Division 22: PLUMBING

1. GENERAL INSTRUCTIONS

A. GENERAL REQUIREMENTS

All requirements under Division 01 and the general and supplementary conditions of these specifications apply to this section and division. Where the requirements of this section and division exceed those of Division 01, this section and division take precedence. Become thoroughly familiar with all its contents as to requirements that affect this division, section, or both. Work required under this division includes all material, equipment, appliances, transportation, services and labor required to complete the entire system as required by the drawings and specifications, or reasonably inferred to be necessary to facilitate the function of each system as implied by the design and equipment specified.

The specifications and drawings for the Project are complementary, and any portion of work described in one shall be provided as if described in both. In the event of discrepancies, notify the Engineer and request clarification prior to proceeding with the work involved.

Drawings are graphic representations of the work upon which the contract is based. They show the materials and their relationship to one another, including sizes, shapes, locations, and connections. They convey the scope of work, indicating the intended general arrangement of the systems without showing all of the exact details as to elevations, offsets, control lines, and other installation requirements. Use the drawings as a guide when laying out the work and to verify that materials and equipment will fit into the designated spaces, and which when installed per manufacturers' requirements, will ensure a complete, coordinated, satisfactory, and properly operating system.

B. DEFINITIONS

Division: References contained in this specification follow the numbering system defined in the Construction Specifications Institute (CSI) MasterFormat 2004 Edition. Specification Divisions 01 through 13 provided with this project may reference the CSI MasterFormat 1995 Edition. The corresponding division references between the 2004 Edition and 1995 Edition are as follows:

	2004 Edition	1995 Edition
1.	Division 21 - Fire Suppression	Division 15
2.	Division 22 - Plumbing	Division 15
3.	Division 23 - HVAC	Division 15
4.	Division 26 - Electrical	Division 16
5.	Division 27 - Communications	Division 16
6.	Division 28 - Electronic Safety and Security	Division 16

Furnish: "to supply and deliver to the project site, ready for unloading, unpacking, assembly, installation and similar operations."

Install: "to perform all operations at the project site including, but not limited to, the actual unloading, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, testing, commissioning, starting up and similar operations, complete, and ready for the intended use."

Provide: "to furnish and install, complete and ready for the intended use."

Furnished by Owner (or Owner-Furnished) or Furnished by Others: "an item furnished by the Owner or under other divisions or contracts, and installed under the requirements of this division, complete, and ready for the intended use, including all items and services incidental to the work necessary for proper installation and operation. Include the installation under the warranty required by this division."

Engineer: Where referenced in this division, "Engineer" is the Engineer of Record and the Design Professional for the work under this division, and is a consultant to, and an authorized representative of the Architect, as defined in the General and/or Supplementary Conditions. When used in this division, Engineer means increased involvement by and obligations to the Engineer, in addition to involvement by and obligations to the Architect.

AHJ: The local code and/or inspection agency (Authority) Having Jurisdiction over the work.

NRTL: Nationally recognized testing laboratory, as defined and listed by OSHA in 29 CFR 1910.7 (e.g., UL, ETL, CSA), and acceptable to the AHJ over this project. Nationally recognized testing laboratories and standards listed are used only to represent the characteristics required and are not intended to restrict the use of other NRTLs that are acceptable to the AHJ and standards that meet the specified criteria.

The terms "approved equal", "equivalent", or "equal" are used synonymously and shall mean "accepted by or acceptable to the Engineer as equivalent to the item or manufacturer specified". The term "approved" shall mean labeled, listed, or both, by an NRTL, and acceptable to the AHJ over this project.

The term lead free refers to the wetted surface of pipe, fittings and fixtures in potable water systems that have a weighted average lead content of less than or equal to 0.25% per safe drinking water act as amended January 4, 2011 Section 1417.

C. PREBID SITE VISIT

Prior to submitting bid, visit the site of the proposed work and become fully informed as to the conditions under which the work is to be done. Failure to comply with this requirement shall not be considered sufficient justification to request or obtain extra compensation over and above the contract price.

D. MATERIAL AND WORKMANSHIP

Provide new material, equipment, and apparatus under this contract unless otherwise stated herein, of best quality normally used for the purpose in good commercial practice, and free from defects. Model numbers listed in specifications or shown on the drawings are not necessarily intended to designate the required trim, written descriptions of the trim govern model numbers.

Pipe, pipe fittings, pipe specialties and valves shall be manufactured in plants located in the United States or certified to meet the specified ASTM and ANSI standards.

Work performed under this contract shall provide a neat and "workmanlike" appearance when completed, to the satisfaction of the Architect and Engineer. Workmanship shall be the finest possible by experienced mechanics. Installations shall comply with applicable codes and laws.

The complete installation shall function as designed and intended with respect to efficiency, capacity, noise level, etc. Abnormal noise caused by rattling equipment, piping and squeaks in rotating components shall not be acceptable. Materials and equipment shall be of commercial specification grade in quality. Light duty and residential grade equipment shall not be accepted unless otherwise indicated.

Remove from the premises waste material present as a result of his work, including cartons, crating, paper, stickers, and/or excavation material not used in backfilling, etc. Clean equipment installed under this contract to present a neat and clean installation at the termination of the work.

Repair or replace public and private property damaged as a result of work performed under this contract to the satisfaction of authorities and regulations having jurisdiction. Provide all safety lights, guards, and warning signs required for the performance of the work and for the safety of the public.

E. MANUFACTURERS

In other articles where lists of manufacturers are introduced, subject to compliance with requirements, provide products by one of the manufacturers specified.

Where a list is provided, manufacturers are listed alphabetically and not in accordance with any ranking or preference.

Where manufacturers are not listed, provide products subject to compliance with requirements from manufacturers that have been actively involved in manufacturing the specified product for no less than 5 years.

F. COORDINATION

Coordinate work with that of other trades so that the various components of the systems are installed at the proper time, will fit the available space, and will allow proper service access to those items requiring maintenance. Components which are installed without regard to the above shall be relocated at no additional cost to the Owner.

Unless otherwise indicated, General Contractor [illegible] chases and openings in building construction required for installation of the systems specified herein. Contractor shall furnish the General Contractor with information where chases and openings are required. Contractor shall keep informed as to the work of other trades engaged in the construction of the project and shall execute his work in such a manner as to not interfere with or delay the work of other trades.

Figured dimensions shall be taken in preference to scaled dimensions. Contractor shall take his own measurements at the building, as variations may occur. Contractor will be held responsible for errors which could have been avoided by proper checking and verification.

Provide materials with trim that will properly fit the types of ceiling, wall, or floor finishes actually installed. Model numbers listed in the specifications or shown on the drawings are not intended to designate the required trim.

G. ORDINANCES AND CODES

Work performed under this contract shall, at a minimum, be in conformance with applicable national, state and local codes having jurisdiction. Equipment furnished and associated installation work performed under this contract shall be in strict compliance with current applicable codes adopted by the local AHJ, including any amendments and standards as set forth by the following:

1. National Fire Protection Association (NFPA)
2. Underwriters Laboratories (UL)
3. Occupational Safety and Health Administration (OSHA)
4. American Society of Mechanical Engineers (ASME)
5. American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE)
6. American National Standards Institute (ANSI)
7. American Society of Testing Materials (ASTM)
8. Other national standards and codes where applicable.

Where the contract documents exceed the requirements of the referenced codes, standards, etc., the contract documents shall take precedence. Where conflicts between various codes, ordinances, rules, and regulations exist, comply with the most stringent.

Promptly bring all conflicts observed between codes, ordinances, rules, regulations, referenced standards, and these documents to the attention of the Architect and Engineer for final resolution. Contractor will be held responsible for any violation of the law.

Procure and pay for permits and licenses required for the accomplishment of the work herein described. Where required, obtain, pay for, and furnish certificates of inspection to Owner.

H. PROTECTION OF EQUIPMENT AND MATERIAL

Store and protect from damage equipment and material after delivery to job site. For materials and equipment susceptible to changing weather conditions, dampness, or temperature variations, store inside in conditioned spaces. For materials and equipment not susceptible to these conditions, cover with waterproof, tear-resistant, heavy tarp or polyethylene plastic as required to protect from plaster, dirt, paint, water, or physical damage. Equipment and material damaged by construction activities shall be rejected and Contractor shall furnish new equipment and material of a like kind at his own expense.

Keep premises broom clean of foreign material created during work performed under this contract. Piping, equipment, etc. shall have a neat and clean appearance at the termination of the work.

Plug or cap open ends of piping systems while stored and installed during construction when not in use to prevent the entrance of debris into the systems.

Keep the manufacturer-provided protective coverings on floor drains, floor sinks and trench drains during construction. Remove coverings at the termination of the work and polish exposed surfaces.

I. SUBSTITUTIONS

The base bid shall include only the products from manufacturers specifically named in the drawings and specifications. No substitution will be considered prior to receipt of bids unless written request for approval to bid has been received by the Engineer at least ten (10) calendar days prior to the date for receipt of bids. Each such request shall include the name of the material or equipment for which substitution is requested and a complete description of the proposed substitution including drawings, cuts, performance and test data, and other information necessary for an evaluation. Include a statement setting forth changes in other materials, equipment or other work that incorporation of the substitute would require. The burden of proof of the merit of the proposed substitute is upon the proposer. The Engineer's decision of approval or disapproval to bid of a proposed substitution shall be final.

Coordinate and verify with other trades whether or not the substituted equipment can be installed as shown on the construction drawings without modification to associated systems or architectural or engineering design. Include additional costs for architectural and engineering design fees in bid if drawing modifications are required because of substituted equipment.

If the proposed substitution is approved prior to receipt of bids, such approval will be stated in an addendum. Bidders shall not rely upon approvals made in any other way. Verbal approval will not be given. No substitutions will be considered after the contract is awarded unless specifically provided in the contract documents.

The terms "approved", "approved equal", or "equal", refer to approval by the Engineer as an acceptable alternate bid. No substitutions will be considered that are not bid as an alternate. No material substitutions shall be considered for approval prior to award of contract.

J. SUBMITTALS

Assemble and submit for review shop drawings, material lists, manufacturer product literature for equipment to be furnished, and items requiring coordination between contractors under this contract. Provide submittals in sufficient detail so as to demonstrate compliance with these Contract Documents and the design concept. Prior to transmitting submittal, verify that the equipment submitted is mutually compatible and suitable for the intended use, will fit the available space, and maintain manufacturer recommended service clearances. If the size of equipment furnished makes necessary any change in location or configuration, submit a shop drawing showing the proposed layout.

Transmit submittals as early as required to support the project schedule. Allow for two weeks Engineer review time, plus to/from mailing time via the Architect, plus a duplication of this time for resubmittal, if required. Only resubmit those sections requested for resubmittal.

Submittals shall contain the project name, applicable specification section, submittal date, equipment identification acronym as used on the drawings, and the Contractor's stamp. The stamp shall certify that the submittal has been checked by the Contractor, complies with the drawings and specifications, and is coordinated with other trades. Manufacturer product literature shall include shop drawings, product data, performance sheets, samples and other submittals required by this division. Highlight, mark, list, or indicate the materials, performance criteria, and accessories that are being proposed. General product catalog data not specifically noted to be part of the specified product will be rejected and returned without review.

Submittals and shop drawings shall not contain the firm name, logo, seal, or signature of the Engineer. They shall not be copies of the work product of the Engineer. If the Contractor desires to use elements of such product, refer to paragraph "Electronic Drawing Files" for procedures to be used.

Separate submittals according to individual specification sections. Illegible submittals will be rejected and returned without review. Catalog data shall be properly bound, identified, indexed and tabbed in a 3-ring binder. Each item or model number shall be clearly marked and accessories indicated. Label the catalog data with the equipment identification acronym or number as used on the drawings and include performance curves, capacities, sizes, weights, materials, finishes, wiring diagrams, electrical requirements and deviations from specified equipment or materials. For equipment with motor starters or VFDs, include short circuit current ratings. Mark out inapplicable items. Shop drawings will be returned without review if the above mentioned requirements are not met.

Provide the quantity of submittals required by Division 01. If not indicated and hard-copy sets are provided, submit a minimum of six (6) copies. Refer to Division 01 for acceptance of electronic submittals for this project. For electronic submittals, Contractor shall submit the documents in accordance with the procedures specified in Division 01. Contractor shall notify the Architect and Engineer that the submittals have been posted. If electronic submittal procedures are not defined in Division 01, Contractor shall include the website, user name, and password information needed to access the submittals. For submittals sent by e-mail, Contractor shall copy the designated representatives of the Architect and Engineer. Contractor shall allow for the Engineer review time as specified above in the construction schedule. Contractor shall submit only the documents required to purchase the materials and/or equipment in the electronic submittal.

The checking and subsequent acceptance of submittals by the Engineer and/or Architect shall not relieve the Contractor from responsibility for deviations from the drawings and specifications, errors in dimensions, details, size of members, or quantities, omissions of components or fittings, coordination of electrical requirements; and not coordinating items with actual building conditions and adjacent work. Proceed with the procurement and installation of equipment only after receiving approved shop drawings relative to each item.

K. ELECTRONIC DRAWINGS

In preparation of shop drawings or record drawings, Contractor may, at his option, obtain electronic drawing files in AutoCAD or DXF format on CD-ROM disk, DVD disk, flash [illegible] direct download, as desired, from the Engineer for a shipping and handling fee of $200 [illegible] drawing set up to 12 sheets and $15 per sheet for each additional sheet. Contact the Architect for written authorization and Engineer for the necessary release agreement form and to specify shipping method and drawing format. In addition to payment, written authorization from the Architect and release agreement form from the Engineer must be received before electronic drawing files will be sent.

L. RECORD DRAWINGS (AS-BUILT DRAWINGS)

During progress of the work in this division, Contractor shall maintain an accurate record of all changes made during the installation of the system. Upon completion of the work, accurately transfer all record information to three identical sets of the approved shop drawings. Insert one set into each copy of the manual described below.

See Division 01 and General Conditions for additional information.

M. OPERATION AND MAINTENANCE INSTRUCTIONS

During the course of construction, collect and compile a complete brochure of equipment furnished and installed on this project. Include operational and maintenance instructions, manufacturer's catalog sheets, wiring diagrams, parts lists, approved submittals and shop drawings, warranties, and descriptive literature as furnished by the equipment manufacturer. Include an inside cover sheet that lists the project name, date, Owner, Architect, Engineer, General Contractor, Sub-Contractor, and an index of contents.

Submit three copies of literature bound in approved binders with index and tabs separating equipment types to the Architect and Engineer for review, at the termination of the work. Paper clips, staples, rubber bands, loose-leaf binding, and mailing envelopes are not considered approved binders. Final approval of systems installed under this contract shall be withheld until this equipment brochure is received and deemed complete by the Architect and Engineer. Instruct workmen to save required literature shipped with the equipment itself for inclusion in this brochure.

Include record drawings as described above.

Refer to Division 01 for acceptance of electronic manuals for this project. For electronic manuals, refer to paragraph "Submittals" for requirements.

N. SPARE PARTS

Furnish to Owner, with receipt, the spare parts for faucet washers and O-rings, flushometer repair kits, and water closet tank repair kits for the fixtures furnished for this project.

O. TRAINING

At a time mutually agreed upon between the Owner and Contractor, provide the services of a factory trained and authorized representative to train Owner's designated personnel on the operation and maintenance of the equipment provided for this project.

Provide training to include, but not be limited to, an overview of the system and/or equipment as it relates to the facility as a whole; operation and maintenance procedures and schedules related to startup and shutdown, troubleshooting, servicing, preventive maintenance and appropriate operator intervention; and review of data included in the operation and maintenance manuals.

Submit a certification letter to the Architect stating that the Owner's designated representative has been trained as specified herein. Letter shall include date, time, attendees and subject of training. The Contractor and the Owner's representative shall sign the certification letter indicating agreement that the training has been provided.

Schedule training with Owner with at least 7 days advance notice.

P. WARRANTIES

Warrant each system and each element thereof against all defects due to faulty workmanship, design, or material for a period of 12 months from date of Substantial Completion, unless specific items are noted to carry a longer warranty in the construction documents or manufacturer's standard warranty exceeds 12 months. Remedy all defects, occurring within the warranty period(s), as stated in the General Conditions and Division 01.

Warranty shall include a guarantee of free circulation of liquids throughout the system as intended without leaks, excessive noise, or water hammer.

Warranties shall include labor and material, including travel expenses. Make repairs or replacements without any additional costs to the Owner, and to the satisfaction of the Owner, Architect, and Engineer.

Perform the remedial work promptly, upon written notice from the Engineer or Owner.

At the time of Substantial Completion, deliver to the Owner all warranties, in writing and properly executed, including term limits for warranties extending beyond the one year period and any actions the Owner must take in order to maintain warranty status. Each warranty instrument shall be addressed to the Owner and state the commencement date and term.

2. GENERAL MATERIALS AND INSTALLATION

A. BUILDING OPERATION

Comply with the schedule of operations as outlined in the architectural portions of this specification. Building shall be in operation during normal workday hours. Accomplish work requiring interruption of building operation at a time when the building is not in operation and only with written approval of building Owner and/or tenant. Coordinate interruption of building operation with the Owner and/or tenant a minimum of seven (7) days in advance of work.

B. EXISTING EQUIPMENT REUSE AND REMOVAL

Provide items of plumbing systems modification required because of building remodeling, as noted on the drawings, or necessary for proper operation. Match existing materials and construction techniques when modifying existing systems. Coordinate requirements with general contractor and architect.

Seal existing floor drains to be abandoned or not in use at completion of work gas-tight with plug. Clean P-trap of debris. Provide blank grate. Cover drains with floor material matching adjacent area in finished portions of the building.

New floor drains shall be connected to the existing sanitary drainage system as shown on the drawings or as required. Saw-cut existing concrete floor as required to install new underfloor lines, and patch to match existing sub-floor. Refer to architectural specifications for finish floor patching requirements.

Existing plumbing fixtures where indicated on the drawings to be reused shall be cleaned, repaired, provided with new washers, etc. As required to put them into good operating condition.

Patch holes weather-tight in existing roofs caused by removal of plumbing items such as piping.

Make connection of new pipe to similar existing waste, water and gas pipe using standard fittings and joining practices.

C. EXCAVATION AND BACKFILLING

Perform excavation and backfill required for installation of underground work under this contract. Trenches shall be of sufficient width. Crib or brace trenches to prevent cave-in or settlement. Do not excavate trenches close to columns and walls of new building without prior consultation with the Architect. Use pumping equipment if required to keep trenches free of water. Backfill trenches in maximum 6 inch layers of well-tamped dry earth in a manner to prevent future settlement.

Excavation as specified herein shall be classified as common excavation. Common excavation shall comprise the satisfactory removal and disposition of material of whatever substances and of every description encountered, including rock, if any, within the limits of the work as specified and shown on the drawings. Excavation shall be performed to the lines and grades indicated on the drawings. Dispose of excavated materials that are considered unsuitable for backfill and surplus of excavated material which is not required for backfill to the satisfaction of the Architect.

Coordinate with the local gas service company to provide a new gas service, including gas meter, shut-off valves, and regulator as indicated on the drawings. Installation shall be in complete conformance with the requirements of the local gas service company.

D. COINCIDENTAL DAMAGE

Repair streets, sidewalks, drives, paving, walls, finishes, and other facilities damaged in the course of the work. Repair materials shall match existing construction. Repair work shall meet all requirements of the Owner, local authorities having jurisdiction, and meet the satisfaction of the Architect.

E. SUPPORT SYSTEMS

Structural steel used for pipe supports, equipment supports, etc., shall be new and clean, and shall conform to ASTM designation A-36.

Support plumbing equipment and piping from the building structure. Do not support plumbing equipment and piping from ceilings, other mechanical or electrical components and other non-structural elements.

F. ACCESS DOORS

Provide access doors for all concealed equipment where indicated or as required, except where above lay-in ceilings. Access doors shall be adequately sized for the devices served with a minimum size of 18 inches by 18 inches. Access doors must be of proper construction for type of construction in which installed. Obtain Architect's approval of type, size, location, and color before ordering. Provide factory fabricated and assembled units, complete with attachment devices and fasteners ready for installation; concealed hinges, flush screwdriver operated cam lock, and anchor straps. Provide access doors manufactured by Milcor, Titus or equal.

G. PENETRATIONS

Provide sleeves for pipes passing through above grade concrete or masonry walls, concrete floor or roof slabs. Sleeves are not required for core drilled holes in existing masonry walls, concrete floors or roofs. Provide 10 gauge galvanized steel sleeves for pipes 6 inches and smaller. Provide galvanized sheet metal sleeves for larger than 6 inches. Schedule 40 PVC sleeves are acceptable for installation in areas without return air plenums.

Make interior floor, exterior wall and roof penetrations watertight and weathertight with non-shrink, non-hardening commercial sealant. Pack with mineral wool and seal both ends with minimum [illegible] of sealant.

Seal around penetrations of fire rated assemblies. Coordinate fire ratings and locations with the architectural drawings. Refer to architectural specifications for fire stoppings. Provide a product schedule for UL listing, location, wall or floor rating and installation drawing for each penetration firestop system.

Provide pipe insulation for insulated pipe through floor, wall and roof penetrations, including fire rated walls and floors. The vapor barrier shall be maintained. Size sleeve for a minimum of 1 inch annular clear space between inside of sleeve and outside of insulation.

Seal concrete or masonry exterior wall penetrations below grade with "wall pipes" and mechanical sleeve seals. Provide cast iron "wall pipes" with integral waterstop ring manufactured by Josam, Jay R. Smith, Wade, Watts or Zurn. Provide modular mechanical sleeve seals, manufactured by Thunderline / Link Seal, Calpico, Inc. and Metraflex.

Seal elevated concrete slab with water proof membrane penetrations with "wall pipes" and water proof sealant. Secure waterproof membrane flashing between "wall pipe" clamping flange and clamping ring. Provide cast iron "wall pipes" with integral waterstop ring manufactured by Josam, Jay R. Smith, Wade, Watts or Zurn.

Provide sleeves for horizontal pipe passing through or under foundation. Sleeves shall be cast iron soil pipe two nominal pipe sizes larger than the pipe served.

Provide Schedule 40 PVC pipe sleeves for vertical pressure pipe passing through concrete slab on grade. Sleeves shall be one nominal pipe size larger than the pipe served and two pipe sizes larger than pipe served for ductile iron pipes with restraining rods. Seal water-tight with silicone caulk.

Provide 1/2 inch thick cellular foam insulation around perimeter of non-pressure pipe passing thru concrete slab on grade. Insulation shall extend to 2 inches above and below the concrete slab.

H. FIRESTOPPING

Sealants and accessories shall have fire-resistance ratings indicated, as established by testing identical assemblies in accordance with UL 2079 or ASTM E 814, or other NRTL acceptable to AHJ.

Manufacturers: Hilti, RectorSeal, Specified Technologies Inc., United States Gypsum Company, or 3M corp.

Through and Membrane Penetration Firestopping Systems Product Schedule: Provide UL listing, location, wall or floor rating, and installation drawing for each penetration fire stop system.

Where project conditions require modification to qualified testing and inspecting agency's illustrations for a particular firestopping condition, submit illustration, with modifications marked, approved by penetration firestopping manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. Include qualifications data for testing agency.

I. ELECTRICAL WIRING

Line voltage wiring shall be provided by Division 26. Line voltage control and interlock wiring for plumbing systems shall also be provided by Division 26. Low voltage control wiring shall be provided by Division 23. Furnish wiring diagrams to Division 26 as required for proper equipment hookup. Coordinate with Division 26 the actual wire sizing amps for plumbing equipment (from the equipment nameplate) to ensure proper installation.

J. EQUIPMENT FURNISHED BY OTHERS

Provide necessary equipment and accessories that are not provided by the equipment supplier or Owner to complete installation of equipment furnished by others in locations as indicated on the drawings, specified herein, or both. Furnish and install roughed-in wastes, vents and water services. Provide final connection to kitchen equipment, furnished by others, in locations as indicated on the drawings. Provide accessory items that are required but not furnished with the equipment including traps, stop valves, PRVs, indirect drain from equipment to floor drains, and accessory items indicated or required for the proper operation of the complete system at the termination of the work.

Contractor shall be responsible for correct rough-in dimensions and shall verify same with Architect and/or equipment supplier prior to service installations.

Install the emergency natural gas shutoff valve furnished with exhaust hood fire extinguishing system in an accessible location.

K. SYSTEM TESTING AND ADJUSTING

Upon completion of each phase of the installation, test each system in conformance with local code requirements and as noted below. Furnish labor and equipment required to test each system installed under this contract. Assume all costs involved in making the tests and repairing and/or replacing any damages resulting therefrom.

Notify the Architect and the AHJ, three (3) working days prior to making plumbing system tests. Leave concealed work uncovered until the required tests have been completed, but if necessary due to construction procedure, tests on portions of the work may be made, and when satisfactory, the work may be concealed. Test piping before insulation is installed, and before backfill. Pipes, joints, flanges, valve stems, etc., shall be leak tight. Repair or replace system defects with new materials. Caulking of defective joints, cracks or holes will not be permitted. Repeat tests after defects have been eliminated. Make tests in the presence of the administrative authority and/or the Owner's authorized representative.

Upon completion of the systems installation, and prior to acceptance by the Architect and Engineer, make general operating tests to demonstrate that equipment and systems are in proper working order, and are functioning in conformance with the intent of the drawings and specifications. As a part of these tests, open every water outlet to ensure complete system flushing, remove and clean faucet aerators, clean strainers, light pilot lights, and operate every piece of equipment furnished under this contract to demonstrate proper functioning.

Test the drainage and vent system by plugging openings with test plugs, except those at the top of the stacks. Fill the system with water; test results will be satisfactory if the water level remains stationary for not less than one (1) hour. Subject the drainage and vent system to a pressure of at least ten (10) feet of water. If leaks develop, repair them and repeat the test.

Test the domestic water system by filling it with water and then isolating the system from its source. Keep the system closed for a period of twenty-four hours with no fixture being used. The pressure differential for this test period shall not exceed 10 psig. Test water piping to a 125 PSI hydrostatic pressure.

For low pressure natural gas systems, subject the pipe to 10 psig air pressure for a period of one hour. The resultant pressure differential for this period shall be 0 psig. Test per gas company requirements where required.

For welded natural gas systems and systems with an operating pressure in excess of 14" water column, subject the pipe to 60 psig air pressure for a period of one hour. The resultant pressure differential for this period shall be 0 psig. Test per gas company requirements where required.

3. PLUMBING PIPING

A. PIPING MATERIALS

Materials specified or noted on the drawings are subject to the approval of local code authorities. Verify approval before installing any material or joining method.

Domestic Water (Cold and Hot): Domestic water piping installed above the floor slab inside the building shall be Type "L" hard temper copper tube with wrought copper fittings and soldered connections made up with 95/5 solder. Brazed mechanically formed tee connections (T-drill) may be used in copper lines where approved by code; connection shall be made with brazed silver solder (Sil-Fos) joints in conformance with manufacturer's instructions.

Underground domestic water piping 2 inch and smaller shall be Type "K" soft temper copper tubing with flared copper alloy fittings and connections, or Type "K" hard temper copper tubing with conventional wrought copper fittings and silver solder (Sil-Fos) joints. Install as few underground copper piping joints as possible. At building service entrance, no joints shall be installed under or within 5 feet of the building. Install domestic water piping below grade outside building at adequate depth to prevent freezing.

Interior Waste And Vent Below Slab: Waste and vent piping [illegible] inside building shall be service weight cast iron soil pipe with hub and spigot fittings with neoprene gasket joints, meeting ASTM A74, manufactured by AB & I Foundry, Charlotte or Tyler [illegible] bearing the trademark of the CISPI and NSF. Hubless waste and vent pipe is not permitted [illegible] base slab. PVC schedule 40 DWV ASTM D2665 pipe with PVC meeting ASTM B17[illegible] wall" cell class 12454-B with ASTM 2665 socket fittings with solvent weld joints is also [illegible] where approved by code.

Interior Waste and Vent Above Slab: Waste and vent pipe above slab inside building shall be hubless cast iron soil pipe and fittings, meeting ASTM A888 and CISPI 301, [illegible] by AB & I foundry, Charlotte or Tyler pipe and bearing the trademark of the CISPI and [illegible]

Natural Gas Above Slab: Gas piping above ground shall be Schedule 40 black steel [illegible] screwed fittings for 2" and smaller and Class 150 welded fittings for 2-1/2" and larger.

Connections To Plumbing Fixtures and Equipment: 1-1/4 inch and larger waste connections from fixture traps [illegible] shall be "DWV" copper with wrought copper drainage pattern fittings with copper sweat or [illegible] joints at fixture trap connections and threaded joints at connections to cast iron pipe.

Indirect and Condensate Drain Inside Building: Indirect and condensate drain pipe installed inside building shall be Type "M" hard copper with wrought copper fittings for 1" and smaller and [illegible] copper with wrought copper drainage pattern fittings for 1-1/4" and larger hard temper [illegible] and soldered connections made with 95/5 solder. Install cleanouts at elbows greater than 45 degrees.

Indirect And Condensate Drain Outside Building: indirect and condensate drain pipe installed outside the building above ground shall be Type "M" for 1 inch and smaller and "DWV" for 1-1/4 inches and larger hard temper copper tube with wrought copper drainage pattern fittings and soldered connections made with 95/5 solder. Terminate at nearest roof drain, gutter or other location as shown drawings. Install cleanouts at elbows greater than 45 degrees.

B. PIPING AND EQUIPMENT INSULATION

Provide domestic cold water, hot water, hot water recirculation, indirect and condensate drain pipe (within building) interior horizontal storm drain piping above ceiling and exposed with one-piece fiberglass insulation with all-service jacket with self-sealing lap to provide a continuous vapor barrier by Certainteed, Owens-Corning or Armstrong. Provide Insulation thickness as follows:

1" thick for cold piping

1" thick for storm piping and overflow storm piping

1" thick for condensate and auxiliary condensate piping

1" thick for hot water and hot water return piping 6" and smaller

Provide 1 inch fiberglass insulation on vent piping within six feet of vent through the roof. Provide fiberglass insulation on domestic cold and hot water pipes installed in walls and chases. Provide fiberglass insulation on domestic cold and hot water pipes installed in walls and chases.

Insulate water heaters, storage tanks, hot water pumps, etc. that are not factory insulated.

For hot piping, provide pipe hangers and riser clamps sized for the outside diameter of piping. Butt insulation to hanger or riser clamp for vertical pipe. Seal exposed insulation with insulation sealer. Exception for Vertical Piping: Provide clamps sized for the outside diameter of the vertical pipe and extend clamp through insulation. Seal penetrations of insulation and vapor barrier with wet coat of vapor barrier lap cement. For 2-1/2" and larger cold piping at hangers, provide 8 inch long sections of high density, high temperature calcium silicate by Johns-Manville, Fiberglass by Knauf or flexible unicellular piping insulation meeting ASTM C 534-01A, Type I with integral high density pipe supports and encased in steel insulation shield by Cooper B-line, Armacell, or approved equal. Insulation shall be continuous along the pipe surface, except at valves, unions, and where piping is exposed at fixtures. For pipes 2 inch and smaller using fiberglass or flexible elastomeric insulation without pre-insulated supports, provide insulation protection shields installed between hanger and pipe which meets the following minimum length requirements:

Pipe Size (NPS)	Insulation Thickness (inches)	Minimum Shield Length, (in) Hanger Spacing, (ft) 5	6	7	8	9	10
	1	3	5	5	-	-	-
Less than 1"	1.5	3	5	5	-	-	-
	1	5	6	8	9	11	11
1-1/4" to	1.5	5	6	8	8	9	9
2" and Less	2	5	5	6	6	8	8

Cover fittings with Zeston, Knauf, or equal one-piece PVC premolded insulating covers. Fitting covers, jackets and adhesives shall not exceed flame spread rating of 25 and smoke development rating of 50 per ASTM E84. Fill voids between covers and piping with fiberglass insulation and tape joints at all elbows and tees. Install pipe insulation in compliance with manufacturer's recommendations. Where premolded insulating fittings are not approved by the local AHJ, miter insulation at fittings.

C. PIPING JOINTS

Copper Tubing: Joints in hard temper tubing shall be soldered joints using lead-free 95/5 solder except where tubing is installed below grade or below the base slab, in which case joints shall be soldered with silver solder (Sil-Fos). Joints in soft temper copper tubing shall be of the flared type installed in compliance with the fitting manufacturer's recommendations.

Threaded Steel Pipe: Threaded joints shall be full and clean, cut with not more than three (3) threads exposed beyond the fittings. Make joints tight with graphite base pipe joint compound and paint exposed threads of ferrous pipe with acid-resisting paint after piping has been tested and proven tight. No caulking, lamp-wick or other material will be permitted for correction of defective joints.

Welded Steel Pipe: Welded joints shall be of the butt welded single "Vee" type. Bevel pipe at a 45 degree angle to within 1/16 inch of the inside wall, and build up the weld to one fourth greater depth than the pipe wall thickness. Welding shall be either electric or oxy-acetylene, performed in conformance with the ASME code for pressure pipe welding, and only by experienced certified welders.

Cast Iron Pipe Below Grade: Joints in bell and spigot cast iron waste and vent pipe shall be neoprene compression gaskets, Tyseal or equal.

Cast Iron Pipe Above Grade: Joints in hubless pipe shall be standard CISPI 310 NSF certified by Anaco, Ideal, Misson or Tyler. Joints in storm piping, including connections to roof drains, shall be heavy duty couplings meeting ASTM C1540 and FM 1680, Anaco Husky #SD-2000, Clamp-All "Hi Torque" 80 in. lb, Ideal Tridon "HD" or Mission "Heavyweight".

Dissimilar Pipes Above Grade: Make connection of new waste pipe to new or existing dissimilar waste pipe using shielded transition couplings meeting ASTM C1460 with neoprene adapter gasket with stainless steel shield and hose clamps, Fernco, Proflex 3000 Series or Mission Flexseal MR56 Series

Dissimilar Pipes Below Grade: Make connection of new waste pipe to new or existing dissimilar waste pipe using shielded adapter couplings meeting ASTM C1173 with neoprene adapter gasket with stainless steel shield and hose clamps, Fernco, 1056 Series or Mission Sewer Couplings.

D. PIPING INSTALLATION

General: Clean pipe thoroughly prior to installation. Ream ends of pipe to remove burrs. Cut pipe accurately to measurements taken on the job. Install with adequate clearance for installation of coverings where required. Pipe shall not be sprung or bent. Neatly align pipe, connect it securely, and support it from the building structure with hangers as specified below. Provide chrome-plated escutcheons on pipes passing through ceilings, floors or walls of finished spaces. Run pipes freely through floor and wall penetrations using pipe sleeves. Do not grout in place unless required for structural fire integrity. Install pipe concealed in finished spaces wherever possible. Use a dielectric union where ferrous and copper pipe connect. Dielectric union shall have a zinc-plated steel body, a threaded nylon insert, and insulating pressure gasket. No ferrous metal-to-copper connection made without insulating unions will be allowed.

Hanger & Supports: Pipe hangers shall be as described in the specifications by B-Line or equal by Anvil, Michigan, Truscon, or Unistrut. Connect hangers to the structure with side beam connectors and all thread hanger rods. Provide engineered support struts between joists and other structural members as required to provide a rigid hanging installation. Do not hang pipes from other pipes, conduit or ductwork. Provide hanger rods and space hangers at intervals as specified in "hanger spacing". Provide support within 1 foot of each elbow and tee. Provide supports within 1 foot of each equipment connection. Provide two nuts on threaded supports to securely fasten the support. Install hanger types or supports for various piping as follows:

Copper Tube: Adjustable band hangers for bare copper tube 3 inches and smaller shall be B-Line #B3170 CT copper plated adjustable band swivel ring type. Adjustable band hangers for insulated copper tube 3 inches and smaller shall be B-Line #B3170 NF adjustable band swivel ring type. Clevis hangers for insulated copper tube 4 inches and larger shall be B-Line #B3100 galvanized steel clevis type. Support exposed copper tube 2 inches and smaller to walls or in chases with B-Line #B3198RCT copper coated extension split ring pipe clamps, 3/8 inch threaded rod and B-Line #B3199CT ceiling flanges. Support copper tube in chases and walls at plumbing fixtures with plastic or copper brackets secured to structure and U-bolts sized to bare on the pipe. Riser clamps to support vertical copper tube shall be B-Line #B3373CT copper coated steel, cut insulation, seal vapor barrier, and attach to bare tube.

Steel Pipe: Adjustable band hangers for 2 inch and smaller shall be B-Line #B3170 NF adjustable band swivel ring type. Clevis hangers for 2-1/2 inch and larger shall be B-Line #B3100 galvanized steel clevis type. Riser clamps to support vertical pipe shall be B-Line #B3373 galvanized steel.

Cast Iron Pipe: Adjustable band hangers for [illegible] inch and smaller. Clevis hangers for 3 inch and larger shall be B-Line #B3100 galvanized steel clevis type. Riser clamps to support vertical pipe shall be B-Line #B3373 galvanized steel.

Insulation Protection Shields: B-Line #B3151 [illegible] gauge galvanized sheet metal shield shall cover half of the circumference of the pipe and shall be of length indicated by manufacturer for pipe size and insulation thickness.

Hanger Spacing, Rod Sizes and Attachments: Connect rods to steel beams or joists with B-Line #B3031 or #B3033 beam clamps as required. Connect rods to concrete with B-Line [illegible] malleable iron single type inserts with removable iron nut. Connect rods in wood construction with B-Line #B3058 side beam connectors. Install and support piping with spacing and rod sizes as follows:

Copper Tube: 1-1/2 inch and smaller - every 6 feet with 3/8 inch hanger rods; 2 inch - every 10 feet with 3/8inch hanger rods; 2-1/2 inch - every 10 feet with 1/2 inch hanger rods; 3 inch - every 10 feet with 1/2 inch rods, 4 inch - every 10 feet with 5/8 inch hanger rods. Support vertical copper tube every 10 feet.

Steel Pipe: 1 inch and smaller - every 8 feet with 3/8 inch hanger rods; 1-1/4 inch through 2 inch - every 10 feet with 3/8 inch hanger rods; 2-1/2 inch and 3 inch - every 10 feet with 1/2 inch hanger rods; 4 inch - every 10 feet with 5/8 inch hanger rods. Support vertical steel pipe every 10 feet.

Cast Iron Pipe: Every 10 feet and within 1 foot of each joint. 2 inch and smaller with 3/8 inch hanger rods; 3 inch with 1/2 inch hanger rods; 4 inch with 5/8 inch hanger rods; 6 inch with 3/4 inch hanger rods; 8 inch and larger with 7/8 inch hanger rods. Support vertical cast iron pipe every 15 feet.

Supports on Roof: Support piping on roof with pre-engineered roof pipe supports manufactured by B-line, Erico, Miro or Portable Pipe Hangers: 4 inch x 4 inch x 12 inch long closed cell polyethylene blocks with embedded pre-engineered support strut or pre-engineered support struts with factory plastic bases. Two piece straps shall be captivated at the shoulder when attachment nut is tightened and designed for use with strut system. All nuts, brackets and clamps shall have the same finish as the channels. Support pipe with spacing as described above at a minimum 7 inches above the roof. Set supports on 18 inch x 18 inch x 3/16 inch thick roof walkway material compatible with actual roof material.

Supports On Floor: Support piping from the floor where required for ferrous pipe or insulated copper tube, shall be B-Line B3093 galvanized steel with pipe saddle, threaded shank for height adjustment and floor stand secured to the floor.

Below Ground Installation for Soil, Waste, and Storm: Install soil and waste piping to a uniform slope of not less than 1/8 inch per foot for piping 4 inch or larger, and not less than 1/4 inch per foot for piping 3 inch or smaller. Lay pipe at uniform slope, free from sags, with hub end upstream. Make changes in direction from horizontal to vertical, at fixture branches and other branch connections with sanitary "tees" or short sweep "ells". Make changes in direction from vertical to horizontal or horizontal to horizontal with long radius fittings, long sweeping "ells", combination "Y and 1/8 bend" fittings, or 45 degree "ells" (1/8 bend fittings), 1/6 bend or 1/16 bend and "Y" fittings. Install pipe with the barrel of the pipe on firm, solid earth for its entire length, and excavate holes for the pipe bells. Lay pipe in a straight line and install with uniform grade to line with batten boards set not more than 24'-0" apart. Close open ends of pipe with a stopper when pipe laying is not in progress. Center spigots accurately in bells for uniform caulking. Provide a smooth and uniform invert in the system. Drilling or tapping of soil and waste lines, and saddle hubs and bands are not permitted. Locate and install soil and waste lines as indicated on the drawings. Determine exact locations in such a manner as to maintain proper clearance. Prior to installation of any building drain pipe, verify elevation of connection point of existing sewer, service line or existing tenant connections indicated on the drawings. If the installation will not tie into the indicated invert elevation point while maintaining proper fall, notify Architect so that an alternative may be determined.

Above Ground Installation for Soil, Waste, and Storm: Install soil and waste piping to a uniform slope of not less than 1/8 inch per foot for piping 4 inch or larger, and not less than 1/4 inch per foot for piping 3 inch or smaller. Lay pipe at uniform slope free from sags. Support pipe within 12 inches of each joint. Make changes in direction from horizontal to vertical, at fixture branches and other branch connections with sanitary "tees" or short sweep "ells". Make changes in direction from vertical to horizontal or horizontal to horizontal with long radius fittings, long sweeping "ells", combination "Y and 1/8 bend" fittings, or 45 degree "ells" (1/8 bend fittings), 1/6 bend or 1/16 bend and "Y" fittings. Provide a smooth and uniform invert in the system. Drilling or tapping of soil and waste lines, and saddle hubs and bands are not permitted. Locate and install soil and waste lines as indicated on the drawings. Determine exact locations in such a manner as to maintain proper clearance.

Plumbing Vent: Connect plumbing vent pipes to fixture drain pipes as indicated on the drawings or as required by the installation practices adopted and enforced by local codes official, and extend vent pipes full size through the roof line. Grade pipe to a uniform slope so as to drain back by gravity to the drainage piping system. Vents passing through the roof shall be minimum 3 inch size except in tropical climates, per local codes. Turn flashing down into stacks at least 2 inches, and extend flashing 24 inches in all directions from the pipe at the roof line. Apply white lead pipe dope on male steel pipe threads. Vent lines shall be air and water tight. Vent floor drains individually or connect them to a horizontally vented line as shown on the drawings.

Domestic Water: Arrange cold and hot water piping to drain at the lowest point in each system. Install at least one pipe union adjacent to all shutoff valves, at connection points of each piece of equipment, and elsewhere in the system where required to allow proper maintenance. Provide unions of the ground joint type. Make allowance for expansion and contraction where required by the installation. Where water piping occurs in exterior walls, hold pipe as close as possible to the interior face of wall and install insulation batt or other insulation (minimum R-8) between piping and the exterior wall face.

Natural Gas: Pitch natural gas piping and provide accessible dirt legs at the low points. Take branch pipes off the top or sides of main pipes to prevent accumulation of water in the branches. Install gas piping valves and unions only in accessible locations. Do not install gas pipe below the base slab.

E. PIPING SANITIZATION

Sanitize the entire domestic water piping system (cold, hot, and hot water return) with a solution containing not less than 50 ppm available chlorine. Keep solution in the system for a minimum of 24 hours, with each valve being operated several times during the period. After completion, flush system with city water until chlorine residual is lowered to incoming city water level.

F. PIPE AND VALVE MARKERS

Provide manufacturer's standard pre-printed, semi-rigid snap-on or permanent adhesive, pressure-sensitive vinyl pipe markers. Pipe markers shall be color-coded complying with ANSA A13.1.

Install pipe markers on each plumbing piping system and include arrows to show normal direction of flow.

Locate pipe markers and color bands wherever piping is exposed to view in occupied spaces, machine rooms, accessible maintenance spaces (shafts, tunnels, plenums) and exterior non-concealed locations.

Provide plastic laminate or brass valve tag on every valve, cock and control device in each plumbing piping system; exclude check valves, valves within factory-fabricated equipment units, plumbing fixture faucets, convenience and lawn-watering hose bibbs, and shut-off valves at plumbing fixtures and similar rough-in connections of end-use fixtures and units.

G. BEVERAGE CONDUIT

Beverage conduit above ground and inside the building shall be electrical metallic tubing (EMT) where approved by code. Tubing shall be in accordance with ANSI C 80.2, UL 797, NEC Article 348 and FL WW-C-563A. Fittings shall be compression type in accordance with FS-W-F-408. Fittings shall be UL listed for the environment in which they are used. Electrical metallic tubing shall not be used below grade.

Beverage conduit above ground and inside the building shall be rigid galvanized steel (RGS) where approved by code. Tubing shall be hot dipped rigid galvanized steel conduit, UL listed and labeled and shall conform to ANSI C80.1 and FS WW_C_581. Fittings shall be galvanized conforming to FS_W_F_408 and UL listed for the environment in which they are to be used.

A. HEAT TRACE

Provide heat trace system as indicated on the drawings manufactured by Raychem, Chromalox, Nextron, Nelson or approved equal.

Heat Trace Cables: Pair of parallel No. 16 AWG tinned-copper bus wires embedded in cross linked conductor polymer core, which varies power output in response to temperature along its length; line voltage as indicated on the drawings. Provide outer jacket material as indicated on the drawings. Cable shall be capable of cross over itself without overheating. Cable shall capable of a heat output of 90 percent of rating over a temperature range of 40 F to 150 F pipe temperature. Provide field-applied power connection kits, end seal kits and any tee kits as required.

Heat Trace Control Panel: For "ON-OFF" control of heat tape circuit with NEMA 4X fiberglass reinforced plastic enclosure for outdoor installation with hinged access door with window and furnished with the following: Microprocessor based controller with led display with keypad interface and non-volatile memory. Ground fault circuit protection capable of checking heating cable circuit faults. Led indicator lights: Current mode, heater on, alarm conditions and receive / transmit data. Alarm conditions: RTD failure, high/low temperature, high/low current, hi/low resistance and high/low voltage, ground fault alarm, trip, loss of programmed values and electromechanical relay failure. Alarm contacts: One single pole single throw rated at 0.75 amp 120 to 277 Volt relay and one dry pilot duty only relay rated at 48 VAC / DC 50 milliamps, 10 VA maximum resistive switching. Power strip for connecting 277 Volt single phase at 30 amps maximum. Temperature control sensors: Total of two three wire 100 ohm RTD's with 10 foot long stainless steel sheath, ambient temperature range of -76 F to 1058 F with an accuracy of plus/minus 3 F and a repeatability of plus/minus 3 F.

Thermostats: As scheduled on the drawings and of the same manufacturer as the heat trace cable.

B. HEAT TEMPERATURE MAINTENANCE SYSTEM

Provide heat trace system as indicated on the drawings manufactured by Raychem with no substitutions accepted.

Heat Trace Cables: Pair of parallel No. 16 AWG tinned-copper bus wires embedded in cross linked conductor polymer core, which varies power output in response to temperature along its length; line voltage as indicated on the drawings. Provide with polyolefin outer jacket material. Cable shall be capable of crossing over itself without overheating. Cable shall capable of a heat output of 90 percent of rating over a temperature range as indicated on the drawings pipe temperature. Provide field-applied power connection kits, end seal kits and any tee kits as required. Provide pipe identification markers stating "electrically heat traced" every 25 feet.

Heat Trace Control Panel: For [illegible] tape circuit with integrated functionality that lowers the maintenance temperature during low usage times, nine customizable predefined programs and capable of operating as master for up to [illegible] controllers [illegible] enclosure for indoor installation with hinged access door with window and furnished with the following: Microprocessor based controller with LED display with keypad interface and non-volatile memory. 30 milliamp equipment ground fault circuit protection. LED indicator lights: power on, power to heating cable, heat-up cycle, water heater alarm [illegible] alarm. Alarm conditions: Loss of power, [illegible] initialized, high [illegible] controller temperature, high water temperature, low water temperature, and master / slave error. Alarm contacts: One single pole single throw rated at 1 Amp 24 VAC or VDC. Power strip for connecting 120 Volt single phase at 30 Amps maximum. Temperature control sensor: Thermistor with 13'-3" long lead.

4. PLUMBING SPECIALTIES

A. WATER HAMMER ARRESTORS, AND TRAPS

Provide water hammer arrestors at valves or batteries of fixtures as indicated on the drawings to prevent water hammer. Arrestors shall be Josam, Sioux Chief, Smith, Precision Plumbing Products, Proflo, Wade, Watts, or Zurn, stainless steel bellows type, or O-ring sealed and lubricated acetal piston. Install water hammer arrestors per the Plumbing and Drainage Institute (PDI) WH-201 installation instructions. Installation of arrestors at batteries of fixtures precludes the requirement for individual air chambers at each battery fixture. Submit certification that water hammer arrestors comply with NSF 61 Annex G and/or NSF 372.

Provide water-seal traps on floor drains, fixtures and equipment with drain connections, including traps not furnished in combination with fixtures and equipment. Place trap as close to the fixture or drain as possible. Exposed traps in finished spaces shall be chrome-plated brass.

Provide conventional "P" type trap, water-sealed self-cleaning design. Full "S" traps or trap standards shall be used only where specifically called for on the drawings or elsewhere in this specification. Trap water seals shall not be less than 2 inches, and deep seal traps shall be provided where specified or indicated. Each trap not integral with the fixture or floor drain or installed below the base slab shall be provided with an accessible cleanout of adequate size. Provide trap primers where required by code and where indicated on the drawings.

B. CLEANOUTS AND FLOOR DRAINS

Cleanouts, floor drains and roof drains shall be by one manufacturer if possible. Acceptable manufacturers are Josam, Sioux Chief, Smith, Wade, Watts, and Zurn. Provide long sweep fittings for cleanout extensions; short sweeps at start of runs or change in direction and combination wye and eight bend fittings in horizontal runs. Install cleanouts with a minimum of 18 inches clear all around, consult local codes for other requirements, for easy system maintenance. Install plug with Teflon joint compound.

Floor Drains: As scheduled on the drawings.

Wall Cleanouts: As scheduled on the drawings. Install wall cleanouts at points as noted on the drawings; at the foot of each soil, waste or interior downspout stack; at horizontal soil and waste branches longer than five feet not served by a floor cleanout; consult local codes for installation at specific fixture types. Install wall cleanouts above the flood rim of the fixture served within four feet of the floor and install extensions from the cleanout tee to the wall to locate the plug within 2 inch of the wall where required. Install cleanouts on urinals and sinks where required by code.

C. VALVES, STRAINERS, HOSE BIBBS, AND UNIONS

Plumbing system valves shall be designed for 125 psi steam working pressure and 200 psi cold water pressure. Install valves on the hot and cold water lines at the water heater connections and other items of equipment, at branches from mains serving groups of fixtures, and at other places indicated or required by the installation to allow ease of future maintenance. Submit certification that valves, fittings and specialties comply with NSF 61 Annex G and / or NSF 372. Except for the following: Hose bibbs, hydrants, backflow preventers isolating irrigation or mechanical make-up systems, emergency mixing valves and trap primers.

Ball Valves 2 inch and Smaller (may be used in lieu of gate valves up to 2 inch): Class 150, two piece lead free cast bronze body, with sweat ends, chrome plated bronze ball with conventional port, 600 psi, blow-out proof stem by Apollo # 70-LF-200, Hammond # UP8501, Milwaukee # UPBA-150.

Globe Valves 2 inch and Smaller: Class 125, lead free cast bronze body and brass disc, with sweat ends by Apollo # 102S-LF, Hammond # UP-688, Milwaukee # UP688 or Nibco # S-113-LF.

Swing Check Valves 2 inch and Smaller: Class 125, lead free cast bronze body and with sweat ends by Apollo # 163S-LF, Milwaukee #UP-1509, or Nibco # S-413-Y-LF. Install in horizontal pipe runs.

Lift Check Valves 2 inch and Smaller: Class 125, lead free cast bronze body, stainless steel spring and with sweat ends by Hammond # LP-947 or Nibco # S-413-Y-LF. Install in vertical pipe or in horizontal runs where required.

Gas Cocks 2 inch and Smaller: Lubricated type with semi-steel body and full area rectangular port with screwed ends by Homestead # 601, Milliken #200M or RM Energy Systems # D125.

Gas Cocks 2-1/2 inch and Larger: Lubricated type with semi-steel body and full area rectangular port with flanged ends by Homestead # 602, Milliken #200mf or RM Energy Systems # D126.

Point of Use Thermostatic Mixing Valves: Thermostatic mixing valves shall be Powers as scheduled on the drawings by Powers or equal by Acorn Engineering Co. or Leonard meeting ASSE 1070 with lead free brass body, non-corrosive internal parts, tamper resistant temperature adjustment, union inlets and check stops with strainers. Install valve at public lavatories and handwashing sink locations in accessible location. Set temperature as scheduled on the drawings.

Unions: Ferrous unions shall be Crane or equal, combination iron and brass, ground joint with screwed ends. Copper unions shall be streamline or equal, cast bronze sweat type with ground joint. Ferrous to copper unions shall be universal controls or equal, dielectric type with threaded nylon insert.

Backflow Preventers: Shall be of the type as scheduled and indicated on the drawings by Watts, Conbraco, Febco or Wilkins.

D. SYSTEM ACCESSORIES

Thermometers shall be American 3 inch bi-metal dial type with separable socket, and shall be installed where indicated or required.

Pressure gauges shall be Ashcroft 3 inch dial type with shut-off cock, and shall be installed where indicated or required.

Trap primers shall be as specified on the drawings, by Mifab with brass body and integral vacuum breaker. Provide distribution box where more than one trap is indicated to be primed on the drawings. Provide access panel where required.

5. PLUMBING FIXTURES

A. PLUMBING FIXTURES

Furnish and install commercial grade plumbing fixtures, see the drawings for quantities and descriptions. Provide china fixtures as scheduled by American-Standard or approved equal by Gerber, Kohler, Sloan Valve Co, Toto-Kiki or Zurn. Provide mop sinks as scheduled by Advance Tabco or equal by Acorn Engineering Co., Fiat, Stern-Williams or Florestone. Provide fixtures of same manufacturer where possible.

Fixtures shown on the drawings or specified herein shall be furnished and installed, set firm and true, connected to required piping services, thoroughly cleaned, left clean and ready for use. Exposed fittings and piping at the fixtures shall be chrome-plated, and water supply piping shall be valved at each fixture.

B. PLUMBING FIXTURE TRIM

Submit certification that faucets and trim comply with NSF 61 Annex G and / or NSF 372. Except for the following: Faucets not used for drinking water or cooking, shower valves and heads or flush valves.

Fixture trim shall have the manufacturer's name stamped clearly and visibly on each item.

Provide faucets as scheduled on drawings.

Fixture P-traps shall be 17 gauge brass body with cleanout, 17 gauge seamless tubular wall bend with cast brass slip nut, shallow steel flange, all chrome plated by McGuire, Brass Craft, Dearborn Brass, EBC, Proflo, Watts Brass and Tubular or Zurn.

Sink drains shall be basket type with chrome plated forged brass basket strainer and strainer body with 1-1/2 inch x 4 inch long seamless brass tailpiece and cast brass lock and coupling nuts by McGuire, Brass Craft, Dearborn Brass, EBC, Proflo or Zurn.

Provide handicap insulation kits for lavatories and sinks on exposed water and waste pipes and fittings, including offset drain and continuous waste covers where required by Brocar, McGuire, Plumberex "Pro-2000", Proflo, Trap-Wrap or Tru-Bro.

END OF SECTION 22

NOTE:
EXISTING CONDITIONS WERE TAKEN FROM ORIGINAL DRAWINGS & SITE VISITS AND MAY NOT REFLECT EXACT "AS-BUILT" CONDITIONS. FIELD VERIFY ALL EXISTING CONDITIONS PRIOR TO SUBMITTING FINAL BIDS. CAREFULLY COORDINATE NEW WORK AND DEMOLITION WITH ALL OTHER DISCIPLINES AND EXISTING CONDITIONS.

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CallisonRTKL, Inc.
1420 Fifth Ave., Suite 2400
Seattle, WA 98101
Tel: 206.623.4646

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Consultant
HENDERSON ENGINEERS
Henderson Engineers, Inc.
[illegible] Suite 300
Lenexa, KS [illegible]
Tel: 913.742.5000

Consultant
CMS
[illegible]29 West 27th Street, 5th Floor
New York, NY 10001
Tel: 212.254.0030

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ISSUE FOR PERMIT / BID

Client/Owner/Project Address

Bowlmor | AMF
Client Address
222 W44th Street
New York, NY 10036

Project Address
3067 Washington Rd.
Augusta, GA 30907

Bowlero

Issue Drawing Log

	Date	Issue
	2018.05.29	ISSUE FOR PERMIT
	2018.05.29	ISSUE FOR BID

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