

All mechanical and electrical installations shall at least comply with the requirements of laws, ordinances, rules, and regulations prevailing at the construction site. Documents of the manufacturer and suppliers of materials and equipment shall be presented to the Owner along with a Certificate of Occupancy, prior to request for final payment. Each contractor shall examine all of the contract documents and shall visit the site prior to bidding. The contractor shall include in his bid all costs that may be incurred in installation of the mechanical and electrical equipment. The contractor shall submit all documents and site conditions that would preclude installation as described shall be called to the attention of the Owner prior to bidding.

The general contractor is responsible for coordinating the work of the various trades to assure that the work is completed in a timely manner. The work shall be installed by one and only one subcontractor. For example, exhaust fans (scheduled as lighting fixtures) shall be installed and connected to ductwork (described under heating and air conditioning) without outside coordination or additional cost to the Owner.

All air, condyle and ductwork shall be installed plumb and either parallel to or perpendicular to the building line. Piping, conduit, and ductwork shall be suspended from the overhead construction or incorporated within the foundation or structures; all work shall be complete except in chases and mechanical spaces. All installations shall be performed with attention to the requirements for minimum clearance to allow for air flow through and work within chases; piping and conduit shall be installed against walls and at maximum heights.

All mechanical equipment are specified by name to establish quality and standards of manufacture. Substitution of equal products will be allowed provided that the product substituted is equal to that specified. The general contractor shall be responsible for evaluating proposals for substitution made by subcontractors and for submitting the necessary documentation to the Owner for approval. The Owner shall be sufficient for the Owner to make a decision. Changes in construction cost made necessary by substitutions shall be borne by the contractor.

All hoisting and scaffolding required in connection with the construction shall be provided by the contractor.

All cutting and patching of the structure required in order to install the mechanical and electrical systems shall be performed and paid for by the contractor. Approval of the Owner shall be obtained prior to cutting; no changes that would compromise the structural integrity of the structure shall be made without the written approval of the Owner.

All excavation and backfilling necessary for the installation of the work shall be performed by the contractor. Trenches shall be backfilled with clean earth or sand and compacted in 6" pipe bedding. All trenching shall be done in a manner that does not damage the pipe. Water supply pipes below grade shall be provided with thrust blocks at all changes of direction. Pipes installed below public roadways shall utilize procedures approved by the City and the governing utility.

All piping and conduit shall be installed through the structure and through openings in occupied space shall be provided with chromium plated escutcheon plates.

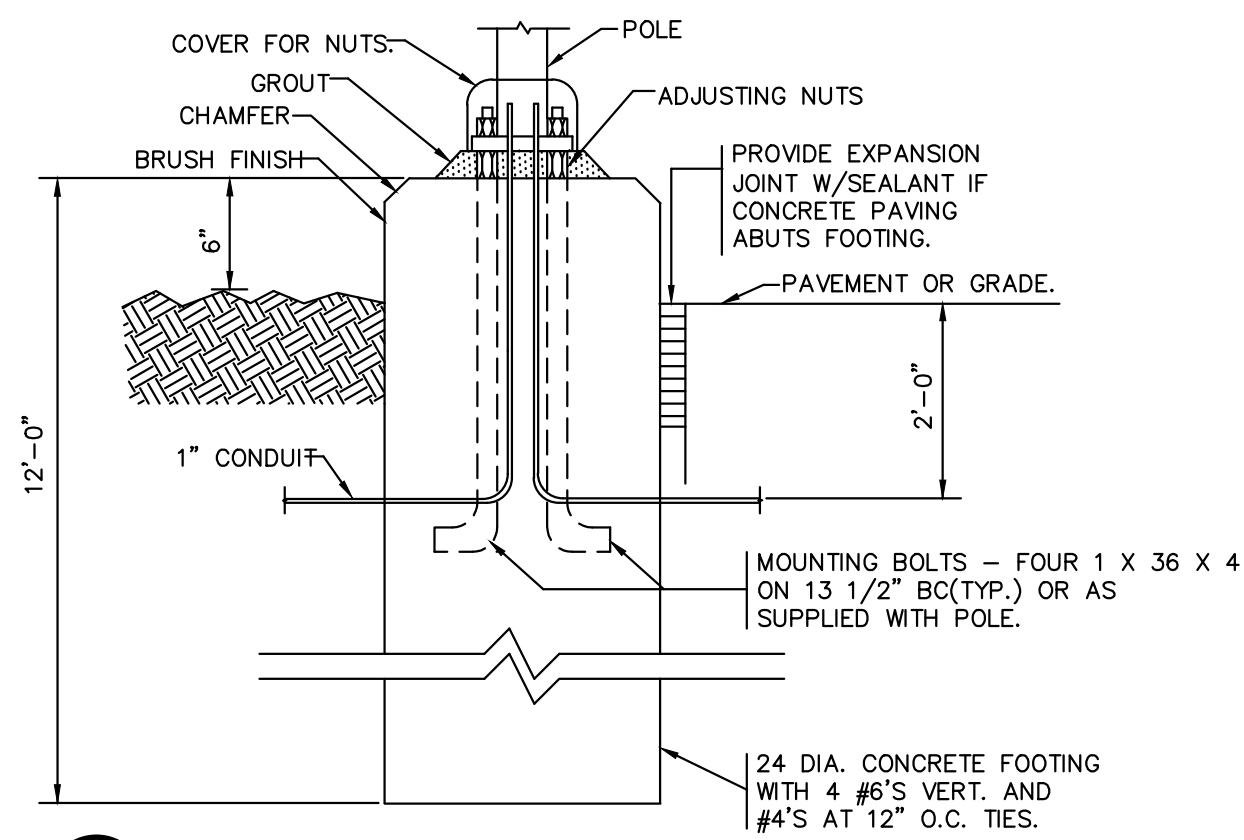
All piping and conduit shall be suspended from the structure with steel rods and hangers or fastened directly to the structure with clips or clamps. Soil pipe shall have hangers. All piping and conduit shall be supported by steel rods and hangers and conduit shall be supported at 5'-0" on centers (sizes up to 1-1/2") and at 10'-0" on centers (sizes 1-1/2" and up). Insulated pipe shall be provided with sheet metal saddles at points of support to prevent damage to the insulation. Perforated strap hangers or hangers with straps shall be used for heavy loads shall be distributed over several rafters or joists in a manner specifically approved by the Structural Engineer. The contractor shall guarantee the mechanical and electrical systems for materials, workmanship and equipment substitution for a period of one year after completion of substantial completion. Compressors in air conditioning systems shall be guaranteed for Five years. The year of warranty service shall be provided by the contractor for all mechanical and electrical systems.

Mechnical and electrical contractors shall maintain "as-built" drawings during construction; these drawings shall be delivered to the Owner at the time of substantial completion.

The following shall be delivered to the Owner at the time of substantial completion:

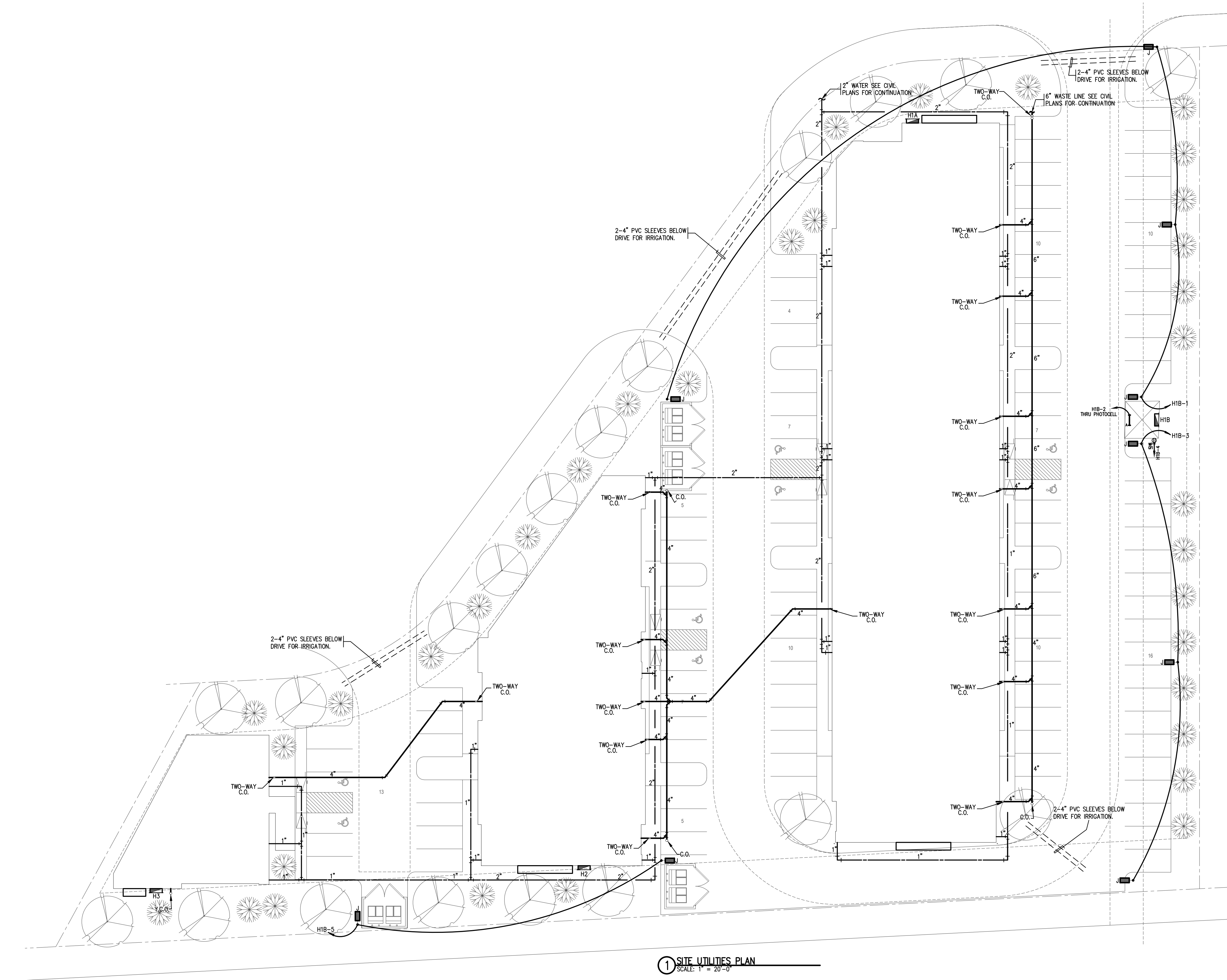
- A. As-built drawings approved by the Structural Engineer.
- B. Copies of acceptance certificates issued by inspecting agencies.
- C. Test and balance reports.
- D. Maintenance and operating instruction manuals for each item of equipment.
- E. Manufacturer's manuals for each item of equipment.
- F. Copy of the contractor's service agreement.

1. VERIFY LOCATIONS OF ALL UTILITIES AND COORDINATE WITH UTILITY COMPANIES PRIOR TO BEGINNING CONSTRUCTION.
2. SWITCH EXTERIOR LIGHTING & SIGNAGE THROUGH TIME CLOCK UNLESS OTHERWISE NOTED.



2 POLE BASE DETAIL
N.T.S.

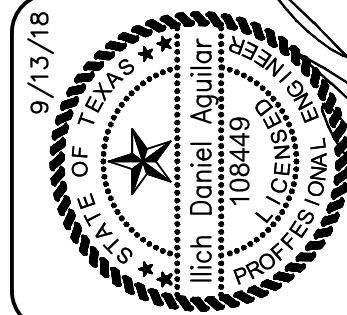
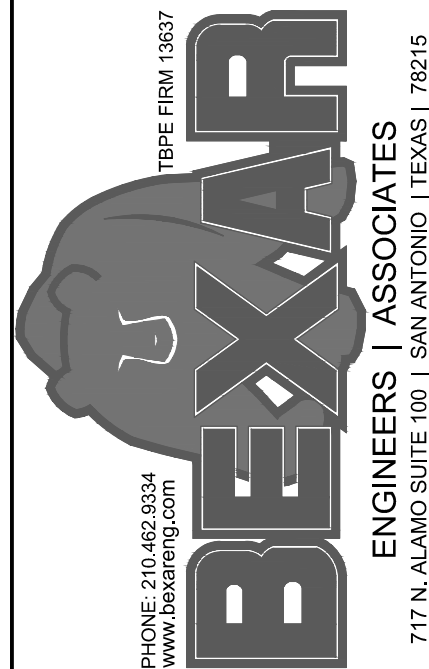
COORDINATE WITH CIVIL AND STRUCTURAL



1 SITE UTILITIES PLAN
SCALE: 1" = 20'-0"

$$E: 1'' = 20' - 0$$

REVISIONS:		DESCRIPTION
NO.	DATE	



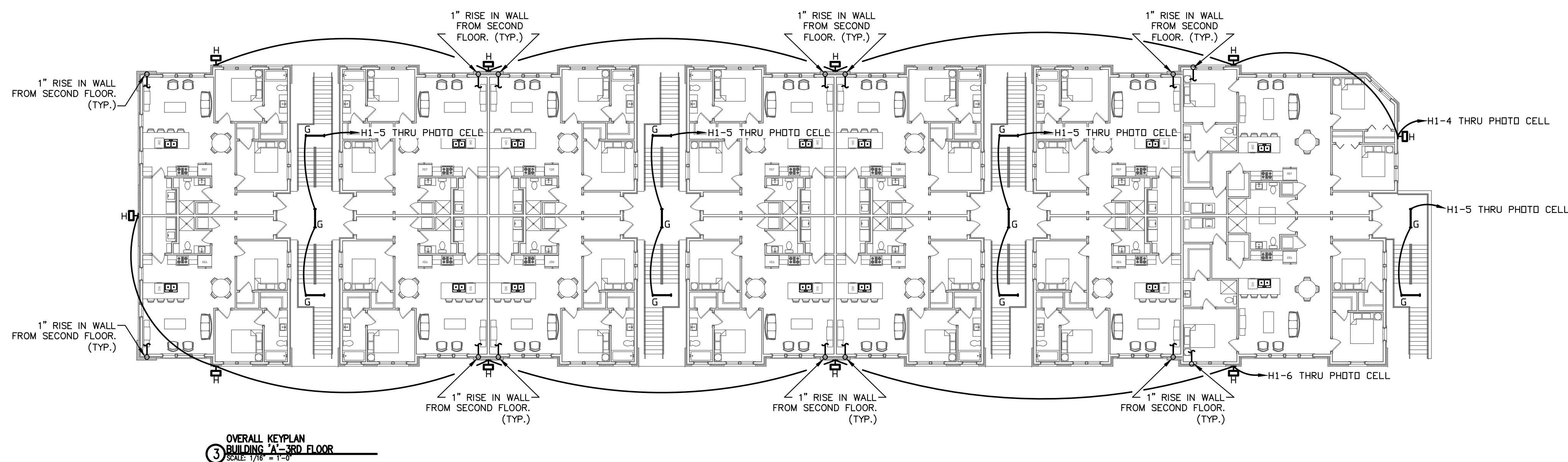
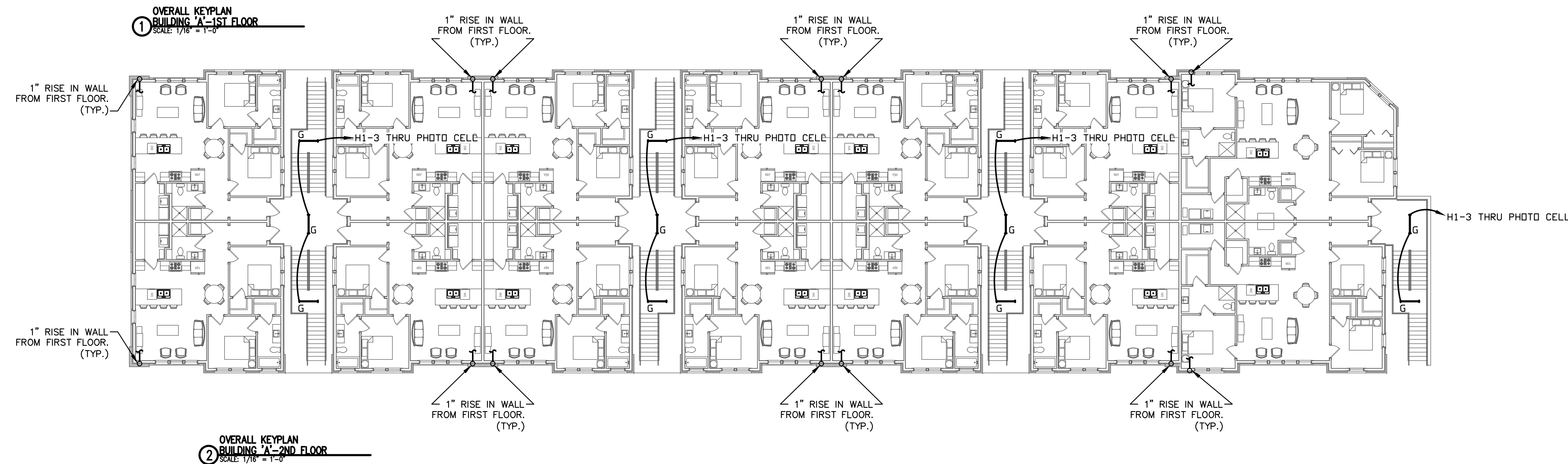
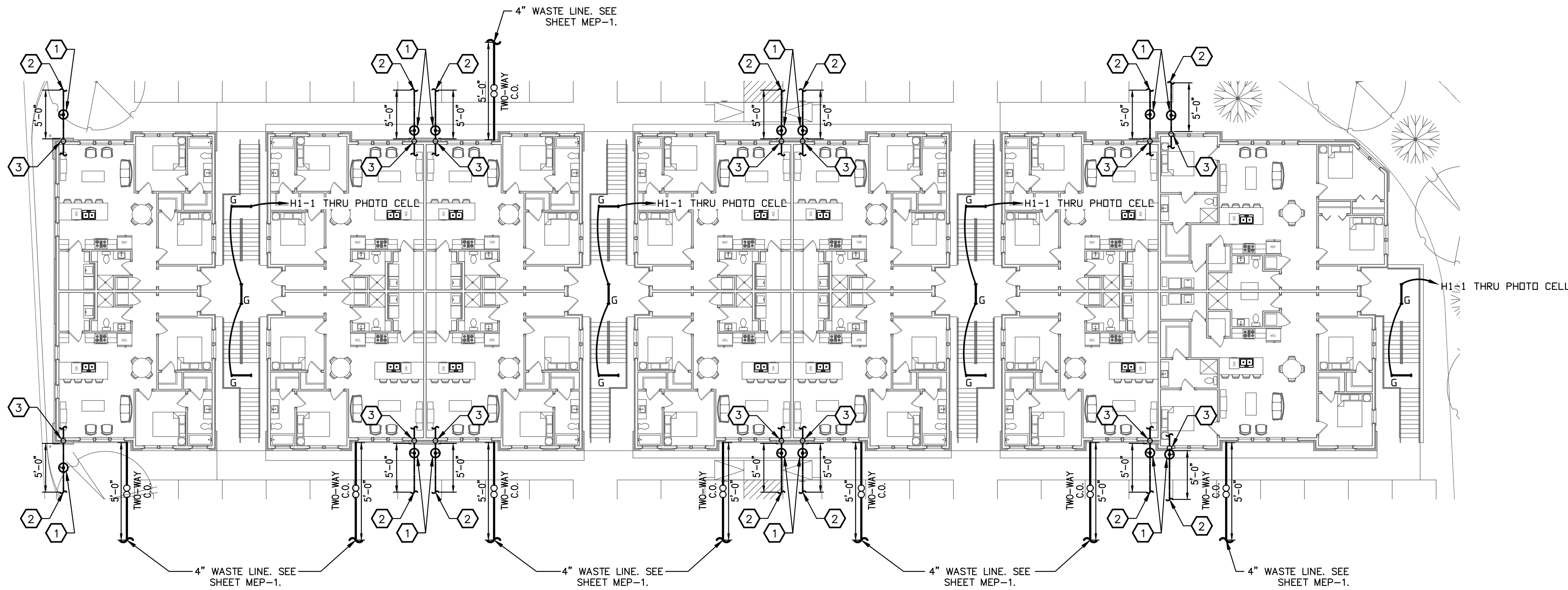
UTILITIES SITE PLAN

GARDEN CREEK APARTMENTS
NEW BUILDING
110 BLUEBONNET CIRCLE
BOERNE, TX 78006

DESIGN RL
DRAWN RL
CHECKED DA
DATE 9/13/18
JOB NO. 18161

MEP-1

1 OF 3



PROJECT SITE
NTS



LOCATION MAP
NTS

KEYED NOTES:

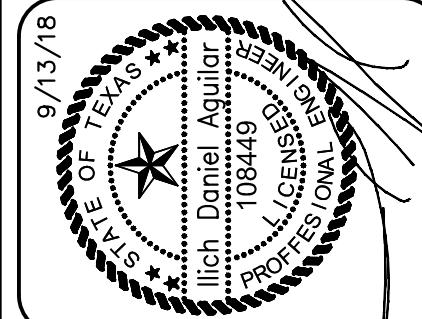
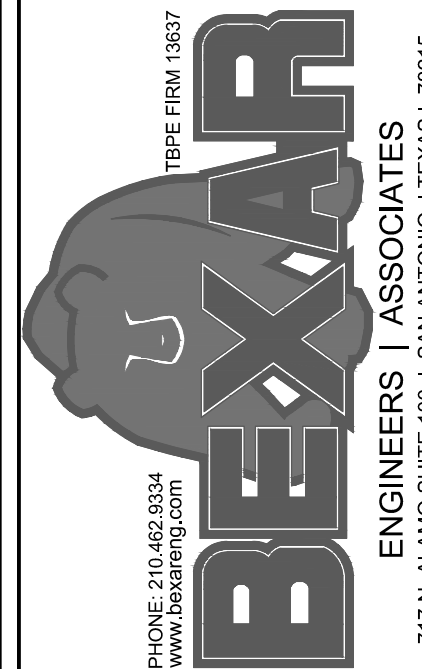
- 1" CUT-OFF VALVE.
- 1" WATER LINE. SEE SHEET MEP-1.
- 1" RISE IN WALL TO SECOND FLOOR. (TYP.)

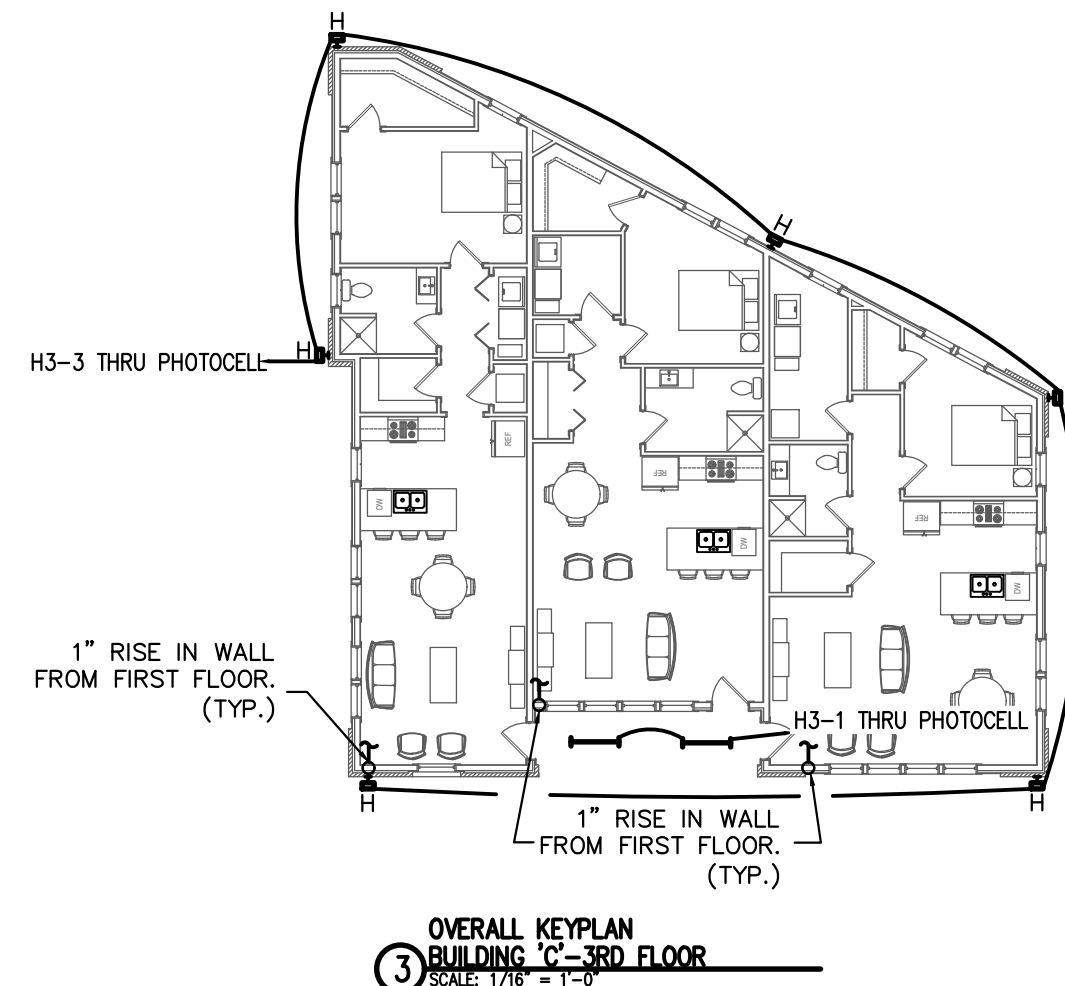
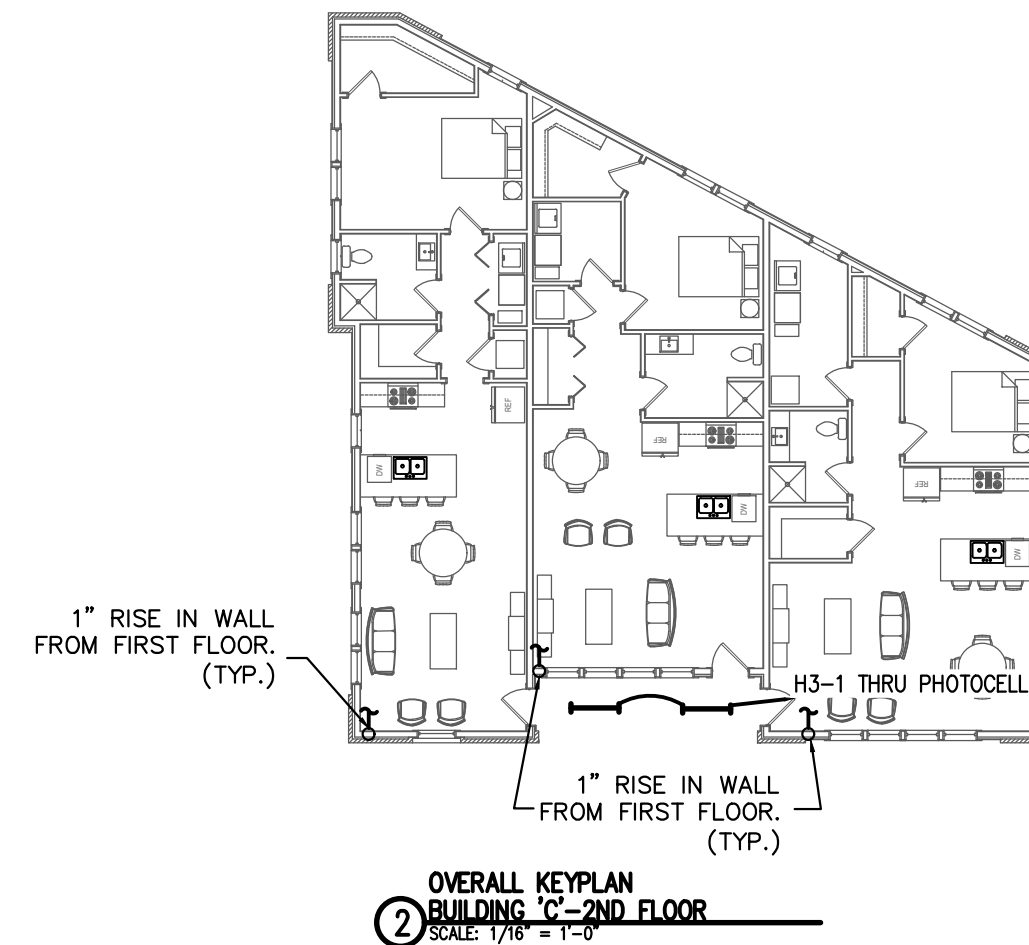
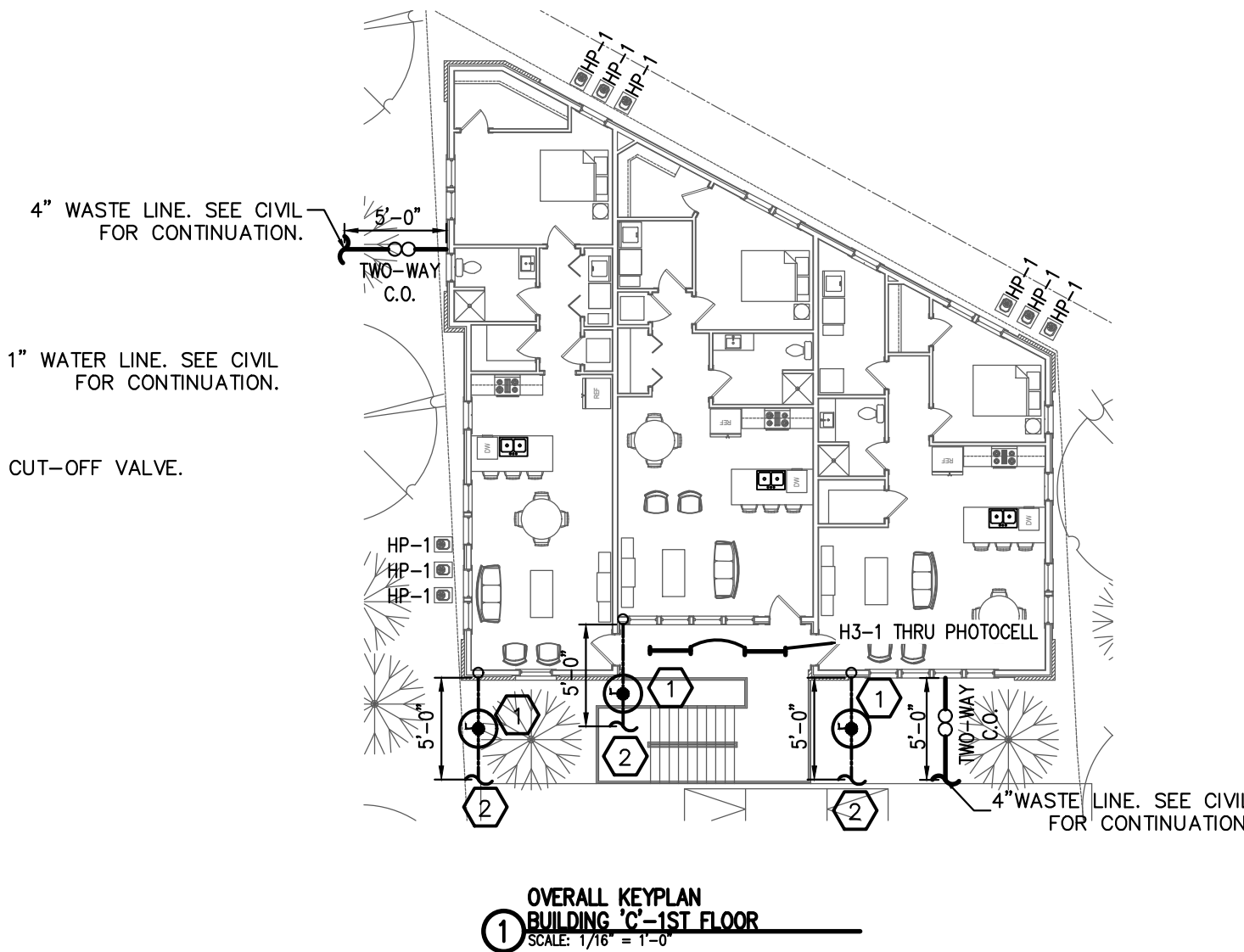
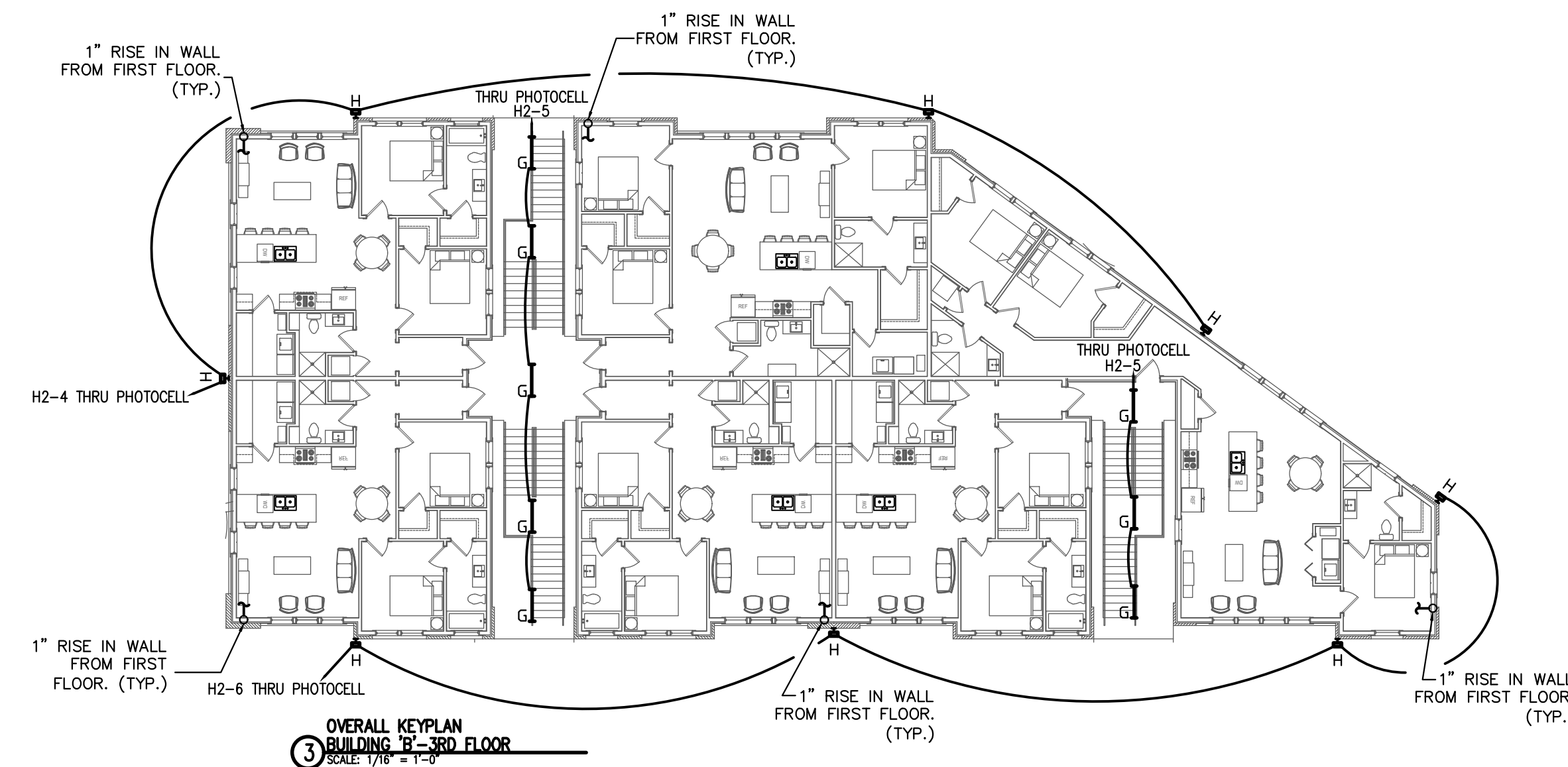
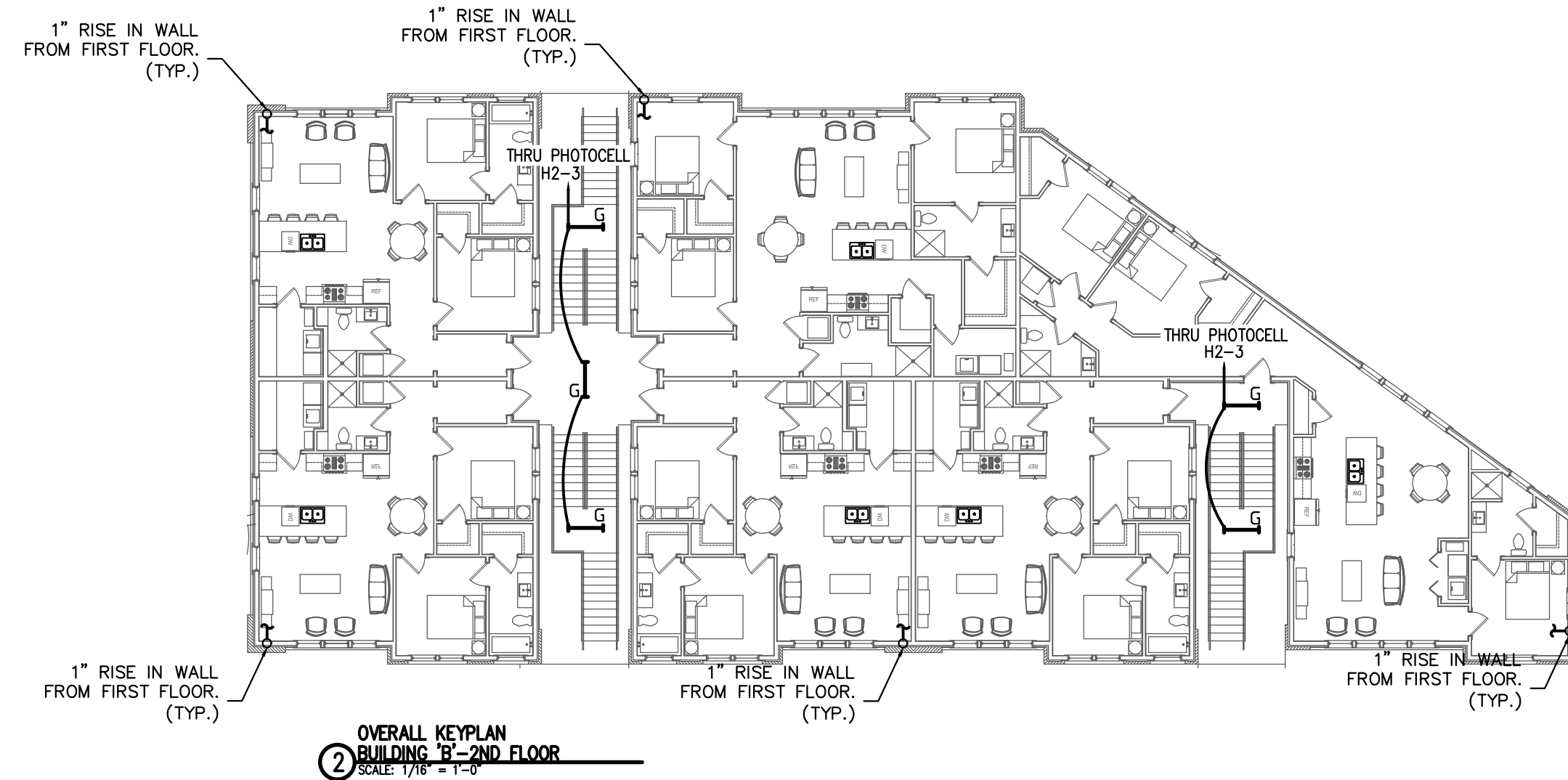
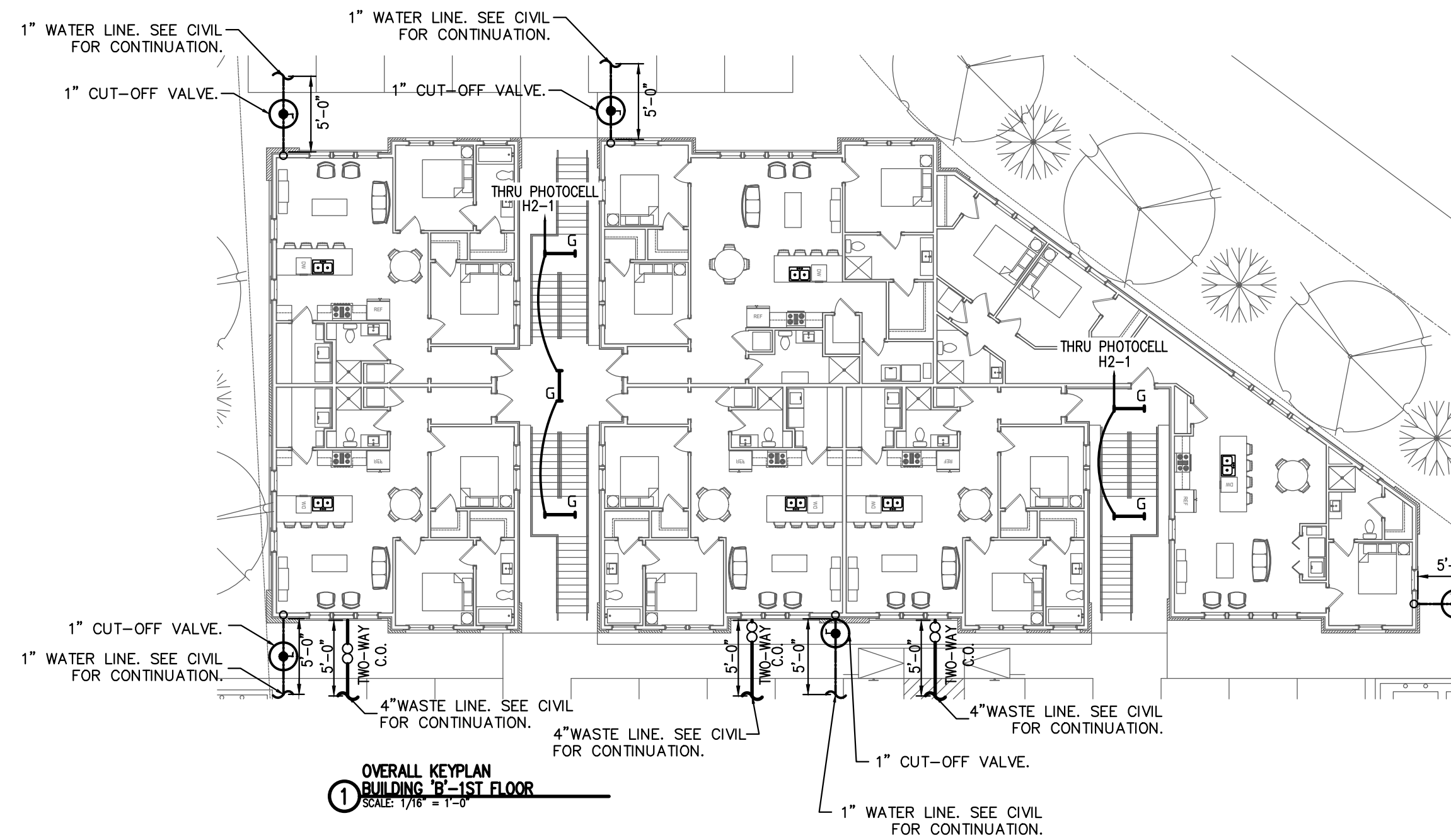
OVERALL KEYPLAN

GARDEN CREEK APARTMENTS
NEW BUILDING
110 BLUEBONNET CIRCLE
BOERNE, TX 78006

DESIGN RL
DRAWN RL
CHECKED DA
DATE 9/13/18
JOB NO. 18161
SHEET

MEP-2
2 OF 3





PROJECT SITE
NTS



LOCATION MAP
NTS

KEYED NOTES:

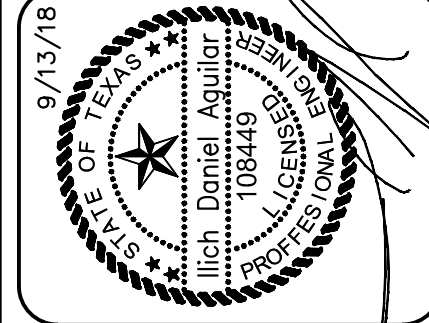
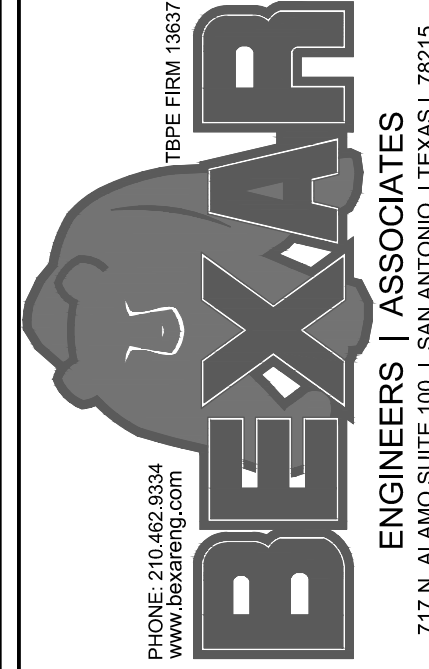
- 1 1" CUT-OFF VALVE.
- 2 1" WATER LINE. SEE SHEET MEP-1

OVERALL KEYPLAN

GARDEN CREEK APARTMENTS
NEW BUILDING
110 BLUEBONNET CIRCLE
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SHEET

MEP-3
3 OF 3



MECHANICAL SYSTEM SPECIFICATIONS

1. GENERAL SPECIFICATIONS

THE GENERAL AND SPECIAL CONDITIONS OF THE SPECIFICATIONS ARE TO APPLY AND BE A PART OF THIS SECTION.

FURNISH AND INSTALL ALL MATERIAL AND EQUIPMENT HEREIN SPECIFIED OR SHOWN ON THE DRAWINGS. THIS SHALL INCLUDE ALL ITEMS OF A NATURE NECESSARY TO COMPLETE THE INSTALLATION.

DRAWINGS ARE DIAGRAMMATIC AND ARE INTENDED TO SHOW THE APPROXIMATE LOCATION OF OUTLET EQUIPMENT AND PIPING. DIMENSIONS GIVEN IN FIGURES ON THE PLANS SHALL TAKE PRECEDENCE OVER SCALED AND SHALL BE VERIFIED IN THE FIELD. ALL PIPING AND EQUIPMENT SHALL BE INSTALLED IN A MANNER AND IN LOCATIONS TO AVOID OBSTRUCTION, PRESERVE HEADROOM, AND KEEP OPENINGS AND PASSAGEWAYS CLEAR.

SHOULD ANY INTERFERENCES BETWEEN SERVICES OCCUR, SUCH INTERFERENCE SHALL BE RESOLVED BEFORE ANY IMMEDIATE OR ADJOINING WORK IS STARTED. IF SUCH INTERFERENCE CANNOT BE RESOLVED WITHOUT CHANGE TO THE ARCHITECTURAL DETAILS OR EXTRA COST TO THE OWNER, THE MATTER SHALL BE REFERRED TO THE ARCHITECT WHOSE DECISION SHALL BE FINAL.

THE DRAWINGS DO NOT SHOW ALL FITTINGS, VALVES, OFFSETS, ETC., THEREFORE, EACH SUBCONTRACTOR WILL BE REQUIRED TO FURNISH AND INSTALL, WITHOUT ADDITIONAL COST TO THE OWNER, ALL SUCH MATERIALS.

2. SUBSTITUTION OF MATERIAL

ATTENTION IS CALLED TO THE FACT THAT, TO SECURE CONSIDERATION, REQUESTS FOR APPROVAL OF MATERIAL AND EQUIPMENT NOT MENTIONED IN THE SPECIFICATIONS MUST BE MADE IN THE MANNER DESCRIBED IN THE "INSTRUCTIONS TO BIDDERS".

THE SYSTEMS HAVE BEEN DESIGNED AROUND THE MAKES AND SIZES OF EQUIPMENT SPECIFIED. ANY OTHER MAKE OF EQUIPMENT APPROVED IN THE PROPER MANNER MAY BE FURNISHED, AT THE CONTRACTOR'S OPTION, PROVIDED THAT SUCH EQUIPMENT HAS EQUAL CAPACITY TO THAT SPECIFICALLY NAMED, IS SUBSTANTIALLY THE SAME PHYSICAL DIMENSIONS AND CAN BE INSTALLED IN THE SPACE AVAILABLE WITH AMPLE WORKING SPACE AROUND IT. ADDITIONAL COSTS RESULTING FROM THE USE OF THE SUBSTITUTED EQUIPMENT WILL BE AT THE EXPENSE OF THIS CONTRACTOR. (RUDD IS AND APPROVED EQUAL/LIKE MANUFACTURER.)

BEFORE SUBMITTING ANY MATERIAL OR EQUIPMENT FOR APPROVAL IT IS THE SUBCONTRACTOR'S RESPONSIBILITY TO ASCERTAIN THAT SUCH MATERIAL OR EQUIPMENT WILL FIT SATISFACTORILY INTO THE SPACE ALLOTTED FOR IT OR DOES NOT EXCEED HEIGHT LIMITATIONS.

ALL MATERIAL USED IN THE INSTALLATION OF WORK UNDER THIS CONTRACT SHALL BE NEW AND IN PERFECT CONDITION WHEN INSTALLED, AND SHALL BE FURNISHED IN AMPLE QUANTITIES AND AT THE PROPER TIME.

3. EXAMINATION OF DRAWINGS AND PREMISES

BEFORE SUBMITTING A BID EACH SUBCONTRACTOR SHALL CAREFULLY STUDY THE ARCHITECTURAL DRAWINGS AND SHALL MAKE A CAREFUL EXAMINATION OF THE PREMISES AND ANY EXISTING WORK. HE SHALL DETERMINE IN ADVANCE THE METHODS OF INSTALLING AND CONNECTING THE APPARATUS, THE MEANS TO BE PROVIDED FOR GETTING THE EQUIPMENT INTO THE PLACE, AND SHALL BECOME THOROUGHLY FAMILIAR WITH ALL OF THE REQUIREMENTS OF HIS CONTRACT.

BY THE ACT OF SUBMITTING A PROPOSAL FOR THE WORK REQUIRED AND INCLUDED IN THE CONTRACT THE CONTRACTOR SHALL BE DEEMED TO HAVE MADE SUCH STUDY AND EXAMINATION, AND TO BE FAMILIAR WITH AND ACCEPT ALL CONDITIONS OF THE SITE.

4. SHOP DRAWINGS

BEFORE STARTING WORK EACH SUBCONTRACTOR SHALL SUBMIT SHOP DRAWINGS OF THE EQUIPMENT LISTED TO THE ARCHITECT FOR APPROVAL. FIVE COMPLETE SETS OF SHOP DRAWINGS SHALL BE SUBMITTED.

IN CHECKING SHOP DRAWINGS, THE ARCHITECT AND ENGINEER WILL MAKE EVERY EFFORT TO DETECT ERRORS AND OMISSIONS, BUT NEITHER THE FAILURE OF THE ARCHITECT OR ENGINEER TO DETECT ERRORS OR OMISSIONS NOR THE APPROVAL OF SHOP DRAWINGS SHALL RELIEVE THE CONTRACTOR OF HIS RESPONSIBILITY TO COMPLY WITH THE PLANS AND SPECIFICATIONS.

5. CUTTING AND PATCHING

THE MECHANICAL CONTRACTOR WILL PROVIDE ALL CHASES AND OPENINGS THROUGH MASONRY AND CONCRETE WALL, FLOORS, AND THE ROOF, NECESSARY FOR THE INSTALLATION OF THE WORK UNDER THIS SECTION. THIS WILL INCLUDE THE FURNISHING AND SETTING OF ALL NECESSARY FORMS. THE MECHANICAL CONTRACTOR WILL ALSO BUILD-IN ALL SLEEVES, CONCRETE INSERTS, ANCHOR BOLTS, ETC., NECESSARY FOR THE INSTALLATION OF THE WORK UNDER THIS SECTION.

THE SUBCONTRACTOR FOR THIS SECTION SHALL COOPERATE WITH THE GENERAL CONTRACTOR AND SHALL LAY OUT ALL CHASES AND OPENINGS REQUIRED AND SHALL FURNISH AND SET ALL SLEEVES, CONCRETE INSERTS AND ANCHOR BOLTS. THIS SUBCONTRACTOR WILL BE HELD SOLELY RESPONSIBLE FOR THE PROPER SIZE AND LOCATION OF CHASES, OPENINGS, SLEEVES, INSERTS, ANCHOR BOLTS, ETC. SHOULD ANY SUBCONTRACTOR FAIL TO GIVE THE GENERAL CONTRACTOR ALL NECESSARY INFORMATION OR SET SLEEVES, INSERTS AND ANCHORS AT THE PROPER TIME, THE NECESSARY CUTTING AND PATCHING SHALL BE DONE BY THE GENERAL CONTRACTOR AT THE SUBCONTRACTOR'S EXPENSE.

6. ELECTRICAL WORK

IT IS THE DUTY OF THIS SUBCONTRACTOR TO ASCERTAIN THE PHASE AND VOLTAGE OF EACH ELECTRICAL DEVICE FURNISHED FROM THE ELECTRICAL PLANS AND THE ELECTRICAL CONTRACTOR. SHOULD A SUBCONTRACTOR FAIL TO ASCERTAIN SUCH INFORMATION AND MOTORS OR IMPROPER TYPE ARE DELIVERED, THEY SHALL BE CHANGED WITHOUT COST TO THE OWNER OR THE ELECTRICAL SUBCONTRACTOR.

UNLESS OTHERWISE HEREIN SPECIFIED, PROTECTION DEVICES, AND DISCONNECT SWITCHES WILL BE FURNISHED AND INSTALLED AND ALL MOTOR WIRING WILL BE DONE BY THE ELECTRICAL CONTRACTOR. ALL MOTORS 3/4 HP AND LARGER SHALL BE EQUIPPED WITH AUTOMATIC MAGNETIC STARTERS WITH UNDER-VOLTAGE AND OVERLOAD PROTECTION. STARTERS SHALL BE FURNISHED BY THIS CONTRACTOR.

7. INSULATION

THIS SUBCONTRACTOR SHALL FURNISH AND INSTALL ALL THERMAL INSULATION INCIDENTAL TO THIS PORTION OF THE WORK.

EXCEPT AS OTHERWISE SPECIFIED, ALL INSULATION SHALL BE GUSTIN-BACON, FIBERGLAS, JOHNS-MANVILLE OR LIBBY OWENS FORD.

8. PAINTING

ALL PAINTING WILL BE DONE BY THE GENERAL CONTRACTOR.

9. CLEANING UP

EACH SUBCONTRACTOR SHALL AT ALL TIMES KEEP THE BUILDINGS AND PREMISES IN A NEAT AND ORDERLY CONDITION INSOFAR AS THE STORAGE OF MATERIAL AND THE REMOVAL OF DIRT AND RUBBISH CAUSED BY HIS WORK ARE CONCERNED. ALL INSTRUCTION ISSUED BY THE ARCHITECT IN REGARD TO THE STORAGE OF MATERIAL, PROTECTION MEASURES, CLEANING UP OF DEBRIS, ETC., SHALL BE EXPLICITLY FOLLOWED.

UPON COMPLETION OF THE WORK, EACH SUBCONTRACTOR SHALL THOROUGHLY CLEAN ALL EQUIPMENT, PIPING, HANGERS, ETC., AND SHALL LEAVE THE PREMISES BROOM CLEAN INSOFAR AS HIS WORK IS CONCERNED. IF EQUIPMENT AND PIPES CANNOT BE CLEANED TO GIVE A NEW APPEARANCE, THE ENTIRE PIECE OF EQUIPMENT OR PIPE SHALL BE PAINTED.

10. RECORD DRAWINGS

EACH SUBCONTRACTOR SHALL KEEP ON THE JOB A COMPLETE SET OF DRAWINGS OF HIS WORK AND SHALL DAILY INDICATE THEREON THE EXACT LOCATION OF ALL PIPE AS WELL AS ALL CHANGES IN LOCATION OF EQUIPMENT, ETC. AT COMPLETION OF THE JOB, THIS COMPLETED RECORD SHALL BE TURNED OVER TO THE ARCHITECT PRIOR TO FINAL ACCEPTANCE.

11. ENGINEERING DATA

PRIOR TO FINAL ACCEPTANCE OF THE BUILDING, EACH SUBCONTRACTOR SHALL FURNISH THE OWNER WITH COMPLETE ENGINEERING DATE ON ALL MAJOR EQUIPMENT FURNISHED BY HIM. THE ENGINEERING DATA SHALL INCLUDE THE MAKE, SIZE, CAPACITY, HORSEPOWER AND THE NAME AND ADDRESS OF THE NEAREST FACTORY REPRESENTATIVE. IT SHALL ALSO INCLUDE A PARTS LIST AND COMPLETE INSTRUCTIONS FOR CARE AND OPERATION. ALL SUCH INFORMATION SHALL BE BOUND IN THREE RING NOTEBOOKS, TITLED AND DELIVERED TO THE OWNER IN DUPLICATE.

12. INSPECTION

WHERE PORTIONS OF THE INSTALLATION WILL BE COVERED OR CONCEALED, THE SUBCONTRACTOR SHALL NOTIFY THE ARCHITECT WELL IN ADVANCE SO THAT INSPECTION MAY BE ACCOMPLISHED PRIOR TO CONCEALMENT. FAILURE TO PROVIDE ADVANCED NOTICE SHALL CONSTITUTE A REASON TO CHARGE THE SUBCONTRACTOR FOR INSPECTION COSTS INVOLVED.

13. PERMITS AND CODES

THIS MECHANICAL CONTRACTOR MUST, AT HIS OWN EXPENSE, OBTAIN ALL NECESSARY PERMITS, PAY ALL LEGAL FEES AND CHARGES, AND COMPLY WITH ALL STATE AND MUNICIPAL BUILDING AND SAFETY LAWS, ORDINANCES AND REGULATIONS, RELATING TO BUILDING AND PUBLIC HEALTH AND SAFETY. CODES AND REGULATIONS SHALL SUPERSEDE PLANS AND SPECIFICATIONS WHERE THERE ARE CONFLICTS. THIS CONTRACTOR SHALL INCLUDE COMPLIANCE COSTS IN HIS BID.

14. DRAWINGS AND SPECIFICATIONS

THIS CONTRACTOR SHALL FURNISH AND INSTALL ALL EQUIPMENT NECESSARY FOR PROPER OPERATION OF THE SYSTEM. BEFORE THE INSTALLATION WILL BE ACCEPTED, THIS CONTRACTOR SHALL HAVE PUT EVERY PORTION OF THE WORK IN FIRST CLASS OPERATION CONDITION.

THE DRAWINGS ARE GENERALLY DIAGRAMMATIC AND INDICATE THE MANNER, METHOD, AND NATURE OF THE INSTALLATION, WHILE THE SPECIFICATIONS DENOTE THE STYLE AND QUALITY OF MATERIAL AND WORKMANSHIP TO BE EMPLOYED AND USED. WHERE A CONFLICT EXISTS BETWEEN THE DRAWINGS AND SPECIFICATIONS, THIS CONTRACTOR SHALL PROMPTLY NOTIFY THE ARCHITECT WHO SHALL MAKE THE PROPER INTERPRETATION AND WHOSE DECISION SHALL BE FINAL.

THIS CONTRACTOR AND ALL SUBCONTRACTORS SHALL BE HELD TO HAVE FAMILIARIZED THEMSELVES WITH ALL THE DRAWINGS, ALL OF THE SPECIFICATIONS AND WORK OF ALL TRADE AND CRAFTS WHICH MIGHT AFFECT THE INSTALLATION OF THIS WORK.

15. WORKING DRAWINGS

ALL EQUIPMENT FURNISHED SHALL FIT THE SPACE AVAILABLE WITH PIPING CONNECTIONS, ETC., IN THE REQUIRED LOCATIONS AND WITH ADDITIONAL SPACE FOR OPERATING AND SERVICING OF THE EQUIPMENT. WHERE THE EQUIPMENT FURNISHED IS OF DIFFERENT MAKE THAN THAT SHOWN ON THE PLANS, THIS CONTRACTOR SHALL MAKE LARGE SCALE DETAILED DRAWINGS OF ALL EQUIPMENT LOCATIONS AND LAYOUT. FOUR (4) COPIES OF THE NEW EQUIPMENT LAYOUT PLANS SHALL BE FURNISHED TO THE ARCHITECT FOR APPROVAL.

16. KIND AND QUALITY OF MATERIAL

ALL MATERIAL, APPLIANCES, AND EQUIPMENT SHALL BE IN STRICT ACCORDANCE WITH THE SPECIFICATION REQUIREMENTS IN EACH CASE AND OF THE BEST QUALITY AND GRADE, NEW AND USED.

17. PROTECTION OF APPARATUS

THIS CONTRACTOR SHALL, AT ALL TIMES, TAKE SUCH PRECAUTIONS AS ARE NECESSARY TO PROTECT HIS APPARATUS FROM DAMAGE CAUSED BY THEFT, THE WEATHER, AND ALL BUILDING OPERATIONS. FAILURE ON THE PART OF THIS CONTRACTOR TO PROTECT HIS MATERIAL AND APPARATUS ADEQUATELY TO THE ENTIRE SATISFACTION OF THE ARCHITECT SHALL BE SUFFICIENT CAUSE FOR THE REJECTION OF ANY DAMAGED MATERIAL OR EQUIPMENT. ALL PIPE AND EQUIPMENT OPENINGS SHALL BE CLOSED TO PREVENT OBSTRUCTION AND DAMAGE.

18. MEASUREMENTS

BEFORE ORDERING ANY MATERIAL OR DOING ANY WORK, THIS CONTRACTOR SHALL VERIFY ALL MEASUREMENTS AT THE BUILDING AND SHALL BE RESPONSIBLE FOR THEIR CORRECTNESS. NO EXTRA CHARGE OR COMPENSATION WILL BE ALLOWED ON ACCOUNT OF ANY DIFFERENCE BETWEEN ACTUAL DIMENSIONS AND MEASUREMENTS INDICATED ON THE DRAWINGS. ANY DIFFERENCE WHICH MAY BE FOUND SHALL BE SUBMITTED TO THE ARCHITECT FOR CONSIDERATION BEFORE PROCEEDING WITH THE WORK.

19. EQUIPMENT

FURNISH AND INSTALL FOUNDATIONS, SADDLE SUPPORTS, AND BASES UNDER ALL EQUIPMENT. SUPPORTS SHALL BE AS NOTED. WHERE SUITABLE SUPPORTS ARE NOT DETAILED THEY SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. VIBRATION ELIMINATORS SHALL BE PROVIDED UNDER ALL EQUIPMENT SUCH AS FANS, BLOWERS, AND AIR CONDITIONING UNITS THAT HAVE MOVING PARTS.

VIBRATION ELIMINATORS SHALL BE PROPERLY LOCATED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS TO ELIMINATE TRANSFER OF VIBRATION TO THE BUILDING STRUCTURE, AND SHALL BE AS MANUFACTURED BY MASON INDUSTRIES. POWER DRIVEN EQUIPMENT SHALL BE QUIET IN OPERATION AND SHALL BE FREE OF VIBRATION. METAL PARTITIONS, DUCTS SHEET METAL HOUSINGS, ETC., SHALL BE SO CONSTRUCTED AND BRACED THAT THERE WILL BE NO VIBRATION OR RATTLING WHEN THE SYSTEM IS IN OPERATION. CONNECTIONS TO EQUIPMENT SHALL BE SO DESIGNED AND CONSTRUCTED THAT NOISE AND VIBRATION WILL NOT REACH THE CONDITIONED AREA THROUGH DUCTS, PIPING, SHEET METAL CONSTRUCTION OR THE BUILDING CONSTRUCTION. POWER DRIVEN EQUIPMENT SUSPENDED FROM THE STRUCTURAL MEMBERS SHALL BE PROVIDED WITH SPRING TYPE ISOLATION.

IN NO CASE SHALL SMALLER EQUIPMENT BE INSTALLED, NOR SHALL SMALLER/HIGHER RPM. FANS BE SUBSTITUTED.

BELT GUARDS FOR ALL BELT DRIVES AND GUARD HOODS FOR ALL DRIVE COUPLINGS SHALL BE PROVIDED. THESE GUARDS SHALL BE FACTORY-BUILT AND FURNISHED WITH THE EQUIPMENT.

20. DUCTWORK

ALL DUCTWORK SHOWN ON PLANS SHALL BE GALVANIZED SHEET METAL, RECTANGULAR OR ROUND, AS REQUIRED BY ASHRAE, SMACNA, AND IECC.

ALL DUCTS SHALL BE FABRICATED BY SKILLED MECHANICS AND INSTALLED IN A WORKMANLIKE MANNER USING GAUGES AS FOLLOWS OR USE FIBERGLASS DUCTS:

12" AND SMALLER	26 GAUGE	1/2" SEAM
13 TO 26"	24 GAUGE	1" SEAM
27" TO 36"	22 GAUGE	1" SEAM

TRANSITIONS, FITTINGS AND ELBOWS SHALL BE CONSTRUCTED TO OFFER A MINIMUM OF NOISE AND RESISTANCE. WHERE SPACE PERMITS, ELBOWS SHALL HAVE A RADIUS OF 1-1/2 TIMES THE WIDTH (OR DEPTH) AND TRANSITIONS SHALL BE GRADUAL WITH CHANGES NOT EXCEEDING 1" IN 4". HOWEVER, WHEN STRUCTURAL CONDITIONS NECESSITATE, FITTINGS AND ELBOWS SHALL BE MADE SHARPLY AS REQUIRED BUT WITH SINGLE RADIUS TURNING VANES. ALL RIGHT ANGLE BRANCH TAKE-OFFS TO GRILLERS AND REGISTERS FROM THE MAIN DUCT SHALL BE MADE WITH THE USE OF EXTRACTORS. ALL METAL DUCTS SHALL BE SEALED WITH HARDCAST MASTIC AND CLOTH.

ALL DUCTS SHALL BE SECURELY SUPPORTED WITH STRAP IRON OR ANGLES. GENERALLY ALL DUCTS SHALL BE SUPPORTED FROM OVERHEAD STRUCTURAL MEMBERS. VIBRATION CONNECTORS SHALL BE USED AT ALL METAL DUCT CONNECTIONS TO EQUIPMENT. SUPPORT PER UMC CHAPTER 10.

ALL DUCTS OUT OF DOORS TO BE SHEET METAL AND WEATHERPROOFED WITH A NON-DETERIORATING EPOXY SEALER AND SHALL BE LINED WITH 2", 3# DENSITY DUCT LINER. MASTIC SHALL COVER THE ENTIRE DUCT SURFACE AND RAW FIBERGLASS EDGES SHALL BE SEALED.

FLEXIBLE DUCT SHALL BE A FACTORY FABRICATED ASSEMBLY CONSISTING OF AN INNER SLEEVE, INSULATION AND AN OUTER MOISTURE BARRIER. THE INNER SLEEVE SHALL PROVIDE AN AIR SEAL AND SHALL BE CONSTRUCTED OF AN ELASTOMERIC COMPOUND REINFORCED WITH WOVEN FIBERGLASS, BONDED PERMANENTLY TO A VINYL COATED SPRING STEEL WIRE SUPPORTING HELIX. A THICK INSULATING BLANKET OF FIBERGLASS, PROVIDING A THERMAL CONDUCTANCE (C FACTOR) OF 0.23 BTU/HR./SQ. FT./ DEGREES F. AT 75 DEGREES FAHRENHEIT, SHALL ENCASE THE INNER SLEEVE AND BE SHEATHED WITH AN OUTER MOISTURE BARRIER OF A REINFORCED METALIZED MYLAR OR LAMINATE OF LOW PERMEABILITY WITH INTEGRAL ATTACHING DEVICES (GROMMETS) FOR A SUSPENSION SYSTEM AS LISTED BY UNDERWRITERS' LABORATORIES, INC. UNDER THEIR UL-181 STANDARDS AS A CLASS 1 AIR DUCT AND SHALL COMPLY WITH NFPA STANDARD O. 90A. THE FLEXIBLE DUCT SHALL BE EQUAL TO THERMAFLEX M-KE. FLEXIBLE DUCTS SHALL NOT EXCEED 6 FEET IN LENGTH, SHALL BE SUPPORTED AT INTERVALS OF 5 FEET LENGTH AND SHALL NOT BE SHARPLY ANGLED TO WHERE AIR FLOW IS RESTRICTED.

FLEXIBLE DUCT CONNECTIONS TO BRANCH OR PLENUM DUCTS TO AIR TERMINAL DEVICES SHALL BE FACTORY FABRICATED BELL-MOUTH CONNECTOR WITH A MINIMUM 1/2 INCH BELL-MOUTH RADIUS. THE CONNECTOR SHALL BE DIE STAMPED OF HEAVY GAUGE STEEL SO AS TO PROVIDE A UNIFORM AND RIDIG CONNECTION. THE CONNECTOR SHALL BE EQUAL TO THERMALAIR TYPE T TWIST-IN WITH VOLUME DAMPER AT PLENUM LOCATION. ALL DUCTWORK MUST MEET SMACNA LOW VELOCITY DUCT STANDARDS.

21. DUCT INSULATION

ALL SUPPLY DUCTS IN UNCONDITIONED SPACES SHALL BE INSULATED TO R-5 PER CODE REQUIREMENTS, WITH THE INSULATION SECURELY WIRED ON WITH OVERLAPPING JOINTS SO THAT THERE ARE NO VOIDS. VAPOR SEAL SHALL BE A FOIL SKIM-COATED KRAFT PAPER AND SHALL LAP 2" MIN. EXPOSED DUCTS IN UNCONDITIONED SPACES AND EXTERIOR DUCTS SHALL BE INSULATED TO R-8 PER CODE REQUIREMENTS. ALL DUCT SIZES ARE NET. WHERE DUCTS ARE LINED W/1.5" INSULATION, DUCT WRAP IS NOT REQUIRED.

22. FIBERGLASS DUCT

FIBERGLASS DUCT BOARD SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS, THE LATEST ADDITION OF SMACNA AND AS SPECIFIED HEREIN. DUCT BOARD SHALL MEET N.F.P.A. 90A AND UL 181 STANDARDS.

RECTANGULAR FIBERGLASS DUCTS SHALL BE 1.5" THICK WITH REINFORCED FOIL VAPOR SEAL BACKING. JOINTS AND SEAMS SHALL BE SEALED WITH HEAT-ACTIVATED TAPE EQUAL TO J-M THERM-LOCK. SUPPORT FOR FIBERGLASS DUCTS SHALL NOT EXCEED 5 FEET O.C. AND SHALL BE MIN. OF 24 GA., 2" WIDE METAL STRAP LOOPED UNDER THE DUCT AND SUPPORTED FROM STRUCTURAL MEMBERS.

23. CONTROLS

THERMOSTATS SHALL BE ELECTRIC LOW VOLTAGE COMBINATION HEATING AND COOLING TYPE WITH AUTOMATIC CHANGEOVER. THERMOSTATS SHALL BE EQUIPPED WITH AN "OFF-FAN-AUTO" SWITCH AND A SEPARATE "COOL-OFF-AUTO-HEAT" SWITCH ALONG WITH A THERMOMETER THAT INDICATES THE TEMPERATURE AT THE CONTROL STATION AND A MEANS FOR SETTING THE DESIRED TEMPERATURE.

24. ELECTRICAL WIRING

MECHANICAL EQUIPMENT HAVING ELECTRICAL MOTORS SHALL BE FURNISHED WITH ALL NECESSARY CONTROL DEVICES FOR THE PROTECTION OF EACH MOTOR.

ALL LINE VOLTAGE ELECTRICAL WIRING IS INCLUDED UNDER THE ELECTRICAL SECTION OF THE SPECIFICATIONS. THE MECHANICAL CONTRACTOR SHALL FURNISH AND INSTALL ALL LOW VOLTAGE CONTROL WIRING AND CONTROL SWITCHES TO OPERATE ALL MECHANICAL EQUIPMENT SHOWN ON THE MECHANICAL DRAWINGS. WHERE CONDUIT IS REQUIRED FOR LOW VOLTAGE WIRING, THIS CONTRACTOR WILL EMPLOY THE ELECTRICAL CONTRACTOR.

ALL CONTROLS, RELAYS, STARTERS, AND WIRING SHALL CONFORM TO THE GOVERNING ELECTRICAL CODES. PROVIDE PLENUM RATED CABLE OR PROVIDE CONDUIT FOR ALL CONTROL WIRING RUN IN A SUPPLY OR RETURN AIR PLENUM.

25. REFRIGERANT PIPING

INSTALL REFRIGERANT PIPING AS SPECIFIED. PROVIDE SIZES AS RECOMMENDED BY MANUFACTURER. PIPING SHALL BE RUN AND INSTALLED IN A MANNER TO ASSURE PROPER OIL RETURN TO THE COMPRESSOR.

HARD COPPER TUBING, TYPE "L" ABOVE GRADE, TYPE "K" BELOW GRADE, OR FACTORY PRECHARGED SOFT DRAWN TUBING WITH QUICK CONNECT COUPLINGS.

WROUGHT COPPER FITTINGS ASSEMBLED WITH 1050 DEGREES F OR HIGHER MELTING POINT SILVER SOLDER. FACTORY FABRICATED QUICK COUPLINGS WITH SOFT DRAWN TUBING APPROVED ONLY WHEN SPECIFICALLY NOTED ON THE DRAWINGS.

CUT ALL COPPER PIPING SMOOTH AND SQUARE. CLEAN ALL FITTINGS BEFORE INSTALLATION.

THOROUGHLY TEST FOR LEAKS AND PROVE TIGHT BEFORE CHARGING. TESTS SHALL INCLUDE NOT LESS THAN 20-INCH VACUUM HELD FOR 24 HOURS. FINAL TEST SHALL BE HALIDE TORCH TEST OR ELECTRONIC SENSOR TEST AT ALL JOINTS AFTER CHARGING AND BEFORE INSULATION IS APPLIED.

INSTALL UNDERGROUND PIPING IN TRANSITE NON-PRESSURE PIPE SLEEVE, SIZE TO ALLOW EASY REMOVAL OF PIPE AND INSULATION.

INSULATE ALL REFRIGERANT SUCTION PIPING TO 1" FOR PIPES 1 1/2" AND LESS, 1.5" FOR PIPES GREATER THAN 1 1/2".

FLEXIBLE FOAMED PLASTIC CLOSED CELL PIPE INSULATION, K FACTOR OF NOT MORE THAN .28 @ 70 DEGREES F. AND A WATER VAPOR TRANSMISSION RATE OF 0.1 PERM/INCH OR LESS IN CONFORMANCE WITH ASTM C177-63 AND ASTM C-355-64 WATER METHOD. PROVIDE INSULATION EQUAL TO ARMAFLEX.

SEAL JOINTS AND BUTT ENDS WITH FIRE RETARDANT, WATERPROOF ADHESIVE EQUAL TO ARMSTRONG 520. (TAPED JOINTS WILL NOT BE ACCEPTED). FINISH ALL PIPE INSULATION EXPOSED TO WEATHER WITH TWO COATS OF ARMAFLEX FINISH (OR APPROVED EQUAL).

26. FINAL TESTS AND BALANCE

BALANCING DEVICES SHALL BE PROVIDED IN ACCORDANCE WITH IMC 603.15. BEFORE ACCEPTANCE AND FINAL PAYMENT, THE CONTRACTOR SHALL DEMONSTRATE THAT ALL APPARATUS IS FUNCTIONING PROPERLY AND EFFICIENTLY. HE SHALL BALANCE AIR QUANTITIES FOR EVEN TEMPERATURES THROUGHOUT, SHALL ADJUST CONTROLS, AND IN GENERAL PLACE THE SYSTEM INTO OPERATION. START-UPS FOR THE FIRST HEATING AND THE FIRST COOLING SEASON SHALL BE PERFORMED AS PART OF THE CONTRACT. THE CONTRACTOR SHALL BE N.E.B.B. CERTIFIED AND PERFORM ALL TESTS IN ACCORDANCE WITH N.E.B.B. STANDARDS.

27. GUARANTEE

THIS CONTRACTOR SHALL GUARANTEE THE SYSTEM (LABOR AND MATERIAL) FOR ONE (1) YEAR FROM DATE OF ACCEPTANCE BY ARCHITECT OR DATE OF OCCUPANCY (WHICHEVER IS SOONER).

GUARANTEE SHALL COVER DEFECTIVE MATERIAL OR WORKMANSHIP AND SHALL INCLUDE REPLACEMENT OF REFRIGERANT.

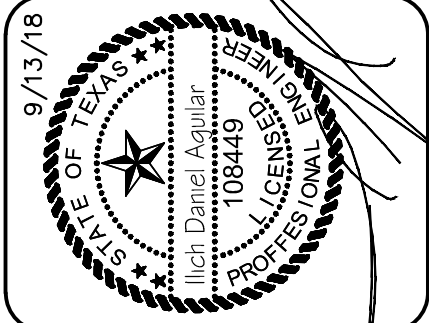
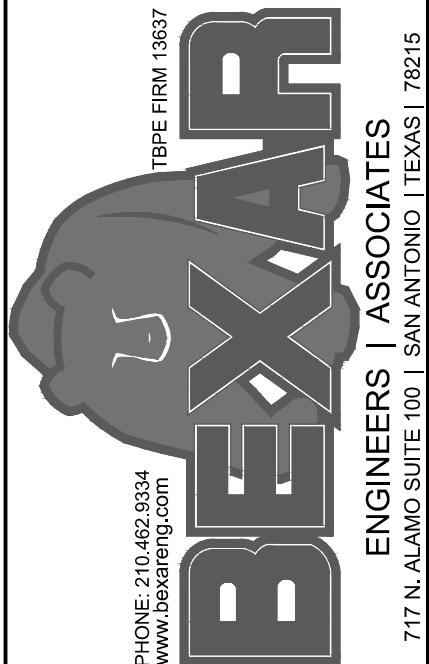
IN THE EVENT THAT HEATING OR COOLING IS UTILIZED PRIOR TO ACCEPTANCE, ALL FILTERS IN THE EQUIPMENT USED SHALL BE REPLACED.

THIS CONTRACTOR SHALL PROVIDE THE OWNER WITH A COMPRESSOR WARRANTY FOR FOUR (4) YEARS SUBSEQUENT TO THE FIRST YEAR PARTS AND LABOR GUARANTEE AND INSTRUCT THE OWNER OR HIS REPRESENTATIVE IN THE PROPER OPERATION AND MAINTENANCE OF THE EQUIPMENT.

*INDICATES SECTION OF SPECIFICATION NOT APPLICABLE TO THIS PROJECT

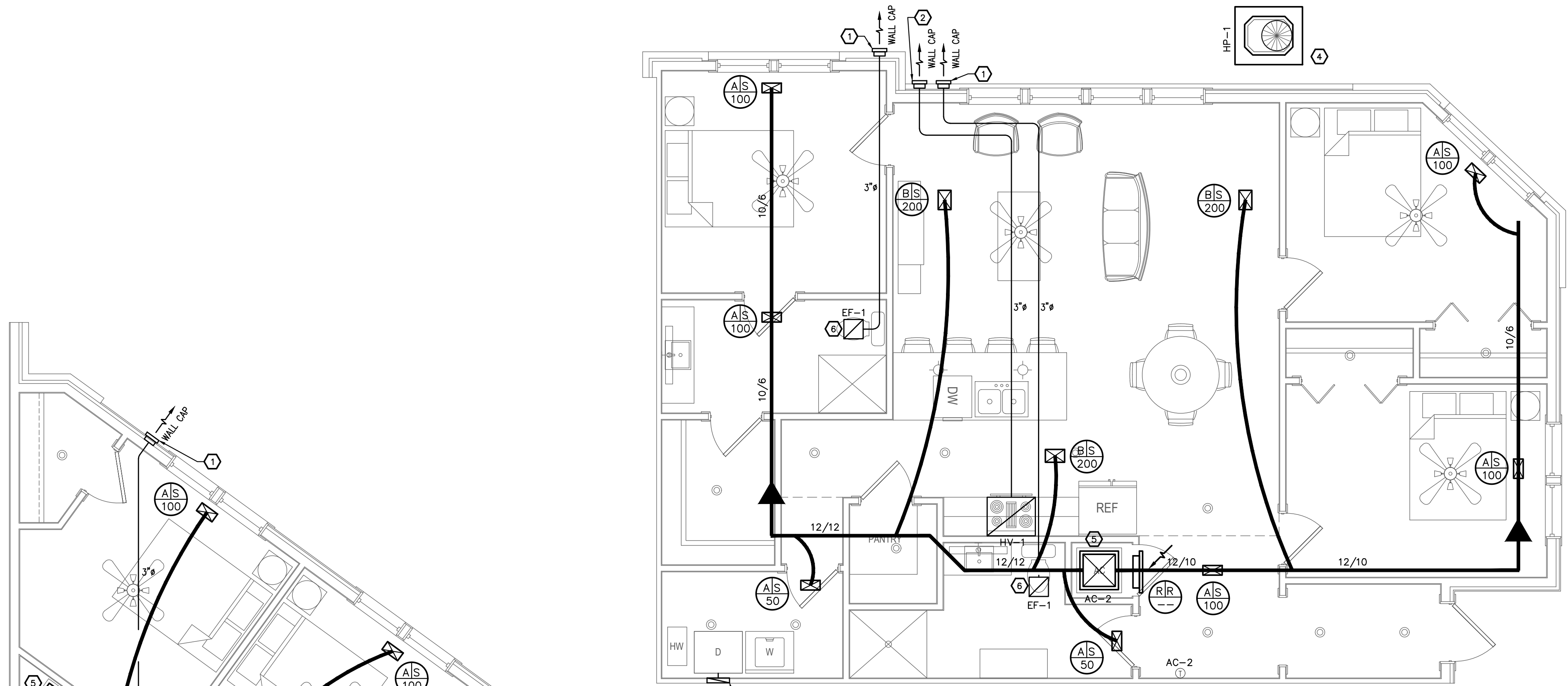
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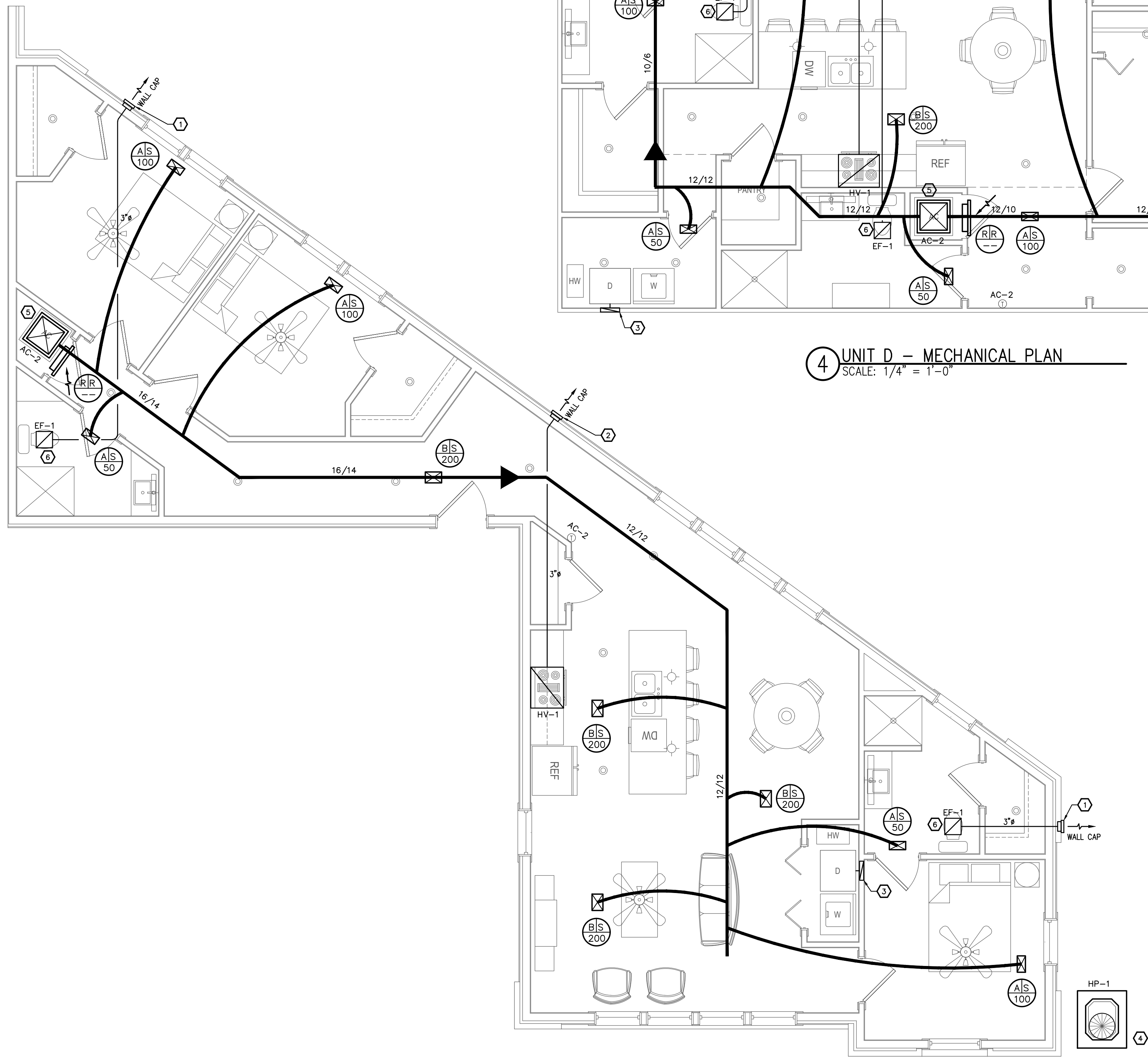


MECHANICAL NOTES/SPECIFICATIONS
GARDEN CREEK APARTMENTS
NEW BUILDING
110 BLUEBONNET CIRCLE
BOERNE, TX 78006

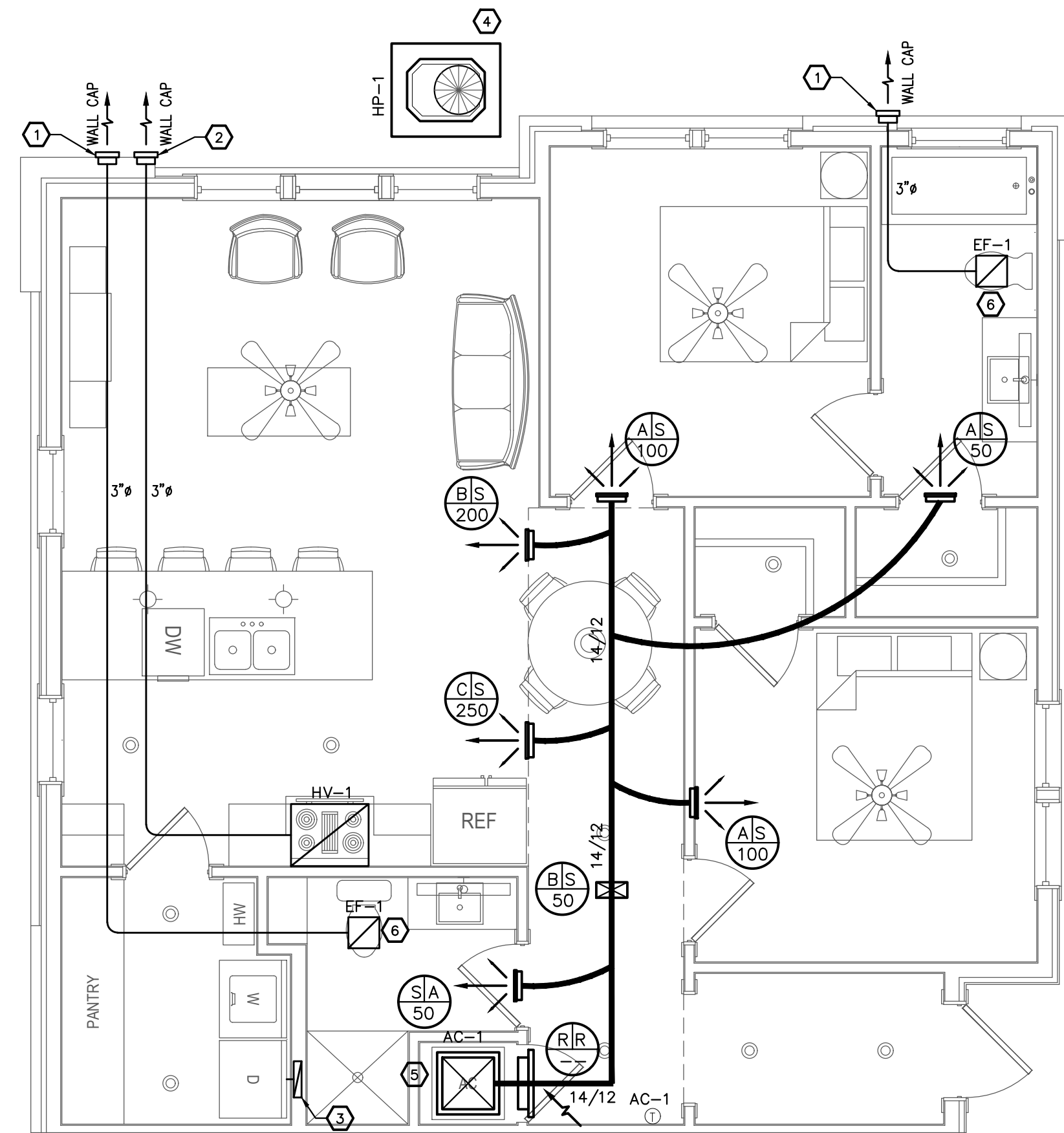
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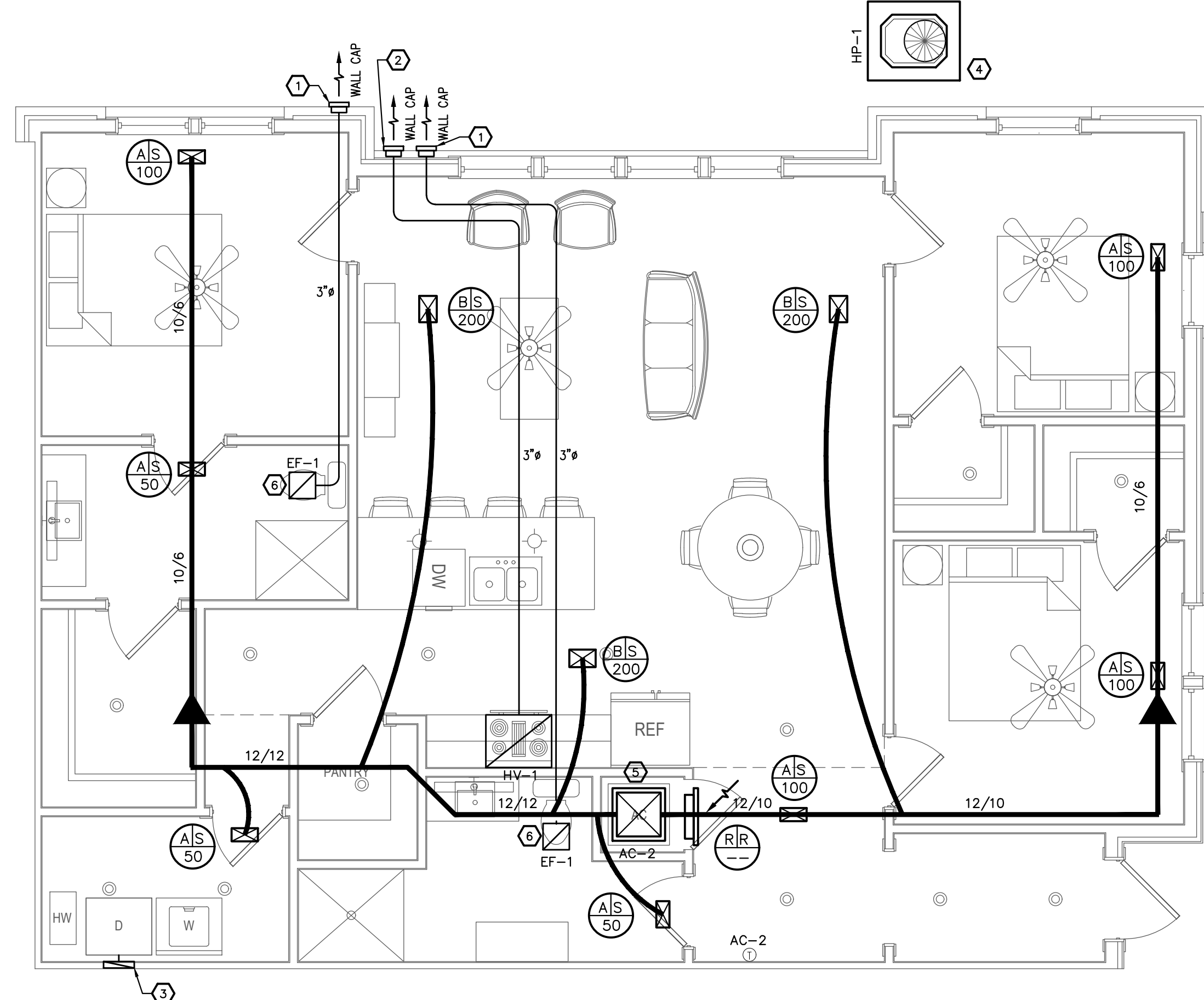
4 UNIT D - MECHANICAL PLAN
SCALE: 1/4" = 1'-0"



3 UNIT C - MECHANICAL PLAN
SCALE: 1/4" = 1'-0"



1 UNIT A - MECHANICAL PLAN
SCALE: 1/4" = 1'-0"



2 UNIT B - MECHANICAL PLAN
SCALE: 1/4" = 1'-0"

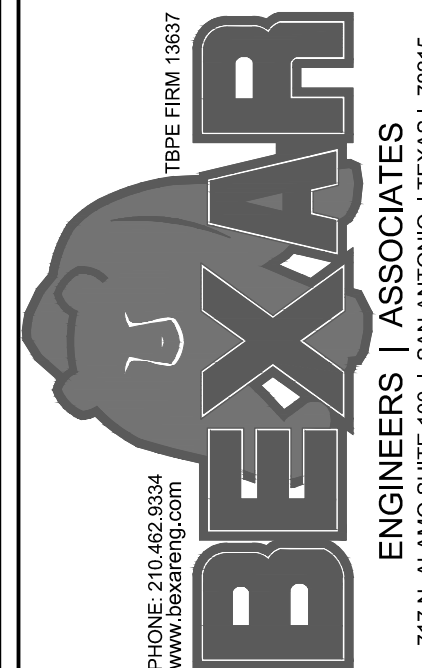
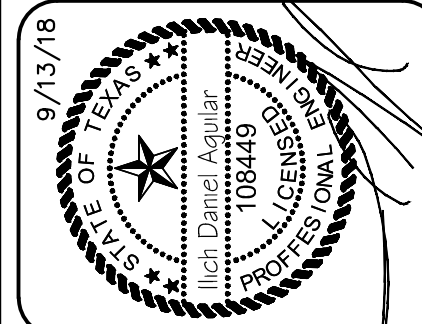
MECHANICAL PLAN

GARDEN CREEK APARTMENTS
NEW BUILDING
110 BLUEBONNET CIRCLE
BOERNE, TX 78006

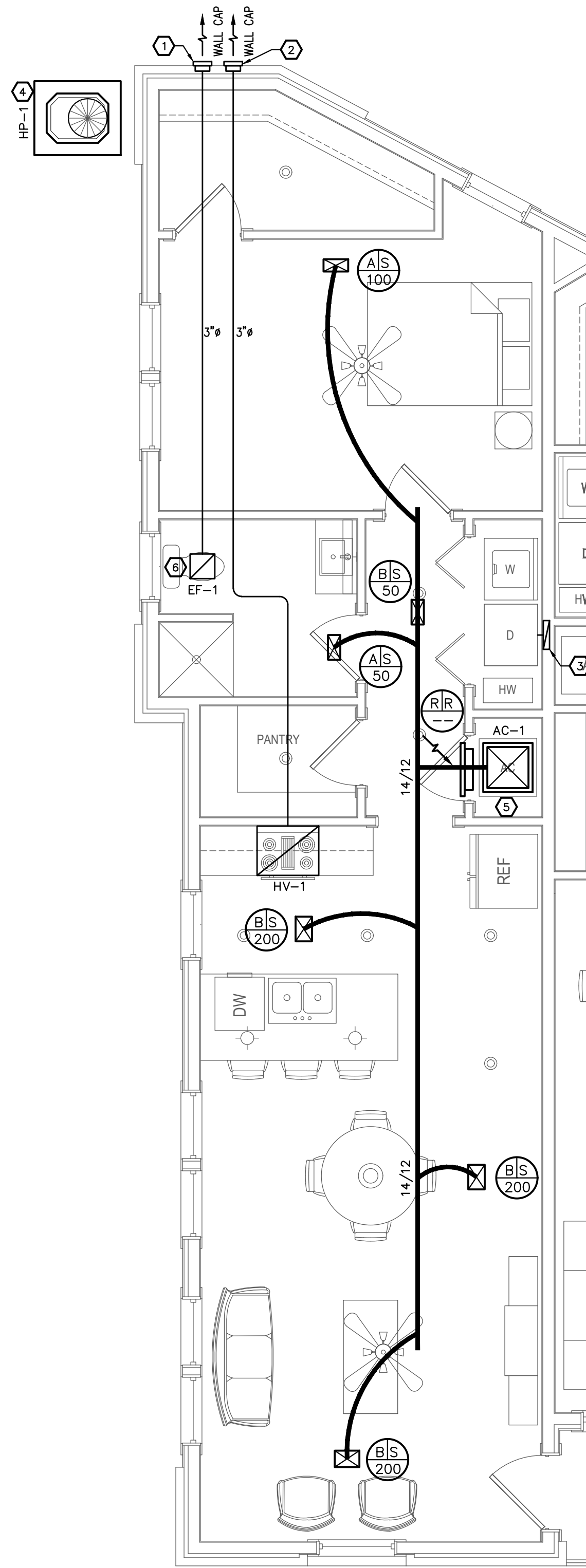
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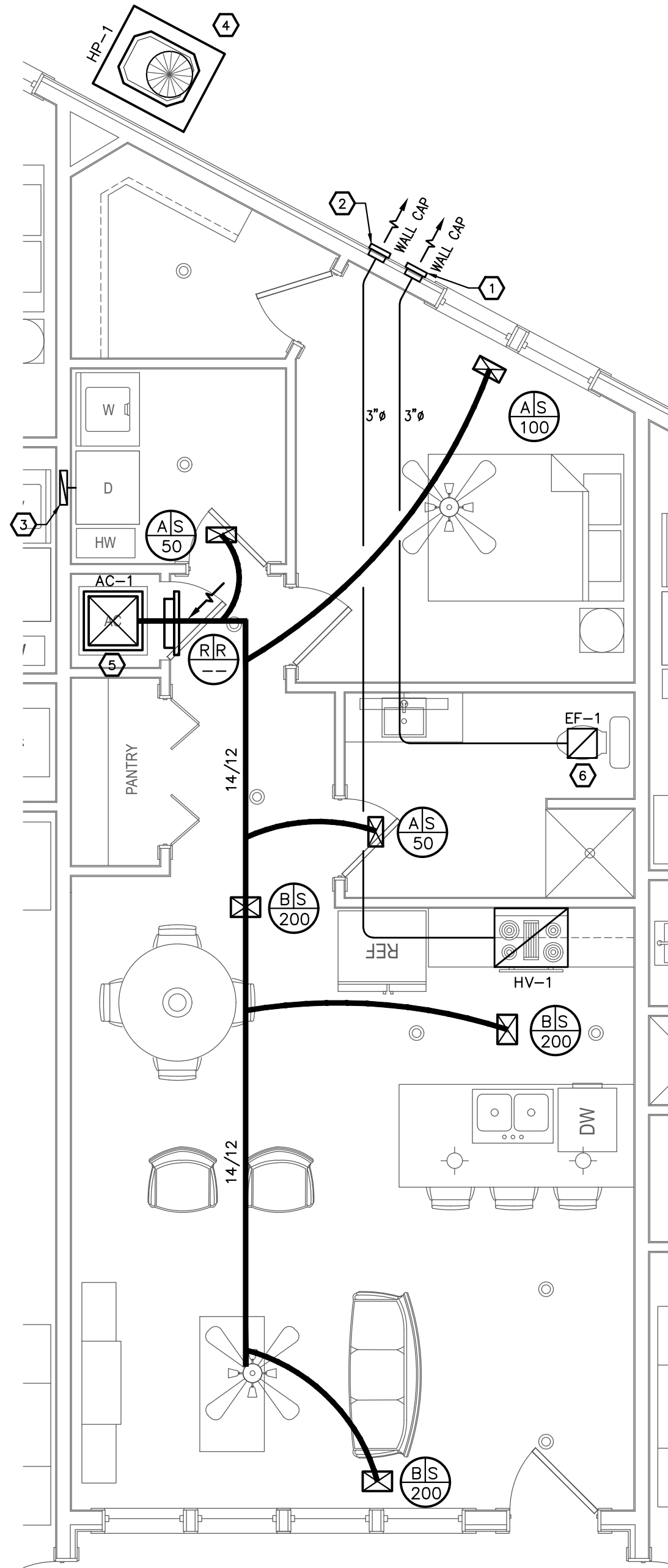
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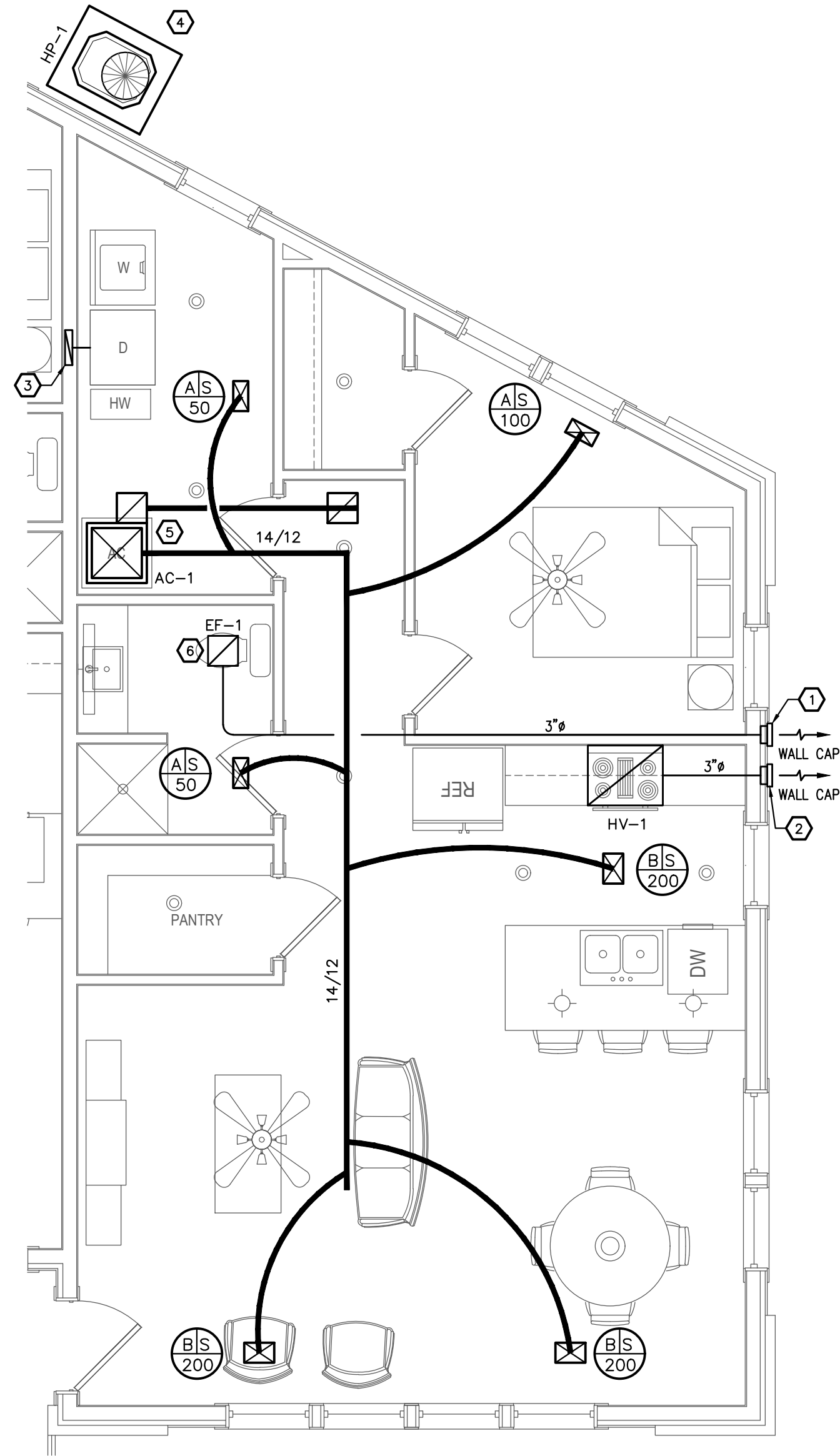
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7 UNIT G - MECHANICAL PLAN
SCALE: 1/4" = 1'-0"



6 UNIT F - MECHANICAL PLAN
SCALE: 1/4" = 1'-0"



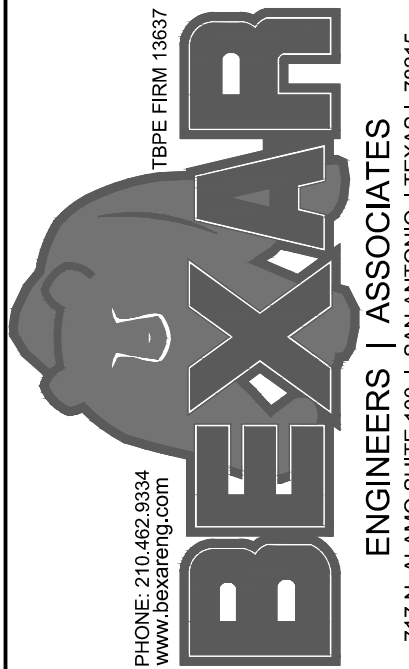
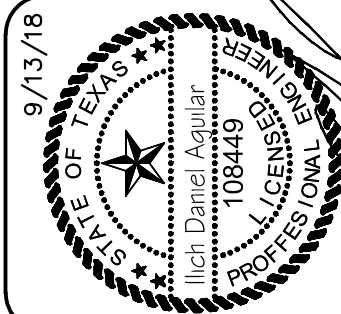
5 UNIT E - MECHANICAL PLAN
SCALE: 1/4" = 1'-0"

MECHANICAL PLAN

GARDEN CREEK APARTMENTS
NEW BUILDING
110 BLUEBONNET CIRCLE
BOERNE, TX 78006

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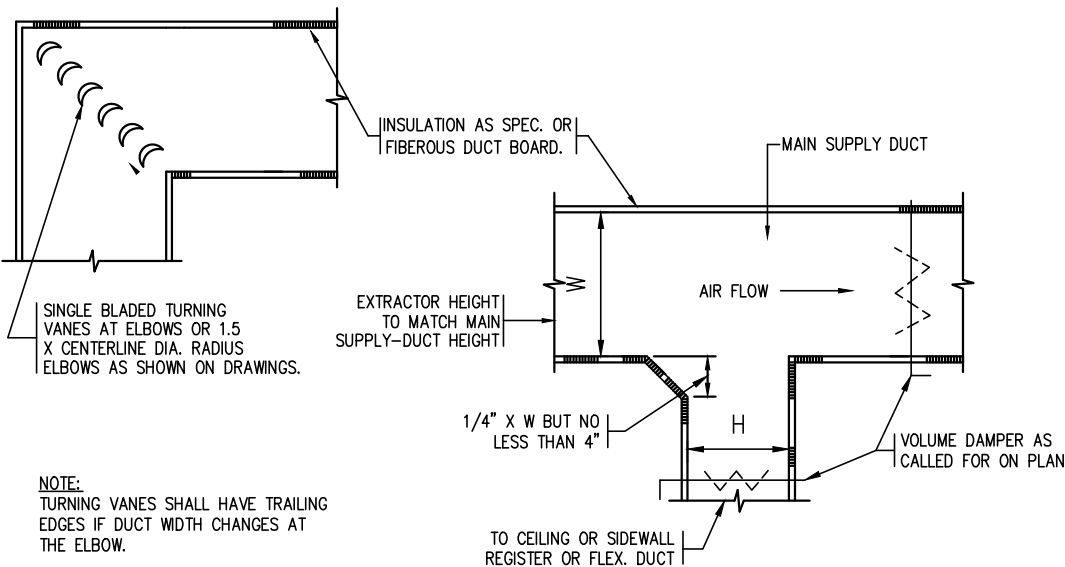
AIR-CONDITIONING SYMBOLS	
	DUCTWORK AND TRANSITION. FIRST DIMENSION NOTED IS SIZE SHOWN.
	DUCTWORK: SPLITTER DAMPER AND TURNING VANES.
	DUCTWORK: CEILING S/A DIFFUSERS.
	COMBINATION FIRE/SMOKE DAMPER
	DUCTWORK: RISE OR DROP IN DUCTWORK.
	WALL SUPPLY AIR REGISTER
	DUCT SECTION: EXHAUST OR RETURN DUCTWORK.
	DUCT SECTION: SUPPLY AIR DUCTWORK.
	THERMOSTAT
	DUCTWORK: AIR EXTRACTOR AT BRANCH DUCTWORK. EXTRACTOR TO BE ADJUSTABLE TYPE WITH CONTROL DEVICE.
	GRILLE TYPE
	SUPPLY OR RETURN NUMBER IN SPACE

KEYED NOTES:

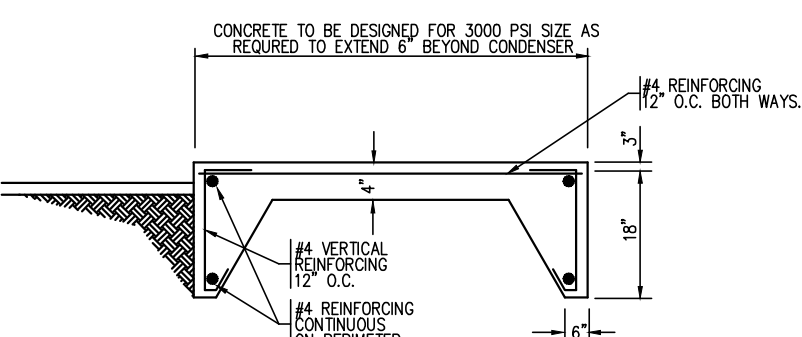
- 3" METAL RIGID DUCT FROM EF-1 TO EXTERIOR WALL CAP.
- 3" METAL RIGID DUCT FROM HV-1 TO EXTERIOR WALL CAP.
- 3" METAL RIGID DUCT FROM DRYER TO 3X14 RECTANGULAR RIGID METAL DUCT UP TO ATTIC SPACE. TRANSITION TO 4" RIGID METAL DUCT UP THRU ROOF TO APPROVED ROOF CAP.
- CONDENSING UNITS TO HAVE REFRIGERANT LOCKS PER IMC 2015.
- AIR HANDLER IN A/C CLOSET. PROVIDE AUXILIARY DRAIN PAN AND NEW 1" CONDENSATE TO TAIL PIECE IN RESTROOM LAVATORY PER IPC 2015.
- ALL SUSPENDED EQUIPMENT SHALL BE SUPPORTED FROM TOP CORD OF STRUCTURAL JOIST ONLY.

NOTES:

- NO EXHAUST VENTS WILL BE LOCATED WITH 10' OF ALL OPERABLE OPENINGS.
- ALL WORK TO COMPLY WITH 2015 INTERNATIONAL MECHANICAL CODE.
- ALL WORK TO COMPLY WITH 2015 INTERNATIONAL PLUMBING CODE.



2 ELBOW AND DUCT TAKEOFF DETAIL
NOT TO SCALE

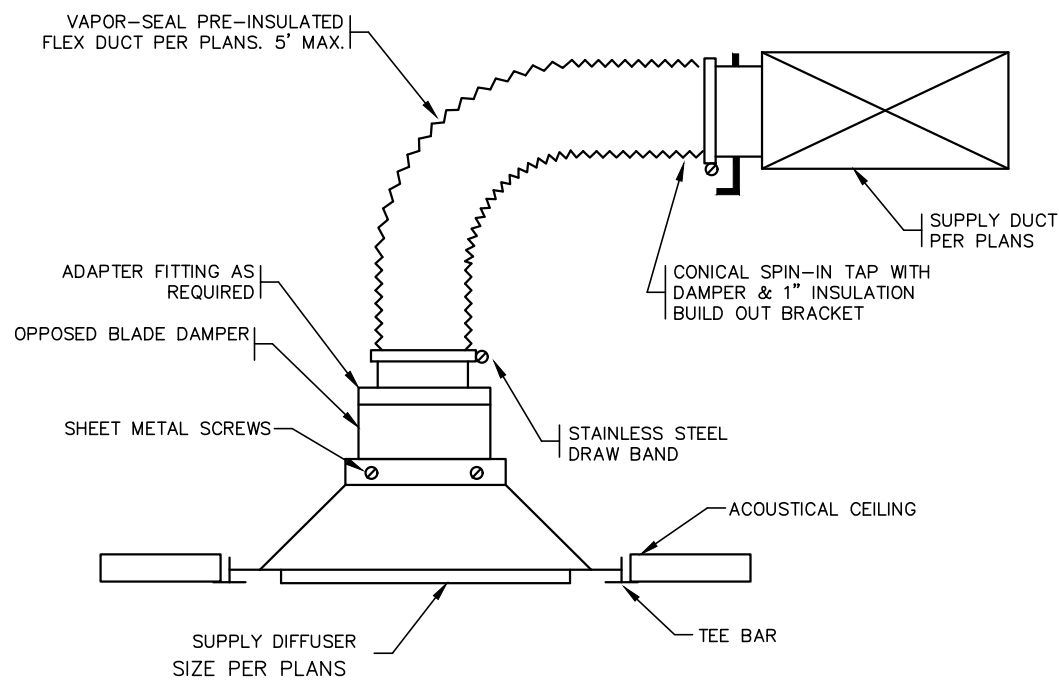


5 CONDENSER BASE DETAIL
NOT TO SCALE

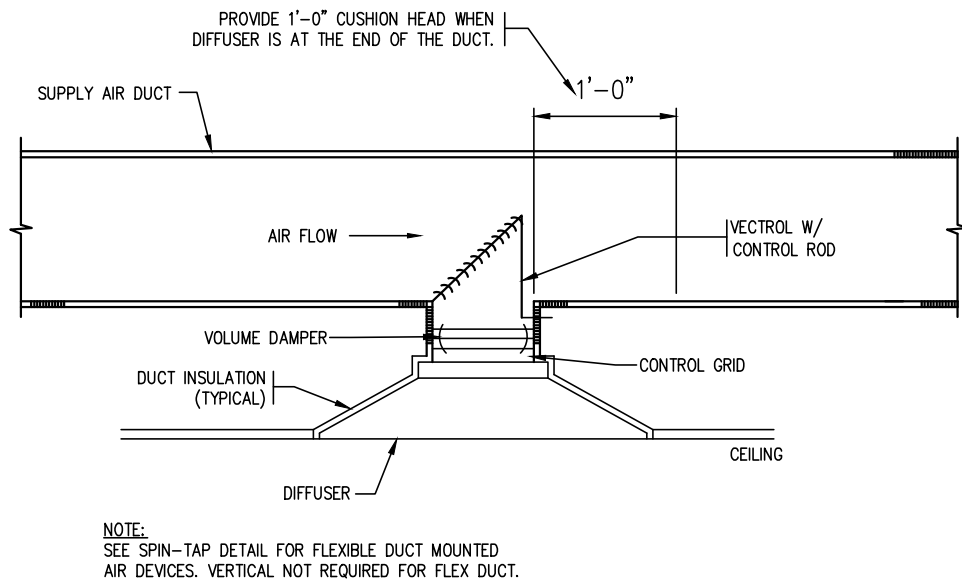
HEATING, VENTILATING, AND AIR CONDITIONING SPECIFICATIONS:

- Heating, ventilating, and air conditioning work includes packaged terminal air conditioning systems, gas furnaces with coils and condensing units, ventilating systems, ductwork and air device systems, insulation, and all labor, supplies, materials, and hardware required for a complete and finished system.
- Ductwork: Supply and return ductwork shall be constructed from galvanized steel in accordance with ASHRAE and SMACNA standards. Flexible duct, if used, shall be Owens-Corning NL-25 or equal as manufactured by ATCO. Ducts and duct fittings for toilet exhaust systems shall be round or rectangular metal duct. The duct system shall include turning vanes, splitters, dampers, and control devices as required for balancing and effective operation. Duct dimensions shown are interior measurements. Supply and return duct shall be insulated with 1-1/2" fiberglass batt material with fiberglass reinforced aluminum foil backing. Insulation shall be adhered with adhesive and joints shall be sealed with vapor barrier mastic. Provide flexible connections at duct connections to units.
- Supply air devices shall be equipped with opposed-blade damper air volume controls and square-to-round adapters as required.
- Louvers shall be Ruskin model ELF 375 or equal, provide mororized dampers as shown.
- Thermostats shall be electric low voltage combination heating and cooling type with automatic changeover. Thermostats shall be equipped with an "off-fan-auto" switch and a separate "cool-off-auto-heat" switch along with a thermometer that indicates the temperature at the control station and a means for setting the desired temperature.
- Testing and balancing: All systems shall be tested at the completion of the project to verify that systems are functioning properly and that controls are calibrated. Duct systems shall be balanced to produce the air quantities shown. For the ducted air supply systems, the contractor shall measure the air supply at each outlet using a flow hood and provide a report for the Owner.

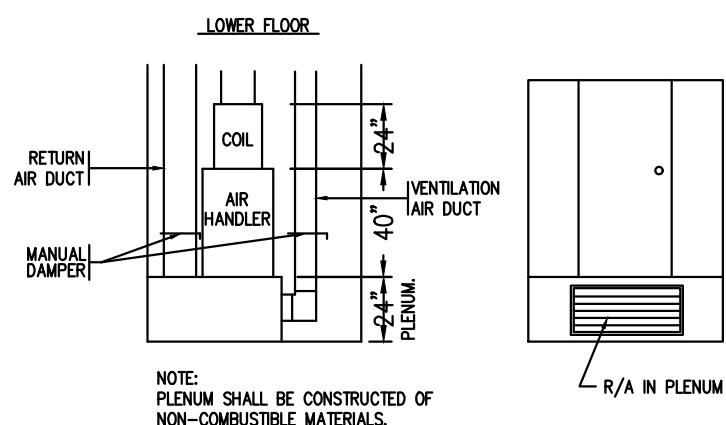
FLEX DUCT	
CFM	SIZE
0-50	4"
51-150	6"
151-250	8"
251-350	10"
351-500	12"



1 FLEX DUCT INSTALLATION
NOT TO SCALE



3 DIFFUSER DETAIL
NOT TO SCALE



6 ELEVATION AT A/C CLOSET
NOT TO SCALE

SPLIT SYSTEM AIR CONDITIONING UNIT SCHEDULE																						
MARK	SERVICE	TOTAL AIR CFM	VENT AIR CFM	FAN DATA	-----COOLING-----				HEAT KW	HEAT TYPE	VOLT/PHASE	M/KT AMP	-----OUTSIDE UNIT-----				--REFRIG--		TRANE MODELS			
					EXT. HP	ENT AIR DB	WB	TOTAL SENSIBLE					NOM TENS	AMB. TEMP SUM	MIN M/KT AMPS	VOLT/PHASE	LINES	LIQ	VAP	OUTSIDE UNIT	INSIDE UNIT	ELECTRIC HEATER
AC-1	RESIDENCE	800	45	0.5 1/4	80	67	18,000	16000	4.00	ELEC	208/1	27X30	2.0	100	9K20	208/1	3/8	1-1/8	4TTR3018E1	4TEC3F18B	BAYHTR140S	
AC-2	RESIDENCE	1200	45	0.5 1/2	80	67	36,000	33200	7.20	ELEC	208/1	48X50	3.0	100	34X50	208/1	3/8	1-1/8	2TWR4048A100	TWE048C14FD	BAYHTR1410	

NOTE: (1) REFRIGERANT LINES SHALL BE SIZED IN ACCORDANCE WITH RECOMMENDATIONS OF THE MANUFACTURER FOR EQUIPMENT SIZE AND DISTANCE.

NOTE: (1) REFRIGERANT LINES SHALL BE SIZED IN ACCORDANCE WITH RECOMMENDATIONS OF THE MANUFACTURER FOR EQUIPMENT SIZE AND DISTANCE.

REGISTER, GRILLE AND DIFFUSER SCHEDULE					
MARK	GRILLE SIZE	NECK SIZE	CFM	DISTRIBUTION ()-WAY	METAL-AIRE MODEL NO.
A	12x6	10X4	50-100	2-WAY	V4002S
B	12x8	10X6	101-200	2-WAY	V4002S
C	14x10	12X8	201-300	2-WAY	V4002S
D	18x10	16X8	301-400	2-WAY	V4002S
E	22x10	20X8	401-500	2-WAY	V4002S
R	20x20	18x18	-	RTN	RH

ALL SUPPLY AND RETURN DEVICES SHALL BE EQUIPPED WITH OPPOSED BLADE DAMPERS.
ALL SUPPLY AND RETURN DEVICES SHALL BE ALUMINUM CONSTRUCTION WITH WHITE ENAMEL FINISH.
ALL SUPPLY AND RETURN DEVICES SHALL BE EQUIPPED WITH SQUARE-TO-ROUND TRANSITIONS AS REQUIRED.

EXHAUST FAN SCHEDULE						
MARK	CFM	WATER IN INCHES	WATTS /HP	MANUFACTURER	MODEL #	REMARKS
EF-1	80	0.125	28W	BRDAN	XB80	(1,2)
HV-1	160	0.125	200	BRDAN	372401	(1,2)

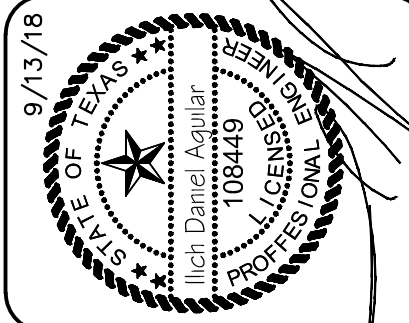
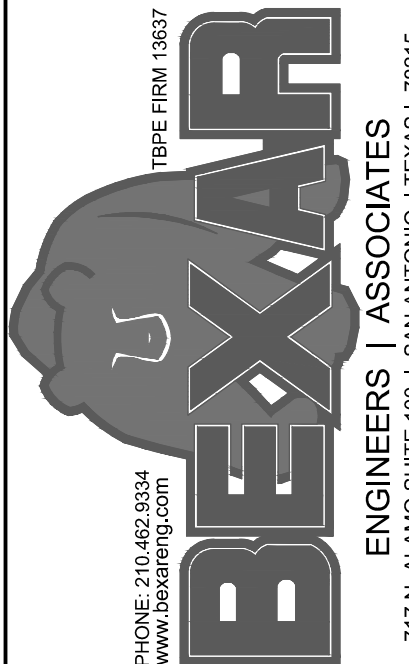
NOTES:
(1) PROVIDE SPEED CONTROL, TRANSITIONS, BACKDRAFT DAMPER AND BIRD SCREEN.
(2) PROVIDE DUCT AND APPROVED ROOF CAP.

MECHANICAL PLAN

GARDEN CREEK APARTMENTS
NEW BUILDING
110 BLUEBONNET CIRCLE
BOERNE, TX 78006

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REVISIONS:
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ELECTRICAL SYSTEM SPECIFICATIONS

1. GENERAL CONDITIONS

THE GENERAL PROVISIONS OF THE CONTRACT, INCLUDING THE CONDITIONS OF THE CONTRACT (GENERAL, SUPPLEMENTARY AND OTHER CONDITIONS) AND DIVISION 1 – GENERAL REQUIREMENTS AS APPROPRIATE, APPLY TO THE WORK SPECIFIED IN THIS SECTION.

2. SCOPE OF WORK

THE WORK INCLUDED UNDER THIS SECTION CONSISTS OF FURNISHING ALL MATERIALS, EQUIPMENT, AND LABOR AND THE PERFORMING OF ALL FUNCTIONS, EXCEPT AS OTHERWISE SPECIFIED HEREIN OR SHOWN ON THE DRAWINGS TO BE PERFORMED BY OTHERS, FOR THE INSTALLATION AND PLACING INTO OPERATION OF A COMPLETE ELECTRICAL SYSTEM AS SPECIFIED AND SHOWN ON THE DRAWINGS.

3. GENERAL DESCRIPTION

3.1 THE WORK IN GENERAL SHALL CONSIST OF, BUT IS NOT NECESSARILY LIMITED TO THE FOLLOWING.

3.1.1 FURNISHING AND INSTALLING ALL FIXTURES WITH LAMPS AS INDICATED ON THE DRAWINGS AND AS SPECIFIED HEREIN UNLESS NOTED.

3.1.2 FURNISHING AND INSTALLING ALL ELECTRICAL WORK, PANELS, SERVICE, CONDUIT, WIRING, ETC., FOR ALL OUTLETS AND EQUIPMENT.

3.1.3 FURNISHING AND INSTALLING ALL TELEPHONE AND DATA OUTLETS, CONDUITS WITH PULL STRINGS AND TELEPHONE MOUNTING BOARDS INCLUDING CONDUIT FROM TELEPHONE MOUNTING BOARD TO THE BUILDING ENTRANCE AS INDICATED ON THE PLAN.

3.1.6 FURNISHING AND INSTALLING ALL MOTOR STARTERS AND CONTROL COMPONENTS, NOT SPECIFICALLY SPECIFIED TO BE FURNISHED IN ACCORDANCE WITH OTHER SECTIONS OF THE SPECIFICATIONS.

3.1.7 FURNISHING AND INSTALLING ALL POWER AND WIRING EXCEPT THAT WHICH IS PRE-WIRED IN FACTORY ASSEMBLED EQUIPMENT.

3.1.8 INSTALLING ALL LINE VOLTAGE MECHANICAL CONTROL WIRING AND ASSOCIATED CONTROLS WHICH ARE FURNISHED BY THE MECHANICAL CONTRACTOR (LOW VOLTAGE CONTROL WIRING AND CONTROLS SHALL BE FURNISHED AND INSTALLED BY THE MECHANICAL CONTRACTOR).

3.1.9 PAINTING WORK AS DESCRIBED UNDER OTHER SECTIONS OF THESE SPECIFICATIONS. CLEAN AND PREPARE ALL SURFACES READY FOR PAINTING.

3.1.10 PROVIDE TEMPORARY CONSTRUCTION POWER AS OUTLINED BELOW. THIS SERVICE SHALL BE MAINTAINED THROUGHOUT THE ENTIRE JOB AS THE WORK PROGRESSES. PROVIDE OUTLETS AT CONVENIENT POINTS AND IN SUFFICIENT NUMBERS SO THAT NO EXTENSION CORD OVER 50 FEET IN LENGTH IS REQUIRED TO REACH ANY WORK POINT. MAINTAIN GENERAL LIGHTING IN CORRIDORS, STAIRS, BASEMENT AND OTHER AREAS NOT RECEIVING SUFFICIENT DAYLIGHT REQUIRED FOR SAFETY. REMOVE TEMPORARY WORK AS RAPIDLY AS REQUIRED FOR OR ALLOWED BY INSTALLATION OF PERMANENT WORK.

3.1.11 CERTAIN ITEMS OF WORK BY OTHER TRADES WILL BE NECESSARY FOR THE COMPLETION OF WORK UNDER THIS DIVISION. COOPERATE WITH OTHER TRADES AND ARRANGE FOR THESE ITEMS TO BE PERFORMED IN ORDERLY COURSE.

3.1.12 THIS CONTRACTOR SHALL REVIEW THE MECHANICAL CONTROL REQUIREMENTS AS SPECIFIED AND SHOWN ON THE DRAWINGS AND SHALL FURNISH AND INSTALL ALL NECESSARY CONDUIT, WIRING, BOXES, PROTECTIVE DEVICES, SWITCHES, ETC., FOR THE COMPLETION AND PROPER OPERATION OF THE SYSTEM.

3.1.13 REVIEW ALL DRAWINGS AND ALL SPECIFICATIONS FOR EACH SECTION OF WORK. UNLESS SPECIFICALLY NOTED OTHERWISE, HEREIN OR ELSEWHERE, FURNISH AND INSTALL ALL ITEMS OF ANY ELECTRICAL NATURE REQUIRED FOR COMPLETION OF WORK FOR OTHER TRADES, WHETHER OR NOT SAME IS SHOWN OR NOTED IN THIS OR OTHER SECTIONS.

4. REGULATIONS AND CODES

THE CONTRACTOR MUST COMPLY WITH ALL STATE, MUNICIPAL AND FEDERAL SAFETY LAWS, CONSTRUCTION CODES, ORDINANCES AND REGULATIONS RELATING TO BUILDING AND PUBLIC HEALTH AND SAFETY. IN ADDITION, COMPLY WITH RULES AND REGULATIONS OF THE STATE FIRE PROTECTION CODE. FIRE PROTECTION MATERIAL MUST BEAR THE FIRE UNDERWRITERS LABORATORIES LABEL.

5. GENERAL REQUIREMENTS

5.1 THE CONTRACTOR SHALL EXAMINE THE PREMISES AND SATISFY HIMSELF OF EXISTING CONDITIONS UNDER WHICH HE WILL BE OBLIGATED TO OPERATE IN PERFORMING HIS PART OF THE WORK OR THAT WILL IN ANY MANNER AFFECT THE WORK UNDER THE CONTRACT. THE CONTRACTOR SHALL COOPERATE WITH OTHER TRADES SO THAT THE INSTALLATION OF ALL EQUIPMENT MAY BE PROPERLY COORDINATED.

5.2 ALL EQUIPMENT FURNISHED SHALL FIT THE SPACE AVAILABLE, WITH CONNECTION, ETC., IN THE REQUIRED LOCATIONS AND WITH ADEQUATE SPACE FOR OPERATING AND SERVICING. THE DRAWINGS ARE GENERALLY DIAGRAMMATIC AND INDICATE THE MANNER AND METHOD OF THE INSTALLATION, WHILE THE SPECIFICATIONS AND FIXTURE LIST DENOTE THE TYPE AND QUALITY OF MATERIAL AND WORKMANSHIP TO BE USED. WHERE A CONFLICT EXISTS BETWEEN THE DRAWINGS AND THE SPECIFICATIONS, THE CONTRACTOR SHALL PROMPTLY NOTIFY THE ARCHITECT/ENGINEER WHOSE DECISION SHALL BE FINAL. NO ALLOWANCE WILL BE MADE SUBSEQUENTLY IN THIS CONNECTION IN BEHALF OF THE CONTRACTOR AFTER AWARD OF THE CONTRACT.

GROUND FAULT RATING:

480 VOLT

DEVICE	RATING
SAFETY SWITCHES	100,000 (WITH RC-1 FUSES)
SERVICE BREAKERS	65,000 A.M.P.S
DIST. BREAKERS TO PANELS	35,000 A.M.P.S
BRANCH BREAKERS TO DEVICES	25,000 A.M.P.S

208 VOLT

DEVICE	RATING
SAFETY SWITCHES	100,000 (WITH RC-1 FUSES)
SERVICE BREAKERS	45,000 A.M.P.S
DIST. BREAKERS TO PANELS	25,000 A.M.P.S
BRANCH BREAKERS TO DEVICES	10,000 A.M.P.S

NOTE: THE BUILDING ELECTRICAL GROUND SYSTEM SHALL INCLUDE A DOMESTIC COLD WATER SERVICE BOND, A STRUCTURAL STEEL BOND, A CONCRETE ENCASED ELECTRODE (FOUNDATION - 4"X20" MIN. DIA.) & ANCHORS IN REINFORCE ALL INITIAL FPD PER NEC REQUIREMENTS.

6. EQUIPMENT AND MATERIAL

6.1 ALL MATERIALS FURNISHED UNDER THIS CONTRACT SHALL BE NEW (EXCEPT AS NOTED), FREE FROM DEFECTS OF ANY CHARACTER, SHALL CONFORM WITH THE STANDARDS OF THE UNDERWRITERS LABORATORIES, INC. (U.L.) OR OTHER NATIONALLY RECOGNIZED LABORATORY, IN EVERY CASE WHERE SUCH A STANDARD HAS BEEN ESTABLISHED AND SHALL BE SO LABELED. IT IS THE INTENTION OF THESE SPECIFICATIONS TO INDICATE A STANDARD OF QUALITY FOR ALL MATERIALS INCORPORATED IN THIS WORK, AND WHERE MATERIALS ARE NOT SPECIFIED HEREIN AND ARE REQUIRED TO COMPLETE THE ELECTRICAL INSTALLATION, THESE MATERIALS SHALL BE OF FIRST QUALITY FOR USE INTENDED. MANUFACTURERS OF SIMILAR QUALITY PRODUCTS WILL BE CONSIDERED UNLESS THE SPECIFICATIONS OR DRAWINGS INDICATE OTHERWISE.

6.2 MATERIALS SHALL BE SUITABLE FOR INTENDED USE AND LOCATION. UNLESS OTHERWISE SHOWN USE NEMA-1 FOR INTERIOR AREAS AND NEMA-3R FOR EXTERIOR AREAS.

6.3 THE ARCHITECT/ENGINEER DECISION AS TO EQUAL IN GRADE AND QUALITY SHALL RULE AND BE FINAL FOR ALL ELECTRICAL MATERIALS INCORPORATED IN THIS WORK. WHERE TWO OR MORE SIMILAR TYPE ITEMS ARE FURNISHED, ALL SHALL BE OF THE SAME MANUFACTURER (E.G. ALL DISCONNECT SWITCHES SHALL BE OF THE SAME MANUFACTURER) UNLESS OTHERWISE NOTED HEREIN OR SHOWN ON THE DRAWINGS. ALL MATERIAL AND INSTALLATION METHODS USED SHALL BE IN ACCORDANCE WITH THE LATEST AND APPROVED ELECTRICAL AND MECHANICAL ENGINEERING PRACTICES.

7. SERVICE ENTRANCE EQUIPMENT

7.1 SERVICE ENTRANCE EQUIPMENT SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE MUNICIPAL GOVERNING BODY AND SERVING UTILITY. SHOP DRAWINGS SHALL BE SUBMITTED TO THE SERVING UTILITY FOR WRITTEN APPROVAL BEFORE ORDERING EQUIPMENT.

7.2 LABEL EQUIPMENT AND EACH INDIVIDUAL OVERCURRENT DEVICE WITH MILLED PHENOLIC LABELS.

8. PANELBOARDS

8.1 EACH PANEL SHALL BE PROVIDED WITH DOOR LOCK AND TWO KEYS, ALL KEYS ALIKE. EACH PANEL SHALL BE PROVIDED WITH TYPEWRITTEN SHEET INSTALLED ON DOOR IDENTIFYING THE USE OF EACH BRANCH CIRCUIT. PANELS SHALL HAVE BUSSING AS INDICATED ON THE DRAWINGS.

8.2 LABEL EQUIPMENT WITH MILLED PHENOLIC LABELS.

8.3 APPROVED MANUFACTURERS ARE: SQUARE D, CHALLENGER, WESTINGHOUSE, SIEMENS/ITE, GENERAL ELECTRIC, RYCO, PCl

8.4 FLUSH MOUNTED PANELS SHALL BE FURRED OUT AS NECESSARY BY CONTRACTOR.

9. STARTERS

9.1 ALL MOTOR STARTERS SHALL BE FURNISHED UNDER THIS SECTION OF THE SPECIFICATIONS UNLESS AN INTEGRAL PART OF EQUIPMENT OR NOTED AS FURNISHED WITH EQUIPMENT SPECIFIED UNDER OTHER SECTIONS OF THESE SPECIFICATIONS.

9.2 SEPARATELY MOUNTED MOTOR STARTERS SHALL BE ACROSS-THE-LINE COMBINATION MAGNETIC WITH 120V COILS, FUSED DISCONNECT CONTACTORS, ADDITIONAL AUXILIARY CONTACT FOR INTERLOCKING OF CONTROLS. PROVIDE PUSHBUTTON OR SELECTOR SWITCH IN COVER. SWITCHBOARD MOUNTED STARTERS SHALL BE MAGNETIC WITH 120V COILS AND ADDITIONAL AUXILIARY CONTACTS AS REQUIRED FOR INTERLOCKING OF CONTROLS. STARTERS SHALL HAVE AN INTEGRAL CONTROL CIRCUIT TRANSFORMER OR SEPARATE 120V CONTROL WITH CONTROL CIRCUIT DISCONNECT SWITCH IN COVER.

9.3 MANUAL STARTERS SHALL BE HORSEPOWER, VOLTAGE AND PHASE RATED WITH OVERLOAD PROTECTION AND GREEN "ON" PILOT LIGHT. SURFACE MOUNTED UNLESS NOTED OTHERWISE.

9.4 ALL STARTERS SHALL HAVE OVERLOAD PROTECTION IN ALL PHASE LINES. FURNISH AND INSTALL THE PROPER SIZE OVERLOAD HEATER ELEMENTS DETERMINED FROM FULL LOAD NAMEPLATE READINGS ON MOTORS AND COMPENSATION FOR AMBIENT TEMPERATURE IN ALL STARTERS WHETHER THEY BE FURNISHED UNDER THIS SECTION OR OTHER SECTIONS.

9.5 LABEL PER 7.2.

9.6 APPROVED MANUFACTURERS ARE: SQUARE D

WIRING AND CONDUIT GENERAL NOTES:

ON 20A 120V CIRCUITS, WIRING AND CONDUIT SIZE SHALL BE ENLARGED IF ROUTING OF LINES CAUSES WIRE LENGTH TO BE GREATER THAN THE FOLLOWING:

LENGTH ONE WAY	MINIMUM WIRE SIZE	MINIMUM CONDUIT SIZE
75	12	1/2"
100	10	1/2"
125	8	1"
150	6	1"
175	4	1-1/4"

CONDUIT AND WIRE SIZES SPECIFIED IN 120/208 VOLT PANEL SCHEDULES ARE ONLY ACCURATE WHERE THE TOTAL WIRE LENGTH IN ROUTING IS 75 FEET OR LESS.

ON 20A-277V CIRCUITS, WIRING AND CONDUIT SIZE SHALL BE ENLARGED IF ROUTING OF LINES CAUSES WIRE LENGTH TO BE GREATER THAN THE FOLLOWING:

LENGTH ONE WAY	MINIMUM WIRE SIZE	MINIMUM CONDUIT SIZE
150	12	3/4"
210	10	3/4"
430	8	1"
700	6	1"
1000	4	1-1/4"

CONDUIT AND WIRE SIZES SPECIFIED IN 277/480 VOLT PANEL SCHEDULES ARE ONLY ACCURATE WHERE THE TOTAL WIRE LENGTH IN ROUTING IS 150 FEET OR LESS.

ON ALL CIRCUITS, WIRING AND CONDUIT SIZES SHALL BE ENLARGED IF ROUTING OF LINES CAUSES WIRE LENGTH TO BE EXCESSIVE. WIRING AND CONDUIT SIZES

11. CONDUIT

11.1 METALLIC CONDUITS SHALL BE HOT DIPPED GALVANIZED EQUAL TO CLIFFTON.

11.2 ELECTRIC METALLIC TUBING (EMT) IS PERMITTED FOR EXPOSED WORK ABOVE 6'-0" A.F.F. OR CONCEALED WORK ONLY. EMT IS NOT PERMITTED IN THE FOLLOWING: (1) IN OR UNDER CONCRETE, (2) IN EARTH, (3) IN GROUTED WALLS, (4) EXTERIOR OF BUILDING. INSTALL BOND WIRE PER P.C.C. OR M.A.G. AMENDMENTS.

11.3 RIGID PVC CONDUIT IS PERMITTED ONLY UNDERGROUND OR AS NOTED ON DRAWINGS. PROVIDE RIGID STEEL ELBOWS AND RISERS (NO MINIMUM SIZE).

11.4 RIGID GALVANIZED OR SHERADIZED STEEL SHALL BE USED FOR ALL EXPOSED CONDUIT BELOW 6'-0" A.F.F. OR AS NOTED ON DRAWINGS. WHERE USED IN OR UNDER CONCRETE OR IN EARTH, SHALL BE CODE APPROVED PVC COATED OR HALF LAP WRAPPED WITH POLYKEN #900 TAPE OR EQUAL.

11.5 INSTALL EXPOSED RACEWAYS PARALLEL AND PERPENDICULAR TO NEARBY SURFACES OR STRUCTURAL MEMBERS AND FOLLOW THE SURFACE CONTOURS AS MUCH AS PRACTICAL.

11.6 RUN EXPOSED, PARALLEL, OR BANKED RACEWAYS TOGETHER. MAKE BENDS IN PARALLEL OR BANKED RUNS FROM THE SAME CENTER LINE SO THAT THE BENDS ARE PARALLEL. FACTORY ELBOWS MAY BE USED IN BANKED RUNS ONLY WHERE THEY CAN BE INSTALLED PARALLEL. THIS REQUIRES THAT THERE BE A CHANGE IN THE PLANE OF THE RUN SUCH AS FROM WALL TO CEILING AND THAT THE RACEWAYS BE OF THE SAME SIZE. IN OTHER CASES PROVIDE FIELD BENDS FOR PARALLEL RACEWAYS.

12. WIRE

12.1 SOFT DRAWN ANNEALED COPPER (UNLESS OTHERWISE NOTED ON PLANS) HAVING CONDUCTIVITY OF NOT LESS THAN 98% OF THAT OF PURE COPPER, UNIFORM IN CROSS SECTION, FREE FROM FLAWS, SCALES, AND OTHER IMPERFECTIONS. ALL WIRE LARGER THAN #10 SHALL BE STRANDED.

12.2 INSULATION: TYPE THHN/THWN, OR XHHW FOR ALL BRANCH CIRCUIT AND FEEDER WIRING.

12.3 SIZES: NO WIRE SMALLER THAN #12 UNLESS OTHERWISE NOTED ON DRAWINGS.

13. MISCELLANEOUS MATERIALS:

13.1 SAFETY SWITCHES: HEAVY DUTY, FUSED REJECTION TYPE, MINIMUM 200,000 A.I.C. RATED. "NF" INDICATES NOT FUSED.

13.1.1 LABEL PER SECTION 16000.22

13.1.2 APPROVED MANUFACTURERS ARE: SQUARE D, CHALLENGER, WESTINGHOUSE, GENERAL ELECTRIC OR SAME MANUFACTURERS AS DISTRIBUTION EQUIPMENT.

13.2 FUSES: "BUSSMAN" OR "GOULD SHAWMUT" MFG. NO SUBSTITUTIONS ALLOWED BY PRIOR WRITTEN APPROVAL FROM ENGINEER, OR AS NOTED ON DRAWINGS.

13.3 CONDUIT STRAP: HEAVY GAUGE STEEL SNAP-ON TYPE.

13.4 ELECTRICAL METALLIC TUBING FITTINGS: EQUAL TO T&B COMPRESSION TYPE. CONNECTORS SHALL HAVE INSULATED BUSHINGS.

13.5 RIGID CONDUIT LOCKNUTS AND BUSHINGS: EQUAL TO T&B.

13.6 FLEXIBLE CONDUIT AND FITTINGS: EQUAL TO CALIFORNIA CONDUIT AND CABLE COMPANY, INC.

13.7 LIQUID TIGHT CONDUIT AND FITTINGS FOR ALL EXTERIOR AND EQUIPMENT CONNECTIONS.

13.8 OUTLET BOXES, PLASTER RINGS, PULL, AND JUNCTION BOXES, ETC.: EQUAL TO RACO. ZINC COATED OR CADMIUM PLATED SHEET STEEL FOR INDOOR LOCATIONS, CAST ALUMINUM FOR OUTDOOR LOCATIONS.

13.8.1 FOR ALL LIGHT FIXTURES: OCTAGON OR 4" SQUARE BOXES.

13.8.2 FOR SWITCHES AND RECEPTACLES: 4" OR 4-11/16" SQUARE BOXES.

13.8.3 JUNCTION AND PULL BOXES: 4" SQUARE MINIMUM SIZE. PROVIDE WITH SCREWFASTENED COVERS LOCATED IN ACCESSIBLE LOCATIONS.

13.9 CONDULETS: EQUAL TO CROUSE-HINDS.

13.10 WIRE AND CABLE: EQUAL TO GENERAL CABLE AND/OR SIMPLEX.

13.11 DEVICES: "HUBBELL", "BRYANT" OR APPROVED EQUAL. RECEPTACLES: DUPLEX-20 AMP #5362-1, ISOLATED GROUND - 20 AMP #IG-5362, GFCI - 20 AMP #GF-5362-1, SWITCHES: 20 AMP #1221-1 SINGLE POLE, 1222-1 DOUBLE POLE, 1223-1 THREE WAY, 1224-1 FOUR WAY.

13.12 DEVICE PLATES: "HUBBELL" OR EQUAL. IVORY NYLON IN INTERIOR AREAS OR AS NOTED ON DRAWINGS. ZINC DIE CAST FLIP LID MOUNTED HORIZONTALLY FOR EXTERIOR OR WEATHERPROOF LOCATIONS.

13.13 LIGHTING FIXTURES: EQUAL TO AS SHOWN ON FIXTURE SCHEDULE OR DESCRIBED ON DRAWINGS, COMPLETE WITH LAMPS IN ORIGINAL CARTONS AND ALL CANOPIES, STEMS, HANGERS AND ACCESSORIES INCLUDING ALL STRUCTURAL MEMBERS REQUIRED FOR PROPER MOUNTING. ALL FIXTURE BALLASTS SHALL BE ELECTRONIC ENERGY SAVING TYPE. SUBMIT SHOP DRAWINGS TO ARCHITECT/ENGINEER FOR APPROVAL BY THE SAME. BALLASTS SHALL BE C.E.C. APPROVED. BALLAST LOSS SHALL NOT EXCEED 10 PERCENT OF TOTAL FIXTURE WATTAGE.

13.14 LAMPS: G.E. OR EQUAL AND SHALL BE FOR THE MAXIMUM RATED WATTAGE OF FIXTURE UNLESS OTHERWISE SHOWN ON DRAWINGS. FLUOR. LAMPS & BALLASTS SHALL BE SOLID STATE ELECTRONIC. TYPE.

23 GROUNDING

23.1 GROUND EACH TRANSFORMER PER NEC.

23.2 AT EACH BUILDING SERVICE ENTRANCE, PROVIDE DISCONNECT SWITCH AND ONE 3/4"x10" GROUND ROD BONDED TO SERVICE WITH CONDUCTOR PER N.E.C. ALSO BOND PER N.E.C. TO FOUNDATION REBAR, BUILDING STEEL AND WATER SERVICE.

14. SLEEVES, INSERTS, OPENINGS

14.1 CONTRACTOR SHALL LAYOUT AND INSTALL HIS WORK IN ADVANCE OF POURING CONCRETE FLOORS OR WALLS. PROVIDE ALL SLEEVES AND/OR OPENINGS THROUGH FLOORS OR WALLS REQUIRED FOR ELECTRICAL CONDUITS OR DUCTS.

14.2 SLEEVES SHALL BE OF RIGID CONDUIT OR GALVANIZED SHEET STEEL RIGIDLY SUPPORTED AND SUITABLY PACKED TO PREVENT ENTRANCE OF WET CONCRETE.

15. EXCAVATION/CUTTING/FITTING/REPAIRING/FINISHING

15.1 THE CONTRACTOR SHALL INCLUDE IN HIS BID ALL EXCAVATION, COMPACTION, FILL, BACKFILL, CUTTING, FITTING, REPAIRING AND FINISHING OF ALL WORK NECESSARY FOR THE INSTALLATION OF ALL EQUIPMENT UNDER THIS SPECIFICATION BUT NO CUTTING OF THE WORK OF OTHER CONTRACTORS SHALL BE DONE WITHOUT THE CONSENT OF THE GENERAL CONTRACTOR.

15.2 EARTHWORK SHALL BE DONE IN ACCORDANCE WITH LATEST INDUSTRY STANDARDS.

16. CLEANUP OF PREMISES

CONTRACTOR SHALL AT ALL TIMES KEEP THE PREMISES CLEAR OF WASTE MATERIALS AND DEBRIS CAUSED BY HIS EMPLOYEES AND OPERATION. EQUIPMENT NOT REQUIRED IN THE WORK SHALL BE REMOVED PRIOR TO THE TERMINATION OF THE CONTRACT.

17. TESTS AND INSPECTIONS

17.1 CONTRACTOR SHALL TEST WIRING AND DEVICES AS SECTIONS ARE COMPLETED AND SHALL CORRECT ALL DEFECTS IMMEDIATELY AT HIS OWN EXPENSE, INCLUDING ANY DAMAGE TO WALLS, CEILINGS, FLOOR OR OTHER PORTIONS OF THE BUILDING WHICH MAY RESULT FROM REPLACING DEFECTIVE EQUIPMENT.

17.2 FURNISH ALL METERS, CABLE, CONNECTIONS AND APPARATUS NECESSARY FOR MAKING TESTS.

17.3 TEST SYSTEM FOR SHORTS AND GROUNDS. FAULTY WIRING SHALL BE REMOVED AND REPLACED. ANY DEVICE, APPARATUS OR FIXTURE INSTALLED SHOWING SUBSTANDARD PERFORMANCE SHALL BE REMOVED AND REPLACED AS DIRECTED BY THE ARCHITECT/ENGINEER.

17.4 MEGGER ALL SYSTEMS NEUTRALS TO INSURE THE NEUTRAL IS NOT GROUNDED WITHIN THE SYSTEM.

17.5 ALL EQUIPMENT RATED AT 1,000 AMPS OR MORE, OR 480 VOLTS SHALL BE TESTED FOR INSULATION BREAKDOWN PRIOR TO ITS BEING ENERGIZED. SUCH EQUIPMENT SHALL WITHSTAND FOR A PERIOD OF ONE MINUTE WITHOUT BREAKDOWN, THE APPLICATION OF A 60 HZ ALTERNATING POTENTIAL OF 1,000V PLUS TWICE THE RATED VOLTAGE OF THE DEVICE.

17.6 AFTER THE ELECTRICAL WIRING SYSTEM INSTALLATION IS COMPLETED AND AT SUCH TIME AS THE ARCHITECT/ENGINEER OR HIS AUTHORIZED REPRESENTATIVE MAY DIRECT, THE CONTRACTOR SHALL CONDUCT AN OPERATING TEST FOR APPROVAL. EQUIPMENT SHALL BE DEMONSTRATED TO OPERATE IN ACCORDANCE WITH REQUIREMENTS OF SPECIFICATIONS. TEST SHALL BE PERFORMED IN PRESENCE OF ARCHITECT/ENGINEER OR HIS REPRESENTATIVE.

18. SHOP DRAWINGS

18.1 ALL DATA SHALL BE SUBMITTED AT ONE TIME, BOUND AND INDEXED IN AN ORDERLY MANNER. PRIOR TO STARTING THE WORK, SUBMIT TO THE ARCHITECT/ENGINEER FOR APPROVAL, SIX (6) SETS OF SHOP DRAWINGS OF SERVICE (S.E.S.), PANELS DISTRIBUTION SECTIONS, LIGHT FIXTURES, MOTOR CONTROL CENTERS, FIRE ALARM SYSTEM, DIMMERS, SOUND SYSTEM, EMERGENCY GENERATOR, DEVICES, TRANSFORMERS, LABELS AS REQUIRED BY 16000.22, AND ALL OTHER EQUIPMENT TO BE FABRICATED.

18.2 PROCURE SHOP DRAWINGS, WIRING DIAGRAMS, ETC., FROM OTHER TRADES INVOLVED WHERE SUCH DRAWINGS MAY FACILITATE AND EXPEDITE THE WORK. AIR CONDITIONING AND MECHANICAL EQUIPMENT SHALL BE WIRED COMPLETE AS PER MANUFACTURER'S WIRING DIAGRAMS FURNISHED BY THE AIR CONDITIONING AND MECHANICAL CONTRACTORS.

19. DRAWINGS OF RECORD (AS-BUILT)

AS-BUILT DRAWINGS SHALL BE SUBMITTED IN ACCORDANCE WITH AND IF REQUIRED BY DIVISION 1 – GENERAL REQUIREMENTS.

20. GUARANTEE

THE CONTRACTOR SHALL GUARANTEE ALL MATERIALS AND EQUIPMENT TO BE FREE FROM DEFECT OF MATERIAL AND WORKMANSHIP AND SHALL REPLACE OR REPAIR WITHOUT COST TO THE OWNER ALL DEFECTIVE MATERIAL AND WORKMANSHIP FOR A PERIOD OF ONE YEAR AFTER FINAL ACCEPTANCE.

21. INSTRUCTIONS

21.1 CONTRACTOR SHALL INSTRUCT THE OWNER IN THE PROPER OPERATING AND MAINTENANCE OF THE EQUIPMENT.

21.2 CONTRACTOR SHALL PROVIDE TWO (2) SETS OF OPERATING AND MAINTENANCE MANUALS FOR EACH PIECE OF EQUIPMENT PROVIDED BY THIS DISCIPLINE ONLY WHEN SUCH MANUALS ARE AVAILABLE FROM THE MANUFACTURER.

21.2.1 ALL MANUALS TO BE BOUND IN A 3-RING BINDER AND TABULATED IN AN ORDERLY MANNER.

22. LABELING

22.1 LABELS SHALL BE ENGRAVED, BLACK ON WHITE MELAMINE, PLASTIC LAMINATE, 1/16" MINIMUM THICKNESS FOR SIGNS UP TO 20 SQUARE INCHES OR 8 INCHES LONG; 1/8" THICK FOR LARGER SIZES. ENGRAVED LEGEND SHALL BE IN WHITE LETTERS ON BLACK FACE WITH MINIMUM 3/16" HIGH LETTERS. LABELS SHALL BE PUNCHED AND FASTENED TO EQUIPMENT WITH ALUMINUM RIVETS OR SELF TAPPING STAINLESS STEEL SCREWS OR NUMBER 10/32 STAINLESS STEEL MACHINE SCREWS WITH NUTS, FLAT AND LOCK WASHERS.

22.2 LABEL EQUIPMENT WITH NAME, AMPERAGE, VOLTAGE, PHASE, AND WRES (I.E. PANEL "A", 400A, 120/208V, 3 PHASE, 4W). SUBMIT LIST OF ALL LABELS WITH WORDING FOR REVIEW AS PER 16000.18.

22.3 EQUIPMENT TO BE LABELED SHALL INCLUDE SERVICE (S.E.S.) AND ALL OVERCURRENT DEVICES, DISTRIBUTION SECTIONS AND ALL OVERCURRENT DEVICES, MOTOR CONTROL CENTERS (M.C.C.) AND ALL OVERCURRENT DEVICES, FUSIBLE PANELBOARDS AND ALL OVERCURRENT DEVICES, PANELS, STARTERS AND TRANSFORMERS. LABEL OTHER EQUIPMENT AS NOTED ON PLANS.

ELECTRICAL NOTES/SPECIFICATIONS

GARDEN CREEK APARTMENTS

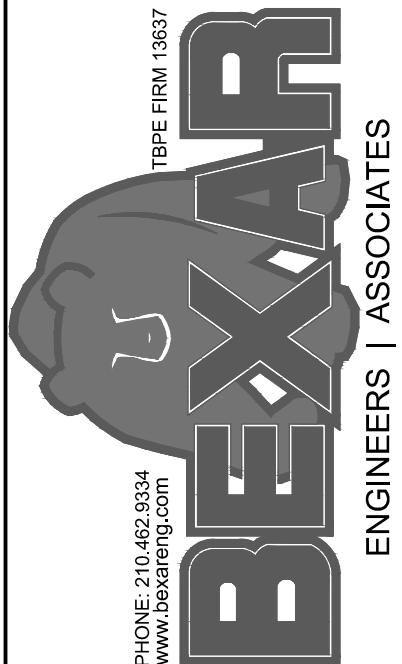
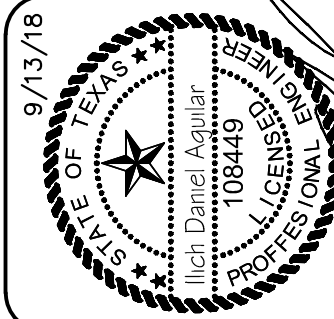
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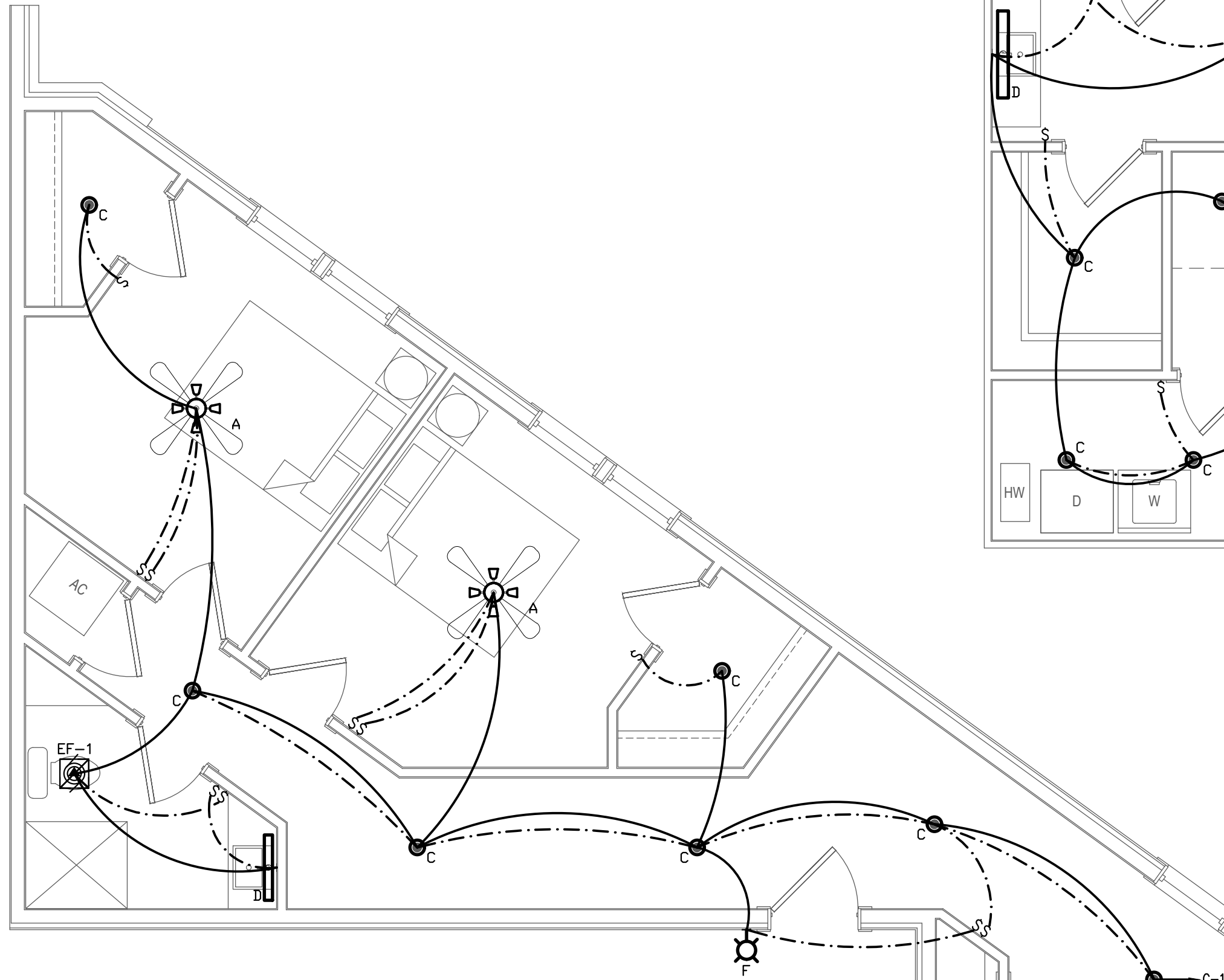
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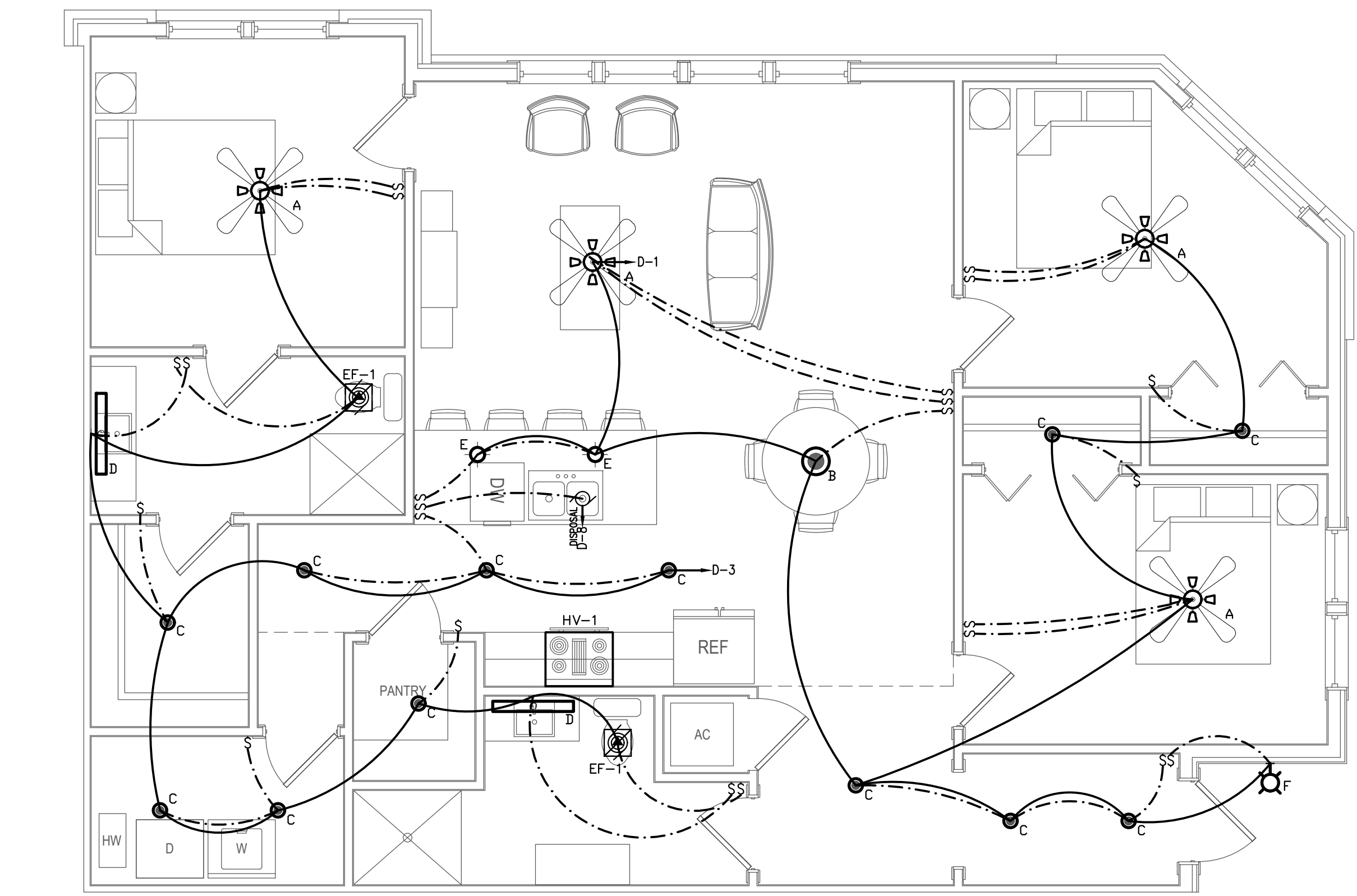


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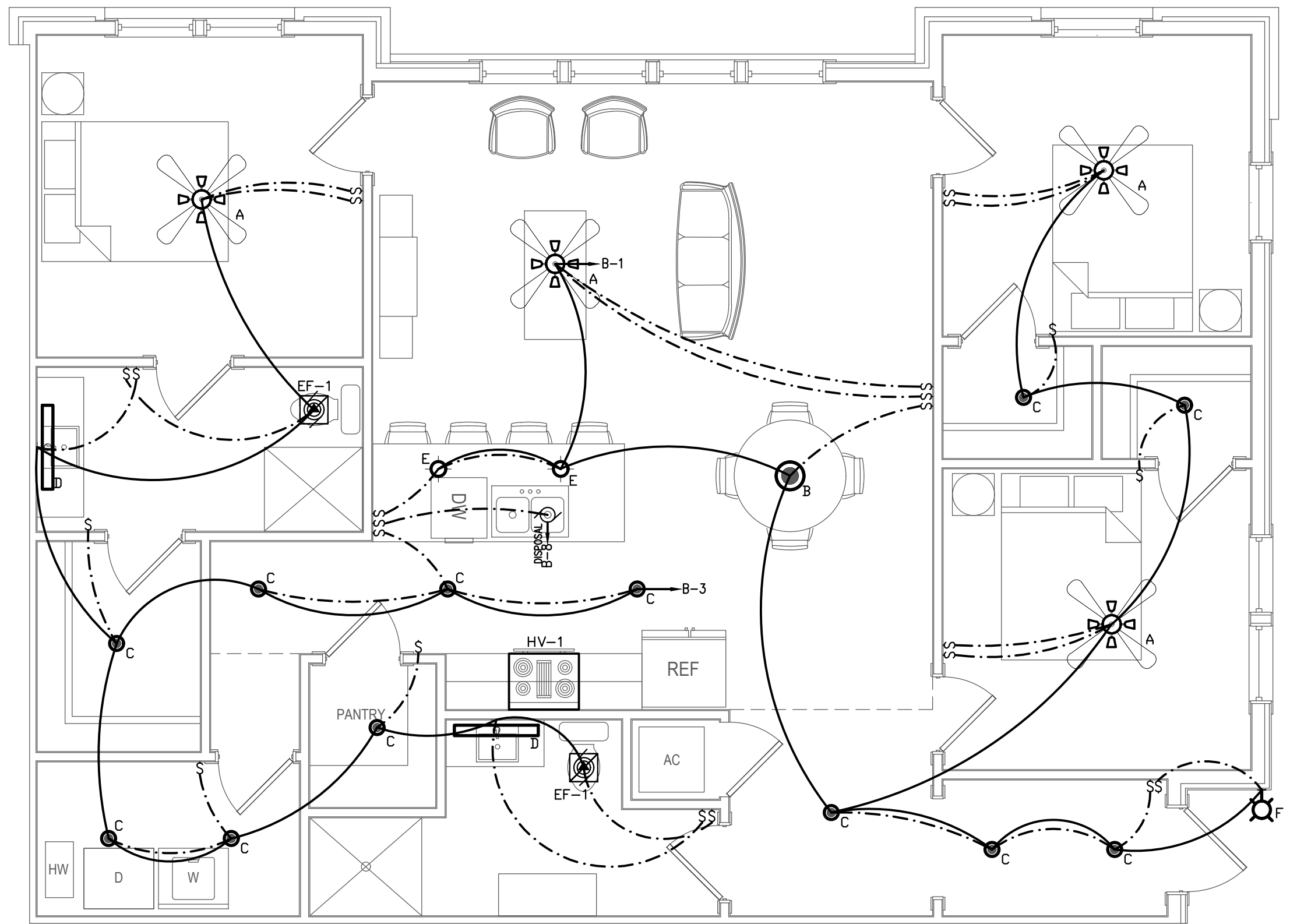
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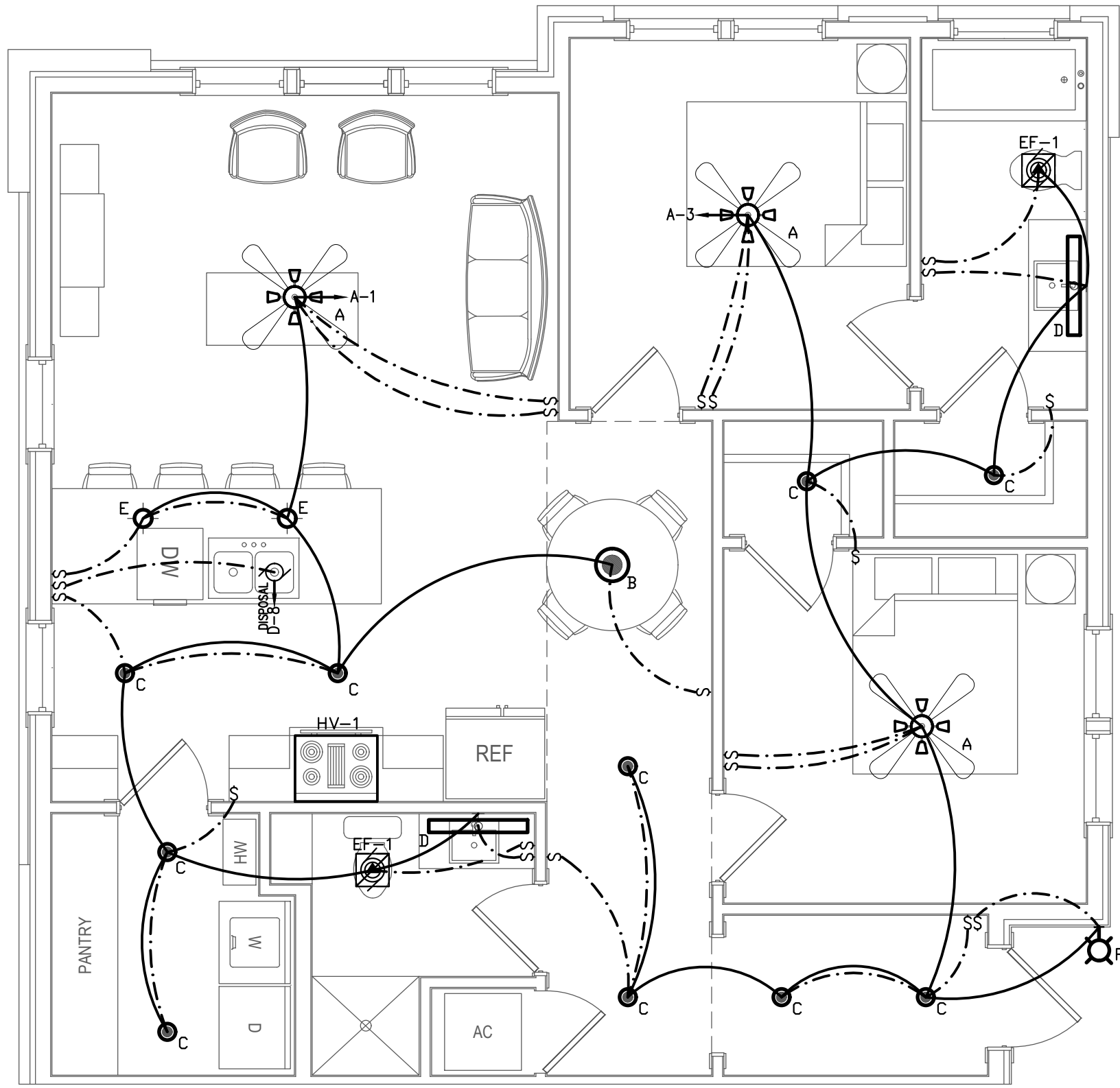
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4 UNIT D - LIGHTING PLAN
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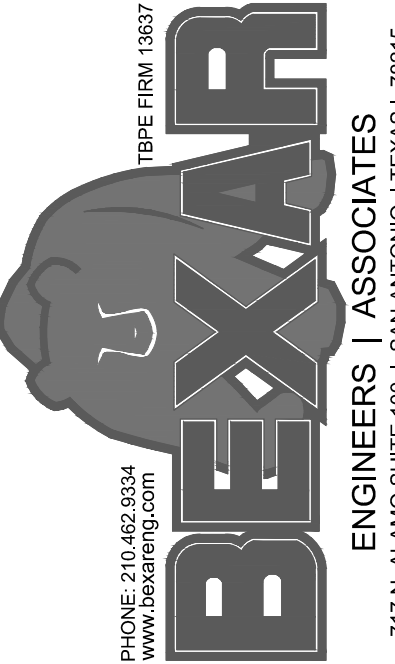
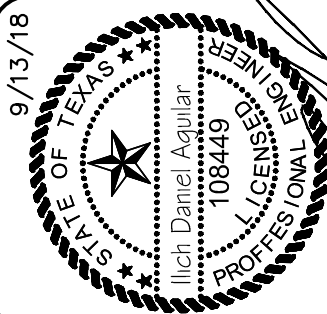
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BOERNE, TX 78006

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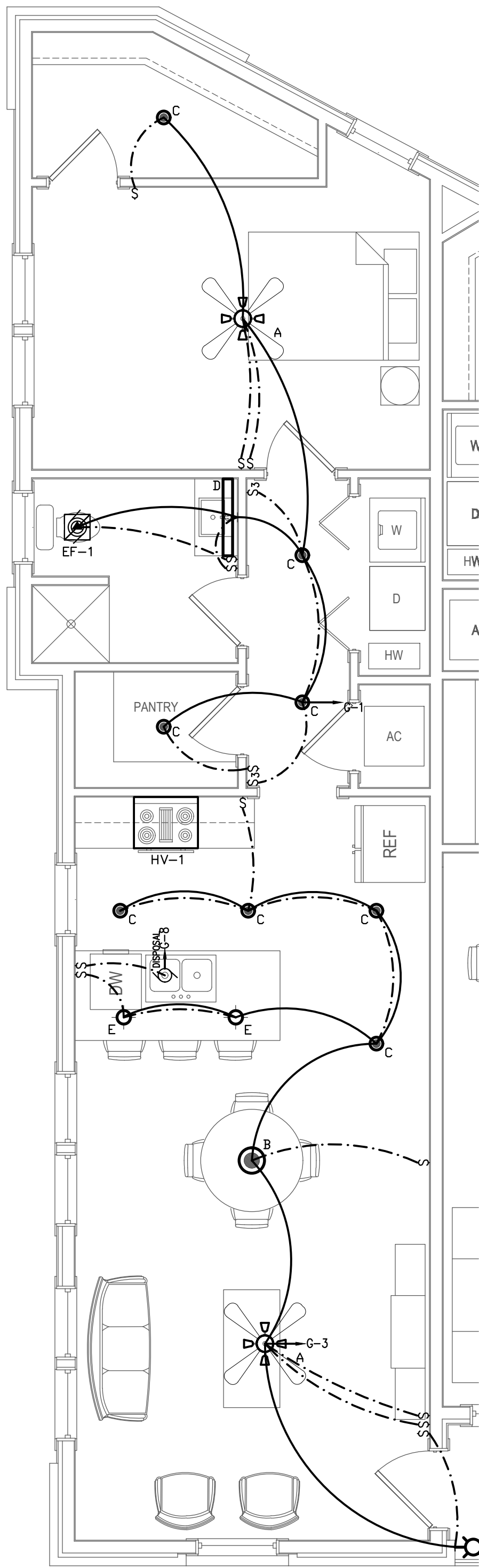
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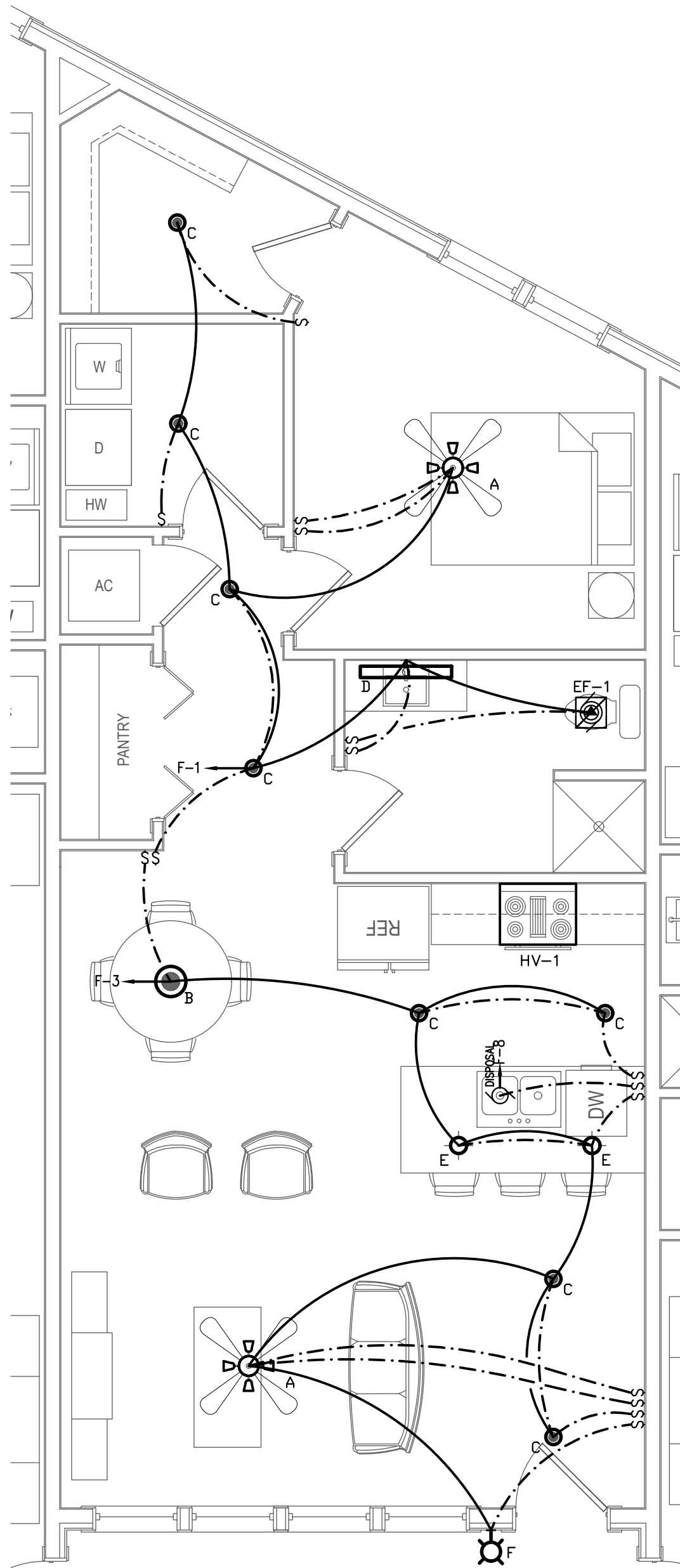
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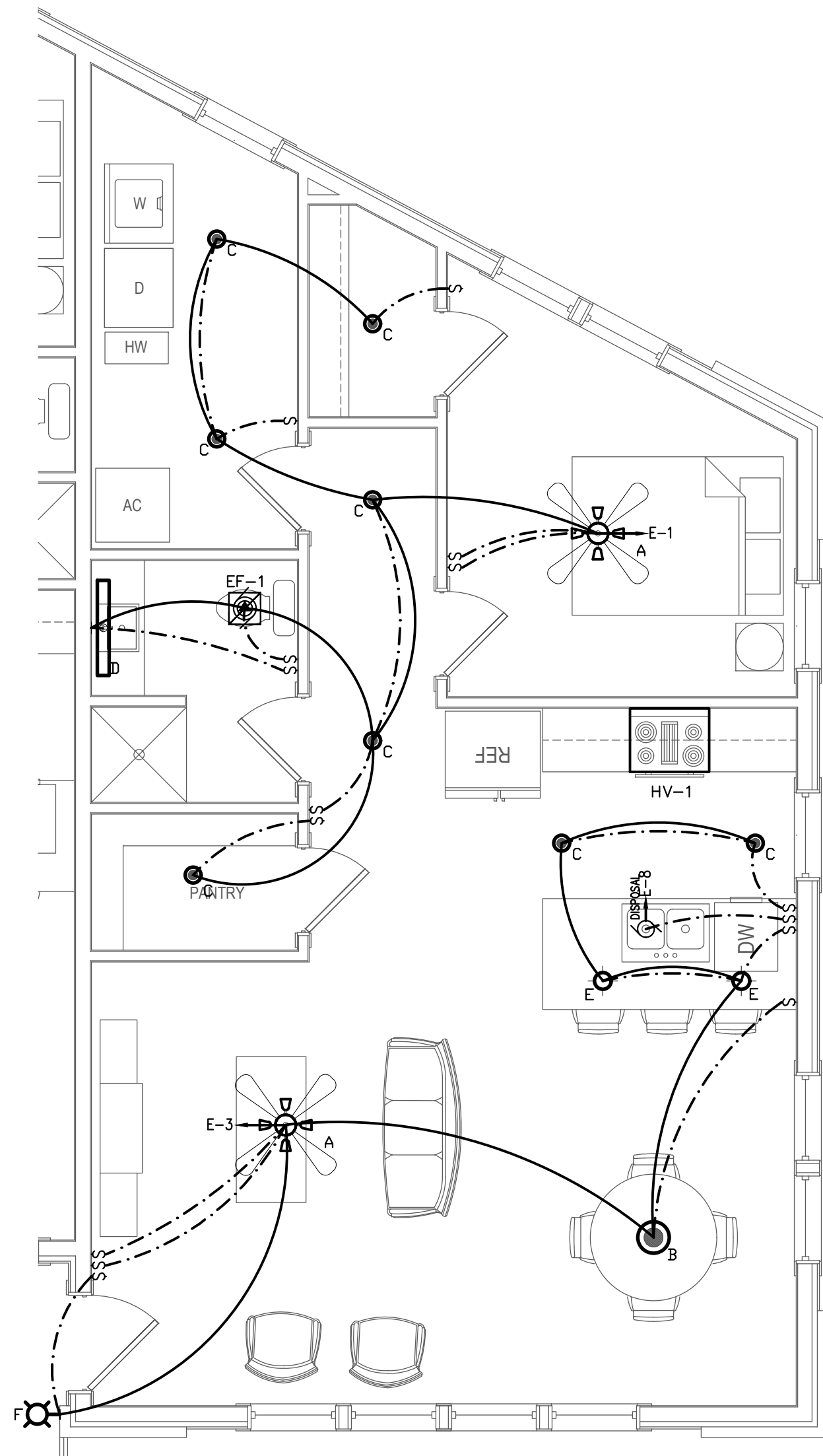
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6 UNIT F - LIGHTING PLAN
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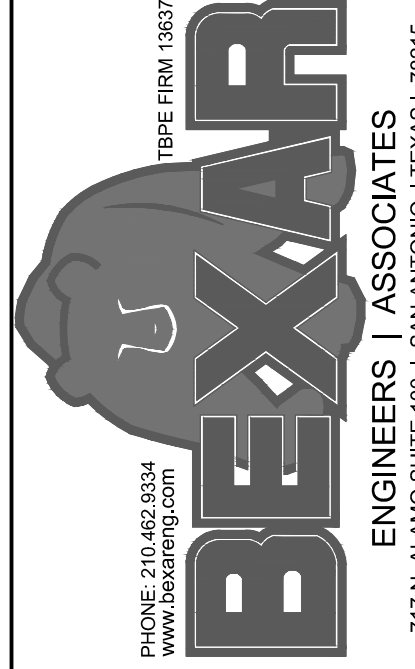
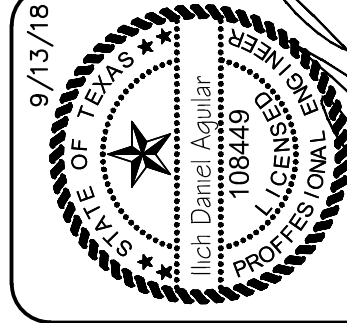
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GARDEN CREEK APARTMENTS
NEW BUILDING
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BOERNE, TX 78006

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DATE 9/13/18
JOB NO. 18161

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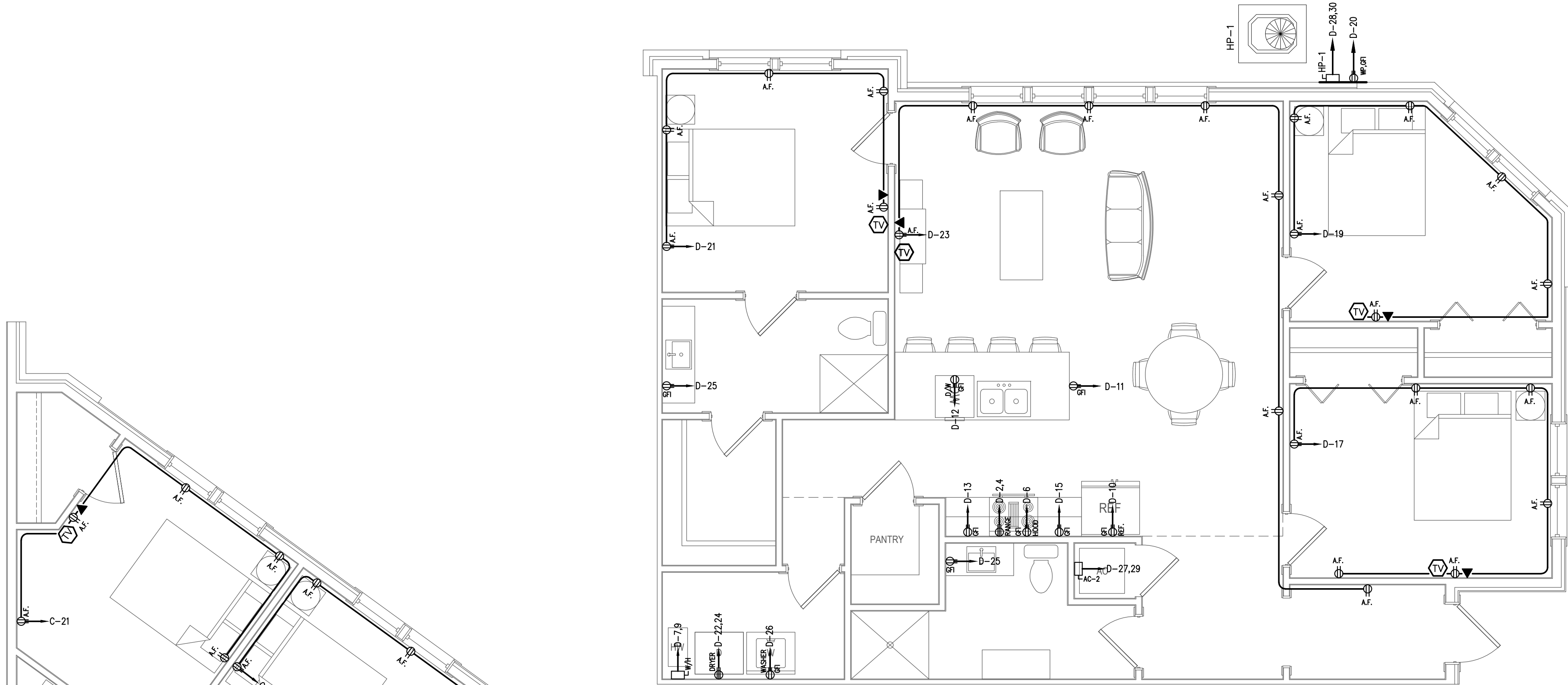
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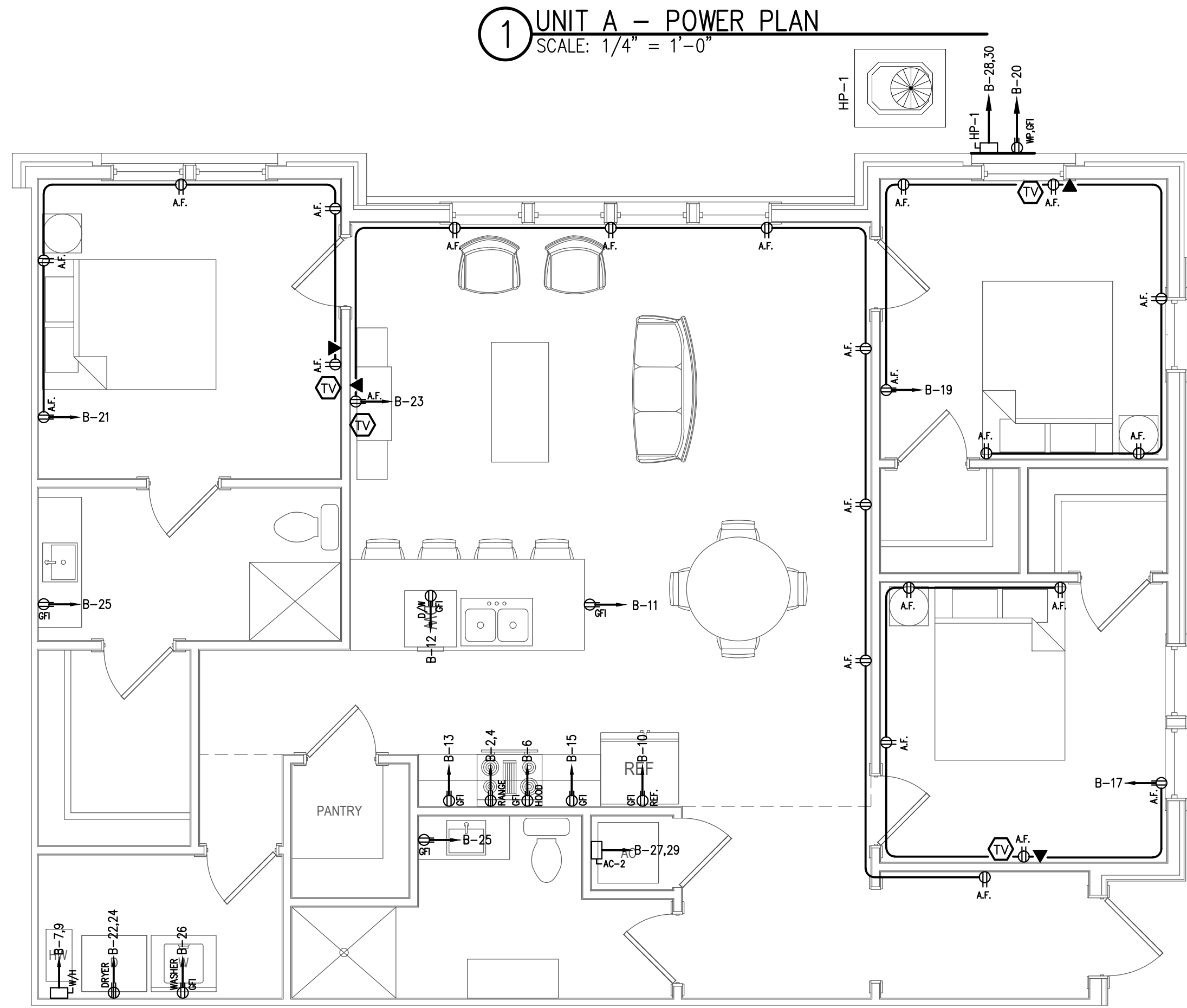
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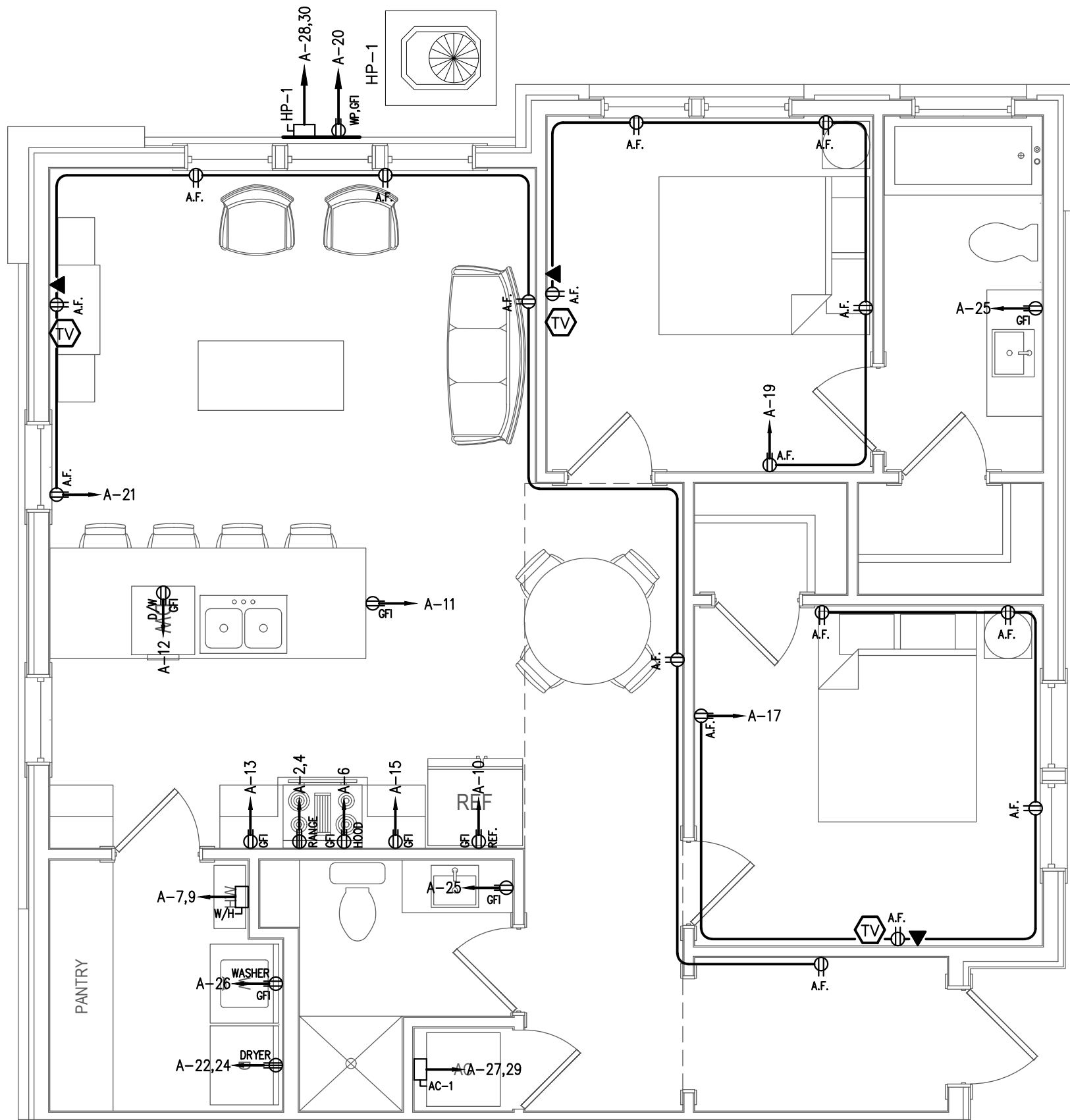
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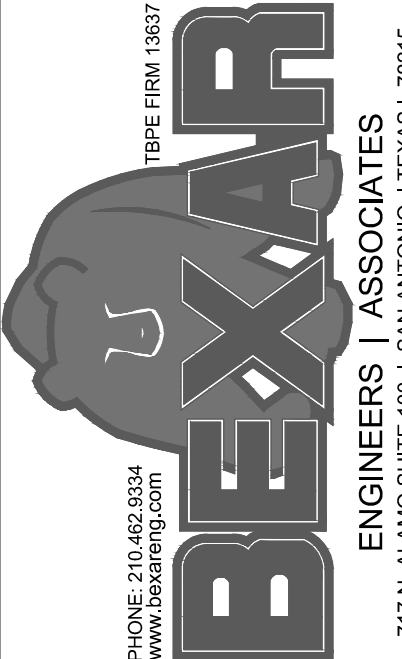
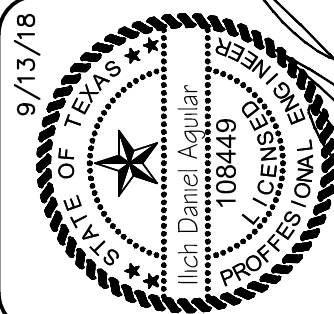


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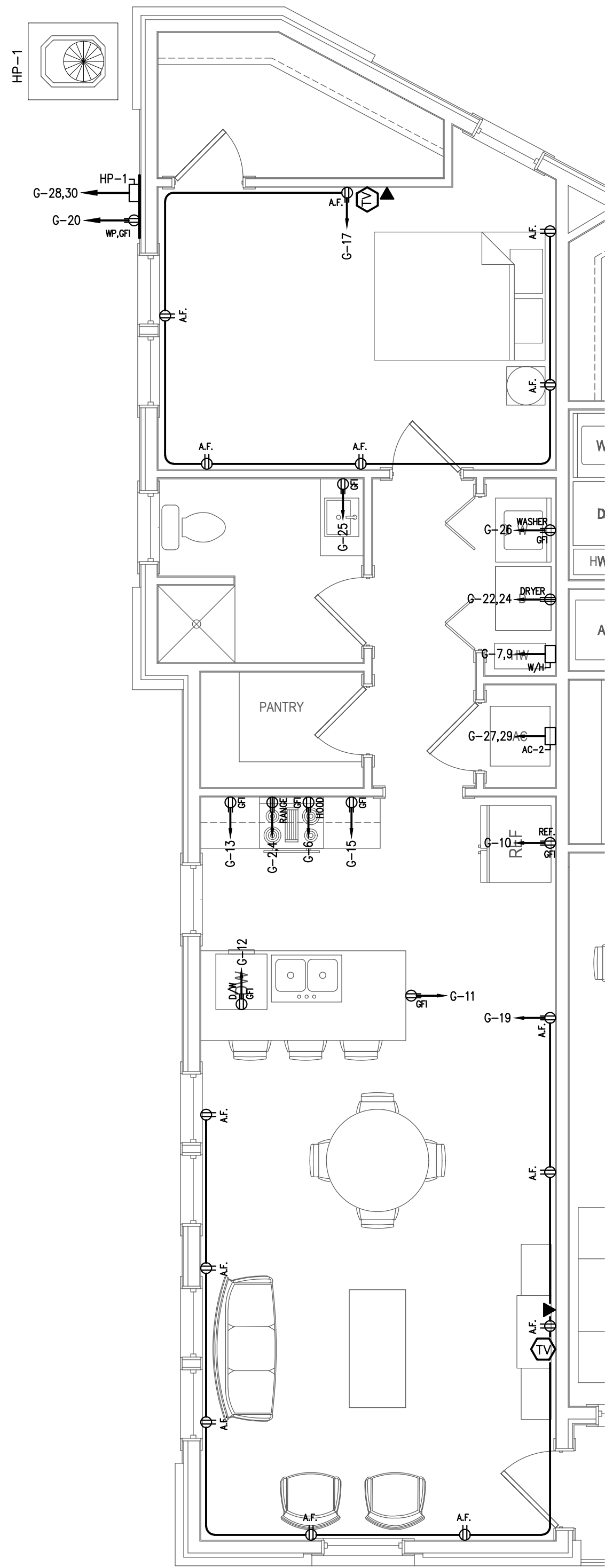
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GARDEN CREEK APARTMENTS
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BOERNE, TX 78006

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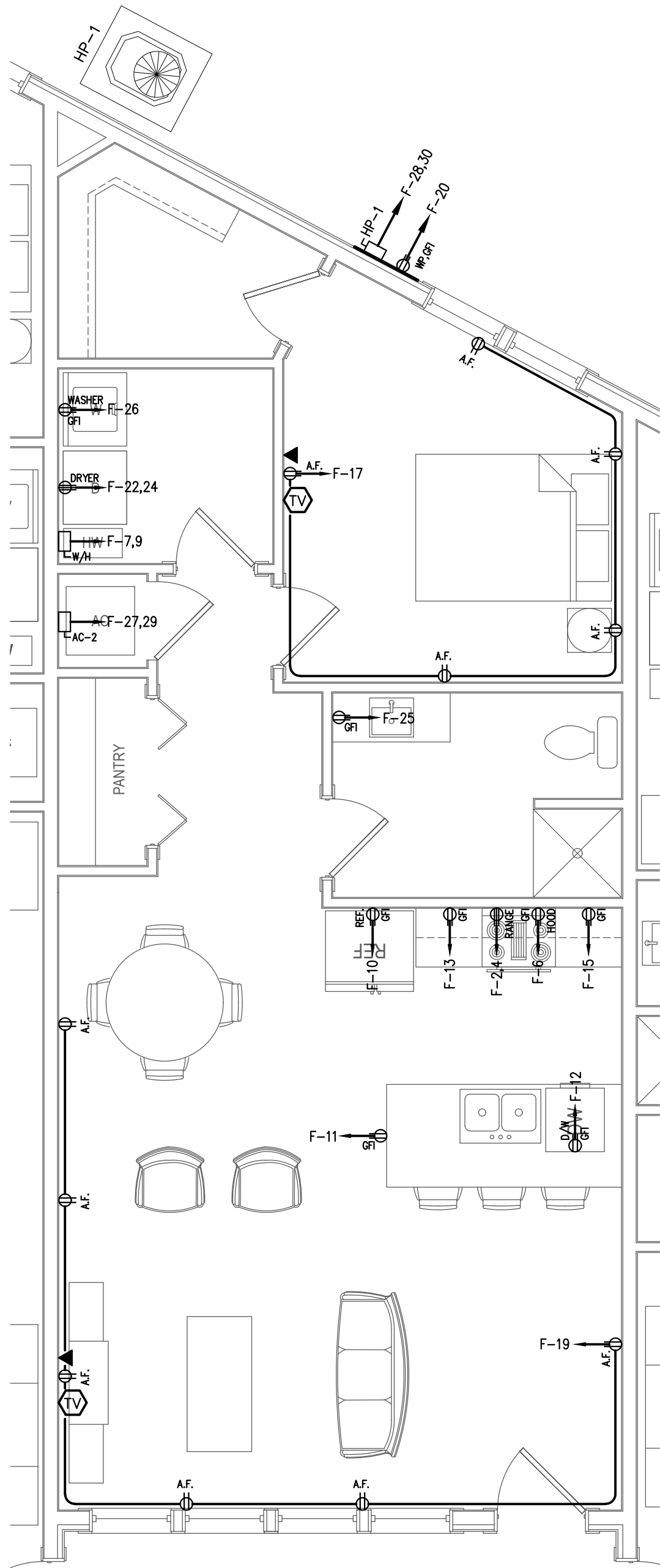
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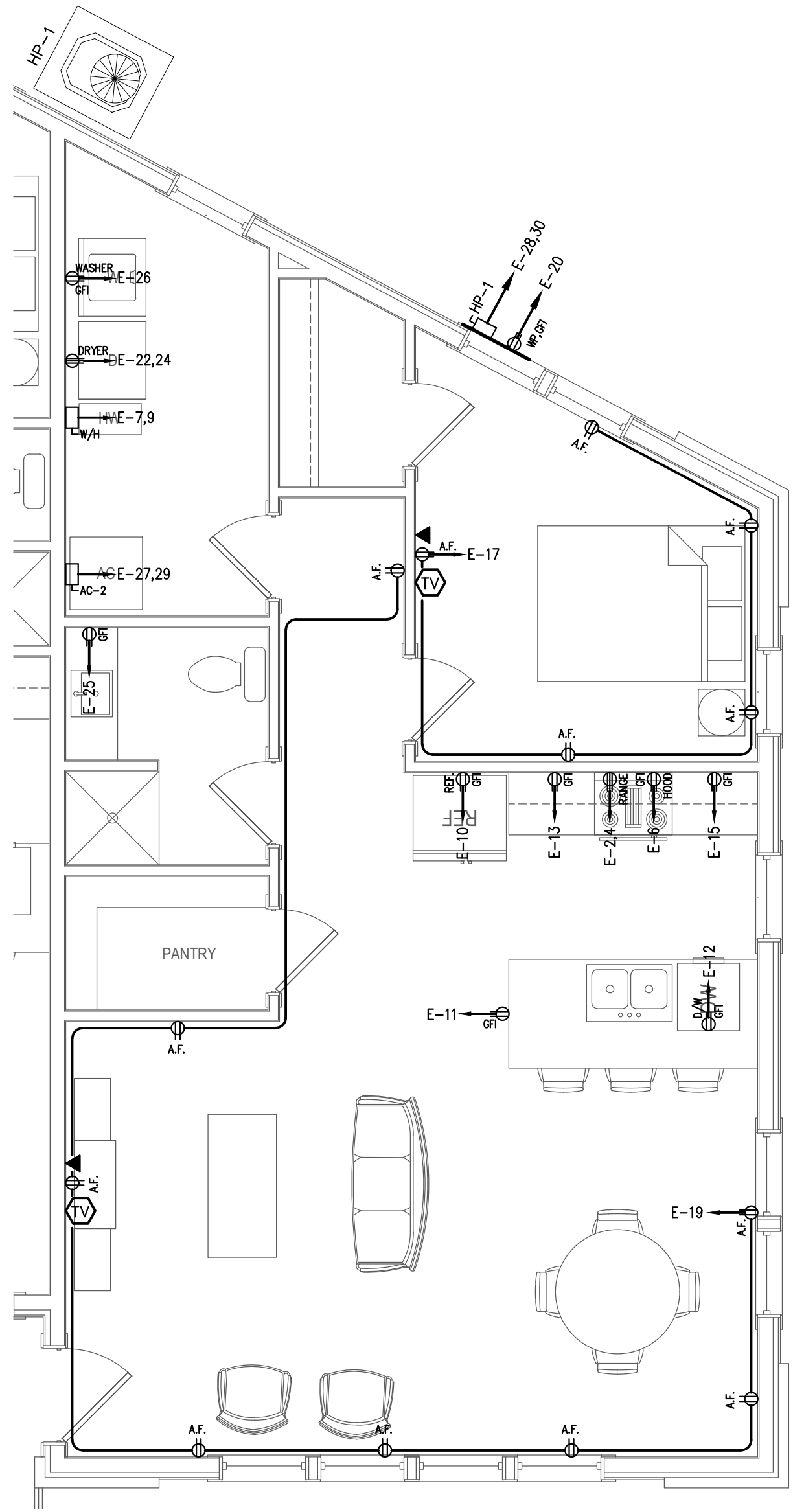
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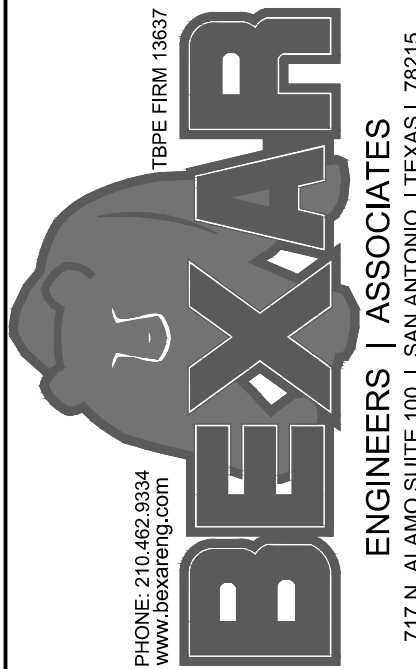
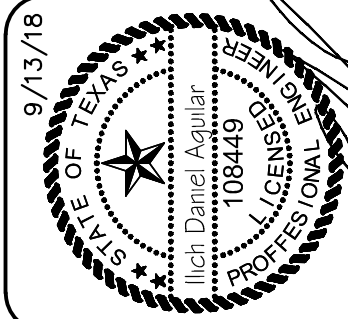


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POWER PLAN
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BOERNE, TX 78006



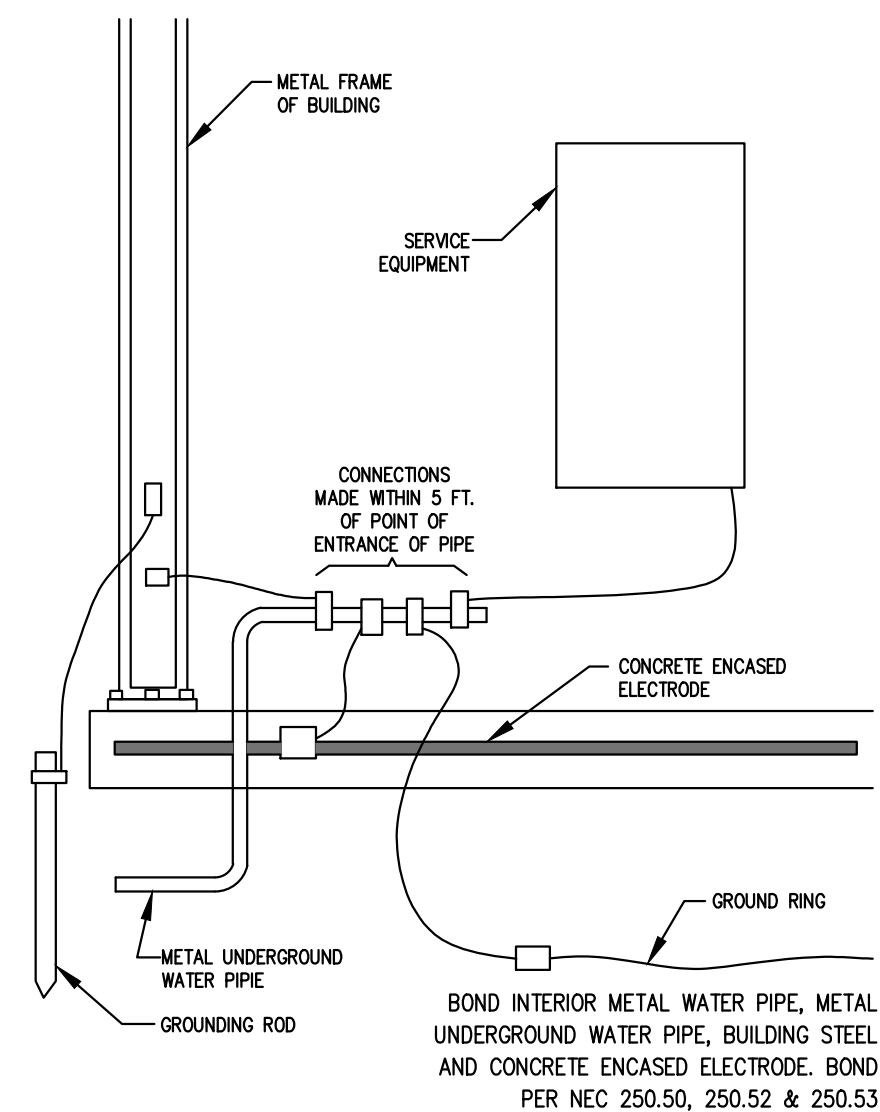
REVISIONS:
NO. DATE DESCRIPTION

SYMBOLS SCHEDULE

SYMBOL	DESCRIPTION
	FLUORESCENT LIGHTING FIXTURE, TO REMAIN.
	FLUORESCENT LIGHTING FIXTURE, TO BE RELOCATED.
	FLUORESCENT LIGHTING FIXTURE, RECESSED, RELOCATED OR NEW
	PENDANT LIGHT
	WALL MOUNTED COMPACT FLOURESCENT FIXTURE
	EXIT SIGN.
	EMERGENCY LIGHT WITH SELF-CONTAINED BATTERY.
	TELEPHONE OUTLET.
	S SINGLE POLE SWITCH, 20A, MTD AT 48" A.F.F. UNLESS NOTED.
	S ₂ 20 AMP, 120/277 VOLT DOUBLE POLE TOGGLE SWITCH.
	S ₃ 3-WAY SWITCH, 20A, MTD AT 48" A.F.F. UNLESS NOTED.
	Ⓛ DUPLEX RECEPTACLE 20 AMP, 125 VOLT, 2 POLE, 3 WIRE, GROUNDING TYPE.
	ⓁWP DUPLEX RECEPTACLE, 20 AMP, GROUNDING TYPE WEATHER PROOF.
	Ⓛ DUPLEX RECEPTACLE, 20 AMP GROUNDING TYPE, MOUNTED AT 18" A.F.F. BOTTOM HALF SWITCHED.
	Ⓛ Quadplex RECEPTACLE, 20 AMP, 125 VOLT, 2 POLE, 3WIRE, GROUNDING TYPE.
	Ⓛ 20 AMP, 250 VOLT 10 GROUNDED RECEPTACLE.
	PANELBOARD. SEE SCHEDULES.
	S SAFETY SWITCH NON-FUSED, WP INDICATES NEMA 3R.
	EF--# EXHAUST FAN.
	M MOTOR OUTLET.

ELECTRICAL SPECIFICATIONS

- Electrical work includes lighting fixtures, connections to new equipment and to Owner furnished equipment, electrical connection to heating, ventilating, and air conditioning equipment, switches, convenience outlets, wiring and conduit, emergency systems, empty conduit systems, and all other labor, supplies, materials, and hardware required to provide a complete and finished installation. The electrical contractor shall provide temporary electrical service to the project during construction.
- Service to the project shall be by means of a existing 120/208 volt, three phase, four-wire service.
- The contractor shall coordinate the location of all outlets with the Owner.
- All power wiring systems shall be installed in conduit. Conduit shall be run concealed where possible; the owner shall be consulted prior to installation of any conduit that will be exposed to public view at the completion of the project. Low voltage systems, such as thermostat wiring, may be installed without conduit if plenum-- grade conductor is utilized. Conduit types are as follows:
 - Conduit 2-1/2" and larger --- Intermediate Metal Conduit
 - Conduit 2" and smaller --- Electrical Metallic Tubing
 - Connections to motors and equipment --- Flexible Metal Conduit (Greenfield)
 - Flexible Metal Conduit may be used within walls as permitted by City Code.
 - Electrical Nonmetallic Tubing (ENT) may be used in applications where permitted by Code and by the City.
- Conduit and fittings must conform to ASA standards, and conduit size shall conform to National Electrical Code requirements for numbers of conductors.
- All wire and cable shall be copper wire conforming to Article 310 of the National Electrical Code for 600 volt wire. Minimum power wire size shall be #12. All conductors #8 AWG and larger shall be stranded. Insulation shall be THW or THHN. Wire size shall be increased to compensate for voltage drop as distance increases; voltage drop shall not exceed five percent.
- All splices shall be made in accessible junction boxes or outlet boxes sized in accordance with NEC requirements for the number and size of conductors. Splices shall be made with "Scotchlok" or equal connectors sized for the conductors served.
- Lighting fixtures, motors, safety switches, panelboards, and outlets shall be grounded using a green wire grounding system. All metallic conduit shall be bonded to the ground.
- Power panels used for branch circuit lighting and power loads shall be load center construction with thermal and magnetic type circuit breakers in the ratings scheduled. Panels shall be provided with concealed hinges and trim. All circuits shall be identified by means of typewritten index cards mounted on the interior of the doors. Circuit designations shall include room numbers. Panels shall be General Electric or equal.
- Switches and receptacles shall be as follows:
 - Single-pole switches: Leviton 1243-W
 - Three-way switches: Leviton 1244-W
 - Convenience outlets: Leviton 5014-SP
 - Ground-fault interrupters: Leviton 012-8598-00W
 - Heavy-duty outlets shall be as noted on the drawings or as required for the appliance being connected. All switches and outlets shall be provided with Sierra plastic smooth pattern plates. Provide appropriate plates for coaxial cable and telephone outlets. Switches shall be mounted to conform to ADA requirements.
- Lighting fixtures as scheduled shall be furnished and installed by the contractor. All fluorescent fixtures shall be provided with Class "P" type CBM ballasts having an "A" sound rating.
- The electrical contractor shall make all find connections to all items of equipment requiring power. For equipment connected by cord-and-plug, furnish and install properly sized cords, plugs, and caps.
- After all equipment is installed, test the entire system to verify that each circuit is free of short circuits or points of excessive resistance.



NOT ALL APPLICATIONS MAY APPLY

EXISTING GROUNDING SYSTEM DETAIL NOT TO SCALE

LIGHTING FIXTURE SCHEDULE

MARK	MANUFACTURER	MODEL	FIXTURE TYPE	NL	WATTS	TYPE	BALLAST	MOUNTING	REMARKS
A	G.C. PROVIDED	OWNER SELECTED	CETILING FAN	4	13	LED	ELEC.	SURFACE	
B	G.C. PROVIDED	OWNER SELECTED	DOWNLIGHT	1	26	LED	ELEC.	RECESSED	
C	G.C. PROVIDED	OWNER SELECTED	DOWNLIGHT	1	13	LED	ELEC.	RECESSED	
D	G.C. PROVIDED	OWNER SELECTED	WALL LIGHT	3	13	LED	ELEC.	SURFACE	
E	G.C. PROVIDED	OWNER SELECTED	CAN LIGHT	1	13	LED	ELEC.	SUSPENDED	
F	G.C. PROVIDED	OWNER SELECTED	EXTERIOR LIGHT	1	26	LED	ELEC.	SURFACE	
G	G.C. PROVIDED	OWNER SELECTED	8" STRIP	2	33	LED	ELEC.	SURFACE	
H	G.C. PROVIDED	OWNER SELECTED	AREA LIGHT	1	200	MH	ELEC.	WALL	
J	G.C. PROVIDED	OWNER SELECTED	POLE LIGHT	1	400	MH	ELEC.	POLE	

NOTES: (1) PROVIDE SAMPLES FOR OWNER APPROVAL PRIOR TO ORDER.
(2) LAMPS SHALL BE CONSISTENT WITH NATIONAL ENERGY POLICY PER DEADLINES IN EFFECT AT TIME DN CONSTRUCTION.

ELECTRICAL LOAD ANALYSIS 'A'

TOTAL SQ.FT.	947X3 VA	2,900 VA
APPLAANCE CIRCUITS	2X1,500 VA	3,000 VA
LAUNDRY CIRCUITS	1X1,500 VA	1,500 VA
RANGE	1X8,000 VA	8,000 VA
DRYER	1X5,000 VA	5,000 VA
WATER HEATER	1X2,000 VA	2,000 VA
DISH WASHER	1X1,200 VA	1,200 VA
TOTAL GENERAL LOAD		23,600 VA
1ST 10 KVA @ 100%		10,000 VA
REMAINDER @ 40%		5,440 VA
		15,440 VA

A/C LOAD	4,400X100%	4,400 VA
TOTAL KVA LOAD		19,840 VA
Ⓛ120/240		55.1 AMPS

ELECTRICAL LOAD ANALYSIS 'B'

TOTAL SQ.FT.	1316X3 VA	4,000 VA
APPLAANCE CIRCUITS	2X1,500 VA	3,000 VA
LAUNDRY CIRCUITS	1X1,500 VA	1,500 VA
RANGE	1X8,000 VA	8,000 VA
DRYER	1X5,000 VA	5,000 VA
WATER HEATER	1X2,000 VA	2,000 VA
DISH WASHER	1X1,200 VA	1,200 VA
TOTAL GENERAL LOAD		23,700 VA
1ST 10 KVA @ 100%		10,000 VA
REMAINDER @ 40%		5,480 VA
		15,480 VA

A/C LOAD	4,400X100%	4,400 VA
TOTAL KVA LOAD		19,880 VA
Ⓛ120/240		55.2 AMPS

ELECTRICAL LOAD ANALYSIS 'C'

TOTAL SQ.FT.	1367X3 VA	4,100 VA
APPLAANCE CIRCUITS	2X1,500 VA	3,000 VA
LAUNDRY CIRCUITS	1X1,500 VA	1,500 VA
RANGE	1X8,000 VA	8,000 VA
DRYER	1X5,000 VA	5,000 VA
WATER HEATER	1X2,000 VA	2,000 VA
DISH WASHER	1X1,200 VA	1,200 VA
TOTAL GENERAL LOAD		23,800 VA
1ST 10 KVA @ 100%		10,000 VA
REMAINDER @ 40%		5,520 VA
		15,520 VA

A/C LOAD	4,400X100%	4,400 VA
TOTAL KVA LOAD		19,920 VA
Ⓛ120/240		55.3 AMPS

ELECTRICAL LOAD ANALYSIS 'D'

TOTAL SQ.FT.	1334X3 VA	4,000 VA
APPLAANCE CIRCUITS	2X1,500 VA	3,000 VA
LAUNDRY CIRCUITS	1X1,500 VA	1,500 VA
RANGE	1X8,000 VA	8,000 VA
DRYER	1X5,000 VA	5,000 VA
WATER HEATER	1X2,000 VA	2,000 VA
DISH WASHER	1X1,200 VA	1,200 VA
TOTAL GENERAL LOAD		23,700 VA
1ST 10 KVA @ 100%		10,000 VA
REMAINDER @ 40%		5,480 VA
		15,480 VA

A/C LOAD	4,400X100%	4,400 VA
TOTAL KVA LOAD		19,880 VA
Ⓛ120/240		55.2 AMPS

ELECTRICAL LOAD ANALYSIS 'E'

TOTAL SQ.FT.	804X3 VA	2,400 VA
APPLAANCE CIRCUITS	2X1,500 VA	3,000 VA
LAUNDRY CIRCUITS	1X1,500 VA	1,500 VA
RANGE	1X8,000 VA	8,000 VA
DRYER	1X5,000 VA	5,000 VA
WATER HEATER	1X2,000 VA	2,000 VA
DISH WASHER	1X1,200 VA	1,200 VA
TOTAL GENERAL LOAD		23,100 VA
1ST 10 KVA @ 100%		10,000 VA
REMAINDER @ 40%		5,240 VA
		15,240 VA

A/C LOAD	4,400X100%	4,400 VA
TOTAL KVA LOAD		19,540 VA
Ⓛ120/240		54.5 AMPS

ELECTRICAL LOAD ANALYSIS 'F'

TOTAL SQ.FT.	811X3 VA	2,400 VA
APPLAANCE CIRCUITS	2X1,500 VA	3,000 VA
LAUNDRY CIRCUITS	1X1,500 VA	1,500 VA
RANGE	1X8,000 VA	8,000 VA
DRYER	1X5,000 VA	5,000 VA
WATER HEATER	1X2,000 VA	2,000 VA
DISH WASHER	1X1,200 VA	1,200 VA
TOTAL GENERAL LOAD		23,100 VA
1ST 10 KVA @ 100%		10,000 VA
REMAINDER @ 40%		5,280 VA
		15,280 VA

A/C LOAD	4,400X100%	4,400 VA
TOTAL KVA LOAD		19,680 VA
Ⓛ120/240		54.6 AMPS

ELECTRICAL LOAD ANALYSIS 'G'

TOTAL SQ.FT.	824X3 VA	2,500 VA
APPLAANCE CIRCUITS	2X1,500 VA	3,000 VA
LAUNDRY CIRCUITS	1X1,500 VA	1,500 VA
RANGE	1X8,000 VA	8,000 VA
DRYER	1X5,000 VA	5,000 VA
WATER HEATER	1X2,000 VA	2,000 VA
DISH WASHER	1X1,200 VA	1,200 VA
TOTAL GENERAL LOAD		23,200 VA
1ST 10 KVA @ 100%		10,000 VA
REMAINDER @ 40%		5,280 VA
		15,280 VA

A/C LOAD	4,400X100%	4,400 VA
TOTAL KVA LOAD		19,680 VA
Ⓛ120/240		54.6 AMPS

ELECTRICAL LOAD ANALYSIS 'H'

LIGHTING	1.0KVAx100%	1.0KVA
RECEPTACLES	1@ 0.36KVA	0.4KVA
TOTAL		1.4KVA
Ⓛ120/240		5.8AMPS

OVERALL ELECTRICAL LOAD ANALYSIS

PANEL 'A'	14 PANELS X 19.7 KVA	275.8KVA
PANEL 'H'		1.4KVA
TOTAL		277.2KVA
Ⓛ120/240		1155.0AMPS

PANELBOARD SCHEDULE

PANEL:	VOLTS 120/240 PHASE 2 AMPS 100 ENCLOSURE NEMA-1	WIRE 4 MARE 100 MLD ER-10000	MOUNTED FLUSH FEED TOP CIRCUITS 30	WIRE SIZE SEE GROUND RISE INSULATION DIAGRAM CONDUIT:	DESCRIPTION
A	BREAKER	RUN	CONNECTED KVA PER PHASE	RUN	BREAKER
1	DESCRIPTION	VOLT A P G C	A PHASE B PHASE C G P A	VOLT	DESCRIPTION
1	LIGHTS	120 20 1 1/2 1/2	1.0	1.0	3/4 10 2 30 208 RANGE
3	LIGHTS	120 20 1 1/2 1/2	1.0	1.0	3/4 10 2 30 208 RANGE
5					
7	WATER HEATER	208 30 2 10 3/4	1.0	1.0	1/2 12 1 20 120 HOOD
9					
11	GF1	120 20 1 1/2 1/2	0.2	1.0	1/2 12 1 20 120 DISHWASHER
13	GF1	120 20 1 1/2 1/2	0.2	1.0	1/2 12 1 20 120 DISHWASHER
15	GF1	120 20 1 1/2 1/2	0.2	1.0	1/2 12 1 20 120 DISHWASHER
17	SCD	120 20 1 1/2 1/2	1.0	1.0	1/2 12 1 20 120 DISHWASHER
19	SCD	120 20 1 1/2 1/2	1.0	1.0	1/2 12 1 20 120 DISHWASHER
21	7CD	120 20 1 1/2 1/2	1.4	1.0	3/4 10 2 30 208 DRYER
23					
25	2GF1	120 20 1 1/2 1/2	0.4	1.0	1/2 12 1 20 120 WASHER
27	AC-1	208 20 2 12 1/2	0.7	1.5	1/2 12 2 20 208 HP-1
29					

Q: WIRE GAUGE BASED ON THW COPPER
C: CONDUIT SIZE
R: SEE "RISER DIAGRAM"
IER: INTEGRATED EQUIPMENT RATING

PANELBOARD SCHEDULE

PANEL:	VOLTS 120/240 PHASE 2 AMPS 100 ENCLOSURE NEMA-1	WIRE 4 MARE 100 MLD ER-10000	MOUNTED FLUSH FEED TOP CIRCUITS 30	WIRE SIZE SEE GROUND RISE INSULATION DIAGRAM CONDUIT:	DESCRIPTION
B	BREAKER	RUN	CONNECTED KVA PER PHASE	RUN	BREAKER
1	DESCRIPTION	VOLT A P G C	A PHASE B PHASE C G P A	VOLT	DESCRIPTION
1	LIGHTS	120 20 1 1/2 1/2	1.0	1.0	3/4 10 2 30 208 RANGE
3	LIGHTS	120 20 1 1/2 1/2	1.0	1.0	3/4 10 2 30 208 RANGE
5					
7	WATER HEATER	208 30 2 10 3/4	1.0	1.0	1/2 12 1 20 120 HOOD
9					
11	GF1	120 20 1 1/2 1/2	0.2	1.0	1/2 12 1 20 120 DISHWASHER
13	GF1	120 20 1 1/2 1/2	0.2	1.0	1/2 12 1 20 120 DISHWASHER
15	GF1	120 20 1 1/2 1/2	0.2	1.0	1/2 12 1 20 120 DISHWASHER
17	SCD	120 20 1 1/2 1/2	1.0	1.0	1/2 12 1 20 120 DISHWASHER
19	6CD	120 20 1 1/2 1/2	1.2	0.2	1/2 12 1 20 120 SERVICE(CCD)
21	SCD	120 20 1 1/2 1/2	1.0	1.0	3/4 10 2 30 208 DRYER
23	BCD	120 20 1 1/2 1/2	1.6	1.0	3/4 10 2 30 208 DRYER
25	2GF1	120 20 1 1/2 1/2	0.4	1.0	1/2 12 1 20 120 WASHER
27	AC-2	208 20 2 12 1/2	0.7	1.5	1/2 12 2 20 208 HP-1
29					

Q: WIRE GAUGE BASED ON THW COPPER
C: CONDUIT SIZE
R: SEE "RISER DIAGRAM"
IER: INTEGRATED EQUIPMENT RATING

PANELBOARD SCHEDULE

PANEL:	VOLTS 120/240 PHASE 2 AMPS 100 ENCLOSURE NEMA-1	WIRE 4 MARE 100 MLD ER-10000	MOUNTED FLUSH FEED TOP CIRCUITS 30	WIRE SIZE SEE GROUND RISE INSULATION DIAGRAM CONDUIT:	DESCRIPTION
C	BREAKER	RUN	CONNECTED KVA PER PHASE	RUN	BREAKER
1	DESCRIPTION	VOLT A P G C	A PHASE B PHASE C G P A	VOLT	DESCRIPTION
1	LIGHTS	120 20 1 1/2 1/2	1.0	1.0	3/4 10 2 30 208 RANGE
3	LIGHTS	120 20 1 1/2 1/2	1.0	1.0	3/4 10 2 30 208 RANGE
5					
7	WATER HEATER	208 30 2 10 3/4	1.0	1.0	1/2 12 1 20 120 HOOD
9					
11	GF1	120 20 1 1/2 1/2	0.2	1.0	1/2 12 1 20 120 DISHWASHER
13	GF1	120 20 1 1/2 1/2	0.2	1.0	1/2 12 1 20 120 DISHWASHER
15	GF1	120 20 1 1/2 1/2	0.2	1.0	1/2 12 1 20 120 DISHWASHER
17	SCD	120 20 1 1/2 1/2	1.0	1.0	1/2 12 1 20 120 DISHWASHER
19	SCD	120 20 1 1/2 1/2	1.0	0.2	1/2 12 1 20 120 SERVICE(CCD)
21	SCD	120 20 1 1/2 1/2	1.0	1.0	3/4 10 2 30 208 DRYER
23	BCD	120 20 1 1/2 1/2	1.6	1.0	3/4 10 2 30 208 DRYER
25	2GF1, 4CD	120 20 1 1/2 1/2	1.2	1.0	1/2 12 1 20 120 WASHER
27	AC-2	208 20 2 12 1/2	0.7	1.5	1/2 12 2 20 208 HP-1
29					

Q: WIRE GAUGE BASED ON THW COPPER
C: CONDUIT SIZE
R: SEE "RISER DIAGRAM"
IER: INTEGRATED EQUIPMENT RATING

PANELBOARD SCHEDULE

PANEL:		VOLTS 120/240 PHASE 2 AMPS 100 ENCLOSURE NEMA-1				WIRE 4 MAIN 100 MLD ER-10000		MOUNTED FLUSH FEED TOP CIRCUITS 30		WIRE SIZE SEE GROUND RISE INSULATION DIAGRAM CONDUIT:					
D		BREAKER		RUN		CONNECTED KVA PER PHASE		RUN		BREAKER					
CCT	DESCRIPTION	VOLT	A	P	G	C	A PHASE	B PHASE	C	G	P A	VOLT	DESCRIPTION	CCT	
1	LIGHTS	120	20	1	1/2	1/2	1.0		1.0	3/4	10	2 30	RANGE	2	
3	LIGHTS	120	20	1	1/2	1/2	1.0		1.0					4	
5								0.2	1/2	1/2	12	1 20	HOOD	6	
7	WATER HEATER	208	30	2	10	3/4	1.0	1.0	1/2	1/2	12	1 20	DISPOSER	8	
9								1.0	1/2	1/2	12	1 20	REFRIGERATOR	10	
11	GF1	120	20	1	1/2	1/2	0.2	0.2	1/2	1/2	12	1 20	DISHWASHER	12	
13	GF1	120	20	1	1/2	1/2	0.2							14	
15	GF1	120	20	1	1/2	1/2	0.2							16	
17	600	120	20	1	1/2	1/2	1.3							18	
19	600	120	20	1	1/2	1/2	1.2	0.2	1/2	1/2	12	1 20	SERVICE CDD	20	
21	7CD	120	20	1	1/2	1/2	1.0	1.0	3/4	10	2 30	208	DRYER	22	
23	5CD	120	20	1	1/2	1/2	1.4	1.0						24	
25	WPT1	120	20	1	1/2	1/2	0.4	0.4	1/2	1/2	12	1 20	WASHER	26	
27	AC-2	208	20	2	1/2	1/2	0.7		1.0	1/2	1/2	12	2 208	HP-1	28
29	*						1.5	0.7						30	
G: WIRE GAUGE BASED ON THIR COPPER C: CONDUIT SIZE S: SEE "RISER DIAGRAM" IR: INTEGRATED EQUIPMENT RATING							A: 12.0		B: 10.6		TOTAL: 22.6 KVA				

Date: Sep 13, 2018, 3:46pm User ID: DANIEL
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ELECTRICAL LOAD ANALYSIS "H1A"			
LIGHTING	5.0KVx100%	5.0KVA	
RECEPTACLES	7@ 0.18KVA	1.3KVA	
TOTAL		6.3KVA	
@120/240		18.5AMPS	

OVERALL ELECTRICAL LOAD ANALYSIS "A1"			
PANEL "A"	18 PANELS X 21.2 KVA	381.6KVA	
PANEL "B"	3 PANELS X 22.6 KVA	67.8KVA	
PANEL "D"	3 PANELS X 22.6 KVA	67.8KVA	
PANEL "H1A"		6.3KVA	
TOTAL		523.5KVA	
@120/240		1539.7AMPS	

ELECTRICAL LOAD ANALYSIS "H1B"			
LIGHTING	5.0KVx100%	5.0KVA	
RECEPTACLES	7@ 0.18KVA	1.3KVA	
TOTAL		6.3KVA	
@120/240		18.5AMPS	

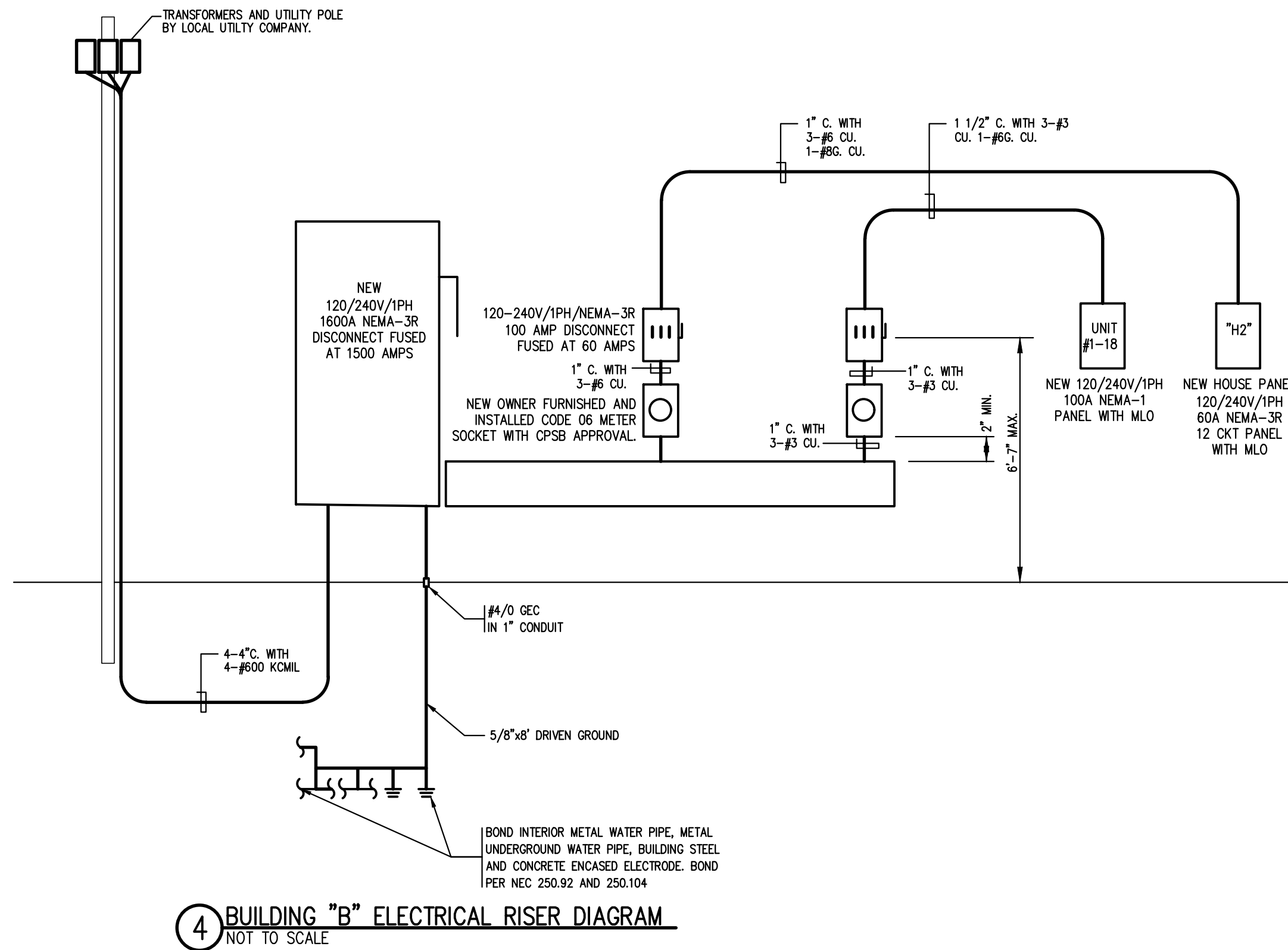
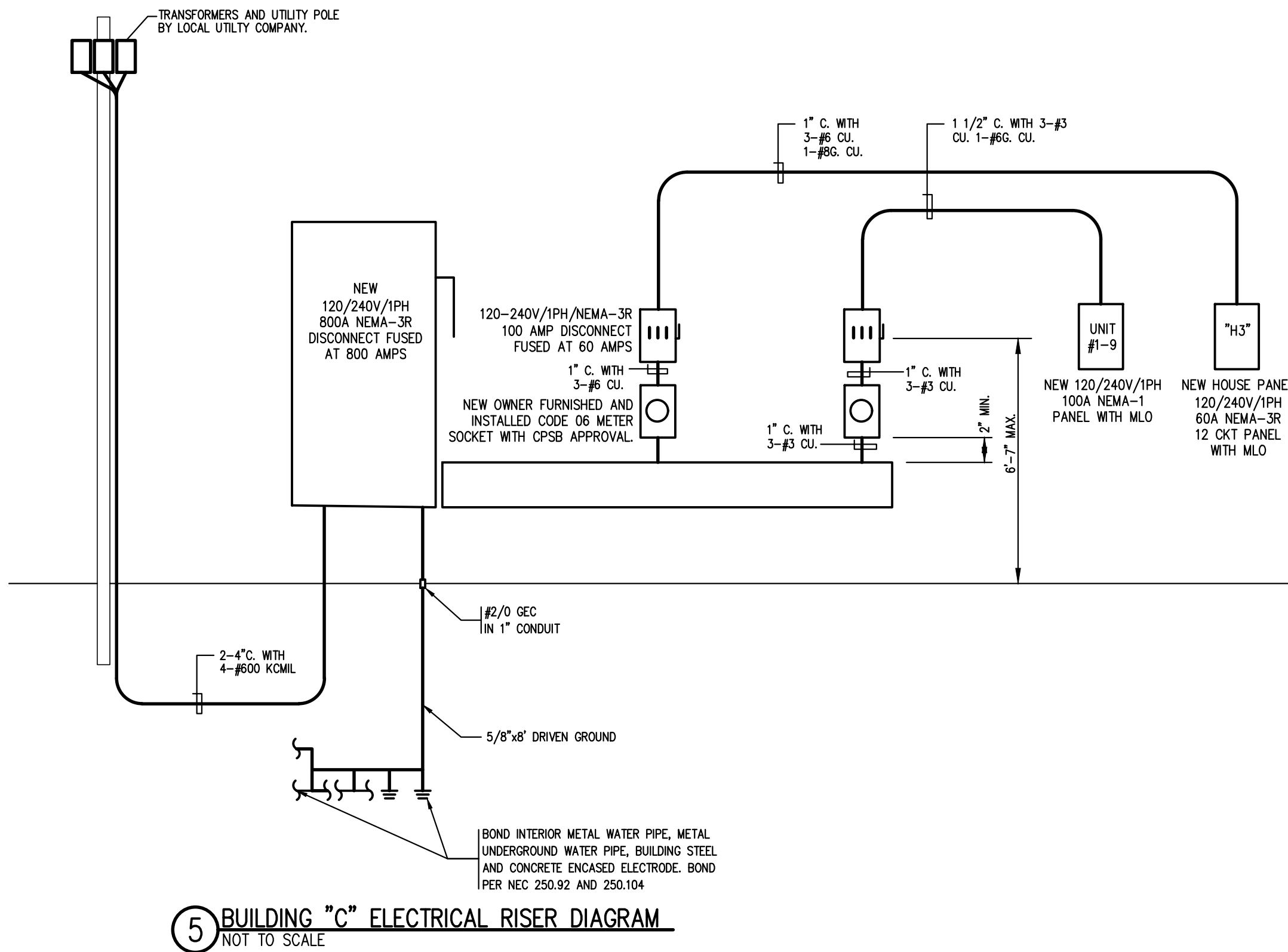
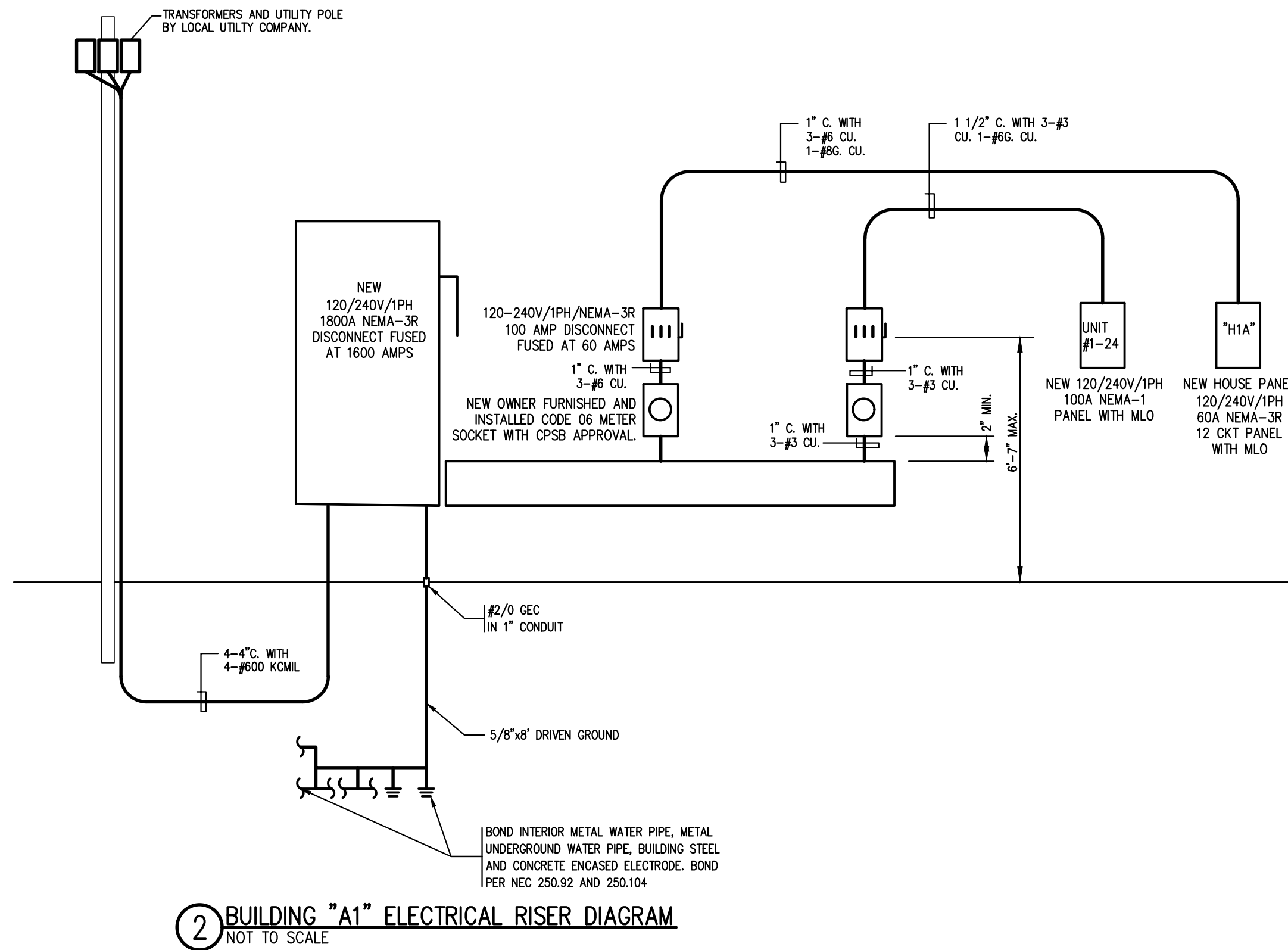
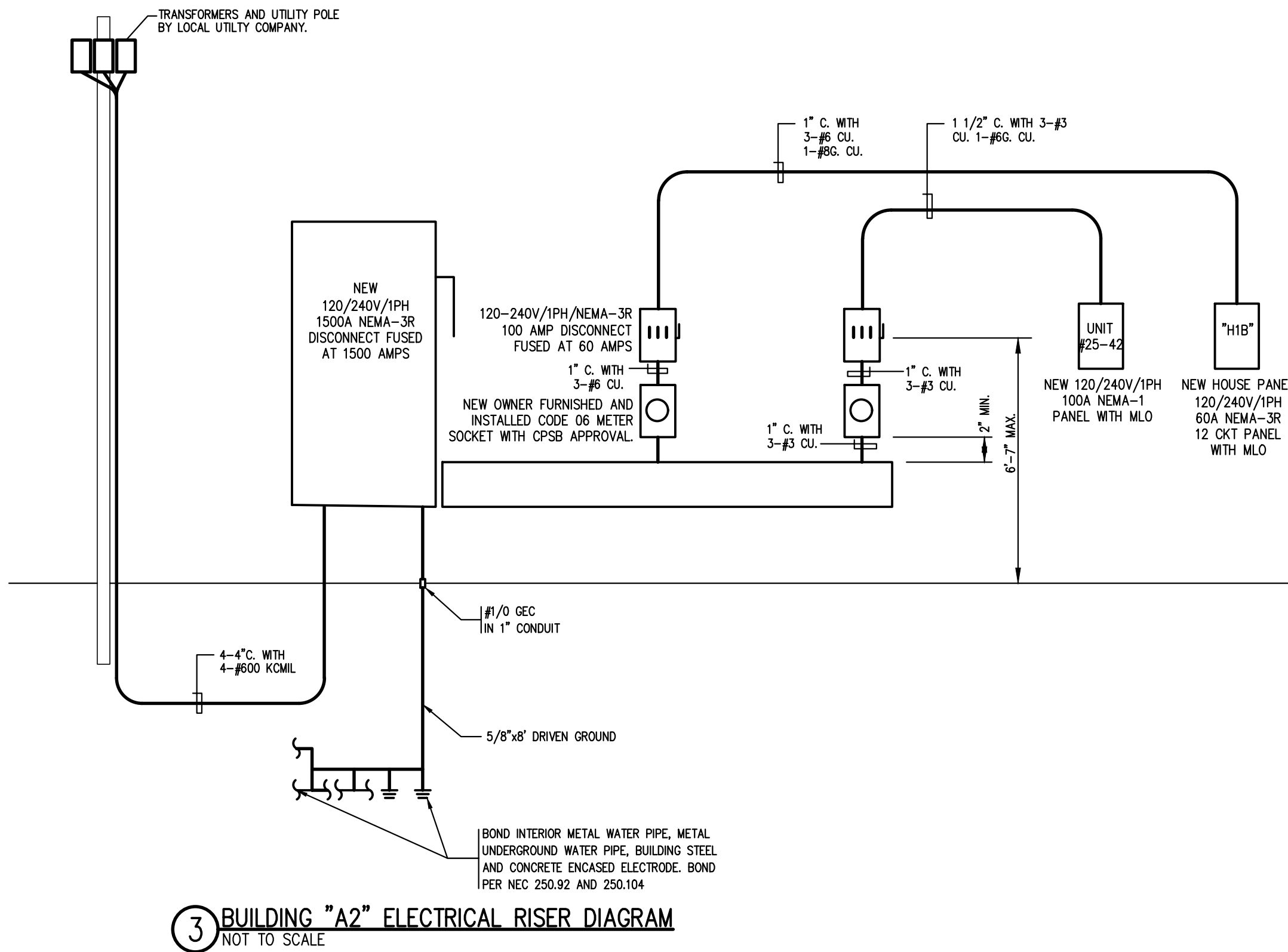
OVERALL ELECTRICAL LOAD ANALYSIS BUILDING "A2"			
PANEL "A"	18 PANELS X 21.2 KVA	381.6KVA	
PANEL "H1B"		6.3KVA	
TOTAL		387.9KVA	
@120/240		1140.9AMPS	

ELECTRICAL LOAD ANALYSIS "H2"			
LIGHTING	4.6KVx100%	4.6KVA	
RECEPTACLES	3@ 0.18KVA	0.5KVA	
TOTAL		5.1KVA	
@120/240		15.0AMPS	

OVERALL ELECTRICAL LOAD ANALYSIS BUILDING "B"			
PANEL "A"	12 PANELS X 21.2 KVA	254.4KVA	
PANEL "B"	3 PANELS X 22.6 KVA	67.8KVA	
PANEL "C"	3 PANELS X 23.2 KVA	69.6KVA	
PANEL "H2"		5.1KVA	
TOTAL		396.9KVA	
@120/240		1167.4AMPS	

ELECTRICAL LOAD ANALYSIS "H3"			
LIGHTING	1.6KVx100%	1.6KVA	
RECEPTACLES	3@ 0.18KVA	0.5KVA	
TOTAL		2.1KVA	
@120/240		6.2AMPS	

OVERALL ELECTRICAL LOAD ANALYSIS BUILDING "C"			
PANEL "E"	3 PANELS X 20.4 KVA	61.2KVA	
PANEL "F"	3 PANELS X 19.8 KVA	59.4KVA	
PANEL "G"	3 PANELS X 20.2 KVA	60.6KVA	
PANEL "H3"		2.1KVA	
TOTAL		183.3KVA	
@120/240		539.1AMPS	

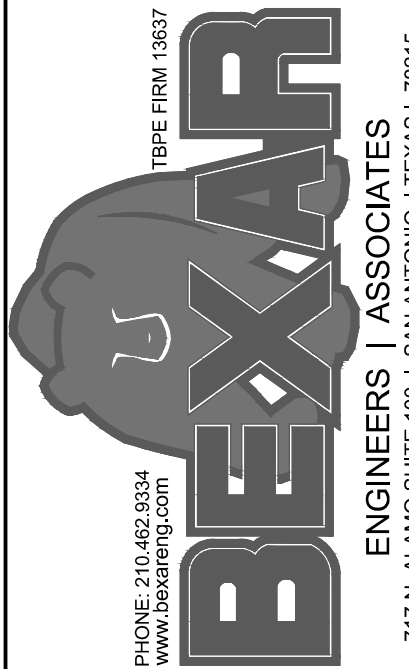
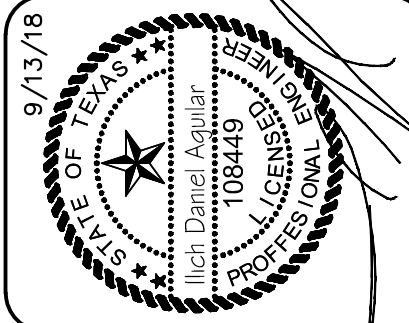


LIGHTING/POWER PLAN

GARDEN CREEK APARTMENTS
NEW BUILDING
110 BLUEBONNET CIRCLE
BOERNE, TX 78006

DESIGN RL
DRAWN RL
CHECKED DA
DATE 9/13/18
JOB NO. 18161
SHEET

E-6
7 OF 7



REVISIONS:
NO. DATE DESCRIPTION

PLUMBING SYSTEM SPECIFICATIONS

I. GENERAL

1.1 THE GENERAL PROVISIONS OF THE CONTRACT, INCLUDING THE CONDITIONS OF THE CONTRACT (GENERAL, SUPPLEMENTARY, AND OTHER CONDITIONS) AND DIVISION 1 – GENERAL REQUIREMENTS AS APPROPRIATE, APPLY TO THE WORK SPECIFIED IN THIS SECTION.

2. SCOPE OF WORK

2.1 THE WORK INCLUDED UNDER THIS SECTION CONSISTS OF FURNISHING ALL MATERIALS, EQUIPMENT, LABOR, AND THE PERFORMING OF ALL FUNCTIONS EXCEPT AS OTHERWISE SPECIFIED HEREIN OR SHOWN ON THE DRAWINGS TO BE PERFORMED BY OTHERS FOR THE INSTALLATION AND PLACING INTO OPERATION A COMPLETE PLUMBING AND PIPING SYSTEM AS SPECIFIED AND SHOWN ON THE DRAWINGS.

3. GENERAL DESCRIPTION

3.1 THE WORK IN GENERAL SHALL CONSIST OF, BUT IS NOT NECESSARILY LIMITED TO THE FOLLOWING:

3.2 COMPLETE SANITARY PLUMBING SYSTEM FROM HE PLUMBING FIXTURES OR EQUIPMENT AS INDICATED ON THE DRAWINGS TO PUBLIC SANITARY SEWER OR PRIVATE DISPOSAL SYSTEM, INCLUDING TAP, AND MANHOLES IF NECESSARY.

3.3 INSTALLATION OF ALL WATER AND GAS PIPING AND EQUIPMENT CONNECTIONS INCLUDING WATER SERVICE LINES AND METER IF REQUIRED.

3.4 FURNISH AND INSTALL ALL PLUMBING FIXTURES AS SHOWN ON THE DRAWINGS.

3.5 BEFORE STARTING WORK, EACH SUBCONTRACTOR SHALL SUBMIT SHOP DRAWINGS OF THE EQUIPMENT LISTED TO THE ARCHITECT FOR APPROVAL. FIVE COMPLETE SETS OF SHOP DRAWINGS SHALL BE SUBMITTED.

IN CHECKING SHOP DRAWINGS, THE ARCHITECT AND ENGINEER WILL MAKE EVERY EFFORT TO DETECT ERRORS AND OMISSIONS, BUT NEITHER THE FAILURE OF THE ARCHITECT OR ENGINEER TO DETECT ERRORS OR OMISSIONS NOR THE APPROVAL OF SHOP DRAWINGS SHALL RELIEVE THE CONTRACTOR OF HIS RESPONSIBILITY TO COMPLY WITH THE PLANS AND SPECIFICATIONS.

3.6 WORK EXCLUDED: NOTED ON DRAWINGS.

4. REGULATIONS AND CODES

4.1 THE CONTRACTOR MUST COMPLY WITH ALL STATE, MUNICIPAL, AND FEDERAL SAFETY LAWS, CONSTRUCTION CODES, ORDINANCES AND REGULATIONS RELATING TO BUILDING AND PUBLIC HEALTH SAFETY.

5. GENERAL REQUIREMENTS

5.1 THE CONTRACTOR SHALL EXAMINE THE PREMISES PRIOR TO THE COMMENCEMENT OF ANY WORK AND SATISFY HIMSELF OF EXISTING CONDITIONS UNDER WHICH HE WILL BE OBLIGATED TO OPERATE IN PERFORMING HIS PART OF THE WORK OR THAT WILL IN ANY MANNER AFFECT THE WORK UNDER THE CONTRACT. THE CONTRACTOR SHALL COOPERATE WITH THE OTHER TRADES SO THAT THE INSTALLATION OF ALL EQUIPMENT MAY BE PROPERLY COORDINATED.

5.2 ALL EQUIPMENT FURNISHED SHALL FIT THE SPACE AVAILABLE, WITH CONNECTION, ETC., IN THE REQUIRED LOCATIONS AND WITH ADEQUATE SPACE FOR OPERATING AND SERVICING. THE DRAWINGS ARE GENERALLY DIAGRAMMATIC AND INDICATE THE MANNER AND METHOD OF THE INSTALLATION WHILE THE SPECIFICATIONS AND FIXTURE LIST DENOTE THE TYPE AND QUALITY OF MATERIAL AND WORKMANSHIP TO BE USED. WHERE A CONFLICT EXISTS BETWEEN THE DRAWINGS AND THE SPECIFICATIONS, THE CONTRACTOR SHALL PROMPTLY NOTIFY THE ARCHITECT WHOSE DECISION SHALL BE FINAL. NO ALLOWANCE WILL BE MADE SUBSEQUENTLY IN THIS CONNECTION IN BEHALF OF THE CONTRACTOR AFTER AWARD OF THE CONTRACT.

6. EQUIPMENT AND MATERIAL

6.1 SUBSTITUTION OF EQUIPMENT BRANDS, OTHER THAN AS NOTED ON THE DRAWINGS, IS TO BE ON AN APPROVED EQUAL BASIS.

6.2 THE PLUMBING CONTRACTOR SHALL PROVIDE ALL NECESSARY TAILPIECES, P=TRAPS, TRAP ARMS, WALL HANGERS, CARRIERS, SHUTOFF VALVES, ANGLE VALVES, ETC., REQUIRED FOR THE INSTALLATION OF A CODE APPROVED PLUMBING SYSTEM.

7. PIPING

7.1 BUILDING DRAIN

7.1.1 NO-HUB CAST IRON CONFORMING TO CISPI NO. 301.

7.1.2 GALVANIZED STEEL PIPE CONFORMING TO ASTM A-120

7.1.3 SCH. 40 PVC.

7.2 BUILDING SEWER

7.2.1 SCH. 40 PVC.

7.3 FITTINGS

7.3.1 NO-HUB CAST IRON DRAINAGE PATTERN FITTINGS CONFORMING TO CISPI NO. 301

7.3.2 THREAD CAST IRON FITTINGS SHALL CONFORM TO ANSI-B16.4.

7.3.3 THREADED MALLEABLE IRON FITTINGS CONFORMING TO ANSI-B16.3.

7.3.4 SOLVENT WELD SCH. 40 PVC FITTINGS.

7.3.6 NO-HUB COUPLINGS:

7.3.6.1 (DOUBLE BAND STAINLESS STEEL COUPLINGS WITH NEOPRENE LINER CONFORMING TO CISPI NO. 301 SPECIFICATIONS. FOR ABOVE GROUND USE ONLY.) (TYPE 304 STAINLESS STEEL COUPLING EQUAL TO "HUSKEY" OR "CLAMP-ALL" FOR BELOW GRADE.)

7.3.7 PITCH 3" AND SMALLER PIPE AT 1/4" PER FOOT, 4" AND LARGER @ 1/8" PER 1 FT. WHERE APPROVED BY LOCAL JURISDICTION.

7.3.8 TEMPORARILY CLOSE ENDS OF PIPE WITH WOOD BLOCKS AT END OF EACH WORKING DAY.

7.4 DOMESTIC WATER

7.4.1 TYPE "L" HARD DRAWN COPPER, CONFORMING TO ASTM B-88 TO BE USED FOR ALL PIPE SET ABOVE CONCRETE.

7.4.2 TYPE "K" SOFT DRAWN COPPER, CONFORMING TO ASTM B-88 TO BE USED FOR ALL PIPE SET UNDER CONCRETE.

7.5 FITTINGS

7.5.1 PROVIDE WROUGHT COPPER TYPE FITTINGS CONFORMING TO ANSI B16.22 FOR ALL CONNECTIONS TO COPPER PIPING.

7.5.2 PROVIDE PVC FITTINGS CONFORMING TO ASTM D2466 WITH SOLVENT CEMENT CONFORMING TO ASTM D2564 AND PRIMER CONFORMING TO ASTM F656.

7.6 SOLDER

7.6.1 PIPES 1/2" THROUGH 2": USE LEAD FREE SOLDER WITH SUITABLE FLUX.

7.6.2 PIPES 2 1/2" AND LARGER: USE AIRCOSIL 45, OR EQUAL SILVER BRAZING ALLOY OF MELTING POINT AND PHYSICAL PROPERTIES. USE AIRCOSIL FLUX OR EQUAL, SUITABLE TO BRAZING ALLOY.

7.7 INSTALLATION

7.7.1 PITCH PIPING TO DRAIN AND PROVIDE ALL NECESSARY DRAIN VALVES. BURY A MINIMUM OF 24" BELOW GRADE OR NATURAL FROST LINE. PROVIDE DI-ELECTRIC UNIONS AT ALL MATERIAL CHANGES IN SYSTEM.

7.7.2 COPPER PIPE INSTALLED BELOW CONCRETE FLOORS SHALL BE WITHOUT JOINTS AND WRAPPED WITH 20 MILS OF POLYETHYLENE TAPE WITH A MINIMUM OF 50% OVERLAP.

7.8 PIPE HANGERS AND SUPPORTS

7.8.1 ADEQUATELY SUPPORT PIPING AGAINST SAGGING, POCKETING, SWAYING, AND DISPLACEMENT. ALL PIPING AND EQUIPMENT SHALL BE SUPPORTED BY STRUCTURAL MEMBERS ADEQUATELY ABLE TO BEAR THEIR WEIGHT. PROPERLY SPACE AND APPLY HANGERS IN ACCORDANCE WITH THE FOLLOWING:

7.8.2 SPACING

7.8.2.1 STEEL PIPE:

3/4" AND SMALLER	5' ON CENTER
1" AND 1 1/4"	6' ON CENTER
1 1/2" TO 2 1/2"	10' ON CENTER
3" AND LARGER	12' ON CENTER

7.8.2.2 COPPER PIPE:

3/4" AND SMALLER	5' ON CENTER
1" TO 1 1/2"	6' ON CENTER
2" AND LARGER	10' ON CENTER

7.8.2.3 CAST IRON:

5' ON CENTER AND ALL BRANCHES IN EXCESS OF 30" LONG.

7.8.3 ALL PIPING SHALL BE INSTALLED WITH ADEQUATE PROVISION FOR EXPANSION AND CONTRACTING USING SWING JOINTS, PIPE CLAMPS, ANCHORS, AND EXPANSION JOINTS. FITTINGS SHALL BE SO SPACED THAT THEY WILL NOT INTERFERE WITH SLIDING OF PIPE ON SUPPORTS.

7.9 Provide shock arrestors for each group of fixtures per mfg. req. minimum 1 pt size.

8. CONDENSATE PIPING

8.1 REFER TO PLANS FOR LAYOUT AND ROUTING. OFFSET PIPING AS REQUIRED TO AVOID CONFLICT WITH DUCTWORK, OTHER PIPING SYSTEMS, OR STRUCTURE. USE CODE APPROVED TYPE "M" COPPER. PROVIDE TRAP AND VENT AT MECHANICAL EQUIPMENT, SLOPE TO LOCATION SHOWN ON PLANS.

8.2 CONDENSATE PIPING SHALL BE INSULATED WHEN RUNNING INSIDE AN UNCONDITIONED SPACE. INSULATION SHALL BE EQUAL TO 1/2" ARMAFLEX.

9. CLEANOUTS

9.1 CLEANOUTS SHALL BE SAME SIZE AS PIPE UNLESS OTHERWISE INDICATED ON THE DRAWINGS. CLEANOUTS SHALL BE INSTALLED IN SOIL AND WASTE LINES AT EVERY CHANGE OF DIRECTION AND AT EVERY 100 FEET OF RUN WHETHER SHOWN ON THE DRAWINGS OR NOT. CLEANOUTS SHALL BE ACCESSIBLE IN ALL CASES. WHEN LOCATED IN A FINISHED WALL OR FLOOR, SET CLEANOUT FLUSH WITH SURROUNDING SURFACE.

10. VENTS

10.1 VENTS SHALL EXTEND NOT LESS THAN 10 INCHES THROUGH THE ROOF. THEY SHALL BE GATHERED TOGETHER WHERE POSSIBLE INTO ONE VENT OF EQUIPMENT AREA. VENTS SHALL BE OF SAME MATERIAL AS BUILDING DRAIN. ALL VENTS THROUGH ROOF SHALL BE LOCATED A MINIMUM OF 10 FEET FROM ANY OUTSIDE AIR INTAKE. VENTS SHALL BE FLASHED AS INDICATED BELOW.

11. MISCELLANEOUS

11.1 SUPPLY FLASHINGS FOR ALL PIPES WHICH PASS THROUGH THE ROOF. FLASHINGS SHALL BE INSTALLED WITH ROOFING. VENTS SHALL BE FLASHED WITH THE CORRECT SIZE STANDARD GALVANIZED SHEET METAL OR LEAD ROOF FLASHING. SLEEVES SHALL BE 24 GAUGE GALVANIZED STEEL WHERE PIPES PASS THROUGH MASONRY AND FOOTINGS. WHEREVER PIPES PASS THROUGH WALLS, FLOORS, OR CEILINGS, ESCUTCHEON PLATES EQUAL TO CADWELL NO. 3A, CAST BRASS SPLIT RINGS WITH SET SCREWS SHALL BE USED. USE POLISHED CHROME IN FINISHED ROOMS, POLISHED BRASS IN ALL OTHERS. ALL CLEANOUTS IN FINISHED WALLS ARE TO HAVE CHROME COVERS.

GLOBE VALVES EQUAL TO	MILWAUKEE 502 OR 554
GATE VALVES EQUAL TO	MILWAUKEE 1140 OR 1145
BALANCING VALVES EQUAL TO	MILWAUKEE BB-1
CHECK VALVE VERTICAL EQUAL TO	MILWAUKEE 558
CHECK VALVE HORIZONTAL EQUAL TO	MILWAUKEE 553
TEMP RELIEF VALE EQUAL TO	CRANE NHLX5
ANGLE STOPS EQUAL TO	CRANE 96107W
SUPPLY TUBING EQUAL TO	CRANE

11.2 CONTRACTOR SHALL LAYOUT AND INSTALL HIS WORK IN ADVANCE OF POURING CONCRETE FLOORS OR WALLS. PROVIDE SLEEVES FOR ALL PLUMBING PIPES PASSING THROUGH CONCRETE FLOOR SLABS, MASONRY, TILES, AND GYPSUM WALLS. SLEEVES SHALL NOT SUPPORT PIPE AND SHALL BE CONSTRUCTED OF 24 GAUGE GALVANIZED STEEL.

11.3 ALL SMITH, ZURN, JOSAM, AND WADE SHALL BE ON AN EQUAL BASIS AND EQUAL TO THE SERIES SPECIFIED ON THE DRAWINGS.

11.4 REFER TO PLUMBING DRAWINGS FOR FIXTURE SPECIFICATIONS.

12. APPROVED MANUFACTURES LIST

12.1.1 FIXTURES:
AM. STD., ELJER, KOHLER, CRANE, ELKAY, HALSEY TAYLOR

12.1.2 SUPPLIES (NON BRASS):
DELTA, ELKAY, CRANE

12.1.3 SUPPLIES (BRASS):
CHICAGO, T&S, ROYAL BRASS, AM. STD., ELJER

12.2 EQUIPMENT:

12.2.1 WATER HEATERS RESIDENTIAL:
A.O. SMITH, RHEEM, LOCHINVAR, RUUD

13. CONNECTIONS TO EQUIPMENT

13.1 CONTRACTOR SHALL MAKE ALL PLUMBING AND PIPING CONNECTIONS TO EQUIPMENT SPECIFIED TO BE FURNISHED BY OWNER OR UNDER OTHER SECTIONS OF THESE SPECIFICATIONS. PLUMBING CONTRACTOR SHALL BE RESPONSIBLE FOR ALL FINAL CONNECTIONS TO AIR CONDITIONING AND HEATING EQUIPMENT. PROVIDE SUFFICIENT APPROVED AIR CHAMBERS OR EXPANSION LOOPS TO PREVENT WATER HAMMER. AFTER COMPLETION OF WORK, ALL EXPOSED FIXTURES, EQUIPMENT, AND PIPING SHALL BE THOROUGHLY CLEANED.

14. ACCESSIBILITY

14.1 UNIONS, VALVES, TRAPS, CONTROLS, ETC., WHICH ARE LOCATED IN NON ACCESSIBLE LOCATIONS SHALL BE PROVIDED WITH APPROVED ACCESS DOORS (FITTED IN A FRAMED HOLE).

15. EXCAVATION AND BACKFILL

15.1 THE CONTRACTOR SHALL DO ALL EXCAVATION AND BACKFILLING NECESSARY FOR INSTALLATION OF WATER AND SOIL PIPE. BACKFILL TO ORIGINAL GRADE TO 95% OF ASTM-D-698 MAX. DENSITY. REMOVE EXCESS DIRT AS DIRECTED. NO WORK SHALL BE COVERED UNTIL PROPERLY TESTED.

16. TESTS

16.1 WATER PIPING: HYDROSTATIC TEST AT 160 PSI; MAXIMUM ALLOWABLE PRESSURE DROP OF 1.5 PSI IN FOUR HOURS AT CONSTANT TEMPERATURE.

16.2 BUILDING SEWER AND DRAIN: 10 FEET STATIC HEAD OR HIGHEST VENT, (WHICHEVER IS GREATER). HEAD MUST BE MAINTAINED AT A CONSTANT LEVEL FOR TWO HOURS AT CONSTANT TEMPERATURE.

16.3 NATURAL GAS PIPING: EACH SEGMENT OF A SERVICE LINE (OTHER THAN PLASTIC) INTENDED TO BE OPERATED AT A PRESSURE OF 5" W.C. SHALL BE GIVEN A LEAKAGE TEST AT A PRESSURE OF NOT LESS THAN 50 P.S.I.G. FOR A PERIOD OF NOT LESS THAN 8 HOURS.

16.4 FAILURE OF TESTS: ANY PIPING SYSTEM WHICH HAS FAILED ITS REQUIRED TEST SHALL HAVE ALL LEAKS REPAIRED AND/OR PIPES REPLACED UNTIL SAID PIPING SYSTEM PASSES ITS REQUIRED TEST. NO PIPING SYSTEM SHALL BE PUT INTO OPERATION UNTIL IT HAS PASSED ALL TESTING PROCEDURES.

17. POTABLE WATER SYSTEM STERILIZATION

17.1 STERILIZE THE ENTIRE WATER DISTRIBUTION SYSTEM THOROUGHLY WITH A SOLUTION CONTAINING NOT LESS THAN 50 PARTS PER MILLION OF AVAILABLE CHLORINE. FOR THE CHLORINATING MATERIAL USE SODIUM HYPOCHLORITE SOLUTION CONFORMING TO FEDERAL SPECIFICATION 0-8-441, GRADE D. ALLOW THE STERILIZATION SOLUTION TO REMAIN IN THE SYSTEM FOR A PERIOD OF 8 HOURS. DURING WHICH TIME ALL VALVES AND FAUCETS SHALL BE OPENED AND CLOSED SEVERAL TIMES. AFTER STERILIZATION, FLUSH THE SOLUTION FROM THE SYSTEM WITH CLEAN WATER UNTIL THE RESIDUAL CHLORINE CONTENT IS NOT GREATER THAN 0.2 PARTS PER MILLION. PROVIDE ARCHITECT WITH CERTIFICATION OF TEST RESULTS.

18. GUARANTEE

18.1 THE CONTRACTOR SHALL GUARANTEE ALL MATERIAL AND EQUIPMENT TO BE FREE FROM DEFECT OF MATERIAL AND WORKMANSHIP AND SHALL REPLACE OR REPAIR, WITHOUT COST TO THE OWNER, ALL DEFECTIVE MATERIAL AND WORKMANSHIP FOR A PERIOD OF ONE YEAR AFTER FINAL ACCEPTANCE.

GENERAL NOTES

ALL WORK SHALL BE DONE IN ACCORDANCE WITH THESE PLANS, SPECIFICATIONS, AND LATEST INDUSTRY ACCEPTED PRACTICES.

PLUMBING CONTRACTOR SHALL FURNISH ALL EQUIPMENT, MATERIAL, LABOR, ETC., WHETHER SHOWN ON THESE PLANS OR NOT, NECESSARY TO PROVIDE A COMPLETE, WORKABLE, CODE-APPROVED PLUMBING SYSTEM.

ALL LAVATORIES AND SINKS SHALL COME COMPLETE WITH NECESSARY TRIM, P=TRAPS, TAILPIECE CONNECTIONS, SHUTOFF VALVES, AND REQUIRED CARRIERS. PROVIDE NECESSARY CARRIERS FOR ALL WATER CLOSETS, URINALS, AND ALL OTHER PLUMBING EQUIPMENT WHICH REQUIRES THEM.

ALL HOT WATER LINES SHALL BE INSULATED WITH 1/2" ARMAFLEX OR EQUAL.

PLUMBING CONTRACTOR TO COORDINATE ALL LINES AND VENTS WITH RELIEF VENTS AND MECHANICAL EQUIPMENT.

BUILDING SEWER CLEANOUTS SHALL BE INSTALLED AT INTERVALS NOT TO EXCEED ONE HUNDRED FEET (100') IN STRAIGHT RUNS.

PLUMBING CONTRACTOR SHALL VERIFY, PRIOR TO TRENCHING, THAT THE DESIGNED SLOPE OF THE SEWER SHALL WORK UNDER ACTUAL FIELD CONDITIONS. IF THE DESIGNED SLOPE WILL NOT WORK, THE PLUMBING CONTRACTOR SHALL CONTACT DIVERSIFIED METRO DESIGN GROUP AT (602) 235-9399 IMMEDIATELY.

PROVIDE ACCESS PANELS FOR ALL WATER HAMMER ARRESTORS AND/OR TRAP PRIMERS.

PLUMBING CONTRACTOR TO CAP ALL UNUSED HOLES IN LAVATORIES AND SINKS.

FLASH ALL PIPE PENETRATIONS THROUGH THE ROOF IN A WATER TIGHT MANNER.

THE CONTRACTOR SHALL VERIFY ALL UTILITES LOCATION, SIZES AND CONNECTION REQUIREMENTS PRIOR TO BID AND COMMENCEMENT OF ANY WORK.

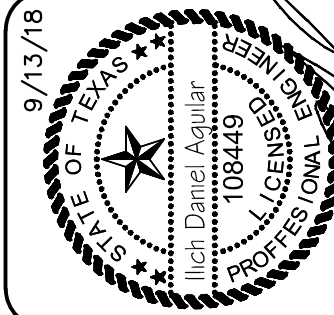
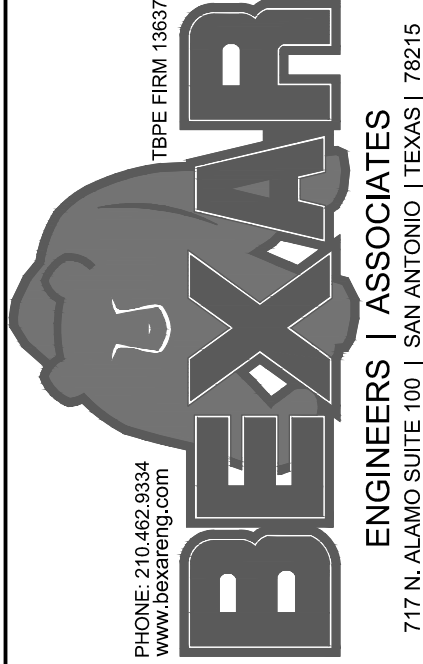
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CONDENSATE PIPING SHALL BE INSULATED WHEN RUNNING INSIDE AN UNCONDITIONED SPACE. INSULATION SHALL BE EQUAL TO 1/2" ARMAFLEX.

REVISIONS:

NO. DATE



PLUMBING NOTES/SPECIFICATIONS

GARDEN CREEK APARTMENTS

NEW BUILDING

110 BLUEBONNET CIRCLE

BOERNE, TX 78006

DESIGN RL

DRAWN RL

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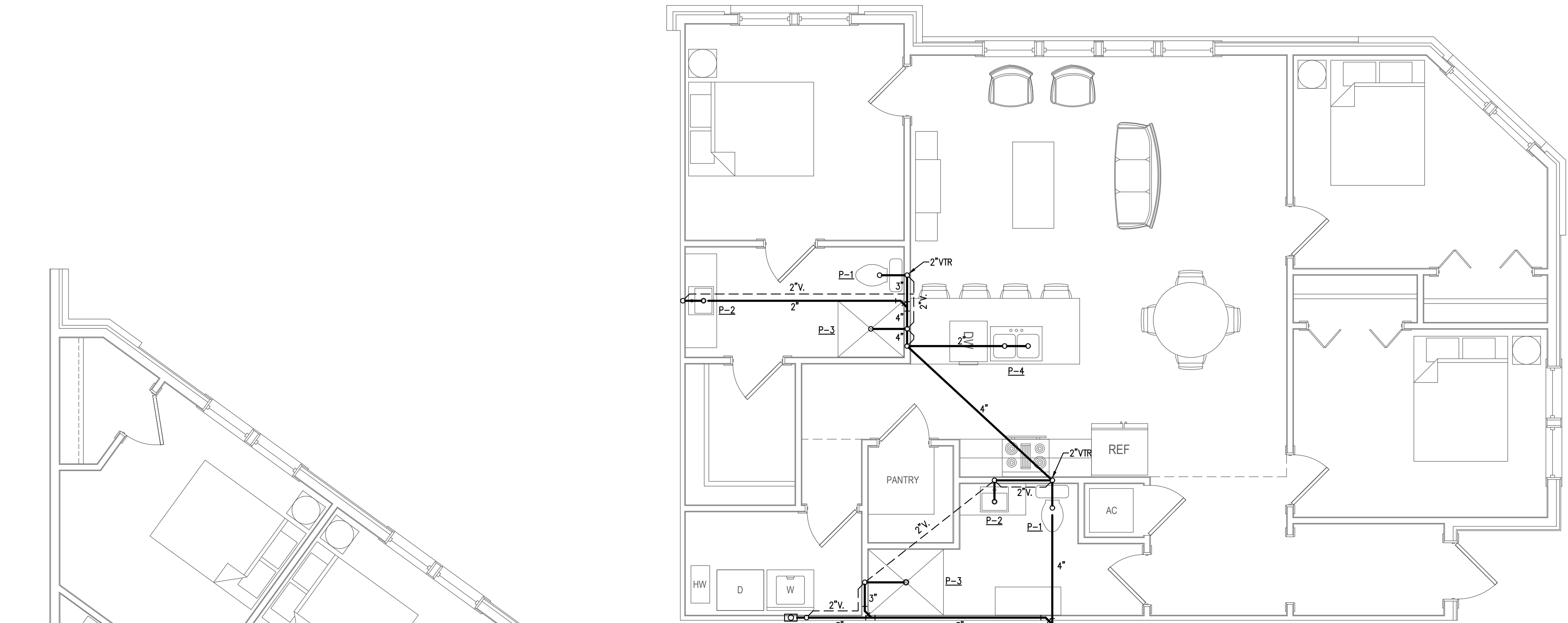
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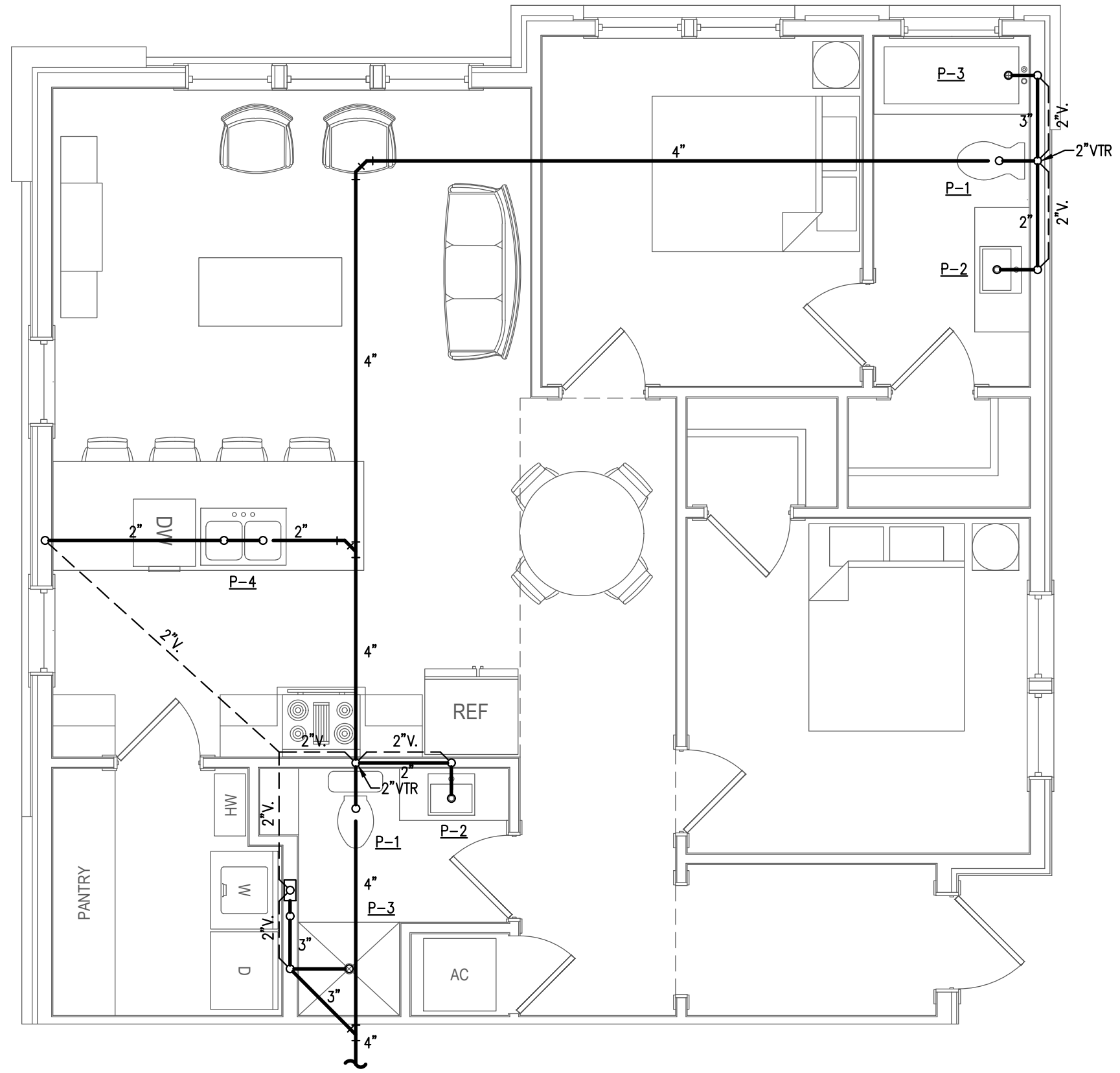
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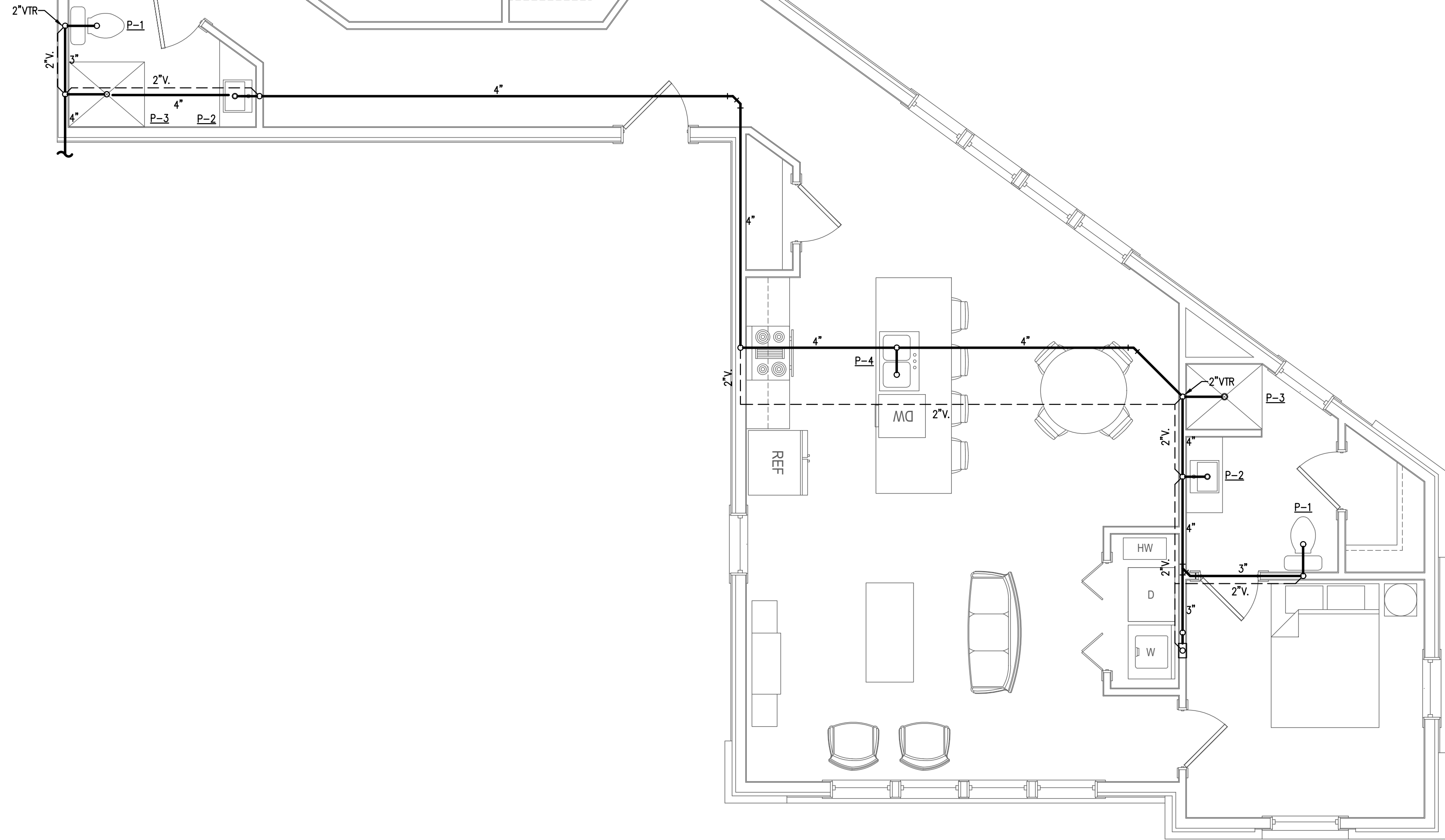
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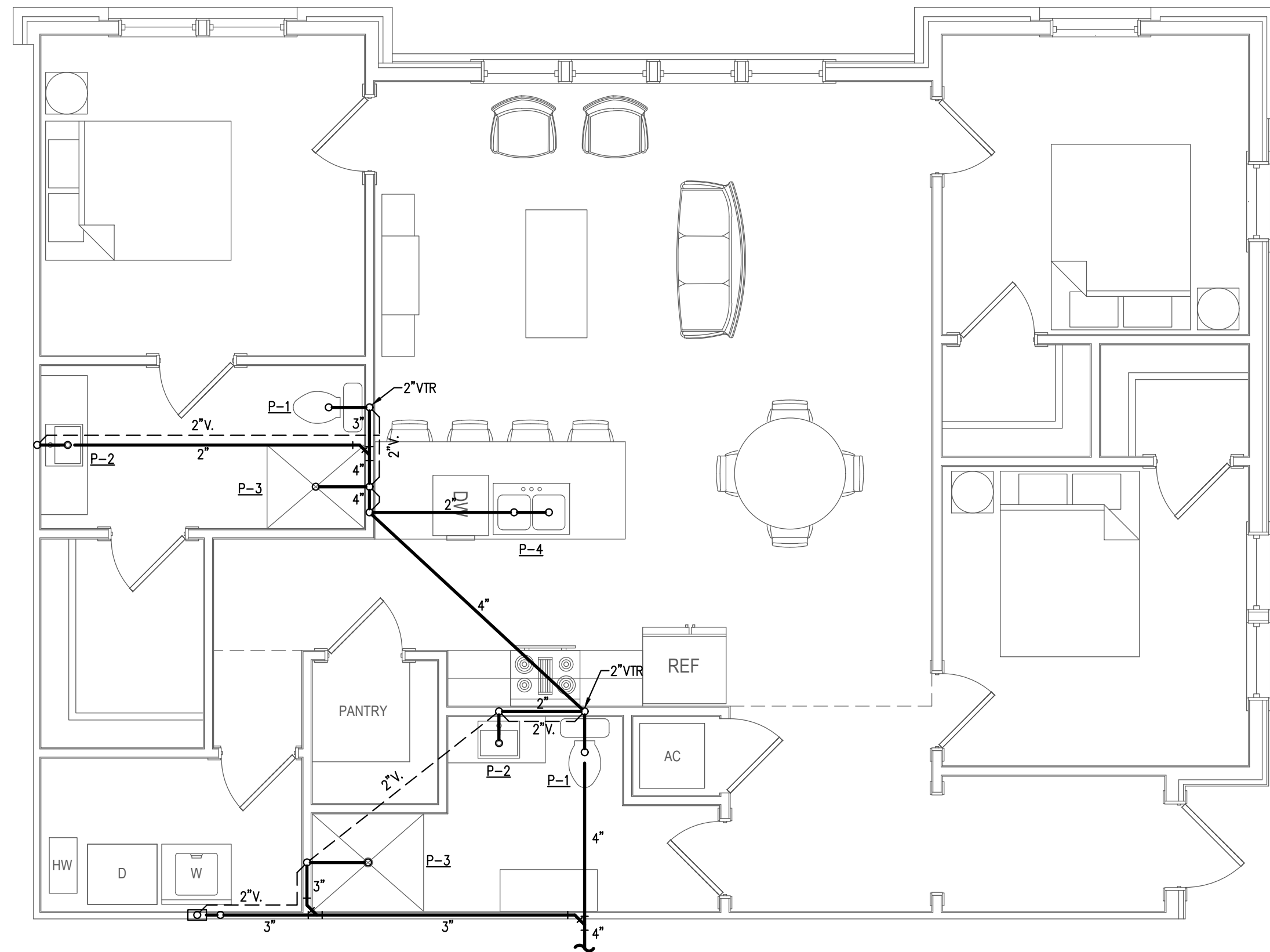
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SCALE: 1/4" = 1'-0"



1 UNIT A - WASTE PIPING PLAN
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3 UNIT C - WASTE PIPING PLAN
SCALE: 1/4" = 1'-0"



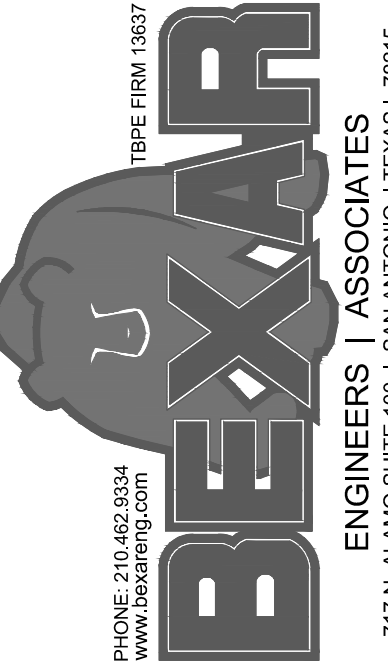
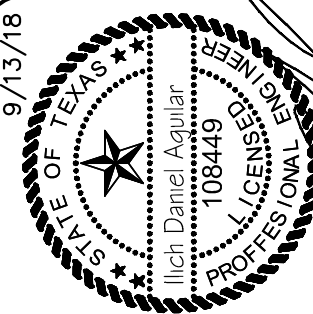
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SCALE: 1/4" = 1'-0"

WASTE PIPING PLAN

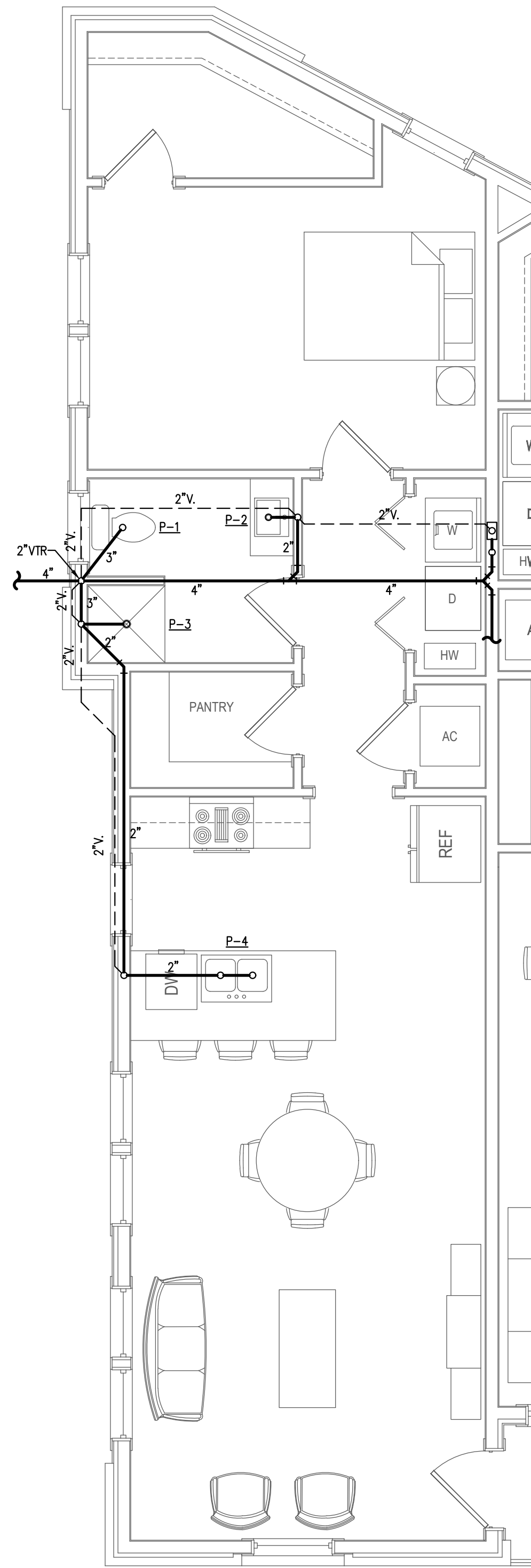
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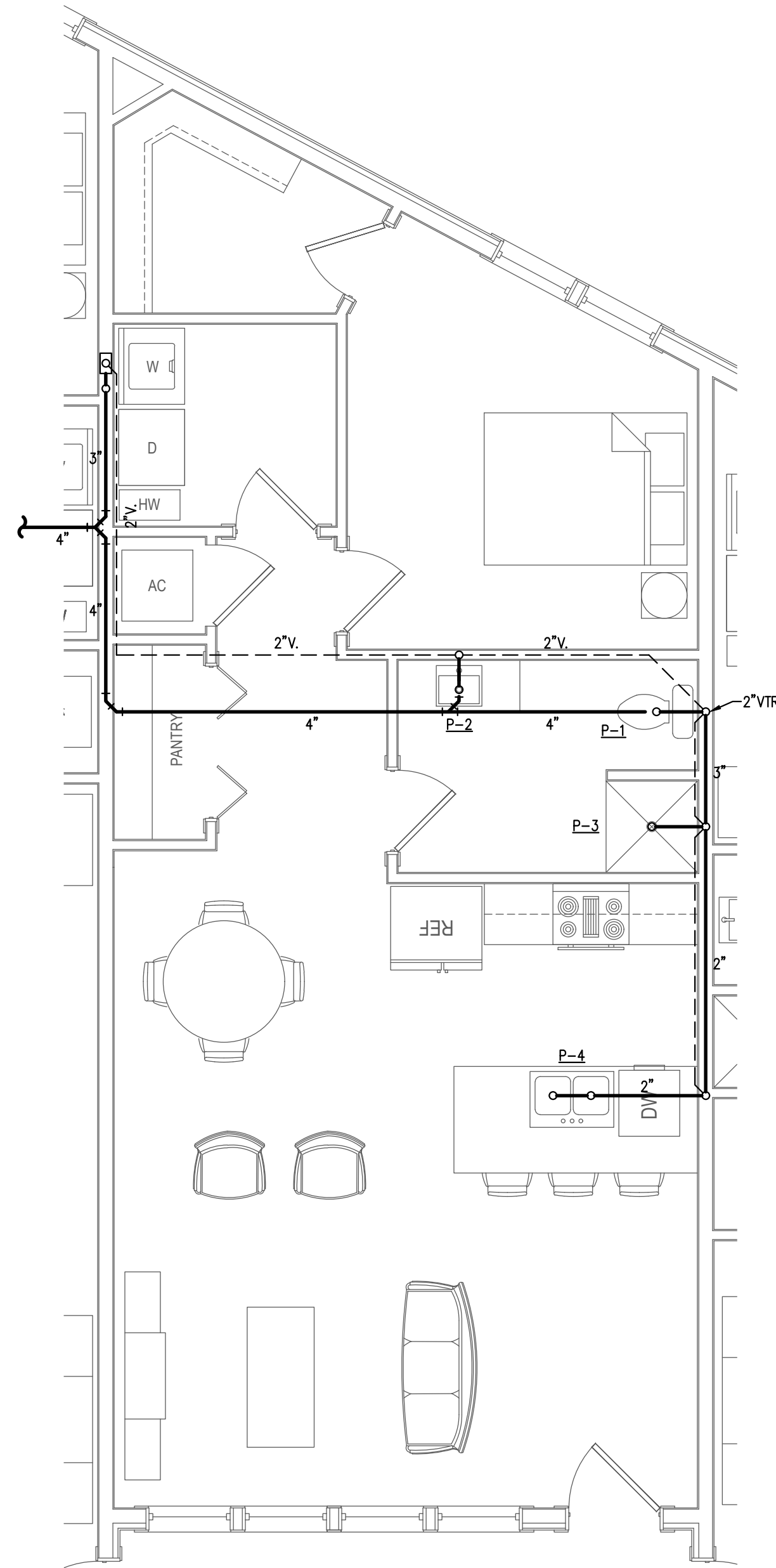
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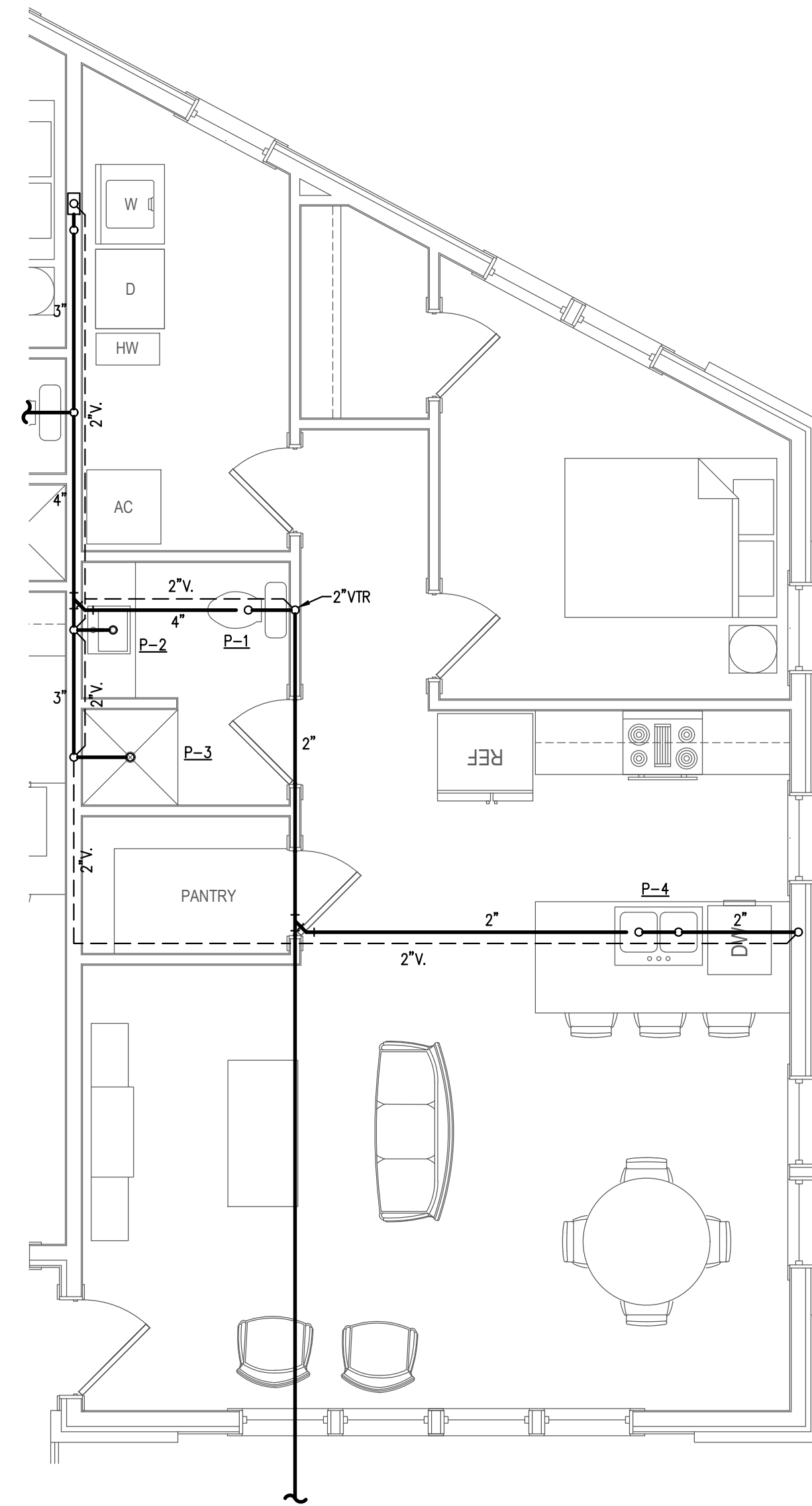
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7 UNIT G – WASTE PIPING PLAN
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6 UNIT F – WASTE PIPING PLAN
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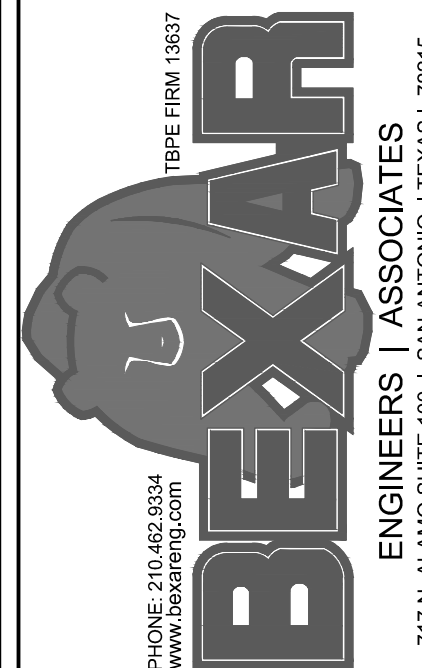
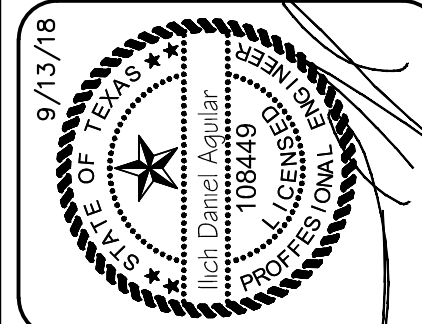
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WASTE PIPING PLAN

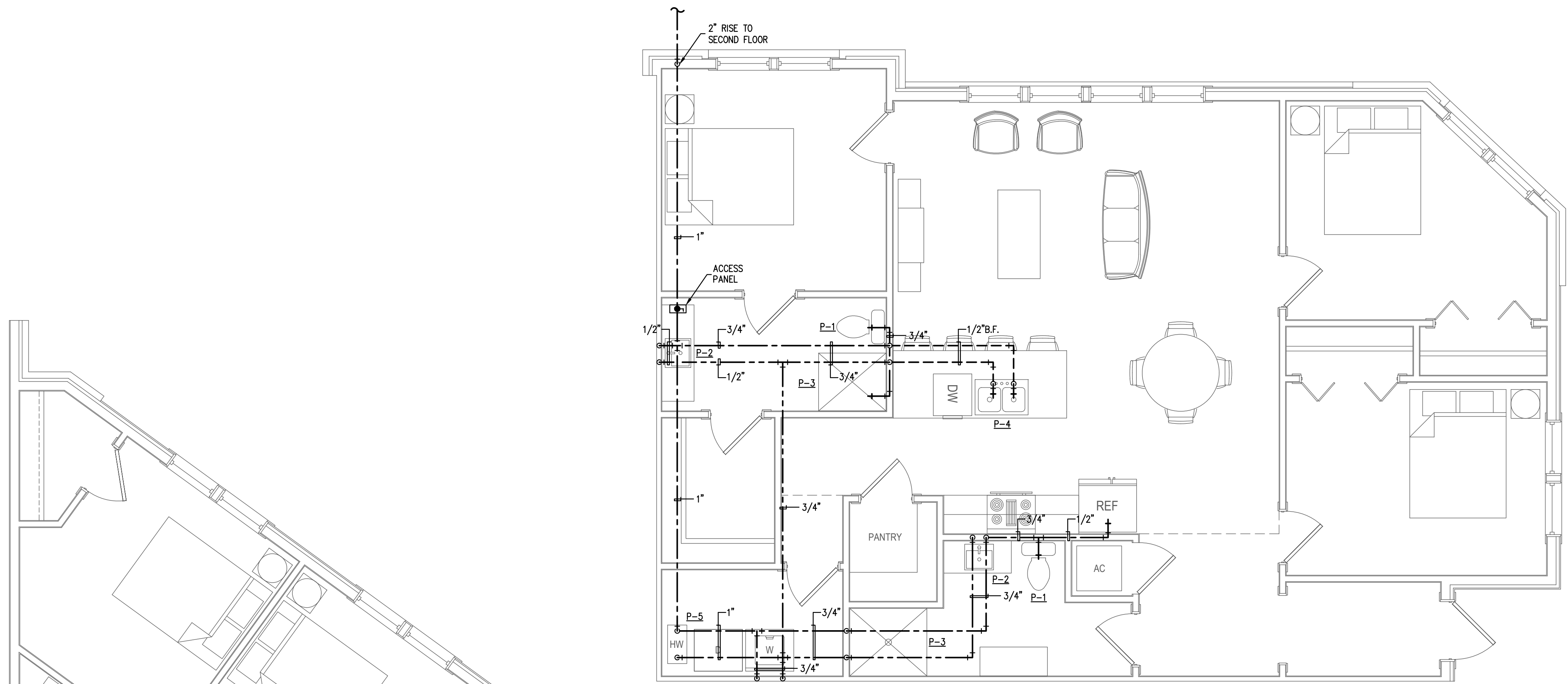
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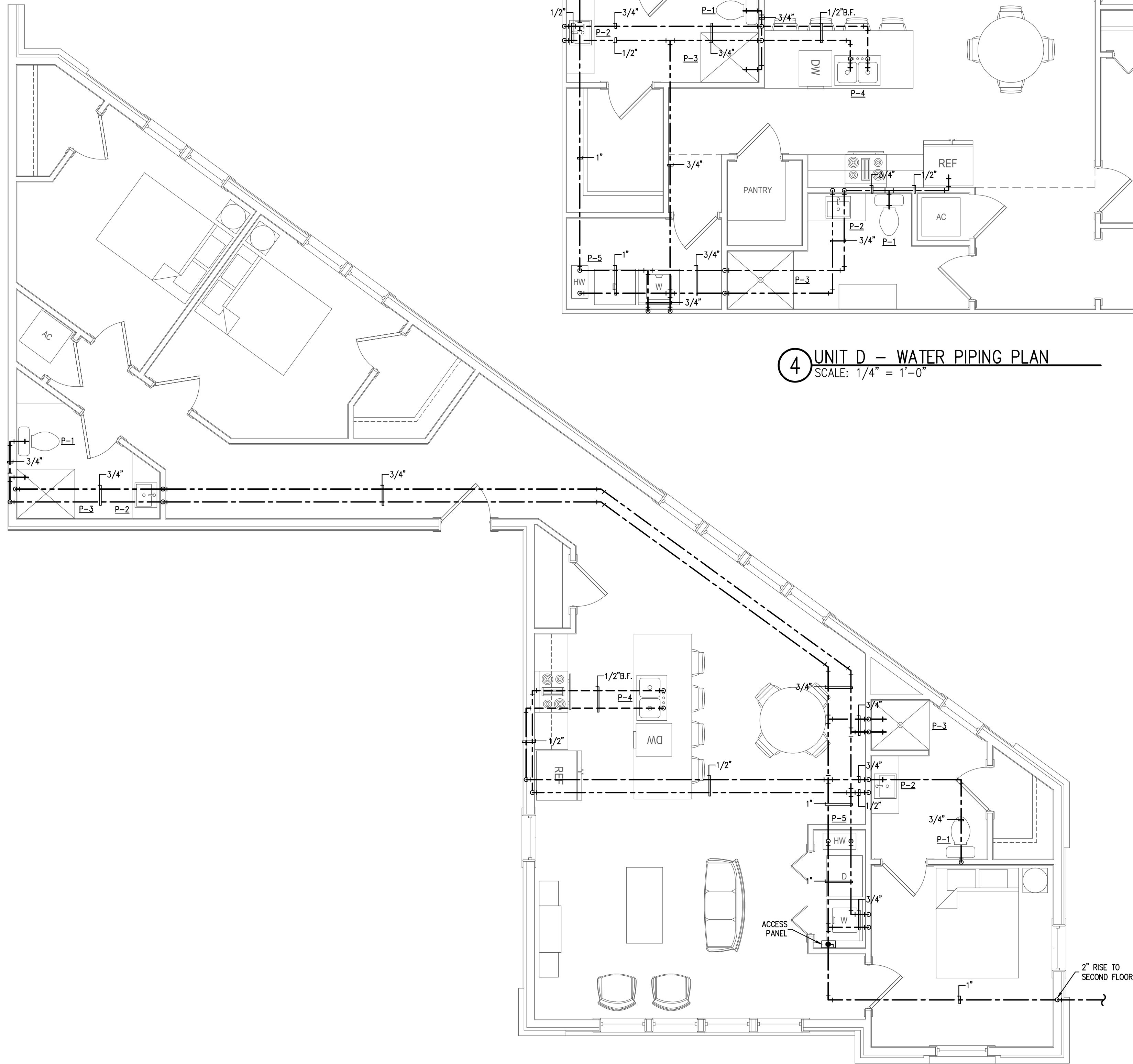
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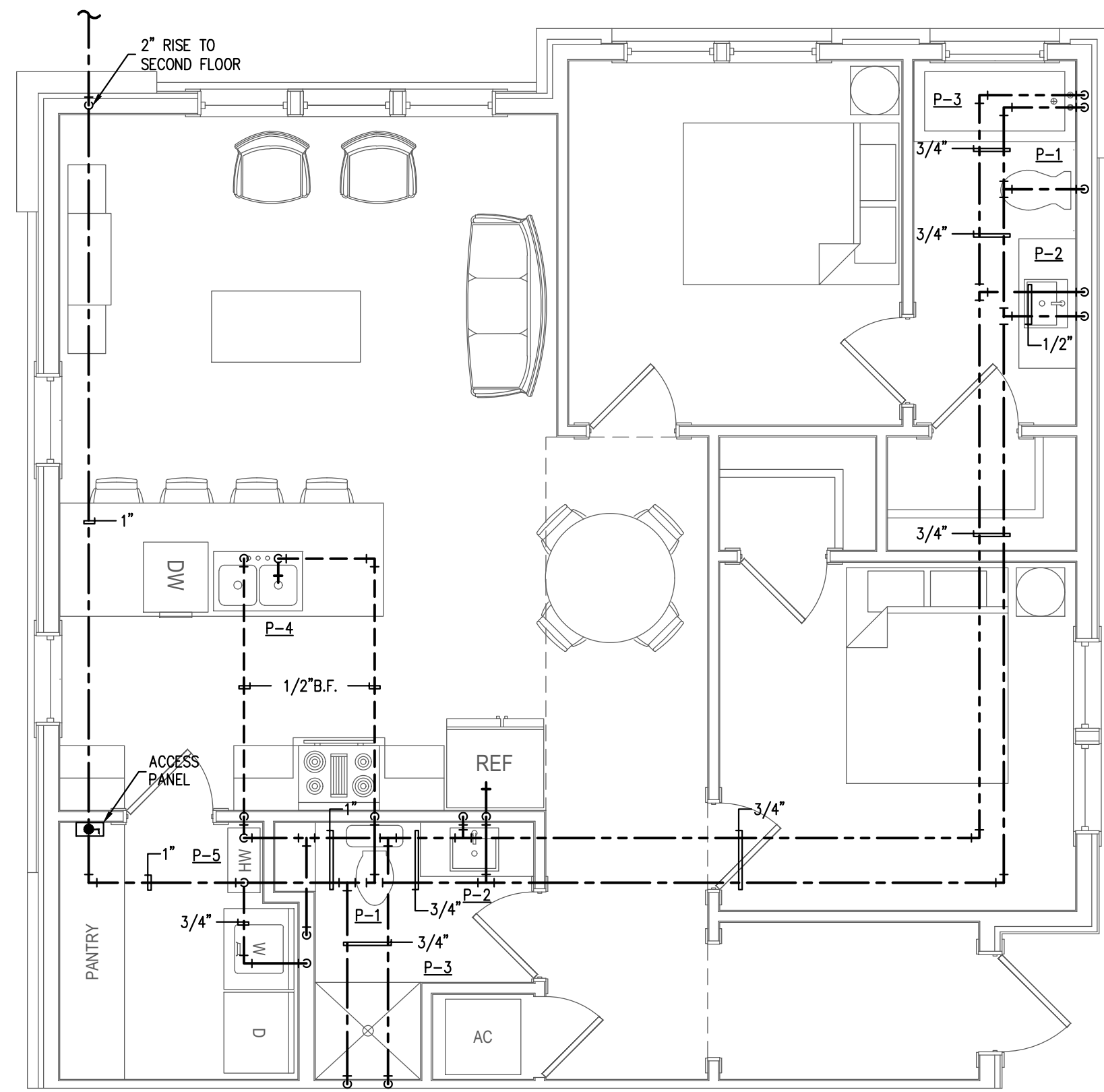
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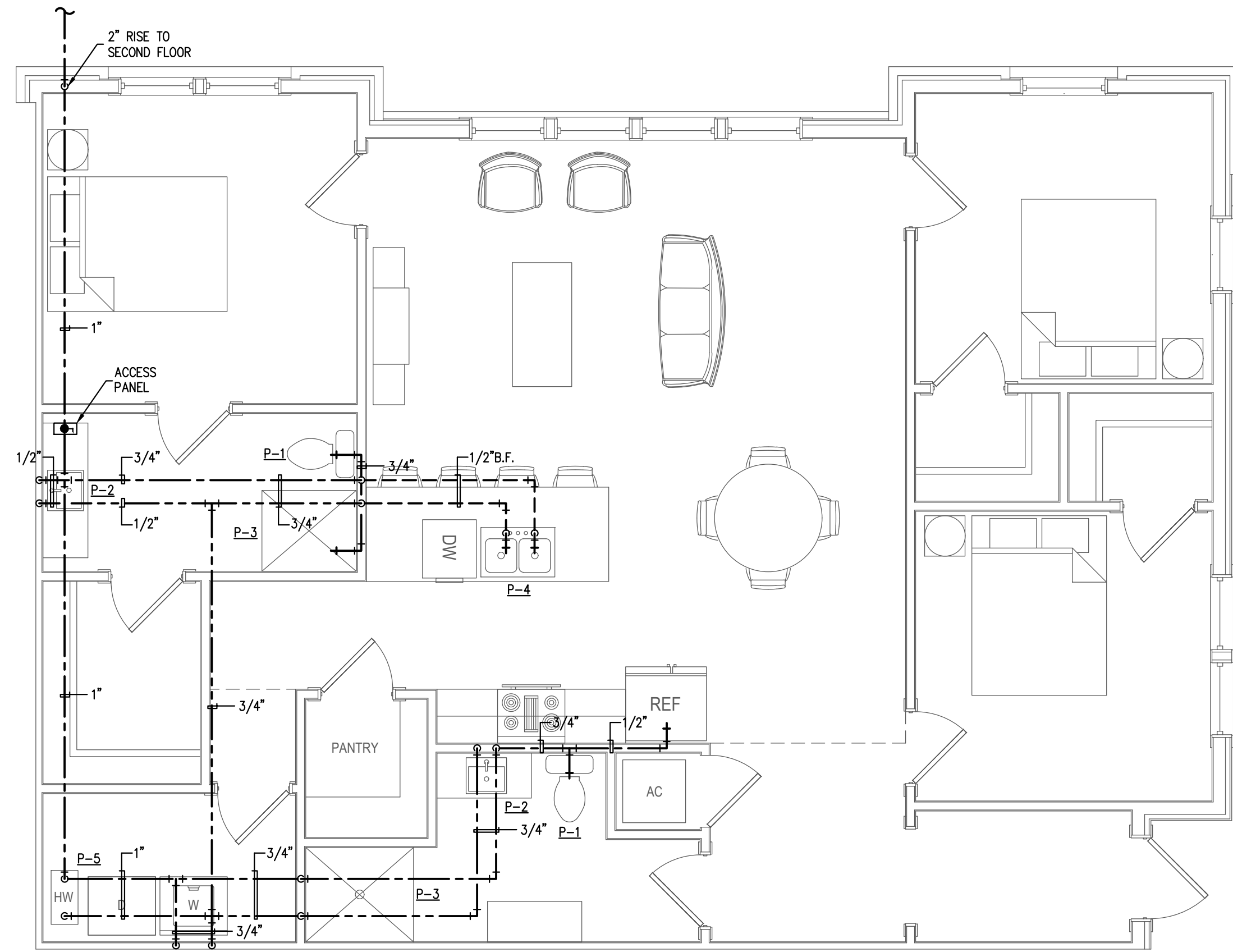
4 UNIT D - WATER PIPING PLAN
SCALE: 1/4" = 1'-0"



3 UNIT C - WATER PIPING PLAN
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1 UNIT A - WATER PIPING PLAN
SCALE: 1/4" = 1'-0"



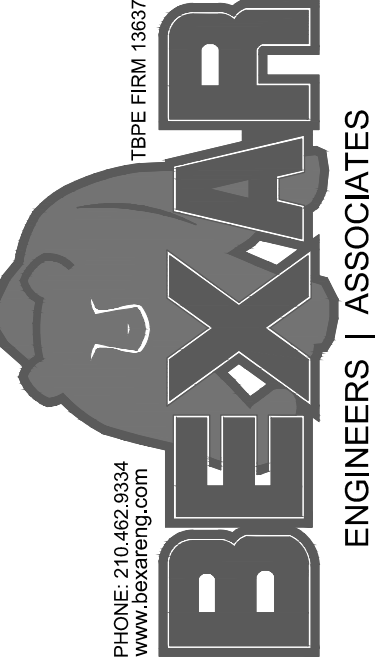
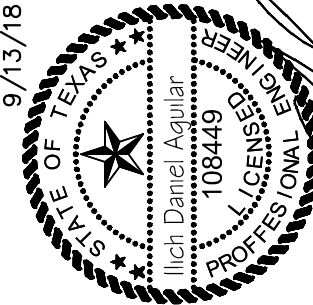
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WATER PIPING PLAN

GARDEN CREEK APARTMENTS
NEW BUILDING
110 BLUEBONNET CIRCLE
BOERNE, TX 78006

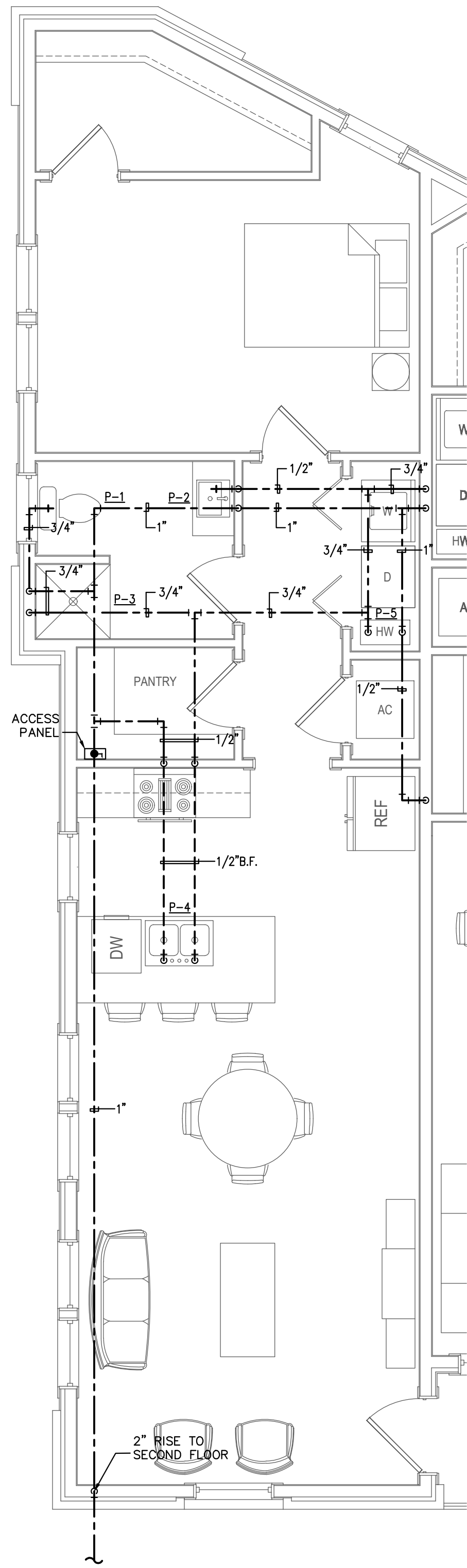
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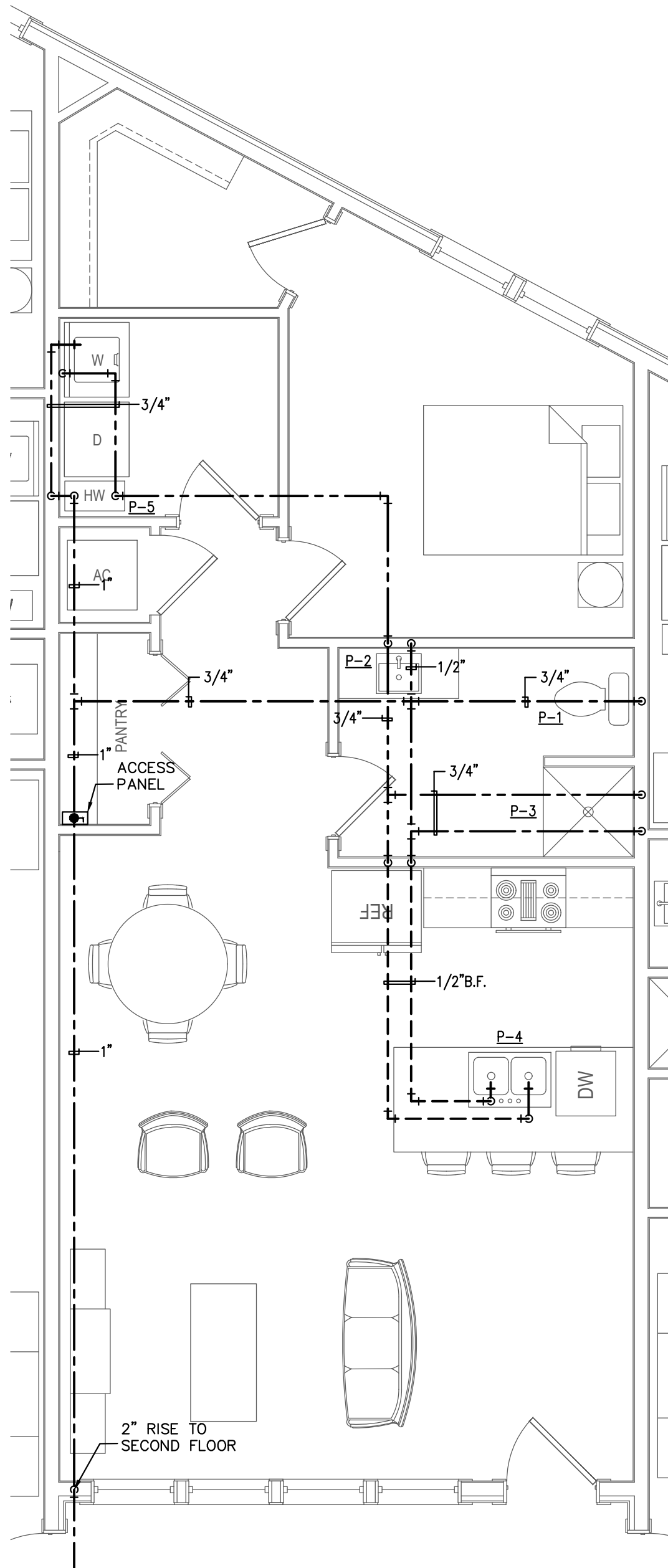


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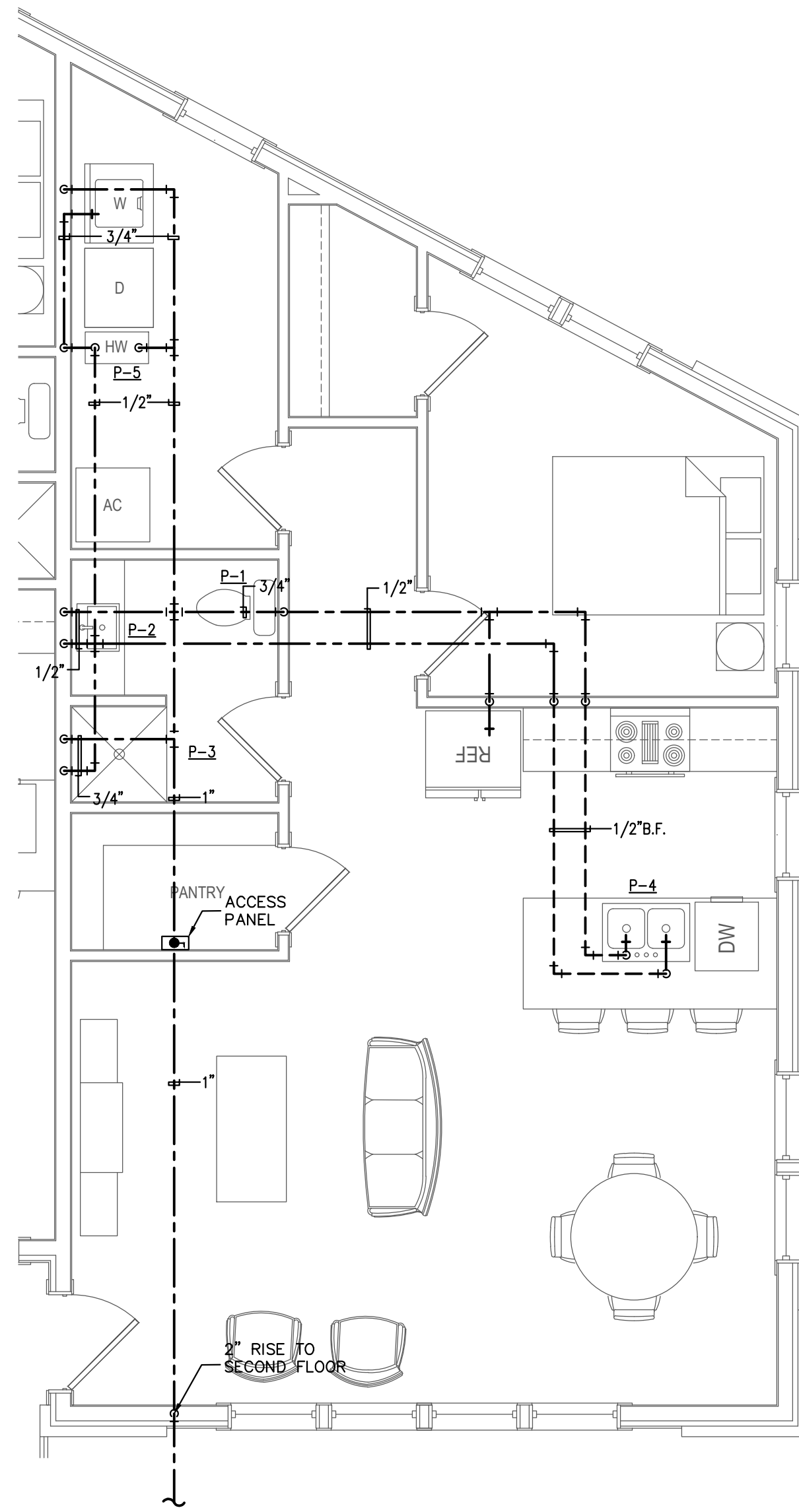
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7 UNIT G - WATER PIPING PLAN
SCALE: 1/4" = 1'-0"



6 UNIT F - WATER PIPING PLAN
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4 UNIT E - WATER PIPING PLAN
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WATER PIPING PLAN

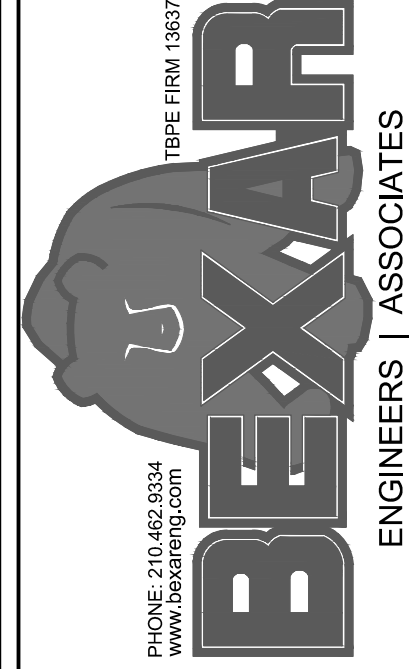
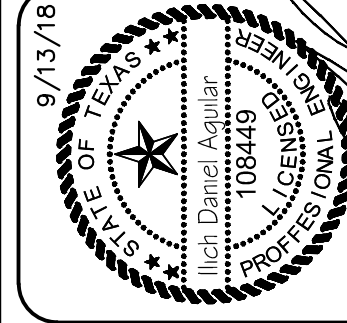
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REVISIONS:
NO. DATE DESCRIPTION

PLUMBING SYMBOLS

MARK	DESCRIPTION
	WASTE PIPE
	VENT PIPE
	COLD WATER PIPE
	HOT WATER PIPE
	GAS PIPE
	FLOOR DRAIN
	HUB DRAIN
	CLEANOUT
	GATE VALVE
	GLOBE VALVE
	RISE OR DROP IN PIPING
	HOSE BIBB
	FIRE SPRINKLER HEAD, STANDARD
	FIRE SPRINKLER HEAD, SPECIAL
	FIRE SPRINKLER PIPING

PLUMBING SPECIFICATIONS

- Plumbing work consists of soil, waste, and vent piping; hot and cold water supply piping; water heaters and accessories; plumbing fixtures, trim, and accessories; swimming pool accessories; and all labor, supplies, materials, and hardware required for a complete and finished installation. The plumbing contractor shall provide final connections to all fixtures and items of equipment and shall coordinate such connections with the general contractor and other subcontractors. The plumbing contractor shall provide temporary water and sewer services as required during construction.
- All work shall be performed in accordance with the requirements of the City of Live Oak, Texas.
- The water services, sewer service, and gas service shall be provided as shown on the Drawings and as directed by the Owner. All utility taps shall be coordinated with the utilities providing the service, and all connection fees shall be included in the Contract.
- Piping and drainage system materials:
 - Hot and cold water piping within building: "pex" or Type "L" copper with lead-free solder joints and dielectric fittings at connections to dissimilar metals.
 - Cold water piping more than five feet from building footprint: Schedule 40 PVC with solvent welded fittings.
 - Soil, waste, and vent piping: Schedule 40 PVC with solvent welded fittings.
 - Valves for hot and cold water piping: Jenkins 650-A (above 2"), Jenkins 902T ball valves or Jenkins 1222 check valves.
 - Provide access doors for all valves or equipment concealed by walls or solid ceilings.
 - Provide Zurn "Shoktrols" or equal in sizes and quantities necessary to prevent water hammer.
 - Hose bibbs on the building exterior shall be ZURN Z-1320 or equal.
- Provide control valves as shown on the drawings for isolation of portions of the work.
- Insulate all hot water piping in chases or in walls with 1" thick closed cell foam insulation rated at 25 or less for flame spread and 50 or less for smoke development according to ASTM E-84.
- Sterilize the entire plumbing installation upon completion with a concentrated chlorine solution. Flush the system thoroughly following sterilization.
- Test all soil, waste, and vent lines to a head of six feet for 24 hours. Test all water piping to 150 psi for eight hours. Test all gas piping to 25 psi for eight hours. All tests shall at least conform to City Code requirements.
- Where flue vents are included in the plumbing subcontract, such vents shall be double-walled metal Class "B" systems assembled from standard manufactured fittings in accordance with City Code. The vent systems shall include Briedent or equal caps above the roof.

PLUMBING FIXTURE SCHEDULE												
MARK	FIXTURE	MANUF.	MODEL	DESCRIPTION	FITTINGS		CONNECTIONS					REMARKS
					MANUF.	MODEL	TRAP	WASTE	VENT	CW	HW	
P-1	WATER CLOSET	G.C. PROVIDED		TANK TYPE WATER CLOSET			3"	3"	2"	1"		1
P-2	LAVATORY	G.C. PROVIDED		DROP IN LAVATORY	DELTA	520 MPU	1-1/2"	1-1/2"	1-1/2"	1/2"	1/2"	3, 5
P-3	TUB/SHOWER	G.C. PROVIDED		TUB/SHOWER	DELTA	817231	1-1/2"	1-1/2"	1-1/2"	1/2"	1/2"	
P-4	SINK	G.C. PROVIDED		2-COMPARTMENT SINK	ELKAY	LK-2223	1-1/2"	1-1/2"	1-1/2"	1/2"	1/2"	5, 8
P-5	WATER HEATER	G.C. PROVIDED		TANKLESS WATER HEATER							1" 1"	

NOTES:

- APPLY FULL BEAD OF CAULK AROUND ALL FIXTURES AT POINTS OF CONTACT WITH WALLS OR FLOORS.
- LTR-5422-10.
- 2-8609-42-89.
- MOUNT HYDRANT FLUSH WITH FINISHED GRADE.
- PROVIDE SAMPLES OF TRIM AND FITTINGS FOR APPROVAL OF OWNER PRIOR TO ORDERING OR BUILDING.

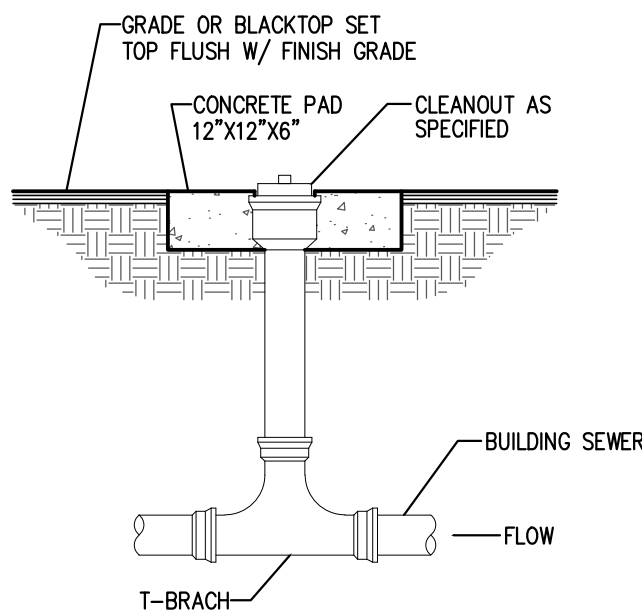
PLUMBING TRIM AND ACCESSORIES:

- TOILET SEAT WITH COVER.
- KOHLER K-7637 STOP AND SUPPLY.
- KOHLER K-7605 STOPS AND SUPPLIES.
- CP STRAINER, TYPE B, AND Z-1028.
- KOHLER P-1000, K-8999 OR 9000 AS REQUIRED.
- AMERICAN STANDARD 7723.018 OFFSET DRAIN.
- SMITH #700 CARRIER.
- ELKAY LK-36.

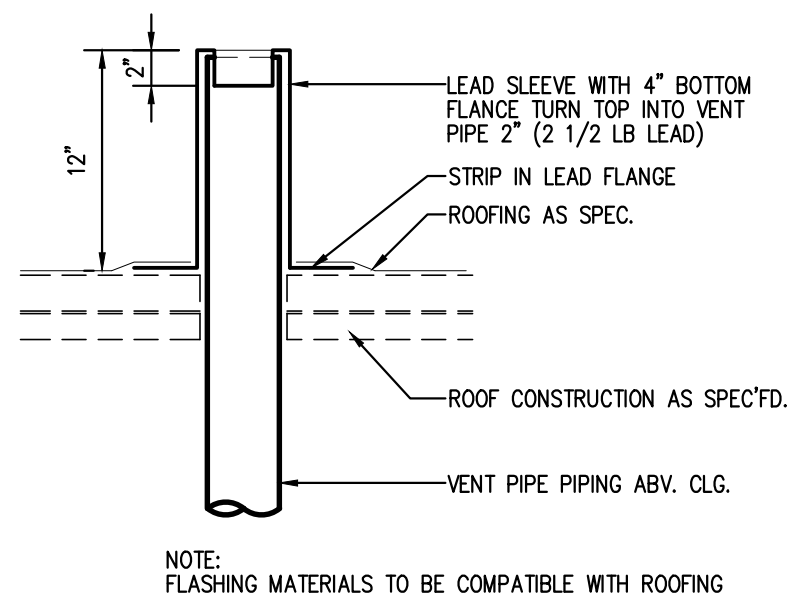
*ALL FIXTURE FLOW RATES TO OCMPLY WITH CITY OF LIVE OAK MAX FLOW RATE TABLE 604.4

FLOW RATE TABLE PER LOCAL AMENDMENTS (604.4)	
EQUIPMENT	FLOW RATE
LAVATORY, PRIVATE	1.5 GPM AT 60 PSI
LAVATORY, PUBLIC (METERING)	0.25 GAL. PER METERING CYCLE
LAVATORY, PUBLIC (OTHER)	0.5 GPM AT 60 PSI
SHOWER HEAD	2.0 GPM AT 60 PSI
SINK FAUCET	2.2 GPM AT 60 PSI
URINAL	0.5 GAL. PER FLUSH CYCLE
WATER CLOSET	1.28 GAL. PER FLUSH CYCLE

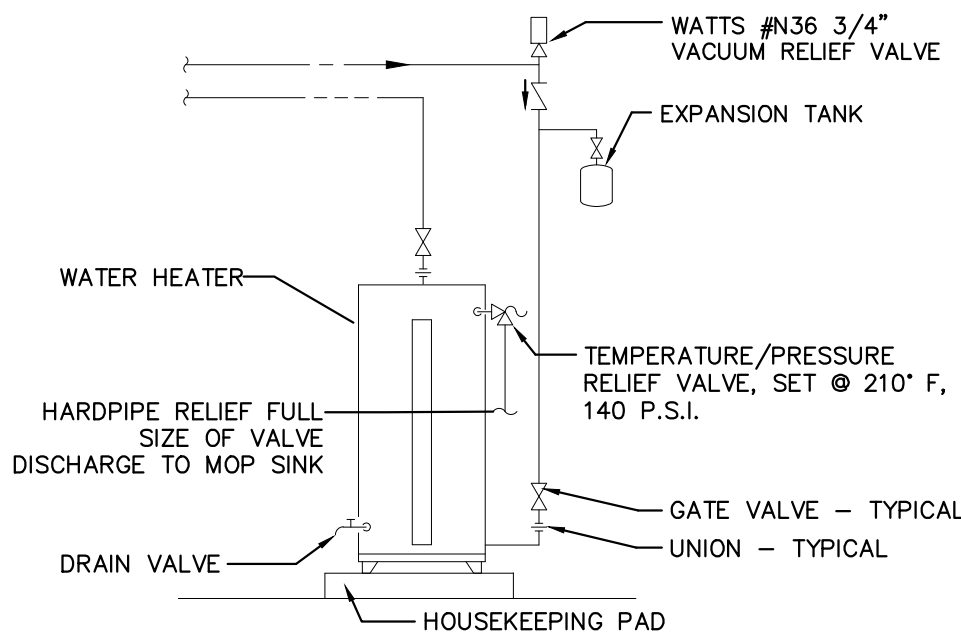
PLUMBING LOAD ANALYSIS					
FIXTURE	QUANTITY	D. F. U.	S. F. U.	TOTAL	
				DFU	SFU
BATHROOM GROUP					
BUILDING "A"	84	6	10	504	840
BUILDING "B"	36	6	10	216	360
BUILDING "C"	9	6	10	54	90
				774	1290
SEWER REQUIREMENT (1/4" PER FOOT SLOPE) - 6" MINIMUM WATER DEMAND 3" SUPPLY, 200 GPM					



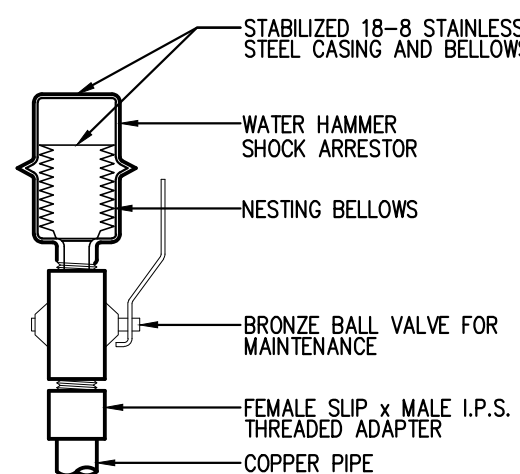
1 TWO-WAY CLEANOUT DETAIL
NOT TO SCALE



5 VENT PIPE DETAIL
NOT TO SCALE



2 WATER HEATER DETAIL
NOT TO SCALE



6 SHOCK ARRESTOR DETAIL
NOT TO SCALE

PLUMBING DETAILS/SCHEDULES

GARDEN CREEK APARTMENTS
NEW BUILDING
110 BLUEBONNET CIRCLE
BOERNE, TX 78006

DESIGN RL
DRAWN RL
CHECKED DA
DATE 9/13/18
JOB NO. 18161

SHEET

P-5
6 OF 6

REVISIONS:
NO. DATE DESCRIPTION

