6" and larger shall be standard clevis. Provide hanger rods in diameters as required by the hanger rod holes. Provide riser clamps at each floor and at other locations where vertical support is necessary.
   - A. Upper ends of hanger rods shall be supported angle iron laid across top chord of bar joists, or from side beam clamps in steel structure. Upper ends of hanger rods in other construction types shall be as recommended by the Structural Engineer of record.
   - B. Hanger and support spacing for horizontal steel and copper piping shall not exceed the values given in the following table:

NOMINAL PIPE SIZE	STEEL PIPE	COPPER PIPE
1/2" to 1-1/4"	7'	5'
1-1/2" to 2"	9'	6'
2-1/2" to 3"	11'	10'
4"	14'	10'
6"	17'	__

   - C. Soil, waste, vent and drain pipe as well as roof drain lines shall have a minimum of one hanger per pipe section at the joints and at changes in direction and branch connections. If FM approved couplings are used, pipe may be hung with one hanger per 10 foot lengths and at every third fitting where they are contiguous in conformance with manufactures installation instructions.
   - D. No pipe hanger rod shall be less than 6" in length unless otherwise shown or approved. Spacing of supports and braces for exposed vertical piping shall not exceed the hanger spacing specified for horizontal pipe, unless otherwise indicated.
9. Roof Piping Supports shall be constructed of 100% recycled rubber and polyurethane prepolymer with a uniform load capacity of 500 pounds per linear foot of support. Steel frame shall be 14 ga. Galvanized strut. Attaching hardware shall be zinc plated threaded rod and nuts. Provide bridge channel, extended height, and/or roller supports as needed for the actual installation.
10. Soil, waste, vent and drain pipe as well as roof drain lines shall have a minimum of one hanger per pipe section at the joints and at changes in direction and branch connections.
11. Piping Systems, Integrity Test The following piping systems shall be fully tested before covering and concealing in the presence of the Owner's representative. All leaks shall be repaired in a satisfactory manner.
   - A. Domestic water piping interior lines shall be tested in accordance with the IPC/UPC as follows:
     - a. Hydrostatically tested at 100 psi (or system pressure) for a period of 1 hour with no drop in water pressure.
     - b. Air tested at minimum 50 psi for 20 minutes with no loss of pressure.
   - B. Compressed air piping shall be tested at 150% of operating pressure but not less than 50 psi for a period of 1 hour.
   - C. Purified water piping shall be tested at 150% of operating pressure but not less that 100 psi for a period of 1 hour.
   - D. All fittings and joints in gas piping shall be soap tested while holding a 50-psi air pressure.
   - E. Soil, waste, vent and roof drain pipe underground shall be tested before complete covering. This test shall be made by extending a 10' length of pipe vertically, temporarily caulking, and filling with water. This test shall remain 12 hours.
     - a. Soil, waste, vent and roof drain pipe in the building shall be tested in accordance with IPC/UPC as follows:
     - b. Minimum hydrostatic pressure of 10 feet of water for a period of 1 hour with no drop in water level. System shall be visually inspected after the 1 hour duration for leaks
     - c. Air tested at minimum 5 psi for 20 minutes with no loss of pressure.
   - F. All flush valves, faucets and other plumbing items shall be properly adjusted.
   - G. All hot water recirculating valves shall be balanced to the flows noted on the drawings using gauges supplied by the valve manufacturer.
   - H. Domestic water piping system shall be purged of deleterious matter and disinfected prior to utilization per IPC as follows:
   - I. The pipe system shall be flushed with clean, potable water until dirty water does not appear at the points of outlets.
   - J. The system, or part thereof, shall be filled with a water/chlorine solution containing at least 50 ppm of chlorine, and the system or part thereof shall be valved off and allowed to stand for 24 hours; or the system or part thereof shall be filled with a water/chlorine solution containing 200 ppm of chlorine and allowed to stand for 3 hours.
   - K. Soil, waste, vent and roof drain pipe underground shall be tested before complete covering. This test shall be made by extending a 10' length of pipe vertically, temporarily caulking, and filling with water. This test shall remain 12 hours. All other piping systems shall be tested with compressed air at 150% of operating pressure but not less than 50 psi for a period of 1 hour.
   - L. Provide 1-1/2" preformed fiberglass pipe insulation with ASJ jacket and SSL self-sealing lap for all domestic water and storm drain piping. Provide a continuous vapor barrier on cold water and roof drain lines.
   - M. Handicapped lavatory and sink P-traps and domestic water lines shall be insulated with Truebro Model 102, fully molded insulation system with 3-piece interlocking trap and 2-piece interlocking angle valve assembly. Color shall be light gray.
   - N. Discharge pipe from relief valves, and non-potable domestic water lines 4" and smaller shall be type L hard copper pipe with sweat type fittings and 50/50 solder connections.
12. Potable domestic water lines above grade shall be type L hard copper pipe with sweat type fittings and 95/5 solder or Silfos brazed connections. Below grade piping shall be type K hard copper piping with Silfos joints for 3" and below and cement lined ductile iron pipe or C900 plastic with mechanical joints for 4" and larger. All domestic water piping within dwelling units shall be allowed to be cross-linked polyethylene (PEX) piping.
13. PEX (Cross-Linked Polyethylene) plastic tubing and fittings for Hot and Cold water Distribution systems: (USE OF SYSTEM MUST BE APPROVED BY ENGINEER & OWNER PRIOR TO BIDDING/INSTALLATION)
   - A. FostaPex Tubing: High-Density Cross-linked polyethylene tubing shall be manufactured from polyethylene compounds that are electronically crosslinked. The degree of crosslinking shall be at a minimum of 65 percent. Cross-linked polyethylene plastic tubing (PEXc) shall be rated for maximum pressure of 100 psi at 180°F or 80 psi at 200°F. Cross-linked polyethylene plastic tubing shall be opaque in color to reduce transmission of visible light. Inner layer shall be fully dimensioned Pexcel tubing conforming to ASTM F876 standards.
   - B. Press Fittings: Cross-linked polyethylene fittings shall be manufactured from bronze. The press sleeve shall be stainless steel. The press sleeve shall have a sight hole to ensure proper insertion.
   - C. Installation in accordance with the manufacturer's installation instructions.
   - D. Field Quality Control: Upon completion of a section or of the entire hot and cold water supply system, it shall be tested and proved tight under a water pressure not less than the working pressure under which it is to be used. The water used for tests shall be obtained from a potable source of supply. The piping shall withstand the test without leaking for a period of not less than 15 minutes.
   - E. Manifolds: Acceptable manifolds shall include:
     - Bronze Manifolds: Shall be bronze material having 1 inch NPT threaded ends. Manifolds shall be non}directional. All outlets shall either be ProPress or Press fittings. Shall be provided by the Cross-linked polyeth}ylene manufacturer.
     - Copper Manifolds: Shall be copper material having a female solder or ProPress inlet. All outlets shall be Press or ProPress fittings. Shall be provided by the Cross-linked polyethylene system manufacturer.
     - Adapter Fittings: Cross-linked polyethylene adapter fittings shall conform to ASTM F877 or CSA CAN3-B137.5. The adapter fittings shall mate to NPT threads, copper tubing, copper fitting or ProPress fittings.
     - Install manifolds in accordance with the manufacturer's installation instructions.
14. Exterior buried piping shall have a minimum of 42" cover.
15. All runs of pipe shall be installed as shown on drawings, unless some condition should arise which would make it necessary or seem advisable to alter same. No piping shall be buried unless shown as such as the drawings.
16. All piping shall be concealed in walls, below floors, or above ceilings unless indicated otherwise or shown running through areas with exposed structure. All pipe shall be installed parallel or perpendicular to building surfaces.
17. Provide Febco 825Y, or approved equal, reduced pressure backflow preventer where indicated at domestic water service entrance.
18. Provide Woodford, or approved equal Zurn, Prier, Wade, Smith, or Josam hose bibbs as follows: Exterior: Woodford #65C (self-draining with vacuum breaker). Interior: Zurn S-1333 key operated, vandal resistant interior hose bibb with vacuum breaker.
19. Shock Stops: Provide Precision Plumbing Products, or approved equal, Model SC water hammer arrestors sizes as noted on the plans and required by the plumbing code.
20. Natural Gas Piping and Fittings
   - A. Above Grade: Schedule 40 grade, ASTM A-53, butt weld black steel pipe with either welded or threaded malleable fittings shall be used for above grade gas piping. Flexible gas piping in maximum 24" lengths will be required at final connections to all gas appliances.
   - B. Above Grade (if approved) Flexible gas piping shall be Gastite corrugated stainless steel tubing, ASTM A240 type 304 - 321, with a minimum wall thickness of .010, complying with ANSI/IAS LC-1 Standard for fuel Gas Piping using Corrugated Stainless Steel Tubing (CSST), CSA International Report No. 1898978-1009875, ICBO Evaluation Report ER-5122, and IAPMO Research Report File No. C-3250. Jacketing shall be Tenite polyethylene meeting the requirements of ASTM E84 for flame spread and smoke density.
   - C. Below Grade: Buried gas piping shall be Plexco PE2406, SDR11, polyethylene with #12 copper tracer wire and anodeless risers where rising above grade.
   - D. Gas piping shall be installed as shown with all exterior buried piping with a minimum of 24" cover. Provide a union, gas valve, and scale pocket at each equipment connection. Final connections to equipment shall be made with a 24" length of flexible gas piping. All fittings in flexible gas lines shall be SAE CA360 brass incorporating double wall flare for sealing and Jacket Lock jacket capturing for steel tubing protection. Installation shall be in full accordance with the current edition of Gastite Design and Installation Guide.
21. Reduced Pressure Style Backflow Preventor
   - A. $\frac{1}{2}$" to 2": Provide Febco 825Y, or approved equal, reduce pressure backflow preventer where indicated at hydronic system make-up connections and domestic water service entrance. Reduced pressure backflow preventer assemblies shall consist of two independent "Y" configured check valves and one differential relief valve.The assembly shall meet or exceed requirements of ASSE Standard 1013, AWWA Standard C511, CSA Standard B64.4 and the USC Foundation for Cross Connection Control and Hydraulic Research.
   - B. 2 $\frac{1}{2}$" to 10": Provide Febco 825YD, or approved equal, reduce pressure backflow preventer where indicated at hydronic system make-up connections and domestic water service entrance. educed pressure backflow preventer assemblies shall consist of two independent "Y" configured check valves and one differential relief valve. By design, the assembly shall automatically reduce the pressure in the zone between the checkvalves. Should the differential between the zone and upstream pressure drop to 2 psi, the differential relief valve will open, maintaining proper zone differential.
22. Double Check Style Backflow Preventers: Provide Febco 850, or approved equal, double check valve assembly where indicated to create potable and non-potable water systems in hydronic system make-up connections.
23. Waste & Vent
   - A. If allowed per Jurisdiction and if the space allows, Schedule 40 PVC drain waste and vent piping with solvent welded joints shall be used for all soil, waste, storm and vents lines located above grade for all concealed piping.
   - B. Cast iron soil pipe with no hub joints shall be used for soil, waste, storm, and vent lines above grade for any exposed piping. Couplings for joining hubless cast iron pipe and fittings conforming to ASTM Q-888, shall be 3 inches wide for nominal pipe sizes 1 ½ to 4 inches in diameter, 4 inches wide for nominal sizes 5 to 10 inch diameter, and 5 5/8 inches wide for couplings 12 and 15 inches in diameter. Shields shall have a minimum thickness of .015 inches, (28 gage) type 304 stainless steel. Worm drive clamps shall be type 304 stainless steel with a minimum clamp torque of 80 in/lbs. Sealing gasket shall be neoprene conforming to ASTM C-564.
   - C. Schedule 40 PVC drain waste and vent piping with solvent welded joints shall be used for all soil, waste, storm, and vents lines located below grade.
   - D. The arrangement of waste and vent systems must be as direct as possible avoiding all unnecessary offsets. All pipe shall run as indicated on the drawings, unless some condition should arise which would make it necessary or seem advisable to alter same. Horizontal lines shall be graded at 1/8" per foot, unless noted otherwise. Where necessary, lines may pitch at 1/10" per foot when approved or noted.
   - E. Every vent for traps shall be connected to the waste line by as short a connection as possible, but in no case shall such connections have a length greater than 2' in length, measuring horizontally from the center of the fixture to the vent. Horizontal vents shall connect into the main stack at least 18" above the highest fixture.
   - F. Each fixture and piece of equipment requiring connection to the sanitary drainage system shall be equipped with a trap. Each trap shall be placed as near the fixture as possible and no fixture shall be double-trapped.
   - G. Provide cleanouts where shown or required by code. Cleanouts shall be the same size pipe for pipe 4" and smaller, and 4" for lines 4" and larger.
   - H. Floor drains and sinks shall have deep seal trap and shall be as scheduled on the drawings. Trap material shall match that of system connection. Unless noted otherwise, or specifically excluded by code, provide trap primers for all floor drains.
24. Plumbing Fixtures and Trim:
   - A. Provide complete, all fixtures indicated. All fixtures shall be set firm and true, connected to all pipe and ready for use.
   - B. Quarter turn stop valves shall be provided on the hot and cold water connections to all plumbing fixtures. No flexible supply connections are allowed.
   - C. Install plumbing fixtures and specified components in accordance with designations and locations indicated on Drawings and in complete compliance with the manufacturer's recommendations and instructions.
   - D. Refer to elevations on the Architect's drawings for installation height of wall-mounted fixtures. Refer to architectural plans to ensure flush valve control handle is mounted for use from the wide side of handicapped toilet stalls.
   - E. Set shower receptors and mop basins in leveling bed of cement grout.
   - F. Install stop valve in an accessible location in each water supply to each fixture.
   - G. Install escutcheons at each wall, floor, and ceiling penetration in exposed finished locations and within cabinets and millwork. Use deep pattern escutcheons where required to conceal protruding pipe fittings.
   - H. Seal fixtures to walls, floors, and counters using a sanitary-type, one-part, mildew-resistant, silicone sealant. Match sealant color to fixture color.
   - I. Operate and adjust all plumbing fixtures and equipment. Replace damaged and malfunctioning fixtures, fittings, and controls. Adjust water pressure at drinking fountains, electric water coolers, and faucets, shower valves, and flush valves having controls, to provide proper flow and stream. All hot water recirculating valves shall be balanced to the flows noted on the drawings using gauges supplied by the valve manufacturer. Clean fixtures, fittings, and spout and drain strainers with manufacturers' recommended cleaning methods and materials.
25. Domestic Water Pumps:
   - A. The basis for the equipment in this specification is Bell and Gossett and shall represent the minimum level of construction. Equipment from Taco, Thrush, Armstrong, and Patterson shall be permitted to bid these specifications
   - B. Circulators shall be horizontal inline, centrifugal, separately-coupled, single-stage, bronze-fitted, radially split case design, with mechanical seals, and rated for 125 psig working pressure and 225 deg F continuous water temperature.
   - C. Pump Couplings: Flexible, capable of absorbing torsional vibration and shaft misalignment.
   - D. Install pumps in locations and arranged to provide access for periodic maintenance, including removal of motors, impellers, couplings, and accessories.
   - E. Pump Couplings: Flexible, capable of absorbing torsional vibration and shaft misalignment.
26. Electric Water Heaters:
   - A. The basis for the water heating equipment in this specification is A.O. Smith and shall represent the minimum level of construction. Equipment from Rheem or State shall be permitted to bid these specifications
   - B. Water heater shall be electric storage type heater as scheduled on the plans. Provide with non-simultaneous, single or three phase element, and glass lined storage tank.
27. Gas Fired Water Heaters:
   - A. The basis for the water heating equipment in this specification is A.O. Smith and shall represent the minimum level of construction. Equipment from Rheem or State shall be permitted to bid these specifications
   - B. Water heater shall be a gas fired storage type heater as scheduled on the plans with glass lined storage tank.
   - C. Provide with 100 % gas safeties, brass drain valve in tapping, temperature pressure relief valve, and ASHRAE 90 tank insulation with painted metal jacketing.
28. Roof Drains:
   - A. Roof Drains: Provide Zurn model ZC-100-EARC roof drain with cast iron domes and all accessories as required for proper installation in roof decks with an overall insulation thickness as indicated on the architectural plans.
   - B. Overflow Drains: Provide Zurn model ZC-100-EARC-W2, overflow roof drain with cast iron domes and all accessories as required for proper installation in roof decks with an overall insulation thickness as indicated on the architectural plans.
   - C. Downspout Nozzle: Provide Zurn model ZANB-199 for all above grade discharge. Where internal surface of visible piping behind downspout nozzle is not black, contractor shall paint visible surfaces matte black.

GENERAL MEP REQUIREMENTS

1. The contract includes all labor, material, and equipment required for the complete systems as shown and specified. Provide all devices and accessories as necessary for complete and working systems.
2. The contractors shall become familiar with the work of all other trades and shall fully coordinate their work prior to ordering equipment or installation of systems.
3. The materials, products and equipment described in these specifications or on the drawings establish a standard of required function, dimension, appearance, and quality to be met by any proposed substitution. Listing of these manufacturers shall in no way be construed as a device intended to limit the bidders to those specifically listed.
4. Reference to any article, device, product, material, fixture, form or type of construction by name, make, or catalog number, 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 listed in this specification for the applicable use, shall be acceptable, subject to performance, spatial, structural, and electrical constraints of the project design. The Engineer reserves last opinion as to a product's equality or superiority to that specified.
5. Shop drawings shall be submitted for all equipment and major materials supplied and shall include: manufacturer, model number, materials, and miscellaneous data as required to describe the equipment; capacity, voltage, phase, ampacity, and other miscellaneous data to quantify the size of the equipment; dimensional drawings showing layout, connection points, and detailed layout of components; electrical full load amps and minimum circuit ampacities; and other pertinent information needed for complete review by the engineer. Conspicuously mark on each submittal the exact model, fittings, accessories, and devices to be supplied. When a schedule is shown on the drawings or in the specifications, provide a copy of that schedule with the submittal. Contractor shall check all shop drawings to verify that they meet the requirements of the drawings and specifications before forwarding to the architect and engineer. All shop drawings submitted shall bear the stamp of the contractor to show that they have been reviewed in detail. No work shall be fabricated and no equipment ordered until the architect and engineer have returned acceptable reviewed shop drawings.
6. Locations of equipment, piping, and other work are indicated diagrammatically on the drawings. Each contractor shall coordinate exact locations subject to structural conditions, work of other contractors, access requirements, and the approval of the architect and engineer.
7. Drawings and specifications indicate minimum construction standards, but should any work indicated be sub-standard, to any ordinances, laws, codes, rules, or regulations bearing on work, the contractor shall execute work in accordance with such without increased cost to the owner, but not until he has referred such variances to the engineer.
8. The contractors shall secure and pay for the necessary permits and certificates of inspection for their trade. Keep record of all permits and inspections and submit two copies to the engineer with request for final inspection.
9. The owner shall be provided with training on each piece of equipment as to startup, shutdown, normal maintenance, seasonal changeover, and other pertinent information as recommended by the manufacturer.
10. This contractor shall warrant that the complete systems installed under this contract shall be free of defects in workmanship and materials for a period of one (1) year from the date of substantial completion by the arch/owner. If defects occur during the one year guarantee period, this contractor shall repair or replace such defects at no expense to the owner and to the satisfaction of the owner and engineer.
11. Provide 3-1/2" concrete bases for all floor mounted equipment unless shown or noted otherwise. Provide 6x6 welded wire fabric reinforcing minimum or as required by the structural engineer.
12. Adequately protect equipment from damage after delivery to the jobsite. Cover with heavy polyethylene plastic. Elevate equipment when there is danger of water damage. Equipment damaged will be rejected.
13. Any scratches to factory finishes shall be touched up using factory supplied paint before final acceptance. If extensive damage to factory finishes has occurred, equipment panels shall be replaced to the satisfaction of the engineer. If rust has formed, remove as recommended by the manufacturer prior to touch-up.
14. Install all equipment in strict accordance with the manufacturer's recommendations and the shop drawings reviewed by the Engineer. The complete installation shall function as designed and intended with respect to efficiency, capacity, and noise level, etc. Any abnormal noise caused by rattling equipment, conduit, or fixtures will not be acceptable.
15. Contractor shall perform initial start-up of systems and shall provide necessary supervision and labor to make the first seasonal change-over of systems. Owner's operating personnel shall be present during this operation.
16. It is the contractor's responsibility to provide materials and trim which fit properly the types of ceiling, wall, or floor finishes actually installed. Model numbers in specifications or shown on drawings are not intended to designate the required trim.
17. Contractor shall provide all miscellaneous steel, etc., for the proper installation of the systems specified and/or indicated on the plans. Any item connecting to building structure shall be done in a manner accepted by the structural engineer. When bar joists are used for steel construction, items shall be supported from angle iron spanning the top chord of the joists.
18. Periodically during construction and prior to Owner acceptance of the building, Contractor shall remove from the premises and dispose of all packing material and debris.
19. Before submitting his bid, the Contractor shall visit the actual location of the job and shall fully understand the scope of the work to be done and the conditions under which it is to be performed. In no case shall additional compensation be granted when existing conditions could reasonably be determined.
20. Locate and mark all known utilities prior to proceeding with work. Proceed with caution since unmarked utilities may exist on site. Should any existing utilities be damaged or disrupted, immediately notify owner and repair to existing conditions.
21. The Contractor shall closely coordinate all utility downtime with the Owner and Architect giving a minimum fourteen (14) day notice prior to downtime. Downtimes are to be held to a minimum duration with the Owner being notified as to the extent of said downtime. Any work that will affect the building occupants in any way shall be coordinated with that tenant. Such work shall be performed in a satisfactory manner to those affected.
22. The Electrical Contractor shall provide all conduit and wiring and shall connect complete and ready for operation all electrical motors and equipment in the other contracts. The other contractors shall furnish to the Electrical Contractor all switches, electrical controls, and other accessories required. Installation of all motors, equipment, etc., shall be made by the Contractor furnishing the equipment, unless otherwise indicated.
23. Unless integral to the equipment supplied or noted otherwise, the Electrical Contractor shall provide disconnect switches, motor starters, and variable frequency drives as required by code and/or as shown on the drawings. The contractors responsible for installing the associated equipment shall coordinate with the Electrical Contractor to ensure devices of the proper size are furnished. Further, the other trades shall furnish all electric control items needed to the Electrical Contractor for installation and connection.
24. The contractor shall provide openings and chases, cutting and patching, excavation and backfilling, and pipe sleeves as needed for proper execution of the work.
25. The Contractor shall do all excavation and backfilling necessary to complete work under this contract. Trenches close to walls and columns of the building shall not be excavated without the Architect's prior consent. As a minimum, backfill in 6" lifts, compacting to a minimum of 90%. The first 12" of fill above any buried item outside the building shall be sand in order to contrast with other fill material. Provide a yellow warning tape at the top of the sand layer.
26. Sleeves are required in all penetrations through new exterior walls, masonry walls, floors and fire rated gypboard walls. Sleeves shall be either Schedule 5 steel pipe, EMT conduit, field fabricated from minimum 16 gauge steel with 2" overlap at the seam, or as required by UL listed fire-stopping system. Sleeves will not be required in existing wall penetrations of masonry construction when such openings are made by "core-drilling." Space between sleeves and pipe in outside walls shall be sealed using link seals. Space between sleeves and pipe in other wall construction shall be the diameter necessary to provide the clearance required by the UL listed fire stopping method chosen by the contractor.
27. All sidewalks, streets, or alley surfaces that are broken in connection with this contract shall be patched to the satisfaction of the owner.
28. Provide fire stopping to maintain the fire rating of walls, floors, ceilings, or other building component. Fire stopping shall be composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the fire stopping under conditions of service and application, as demonstrated by the fire stopping manufacturer based on testing and field experience. Firestop system installation must meet requirements of ASTM E-814, UL Standard 1479 or UL Standard 2079 tested assemblies that provide a fire rating equal to that of construction being penetrated.
29. All installation shall conform with the latest adopted Building Codes and Justification amendments.
30. Description of Work
   - A. The Mechanical Contract includes all labor, materials and equipment required for the complete mechanical systems as shown and herein specified.
   - B. Provide all devices and accessories as necessary for complete and working systems.
   - C. The contractors shall become familiar with the work of all other trades and shall fully coordinate their work prior to ordering equipment or installation of systems.
   - D. The contractors shall become familiar with the work of all other trades and shall fully coordinate their work prior to ordering equipment or installation of systems.
   - E. The Contractor shall coordinate his work with that of all other trades in order to eliminate interferences. He shall examine the drawings in advance to determine the location of sprinklers, electrical systems, ducts, piping, structures, conduits, alarms, and other equipment and services to be installed, and properly coordinate the installation of his work to avoid interferences. The Engineers have considered existing interferences in making the drawings, but it is the responsibility of the Contractor to include in his bid proposal adequate allowances to modify, offset, or otherwise accommodate all equipment to the structure, utilities, and apparatus.
31. Definitions
   - A. Furnish: The term "furnish" is used to mean "supply and deliver to the project site, ready for unloading, unpacking, assembly, installation and similar operations."
   - B. Install: The term "install" is used to describe operations at the project site including the actual "unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations."
   - C. Provide: The term "provide" means "to furnish and install, complete and ready for the intended use."
   - D. Furnished by Owner or Furnished by Others: The item will be furnished by the Owner or Others. It is to be installed and connected under the requirements of this Division, complete and ready for operation, including all items incidental to the Work, including all services necessary for proper installation and operation. The Installation shall be included under the guarantee required by this Division.
32. Operation and Maintenance Manuals
   - A. Before project close-out, submit three copies of installation, operating, maintenance instructions, and parts lists for equipment provided. Include in the manual a list of emergency service organizations capable of rendering service for each piece of equipment.
   - B. Keep in a safe place all keys, wrenches, and other specialty tools furnished with equipment. Present to owner at project close-out and receive a receipt showing he has received the same.
   - C. At the completion of the project furnish to the Architect for the Owner, Operation and Maintenance Manuals in PDF format on CR-ROM and three (3) copies of brochures in three ring notebook form, divided and tabbed, containing all data, diagrams, capacities, spare part numbers, manufacturers service and maintenance data, warranties, guarantees, etc., including local contacts and escalation schedule complete with addresses and telephone numbers, of all equipment, apparatus, and system components furnished and installed under this Division of the specifications.
33. Codes and Ordinances
   - A. All work shall be in accordance with applicable codes, rules, ordinances, and regulations of local, state, and federal governments and other authorities having jurisdiction.
   - B. Drawings and specifications indicate minimum construction standards, but should any work indicated be sub-standard, to any ordinances, laws, codes, rules, or regulations bearing on work, the contractor shall execute work in accordance with such without increased cost to the owner, but not until he has referred such variances to the engineer.
34. Where other than first named products are used, it shall be the responsibility of the contractor to determine prior to bid time that his proposed materials and equipment selections do not require adjustments in the mechanical, electrical , structural, or architectural requirements as shown on the drawings. The contractor shall include in his bid all costs associated with any required adjustments
35. Instillation
   - A. Install all equipment in strict accordance with the manufacturer's recommendations and the shop drawings reviewed by the Engineer.
   - B. Locations of equipment, piping, and other work are indicated diagrammatically on the drawings. Each contractor shall coordinate exact locations subject to structural conditions, work of other contractors, access requirements, and the approval of the architect and engineer.
   - C. item interfering with proper placement of other work shall be removed and relocated without extra cost if reasonable coordination would have eliminated the interference. Damage to other work caused by this contractor shall be restored as specified for new work.
   - D. Final acceptance of work shall be subject to the condition that all systems, equipment, apparatus, and appliances operate satisfactorily as designed and intended. Work shall include required adjustment of systems and control equipment installed under this specification.
   - E. Contractor shall perform initial start-up of systems and shall provide necessary supervision and labor to make the first seasonal change-over of systems. Owner's operating personnel shall be present during this operation.
   - F. It is the contractor's responsibility to provide materials and trim which properly fit the types of ceiling, wall, or floor finishes actually installed. Model numbers in specifications or shown on drawings are not intended to designate the required trim.
   - I. This contractor shall provide all miscellaneous steel, etc., for the proper installation of the systems specified and/or indicated on the plans.
36. Connections to Building Structure
   - A. Any item connecting to building structure shall be done in a manner accepted by the structural engineer.
   - B. When bar joists are used for steel construction, items shall be supported from angle iron spanning the top chord of the joists.

FIRE ALARM REQUIREMENTS

1. Furnish and install a complete Fire Alarm System as described herein and as shown on the plans; to be wired, connected, and left in first class operating condition. The system shall use closed loop initiating device circuits with individual zone supervision, individual notification appliance circuit supervision, incoming and standby power supervision. Include a control panel, manual pull stations (fire alarm boxes), automatic fire detectors, horns, annunciator, remote control devices, all wiring, connections to devices, outlet boxes, junction boxes, and all other necessary material for a complete operating system.
2. Fire Alarm Wiring
   - A. Fire alarm wiring shall be solid, unstranded power limited cable as follows:
     - Non-Plenum Mapnet: West Penn D975, 1PR, 18GA shielded
     - Plenum Network and Mapnet: West Penn 60975, 1PR, 18GA shielded
     - 16GA Non-Plenum: West Penn 991, 1PR unshielded
     - 16GA Plenum: West Penn 60990B, 1PR shielded
     - 14GA Non-Plenum: West Penn 994, 1PR shielded
     - 14GA Plenum: West Penn 60993B, 1PR unshielded
   - B. All wiring shall be installed in strict compliance with all the provisions of National Electrical Code, Article 760 A and C, Power_Limited Fire Protective Signaling Circuits or if required may be reclassified as non_power limited and wired in accordance with National Electrical Code, Article 760 A and B. All required wiring shall have a minimum insulation rating of 600 volts.
   - C. Fire alarm wiring for this system shall be Fire Alarm plenum rated cable, or run in EMT, or ridged conduit. All wiring in walls shall be in conduit with rough-in boxes. All cables located in environmental air plenum will be plenum rated cables.
3. Fire alarm system indicated on plans is a schematic design only, Contractor shall provide Engineered signed and sealed plans by a NICET company specializing in the detection of detection and alarm systems. Provide documentation verifying compliance with the specified certification, that all persons involved with this project shall be NICET Level III certified in the field of "Fire Protection Engineering Technology, 003", and the sub field of "Fire Alarm Systems, 03". This documentation shall be submitted as a part of the submittal package for "approved" suppliers, and shall be submitted as a part of the "request for approval" by all potential suppliers not pre-approved.
4. Plan size, CAD produced system drawings shall include:
   - A. Wiring diagrams/Locations of all equipment.
   - B. Individual device addresses, indicated at all addressable device.
   - C. Interconnection details of all devices, controls and interfaces to equipment supplied by others.
   - D. Complete product data sheets for equipment proposed, with highlighted, or arrowed identifications of component descriptions, finishes, UL listings, and any other pertinent system information.
   - E. Complete sequence of operations of all functions of the system.
   - F. Standby battery sizing documentation. Provide a complete chart, or spreadsheet, listing all components, indicating individual and cumulative power requirements by type, and showing battery standby required, verses actual.
   - G. Any additional documentation required to properly describe all functions and components needed to configure a complete and operable system.

PLUMBING ABBREVIATIONS

(E)	EXISTING
ABV	ABOVE
ADA	AMERICANS WITH DISABILITIES ACT
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AHJ	AUTHORITY HAVING JURISDICTION
BFF	BELOW FINISHED FLOOR
BFG	BELOW FINISHED GRADE
CLG	CEILING
CTE	CONNECT TO EXISTING
CW	DOMESTIC COLD WATER
DN	DOWN
EXG	EXISTING
FCO	FLOOR CLEANOUT
FD	FLOOR DRAIN
FLR	FLOOR
FS	FLOOR SINK
FW	DOMESTIC FILTERED COLD WATER
GCO	GRADE CLEANOUT
GI	GREASE INTERCEPTOR
GT	GREASE TRAP
GW	GREASE WASTE
GYP	GYPSUM BOARD
HW	DOMESTIC HOT WATER
NTS	NOT TO SCALE
O/H	OVERHEAD
SAN	SANITARY WASTE
ST	STORM SEWER
SW	DOMESTIC SOFTENED COLD WATER

PLUMBING ABBREVIATIONS

TYP	TYPICAL
U/G	UNDERGROUND
UNO	UNLESS NOTED OTHERWISE
W/	WITH
C02AS	CO2 ALARM SUPPLIER
GC	GENERAL CONTRACTOR
HES	TENANT'S HVAC EQUIPMENT SUPPLIER
LL	LANDLORD
TAB	TENANT'S TEST AND BALANCE VENDOR
TDC	TENANT'S DUCT CLEANER
TEMS	TENANT'S ENERGY MANAGEMENT SYSTEM SUPPLIER
TPS	TENANT'S PANELBOARD SUPPLIER
TSV	TENANT'S SIGN VENDOR
WHS	TENANT'S WATER HEATER SUPPLIER

PLUMBING MATERIAL SCHEDULE

APPLICATION		ALLOWABLE MATERIAL
NATURAL GAS PIPE		
	CONCEALED	SCH. 40 STEEL PIPE, MALLEABLE IRON THREADED FITTINGS
	EXPOSED	SCH. 40 STEEL PIPE, MALLEABLE IRON THREADED FITTINGS, PAINTED
SANITARY WASTE & VENT PIPE		
	ABOVE GROUND, CONCEALED	PVC PLASTIC DWV PIPE AND FITTINGS
	BELOW GROUND	PVC PLASTIC DWV PIPE AND FITTINGS
WATER SUPPLY PIPE		
	ABOVE GRADE	TYPE L COPPER TUBE

PLUMBING GENERAL NOTES

- A GENERAL NOTES APPLY TO PLUMBING SHEETS.
- B PLUMBING WORK SHALL BE DONE IN ACCORDANCE WITH THE PLUMBING CODE, LOCAL HEALTH DEPARTMENT STANDARDS, AND THE AUTHORITY HAVING JURISDICTION. SEE ARCHITECTURAL SHEETS FOR THE PREVAILING CODES.
- C PIPING LAYOUTS ON DRAWINGS ARE SCHEMATIC. EXACT LOCATIONS ARE TO BE COORDINATED WITH THE EXISTING CONDITIONS AND THE WORK OF OTHER TRADES.
- D CONCEAL PIPING UNLESS NOTED OTHERWISE. WATER SUPPLY PIPES SHALL BE INSTALLED LEVEL.
- E PROVIDE SHUT-OFF VALVES FOR ISOLATION OF FIXTURE GROUPS AS SHOWN ON DRAWINGS IN ADDITION TO STOP VALVES AT EACH FIXTURE.
- F PROVIDE STOP VALVES AT FIXTURES.
- G PROVIDE TRAP PRIMERS IN AN ACCESSIBLE LOCATION FOR ALL FLOOR DRAINS SHOWN.
- H WHERE THE WATER OR GAS SUPPLY LINE SIZE SHOWN IN THE PLUMBING DIAGRAMS DIFFERS FROM THE FIXTURE OR EQUIPMENT CONNECTION SIZE, PROVIDE LINE SIZE PIPE TO WITHIN 6" OF THE FIXTURE OR EQUIPMENT BEFORE TRANSITIONING TO THE CONNECTION SIZE.
- I PIPING IN EXTERIOR WALLS SHALL BE INSTALLED BETWEEN THE INSULATION AND THE INTERIOR WALL FINISHING MATERIAL.
- J INSULATE THE HOT AND COLD WATER, CONDENSATE DRAINAGE, AND STORM PIPING PER THE SPECIFICATIONS AND DETAIL 8/P700.
- K PROVIDE GAS SHUT-OFF VALVES AT EACH PIECE OF EQUIPMENT. PROVIDE ACCESSIBLE DIRT LEG AT THE BOTTOM OF VERTICAL SECTIONS OF GAS PIPE AND AT THE CONNECTION TO EACH PIECE OF EQUIPMENT.
- L PLUMBING FIXTURES, ACCESSORIES, AND MATERIALS PROVIDED FOR DOMESTIC WATER SHALL BE LEAD FREE.
- M PRIOR TO TURNOVER PERFORM A VIDEO INSPECTION OF THE SANITARY AND GREASE LINES FROM THE MAIN LINES WITHIN THE TENANT SPACE TO THE MAIN SEWER TO VERIFY THAT THE SANITARY WASTE SYSTEM IS CONNECTED, CLEAN, AND FREE OF SAGS, BELLIES, BREAKS, AND DEBRIS. DELIVER A REPORT AND COPY OF THE VIDEO TO THE TENANT'S CONSTRUCTION MANAGER PRIOR TO TURNOVER.
- N THE TERM "FURNISH" MEANS SUPPLY AND DELIVER TO THE PROJECT SITE, READY FOR UNLOADING, UNPACKING, ASSEMBLY, INSTALLATION, AND SIMILAR OPERATIONS. THE TERM "INSTALL" DESCRIBES THE OPERATIONS AT THE PROJECT SITE INCLUDING THE ACTUAL UNLOADING, UNPACKING, ASSEMBLY, ERECTING, PLACING, ANCHORING, APPLYING, WORKING TO DIMENSION, FINISHING, CURING, PROTECTING, CLEANING, AND SIMILAR OPERATIONS. THE TERM "PROVIDE" MEANS TO FURNISH AND INSTALL, COMPLETE AND READY FOR THE INTENDED USE.
- O PRIOR TO CONNECTION TO ANY EXISTING SEWER SYSTEM PERFORM A DIE TEST TO VERIFY THE TYPE OF SYSTEM AND THE DIRECTION OF FLOW. REPORT ANY DEVIATION FROM THE CONSTRUCTION DOCUMENTS TO THE TENANT'S CONSTRUCTION MANAGER.
- P PROVIDE SANITARY AND GREASE WASTE PIPES AT A MINIMUM SLOPE OF 1/4" PER FOOT UNLESS NOTED OTHERWISE.
- Q INSTALL SHUTOFF AND ISOLATION VALVES SHOWN TO BE ABOVE CEILINGS IN ACCESSIBLE LOCATIONS WITHIN 12" OF LAY-IN CEILINGS.
- R ALL UNDERGROUND PIPE, CONDUIT, AND LINES SHALL BE PROTECTED WITH CLEANED DIRT, VOID OF ANY ROCKS OR CLEAN SAND, 6" BELOW AND 12" ABOVE SAID PIPE, CONDUIT, OR LINE.
- S PROVIDE APPROVED BACKFLOW DEVICE AS NECESSARY FOR ALL FIXTURES CONNECTED TO THE WATER SUPPLY PER LOCAL AHJ REQUIREMENTS.
- T FIRE PROTECTION SYSTEM IS REQUIRED PER NFPA 13R. CONTRACTOR SHALL PROVIDE A DESIGN BUILD SYSTEM.
- U FIRE PROTECTION SYSTEM IS REQUIRED PER NFPA 13R. CONTRACTOR SHALL PROVIDE A DESIGN BUILD SYSTEM.

PLUMBING SYMBOLS

- ELBOW UP
- ELBOW DOWN
- DOMESTIC COLD WATER
- DOMESTIC FILTERED COLD WATER (F)
- DOMESTIC SOFTENED COLD WATER (S)
- DOMESTIC HOT WATER (110 DEGREES)
- DOMESTIC HOT WATER RECIRC.
- GAS (G)
- GAS (ON ROOF) (G)
- SANITARY WASTE
- GREASE WASTE (GW)
- SANITARY VENT
- CONDENSATE DRAIN (CD)
- (X) PLAN NOTE: SEE PLAN NOTES LISTED ON THE SAME SHEET FOR NOTE MEANING
- CONNECT TO EXISTING
- REDUCED PRESSURE ZONE BACKFLOW PREVENTER
- (WM) WATER METER
- (GM) GAS METER
- (XX-#) EQUIPMENT TAG: SEE EQUIPMENT SCHEDULE ON SHEET P600 FOR EQUIPMENT INFORMATION
- VALVE
- SOLENOID-OPERATED VALVE
- WALL HYDRANT/ROOF HYDRANT
- CHECK VALVE
- CIRCUIT-SETTER BALANCE VALVE RATED FOR POTABLE WATER
- FLOOR DRAIN
- FLOOR SINK
- CLEANOUT

NEW BUILDING FOR:
LS MANAGEMENT SERVICES, LLC
STREET ADDRESS TBD
LEE'S SUMMIT, MO

Blanchard AE Group
1425 WAKARUSA DR. STE B
LAWRENCE, KS 66049
Ph:785-993-0300

INSIGHT DESIGN ARCHITECTS iDeA
112 S. Main St., Nixa, MO 65714 Ph:417-724-8553
NATHAN RAPP, ARCHITECT #A-2008008201

REISSUE DATE

ADDENDUM 1 - 05/02/2025
ADDENDUM 2 - 05/15/2025
ADDENDUM 3 - 05/27/2025

PROFESSIONAL OF RECORD

STATE OF MISSOURI
LAURA MICHELLE BLANCHARD
NUMBER PE-2007032416
PROFESSIONAL ENGINEER
5.15.2025

ARCHITECT: RAPP
PROJECT NO.: 241121
DATE: 04/14/2025
DRAWING TITLE: PLUMBING SPECIFICATIONS
SHEET NO.: P010

WATER PLAN NOTES

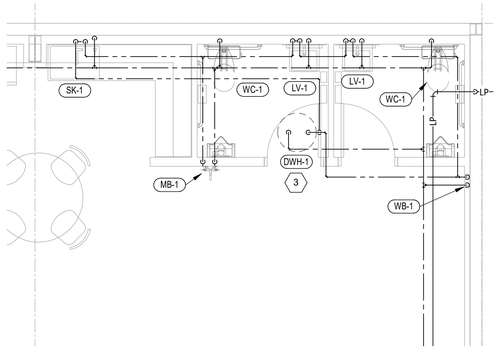
3 / 1 SEE CIVIL UTILITY PLAN FOR CONTINUATION OF 1" DOMESTIC WATER SERVICE LINE TO EXTERIOR 1" METER.

2 REFER TO SHEET P600 FOR GAS PIPING CONNECTION DETAIL. PROVIDE EACH CONNECTION TO UNIT HEATER WITH AN INDOOR VENTLESS PRESSURE REGULATOR.

3 PROVIDE CONNECTIONS TO WATER HEATER ABOVE CEILING PER MANUFACTURER'S RECOMMENDATIONS. REFER TO DETAIL 4/P600 FOR MORE INFORMATION.

4 REFER TO CIVIL UTILITY PLANS FOR CONTINUATION OF PROPANE LINE TO EXTERIOR TANK.

5 PROVIDE BACKFLOW PREVENTER FOR WATER SERVICE LINE IF NONE EXISTING. BACKFLOW SHALL HAVE INDIRECT DRAIN WITH 2X PIPE DIAMETER AIR GAP INTO FLOOR DRAIN BELOW.

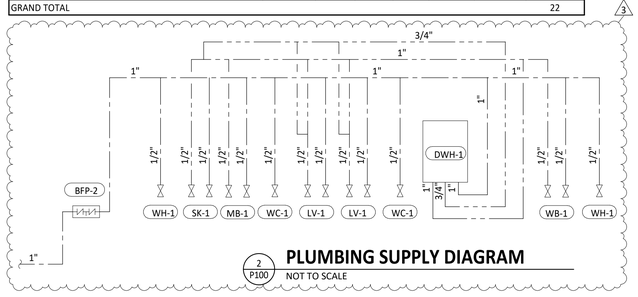


4 / P100 **ENLARGED PLUMBING SUPPLY PLAN**
1/4" = 1'-0"

PLUMBING FIXTURE SUPPLY CONNECTIONS

TAG	DESCRIPTION	CONNECTION SIZE CW	CONNECTION SIZE HW	WSFU CW	WSFU HW	WSFU TOTAL	COUNT	TOTAL WSFU
BFP-1	RPZ BACKFLOW PREVENTER	1 1/2"		0	0	0	1	0
FCO-2	FLOOR CLEANOUT (4")						3	0
FD-1	FLOOR DRAIN	1/2"					3	0
LV-1	RESTROOM LAVATORY	1/2"	1/2"	1	1	1.5	4	6
MB-1	MOP BASIN	1/2"	1/2"	1.25	1.25	2	2	4
OS-1	FUTURE OIL/SAND SEPARATOR						1	0
SK-1	KITCHEN SINK	1/2"	1/2"	2	2	2	1	2
TD-1	TRENCH DRAIN						1	0
UR-1	WATERLESS URINAL						2	0
WB-1	WASHING MACHINE BOX	1/2"	1/2"	3	3	4	1	4
WC-1	WATER CLOSET	1/2"		2		2	2	4
WH-1	FREEZE PROOF WALL HYDRANT	3/4"		1		1	2	2
GRAND TOTAL								22

3

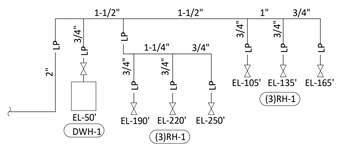


2 / P100 **PLUMBING SUPPLY DIAGRAM**
NOT TO SCALE

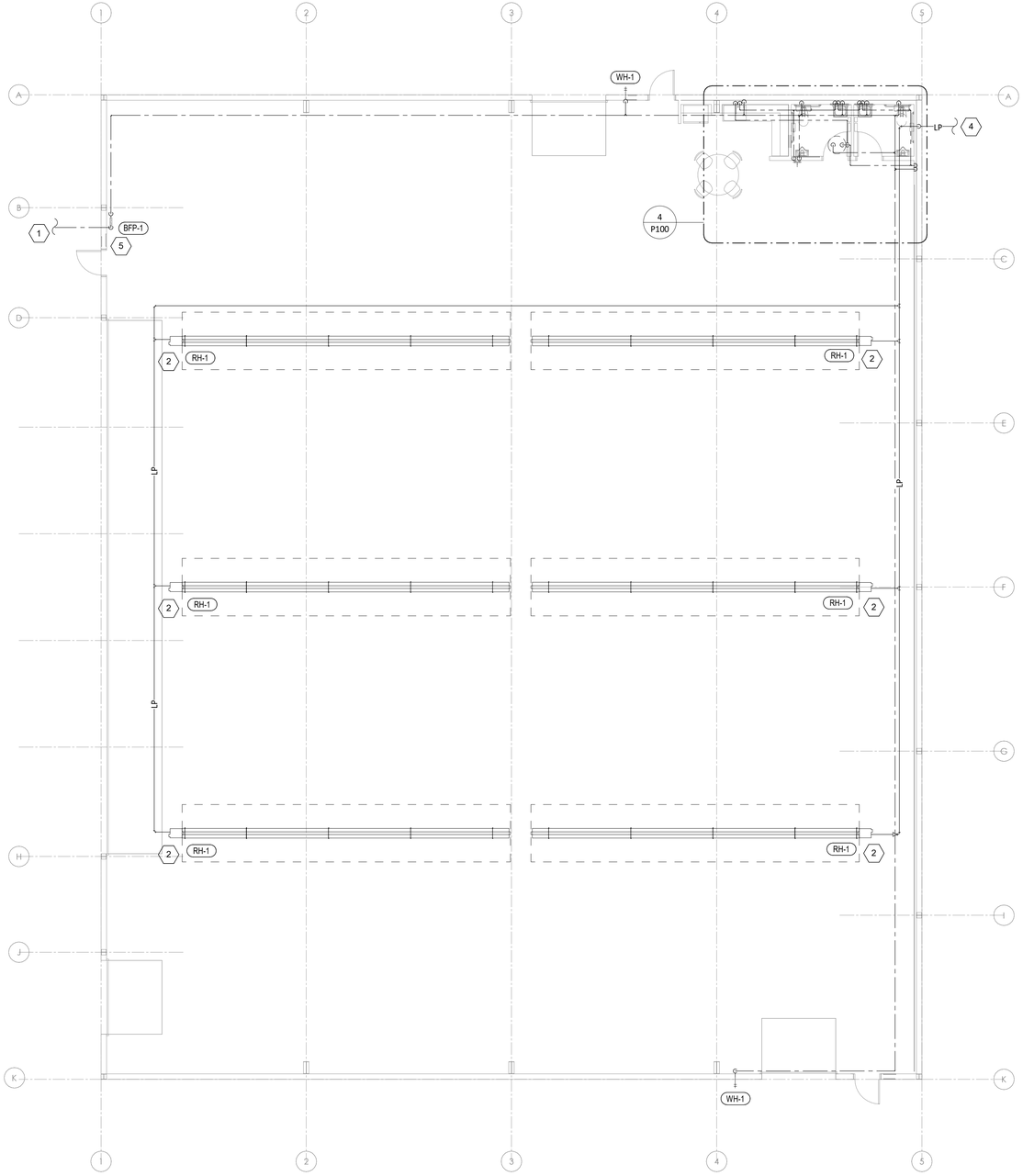
PLUMBING GAS CONNECTIONS

TAG	DESCRIPTION	Count	CONNECTION SIZE	LONGEST LENGTH	INPUT
RH-1	RADIANT TUBE HEATER	6	3/4"	240'	600,000 Btu/h
GRAND TOTAL					600,000 Btu/h

NOTE:
- PIPES SIZED PER TABLE 402.4(28) OF THE 2021 IFGC
- DISTANCES ARE APPROXIMATE
- MAX INLET PRESSURE: 11" W.C., MIN INLET PRESSURE: 14" W.C. - PC TO PROVIDE REGULATOR AS NECESSARY.



3 / P100 **PROPANE DISTRIBUTION DIAGRAM**
NOT TO SCALE



1 / P100 **PLUMBING SUPPLY PLAN**
1/8" = 1'-0"

NEW BUILDING FOR:
LS MANAGEMENT SERVICES, LLC
STREET ADDRESS TBD
LEE'S SUMMIT, MO

Blanchard AE Group
1425 WAKARUSA DR. STE B
LAWRENCE, KS 66049
Ph:785-993-0300

INSIGHT DESIGN IDEA ARCHITECTS
112 S. Main St., Nixa, MO 65714 Ph:417-724-4553
NATHAN RAPP, ARCHITECT #A-2008092601

REISSUE DATE

ADDENDUM 1 - 05/02/2025
ADDENDUM 2 - 05/15/2025
ADDENDUM 3 - 05/27/2025

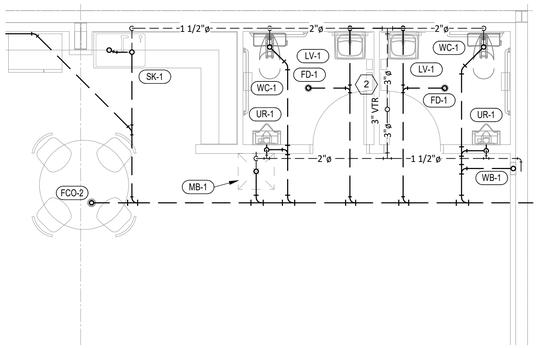
PROFESSIONAL OF RECORD

STATE OF MISSOURI
LAURA MICHELLE BLANCHARD
NUMBER PE-2007033414
PROFESSIONAL ENGINEER
5.15.2025

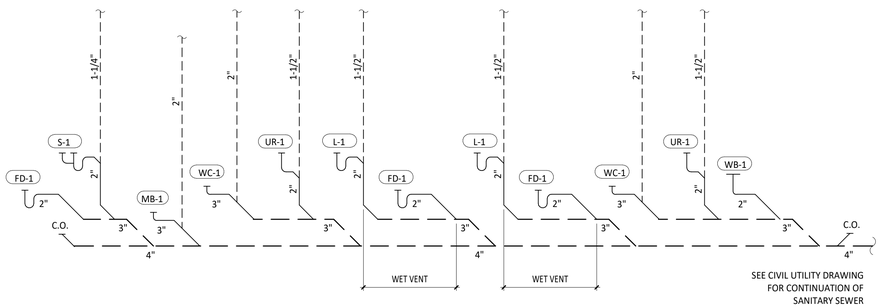
ARCHITECT	RAPP
PROJECT NO.	241121
DATE	04/14/2025
DRAWING TITLE	PLUMBING SUPPLY PLAN
SHEET NO.	P100

PLUMBING WASTE AND VENT PLAN NOTES

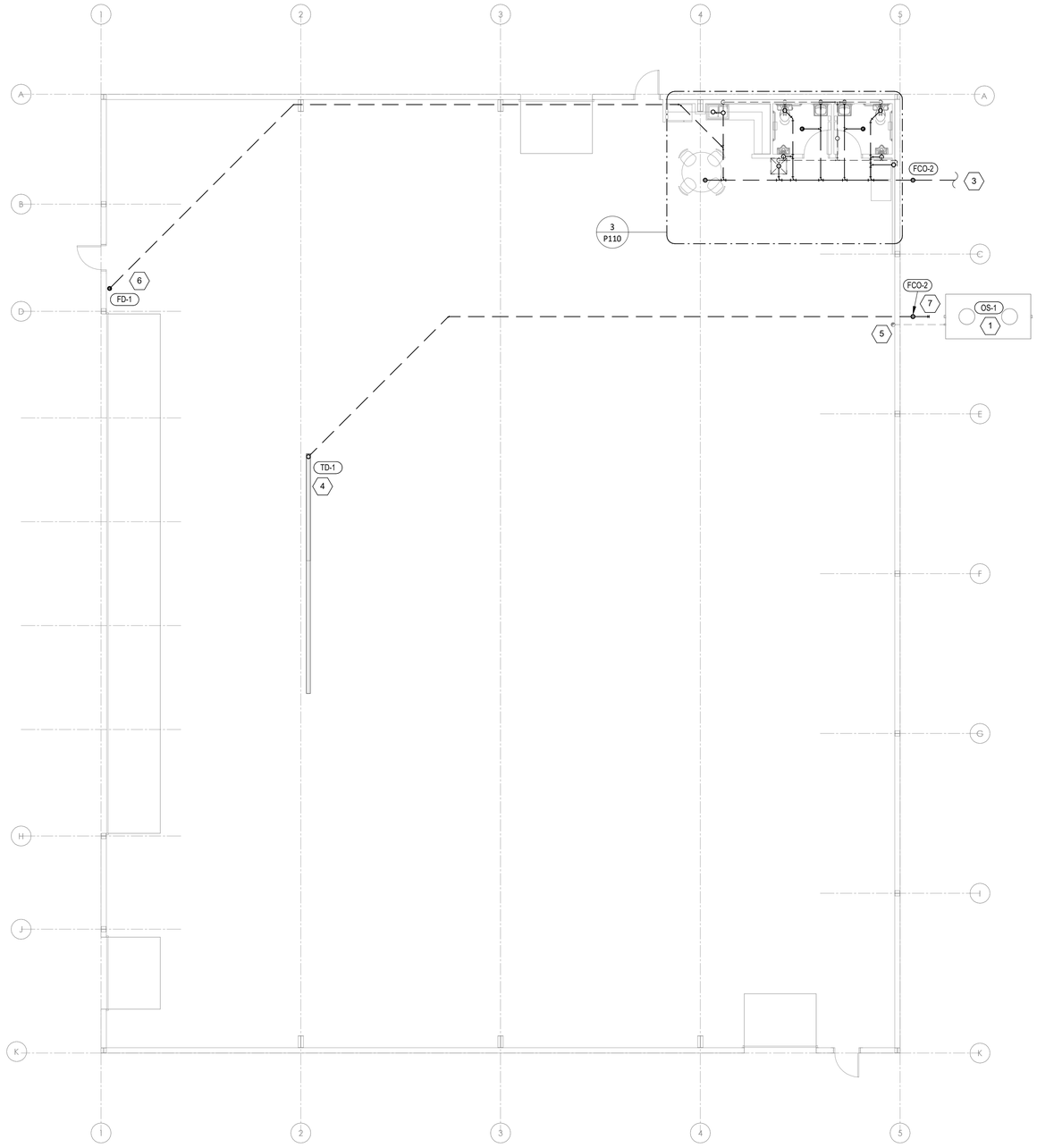
1. FUTURE 500 GALLON OIL/SAND SEPARATOR TO BE INSTALLED. REFER TO DETAILS SHEET P600 FOR MORE INFORMATION.
2. PROVIDE A 3" VENT THROUGH THE ROOF PER DETAIL, SHEET P600.
3. ROUTE 4" LINE FROM OIL/SAND SEPARATOR FOR DAYLIGHT DISCHARGE. FIELD VERIFY EXACT LOCATION OF TERMINATION.
4. TRIM TRENCH DRAIN ENDS PER THE MANUFACTURER'S INSTALLATION INSTRUCTIONS PRIOR TO INSTALLATION SO THAT GRATE FITS WITHOUT GAPS. INSTALL TRENCH DRAIN WITH SLIGHT POSITIVE SLOPE TOWARD THE DRAIN CONNECTION TO AVOID STANDING WATER IN TRENCH DRAIN.
5. FUTURE 2" VENT PIPING UP THROUGH ROOF AND TIGHT AGAINST WALL FOR FUTURE OIL/SAND SEPARATOR.
6. FLOOR DRAIN FOR BACKFLOW PREVENTER. REFER TO SHEET P100 FOR MORE INFORMATION.
7. CAP 4" TRENCH DRAIN LINE FOR FUTURE CONNECTION TO OIL/SAND SEPERATOR.



3 P110 **ENLARGED PLUMBING WASTE & VENT PLAN**
1/4" = 1'-0"



2 P110 **SANITARY WASTE & VENT DIAGRAM**
NOT TO SCALE



1 P110 **SANITARY WASTE & VENT PLAN**
1/8" = 1'-0"

RELEASED FOR CONSTRUCTION
As Noted on Plans Review
Development Services Department
Lee's Summit, Missouri
05/28/2025

NEW BUILDING FOR:
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PROFESSIONAL OF RECORD

STATE OF MISSOURI
LAURA MICHELLE BLANCHARD
NUMBER PE-2007032414
PROFESSIONAL ENGINEER
5/15/2025

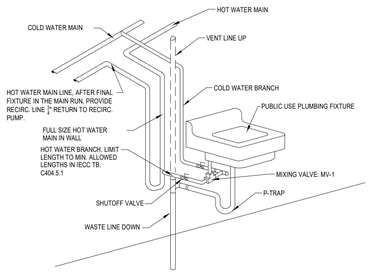
ARCHITECT	RAPP
PROJECT NO.	241121
DATE	04/14/2025
DRAWING TITLE	PLUMBING PLAN WASTE & VENT
SHEET NO.	P110

PLUMBING FIXTURE SCHEDULE

TAG	DESCRIPTION	FURNISHED BY	INSTALLED BY	BASIS FOR DESIGN		REMARKS	COUNT	CONNECTION SIZE			WATER SUPPLY FIXTURE UNITS			DRAINAGE
				MANUFACTURER	MODEL			CW	HW	WASTE	CW	HW	TOTAL	FIXTURE UNITS
BFP-1	RPZ BACKFLOW PREVENTER	GC	GC	CONBRACO	4ALF-207	LEAD FREE REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTER WITH AUTOMATIC DIFFERENTIAL RELIEF VALVE AND AIR GAP FITTING	1	1 1/2"			0	0	0	
ET-1	EXPANSION TANK	GC	GC	AMTROL	ST-5	2 GALLON CAPACITY	1	3/4"			0		0	
FCO-2	FLOOR CLEANOUT (4")	GC	GC	SIOUX CHIEF	852-4PNR	ON-GRADE ADJUSTABLE CLEANOUT WITH INTERNAL THREADED CLEANOUT PLUG AND ROUND NICKEL-BRONZE RING AND COVER (OR APPROVED EQUAL WITH INTERNAL THREADED CLEANOUT PLUG)	3			4"				0
FD-1	FLOOR DRAIN	GC	GC	SIOUX CHIEF	842-2-PNR	ADJUSTABLE FLOOR DRAIN WITH PVC BODY, ROUND POLISHED METAL RING AND STRAINER, AND TRAP PRIMER PORT	3	1/2"		2"				2
LV-1	RESTROOM LAVATORY	GC	GC	AMERICAN STANDARD	9024.001EC	ADA-ACCESSIBLE, WALL-MOUNTED, PORCELAIN LAVATORY. PROVIDE ZURN Z1231 (Z1231-D FOR BACK-TO-BACK APPLICATIONS) CONCEALED ARM CARRIER IN WALL. PROVIDE METERED FAUCET WITH 0.5 GPM AERATOR AND FURNISHED WITH THERMOSTATIC MIXING VALVE. ADJUST FAUCET CONTROLS FOR 30 SECOND RUN TIME.	4	1/2"	1/2"	2"	1	1	1.5	2
MB-1	MOP BASIN	GC	GC	FIAT	MSB2424	PROVIDE 24"x24"x10" MOLDED-STONE MOP BASIN. INSTALL MOP BASIN IN A BED OF GROUT SO THERE ARE NO VOIDS BETWEEN THE MOP BASIN AND THE SLAB. PROVIDE SERVICE SINK FAUCET WITH BUILT IN STOPS, LEVER HANDLES, WALL BRACE, AND NPT FEMALE INLETS	2	1/2"	1/2"	2"	1.25	1.25	2	3
OS-1	FUTURE OIL/SAND SEPARATOR	N/A	N/A	JENSEN	JP-500-E-OS	500 GALLON OIL/SAND SEPARATOR	1			4"				0
SK-1	KITCHEN SINK	GC	GC	AMERICAN STANDARD	18.DB.9291800	29" x 18" STAINLESS STEEL DOUBLE BOWL SINK PROVIDE WITH AMERICAN STANDARD 2021.634 FAUCET.	1	1/2"	1/2"		2	2	2	
TD-1	TRENCH DRAIN	GC	GC	ZURN	Z886 8606	6" X 360" HDPE TRENCH DRAIN WITH (2) CLOSED END CAPS, (1) 4" NO-HUB BOTTOM OUTLET, AND CLASS-A HEEL-PROOF POLYETHYLENE GRATES.	1			2"				2
UR-1	WATERLESS URINAL	GC	GC	ZURN	Z5795	WATERLESS, WALL-MOUNTED, VITREOUS CHINA. PROVIDE WITH 1 GALLON BOTTLE OF SEALANT REFILL. INSTALL WITH RIM AT 17" AFF.	2			2"				2
WB-1	WASHING MACHINE BOX	GC	GC	GUY GREY	B200	CENTER DRAIN, GALVANIZED	1	1/2"	1/2"	2"	3	3	4	0
WC-1	WATER CLOSET	GC	GC	KOHLER	K-3519 W/ SEAT K-4666-C	WHITE HIGHLINE 1.0 GPF, 17-1/8"-HIGH, ADA ACCESSIBLE, PRESSURE ASSIST WATER CLOSET WITH OPEN-FRONT SEAT. INSTALL TRIP LEVER ON THE TANK TO THE OPEN SIDE OF THE STALL (ADD -RA TO THE MODEL #FOR RIGHT HAND TRIP LEVER).	2	1/2"		3"	2		2	4
WH-1	FREEZE PROOF WALL HYDRANT	GC	GC	WOODFORD	MODEL 65	AUTOMATIC DRAINING, FREEZELESS WALL HYDRANT WITH ANTI-SIPHON VACUUM BREAKER. PROVIDE WITH STEM LONG ENOUGH TO REACH INSIDE THE THERMAL ENVELOPE OF THE BUILDING.	2	3/4"			1		1	

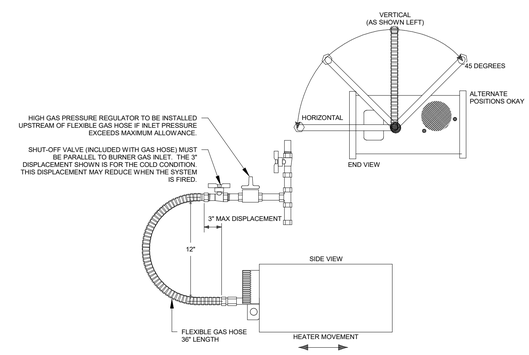
WATER HEATER SCHEDULE

TAG	DESCRIPTION	ELECTRICAL V/P/H	FURNISHED BY	INSTALLED BY	BASIS FOR DESIGN		REMARKS
					MANUFACTURER	MODEL	
DWH-1	COMPACT ELECTRIC WATER HEATER	120/1/60	GC	GC	AO SMITH	EJC-10	10 GALLON COMMERCIAL GRADE WATER HEATER. FURNISH WITH ALL ACCESSORIES NECESSARY FOR A COMPLETE INSTALLATION.



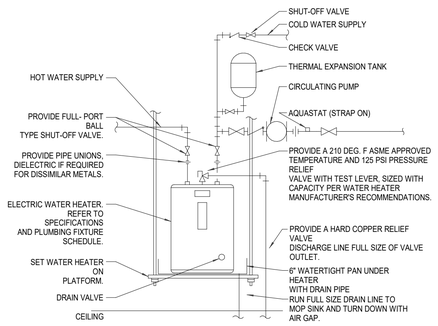
HOT WATER PIPING DETAIL

5 P600 NOT TO SCALE



RADIANT HEATER GAS CONNECTION DETAIL

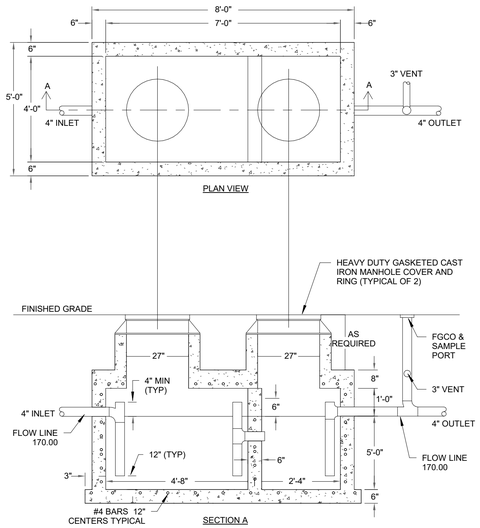
1 P600 NOT TO SCALE



NOTES:
1. PIPING ARRANGEMENT SHOWN IS SCHEMATIC. ADJUST TO SUIT FIELD CONDITIONS. REFER TO FLOOR PLANS FOR PIPE SIZES. SET HEATER THERMOSTAT AT 120F. PROVIDE SEISMIC STRAP OR BRACING IF/AS REQUIRED BY LOCAL AUTHORITIES. PROVIDE CLEARANCE, ACCESSIBILITY, AND REMOVABILITY.

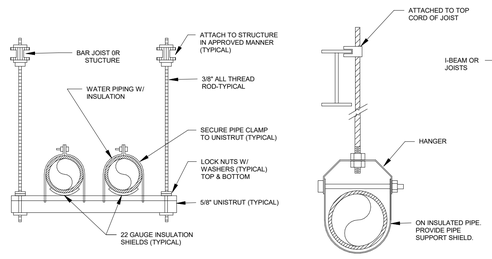
WATER HEATER DETAIL

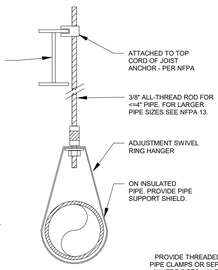
4 P600 NOT TO SCALE



OIL/SAND SEPARATOR DETAIL

7 P600 NOT TO SCALE



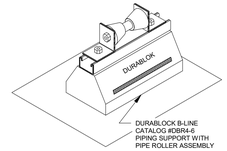


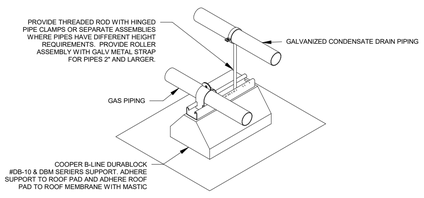
HANGER SPACING TABLE		
PIPING MATERIAL	MAXIMUM HORIZONTAL SPACING (feet)	MAXIMUM VERTICAL SPACING (feet)
CAST-IRON PIPE	5a	15
COPPER OR COPPER-ALLOY PIPE	12	10
COPPER OR COPPER-ALLOY TUBING, 1-1/4" DIA. AND SMALLER	6	10
COPPER OR COPPER-ALLOY TUBING, 1-1/2" DIA. AND LARGER	10	10
STEEL PIPE	12	15
PVC PIPE	4	10

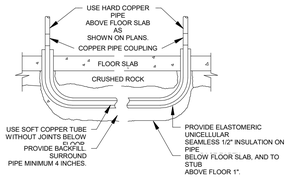
a. The maximum horizontal spacing of cast-iron pipe hangers shall be increased to 10 feet where 10-foot lenghts of pipe are installed. Based on INTERNATIONAL PLUMBING CODE 2009.

PIPING SUPPORT DETAILS

2 P600 NOT TO SCALE



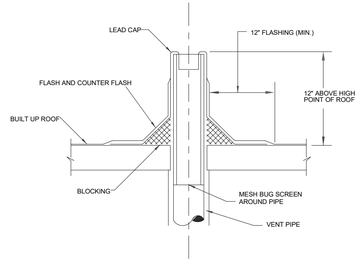




NOTES:
1. IF FLOOR SLAB IS EXISTING, SAW CUT IT, EXCAVATE, BACKFILL, REPAIR VAPOR BARRIER, AND PATCH SLAB. PIPE SHALL HAVE LONG RADIUS WITH OTHER PIPE, CONDUIT, OR REINFORCING STEEL. DO NOT USE FLARED OR COMPRESSION JOINTS BELOW SLAB; USE WROUGHT COPPER FITTINGS WITH BRAZED JOINTS ONLY WHEN JOINTS ARE UNAVOIDABLE.

WATER PIPE UNDER SLAB DETAIL

3 P600 NOT TO SCALE



VENT THRU ROOF DETAIL

6 P600 NOT TO SCALE

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PROFESSIONAL OF RECORD

STATE OF MISSOURI
LAURA MICHELLE BLANCHARD
NUMBER PE-2007032414
PROFESSIONAL ENGINEER
5/15/2025

ARCHITECT	RAPP
PROJECT NO.	241121
DATE	04/14/2025
DRAWING TITLE	PLUMBING SCHEDULES & DETAILS
SHEET NO.	P600

ELECTRICAL REQUIREMENTS

1. The Electrical Contractor shall provide all conduit and wiring and shall connect complete and ready for operation all electrical motors and equipment for other trades as shown on the drawings and as required for complete and operating systems per the latest adopted National Electrical Code.
2. Domestic Water Pumps: The Electrical Contractor shall provide disconnects and motor starter/contactors as indicated. The Electrical Contractor shall make all required electrical connections.
3. Sump Pumps: The PC will provide these pump sets complete with alternator controls. The Electrical Contractor shall make all required electrical connections.
4. Single Phase Exhaust Fans: The MC shall provide the single phase exhaust fans with disconnecting means. The Electrical Contractor shall provide the line voltage thermostat as may be indicated. The Electrical Contractor shall make all required electrical connections.
5. Fan Coil Units: The MC shall provide units complete with factory mounted and wired disconnect, speed control switches, and factory mounted and wired electric heating coil. The Electrical Contractor shall make all required electrical connections.
6. Unit Heaters: The MC shall provide the single phase unit heaters with disconnecting means. The Electrical Contractor shall provide the line voltage thermostat as may be indicated. The Electrical Contractor shall make all required electrical connections.
7. Temperature Controls: The temperature control supplier will provide all low voltage control wiring. The EC shall provide indicated 120 volt power supplies and connection. The EC shall provide all rough-in boxes and conduits for thermostat indicated under the direct supervision of the Temperature Control Contractor. Coordinate all requirements with the Temperature Control Contractor.
8. Range Hoods: The Electrical Contractor shall make all required electrical connections to fan(s), light(s), and switch(es).
9. Fire Alarm: The fire alarm supplier/contractor will provide all low voltage control wiring. The EC shall provide indicated 120 volt power supplies and connections. The EC shall provide all rough-in boxes and conduits for devices as indicated under the direct supervision of the Fire Alarm Contractor. Coordinate all requirements with the Fire Alarm Contractor.
10. Security System: The security system supplier/contractor will provide all low voltage control wiring. The EC shall provide indicated 120 volt power supplies and connections. The EC shall provide all rough-in boxes and conduits for devices as indicated under the direct supervision of the Security Contractor. Coordinate all requirements with the Security Contractor.
11. Structured Cabling System: The structured cabling system supplier/contractor will provide all low voltage control wiring. The EC shall provide indicated 120 volt power supplies and connections. The EC shall provide all rough-in boxes and conduits for devices as indicated under the direct supervision of the Structured Cabling Contractor. Coordinate all requirements with the Structured Cabling Contractor.
12. Handicapped Door Operators: The Electrical Contractor shall provide disconnect as required and make all rough-ins for controllers. The Electrical Contractor shall make all required electrical connections.
13. Security Door Lock System: The Electrical Contractor shall provide disconnect as required and make all rough-ins for controllers. The Electrical Contractor shall make all required 120 volt and low voltage electrical connections.
14. Kitchen Ranges: The range(s) shall be provided by others complete with cord and plug assembly. The Electrical Contractor shall install the cord and plug assembly and shall make all required electrical connections.
15. Washers and Dryers: The Electrical Contractor shall verify NEMA configurations of cord and plugs sets for both washers and dryers provided. The Electrical Contractor shall install cord and plug kits for dryers. The Electrical Contractor shall make all required electrical connections.
16. The contractor shall pay any and all required utility service fees associated with this project direct to the local utility company.
17. Underground Service: Service work shall include secondary conduits and feeders, primary conduits, CT cabinet, meter can, and support pad for transformer and sectionalizing switch as shown on the plans or required by the utility. Electrical Contractor shall leave adequate conductor length at the transformer to allow connections by the Electric Utility. Contractor shall provide all trenching, backfilling, and pavement removal and replacement as necessary for the primary and secondary raceway systems. Local utility company will provide all primary cable from the new sectionalizing switch to the primary compartment of transformer including sectionalizing equipment. Local utility company will provide all connections to primary equipment and shall make all transformer connections. Local utility company will provide the meter. Local utility company will provide all metering equipment CT's, wiring and meter installation.
18. Provide the wire as specified and the circuiting as shown on the drawings. All power wires and cables #10 awg and smaller shall be annealed soft copper, solid construction, code type THWN or THHN. All power wires and cables #8 awg and larger shall be annealed soft copper, compressed strand construction, code type THWN-2 or THHN.
19. At the contractor's option, wires and cables #6 and larger may be Alcan "Stabiloy", or Southwire "Triple E" with Code type XHHW-2 insulation. Cables shall be marked "Al Stabiloy 600V XHHW-2 (UL)" or "Al Triple E 600V XHHW-2". Note that wire and conduit sizes indicated on plans are based on copper. **If aluminum conductors are used, it is the responsibility of the contractor to size the conductors and conduit.** All circuits feeding mechanical equipment are sized based on copper wires, and shall be installed using copper feeders only.
20. All wiring shall be in conduit, unless noted otherwise.
21. All HVAC equipment feeders shall be copper code type THWN/THHN.
22. Grounding and Bonding:
    A. Supplement the grounded neutral of the electrical distribution system with an equipment grounding system, installed so that metallic enclosures, raceways, junction boxes, outlet boxes, cabinets, machine frames, portable equipment, etc., operate continuously at ground potential and provide a low impedance path for ground fault currents.
    B. The entire electrical system, including all special power systems, shall be grounded in accordance with the latest adopted version of the National Electrical Code.
    C. Grounding conductors shall be installed in conduits as shown on the drawings. Provide 100% rated dedicated grounding conductors per each 120-volt outlet circuit.
    D. Grounding conductors shall be installed in all PVC and Metal conduits.
    E. Provide grounding plates in hub room and at main service grounding electrode, as indicated on plans.
    F. Rod electrodes shall be copper, 5/8"diameter and 8'-0" long.
    G. Provide service grounding per NEC Article 250 of the latest adopted Code version, and as shown on the drawings.
23. Color coding for 120/208 volt systems shall be Black/Blue/Red for phase conductors, White for neutral and green for grounding conductors. Color coding for 277/480 volt systems shall be Brown/Orange/Yellow for phase conductors, Grey/White for neutral and green for grounding conductors.
24. Underground service conduits shall be heavy wall Schedule 40 PVC utility conduit with UL Label. Fittings and bends shall be deep socket type schedule 40 utility elbows with 36" radius. All other exterior conduits shall be rigid steel conduit or intermediate metal conduit with threaded couplings and fittings.
25. All interior conduit shall be E.M.T. Provide setscrew couplings and fittings for NEMA 1 installations and compression couplings and fittings for NEMA 3R installations as a minimum. All conduit shall be run parallel or perpendicular to the building surfaces. All conduit shall be concealed in walls. Overhead conduit shall be concealed except in rooms without ceilings.
26. At the Contractor's option all interior branch circuits may be type MC cable with listed fittings and couplers in lieu of EMT conduit and conductors. Color coding shall be maintained.
27. Each 120 volt outlet circuit shall be provided with dedicated neutral conductors. Three phase, four wire homeruns of 120 volt branch circuits will not be accepted.
28. Each light fixture shall be provided with a dedicated fixture whip from a junction box. The practice of 'daisy-chaining' from fixture to fixture will not be accepted. Multiple fixture whips from a single box is acceptable.
29. Provide conduits and raceways; electrical pull, junction and device boxes as specified and shown on the drawings, as well as those required for a complete and code acceptable installation.
30. The Electrical Contractor shall provide rough-in boxes and ½"conduit for thermostats under the supervision of the temperature controls installation contractor.
31. 120/208 Volt Panelboards: Provide Square D, type NQOD or equal, 3 phase, 4-wire panelboards with circuit breakers as scheduled. Circuit breakers shall be bolt-on thermal-magnetic molded case type. Arc Fault breakers shall be provided for all circuits as required in section 210.12 of the NEC.
32. Circuit Breaker Distribution Panels: Provide Square D or equal, I-Line, 3 phase, 4-wire panelboards with circuit breakers as scheduled. Provide panels with ground bars, surface mounted cabinets and UL label. Circuit breakers shall be Square D, Type KA and FH thermal-magnetic, molded case circuit breakers.
33. Inside each panel door, provide an approved typewritten schedule card showing what each circuit feeds.
34. Provide engraved, white on black, laminated plastic plate, mechanically affixed labels on all panels, transformers, safety switches, motor starter, etc. Where panels, etc., occur in finished rooms, label shall be on inside of the door. Labels shall match designation indicated on the plans.
35. Provide 20 amp, heavy duty commercial wiring devices as shown on the drawings. Device and coverplate colors shall be as directed by the architect. Coverplates shall be nylon. Ground fault interrupter receptacles shall be provided in all locations as required in Section 210.8 of the latest adopted version of the NEC. Tamper resistant receptacles shall be provided at all locations as required by Section 406.11 (dwelling units) and Section 517 (pediatric areas) of the latest adopted version of the NEC.
36. Time switches shall be EZ Controls, or approved equal Paragon or Intermatic, maintained contact time switch with 25 amp rated controls. Time clocks shall be based on solid state technology with 10-year memory retention and rechargeable battery carryover.
37. Provide general-duty safety switches as indicated on the plans and as specified. Provide the appropriate NEMA enclosure rating for the installation location. All safety switches shall be NEMA Type HD and UL listed. Provide fusible devices as shown on the drawings.
38. Provide light fixtures as specified. Material, equipment or services necessary to complete the installation of these fixtures, but not specifically mentioned shall be furnished as though specified.
39. Properly support and align all fixtures and provide all necessary steel shapes for support of the fixtures. Fixtures recessed in ceilings shall be securely connected to the ceiling and structure.
40. Verify all ceiling systems and coordinate fixture type and accessories prior to ordering fixtures. Coordinate and cooperate with ceiling installer in regards to the location and installation of light fixtures.
41. All wall mounted fixtures shall be coordinated with the architectural features of the building. Where specific elevations or dimensions are not indicated, verify the correct location with the Architect prior to beginning any work.
42. At the time of substantial completion, aim all track lights, flood lights, spot lights, etc per the Architect's direction. Provide all scaffolds, lifts etc as required.
43. Transformers:
    A. Provide Square D Type EE Energy Efficient Transformers Class 7400 dry-type transformers. Three phase transformers shall be 480-volt delta primary and 120/208 volt, 4-wire, wye connected secondary. Transformers shall have a minimum of 4-2.5% full capacity primary taps. Transformers shall be 150° C. temperature rise above 40° C. ambient. All insulating materials to be in accordance with NEMA ST20 Standard for a 220° C. UL component recognized insulation system.

45. 120/208v 3 phase PanelBoards:
    A. Provide the following Square D, type NQ, 3 phase, 4-wire panelboards with circuit breakers as scheduled. Provide panels with ground bars, surface mounted cabinets and UL label.
    B. Circuit breakers shall be Square D Type QO (plug-on) or QOB (bolt-on) thermal-magnetic molded case circuit breakers. Type QO-GFI ground fault breakers and QO-CAFI combination arc breakers shall be provided as indicated and required by the NEC. Breakers shall be 1, 2 or 3-pole with an integral crossbar to assure simultaneous opening of all poles in multi-pole circuit breakers. Breakers shall have an overcenter, trip-free, toggle-type operating mechanism with quick-make, quick-break action and positive handle indication. Handles shall have "ON," "OFF" and "TRIPPED" positions. Plug-on (QO) and bolt-on (QOB) circuit breakers shall be able to be installed in the panelboard without requiring additional mounting hardware. Circuit breakers shall be UL listed in accordance with UL Standard 489 and shall be rated 240 volts ac maximum with continuous current ratings as noted on the plans. Interrupting ratings shall be 10,000 rms symmetrical amps maximum at 208Y/120 volts ac maximum. Other frames are available with higher AIC ratings, refer to notes in panel schedules on the plans.
    C. AFCI - Arc Fault breakers shall be provided for all circuits as required in section 210.12 of the NEC

46. 277/480v 3 phase PanelBoards:
    A. Provide the following Square D type NF, 3 phase, 4-wire panelboards with circuit breakers as scheduled.
    B. Provide panels with ground bars, surface mounted cabinets and UL label.
    C. Circuit breakers shall be Square D, Type EDB (bolt-on) thermal magnetic, molded case circuit breakers. Breakers shall be 1, 2 or 3 pole with an integral crossbar to assure simultaneous opening of all poles in multiple circuit breakers. Breakers shall have an overcenter, trip-free, toggle-type operating mechanism with quick-make, quick-break action and positive handle indication. Handles shall have "ON", "OFF" and "TRIPPED" positions. Circuit breakers shall be UL listed in accordance with UL Standard 489 and shall be rated 277 volts ac (single pole, 15-30 amps) or 480Y/277 volts ac (2 and 3 pole, 15-100 amps) with continuous current ratings. Interrupting ratings shall be 18,000 rms symmetrical amps at 480Y/277 volts ac maximum. Other frames are available with higher AIC ratings, refer to notes in panel schedules on the plans.

47. Circuit Breaker Distribution PanelBoards (I-lIne):
    A. Provide the following Square D, type I-Line, 3 phase, 4-wire panelboards with circuit breakers as scheduled. Where applicable, panelboard shall be UL Listed for Service Entrance Equipment. Provide panels with ground bars, surface mounted cabinets and UL label. Panelboard assembly shall be enclosed in a steel cabinet. The rigidity and gauge of steel to be as specified in UL Standard 50 for cabinets. The size of wiring gutters shall be in accordance with UL Standard 67. Cabinets to be equipped with latch and tumbler-type lock on door of trim. Doors over 48" long shall be equipped with three-point latch and vault lock. All locks shall be keyed alike. Endwalls shall be removable. Fronts shall be of code gauge steel. Gray baked enamel finish electrodeposited over cleaned phosphatized steel.
    B. Circuit breakers shall be Square D, Type FA in 100 amp frames, Type HD in 150 amp frames, Type JD is 250 amp frames, and LD in 400 and 600 amp frames. All shall be thermal-magnetic, molded case circuit breakers with factory sealed trip units, unless scheduled otherwise. Breakers shall be 1, 2 or 3 pole with an integral crossbar to assure simultaneous opening of all poles in multiple circuit breakers. Breakers shall have an over-center, trip-free, toggle-type operating mechanism with quick-make, quick-break action and positive handle indication. Handles shall have "ON", "OFF" and "TRIPPED" positions. Circuit breakers shall be UL listed in accordance with UL Standard 489 and shall be rated(1 pole FA, 15 to 100) with an interrupting rating as indicated on drawings/schedule with a minimum of 18 Kaic, (2 and 3 pole HD, 15-150 amps) with an interrupting rating as indicated on drawings/schedule with a minimum of 18 Kaic, (2 and 3 pole JD, 150 to 250 amps) with an interrupting rating of as indicated on drawings/schedule with a minimum rating of 18 Kaic, and , (2 and 3 pole LD, 250 to 600 amps) with an interrupting rating of as indicated on drawings/schedule with a minimum rating of 18 Kaic. Other frames are available with higher AIC ratings, refer to notes in panel schedules on the plans.
    C. Panels shall be as indicated and scheduled on the plans.

48. Wiring Devices:
    A. The following devices shall be as manufactured by Hubbell, or approved equal. They shall be rated at 20 amps, 120/277 volts, unless specified otherwise. Verify device color with architect before ordering.

Switches:

a.	S.P.S.T.	Hubbell CSB120
b.	2-pole switch	Hubbell CSB220
c.	3_way switch	Hubbell CSB320
d.	4-way switch	Hubbell CSB420
e.	Auto/Off switch	Hubbell CS1221

General Wall Receptacles:

a.	120 volt duplex outlet	Hubbell CR5352AG
b.	Tamper resistant	Hubbell BR20TR
b.	Isolated Ground outlet	Hubbell CR5352IG
c.	Single outlet	Hubbell HBL5361
d.	Drinking fountain/Vending	Hubbell GF20L
e.	GFI outlet	Hubbell GF20L
f.	Weatherproof outlet	Hubbell GF20L with RW57400 cover
g.	Range Outlet (50 amp, 120/240) (NEMA 14-50)	Hubbell RR450F /SS703 cover plate
h.	Dryer Outlet (30 amp, 120/240) plate (NEMA 14-30)	Hubbell RR430F w/SS703 cover

General Wall Tamper-Resistant Receptacles (Dwelling Units):

a.	120 volt duplex outlet	Hubbell BR20TR
b.	Single outlet	Hubbell RR201TR
c.	GFI outlet	Hubbell GFTR20
e.	Weatherproof cover/GFI outlet	Hubbell GF8300RA

Cover Plates

A. All flush_mounted wiring devices shall be provided with Hubbell SS Series Stainless Steel (back of house, kitchen areas or Mechanical rooms) Hubbell NP Series smooth nylon plate - (in color as selected by Architect) plates in the configuration and number of gangs as required in all common areas. Cover plates for wiring devices in surface_mounted boxes shall be galvanized utility box covers, raised 1/4". Where more than one device is in a single location, a one-piece multi-gang cover plate shall be used. All cover plates for switches controlling mechanical equipment and where indicated on the drawings, shall be stainless steel with standard 1/8" high engraved characters and black filler.

49. Safety Switch
    A. Provide Square D heavy duty grade safety switches in configuration noted.
    B. All switches shall have switchblades, which are fully visible in the "OFF" position when the switch door is open. All current carrying parts shall be plated to resist corrosion and promote cool operation. Switches shall have removable arc suppressors where necessary to permit easy access to line side lugs. Lugs shall be front removable and UL listed for 60° C or 75° C aluminum or copper wires. Switches shall be furnished in NEMA 1 heavy duty enclosures unless specified as NEMA 3R on the plans. Covers on NEMA 1 enclosures shall be attached with pin type hinges. NEMA 3R covers shall be securable in the open position. NEMA 3R enclosures for switches through 200 amps shall have provisions for interchangeable bolt-on hubs. Hubs shall be as indicated on the plans. NEMA 3R enclosures shall be manufactured from galvanized steel. Enclosures shall have a gray baked-enamel finish, electrodeposited on cleaned, phosphatized steel.

GENERAL MEP REQUIREMENTS

1. The contract includes all labor, material, and equipment required for the complete systems as shown and specified. Provide all devices and accessories as necessary for complete and working systems.
2. The contractors shall become familiar with the work of all other trades and shall fully coordinate their work prior to ordering equipment or installation of systems.
3. The materials, products and equipment described in these specifications or on the drawings establish a standard of required function, dimension, appearance, and quality to be met by any proposed substitution. Listing of these manufacturers shall in no way be construed as a device intended to limit the bidders to those specifically listed.
4. Reference to any article, device, product, material, fixture, form or type of construction by name, make, or catalog number, 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 listed in this specification for the applicable use, shall be acceptable, subject to performance, spatial, structural, and electrical constraints of the project design. The Engineer reserves last opinion as to a product's equality or superiority to that specified.
5. Shop drawings shall be submitted for all equipment and major materials supplied and shall include: manufacturer, model number, materials, and miscellaneous data as required to describe the equipment; capacity, voltage, phase, ampacity, and other miscellaneous data to quantify the size of the equipment; dimensional drawings showing layout, connection points, and detailed layout of components; electrical full load amps and minimum circuit ampacities; and other pertinent information needed for complete review by the engineer. Conspicuously mark on each submittal the exact model, fittings, accessories, and devices to be supplied. When a schedule is shown on the drawings or in the specifications, provide a copy of that schedule with the submittal. Contractor shall check all shop drawings to verify that they meet the requirements of the drawings and specifications before forwarding to the architect and engineer. All shop drawings submitted shall bear the stamp of the contractor to show that they have been reviewed in detail. No work shall be fabricated and no equipment ordered until the architect and engineer have returned acceptable reviewed shop drawings.
6. Locations of equipment, piping, and other work are indicated diagrammatically on the drawings. Each contractor shall coordinate exact locations subject to structural conditions, work of other contractors, access requirements, and the approval of the architect and engineer.
7. Drawings and specifications indicate minimum construction standards, but should any work indicated be sub-standard, to any ordinances, laws, codes, rules, or regulations bearing on work, the contractor shall execute work in accordance with such without increased cost to the owner, but not until he has referred such variances to the engineer.
8. The contractors shall secure and pay for the necessary permits and certificates of inspection for their trade. Keep record of all permits and inspections and submit two copies to the engineer with request for final inspection.
9. The owner shall be provided with training on each piece of equipment as to startup, shutdown, normal maintenance, seasonal changeover, and other pertinent information as recommended by the manufacturer.
10. This contractor shall warrant that the complete systems installed under this contract shall be free of defects in workmanship and materials for a period of one (1) year from the date of substantial completion by the arch/owner. If defects occur during the one year guarantee period, this contractor shall repair or replace such defects at no expense to the owner and to the satisfaction of the owner and engineer.
11. Provide 3-1/2" concrete bases for all floor mounted equipment unless shown or noted otherwise. Provide 6x6 welded wire fabric reinforcing minimum or as required by the structural engineer.
12. Adequately protect equipment from damage after delivery to the jobsite. Cover with heavy polyethylene plastic. Elevate equipment when there is danger of water damage. Equipment damaged will be rejected.
13. Any scratches to factory finishes shall be touched up using factory supplied paint before final acceptance. If extensive damage to factory finishes has occurred, equipment panels shall be replaced to the satisfaction of the engineer. If rust has formed, remove as recommended by the manufacturer prior to touch-up.
14. Install all equipment in strict accordance with the manufacturer's recommendations and the shop drawings reviewed by the Engineer. The complete installation shall function as designed and intended with respect to efficiency, capacity, and noise level, etc. Any abnormal noise caused by rattling equipment, conduit, or fixtures will not be acceptable.
15. Contractor shall perform initial start-up of systems and shall provide necessary supervision and labor to make the first seasonal change-over of systems. Owner's operating personnel shall be present during this operation.
16. It is the contractor's responsibility to provide materials and trim which fit properly the types of ceiling, wall, or floor finishes actually installed. Model numbers in specifications or shown on drawings are not intended to designate the required trim.
17. Contractor shall provide all miscellaneous steel, etc., for the proper installation of the systems specified and/or indicated on the plans. Any item connecting to building structure shall be done in a manner accepted by the structural engineer. When bar joists are used for steel construction, items shall be supported from angle iron spanning the top chord of the joists.
18. Periodically during construction and prior to Owner acceptance of the building, Contractor shall remove from the premises and dispose of all packing material and debris.
19. Before submitting his bid, the Contractor shall visit the actual location of the job and shall fully understand the scope of the work to be done and the conditions under which it is to be performed. In no case shall additional compensation be granted when existing conditions could reasonably be determined.
20. Locate and mark all known utilities prior to proceeding with work. Proceed with caution since unmarked utilities may exist on site. Should any existing utilities be damaged or disrupted, immediately notify owner and repair to existing conditions.
21. The Contractor shall closely coordinate all utility downtime with the Owner and Architect giving a minimum fourteen (14) day notice prior to downtime. Downtimes are to be held to a minimum duration with the Owner being notified as to the extent of said downtime. Any work that will affect the building occupants in any way shall be coordinated with that tenant. Such work shall be performed in a satisfactory manner to those affected.
22. The Electrical Contractor shall provide all conduit and wiring and shall connect complete and ready for operation all electrical motors and equipment in the other contracts. The other contractors shall furnish to the Electrical Contractor all switches, electrical controls, and other accessories required. Installation of all motors, equipment, etc., shall be made by the Contractor furnishing the equipment, unless otherwise indicated.
23. Unless integral to the equipment supplied or noted otherwise, the Electrical Contractor shall provide disconnect switches, motor starters, and variable frequency drives as required by code and/or as shown on the drawings. The contractors responsible for installing the associated equipment shall coordinate with the Electrical Contractor to ensure devices of the proper size are furnished. Further, the other trades shall furnish all electric control items needed to the Electrical Contractor for installation and connection.
24. The contractor shall provide openings and chases, cutting and patching, excavation and backfilling, and pipe sleeves as needed for proper execution of the work.
25. The Contractor shall do all excavation and backfilling necessary to complete work under this contract. Trenches close to walls and columns of the building shall not be excavated without the Architect's prior consent. As a minimum, backfill in 6" lifts, compacting to a minimum of 90%. The first 12" of fill above any buried item outside the building shall be sand in order to contrast with other fill material. Provide a yellow warning tape at the top of the sand layer.
26. Sleeves are required in all penetrations through new exterior walls, masonry walls, floors and fire rated gypboard walls. Sleeves shall be either Schedule 5 steel pipe, EMT conduit, field fabricated from minimum 16 gauge steel with 2" overlap at the seam, or as required by UL listed fire-stopping system. Sleeves will not be required in existing wall penetrations of masonry construction when such openings are made by "core-drilling." Space between sleeves and pipe in outside walls shall be sealed using link seals. Space between sleeves and pipe in other wall construction shall be the diameter necessary to provide the clearance required by the UL listed fire stopping method chosen by the contractor.
27. All sidewalks, streets, or alley surfaces that are broken in connection with this contract shall be patched to the satisfaction of the owner.
28. Provide fire stopping to maintain the fire rating of walls, floors, ceilings, or other building component. Fire stopping shall be composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the fire stopping under conditions of service and application, as demonstrated by the fire stopping manufacturer based on testing and field experience. Firestop system installation must meet requirements of ASTM E-814, UL Standard 1479 or UL Standard 2079 tested assemblies that provide a fire rating equal to that of construction being penetrated.
29. All installation shall conform with the latest adopted Building Codes and Justification amendments.
30. Description of Work
    A. The Mechanical Contract includes all labor, materials and equipment required for the complete mechanical systems as shown and herein specified.
    B. Provide all devices and accessories as necessary for complete and working systems.
    C. The contractors shall become familiar with the work of all other trades and shall fully coordinate their work prior to ordering equipment or installation of systems.
    D. The contractors shall become familiar with the work of all other trades and shall fully coordinate their work prior to ordering equipment or installation of systems.
    E. The Contractor shall coordinate his work with that of all other trades in order to eliminate interferences. He shall examine the drawings in advance to determine the location of sprinklers, electrical systems, ducts, piping, structures, conduits, alarms, and other equipment and services to be installed, and properly coordinate the installation of his work to avoid interferences. The Engineers have considered existing interferences in making the drawings, but it is the responsibility of the Contractor to include in his bid proposal adequate allowances to modify, offset, or otherwise accommodate all equipment to the structure, utilities, and apparatus.
31. Definitions
    A. Furnish: The term "furnish" is used to mean "supply and deliver to the project site, ready for unloading, unpacking, assembly, installation and similar operations."
    B. Install: The term "install" is used to describe operations at the project site including the actual "unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations."
    C. Provide: The term "provide" means "to furnish and install, complete and ready for the intended use."
    D. Furnished by Owner or Furnished by Others: The item will be furnished by the Owner or Others. It is to be installed and connected under the requirements of this Division, complete and ready for operation, including all items incidental to the Work, including all services necessary for proper installation and operation. The Installation shall be included under the guarantee required by this Division.
32. Operation and Maintenance Manuals
    A. Before project close-out, submit three copies of installation, operating, maintenance instructions, and parts lists for equipment provided. Include in the manual a list of emergency service organizations capable of rendering service for each piece of equipment.
    B. Keep in a safe place all keys, wrenches, and other specialty tools furnished with equipment. Present to owner at project close-out and receive a receipt showing he has received the same.
    C. At the completion of the project furnish to the Architect for the Owner, Operation and Maintenance Manuals in PDF format on CR-ROM and three (3) copies of brochures in three ring notebook form, divided and tabbed, containing all data, diagrams, capacities, spare part numbers, manufacturers service and maintenance data, warranties, guarantees, etc., including local contacts and escalation schedule complete with addresses and telephone numbers, of all equipment, apparatus, and system components furnished and installed under this Division of the specifications.
33. Codes and Ordinances
    A. All work shall be in accordance with applicable codes, rules, ordinances, and regulations of local, state, and federal governments and other authorities having jurisdiction.
    B. Drawings and specifications indicate minimum construction standards, but should any work indicated be sub-standard, to any ordinances, laws, codes, rules, or regulations bearing on work, the contractor shall execute work in accordance with such without increased cost to the owner, but not until he has referred such variances to the engineer.
34. Where other than first named products are used, it shall be the responsibility of the contractor to determine prior to bid time that his proposed materials and equipment selections do not require adjustments in the mechanical, electrical , structural, or architectural requirements as shown on the drawings. The contractor shall include in his bid all costs associated with any required adjustments
35. Instillation
    A. Install all equipment in strict accordance with the manufacturer's recommendations and the shop drawings reviewed by the Engineer.
    B. Locations of equipment, piping, and other work are indicated diagrammatically on the drawings. Each contractor shall coordinate exact locations subject to structural conditions, work of other contractors, access requirements, and the approval of the architect and engineer.
    C. item interfering with proper placement of other work shall be removed and relocated without extra cost if reasonable coordination would have eliminated the interference. Damage to other work caused by this contractor shall be restored as specified for new work.
    D. Final acceptance of work shall be subject to the condition that all systems, equipment, apparatus, and appliances operate satisfactorily as designed and intended. Work shall include required adjustment of systems and control equipment installed under this specification.
    E. Contractor shall perform initial start-up of systems and shall provide necessary supervision and labor to make the first seasonal change-over of systems. Owner's operating personnel shall be present during this operation.
    F. It is the contractor's responsibility to provide materials and trim which properly fit the types of ceiling, wall, or floor finishes actually installed. Model numbers in specifications or shown on drawings are not intended to designate the required trim.
    I. This contractor shall provide all miscellaneous steel, etc., for the proper installation of the systems specified and/or indicated on the plans.
36. Connections to Building Structure
    A. Any item connecting to building structure shall be done in a manner accepted by the structural engineer.
    B. When bar joists are used for steel construction, items shall be supported from angle iron spanning the top chord of the joists.

FIRE ALARM REQUIREMENTS

1. Furnish and install a complete Fire Alarm System as described herein and as shown on the plans; to be wired, connected, and left in first class operating condition. The system shall use closed loop initiating device circuits with individual zone supervision, individual notification appliance circuit supervision, incoming and standby power supervision. Include a control panel, manual pull stations (fire alarm boxes), automatic fire detectors, horns, annunciator, remote control devices, all wiring, connections to devices, outlet boxes, junction boxes, and all other necessary material for a complete operating system.
2. Fire Alarm Wiring
    A. Fire alarm wiring shall be solid, unstranded power limited cable as follows:
        - Non-Plenum Mapnet: West Penn D975, 1PR, 18GA shielded
        - Plenum Network and Mapnet: West Penn 60975, 1PR, 18GA shielded
        - 16GA Non-Plenum: West Penn 991, 1PR unshielded
        - 16GA Plenum: West Penn 60990B, 1PR shielded
        - 14GA Non-Plenum: West Penn 994, 1PR shielded
        - 14GA Plenum: West Penn 60993B, 1PR unshielded
    B. All wiring shall be installed in strict compliance with all the provisions of National Electrical Code, Article 760 A and C, Power_Limited Fire Protective Signaling Circuits or if required may be reclassified as non_power limited and wired in accordance with National Electrical Code, Article 760 A and B. All required wiring shall have a minimum insulation rating of 600 volts.
    C. Fire alarm wiring for this system shall be Fire Alarm plenum rated cable, or run in EMT, or ridged conduit. All wiring in walls shall be in conduit with rough-in boxes. All cables located in environmental air plenum will be plenum rated cables.
3. Fire alarm system indicated on plans is a schematic design only, Contractor shall provide Engineered signed and sealed plans by a NICET company specializing in the detection of detection and alarm systems. Provide documentation verifying compliance with the specified certification, that all persons involved with this project shall be NICET Level III certified in the field of "Fire Protection Engineering Technology, 003", and the sub field of "Fire Alarm Systems, 03". This documentation shall be submitted as a part of the submittal package for "approved" suppliers, and shall be submitted as a part of the "request for approval" by all potential suppliers not pre-approved.
4. Plan size, CAD produced system drawings shall include:
    A. Wiring diagrams/Locations of all equipment.
    B. Individual device addresses, indicated at all addressable device.
    C. Interconnection details of all devices, controls and interfaces to equipment supplied by others.
    D. Complete product data sheets for equipment proposed, with highlighted, or arrowed identifications of component descriptions, finishes, UL listings, and any other pertinent system information.
    E. Complete sequence of operations of all functions of the system.
    F. Standby battery sizing documentation. Provide a complete chart, or spreadsheet, listing all components, indicating individual and cumulative power requirements by type, and showing battery standby required, verses actual.
    G. Any additional documentation required to properly describe all functions and components needed to configure a complete and operable system.

ELECTRICAL SYMBOLS

Symbol	Description
	CONDUIT CONCEALED ABOVE THE CEILING, IN A WALL, OR IN A RACEWAY
	CONDUIT CONCEALED BELOW THE SLAB
A-6	HOME-RUN TO PANELBOARD AND CIRCUIT NUMBER SHOWN
#	PLAN NOTE: SEE PLAN NOTES LISTED ON THE SAME SHEET FOR NOTE MEANING
X/Y/Z	DISCONNECT SWITCH: X = SWITCH RATING Y = FUSE SIZE (NF = NON-FUSED) Z = NUMBER OF POLES
J	JUNCTION BOX
	ELECTRIC PANELBOARD
$	GENERAL PURPOSE 1-POLE SWITCH
	NEMA 5-20R 1-PLEX RECEPTACLE
	NEMA 5-20R DUPLEX RECEPTACLE
	NEMA 5-20R DUPLEX GFCI RECEPTACLE
	NEMA 5-20R DOUBLE-DUPLEX RECEPTACLES
IG/GFI	NEMA 5-20R DUPLEX COMBINATION ISOLATED GROUND/GFI RECEPTACLE PASS & SEYMOUR MODEL#2095IGTRGRY (GRAY)
	OTHER RECEPTACLE - SEE PLAN FOR RATING AND TYPE
	JUNCTION BOX FOR RJ-45 DATA OUTLETS. PROVIDE 1" CONDUIT WITH PULL STRING FROM J-BOX TO ABOVE OFFICE CEILING. TERMINATE CONDUIT WITH CONDUIT BUSHING.
	DOUBLE GANG JUNCTION BOX FOR RJ-45 DATA OUTLETS. PROVIDE 1" CONDUIT WITH PULL STRING FROM J-BOX TO ABOVE OFFICE CEILING. TERMINATE CONDUIT WITH CONDUIT BUSHING.
	JUNCTION BOX FOR RJ-11 TELEPHONE OUTLETS. PROVIDE 1" CONDUIT WITH PULL STRING FROM J-BOX TO ABOVE OFFICE CEILING. TERMINATE CONDUIT WITH CONDUIT BUSHING.

ELECTRICAL GENERAL NOTES

- A GENERAL NOTES APPLY TO ELECTRICAL SHEETS.
- B ELECTRICAL WORK SHALL BE DONE IN ACCORDANCE WITH THE ELECTRICAL CODE AND IN ACCORDANCE WITH THE AUTHORITY HAVING JURISDICTION. SEE ARCHITECTURAL SHEETS FOR THE PREVAILING CODES.
- C WIRING SHALL BE (2)#12, #12 G IN 3/4" C UNLESS NOTED OTHERWISE.
- D INDIVIDUAL CONDUIT HOME RUNS SHOWN SHALL NOT BE CONSOLIDATED.
- E CIRCUIT EMERGENCY LIGHTS, ILLUMINATED EXIT SIGNS, AND NIGHT LIGHTS AHEAD OF LOCAL SWITCHING.
- F INSTALL WALL SWITCHES AT 48" AFF TO CENTER OF SWITCH AND RECEPTACLES AT 18" AFF TO CENTER OF RECEPTACLE UNLESS NOTED OTHERWISE.
- G INSTALL ALL CONDUIT AND LOW VOLTAGE WIRING CONCEALED ABOVE THE CEILING, IN WALLS, OR IN RACEWAYS.
- H PROVIDE 1" CONDUIT WITH PULL STRING FROM EACH J-BOX FOR TELEPHONE OR DATA JACKS TO ABOVE OFFICE CEILING. SEE MATERIAL SCHEDULE FOR ALLOWABLE CONDUIT MATERIALS. PROVIDE CONDUITS WITH MINIMAL ELBOWS AND TERMINATE CONDUITS ABOVE OFFICE CEILING WITH CONDUIT BUSHING.
- I THE TERM "FURNISH" MEANS SUPPLY AND DELIVER TO THE PROJECT SITE, READY FOR UNLOADING, UNPACKING, ASSEMBLY, INSTALLATION, AND SIMILAR OPERATIONS. THE TERM "INSTALL" DESCRIBES THE OPERATIONS AT THE PROJECT SITE INCLUDING THE ACTUAL UNLOADING, UNPACKING, ASSEMBLY, ERECTING, PLACING, ANCHORING, APPLYING, WORKING TO DIMENSION, FINISHING, CURING, PROTECTING, CLEANING, AND SIMILAR OPERATIONS. THE TERM "PROVIDE" MEANS TO FURNISH AND INSTALL, COMPLETE AND READY FOR THE INTENDED USE.
- J DIMENSIONS SHOWN IN ELECTRICAL ELEVATIONS ARE FROM THE WALL FRAMING UNLESS NOTED OTHERWISE.
- K IF THERE ARE RATED ASSEMBLIES WITHIN CHIPOTLE'S SPACE COORDINATE ANY REQUIRED CONDUIT RUNS WITH SECURITY VENDOR.
- L ALL ELECTRICAL METAL CONDUIT SHALL HAVE A GROUND CONDUCTOR. THE METAL CONDUIT WILL NOT ACT AS THE GROUND CONDUCTOR.
- M FIRE PROTECTION SYSTEM IS REQUIRED PER NFPA 13R. CONTRACTOR SHALL PROVIDE A DESIGN BUILD SYSTEM.

ELECTRICAL MATERIAL SCHEDULE

	APPLICATION	ALLOWABLE MATERIAL
CONDUCTORS		
	#8 AWG AND LARGER	STRANDED CU, TYPE THHN/THWN OR XHHW
	#10 AWG AND SMALLER	SOLID CU, TYPE THHN/THWN OR XHHW
	FIELD-MADE CORD (EXPOSED INDOOR LOCATIONS)	TYPE SO OR SJO SERVICE CORD WITH CU CONDUCTORS
CONDUITS		
	CONNECTION TO VIBRATING EQUIPMENT (EXPOSED INDOOR DRY LOCATIONS)	FLEXIBLE METAL CONDUIT
	CONNECTION TO VIBRATING EQUIPMENT (EXPOSED WET OR DAMP LOCATIONS)	LIQUIDTIGHT FLEXIBLE METAL CONDUIT
	INDOOR, CONCEALED ABOVE GRADE	ELECTRICAL METALLIC TUBING, FLEXIBLE METAL CONDUIT, OR METAL CLAD CABLE
	INDOOR, EXPOSED	ELECTRICAL METALLIC TUBING U.N.O.
	INDOOR, WITHIN 1-1/2" OF ROOF DECK	INTERMEDIATE METAL CONDUIT
	LOW OR LINE VOLTAGE, BELOW GRADE	RIGID NONMETALLIC CONDUIT (SCHEDULE 40 PVC)
	LOW VOLTAGE, INDOOR, ABOVE GRADE	ELECTRICAL METALLIC TUBING
	OUTDOOR, ABOVE GRADE, EXPOSED OR CONCEALED	INTERMEDIATE METAL CONDUIT
WIRING DEVICES		
	IG OR IG/GFI RECEPTACLES	GRAY DEVICE WITH STAINLESS STEEL COVER PLATE
	IN KITCHEN, OFFICE, OR NON-PUBLIC SPACES	GRAY DEVICE WITH STAINLESS STEEL COVER PLATE
	IN RESTROOMS	WHITE DEVICE WITH WHITE COVER PLATE
	ON DRYWALL IN DINING ROOM	WHITE DEVICE WITH WHITE COVER PLATE
	ON HOT ROLLED STEEL, RICHLITE, OR OTHER BLACK FINISHES	BLACK DEVICE WITH BLACK COVER PLATE

ELECTRICAL ABBREVIATIONS

(E)	EXISTING
ABV	ABOVE
ADA	AMERICANS WITH DISABILITIES ACT
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AHJ	AUTHORITY HAVING JURISDICTION
BFF	BELOW FINISHED FLOOR
BFG	BELOW FINISHED GRADE
CLG	CEILING
CTE	CONNECT TO EXISTING
DN	DOWN
EXG	EXISTING
FLR	FLOOR
GFCI	GROUND FAULT CURRENT INTERRUPTER
GYP	GYPSUM BOARD
IG	ISOLATED GROUND
NF	NON-FUSED
NL	NIGHT LIGHT
NTS	NOT TO SCALE
O/H	OVERHEAD
TYP	TYPICAL
U/G	UNDERGROUND
UNO	UNLESS NOTED OTHERWISE
W/	WITH
WP	WEATHERPROOF
C02AS	CO2 ALARM SUPPLIER
GC	GENERAL CONTRACTOR
HES	TENANT'S HVAC EQUIPMENT SUPPLIER
LL	LANDLORD
TAB	TENANT'S TEST AND BALANCE VENDOR
TDC	TENANT'S DUCT CLEANER
TEMS	TENANT'S ENERGY MANAGEMENT SYSTEM SUPPLIER
TPS	TENANT'S PANELBOARD SUPPLIER
TSV	TENANT'S SIGN VENDOR
WHS	TENANT'S WATER HEATER SUPPLIER

20A WIRE SIZING SCHEDULE (VOLTAGE DROP)

ALL WIRE SIZES SHOWN ON BELOW SCHEDULE ARE INTENDED TO BE MINIMUM ACCEPTABLE WIRE SIZE

THE FOLLOWING SCHEDULE IS TO BE USED TO SIZE WIRE FOR 20 AMP CIRCUITS (120 VOLT).
LENGTHS (ONE WAY) ARE INTENDED TO BE MAXIMUM.

120 VOLT CIRCUIT MAX LENGTH (FT)

MAX AMPS	MAX WATTS	WIRE SIZE #12	#10	#8	#6
5	600	200	325	490	770
10	1200	100	160	245	385
15	1800	70	110	165	255

NEW BUILDING FOR:
LS MANAGEMENT SERVICES, LLC
STREET ADDRESS TBD
LEE'S SUMMIT, MO

Blanchard AE Group
1425 WAKARUSA DR. STE B
LAWRENCE, KS 66049
Ph:785-993-0300

INSIGHT DESIGN iDeA ARCHITECTS
112 S. Main St., Nixa, MO 65714 Ph:417-724-8553
NATHAN RAPP, ARCHITECT #A-2008008201

REISSUE DATE

ADDENDUM 1 - 05/02/2025
ADDENDUM 2 - 05/15/2025
ADDENDUM 3 - 05/27/2025

PROFESSIONAL OF RECORD

STATE OF MISSOURI
LAURA MICHELLE BLANCHARD
NUMBER PE-2007032416
PROFESSIONAL ENGINEER
5.15.2025

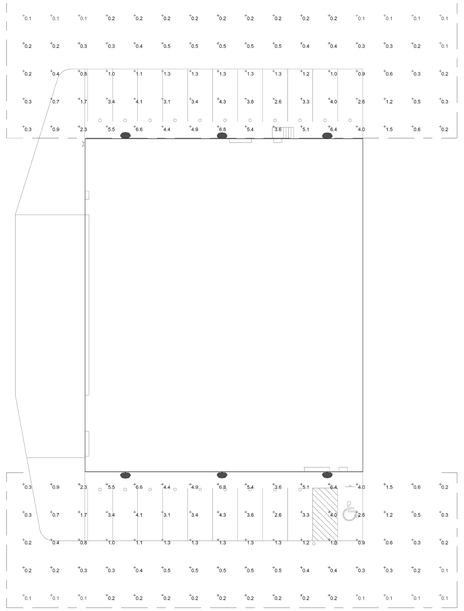
ARCHITECT: RAPP
PROJECT NO.: 241121
DATE: 04/14/2025
DRAWING TITLE: ELECTRICAL SPECIFICATIONS
SHEET NO.: E010

ELECTRICAL LIGHTING PLAN NOTES

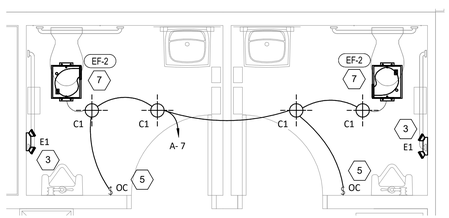
1 PROVIDE 4-WAY SWITCH FOR HIGH BAY HANGAR LIGHTING. VERIFY SWITCH LOCATIONS AND CONTROL ZONES WITH OWNER PRIOR TO INSTALL.
2 PROVIDE REMOTE EMERGENCY LIGHT MOUNTED AT 8'-0" AFF. COORDINATE EXACT LOCATION WITH OWNER AND CONCEAL LOW VOLTAGE WIRING TO INTERIOR EXIT SIGN.
3 WALL MOUNT THE EMERGENCY LIGHT FIXTURE AT 6" BELOW THE CEILING. PROVIDE UNSWITCHED HOT TO FIXTURE, CIRCUITED AHEAD OF ALL LOCAL AND GLOBAL SWITCHING.
4 VERIFY MOUNTING HEIGHT OF EXIT SIGN PRIOR TO ROUGH IN.
5 INSTALL WALL-MOUNTED OCCUPANCY SENSOR AT 42" AFF. ADJUST OCCUPANCY SENSOR TO PROVIDE AUTOMATIC ON/AUTOMATIC OFF OPERATION WITH A FIXED TIMER OF 30 MINUTES AND WITH BOTH THE PASSIVE INFRARED AND ULTRASONIC SENSORS ENABLED.
6 EMERGENCY LIGHT FIXTURE SHALL BE SWITCHED DURING NORMAL OPERATION. UPON LOSS OF POWER, FIXTURE SHALL BE ENERGIZED VIA THE EMERGENCY FIXTURE, ONBOARD EMERGENCY LIGHTING INVERTER.
7 INTERLOCK EXHAUST FAN OPERATION WITH RESTROOM LIGHTING.

LIGHTING FIXTURE SCHEDULE

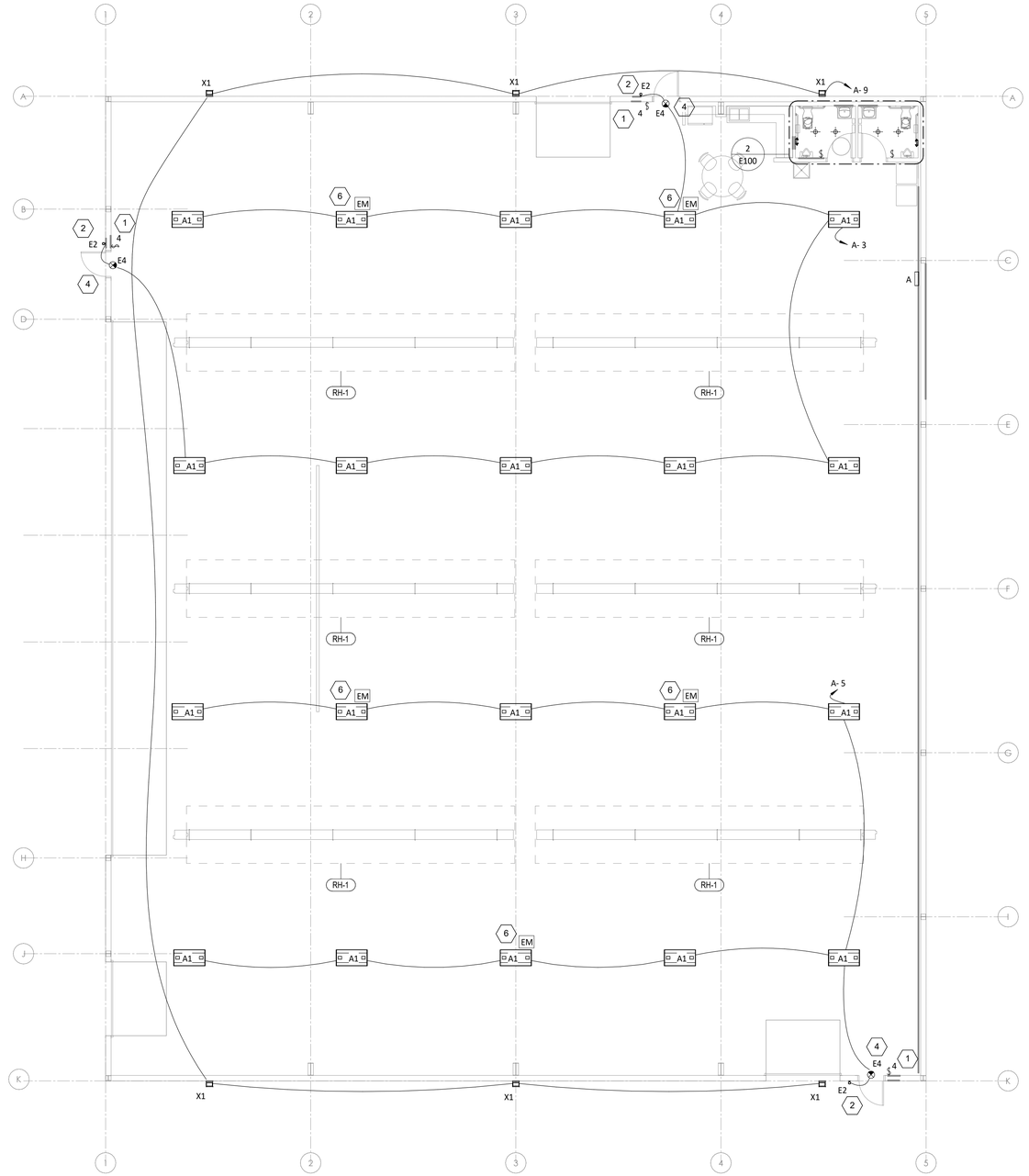
TAG	COUNT	DESCRIPTION	MOUNTING	VOLTAGE	WATTS	BASIS FOR DESIGN			REMARKS
						MANUFACTURER	MODEL	LAMP	
A1	20	MODULAR HIGH BAY	SUSPENDED	120 V	295 W	GH-4-L400-840-FA-UNIV	HE WILLIAMS	LED	COORDINATE MOUNTING HEIGHT WITH ARCHITECT. REFER TO E100 FOR FIXTURES THAT SHALL BE PROVIDED WITH AN EMERGENCY FEATURE. FIXTURES DENOTED WITH 'EM'.
C1	4	RECESSED 6IN CAN LIGHT	CEILING	120 V	17 W	NORA LIGHTING	NHIC-6G24ATFL WITH NLCBC-65130WW LED TRIM	LED	LED TRIM FURNISHED WITH GU24 SOCKET ADAPTER
E1	2	EMERGENCY LIGHT - DUAL HEAD	WALL	120 V	2 W	EXITRONIX	LED-90	INTEGRAL LED	90 MINUTE BATTERY BACKUP
E2	3	EXTERIOR REMOTE EMERGENCY LIGHT	WALL	4 V	1 W	EXITRONIX	MLED1-WP	INTEGRAL LED	LOW VOLTAGE REMOTE EMERGENCY LIGHT POWERED BY REMOTE-CAPABLE EXIT SIGN WITH MOUNTING PLATE
E4	3	EXIT SIGN WITH EMERGENCY LIGHT -STANDARD RED LETTERS	WALL	120 V	2 W	EXITRONIX	CLED-U	INTEGRAL LED	90 MINUTE BATTERY BACKUP WITH INTEGRAL EMERGENCY LIGHT, REMOTE HEAD CAPABLE
X1	6	EXTERIOR WALL PACK	WALL	120 V	49 W	HE WILLIAMS	VWPH-L60-840-T3-SDGL	LED	MOUNT AT 15'-0", COORDINATE FINSIH WITH ARCHITECT.



3 E100 **EXTERIOR PHOTOMETRICS**
NOT TO SCALE



2 E100 **ENLARGED LIGHTING PLAN**
3/8" = 1'-0"



1 E100 **LIGHTING FLOOR PLAN**
1/8" = 1'-0"

NEW BUILDING FOR:
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1425 WAKARUSA DR. STE B
LAWRENCE, KS 66049
Ph:785-993-0300

INSIGHT DESIGN IDEA ARCHITECTS
112 S. Main St., Nixa, MO 65714 Ph:417-724-4553
NATHAN RAPP, ARCHITECT #A-2008092601

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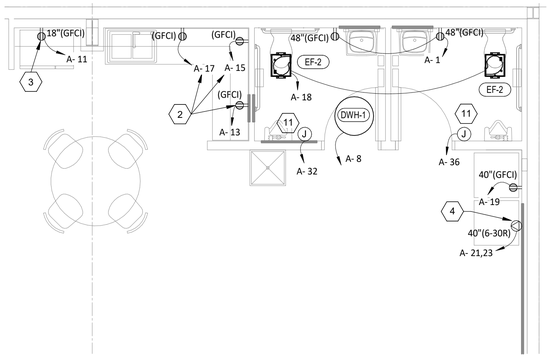
PROFESSIONAL OF RECORD

STATE OF MISSOURI
LAURA MICHELLE BLANCHARD
NUMBER PE-2007032414
PROFESSIONAL ENGINEER
5/15/2025

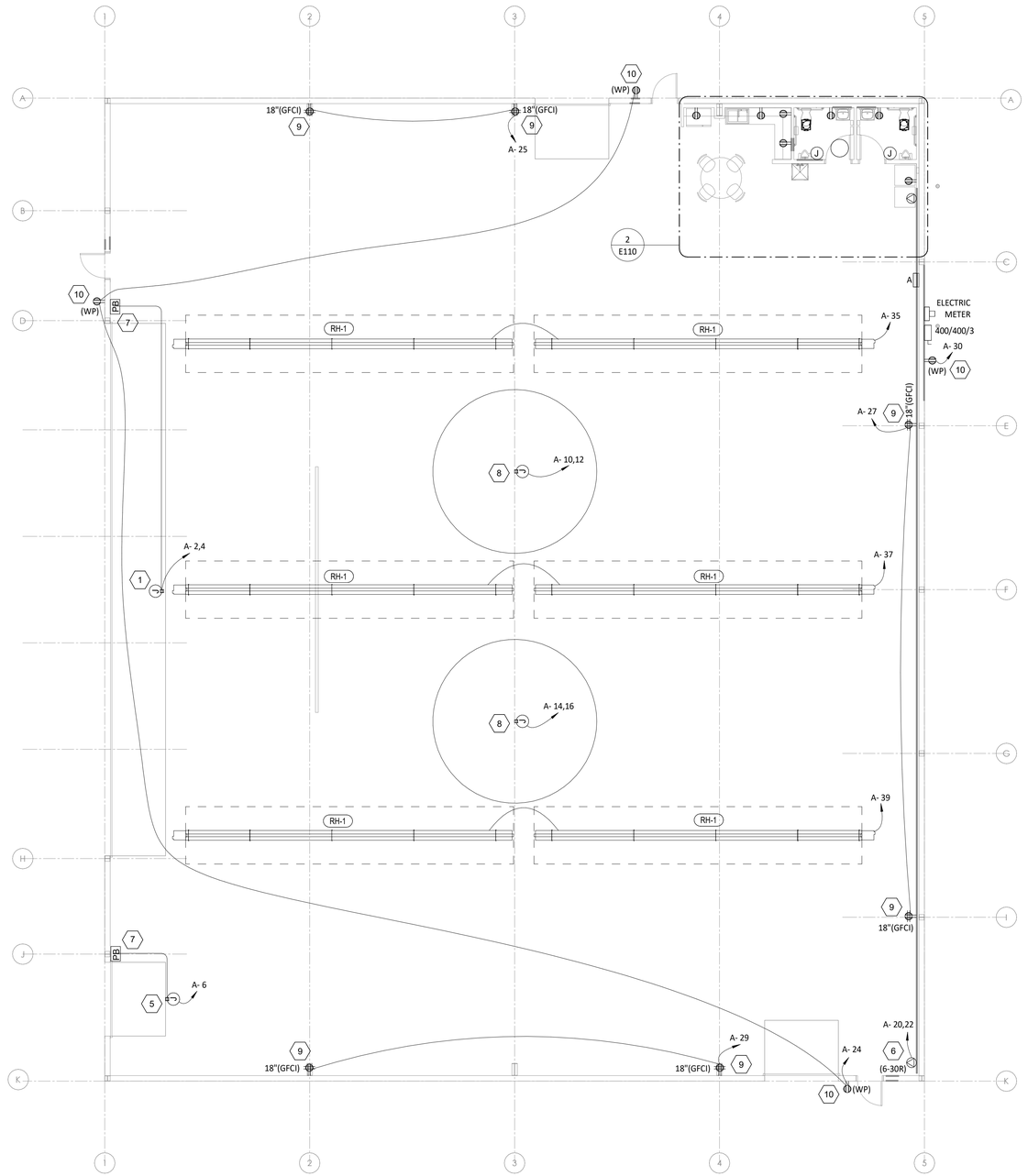
ARCHITECT	RAPP
PROJECT NO.	241121
DATE	04/14/2025
DRAWING TITLE	ELECTRICAL LIGHTING PLAN
SHEET NO.	E100

ELECTRICAL POWER PLAN NOTES

1 PROVIDE POWER FOR BI-FOLD DOOR WITH ACCESSIBLE DISCONNECT SWITCH PER MANUFACTURERS RECOMMENDATIONS. FIELD VERIFY EXACT LOCATION OF MOTOR PRIOR TO ROUGH-IN.
2 INSTALL RECEPTACLES ABOVE COUNTERTOP AND CIRCUIT AS SHOWN. FIELD VERIFY MOUNTING HEIGHT PRIOR TO ROUGH-IN.
3 PROVIDE POWER FOR REFRIGERATOR. VERIFY ELECTRICAL REQUIREMENTS PRIOR TO ROUGH-IN.
4 PROVIDE POWER FOR DRYER PER MANUFACTURERS RECOMMENDATIONS AT 40" AFF. VERIFY PLUG TYPE PRIOR TO ROUGH-IN.
5 VERIFY OVERHEAD DOOR ELECTRICAL REQUIREMENTS AND EXACT LOCATION OF MOTOR PRIOR TO ROUGH-IN. PROVIDE ACCESSIBLE DISCONNECT SWITCH AS NECESSARY.
6 PROVIDE POWER FOR AIR COMPRESSOR PER MANUFACTURERS RECOMMENDATIONS. VERIFY PLUG TYPE AND COORDINATE LOCATION/MOUNTING HEIGHT WITH OWNER PRIOR TO ROUGH-IN.
7 PUSH BUTTON TO BE PROVIDED WITH DOOR OPENER. VERIFY QUANTITY AND LOCATION WITH OWNER PRIOR TO ROUGH-IN.
8 J-BOX FOR FUTURE CONNECTION OF HVLS FAN. VERIFY LOCATION(S) WITH OWNER PRIOR TO ROUGH IN.
9 VERIFY LOCATION OF GENERAL QUAD RECEPTACLE WITH OWNER PRIOR TO ROUGH-IN.
10 PROVIDE EXTERIOR RATE RECEPTACEL WITH WEATHERPROOF WHILE IN USE COVER. VERIFY LOCATION WITH OWNER PRIOR TO ROUGH-IN.
11 PROVIDE J-BOX FOR FUTURE RESTROOM UNIT HEATER. COORDINATE LOCATION WITH OWNER PRIOR TO ROUGH-IN.



2 E110 **ENLARGED POWER PLAN**
1/4" = 1'-0"



1 E110 **POWER FLOOR PLAN**
1/8" = 1'-0"

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LAURA MICHELLE BLANCHARD
NUMBER PE-2007032414
PROFESSIONAL ENGINEER
5.15.2025

ARCHITECT: RAPP
PROJECT NO.: 241121
DATE: 04/14/2025
DRAWING TITLE: ELECTRICAL POWER PLAN
SHEET NO.: E110

VOLTS: 208/120V Wye
PHASES: 3
WIRES: 4
MOUNTING: Recessed
ENCLOSURE: Type 1

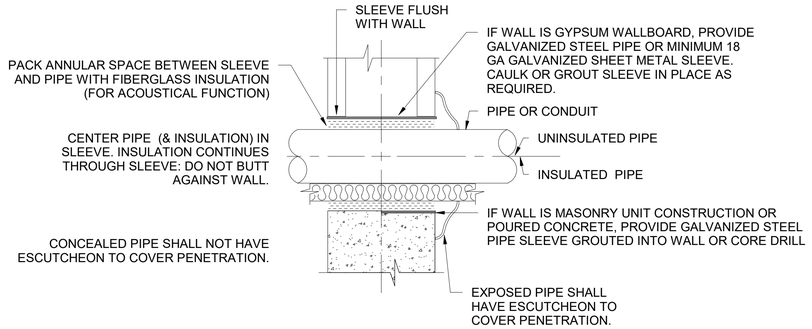
PANEL: A
MAINS: MCB
AMPERAGE: 400 A
MCB RATING: 400 A

CKT #	DESCRIPTION	C/B [A]	# PLS	NOTES	LOAD [A]	LOAD TYPE	A	B	C	LOAD TYPE	LOAD [A]	NOTES	# PLS	C/B [A]	DESCRIPTION	CKT #
1	RR RECEPTACLES	20	1		3.0	G	0.4	2.0		G	19.2		2	50	BI-FOLD DOOR	2
3	HANGAR LIGHTING	20	1		7.0	A		0.8	2.0							4
5	HANGAR LIGHTING	20	1		7.0	A			0.8	1.0	G	8.3		1	20	SMALL OVERHEAD DOOR	6
7	RESTROOM LIGHTING	20	1		0.6	A	0.1	1.7		E	14.2	GFCI	1	20	WATER HEATER	8
9	EXTERIOR LIGHTING	20	1		2.5	B		0.3	1.1							10
11	REFRIGERATOR	20	1		8.3	G			1.0	1.1	G	10.6		2	15	FUTURE FAN	12
13	COFFEE MAKER	20	1		10.0	G	1.2	1.1								14
15	MICROWAVE	20	1		10.0	G		1.2	1.1	G	10.6		2	15	FUTURE FAN	16
17	KITCHEN RECEPTACLE	20	1		4.2	G			0.5	0.0	E	0.0		1	20	RR EXHAUST	18
19	WASHER	20	1		8.3	G	1.0	0.1								20
21	DRYER	30	2	GFCI	12.0	G		1.3	0.1	G	0.9		2	20	AIR COMPRESSOR	22
23									1.3	0.5	G	4.5		1	20	EXTERIOR RECEPTACLES	24
25	GENERAL RECEPTACLES (SOUTH WALL)	20	1		8.3	G	1.0	0.0			--	--		1	20	SPARE	26
27	GENERAL RECEPTACLES (WEST WALL)	20	1		8.3	G		1.0	0.0		--	--		1	20	SPARE	28
29	GENERAL RECEPTACLES (NORTH WALL)	20	1		8.3	G			1.0	0.2	G	1.5	GFCI	1	20	SERVICE RECEPTACLE (EXTERIOR)	30
31	SPARE	20	1		--	--	0.0	1.5			G	12.5		1	20	RR UNIT HEATER (FUTURE)	32
33	SPARE	20	1		--	--		0.0	0.0		--	--		1	20	SPARE	34
35	RADIANT HEATERS (RH-1 - SOUTH ROW)	20	1		10.0	D			1.2	1.5	G	12.5		1	20	RR UNIT HEATER (FUTURE)	36
37	RADIANT HEATERS (RH-1 - MIDDLE ROW)	20	1		10.0	D	1.2	0.0			--	--		1	20	SPARE	38
39	RADIANT HEATERS (RH-1 - NORTH ROW)	20	1		10.0	D		1.2	0.0		--	--		1	20	SPARE	40
41	SPACE	--	1		--	--			--	--	--	--		1	--	SPACE	42
43	SPACE	--	1		--	--	--	--			--	--		1	--	SPACE	44
45	SPACE	--	1		--	--		--	--		--	--		1	--	SPACE	46
47	SPACE	--	1		--	--			--	--	--	--		1	--	SPACE	48
49	SPACE	--	1		--	--	--	--			--	--		1	--	SPACE	50
51	SPACE	--	1		--	--		--	--		--	--		1	--	SPACE	52
53	SPACE	--	1		--	--			--	--	--	--		1	--	SPACE	54
	PHASE TOTAL [kVA]:						**11.2 kVA**	**10.0 kVA**	**10.0 kVA**							
	PHASE TOTAL [AMPS]:						**94 A**	**83 A**	**84 A**							

TYPE	DESCRIPTION	CONNECTED LOAD	DEMAND FACTOR		ESTIMATED DEMAND
A	INTERIOR LIGHTING	2 kVA	125.00%		2 kVA
B	EXTERIOR LIGHTING	0 kVA	125.00%		0 kVA
C	COMFORT COOLING	0 kVA	0.00%	+ 25% LARGEST MOTOR	0 kVA
D	COMFORT HEATING	4 kVA	100.00%		4 kVA
E	MISC. MOTOR	2 kVA	100.00%		2 kVA
F	KITCHEN EQUIPMENT	0 kVA	0.00%		0 kVA
G	RECEPTACLES	24 kVA	70.78%		17 kVA

PANEL TOTALS

TOTAL CONNECTED kVA: 31 kVA
TOTAL CONNECTED AMPS: 87 A
TOTAL DEMAND kVA: 24.7 kVA
TOTAL DEMAND AMPS: 69 A

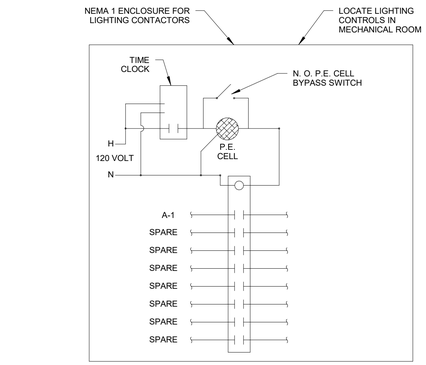


NOTES:

1. REFER TO ARCHITECTURAL DRAWINGS FOR WALL LOCATIONS. REFER TO SPECIFICATIONS FOR ALTERNATIVE INSTALLATIONS. COORDINATE REQUIREMENTS WITH GENERAL CONTRACTOR.

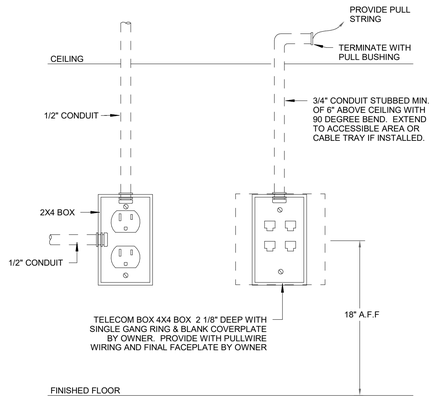
1 E600 Conduit Penetration Through Non-Firewall Detail

NOT TO SCALE



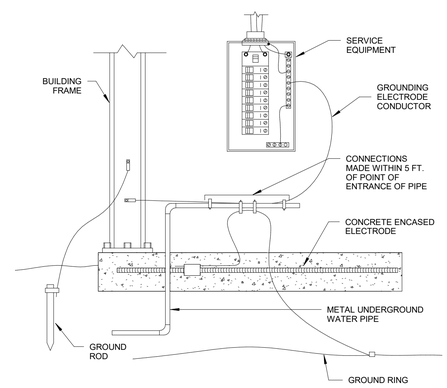
2 E600 Exterior Lighting Control Schematic

NOT TO SCALE



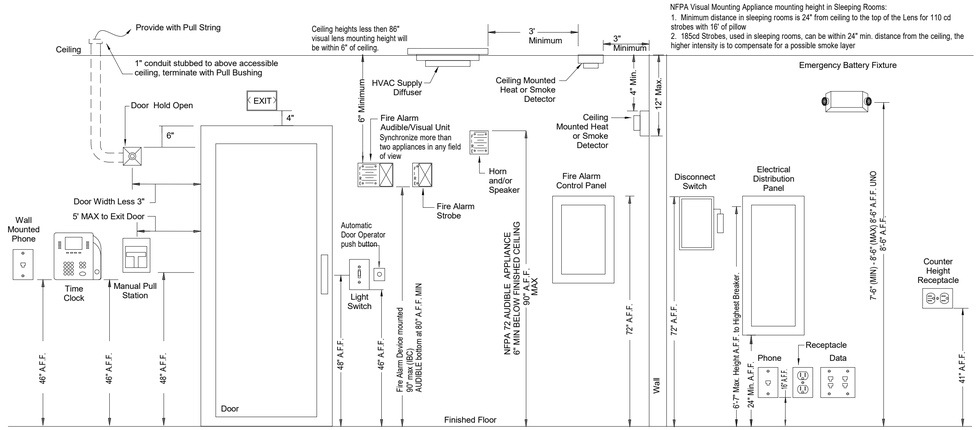
3 E600 Power & Communication Outlet Install Detail

NOT TO SCALE



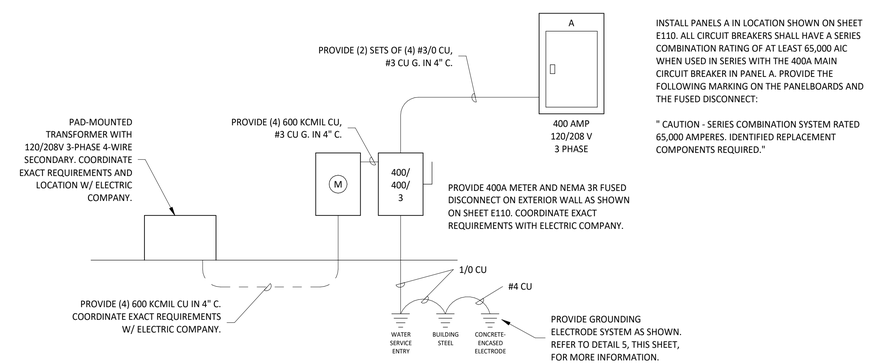
5 E600 Grounding Electrode System Detail

NOT TO SCALE



6 E600 MOUNTING HEIGHTS DETAIL

NOT TO SCALE



INSTALL PANELS A IN LOCATION SHOWN ON SHEET E110. ALL CIRCUIT BREAKERS SHALL HAVE A SERIES COMBINATION RATING OF AT LEAST 65,000 AIC WHEN USED IN SERIES WITH THE 400A MAIN CIRCUIT BREAKER IN PANEL A. PROVIDE THE FOLLOWING MARKING ON THE PANELBOARDS AND THE FUSED DISCONNECT:

" CAUTION - SERIES COMBINATION SYSTEM RATED 65,000 AMPERES. IDENTIFIED REPLACEMENT COMPONENTS REQUIRED."

4 E600 MAIN DISTRIBUTION DIAGRAM

NOT TO SCALE

RELEASED FOR CONSTRUCTION
As Noted on Plans Review
Development Services Department
Lee's Summit, Missouri
05/28/2025

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PROFESSIONAL OF RECORD

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LAURA MICHELLE BLANCHARD
NUMBER PE-2007033434
PROFESSIONAL ENGINEER
5.15.2025

ARCHITECT	RAPP
PROJECT NO.	241121
DATE	04/14/2025
DRAWING TITLE	ELECTRICAL SCHEDULES & DETAILS
SHEET NO.	E600