SECTION 22 00 00
PLUMBING GENERAL REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Plumbing General Requirements, as shown on the Plans, as specified and/or directed.

B. Related Work specified elsewhere:
   1. Division 1, “General Requirements”
   2. Division 22, “Plumbing”
   3. Division 23, “Mechanical”
   4. Division 26, “Electrical”

1.02 REFERENCE STANDARDS

A. The following is a list of standards that may be referenced in this Section:
   1. Code of Federal Regulations (CFR) Publications:
      a. 29-1910 SUBPART O – Machinery and Machine Guarding
      b. 29-1910.219 – Mechanical Power Transmission Apparatus

1.03 SUBMITTALS

A. Submit shop drawings, manufacturer's data, publication compliance, certified test reports, and manufacturer's certificates of compliance for equipment, materials and finish, and pertinent details for each system where specified in each individual section, and have them approved before procurement, fabrication or delivery of the items to the job site. Shop drawings shall be accompanied by a letter of transmittal in duplicate, and all shop drawings shall be suitably identified with the name of the project, contract number, Contractor's name, date and initials indicating approval of such submittal by the Contractor under the applicable specification. Partial submittals will not be acceptable and will be returned without review. Submittals shall include the manufacturer's name, trade name, catalog model or number, nameplate data, size, layout dimensions, capacity, project specification and the specific technical paragraph reference which specifies each item, applicable industry and technical society publication references, and other information necessary to establish contract compliance of each item to be furnished.
   1. Manufacturer's Data: Submittals for each manufactured item shall be current manufacturer's descriptive literature of cataloged products, equipment drawings, diagrams, performance and characteristic curves, and catalog cuts.
   2. Shop Drawings: Drawings shall be a minimum of 8.5 inches by 11 inches in size, except as specified otherwise. Drawings shall include floor plans, sectional views, wiring diagrams, and installation details of equipment; and equipment spaces identifying and indicating proposed location, layout and arrangement of items of equipment, control panels, accessories,

piping, ductwork, and other items that must be shown to ensure a coordinated installation. Wiring diagrams shall identify circuit terminals, and indicate the internal wiring for each item of equipment and the interconnection between each item of equipment. Drawings shall indicate adequate clearance for operation, maintenance, and replacement of operating equipment devices.

3. Manufacturer's Certificates of Compliance: Submit certification from manufacturer attesting that materials and equipment to be furnished for this project comply with the requirements of this specification and of the reference publications. Pre-printed certifications will not be acceptable; certifications shall be the manufacturer's original; certifications shall be not more than one year old. The certification shall not contain statements that could be interpreted to imply that the product does not meet all requirements specified, such as "as good as"; "achieve the same end use and results as materials formulated in accordance with the referenced publications"; "equal or exceed the service and performance of the specified material". The certification shall simply state that the product conforms to the requirements specified. Certificates shall be signed by the manufacturer's official authorized to sign certificates of compliance.
4. Reference Standards Compliance: Where equipment or materials are specified to conform to industry and technical society reference standards of organizations such as the American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), National Electrical Manufacturers Association (NEMA), American Society of Mechanical Engineers (ASME), American Gas Association (AGA), American Refrigeration Institute (ARI), and Underwriters' Laboratories (UL), proof of such conformance shall be submitted. If an organization uses a label or listing to indicate compliance with a particular reference standard, the label or listing will be acceptable evidence, unless otherwise specified in the individual sections.
    a. Independent Testing Organization Certificate: In lieu of the label or listing, submit a certificate from an independent testing organization, competent to perform testing and approved by the Engineer. The certificate shall state that the item has been tested in accordance with the specified organization's test methods and that the item complies with the specified organization's reference standard.

1.04 OPERATION AND MAINTENANCE MANUAL

A. Furnish an operation and maintenance manual for each item of equipment. Furnish three copies of the manual bound in hardback binders or an approved equivalent. Furnish one complete manual to the Owner's Representative for review and approval not more than 90 calendar days after an item is approved, but at least 60 calendar days prior to field acceptance testing of the item. Furnish the remaining manuals at least 60 days prior to contract completion. Inscribe the following identification on the cover: the words "OPERATION AND MAINTENANCE MANUAL", the name and location of the equipment or the building, the name of the Contractor, and the contract number. The manual shall include the names, addresses, and telephone numbers of each subcontractor

installing equipment, and of the local representatives for each item of equipment. The manual shall have a table of contents and be assembled to conform to the table of contents with the tab sheets placed before instructions covering the subject. The instructions shall be legible and easily read, with large sheets of drawings folded in. The manual shall include: wiring and control diagrams with data to explain detailed operation and control of each item of equipment; a control sequence describing start up, operation and shut down; description of the function of each principal item of equipment; the procedure for starting; the procedure for operating; shut down instructions; installation instructions; maintenance instructions; lubrication schedule including type, grade, temperature range, and frequency; safety precautions, diagrams, and illustrations; test procedures; performance data; and parts list. The parts lists for equipment shall indicate the sources of supply, recommended spare parts, and the service organization which is reasonably convenient to the project site. The manual shall be complete in all respects for equipment, controls, accessories, and associated appurtenances provided.

1.05 CATALOGED PRODUCTS

A. Materials and equipment shall be cataloged products of manufacturers regularly engaged in production of such materials or equipment and shall be manufacturer's latest design that complies with the specification requirements. Materials and equipment shall duplicate items that have been in satisfactory commercial or industrial use. Where two or more items of the same class of equipment are required, these items shall be products of a single manufacturer; however, the component parts of the items need not be the products of the same manufacturer. Each item of equipment shall have the manufacturer's name, address, model number and serial number on the nameplate securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

1.06 MANUFACTURER'S RECOMMENDATIONS

A. Unless otherwise stated in the Contract Specifications, all new equipment items, and specialties shall be installed in strict accordance with the recommendations of the manufacturer of the items being installed. Prior to the installation of new items, the Contractor shall submit to the Owner's representative printed copies of the manufacturer's installation recommendations. Installation of the item will not be allowed to proceed until the recommendations are received. Failure to furnish these recommendations can be cause for rejection of the material. Failure to install items in accordance with manufacturer's recommendations can be cause for rejection of the work items installed.

1.07 LAYOUT OF THE WORK

A. Coordinate the proper relation of the work to the building structure, existing utilities and to the work of all trades. The Contractor shall advise the Owner's Representative of any discrepancy before performing any work.
   1. Contract Drawings: The Contract Drawings represent the general intent as to piping and equipment arrangements. All locations and dimensions shown shall be field verified and minor alterations made if so required. Where dimensions are not given for the location and arrangement of

mechanical systems, locations may be assumed to be approximate, and may be altered if required. Major modifications to the indicated arrangements shall be approved by the Owner's Representative prior to the installation of mechanical systems. Schematic diagrams represent the overall system requirements and do not necessarily indicate the physical orientation, location or dimensions of that system.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Properly store, adequately protect, and carefully handle equipment and materials to prevent damage before and during installation in accordance with the manufacturer's recommendations, and as approved by the Engineer. Replace damaged or defective items.

1.09 SAFETY REQUIREMENTS

A. Equipment Safety: Fully enclose or properly guard in accordance with 29 CFR 1910.219 belts, pulleys, chains, gears, couplings, projecting setscrews, keys, rotating parts, and other power transmission apparatus, located where persons can come in close proximity thereto. Points of operation, ingoing nip points, and machinery producing flying chips and sparks shall be guarded in accordance with the applicable portions of 29 CFR 1910 SUBPART O. Provide positive means of locking out equipment so that equipment cannot be accidentally started during maintenance procedures. High temperature equipment and piping so located as to endanger personnel or create a fire hazard shall be properly guarded or covered with insulation of the type specified. Provide catwalks, maintenance platforms, and guardrails where required for safe operation and maintenance of equipment. Provide ladders or stairways to reach catwalks and maintenance platforms. Ensure that access openings leading to equipment are large enough to carry through routine maintenance items such as filters and tools.

1.10 ELECTRICAL REQUIREMENTS

A. Furnish motors, controllers, disconnects and contactors with their respective pieces of equipment. Motors, controllers, disconnects and contactors shall conform to and have electrical connections provided under Division 26-Electrical. Furnish internal wiring for components of packaged equipment as an integral part of the equipment. Extended voltage range motors will not be permitted. Controllers and contactors shall have a maximum of 120 volt control circuits, and shall have auxiliary contacts for use with the controls furnished. When motors and equipment furnished are larger than sizes indicated, the cost of additional electrical service and related work shall be included under this Section. Power wiring and conduit for field installed equipment shall be provided under and conform to the requirements of Division 26 - Electrical. Unless specifically noted otherwise, all control wiring (120 volt or less) shall be provided by Mechanical Contractor and conform to the requirements of Division 26 - Electrical.

1.11 INSTRUCTION TO OWNER'S PERSONNEL

A. When specified in other sections, furnish the services of competent instructors to give full instruction to the designated Owner's personnel in the adjustment,

operation, and maintenance, including pertinent safety requirements, of the specified equipment or system. Instructors shall be thoroughly familiar with all parts of the installation and shall be trained in operating theory as well as practical operation and maintenance work. Instruction shall be given during the first regular work week after the equipment or system has been accepted and turned over to the Owner for regular operation. The number of days (8 hours per day) of instruction furnished shall be as specified in the individual section. When more than 4 days of instruction are specified, use approximately half of the time for classroom instruction. Use other time for instruction with the equipment or system. When significant changes or modifications in the equipment or system are made under the terms of the Contract, provide additional instruction to acquaint the operating personnel with the changes or modifications.

1.12 INSPECTIONS AND CERTIFICATIONS

A. The Contractor shall provide and pay for any third party inspections or certifications required by applicable regulatory agencies for boilers and other mechanical equipment components modified, or furnished and installed as a part of the Contract work.

1.13 SPECIAL CONDITIONS

A. The Contractor shall be performing work within active Museum and office areas and shall be responsible to coordinate with the Owner regarding planned interruptions to mechanical and electrical services.
   1. Protection of Existing Work: The Contractor shall take all necessary precautions to insure against damage to existing work to remain in place, or to be reused. The Contractor shall insure that structural elements are not overloaded and additional structural supports required as a result of any cutting, removal or demolition work performed under any part of this Contract are added. The Contractor shall minimize disruption of existing non-contract work areas as much as possible.
   2. Upon damage to existing equipment, buildings and/or structures, the Contractor shall immediately notify the Owner. All damages shall be repaired by the Contractor, or shall be replaced if beyond repair to match the existing to the Owner's satisfaction.
   3. Protection of Buildings from the Weather: The interior of the buildings and all materials and equipment shall be protected from the weather at all times.
   4. Protection of Personnel: Where the safety of non-contractor personnel is endangered in the area of the work, barricades shall be used. Additional protection shall be provided, if required, to preserve the safety of non-contractor personnel in the immediate area of the work.

PART 2 - PRODUCTS

2.01 NOT USED

PART 3 - EXECUTION

3.01 FIELD PAINTING

A. Conform to Section 09 91 23 – Interior Painting

END OF SECTION

SECTION 22 05 53
IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.01 SUMMARY

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for identification of plumbing piping and equipment including all pumps, hot water heaters, storage tanks, piping and valves using color bands, lettering, flow direction arrows, and related permanent identification devices for Identification for Plumbing Piping and Equipment, as shown on the Plans, as specified and/or directed.

B. Related Work specified elsewhere:
   1. Section 22 00 00 – Plumbing General Requirements
   2. Section 22 07 00 – Plumbing Insulation

1.02 REFERENCE STANDARDS

A. The following is a list of standards that may be referenced in this section:
   1. American National Standards Institute, Inc. (ANSI) Publication:
      a. A13.1 – Scheme for the Identification of Piping Systems
      b. Z535.1 – Safety Color Code

1.03 SUBMITTALS

A. Manufacturer's Data:
   1. Label, Tag and Nameplate materials
   2. List of wording, symbols, letter size, and color coding to be used
   3. Valve chart
   4. Accessory materials

PART 2 - PRODUCTS

2.01 MATERIALS

A. Pipe labels, valve tags and equipment nameplates shall be as manufactured by Marking Services Incorporated, or approved equal.
   1. Nameplates: Three-ply laminated phenolic plastic at least 1/16" thick with black surfaces and white core. Engraving shall be minimum ½" high with appropriate spacing. Text shall be white on black background. Nomenclature shall match the equipment designation as indicated on the Plans and Schedules.
   2. Valve Tags: Three-ply laminated phenolic plastic at least 1/16" thick with black surfaces and white core. Engraving shall be minimum ½" high with appropriate spacing. Text shall be white on black background. Valve tag shall be minimum 1-1/2" diameter with smooth edges.

3. Pipe Markers: Color, text and size shall conform to ASME/ANSI Standard A13.1.
   a. Plastic Pipe Markers: Strap-type labels shall be factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering with flow direction arrows and identification of fluid being conveyed. Straps shall be self-locking nylon ties.
   b. Plastic Tape Pipe Markers: Self-adhesive flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings with flow direction arrows and identification of fluid being conveyed.
4. Valve Chart: Valve chart(s) shall be printed on 8-1/2”x11” white paper with typewritten black text, minimum 12 point character size. Information to be provided shall be, at a minimum, the number, location, size and function of each line valve installed under this Contract. Chart shall be installed in a glazed frame and permanently mounted to wall in mechanical room or other suitable location coordinated with the Owner.

PART 3 - EXECUTION

3.01 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

3.02 GENERAL

A. All markers shall be installed in accordance with manufacturer’s printed instructions, and shall be neat and uniform in appearance. All tags or markers shall be oriented such that they are readily visible from all normal working locations. All equipment above lift-out ceilings or made accessible by access doors shall be labeled in the same manner as that of exposed equipment.

3.03 NAMEPLATES

A. Install plastic nameplates with corrosive resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer. Equipment to be labeled shall include but not be limited to the following items: pumps, hot water heaters, storage tanks, water treatment equipment, air compressors, plumbing control devices, switches, control panels and other related devices.

3.04 VALVE TAGS

A. Install valve tags on all valves except simple service and drain valves located within 10 feet and sight distance of the device or equipment served. For example, it would not be expected that strainer blow-down values in a machine room would be tagged. Each tag shall be attached to its valve with copper clad annealed iron wire, corrosion resistant chain, or other approved material.

3.05 PIPE MARKERS

A. Exposed piping shall be identified at intervals of 20 feet and at least one time in each room. Provide a pipe marker at each valve. Provide arrow markers at each pipe marker with arrows pointing away from the pipe marker to indicate direction of flow. When flow can be in either or both directions, provide a double ended arrow marker. Provide pipe and arrow marker at every point of pipe entry or exit where line penetrates a wall or service chase. Self-adhesive labels shall be used to identify piping under 6 inches in diameter when insulated and covered. For finished pipe sizes 6 inches and larger, strap type markers with self-locking nylon ties shall be utilized.

3.06 MISCELLANEOUS EQUIPMENT

A. Small items such as inline pumps shall be identified with tags in lieu of nameplates. Submit labeling plan to Engineer for devices and equipment not otherwise specified herein.

END OF SECTION

SECTION 22 07 00
PLUMBING INSULATION

PART 1 - GENERAL

1.01 SUMMARY

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Plumbing Insulation as shown on the Plans, as specified and/or directed.

B. Related Work specified elsewhere:
1. Section 22 00 00 – Plumbing General Requirements
2. Section 22 11 16 – Domestic Water Piping
3. Section 22 33 33 – Commercial Electric Domestic Water Heaters
4. Section 22 42 00 – Commercial Plumbing Fixtures

1.02 REFERENCE STANDARDS

A. The following is a list of standards that may be referenced in this Section:
1. American Society for Testing and Materials (ASTM) Publication:
   a. A167 – Stainless and Heat Resisting Chromium Nickel Steel Plate, Sheet and Strip
   b. C177 – Steady State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded Hot Plate Apparatus, Test Method
   c. C195 – Mineral Fiber Thermal Insulating Cement
   d. C534 – Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form
   e. C547 – Mineral Fiber Preformed Pipe Insulation
   f. C552 – Cellular Glass Block and Pipe Thermal Insulation
   g. C553 – Mineral Fiber Blanket and Felt Insulation (Industrial Type)
   h. C612 – Mineral Fiber Block and Board Thermal Insulation
   i. C795 – Wicking Type Thermal Insulation for Use Over Austenitic Stainless Steel
   j. C921 – Properties of Jacketing Materials for Thermal Insulation
   k. D227 – Coal Tar Saturated Organic Felt Used in Roofing and Waterproofing
   l. E84 – Surface Burning Characteristics of Building Materials
   m. E96 – Water Vapor Transmission of Materials
2. Manufacturer's Standardization Society of the Valves and Fittings Industry (MSS) Publication:
   a. SP 58 – Pipe Hangers and Supports Materials, Design, and Manufacture
   b. SP 69 – Pipe Hangers and Supports Selection and Application
3. National Fire Protection Association (NFPA) Publication:
   a. 255 – Surface Burning Characteristics of Building Materials

4. Underwriters Laboratories, Inc. (UL) Publication:
   a. 723 – Tests for Surface Burning Characteristics of Building Materials
5. Uniform Fire Prevention and Building Code of New York State Publication:
   a. 2020 – Plumbing Code of New York State
   b. 2020 – Energy Conservation Construction Code of New York State

1.03 SUBMITTALS

A. Manufacturer's Data:
   1. Insulation
   2. Jackets
   3. Vapor-barrier materials
   4. Accessory materials

B. Standards Compliance: Standards compliance labels are requirements on each container or package
   1. Insulation
   2. Jackets
   3. Vapor-barrier materials
   4. Accessory materials

1.04 DEFINITIONS

A. Finished Spaces: Spaces used for habitation or occupancy where rough surfaces are plastered, paneled, or otherwise treated to provide a pleasing appearance.

B. Unfinished Spaces: Spaces used for storage or work areas where appearance is not a factor, such as unexcavated spaces and crawl space.

C. Concealed Spaces: Spaces out of sight. For example, above ceilings; below floors; between double walls; furred in areas; pipe and duct shafts; and similar spaces.

D. Exposed: Open to view. For example, pipe running through a room and not covered by other construction.

E. Fugitive Treatments: Treatments subject to deterioration due to aging, moisture, high humidity, oxygen, ozone, and heat. Fugitive materials are entrapped materials that can cause deterioration, such as solvents and water vapor.

F. Outside: Open to view up to 5 feet beyond the exterior side of walls, above the roof, and unexcavated or crawl spaces.

1.05 MANUFACTURER'S STAMP OR LABEL

A. Every package or standard container of insulation, jackets, cements, adhesives, and coatings delivered to the project site for use must have the manufacturer's

stamp or label attached giving name of manufacturer, brand, and description of material. Insulation packages and containers shall be asbestos free.

1.06 FLAME SPREAD AND SMOKE DEVELOPED RATINGS

A. In accordance with NFPA 255, ASTM E84 or UL 723, the materials shall have a flame spread rating of not more than 25 and a smoke developed rating of not more than 50.
   1. Materials Tests: Test factory applied materials as assembled. Field applied materials may be tested individually. Use no fugitive or corrosive treatments to impart flame resistance. UL label or satisfactory certified test report from a testing laboratory will be required to indicate that fire hazard ratings for materials proposed for use do not exceed those specified. Flame proofing treatments subject to deterioration due to effects of moisture or high humidity are not acceptable.
   2. Materials Exempt From Fire Resistant Rating: Nylon anchors.

B. Materials Exempt from Fire Resistant Rating When Installed In Outside Locations, Buried, or Encased In Concrete: PVC casing and glass fiber reinforced plastic casing.

PART 2 - PRODUCTS

2.01 PIPING SYSTEMS INSULATION

A. Piping systems (except buried pipe) requiring insulation, types of insulation required, and insulation thickness shall be as listed in Tables I and II herein. Except for flexible unicellular insulation, insulation thicknesses as specified in Table II shall be one inch greater for insulated piping systems located outside. Unless otherwise specified, insulate all fittings, flanges, and valves, except valve stems, hand wheels, and operators. Use factory premolded, precut, or field fabricated insulation of the same thickness and conductivity as used on adjacent piping. Insulation exterior shall be factory cleanable, grease resistant, non-flaking and non-peeling. Pipe insulation shall conform to the referenced publications in Table I.
   1. Flexible Unicellular Insulation: ASTM C534. The minimum density limit of 4.5 pounds per cubic foot may be waived if all other characteristics of the standard are met.
   2. Piping Insulation Finishes:
      a. All Purpose Jacket: Except calcium silicate and unicellular insulation, provide a factory applied all-purpose jacket with or without integral vapor barrier as required by the service. Provide jackets in exposed locations with a white surface suitable for field painting. Allow a maximum water vapor permeance of 0.05 perm per ASTM E96, a puncture resistance of not less than 50 Beach units, and a minimum tensile strength of 35 pounds force per inch of width.
      b. Vapor Barrier Material: Resistant to flame, moisture penetration, and mold growth. Provide vapor barrier material on pipe insulation as required in Table I.

2.02 ADHESIVES, SEALANTS, AND COATING COMPOUNDS

A. Adhesive for Securing Insulation to Metal Surfaces and Vapor Barrier Lap Adhesive (For Use in Building Interior Only): ASTM C916, Type I (an adhesive in which the vehicle is nonflammable in liquid (wet) state and which will pass the edge burning test), or Type II (An adhesive in which the vehicle is nonflammable in the liquid (wet) state and which will not pass the edge burning test).

B. Mineral Fiber Insulation Cement: ASTM C195, thermal conductivity 0.85 maximum at 200 degrees F mean when tested per ASTM C177.

C. Weatherproof Coating: For outside applications use a weatherproof coating recommended by the manufacturer of the insulation and jackets.

2.03 ACCESSORIES

A. Staples: ASTM A167, Type 304 stainless steel outside clinch type.

B. Insulation Bands: 3/4 inch wide; 0.018 inch stainless steel.

C. Anchor Pins: Provide anchor pins and speed washers recommended by the insulation manufacturer.

D. Glass Cloth and Tape: Tape shall be 4 inch wide rolls. Class 3 tape shall be 4.5 ounces per square yard. In lieu of glass cloth and tape, open weave glass membrane may be used.

E. Coal Tar Saturated Organic Felt: ASTM D227, minimum weight of 13 pounds per 100 square feet.

F. Wire: Soft annealed stainless steel, 0.047 inch nominal diameter.

PART 3 - EXECUTION

3.01 PREPARATION

A. Do not insulate materials until all system tests have been completed and surfaces to be insulated have been cleaned of dirt, rust, and scale and dried. Ensure full range of motion of equipment actuators. Modify insulation to avoid obstruction with valve handle, safety relief, etc. Allow adequate space for pipe expansion. Install insulation with jackets drawn tight and cement down on longitudinal and end laps. Do not use scrap pieces where a full length section will fit. Insulation shall be continuous through sleeves, wall and ceiling openings. Extend all surface finishes to protect all surfaces, ends, and raw edges of insulation. Apply coatings and adhesives at the manufacturer's recommended coverage per gallon. Individually insulate piping. Provide a moisture and vapor seal where insulation terminates against metal hangers, anchors and other projections through the insulation on surfaces for which a vapor seal is specified. Keep insulation dry during the application of any finish. Bevel and seal the edges of exposed insulation. Unless otherwise indicated, do not insulate the following:

1. Vertical portion of interior roof drain pipelines, chrome plated pipes, and fire protection pipes.
2. Vibration isolating connections.
3. Adjacent insulation.
4. ASME stamps.

3.02 PIPING INSULATION

A. Pipe Insulation (Except Unicellular Insulation): Installation of plumbing insulation including materials and workmanship shall be in accordance with the Energy Conservation Construction Code of New York State, except as modified herein. Place sections of insulation around the pipe and joints tightly butted into place. The jacket laps shall be drawn tight and smooth. Secure jacket with fire resistant adhesive, factory applied self-sealing lap, or stainless steel outward clinching staples spaced not over 4 inches on centers and l/2 inch minimum from edge of lap. Cover circumferential joints with butt strips, not less than 3 inches wide, of material identical to the jacket material. Overlap longitudinal laps of jacket material not less than 1-1/2 inches. Adhesive used to secure the butt strip shall be the same as used to secure the jacket laps. Apply staples to both edges of the butt strips. When a vapor barrier jacket is required, as indicated in TABLE I, or on the ends of sections of insulation that butt against flanges, unions, valves, and fittings, and joints, use a vapor barrier coating or manufacturer's weatherproof coating for outside service. Apply this vapor barrier coating at all longitudinal and circumferential laps. Patch damaged jacket material by wrapping a strip of jacket material around the pipe and cementing, stapling, and coating as specified for butt strips. Extend the patch not less than l-l/2 inches past the break in both directions. At penetrations by pressure gauges and thermometers, fill the voids with the vapor barrier coating for outside service. Seal with a brush coat of the same coating. Do not use staples to secure jacket laps on pipes carrying fluid medium at temperatures below 35 degrees F. Where penetrating roofs, insulate piping to a point flush with the top of the flashing and seal with the vapor barrier coating. Butt tightly the exterior insulation to the top of the flashing and interior insulation. Extend the exterior metal jacket 2 inches down beyond the end of the insulation. Seal the flashing and counterflashing underneath with the vapor barrier coating. In cold water piping in high humidity areas, use cellular glass, or flexible unicellular insulation.

B. Flexible Unicellular Insulation: Bond cuts, butt joints, ends, and longitudinal joints with adhesive. Miter 90 degree turns and elbows, tees, and valve insulation. Where pipes penetrate fire walls, provide mineral fiber insulation inserts and sheet metal sleeves. Insulate flanges, unions, valves, and fittings in accordance with manufacturer's published instructions.

C. Hangers and Anchors: Pipe insulation shall be continuous through pipe hangers. Where pipe is supported by the insulation, provide MSS SP 58, Type 40 galvanized steel shields or MSS SP 58, Type 39 protection saddles conforming to MSS SP 69. Where shields are used on pipes 2 inches and larger, provide insulation inserts at points of hangers and supports. Insulation inserts shall be of cellular glass (minimum 8 pcf), molded glass fiber (minimum 8 pcf), or other approved material of the same thickness as adjacent insulation. Inserts shall have sufficient compressive strength to adequately support the pipe without

compressing the inserts to a thickness less than the adjacent insulation. Insulation inserts shall cover the bottom half of the pipe circumference 180 degrees and be not less in length than the protection shield. Vapor barrier facing of the insert shall be of the same material as the facing on the adjacent insulation. Seal inserts into the insulation with vapor barrier coating, or for exterior work, manufacturers recommended weatherproof coating, as applicable. Where protection saddles are used, fill all voids with the same insulation material as used on the adjacent pipe.

D. Sleeves and Wall Chases: Where penetrating interior walls, extend a metal jacket 2 inches out on either side of the wall and secure on each end with a band. Where penetrating floors, extend a metal jacket from a point below the back-up material to a point 10 inches above the floor with one band at the floor and one not more than one inch from end of metal jacket. Where penetrating exterior walls, extend the metal jackets through the sleeve to a point 2 inches beyond the interior surface of the wall.

E. Flanges, Unions, Valves and Fittings Insulation (Except Flexible Unicellular) for Hot Piping: Factory fabricated removable and reusable insulation covers may be used. For inside domestic hot water, and exposed hot water piping and drains in handicap areas, place factory premolded, precut or field fabricated segmented insulation of the same thickness and conductivity as the adjoining pipe insulation around the flange, union, valve, and fitting abutting the adjoining pipe insulation. If nesting size insulation is used, overlap 2 inches or one pipe diameter whichever is larger. Use insulating cement to fill voids. Elbows insulated using segments shall have not less than three segments per elbow. Place and joint the segments with manufacturer's recommended water vapor resistant, fire retardant, and adhesive appropriate for the temperature limit of the service. Upon completion of installation of insulation, apply two coats of lagging adhesive with glass tape embedded between coats. Overlap tape seams one inch. Extend adhesive onto adjoining insulation not less than two inches. The total dry film thickness shall be not less than 1/16 inch. Where unions are indicated not to be insulated, taper the insulation to the union at a 45 degree angle. Coat the insulation and all-purpose jacket with two coats of lagging adhesive and with glass tape embedded between coats. The total dry film thickness shall be not less than 1/16 inch. At the option of the Contractor, factory premolded one piece PVC fitting covers may be used in lieu of two coats of adhesive with tape embedded between coats. Factory premolded field fabricated segment or blanket insert insulation shall be used under the fitting covers. Install factory premolded one piece PVC fitting covers over the insulation and secure by stapling, taping with PVC vapor barrier tape, or with metal or plastic tacks made for securing PVC fitting covers. Do not use PVC fitting covers where exposed to the weather. Limit the use of PVC fitting covers to ambient temperatures below 150 degrees F.

F. Flanges, Unions, Valves, Anchors, Fittings for Cold Piping: Factory fabricated removable and reusable insulation covers may be used. For piping insulation inside the building that service domestic cold water above ceilings, drinking fountain drain piping to sewer tie in, and horizontal roof drain leaders, coat pipe insulation ends with vapor barrier coating not more than six inches from each

flange, union, valve, anchor or fitting. Place insulation of the same thickness and conductivity as the adjoining pipe insulation (either premolded or segmented) around the item, butting the adjoining pipe insulation. If nesting size insulation is used, overlap the insulation 2 inches or one pipe diameter. Use loose fill mineral wool or insulating cement to fill the voids. Elbows insulated using segments shall not have less than 3 segments per elbow. Insulation may be secured by wire or tape until finish coating is applied. Apply two coats of vapor barrier coating with glass tape embedded between coats. Overlap tape seams one inch. Extend the coating out onto the adjoining pipe insulation 2 inches. Where unions are shown not to be insulated, the insulation shall be tapered to the union at a 45 degree angle. Seal the insulation and jacket with two coats of vapor barrier coating with glass tape embedded between coats. Insulate anchors attached directly to the pipe for a sufficient distance to prevent condensation but not less than 6 inches from the insulation surface. Insulate flexible connections at pumps and other equipment with unicellular plastic insulation, unless otherwise indicated. At the option of the Contractor, premolded, one piece polyvinyl chloride (PVC) fitting covers may be used in lieu of the embedded glass tape. Factory premolded insulation or field fabricated insulation segments shall be used under the fitting covers. Blanket inserts may be used. Secure the covers with adhesive and vapor barrier tape with a vapor resistance of maximum 0.05 perm per ASTM E96, or with tacks made for securing PVC covers. Then coat all tape seams and tacks with Type II vapor barrier coating. Do not use premolded PVC fitting covers where exposed to weather. Limit the use of PVC covers to not less than 35 degrees F medium temperatures and below 150 degrees F ambient temperatures.

3.03 PAINTING AND IDENTIFICATION

A. Paint in accordance with Section 09 90 00, "Painting". Piping identification shall be as specified in Section 22 05 53, “Identification for Plumbing Piping and Equipment”.

3.04 REPLACEMENT OF EXISTING ASBESTOS INSULATION

A. When existing asbestos insulation is to be replaced, provide new asbestos free insulation. Label or stencil new insulation "Asbestos Free" after final finishing and painting.

3.05 FIELD INSPECTION

A. Visually inspect to ensure that materials used conform to specifications. Inspect installations progressively for compliance with requirements.

TABLE I
INSULATION MATERIAL FOR PIPING

SERVICE	MATERIAL	SPEC.	TYPE	CLASS	VAPOR BARRIER REQUIRED
*Domestic Hot Water and Hot Water Recirculating Piping	Mineral Fiber	ASTM C547		1	No
	Cellular Glass	ASTM C552	II	2	No
	Flexible Unicellular	ASTM C534	I or II		No
Domestic Cold Water Piping Above Ceilings	Mineral Fiber	ASTM C547		1	Yes
	Cellular Glass	ASTM C552	II	2	No
	Flexible Unicellular	ASTM C534	I or II		No
Drinking Fountain, Drain Piping (to sewer tie in)	Mineral Fiber	ASTM C547		1	Yes
	Cellular Glass	ASTM C552	II	2	No
	Flexible Unicellular	ASTM C534	I or II		No
Horizontal Roof Drain Leaders	Mineral Fiber	ASTM C553	I	B-3	Yes
Exposed Domestic Water and Drains Areas (Handicap Personnel)	Flexible Unicellular	ASTM C534	I or II		No

*NOTE: If there is no condensation condition existing, insulation is not required for CPVC or PVC piping.

TABLE II
PIPING INSULATION WALL THICKNESS

SERVICE	MATERIAL	TUBE AND PIPE SIZE (INCHES)				
		1/4 - 3/4	1 – 1-1/4	1-1/2 - 3	4 - 6	8+
Domestic Water (Hot and Recirculating), and Insulated Drains	Mineral Fiber	1	1	1-1/2	1-1/2	1-1/2
	Cellular Glass	1	1	1-1/2	1-1/2	1-1/2
	Flexible Unicellular	1	1	1-1/2	1-1/2	1-1/2
Domestic Cold Water	Mineral Fiber	1/2	1/2	1	1	1
	Cellular Glass	1/2	1/2	1	1	1
	Flexible Unicellular	1/2	1/2	1	1	1
Horizontal Roof Drain Leaders (Including underside of roof drain fittings)	Mineral Fiber	1/2	1/2	1	1	1

END OF SECTION

SECTION 22 11 16 DOMESTIC WATER PIPING

PART 1 - GENERAL

1.01 SUMMARY

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Domestic Water Piping, as shown on the Plans, as specified and/or directed.

B. Related Work specified elsewhere:
1. Section 22 00 00 – Plumbing General Requirements
2. Section 22 05 53 – Identification for Plumbing Piping and Equipment
3. Section 22 33 00 – Commercial Electric Domestic Water Heaters
4. Section 22 42 00 – Commercial Plumbing Fixtures

1.02 REFERENCE STANDARDS

A. The following is a list of standards that may be referenced in this Section:
1. American National Standards Institute (ANSI) Publication:
   a. A112.26.1M - Water Hammer Arrester
   b. B16.18 – Cast Copper Alloy Solder Joint Pressure Fittings
   c. B16.22 – Wrought Copper and Copper Alloy Solder Joint Pressure Fittings
   d. B16.23 – Cast Copper Alloy Solder Joint Drainage Fittings –DWV
   e. B16.24 – Bronze Pipe Flanges and Flanged Fittings, Class 150 and 300
   f. B16.26 – Cast Copper Alloy Fittings for Flared Copper Tubes
   g. B16.39 – Malleable Iron Threaded Pipe Unions, Class 150, 250 and 300
2. American Society of Mechanical Engineers (ASME) Publication:
   a. B40.100 – Pressure Gauges and Attachments
   b. B40.200 – Thermometers, Dial Reading and Remote Reading
3. American Society for Testing and Materials (ASTM) Publication:
   a. A48 – Gray Iron Castings
   b. A126 – Gray Iron Castings for Valves, Flanges, and Pipe Fittings
   c. B32 – Solder Metal
   d. B61 – Steam or Valve Bronze Castings
   e. B62 – Composition Bronze or Ounce Metal Castings
   f. B88 – Seamless Copper Water Tube
   g. D2846 – Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Hot and Cold Water Distribution Systems
   h. F439 – Socket Type Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80
   i. F441 – Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80
   j. F493 – Solvent Cements for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe and Fittings

4. American Society of sanitary Engineering (ASSE) Publication:
   a. 1003 – Water Pressure Reducing Valves for Domestic Water Supply Systems
   b. 1010 – Water Hammer Arresters
   c. 1019 – Wall Hydrants, Frost Proof Automatic Draining, Anti backflow Types
5. American Water Works Association (AWWA) Publication:
   a. C104 – Cement Mortar Lining for Ductile Iron and Gray Iron Pipe and Fitting for Water
   b. C105 – Polyethylene Encasement for Ductile Iron Piping for Water and Other Liquids
   c. C110 – Gray Iron and Ductile Iron Fittings, 3 in. Through 48 in. for Water and Other Liquids
   d. C111 – Rubber Gasket Joints for Ductile Iron and Gray Iron Pressure Pipe and Fittings
   e. C115 – Flanged Ductile Iron and Gray Iron Pipe with Threaded Flanges
   f. C500 – Gate Valves, 3 Through 48 inch NPS, for Water and Sewage Systems
   g. C504 – Rubber Seated Butterfly Valves
   h. C651 – Disinfecting Water Mains
   i. C700 – Cold Water Meters, Displacement Type
   j. C701 – Cold Water Meters, Turbine Type for Customer Service
   k. C702 – Cold Water Meters, Compound Type
6. Manufacturers Standardization Society of the Valve and Fittings Industry (MSS) Publication:
   a. SP 58 – Pipe Hangers and Supports Materials, Design and Manufacture
   b. SP 67 – Butterfly Valves
   c. SP 69 – Pipe Hangers and Supports Selection and Application
   d. SP 70 – Cast Iron Gate Valves, Flanged and Threaded Ends
   e. SP 80 – Bronze Gate, Globe, Angle and Check Valves
   f. SP 85 – Cast Iron Globe and Angle Valves, Flanged and Threaded Ends
7. Plumbing and Drainage Institute (PDI) Publication:
   a. WH201 – Water Hammer Arresters
8. Uniform Fire Prevention and Building Code of New York State Publication:
   a. 2020 – Plumbing Code of New York State
9. Foundation for Cross Connection Control and Hydraulic Research, University of Southern California (FCCCHR) Publication:
   a. List of Approved Backflow Prevention Assemblies (Obtain current date from NAVFAC HQ, Code 04)

1.03 GENERAL REQUIREMENTS

A. Section 22 00 00, "Plumbing General Requirements", applies to this Section, with the additions and modifications specified herein. Plumbing systems including equipment, materials, installation, and workmanship shall be in accordance with the Plumbing Code of New York State, except as modified herein. In the

Plumbing Code referred to herein, the advisory provisions shall be considered to be mandatory, as though the word "shall" had been substituted for the word "should" wherever it appears. Capacity of equipment shall be not less than that indicated. Plumbing systems shall include all water piping buried and aboveground to a limit of 5 feet outside of the building walls unless otherwise specified, or indicated by the Contract Drawings.

1.04 SUBMITTALS

A. Manufacturer's Data:
   1. Pipe and fittings
   2. Valves and Valve Boxes
   3. Pipe supports (hangers)
   4. Gauges and thermometers
   5. Strainers
   6. Water hammer arresters
   7. Backflow preventers

B. Certificates of Conformance
   1. Pipe and fittings
   2. Valves
   3. Backflow preventers

PART 2 - PRODUCTS

2.01 DOMESTIC WATER PIPING:

A. Buried Piping and Aboveground Piping:
   1. Copper Tubing: ASTM B88, Type K, with ANSI B16.26 flared joint fittings for all below ground piping. ASTM B88, Type L, with ANSI B16.18 or ANSI B16.22 solder joint fittings using ASTM B32, 95-5 tin-antimony or grade Sn96 tin-silver solder, and flux containing not more than 0.2% lead, shall be provided for aboveground piping.
   2. Cast Ductile Iron Piping: Sizes 4 inches and larger, outside coated, AWWA C104 cement mortar lined, AWWA C151 ductile iron pipe, AWWA C111 rubber gasket joints, and AWWA C110 fittings. Provide concrete thrust blocks at the elbow where the buried piping turns up toward the floor, and restrain the pipe riser with steel rods from the elbow to the flange above the floor. Aboveground piping shall have flanged end connections conforming to AWWA C115 for flanged pipe and AWWA C110 for flanged fittings.

B. Water Valves: Provide valves suitable for minimum of 125 psig and minimum of 180 degrees F hot water. Valves shall have flanged end connections, except sizes smaller than 2.5 inches may have threaded end connections with a union on all but one side of the valve, or solder end connections between bronze valves and copper tubing. Copper alloy and bronze valve body shall be ASTM B61 or ASTM B62 copper alloy. Ball valves may be provided in lieu of gate valves.

1. Gate Valves 2-1/2” and Larger: Class 125 iron body, bronze mounted, ASTM A126 Class B cast iron body and bonnet, flanged ends, Teflon-impregnated packing and two-piece packing gland. Manufacture shall be as by Stockham, Crane, Powell, or equal.
2. Gate Valves 2” and Smaller: Class 125, ASTM B62 cast bronze composition body and bonnet, soldered ends, solid disc, copper-silicon alloy stem, brass packing gland, Teflon-impregnated packing and malleable hand wheel. Manufacture shall be as by Stockham, Crane, or equal.
3. Ball Valves 2” and Smaller: 600 psi cwp, cast brass bodies, two-position hand levers, replaceable reinforced Teflon seats, conventional port, blow-out proof stems, chrome-plated brass ball, soldered ends with extended solder cups. Manufacture shall be as by Stockham, Crane, Apollo, or equal.
4. Globe Valves 2-1/2” and Larger: Class 125 iron body, bronze mounted with ASTM A-126 Class B cast iron body and bonnet, flanged ends, Teflon-impregnated packing and two-piece packing gland assembly. Manufacture shall be as by Stockham, Crane, Powell, or equal.
5. Globe Valves 2” and Smaller: Class 125, ASTM B62 cast bronze composition body and bonnet, soldered ends, copper silicon alloy stem, brass packing gland, Teflon-impregnated packing and malleable hand wheel. Manufacture shall be as by Stockham, Crane, Powell, or equal.
6. Butterfly Valves 2-1/2” and Larger: Wafer type, 200 psi cwp, ASTM A126 Class B cast iron body, replaceable EPDM sleeve, ductile nickel-plated disc, 410 stainless steel stem and EPDM O-ring stem seals. 2-1/2”-6” sizes – lever operated; 8”-24” – gear operated. Manufacture shall be as by Stockham, Crane, or equal.
7. Check Valves 2-1/2” and Larger: Iron body, bronze mounted, ASTM A126 Class B cast iron body and cap, flanged ends and swing disc type. Manufacture shall be as by Stockham, Crane, Powell, or equal.
8. Check Valves 2” and Smaller: Class 125, soldered ends, ASTM B62 cast bronze composition bodies and caps and swing disc type. Manufacture shall be as by Stockham, Crane, Powell, or equal.
9. Hose Bibbs: Provide angle type copper alloy hose bibb with lockshield and hand wheel. Inlet shall have internal threads. Outlet shall have vacuum breaker with 0.75 inch external hose threads.
10. Nonfreeze Wall Hydrant: ASSE 1019, cast bronze, with lockshield and hand wheel, one inch external thread inlet, 0.75 inch external hose thread outlet with automatic draining vacuum breaker. Hydrant shall be of sufficient length to extend through walls and place the valve seat inside the building or in the crawl space. Bonnet and valve stem shall be removable from outside of the building.
11. Water Pressure Reducing Valves: ASSE 1003.

C. Strainers: Class 125, Style Y, cast bronze body, 20 mesh stainless steel screen and shall have blow-off outlet with pipe nipple and gate valve. Manufacture shall be as by Watts, Sarco, or equal.

D. Gauges: ASME B40.100, single style pressure gauge for water with 4 inch dial, brass or aluminum case, bronze tube, gauge cock, pressure snubber, and syphon. Provide scale range suitable for the intended service.

E. Thermometers: ASME 40.200, bi metal dial type thermometers with stainless steel case, stem, and fixed thread connection; 5 inch diameter dial with glass face gasketed within the case; accuracy within 1.0 percent of scale range. Provide scale range suitable for the intended service.

F. Dielectric Connections: Provide at connections between copper and ferrous metal piping materials. ASTM F441, Schedule 80, CPVC threaded pipe nipples, 4 inch minimum length, may be provided for dielectric connections in pipe sizes 2 inches and smaller.

G. Water Hammer Arresters: PDI WH201, ANSI A112.26M.1, or ASSE 1010, elastomer bellows or plunger type with stainless steel or copper shell. Manufacture shall be as by Josam, Zurn, Watts, or equal.

H. Valve Boxes: For each buried valve provide ASTM A48 cast iron or ductile iron of a suitable size. Provide cast iron or ductile iron cover for the box with the word "WATER" cast on the cover. Coat cast iron and ductile iron boxes with bituminous paint.

I. Backflow Preventers: Reduced pressure principle (RPZ) type. Proof shall be furnished that each make, model/design, and size of backflow preventer being furnished for the project is approved by and has a current "Certificate of Approval" from the Foundation for Cross Connection Control and Hydraulic Research, University of Southern California (FCCCHR). Listing of the particular make, model/design, and size in the current FCCCHR List of Approved Backflow Prevention Assemblies will be acceptable as the required proof.

2.02 MISCELLANEOUS PIPING MATERIALS

A. Pipe Nipples: ANSI B16, copper alloy for use in copper tubing and hot dip galvanized Schedule 80 steel pipe for use in steel piping.

B. Unions: ANSI B16 for use in copper tubing; ANSI B16.39 hot dip galvanized steel for use in steel piping.

C. Flanges: ANSI B16.1, Class 125, for use in ferrous piping; ANSI B16.22 or ANSI B16.24 for use in copper tubing; with full face flat type synthetic rubber gaskets.

D. Escutcheon Plates: One piece or split hinge type metal plates for piping passing through floors, walls, and ceilings in exposed spaces, chromium plated finish on plates in finished spaces, paint finish on plates in unfinished spaces, and with setscrews or other approved positive means to anchor plates in place securely.

E. Pipe Sleeves:
1. Sleeves in Masonry and Concrete Walls, Floors, and Roofs: ASTM A53 or ASTM A120, Schedule 40 or Standard Weight, hot dip galvanized steel pipe sleeves.

2. Sleeves in Partitions and Other Than Masonry and Concrete Walls, Floors, and Roofs: Hot dip galvanized steel sheet having a nominal weight of not less than 0.90 pounds per square foot.

F. Pipe Hangers and Supports: Provide MSS SP 58 and MSS SP 69, Type 1 or 6, of the adjustable type, except as modified herein or indicated otherwise. Attachments to steel W or S beams shall be with Type 21, 28, 29, or 30 clamps. Attachments to steel angles and channels (with web vertical) shall be with Type 20 clamp with a beam clamp channel adaptor. Attachments to steel channel web horizontal) shall be with drilled hole on center line and double nut and washer. Attachments to concrete shall be with Type 18 insert or a drilled hole with expansion anchor. Attachments to wood shall be as indicated. Hanger rods and attachments shall be full size of the hanger threaded diameter. Provide Type 40 insulation protection shields for insulated piping. Provide steel support rods. Provide nonmetallic, hair felt, or plastic piping isolators between copper tubing and the hangers.

G. Access Doors: Provide 12 by 12 inch factory prefabricated and primed flush face steel access doors including steel door frame with continuous hinges and turn screw operated latch. Door frame shall be for installation in plaster and masonry walls. Furnish doors under this Section to provide proper access to concealed valves; install doors under the appropriate section of this Specification.

2.03 PIPE, VALVE AND EQUIPMENT INSULATION AND IDENTIFICATION:

A. Section 22 07 00, “Plumbing Insulation”.

B. Section 22 05 53, “Identification for Plumbing Piping and Equipment”.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Installation of plumbing systems including equipment, materials, and workmanship shall be in accordance with the Plumbing Code of New York State, except as modified herein. When fixtures require both hot water and cold water supplies, provide the hot water supply to the left of the cold water supply.

1. Threaded Connections: Jointing compound for pipe threads shall be polytetrafluoroethylene (PTFE) pipe thread tape, pipe cement and oil, or PTFE powder and oil; apply only on male threads.
2. Solder End Valves: Remove stems and washers and other item subject to damage by heat during installation. Reassemble valve after soldering is completed. Valves without heat sensitive parts do not require disassembly but shall be opened at least two turns during soldering.
3. Pipe Supports (Hangers): Provide additional supports at the concentrated loads in piping between supports, such as for in-line water pumps and flanged valves.
    a. Piping to Receive Insulation: Provide temporary wood spacers between the insulation protection shield and the pipe in order to properly slope the piping and to establish final elevations.

Temporary wood spacers shall be of the same thickness as the insulation to be provided under Section 22 07 00, "Plumbing Insulation".

b. Maximum Spacing Between Supports:

1) Vertical Piping: Support metal piping at each floor, but at not more than 10 foot intervals.

2) Horizontal Piping: Support cast iron piping at 5 foot intervals, except for pipe exceeding 5 foot length, provide supports at intervals equal to the pipe length but not exceeding 10 feet. Support steel piping and copper tubing as follows:

MAXIMUM SPACING (FEET)						
Nominal Pipe Size (Inches)	One and Under	1.25	1.5	2	2.5	3 and Over
Steel Pipe	7	8	9	10	11	12
Copper Tube	6	6	8	8	9	10

4. Ductile Iron Pipe Aboveground: Provide flanged joints.

5. Installation of Pipe Sleeves: Provide pipe sleeves where piping passes through walls, floors, roofs, and partitions. Secure sleeves in proper position and location during construction. Provide sleeves of sufficient length to pass through entire thickness of walls, floors, roofs, and partitions. Provide not less than 0.25 inch space between exterior of piping or pipe insulation and interior of sleeve. Firmly pack space with insulation, and calk at both ends of the sleeve with plastic waterproof cement which will dry to a firm but pliable mass, or provide a segmented elastomeric seal. Seal both ends of penetrations through fire walls and fire floors to maintain fire resistive integrity with UL listed fill, void, or cavity material. Extend sleeves in floor slabs 3 inches above the finished floor.

3.02 NAMEPLATES

A. Provide laminated plastic nameplates for equipment, gauges, thermometers, and valves; stop valves in supplies to fixtures will not require nameplates. Laminated plastic shall be 0.125 inch thick melamine plastic, black with white center core. Surface shall be a matte finish. All corners shall be square. Accurately align lettering and engrave into the white core. Minimum size of nameplates shall be 1.0 inch by 2.5 inches. Lettering shall be a minimum of 0.25 inch high normal block lettering. Key the nameplates to a chart and schedule for each system. Frame charts and schedules under glass and place where directed near each system. Furnish two copies of each chart and schedule. Each inscription shall identify its function. Equipment nameplates shall show the following information.

1. Manufacturer, type, and model number
2. Contract number and accepted date
3. Capacity or size
4. System in which installed

5. System which it controls

3.03 FIELD TESTING

A. Before final acceptance of the work, test each system as in service to demonstrate compliance with the contract requirements. Perform the following tests in addition to the tests specified in the Plumbing Code of New York State, except as modified herein. Correct all defects in the work provided by the Contractor, and repeat the tests until the work is in compliance with contract requirements. Furnish water, electricity, instruments, connecting devices, and personnel for the tests.

1. Domestic Water Piping: Before insulation is applied, hydrostatically test each piping system at not less than 100 psig or working pressure plus 50%, whichever is greater with no leakage or reduction in gauge pressure for 2 hours.

3.04 DISINFECTION

A. Thoroughly flush entire system prior to disinfection. Disinfect the new water piping and existing water piping affected by Contractor's operations in accordance with AWWA C601. Fill the piping systems with solution containing minimum of 50 parts per million of available chlorine and allow solution to stand for minimum of 24 hours.

B. Maintain a minimum of 25 ppm during retention period. Repeat chlorination as required to achieve 25 ppm minimum. Flush the solution from the systems with clean water until maximum residual chlorine content is not greater than 0.2 parts per million.

END OF SECTION

SECTION 22 13 16
SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.01 SUMMARY

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Sanitary Waste and Vent Piping as shown on the Plans, as specified and/or directed.

B. Related Work specified elsewhere:
   1. Section 22 00 00 – Plumbing General Requirements
   2. Section 22 42 00 – Commercial Plumbing Fixtures

1.02 REFERENCE STANDARDS

A. The following is a list of standards that may be referenced in this Section:
   1. American National Standards Institute (ANSI) Publication:
      a. B16.1 – Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250 and 800
      b. B16.3 – Malleable Iron Threaded Fittings
      c. B16.12 – Cast Iron Threaded Drainage Fittings
      d. B16.18 – Cast Copper Alloy Solder Joint Pressure Fittings
      e. B16.22 – Wrought Copper and Copper Alloy Solder Joint Pressure Fittings
      f. B16.23 – Cast Copper Alloy Solder Joint Drainage Fittings –DWV
      g. B16.24 – Bronze Pipe Flanges and Flanged Fittings, Class 150 and 300
      h. B16.26 – Cast Copper Alloy Fittings for Flared Copper Tubes
      i. B16.29 – Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings DWV
      j. B16.32 – Cast Copper Alloy Solder Joint Fittings for Solvent Drainage Systems
      k. B16.39 – Malleable Iron Threaded Pipe Unions, Class 150, 250 and 300
   2. American Society for Testing and Materials (ASTM) Publication:
      a. A47 – Ferritic Malleable Iron Castings
      b. A53 – Pipe, Steel, Black and Hot Dipped, Zinc Coated Welded and Seamless
      c. A74 – Cast Iron Soil Pipe and Fittings
      d. A120 – Pipe, Steel, Black and Hot Dipped, Zinc Coated (Galvanized) Welded and Seamless for Ordinary Uses
      e. A183 – Carbon Steel Track Bolts and Nuts
      f. A536 – Ductile Iron Castings
      g. B32 – Solder Metal
      h. B61 – Steam or Valve Bronze Castings
      i. B62 – Composition Bronze or Ounce Metal Castings
      j. B88 – Seamless Copper Water Tube
      k. B306 – Copper Drainage Tube (DWV)

l. C564 – Rubber Gaskets for Cast Iron Soil Pipe and Fittings
m. D2000 – Classification System for Rubber Products in Automotive Applications
n. D2564 – Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Pipe and Fittings
o. D2661 – Acrylonitrile Butadiene Styrene (ABS) Plastic Drain, Waste, and Vent Pipe and Fittings
p. D2665 – Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste and Vent Pipe and Fittings

3. American Water Works Association (AWWA) Publication:
   a. C104 – Cement Mortar Lining for Ductile Iron and Gray Iron Pipe and Fitting for Water
   b. C105 – Polyethylene Encasement for Ductile Iron Piping for Water and Other Liquids
   c. C110 – Gray Iron and Ductile Iron Fittings, 3 in. Through 48 in. for Water and Other Liquids
   d. C111 – Rubber Gasket Joints for Ductile Iron and Gray Iron Pressure Pipe and Fittings
   e. C115 – Flanged Ductile Iron and Gray Iron Pipe with Threaded Flanges
   f. C151 – Ductile Iron Pipe, Centrifugally Cast in Metal Molds or Sand Lined Molds, for Water and Other Liquids
   g. C500 – Gate Valves, 3 Through 48 inch NPS, for Water and Sewage Systems
4. Cast Iron Soil Pipe Institute (CISPI) Publication:
   a. 301 – Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications
   b. 310 – Patented Joint for Use in Connection with Hubless Cast Iron Sanitary System
   c. HSN – Neoprene Rubber Gaskets for Hub and Spigot Cast Iron Soil Pipe and Fittings
5. Manufacturers Standardization Society of the Valve and Fittings Industry (MSS) Publication:
   a. SP 58 – Pipe Hangers and Supports-Materials, Design and Manufacture
   b. SP 69 – Pipe Hangers and Supports-Selection and Application
   c. SP 70 – Cast Iron Gate Valves, Flanged and Threaded Ends
   d. SP 80 – Bronze Gate, Globe, Angle and Check Valves
   e. SP 85 – Cast Iron Globe and Angle Valves, Flanged and Threaded Ends
6. Plumbing and Drainage Institute (PDI) Publication:
   a. G101 – Testing and Rating Procedure for Grease Interceptors
7. Uniform Fire Prevention and Building Code of New York State Publication:
   a. 2020 – Plumbing Code of New York State

1.03 GENERAL REQUIREMENTS

A. Section 22 00 00, "Plumbing General Requirements", applies to this Section, with the additions and modifications specified herein. Plumbing systems including

equipment, materials, installation, and workmanship shall be in accordance with the Plumbing Code of New York State, except as modified herein. In the Plumbing Code referred to herein, the advisory provisions shall be considered to be mandatory, as though the word "shall" had been substituted for the word "should" wherever it appears. Capacity of equipment shall be not less than that indicated. Plumbing systems shall include all water piping buried and aboveground to a limit of 5 feet outside of the building walls unless otherwise specified, or indicated by the Contract Drawings.

1.04 SUBMITTALS

A. Manufacturer's Data:
   1. Pipe and fittings
   2. Valves
   3. Pipe supports (hangers)
   4. Drains
   5. Cleanouts
   6. Grease Separator

B. Certificates of Conformance:
   1. Pipe and fittings

C. Operation and Maintenance Manuals:
   1. Grease Separator

PART 2 - PRODUCTS

2.01 DWV (DRAIN, WASTE, AND VENT) PIPING

A. Fittings shall be long radius fittings, except fittings in vent piping may be short radius fittings. Minimum size piping shall be 2 inches for buried piping and 1.5 inches for aboveground piping.
   1. Buried Piping: Buried piping includes piping up to but not more than 6 inches aboveground or floor slab on grade.
      a. Cast Iron Hub and Spigot Pipe and Fittings: ASTM A74 with ASTM C564 or CISPI HSN 85 rubber compression gasket joints, or calked and leaded joints.
   2. Aboveground Piping:
      a. Cast Iron Hubless Pipe and Fittings: CISPI 301 with CISPI 310 coupling joints.
      b. Cast Iron Hub and Spigot Pipe and Fittings: ASTM A74 with ASTM C564 or CISPI HSN 85 rubber compression gasket joints, or calked and leaded joints.
      c. Copper Tubing: ASTM B306, with ANSI B16.23, ANSI B16.29, or ANSI B16.32 solder joint fittings using ASTM B32, 95 5 tin antimony or Grade Sn96 tin silver solder, and flux containing not more than 0.2 percent lead.
      d. Steel Pipe: ASTM A53 or ASTM A120, Schedule 40, hot dip galvanized, threaded end connections; with ANSI B16.12 hot dip galvanized threaded fittings.

3. Cleanouts: ANSI A112.36.2M; provide threaded bronze or thermoplastic cleanout plugs.
   a. Floor Cleanouts: Provide cast iron floor cleanout with flange, adjustable height polished bronze or nickel bronze rim and scoriated floor plate with "CO" cast in the plate, and countersunk screws for installing floor plate flush with finished floor.
   b. Wall Cleanouts: Provide polished stainless steel or chromium plated bronze cover plate and secure to cleanout plug with countersunk screw.
4. Drains: ANSI A112.21.1M; provide cast iron drains and clamping rings for use with membrane waterproofing.
   a. Flush Strainer Floor Drains: Provide with double drainage flange, perforated or slotted cast bronze or nickel bronze strainer, adjustable collar, and P trap. Drains of sizes 2, 3, and 4 inches shall have strainers with minimum free drainage area of 5, 11, and 18 square inches, respectively.
   b. Extended Rim Floor Drains: Provide as specified for flush strainer floor drains, except strainer body shall have 1 inch extended rim installed flush with finished floor.
   c. Roof Drains: ANSI A112.21.2M; provide hot dip galvanized cast iron drains, with minimum of 10 inch diameter body, nonpuncturing flashing clamp device with integral gravel stop and deck clamp, and removable cast iron or polypropylene locking dome. Free area of dome shall be not less than two times the free area of drain outlet. Provide drain flashing ring seat flush with adjacent roof deck, and secure rigidly in place with deck clamp.
      1) Downspout Nozzle: Coated cast bronze downspout nozzle with loose wall flange and no-hub inlet connection. Provide with stainless steel mesh bird screen and satin bronze finish. Manufacture shall be as by Josam 25010-Z series, or approved equal.
5. Grease Separators (Traps): All-welded 10-gauge steel, 3-inch tapped inlet and outlet connection, on the floor installation, heavy-duty leakproof gasket hand-tightened to body with safety-catch bolt assemblies, inside and outside epoxy coating, visible double-wall outside trap seal, and easily removable filter screen. Unit shall have a minimum grease/sludge capacity of 116 pounds, a 23-gallon static capacity and 30 gpm intermittent flow. Manufacture shall be as by Rockford Separators Model G-30-LO-R, or approved equal.

2.02 MISCELLANEOUS PIPING MATERIALS

A. Pipe Nipples: ANSI B16, copper alloy for use in copper tubing and hot dip galvanized Schedule 80 steel pipe for use in steel piping.

B. Unions: ANSI B16 for use in copper tubing; ANSI B16.39 hot dip galvanized steel for use in steel piping.

C. Flanges: ANSI B16.1, Class 125, for use in ferrous piping; ANSI B16.22 or ANSI B16.24 for use in copper tubing; with full face flat type synthetic rubber gaskets.

D. Escutcheon Plates: One piece or split hinge type metal plates for piping passing through floors, walls, and ceilings in exposed spaces, chromium plated finish on plates in finished spaces, paint finish on plates in unfinished spaces, and with setscrews or other approved positive means to anchor plates in place securely.

E. Pipe Sleeves:
1. Sleeves in Masonry and Concrete Walls, Floors, and Roofs: ASTM A53 or ASTM A120, Schedule 40 or Standard Weight, hot dip galvanized steel pipe sleeves.
2. Sleeves in Partitions and Other Than Masonry and Concrete Walls, Floors, and Roofs: Hot dip galvanized steel sheet having a nominal weight of not less than 0.90 pounds per square foot.

F. Pipe Hangers and Supports: Provide MSS SP 58 and MSS SP 69, Type 1 or 6, of the adjustable type, except as modified herein or indicated otherwise. Attachments to steel W or S beams shall be with Type 21, 28, 29, or 30 clamps. Attachments to steel angles and channels (with web vertical) shall be with Type 20 clamp with a beam clamp channel adaptor. Attachments to steel channel web horizontal) shall be with drilled hole on center line and double nut and washer. Attachments to concrete shall be with Type 18 insert or a drilled hole with expansion anchor. Attachments to wood shall be as indicated. Hanger rods and attachments shall be full size of the hanger threaded diameter. Provide Type 40 insulation protection shields for insulated piping. Provide steel support rods. Provide nonmetallic, hair felt, or plastic piping isolators between copper tubing and the hangers.

G. Access Doors: Provide 12 by 12 inch factory prefabricated and primed flush face steel access doors including steel door frame with continuous hinges and turn screw operated latch. Door frame shall be for installation in plaster and masonry walls. Furnish doors under this Section to provide proper access to concealed valves; install doors under the appropriate section of this Specification.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Installation of sanitary waste and vent systems including equipment, materials, and workmanship shall be in accordance with the Plumbing Code of New York State, except as modified herein. Installation of grease separator shall be in accordance with manufacturer’s recommendations and requirements.
1. Threaded Connections: Jointing compound for pipe threads shall be polytetrafluoroethylene (PTFE) pipe thread tape, pipe cement and oil, or PTFE powder and oil; apply only on male threads.
2. Solder End Valves: Remove stems and washers and other item subject to damage by heat during installation. Reassemble valve after soldering is completed. Valves without heat sensitive parts do not require disassembly but shall be opened at least two turns during soldering.
3. Pipe Supports (Hangers): Provide additional supports at the concentrated loads in piping between supports, such as for in-line water pumps and flanged valves.

4. Maximum Spacing Between Supports:
   a. Vertical Piping: Support metal piping at each floor, but at not more than 10 foot intervals
   b. Horizontal Piping: Support cast iron piping at 5 foot intervals, except for pipe exceeding 5 foot length, provide supports at intervals equal to the pipe length but not exceeding 10 feet. Support steel piping and copper tubing as follows:

MAXIMUM SPACING (FEET)						
Nominal Pipe Size (Inches)	One and Under	1.25	1.5	2	2.5	3 and Over
Steel Pipe	7	8	9	10	11	12
Copper Tube	6	6	8	8	9	10

5. Installation of Pipe Sleeves: Provide pipe sleeves where piping passes through walls, floors, roofs, and partitions. Secure sleeves in proper position and location during construction. Provide sleeves of sufficient length to pass through entire thickness of walls, floors, roofs, and partitions. Provide not less than 0.25 inch space between exterior of piping or pipe insulation and interior of sleeve. Firmly pack space with insulation, and calk at both ends of the sleeve with plastic waterproof cement which will dry to a firm but pliable mass, or provide a segmented elastomeric seal. Seal both ends of penetrations through fire walls and fire floors to maintain fire resistive integrity with UL listed fill, void, or cavity material. Extend sleeves in floor slabs 3 inches above the finished floor, except sleeves are not required where DWV piping passes through concrete floor slabs located on grade.

3.02 NAMEPLATES:

A. Provide laminated plastic nameplates for equipment and valves. Laminated plastic shall be 0.125 inch thick melamine plastic, black with white center core. Surface shall be a matte finish. All corners shall be square. Accurately align lettering and engrave into the white core. Minimum size of nameplates shall be 1.0 inch by 2.5 inches. Lettering shall be a minimum of 0.25 inch high normal block lettering. Key the nameplates to a chart and schedule for each system. Frame charts and schedules under glass and place where directed near each system. Furnish two copies of each chart and schedule. Each inscription shall identify its function. Equipment nameplates shall show the following information.
   1. Manufacturer, type, and model number
   2. Contract number and accepted date
   3. Capacity or size
   4. System in which installed
   5. System which it controls

3.03 FIELD TESTING

A. Before final acceptance of the work, test each system as in service to demonstrate compliance with the contract requirements. Perform the following tests in addition to the tests specified in the Plumbing Code of New York State, except as modified herein. Correct all defects in the work provided by the Contractor, and repeat the tests until the work is in compliance with contract requirements. Furnish water, electricity, instruments, connecting devices, and personnel for the tests.

1. DWV Piping: Before the installation of fixtures, cap the ends of each system, fill the piping with water to the roof, and allow to stand a minimum of 3 hours with no measurable leakage. If the system is tested in sections, each opening shall be plugged and each section tested with not less than a 10 foot head of water.

END OF SECTION

SECTION 22 33 33
COMMERCIAL ELECTRIC DOMESTIC WATER HEATER

PART 1 - GENERAL

1.01 SUMMARY

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Commercial Electric Domestic Water Heater and circulating pumps, as shown on the Plans, as specified and/or directed.

B. Related Work specified elsewhere:
1. Section 22 00 00 – Plumbing General Requirements
2. Section 22 05 53 – Identification for Plumbing Piping and Equipment
3. Section 22 07 00 – Plumbing Insulation
4. Section 22 11 16 – Domestic Water Piping
5. Division 26 – Electrical

1.02 REFERENCE STANDARDS

A. The following is a list of standards that may be referenced in this Section:
1. American National Standards Institute (ANSI) Publication:
   a. Z21.22 – Relief Valves For Hot Water Supply Systems
2. American Society of Mechanical Engineers (ASME) Publication:
   a. A112.4.1 – Water Heater Relief Valve Drain Tubes
   b. BPVC IV-HLW – Heating Boilers – Lined Potable Water Heaters
   c. BPVSEC8 – Pressure Vessels (Division1)
3. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) Publication:
   a. 90.1-2013 – Energy Standard for Buildings Except Low-Rise Residential Buildings
4. American Society of Sanitary Engineering (ASSE) Publication:
   a. 1005 – Performance of Water Heater Drain Valve (3/4-inch)
   b. 1017 – Performance of Temperature Actuated Mixing Valves for Hot Water Distribution Systems
   c. 1070 – Performance Requirements for Water Temperature Limiting Devices
5. National Electrical Manufacturers Association (NEMA) Publication:
   a. ICS 6 – Industrial Control and Systems: Enclosures
6. NSF International (NSF) Publication:
   a. 5 – Water Heaters, Hot Water Supply Boilers, and Heat Recovery Equipment
   b. 61 – Drinking Water System Components – Health Effects
   c. 372 – Drinking Water System Components – Lead Content
7. Underwriters Laboratories, Inc. (UL) Publication:
   a. 94 – Tests for Flammability of Plastic Materials for Parts in Devices and Appliances
   b. 174 – Household Electric Storage Tank Water Heaters
   c. 499 – Electric Heating Appliances

d. 1453 – Electric Booster and Commercial Storage Tank Water Heaters

8. Uniform Fire Prevention and Building Code of New York State Publication:
   a. 2020 – New York State Plumbing Code
   b. 2020 – New York State Energy Conservation Code

1.03 SUBMITTALS

A. Manufacturer's Data:
   1. Water Heaters
   2. Thermostatic Mixing Valve

B. Certificates of Conformance:
   1. Water Heaters
   2. Thermostatic Mixing Valve

C. Operation and Maintenance Manuals:
   1. Water Heaters
   2. Thermostatic Mixing Valve

PART 2 - PRODUCTS

2.01 DOMESTIC ELECTRIC WATER HEATERS

A. Unit shall be electric domestic hot water heater with insulated seamless glass-lined steel tank construction meeting ASME pressure vessel code, with electrical junction box and heavy-duty terminal block. Unit power shall be rated at 480 volts, three phase, 60 cycle AC. Tank shall be cathodically protected with two anode rods. Water heater shall have heavy-duty medium watt density heating elements within coloy sheathing, and controlled by individually mounted thermostat and high temperature cutoff switch. Internal circuits shall be fused. Unit shall be equipped with an adjustable range thermostat to allow hot water settings between 120°F and 181°F and shall meet or exceed all scheduled performance ratings. Hot water heater shall meet ASHRAE 90.1 standard, shall be UL listed and certified, and approved to NSF 5 standard. Unit shall include all scheduled or specified features and meet or exceed all scheduled and specified performance characteristics. Manufacture shall be as by AO Smith Gold Series DRE, or approved equal.

B. Combination Pressure and Temperature Relief Valve: ASME and ANSI Z21.22 rated temperature and pressure relief valve set at not less than 25 psi above maximum system pressure, not to exceed maximum working pressure, and temperature relief setting not to exceed 210°F. Provide with test lever.

2.02 INSTANTANEOUS ELECTRIC DOMESTIC HOT WATER HEATERS (SINGLE LAVATORIES ONLY)

A. UL listed and certified on demand type, lead free electric instantaneous water heaters with replaceable cartridge immersion heating element, replaceable filter

in the inlet connector, and a 0.3 GPM activation point as sensed by an integral flow meter. Unit shall be equipped with an integral ASSE 1070 compliant mixing valve, inlet and outlet temperature sensors, and power management algorithm to limit outlet tempered water temperature to 105 ºF (non-adjustable). Unit shall have an integral high limit switch with automatic reset, and a digital LED display for system status and heater operation feedback. Unit shall meet or exceed all scheduled performance ratings. Manufacture shall be as by Eemax Accumix II, or approved equal.

2.03 THERMOSTATIC MIXING VALVE

A. Valve to be lead free brass body with integral checks and screen, union connections, ASSE 1017 listed, paraffin-based thermal actuation technology, and a vandal-resistant lockable temperature-setting feature with an outlet temperature range of 90°F to 160°F, and activation at a minimum of 0.5 gpm. Manufacture shall be as by Powers HydroGuard Series LFLM490, or approved equal.

2.04 PLUMBING INSULATION AND IDENTIFICATION:

A. Section 22 07 00, “Plumbing Insulation”

B. Section 22 05 53, “Identification for Plumbing Piping and Equipment”.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Installation of domestic water heater systems including equipment, materials, and workmanship shall be in accordance with the New York State Plumbing Code and New York State Energy Conservation Code, except as modified herein.
   1. Water heaters shall be installed level and plumb and securely anchored.
   2. Water heaters shall be installed and connected in accordance with manufacturer’s written instructions with manufacturer’s recommended clearances.

3.02 TESTING

A. Before final acceptance of the work, test each system as in service to demonstrate compliance with the contract requirements. Correct all defects in the work provided by the Contractor, and repeat the tests until the work is in compliance with contract requirements. Furnish water, electricity, instruments, connecting devices, and personnel for the tests.

3.03 DISINFECTION

A. Thoroughly flush entire system prior to disinfection. Disinfect the new water piping in accordance with AWWA C601. Fill the piping systems with solution containing minimum of 50 parts per million of available chlorine and allow solution to stand for minimum of 24 hours. Maintain a minimum of 25 ppm during

retention period. Repeat chlorination as required to achieve 25 ppm minimum. Flush the solution from the systems with clean water until maximum residual chlorine content is not greater than 0.2 parts per million.

3.04 INSTRUCTION OF OPERATING PERSONNEL

A. Upon completion of the work, and acceptance of the installation, and at a time designated by the Owner, the services of a competent technician regularly employed or authorized by the manufacturer of the system shall be provided for instructing personnel in the proper operation, maintenance, safety and emergency procedures. The period of instruction shall be not less than four hours. The training shall be conducted at the job site during actual operation and coordinated with the Owner one week in advance.

END OF SECTION

SECTION 22 42 00
COMMERCIAL PLUMBING FIXTURES

PART 1 - GENERAL

1.01 SUMMARY

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Commercial Plumbing Fixtures, as shown on the Plans, as specified and/or directed.

B. Related work specified elsewhere:
1. Section 22 00 00 – Plumbing General Requirements
2. Section 22 05 53 – Identification for Plumbing Piping and Equipment
3. Section 22 07 00 – Plumbing Insulation
4. Section 22 11 16 – Domestic Water Piping
5. Section 22 13 16 – Sanitary Waste and Vent Piping
6. Division 26 – Electrical

1.02 REFERENCE STANDARDS

A. The following is a list of standards that may be referenced in this Section:
1. American National Standards Institute (ANSI) Publication:
   a. Z124.1 – Plastic Bathtub Units
   b. Z124.2 – Gel Coated Glass Fiber Reinforced Polyester Resin Shower Receptors and Shower Stall Units
   c. Z358.1 – Emergency Eye Wash and Shower Equipment
2. American Society of Mechanical Engineers (ASME) Publication:
   a. A112.6.1M – Supports for Off the Floor Plumbing Fixtures for Public Use
   b. A112.6.2 – Framing-Affixed Supports (Carriers) for Off-the-Floor Plumbing Fixtures
   c. A112.18.1 – Plumbing Supply Fittings
   d. A112.18.2 – Plumbing Waste Fittings
   e. A112.19.1 – Enameled Cast Iron Plumbing Fixtures
   f. A112.19.2 – Ceramic Plumbing Fixtures
   g. A112.19.3 – Stainless Steel Plumbing Fixtures
   h. A112.19.4M – Porcelain Enameled Formed Steel Plumbing Fixtures
   i. A112.19.5 – Flush Valves and Spuds for Water Closet Bowls, Tanks, and Urinals
   j. A112.19.14 – Six Liter Water Closets Equipped with a Dual Flushing Device
3. American Society of Sanitary Engineering (ASSE) Publication:
   a. 1001 – Atmospheric Type Vacuum Breakers
   b. 1016 – Individual Thermostatic, Pressure Balancing and Combination Balancing and Thermostatic Control Valves for Individual Fixture Fittings
   c. 1037 – Pressurized Flushing Devices for Plumbing Fixtures
   d. 1070 – Water Temperature Limiting Devices

4. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) Publication:
   a. 18 – Testing for Rating Drinking-Water Coolers with Self-Contained Mechanical Refrigeration
5. National Electrical Manufacturers Association (NEMA) Publication:
   a. ICS 6 – Industrial Control and Systems: Enclosures
6. NSF International (NSF) Publication:
   a. 61 – Drinking Water System Components – Health Effects
   b. 372 – Drinking Water System Components – Lead Content
7. Underwriters Laboratories, Inc. (UL) Publication:
   a. 399 – Drinking-Water Coolers
8. Uniform Fire Prevention and Building Code of New York State Publication:
   a. 2020 – New York State Plumbing Code
   b. 2020 – New York State Energy Conservation Code

1.03 GENERAL REQUIREMENTS

A. Section 22 00 00, "Plumbing General Requirements", applies to this Section, with the additions and modifications specified herein. Plumbing systems including equipment, materials, installation, and workmanship shall be in accordance with the New York State Plumbing Code and New York State Energy Conservation Code, except as modified herein. In the Plumbing Code referred to herein, the advisory provisions shall be considered to be mandatory, as though the word "shall" had been substituted for the word "should" wherever it appears.

1.04 SUBMITTALS

A. Manufacturer’s Data:
   1. Plumbing Fixtures

B. Certificates of Conformance:
   1. Water flushing volume of flushometer and water closet combination
   2. Water flushing volume of flushometer and urinal combination

PART 2 - PRODUCTS

2.01 FIXTURES, FITTINGS, ACCESSORIES, AND SUPPLIES:

A. Provide control stop valves in each supply to each fixture. The finish of fittings, accessories, and supplies exposed to view shall be chromium plated per ASME A112.18.1. Center set faucets shall be top mounted with inlets on not greater than 4 inch centers, unless noted otherwise. Provide special roughing in for wheelchair fixtures.
   1. Flush Valve Type Water Closets (P-1): ASME A112.19.2, white vitreous china, floor mounted or wall hung as indicated, floor or wall outlet as indicated, siphon jet, elongated bowl, white solid plastic elongated open front seat, and ASME A112.19.5 trim. Provide ASSE 1037, ADA-compliant electronic sensor exposed flush valve with infrared sensor, multiple-focused sensing fields, chrome plated cast brass, line powered

with 6 VAC step down transformer and override button, hard-wired power kit, including adjustable tailpiece, Chloramine-resistant EPDM Seals, vacuum breaker and angle (control stop) valve with vandal-resistant cap and back check. The water flushing volume of the flush valve and water closet combination shall not exceed 1.3 gallons per flush from 25 to 90 psi; furnish water closet manufacturer's certification of conformance. Provide ASME A112.6.2 water closet carrier. Manufacture of fixture shall be as by American Standard Afwall Model 3351.101, or approved equal. Flush Valve manufacture shall be as by American Standard Selectronic Sensor Model 606B.121, or approved equal.

2. Tank Type Water Closets (P-2): ASME A112.19.2, close coupled, white vitreous china, ASME A112.19.14, low flow (1.1 gpf) type, floor mounted, floor outlet, pressure assist siphon jet, elongated bowl, ADA compliant bowl rim at 17 inches, and white solid plastic elongated open front seat. The water flushing volume shall not exceed 1.1 gallons per flush from 20 to 80 psi. Manufacture shall be as by American Standard Cadet Model 2467.100, or approved equal.
3. Lavatories (P-3): ASME A112.19.2 white vitreous china with ASME 112.6.1 concealed arm carrier support, shelf back type, minimum dimensions of 19 inches wide by 17 inches front to rear. Provide ASME 112.18.1 copper alloy center set faucets with 0.5 gpm pressure compensating stationary spout, and ADA compliant vandal-resistant level handles for the Toilet Room fixture in the Cottage. Provide ASME 112.18.1 solid brass construction, single-post mounting, vandal resistant, UL approved electronic faucet with proximity operation, solenoid valve, flexible stainless steel hoses with check valves, filter screen and compression fittings, hard-wired with low voltage transformer and power kit for the Toilet Room fixtures in the Museum building. Faucet shall have a maximum flow rate of 0.5 gpm with vandal-resistant aerator. Provide with perforated grid strainer drain fittings, and 1.25 inch adjustable P traps. Manufacture shall be as by American Standard Declyn Model 0321.075, or approved equal. Manual faucet manufacture shall be as by American Standard Monterrey Model 5502.145, or approved equal. Electronic faucet manufacture shall be as by American Standard Selectronic Model 605B.104, or approved equal.
4. Mop Basin (P-4): ASME A112.18.2 one-piece molded stone 36”x24”x10” deep, floor mounted type with stainless steel grid strainer, hose and hose bracket, and mop hanger. Provide ASME A112.18.1 copper alloy chrome plated wall mounted, top brace combination faucets with ceramic disc valves, integral supply stops, vacuum breaker, pail hook, and 0.75 inch external hose threads on spout. Manufacture shall be as by Fiat Model MSBIDTG3624, or approved equal.
5. Hand Sinks (P-5): ASME A112.19.3, 304 stainless steel, wall-mounted, minimum dimensions of 17 inches wide by 15 inches front to rear by 6 inches deep, single compartment with ledge back. Provide wall mounted ASME A112.18.1 copper alloy faucets, 2.2 GPM swing spout with aerator, ADA compliant lever handles, and stainless steel grid drain outlet. Provide 2 inch adjustable P trap with drain piping to vertical vent stack. Manufacture shall be as by Elkay Model CHSB1716C, or approved equal.

Faucet and strainer shall be as manufactured by Elkay Model LKB400 and Model LK8, or approved equal.

6. Three-Bay Sink (P-6): ASME A112.19.3, 18 gauge stainless steel, three compartments with 18-inch left and right drain boards, stainless steel legs and adjustable bullet feet, minimum dimensions of 88 inches wide by 26" front to rear by 12 inches deep, and 9-inch backsplash. ASME A112.18.1, pre-rinse type faucet, add-on faucet, quarter-turn ceramic cartridges with check valves, wall-mounted, level handles, 14-inch switch nozzle with 2.2 gpm aerator, 44-inch flexible stainless steel hose, quick disconnect, 1.07 gpm spray valve with swivel, 6-inch wall bracket, accessory fitting tee and ½-inch female inlets. Manufacture shall be as by Elkay Dependabilt, Model E3C16X20-2-18X, or approved equal. Faucet manufacture shall be as by T&S Brass, Model B-0133-14CRQJST, or approved equal.
7. Electric Water Cooler (P-7): ASHRAE 18, UL 399, ASME A112.19.3, ADA compliant wall-mounted bubbler style with in-wall frame/plate, air-cooled condensing unit, 8.0 gph minimum capacity, hands-free, stainless steel splash receptor, and all stainless steel cabinet, with 27-inch minimum knee clearance from front to bottom of unit to floor and 36-inch maximum spout height above floor. Bubblers shall also be controlled by front mechanical bubbler button, and include a bottle filling station with electronic bottle filler sensor and visual filter monitor. Manufacture shall be as by Elkay Model LZWS-LRPBM28K, or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Installation of plumbing systems including fixtures, equipment, materials, and workmanship shall be in accordance with the New York State Plumbing Code, except as modified herein. When fixtures require both hot water and cold water supplies, provide the hot water supply to the left of the cold water supply. Plastic piping shall not penetrate fire walls or fire floors and shall be used on one side of fire walls and fire floors not closer than 6 inches to the penetration.
   1. Threaded Connections: Jointing compound for pipe threads shall be polytetrafluoroethylene (PTFE) pipe thread tape, pipe cement and oil, or PTFE powder and oil; apply only on male threads.
   2. Solder End Valves: Remove stems and washers and other item subject to damage by heat during installation. Reassemble valve after soldering is completed. Valves without heat sensitive parts do not require disassembly but shall be opened at least two turns during soldering.
   3. Pipe Supports (Hangers): Provide additional supports at the concentrated loads in piping between supports, such as for in-line water pumps and flanged valves.

3.02 NAMEPLATES

A. Provide laminated plastic nameplates for equipment, gauges, thermometers, and valves; stop valves in supplies to fixtures will not require nameplates. Laminated plastic shall be 0.125 inch thick melamine plastic, black with white center core. Surface shall be a matte finish. All corners shall be square. Accurately align

lettering and engrave into the white core. Minimum size of nameplates shall be 1.0 inch by 2.5 inches. Lettering shall be a minimum of 0.25 inch high normal block lettering. Key the nameplates to a chart and schedule for each system. Frame charts and schedules under glass and place where directed near each system. Furnish two copies of each chart and schedule. Each inscription shall identify its function. Equipment nameplates shall show the following information.

1. Manufacturer, type, and model number
2. Contract number and accepted date
3. Capacity or size
4. System in which installed
5. System which it controls

3.03 FIELD TESTING

A. Before final acceptance of the work, test each system as in service to demonstrate compliance with the contract requirements. Correct all defects in the work provided by the Contractor, and repeat the tests until the work is in compliance with contract requirements. Furnish water, electricity, instruments, connecting devices, and personnel for the tests.

END OF SECTION