SECTION 15400 - PLUMBING

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

The General Provisions of the contract, including the General Provisions for Construction Projects (2016), Special Provisions, and General Requirements of the Specifications, apply to the work specified in this Section.

1.01 SUMMARY

A. Provide all labor, materials, equipment, services, and related work to complete all plumbing work as shown on the drawings and as specified. The work shall include the following:

Removal of existing equipment and piping, as indicated on drawings.

Plumbing equipment and connections thereto.

Domestic hot and cold-water piping and insulation.

Connection to existing utilities.

Disinfection of water supply lines.

Testing and adjusting.

Manufacturer's literature, shop drawings, and record drawings.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Line voltage wiring and conduit shall be performed under DIVISION 16 – ELECTRICAL WORK.

1.03 GENERAL REQUIREMENTS

A. It is the intent of the plans and specifications to provide a complete installation. Should there be omissions or discrepancies in the plans and specifications, the Contractor shall call the attention of the Engineer to such omissions and discrepancies in advance of the date of bid opening so that the necessary corrections can be made. Otherwise, the Contractor shall furnish and install the omissions or discrepancies as if the same were specified and provided for.

1. Standards:

    a. All work shall be done in accordance with UPC 2018 and applicable ordinances of the City and County of Honolulu.

    b. Work shall comply with applicable regulations of the State of Hawaii Health Department.

    c. Contractor shall obtain all permits, licenses, and certificates and pay for all fees.

    d. ASHRAE/IESNA 90.1

2. Product Standards: Specified materials and equipment shall be standard products of a manufacturer regularly engaged in the manufacture of such products.

3. Project/Site Conditions: The Contractor shall become familiar with details of the work, verify dimensions in the field and advise the Contractor of any discrepancy before performing any work.

1.04 SUBMITTALS

A. Drawings: The drawings and specifications are intended to cover the complete installation of systems to function as described. The omission of reference to any necessary item of labor or material shall not relieve the Contractor from providing such labor or material. Drawings do not attempt to show exact details of piping and ductwork. Provide offsets as necessary to avoid local obstructions or interferences with other trades.

1. Contract Drawings: Mechanical plans are essentially diagrammatic, showing locations of pipes and other mechanical equipment. Where locations are not dimensioned, they are approximate, and before installing, Contractor shall study existing conditions and make installation in most logical manner.

2. Shop Drawings: The Contractor shall submit 6 copies of shop drawings and brochures or catalog cuts of equipment for review and reply prior to start of work. Drawings shall show complete dimensioned installation, including all piping in building, equipment installation, elevation, inverts, supports and foundations.

3. Record Drawings: The Contractor shall keep at the job site a complete, neat, and accurate record of all approved deviations from the contract drawings, shop drawings and specifications, indicating the work as actually installed. These changes shall be recorded on prints of the drawings affected and the shop drawings. ~~A~~s-builts shall be submitted to the Contractor after final acceptance.

B. Product Data: As soon as practicable and within 30 days after award of contract and before commencement of installation of any materials and equipment, a complete schedule of the materials and equipment proposed for installation shall be submitted for the approval of the Contractor. No consideration will be given to partial lists submitted from time to time. Any scheduled materials, fixtures and equipment not conforming to the specifications may be rejected.

For each type of plumbing equipment, include selected fixture and trim, fittings, accessories, appliances, appurtenances, equipment and supports.

C. Warranty: All work and materials executed under this section shall be under warranty to be free from defects of materials and workmanship for one (1) year from date of final acceptance of project as a whole by the Contractor. All work of repair and replacement required, including other work damaged by this work's defects shall be performed without cost to the State.

D. Certificates: Furnish certificates for evidence of proper performance or compliance with code for the following:

1. Sterilization of domestic water piping.

2. Water leak testing of domestic water piping.

PART 2 – PRODUCTS

2.01 MATERIALS

A. All materials shall be new and of the best quality available in their respective kinds, free from all defects and shall be of the make and types specified or approved equal.

B. Domestic Water Piping:

1. Copper tubing, ASTM B88, Type L for above ground piping, with ANSI B16.18 pressure fittings or B16.22 solder joint fittings.

C. Water Valves:

1. General

a. Ball valves, pressure regulating valves, gate valves, globe valves, and plug valves used to supply potable water shall meet the requirements of NSF 61.

b. Valves in insulated piping shall have 2 inch stem extensions and extended handles of non-thermal conductive material that allows operating the valve

without breaking the vapor seal or disturbing the insulation. Memory stops shall be fully adjustable after insulation is applied

2. Shut off valves for Cold and Hot Water:

   a. 2 inches and smaller: Ball, MSS SP-72, SP-110, Ball valve shall be full port three piece or two-piece with a union design with adjustable stem package. Threaded stem designs are not allowed. The ball valve shall have a SWP rating of 150 psig and a CWP rating of 600 psig. The body material shall be Bronze ASTM B584, Alloy C844. The ends shall be solder.

D. Insulation: Provide insulation on all hot water piping. Provide nested insulation segments on fittings, valves, and flanges. Seal ends with vapor barrier mastic. Vapor barrier shall be greater than 3 ply self-adhesive laminate – white vapor barrier jacket – superior performance. Vapor barrier shall meet UL 723 or ASTM E 84, 25 flame and 50 smoke requirements and UV resistant. Provide aluminum jacket on piping exposed to the weather.

E. Miscellaneous Materials:

1. Nipples: Nipples shall be the same material as the piping in which installed.

2. Unions: Unions shall be brass or bronze, either threaded or with solder joint ends, for use in copper tubing.

3. Wall and Ceiling Escutcheon Plates: Provide split hinged, locked type, or one-piece escutcheon plates of pressed steel with heavy coating of copper, nickel or chromium.

4. Solder: Solder metal shall conform to ASTM B32, flux shall be liquid form, non-corrosible and conform to ASTM B 813, standard Test I, solder shall be lead-free.

5. Supports: MSS SP-58 and SP-69, types 1,6,9 or 11 for suspended piping. Provide turnbuckles Type 13 and 15 where required for vertical adjustment. Carbon steel with pre-galvanized or hot dipped galvanized metallic coating. Maximum spacing shall be as specified in SP-69, see table below.

	Copper	
NPS	Max Spacing	Rod Diameter
3/4”	5’	3/8”
1 & 1-1/4”	6’	3/8”
1-1/2 & 2”	8’	3/8”
2-1/2”	9’	½”
3-5”	10’	½”

	Copper	
NPS	Max Spacing	Rod Diameter
6”	10’	5/8”
8”	10’	3/4”

Install supports for vertical copper tubing every 10’. Install supports for vertical steel piping every 15’.

	Copper	
NPS	Max Spacing	Rod Diameter
3/4”	5’	3/8”
1 & 1-1/4”	6’	3/8”
1-1/2 & 2”	8’	3/8”
2-1/2”	9’	½”
3-5”	10’	½”
6”	10’	5/8”
8”	10’	3/4”

Install supports for vertical copper tubing every 10’. Install supports for vertical steel piping every 15’.

6. Piping Isolators: Standard commercial products, consisting of metal-clad hair felt manufactured specifically for isolating pipe from hangers.

7. Dielectric Fittings: Dielectric union with galvanized or plated steel female pipe threaded end and copper solder-joint end. Union shall have a water-impervious insulation barrier capable of limiting galvanic current to one percent of the short-circuit current in a corresponding bimetallic joint and, when dry, shall also be able to withstand a 600-volt breakdown test. Provide dielectric couplings or unions between all ferrous and non-ferrous pipe.

8. Strainers: Provide on high pressure side of pressure reducing valves, on suction side of pumps, on inlet side of indicating and control instruments and equipment subject to sediment damage and where shown on drawings. Strainer element shall be removable without disconnection of piping. Basket or “Y” type with easily removable cover and brass strainer basket. Body smaller than 3”, shall be brass or bronze; 3” and larger shall be cast iron.

2.02 PLUMBING FIXTURES

A. P-1 Water Closet, Flush Valve Type (Accessible): ASME A112.19.2, white, vitreous china, siphon jet, elongated bowl, anti-microbial surface, pressure assisted, floor mounted, floor outlet.

1. Nominal Dimensions: 28-1/4 inches by 14-inches by 16-1/2 inches.

2. Mounting Height: 17 to 19 inches to comply with ADA standards

3. Flushing Capacity: 1.1 gallons per flush.

4. Toilet Seat: Heavy-duty, white solid polypropylene plastic, open front toilet seat less cover.
5. Flush Valve Manual, self-cleaning brass piston flush valve including one inch I.P.S. angle stop with backflow prevention, vandal-resistant cap, high back pressure vacuum breaker. Components exposed to view shall be chromium plated. Mount not less than 11 inches above the fixture. Mount height shall not interfere with ADA handrails if in ADA stall.

B. P-2 Urinal, Wall Mounted (Accessible): ASME A112.19.2, white vitreous china, elongated 14-inch rim from finished wall, extended sides for privacy.

1. Mounting Height: Mount urinal with the height of the rim being no more than 17 inches above the floor.

2. Nominal Dimensions: 14-1/8 inches by 18-7/8 inches by 26-1/8 inches.

3. Flow Rate: 1 gallon per flush.

4. Manual Flush Valve (Accessible): American Standard 6045.101.002 or accepted equivalent. self-cleaning brass piston with integral wiper spring, non-hold open handle, double chrome -plated cast brass construction.

C. P-3 Lavatory, Wall Mounted (Accessible): Kohler K-2031 or accepted equivalent. ASME A112.19.2, white vitreous china, straight back, concealed arm carrier installation.

1. Mounting Height: Mount lavatory with the top surface 34 inches above floor and with 29 inches minimum clearance from bottom of the counter face to floor.

2. Nominal Dimensions: 20-3/4” by 18-1/4”

3. Flow Rate: Restrictor to be installed to limit flow to 0.5 gallons per minute.

4. Faucet (Accessible): Kohler K-97060-4 or accepted equivalent. Singlehole installation, metal construction, resistance to corrosion and tarnishing. The force required to activate the faucet shall be 5 lbs. maximum.

D. P-4 Nozzle: Spray Systems CO. Floodjet Nozzle No. 3/8K 30 or accepted equivalent. Brass, wide flat spray pattern with uniform distribution.

1. Adjustable Ball Fitting: Spraying Systems Co. Adjustable Ball Fittings No. 36275 - 3/8x3/8 or accepted equivalent. Brass, 45-degree angle of adjustment.

PART 3 – EXECUTION

3.01 DEMOLITION

A. Disconnect, demolish, and remove plumbing systems, equipment, and components indicated to be removed.

1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.

2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.

3. Equipment to Be Removed: Disconnect and cap services and remove equipment.

4. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.

5. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to State.

6. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.02 INSTALLATION AND WORKMANSHIP

A. All workmanship shall be of the highest standard. Vertical piping lines shall be plumbed and lines that are grouped shall be parallel and as direct as possible. Exposed pipe, where indicated, shall be run parallel with walls.

B. The installation shall comply with the latest accepted edition of the Plumbing Code, the Fire Marshal's regulations of the State of Hawaii, the regulations of the Department of Health of the State of Hawaii and all other applicable codes.

C. The Contractor shall obtain and pay for all permits and licenses for the work. At completion, transmit to the State, applicable certificates of inspections.

3.03 CROSS CONNECTIONS AND INTERCONNECTIONS

A. No plumbing fixtures, device, or piping shall provide a cross connection or interconnection between a distributing supply for drinking or domestic purposes and a polluted supply such as a drainage system or a soil or waste pipe, so as to make

possible the backflow of sewage, polluted water, or waste into the water supply system.

3.04 CUTTING AND REPAIRING

A. The work shall be carefully laid out in advance providing sleeves, templates or details for chases and openings to be left in the walls, floors, structural members or partitions. Any access cutting of construction will not be permitted. Cutting shall be carefully done, and damage to buildings, piping, wiring or equipment as a result of cutting for installation shall be repaired by skilled mechanics of the trade involved at no additional expense to the State. Written permission from the State shall be obtained before any cutting is done.

3.05 PROTECTION TO FIXTURES, MATERIALS AND EQUIPMENT

A. Pipe openings shall be closed with caps or plugs during installation. Fixtures and equipment shall be tightly covered and protected against dirt, water and chemical or mechanical injury. Upon completion of all work the fixtures, materials and equipment shall be thoroughly cleaned, repainted as required, adjusted and operated.

3.06 CHLORINATION

A. Domestic hot and cold-water lines shall be sterilized with chlorine before acceptance of the work. Dosage of chlorine shall be not less than 50 ppm. Chlorinating material shall be introduced into the water lines in a manner approved by the Contractor. After a contact period of not less than twenty-four (24) hours the system shall be flushed with clean water until the residual chlorine content is not greater than 0.2 ppm. All valves in the lines being sterilized shall be opened and closed several times during the contact period. A certificate shall be furnished to the Contractor evidencing proper performance of sterilizations.

3.07 PIPE INSTALLATION

A. No pipe shall be closed up, furred in, buried or otherwise hidden until it has been inspected, tested and approved by the Contracting Officer.

1. All piping shall be inspected inside and out before installation and no obstructions shall be allowed. Pipe ends shall be taper reamed to full I.D. and all burrs removed.

2. All exposed piping shall be carefully handled to avoid excessive tool marking and polished fittings shall be handled with extra care so that tool marks do not show. All exposed piping shall be in one length, where possible, fittings shall be in walls under counter cabinet or in furred space.

3. Escutcheons: Shall be installed around all exposed pipe passing through a finished floor, wall or ceiling. Escutcheons shall be of sufficient outside diameter to cover the sleeve opening and shall fit snugly around the pipe.

4. Anchor piping in building with approved clamps or adjustable hangers spaced in accordance with the Plumbing Code. Straps for copper tubing shall be copper or brass, or copper plated. Where copper contacts ferrous material, wrap with two layers of plastic tape.

5. Provide dielectric unions where copper piping is connected to ferrous pipe.

6. Install union and shut-off valve on pressure piping at connections to equipment.

3.08 VALVE INSTALLATION

A. NPS 1/2 or NPS 3/4 inlet hose-end drain valves may be adequate for application in first paragraph below.

B. Install drain valves for equipment at base of each water riser, at low points in horizontal piping, and where required to drain water piping.

Hose-End Drain Valves: At low points in water mains, risers, and branches.

Stop-and-Waste Drain Valves: Instead of hose-end drain valves where indicated.

C. Valves shall be located for easy access and shall be provide with separate support. Valves shall be accessible with access doors when installed inside partitions or above hard ceilings.

3.09 PIPE INSULATION

A. Provide insulation on all hot water piping. Insulation through wall penetrations shall be a continuous single piece through the entire penetration. All edges, flaps, corners, and exposed insulation shall be neatly tucked or secured.

3.10 TESTING AND INSPECTION

A. Contractor shall furnish all equipment for tests and any required retests and pay for all cost of repairing any damage resulting from such tests. Contractor shall adjust systems until they are approved. Tests shall be performed in the presence of, and to the satisfaction of, the Engineer and inspector of the official agency involved.

B. Water piping shall be tested in accordance with the Plumbing Code. Water piping shall be tested at 150 psi.

3.11 CLEAN UP

A. Debris shall not be allowed as a result of this work. Upon completion of this work, remove all debris and excess materials, tools, etc., resulting from this work from the job site and leave the location of this work broom-cleaned in an acceptable manner as approved by the Engineer. All work including plumbing fixtures, traps and mechanical equipment shall be thoroughly cleaned and ready for use.

PART 4 – MEASUREMENT AND PAYMENT

4.01 BASIS OF MEASUREMENT AND PAYMENT

A. Work under this section will not be measured nor paid for separately but shall be considered incidental to and included in the price bid for the various items of work in this project.

END OF SECTION