DIVISION 15 - PLUMBING SPECIFICATIONS

BASIC MECHANICAL REQUIREMENTS

QUALITY ASSURANCE:
1. IF MANUFACTURER'S MATERIAL OR EQUIPMENT IS LISTED IN SCHEDULES OR ON DRAWINGS, THEY ARE TYPES TO BE PROVIDED FOR ESTABLISHMENT OF SIZE, CAPACITY, GRADE, AND QUALITY. IF OTHER ACCEPTABLE MANUFACTURERS ARE USED, COST OF ANY CHANGE IN CONSTRUCTION REQUIRED BY THEIR USE SHALL BE BORNE BY CONTRACTOR.
2. EQUIPMENT SHALL CONFORM TO STATE AND/OR LOCAL ENERGY CONSERVATION STANDARDS.
3. COMPLY WITH RULES AND REGULATIONS OF LOCAL UTILITY COMPANIES. INCLUDE COST OF VALVES, VALVE BOXES, METER BOXES, METERS, ACCESSORY EQUIPMENT REQUIRED FOR PROJECT.

INTENT AND INTERPRETATIONS:
1. IT IS THE INTENT OF THESE DRAWINGS AND SPECIFICATIONS TO RESULT IN A COMPLETE MECHANICAL INSTALLATION IN COMPLETE ACCORDANCE WITH ALL APPLICABLE LOCAL CODES AND ORDINANCES.
2. DRAWINGS ARE DIAGRAMMATIC IN CHARACTER AND DO NOT NECESSARILY INDICATE EVERY REQUIRED PIPE, OFFSET, TRANSITION, ETC. ITEMS NOT SPECIFICALLY MENTIONED IN THE SPECIFICATION OR NOTED ON THE DRAWINGS, BUT WHICH ARE OBVIOUSLY NECESSARY TO MAKE A COMPLETE WORKING INSTALLATION, SHALL BE INCLUDED.
3. DRAWINGS AND SPECIFICATIONS ARE COMPLEMENTARY. WHATEVER IS CALLED FOR IN EITHER IS BINDING AS THOUGH CALLED FOR IN BOTH. IF THERE IS A CONFLICT IN THE CONTRACT DOCUMENTS, THE MORE DEMANDING AND COSTLY DESIGN SHALL BE SELECTED FOR BIDDING PURPOSES. THE CONTRACTOR SHALL IMMEDIATELY PRESENT THE CONFLICT FOUND IN THE CONTRACT DOCUMENTS TO THE ARCHITECT/ENGINEER FOR RESOLUTION. IF THE RESOLUTION FAVORS A LESS COSTLY DESIGN, THE CONTRACTOR WILL BE REQUIRED TO REIMBURSE THE DIFFERENCE IN COST.
4. DRAWINGS SHALL NOT BE SCALED FOR ROUGH-IN MEASUREMENTS OR USED AS SHOP DRAWINGS. WHERE DRAWINGS ARE REQUIRED FOR THESE PURPOSES OR HAVE TO BE MADE FROM FIELD MEASUREMENTS, TAKE THE NECESSARY MEASUREMENTS AND PREPARE THE DRAWINGS.
5. BEFORE ANY WORK IS INSTALLED, DETERMINE THAT EQUIPMENT WILL PROPERLY FIT THE SPACE, THAT REQUIRED CLEARANCES CAN BE MAINTAINED AND THAT EQUIPMENT CAN BE LOCATED WITHOUT INTERFERENCES BETWEEN SYSTEMS, WITH STRUCTURAL ELEMENTS, OR WITH THE WORK OF OTHER TRADES.
6. IF CONFLICTS ARE DISCOVERED IN CONTRACT DOCUMENTS AS WORK PROGRESSES, SUBMIT A SET OF DRAWINGS MARKED WITH RED PENCIL SHOWING RECOMMENDED MODIFICATIONS TO THE ARCHITECT FOR APPROVAL PRIOR TO INSTALLATION.

JOB CONDITIONS:
1. CONFER, COOPERATE, AND COORDINATE WORK WITH OTHER TRADES. COORDINATE CEILING CAVITY SPACE CAREFULLY WITH ALL TRADES. IN EVENT OF CONFLICT, INSTALL MECHANICAL AND ELECTRICAL SYSTEMS WITHIN CAVITY SPACE IN FOLLOWING ORDER OF PRIORITY.
   - A. PLUMBING WASTE AND VENT PIPING.
   - B. ROOF DRAIN PIPING.
   - C. DUCTWORK.
   - D. ELECTRICAL CONDUIT AND LIGHTING.
   - E. DOMESTIC HOT AND COLD WATER PIPING.
   - F. FIRE SPRINKLER PIPING.

PERMITS AND FEES:
1. ARRANGE AND PAY FOR ALL INSPECTIONS, PERMITS, LICENSES, CERTIFICATES, AND FEES REQUIRED IN CONNECTION WITH WORK.

SUBMITTALS AND SHOP DRAWINGS:
1. CONFORM TO REQUIREMENTS OF DIVISION 1 AND FOLLOWING PARAGRAPHS.
2. SUBMITTALS SHALL INCLUDE CATALOG CUT-SHEETS AND MANUFACTURER'S DATA SHEETS,
3. PRIOR TO ORDERING EQUIPMENT OR BEGINNING INSTALLATION WORK, ASSEMBLE, PREPARE, AND FURNISH SUBMITTALS AND SHOP DRAWINGS REQUIRED FOR PROJECT. FURNISH SUBMITTALS AND SHOP DRAWINGS AS REQUIRED BY INDIVIDUAL SECTIONS OF SPECIFICATIONS.
4. CONTRACTOR SHALL THOROUGHLY CHECK SUBCONTRACTORS' OR VENDORS' SUBMITTALS AND SHOP DRAWINGS AND, AFTER APPROVING THEM, SUBMIT THEM FOR REVIEW. SUBMITTALS AND SHOP DRAWINGS THAT DO NOT BEAR CONTRACTOR'S REVIEW STAMP WILL BE RETURNED NOT REVIEWED.
5. IF DISCREPANCIES BETWEEN SUBMITTALS, SHOP DRAWINGS, AND CONTRACT DOCUMENTS ARE DISCOVERED EITHER PRIOR TO OR AFTER SUBMITTALS AND SHOP DRAWINGS ARE REVIEWED, REQUIREMENTS OF CONTRACT DOCUMENTS SHALL TAKE PRECEDENCE. SUBMITTALS AND SHOP DRAWINGS WHICH ARE SUBMITTED, BUT WHICH ARE NOT REQUIRED BY CONTRACT DOCUMENTS, WILL BE RETURNED NOT REVIEWED.
6. SUBMITTALS AND SHOP DRAWINGS SHALL IDENTIFY SPECIFIC EQUIPMENT WITH NUMBERS OR LETTERS IDENTICAL TO THOSE LISTED OR SCHEDULED ON THE DRAWINGS OR SPECIFICATIONS.

RECORD DOCUMENTS:
1. KEEP IN CUSTODY DURING ENTIRE PERIOD OF CONSTRUCTION, A CURRENT SET OF DOCUMENTS INDICATING CHANGES THAT HAVE BEEN MADE TO THE CONTRACT DOCUMENTS.
2. UPON COMPLETION OF WORK, SUBMIT THE COMPLETE SET OF RECORD DOCUMENTS TO THE ARCHITECT.

PROTECTION OF EQUIPMENT:
1. PROTECT MATERIALS AND EQUIPMENT FROM PHYSICAL DAMAGE, CONSTRUCTION DIRT, AND THE ELEMENTS FROM TIME OF SHIPMENT TO TIME INSTALLATION IS ACCEPTED BY OWNER.

GUARANTEE:
1. GUARANTEE MATERIALS, WORKMANSHIP, AND OPERATION OF EQUIPMENT INSTALLED FOR PERIOD OF ONE YEAR FROM DATE OF ACCEPTANCE OF ENTIRE WORK. REPAIR OR REPLACE ANY PART OF WORK WHICH SHOWS DEFECT DURING THAT TIME.
2. BE RESPONSIBLE FOR DAMAGE TO PROPERTY OF OWNER OR TO WORK OF OTHER CONTRACTORS DURING CONSTRUCTION AND GUARANTEE PERIOD.
3. FURNISH EQUIPMENT WARRANTIES TO OWNER.

MECHANICAL EQUIPMENT WIRING AND CONNECTIONS:
1. VOLTAGE CHARACTERISTICS SHALL BE AS IN ELECTRICAL DIVISION OF SPECIFICATIONS AND ON ELECTRICAL DRAWINGS.

TEMPORARY FACILITIES:
1. USE OF EXISTING EQUIPMENT FOR TEMPORARY HEATING OR COOLING: DO NOT USE NEW OR EXISTING BUILDING EQUIPMENT WITHOUT WRITTEN PERMISSION FROM OWNER.

INSPECTIONS:
1. DO NOT COVER UP OR ENCLOSE WORK UNTIL INSPECTED, TESTED, AND APPROVED. ANY WORK ENCLOSED OR COVERED UP BEFORE SUCH APPROVAL SHALL BE UNCOVERED, TESTED, AND APPROVED.

ACCESS DOORS:
1. FURNISH HINGED STEEL ACCESS DOORS WITH CONCEALED LATCH, WHETHER SHOWN OR NOT, IN WALLS AND PLASTER OR GYPSUM BOARD CEILINGS FOR ACCESS TO CONCEALED VALVES, SHOCK ARRESTERS, AIR VENTS, MOTORS, FANS, BALANCING VALVES, OR OTHER OPERATING DEVICES REQUIRING ADJUSTMENT OR SERVICING.
2. ACCESS DOOR SHALL BE SIZE OF EQUIPMENT TO BE REMOVED OR 24" BY 24" IF USED FOR SERVICE ONLY.

INSTALLATION:
1. WORKMANSHIP SHALL BE FIRST QUALITY. APPEARANCE OF WORK SHALL BE OF EQUAL IMPORTANCE TO ITS MECHANICAL OPERATION. LACK OF QUALITY WORKMANSHIP SHALL BE REASON FOR REJECTION OF SYSTEM IN PART OR IN WHOLE.
2. INSTALL SO THAT ALL VALVES AND EQUIPMENT CAN BE EASILY ACCESSED AND SERVICED BY ADEQUATE CLEARANCE, INSTALLATION OF ACCESS DOORS, UNIONS IN PIPING, OR OTHER METHODS.
3. COMPLETE INSTALLATION SHALL FUNCTION SMOOTHLY AND NOISELESSLY.
4. INSTALL EQUIPMENT AND MATERIALS PER MANUFACTURERS' RECOMMENDATIONS AND LOCAL CODES OR REGULATIONS.
5. PLACE OR REPLACE ALL EQUIPMENT NAMEPLATES WHERE THEY CAN BE SEEN AND READ WITHOUT DIFFICULTY.
6. FLUSH PIPES FREE OF FOREIGN SUBSTANCES BEFORE INSTALLING VALVES OR MAKING FINAL CONNECTIONS. CLEAN ALL PIPING AND EQUIPMENT.

COMPLETION:
1. CLEAN INSULATION COVERING, PIPES, EQUIPMENT, AND ACCESSORIES TO RECEIVE PRIME COAT OF PAINT. CLEAN EQUIPMENT RECEIVED WITH PRIME COAT TO RECEIVE FINAL COAT.
2. INSTRUCT OWNER IN OPERATION AND MAINTENANCE OF PLUMBING SYSTEMS. MINIMUM PARTICIPANTS SHALL INCLUDE PLUMBING CONTRACTOR AND CONTROLS CONTRACTOR REPRESENTATIVES.
3. AFTER TESTS AND ADJUSTMENTS HAVE BEEN MADE AND SYSTEMS PRONOUNCED SATISFACTORY FOR PERMANENT OPERATION, REFINISH DAMAGED FINISH AND LEAVE EVERYTHING IN PROPER WORKING ORDER AND APPEARANCE.
4. ON COMPLETION OF WORK, REMOVE TOOLS, SCAFFOLDING, DEBRIS, ETC., FROM GROUNDS AND LEAVE PREMISES CLEAN.

OPERATION AND MAINTENANCE MANUALS:
1. PRIOR TO COMPLETION OF PROJECT, SUBMIT ONE (1) ELECTRONIC SET OF MAINTENANCE MANUALS COVERING OPERATION AND MAINTENANCE OF MECHANICAL EQUIPMENT WITH MOVING OR MOVABLE PARTS, INCLUDING PLUMBING SYSTEMS. INSTRUCTIONS SHALL BE IN PAMPHLET OR TYPEWRITTEN FORM IN THREE RING BINDERS. INSTRUCTIONS FOR EACH UNIT SHALL BE INDICATED BY SEPARATE TAB.
2. INCLUDE STARTING, STOPPING, LUBRICATION, PREVENTATIVE MAINTENANCE SCHEDULE, AND ADJUSTMENT INFORMATION FOR EACH PIECE OF EQUIPMENT.

PIPE AND PIPE FITTINGS

QUALITY ASSURANCE
- A. WELDING MATERIALS AND LABOR SHALL CONFORM TO ASME CODE FOR PRESSURE PIPING AND APPLICABLE STATE LABOR REGULATIONS.
- B. USE WELDERS FULLY QUALIFIED AND LICENSED BY STATE AUTHORITIES. FURNISH CERTIFICATION FROM APPROVED TESTING AGENCY OR NATIONAL CERTIFIED PIPE WELDING BUREAU THAT WELDERS PERFORMING WORK ARE CERTIFIED.
- C. ALL PIPING MATERIALS SHALL COMPLY WITH LOCAL CODES.

UNIONS AND COUPLINGS
- A. 2" AND SMALLER: 125 PSI CAST IRON FOR THREADED FERROUS PIPING; BRONZE FOR COPPER OR BRASS PIPE, SOLDERED JOINTS.
- B. 2-1/2" AND LARGER: 150 PSI FORGED STEEL FLANGES, RAISED FACE WITH WELDING NECK, FOR FERROUS PIPING; BRONZE FLANGES FOR COPPER OR BRASS PIPING. GASKETS FOR WATER PIPING TO 140 F EQUAL TO GARLOCK PREMIUM GRADE STYLE 22 RED RUBBER, 1/16" THICK. GASKETS FOR NATURAL GAS EQUAL TO GARLOCK BLUE-GARD STYLE 3000 SYNTHETIC FIBER WITH NITRILE BINDER, 1/16" THICK. GASKETS FOR CONDENSATE, AND WATER ABOVE 140 F AS MANUFACTURED BY FLEXITALLIC.

EXECUTION
- A. VERIFY LOCATION(S) OF ALL AIR PLENUMS. ALL PIPING AND SUPPORT MATERIALS INSTALLED IN AIR PLENUMS SHALL BE PLENUM-RATED. DO NOT INSTALL SPECIFIED NON-PLENUM-RATED MATERIALS IN AIR PLENUMS; USE PLENUM-RATED OPTIONS.
- B. ROUTE PIPING IN ORDERLY MANNER AND MAINTAIN PROPER SLOPE.
- C. CONCEAL PIPING IN WALLS OR ABOVE CEILING UNLESS OTHERWISE NOTED.
- D. MAINTAIN FOLLOWING PIPE SLOPES UNLESS OTHERWISE NOTED ON DRAWINGS:
  - SANITARY WASTE 2-1/2" AND SMALLER: 1/4" DOWN PER 1'-0" IN DIRECTION OF FLOW.
  - SANITARY WASTE 3" AND LARGER: 1/8" DOWN PER 1'-0" IN DIRECTION OF FLOW.
  - SANITARY VENT PIPING, ALL SIZES: GRADED AND CONNECTED AS TO DRIP BACK BY GRAVITY TO THE DRAINAGE PIPE IT SERVES.
- E. INSTALL PIPING TO ALLOW FOR EXPANSION AND CONTRACTION WITHOUT STRESSING PIPE OR CONNECTED EQUIPMENT.
- F. PROVIDE CLEARANCE FOR INSTALLATION OF INSULATION AND FOR ACCESS TO VALVES, AIR VENTS, DRAINS, UNIONS.
- G. INSTALL SAME TYPE PIPING MATERIAL SPECIFIED FOR INSIDE BUILDING TO 5'-0" OUTSIDE BUILDING.
- H. MAKE CONNECTIONS TO EQUIPMENT WITH UNIONS OR FLANGES.

STEEL PIPE CONNECTIONS
- A. 2" AND SMALLER - THREADED; 2-1/2" AND LARGER - WELDED.
- B. DO NOT USE MITERED AND WELDED ELBOWS IN LIEU OF FITTINGS.
- C. DIE CUT THREADED JOINTS WITH FULL CUT STANDARD TAPER PIPE THREADS WITH 1/2" WIDE WHITE TEFLON PIPE JOINT SEALANT TAPE APPLIED TO MALE THREADS ONLY.
- D. USE ONLY MALLEABLE IRON THREADED PIPE FITTINGS FOR GAS PIPING.
- E. USE BUTT WELD FITTINGS FOR WELDED STEEL PIPES. USE OXYACETYLENE OR ELECTRIC ARC PROCESS.

CAST IRON PIPE CONNECTIONS
- A. JOINTS FOR BELL AND SPIGOT PIPES: NEOPRENE GASKETING SYSTEM WITH "TY-SEAL" WATER SOLUBLE LUBRICANT.
- B. JOINTS FOR PLAIN END PIPE ABOVE GRADE: STAINLESS STEEL BAND TYPE GASKET AND CLAMP MECHANICAL FASTENER.
- C. USE HUBLESS PIPING ABOVE GRADE ONLY.

COPPER PIPE CONNECTIONS
- A. 2-1/2" AND SMALLER: USE 15% SILVER BRAZING ALLOY AND SILVER BRAZING FLUX ON BELOW-GRADE JOINTS. USE 95% TIN, 5% ANTIMONY LEAD-FREE SOLDER AND ASTM B813-91 NON-CORROSIVE STM 1.0 FLUX ON JOINTS. APPLY FLUX ON CLEANED END OF PIPE AND INSIDE FITTINGS WITH SMOOTH EVEN COATS.

APPLICATION OF PIPING SYSTEMS:

SERVICE	MATERIAL
EQUIPMENT DRAINS AND OVERFLOWS	COPPER, TYPE L OR DWV, HARD DRAWN
SANITARY DRAIN AND VENT ABOVE SLAB-ON-GRADE	COPPER, TYPE L, HARD DRAWN; CAST IRON
SANITARY DRAIN AND VENT, BELOW SLAB-ON-GRADE INSIDE BUILDING	CAST IRON
DOMESTIC WATER UNBURIED	COPPER, TYPE K, HARD DRAWN
DOMESTIC WATER EXPOSED AT FIXTURES	SEAMLESS BRASS PIPE, CHROME PLATED
GAS PIPING	SCHEDULE 40 BLACK STEEL

UNDERGROUND PIPE INSTALLATION
- A. PROTECT STEEL PIPE INSTALLED BELOW GRADE AND TO MINIMUM 6" ABOVE GRADE WITH FACTORY APPLIED COVERING, PRO-CO FELT AND PIPE LINE ENAMEL NO. 4 DOUBLE WRAP OR X-TRU-COAT PLASTIC COATING. PROTECT FIELD JOINTS ON STEEL PIPE BY WITH TAPECOAT COMPANY PRIME COAT AND ONE LAYER OF TAPECOAT #20 HEAT APPLIED, 62 MIL TAPE PER MANUFACTURER'S RECOMMENDATIONS.
- B. PROVIDE THRUST BLOCK AT ALL DIRECTION CHANGES ON PRESSURE PIPE.
- C. BURY ALL OUTSIDE WATER PIPING MINIMUM 5'-0" BELOW GRADE TO TOP OF PIPE.
- D. BURY ALL OUTSIDE GAS PIPING MINIMUM 1'-6" BELOW GRADE TO TOP OF PIPE.

SUBMITTALS
- A. FURNISH MANUFACTURER'S SUBMITTAL DATA FOR VALVES.
- B. VALVES SHALL BE OF SAME MANUFACTURER WHERE POSSIBLE. STAINLESS STEEL BALL AND STEM, VALVE SEATS AND MATERIALS SHALL BE SUITABLE FOR SERVICE INTENDED.

VALVES

ACCEPTABLE MANUFACTURES
- A. BALL VALVE: APOLLO, KITZ, NIBCO.
- B. GAS VALVE: DEZURIK.

RATINGS
- A. UNLESS OTHERWISE INDICATED, VALVES SHALL BE SUITABLE FOR 200 PSIG WOG AND 250 F.

SHUTOFF VALVE
- A. BALL VALVE, ALL SIZES: TWO-PIECE BRONZE OR FORGED BRASS BODY WITH PTFE SEATS, PRESSURE RATED TO 150 SWP/600 WOG, FULL PORT, BLOWOUT-PROOF STEM AND POSITIVE SHUT-OFF. PACKING GLAND WITH PTFE PACKING. STEM EXTENSION WHERE INSULATED, LOCKABLE HANDLE.

BALANCING VALVE
- A. FULL PORTED BALL VALVE WITH BALANCING STOPS.

CHECK VALVE
- A. 2" AND SMALLER: BRONZE, SWING DISC, SOLDER OR THREADED ENDS.
- B. 2-1/2" AND LARGER: IRON BODY, BRONZE TRIM, SWING DISC, RENEWABLE DISC AND SEAT, FLANGED ENDS.
- C. SPRING LOADED, SILENT TYPE, CAST IRON BODY WITH BUNA-N SEATS SUITABLE FOR 250F. WAFER AND DISCS OF ALUMINUM, BRONZE, OR DUCTILE IRON. SHAFT AND SPRINGS TYPE 316 STAINLESS STEEL.

GAS VALVE
- A. IRON OR FORGED BRASS BODY INDOORS, BRONZE OR FORGED BRASS BODY OUTDOORS.
- B. FORGED BRASS BALL VALVE. CERTIFIED TO CSA, ASME B16.33, AND UL FOR GAS PIPING SYSTEMS.

DRAIN VALVE
- A. BALL VALVE WITH NIPPLE, CAP, HOSE THREAD.

INSTALLATION
- A. PROVIDE VALVES SUITABLE TO CONNECT TO ADJOINING PIPING AS SPECIFIED FOR PIPE JOINTS. USE PIPE SIZE VALVES.
- B. 2" AND SMALLER: THREADED OR SOLDERED.
- C. 2-1/2" AND LARGER: FLANGED.
- D. SOLDER OR SCREW TO SOLDER ADAPTERS FOR COPPER TUBING.
- E. PROVIDE DRAIN VALVES AT MAIN SHUT-OFF VALVES, LOW POINTS OF PIPING AND APPARATUS.
- F. USE SPRING LOADED CHECK VALVES AT PUMPS AND WHERE INSTALLED IN VERTICAL POSITION.

SUPPORTS, ANCHORS, SEALS

REFERENCE STANDARDS
- A. PIPE SUPPORTS: ANSI B31.1, POWER PIPING.

INSERTS
- A. MALLEABLE IRON CASE, GALVANIZED STEEL SHELL, EXPANDER PLUG FOR THREADED CONNECTION WITH LATERAL ADJUSTMENT, TOP SLOT FOR REINFORCING RODS, LUGS FOR ATTACHING TO FORMS. USE INSERTS AND ANCHORS SUITABLE FOR TYPE OF STRUCTURAL CONDITIONS AND COMPONENTS.

PIPE HANGERS AND SUPPORTS
- A. HANGERS, PIPE SIZES TO 1-1/2": ADJUSTABLE STEEL RING (INSULATED PIPE) OR BAND (UNINSULATED PIPE).
- B. HANGERS, HOT PIPE SIZES 2" TO 4" AND ALL COLD PIPE SIZES: ADJUSTABLE STEEL CLEVIS.
- C. WALL SUPPORT, PIPE SIZES TO 3": CARBON STEEL HOOK.
- D. WALL SUPPORT, PIPE SIZES 4" AND OVER: WELDED STEEL BRACKET AND PIPE STRAP. ADJUSTABLE STEEL YOKE PIPE ROLL OR ROLLER CHAIR FOR HOT PIPE SIZES 5" AND OVER.
- E. VERTICAL SUPPORT: STEEL RISER CLAMP.
- F. FLOOR SUPPORT, HOT PIPE SIZES TO 4" AND ALL COLD PIPE SIZES: CARBON STEEL, ADJUSTABLE PIPE SADDLE, LOCKNUT NIPPLE, FLOOR FLANGE, CONCRETE PIER OR STEEL SUPPORT SIZED FOR PIPE ELEVATION.
- G. FOR PIPE SIZES 1-1/2" AND SMALLER, PROTECT INSULATED HORIZONTAL PIPE AT POINT OF SUPPORT BY 180 DEGREE, 12" LONG SHEET METAL SHIELD. NO HANGER SHALL PENETRATE OR CRUSH INSULATING MATERIAL.
- H. FOR PIPE SIZES 2" AND LARGER, PROTECT INSULATED HORIZONTAL PIPE AT POINT OF SUPPORT BY 180 DEGREE, 12" LONG GALVANIZED SHEET METAL SHIELD SURROUNDING 180 DEGREE INSERT OF HIGH DENSITY CALCIUM SILICATE INSULATION OF SAME THICKNESS AS ADJOINING PIPE INSULATION. ON COLD PIPING, EXTEND INSULATION INSERT 1" BEYOND SHEET METAL SHIELD AT EACH END. OVERSIZE HANGERS TO ACCOMMODATE SHIELDED INSERTS. NO HANGER SHALL PENETRATE OR CRUSH INSULATING MATERIAL. AT CONTRACTOR'S OPTION, PRE-MANUFACTURED THERMAL HANGER SHIELDS WITH INTEGRAL VAPOR BARRIER, EQUIVALENT TO VALUE ENGINEERED PRODUCTS PRO-SHIELD OR PRO-SHIELD N/T, MAY BE UTILIZED. FOR EXTERIOR INSTALLATIONS USE WEATHER SHIELD WITH ALUMINUM JACKET.
- I. PROVIDE COPPER PLATED HANGERS AND SUPPORTS FOR COPPER PIPING WHERE PIPING AND HANGER ARE IN DIRECT CONTACT WITH ONE ANOTHER.

PIPE HANGER RODS
- A. THREADED STEEL.

PIPE HANGERS AND SUPPORTS
- A. SUPPORT HORIZONTAL PIPING AS FOLLOWS:

NOMINAL PIPE SIZE	MAXIMUM HANGER SPACING			HANGER ROD DIAMETER
	STEEL	COPPER	SCHEDULE 40 PVC	
1-1/2" AND SMALLER	6'-0"	6'-0"	4'-0"	3/8"
2" TO 4"	10'-0"	10'-0"	4'-0"	3/8"

- A. INSTALL HANGERS TO PROVIDE MINIMUM 1/2" CLEAR SPACE BETWEEN FINISHED COVERING AND ADJACENT WORK, EXCEPT WHERE UL LISTING FOR FIRE RATED CEILING REQUIRES 4" MINIMUM SEPARATION.
- B. SUPPORT HORIZONTAL CAST IRON HUB AND SPIGOT PIPE WITHIN 1'-0" OF EACH HUB AND WITH 5'-0" MAXIMUM SPACING BETWEEN HANGERS, EXCEPT THAT PIPE EXCEEDING 5'-0" IN LENGTH SHALL BE SUPPORTED AT INTERVALS NO GREATER THAN 10'-0". SUPPORT HORIZONTAL NO-HUB CAST IRON PIPE RUNS AT EACH FITTING AND AT EACH LENGTH OF PIPE LESS THAN 4'-0" WITH AT LEAST ONE HANGER. SUPPORT HORIZONTAL NO-HUB PIPES LONGER THAN 4'-0" ON BOTH SIDES OF EACH JOINT.
- C. PLACE HANGER WITHIN 1'-6" OF EACH ELBOW OR TEE.
- D. SUPPORT VERTICAL PIPING AT EVERY FLOOR. SUPPORT VERTICAL SOIL PIPE AT EACH FLOOR AT HUB. SUPPORT NO-HUB PIPE SO WEIGHT IS CARRIED FROM PIPE TO SUPPORT AND NOT FROM JOINT TO SUPPORT.
- E. SUPPORT EACH BRANCH PIPE TO EQUIPMENT AT TAKE-OFF AND WITHIN 12" OF TERMINATION.
- F. PROVIDE GALVANIZED STEEL INSULATION PROTECTION SADDLES AT ALL SUPPORT POINTS FOR INSULATED PIPES ON TRAPEZE HANGERS.
- G. ANCHOR ALL SUPPORTING LUGS OR GUIDES TO BUILDING STRUCTURE.
- H. ANCHOR AND SUPPORT WATER CONNECTIONS TO PLUMBING FIXTURES, IN PIPE CHASES OR WALLS, TO FIXTURE CARRIERS OR WASTE AND VENT PIPING. SUPPORTS SHALL BE SIMILAR TO ADJUSTO-SPACER SYSTEM AS MANUFACTURED BY THOMAS INDUSTRIES. PLACE ADJUSTO-SPACERS EVERY 10'-0" ON VERTICAL PIPE AND EVERY 5'-0" ON HORIZONTAL PIPE. INSULATE PIPE AREA IN CONTACT WITH ADJUSTO-SPACERS WITH DUCT TAPE, FELT LINER, OR PLASTIC LINER MATERIAL.

FLASHING AND SAFING
- A. WHERE EXPOSED PIPING PASSES THROUGH WALLS, FLOORS, ROOFS, PROVIDE CHROME PLATED OR STAINLESS STEEL ESCUTCHEON FOR PIPING.
- B. FLASH AND COUNTERFLASH WHERE MECHANICAL EQUIPMENT PASSES THROUGH WEATHER- OR WATER-PROOFED WALLS, FLOORS, ROOFS.
- C. PROVIDE PRE-MANUFACTURED PIPE BOOT FOR VENT AND/OR WASTE STACKS PASSING THROUGH ROOF. SECURE BOOT TO PIPE WITH STAINLESS STEEL BAND CLAMP OR OTHER CLAMPING DEVICE AS APPROVED BY ROOFING MANUFACTURER, RE: ARCHITECT.

SLEEVES
- A. PROVIDE PIPE SLEEVES TO APPLICABLE TRADES WITH PRECISE ROUGH-IN LOCATIONS FOR PIPES PASSING THROUGH CONCRETE OR MASONRY CONSTRUCTION. UNLESS OTHERWISE INDICATED, SLEEVES SHALL BE OF SIZE TO PROVIDE FROM 1/4" TO 1" CLEARANCE BETWEEN BARE PIPE AND SLEEVE. WHERE PIPE PASSES THROUGH CONCRETE FLOOR, EXTEND SLEEVE MINIMUM 1" ABOVE FINISHED FLOOR.
- B. SLEEVES IN BEARING WALLS, WATERPROOF MEMBRANE FLOORS, WET AREAS SHALL BE STEEL PIPE OR CAST IRON PIPE. SLEEVES IN NON-BEARING WALLS, FLOORS, CEILINGS SHALL BE STEEL PIPE OR CAST IRON PIPE.
- C. WHERE UNINSULATED PIPES PENETRATE BEARING WALLS (EXCLUDING FOUNDATIONS), FIRE RATED WALLS, PARTITIONS, FLOORS, PACK AND SEAL ENTIRE SPACE BETWEEN PIPE AND SLEEVE WITH DOW CORNING 3-6548 SILICONE RTV FOAM, OR 1" MINIMUM THICKNESS OF 3M FIRE BARRIER, CP-25 CAULK, OR 303 PUTTY ON EACH SIDE OF OPENING.
- D. ENCASE ALL INSULATED PIPES PENETRATING FIRE WALLS AND FLOORS IN 360 DEGREE METAL-SHIELDED INSULATION INSERTS AS MANUFACTURED BY VALUE ENGINEERED PRODUCTS. PACK AND SEAL SPACE BETWEEN SHIELD AND SLEEVE PER PRECEDING PARAGRAPH. EXTEND INSULATION INSERT ON ALL DOMESTIC WATER LINES 1" BEYOND SHEET METAL SHIELD.
- E. PIPE TO SLEEVE CLOSURE FOR PIPES PENETRATING FOUNDATIONS, WATERPROOFING MEMBRANE FLOORS, WET AREAS SHALL BE "LINK-SEAL."

METERS AND GAUGES

SUBMITTALS
- A. FURNISH MANUFACTURER'S SUBMITTAL DATA FOR: THERMOMETERS, PRESSURE GAUGES, FLOW MEASURING DEVICES, TEST PLUGS.

PORTABLE INSERTION TYPE THERMOMETERS
- A. 5" STEMS, ACCURATE WITHIN 1% OVER DIAL RANGE, HERMETICALLY SEALED.

CONSTANT READ THERMOMETERS
- A. MERCURY FREE THERMOMETER: 9" ALUMINUM CASE, NON-TOXIC HEAT TRANSFER MEDIUM-FILLED TUBE, SEPARABLE SOCKET CONNECTION, EXTENSION NECK TO CLEAR INSULATION, SWIVEL ANGLE STEM, FULLY ADJUSTABLE, ACCURATE WITHIN 1% OVER DIAL RANGE.

PORTABLE INSERTION TYPE PRESSURE GAUGES
- A. 4-1/2" DIAL, PHOSPHOR-BRONZE BOURDON TUBE, STAINLESS STEEL MOVEMENT, ACCURATE WITHIN 1/2% OVER SCALE RANGE.

CONSTANT READ PRESSURE GAUGES
- A. 4-1/2" OR 5" DIAL, STANDARD BLACK CASE, BRASS PRESSURE SNUBBER AND NEEDLE VALVE. ACCURATE WITHIN 1% OVER MIDDLE HALF OF SCALE RANGE, 2% OVER REMAINDER.

FLOW MEASURING DEVICE
- A. ORIFICE OR VENTURI TYPE, FACTORY ASSEMBLED WITH 300 PSIG RATED BALL VALVE OR 125 PSIG RATED MULTI-TURN GLOBE VALVE WITH ADJUSTABLE MEMORY STOP. SCHRADER TYPE PRESSURE TEST PORTS AND CAPS WITH PORT EXTENSIONS. CHAINED METAL TAG INDICATING LOCATION, GPM, AND METER READING.

INSTALLATION
- A. MOUNT THERMOMETERS TO BE EASILY READ FROM FLOOR.
- B. INSTALL FLOW MEASURING DEVICES PER MANUFACTURER'S RECOMMENDATIONS.
- C. FURNISH METERING STATION WITH PERMANENT METAL TAG MARKED WITH STATION DESIGNATION, GPM, METER READING FOR GPM.

MECHANICAL INSULATION

GENERAL
- A. ADHESIVES AND INSULATION MATERIALS: COMPOSITE FIRE AND SMOKE HAZARD RATINGS MAXIMUM 25 FOR FLAME SPREAD AND 50 FOR SMOKE DEVELOPED. ADHESIVES SHALL BE WATERPROOF.

PIPE INSULATION
- A. HEAVY DENSITY ONE-PIECE FIBERGLASS, FACTORY APPLIED VAPOR BARRIER JACKET, DOUBLE SURFACE ADHESIVE SELF-SEALING LAP, "K" FACTOR 0.23 AT 75 F MEAN TEMPERATURE. INSULATION EXPOSED TO WEATHER: PROTECT INSULATION WITH WEATHERPROOF METAL JACKET. JACKET SHALL BE FACTORY APPLIED ALUMINUM, 0.016" THICK, WITH LAMINATED VAPOR BARRIER AND "Z" GROOVE WATERTIGHT SEAL. SEAL EACH JOINT WITH SNAP STRAPS CONTAINING PERMANENT PLASTIC SEALING COMPOUND. SECURE WITH 1/2" WIDE STAINLESS STEEL BANDS. INSULATE FITTINGS WITH MITERED SECTIONS OF SAME MATERIAL. SEAL JOINTS WITH SEALING COMPOUND AND PREFORMED ALUMINUM BANDS.

INSTALLATION
- A. INSULATION SHALL BE CONTINUOUS THROUGH INSIDE WALLS. PACK AROUND PIPES WITH FIREPROOF SELF-SUPPORTING INSULATION MATERIAL, FULLY SEALED.
- B. FINISH INSULATION NEATLY AT HANGERS, SUPPORTS, OTHER PROTRUSIONS, AND WHERE THE INSULATION BREAKS FOR SERVICE OR ACCESS REQUIREMENTS.
- C. DO NOT COVER PIPING UNTIL TESTED.
- D. REMOVE AND REAPPLY INSULATION IF, IN OPINION OF ARCHITECT, IT HAS NOT BEEN INSTALLED IN FIRST CLASS WORKMANLIKE MANNER.
- E. REPAIR SEPARATION OF JOINTS OR CRACKING OF INSULATION DUE TO THERMAL MOVEMENT OR POOR WORKMANSHIP.

INSTALLATION OF PIPE INSULATION
- A. SEAL LONGITUDINAL LAPS WITH VAPOR BARRIER ADHESIVE OR WITH FACTORY APPLIED DOUBLE SURFACE PRESSURE SENSITIVE ADHESIVE SYSTEM. SEAL END JOINTS WITH 3" WIDE BUTT STRIPS SECURED WITH VAPOR BARRIER ADHESIVE. SEAL ALL SEAMS ON COLD WATER PIPING WITH BENJAMIN FOSTER 30-35 SEAL FAST MASTIC.

INSTALLATION OF INSULATION ON FITTINGS AND VALVES
- A. INSULATE FITTINGS AND VALVES WITH FIRMLY COMPRESSED FOIL-FACED FIBERGLASS BLANKET AND 25/50 UL RATED PVC FITTING COVERS (ZESTON OR EQUAL).
- B. WHERE INSTALLATION OF PVC FITTING COVERS IS PROHIBITED BY LOCAL AUTHORITIES, INSULATE FITTINGS AND VALVES WITH MOLDED FIBERGLASS FITTINGS OR FIRMLY COMPRESSED FOIL-FACED FIBERGLASS BLANKET. SECURE IN PLACE WITH 20 GAUGE CORROSION RESISTANT WIRE AND APPLY SMOOTHING COAT OF INSULATING CEMENT. FINISH WITH LAYER OF GLASS CLOTH EMBEDDED BETWEEN TWO COATS OF VAPOR BARRIER MASTIC. LAP GLASS FABRIC 2" ONTO ADJACENT INSULATION.
- C. INSULATION ON FITTINGS AND VALVES SHALL BE SAME THICKNESS AS ON PIPE.

INSULATION SCHEDULE:

SERVICE	PIPE SIZE	THICKNESS
DOMESTIC COLD WATER	ALL	1"
DOMESTIC HOT WATER, DOMESTIC HOT WATER RECIRCULATION	1-1/2" AND SMALLER	1"
	2" AND LARGER	2"

TESTING AND BALANCING

STATUS OF SYSTEMS
- A. DO NOT BEGIN TESTING AND BALANCING WORK UNTIL SYSTEM HAS BEEN COMPLETED AND IS IN FULL WORKING ORDER.
- B. PUT SYSTEMS AND EQUIPMENT INTO FULL OPERATION AND CONTINUE OPERATION OF SAME DURING EACH WORKING DAY OF TESTING AND BALANCING. ASCERTAIN PRELIMINARY TAB REQUIREMENTS PRIOR TO COMMENCEMENT OF WORK THROUGH REVIEW OF AVAILABLE DRAWINGS AND SPECIFICATIONS. MAKE VISUAL OBSERVATIONS AT SITE DURING CONSTRUCTION TO DETERMINE LOCATION AND SUITABILITY OF REQUIRED BALANCING DEVICES.

REQUIREMENTS OF WORK
- A. DOMESTIC CIRCULATING HOT WATER
  - a. ADJUST MANUAL BALANCING VALVES IN SYSTEM SO ALL HOT WATER OUTLETS RECEIVE ADEQUATE SUPPLY OF HOT WATER.
  - b. WHEN BALANCING IS DONE, MARK VALVES IN BALANCED POSITION, SET LOCKING RINGS.

GENERAL PIPE TESTING
- A. TEST ALL PIPING SYSTEMS. CORRECT LEAKS BY REMAKING JOINTS. REMOVE EQUIPMENT NOT ABLE TO WITHSTAND TEST PRESSURE FROM SYSTEM DURING TEST. CONSULT GOVERNING CODES FOR SPECIAL SYSTEM REQUIREMENTS.
- B. TEST PIPING BEFORE BEING PERMANENTLY ENCLOSED.
- C. OBTAIN CERTIFICATES OF APPROVAL, ACCEPTANCE, COMPLIANCE WITH REGULATIONS OF AGENCIES HAVING JURISDICTION. SUBMIT TO OWNER.

CHLORINATION OF DOMESTIC WATER LINE
- A. STERILIZE DOMESTIC WATER SYSTEM AFTER PRESSURE TESTS HAVE BEEN COMPLETED. FLUSH ENTIRE SYSTEM, INTRODUCE CHLORINE OR HYPOCHLORITE TO NOT LESS THAN 50 PPM RESIDUAL CHLORINE. LET STAND FOR 24 HOURS MINIMUM.
- B. FLUSH SYSTEM WITH CLEAN WATER UNTIL CHLORINE CONTENT IS REDUCED TO 1 PPM AT POINT FURTHEST FROM WHERE CHLORINE WAS INTRODUCED.

SYSTEM TESTS
- A. HYDROSTATIC TEST - WATER PIPING (NEW PIPING ONLY): HAND PUMP SYSTEM TO GREATER OF 100 PSIG OR 150% OF OPERATING PRESSURE. MAINTAIN PRESSURE UNTIL SYSTEM HAS BEEN INSPECTED FOR LEAKS BUT NOT LESS THAN FOUR HOURS.
- B. COMPRESSED AIR OR NITROGEN TEST FOR NATURAL GAS PIPING: SUBJECT PIPING SYSTEM TO REQUIRED GAS PRESSURE WITH OIL FREE AIR OR NITROGEN. SYSTEM SHALL MAINTAIN PRESSURE FOR DURATION OF SOAPY WATER TEST OF EACH JOINT. TEST PRESSURE OF 100 PSIG FOR 4 HOURS OR TEST PRESSURE OF 60 PSIG OR ABOVE FOR 24 HOURS SHOWING NO PRESSURE DROP EXCEPT THAT CAUSED BY TEMPERATURE CHANGES. DO NOT USE FLAME OR OTHER LIQUID FOR TESTING. DO NOT REPAIR DEFECTS IN GAS PIPING OR FITTINGS; REMOVE AND REPLACE WITH SOUND MATERIAL.
- C. WASTE, DRAIN, VENT PIPING: FILL SYSTEM WITH WATER TO POINT OF OVERFLOW BUT NOT LESS THAN 10'-0" HEAD. MAINTAIN WATER LEVEL FOR 4 HOURS.

PLUMBING LEGEND

NOT ALL ITEMS LISTED BELOW ARE USED ON THIS SET OF PLUMBING DRAWINGS

PLUMBING PIPING

SYMBOL	ABBV.	DESCRIPTION
	CW	DOMESTIC COLD WATER
	HW	DOMESTIC HOT WATER
	HWC	DOMESTIC HOT WATER CIRCULATION
180°	HW	DOMESTIC HOT WATER AT TEMP. SHOWN
T	T	TEMPERED WATER
TR	TR	TEMPERED WATER CIRCULATION
W	W	SOIL OR WASTE
GW	GW	GREASE WASTE
SOD	SOD	SEDIMENT & OIL DRAIN
BD	BD	BUILDING DRAIN
BS	BS	BUILDING SEWER
PD	PD	PUMP DISCHARGE LINE
D	D	DRAIN
	V	SANITARY VENT
SD	SD	STORM DRAIN
OD	OD	OVERFLOW DRAIN
SS	SS	STORM SEWER
F	F	FIRE SPRINKLER
FDC	FDC	FIRE DEPT. CONNECTION
G	G	NATURAL GAS LOW PRESSURE
MPG	MPG	NATURAL GAS MEDIUM PRESSURE
LPG	LPG	PROPANE GAS
CA	CA	COMPRESSED AIR

PLUMBING PIPING SYMBOLS

SYMBOL	DESCRIPTION
	ARROW IN LINE INDICATES DIRECTION OF FLOW
XX	INDICATES PIPE SLOPE DOWN
	REMOVE EXISTING
	BOTTOM PIPE CONNECTION
	PIPING UP
	PIPING DOWN
	FIXTURE TRAP OR DRAIN TRAP
	PIPING CAP OR PLUG

PIPING SYMBOLS

SYMBOL	DESCRIPTION
	WALL HYDRANT
	HOSE BIBB
	BALL VALVE
	BALANCING VALVE/ FLOW MEASURING DEVICE
	GATE VALVE
	CHECK VALVE
	SOLENOID VALVE
	PRESSURE REDUCING VALVE
	GAS VALVE
	PUMP
	ATMOSPHERIC VACUUM BREAKER
	STRAINER
	RELIEF VALVE
	DOWNSPOUT NOZZLE
	WATER HAMMER ARRESTER
	UNION
	REDUCER
M	WATER METER
	PRESSURE GUAGE
	THERMOMETER
	FLOOR SINK
	AREA/FLOOR DRAIN
	ROOF DRAIN OR OVERFLOW DRAIN
	WALL CLEANOUT AND LINE CLEANOUT
	FLOOR CLEANOUT
	CONNECT NEW TO EXISTING
DTL SHT / DTL SHT	RISER BUBBLE AND REFERENCE BUBBLE
EQUIP#	EQUIPMENT DESIGNATION

ABBREVIATIONS

AFF	ABOVE FINISHED FLOOR	FCO	FLOOR CLEAN OUT	NC	NORMALLY CLOSED
AFG	ABOVE FINISHED GRADE	FPC	FIRE PROT. CONTRACTOR	NIC	NOT IN CONTRACT
AP	ACCESS PANEL	GC	GENERAL CONTRACTOR	NO	NORMALLY OPEN
BFP	BACKFLOW PREVENTER	IE	INVERT ELEVATION	NTS	NOT TO SCALE
DNZ	DOWNSPOUT NOZZLE	LCO	LINE CLEAN OUT	SCO	SURFACE CLEAN OUT
(E)	EXISTING	MC	MECHANICAL CONTRACTOR	TYP	TYPICAL
EC	ELECTRICAL CONTRACTOR	MH	MANHOLE	WCO	WALL CLEAN OUT
EL	ELEVATION	(N)	NEW	VTR	VENT THROUGH ROOF

PLUMBING SHEET INDEX

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P-1

TOTAL CONNECTED LPG LOAD SCHEDULE •ALTERNATE #7

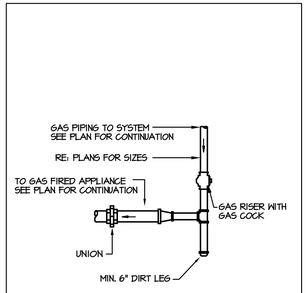
EQUIPMENT	QTY	INPUT EACH (BTUH @ SL)	INPUT TOTAL (BTUH @ SL)	INLET PRESSURE	NOTES
EXISTING EQUIPMENT					
(E)FURNACE	1	110,000	110,000	7" WC	TO REMAIN
TOTAL EXISTING TO REMAIN=			110,000		
NEW EQUIPMENT					
FURN-1	1	110,000	110,000	7" WC	1, 2, 3
TOTAL NEW LOAD=			110,000		
TOTAL EXISTING LOAD TO REMAIN=			110,000		
BUILDING TOTAL CONNECTED LOAD=			220,000		NEW AND EXISTING

NOTES:
1. MODIFICATIONS TO LPG STORAGE CONTAINER AND/OR SERVICE PIPING SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR. SUBMIT REQUIRED GAS SERVICE APPLICATION TO AMERI-GAS (PHONE 1-303-642-1121).
2. FARTHEST CONNECTED DEVICE DISTANCE BASED ON 60'.
3. PIPE SIZING BASED ON PRESSURE AT METER OUTLET OF 120 PSIG. CONTRACTOR TO FIELD VERIFY OUTLET PRESSURE PRIOR TO STARTING WORK.

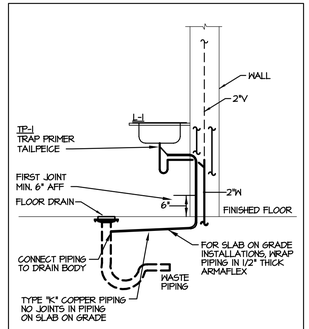
PLUMBING FIXTURE SCHEDULE

SYMBOL	TYPE	ADA	ACCESSORIES	FINISH	MANUFACTURER & MODEL NUMBER	FAUCET TRIM MANUFACTURER & MODEL NUMBER	ACCEPTABLE MANUFACTURERS	REMARKS	ROUGH IN CONNECTION SIZING			
									WASTE (INCHES)	VENT (INCHES)	HOT (INCHES)	COLD (INCHES)
WC-1	FLOOR MOUNTED, PRESSURE ASSISTED TANK TYPE, 17" HIGH, 1.0 GPF, ELONGATED BOWL, 12" ROUGH-IN	YES	HEAVY DUTY SEAT, COLOR SHALL MATCH FIXTURE	VITREOUS CHINA	ZURN ONE Z5561	N/A	AMERICAN STD. CRANE KOHLER	--	4	2	--	1/2
L-1	20"x18" CONCEALED ARM WALL MOUNTED LAVATORY, 4" CENTERSET FAUCET WITH IR HANDS FREE CONTROL & 4-3/4" SPOUT	YES	METAL DRAIN ASSEMBLY	VITREOUS CHINA CHROME FAUCETS	ZURN ONE Z5344.248.3.01.216	ZURN ONE Z5344.248.3.01.216	AMERICAN STD. CRANE KOHLER	PROVIDE WITH 0.5GPM AERATOR AND FLOOR MOUNTED CARRIER AND MIXING VALVE	2	2	1/2	1/2
SCO-1 AND SCO-2	ROUND CAST IRON BODY BRONZE DOUBLE FLANGED HOUSING HEAVY DUTY SECURED COVER	YES	VANDAL RESISTANT SCREWS TAPER THREAD BRONZE PLUG	NICKEL BRONZE	ZURN Z1414-N-VP	--	JOSAM J.R. SMITH WADE, MATTS	PROVIDE 2-WAY CLEANOUT AT EACH SCO-2, TWO COVERS REQUIRED	--	--	--	--
FD-1	6" ROUND TOP, ROUND CAST IRON BODY, FLASHING COLLAR, ADJUSTABLE STRAINER HEAD, SECURED GRATE	YES	TRAP PRIMER CONNECTION	NICKEL BRONZE	ZURN FD2322	--	JOSAM J.R. SMITH WADE, MATTS	FOR FINISHED FLOOR AREAS	NOTED ON PLANS	2	--	--
AD-1	ROUND BODY, SQUARE APRON, 7-1/2" DIAMETER HINGED GRATE	N/A	ROUND TRAFFIC RATED GRATE	CAST IRON	ZURN Z560	--	JOSAM J.R. SMITH WADE/MATTS	--	NOTED ON PLANS	--	--	--
HB-1	SURFACE MOUNTED EXPOSED TYPE HOSE BIBB, ALL BRASS REMOVABLE TEE HANDLE, SPOUT OUTLET VACUUM BREAKER	N/A	DOUBLE CHECK VALVE, 3/4" HOSE THREAD OUTLET	ROUGH BRASS	CHICAGO 293CP-E27	--	JOSAM J.R. SMITH WOODFORD	FOR USE IN NON PUBLIC, HEATED AREAS ONLY	--	--	--	3/4
TP-1	WATER SAVER SINK TAILPIECE STYLE TRAP PRIMER, CHROME PLATED, SEMI CAST BODY	N/A	--	--	ZURN Z1021	--	JOSAM J.R. SMITH P.P.P.	--	--	--	--	--

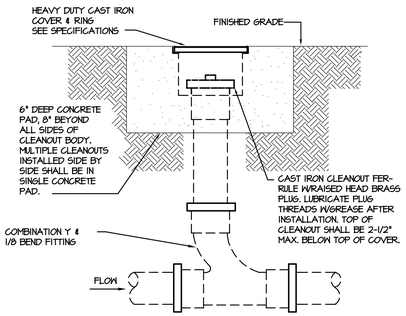
NOTE: FIXTURES SHOWN CONSTITUTE NEGLIGIBLE CHANGE TO OVERALL WATER SERVICE.



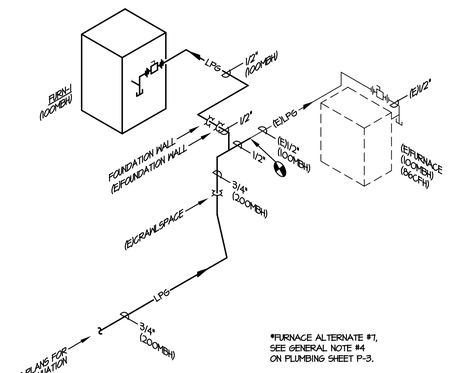
TYPICAL INTERIOR EQUIP. LP-GAS PIPING DIAGRAM
NOT TO SCALE *ALTERNATE #7



TRAP PRIMER DIAGRAM
NOT TO SCALE

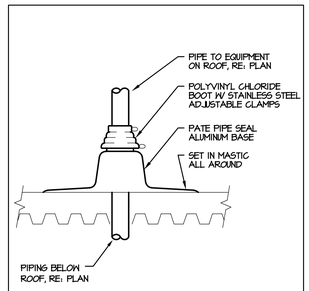


SURFACE CLEANOUT (SCO)
NOT TO SCALE

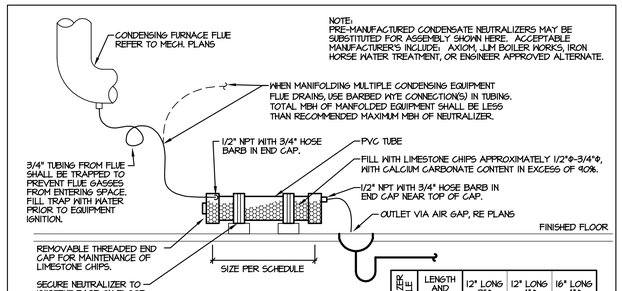


*FURNACE ALTERNATE #7, SEE GENERAL NOTE #4 ON PLUMBING SHEET P-3.

A LP-GAS RISER DIAGRAM
SCALE: NONE *ALTERNATE #7



ROOF PENETRATION DIAGRAM
NOT TO SCALE



NEUTRALIZER SCHEDULE	LENGTH AND DIAMETER:	12" LONG 3"ø	12" LONG 4"ø	16" LONG 4"ø
	MAX. MBH	200	600	1,000

INLINE CONDENSATE NEUTRALIZER DIAGRAM
NOT TO SCALE *ALTERNATE #7

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Bid Set	August 3 2010
Revised per CU Comments	August 19 2010

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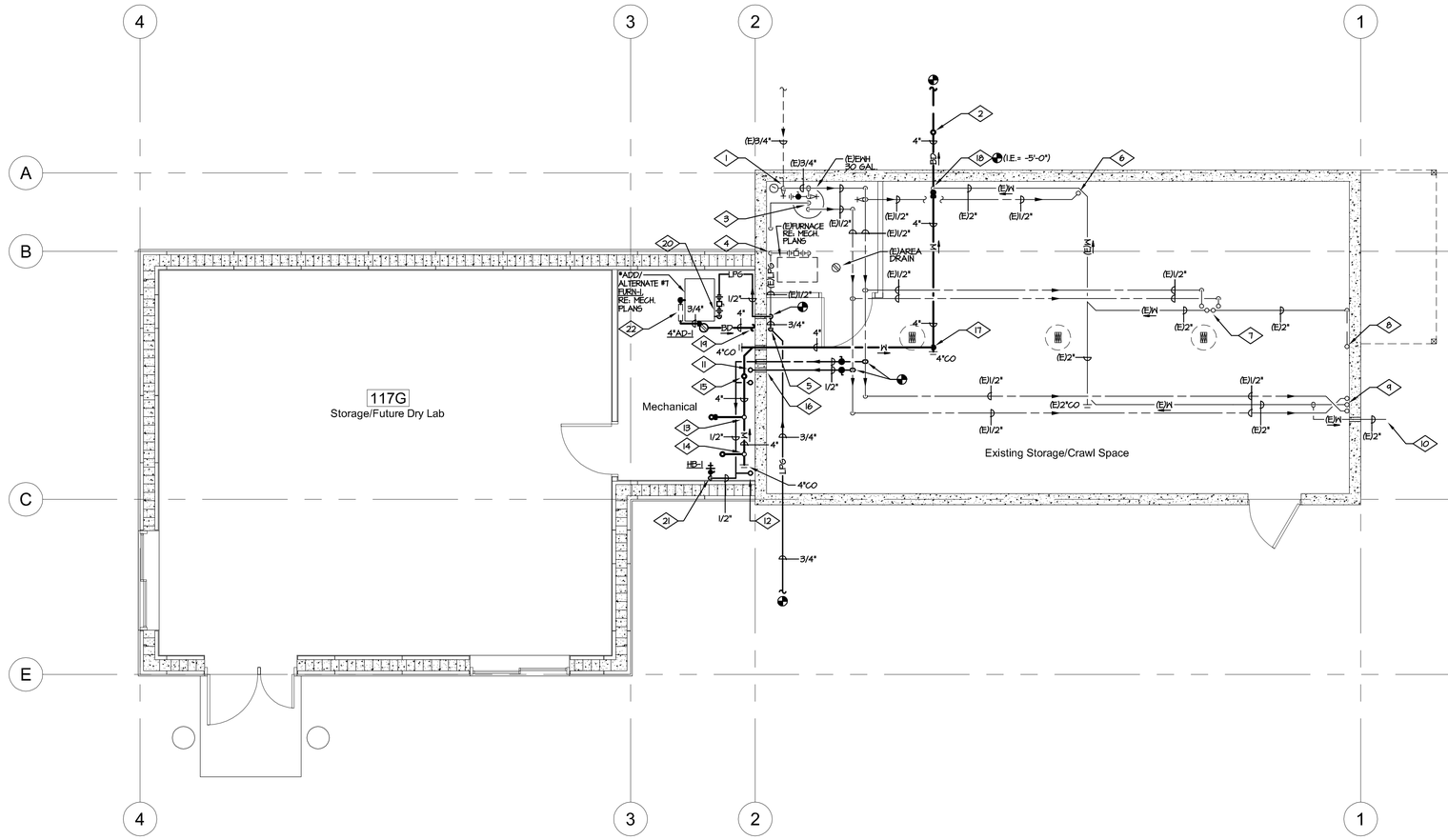

LOWER LEVEL PLUMBING PLAN

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

GENERAL NOTES

1. COORDINATE WITH ALL DISCIPLINES PRIOR TO COMMENCING OF PLUMBING WORK.
2. FIELD VERIFY ALL EXISTING PLUMBING FIXTURES, EQUIPMENT AND ASSOCIATED APPURTENANCES PRIOR TO COMMENCING OF PLUMBING WORK.
3. FIELD VERIFY ALL EXISTING PLUMBING WASTE, VENT AND DOMESTIC SUPPLY PIPING SIZES AND LOCATIONS PRIOR TO COMMENCING OF PLUMBING WORK.
4. ADDITION OF MECHANICAL FURNACE FURN-1, DEMOLITION OF EXISTING 1/2"LPG MAIN, UPSIZING GAS LINE MAIN TO 3/4"LPG AND ROUTING OF NEW 1/2"LPG PIPING AND APPURTENANCES TO FURN-1 IS ALL PART OF THE FURNACE ADD/ALTERNATE #1.

DRAWING NOTES

1. EXISTING 3/4" DOMESTIC COLD WATER SERVICE ENTRY WITH MAIN SHUT-OFF VALVE, BACKFLOW DEVICE, PRESSURE GAUGE AND HEAT TRACE.
2. 4" BUILDING SEWER RISER UP TO 4" SURFACE CLEANOUT (SCO).
3. EXISTING A.O. SMITH, 30 GALLON, ELECTRIC WATER HEATER AND APPURTENANCES. EXISTING 3/4" COLD AND HOT WATER BRANCH SUPPLY MAINS.
4. EXISTING FURNACE WITH 1/2" LPG SUPPLY CONNECTION. REFER TO MECHANICAL PLANS.
5. REMOVE EXISTING 1/2" LPG SUPPLY MAIN FROM POINT SHOWN, DOWN TO BELOW GRADE AND BACK TO LPG TANK PRESSURE REGULATOR, ROUGHLY, 50' SOUTH OF BUILDING. PROVIDE 3/4"LPG PIPING BELOW GRADE FROM TANK TO NEW POINT CONNECTION SHOWN. RE CIVIL FOR CONTINUATION. SEE GENERAL NOTE #4.
6. EXISTING 1/2" DOMESTIC COLD WATER RISER UP TO EXISTING EMERGENCY SHOWER.
7. EXISTING ISLAND SINK WASTE AND VENT RISERS. EXISTING DOMESTIC COLD AND HOT WATER SUPPLY RISERS.
8. EXISTING 2" VENT RISER UP THRU FLOOR TO LEVEL ABOVE. REFER TO PLUMBING PLAN SHEET, P-4, FOR CONTINUATION.
9. EXISTING WASTE RISER, DOMESTIC COLD AND HOT WATER SUPPLY RISERS UP TO EXISTING SINK ABOVE.
10. EXISTING 2" WASTE PIPE DOWN FROM EXISTING SINK ABOVE. ROUTING IS AS SHOWN AND EXITS OUT THRU SIDE CRAWLSPACE FOUNDATION WALL, EXISTING WASTE PIPE SPILLS ON TO GRADE.
11. 1/2" DOMESTIC COLD AND HOT WATER SUPPLY RISERS UP TO LAV, L-1, ABOVE.
12. 1/2" DOMESTIC COLD WATER SUPPLY RISER UP TO WATER CLOSET, WC-1, ABOVE.
13. 2" WASTE, 2" VENT AND 1/2" TRAP PRIMER CONNECTION TO FLOOR DRAIN.
14. 4" WASTE AND 2" VENT DOWN FROM WATER CLOSET, WC-1, ABOVE.
15. 2" WASTE DOWN FROM LAV, L-1, ABOVE.
16. ROUTE WASTE, DOMESTIC COLD AND HOT WATER MAINS THRU CRAWLSPACE FOUNDATION WALL. COORDINATE PENETRATIONS WITH STRUCTURAL ENGINEER, SEAL FOUNDATION WALL PENETRATIONS AS REQUIRED.
17. ROUTE 4" WASTE @ 1% SLOPE HIGH AND TIGHT TO BELOW CRAWLSPACE CEILING STRUCTURE AS POSSIBLE. DROP WASTE PIPE DOWN BELOW STRUCTURE AND MECHANICAL DUCT WORK AS NECESSARY AND CONNECT TO NEW 4" BUILDING DRAIN MAIN PIPING @ -5'-0" BELOW GRADE.
18. REMOVE AND REPLACE EXISTING 4" BUILDING DRAIN MAIN FROM WITHIN CRAWLSPACE OUT TO 5'-0" FROM BUILDING. PROVIDE 4" BUILDING DRAIN MAIN WITH INVERT ELEVATION TO EXIT AT -5'-0" BELOW GRADE FOR FROST PROTECTION. REFER TO CIVIL PLANS FOR CONNECTION AND CONTINUATION.
19. ROUTE 4" BUILDING DRAIN PIPE BELOW GRADE AS NECESSARY FROM AREA DRAIN, AD-1, AND CONNECT TO EXISTING 4" OR LARGER BUILDING DRAIN MAIN.
20. PROVIDE 1/2"LPG SUPPLY BRANCH WITH GAS COCK AND 6" DIRTLEG FROM EXISTING CRAWLSPACE LPG PIPE MAIN. REFER TO MECHANICAL PLANS FOR FURNACE DETAILS AND INFORMATION. SEE RISER DIAGRAM SHEET P-2. SEE GENERAL NOTE #4.
21. 1/2" COLD WATER WITH SHUT-OFF VALVE DOWN TIGHT ALONG WALL TO HOSE BIBB, HB-1.
22. PROVIDE 3/4" CONDENSATE PIPE CONNECTION AND ROUTE TO CONDENSATE NEUTRALIZER. INSTALL PER MANUFACTURERS RECOMMENDATIONS, REFER TO DIAGRAM. CONDENSATE NEUTRALIZATION PIPE KIT PART OF ADD/ALTERNATE #1.

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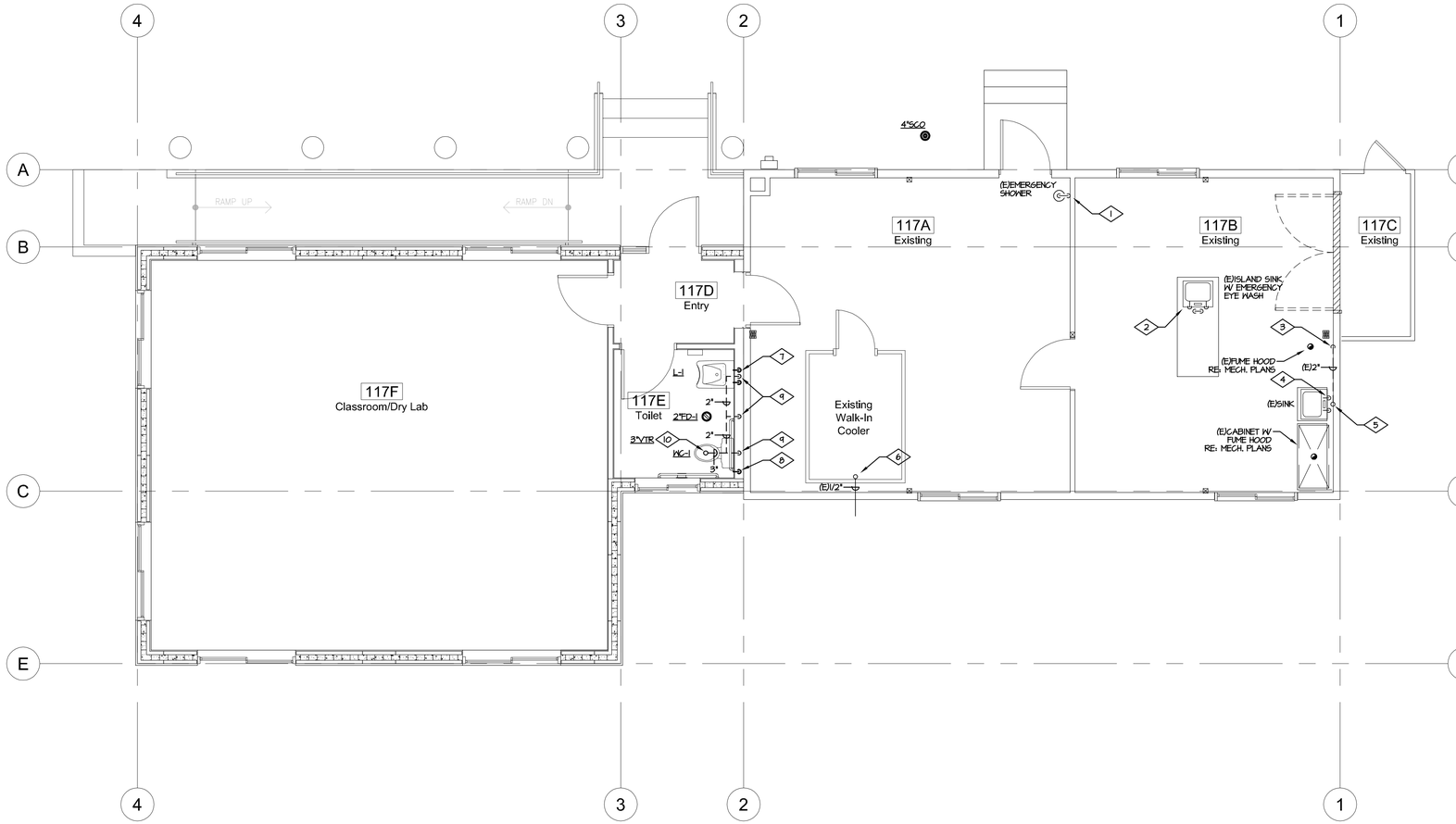

UPPER LEVEL PLUMBING PLAN

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1. COORDINATE WITH ALL DISCIPLINES PRIOR TO COMMENCING OF PLUMBING WORK.
2. FIELD VERIFY ALL EXISTING PLUMBING FIXTURES, EQUIPMENT AND ASSOCIATED APPURTENANCES PRIOR TO COMMENCING OF PLUMBING WORK.
3. FIELD VERIFY ALL EXISTING PLUMBING WASTE, VENT AND DOMESTIC SUPPLY PIPING SIZES AND LOCATIONS PRIOR TO COMMENCING OF PLUMBING WORK.
4. STORM DRAIN RUNOFF BY GUTTER AND LEADERS TO DISCHARGE ON TO GRADE, REFER TO ARCHITECTURAL PLANS FOR DETAILS.
5. AREA DRAINAGE BY CIVIL ENGINEER, REFER TO CIVIL PLANS FOR DETAILS.

DRAWING NOTES

1. EXISTING EMERGENCY SHOWER WITH DOMESTIC COLD WATER RISER UP FROM CRAWL SPACE BELOW.
2. EXISTING ISLAND SINK DOMESTIC COLD AND HOT WATER SUPPLY RISERS UP FROM CRAWL SPACE BELOW.
3. EXISTING 2" VENT RISER UP FROM CRAWL SPACE BELOW.
4. EXISTING VENT, DOMESTIC COLD AND HOT WATER RISERS UP FROM CRAWL SPACE BELOW TO EXISTING SINK.
5. EXISTING 3" VENT RISER UP THRU ROOF TO EXISTING VENT THRU ROOF.
6. EXISTING 1/2" CONDENSATE DRAIN LINE FROM WALK-IN COOLER, SPILLS ON TO GRADE.
7. 1/2" DOMESTIC COLD AND HOT WATER SUPPLY RISERS TO LAV, L-1. PROVIDE TMV-1 PRIOR TO HOT WATER FAUCET CONNECTION.
8. 1/2" DOMESTIC COLD WATER SUPPLY RISER TO WATER CLOSET, WC-1.
9. 2" VENT UP WITHIN WALL TO ABOVE CEILING, ROUTE AS NECESSARY TO 3"VTR.
10. 3" VENT RISER UP THRU ROOF TO 3"VTR. SEAL PENETRATION WEATHERTIGHT.

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DRB DESIGN DEVELOPMENT - 06/11/10

Kiowa Laboratory Addition - PR 004591
University of Colorado Mountain Research Station

COLORADO REGISTERED PAUL R. WYMAN 40318 PROFESSIONAL ENGINEER

Issue	Date
100 % Construction Documents	July 16 2010
Bid Set	August 3 2010
Revised per CU Comments	August 19 2010

Project Number:	10223
Design By:	AXH
Reviewed By:	PRR
Approved By:	PRR

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