SECTION 15460 – PLUMBING EQUIPMENT

PART 1 – GENERAL

1.1 WORK INCLUDED

A. The work shall include labor, materials, tools, equipment, transportation, insurance, temporary protection, supervision and incidental items essential for proper installation and operation, even though not specifically mentioned or indicated on the drawings but which are usually provided or are essential for proper installation of systems related to this Section, as indicated on the drawings and specified herein.

B. The specifications and drawings describe the minimum requirements that must be met for the installation of work as shown on the drawings and as specified hereinunder.

C. Shop drawings.

D. Field acceptance testing.

1.2 RELATED SECTIONS

A. Examine drawings and criteria sheets and other Section of the Specifications for requirements which affect work under this Section whether or not such work is specifically mentioned in this Section.

1. Section 15050 – Basic Mechanical Materials and Methods
2. Section 15075 – Mechanical Identification
3. Section 15410 – Plumbing Valves
4. Section 15420 – Plumbing Distribution Piping
5. Section 15430 – Drainage and Vent Piping
6. Section 15440 – Plumbing Specialties
7. Section 15450 – Plumbing Fixtures
8. Section 15480 – Medical Plumbing Systems

1.3 REFERENCES

A. Applicable provisions of the following Codes and Trade Standard Publications shall apply to the work of this Section, and are hereby incorporated into, and made a part of the Contract Documents.

B. Material standards shall be as specified or detailed hereinafter and as follows:

1. ANSI American National Standards Institute

2. ASME American Society of Mechanical Engineers
3. ASTM American Society of Testing Materials
4. ASTM B88-78: Wrought Copper Fittings
5. AWS American Welding Society
6. CS Commercial Standards, U.S. Dept. of Commerce
7. FM Factory Mutual
8. FS Federal Specification, U.S. Government
9. MSS Manufacturers Standardization Society of the Valve and Fittings Industry
10. UL Underwriters Laboratories, Inc.
11. OSHA Occupational Safety and Health Act
12. ASPE American Society of Plumbing Engineers

1.4 ALTERNATES

A. Refer to Section 01230 – ALTERNATES.

1.5 SUBMITTALS

A. Refer to Section 01330 – SUBMITTAL PROCEDURES.

B. Prepare and submit shop drawings in accordance with the requirements of the General Conditions and Supplementary Conditions and in the manner described therein, modified as noted hereinafter.

C. Submittals: The following documents shall be provided:

1. Water booster pumps
2. Sewage ejectors
3. Sump pumps
4. Water heaters
5. Hot water circulators
6. Elevator sump pumps

1.6 QUALITY ASSURANCE

A. Refer to Section 01400 – QUALITY REQUIREMENTS.

PART 2 – PRODUCTS

2.1 WATER HEATERS

A. Provide domestic water heaters as listed below. All storage vessels shall be constructed in accordance with ASME Code, Section IV, and stamped with the appropriate symbol,

hydrostatically tested to 225 psi, operating pressure of 150 psi. All units shall be factory insulated, jacketed and painted. All fitting connections shall be copper. The heaters shall be completely packaged, heat loss shall comply with ASHRAE 90 (1982) standards. Start-up of equipment shall be by factory trained manufacturer's personnel. The final installation shall comply with all authorities having jurisdiction. Nameplate data shall be marked accordingly and clearly visible from the front of the unit.

B. Instantaneous Steam-to-Hot Water Heat Exchanger

1. Provide Leslie Constantemp low pressure steam water heater, for use on 2 to 15 psig steam consisting of an integrally piped heat exchanger, mounted on a heavy duty angle iron frame heater control package capable of supplying 100 gpm of hot water when heated from 40°F to 140°F without the use of thermostatic control devices or storage tanks.
2. The heaters shall be capable of maintaining the ±3°F over a flow range of 2% to 100%. The water shall flow through the tubes and steam in the shell. If recirculation is required, the heater shall be equipped with a recirculation system with an adjustable valve to set the recirculation temperature. The recirculation system shall be integrally mounted and shall not alter the overall dimensions of the heater.
3. Refer to valve section for required mixing valves.
4. Warranty: The heat exchanger shall carry an extended warranty in addition to the manufacturer's warranty as follows:

    a. Coils: Unconditional, non-prorated 10-year guarantee against failure due to thermal shock, mechanical failure, or erosion.
    b. Pressure Vessel: Unconditional, non-prorated 10-year guarantee against all failures.

2.2 DOMESTIC WATER PRESSURE BOOSTER

A. Contractor to furnish and install a prefabricated and tested water pressure duplex pump booster system as designed and manufactured by Syncroflo, Inc., Canaris or approved equal, rated at total capacity of 200 gpm with an inlet pressure of 40 psi, and a discharge pressure of 80 psi. The system described is using Syncroflo as the minimum standard of quality. System shall be provided with 4" Type "L" copper tubing discharge and suction headers. Any and all deviations from these specifications must be acknowledged in writing.

B. Vertical Multi-Stage Pumps

1. Pumps shall be industrial constant sped vertical multi-stage diffuser pumps with stainless steel shafts, water lubricated bronze radial bearings, mixed flow balanced bronze impellers and cast iron bowls with glass lined diffusers. The pump barrels shall have a corrosion inhibiting lining and a 3" clean-out access. The discharge head shall be flanged with continuous bypass for low seal pressure. the mechanical seal shall be sleeve mounted and replaceable without removing the motor, disassembling the pump, or disturbing piping connections.

2. Pumps shall be driven by WP1 vertical hollow shaft motors. Each motor shall meet NEMA standards be energy efficient type and operate within the nameplate horsepower at any point on the pump curve. Include a hex type shaft coupling and a steady bushing for each motor.
3. Lead pump shall be Syncroflo Model 2M, 10 HP, 3550 RPM at 230 Feet head. Lag pumps shall be Syncroflo Model 2M, 10 HP, 3550 RPM at 230 Feet head.

C. Pressure Regulating Valves

1. Constant system pressure shall be maintained by a pilot operated diaphragm type combination pressure regulating and non-slam check valve, complete with stainless steel cover bolting and fully fused epoxy coating inside and out. The valve body shall be suitable for operation at maximum pump pressure plus maximum suction pressure.

D. Lag Pump Sequencing

1. Flow sequencing shall be controlled by a flow sensor. The flow sensor shall be provided with a panel mounted visual indicator for continuous readout in GMP, include necessary pump sequencing set points and shall be readily field adjustable to accommodate changing demand conditions.
2. The small lead pump is to run during low-flow periods and constantly prior to the second lag pump operation is initiated. The first lag pump is to operate when the building's requirements have surpassed the small lead pumps capacity.

0 to 100 GPM	Lead Pump
100 to 200 GPM	
320 GPM	Total Capacity of Water System

E. Lead Pump Shut-Down

1. Provide a factory precharged, ASME code and NB stamped and labeled HydroCumulator tank. Construction features shall include an air fill valve, an air pressure gauge, a drain valve, and a replaceable FDA approved flexible membrane to separate air and water. No water shall come in contact with the metal walls of the tank. In addition the HydroCumulator tank shall be bottom fed and capable of 100% draw down. tank shall be shipped precharged to the proper design conditions.
2. Provide a pressure switch, a MaxiStore flow switch, and a time delay relay to automatically control lead pump on-off operation. These controls shall operate in such a way as to prevent high flow rate shutdowns and lead pump short cycling while maximizing the amount of stored water available from the HydroCumulator.

F. Power and Control Panel

1. System manufacturer shall furnish a NEMA 12 power and control panel complete with through the door disconnect switch(es), power fuses, magnetic starter, each with 3 leg overload protection for each motor 120/1/60 fused control circuit transformer, automatic 24 hour alternation on equal capacity pumps, individual external overload reset buttons, lag pump start time delays, pump indicating lights, multiple position selector switches,

control power light, low suction pressure shut down with visual alarm light and auxiliary contact, low system pressure indicating light. All of the above shall be factory internally prewired and tested in accordance with provisions of the National Electric code. The system is to be fully wired to a single point connection for Section 16100. The complete panel assembly shall have the system manufacturer's name and have affixed the serial numbered UL label stating that the panel is listed as an industrial control panel.

G. Programmable Controller

1. Provide a Programmable Logic Controller, as manufactured by Allen-Bradley, to control all functions of the system. The controller shall have the following features:
2. A nonvolatile memory with no battery backup which prevents program loss due to power failures, a program cartridge which allows program changes to be made by the factory and transmitted to the field for simple loading into the controller by the operator, input and output "on" status lights must be supplied for ease of monitoring, and controller must be designed for use in locations where electromagnetic noise, high temperature, humidity, and mechanical shock may exist.
3. Standardized program features for system shall include the following:

   a. Adjustable minimum run time for each pump start signal.
   b. Adjustable time delay on each lag pump start signal.
   c. Pressure switch or flow sequencing of lag pumps.
   d. Automatic and manual alternation of equal capacity pumps.
   e. Automatic lag pump exerciser.
   f. Multiple function low system pressure alarm.
   g. Single function low suction pressure alarm.
   h. Status lights for inputs and outputs for ease in monitoring.
   i. Adjustable time delays for each alarm system.
   j. Intermittent audible alarm horn with silence and reset delay.
   k. Indication of first actuated alarm.
   l. Indication of which alarm still exists when reset attempted.
   m. Lead pump shutdown controls and energy saving mode light.
   n. Provide a common alarm dry contact, for connection to the building automation system by the ATC Contractor.
   o. Shutdown of one pump during an electrical emergency.

H. Instrumentation and Emergency Controls.

1. Each pump shall have stainless steel label, a temperature probe, and an electric purge valve. Include individual 4-1/2" ASA grade A pressure gauges for indicating each pump, system, and suction pressure. Include pressure switches for low system and low suction pressure. All pressure switches, as well as the system and suction pressure gauges, shall be control panel mounted.

I. Factory Prefabrication

1. The entire booster system shall be factory prefabricated on a common structural steel stand with all interconnecting piping and wiring completed and operationally tested prior

to shipment. The complete package shall also include isolation valves on the suction and discharge of each pump. The only field connection required will be at the suction and discharge headers, the drain, and one power connection at the panel. The system shall have all pressure regulating valves, flow switches, pressure switches and controls adjusted, wired and ready for operation.

2. The contractor shall furnish all labor and materials to unload and install the system and render it operational. The contractor shall install remote mounted equipment prior to operating system.

J. Factory Test and Certification

1. The booster system and its component parts shall undergo a complete operating flow test from zero to 100% design flow rate under the specified suction and net system pressure conditions. The certification shall include copies of the test data as recorded by X-Y plotter. Final approval will not be issued until X-Y test data and wire to water efficiency data have been reviewed and accepted by the approving authorities.

K. Submittal Data

1. The submittal data for the pumping system shall include a letter from the system manufacturer stating place of assembly and who will be responsible for design, product liability, service and all system and component guarantees. The submittal shall include pump curves, complete description of control panel with wiring diagrams and sequences of operation, cut-sheets on major items and a copy of the manufacturer's certificate of $1,000,000.00 minimum liability insurance. This letter shall be signed by a corporate officer of the manufacturer and provide the name and address of their local representative.

L. Guarantee

1. The vertical internal multi-stage pumping assemblies and pressure regulating valves shall be guaranteed for five years from date of shipment against defective material and workmanship. WP-1 motors shall also be guaranteed for five years from date of shipment against burn-out. Motor bearings have a 2 year limit. End suction pumps and motors are guaranteed for one year. The Water Pressure Booster System as a whole shall be guaranteed in writing by the manufacture for a period of one year from date of shipment against defect in design, materials, or construction. Mechanical seals, O-rings, diaphragms, fuses and bulbs, gauges, oil and grease are not included.

M. Start-Up Service

1. The service of a factory trained representative shall be made available on the job site to check installation and start-up and instruct operating personnel.

N. Installation, Operating and Maintenance Manuals

1. Provide complete manuals with a list of recommended spare parts to ensure continuous system operation. The system manufacturer or its local representative shall also have a copy so they can provide prompt assistance if necessary.

O. Final Checkout and Report

1. The local representative shall visit the project after it is turned over to the owner's building engineer and instruct them in the proper system operation and afterwards provide a letter to the contractor and engineer stating that the system is operating satisfactorily.

2.3 SEWAGE EJECTORS

A. Furnish and install where shown on plans, one duplex set of Weil sewage ejector Model No. 2519, Flygt, Zoeller or Weinman, 4" discharge. Each pump has a capacity of 100 GPM against a TDH of 20 ft.

1. Construction Features

a. Stainless steel shaft
b. cast iron impeller
c. elevated thrust bearing
d. pumps capable of passing 2 1/2" solids

2. Motors

a. 5 HP, 480 volts, three phase, 60 cycle, AC, 1750 RPM, TEFC motors.

3. Controls

a. Four (4) mercury float switches suspended from cable holder integral to the cover, each with 20 ft. cord.
b. One (1) NEMA I duplex control cabinet with:

1) (2) Magnetic starters
2) (2) Fusible disconnect switches
3) (1) Automatic alternator
4) (2) TOA selector switches
5) (2) Running lights
6) (2) Control circuit transformers
7) (1) 4" alarm bell with silencer (120V). (Electrician to provide separate source of power for alarm).
8) (1) Set of isolated contacts for remote alarm

4. Cover

a. Provide gas tight square steel cover gasketed with all necessary openings for pumps, controls, inspection opening and 4" vent connection and frame for casting into concrete. Cover shall be sized to fit 48" x 48" cast in place concrete sump. All openings shall be caulked.

2.4 CIRCULATORS (AUTOMATIC)

A. Pumps: Furnish and install where shown on the plans Taco, Bell & Gossett or pre-approved equal, all bronze horizontal centrifugal hot water circulation pumps. Voltage, horsepower, pipe sizes, etc. of units shall be: 480V, 3-phase, ½ HP. Pumps shall be for in-line installation. All motors to be high efficiency type.

B. Control: Each pump shall be automatically controlled by a Minneapolis Honeywell, Marshall, or Powers Company, or pre-approved equal L-4006A immersion aquastat which shall be installed in a suitable copper or bronze pipe well, in the hot water circulation piping and shall be adjusted to start the circulating pumps at 5°F. above and below the normal operating temperature of the system. Thermometers shall be installed close to each aquastat with 4½" dial and range from 50°F. to 250°F.

PART 3 – EXECUTION

3.1 CONNECTIONS TO EQUIPMENT

A. Furnish and install waste and vents, traps, cold water, hot water, non-domestic cold and hot water, medical gases, piping, shutoffs, backflow preventers, pressure reducing valves, vacuum breakers, shock absorbers, regulators and flexible tubing for all final connections to kitchen, medical and laboratory equipment, headwalls, casework and sinks provided under other Sections. Roughing for this equipment shall be as indicated on the drawings.

B. Obtain exact roughing in dimensions from manufacturers of all service locations before connecting to or roughing for equipment. Provide shutoff valves at each piece of equipment.

C. Owner provided equipment shall be furnished and set under other Sections. Roughing for and final connections to including piping shall be provided by this Contractor. Equipment included shall be:

1. Kitchen equipment (dishwasher, ice maker)
2. Prefabricated medical gas headwalls
3. Preformed sink tops
4. Scrub stations
5. Sterilizers, glasswashers

3.2 IDENTIFICATION OF SYSTEMS

A. Provide clip-on color coded piping identification markers on piping systems installed under this Section. Provide matching flow arrows to indicate direction of flow. Markers shall be Seton Nameplate Co., W.H. Brady, Westline Products or approved equal.

B. Color coding shall comply with the American Hospital Association or ANSI A13.1 Standards as directed by the Owner.

C. Install markers on each side of wall penetrations, at each valve, at tee fittings and base of risers. Spacing of markers shall not exceed 20’-0" and shall include at least one marker in each room. Letters shall not be less than 1 1/2" in height. Arrows shall not be less than 9' long.

D. Install markers on cleaned or painted piping only after piping is complete and has been accepted by the Architect. Install marker adjacent to access panels where piping is concealed.

E. Stencil equipment, such as pumps, compressors, water heaters, and tanks with the name of the equipment and equipment number. Stencils shall be at least 6" high and of a color to provide a contrast with the equipment finish.

END OF SECTION