SECTION 15400
PLUMBING

PART 1 - GENERAL

1.1 APPLICABLE REQUIREMENTS

A. All work to be furnished and installed under this section shall comply with all the requirements of General Conditions, Supplemental Conditions, Division 1 - General Requirements, and Section 15050 - Basic Materials and Methods, and other Sections in Division 15 specified herein.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Section 15050: Basic Materials and Methods

B. Section 15080: Mechanical Insulation

C. Section 15150: Plumbing Piping, Valves and Specialties

D. Section 15440: Plumbing Fixtures

E. Section 15450: Plumbing Equipment

1.3 SCOPE

A. All work includes providing new plumbing. Systems as specified under this section shall include but not necessarily be limited to the following:

1. Connection to utilities at five (5) feet from the building. Coordinate with the Civil Engineering Plans and/or Division 2 work.

2. Connection of all waste, vent, and water piping to all plumbing fixtures, drinking fountains, sinks, electric water coolers, drains and mechanical equipment.

3. Connect to new mechanical equipment including packaged roof top a/c units, make-up air units expansion tanks, domestic hot water heaters, and boilers, etc.

4. Connect cold water to hose. Provide individual shut-off valves at each location.

5. Double check valve assembly on incoming water service provided under Division 2. Provide reduced pressure type backflow preventor assembly on connection to make-up air units, expansion tanks, etc...

6. Provide traps on all floor drains with trap primers. Pipe to trap shall be ½" minimum.

7. 140°F kitchen areas. Mixing valves shall be provided to reduce to desired temperatures within each service area.

8. 120°F hot water shall be mixed at point of use for service to public fixtures including lavatories.

9. Domestic water heating plant shall be gas supply.

10. Provide domestic hot water recirculation system. Each branch line to be set at one (1) gpm. Provide individual shut-off valve, check valve and Circuit Setter ball valve with memory stop

at each location.

11. Provide floor drainage in restrooms, mechanical rooms and equipment rooms.

12. Provide connections for all area drains, catch basins, downspouts, roof drains and overflow drains to storm sewer system.

13. Gas service and meter assembly for the project shall be by "Southern California Gas". Location of new meter to be approved by Owner, Facility Engineer, Architect, and Engineer before installation.

14. Contractor to start gas system at discharge flange of meter setting assembly. Provide regulator assembly to reduce pressure to 5.0 psi maximum entering building.

15. Provide gas shut-off and regulator assembly at each building connection, as detailed on drawings. Supply to any piece of equipment shall not exceed 0.5 psi. All connections to equipment shall be with a flexible connector.

16. Temporary Water Service: As directed by the General Contractor, the plumber shall provide a temporary metered water service and temporary water risers with four (4) hose bibbs installed at each level as the building proceeds upwards to the roof.

1.4 SUBMITTALS

A. Prior to construction submit for approval all materials and equipment in accordance with Division 1. Submit manufacturer's data, installation instructions, and maintenance and operating instructions for all components of this section including, but not limited to, the following:

1. Emergency showers and eye wash.

2. Plumbing specialties.

3. Trap primers.

4. Cleanouts.

5. Drains

6. Roof flashing

7. Wall hydrants and hose bibs

8. Mixing valves

9. Backwater valve

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to the site in containers with manufacturer's stamp or label affixed.

B. Store and protect products against dirt, water, chemical, and mechanical damage. Do not install damaged products - remove from project site.

1.6 WARRANTY

A. Provide one-year (12 months) warranty. The warranty shall include parts, labor, travel costs, and living expenses incurred by the manufacturer to provide factory authorized service.

PART 2 - PRODUCTS

2.1 GENERAL

A. All materials and equipment under this Division of the Specifications shall be new, of best grade and as listed in printed catalogs of the manufacturer.

B. All manufactured materials shall be delivered and stored in their original containers. Equipment shall be clearly marked or stamped with the manufacturer's name and rating.

C. All items shall be furnished Vandal Proofed. One type of vandal proof screw is to be used through out this facility. Coordinate with general contractor for type.

D. The following products to be included as part of this work but specified under Section 15050 Mechanical Requirements and Section 15150 Plumbing Piping, Valves and Specialties:

1. Piping.

2. Valves.

3. Hangers and supports.

4. Escutcheon plates, flashings, and sleeves.

5. Identification markers and signs.

6. Anchors, alignment guides and Seismic Zone D requirements.

7. Excavation and backfill.

8. Pressure and temperature gauges.

9. Access Panels.

E. Plumbing Fixtures: Refer to Section 15440.

F. Plumbing Equipment: Refer to Section 15450.

G. Products made of, or containing, lead, asbestos, mercury, or other known toxic or hazardous materials are not acceptable for installation under this Section. Any such products installed as part of the work of this Section shall be removed and replaced and all costs for removal and replacement shall be borne solely by the Contractor(s).

2.2 VALVES: DOMESTIC WATER AND NATURAL GAS (SEE SECTION 15150)

2.3 CLEANOUTS

A. Cleanout Plugs: Bronze, taper thread countersunk head.

B. Floor Cleanouts: Service weight cast-iron body and frame, flange with flashing clamp, adjustable cast-iron collar, caulk inside, Ty-seal or No-hub joints, neoprene plug gasket seal.

1. Carpeted Areas: Zum ZN-1400-KC-VP-BP-CM or J. R. Smith 4028 C - F- C - Y – U

2. Tiled Areas: Zum ZN-1400-X-KC-VP-BP or J.R. Smith 4148 - F - C – U

3. Unfinished Areas: Zurn ZN-1400-HD-KC-VP-BP or J.R. Smith 4108 C - F - C – U

4. Yard Areas: Zurn Z 1474-IN-VP or J.R. Smith 4258 - C - U

C. Cleanout Tee: Cast iron cleanout tee with countersunk brass plug, neoprene plug gasket seal and smooth stainless steel cover.

1. Manufacturer: Zurn Z-1446-BP or J. R. Smith 4532 S (Y)

2.4 ROOF FLASHING

A. Flashing: Unless indicated otherwise on the drawings flashings for pipes through the roof shall be galvanized sheet metal, 24 gauge minimum with seams and joints lapped and soldered watertight. Coordinate with Architectural Sections for flashings and roofing.

B. Vent Pipes: Provide caulk type, vandalproof hood with Allen head vandal proof screws for all vent pipes through roof.

2.5 WATER HAMMER ARRESTORS

A. Piston Type: Hard drawn copper construction, mirror finished internal surfaces; machine finished brass piston, air charged, 250 psi rated, tested and certified per PDI WH-201 and ASSE 1015. Coordinate location of access panels with Architect or provide access panel where none are shown.

1. Manufacturer: Watts Series 15, Precision Plumbing series SC, or Sioux Chief.

2.6 DRAINS

A. General: Provide drains of type and size as indicated on drawings, including features, as specified herein.

1. Acceptable Manufacturers: J.R. Smith or Zurn.

2.7 TRAP PRIMER

A. Cast bronze construction, vacuum breaker, ½" sweat solder connection. Install in accessible location or provide access panel.

1. Manufacturer: PPP Oregon #1 or E&S, for use for up to 8 drains using PPP trap primer distribution units.

2. Option: Sloan F-72-A1 used in conjunction with water closet flush valve.

B. For Multiple Units or Kitchen Areas: PPP Prime Time electronic trap primer Series PT. Coordinate 120 V, electrical service with Division 16.

2.8 MIXING VALVES ASSEMBLY

A. Mixing Valve: 300 psi, Brass construction, thermostatic controller with check stops. Refer to drawings for schedule of each valve.

B. Manufacturer: Powers or Leonard.

PART 3 - EXECUTION

3.1 GENERAL

A. This system to be installed by an experienced firm regularly engaged in the installation of plumbing systems as specified by the requirements of the Specifications.

B. Install all items specified in this section of the Specification under the full purview of local and state governing agencies.

C. Refer to Section 15050: General Mechanical Requirements for installation of piping, valves and other requirements.

3.2 PERFORMANCE OF WORK

A. Examine areas, physical conditions and phasing requirements under which materials are to be installed. Layout the system to suit the different types of construction and equipment as indicated on the drawings.

B. Work shall start immediately after authorization has been given to proceed so that the overall progress of the construction is not delayed. No foundry items to be installed until submittals have been approved.

C. Coordinate with other trades as necessary to properly interface components of the plumbing system.

D. Follow manufacturer's directions and recommendations in all cases where the manufacturers of articles used on this Contract furnish directions covering points not shown on the drawings or covered in these Specifications.

E. The omission from the drawings or Specifications of any details of construction, installation, materials, or essential specialties shall not relieve the Contractor from furnishing the same in place for a complete system.

3.3 PIPING INSTALLATION

A. The word "piping" shall mean all pipes, fittings, nipples, valves and all accessories connected thereto.

B. Run piping generally parallel to the axis of the building, arranged to conform to the building requirements and to suit the necessities of clearance for other mechanical ducts flues, conduits and work of other trades and close to ceiling or other construction as practical, free of unnecessary traps or bends.

C. Run horizontal sanitary drainage at uniform pitch of not less than 1/8" per foot, unless otherwise indicated. Pitch horizontal vent piping downward from stack to fixtures.

D. Run drainage piping as straight as possible with long radius turns. Offsets shall be made at an angle of 45° or less.

E. Grade water supply piping for complete drainage of the system. Install hose bibbs at low points.

F. Piping connections to all equipment shall be made up with unions.

G. Provide sufficient elbows, swings and offsets to permit free expansion and contraction.

H. Use reducers or increasers. Use no bushings.

I. Ream or file each pipe to remove burrs. Inspect each length of pipe and each fitting for workmanship and clear passageway.

J. Vent pipes to terminate at least 6" above the roof. Provide vandal proof hood assembly.

K. Cover, cap or otherwise protect open ends of all piping during construction to prevent damage to threads or flanges and prevent entry of foreign matter. Disinfect water supply piping as specified.

L. Exposed connections to equipment shall be installed with special care, showing no tool marks or threads at fittings and piping. No bowed or bend piping to be permitted.

M. All ferrous to non-ferrous connections shall be made by means of dielectric fittings. Submit shop drawings for approval.

N. Use extra heavy pipe for nipples, where unthreaded portion is less than 1½". Use no close nipples. Use only shoulder nipples.

O. All piping shall be inspected for defects and flaws prior to installation. Remove any damaged piping from job site. Piping shall be thoroughly cleaned of dirt, debris or rust.

P. Cleanouts to be provided at each change in direction greater than 135° or 100' maximum intervals on underground piping.

Q. Cleanouts to be same size as pipe except cleanout plugs larger than 4" shall not be required.

R. Cleanouts on concealed piping to be extended through and terminate flush with the finished wall or floor. Cover plates to be provided on all cleanout plugs in finished areas.

S. The bodies of cleanout ferrules to conform in thickness to that required for pipe and fittings of the same metal.

T. Route piping on roof on manufactured polyethylene pipe pier supports "Pipe Pier" by Erico.

3.4 WATER HAMMER ARRESTERS

A. Install as per PDI Standard WH-20 and equipment manufacturer's recommendation and as shown on working drawings. Provide before each quick closing valve (flush valve, solenoid valve, etc.) or bank of fixtures.

B. Install at each plumbing fixture, bank of fixtures, equipment and as indicated.

3.5 TESTING AND DISINFECTING - PLUMBING SYSTEMS

A. General: The Contractor to perform all field tests and provide all labor, equipment, and incidentals required for the tests. Owner to witness all field tests and conduct all field inspections. The Contractor to give the Owner ample notice of the dates and times scheduled for tests. Any deficiencies to be completely retested at no additional cost.

1. Inspection: Inspection to continue during installation and testing. Perform a final inspection of the equipment prior to installation to determine conformity to the type, class, grade, size, capacity, and other characteristics specified herein or indicated. Correct or replace all rejected equipment prior to installation.

2. Water Distribution Piping Test: Before fixtures are set, subject the entire hot and cold piping system to a hydrostatic pressure test of 150 pounds per square inch with water for not less than 8 hours in order to permit inspection of all joints with no evidence of leakage. Where a portion of the water distribution piping is to be concealed before completion, test this portion separately as specified for the entire system.

3. Sanitary, Waste, Storm, Rainwater, and Vent Piping Test: Before the installation of any fixtures or drains, cap the ends of the system and fill all lines with water to the roof level and allow to stand for at least 30 minutes without leakage. Make tests within building with piping exposed. If the system is tested in sections, tightly lug each opening, except the highest opening of the section under test, and fill each section with water and test with at least a 10' head of water.

4. Sanitary Drainage Vent, Storm, Rainwater and Fixture System Final Test: Give sanitary, drainage vent, and fixture systems an in-service test after complete installation. After all fixtures are installed, test the entire vent and sewer system and prove gas and water tight. Final test shall be with air. Before proceeding with test, fill all traps with water. Close all stacks and line openings during test, for a minimum period of 24 hours. If test reveals leakage of air at any point, repair and retest the system.

5. Disinfection of Water Distribution System: After pressure tests have been made thoroughly flush the entire domestic water distribution system with water until all entrained dirt and mud have been removed, and sterilize by chlorinating material. The chlorinating material shall be liquid chlorine. The chlorinating material shall provide a dosage of not less than 50 parts per million and shall be introduced into the system or part thereof in an approved manner. Retain the treated water in the pipe for 24 hours, or, fill the system or part thereof with a water-chlorine solution containing at least 200 parts per million of chlorine and allow to stand for three hours. Open and close all valves in the system being disinfected three times during the contact period. Then flush the system with clean potable water until the residual chlorine is reduced to less than 1.0 ppm. During the flushing period open and close all valves and faucets three times. From at least three divergent points in the system, take samples of water in properly sterilized containers for bacterial examination. Repeat the disinfecting until tests indicate that satisfactory bacteriological results have been obtained.
   a. Taking of samples shall be witnessed by Architect or Owner's representative. Samples are to be taken and tested by an independent analytical testing laboratory. Written reports shall be supplied to Architect for approval.

3.6 OPERATING TESTING AND CERTIFICATION - PLUMBING SYSTEMS

A. Upon completion and disinfection, and prior to acceptance of the installation, the Contractor to subject the plumbing system to operating tests to demonstrate satisfactory, functional, and operating efficiency. Such operating tests to include the following information in a report with conclusions as to the adequacy of the system.

1. Time, date, and duration of tests.

2. Water pressures at most remote location.

3. Operation of all valves and hydrants.

4. Operation of all floor drains by flooding with water.

5. Quality of domestic water.

6. Read all indicating instruments at half-hour intervals unless otherwise directed. Supply four copies of the test report to the Owner.

3.7 CLEANING EQUIPMENT AND MATERIALS

A. In addition to the requirements of Section 15050, provide for the safety and good condition of all materials and equipment until final acceptance by the Owner. Protect all materials and equipment from damage. Provide adequate and proper storage facilities during the progress of the work. Special care to be taken to provide protection for bearings, open connections, pipe coils, pumps, compressors, and similar equipment.

B. All piping, finished surfaces, and equipment to have all grease, adhesive labels, and foreign materials removed.

C. All piping to be drained and flushed to remove grease and foreign matter. Pressure regulating assemblies, traps, flush valves, and similar items shall be thoroughly cleaned. Remove and thoroughly clean and reinstall all liquid strainer screens after the system has been in operation for ten days.

D. When connections are to be made to existing systems, the Contractor is to do all cleaning and purging of the existing systems required to restore them to the condition existing prior to the start of work.

3.8 OPERATION MANUALS, START-UP SERVICE, WARRANTIES, ACCEPTANCE AND GUARANTEES

A. General: Refer to Section 15050 for details.

END OF SECTION 15400

SECTION 15440
PLUMBING FIXTURES

PART 1 - GENERAL

1.1 APPLICABLE REQUIREMENTS

A. All work to be furnished and installed under this section shall comply with all the requirements of General Conditions, Supplemental Conditions, Division 1 - General Requirements, and Section 15050 - Basic Materials and Methods, and other Sections in Division 15 specified herein.

1.2 SCOPE

A. All work to be furnished and installed under this section shall include, but not necessarily be limited to, the installation of plumbing fixtures and trim.

1.3 RELATED WORK IN OTHER SECTIONS

A. Section 15050: Basic Materials and Methods

B. Section 15400: Plumbing

C. Section 15450: Plumbing Equipment

1.4 SUBMITTALS

A. Prior to construction submit for approval all materials and equipment in accordance with Division 1. Submit manufacturer's data, colors, installation instructions, and maintenance and operating instructions for all components of this section including, but not limited to, the following:

1. Plumbing fixtures.

2. Piping specialties.

3. Toilets.

4. Urinals.

5. Lavatories.

6. Sinks.

7. Drinking fountains.

B. Shop Drawings: Submit rough-in drawings. Detail dimensions, rough-in requirements, required clearances, and methods of assembly of components and anchorages. Coordinate requirements with Architectural Woodwork shop drawings specified in Division 6 for fixtures installed in countertops and cabinets. Furnish templates for use in woodwork shop.

C. Samples: Submit samples of any piece of equipment requested by Architect for review and approval.

D. Wiring Diagrams: Submit manufacturer's electrical requirements and wiring diagrams for power supply to units. Clearly differentiate between portions of wiring that are factory installed and field installed portions.

1.5 CODES AND STANDARDS

A. Uniform Plumbing Code (UPC) with State Amendments.

B. All fixtures and faucets must meet all requirements of Americans with Disabilities Act (ADA).

C. State Energy Code

D. ARI Standard 1010: "Drinking Fountains and Self-Contained Mechanically Refrigerated Drinking Water Coolers."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver units to the site in containers with manufacturer's stamp or label affixed.

B. Store and protect products against dirt, water, chemical, and mechanical damage. Do not install damaged products. Remove damaged products from project site.

1.7 MAINTENANCE

A. Extra Stock:

1. Furnish special wrenches and other devices necessary for servicing plumbing fixtures, flush valves, and trim to Owner with receipt in a quantity of one device for each 10 fixtures.

2. Furnish faucet repair kits complete with all necessary washers, springs, pins, retainers, packings, o-rings, sleeves, and seats in a quantity of 1 kit for each 10 faucets.

PART 2 - PRODUCTS

2.1 GENERAL

A. Provide fixtures as specified. Fixtures in any secure or public areas shall be vandal proofed.

B. Architect/Engineer shall review and approve any substitution requested by Contractor prior to bid submittal.

C. Provide fixture as specified, acceptable manufacturers:

1. Vitreous China or Cast Iron Fixtures: Zurn or Kohler.

2. Stainless Steel Sinks: Elkay or Just
   a. All stainless steel is 18 gauge, type 304 unless otherwise specified.

3. Drinking Fountains: Elkay or Haws.

D. Provide faucet as specified. Acceptable manufacturers: Chicago Faucets or Zurn.

E. Provide flush valve as specified. Acceptable manufacturers: Sloan or Zurn.

F. Provide commercial grade toilet seat as specified. Acceptable manufacturers: Beneke, Bemis, Church or Olsonite.

G. Provide heavy-duty cast iron commercial grade carrier as specified. Provide compact carriers where space is limited. Acceptable manufacturers: Ancon, Jay R. Smith, Wade or Zurn. No plastic parts on foundry items.

1. Wall hung urinal: J.R. Smith fig: 0634-M12 or Zurn Z-1221-58.

2. Wall hung lavatory: J.R. Smith fig: 0700(D) –M31 concealed arm carrier.

H. Provide heavy duty commercial grade 17-gauge P-Trap and supplies with stops as specified. Provide heavy duty commercial grade lavatory supplies. Supplies shall be ½"x 3/8" x 12" ground joint flexible riser with loose key angle stop with chrome plates I.P.S. brass nipple. Sink supplies shall be ½" x 12" ground joint flexible riser with loose-key angle stop with chrome plated I.P.S. brass nipple. Provide bell type escutcheons for both P-trap and supplies. Acceptable manufacturers: Zurn or McGuire.

1. P-trap - Lav: McGuire C8902-DF or Zurn Z-8701.

2. P-trap - Sink: McGuire C8912-DF or ZurnZ-8702.

3. Supply for Lavatory: McGuire H2165 LK or Zurn ZH-8821-LK.

4. Offset supply for barrier free lavatory: McGuire 158 WC.

5. Supply for Sink: McGuire H2167 LK or Zurn ZH-8803-LR.

6. Supply for Water Closet: McGuire H2169LK or Zurn ZH-8807-CR.

7. Escutcheons: McGuire WE00D Series, wrought brass, bell type.

8. Lavatory grid strainer: McGuire 155A or Zurn Z-8743.

9. Barrier-free lavatory offset grid strainer: McGuire 155WC or Zurn 8746.

10. Sink Strainer: Elkay LK-18B.

I. Insulation: provide white molded closed cell vinyl pre-fab insulation on P-Trap and on both hot and cold water supply for barrier free lavatories and sinks. Acceptable manufacturers: McGuire, True-Bro or Zurn. Bag type insulators are not acceptable.

J. Drinking fountain shall be lead-free construction only.

PART 3 - EXECUTION

3.1 GENERAL

A. Verify all dimensions by field measurements. Verify that all plumbing fixtures may be installed in accordance with pertinent codes and regulations, the original design, and the referenced standards.

B. Examine rough-in for potable water and waste piping systems to verify actual locations of piping connections prior to installing fixtures.

C. Examine walls, floors and cabinets for suitable conditions where fixtures are to be installed.

D. Install plumbing fixtures level and plumb, in accordance with fixture manufacturer's written instructions, rough-in drawings, and pertinent codes and regulations, the original design, and the referenced standards.

E. Comply with the installation requirements of ADA with respect to plumbing fixtures for the physically handicapped.

F. Fasten plumbing fixtures securely to supports or building structure. Secure supplies behind or within wall construction to provide rigid installation.

G. Install a stop valve in an accessible location in the water connection to each fixture.

H. Install escutcheons at each wall, floor, and ceiling penetration in exposed finished locations and within cabinets and millwork.

I. Seal fixtures to walls and floors using silicone sealant as specified in Section 07900. Match sealant color to fixture color.

J. Test fixtures to demonstrate proper operation upon completion of installation and after units are water pressurized. Replace malfunctioning units, then retest.

K. Inspect each installed unit for damage. Replace damaged fixtures.

L. Adjust water pressure at drinking fountains, faucets and flush valves to provide proper flow stream.

M. Replace washers or cartridges of leaking or dripping faucets and stops.

N. Clean fixtures, trim, and strainers using manufacturer's recommended cleaning methods and materials.

O. During construction cover all installed fixtures, sinks, and water coolers with cardboard boxes and wrap with Visqueen.

P. Provide Holdrite flush valve and faucet support behind wall.

END OF SECTION 15440

SECTION 15450
PLUMBING EQUIPMENT

PART 1 - GENERAL

1.1 APPLICABLE REQUIREMENTS

A. All work to be furnished and installed under this section shall comply with all the requirements of General Conditions, Supplemental Conditions, Division 1 - General Requirements, and Section 15050 - Basic Materials and Methods, and other Sections in Division 15 specified herein.

1.2 SCOPE

A. All work to be furnished and installed under this section shall include but not necessarily be limited to the following:

1. Water heaters

2. Domestic hot water recirculating pumps

1.3 RELATED WORK SPECIFIED ELSEWHERE

A. Section 15050: Basic Materials and Methods

B. Section 15400: Plumbing

C. Section 15440: Plumbing Fixtures

1.4 SUBMITTALS

A. Prior to construction submit for approval all materials and equipment in accordance with Division 1. Submit manufacturer's data, colors, installation instructions, and maintenance and operating instructions for all components of this section including, but not limited to, the following:

1. Water heaters

2. Expansion Tank

3. Domestic hot water recirculating pumps

4. Grease Intercepter

B. Electrical Work: Refer to Division 15050 for requirements.

C. Shop Drawings: Submit rough-in drawings. Detail dimensions, rough-in requirements, required clearances, and methods of assembly of components and anchorages.

D. Wiring Diagrams: Submit manufacturer's electrical requirements for electrical power supply wiring. Submit manufacturer's ladder-type wiring diagrams for interlock and control wiring required for final installation. Differentiate between portions of wiring that are factory installed and portions that are to be field installed.

E. Maintenance Data: Submit maintenance data and parts lists for each type and size of water heater, control, and accessory, including "trouble-shooting" maintenance guide. Include this data, product

data, shop drawings, and wiring diagrams in maintenance manual, in accordance with requirements of Division 1.

F. Certificates: Submit appropriate Certificates of Shop Inspection and Data Report as required by provisions of ASME Boiler and Pressure Vessel Code.

G. Start-up: Provide written report on start-up in accordance with Section 15050.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver units to the site in containers with manufacturer's stamp or label affixed.

B. Store and protect products against dirt, water, chemical, and mechanical damage. Do not install damaged products - remove from project site.

1.6 WARRANTY

A. Provide one year (12 months) warranty. The warranty shall include parts, labor, travel costs, and living expenses to repair or replace products or systems.

PART 2 - PRODUCTS

2.1 HIGH EFFICIENCY CONDENSING HOT WATER HEATER - GAS

A. Water heater shall be fully condensing with 94% thermal efficiency with closed combustion venting.

B. Water heater shall be of a seamless glass lined steel tank construction and include a powered gas burner with electronic flame safeguard, intermittent ignition, automatic gas valve, and gas pressure regulator. Maximum supply gas pressure to heater 14" W.C. Heater shall have capacities as indicated on contract documents.

C. Water heater shall be suitable for sealed combustion direct venting using a 3" diameter PVC air intake pipe and 3" diameter PVC exhaust pipe for a total distance of 50 equivalent feet of vent and 50 equivalent feet of intake. The heater shall be approved for 0" clearances to combustibles.

D. Water heater controls shall include integrated solid state temperature and ignition control device with integral diagnostics, LED fault display capability and a digital display of temperature settings.

E. Tank shall be foam insulated and equipped with an ASME rated temperature pressure relief valve. The water heater shall be UL listed and exceed the minimum efficiency requirements of ASHRAE/IES 90.1b-1992.

F. Set water heater temperature supply temperature to 140°F (minimum).

G. Provide with muffler on flue, A.O. Smith 195334, route condensate through neutralizer and then to floor sink.

H. Manufacturer: A. O. Smith #Cyclone BTH.

2.2 POINT-OF-USE HOT WATER HEATER

A. Furnish and install Chronomite electric water heater as indicated on drawings.

B. Warranty: 1 year.

C. Manufacturer: Chronomite or Eemax.

2.3 RELIEF VALVES

A. Relief Valve: Watts vacuum relief valve, bronze body, silicone disc, threaded ends, installed on C.W. supply line only, refer to H.W. Heater Detail on contract drawings.

B. Temperature and Pressure Relief Valve: Watts, bronze body construction, thermostat and test lever, temperature relief set at 210° F, and pressure relief set at 125 psi.

C. Acceptable manufacturers: Watts, Kunkle, Keckley or Cash Acme.

2.4 HOT WATER RECIRCULATING PUMPS

A. Furnish and install pumps with capacities as shown on plans. Pumps shall be in-line type for installation in vertical or horizontal piping. Pump must be capable of being serviced without disturbing piping connections.

B. Pump body shall be of all bronze construction, rated 175 psi working pressure, with gauge ports at nozzles, and with vent and drain ports.

C. Impeller shall be non-ferrous material, enclosed type, dynamically balanced, keyed to the shaft and secured by a locking capscrew or nut.

D. The liquid cavity shall be sealed off at the motor shaft by an internally-flushed mechanical seal with ceramic seal seat, and carbon seal ring, suitable for continuous operation at 225° F. A non-ferrous shaft sleeve shall completely cover the wetted area under the seal.

E. Pump bearing bracket shall have oil lubricated bronze journal and thrust bearings. Bracket shaft shall be alloy steel having ground and hardened thrust bearing faces. A flexible coupling to dampen starting torque and torsional vibration shall be employed.

F. Motor shall meet NEMA specifications and shall be the size, voltage and enclosure called for on the plans.

G. Each pump shall be factory tested. It shall then be thoroughly cleaned and painted with at least one coat of high-grade machinery enamel prior to shipment.

H. Provide H-O-A switch with overload protection. Pump shall run continuously. Wiring between switch and pump provided under Division 15, as stated in Section 15050.

I. Manufacturer: ITT Bell and Gossett or Grundfos.

2.5 EXPANSION TANK

A. Furnish and install where shown on plans for domestic hot water system.

B. ASME stamped and constructed vessel with the following:

1. Tanks rated for 125psi maximum working pressure.

2. Black steel construction painted with "Hammertone" blue enamel.

3. Tank ring base support.

4. Stainless connection opening.

5. Butyl diaphragm bonded to polypropylene liner.

6. Pre-charged air chamber permanently sealed.

7. Air valve.

C. Manufacturer: Amtrol AST, Adamson or RECO.

2.6 GREASE INTERCEPTER

A. Grease separator shall be constructed of reinforced concrete according to the design, and with pre-fabricated internal parts and covers, as manufactured by Jensen or Procast and as noted on plans.

PART 3 - EXECUTION

3.1 GENERAL

A. Examine areas and conditions under which equipment is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

B. Install equipment in accordance with manufacturer's installation instructions. Install units plumb and level, firmly anchored in locations indicated, and maintain manufacturer's recommended clearances.

C. Orient so controls and devices needing service and maintenance have adequate access.

D. Connect water piping to units with shutoff valves and unions as indicated.

E. Start-Up: Start-up, test, and adjust equipment in accordance with manufacturer's start-up instructions. Check and calibrate controls. Start-up to be by authorized manufacturer's representative or agent.

3.2 OPERATION MANUALS, START-UP SERVICE, WARRANTIES, ACCEPTANCE AND GUARANTEES

A. General: Refer to Section 15050 for details.

END OF SECTION 15450