SECTION 15400
PLUMBING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

Drawings, Addenda, General Provisions of Contract, including Division 1 General and Supplementary conditions and General Requirements apply to work specified in this Section.

1.02 DEFINITIONS

A. Reviewed equal: Shall mean that the Architect or a designated Consultant, not the contractor, shall make final determination whether materials are an equal to that which is specified.

B. Equal: Shall mean essentially the same as that product specified, but a model of a different manufacturer.

C. Concealed: Shall mean in walls, in chases, above ceilings, within enclosed cabinets, otherwise enclosed.

D. Exposed: Shall mean in finished spaces, in closets, under counters, behind and/or under equipment and/or otherwise visible.

E. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawl spaces, and tunnels.

F. Others: Shall mean provided by sections other than this section. If not purposely assumed by another section, shall be provided by the General Contractor.

G. Materials: Shall mean any product used in the construction, including but not limited to: fixtures, equipment, piping and supplies.

H. Piping: Shall mean pipe, fittings, hangers and valves.

I. Provide: Shall mean the furnishing and installing of materials.

J. Substitution: Shall mean materials of significantly different physical, structural or electrical requirements, performance, dimensions, function, maintenance, quality or cost, than that specified.

1.03 DESCRIPTION OF WORK

A. Work Included

1. Furnish all labor, materials, equipment, transportation, and perform all operations required to install complete plumbing systems in the building, in accordance with these specifications and applicable drawings.

2. Provide the following:

   a. Sanitary, waste and vent systems.
   b. Storm water systems.
   c. Domestic hot and cold water system.
   d. Natural gas system.
   e. Pipe, valve and fittings
   f. Water specialties
   g. Drainage specialties
   h. Circulating pumps
   i. Sump pumps
   j. Plumbing fixtures and accessories
   k. Insulation
   l. Installation and/or connections to fixtures/equipment provided by others.

3. Specifications and accompanying drawings do not indicate every detail of pipe, valves, fittings, hangers, fixtures and equipment necessary for complete installation; but are provided to show general arrangement and extent of work to be performed.

4. Before submitting proposal, This Contractor shall be familiar with all conditions. Failure to do so does not relieve This Contractor of responsibility regarding satisfactory installation of the system.

B. Related Work Described Elsewhere

1. Cutting and patching – Division 1 and others.
2. Temporary Water, Light and Power - Division 1
3. Water and Fire Services - Division 2
4. Site Utilities - Division 2
5. Excavation and backfill – Division 2
6. Concrete Bases - Division 3
7. Setting of sleeves in masonry (sleeves provided by This Contractor) - Division 3
8. Carpentry Work - Division 6
9. Firestopping except as specified in this section, Division 7.
10. Flashing of Vents and Roof Drains - Division 7
11. Furnishing of Toilet Room Accessories - Division 8
12. Installation of Access Panels - Division 8
13. Finished Painting - Division 9, except as specified in this section.
14. Electrical conduit and wiring, except as noted within - Division 16

1.04 PERMITS

A. This Contractor shall be responsible for providing and filing all Plans, Specifications and other documents, pay all requisite fees and secure all permits, inspections and approvals necessary for the legal installation and operation of the systems and/or equipment furnished under this Section of the Specifications.

B. The Contractor shall frame under glass/ clear plastic all permits, secured by him, adjacent to the respective system and/or equipment and required to be displayed by Code, law or ordinance. Those permits secured but not required to be displayed shall be laminated in plastic and included in the Owner’s maintenance manual.

1.05 CODES AND ORDINANCES

A. All work performed under this Section of the Specifications shall be done in accordance with applicable Maine State Laws, Uniform Plumbing Code, Subsurface Wastewater Disposal Rules, and local plumbing codes, and ordinances. The following standards are also to be followed when applicable:

ADA	Americans With Disabilities Act
ANSI	American National Standards Institute
ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
ASTM	American Society for Testing and Materials
BOCA	Building Officials & Code Administrators International, Inc.
NFPA	National Fire Protection Association (a.k.a. NFC, National Fire code)
NEMA	National Electrical Manufacturer's Association
OSHA	Occupational Safety and Health Act
UL	Underwriter's Laboratories

B. If an obsolete code section or standard is specified, the latest replacement issue of each Code or standard for the application, in effect at the time of bidding, shall be used. Code requirements are the minimum quality and/or performance acceptable. Where the Specifications and/or Drawings indicate more stringent requirements, these requirements shall govern.

1.06 QUALITY ASSURANCE

A. Use sufficient qualified workmen and competent supervisors in execution of this portion of the work to ensure proper and adequate installation of the system throughout. Work performed shall conform to manufacturers recommendations, good standard practice and industry standards.

B. Any work deemed unacceptable by the Engineer, Architect or Clerk of the Works shall be redone correctly, at no additional cost to the owner.

1.07 MATERIALS AND SUBSTITUTIONS

All materials and equipment shall be new and of the latest design of respective manufacturers. **All materials and equipment of the same classification shall be the product of the same manufacturer**, unless specified otherwise.

A. Any proposal for substitution of Plumbing equipment shall be made in writing PRIOR TO OPENING OF BIDS, see Division 1. Submit full details for consideration and obtain written approval of the Architect. The phrase "or approved equal" shall be intended to mean that the Architect, not the contractor, shall make final determination whether or not substitute materials are an equal to that which is specified. The contractor shall be responsible to certify within his submittals that any equipment to be considered as an "approved equal" meets or exceeds the requirements of this specification in all aspects and will physically fit within the space provided and still provide adequate space adjacent to the equipment for service. If requested by the Architect the contractor shall provide said certification in the form of scale drawings before review will be made. Architect will not be responsible to provide drawings for substituted materials unless the substitution is agreed upon prior to opening of bids. Architect's decision on acceptability of substitute materials shall be final.

B. Approval by Architect for such substitution shall not relieve the Plumbing Contractor from responsibility for a satisfactory installation and shall not affect his guarantee covering all parts of work

C. Any material or equipment submitted for approval which are arranged differently or is/are of different physical size from that shown or specified shall be accompanied by shop drawings indicating different arrangements of size and method of making the various connections to equipment. Final results will be compatible with system as designed.

D. Materials and equipment determined as an "approved equal" and /or substitutions must meet the same construction standards, capacities, code compliances, etc. as the equipment (i.e. manufacturer, model, etc.) specified.

E. Any additional cost resulting from the substitution of equipment shall be paid by this Contractor.

F. All materials not specified otherwise shall be manufactured within the United States and supplied locally (within the State of Maine) when available. It is preferable to obtain materials that are manufactured within 500 miles of the work site when practical.

1.08 PLANS AND SPECIFICATIONS FOR SUPPLIERS

This Contractor shall provide his suppliers and any subcontractors with a copy of the specifications and floor plans, details and schedules that pertain to the equipment to be supplied.

1.09 SHOP DRAWINGS & SUBMITTALS

A. As soon as possible after award of Contract (but not longer than 21 calendar days), before any material or equipment is purchased, Plumbing Contractor shall submit to the Architect no less than ten (10) copies of shop drawings for approval. If shop drawings are not submitted within the allotted time frame all substitutions included the late shop drawings will be invalid and the equipment specified must be provided. Any costs resulting from delays in the project schedule due to failure to submit shop drawings related to this section in a timely manner shall be the responsibility of the Plumbing Contractor. Shop drawings shall be properly identified and shall describe in detail the material and equipment to be provided, including all dimensional data, performance data, pump curves, computer selection print-outs, etc. Capacities indicated are minimums. Equipment submitted with capacities below specified parameters will be refused.

B. Corrections or comments made on the shop drawings do not relieve the contractor from compliance with requirements of the drawings and specifications. Shop drawing review is only for review of general conformance with the design concept of the project and general compliance with the information given in the contract documents. The contractor is responsible for confirming and correlating all quantities and dimensions, selecting fabrication processes and techniques of construction; coordinating his work with that of all other trades and performing his work in a safe and satisfactory manner.

C. All related items shall be submitted as a package. Partial submission shall not be reviewed until the package is complete, as itemized in paragraph "H" below.

D. Should any materials or products be purchased and/or installed without prior review and comment the contractor shall be required to remove or replace those products and/or materials if directed by the Architect at his own expense. If the materials are not removed (or

replaced) or if the project is delayed as a result the Architect reserves the right to order the withholding of payment until the situation is resolved in a manner satisfactory to the Architect.

E. Plumbing shop drawings shall be separate from Mechanical shop drawings. All submittals shall have a clear area on the front no less than 4inches x 3inches to be reserved exclusively for the Engineers' shop drawing stamp or they will be refused for re-submittal.

F. Submittals must be original documents or good quality photocopies of original documents (photocopies of color samples are not acceptable). Faxed copies of submittal sheets will be refused.

G. Review must be obtained on all items specified in Section 2 or shown on the drawing, and any significant items implied or otherwise required but not specified, including:

1. Plumbing Fixtures and accessories

    a. Plumbing fixtures
    b. Faucets
    c. Seats

2. Equipment and controls

    a. Sump pump
    b. Circulator pumps and accessories

3. Piping, valves and Accessories

    a. Pipe, fittings, unions and flanges
    b. Shut-off, check & balancing valves

4. Water specialties

    a. Shock absorbers
    b. Wall hydrants and hose bibs
    c. Relief valves
    d. Expansion tank(s) and accessories
    e. Pipe hangers & supports
    f. Pressure gauges and thermometers
    g. Trap Seal Primers
    h. Pipe flexible connectors
    i. Equipment, pipe and valve identification
    j. Backflow Preventers
    k. Pipe sleeve wall closure devices
    l. Water meters
    m. Relief valves
    n. Mixing valves

5. Drainage specialties

    a. Roof drains
    b. Floor drains
    c. Cleanouts

d. Carriers
e. Traps

6. Insulation

a. Pipe & fittings
b. Equipment Insulation
c. Handicapped accessibility insulation kits

H. All submittals shall include a disclosure stating the content of recycled and recyclable materials contained within the products submitted.

1.10 PRODUCT HANDLING

Use all means necessary to protect materials before, during and after installation, and to protect the installed work and materials of all other trades. In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect at no additional cost to the Owner.

1.11 AS-BUILT DRAWINGS

Keep in good condition at the job, apart from all other prints used in actual construction, one complete set of all blueprints furnished for this job. On this special set of blueprints, record *completely and accurately* all differences between the work as actually installed and the design as shown on the drawings. These record prints must be kept up to date by recording all changes within one week of the time that the changes are authorized. At the completion of the work, this set of blueprints shall be transcribed electronically into the form of CAD drawings and delivered to the Architect for the Owner. If a complete CAD record of changes is not made and provided by the Contractor, a record shall be made by the Engineers, and *the cost of the record shall be paid for by this Contractor*. (A neat, well documented set of record blueprints will greatly reduce this cost.) Free copies of the original CAD drawings will be made available to the Contractor if desired, for this use only. Drawings shall be dated accordingly and clearly identified as "AS-BUILT". Contact the Architect directly or the Engineer via e-mail at mechsyst@maine.rr.com. Specify required CAD format when requesting the files. Files will be compressed and will require "WinZip" (http://www.winzip.com) for extraction.

1.12 MAINTENANCE MANUAL

On completion of this portion of the work, and as a condition of its acceptance, submit for review two copies of a manual describing the system. Plumbing equipment manuals shall be separate from mechanical manuals. All manuals shall be original copies, not photocopies, or they will be refused for resubmittal. Prepare manuals in durable 3-ring binders approximately 8.1/2" by 11" in size with at least the following:

A. Project name on the spine and front cover, and identification on the front cover stating the project name, general nature of the manual, and name, address and telephone number of the General and Plumbing Contractors.

B. Neatly typewritten index.

C. Complete instructions regarding operation and maintenance of all equipment involved.

D. Complete nomenclature of all frequently replaceable parts and supplies, their part numbers, and name, address and telephone number of the vendor.

E. Copy of all guarantees and warranties issued, and dates of expiration.

F. Shop drawings and equipment/fixtures manufacturer's catalog pages. Clearly indicate the precise item included in this installation and delete, cross out or otherwise clearly indicate, all manufacturers' data with which this installation is not concerned.

1.13 OBJECTIONABLE NOISE AND VIBRATION

All equipment shall operate without objectionable noise and vibration. Should objectionable noise or vibration be transmitted to any occupied part of the building by apparatus, piping or ducts, as determined by the Architect, the necessary changes eliminating the noise or vibration shall be made by this Contractor at no extra cost to the Owner.

1.14 GUARANTEE

This Contractor shall guarantee all materials and workmanship furnished by him or his sub-contractors to be free from all defects for a period of no less than one (1) year from date of final acceptance of completed system and shall make good, repair or replace any defective work which may develop within that time at his own expense and without expense to the Owner. Any additional costs required to extend manufacturer's guarantee and warranty for the period specified, shall be included in Contractor's base bid.

1.15 DEVIATIONS, DISCREPANCIES AND OMISSIONS

A. The drawings are intended to indicate only diagrammatically the intent, extent, general character and approximate locations of plumbing work. Work indicated, but having details obviously omitted, shall be furnished complete to perform the functions intended without additional cost to the Owner. This shall include but not limited to:

1. All items that are required to meet all applicable codes and referenced standards.

2. Piping for cold and hot water supply, drain, vent, gas, etc to each plumbing fixture/equipment shown on the floor plans or scheduled.

3. Shut-off valves on lines feeding individual fixtures without integral stops.

4. Minor single phase electrical or control wiring between plumbing provided items that require it, unless indicated on the Division 16 Electrical Drawings.

5. Plumbing related items indicated on the drawings of other trades.

6. Items indicated on one plumbing drawing but not shown on a corresponding drawing.

7. Items implied on the plumbing drawings but not shown.

8. All plumbing related items clearly shown in dark print on the Plumbing drawings but not included in the specification (See paragraph 2.01), unless it is noted as being provided by the owner or other contractor or unless other sections assume the responsibility.

B. The drawings and specifications are complimentary to each other and what is called for in one, shall be as binding as if called for by both. In the event of conflicting information on the drawings, or in the specifications, or between drawings and specifications, or between trades, that which is better, best or most stringent shall govern.

1.16 WORKPLACE SAFETY

A. All Trade Contractors shall comply with the provisions of the "Construction Safety Act" and the "Occupational Safety and Health Act", as well as all other applicable Federal, State, and local requirements.

B. The Trade Contractor alone shall be responsible for the safety, efficiency and adequacy of his plant, appliances and methods, and for any damage, which may result from their failure of their improper construction, maintenance, or operation.

C. All Trade Subcontractors shall notify the General Contractor of any flammable, combustible and/or toxic materials intended for use on the project and shall furnish the General Contractor literature pertinent to the use and control of such materials.

1.17 COMMISSIONING

A commissioning agent has been retained by and works directly for the Owner. The commissioning agent's primary responsibility shall include ensuring the systems function as designed. A full scope of the agent's duties may be provided on request.

1. This contractor shall provide documentation on equipment that may be requested by the commissioning agent with notification provided to the Architect of such.

2. Should the commissioning agent requested changes or alterations to the plumbing systems, said changes or alterations must be authorized by the Architect or Engineer of record prior to work. See part 1.17, "CHANGE ORDERS".

3. The scope of the plumbing contractor's responsibility regarding commissioning shall be (but not limited) to:

    a. Attend commissioning meetings when requested.
    b. Coordinate the tests specified to include the commissioning agent. Coordination shall include as a minimum 1 week notice.

PART 2 - PRODUCTS

2.01 GENERAL

A. Unless otherwise indicated, the materials to be furnished under this contract shall be new and the standard products of manufacturers regularly engaged in the production of such equipment, and shall be the manufacturer's latest standard design that complies with the specification requirements. All materials and equipment of the same classification shall be the product of the same manufacturer, unless specified otherwise.

B. All products shall be manufactured within the United States, unless specified otherwise, and supplied locally (within the State) wherever possible. It is preferable to obtain materials that are manufactured within 500 miles of the work site when practical.

2.02 UNSPECIFIED ITEMS

Products required, implied or indicated, but not specified, shall be by the same manufacturer and level of quality and as similar items specified, whenever possible. When no similarity exists, the Contractor shall submit for review an appropriate commercial/institutional quality item, complete to perform the functions intended, using his best discretion. The Architect or a designated Consultant, not the contractor, shall make final determination whether materials are of suitable quality and perform the functions intended.

2.03 MOTORS AND ELECTRICAL WORK

A. Provide and erect all motors, temperature controls, limit switches as specified.

1. Power supply to switches, fused switches, outlets, motor starters, to line terminals of equipment, and all related wiring and fuses to properly connect and operate all electrical equipment specified shall be furnished and installed under Division 16, "ELECTRICAL" (Electrical Contractor). Coordinate all wiring between Mechanical and Electrical to provide a complete and operating system.

2. All wiring provided under this section shall be in accordance with the latest rules and regulations of the National Fire Underwriters, National Electric Code, and Local Codes Division 16. Install all wiring under the supervision of the Electrical Contractor. Any wiring that is not installed according to these standards, and which does not match wiring installed by Division 16 in type, quality and appearance shall be corrected by Division 16 at the expense of this section.

3. Temperature Control Systems: Electric wiring shall be furnished and installed by Temperature Control Contractor under supervision of Electrical Contractor. Any wiring that is not installed according to these standards, and which does not match wiring installed by Division 16 in type, quality and appearance shall be corrected by Division 16 at the expense of this section.

2.04 PAINTING

Painting shall be provided for all steel/iron equipment supports, steel/iron fuel piping, exposed flanges, fittings and valves within boiler rooms, basements and outside and where specified elsewhere within this section. Painting shall consist of no less than two (2) coats of rust inhibiting paint, Rust'O'leum or approved equal. Paint shall be capable of withstanding temperatures of up to 250^{o}F. Colors shall be as follows:

Equipment supports	Flat black
Fuel Gas Piping outside	Match exterior finish or per gas supplier requirements.

2.05 HANGERS AND SUPPORTS

A. General

1. All hangers and supports shall be especially manufactured for that purpose and shall be the pattern, design and capacity required for the location of use.

2. Piping specified herein shall not be supported from piping of other trades.

3. All steel hangers shall be factory painted.

4. Hangers shall be heavy-duty steel adjustable clevis type, plain for steel, cast iron and plastic pipe, and copper plated for piping in direct contact with copper tubing (i.e. copper hot water piping) shall be equal to Carpenter & Paterson Inc., Fig. 100 (Fig. 100CT copper plated).

5. Hangers shall go outside of insulation for cold water piping. Each hanger shall be furnished with metal shield; Fig. 100 SH.

6. Exposed vertical risers ¾ inch and smaller shall be supported at 6 foot intervals between floor and ceiling with split ring type hangers; copper plated for piping in direct contact with copper tubing equal to Carpenter & Paterson Inc., Fig.81 (Fig. 81CT copper plated). ALL PIPING DROPS TO FIXTURES SHALL BE ANCHORED SOLID TO WALL WITH A STEEL SUPPORT BRACKET WITH ADJUSTABLE CLIP, ESPECIALLY PIPING TO FLUSH VALVES

7. Piping suspended from walls and partitions shall be supported by steel support bracket with adjustable clips equal to Carpenter & Paterson Inc., Fig. 69. All attachments to bar joists shall be from top chord.

B. Hanger Rods & Attachments

1. Hanger rods shall be galvanized all thread rod. Rod size shall be as follows:

Pipe Size	Rod Size
3/8” to 2”	3/8”
2.1/2” to 3.1/2”	1/2"
4” to 5”	5/8”
6”	3/4"

2. All nuts for hanger rods and hangers to be galvanized steel.

3. Provide lag points with rod couplings for fastening to wood, toggle bolts in concrete blocks and compound anchor shields and bolts in poured concrete.

4. Provide toggle bolts with rod couplings for fastening in the pre-cast concrete plank decks.

5. Provide and install angle iron supports for pipe hangers in locations as required. Angle iron supports shall be adequate size for span and piping or equipment.

6. Hot and cold water piping at each fixture shall be securely fastened in wall with split ring type hanger fastened to studs within wall.

2.06 IDENTIFICATION

A. Tag each new pump /equipment, and switch with 2½ inches x ¾ inch rectangular engraved nameplates with white letters on black, #2060-20 by Seton Name Plate Corp. or reviewed equals. Nameplates shall be mechanically fastened to equipment (adhesives are not acceptable). Embossed labels are not acceptable.

B. Identify all new water and drain piping with "Set Mark" snap-around pipe markers by Seton Name Plate Corporation or reviewed equal. Markers shall include both identification and arrows indicating direction of flow. Markers shall be placed on pipe segments 5 feet and longer, and spaced no less than 10 feet apart. Heating hot water piping shall be labeled differently from Domestic hot water piping. On parallel runs of piping, plumbing markers shall be grouped together, and grouped with heating markers whenever practical.

Legend	Background/Letter Color
"Cold Water"	Green/ white letters
"Domestic Hot Water"	Yellow/ black letters
"Domestic Hot Return"	Yellow/ black letters
"Natural Gas"	Yellow/ black letters
"Plumbing Vent"	Green/ white letters
"Roof Drain	Green/ white letters
"Sanitary Drain"	Green/ white letters

C. Tag all new valves with Seton #M4506 1½ inch square brass tags and #6 bead chains, stamped with appropriate identification: "CW", "DHW", "DHWR", "Gas" etc. Tag shall be consecutively numbered. DO NOT DUPLICATE EXISTING VALVE IDENTIFICATION NUMBERS. Fixture stops, control valves or valves adjacent to equipment, the use of which is obvious, are not to be tagged.

D. Provide valve charts identifying valve number, valve identification and service. Mount charts in Boiler Room in 8½ inch x 10 inch and 8½ inch x 11 inch self-closing aluminum frame with plastic windows. Provide additional copies for maintenance manuals.

2.07 INSULATION

A. Insulation shall be provided for water piping, except immediate connections to fixtures. Insulation systems shall have a flame spread rating of 25 or less, and a smoke developed rating of 50 or less.

B. Cold Water

1. Insulate all cold water piping above grade with 1-inch thick fiberglass heavy density sectional pipe insulation system with minimum of 7 lb. density and 450^{o} temperature rating having a factory applied vapor barrier laminate all service ASJ jacket. Insulation jacket to have pressure sealing lap adhesive. Provide additional sealing of jacket with flare type stainless steel staples. Staples shall not penetrate more than ½ the insulation thickness. Cold water run outs to individual fixtures may use ½" thick insulation as specified above.

2. Shields of 28 gauge metal approximately 8 inches long and forming an arc of approximately 120 degrees to fit insulation shall be provided at each hanger for all cold water piping to prevent points of condensation. Shields to be provided by this Contractor. Hangers shall be provided large enough to be outside the covering.

C. Hot Water & H.W. Recirculating

1. Insulate all hot water and Recirculating piping with 1-inch thick fiberglass heavy density sectional pipe insulation system and a 450o temperature rating with all service ASJ jacket. Longitudinal jacket flaps to be secured with flare type staples.

2. Shields of 28 gauge metal approximately 8 inches long and forming an arc of approximately 120 degrees to fit insulation shall be provided at each hanger for unrecirculated hot water piping lines to minimize cooling between uses. Shields to be provided by this Contractor. Hangers shall be provided large enough to be outside the covering.

D. Storm Water

1. Insulate all storm water lines above ground with 1-inch thick insulation as specified for cold water above. Cut insulation to include hangers, then butt insulation tightly together and seal to prevent condensation points.

2. Underside of roof drain boxes to be insulated with 1-inch thickness of a hydraulic setting insulating cement applied in one coat, troweled smooth and finished with 6 oz. canvas pasted over or with Armaflex carefully applied.

D. Fittings

1. All fittings and valves shall be covered with a one piece PVC insulated fitting cover secured.

2. The ends of insulation on exposed pipes at valves, flanges, unions, etc., shall be finished neatly with covering to match jacket and secure with mastic.

3. Valves, flanges and unions on hot water piping shall not be insulated.

E. Installation

All insulation work shall be executed by skilled insulation workmen regularly in the trade.

F. Covering

Wherever insulation is exposed in finished areas, it shall be carefully and neatly covered with a white PVC plastic covering material. Covering shall be applied in no less than 4 foot lengths with shingle joints. Longitudinal joints shall be on the top or back sides so as to be out of sight and sealed with adhesive materials provided with the jacketing. Material shall be butted to finish walls or Insulation. Jacketing material shall be Zeston pre-cut, pre-curled 0.030 thickness. Or reviewed equal.

G. Tub/showers

For sound attenuation and water temperature maintenance, stuff the inside cavities around the tub with pieces of clean scrap (or new) fiberglass insulation.

2.08 VALVES

A. General

1. Valves shall be provided as shown and as required to make the installation and its apparatus complete in operation; locate to permit easy operation, replacement and repair.

2. All valves must be so constructed that they may be repacked under pressure while open.

3. Globe valves shall be installed in all lines where regulation is required.

4. Check valves shall be installed in all lines where flow may reverse from intended direction.

5. Valves shall have name and/or trademark of manufacturer as well as working pressure stamped or cast on valve body.

6. Valves shall comply with Manufacturer's Standards Society (MSS) specifications and be so listed.

B. Types and Manufacturers

All valves shall be of one manufacturer and by one of the manufacturers listed. The following list is provided as a means of identifying the quality and type required.

1. Gate Valves 3 inches in size and smaller

Shall have bronze bodies, rising stem, solid wedge, union bonnet, rated for 150# WSP, 300# WOG:

	Soldered Ends	Screwed Ends
Milwaukee	1169	1151
Stockham	B-124	B-120
NIBCO	S-134	T-134
Hammond	IB648	IB629

2. Globe Valves 2 inches in size and smaller

Shall have bronze bodies, union bonnet, renewable composition disc for service intended, rated for 150# WSP, 300# WOG:

	Soldered Ends	Screwed Ends
Milwaukee	1590-T	590-T
Stockham	B-24-T	B-22-T
NIBCO	S-235-Y	T-235-Y
Hammond	IB423	IB413T

3. Angle valves

Same general description and manufacturers as globe valves above, only outlet at 90 degree angle from inlet.

4. Plug type Globe valves 2 inches in size and smaller

Shall have bronze bodies, union bonnet, stainless steel plug type disc and seat. Rated for 150# WSP, 300# WOG:

	Soldered Ends	Screwed Ends
Milwaukee	591-A	-----
Stockham	-----	-----
NIBCO	T-256-AP	-----

5. Ball valves 1¼ inches in size and smaller

Shall have bronze bodies, Type 316 stainless steel stems and balls, reinforced Teflon seats and seals, blowout proof stems and adjustable stem gland. Shall be equipped with suitable packing for service intended. Ports shall be "full port". Rated for 400# WOG and 350°F:

	Soldered Ends	Screwed Ends
Milwaukee	BA-350S	BA-300S
Apollo	82-200	82-100
Watts	B-6081	B-6080
NIBCO	------	------
Hammond	8614	8604

6. Ball valves 1½ inches in size and larger

Shall have bronze bodies, Type 316 stainless steel stems and balls, reinforced Teflon seats and seals, blowout proof stems and adjustable stem gland. Shall be equipped with suitable packing for service intended. Ports shall be "conventional port". Rated for 400# WOG and 350°F:

	Soldered Ends	Screwed Ends
Apollo	70-200	70-300
Watts	B-6000-SS	B-6001-SS
NIBCO	S-585-66	T-585-66
Hammond	8514	8503

7. Locking ball valves

Where indicated shall be full port ball valves, same as specified above except also provide locking option. Provide brass padlock for each valve, all keyed the same. Give a copy of the key to Maintenance Supervisor and place an appropriately labeled one in the Maintenance Manual Binder. Lock valves in the open position unless noted otherwise.

8. Check Valves 2 inches in size and smaller

Shall be horizontal swing type with bronze body, Teflon disc. Rated for 125# WSP, 200# WOG:

	Soldered Ends	Screwed Ends
Milwaukee	1509-T	509-T
Stockham	B-310-T	B-320-T
NIBCO	S-413-Y	T-413-Y
Hammond	IB945	IB904

9. Spring loaded check valves 2" and smaller:

Bronze body, bronze trim, stainless steel spring, stainless steel center guide pin, Class 125, Teflon seat unless only bronze available.

	Solder or Screwed Ends
ConBraCo	61 series
Grinnell	3600SJ
Mueller	203BP
Nibco	S480Y
Val-Matic	S1400 series.

10. Drain Valves

Shall be conventional ball valves and provided with hose nipples and threaded metal cap on chain. Watts B-6001-CC or reviewed equal.

11. Balancing Valves

Shall be Watts CSB-61-S. For ¾" pipe, initially set dial at 30. For ½" pipe initially set dial at 60. Or reviewed equal.

12. Gas service valves 2" in size and smaller

Shall be full port carbon steel ball valves with stainless steel ball and stem and Teflon seat. Supply with "T" handle. Apollo 72-100 Series or reviewed equal.

13. Gas service valves 2.1/2" in size and larger

Shall be carbon steel flanged ball valves with 316 stainless steel trim, TFE seat, 285# WOG, "T" handle. Apollo 88-100 Series or reviewed equal.

2.09 DOMESTIC WATER PIPING

A. Water and Fire Service Lines

1. Continue water and fire service lines from where the site contractor stops (a maximum of 10 feet from the building) to where they emerge from the slab. Coordinate interface with site utilities. Use same materials.

B. Interior

1. All hot and cold water piping above finish floor (not buried) shall be hard-drawn type "L" copper tube with cast or wrought fittings and made up with Silvabrite 100 lead-free solder. PEX may not be substituted.

2. All buried cold water and trap primer piping shall be type "K" soft copper tubing and installed with silver solder joints below floor slab.

3. All buried hot water piping shall be insulated and run in Schedule 40 P.V.C. sleeve or trenches. **Do not direct bury hot water piping.**

4. All exposed, uninsulated water piping in finished areas shall be chromium plated I.P.S. copper or red brass pipe or tubing and fittings. Valves shall also be chrome plated brass or bronze. Any chrome trim with wrench marks shall be removed and new trim installed.

5. Type of tubing shall be stamped or printed on each length by Manufacturer.

C. Underground Domestic Water Piping Between Buildings

1. General

Furnish and install complete system of pre-manufactured, pre-insulated piping as shown on plans. The system shall consist of a polyethylene (PEX) service pipe encased in a multi-layered insulation and a waterproof, corrugated high-density polyethylene (HDPE) outer jacket. The system shall be capable of service temperatures up to 200^{o}F. and working pressure to 125 psi. Underground portions of piping shall be run continuously and joint-free.

2. Properties

1. Tubing shall be PEX suitable for use in potable water systems.
2. Insulation shall be closed cell, not less than 2.0 lb/ft^3 density, R value of not less than 5.50 with 90mm (2.9 inch I.D.) service pipes. Water absorption shall be not more than 2.0% at 20^{o}F when totally immersed in water for 24 hours.
3. Outer jacket shall be not less than 7.9 inches in diameter and NSF approved.

3. End Caps

End caps shall be provided to protect exposed ends of pipe system from damage and water penetration. Material shall be EPDM rubber and fastened to pipes and jacket with stainless steel draw band style clamps.

4. Sleeves and Compression Wall Seals

Where piping passes through foundation walls (into open basements) and floor slabs provide compression wall seals with a hydrostatic closure device shall consisting of identical interlocking links of solid synthetic rubber compounded to resist ozone, water, chemicals and extreme temperature variations. Each link shall be connected by corrosion resistant bolts and nuts to form a belt which is to fit snugly around the pipe. Under each bolt and nut there shall be a metal pressure plate so that when each nut is tightened the rubber links will expand between the pipe and sleeve to form a continuous, air tight and water tight seal. Device shall be a product of the piping system manufacturer.

5. System shall be Ecoflex Thermo No. 500008 by Ecoflex Systems (www.ecoflex.com) or approved equal.

2.10 PIPE EXPANSION FITTINGS AND LOOPS

A. Provide expansion loops on hot water supply and circulating return lines where shown and on any straight pipe lengths over 200 feet that occur as a result of relocating piping to meet field conditions. Loop shall be 2 feet by 4 feet offset, and located near center of length. Anchors shall be bolted collars held by angular braces in direction of piping near opposite ends of the pipe. Provide guides on each expansion joint.

2.11 SANITARY WASTE AND VENT PIPING

A. All sump pump piping and all waste piping 1.1/4" size and smaller, not buried, shall be type "L" hard drawn copper tubing with drainage fittings made up with 95-5 solder. All exposed piping or tubing in finished areas shall be chrome plated copper or brass. All chrome trim with wrench marks shall be removed and new trim installed.

B. All Vent piping and all sanitary waste piping under the slab or first floor and fittings shall be PVC Schedule 40 polyvinyl chloride plastic, as per ASTM-A-2665 or latest standard. Solvent as per ASTM-D-2564. Exposed vent piping above roof shall be **black** PVC or CPVC for appearance and solar heat dissipation of frost. NOTE: All piping penetrating a fire rated wall or floor shall be cast iron pipe or copper tubing as per Life Safety Code #101. No under slab waste piping shall be smaller than 2".

C. All Sanitary Waste pipe and fittings on the first floor and above, for reason of sound attenuation, shall be standard weight cast-iron, conforming to Commercial Standards CS188-66. Fittings shall be cast-iron, no-hub ASA Group 022 pipe, complete with neoprene elastomer, corrosion-resistant stainless steel shield and clamping assemblies conforming strictly to ASME Standard C654 and requirements of CISPI Standard 310.

Substitution with piping with inferior sound deadening characteristics is not allowed. Substitution of piping or piping/insulation system with equal or superior sound deadening characteristics can be submitted for review provided it is accompanied by:

1. Manufacturer's literature citing proof of acoustic properties by an independent laboratory testing agency.

2. Shop drawings showing how the new piping and any sound insulation can be fitted into the existing wall or space. Note: any preparation of sketches or engineering time required by a consultant for this, shall be reimbursed by this contractor to the involved consultant at the rate of $100.00 per hour.

3. Shop drawings showing how the piping transitions through fire rated walls.

4. A proposal for a significant credit. Note: proposal must also detail the cost of any changes required by other trades, such as adding insulation or fattening of walls, to accommodate the proposed change. Any related charges that arise after the change order is approved, shall be paid by this contractor, at no additional cost to the owner.

2.12 RADON VENT PIPING

A. All vent piping and fittings shall be PVC Schedule 40 polyvinyl chloride plastic, as per ASTM-A-2665 or latest standard. Solvent as per ASTM-D-2564. Exposed vent piping above roof shall be **black** PVC or CPVC for appearance and solar heat dissipation of frost.

2.13 STORM DRAINAGE PIPING

A. Same as listed for Sanitary Waste piping above.

2.14. FUEL GAS PIPING

1. Above ground piping shall be Schedule 40 black steel pipe, ASTM 120 with 150# fittings. Piping 2” or less shall be screwed pattern malleable iron fittings, shall meet ASTM A-47, ASA B16.3. Pipe joint compound shall be used on all threaded joints. Piping over 2” in size or of pressure in excess of 14” W.C shall be welded. Below ground piping and joints shall be in accordance with the Gas Suppliers recommendations.

2.15 PIPE SLEEVES AND ESCUTCHEONS

A. Sleeves

1. Contractor shall set sleeves for all piping penetrating walls and floors. Sleeves through masonry shall be steel pipe sleeves two sizes larger than pipe. Piping passing through walls other than masonry shall be provided with # 24 gauge galvanized steel tubes with wired or hemmed edges.

2. Sleeves set in concrete floors shall finish flush with underside, but extend minimum of 1 inch above finish floor. Weld clips to sleeves for support in concrete pre-cast planks of a size that will be covered by concrete topping. Sleeves set in partitions shall finish flush with each side.

3. Space between sleeves and pipes shall be sealed to make smoke and water tight with 3M Brand Fire Barrier Caulk CP25 or Putty 303.

4. Masonry sleeves shall be Schedule 40 steel pipe.

5. This Contractor has the option to use the Pro-set system on lieu of the above.

B. Exterior Sleeves

Where piping passes through exterior walls, provide and install a complete pipe sleeve/hydrostatic wall closure system.

1. Wall sleeve shall be schedule 40 steel pipe, two pipe sizes larger than carrier pipe. Sleeve shall be the same length as the thickness of the wall served.

2. The hydrostatic closure device shall consist of identical interlocking links of solid synthetic rubber compounded to resist ozone, water, chemicals and extreme temperature variations. Each link shall be connected by corrosion resistant bolts and nuts to form a belt that is to fit snugly around the pipe. Under each bolt and nut there shall be a metal pressure plate so that when each nut is tightened the rubber links will expand between the pipe and sleeve to form a continuous, air tight and water tight seal.

3. Units to be Link-Seal system Model LS wall seal by Thunderline Corp. or reviewed equal.

C. Escutcheons

Where piping passes through finish walls, floors, ceilings and partitions, provide and set two piece nickel plated steel floor and ceiling plates.

2.16 PLUMBING FIXTURES

A. DW-1 Dishwasher, Under counter

Dishwasher supplied by G.C. Install with all required accessories.

B. LV-1 Lavatory, Countertop

1. AMERICAN STANDARD 475.047 Aqualyn Countertop Lavatory, vitreous china, self rimming, front overflow, faucet ledge, center hole, color “white”. Or reviewed equal. Counter by Others.

2. AMERICAN STANDARD 3808.101 Jasmin single handle lavatory faucet, single hole, chrome, pop-up drain., or reviewed equal. Replace aerator with AM Conservation Group (www.amconservationgroup.com) model AMFAL1A 1.0 GPM laminar flow, or reviewed equal.

3. McGuire chrome plated, 17 Ga P-trap, chrome plated angle supplies, wheel stops, wrought escutcheons. Or reviewed equal.

C. LV-2 Lavatory, Countertop - ADA

1. Same as LV-4 except mounted in counter at 34”.

2. Provide pre-insulated McGuire ProWrap PW2125 supply and drain handicapped insulation kit. McGuire Chrome plated angle supplies, loose key stops, wrought escutcheons. Or reviewed equal.

D. LV-3 Lavatory, Wall Mounted - ADA

1. AMERICAN STANDARD 955.000 Murro Universal Design wall hung lavatory, for concealed arm support, center hole, vitreous china, rear overflow, self draining deck, color “white”. 0059.020 shroud/Knee Contact Guard, vitreous china. Or reviewed equal.

2. AMERICAN STANDARD 3808.101 Jasmin single handle lavatory faucet, single hole, chrome or reviewed equal. Replace aerator with AM Conservation Group (www.amconservationgroup.com) model AMFAL1A 1.0 GPM laminar flow, or reviewed equal.

3. McGuire chrome plated, 17 Ga P-trap, chrome plated angle supplies, wheel stops, wrought escutcheons. Or reviewed equal. Must fit inside shroud/knee guard.

E. MB-1 Mop Basin

1. The mop basin shall be Fiat MSB-2424, molded stone or reviewed equal. The molding shall be done in matched metal dies under heat and pressure resulting in a one-piece homogeneous product. Size of unit shall be 24”x24”x10” high.

The drain body shall be cast brass, chrome plated, complete with cast brass lock nut and gaskets. The drain body shall provide for a lead caulked joint to be 3” I.P.S.

Provide the following accessories:
a. Stainless steel wall guard, MSG-2424
b. Service faucet with vacuum breaker; integral stops and wall brace plate #830-AA.
c. 30” Hose with ¾” coupling at one end; Plate #832-AA.
d. Mop Hanger, stainless steel, 24” long with (3) holders, Plate #889-CC.
e. Silicone sealant #833-AA.
f. Vinyl bumper guard #-77-AA.

F. SH-1 Shower, Roll-in - ADA

1. Lasco Bathware Freedomline Showers model 1603-BFST (ADA/ANSI), rear controls, open top, gelcoat fiberglass and resin. Factory accessories: grab bars with steel plate reinforcements, stainless steel shower curtain rod, shower curtain, fold-up seat, brass drain. Provide optional Vinyl foam dam. Or approved equal. Note: models requiring more than ½” floor recess are not acceptable.

2. Symmons Safetymix 1-117-X-FSB, pressure balanced, anti-scald, adjustable safety stop screw, single lever blade handle, integral service stops, diverter and hand held shower, ADA compliant, chrome. Set safety stop screw so shower temperature will not exceed 110 deg. F. Factory shall modify main showerhead to 2 GPM, or shall provide good quality 2 GPM chrome head by another manufacturer.

G. SK-1 Sink, Double Bowl - Adaptable

1. Elkay LR-250-3 double bowl stainless steel sink, left bowl 14” x 18” x 8” deep, right bowl 13-1/2” x 16” x 8”, 18 gauge, type 304 SS, self-rim, satin finish, sound guard undercoating, 3 hole drilling . Or reviewed equal.

2. AMERICAN STANDARD 3821.834 Jasmin single handle kitchen faucet, 2.0 GPM at 70 PSI, single handle, deck mount, 8" centers, anti –siphon vegetable spray on deck plate, 3 hole installation, chrome plated solid brass body, ADA compliant, 9" gooseneck swing spout. Or reviewed equal.

3. McGuire chrome P-trap, continuous waste, chrome plated angle supplies, wheel stops, wrought escutcheons. Or reviewed equal.

H. SK-2 Sink, Double Bowl - ADA

1. Elkay LRAD-250-65-3 double bowl stainless steel sink, left bowl 14" x 18" x 6-1/2" deep, right bowl 13-1/2" x 16" x 6-1/2", 18 gauge, type 304 SS, self-rim, satin finish, sound guard undercoating, 3 hole drilling . Or reviewed equal.

2. AMERICAN STANDARD 3821.834 Jasmin single handle kitchen faucet, 2.0 GPM at 70 PSI, single handle, deck mount, 8" centers, anti –siphon vegetable spray on deck plate, 3 hole installation, chrome plated solid brass body, ADA compliant, 9" gooseneck swing spout. Or reviewed equal.

3. McGuire Prowrap insulated P-trap and supply covers, chrome continuous waste, chrome plated angle supplies, wheel stops, wrought escutcheons. Or reviewed equal.

I. SK-3 Sink, Single Bowl - ADA

1. Elkay LRAD-2522-65-3 single bowl stainless steel sink, 21" x 16" x 6-1/2" bowl, 18 gauge, type 302 SS, self-rim, satin finish, sound guard undercoating, 3 hole drilling . Or reviewed equal.

2. AMERICAN STANDARD 3821.834 Jasmin single handle kitchen faucet, 2.0 GPM at 70 PSI, single handle, deck mount, 8" centers, anti –siphon vegetable spray on deck plate, 3 hole installation, chrome plated solid brass body, ADA compliant, 9" gooseneck swing spout. Or reviewed equal

3. McGuire Prowrap insulated P-trap and supply covers, chrome plated angle supplies, wheel stops, wrought escutcheons. Or reviewed equal.

J. TS-1 Tub / Shower – Right Hand – Adaptable

1. Lasco Bathware Tub/Showers model 2603-CT RH, right handed open top, gelcoat fiberglass and resin. Factory accessories: stainless steel shower curtain rod, shower curtain. Or approved equal.

2. Symmons Safetymix 1-215-X, pressure balanced, anti-scald, adjustable safety stop screw, single lever blade handle, integral service stops, diverter tub spout, chrome. Set safety stop screw so shower temperature will not exceed 110 deg. F. Factory shall modify showerhead to 2 GPM, or shall provide good quality 2 GPM chrome head by another manufacturer.

3. McGuire Bath Waste Drain chrome plated brass overflow, trip lever, flat strainer, 17 gauge tubing. Provide P-trap.

4. Coordinate with GC for placement of reinforcement in walls for future grab bars.

5. Coordinate with Insulation Installer for tub insulation.

K. TS-2 Tub / Shower – Left Handed – Adaptable

1. Same as TS-1 above except left handed

L. TS-3 Tub / Shower – Right Hand – ADA

1. Lasco Bathware Freedomline Tub/Showers model 2603-CTHLA RH, right handed open top, gelcoat fiberglass and resin. Factory accessories: grab bars with steel plate reinforcements, stainless steel shower curtain rod, shower curtain, plastic removable seat. Or approved equal.

2. Symmons Safetymix 1-217-X-FSB, pressure balanced, anti-scald, adjustable safety stop screw, single lever blade handle, integral service stops, chrome, diverter, tub spout, hand held shower, 30" adjustable bar, shower diverter. Set safety stop screw so shower temperature will not exceed 110 deg. F. Factory shall modify main showerhead to 2 GPM, or shall provide good quality 2 GPM chrome head by another manufacturer.

3. McGuire Bath Waste Drain chrome plated brass overflow, trip lever, flat strainer, 17 gauge tubing. Provide P-trap.

4. Coordinate with GC for placement of reinforcement in walls for future grab bars.

5. Coordinate with Insulation Installer for tub insulation.

L. TS-4 Tub / Shower – Left Handed – ADA

1. Same as TS-3 above except left handed

M. WC-1 Water Closet, Floor

1. AMERICAN STANDARD 2023.212 Champion Round Front Toilet, vitreous china, 1.6 GPF, 3" non-adjustable flapper-free flush valve, siphon jet action, left handed side mounted trip lever, close coupled tank, bolt caps, fully glazed trapway, color "white", 10 year warranty.

2. AMERICAN STANDARD 5308.014 Laurel round front molded closed front seat with cover, commercial duty, stainless steel bolts. Or reviewed equal by Church, or Beneke.

3. McGuire chrome water closet supply with wheel handle stop. Or reviewed equal.

N. WC-2 Water Closet, Floor - ADA

1. AMERICAN STANDARD 2002.012 Champion Right Height, 16-1/2", Elongated Toilet, vitreous china, 1.6 GPF, 3" non-adjustable flapper-free flush valve, siphon jet action, left handed side mounted trip lever, close coupled tank, bolt caps, fully glazed trapway, color "white", 10 year warranty.

2. Provide AMERICAN STANDARD alternate tank configuration 4260.600, Tank with Cover Locking Device, only on unit in Community Room bathroom.

3. AMERICAN STANDARD 5311.012 Laurel elongated molded closed front seat with cover, commercial duty, stainless steel bolts. Or reviewed equal by Church, or Beneke.

4. McGuire chrome water closet supply with wheel handle stop. Or reviewed equal..

O. WC-3 Water Closet, Floor – ADA – Right Hand

Same as WC-2 except order with AMERICAN STANDARD alternate tank configuration 4260.800 with trip lever located on right side.

P. WM-1 Washing Machine Supply and Drain Unit.

Guy Gray WB-200 recessed supply and drain unit for automatic washers, ½" Watts Duo-cloz valve, 2" drain, white enameled steel. Or approved equal. Appliance by G.C.

2.17 PLUMBING FIXTURES BY OTHERS

Equipment and fixtures by other sections will be provided and set in place by those sections. This contractor will connect gas, domestic hot water, waste and vent as required.

2.18 PLUMBING SPECIALTIES, DRAINAGE

A. Carriers

1. Wall hung fixtures including lavatories shall be supported with adjustable floor mounted carriers to fit building conditions, piping system, and fixtures specified. Each carrier shall be provided with a wall finishing frame. All carriers shall be secured to the floor with tie down lugs.

2. Carriers shall be as manufactured by Watts or reviewed equal by Zurn, Smith, Josam or Wade.

B. Traps

1. Traps of material and design as approved by the State and shall be furnished and installed at all fixtures and appliances. Trap each fixture separately, keeping all trap screws below water line; vent each trap. Make offsets in vent piping with 45-degree angle fittings when possible. Pitch horizontal vents toward waste lines, group vents and take through roof as shown. All traps, at fixtures and appliances shall be provided with accessible clean outs.

2. All exposed traps under sinks and lavatories, and all piping and fittings shall be chrome-plated. All concealed traps and fittings may be rough brass or copper.

C. Cleanouts

Provide cleanouts for soil and waste where shown on the drawings and as required by code.

1. Floor Cleanouts (FCO)

All floor cleanouts in concrete or tile shall be flush with finish floor. Square top cleanouts must line up with lines of floor finish, coordinate placement with General Contractor.

a. Type “1”, Round, recessed for 1/8” tile
Zurn ZN-1400-BP-X-K, nickel bronze rim, bronze plug, anchor flange.
NOTE: Coordinate tile insert with tile installer at time of floor installation. Adjust height of rim to the thickness of the tile to be used so that it will be flush with the finished floor and oriented correctly before the tile installer arrives. Failure to prepare or coordinate properly will result in this contractor paying for the call-back of the tile installer at no additional expense to the Owner.

b. Type “2”, Round, for Carpet with marker
Zurn ZN-1400-CM-BP-K, carpet marker, nickel bronze, bronze plug, anchor flange

c. Type “3”, Round, for unfinished areas
Zurn Z-1400-BP-K, cast iron top, bronze plug, anchor flange..

2. Wall Cleanouts (WCO)

All wall cleanouts shall be Zurn Z-1445-P cleanout tee with threaded plug. Polished nickel bronze cover, Zurn ZANB-1462 or reviewed equal by Watts, Smith, Josam or Wade.

3. Flashing

Flash each above grade floor clean out with Chloraloy® 240 thermoplastic elastomeric sheet membrane for concealed waterproofing, or other approved flashing material, extending 24” beyond perimeter of clean out and lock into clamping collar.

D. Roof Drain (RD)

1. Roof drains will be provided by This Contractor and set in place by the Roofing Contractor. This Contractor to connect to drains.

a. Type “1” Main Roof Drain
Zurn Model Z-100-E-R-C, 15” cast iron body, polydome.

b. Type “2” Promenade Floor Drain
Cast iron body, flashing collar, polished bronze top, 9” adjustable deep flanged grate, no-hub connection. Zurn ZB-415-9N or equal by Josam, Wade or Smith. No trap required.

c. Type “3” Small Roof Drain
Zurn Model ZRB-125-R-C, 8” cast iron body, plain bronze dome.

2. Provide a wall cleanout at the base of all leaders as specified under wall cleanouts.

3. Heat Tape shall be Raychem Winterguard waterproof, self-regulating heat tape with permanent power connection kit. Provide between pipe and pipe insulation in areas outside the heated building envelope. Note: all practical effort should be made to run/drop piping inside the envelope.

E. Floor Drains (FD)

1. All floor drains above grade shall be complete and each provided with flashing flange, flange device, and 24”x24”, Chloraloy® 240 thermoplastic elastomeric sheet membrane for concealed waterproofing, or other approved flashing material, lock into drain clamping collar.

a. Type “1” General. Round
Cast iron body, flashing collar, sediment bucket, nickel bronze, 6” adjustable strainer head, inside caulk, trap primer connection. Zurn ZN-415-6B-P-DP-Y or equal by Josam, Wade or Smith.

b. Type “2” Indirect Waste
Cast iron body, flashing collar, sediment bucket, polished bronze, 5” adjustable recessed grate, inside caulk. Zurn ZB-415-5I-Y or equal by Josam, Wade or Smith.

c. Type “3” Boiler Room Central
Cast iron body, flashing collar, sediment bucket, polished bronze, 7” adjustable deep flanged grate, inside caulk. Zurn ZB-415-7N-Y or equal by Josam, Wade or Smith.

d. Type “4” Round, Large Collar
Cast iron body, flashing collar, sediment bucket, nickel bronze, 6” adjustable strainer head with large collar flange, inside caulk, trap primer connection. Zurn ZN-415-6BL-P-DP-Y or equal by Josam, Wade or Smith.

2. Traps for floor drains shall be deep seal traps. Those without trap seal primers shall be topped-off with 12 oz. of mineral oil to retard evaporation. Those in poorly heated areas, such as loading docks and penthouses, shall be filled with an undiluted non-toxic, non-corrosive antifreeze effective to at least -20 deg F.

2.19 PLUMBING SPECIALTIES, WATER

A. Trap Primer (TP)

Furnish and install self-adjusting automatic trap primers equal to Model PR-500 as manufactured by Precision Plumbing Products Inc. Provide DU-2 distribution unit where indicated. Or reviewed equal.

B. Hose Bibs (HB)

1. Type “1” Exterior Hose Bib

Zurn Z-1321 exposed Ecolotrol “Anti-Siphon” automatic draining, non-freeze wall hydrant, integral backflow preventer, all bronze interior parts, operating key. Or reviewed equal.

C. Shock Absorbers (SA)

Shock protection shall be provided where shown on drawings and at all quick closing devices. Devices shall be stainless steel shell, welded expansion bellows surrounded by on-toxic mineral oil or gas, pressurized compression chamber charged and factory sealed, all, in-line design, threaded nipple and PDI reviewed. Sized to meet the conditions.

1. Type “1”, 'A' P.D.I. units

Zurn Z-1700, #100. Or reviewed equal by Watts, Sioux Chief, Zurn, Smith, Josam or Wade.

2. Type “2”, 'B' P.D.I. units

Zurn Z-1700, #200. Or reviewed equal by Watts, Sioux Chief, Zurn, Smith, Josam or Wade

D. Thermometer (T)

Units to be dial type, 4.1/2” with 30^{o} to 180^{o} range; Trerice Universal angle or reviewed equal. Locate units such that they can easily be read.

E. Pressure Gauge (PG)

Furnish and install pressure gauges with gauge cocks on piping where shown on drawings. The dial range shall be such that the normal pressure shall be approximately mid-way of dial. Gauges shall be Trerice No. 600 or equivalent by Weiss or Nurnburg, 4.1/2” dial size, cast aluminum case, with brass “T” handle cocks and No. 872 bronze pressure snubbers on water units.

F. Vacuum Relief Valve (VRV)

Watts Model N36 or reviewed equal.

G. Backflow Preventers (BFP)

Provide and install all necessary components to provide protection against potentially hazardous backflow or back siphonage and the contamination of the potable water system at the required GPM demand. Unit shall be UL, USC, ASSE, 1APMD and AWWA approved.

1. Type “1”, Entrance

Watts 909M1QT-S reduced pressure zone backflow preventer, 2”, bronze body, with full port bronze ball valve shut-offs and strainer, flanged adapter ends, 9 PSI drop-off at 120 GPM. Airgap Watts 909-AGF. Or reviewed equal.

2. Type “2” Mechanical Equipment

Watts #9DM2 double check backflow preventer with atmospheric port, or reviewed equal.

H. Mixing Valves (MV)

1. Type "1" Master Mixer

Symmons thermostatic mixing valve Model 5-700, inlet size 1-1/4”, outlet size 1.1/2” capacity 43 GPM @ 10 psi differential pressure for exposed piping, solid bi-metal thermostat scale hot to cold, rough bronze, check stops, set at 130^{o}F. Or reviewed equal.

I. Expansion Tank (ET)

Watts Model DET-35-M1. Potable water expansion tank, 14 gallon, 1” connection, precharged to 80 psi. Or reviewed equal.

J. Relief Valve (RV)

Watts #530 calibrated pressure relief valve. Set at 90 PSI. Or reviewed equal.

K. Dielectric Unions

Series 3000 as manufactured by Watts or reviewed equal

L. Meter

Provide a meter that meets the criteria of the local water district and has remote reader.

2.20 SUMP PUMP (SP)

A. Type 1, Elevator Pit

Stancor model SE-50 sump pump with oil minder probe and alarm, ½ hp 115 V, 1 phase, 8 amps, or reviewed equal.

2.21 DOMESTIC HOT WATER CIRCULATOR PUMPS (DCP)

A. Circulators

Provide and install in-line all bronze, corrosion proof, circulating pump on hot water circulating lines with capacity as shown on the drawings. Unit to be provided with internal overload protection.

1. Type 1 – 130 deg System

Circulator to be Taco Mode 009, bronze construction, ¾” union ends, 7 GPM at 20 ft. head, 1/8 HP, 115V/60/1 or reviewed equal.

B. Control – Manual on/off switch. Pump to run continuously.

C. All power wiring and manual power switch with indicator light shall be provided and installed by Division 16.

2.22 FUEL GAS SYSTEM

A. General

1. All piping, materials and methods of installation, shall comply with NFPA 54.

2. Dirt pockets shall be provided at each riser.

3. No piping/tubing shall be concealed in solid partitions.

4. No piping/tubing shall be run horizontally inside hollow partitions.

5. Piping concealed in walls shall be without fittings, except elbows, tees and screw couplings.

6. Piping passing through masonry shall be sleeved to prevent corrosion.

7. Piping shall not be run through air ducts, clothes chutes, chimney, dumb waiter, elevator shaft or be embedded directly in concrete floor.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

A. Inspection

1. Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.

2. Verify that plumbing may be installed in strict accordance with all pertinent codes and regulations and the reviewed Shop Drawings.

B. Discrepancies

1. In the event of discrepancy, immediately notify the Architect. Do not proceed with installation in areas of discrepancy until such discrepancies have been fully resolved.

3.02 COORDINATION WITH OTHER TRADES

A. Before installation, participate in a coordination meeting with the Clerk of the Works, General Contactor, Mechanical/HVAC, Fire Protection and Electrical trades. Establish and resolve areas of conflict and congestion, especially those indicated on the drawings. Priority to be given to HVAC equipment and large ductwork, then gravity piping, then small ductwork, then piping based on descending order of size. Special consideration given to allow access to valves, dampers etc. Mutually develop coordination sketches documenting space allocation and provide copies to all effected trades.

B. Failure to coordinate will result in this contractor removing and relocating his piping at no additional expense to the owner.

3.03 INSTALLATION OF PIPING AND EQUIPMENT

A. General

1. Install all piping promptly, making pipe generally level and plumb, free from traps, and in a manner to conserve space for other work.

2. Provide uniform pitch of at least ¼ inch per foot for all horizontal waste and soil piping 3” or less. For piping 4” and above, slope at 1/8” minimum per foot

3. Inspect each piece of pipe, tubing, fittings, and equipment for defects and obstructions; promptly remove all defective material from the jobs site.

4. Install pipes to clear all beams and obstructions. Do not cut into or reduce the size of load carrying members without the approval of the Architect.

5. Plumbing and Radon vents

a. Back vent all plumbing fixtures.
b. Pitch all vents at 1/32” per foot minimum toward waste lines for proper drainage to prevent unintended traps.

c. Install vent piping with each bend 45 degrees minimum from the horizontal, wherever structural conditions will permit.
d. Group plumbing vents and take through roof as shown.
e. Increase vents 3" and smaller one size before going thru roof. Make size transition a minimum of 12" below the surface of flat roofs and 72" (or as structure permits) below sloped roofs.
f. Terminate 18" to 24" above roof.
g. If installing in locations other than as shown on the drawings, line up with other plumbing vents for a neat appearance.
h. Do not install plumbing vents within 10 feet of an operable window or door or within 25 feet of a ventilation air intake.

6. All risers and off-sets shall be substantially supported.

7. Pipe hangers shall be placed on center as follows:

MATERIAL	HORIZONTAL	VERTICAL
Brass	10'	10'
Cast-iron	At joints not to exceed 10'	15' or at each story whichever is less, and stacks at the base
Copper 1-1/4" & less	6'	6'
1-1/2"	6'	10'
2" & up	10'	10'
Corrugated S.S.	6'	6'
CVPC, Water	3'	5'
PVC, DWV	4'	4'
Steel	10'	10'

8. Arrange all piping to maintain required grade and pitch to lines to prevent vibration. Expansion loops to anchors shall be provided where shown on drawings.

9. Make all changes in pipe size with reducing fittings.

10. All low points in water piping shall be drained with ½" gate valve with hose nipple and metal cap.

11. No piping shall be installed in such a manner to permit back-siphonage or flow of any liquid in water piping under any conditions.

12. No water piping shall be installed outside of building or in an exterior wall unless adequate provisions are made to protect such pipe from freezing.

13. All piping and drain openings left unattended will be capped, plugged or securely covered to prevent accidental entry of foreign matter. Roof drains in use will be provided with domes.

B. Joints and Connections

1. Smoothly ream all cut pipe; cut all threads straight and true; apply best quality Teflon tape to all male pipe threads but not to inside the fittings; use graphite on all clean out plugs. DO NOT use Teflon tape on gas piping.

2. Smoothly ream all cut P.V.C. pipe. Clean and use solvent for fitting connection and in strict accordance with the manufacturer's recommendations.

3. Make all joints in copper water tube with solder applied in strict accordance with the manufacturer's recommendations.

C. Coordinate with the General Contractor to depress the finished floor where indicated on drawings. Install floor drains at low points of surface areas to be drained. Set grates of drains 1/32" below finished floor, unless otherwise indicated. Square top floor drains must line up with floor finish, coordinate final orientation with Flooring Installer. Finished floor shall be depressed according to the following drainage area radii:

1. Radius, 30 Inches or Less: Equivalent to 1 percent slope, but not less than 1/4-inch total depression.

2. Radius, 30 to 60 Inches: Equivalent to 1 percent slope.

3.04 STERILIZATION AND FLUSHING OF PIPES

A. After preliminary purging of the system, chlorinate the new potable water system in accordance with the current recommendations of the American Water Works Association, and in accordance with all pertinent codes and regulations. Chlorinate only when the building is unoccupied.

B. Upon completion of the sterilization, thoroughly flush the entire potable water system.

C. After sterilization and flushing are complete, a sample shall be collected from the end of the longest main, or at any other location selected by the Architect, and a water analysis test provided. The test must prove the water acceptable or additional disinfecting of system performed. A copy of the test report shall be submitted to the Architect.

3.05 CLOSING IN UNINSPECTED WORK

A. Do not cover up or enclose work until it has been properly and completely inspected and approved.

B. Should any of the work be covered up or enclosed prior to all required inspections and approvals, uncover the work as required and after it has been completely inspected and approved, make all repairs and replacements with such materials as are necessary to the approval of the Architect and at no additional cost to the Owner.

3.06 TESTING OF PIPING

Tests shall be applied to the plumbing installation as required by codes and where as directed by the Architect, and in all cases before work is covered by earth fill or pipe covering.

A. Sanitary piping shall be tested when all underground work is complete (before covering) and again, after all piping is installed, but before it is further closed in. Sanitary systems shall be securely stopped, except at the highest point, and the entire system filled with water to the point of overflow for 24 hours. All leaks shall be repaired. Cracked pipes and fitting shall be removed and replaced. No doping of soil pipe or fittings will be allowed. Plan testing around expected weather and temperature conditions or provide protection so that pipes do not freeze.

B. New domestic water piping shall be filled and subjected to a hydrostatic pressure test of 150 psi for 8 hours with no leaks. If leaks are detected they shall be repaired and the test repeated until work is tight. NOTE: Testing with compressed air only is NOT ACCEPTABLE.

C. Testing of Fuel Gas piping shall conform to NFPA 54. Testing of natural gas piping shall also conform to the requirements of the Gas Supplier.

3.07 CLEANING

A. Prior to acceptance of the buildings, thoroughly clean all exposed portions of the this installation, removing all labels and all traces of foreign substance, using only a cleaning solution approved by the manufacturer of the plumbing item, being careful to avoid all damage to finished surfaces. Additional attention may be required to thoroughly clean any used, re-used or owner provided fixtures.

B. Clean out all strainers and aerators and adjust or replace washers, cartridges, etc

3.08 INSTRUCTIONS

On completion of the job, this Contractor shall provide a competent technician to thoroughly instruct the Owner's Representative in the care and operation of the system. The time of instruction shall be arranged with the Owner.

3.09 RECYCLING

Discarded materials, both new and removed, shall be recycled whenever practical through metal salvage dealers (piping, etc.), paper salvage (cardboard shipping containers, etc.), wood products, etc. The Mechanical Contractor shall retain the salvage value of discarded materials and may use this value to offset his project bid price if so desired. Toxic materials such as adhesives, coolants, etc. SHALL be disposed of in a manner acceptable to the State of Maine Department of Environmental Protection.

3.10 HAZARDOUS MATERIALS

Mercury or any other material deemed by the Federal Environmental Protection Agency or the State Department of Environmental Protection to be hazardous shall not be used in any components of the plumbing systems.

END OF SECTION 15400