DIVISION 22

PLUMBING

PART 1. GENERAL & MISCELLANEOUS

1.1. **General Provisions:** Division 20 is applicable in full hereto. No building materials or products that contain asbestos, formaldehyde, polychlorinated biphenyl (PCB), lead or mercury, in excess of limits mandated and defined by OSHA, LEED and the EPA, shall be utilized.

1.2. **Qualifications:** Shall be properly licensed and established as a Plumbing Contractor at location of the work and shall maintain locally adequate service facilities. He shall have had previous experience in the satisfactory installation of at least six (6) systems of this type, size and scope.

1.3. **General Scope:** Include all equipment, material and labor required for a complete operating plumbing system even though every item involved is not indicated. Refer to architectural drawings and verify all plumbing fixture's locations and mounting heights. Notify the architect prior to bid of any discrepancies. Do not attach any items to other trades' assemblies. Items shall be attached to building structural system.

Advisory provisions listed in all Codes referenced in the Contract Documents are mandatory. Codes are minimum requirements. Where conflicts occur between a Code, Standard, the contract drawings or these specifications, the more stringent requirements shall govern and be applicable.

Manufacturers not named in the specifications require prior approval, seven (7) days prior to bid date. Follow procedures set forth in Division 1 and Division 20 of the specifications. All prior approvals shall be submitted through the Architect.

Arrange and install piping systems sizes as shown, as close as practical, straight, properly supported and run as directly as possible forming right angles or
running parallel with building lines, true to line and grade, free of sags and bends. Locate piping as high as practical and in parallel groups as close together as practical.

Demolish and modify all existing walls, partitions and ceilings as required to accomplish the required work. All penetrations of new and existing floors and partitions shall be core drilled or sawcut large enough to allow all conduits, piping, firestopping assemblies, etc., to continue uninterrupted, and to provide proper firestopping of the penetration as required to install new items as shown and/or specified. Reconstruction and repair of the demolished/modified items shall be as directed by the Architect.

Coordinate demolition and repairing/rebuilding of items with General Contractor prior to bid to allow for installation of carriers, piping, etc., as applicable. All

piping shall be clean and rust free when it is installed. Before installation, it shall be checked, upended and swabbed. All rust or dirt from materials in storage or from lying on the ground shall be removed. Any installed dirty piping shall be cleaned. Any rusted piping shall have the rust removed, etched and primed for painting as recommended by the respective piping manufacturer, and then painted with two coats of black, compatible, rustproof enamel paint. Do not spray paint. Refer to gas piping specification for requirements of gas piping painting. Paint shall comply with the requirements of ASTM E84 for flame spread and smoke development.

The Plumbing Contractor shall take as-built measurements, including all depths, inverts, etc., prior to commencement of backfilling operations. It shall not be sufficient to check offline locations. Definite measurements shall be taken for each line entering or leaving the facility. **The location of buried piping shall be shown on the record drawings and dimensioned from fixed points**.

1.4. **Record Documents:** Provide in such detail, as is set forth under General and Supplemental Conditions and in Division 20. **Note that the Plumbing Contractor shall take as-built measurements, including all depths, inverts, etc., prior to commencement of backfilling operations. It shall not be sufficient to check offline locations. Definite measurements shall be taken for each line entering or leaving the facility. The location of buried piping shall be shown on the record drawings and dimensioned from fixed points. Also, show locations of all dielectric unions, cleanouts and all valve numbers on the record documents.**

1.5. **Access Panels and Doors:** Do not locate serviceable items above inaccessible, hard ceilings without written approval from the Architect. Coordinate all items locations with the Architectural ceiling plans before installing any items. Furnish access panels and doors to the General Contractor for installation wherever required for access to valves, controllers, actuators, trap primer assemblies, water hammer arrestors, air vents and similar devices requiring maintenance access.

Doors/panels shall be suitable for wall or ceiling finish involved, 16" x 16" unless otherwise indicated or as required to permit removal of equipment and acceptable maintenance access. Access panels and doors shall be fire rated where rated assemblies are penetrated. Access panels and doors for items located outdoors shall be weatherproof.

Access panels and doors shall be as manufactured by Milcor, Elmdor, Zurn, Mifab or approved equivalent. The Architect must approve the use of, and type of, all panels and doors to be installed in areas that are exposed to view or in finished areas. Exposed access panels and doors shall be factory cleaned and primed for painting in the field. Colors shall be as selected by the Architect. Refer to Architectural Section, Painting, for additional information.

1.6. **Warranty:** Guarantee work as set forth in Division 20 and Division 1. Guarantee in writing to make good without cost any defects in materials and workmanship for one year following the date of substantial completion of the project as determined by the Architect, unless specified otherwise. Flush

valves shall be provided with a complete replacement, including labor, five year guarantee in the event of failure. Provide free maintenance and service during the guarantee period. Refer to other parts for additional requirements and extended warranty requirements.

1.7. **Site Visits:** It is the contractor's responsibility to have the job ready for site visits when they are scheduled. If the project is not ready for the requested site visit and the Architect, any governmental agency or any other entity requires an additional site visit with the Engineer present, the contractor shall pay Zgouvas, Eiring & Associates a re-visit fee of $2,000. The payment shall be made directly to Zgouvas, Eiring & Associates 5 days prior to the scheduled site visit.

The Contractor is urged to carefully review the extensive requirements of Paragraph "Identification" in Division 20 of the specifications and note that certain identification **is required to be completed before certain site visits. There are specific identification requirements prior to the above ceiling and final site visits, respectively, that are mandatory. Failure to comply with this provision will be cause for cancellation of the site visit, and a fee imposed for the additional site visit, with all costs of the additional site visit to be borne by the respective Contractor responsible.**

1.8. **Governmental Inspections:** The Plumbing Contractor shall arrange and pay for any governmental visit to the job site to inspect water heater installation if required, as well as other items noted by the Governing Authorities having jurisdiction.

Correct all deficiencies required by the Inspector without additional cost to the Owner or the Owner's Project Design Professionals, using materials and methods, as directed by, State of Alabama Boiler and Pressure Vessel Safety Division/Inspection Divisions and Elevators/Boilers inspector as required.

1.9. **Miscellaneous:** Bidders shall visit the site and become acquainted with all job conditions that may affect the work shown on the plans. Report to the Architect, prior to bid, any new or existing conditions that require modifications to accomplish the installation of all items. Provide for required adjustments to complete the intent of the work. No consideration will be given after bid opening for alleged misunderstanding regarding new or existing job conditions, utility connections, permits, fees, etc.

The Contractor shall carefully examine the contract documents during the bidding phase. Any missing information in the contract documents that is required for obtaining accurate pricing shall be brought to the attention of the Architect, **prior to bid date**, so all may be clarified and/or corrected. Failure to identify and resolve the issues prior to bid shall require the Contractor to provide said items, complete, without additional cost to the Owner or the Owner's Project Design Professionals, using materials and methods specified by, and as directed by, the Owner's Design Professionals.

1.10. **Spare Parts:** Manufacturer of any equipment specified shall have a wholesale outlet for readily available replacement parts in the nearest major USA city.

1.11. **Electrical Work:** All electric power wiring required for installation of equipment under this Section is specified under Electrical Division. Plumbing Contractor shall furnish and install all controls and control wiring as specified or required to properly complete the installation. Control conduit is specified under Electrical Division or shown on electrical drawings; all other control conduit shall be provided under this Section of the work.

All control conduit, power wiring, relays, transformers, contactors, etc. which are required and are not shown on the electrical drawings or specified in the Electrical Division of the specifications, shall be provided under this Plumbing Section.

Coordinate all requirements with the Electrical Sub-Contractor prior to bid. Electrical work performed under this Section shall meet requirements set forth in the Electrical Division and the National Electric Code (NEC), current edition.

1.12. **Submittals:** Refer to Division 20 for **strict requirements** and, especially as it applies to format, project cost constraints, addendums and Value Engineering (VE) items.

Only ONE complete submittal will be accepted for review. Providing submittals piecemeal is not allowed. If a partial or incomplete submittal is provided, it shall be cause for immediate rejection.

1.13. **Identification:** The Contractor is urged to carefully review the extensive requirements of Paragraph “Identification” in Division 20 of the specifications and note that certain identification is required to be completed before certain site visits. **There are specific identification requirements prior to the above ceiling and final site visits, respectively, that are mandatory.** Failure to comply with this provision will be cause for cancellation of the site visit, and a fee imposed for the additional site visit, with all costs of the additional site visit to be borne by the respective Contractor responsible.

1.14. **Firestopping:** Refer to Division 20, Part “Miscellaneous Requirements”, Paragraph “Firestopping”. **Note that Division 20 firestopping specifications require firestopping of all penetrations regardless of wall/ceiling/floor construction. Refer to Division 1 for additional requirements.** Where there is a conflict between Division 1 specifications and Division 20 specifications, the most stringent requirements shall govern, be applicable and shall be provided.

1.15. **Motors:** All motors furnished shall be designed, manufactured, and tested in accordance with the current applicable standards of NEMA, ANSI, IEEE, and ASTM. As a minimum requirement, all motors shall conform to the current applicable sections of NEMA Standard No. MG-1. Motors shall meet or exceed The Consortium for Energy Efficiency (CEE) Premium Efficiency full load efficiencies. All motors shall be listed under UL recognized component file as applicable. All motors shall be suitable for installation according to the requirements of NEC. Motors shall be wound for the specified voltage and a 1.5 service factor, 1750 RPM open drip proof construction unless otherwise

shown or specified.

All motors shall be provided with overload protection and phase protection on all legs. Do not run motors until correct overload elements are installed in starters, as applicable.

1.16. **<u>Operating and Maintenance Manuals</u>: Two weeks before the final site visit**, furnish three complete sets of operating and maintenance instructions, bound in hard cover, indexed and tabbed.

The Contractor shall also provide this information in digital Adobe Acrobat PDF format, on a CD-R CD. The PDF file shall be provided with an embedded index for each item specified. The index shall appear in the left hand window of the opened document so that the Owner or his maintenance personnel can “click” on the indexed item and move immediately to that specific item.

Minimum requirements for the Operating and Maintenance Manuals shall be as follows:

a. The first page of the bound instructions shall be a listing of:

    1. The Owner/Project Title.
    2. The Architect and Architect’s Job Number.
    3. The Engineer and Engineer’s Job Number (Found in the Engineer’s Logo in the Bottom Right Corner of the Plumbing Plans).
    4. The General Contractor and Contact Information.
    5. The Plumbing Subcontractor and Contact Information.

b. Second page shall be a Table of Contents listing all products in the order which they appear in the specifications and label the tab accordingly. Include all “P” numbers for fixtures, water heater numbers, valves, floor drains, etc.
c. The third page shall be a summary page that lists each item with its respective warranty listed, including all extended warranties.
d. All warranty card information shall be filled in by the Plumbing Contractor; Serial numbers, Model Numbers, etc. all as required for proper warranty registration. Warranty registration date shall be the date of substantial completion as determined by the Architect.
e. Provide copies of all filled in warranty cards.
f. Provide a local source of supply for parts and replacement, including names and telephone numbers of parts suppliers.
g. Provide a general maintenance summary section. Section shall be a list of each piece of equipment or device using the designations as shown on the plans, and the routine maintenance procedures based on the respective manufacturer’s recommended intervals. As a minimum, maintenance shall be grouped and individually tabbed to indicate maintenance operations required:

    1. Once a month
    2. Quarterly

3. Once every six months
4. Once a year

h. Provide drawings of system controls and wiring diagrams and condensed operating instructions. Include hard copy in binder and digital copy on CD in PDF format. All components shall be numbered and identified on diagram. Laminate, frame under plastic and mount in each mechanical/water heater room(s) in an optimally viewed location for the respective equipment.
i. Provide written results of all tests specified.
j. Copies of all Site Visit Reports including Contractor's written response that items listed were corrected.
k. Copies of all certificates of all site visits, comments and approvals from all Governing Authorities, to include all water heater and pressure vessel inspections by the Authority having jurisdiction, if required.
l. Provide domestic water samples testing and results specified.
m. Provide copy of valve chart required in Division 20, Identification. Include all dielectric unions on chart.
n. Provide copy of Division 20 and Division 22 Specifications.
o. Provide a copy of all shop drawings/submittals.
p. Provide record drawings of the Plumbing drawings, in hard copy and PDF format on CD. Refer to Division 20, Part 1, General, Paragraph, Record Drawings for detailed requirements. Record drawings shall indicate the valve numbers from the required valve chart, all cleanouts and all dielectric unions.

PART 2. TESTS

2.1. **General: Do not test when freezing conditions exist or are anticipated. Test when freezing conditions have subsided.** Perform all tests in the presence of the Architect. Refer to Division One for Fuel, water and power required, therefore. In absence of specific testing procedure comply with code requirements and/or nationally acceptable industry standards. Furnish written reports of all tests results specified to Architect.

2.2. **Drainage and Vent System Pretest: Do not test PVC, CPVC nor any plastic piping with compressed air.** A water test shall be applied to the drainage system in its entirety. All openings in the piping shall be tightly closed, except the highest opening. Then, the system shall be filled with water to the point of overflow.

If the system is tested in sections, each opening shall be tightly plugged except the highest openings of the section under test. Each section shall then be filled with water. Sections shall not be tested with less than a 10-foot head of water. In testing successive sections, not less than the upper 10 feet of the next preceding section shall be tested so that no joint or pipe in the building, except the uppermost 10 feet of the system, shall have been submitted to a test of less than a 10-foot head of water.

Test pressure shall be held for not less 8 hours. Check all portions for leaks. Correct all leaks and retest. The system shall then be tight at all points.

Do not test when freezing conditions exist or are anticipated. Test when freezing conditions have subsided.

2.3. **Drainage and Vent System Final Test:** A smoke test shall be utilized as a final test. It shall be made by filling all traps with water and then introducing into the entire system a pungent, thick smoke produced by one or more smoke machines as required to achieve the specified pressure. **Do not test when freezing conditions exist or are anticipated. Test when freezing conditions have subsided.**

When the smoke appears at stack openings on the roof, the stack openings shall be closed and a pressure equivalent to a 1-inch water column shall be held for a test period of not less than 3-hours. Check all piping visually for smoke leakage and odors and correct all leaks.

The final test of the completed drainage and vent systems shall be visual and in sufficient detail to determine compliance with the provisions of the Florida Plumbing Code.

2.4. **Water Supply System:** Test and secure acceptance of entire system before the piping is insulated or otherwise concealed. **Do not test when freezing conditions exist or are anticipated. Test when freezing conditions have subsided.**

Disconnect and cap all outlets to all plumbing fixtures and all other equipment not designed for the full test pressure. Fill the system with water and prove tight under a water pressure not less than the working pressure of the system; or, for piping systems other than plastic, by an air test of not less than 50 psi. Do not test plastic piping with air. This pressure shall be held for not less than 8-hours without a loss of pressure. The water utilized for the test shall be obtained from a potable source of supply. All piping throughout shall be tight under test. Water piping shall remain under normal water pressure during construction except when freezing weather is expected.

2.5. **Rainwater System:** Test same as drainage and vent systems above.

2.6. **Fixtures:** Test for soundness, stability of support and satisfactory operation.

PART 3. SANITARY PIPING

3.1. **General Scope:** Provide a system of soil, waste and vent piping connecting all plumbing fixtures, equipment, etc. to the house sewer, with consolidated vent connections extending through the building roof, all as shown on the drawings and as required for complete installation. All piping shall be concealed below grade, within walls, chases, above ceilings, etc., unless specifically noted otherwise. Waste and vent piping shall be sloped in accordance with the applicable codes.

The Plumbing Contractor is responsible for and shall consider pipe-grading requirements when coordinating pipe routing for the project. Contractor shall

determine inverts/connection points in the field based on the shop drawings of the sanitary system submitted. Coordination is required with Civil Contractor.

Do not begin work until elevation of final connection point is verified and grading of entire system can be determined (even if final connection is specified under another Section.)

Each length of pipe and each pipe fitting, trap, fixture, material and device utilized in the plumbing system shall bear the identification of the manufacturer and any markings required by the applicable referenced standards.

Rework existing waste roughing as required to facilitate renovation work as applicable.

3.2. **Utility Connection:** Utility connection is specified under Division 2. Connect to temporarily capped main as indicated on the plumbing plans.

3.3. **Soil, Waste and Vent Piping Underground, Inside the Building Walls and to Points Outside the Building as Indicated:** Provide service weight hub-and spigot cast iron soil pipe and fittings for underground service and hubless for above ground service, meeting ASTM A-74 for hub and spigot and ASTM A-888 for hubless, coated inside and out. Pipe exposed within the building shall be uncoated outside, primed and left clean for painting. Fittings to receive screwed pipe arms shall be recessed drainage type. Soil and waste pipe shall have long sweep connections. All cast iron soil pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute (CISPI) and be listed by NSF International.

Joints for hub and spigot pipe shall be made with compression gaskets meeting ASTM C-564. Joints for hubless pipe and fittings shall be equivalent to MG couplings meeting ASTM A-48 and C-564, or Anaco Husky SD 4000, super-duty, shielded couplings of Type 304 AISI stainless steel, meeting ASTM C1540 standard or equivalent by Ideal Tridon Heavy Duty HD (Green), Mission Rubber Company, Heavy Weight, shielded or Charlotte Pipe Heavy Duty HD .

Option: Contractor may use solid wall PVC Schedule 40 DWV pipe and fittings meeting ASTM Standard D2665 and ASTM Standard 1785 for above ground service and underground service with the following exceptions. Use cast iron as specified hereinbefore or PVDF (Polyvinylidene Fluoride) piping and fittings when passing through or within a fire rated assembly.

Piping and fittings above the floor shall be solid wall PVC Schedule 40 DWV pipe and fittings, cast iron pipe and fittings as specified above or PVDF pipe and fittings as specified below, and with exceptions as noted.

THE USE OF "CELLCORE" OR "FOAMCORE" TYPE PIPING IS EXPRESSLY FORBIDDEN.

PVDF piping and fittings, where specified and required, shall be Orion Super Blue PVDF (Polyvinylidene Fluoride) or equivalent products as manufactured by Enfield, Zurn, GEO or Fisher. The PVDF material shall conform to ASTM D3222 ASTM F1673, ASTM E-84 and UL 723. Pipe shall be marked with its

UL Classification to indicate compliance with UL723 (ASTM E84). All fittings shall meet or exceed Schedule 40 dimensions.

All vents thru roof shall be cast iron pipe (minimum 10” both sides of the roof). Secure the cast iron VTR to structure with heavy gauge 1-hole strap.

All floor drains shall have cast iron deep seal p-traps with trap primer and required connections.

3.4. **Laying Out Work:** Vents from any fixture, when connected to a vent line serving other fixtures, shall be extended at least 6 inches above flood level rim of highest of such fixtures to prevent use of vent lines as a waste. Make changes in direction by appropriate use of 45-degree Y's, 1/2 Y's, or long sweep 1/4, 1/6, 1/8 or 1/16 bends. Sanitary T's or short 1/4 bends may be used on vertical stacks or drainage lines where change in direction of flow is from horizontal to vertical; except that long-radiused, double TY's shall be used when two fixtures are installed back-to-back with common drain. Do not use double sanitary T’s. Straight T's, Ells and Crosses may be used on vent lines. Make no change in direction of flow greater than 90 degrees. Where different sizes of drainage pipe or fittings are connected use standard increasers and reducers of proper size. Do not reduce size of drainage piping in direction of flow. Drilling and tapping of house drains, soil, waste or vent pipes, and use of saddle hubs and bands are prohibited. Route all vent lines high as possible while maintaining proper slope. All plumbing vents **through the roof shall be cast iron and located a minimum of 10’-0” away from all outside air intakes**. Coordinate all plumbing vent locations with the HVAC plans.

3.5. **Hangers and Sway Bracing:** Refer to Division 20 and plans for requirements.

3.6. **Grading:** Uniform and not less than 1/8" PLF for pipe 4" and over, and not less than 1/4" PLF for 2" and 3" piping.

3.7. **Roof Flashing:** Roof penetrations are to be flashed by the roofing contractor, using materials as recommended by the roofing manufacturer and approved by the Architect. Coordinate work with Roofing Contractor. Offset vents as required to clear gravel guards and flashing courses. Extend vents to 10" above roof level.

3.8. **Waste Arms:** Type K copper or IPS brass pipe typical; Schedule 40 PVC or IPS brass pipe at urinals.

3.9. **Escutcheons:** Where pipes pass through cabinets, walls and ceilings of finished rooms provide pressed chrome-plated brass or stainless steel type escutcheons securely fastened in place with screws. Pack penetrations with mineral wool insulation, seal with firestopping compound and install escutcheons to prevent passage of fire, smoke and vermin. Do not use split ring type escutcheons.

3.10. **Test Fittings:** Not shown on the drawings; provide where required for partial tests.

PART 4. DRAINAGE SPECIALTIES

4.1. **Manufacturers:** Except as noted, catalog numbers are from J.R. Smith and/or Zurn. Equivalents by Josam, Sioux Chief or MIFAB will be considered.

4.2. **Cleanouts:** Provide in sanitary piping at all changes in direction, at ends of branches, at intervals not exceeding 40 feet on straight runs, and elsewhere as shown. Cleanouts shall be full opening type and completely accessible without obstruction. Size same as lines in which they occur, but not larger than 4 inch. Tees and extensions shall be of same weight as soil pipe. Plugs shall be countersunk or raised head type with lead-free seals. Coordinate with plan details and specifications and provide as required. Provide flashing clamps and flashing flanges in all areas where cleanouts are accessible from floor below or above, as applicable.

Extreme care shall be taken when roughing in cleanouts at each wall mounted lavatory and hand sink. Cleanouts shall be located within the specified Lav Shield piping cover when possible. All cleanouts shall be roughed in high enough to clear the Architectural base molding without cutting the base molding.

All cleanouts shall be indicated on the record/as-built drawings.

In Tile Floors: J.R. Smith 4052L, Zurn Model ZN1400-T-BP, adjustable, cast iron body with bronze plug and satin finished square scoriated nickel bronze top. Where soft tile occurs, provide 4172L, Zurn ZN1400-TX-BP, recessed square nickel bronze cover.

In Concrete Floors: J.R. Smith 4238L, Zurn Model Z1400-BP, adjustable head, cast iron head and ferrule with bronze plug, round loose-set scoriated tractor cover.

In Outside Lines: J.R. Smith 4262L-NB, Zurn Model Z1474-N-BP, cast iron head and ferrule with bronze plug. Terminate cleanout within 8” of finish grade at grade in 18”x18”x18” deep concrete pad with tooled edges or flush in pavement as applicable. Provide with loose set scoriated bronze tractor cover as shown on the plan details.

In Accessible Unfinished Spaces: J.R. Smith 4400 or 4511-S, Zurn Model ZS1468, cast iron with bronze plug, as appropriate.

In Finished Walls: J.R. Smith 4530S, Zurn Model Z1446-BP cast iron cleanout tee with bronze plug and 16 ga., 304 stainless steel, flat, wall plate cover. Where distance from plug to finish wall exceeds 4 inches provide extension from sanitary tee to bring plug within 2 inches of the stainless steel cleanout cover. rough in all wall cleanouts such that stainless steel cover occurs above the Architectural base. Do not cut Architectural base.

In Terrazzo Floors: J.R. Smith 4192L, Zurn Model ZN1400-Z-BP, adjustable cast iron head and ferrule, bronze plug and round nickel bronze cover and rim.

In Carpeted Floors: J.R. Smith 4032L-X, Zurn Model ZN1400-CM-BP, adjustable head, cast iron, round polished bronze top with carpet clamping device.

4.3. **Roof Drains:** Zurn FloForce ZC100-DR-VP as required, powder coated cast iron drain with outlet, removable vandal resistant cast iron dome, flashing clamp and Top-Set drain riser, drain riser flange and Top-Set deck plate. Size outlets same as downspouts to which they connect. Zurn FloForce roof drains will be used as basis of design in the storm drainage systems calculations utilizing Zurn's FloForce provided GPM charts/graphs. Contractor to furnish factory approved drainage calculations for review by the Engineer when submitting roof drains for approval.

4.4. **Combination Roof and Emergency Overflow Drain:** Zurn 100C Froet, completely powder coated assembly, bi-functional roof drain with 45° primary outlet connection. Powder coated cast iron, deep sump body with combination membrane flashing clamp/gravel guard, underdeck clamp, control flow weir, top set deck clamp, cast iron dome on overflow pipe, static extension, elevation ring, roof sump receiver, stainless steel gravel guard, hub outlet, overflow pipe and vent pipe for 6" drains.

4.5. **Typical Drains:** Size outlets same as pipe to which they connect. Install temporary closures during construction. **Each drain connected to sanitary sewer shall have cast iron deep seal P-trap with trap primer and required connections.** Provide trap primer connections on floor drains and trap primers as specified below.

Where drains occur above finished spaces, furnish with clamping collar to secure waterproof membrane.

Mechanical Room Drain (MFD): J.R. Smith Series 2005G, Zurn Model Z541-P, galvanized cast iron body drain with adjustable strainer head, gasketed outlet, P05 trap primer connection, sediment bucket and cast-iron grate.

PART 5. RAINWATER DRAINAGE SYSTEM

5.1. **General:** Provide a system of roof drains, downspouts, emergency overflows, insulated, etc., as required and as shown on the Architectural and Plumbing plans and as required for proper drainage. All piping shall be concealed below grade, within walls, chases, above ceilings, etc., unless specifically noted otherwise. Refer to Division 20 and plan details for hanger rods, hangers, spacing and sway bracing and similar requirements.

5.2. **Roof Drains, etc.:** Refer to Drainage Specialties above.

5.3. **Piping Within Building:** Service weight cast iron pipe with joints, hangers, grading, etc. as specified for sanitary piping. First 18 inches of pipe immediately below roof drain shall be Schedule 40 galvanized steel with threaded connection to drain outlet or cast iron. Refer to Division 20 for

hanger rods, hangers, spacing, sway bracing and uni-strut support assembly requirements.

5.5. **Option:** Contractor may use solid wall PVC Schedule 40 DWV pipe and fittings meeting ASTM Standard D2665 and ASTM Standard 1785 for above ground service and underground service. If the Contractor chooses to provide this option, cast iron/PVDF piping shall still be installed from a point 18" above the finish floor to the point of connection to the underground exterior storm line and from each roof drain and overflow drain to 18" below the roof deck before transitioning to the solid wall Schedule 40 DWV piping.

Use cast iron as specified hereinbefore or PVDF (Polyvinylidene Fluoride) piping and fittings in areas used as return air plenums, return air platforms and when passing through or within a fire rated assembly.

PVDF piping and fittings, where specified and required, shall be Orion Super Blue PVDF (Polyvinylidene Fluoride) or equivalent products as manufactured by Enfield, Zurn, GEO or Fisher. The PVDF material shall conform to ASTM D3222 ASTM F1673, ASTM E-84 and UL 723. Pipe shall be marked with its UL Classification to indicate compliance with UL723 (ASTM E84). All fittings shall meet or exceed Schedule 40 dimensions.

THE USE OF "CELLCORE" OR "FOAMCORE" TYPE PIPING IS EXPRESSLY FORBIDDEN.

5.5. **Flashing:** Use material as recommended by roofing contractor and approved by the Architect. Provide flashing for each drain extending at least eight (8) inches from clamping ring in all directions. Coordinate work with roofing contractor.

5.6. **Hangers:** Refer to Division 20 and plan details for requirements.

5.7. **Sway Bracing:** Rigid support sway bracing and piping anchorage shall be provided for all horizontal drainage piping greater than or equal to 4", and all vertical drops for sizes specified above that are greater than or equal to 24" in length. Restraints shall be provided for all drain pipes, regardless of size, at all changes in direction and at all changes in diameter greater than two pipe sizes. Braces, blocks, rodding and other suitable methods as required by the coupling manufacturer shall be utilized. Sway bracing shall be Eaton/Cooper B-Line Tolco Steel Pipe Clamps for Sway Bracing, transitional fittings, bracing, etc. as required for a complete sway braced assembly.

The entire bracing assembly shall be selected and sized by the Manufacturer. Provide complete manufacturer approved shop drawing showing all required components layout showing locations of all items. All components of the finished assembly shall be of a single manufacturer, resulting in a UL listed and FM approved sway bracing assembly.

Bracing shall be as manufactured by Eaton/Cooper B-Line. Equivalents by Anvil International, Rilco Manufacturing Co and Piping Technology and Products will be considered. Refer to Division 20 for additional requirements.

5.8. **Insulation:** Insulate all rainwater piping and all related roof drains, roof drain sumps, fittings, elbows, traps, etc., located above the slab and within the facility, same as cold water piping.

5.9. **Storm Drains:** Same as piping within building. Connect to temporarily capped lines specified under Division 2.

5.10. **Storm Sewers:** Contractor may use PVC pipe and fittings as specified above for Contractor's option for piping within the building. 24" minimum cover required under this Option.

PART 6. WATER PIPING

6.1. **General Scope:** Connect to water main as indicated and extend to all plumbing fixtures, hose bibbs, water heaters, etc.; and to special equipment or plumbing items as indicated or required. All piping shall be concealed below grade, within walls, chases, above ceilings, etc., unless specifically noted otherwise.

Refer to Division 20 for hanger rods, hangers, spacing and uni-strut support assembly requirements.

6.2. **General Workmanship: All water piping shall be routed within the building insulation envelope unless specifically noted otherwise.** Cut accurately to measurements established at site and work into place without springing or forcing, clearing all openings, finished ceilings, etc.

All piping not in an accessible attic or similar spaces that contain valves and other items which may require maintenance or service access shall be located no more than 12" above the finished ceiling. Piping located in attics shall be supported such that maintenance access can be accomplished without the use of a ladder.

In finished spaces where water piping is exposed to view, route piping high as possible. Where valves or other items requiring service or maintenance are shown in piping of finished areas and exposed to view, the piping shall be installed high as possible, except where a valve or other item requiring maintenance and service is shown in the line, the item shall be no more than 14'-0" above the finish floor. Provide a drop, offset, etc., as required to maintain maximum service height of 14'-0" above the finished floor.

Route all piping through previously built-in sleeves and/or firestopping assembly as specified in Division 20. Avoid excessive cutting or other weakening of the building structure. Make changes in direction and size with fittings. Cap or plug open pipe ends during installation to keep out foreign material. Make connections carefully to ensure unrestricted flow, eliminate air pockets, and to permit complete drainage of the systems. All water piping exposed to view in finished areas shall be routed high as possible.

Supply piping to fixtures, faucets, hydrants, showerheads, and flush valves shall be anchored to prevent movement. Install all buried piping with at least

36" of earth cover. Do not route the water line in the same trench with the sewer/sanitary piping. Maintain a minimum of six (6) feet of separation between the two utilities.

Uninsulated pipes passing through concrete or cinder block walls and floors, or other corrosive material shall be protected against external corrosion by a protective sheathing or wrapping that will withstand any reaction from the lime and acid of concrete, cinder block or other corrosive material. Sheathing or wrapping shall allow for movement including expansion and contraction of piping. The wall thickness of the sheathing material shall be not less than 0.125 inch thickness. The protective wrapping/sheathing is not an alternative where sleeves are specified and required. Coordinate requirement with Division 20 sleeves specifications and provide as specified and required.

All piping below slab-on-grade construction shall be installed in plastic jacket equivalent to Plasti-sleeve, as manufactured by Plastic Products Co. of Stanton, California.

6.3. **Freeze Protection: Do not install piping or any device in spaces subject to freezing. Install piping within building insulation envelope.**

6.4. **Grading:** The Contractor shall consider pipe-grading requirements when coordinating pipe routing for the project. All piping shall be carefully installed to eliminate traps and pockets in pressurized lines. Where air pockets and traps cannot be avoided, provide valved hose connections for water traps and valved automatic air vents for air traps. Pipe slope shall be maintained throughout the project. Pressurized plumbing piping systems shall be sloped to drain points. Grade pipe upward from source to facilitate drainage and air relief. Where low points are required because of long runs or where sections may be valved off, provide with 3/4" globe valve and hose nipple for drainage at low point. **Make all connections to risers and fixtures from top or sides of mains.**

6.5. **Nipples:** Of same material as pipe in which they are installed; provide extra strong when unthreaded portion is less than 1 inch long. Steel nipples are not allowed.

6.6. **Escutcheons:** Where pipes pass through cabinets, walls and ceilings of finished rooms provide pressed chrome-plated brass or stainless steel type escutcheons securely fastened in place with screws. Pack penetrations with mineral wool insulation, seal with firestopping compound and install escutcheons to prevent passage of fire, smoke and vermin. Do not use split ring type escutcheons.

6.7. **Piping and Fittings:** ProPress or similar type joints and fittings are not allowed. Typical lines to be of copper tubing meeting ASTM B-88, Type "L" hard above ground and Type "K" soft below ground. Cut copper pipe square and ream to remove burrs. Clean fitting socket and pipe ends with sand cloth, No. 00 cleaning pads or wire brush. No acids shall be used to clean either pipe or fittings or as a flux in sweating joints. Make up joints with sweat fittings of wrought copper, and 0.25% of the total wetted surface area, lead free compliant solder complying with ASTM B-32 and the Safe Drinking

Water Act. Surfaces shall be prepared for soldering as required by ASTM B828. Do not make joints or branch connections below a slab on grade.

6.8. **Hangers and Sway Bracing:** Refer to Division 20 and plan details for requirements.

6.9. **House Supply Connection:** Utility connection at street, meter installation, etc. is specified under Division 2. Connect to temporarily capped main as indicated. Where shut-off valve is indicated outdoors on the plumbing plans, provide a concrete or steel valve box with hinged medium duty, traffic rated cover, minimum 16x16, larger as required for proper access to valve. Provide valve extension as required so that top of valve handle is within 8" of top of hinged cover.

6.10. **Water Pressure:** Supply system is designed for static pressure of 50 to 75 psi. Gauge city water supply adjacent to building to verify that pressure is within those limits. Submit report in writing. Provide water pressure reducing valve, if required, to meet designed water pressure. See Water Piping Specialties for pressure reducing valve specification.

6.11. **Disinfection:** New potable water systems shall be purged of deleterious matter and disinfected prior to utilization. The method to be followed shall be that prescribed by the health authority or water purveyor having jurisdiction or, in the absence of a prescribed method, the procedure described in AWWA C651 or as described in this section.
The pipe system shall be flushed with clean, potable water until dirty water does not appear at the points of outlet. The system or part thereof shall be filled with a water/chlorine solution containing not less than 50 parts per million of chlorine, and the system or part thereof shall be valved off and allowed to stand for 24 hours; or the system or part thereof shall be filled with a water/chlorine solution containing not less than 200 parts per million of chlorine and allowed to stand for 3 hours. Following the required standing time, the system shall be flushed with clean potable water until the chlorine is purged from the system.

Upon completion of the disinfection procedure, the Plumbing Contractor shall engage the services of the Florida Bureau of Public Health Clinical Laboratories or a certified, licensed, testing laboratory to provide a lead and bacteriological water analysis to include a standard heterotrophic plate count (HPC), microbial, bacterial, pathogens and coliform count.

Test a minimum of two (2) samples of domestic water from two (2) separate locations within the facility.

Test locations shall be selected by the Architect and shall be noted on the Testing Laboratory's report. Test each sample for Coliform Present, Fecal Present, E. Coli and lead present.

If the lab results indicate positive results for Total, Fecal, or E. Coli coliform per 100 ml respectively, or an HPC greater than 500 CFU/mL, or lead maximum contaminant level goal (MCLG) greater than zero, the Contractor shall disinfect the system in its entirety, as specified above, and obtain new

test results as outlined hereinbefore until levels are reached as required by AWWA C651. If maximum contaminant level goal (MCLG) of lead is greater than zero, immediately notify the Architect in writing and furnish copy of test results.

Prior to the final site visit, the Contractor shall provide to the Architect, certified test results on the testing facility letterhead. The report shall indicate the name of the project, the locations from where the samples were taken, the testing laboratory findings and indication whether the water is safe for consumption. **No Certificate of Occupancy will be provided to the Owner without the required lab results indicating the potable water system is safe for consumption.**

6.12. **System Drainage:** Provide valves and hose nipple to allow for drainage of all risers and other system low points.

PART 7. WATER PIPING SPECIALTIES

7.1. **General:** All specialties in potable water distribution shall be certified lead free compliant design as required by Code, Regulations and Standards.

All specialties/valves shall be bronze or heat-treated CW511L brass, lead free compliant, AB 1953 compliant and shall be the product of one American Manufacturer and shall meet the Buy American Act 41, USC 10a-10d as specified hereinbefore. Provide extended operators for all valves installed in insulated piping. Seal the opening where the stem, nipple, etc., penetrates the insulation as required to maintain the continuity of the insulation and vapor barrier.

All valves shall be identified. Provide a custom laser engraved brass valve tag at each valve. Tag shall be 1-1/2 inches diameter, 18-gauge polished brass tags with 3/16-inch chain hole and 1/4 inch high stamped, black-filled service designation. Refer to Division 20, Identification for detailed requirements and provide all as specified.

Valves shall be Nibco, Jomar, Watts, Apollo, Kitz, Hammond/Milwaukee, Matco-Norca or Mueller. Nibco and Jomar units are basis of design unless specified otherwise.

7.2. **Unions:** 150 lb. rated; cast brass ground-joint type in copper pipe, galvanized malleable iron in wrought iron or galvanized pipe. Provide in all sizes of threaded pipe, and in sweat-jointed pipe over 1 inch, to facilitate easy repairs. In such lines, install adjacent to water heaters, pumps, tanks, etc. into which piping is terminated; and on at least one side of valves, cocks, strainers, etc. and other devices that occur in piping runs.

7.3. **Dielectric Unions:** Provide dielectric unions between ferrous and non-ferrous piping as required, including piping and water heater stubs where different and stainless-steel water hammer arrestors. Dielectric unions shall be constructed using lead free compliant materials as required by all Governmental Agencies, Codes and Standards and shall comply with ASTM

1545. Dielectric unions shall be Watts Series LF or equivalent by Mueller or Matco Norca. Where dielectric unions are installed, they shall be provided with factory fabricated brass tag. 1-1/2 inches diameter, 18-gauge polished brass tags with 3/16-inch chain hole and 1/4 inch high stamped, black-filled service designation. Indicate valve tags on the record drawings. **Contractor shall provide a ball valve on entering and leaving side of the respective piping containing the union as required to allow for proper maintenance of the union.**

7.4. **Valves and Extended Valve Operators:** Provide as specified, including all fixtures or equipment not furnished with stops. Arrange and install valves to be readily accessible for servicing. All valves shall be bronze or heat-treated CW511L brass, lead free compliant, AB 1953 compliant and shall be the product of one American Manufacturer and shall meet the Buy American Act 41, USC 10a-10d as specified hereinbefore. Nibco and Jomar units are basis of design.

Coordinate handle height requirement with specified insulation thickness. Provide height extension as required to clear insulation and properly operate without causing damage to piping insulation. All handles shall comply with UL 2043 and shall be UL listed for installation in return air plenums.

7.5. **Globe Valves 2" and Smaller:** Nibco #S-235-Y or Jomar Terminator G, bronze solder-type with replaceable disc, T-235-Y for threaded pipe, 150 WSP.

7.6. **Check Valves 2" and Smaller:** Nibco T-473-B or Jomar T-511G, bronze threaded, Y-Pattern swing check, 200 WSP.

7.7. **Ball Valves for Water Piping in Size 1/2" through 3":** Valve shall be "Lead-Free" forged bronze or heat treated CW511L brass, 600 PSI CWP, 150 PSI WP, two-piece body, full port, blowout proof stem, stainless steel ball, stainless steel stem, PTFE seats and 2" minimum valve extension to bring valve handle beyond insulation. Valve shall meet NSF, ANSI, FM, UL and MSS SP-110 standards. Note that ball valves are also required on one side of each dielectric union.

7.8. **Strainers 2" and Smaller:** Crane No. 988-1/2, iron body screwed, Y-Pattern, 125 WSP sediment separators with a 20-mesh model screen.

7.9. **Strainers Over 2":** Crane No. 989 1/2 of same construction as above.

7.10. **Thermometers:** Trerice Series BX, Model AX9, universally adjustable type with 7-inch scale and suitable temperature range, mercury free, 0°F to 160°F range as manufactured by Trerice. Thermometers shall be "blue liquid" actuated with Phenol Condensate and lead-free cast aluminum case and brass stem and thermowell, with extension neck and other accessories required for a complete installation. Locate for convenient reading. Equivalent product by Blue Ribbon, Weksler, March or Maxwell Moore will be accepted.

7.11. **Wall Hydrants (Exterior):** Encased, Ecolotrol, lead-free compliant, non-freeze automatic draining wall hydrant for flush installation. Hydrant shall

have integral backflow preventer with anti-siphon type, copper casing, all-bronze interior components with 1/2 turn long-life ceramic disc cartridge, combination 3/4" female solder and 3/4" male pipe thread inlet connection, 3/4" male hose connection', with type 304 stainless steel housing with locking hinged cover stamped "WATER" and operating key. Hydrant housing shall fit within one standard modular masonry course. Provide one spare hydrant repair kit and one spare cartridge removal tool for EACH wall hydrant.

Seal all interior joints, seams, gasket seams/closures including around the hydrant box flange with an appropriate sealant recommended by a sealant manufacturer. Wall hydrant shall be JR Smith 5519 QT, Zurn Z1320XL-EZ or approved equivalent by Woodford. Install approximately 24 inches above finished grade.

7.12. **Roof Hydrant:** Freezeproof, MAPA MPH-24FP:24/9 with weather-guard dome, ASSE 1057 Sanitary Yard Hydrant Standard compliant, integrated vacuum breaker, ASSE 1052 double check backflow preventer, stainless steel operating rod and reservoir, 304 stainless steel shroud, under-deck flange, 3/4" hose connection, manufacturer furnished mounting system and all accessories required for a proper installation. MAPA is basis of design. Owner prefers MAPA if possible.

7.13. **Water Hammer Arrestors (Shock Absorbers):** Certified by the American Society of Sanitary Engineers and in compliance with current edition of ASSE 1010-2004, ANSI A112.26.1M, Plumbing and Drainage Institute Standard PDI-WH201, heavy-duty construction and designed for a minimum 150-PSI working pressure. Arrestors shall consist of a Type 304 stainless steel casing and bellows. The device shall be pre-charged and sealed at the factory. Install on both hot and cold-water branch lines in an upright position as close as possible to the valve or valves being served.

Arrestors shall be installed at all solenoids, remote operated or quick closing valves and at each plumbing fixture or battery of plumbing fixtures as recommended by the Manufacturer. Plumbing Contractor shall provide a dielectric union at connection of this device to the copper water piping. Arrestors shall be Zurn Z1700, J.R. Smith Hydrotrol Series 5005-5050, Watts Series SS, Sioux Chief Series 660-G2B or MIFAB Series WHB.

7.14. **Automatic Trap Primer Units:** Units shall be lead-free, UPC/IAPMO listed, and ASSE certified to the ASSE 1018. It shall be provided with copper or brass body distribution unit (as required), copper waterway, vacuum breaker, brass ball type stop valve, union to allow for removal of the trap primer for cleaning, brass FIP/MIP fittings, integral strainer, air gap, and all required accessories. Units shall comply with International Plumbing Code and Local Codes. Allow for required modifications to meet local codes. Units shall be accessible for service and located within the building insulation envelope to prevent freezing. Provide required piping and drainage. Provide trap primer line to each floor drain, hub drain, etc. as shown or required by Code. Provide isolation valve for each trap primer line. Unit shall be Sioux Chief Prime Perfect Series 695, Precision Plumbing Products, Inc. Series PR-500 or equivalent by Watts or MIFAB.

7.15. **Pressure-Reducing Valve and Strainer:** Verify water pressure at site prior to ordering. Device may not be required. If required, provide Zurn/Wilkins 500XL-YSBR or equivalent by Apollo or Watts. Provide full size valved bypass around PRV, two pressure gauges, hose bibb and a valve and union on each side of PRV. Provide if required to meet designed water pressure (not to exceed 70 psi).

PART 8. PIPE HANGERS AND SUPPORTS

8.1. **General:** Refer to Division 20, plan details and Pipe Insulation below.

8.2. **Coatings and Finishes:** See specifications Division 20 for detailed requirements.

PART 9. PIPE INSULATION

9.1. **General: The Plumbing Contractor shall not install the piping insulation.** All piping insulation work shall be by a licensed, experienced insulation subcontractor whose primary business is the installation of insulating materials in accordance with insulation manufacturers' recommendations and these specifications. Where a conflict exists between these specifications and the Manufacturer's recommendations, the strictest installation shall be provided.

Piping shall be clean, dry and pressure tested before covering is applied. Size pipe hangers to fit insulated pipe size. **No installation of pipe hangers for insulated piping will be allowed to be in contact with piping or penetrate the piping insulation. Piping insulation shall be continuous through partitions firestopping/sleeves assembly and shall not be cut away for installation of clamps, valves, fittings, etc.** Refer to details on plans, Division 20, "Pipe Hangers and Supports" and "Firestopping", plan details and below for additional requirements.

Insulate all hot and cold-water piping except that below grade and excluding plated brass fixture connections. All piping shall be routed within the building insulation envelope to prevent freezing. Insulate all hub drains and other condensate receiving drains, as specified below.

Insulate rainwater drainage system as noted in that Part of the specifications. Cover fittings, valves and flanges with insulation material as hereinafter specified to same thickness as adjacent pipe covering except screwed unions and other specifically named items. Neatly bevel covering edges adjacent to unions, valves and other points of termination and seal insulation. All insulation materials (including coatings, mastics, jackets and adhesives) shall have a composite flame spread rating not to exceed of 25/50 rule as determined by ASTM E-84, NFPA 255 and UL 723.

9.2. **Installation of Fiberglass Insulation:** No installation of pipe hangers for insulated piping will be allowed to be in contact with piping or penetrate the piping insulation. Refer to details on plans for additional requirements. Size hanger loops to fit **over** insulation. Insulate with Owens-Corning SSL II with

ASJ Max Fiberglass pipe insulation, thickness as shown below, thermal conductivity of k= 0.23 Btu-in/hr-ft2-ºF at 75ºF mean temperature. Insulation shall comply with ASTM C547, ASTM C585, ASTM C1136, ASTM C795, NFPA 90A and 90B and be UL Labeled for Flame Spread Index of 25 or less and Smoke Developed Index of 50.

Adhere SSL by removing release paper after the insulation is installed on pipe and sealing the lap starting in the center of each section, working towards ends. Lap shall be pressurized by rubbing with a plastic sealing tool. Install 3" butt strips in the same manner at the joint between sections and at 3'-0" on center. Staple jacket flaps and premolded PVC fittings with nominal 3/4" wide stainless steel or Monel outward-clinching insulation staples on 8" centers. Insulation staples shall have a vapor retarder coating or covered with greater than 3 ply laminate jacket (less than 0.0001 perms) adhesive tape or vapor barrier mastic that conceals the entire staple.

Insulate all fittings and elbows with premolded fiberglass fittings containing 3lb. density **rigid** polyisocyanurate pipe insulation of equal thickness as the adjacent piping with PVC covering and UL Labeled for Flame Spread Index of 25 or less and Smoke Developed Index of 50.

In lieu of premolded PVC covers at elbows and fittings, which contain rigid polyisocyanurate pipe insulation as specified hereinbefore, Contractor may at his option miter the fiberglass insulation. Thereafter, seal staples and cover end on both sides of fitting with butt strip, staple and seal staples with insulating sealant. Where applicable, finish open ends of sectional covering by rounding off with insulating cement, glass cloth and lagging adhesive.

Cold Water/Domestic Water Insulation Thickness

All pipe sizes 1" thickness

Hot Water/Domestic Hot Water Insulation Thickness

For pipe sizes up to 1-1/4" – 1.0" thickness
For pipe sizes 1-1/2" to 6" – 1.5" thickness

9.3. **Insulation for Piping Within Concrete Block Walls:** Insulate with 1" or 1.5" thickness insulation for the respective piping as specified above. Insulation shall be black, flexible foamed, elastomeric, closed cell pipe insulation with a fire hazard rating not to exceed 25 for flame spread and 50 for fuel contributed and smoke developed as determined by ASTM E84. It shall be GreenGuard certified tubular insulation with Microban antimicrobial protection. Insulation shall have a 'k' factor of not more than 0.26 at 90°F mean temperature and a water vapor transmission rate of 0.05 perm-inches or less. Slip insulation onto pipe prior to installation. **Slit insulation and longitudinal cutting of the insulation is prohibited. Slip insulation onto pipe prior to erecting. Do not stretch or bend insulation at any turn, tee, etc.** Insulate sweat/brazed fittings with miter-cut pieces of insulation as recommended in AP Armaflex installation instructions or, provide factory fabricated, made to order prefabricated fittings for tees, elbows, unions, etc.

the same size as on adjacent piping as manufactured by AP Armaflex, Aeroflex Aerofit, K-Flex K-Fit or Aerocell.

9.4. **Fiberglass Insulation Fittings:** Insulate with Fiberglas insulation mitered to fit snugly or with PVC covers with integral, 3lb. density **rigid** polyisocyanurate pipe insulation of the same thickness as the adjacent pipe insulation. After covering the fitting/elbow with the premolded PVC covering, completely tape the covering to the adjacent pipe insulation, staple and seal as specified above. **Loose insulation in premolded covers is not allowed.** Premolded PVC covers shall have a flame spread index of 0-25 and a smoke developed index of 0-50 when tested in accordance with ASTM E84.

9.5. **Exposed Ends:** Finish open ends of sectional covering by rounding off with cement, and sizing with fiberglass cloth jacket around the pipe and finish with Foster 30-36 mastic cement.

9.6. **Partitions and Floors:** Refer to Division 20 Pipe Sleeves and Firestopping. In any case, insulation shall extend through floors, partitions and walls and firestopped. Note that Division 20, Firestopping, requires firestopping of all penetrations, regardless of rating. Refer to Division 20, Firestopping, for specifics and additional requirements.

9.7. **Electric Water Coolers:** Insulate drain connections and traps with 1/8" thick insulating tape by AP Armaflex, K-Flex or Aerocel AC EPDM or 1/2” thick fiberglass insulation as specified for piping insulation.

9.8. **Clevis Hanger Saddle Requirements:** For all piping suspended with clevis hangers, provide a factory fabricated pre-formed, pre-insulated saddle assembly consisting of an **integral** G-90 metal saddle per the table below. **Do not use loose saddles.** The assembly shall be a 360-degree section of 3.0 PCF density top section of polyisocyanurate pipe insulation and 6.0 PCF density bottom section of polyisocyanurate pipe insulation, with both sections a minimum of 45-psi compressive strength in compliance with ASTM D1622 and ASTM C518 for thermal conductivity (K-Factor). The assembly shall have a 6-mil thickness, industrial grade vapor retarder film in compliance with ASTM D-374 and 0.01 perm rating in compliance with ASTM E-96. The assembly shall also be provided with an insulation lock joint longitudinal seam. The insulation jacket shall have a hazard rating not to exceed 25 flame spread and 50 for fuel contributed and smoke developed as determined by ASTM E-84, NFPA 255 and UL 723. Insulation thickness required shall be same as specified above.

Installation shall be in strict accordance with the Manufacturer’s requirements. After installation, install 3” butt strips at the joint between sections where fiberglass insulation and the polyisocyanurate insulation butt together. Staple insulation jacket flaps and seal staples as specified above for fiberglass insulation.

Each assembly shall have a genuine “Quick-Inspect” sticker applied at the bottom of each saddle for easy jobsite verification by the Engineer or Inspector. Failure to provide the sticker on each assembly will be cause for immediate rejection of the installation.

The assembly shall be Buckaroos Model 3300E or equivalent by Thermal Pipe Shields, Inc, Pipe Shields, Inc. Carpenter & Paterson, Inc. or Clement Support Services. Tru-Balance is the basis of design.

Clevis Hanger Saddle Requirements

Nominal Pipe Size	Insulation Length	Saddle Length	Saddle Gauge
1/2" - 1-1/2"	9"	6"	22 Ga.
2" - 5"	18"	12"	18 Ga.
6" - 10"	18"	14"	16 Ga.

9.9. **Unistrut Support Saddle Requirements:** For all piping supported by Unistrut assembly, vertically and horizontally, provide a preformed, G-90 galvanized metal saddle per the table below and in compliance with ASTM A-527. The saddles shall be pre-formed to fit the exact specified fiberglass insulation diameters per ASTM C-585. The assembly shall be a 2-piece, upper and lower unit for complete self-clamping 360-degree insulation protection. Provide clamps per details on the plans to attach to the Unistrut assembly. Insulation thickness required shall be same as specified above.

Each assembly shall have a genuine "Quick-Inspect" sticker applied at the side of each saddle for easy jobsite verification by the Engineer or Inspector. Failure to provide the sticker on each assembly will be cause for immediate rejection of the installation.

The assembly shall be Buckaroos 58 Series Saddle or equivalent by Thermal Pipe Shields, Inc, Pipe Shields, Inc. Carpenter & Paterson, Inc. or Clement Support Services. Buckaroos is the basis of design.

Unistrut Saddle Requirements

Nominal Pipe Size	Saddle Length	Saddle Gauge
1/2" - 3-1/2"	12"	18 Ga.
4"	12"	16 Ga.
5" - 6"	18"	16 Ga.
8" - 10"	24"	14 Ga.

9.10. **Painting:** Paint exposed insulation after insulation is completed as specified in Division 20.

9.11. **Identification:** Refer to Division 20 for identification of piping systems.

PART 10. ELECTRIC WATER HEATING EQUIPMENT

10.1. **Water Heater:** Rheem Series ELD, A.O. Smith Series DEN, Lochinvar ESX or equivalent by Bradford-White. Water heater(s) shall be light duty, commercial, glass-lined tank with heating elements designed for current

shown on the Electrical Drawings, copper dip tube, drain pan, storage capacity not less than indicated on the drawings.

The water heater shall bear the UL or ETL label and covered by a minimum 3-year manufacturer's tank warranty and 1-year parts and labor warranty from the date of substantial completion as determined by the Architect.

10.2. **Power Wiring:** Specified under Electrical Division. **Verify voltage and power requirements with Electrical Contractor and Electrical plans prior to ordering equipment.**

10.3. **Circulating Pump:** Furnish and install, as shown on the plans, an all lead-free bronze (0.25% or less lead content of all wetted surfaces) or stainless steel construction, pipe-mounted centrifugal pump with high efficiency ECM motor in eight (8) modes of control and stainless steel flanges. Pump shall be ETL or UL listed and be NSF 372 compliant. Provide a strap-on aquastat and wire to control the pump through a 7-day program clock, which shall be programmed to the Owner's requested operating schedule. Clock shall be equivalent to Grasslin digital 2-72 with 24-hour minimum battery back-up power. Provide required control wiring. Pump power shall be as shown on the electrical plans. Pump shall be Armstrong Series Compass H or equivalent by Taco or Grundfos.

10.4. **Relief Valve:** The relief valve shall comply with ANSI Z21.22 and CSA/ASME rated temperature and pressure relief valve on the water heater with copper relief line piped as indicated on the plans. Temperature and pressure relief valves, or combinations thereof devices shall bear the label of an approved agency and shall have a temperature setting of not more than 210°F and a pressure setting not exceeding the tank or water heater manufacturer's rated working pressure or 150 psi, whichever is less. The relieving capacity of each pressure relief valve and each temperature relief valve shall equal or exceed the heat input to the water heater or storage tank. Do not pipe/connect relief discharge line and auxiliary drain pan lines together. Manufacturer shall be Watts, Apollo or McDonnell and Miller.

10.5. **Expansion Tank:** Provide diaphragm type with NSF liner, designed for 150 psig working pressure and shall bear an ASME stamp. Tank shall have a minimum acceptance as recommended by heater manufacturer. Expansion tank shall be supported at the wall by a QS-5 or QS-12 Quick Strap tank stainless steel and galvanized assembly as manufactured by HoldRite or approved equivalent.

10.6. **Auxiliary Drain Pan:** Provide 1 1/2 "deep, 24 ga. (0.025" thickness) galvanized steel or 18 ga. (0.04") thickness aluminum auxiliary drain pans with seamless, welded or brazed watertight joints, of sufficient size and shape to receive drippings. Width of pan shall provide minimum of 6" clearance between water heater and inside face of the pan. Provide 3/4" copper drain line in **bottom** of pan to floor drain with dielectric separation where water heater is elevated or placed on a stand. Do not pipe relief discharge line and auxiliary drain pan lines together.

10.7. **Inspections:** The Plumbing Contractor shall arrange and pay for the water heater Inspector by the State of Florida, if required. Correct all deficiencies required by the Inspector without additional cost to the Owner or the Owner's Project Design Professionals, using materials and methods, as directed by, State Inspector as required.

PART 11. FIXTURES SUPPORTS AND CONNECTIONS

11.1. **General:** Verify exact size and location of water, vents, waste and supply connections from approved rough-in drawings and/or catalog data sheets. Allow for modifications required by the shop drawings without additional cost to the Owner or the Owner's Project Design Professionals.

All fixtures including lavatories, urinals, water closets, electric water coolers, etc., shall be securely fastened to the walls or floor. **Coordinate all mounting heights and fixture types required with Architectural plans prior to rough-in and ordering fixtures.**

All penetrations of floors and partitions are required to be built-in as work progresses. All penetrations of new construction that were not built-in as required by these specifications shall be core drilled or sawcut large enough to allow all conduits, piping, firestopping assemblies, etc., to continue uninterrupted, and to provide proper firestopping of the penetration as required to install new items as shown and/or specified.

11.2. **Wall Mounted Fixtures:** Support all wall mounted fixtures that are specified without carriers using 1/4" thick 6" high plates full length and width of fixture, mounted behind wall. Where fixtures are back to back on a solid wall, mount with bolts from fixture hanger to fixture hanger. Do not use toggle bolts or expansion bolts unless noted on the plans or specified.

Where fixtures are mounted on solid (single wythe) walls finished both sides, install fixtures with plated toggle bolts.

Where fixtures are mounted on wood or light gauge steel studs, employ pressure treated blocking of 2" x 12" nominal size well secured into stud line with non-corrosive, dielectric separation fasteners. Fit behind stud flanges, using especially placed studs as required.

11.3. **Floor Connections:** Provide cast iron or galvanized malleable iron floor flanges at least 3/16" thick, screwed or caulked to drainage pipe. Bolt the connection and make tight to fixture with plumbing fixture setting compound, wax setting ring or polyethylene gasket flange. Offset flanges for water closets are not allowed.

11.4. **Water Supply Connections:** Provide rigid, lead-free brass nipple from water riser to fixture stop valve threaded connections. Steel pipe is unacceptable. Exposed portion of nipple shall be chromium plated. Stops' risers shall be lead-free, threaded with chrome over copper pipe. Quick connect fittings are not allowed. Stainless steel braided supplies are allowed only where piping is concealed behind the specified Lav Shield for wall mounted lavatories and

hand sinks.

11.5. **Waste Arms to Fixtures:** As specified hereinbefore. Where copper or brass pipe is specified, all joints downstream from the trap shall be brazed joints.

PART 12. SCHEDULED FIXTURES AND MISCELLANEOUS ITEMS

12.1. **Acceptable Manufacturers:** Fixtures listed are from American Standard (AS), Zurn and Elkay Catalogs. Equivalent products by Toto, Kohler, Just or Sloan will be accepted. Where three (3) Manufacturers are listed for fixtures below, use only those Manufacturers.

Manufacturers not named in the specifications require prior approval, seven (7) days prior to bid date. Follow procedures set forth in Division 1 of the specifications. All prior approvals shall be submitted through the Architect. Where substitutions are proposed, unless the Contractor states in writing, on a separate recap/summary sheet in the front of the respective submittal, the differences of the substituted equipment or material, he shall be responsible to replace such items any time discrepancies are found.

Architect shall select all colors where a choices exists.

12.2. **Fixture Trim:** Exposed metal parts to be of heavy weight polished brass, heavily chromium plated, of best quality as regularly furnished by the plumbing fixture manufacturer. Provide stop valve in supply to all fixtures and equipment.

12.3. **Compliance with Americans Disabilities Act:** All fixtures, faucets, flush valves, etc., specified or shown to be ADA type shall be manufactured and installed in complete compliance with the current requirements of the Americans Disabilities Act.

12.4. **Guarantee:** Guarantee in writing to make good without cost any defects in materials and workmanship for one (1) year. Manually operated and sensor operated flush valves and faucets shall be provided with a five (5) year, full replacement warranty, including labor.

Warranty/guarantee shall start on the date of substantial completion of the project as determined by the Architect. Provide free maintenance and service during the first 12 months of the guarantee period.

12.5. **Scheduled Items:**

P – 1 ADA Water Closet: American Standard Madera 3461.160, EverClean, Zurn Model Z5665-BWL1-AM, 1.6 GPF, 17” high vitreous china, siphon jet, fully glazed trapway, elongated bowl with 1-1/2” top spud, Zurn Z6000AV-WS1, Sloan Royal 111 or equivalent flush valve by Toto with trap primer connection, Bemis 1655SSCT white open-front seat with self-sustaining stainless steel check hinge and hardware with Sta-Tite locking system or equivalent by Zurn or Beneke, Zurn Z5972-COMB closet bolt and wax ring kit, china bolt caps and all other items required for a complete and

functional installation. Provide chrome plated YJ split-ring wall bracket for supply pipe. Coordinate flush valve installation with grab bar. Flush valve control/handle shall be mounted for use from the wide side of the toilet stall.

P – 2 ADA Lavatory: American Standard Aqualyn 0476.028, Zurn Model Z5114, ADA compliant, 20" x 17" vitreous china oval self-rimming lavatory with Zurn Z81000-XL-3M single control faucet, 1.5 GPM vandal proof aerator and Zurn Z8743-PC grid drain, McGuire #LF2165, Z8802-XL-LRLK-PC supplies with stop and McGuire 8872C, Zurn Z8700-8-PC, 1-1/4", 17 ga., chrome plated cast brass, offset drain, seamless tubular wall bend, p-trap with neoprene gasketed cleanout and cast brass, chrome plated slip nuts and 17 ga. chrome wall escutcheon. Supplies shall be lead-free, AB 1953 certified by recognized authority and bear manufacturer and testing mark. Provide lead-free mixing valve (ASSE 1070) with tempered water line to faucet. Mixing valve shall be provided with wall bracket, dual check valves and 40-mesh stainless steel screen. Mixing valve shall be Watts LFUSG-B-SC-M2, Zurn Wilkins ZW3870XLT or Leonard 170D-LF. Insulate supplies, trap and drain with premolded ADA compliant protectors with internal fasteners as Manufactured by Truebro Lav Guard 2, Oatey/Dearborn or McGuire Pro-Wrap only.

P – 3 ADA Lavatory: American Standard Lucerne 0355.012, Zurn Model Z5364, 20" x 18", wall hung vitreous china lavatory complete with Zurn Z81000-XL-3M single control faucet, 1.5 GPM vandal resistant aerator, McGuire #LF2167, Zurn Z8803-XL-LRLK-PC, 1/2" supplies with stops, McGuire #155WC, Zurn Z8746-PC offset drain, McGuire 8872 p-trap and heavy-duty floor supported JR Smith Series 0710, Z1231EZ chair carrier with concealed arms. Where lavatory manufacturer drain outlet complies with ADA requirements, offset drains are not required. Supplies shall be lead-free, AB 1953 certified by recognized authority and bear manufacturer and testing mark. Refer to Architectural plans for mounting heights.

Provide lead-free mixing valve (ASSE 1070) with tempered water line to faucet. Mixing valve shall be provided with wall bracket, dual check valves and 40-mesh stainless steel screen. Mixing valve shall be Watts LFUSG-B-SC-M2, Zurn Wilkins ZW3870XLT or Leonard 170D-LF. The entire assembly shall comply with ADA and ANSI standards.

Provide for each fixture an ADA compliant, heavy-duty, impact-resistant, stain-resistant and chemical-resistant rigid vinyl vandal-resistant enclosure with vandal resistant fasteners that shields all piping, electronic faucet components (as applicable), mixing valves and instantaneous water heaters. If plans indicate an instantaneous water heater to be installed at the lavatory, the Contractor shall contact the Lav Shield Manufacturer for guidance on the required installation. **Do not install Lav Shield until Engineer has inspected the piping installation.**

The Lav Shield shall contain an antimicrobial additive that resists fungal and bacterial growth. The Lav Shield shall comply with ASME A112.18.9-2001, ADA article 4.19.4 (606.5), ANSI A117.1, BOCA P 1203.4, and other required State and Local regulations. The Lav Shield shall be provided in standard white finish for the exact fixture specified or custom color, fit to field Lav

Shield in the color selected by the Architect. Furnish standard **and** custom color chart to Architect for selection. Lav Shield shall be as manufactured by Truebro/IPS corporation or approved equivalent.

P – 4 Mop Basin: Stern Williams MTB-2424 terrazzo mop service basin, size 24" x 24" x 10", 3" drain with gasket, stainless steel dome strainer, T-10-VB faucet with vacuum breaker and 3/4" hose thread spout, levered vandal resistant handles, 30" long hose, and bracket, Bradley 99330 combination mop/broom holder and utility shelf constructed of 18 ga. 304 stainless steel with 16 ga. stainless steel gussets and hooks, BP-2-24 20 ga., 12", 304 Stainless Steel Backsplash, A-20-24 stainless steel bumper guard, adjustable wall brace, pail hook and C-10 silicone sealant at all points where wall guard meets the basin, wall and floor. Equivalents by Florestone or Acorn will be acceptable.

P – 5 ADA Sink: Elkay LRAD-332250, 33" x 22" x 5" deep double compartment 18 gauge, 304 stainless steel sink with self-rimming construction complete with one LKGT4083, forward lever faucet with deck plate and escutcheon, pull down spray, LKWRB1316SS stainless steel rinsing basket, two LK-35 crumb cup strainers and tail pieces, 8912 1-1/2" P-trap 17 gauge continuous waste, and two Brasscraft XR1720A angle stops. Sink shall have drains at rear of each compartment as required to meet ADA regulations. Verify cabinet depth and slope with Architectural plans prior to ordering sink.
Provide lead-free mixing valve (ASSE 1070) with tempered water line to faucet. Mixing valve shall be provided with wall bracket, dual check valves and 40-mesh stainless steel screen. Mixing valve shall be Watts LFUSG-B-SC-M2, Zurn Wilkins ZW3870XLT or Leonard 170D-LF. Insulate supplies, trap and drain with premolded ADA compliant protectors with internal fasteners as Manufactured by Truebro Lav Guard 2, Oatey/Dearborn or McGuire Pro-Wrap only.

P – 6 Refrigerator Icemaker Water Connection Box: Guy Grey/IPS Corporation 82392 or 82396 as applicable. Unit shall be NSF-372 compliant; IAMPO listed and accommodate supply line from above. Supply box shall include a 1/4-turn, chrome plated, forged brass, lead-free, ASME A112.18.1 ball valve with stainless steel water hammer arrester and top inlet water sweat fitting. Valve shall accommodate all common industry inlet connections. Box shall be 20 ga. stainless steel, fire rated frame if required, and outlet connection shall be 1/2". Each unit shall include frame and a debris cover for protection during rough-in. Equivalents by Sioux Chief, Oatey, SharkBite or LSP will be acceptable.

P – 7 ADA Sink: Elkay LRAD 221955, 22" x 19" x 6" deep, single compartment 18 gauge stainless steel sink with self-rimming construction complete with LK406LGN08T4 concealed deck, 8" gooseneck spout, 1.5 GPM, ADA faucet with forward only 4" wristblade handles, LK-35 crumb cup strainer and offset tail piece, 8912 1-1/2" P-trap 17 gauge continuous waste and two Brasscraft XR1720A angle stops. Sink shall have drain at rear of the compartment as required to meet ADA regulations. Verify cabinet depth and slope with Architectural plans prior to ordering sink.

Provide lead-free mixing valve (ASSE 1070) with tempered water line to faucet. Mixing valve shall be provided with wall bracket, dual check valves and 40-mesh stainless steel screen. Mixing valve shall be Watts LFUSG-B-SC-M2, Zurn Wilkins ZW3870XLT or Leonard 170D-LF. Insulate supplies, trap and drain with premolded ADA compliant protectors with internal fasteners as Manufactured by Truebro Lav Guard 2, Oatey/Dearborn or McGuire Pro-Wrap only.

P – 8 Bi-Level ADA Indoor Electric Water Cooler with Bottle Filler: Elkay # LZSTL8WSSP-W1, bi-level, ADA cooler, refrigerated stainless steel high capacity lead reduction filtered, wall mounted, front and side bubbler push bar, electronic bottle filler sensor, ADA and ICC A117.1 compliant with cane apron, stainless steel cabinet and receptor, safety and vandal proof bubbler, and 5-year warranty. It shall provide 8 gal/hr. of filtered water at 50°F based on 80ºF inlet water and 90ºF ambient temperature, per ASHRAE 18 testing. Unit shall be certified to UL 399 and CAN/CSA C22.2 No. 120 and NSF/ANSI 42, 53, 61 & 372 for lead free compliant design. Unit shall be provided with quick filter change wrapper providing easy access to filter from the front and side of cooler for efficient filter changes. Furnish with 1-1/4" rough brass p-trap, 17-gauge brass tailpiece and waste with wheelless stop valve, concealed Elkay MLP200 or equivalent by J.R. Smith or Zurn Bi-Level floor mounted support, related floor support plates and base as required for applicable wall construction. Refer to Architectural plans for wall type. Equivalent units by Halsey Taylor, Oasis or Murdock will be considered.

Provide three (3) 51600C Water Sentry Plus Replacement Filters, 6,000-gallon filter tested and certified to NSF 42 and 53 to reduce lead, Class 1 particulates and chlorine taste and odor certified to NSF 42, NSF 53 and NSF 372 for each set of water coolers provided. Upon completion of the project, turn over replacement filters to Architect for transfer to Owner.

P – 9 ADA Sink: (Drop-In) Elkay LRAD 221955, 22" x 19" x 6" deep, single compartment 18 gauge stainless steel sink with self-rimming construction complete with one LKGT4083 ADA faucet with forward only lever handle, pull-down spray, deck plate and escutcheon, LK-35 crumb cup strainer and offset tail piece, 8912 1-1/2" P-trap 17 gauge continuous waste and two Brasscraft XR1720A angle stops. Sink shall have drain at rear of the compartment as required to meet ADA regulations. Verify cabinet depth and slope with Architectural plans prior to ordering sink.

Provide lead-free mixing valve (ASSE 1070) with tempered water line to faucet. Mixing valve shall be provided with wall bracket, dual check valves and 40-mesh stainless steel screen. Mixing valve shall be Watts LFUSG-B-SC-M2, Zurn Wilkins ZW3870XLT or Leonard 170D-LF. Insulate supplies, trap and drain with premolded ADA compliant protectors with internal fasteners as Manufactured by Truebro Lav Guard 2, Oatey/Dearborn or McGuire Pro-Wrap only.

END OF SECTION