

SECTION 220000 – PLUMBING

220001 GENERAL

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.
- B. Contractor shall provide coordination drawings per Division 1.
- C. Plumbing work shall be performed as outlined in “Information for Bidders”.
- D. These specifications and the accompanying plumbing drawings are intended to provide for all labor, materials and equipment necessary for the installation complete of all
  - 1. Plumbing Fixtures
  - 2. Equipment
  - 3. Rough-Ins
  - 4. Waste and Vent System
  - 5. Condensate Drainage System
  - 6. Cold Water System
  - 7. Hot Water System
  - 8. Heat Trace Cable Systemand accessories including necessary apparatus, valves and fittings hereinafter described or called for on the plumbing drawings accompanying these specifications.
- E. All plumbing work shall be installed in accordance with the following Codes and all Local Ordinances. Materials, equipment and workmanship shall be as hereinafter specified.
  - 1. North Carolina State Plumbing Code
  - 2. North Carolina State Fire Prevention Code
  - 3. North Carolina Electrical Code
  - 4. North Carolina Accessibility Code
  - 5. NSF Standard # 61
- F. This contractor shall secure all required permits and inspection fees necessary for this work. Permits may be secured from the Building Inspections Department.
- G. The accompanying drawings are schematic only and are not intended to show all fittings, bolts, connections, offsets, etc., unless specifically dimensioned. Follow drawings as closely as possible, provide all adjustments as necessary to conform to the structural conditions, machinery, equipment, work of other contractors and the intent of the drawings, without additional cost to the Owner. Plumbing drawings should not be scaled. Secure dimensions from Architectural drawings. Refer to drawings of other trades and coordinate with other contractors. All items of equipment shall be installed in accordance with the manufacturer’s published installation instructions and diagrams.
- H. The Contractor shall coordinate water and sewer taps and pay all fees in conjunction to provide services as required, for this project.

220002 SCOPE OF WORK

- A. The Contractor shall be required to perform all the following work, in general and provide a complete plumbing system as shown on the plans. The items in general are to be as follows:
  - 1. Furnish and install complete waste and vent system with connections to services as shown on the plumbing drawings and here-in specified.
  - 2. Furnish and install cold water system complete with connections to point as shown on the plumbing drawings and here-in specified.

3. Furnish and install hot water system complete with connections to equipment as shown on the plumbing drawings and here-in specified.
4. Furnish and install condensate drainage system as shown on the plumbing drawings and here-in specified.
5. Furnish and install an operational freeze protection electric heat trace system on p-traps located below the second floor as shown on the drawings and here-in specified
6. Provide connections to equipment furnished and installed by General Contractor or Owner as shown on the plumbing drawings and here-in specified.

220003 LIST OF MATERIALS, FIXTURES AND EQUIPMENT

- A. The Plumbing Contractor shall obtain written approval from the Engineer/Architect for the use of substitute materials claimed as equal to those specified. Such approvals must be obtained as soon after contract awards as possible and before any materials are ordered. Applications for approvals shall be made by the Plumbing Contractor and not by subcontractors or manufacturer's representative. The Plumbing Contractor shall submit within ten days following award of contract and written notice to begin the work a complete list of materials proposed for the job. All like items shall be by the same manufacturer. When this list is approved, no further substitutions will be permitted except in unusual or extenuating circumstances. If no list is submitted, the Contractor shall supply materials specified. *Contractor should note that all items specified in section 220000 shall be submitted independently of other 220000 series sections.* The Plumbing Contractor shall review and stamp the submittals as being in accordance with his bid and these specifications. **Private labeled materials are not acceptable.**
- B. The Plumbing Contractor shall submit shop drawings to the Architect after award of the contract, and before any materials, fixtures, and equipment to be incorporated in the work has been ordered. Shop drawings shall include the name and address of the manufacturer and their catalog numbers and trade names clearly marked. All items shall be referenced to the plans and specifications by **fixture designation or specification paragraph number on an index tab**. One complete set of submittal data shall be manufacturer's original published material. **FAXED COPIES WILL NOT BE ACCEPTABLE.** Approval of materials will be based upon the manufacturer's published ratings. Submit shop drawings and/or catalog data for the following material and equipment:
  1. Waste Piping, Fittings and Couplings
  2. Condensate Piping, Fittings and Couplings
  3. Water Piping, Fittings and Equipment
  4. Circulator Pumps
  5. Sump Pump
  6. Cleanouts and Access Doors
  7. Valves
  8. Insulation
  9. Hangers
  10. U. L. penetration systems
  11. Pipe Markers
  12. Fixtures
  13. Electric Heat Trace Cable System
  14. Coordination Drawings per Division 1.
- C. Approval of shop drawings and/or submittal data shall not relieve the Plumbing Contractor of the responsibility to comply with the requirements and intent of the plans and specifications with regard to dimensions, capacities, quality, quantity, performance characteristics, etc. If data submitted deviates from the contract documents, the Plumbing Contractor shall point out such deviations in writing and also state reasons for same. All similar items shall insofar as possible be one make and manufacturer.
- D. Where any special make, fixture or materials are specified by plate number, trademark or name, deliver to the building with original labels or other identification marks placed thereon by the manufacturer and do not remove until inspected and approved by the Architect. Similar and equal materials and equipment by other manufacturers will be acceptable, subject to approval.

- E. Failure to submit materials, equipment, fixtures, etc., in the time period specified above, the Architect shall assume that all items shall be installed as specified.

220004 DEMOLITION

- A. General Requirements: The work includes the demolition or removal of all construction indicated, specified or necessary to accomplish the work under this contract. The drawings define the scope of work but it is not intended that all items of demolition work be specifically indicated. After carefully reviewing the drawings and specifications to determine intent, the Contractor shall visit the site and determine the extent of demolition work required to properly complete the work under his contract.
- B. Protection of Materials and Work: Before beginning any cutting or demolition work, the Contractor shall carefully survey the existing work and examine the drawings and specifications to determine the extent of work required. The Contractor shall take all necessary precautions to insure against damage to existing work to remain in place, to be reused, or to remain the property of the Owner and any damage to such work shall be repaired or replaced at no additional cost to the Owner.

220005 WORKMANSHIP

- A. Layout:
1. Drawings indicate general locations of fixtures. Secure exact location from Architectural plans before proceeding with work.
  2. Furnish and install all necessary sleeves, inserts, bolts, etc., for concrete floor slabs, roof, walls, and partitions. Failure to install such items in time to avoid delaying the general contractor shall result in the Contractor doing all cutting and repairing at his own expense.
  3. Sleeves as here-in-after specified shall be installed on all through the floor piping above slab on grade except water closet rough-ins. Water closet rough-ins shall be cast in place. Core drilling of slabs shall be sealed with approved fire retardant caulking and sealed watertight.
  4. All equipment shall be installed in accordance with manufacturer's written installation instructions.
- B. Drainage, Waste and Vent Piping:
1. Grade all sanitary waste lines 2" and smaller 1/4" per foot.
  2. Grade all sanitary waste lines 3" and larger 1/4" per foot, where possible, 1/8" per foot minimum, or as indicated on Contract Drawings.
  3. Grade all condensate drain lines 1/8" per foot.
  4. All underground piping shall be graded by the use of a laser beam alignment system.
  5. All floor drains shall be set 1/2 inch below the room finished floor perimeter and the entire floor sloped to the floor drain.
  6. Run all piping as directly as possible, avoiding unnecessary bends and turns so as not to interfere with proper installation of work of other contractors.
  7. All PVC-DWV piping shall be protected by a cast iron sleeve under the following condition with a sleeve as follows:
    - a. Piping passing thru foundation walls: Sleeve shall extend 6 inches beyond wall footing on both sides.
    - b. Piping passing below a footing: Per Contract Drawings.
  8. Provide removable caps for cleanouts with at least six threads engaged. Provide cleanouts at foot of waste and drainage stacks, all changes in direction of horizontal lines more than 135 degrees, in straight lines at intervals not exceeding 100-feet and anywhere additionally noted on the drawings.
  9. Run all horizontal and vertical piping true and plumb to building structure and connect all piping with 'Y' branches and 1/8 or 1/16 bends.
  10. Tapped tees and crosses will not be permitted. Tapped sanitary tees and crosses shall be used.
  11. No soil, waste, or vent piping shall be covered or concealed, until tested and approved by the Architect.

12. Conceal all soil and vent piping. All vents extended through the roof shall be a minimum of 12" above roof level.
13. All PVC-DWV and PVC drainage lines shall be bedded per the manufacturer's recommendations and shall be maintained under a continuous head of 10-feet until after all concrete slabs are poured and/or all heavy equipment has been removed from the site. Contractor shall be responsible for the protection of the piping system at all times including freezing weather.

C. Water System:

1. Conceal water supply piping in walls, below floor or above ceiling except where exposed for connections to fixtures. Install and secure all piping as walls are built. Wedging of piping will not be permitted. All piping shall be isolated from mortar.
2. First Floor: Install piping exposed tight to bottom of existing ceiling and walls. Piping shall be installed straight and as inconspicuous as possible.
3. All water piping shall be routed with a minimum clearance of ten (10) feet from any electrical switchboards, panel boards or telephone backboards.
4. Arrange all pipes to freely drain through a ball valve when water is cut off. All branch valves shall be installed adjacent to the water piping main.
5. All supplies to fixtures shall have individual stop valves.
6. Provide water hammer shock arrestors as required to prevent water hammer. Arresters shall be A.S.S.E. Standards Number 1010 certified. Arresters shall be installed in accordance with manufacturer's published recommendations. Air chambers are not acceptable. Water hammer shock arrestors shall be as manufactured by Precision Plumbing Products, Inc. or approved equal by Zurn, Josam, J.R. Smith, or Sioux Chief.
7. All exposed piping to fixtures shall be chrome plated installed true and plumb.
8. Insulate all water piping inside the building as hereinafter specified.
9. All tees shall be installed such that the flow shall be straight thru the tee and/or out the side. Tees **shall not** be installed where the flow is into the side and out of both ends of the tee (bullhead tee). Bullhead tees installations are not acceptable and shall not be used.
10. Extend water lines to water mains where shown on the plans.
11. Terminate cold water line 5-feet outside building. Connection at this point will be by the General Contractor.

D. Insulation:

1. All pipe insulation joints shall be sealed to maintain integrity of the vapor jacket and shall pass thru all sleeves unbroken except for fire stops.
2. Pipe insulation at all fire separations shall be butted tightly to the firewall or to the floor after fire stop material has been installed.

220006 CUTTING, PATCHING AND CHASING

- A. All cutting and patching shall be in accordance with the "General Conditions" of these specifications.

220007 EXCAVATION, TRENCHING AND BACKFILLING

- A. All excavation, trenching and backfilling shall be in accordance with Division 31 of these specifications.

220008 WASTE, VENT & CONDENSATE DRAINAGE SYSTEMS

A. Piping:

1. Sanitary waste, vent, and condensate drainage piping shall be schedule 40 PVC-DWV solid wall piping conforming to ASTM D-2665-68 and C.S. 272-65 with NSF seal.
2. Vertical sanitary waste and condensate drainage risers that extend between the first and second floors shall be no-hub cast iron conforming to C.I.S.P.I. Standards 301 and shall carry country of origin, manufacturer's name or manufacturer's registered trade-mark.

B. Fittings:

1. Fittings for cast iron waste and vent piping shall be of the sanitary drainage pattern and conforming to piping specification and shall be marked with the Cast Iron Soil Pipe Institute symbol cast into the fitting.
2. Fittings for PVC-DWV piping shall be PVC-DWV fittings conforming to piping specifications.

C. Joints:

1. Joints for PVC-DWV piping shall be made using the piping manufacturer's approved solvent cement.
2. Joints for hubless cast iron piping shall be made using neoprene gasket and stainless steel clamping band conforming to C.I.S.P.I. Standards 310. Bands shall be same manufacturer as piping and shall carry the NSF Logo.
3. Flashing of plumbing vents will be provided by the General Contractor.

220009 HOT AND COLD WATER SYSTEMS

A. Water Piping:

1. Water piping 2-1/2" and smaller, below grade, shall be type 'K' soft copper conforming to ASTM B-88.
2. Water piping 3" and larger, below grade, shall be type 'K' hard copper conforming to ASTM B-88.
3. Water piping 4" and smaller above grade inside the building shall be Type 'L' hard copper conforming to ASTM B-88.

B. Fittings:

1. Fittings for copper piping shall be wrought copper, solder joint fittings conforming to ANSI B 16.22.
2. Fittings for copper piping 2" and smaller may be press fittings conforming to ASME B16.18 or ASME B16.22 and performance criteria of IAPMO PS 117.

C. Joints:

1. All copper piping joints, 1-1/4" and smaller shall be made using lead free solder with a minimum melting point of 410 degrees Fahrenheit.
2. All copper piping joints, 1-1/2" and larger shall be made using Phos-copper silver alloy material with a minimum melting point of 1000 degrees Fahrenheit.
3. Press fitting joints shall be made using the press fitting manufacturer's tools and per manufacturer's instructions. Upon completion of the project, the press fitting manufacturer's tools used for installation shall be turned over to the Owner.

D. Backflow Preventer:

1. Backflow preventer shall be lead-free double check valve design, high hazard, with strainer, test valves, gate valve on inlet and discharge, inlet and outlet pressure gauges, designed to meet AWWA C-510, ASSE 1015. Unit shall be size as shown on the drawings and be manufactured by Watts LF007S or approved equal by Wilkins, Febco, or Conbraco.

E. Expansion Tank:

1. Expansion tank shall be diaphragm design constructed of welded steel and shall bear the ASME and National Board Stamp for 150 pounds working pressure and 200° F. operating temperature. Fittings shall include test cocks, hose bibb drain and air control fitting. Tank and fittings shall be as manufactured by Amtrol, Bell and Gossett, Thrush or Taco.

F. Thermometers and Gauges:

1. Thermometers shall be metal-case, liquid-in-glass, 9" long with a range of 30F to 240F, 2 degree scale division and an accuracy of plus or minus 1 percent of range.

2. Pressure gauges shall be cast aluminum, 4-1/2" diameter glass window, with a range of two times the operating pressure and an accuracy of plus or minus 1 percent of middle half of scale.

220010 ELECTRIC HEAT MAINTENANCE CABLE

- A. Freeze Protection System:
  1. Heat tape for freeze protection shall be self-regulating type with UL approved connection system and tape controller. Tape shall have capacity of 6 watts per foot at 120 volts. Tape shall be Raychem 5XL1-CR/CT with AMC-F5 controller, or approved equal by Byline Manufacturing Co. or Delta Therm.
- B. Install heat trace cable in accordance with IEEE 515.1.
- C. Testing and start-up shall be performed by a factory technician or factory trained representative. All test results shall be recorded, signed and included in the project Operation and Maintenance manuals.

220011 SUMP PUMP DISCHARGE PIPING

- A. Piping:
  1. Piping shall be Schedule 40 PVC-DWV solid wall, conforming to ASTM D-2665.
- B. Fittings:
  1. Fittings for shall be of the sanitary drainage pattern and conforming to piping specification.
- C. Joints:
  1. Joints for PVC-DWV piping shall be made using manufacturer's approved solvent cement.

220012 SUMP PUMP

- A. The Contractor shall furnish and install submersible sump pump with non-clog vortex impeller, cast iron base, float switches, rust resistant steel shaft, and power/control cords to plug into standard duplex receptacle.
- B. Sump pump shall have capacity of 50-GPM at a 20-foot total dynamic head 1/2 HP, 120-volt single phase motor with internal overload and thermal protection. Pump shall be complete with NEMA 4X weather tight corrosion resistant fiberglass enclosure. Control system shall be complete with audio alarm with silencing switch, red light alarm, high level alarm, manual reset, remote monitoring circuit. Complete systems shall be Stancor, Zoeller, or Grundfos.
- C. Sump for Pump will be furnished and installed by the General Contractor.
- D. Pump shall be started by the manufacturer's factory representative.

220013 HOT WATER CIRCULATOR

- A. Circulator shall have capacity as shown on drawings and shall be specifically designed for domestic hot water service.
- B. Circulator shall have lead-free bronze body and flanges with lead-free impeller; circulator motor shall be shaded-pole type, rubber mounted, and shall be equipped with overload protection. Bearings for all motors shall be prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading. Circulator shall be direct connected to motor. Circulator shall be Taco, B&G, or Grundfos with capacity as noted on the drawings.
- C. Circulator shall be supported by appropriate hangers to avoid piping strain. Circulators shall be mounted horizontally.

- D. Startup shall be by manufacturer's representative.

220014 CLEANOUTS AND ACCESS DOORS

- A. Cleanouts shall be the same diameter as the pipe they are connected to. If the pipe is greater than 4" in diameter, the cleanout shall be 4".
- B. Cleanouts installed in walls or pipe chases shall be installed using PVC-DWV cleanout tee with slotted plug, stainless steel cover with vandalproof securing screw. Cleanouts shall be Zurn ZS-1468, Josam 58600-PLG, or J. R. Smith 4472.
- C. Cleanouts installed in floors and walks shall have adjustable cast iron body with cast brass plug, lead seal and square nickel bronze top with watertight gasketed cover. Cleanouts shall be Zurn ZN-1400-T, Josam 57000-X-SQ or J. R. Smith 4040.
- D. Cleanouts installed outside the building and flush with grade shall be installed flush with 24" x 24" x 12" thick concrete pad. Top of pad shall be 1" above finished grade. Cleanouts plugs shall be ABS with recessed head. Cleanouts shall be Josam 57000-X-LT, Zurn Z-1403-BP-NL, or J. R. Smith 4293 Series.
- E. The Contractor shall provide access doors in accordance with Division 08 of these specifications. Access doors shall be provided for all valves, shock arrestors, and hub drains located behind hard ceilings and in walls to provide access. Ceiling access doors shall be a minimum of 24" x 24".

220015 VALVES

- A. Valves shall be installed at all points noted on the plans by standard symbols or as required by best general practice for proper control and operation of the system. All valves, **including existing valves and mixing valves**, shall be identified with 1" diameter, 19 gauge, polished brass identification tags with a number and valve service indicated. Provide a valve chart listing all valves with size and service framed and mounted under glass, as well as a floor plan with all valve locations and valve tag numbers noted, also framed and mounted under glass, in the main mechanical room. Provide a self-sticking 1/2" diameter dot on lay-in ceiling grid at all valve locations. Red dot for domestic hot water supply and return, blue for cold water, red for mixing valves.
- B. All valves shall be by a single manufacturer.
- C. Check valves 2 inches and smaller shall be Class 125, lead free design cast bronze body with threaded ends.
- D. Domestic cold and hot water system valves 1-1/4 inches and smaller shall be lead free design cast bronze body, two-piece, full ported, soldered end ball valves, minimum 400-psig CWP rating. Valves shall be provided with stem extensions for insulation thickness specified.
- E. Domestic cold and hot water system valves 1-1/2 inch and 2 inch shall be lead free design cast bronze body, two-piece, full ported, threaded end ball valves, minimum 400-psig CWP rating. Valves shall be provided with stem extensions for insulation thickness specified.
- F. Domestic cold and hot water system valves 2-1/2 inch and larger shall be flanged end, iron body ball valves rated for Class 150, 200 WOG service. Valves shall be provided with stem extensions for insulation thickness specified.
- G. Balancing valves shall be installed on domestic hot water return systems shall be lead free design cast bronze body equipped with indicating dial and memory stop. Balancing valves shall B&G, Taco or approved equal.

220016 PIPE INSULATION

- A. All plumbing pipe insulation systems shall be installed as a subcontract to the Plumbing contract. All plumbing pipe insulation systems, including jacketing, coverings, adhesives when used, shall have a

flame spread rating not exceeding twenty-five (25) and a smoke development rating not exceeding fifty (50) when the insulation assembly is tested as a composite. Fibrous glass pipe insulation shall be pre-molded with a thermal conductivity of 0.24BTU/in/hr/ft<sup>2</sup> at 100°F.

1. Insulate all cold water piping above grade with 1" thick pre-molded fibrous glass pipe insulation with self-sealing fire retardant vapor barrier jacket.
  2. Insulate all hot water piping, 1-1/2" and smaller, above grade with 1" thick pre-molded fibrous glass pipe insulation with self-sealing fire retardant jacket.
  3. Insulate all copper water piping below grade or slab on grade with 1/2" thick pre-molded closed cellular plastic foam pipe insulation.
  4. Insulate all hot water return piping with 1-1/2" thick fibrous pre-molded glass pipe insulation with self-sealing fire retardant jacket.
  5. Rigid pipe insulation inserts shall be provided for all insulated piping 2" and larger. Inserts shall be water-repellent treated, ASTM C 533, Type I calcium silicate or ASTM C 552, Type II cellular glass. Inserts on cold water piping shall have vapor barrier and extend 2 inches beyond sheet metal shield.
  6. All condensate drainage piping, horizontal and vertical, above slab on grade serving air conditioning condensate shall be insulated with 1" thick pre-molded fibrous glass pipe insulation with self-sealing fire retardant vapor barrier. Condensate P-traps shall be insulated with 1" thick insulating cement insulation.
  7. Provide 20 gauge galvanized metal jackets on all exposed insulated piping installed within 8 feet above finished floor in occupied spaces. Prime metal jacket with paint grip finish.
- B. Exposed pre-molded pipe insulation in finished areas and mechanical rooms shall be finished with factory jacket neatly pasted in place and left ready for painting as specified hereinafter.
- C. All pipe insulation for pipe fittings shall be pre-molded to fit fittings and shall be enclosed under pre-molded PVC fitting jacket.
- D. P-Traps and piping indicated to be equipped with heat trace cable shall be insulated with pre-molded fibrous glass pipe insulation with self-sealing fire retardant vapor barrier jacket in accordance with the following thickness schedule.

Pipe size	Insulation thickness
1/2"- 1"	1"
1-1/4"-2-1/2"	1-1/2"

Note: Pipe insulation shall be insulated with larger diameter insulation as needed to allow room for cable installation.

- E. Plumbing piping located in CMU walls shall be insulated with closed cellular foam insulation with thicknesses as specified above. Foam insulation thermal properties shall match or exceed the specified thermal insulation properties for the intended usage. Insulation shall be secured with insulation manufacturer's approved tape.
- F. Contractor **may request** that closed cellular foam insulation be used on insulated piping when the building structure is not "dried in" to protect fibrous glass insulation from getting wet. Foam insulation thermal properties shall match or exceed the specified thermal insulation properties for the intended usage. Insulation shall be secured with 16 gauge copper wire at 16 inch centers.

#### 220017 HANGERS

- A. Hangers for vertical piping shall be Riser Clamp design, galvanized steel, and shall conform to MSS SP-58 Types 1 through 58.
- B. Hangers for horizontal piping shall be the Clevis type, galvanized steel, and shall conform to MSS SP-58 Types 1 through 58.



- C. **Hangers for insulated piping shall extend around the insulation.** Provide 16 gage galvanized steel insulation protection saddles 12" long at each hanger on all insulated lines. At the contractor's option, hangers for insulated piping may be Michigan Hangers Model 4031 or 4041. Insulation Shields shall cover lower 180 degrees of pipe in the case of clevis hangers, and entire circumference of pipe in the case of trapeze hangers or clamps.
- D. Hangers shall be spaced per the NC State Plumbing Code in accordance with the piping material.
- E. A hanger shall be provided within one (1) foot of each bend in horizontal piping. Vertical piping shall be supported at each floor or at intervals not exceeding ten (10) feet. Support cast iron soil pipe to each joint.
- F. For piping 4" in diameter and larger, rigid support sway bracing shall be provided at changes in direction greater than 45 degrees.
- G. Hangers shall be fastened by means of threaded rods to steel beam clamps, center of bar joist, center of trusses, etc. All hangers shall permit adequate adjustment after erection while still supporting the load. All hanger rods attached to bar joist and trusses shall be installed between bottom or top cords of the structural member. Structural members to span from building structure to structure shall be provided by the Contractor. Steel pipe hanger installation shall comply with MSS SP-69 and MSS SP-89.
- H. Supports for piping on first floor shall be attached to the existing building using Sammy Screws listed for attachment to specific building material (i.e. metal, wood, etc.), and/or piping shall be supported using pipe straps.
- I. Hangers SHALL NOT be fastened to joist bridging or roof deck.
- J. Hangers shall only be hung with drilling into the slab with "drop-in" hangers with the approval of the Structural Engineer of record and the Mechanical Engineer of record with complete dead and operating load information provided for each location. Loading information shall be provided by the Plumbing Contractor.
- K. Piping supported on a trapeze hanger shall conform to MSS SP-69, Type 59. Piping shall be secured to the trapeze hanger by means of a pipe clamp around the pipe insulation and insulation saddle. Bare piping shall be secured by a pipe clamp and isolated by an isolation cushion. Provide MSS SP-58 hanger rods, nuts, saddles, and U-bolts. Insulation shields shall cover entire circumference of pipe at trapeze hangers. Trapeze pipe hanger installation shall comply with MSS SP-69 and MSS SP-89.
- L. Piping supported from the floor shall be supported using a base plate securely anchored to the floor and be equipped with a pipe riser. Riser shall be a minimum size of one inch. Horizontal piping above the floor shall be anchored and rest on a manufactured saddle. Piping shall be secured to each saddle as approved by the Engineer.

220018 PIPE SLEEVES, PLATES, ESCUTCHEONS, ETC.

- A. Pipe sleeves shall be standard weight schedule 40 black steel above slab on grade or cast iron below slab on grade. All sleeves shall be equal to construction thickness except that pipe sleeves passing through floors, other than slab on grade, shall extend 3/4" above the finished floor. Pipe sleeve sizes shall be sized two pipe sizes larger than piping passing thru the sleeve.
- B. Piping thru non-fire rated walls, floors above slab on grade or ceilings, piping passing through foundation walls, and piping installed below structural footings shall have sleeves installed concentric and centered on pipe. Ream all sleeves to prevent cutting of piping. The Contractor shall furnish shop drawings to the general contractor and the Architect showing location, dimensions, and sizes of holes required. Sleeves on piping passing through foundation walls shall extend 6" beyond wall footing on both sides. Sleeves on piping installed below structural footings shall extend beyond footing as indicated on contract drawings.

- C. Install escutcheons snug against room finish on all exposed pipe passing through walls, floors above slab on grade or ceilings. Use cup type escutcheons at floors where sleeves extend above finished floors. Escutcheons shall be chrome plated steel with spring clip.
- D. Sleeves for insulated piping shall be large enough to allow the insulation to pass thru sleeve unbroken.
- E. Core drill openings for all floor openings may be utilized in lieu of sleeved openings. All openings shall be sized two pipe sizes larger than pipe passing thru the opening. All cored openings shall be fireproofed as required and shall be made water tight.
- F. All penetrations in rated floors, firewalls and any other rated separations shall be protected using a through-penetration firestopping method with an "F" rating equivalent to the rating of the membrane being penetrated for particular piping materials used and membrane construction type. Floor penetrations shall additionally have a "T" rating equivalent to the rating of the floor being penetrated. Through-penetration firestop systems shall be installed and tested in accordance with ASTM E814 or UL 1479 with a minimum positive pressure differential 0.01 inch w.g. All openings through horizontal fire separations shall be protected by Metacaulk U.L. Systems or approved U.L. listed system by other manufacturers.
- G. All openings through floors and vertical fire separations shall be protected by combination water seal and fire stops as manufactured by HoldRite, or approved equal by Proset, Metacaulk, or 3M.

220019 PLUMBING SYSTEM IDENTIFICATION

- A. All piping in the building shall be identified by snap-on pipe markers or secured with two zip ties. Markers shall have ANSI colored letters at ANSI height on ANSI colored background with flow arrows and shall be located at 10' on center along pipeline, near each valve, at access doors, near major equipment at each tee branch, and at each floor/wall penetration, both sides. A pipe marker shall be located adjacent to each valve. Pipe identification markers shall comply with ANSI A13.1 and be Custom MS-790 as manufactured by Marketing Service Incorporated or approved equal Steton, Emed or DuraLabel. Stenciling of piping and/or insulation is not acceptable. Wording on markers shall be as follows where more stringent than ANSI Standards:
  - 1. Cold Water
  - 2. Hot Water
  - 3. Hot Water Return
  - 4. Waste
  - 5. Vent
  - 6. Electric heat cable - freeze protection
    - a. Provide warning tape on all piping equipped with heat trace cable.
- B. Engraved plastic laminate signs for listed plumbing equipment shall be 1/16 inch thick and be secured with self-tapping stainless steel screws in center holes, and conform to ANSI A13.1. Plastic laminate face color shall be red for all emergency applications and black for all other uses. Background color shall be white. Signage for all equipment, etc., shall show equipment or service identification, areas served (use actual room numbers used at the facility, not architectural room numbers), substantial completion date, temperature setting (as applicable), capacity, final date of acceptance for equipment item and warranty information. Signage shall be provided for the following items:
  - 1. Water Heaters
  - 2. Sump pump
  - 3. Circulator pumps
  - 4. Starters
  - 5. Disconnects
  - 6. Access panels (to indicate service behind)

Examples: WH-1 (Room 000 – Mech.)  
S.C.: 1/1/2000 (3 year warranty)

Capacity: 119 gallons  
Temperature Setting: 110 deg. F  
CP-1 (HW Rec. Pump – First Floor Classrooms)  
S.C.: 1/1/2000 (3 year warranty)  
Capacity: 1 gpm @ 6 ft head.

220020 PROTECTION OF WORK AND EQUIPMENT

- A. It is imperative that waste and vent lines not be filled with concrete, concrete grindings, sand, gravel, or other foreign matter. Under no circumstances shall any line be left open while the Contractor's workers are not on the job site.
- B. Plug each opening of waste and vent lines the same day it is installed with test plug securely held in place.
- C. All floor drains and hub drains shall be covered immediately after installation.
- D. The Contractor shall be responsible for all work damaged by him/her. Any plumbing work damaged by any other contractor shall be replaced by the Contractor and placed in perfect working condition without extra cost to the Owner. All fixtures and fittings shall be adequately protected before, during and after installation.
- E. The Contractor shall be responsible for all plumbing fixtures at time of final inspection. Any broken fixtures will be replaced by the Contractor at no cost to the owner regardless of by whom the fixture was broken.

220021 TESTING

- A. The Contractor shall notify the Engineer forty-eight (48) hours in advance of all tests. The Contractor shall make all necessary preliminary tests to insure a tight system. Any joint found to leak under test shall be broken, cleaned and remade.
- B. All tests shall be applied before any work is concealed or covered in any manner.
- C. All sanitary waste, vent and condensate drainage piping shall be tested in the following manner: Plug all openings and fill entire waste and vent system to overflow with water and sustain a constant level for a minimum period of three hours. All portions of the floor system shall be tested under a minimum of a 10-foot head including roof vent terminal.
- D. All water piping, hot and cold shall be made tight under a hydrostatic test pressure of 150-lbs. per square inch and maintained without pressure loss for a minimum of four (4) hours. No caulking of joints will be permitted. Any joint found to leak under this test shall be broken, remade and a new test applied.
- E. All backflow preventers shall be tested and certified by an approved and licensed backflow prevention company.
- F. Heat maintenance cable shall be tested in accordance with manufacturer's instructions.
  - 1. Timing: The tests should be performed after the pipe insulation has been installed and prior to the installation of wall or ceiling panels, and shall be witnessed by the Architect's representative and the manufacturer or the manufacturer's representative.
  - 2. Submittal of results: Submit records of the test data to the Architect's representative. Contractor shall submit test results to the manufacturer on manufacturer's standard form for a ten (10) year warranty.
- G. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1" wg. Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must

remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.

- H. The Contractor shall furnish all necessary equipment, materials and labor to perform the above-specified tests.

220022 STERILIZATION

- A. All new water piping shall be charged with a chlorine solution containing not less than 50-ppm available chlorine. The solution shall remain in the piping for a minimum period of 24 hours, during which time valves shall be opened and closed to permit a small flow of the solution. At the end of the 24 hours, the solution shall be tested and must contain a residual of at least 5 to 10 ppm chlorine. The system shall then be drained and flushed to provide satisfactory potable water before final connection is made to the existing distribution system.
- B. The Contractor shall contract with an independent Testing Laboratory for a certification letter that the system sterilization meets or exceed standards for potable water.

220023 PLACING IN SERVICE

- A. Upon completion of the entire system installation, the entire system and all equipment shall be tested by actual operation to provide that it will function as intended.
- B. The Contractor shall flush and rod out all new and existing waste piping prior to final connection to existing system, to ensure that no foreign materials are in these lines, and that a continuous flow of water and waste can be affected.
- C. The Contractor shall flush all water piping prior to the connection of flush valves, mixing valves, and faucet aerators to provide a clean and operational water system.
- D. The Contractor shall place the entire system in a satisfactory operating condition and shall furnish all assistance and instructions required by the Owner's representative during initial operating period. The Contractor shall acquaint the Owner's representative with the special parts required for the operation of the flush valves furnished and installed on the project.
- E. It is the Contractor's responsibility to turn over to the owner all fixtures and floor drains in a clean condition.

220024 PAINTING

- A. The Contractor should note that plumbing piping may be exposed in various areas. The contractor should specifically note that all exposed cast iron piping be uncoated.
- B. All exposed plumbing pipe and plumbing pipe insulation in areas other than mechanical rooms shall be left clean and free from oil ready for painting by the General Contractor. All finished painting will be by the General Contractor with colors to match the surrounding areas.
- C. The Plumbing Contractor shall paint all plumbing insulation, exposed plumbing piping, etc., in Mechanical Equipment Rooms. Insulation to be painted with two (2) coats of glue sizing and two coats lead free enamel paint. Exposed piping and pipe hangers shall be painted flat black. Paint colors shall be as follows:

<u>SERVICE</u>	<u>Benjamin Moore</u>		<u>Sherwin Williams</u>	<u>Devoe</u>
	<u>Number</u>	<u>Color</u>		
Cold water		Blue	Blue	Blue
Hot water	1330	My Valentine	SW1581	3W4-6
Hot water return	2081-50	Pink Ruffle	SW1575	5W3-3

- D. All plumbing equipment pads shall be painted OSHA approved yellow.

220025 ELECTRICAL WIRING

- A. Electrical wiring of plumbing equipment shall be performed as detailed on the Contract Drawings.
- B. Fused disconnect switches shall be heavy-duty industrial type. Switches shall be Siemens, General Electric Company, Square D or Cutler/Hammer fusible type mounted so handle is approximately 4 feet 0 inches above floor or grade. Switches shall have a factory applied standard finish and the usage or designation shall be indicated on cover with engraved plastic laminated labels with 1/2" high contrasting letters. Each switch for motor circuits shall have a complete set of Bussman "Fusetron" or equal time delay fuses
- C. Motor Starters and Fused Disconnect Switches shall be neatly arranged, and securely fastened to walls with expansion bolts, lead shields, etc. Each starter or switch shall have its usage or letter designation indicated on its cover with engraved plastic laminated labels with 1/2" high contrasting letters. Where connections are made to motors not near walls or columns, a vertical conduit attached to floor and ceiling shall be installed and the wiring carried in and out of this conduit by means of condulets. An 18-inch length of flexible metallic conduit shall be installed in the circuit to each connection to a motor. Liquid tight shall be used in all wet locations. Grounding wire shall run inside of flexible conduit

220026 CONTROLS

- A. General:
1. The Controls Contractor will provide a DDC-controlled circuit in the Mechanical Room. The Contractor shall connect at this point and provide water heating system controls as here in after specified.
  2. Furnish and install an electric control system to fulfill the intent of the drawings and specifications. The system shall include all necessary labor, materials, electrical wiring and devices for a complete installed control system.
  3. All electric wiring in connection with the temperature controls and all interlock wiring shall be furnished under this section of the specifications. The wiring shall be installed by licensed electricians employed by Contractor in strict accordance with all local, State, and National Codes. All control and interlock wiring whether line or low voltage shall be run in EMT conduit or as specified under the electrical section of these specifications. Installation of all concealed conduit shall be coordinated with contractor for general construction so it may be installed before slabs are poured or walls are erected.
  4. The control diagrams indicated on the drawings and specified herein show the intended sequences of operation of the various control systems and shall be followed as closely as practicable.
- B. Temperature Sensing Devices:
1. Strap-on Aquastat shall have an adjustable range and be mounted directly on the building hot water recirculating line. Aquastat shall be set to 105°F.
  2. Each water heater shall be equipped with an integral adjustable thermostat.
- C. Sequence of Operation:
1. The control circuit shall energize the power circuit to the circulator pump wiring circuit.
- D. Instructions and Diagrams:

1. The Contractor shall provide to the owner a complete instruction manual covering the function and operation of all control components. The manual shall also contain a schematic drawing of each control system properly marked and keyed with the equipment list to identify each item of control equipment.
2. The Contractor shall also provide a complete schematic control diagram framed under glass and mounted on the wall in the equipment room.

220027 OPERATING AND MAINTENANCE MANUAL

- A. All operation and maintenance manuals **shall** be delivered by the Contractor to the Owner thru the Architect. The manuals **shall** be installed in 3-ring hard cover heavy duty notebooks with the name of the project and the words “**Operation and Maintenance Manual**” permanently affixed to the cover and spine. All items for the project shall be separated by identification tabs correlated to the index. The manuals **shall** contain the following items as a minimum:
  1. Index and page number.
  2. Certificate of substantial completion.
  3. A summary sheet of warranties with dates noted and a copy of all warranties.
  4. List of subcontractors and suppliers with names, addresses, and phone numbers.
  5. Water Line test data for sterilization.
  6. Backflow preventer certificate of operation.
  7. A copy of the valve tag chart that is to be mounted on the wall of the mechanical room.
  8. Complete start-up, operation, and shutdown procedures for each system including sequence of events, locations of switches, emergency procedures, and any other critical items
  9. Lubrication schedules and types of lubricants.
  10. Complete set of current shop drawings and equipment description showing all capacities and other operation conditions.
  11. Equipment summary showing all capacities and ratings (HP, KW, etc.).
  12. Operation manuals, installation manuals, and parts list for all installed equipment.
  13. All submittal data indexed with tabs and shop drawings.
- B. One copy shall be manufacturer’s original published literature with manufacturer’s name on all items. **FAXED COPIES WILL NOT BE ACCEPTABLE.**

220028 AS BUILT DRAWINGS

- A. The General Contractor and Plumbing Contractor shall maintain “during the course of the work” a set of drawings marked up to show the work as installed, including dimensions to and elevations of buried work. Both Contractors shall initial and date all changes to the contract drawings. The Architectural Observer may check this set of documents monthly for compliance. Upon completion of the work, return this set of drawings to the Architect.

220029 FIXTURES

- A. All exposed piping and metal parts shall be chrome plated. Slip joints will not be permitted except on fixture side of trap. Rigid supplies are specified for fixtures and it is intended that they be installed true and plumb from fixture to wall rough in. Connections for water closets shall be made by use of flanges compatible to waste piping materials and verminproofed wax gaskets.
- B. **MANUFACTURER’S MODEL NUMBERS ARE PROVIDED FOR GENERAL INFORMATION ONLY.** Description of product shall take precedence over model numbers.
- C. All water closets shall flush properly when flushing with 25 PSIG at the flush valve.
- D. All floors drains and mop receptors shall have a deep seal cast iron P-trap installed below floor as a separate item. Joint connection shall be compatible to piping system.
- E. All floor-mounted water closets shall be set and grouted with white grout between floor and closet base.

- F. All wall-hung fixtures shall be sealed between wall and fixture with white "G.E. Silicone Seal" caulking.
- G. All counter mounted fixture rims shall be sealed with clear "G.E. Silicone Seal" caulking.

WC-1 WATER CLOSET: (Adult ADA) 16-1/2" high, floor mounted, vitreous china, elongated siphon jet water saver 1.28 GPF bowl with 1-1/2" top spud, china caps, American Standard No. 3461.128, or approved equal by Kohler, or Zurn. Flush valve with 1" screwdriver angle check stop, vandal resistant stop cap, ADA flush handle, vacuum breaker, 1" chrome plated wall supply cover pipe, chrome plated cast brass escutcheon with set screw, 1-1/2" chrome plated flush pipe, Zurn Z6000AV-HET-YK, Sloan No. 111-1.28YK or Delany F-414-1.6-T42-T36. White moltex open front seat with concealed stainless steel check hinge, less cover, American Standard 5901.100, Church No. 9500CT, Centoco 1500CCSS Bemis 1955SSCT, or Benekee 527. Contractor should note flush valve rough-in height as shown on the drawings. Flush valve handle shall be roughed in and mounted to the wide side of the toilet stall.

WC-2 WATER CLOSET: (Child ADA) Floor mounted, 14" high vitreous china, elongated siphon jet water saver 1.28 GPF bowl with 1-1/2" top spud, china caps, American Standard No. 2599.001, or approved equal by Zurn or Kohler. Flush valve with 1" screwdriver angle check stop, vandal resistant stop cap, ADA flush handle, vacuum breaker, 1" chrome plated wall supply cover pipe, chrome plated cast brass escutcheon with set screw, 1-1/2" chrome plated flush pipe, Zurn Z6000AV-HET-YK, Sloan No. 111-1.28YK or Delany F-414-1.6-T42-T36. White moltex open front seat with concealed stainless steel check hinge, less cover, American Standard 5901.100, Church No. 9500CT, Centoco 1500CCSS Bemis 1955SSCT, or Benekee 527. Contractor should note flush valve rough-in height as shown on the drawings. Flush valve handle shall be roughed in and mounted to the wide side of the toilet stall.

WC-3 WATER CLOSET: (Child Standard) Floor mounted, 14" high vitreous china, elongated siphon jet water saver 1.28 GPF bowl with 1-1/2" top spud, china caps, American Standard No. 2599.001, or approved equal by Zurn or Kohler. Flush valve with 1" screwdriver angle check stop, vandal resistant stop cap, ADA flush handle, vacuum breaker, 1" chrome plated wall supply cover pipe, chrome plated cast brass escutcheon with set screw, 1-1/2" chrome plated flush pipe, Zurn Z6000AV-HET-YK, Sloan No. 111-1.28YK or Delany F-414-1.6-T42-T36. White moltex open front seat with concealed stainless steel check hinge, less cover, American Standard 5901.100, Church No. 9500CT, Centoco 1500CCSS, Bemis 1955SSCT, or Benekee 527. Contractor should note flush valve rough-in height as shown on the drawings.

WC-4 WATER CLOSET: (Adult ADA) Floor mounted, 16.5" high vitreous china, closed coupled, tank type, high-efficiency, 1.28 GPF elongated bowl with china caps and bolts, American Standard No. 211AA, or approved equal by Kohler or Zurn. Provide tank flush lever to operate from the wide side of toilet compartment. Chrome plated flexible riser with wheel handle stop, chrome plated wall supply, chrome plated cast brass escutcheon with setscrew, McGuire No. 169, or approved equal by Zurn or Brasscraft. White moltex open front seat with concealed stainless steel check hinge, less cover, American Standard 5901.100, Church No. 9500CT or approved equal by Centoco or Benekee.

WC-5 WATER CLOSET: (Child ADA) Floor mounted, 15" high vitreous china, closed coupled, tank type, high-efficiency, 1.28 GPF elongated bowl with china caps and bolts, American Standard No. 213CA.104, or approved equal by Kohler or Zurn. Provide tank flush lever to operate from the wide side of toilet compartment. Chrome plated flexible riser with wheel handle stop, chrome plated wall supply, chrome plated cast brass escutcheon with setscrew, McGuire No. 169, or approved equal by Zurn or Brasscraft. White moltex open front seat with concealed stainless steel check hinge, less cover, American Standard 5901.100, Church No. 9500CT or approved equal by Centoco or Benekee.

U-1 URINAL: (Child Standard) Wall hung, vitreous china, waterless, with 2" wall outlet, wall hanger, Sloan Model WES-1000 or approved equal by Zurn, Falcon Waterless Technologies, or Waterless. Contractor should note rough-in height as shown on the drawings.

U-2 URINAL: (Child ADA) Wall hung, vitreous china, waterless, with 2" wall outlet, wall hanger, Sloan Model WES-1000 or approved equal by Zurn, Falcon Waterless Technologies, or Waterless. Contractor should note rough-in height as shown on the drawings.

L-1 STAFF LAVATORY: (Adult ADA) 20" by 18" acid resistant enameled cast iron with 4" center set punching, back ledge, wall hanger, front overflow shall be Commercial Enameling 553 or approved equal by Zurn or Kohler. Single lever, chrome plated, lead free supply faucet with 0.5 GPM vandal resistant aerator, single hole shall be Chicago Faucets 2200-E70ABCP (basis of design), or approved equal by Kohler or American Standard. Thermostatic lead free mixing valve with locking set point, 3/8" inlet check stops, 3/8" outlet, shall be installed under the lavatory to supply 110 F tempered water to the faucet. Mixing valve shall be ASSE 1016 approved and shall be Watts Model LFUSG-B or approved equal by Combraco or Heatguard. A bronze lead free body strainer with stainless steel strainer shall be installed between the stop and the mixing valve. Chrome plated lead free angle stops with loose key handle and 1/2" chrome plated nipple to wall and escutcheon with set screw shall be McGuire, Zurn, or Engineered Brass Company. Stainless steel braided flexible supplies shall be as manufactured by McGuire SSLAV12050038 or approved equal by Brass Craft, Watts. Chrome plated cast brass strainer with open grid, overflow openings, cast brass locknut and 1-1/4" 17 gauge tailpiece shall be McGuire Model 155A, Zurn Model Z-8743, or Engineered Brass Company Model SG7L05. 1-1/4" by 1-1/2" chrome plated adjustable cast brass P-trap with 1-1/4" slip in inlet, cleanout, ground joint, 1-1/2" I.P.S. outlet, shall be McGuire, Zurn or Engineered Brass Company. 1-1/2" chrome plated nipple to wall with escutcheon and setscrew shall be McGuire Model N150060, Zurn Model Z-8919-6 w/Z-8909, or Engineered Brass Company Model NF9.06. Chair carrier with floor anchor plate, upright supports, and bearing plate shall be Zurn Model Z-1224, Mifab Model MC-30 or J. R, Smith Model 0800. Lavatory shall be mounted at height as shown on the drawings. Lavatory supplies and trap shall be protected by A.D.A. approved premolded insulation assembly as manufactured by Truebro, McGuire or EBC.

L-2 LAVATORY: (Child ADA) 20" by 18" acid resistant enameled cast iron with 4" center set punching, back ledge, wall hanger, front overflow shall be Commercial Enameling 553 or approved equal by Zurn or Kohler. Chrome plated, lead free, metering faucet with dual push buttons and 0.5 GPM vandal resistant aerator shall be Chicago Faucets 802-VE2805-665ABCP (basis of design), or approved equal by Kohler or American Standard. Thermostatic lead free mixing valve with locking set point, 3/8" inlet check stops, 3/8" outlet, shall be installed under the lavatory to supply 110 F tempered water to the faucet. Mixing valve shall be ASSE 1016 approved and shall be Watts Model LFUSG-B or approved equal by Combraco or Heatguard. A bronze lead free body strainer with stainless steel strainer shall be installed between the stop and the mixing valve. Chrome plated lead free angle stops with loose key handle and 1/2" chrome plated nipple to wall and escutcheon with set screw shall be McGuire, Zurn, or Engineered Brass Company. Stainless steel braided flexible supplies shall be as manufactured by McGuire SSLAV12050038 or approved equal by Brass Craft, Watts. Chrome plated cast brass strainer with open grid, overflow openings, cast brass locknut and 1-1/4" 17 gauge tailpiece shall be McGuire Model 155A, Zurn Model Z-8743, or Engineered Brass Company Model SG7L05. 1-1/4" by 1-1/2" chrome plated adjustable cast brass P-trap with 1-1/4" slip in inlet, cleanout, ground joint, 1-1/2" I.P.S. outlet, shall be McGuire, Zurn, or Engineered Brass Company. 1-1/2" chrome plated nipple to wall with escutcheon and setscrew shall be McGuire Model N150060, Zurn Model Z-8919-6 w/Z-8909, or Engineered Brass Company Model NF9.06. Chair carrier with floor anchor plate, upright supports, and bearing plate shall be Zurn Model Z-1224, Mifab Model MC-30 or J. R, Smith Model 0800. Lavatory shall be mounted at height as shown on the drawings. Lavatory supplies and trap shall be protected by A.D.A. approved premolded insulation assembly as manufactured by Truebro, McGuire or EBC.



- L-3 CLASSROOM LAVATORY: (Child ADA) 20" by 18" acid resistant enameled cast iron with 4" center set punching, back ledge, wall hanger, front overflow shall be Commercial Enameling 553 or approved equal by Zurn or Kohler. Chrome plated, lead free, metering faucet with single push button, chrome-plated cover plate, and 0.5 GPM vandal resistant aerator shall be Chicago Faucets 807-E2805-665PSHAB (basis of design), or approved equal by Kohler or American Standard. Connect faucet to cold water only. Chrome plated lead free angle stop with loose key handle and 1/2" chrome plated nipple to wall and escutcheon with set screw shall be McGuire, Zurn, or Engineered Brass Company. Stainless steel braided flexible supply shall be as manufactured by McGuire SSLAV12050038 or approved equal by Brass Craft, Watts. Chrome plated cast brass strainer with open grid, overflow openings, cast brass locknut and 1-1/4" 17 gauge tailpiece shall be McGuire Model 155A, Zurn Model Z-8743, or Engineered Brass Company Model SG7L05. 1-1/4" by 1-1/2" chrome plated adjustable cast brass P-trap with 1-1/4" slip in inlet, cleanout, ground joint, 1-1/2" I.P.S. outlet, shall be McGuire, Zurn, or Engineered Brass Company. 1-1/2" chrome plated nipple to wall with escutcheon and setscrew shall be McGuire Model N150060, Zurn Model Z-8919-6 w/Z-8909, or Engineered Brass Company Model NF9.06. Chair carrier with floor anchor plate, upright supports, and bearing plate shall be Zurn Model Z-1224, Mifab Model MC-30 or J. R. Smith Model 0800. Lavatory shall be mounted at height as shown on the drawings. Lavatory supply and trap shall be protected by A.D.A. approved premolded insulation assembly as manufactured by Truebro, McGuire or EBC.
- L-4 WASH FOUNTAIN: (Child ADA) 36" semi-circular, solid-surface, with manual type 303 stainless steel pneumatic metering pushbutton in centrally located type 304 stainless steel pedestal, vandal-resistant spray nozzles, 0.5 gpm flow, 7-9/16" deep bowl, manufacturer's thermostatic mixing valve set to deliver 110F water, designed to accommodate three (3) simultaneous users, concealed water and drain piping, shall be Willoughby WAF-3603-WALL-PPB1 or approved equal by Bradley. Color shall be as selected by Architect. Note rough-in heights indicated on Contract Drawings.
- SK-1 CLASSROOM SINK: 22" x 19" x 4-1/2" deep single compartment, self-rimming, 18-gauge, type 304 nickel bearing stainless steel with backledge, sound deadening applied to under side, rear center drain outlet shall be Elkay LRAD2219-4.5 or Just SL-ADA-1921-A-GR-4.5 GR or approved equal by Advance Tabco. Stainless steel crumbcup strainer with 1-1/2" offset tailpiece shall be Elkay LKAD35 or Just J-ADA-35 GR or approved equal by Advance Tabco. Lead-free single lever cold water supply faucet with renewable cartridge, vandal proof wristblade handle, 8" swing spout, 1.5 GPM aerator, less spray, shall be Chicago 350-G8AE35-317XKAB, or approved equal by Zurn or Delta. 1/2" sweat x 1/2" compression sink supply stops shall be equipped with 5" extension, wheel handle ball valve angle stops shall be McGuire, Zurn, or approved equal by Brasscraft. 1-1/2" x 1-1/2" chrome plated adjustable cast brass P-trap with 1-1/2" slip joint inlet, cleanout, and 1-1/2" 17-gauge tube outlet shall be McGuire, Zurn, or Kohler. Install chrome plated escutcheons with setscrew on all piping entering base cabinet. Supplies and trap shall be protected by A.D.A. approved premolded insulation assembly as manufactured by Truebro, McGuire or EBC.
- SK-2 NURSE STATION SINK: 22" x 19" x 4-1/2" deep single compartment, self-rimming, 18-gauge, type 304 nickel bearing stainless steel with backledge, sound deadening applied to under side, rear center drain outlet shall be Elkay LRAD2219-4.5 or Just SL-ADA-1921-A-GR-4.5 GR or approved equal by Advance Tabco. Stainless steel crumbcup strainer with 1-1/2" offset tailpiece shall be Elkay LKAD35 or Just J-ADA-35 GR or approved equal by Advance Tabco. Lead-free hot and cold water supply faucet with renewable cartridge, 8" gooseneck swing spout, 1.5 GPM soft flow aerator, less spray, shall be Chicago 1895-GN8AE35ABCP, or approved equal by Zurn or Delta. Thermostatic lead free mixing valve with locking set point, 1/2" inlet check stops, 1/2" outlet, shall be installed under the sink to supply 120 F tempered water to the faucet. Mixing valve shall be ASSE 1017 approved and shall be Watts Model LF1170-US-M2 or approved equal by Conbraco or Heatguard. 1/2" sweat x 1/2" compression sink supply stops shall be equipped with 5" extension, wheel handle ball valve angle stops shall be McGuire,

Zurn, or approved equal by Brasscraft. 1-1/2" x 1-1/2" chrome plated adjustable cast brass P-trap with 1-1/2" slip joint inlet, cleanout, and 1-1/2" 17-gauge tube outlet shall be McGuire, Zurn, or Kohler. Install chrome plated escutcheons with setscrew on all piping entering base cabinet. Supplies and trap shall be protected by A.D.A. approved premolded insulation assembly as manufactured by Truebro, McGuire or EBC.

SK-3 WORK ROOM SINK: 22" x 19" x 4-1/2" deep single compartment, self-rimming, 18-gauge, type 304 nickel bearing stainless steel with backledge, sound deadening applied to under side, rear center drain outlet shall be Elkay LRAD2219-4.5 or Just SL-ADA-1921-A-GR-4.5 GR or approved equal by Advance Tabco. Stainless steel crumbcup strainer with 1-1/2" offset tailpiece shall be Elkay LKAD35 or Just J-ADA-35 GR or approved equal by Advance Tabco. Lead-free hot and cold water supply faucet with renewable cartridge, 8" gooseneck swing spout, 1.5 GPM soft flow aerator, less spray, shall be Chicago 1895-GN8AE35ABCP, or approved equal by Zurn or Delta. Thermostatic lead free mixing valve with locking set point, 1/2" inlet check stops, 1/2" outlet, shall be installed under the sink to supply 120 F tempered water to the faucet. Mixing valve shall be ASSE 1017 approved and shall be Watts Model LF1170-US-M2 or approved equal by Conbraco or Heatguard. 1/2" sweat x 1/2" compression sink supply stops shall be equipped with 5" extension, wheel handle ball valve angle stops shall be McGuire, Zurn, or approved equal by Brasscraft. 1-1/2" x 1-1/2" chrome plated adjustable cast brass P-trap with 1-1/2" slip joint inlet, cleanout, and 1-1/2" 17-gauge tube outlet shall be McGuire, Zurn, or Kohler. Install chrome plated escutcheons with setscrew on all piping entering base cabinet. Supplies and trap shall be protected by A.D.A. approved premolded insulation assembly as manufactured by Truebro, McGuire or EBC.

SK-4 ART ROOM SINK: 22" x 19" x 4-1/2" deep single compartment, self-rimming, 18-gauge, type 304 nickel bearing stainless steel with backledge, sound deadening applied to under side, rear center drain outlet shall be Elkay LRAD2219-4.5 or approved equal by Just or Advance Tabco. Stainless steel crumbcup strainer with 1-1/2" offset tailpiece shall be Elkay LKAD35 or Just J-ADA-35 GR or approved equal by Advance Tabco. Lead-free hot and cold water supply faucet with renewable cartridge, 8" gooseneck swing spout, 1.5 GPM soft flow aerator, less spray, shall be Chicago 1895-GN8AE35ABCP, or approved equal by Zurn or Delta. Thermostatic lead free mixing valve with locking set point, 1/2" inlet check stops, 1/2" outlet, shall be installed under the sink to supply 110 F tempered water to the faucet. Mixing valve shall be ASSE 1017 approved and shall be Watts Model LF1170-US-M2 or approved equal by Conbraco or Heatguard. 1/2" sweat x 1/2" compression sink supply stops shall be equipped with 5" extension, wheel handle ball valve angle stops shall be McGuire, Zurn, or approved equal by Brasscraft. 1-1/2" x 1-1/2" bottom access solids trap with 1-1/2" I.P.S. inlet, 1-1/2" I.P.S. outlet, Zurn Z-1184 or approved equal by Josam, Ancon or Wade. Install chrome plated escutcheons with setscrew on all piping entering base cabinet. Supplies and trap shall be protected by A.D.A. approved premolded insulation assembly as manufactured by Truebro, McGuire or EBC.

ECW-1 ELECTRIC WATER COOLER: (Child's Dual Height) Wall mounted, dual height, vandal resistant, air cooled type water cooler with matching drinking fountain with stainless steel anti-splash receptor, stainless steel cabinet, in line 'Y' strainer, anti-squirt dual stream bubbler, automatic stream regulator, wall hangers, sealed hermetic compressor with capacity of 8-GPH of 50 °F drinking water at 90°F. room temperature and 80°F. inlet water temperature, Elkay VRCGRNTL8C, or approved equal by Halsey Taylor, or OASIS factory wired for 115 volt, single phase electrical service. Chair carrier with steel upright support legs, backing plates shall be Zurn Z-1225, or approved equal by J.R. Smith or Watts. The Plumbing Contractor shall furnish the electrical receptacle rough-in dimensions to the Electrical Contractor to provide for a concealed electrical service to the unit. Plumbing Contractor shall provide PVC P-trap the same size as the electric water cooler drain. Wheel handle lead free stop valve shall be McGuire LF175 or approved equal by Zurn or Watts. Plumbing Contractor should note that spout shall be set at height as shown on the drawings.

- DF-1 DRINKING FOUNTAIN: Drinking fountain shall be Bi-Level, floor mounted, ADA compliant, Pedestal Non-Filtered, Non- Refrigerated Freeze Resistant, 316 Stainless steel Heavy Duty Vandal Resistant construction, Vandal Resistant bubbler, Mechanical Front Bubbler Button activation. Product shall be specifically made for Outdoor applications. Elkay LK4420FRK or approved equal by Acorn, or Haws. Color shall be selected by Architect.
- MR-1 MOP RECEPTOR: 36" x 36" x 12" deep terrazzo receptor with 3" inside caulked drain, stainless steel strainer, Fiat Model TSB-500, or approved equal by Williams or Mustee. Two (2) wall mounted, polished chrome plated supply faucets with top braces, vacuum breakers, integral screwdriver shank check stops, 3/4" hose ends, Chicago No. 445-897SRCXKCP, T&S B-0665-BSTP or approved equal by Kohler. Heavy duty, cloth reinforced rubber hose and hose hook, Fiat Model 832-AA, Williams Model T-35, or Mustee Model 65.700. Wall mounted, 24" long, 3 mop spring clip hanger, Fiat Model 889-CC, Williams Model T-40, or Mustee Model 65.600. Stainless steel wall guards with corner bracket shall be Fiat Model MSG3636 or approved equal Williams, or Mustee 67.2424. Plumbing Contractor shall install 3" deep seal P-trap below floor as a separate item. Supply faucet outlet shall be mounted 24" above receptor floor. Contractor should note that joint between receptor, wall and floor should be sealed with clear silicone sealant.
- HB-1 HOSE BIBB: Wall mounted, polished chrome plated brass with 3/4" vacuum breaker hose end, locking shield, tee handle, 1/2" inlet wall flange, Woodford Model 26P-1/2, Mifab MHY-9240, T & S Brass B-0702/B-972 or Preir C-257CP.75.
- HB-2 HOSE BIBB IN BOX: Rough brass hose bibb with wheel handle, 3/4" vacuum breaker outlet, 1/2" inlet, cast brass or 304 stainless steel wall box, hinged door, loose key door lock, chrome plated or stainless steel exposed finish, Woodford Model B26-1/2-CH, Mifab MHY-95-49 or Metcraft Model 182.
- HB-3 WALL HYDRANT: Non-freeze type with 3/4" copper inlet, 3/4" double check or vacuum breaker hose end, removable key handle, self draining, for 12" wall thickness as required, Woodford Model 67, Zurn Model Z-1310 or Josam Model 71050-12.
- HB-4 YARD HYDRANT: Freeze-proof, automatically draining, galvanized steel yard hydrant with field serviceable double check backflow preventer or vacuum breaker, 3/4" male hose threads on outlet, 2'-0" bury depth shall be Woodford Model Y2, or approved equal by Mifab or Prier.
- FD-1 FLOOR DRAIN: Cast iron body drain with 3" outlet to match piping system, 6" square nickel bronze heelproof top, vandal resistant securing screws with flashing device, Zurn ZN415S-VP, or approved equal by Josam, J. R. Smith, Wade, or Watts Plumbing Contractor shall install deep seal P-trap below floor as a separate item.
- FD-2 FLOOR DRAIN: Cast iron body drain with 4" outlet to match piping system, 6" square nickel bronze heelproof top, vandal resistant securing screws with flashing device, Zurn ZN415S-VP, or approved equal by Josam, J. R. Smith, Wade, or Watts. Plumbing Contractor shall install deep seal P-trap below floor as a separate item.
- FD-3 HUB DRAIN: Provide 3" I.D. cast iron hub drain for condensate collection from HVAC equipment. Hub drain shall have p-trap below slab and shall extend to 1" above finished floor. Pipe material shall be per condensate drainage section of these specifications. Support shall be per hangers section of these specifications.
- CB-1 ICE MAKER CONNECTION BOX: Fully recessed unit with lead free cold water shut-off valve, compression nut and ferrule as shall be LSP Products Group model OB-801, IPS Corporation model AB9700 or approved equal Oatey Company.

- WH-1 WATER HEATER (First Floor): Factory assembled electric 40-gallon storage type heater shall be equipped with glass lined steel tanks, ASME pressure temperature relief valve, magnesium anode rod, tank drain with hose connection, ASHRAE/IESNA 90.1 insulated factory applied baked enamel finish jacket, two bolt-in, 3,500-watt immersion elements set to run simultaneously (7 kw total) and control box. Heater shall be controlled by immersed bulb thermostat and be equipped with high limit temperature control, control box, transformer, contactors and junction box. Control circuits shall be a maximum of 120-volts. Heater shall be U.L. approved and shall carry 3-year factory warranty. Heater shall be factory wired for 208-volt, three-phase electrical service as shown on the plans and shall be A.O. Smith Dura-Power DEL-40, or approved equal by State or Bradford White. Water heater shall be started by the manufacturer's factory representative.
- WH-2 WATER HEATER (Second Floor): Factory assembled electric 40-gallon storage type heater shall be equipped with glass lined steel tanks, ASME pressure temperature relief valve, magnesium anode rod, tank drain with hose connection, ASHRAE/IESNA 90.1 insulated factory applied baked enamel finish jacket, two bolt-in, 6,000-watt immersion elements set for non-simultaneous operation and control box. Heater shall be controlled by immersed bulb thermostat and be equipped with high limit temperature control, control box, transformer, contactors and junction box. Control circuits shall be a maximum of 120-volts. Heater shall be U.L. approved and shall carry 3-year factory warranty. Heater shall be factory wired for 208-volt, three-phase electrical service as shown on the plans and shall be A.O. Smith Dura-Power DEL-40, or approved equal by State or Bradford White. Water heater shall be started by the manufacturer's factory representative.
- WH-3 WATER HEATER (First Floor Kitchen): Factory assembled electric 119-gallon storage type heater shall be equipped with glass lined steel tanks, ASME pressure temperature relief valve, magnesium anode rod, tank drain with hose connection, ASHRAE/IESNA 90.1 insulated factory applied baked enamel finish jacket, two bolt-in, 4,500-watt immersion elements set for non-simultaneous operation and control box. Heater shall be controlled by immersed bulb thermostat and be equipped with high limit temperature control, control box, transformer, contactors and junction box. Control circuits shall be a maximum of 120-volts. Heater shall be U.L. approved and shall carry 3-year factory warranty. Heater shall be factory wired for 208-volt, three-phase electrical service as shown on the plans and shall be A.O. Smith Dura-Power DEN-120, or approved equal by State or Bradford White. Water heater shall be started by the manufacturer's factory representative.

220030 GUARANTEE

- A. Guarantee: The Contractor shall guarantee the entire plumbing system subject to the General Conditions of these specifications.

220031 BIDDING PROCEDURE

- A. The Contractor shall provide bidding for Alternate Bids in accordance with Division 1. Contractor shall refer to Division 1 for any required unit prices and allowances.

END OF SECTION 220000