

SECTION 220100 - GENERAL PLUMBING REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 RELATED SECTIONS

- A. Sections included under Division 22
 - 1. 220100 – General Plumbing Requirements
 - 2. 220517 – Sleeves and Sleeve Seals for Plumbing Piping
 - 3. 220518 – Escutcheons for Plumbing Piping
 - 4. 220519 – Meters and Gauges for Plumbing Piping
 - 5. 220523.12 – Ball Valves for Plumbing Piping
 - 6. 220523.14 – Check Valves for Plumbing Piping
 - 7. 220529 – Hangers and Supports for Plumbing Piping and Equipment
 - 8. 220553 – Identification for Plumbing Piping and Equipment
 - 9. 220719 – Plumbing Piping Insulation
 - 10. 221114 – Natural Gas Piping
 - 11. 221116 – Domestic Water Piping
 - 12. 221119 – Domestic Water Piping Specialties
 - 13. 221123.21 – Inline, Domestic Water Pumps
 - 14. 221316 – Sanitary Waste and Vent Piping
 - 15. 221319 – Sanitary Waste Piping Specialties
 - 16. 221319.13 – Sanitary Drains
 - 17. 221323 – Sanitary Waste Interceptors
 - 18. 221414 – Storm Drainage Piping
 - 19. 221423 – Storm Drainage Piping Specialties
 - 20. 221429 – Sump Pumps
 - 21. 223400 – Fuel Fired, Domestic Water Heaters
 - 22. 224200 – Commercial Plumbing Fixtures

1.3 DEFINITIONS

- A. Contractor – plumbing subcontractor, or contractor engaged to perform work specified under Division 22 Plumbing Work.
- B. Furnish – supply and deliver to specific location and or another division.
- C. Furnished by others – receive equipment or materials, delivered to the job site, or where called for and installed by this division.
- D. Provide – to furnish and install complete, fully coordinated, and ready for operation/use.

1.4 SCOPE OF WORK

- A. Provisions of this Section apply to all Division 22, Plumbing work.
- B. Include provisions of General Conditions as part of this section
- C. Provide all labor, tools, materials, equipment, accessories, parts, transportation, storage, fees, taxes, permits and any related items essential for the competition of all Plumbing work shown, specified or implied, complete, and ready for operation/use.
- D. Equipment furnished by Others:
 - 1. Provide rough-in to all equipment furnished by others that require plumbing connections.
 - 2. Provide piping, isolation valves, backflow preventers, water hammer arrestors, unions, traps, flexible connections, etc. required for a complete installation.
 - 3. Equipment furnished by others:
 - a. Ice Maker, Ice Machine
 - b. Refrigerators
 - c. Coffee Makers
 - d. Dishwasher
 - e. Kitchen Equipment
 - f. Laundry Equipment
 - 4. Make all final plumbing connections to all equipment furnished by others unless noted otherwise.

1.5 GENERAL REQUIREMENTS

- A. Coordinate Plumbing work with all other trades; provide approved submittals to appropriate trades to coordinate the installation of systems required for the actual equipment to be installed and operate.
- B. Protect Plumbing equipment from damage during construction. When installation is complete clean equipment and touch up paint.
- C. Install all equipment to provide normal service access to all components, install in accordance with manufacturers instruction. If manufacturer's instructions conflict with contract documents, obtain engineer of records decision before proceeding.
- D. All work shall conform to the contract documents and all codes, standards and requirements listed below in section REGULATORY REQUIREMENTS.
- E. Cooperate with all other crafts and trades. Perform work in a timely manner. Do not interfere with the work of other trades.
- F. If systems interfere or conflict, the Architect shall decide which system to relocate regardless of which was installed first.
- G. The contractor shall be responsible for fire stopping penetrations at fire rated walls or floors. Fire stopping shall be performed immediately after the work is installed. Do not leave penetrations unprotected overnight.
- H. Refer to Architectural drawings for all dimensions.

- I. **Certain areas of the facility are “sound critical” and require special attention during installation.**
 - 1. **Refer to Architectural drawings for areas that are sound critical.**
 - 2. **Refer to Specification section 220719 PLUMBING PIPING INSULATION for insulation requirements in sound critical spaces.**
 - 3. **Refer to Specification section 221116 DOMESTIC WATER PIPING and 221316 SANITARY WASTE AND VENT PIPING for piping requirements in sound critical spaces.**
- J. This facility does not have return air plenums, therefore the requirements of ASTM E84 do not apply

1.6 DRAWINGS AND SPECIFICATIONS

- A. Plumbing drawings and specifications are intended to be worked together as a set by the contractor. Drawings are not standalone.
- B. Plumbing drawings are diagrammatic and are subject to requirements of the Architectural drawings and conditions existing in the field. Plumbing drawings indicate generally the location of components and are not intended to show all fittings or all details of the work. Plumbing drawings are intended to show size, capacity, approximate location, direction, and general relationship of the work, but not exact detail or arrangement.
- C. Coordinate dimensions with all project drawings, and field conditions. Do not scale Plumbing drawings for locations of system components. Coordinate location of air devices, piping, ductwork, lighting, ceiling grids, sprinkler piping, sprinkler heads, structure, general construction, supports, equipment and equipment pads with Architectural, Structural and Electrical drawings as well as conditions existing in the field and lay out work to fit in wall cavities, ceiling spaces and below slab.
- D. Make minor adjustments in the field as required to provide optimum results and to facilitate ease of service, efficient operation, and best appearance. Minor adjustments are those that do not alter the design intent, scope of the work or operation of the Plumbing systems.
- E. Make no changes that alter the intent or scope of the work without written instructions from the Architect. In case of doubt, submit a formal request for information (RFI) to the Architect and obtain architects response before proceeding with work. Where doubt arises as to the meaning of the Plumbing Drawings and specifications, obtain the Architects written interpretation before proceeding. Failure to follow this instruction shall make the contractor liable for damage to other work, and responsible for removing and repairing defective or mis-located work in a proper manner.
- F. All Plumbing piping shall be fully coordinated with other trades systems including but not limited to duct work, cable trays, piping systems, equipment located above ceilings along with any operational clearances. There shall be no change orders permitted for any conflicts discovered while creating shop drawings or during construction while installing systems due to the contractor’s lack of coordination between different trades

1.7 REFERENCES

Edit the list below to identify appropriate standards

- A. ADA: Americans with Disabilities Act
- B. AGCA: American General Contractors of America, Inc
- C. AGA: American Gas Association
- D. AIA: American Institute of Architects
- E. ANSI: American National Standards Institute, Inc.
- F. ASME: American Society of Mechanical Engineers
- G. ASPE: American Society of Plumbing Engineers
- H. ASSE: American Society of Sanitary Engineering
- I. ASTM: American Society for Testing Materials
- J. AWS: American Welding Society Code
- K. AWWA: American Water Works Association
- L. CISPI: Cast Iron Soil Pipe Institute
- M. FM: Factory Mutual
- N. ICC: International Code Council
- O. NAIMA: North American Insulation Manufacturers Association
- P. NEC: National Electric Code
- Q. NEMA: National Electrical Manufacturers Association.
- R. NFPA: National Fire Protection Association
- S. NSF: National Sanitation Foundation
- T. MSS: Manufacturers Standardization Society of the Valve and Fitting Industry
- U. PDI: Plumbing Drainage Institute
- V. UL: Underwriters Laboratories, Inc
- W. OSHA: Occupational Safety and Health Administration

1.8 REGULATORY REQUIREMENTS

- A. Comply with the current editions, unless otherwise noted, of the following codes and standards.
 - 1. ICC 2018 Edition with Georgia Amendments
 - a. International Building Code, IBC

- b. International Energy Conservation Code, IECC
 - c. International Fire Protection Code, IFC
 - d. International Fuel Gas Code, IFGC
 - e. International Mechanical Code, IMC
 - f. International Plumbing Code, IPC
 2. ADA – Americans with Disabilities Act
 3. ASME B31.9 – Building Services Piping
 4. ASME – Boiler and Pressure Vessel Code
 5. Alabama Boiler and Pressure Vessel Code
 6. AWWA Manual M14 – Backflow Prevention and Cross Connection Control
 7. NFPA 13 – Standard for the Installation of Sprinkler systems
 8. NFPA 54 – National Fuel Gas Code
 9. NFPA 70 – National Electric Code
 10. NFPA 96 – Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations
 11. NFPA 101 – Life Safety Code
 12. NFPA 291 – Recommended Practice for Fire Flow Testing and Marking of Hydrants
 13. Local Health Department
- B. Permits, Licenses, Inspections and Fees
1. Contractor shall give required notices, file drawings, obtain and pay for permits, deposits and fees necessary for the installation of the Division 22 Plumbing Work
 2. Contractor shall obtain and pay for inspections required by laws, ordinances, rules, regulations, or public authority having jurisdiction.
 3. Contractor shall obtain and pay for certificates of such inspections and file such certificates with the owner.

1.9 QUALIFICATION OF THE CONTRACTOR AND SUB-CONTRACTORS

- A. The Plumbing contractor shall have been in business as a licensed Plumber for a minimum of 3 years prior to the date of opening bids and shall have been pre-qualified as a bidder by the owner.
- B. The Plumbing contractor shall have a satisfactory experience record with plumbing installations of character and scope comparable with this project, within the last 3 years prior to the date of opening bids.
- C. The contractor shall have an established service department capable of providing service inspection or full maintenance contracts.
- D. If the Plumbing contractor, with the Architect or Engineers approval, uses a sub-contractor to provide another discipline that the plumbing contractor does not normally furnish, that sub-contractor shall meet the same qualifications.
- E. The Plumbing contractor shall have a current Master Plumbing Certificate and Master Gas Certificate issued by the State, County and City in which the work occurs.

1.10 PRODUCT REQUIREMENTS

- A. Provide new, standard, first-grade materials throughout.

- B. Multiple items of similar equipment shall be the product of the same manufacturer.
- C. Substitutions:
1. Comply with the provisions of Division 01, for product requirements, substitutions and alternates, and the following.
 2. When several manufacturers are named in the specifications, the corresponding products and models made by the specified manufacturers will be accepted and Contractor may base their bid on any one of those products. However, if the Contractor's bid is based on products other than the scheduled or specified **basis of design**, it shall be understood that there will be no extra cost involved whatsoever, and the effect on other trades has been included in the Contractor's proposal. Coordination with other trades for substituted equipment or use of products other than the named basis of design shall be the responsibility of the Contractor furnishing the equipment.
 3. The basis of design manufacturer's equipment has been used to determine space requirements. Should another approved manufacturer's equipment be used in preparing proposals, Contractor shall be responsible for determining that said equipment will fit space allocated. Submission of shop drawings or product data on such equipment shall be considered as indicating that the Contractor has reviewed the space requirements and the submitted equipment will fit the space allocated with due consideration given to access required for maintenance and code purposes.
 4. The basis of design manufacturer's equipment and scheduled Plumbing equipment electrical requirements have been used to coordinate the electrical requirements of the plumbing equipment with the electrical systems serving that equipment.
 - a. Contractor shall coordinate the electrical requirements of the equipment actually furnished on this project and provide the electrical systems required by that equipment at no additional cost to the Owner.
 - b. Equipment of higher or lower electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified at no additional cost to the Owner.
 - c. Prior to approval of submittals of plumbing equipment with electrical requirements that are greater or lower than those shown on the Drawings, Contractor shall submit letter verifying that required changes to the electrical system, serving the specific piece of equipment in question, have been coordinated with the electrical contractor. Letter to be included with the associated equipment submittal, addressed to the Architect with a copy to the electrical engineer.
 - d. If minimum energy ratings or efficiencies are specified, equipment shall comply with specified requirements.
 5. Each bidder may submit to the Architect a list of any substitutes which is proposed to use in lieu of the equipment or material named in the specifications with a request for the approval of proposed substitutes. To be considered, such requests must be delivered to the office of the Architect not later than 10 days prior to bid due date. The submittal shall include the following:
 - a. Specific equipment or material proposed for substitution giving manufacturer, catalog, and model number.
 - b. All performance and dimensional data necessary for comparison of the proposed substitute with the equipment or material specified.
 - c. A statement setting forth any changes in other materials, equipment, or other Work that incorporation of the substitute may require.
 6. The Burden of proof of the merit of the proposed substitute is upon the proposer. The Architect's decision of approval or disapproval of a proposed substitution is final.
 7. All bidders will be advised by addenda of proposed substitutes which are found to be acceptable. Do not rely upon approvals made in any other manner.

1.11 SUBMITTALS

- A. Submit under provisions of Division 1 and Division 22 sections for submittals and submittal procedures.
- B. Electronic Submittals: Prepare submittals as a PDF package, incorporating complete information into each PDF file, separated by section. Name each PDF file with section number for the product data contained within.
 - 1. Submittals that are missing information or are otherwise incomplete shall be returned “**REVISE and RESUBMIT**”
 - 2. Recommended naming convention for a PDF:
 - a. 22####-Section Title.pdf
 - b. Example for this section: **220100-Gen PLBG Requirements.pdf**
 - 1) Note: abbreviating long words is acceptable
 - 2) Refer to paragraph 1.2 “RELATED SECTIONS” for an index of section numbers and titles.
 - c. Other information that is relevant to the General Contractor and their sub-contractors is acceptable in the file name, so long as the section number and title appear.
- C. Submittals shall include product information for all equipment and components specified or shown on the plans, and contractor shop drawings that provide details, dimensions and coordination of the work with all other disciplines.
- D. For each type of product, equipment, material, and services specified in Division 22 specification sections provide product data that is clearly marked indicating compliance with the Plumbing drawing and specifications. Submittals shall be provided with specified shop drawings. Provide to the architect or prime consultant, a complete submittal fully marked to identify exactly what shall be provided including the following minimal information:
 - 1. All submittals shall be provided in electronic pdf format and shall be organized in accordance with the Plumbing specification numbering system.
 - 2. All submittals shall be completely marked with manufacturer’s names, model number, dimensions, weights, performance ratings, efficiencies, features, and accessories to be provided.
 - 3. Capacities, dimensions, weights, etc. shall be in the terms specified inch-pound system.
 - 4. Call attention to and clearly identify deviations from specified equipment and components regarding operation and physical dimensions, capacities, and performance.
 - 5. Performance curves for equipment such as pumps shall be included and shall be clearly marked with operating points, and efficiency.
- E. The contractor shall obtain reviewed submittals from the Engineer that have been returned and marked as follows:
 - 1. **APPROVED** – Contractor approved to order equipment and proceed with the work.
 - 2. **APPROVED AS NOTED** – Contractor approved to order equipment and proceed with the work after making corrections noted by the engineer and coordinating corrections with all disciplines. Corrected submittal shall be re-submitted for record purposes to the General Contractor, and A/E team.
 - 3. **REVISE AND RESUBMIT** – Contractor to correct submittal and resubmit to the A/E team for approval. Re-submittal shall be clearly marked as such.
- F. Final equipment or material orders shall not be placed until submittals have been returned marked either “**APPROVED**” OR “**APPROVED AS NOTED**” without exception.

- G. The installation of plumbing systems shall not begin until submittals have been returned marked either **“APPROVED”** or **“APPROVED AS NOTED”**. The installation of any portion of the plumbing system, in the absence of approved submittals, shall make the contractor responsible to make any necessary changes to the plumbing work already completed at the contractor’s expense. No change orders will be allowed for correcting work already completed.
- H. Refer to paragraph 1.9 Product Requirements, bullet C for substitutions and equipment/products that are different from basis of design that affect other disciplines.
- I. Shop Drawings shall be provided for all areas of the building and include the following:
 - 1. Before starting any work submit and obtain approved shop drawings from the Engineer of Record.
 - 2. No work shall begin, and no equipment shall be ordered until shop drawings have been marked by the engineer of record as **“APPROVED”** or **“APPROVED AS NOTED”**. Failure to submit shop drawings will make the Contractor responsible for changes required to facilitate installation of Plumbing work and other affected disciplines.
 - 3. Shop drawings shall fully detail all plumbing work to be performed. Shop drawings shall be submitted in electronic pdf format and shall comply with the following:
 - 4. All shop drawings shall be drawn to 1/4” = 1’-0” scale. 1/8” – 1’-0” scale may be used when approved by the engineer of record.
 - 5. Plumbing shop drawing shall include the following at a minimum:
 - a. Bottom of pipe elevations.
 - b. Dimensions from columns lines.
 - c. Pipe sizes and schedules (including insulation)
 - d. Insulation thickness.
 - e. Fluid type.
 - f. Pipe support locations.
 - g. Pipe support details.
 - h. Location of automatic valves and system isolation valves.
 - i. Equipment connection details
 - j. For multi-story buildings, submit detailed floor penetration sleeve layout drawings.

1.12 ONLINE CONSTRUCTION MANAGEMENT SOFTWARE

- A. The Engineers’ use of online construction management software (e.g. ProCore, Trimble, Plangrid) for Submittals, RFI’s etc, is done so for the convenience of the General Contractor and shall not unduly burden the Engineering team.
- B. It is the responsibility of the General Contractor to ensure that notifications, due dates and the dissemination of information (submittals, RFI’s etc) is done appropriately, correctly and in-line with standard industry practices and the requirements of this section.
- C. Any issues or delays arising from the use of the online construction management software shall be corrected by the General Contractor. Any delays caused by software issues, outages or unavailability of the online construction management software shall extend any associated review time of Submittals and RFI’s accordingly.
- D. Delays that are caused by the General Contractor’s misuse of the software shall not inconvenience the Architectural or Engineering team.

- E. General guidelines and expectations:
1. A minimum of 10 business (*not calendar*) days, from the Engineers receipt of the submittal, are allowed for the engineers review.
 - a. Multiple submittals uploaded simultaneously may incur additional review time.
 - b. When multiple submittals are uploaded simultaneously, it is the responsibility of the General Contractor to notify the Architectural and Engineering team of any items that may require prioritization. Otherwise, submittals will be reviewed on a “first in - first out” basis.
 2. A minimum of 5 business (*not calendar*) days, from the Engineers receipt of the RFI, are allowed for review and response.
 3. Expedited Submittal and RFI review and response.
 - a. Expedited submittal and RFI review, when available, can be requested by the contractor. If requested, it can be provided based on the workload and schedule of the engineering team.
 - b. Expedited submittal review time shall be no less than 5 business (*not calendar*) days from the Engineers receipt of the submittal.
 - c. Expedited RFI review and response time shall be no less than 2 business (*not calendar*) days from the Engineers receipt of the RFI.
 4. National holidays that occur during a review period do not subtract from the response time for Submittal, RFI etc.
 5. Submittals that are in PDF format shall be named and assembled per paragraph 1.11 in this section.
 6. Notifications from the online construction management software shall identify the Section Number and name as well as match the actual file name of the PDF of the submittal being submitted for review.
 7. No more than one submittal per specification section shall be submitted. Multiple submittals per specification section shall be marked ‘**REVISE and RESUBMIT**’.
 8. Notifications regarding submittals being ready for review shall come from the General Contractor, not their sub-contractors. It is the responsibility of the General Contractor to review and confirm that their sub-contractors’ submittals have been named correctly and are organized in accordance with this specification section. The engineer shall only be notified when a submittal or RFI is placed in their court for review or response.
 9. If there are any problems with access, links or files generated by the online construction management software to retrieve submittals, RFIs or other information, it becomes the responsibility of the General Contractor to email the information to the Architectural and Engineering Team when requested.
- F. Any costs for the Engineers’ access and use of the online construction management software shall be paid for by the General Contractor.

1.13 PROJECT/SITE CONDITIONS

- A. Visiting Site: Visit site before and during construction to become familiar with installed work that may affect Plumbing work. No additional allowance will be granted because of lack of knowledge of such conditions.
- B. Cause as little interference or interruption of existing services as possible. Schedule work which will cause interference or interruption in advance with Owner, authorities having jurisdiction, and all affected trades.

- C. Determine size, location, and elevation of existing and new utilities at the project site.
- D. Renovations to Existing Facilities – Conflicts with active systems: Where existing, active piping or equipment conflicts with new Architectural features, the contractor shall make provisions to modify, re-route or relocate the existing piping or equipment to accommodate the Architectural design and then return the existing piping or equipment to operable status. Returning the existing piping or equipment to operable status includes using like materials and sizes, pressure testing, leak testing, insulating, connecting power etc.
- E. Renovations to Existing Facilities – Conflicts with abandoned systems: Where existing abandoned piping or equipment conflicts with new Architectural features, the contractor shall make provisions to remove the abandoned piping or equipment to accommodate the Architectural design.
- F. **[Critical Areas – Certain areas of the facility have been deemed ‘Critical Areas’ by the Owner and their continual operation is ‘necessary’ for normal business operation. Any work that, can, will or otherwise has the potential to interrupt the normal operation of these areas must first be coordinated with the Architect and Owner prior to work beginning. No work is to commence prior to Architect and Owner authorization. Specific Areas that are noted as being critical are as follows:]**
 - a. **[Identify Area]**

1.14 PROJECT CLOSE-OUT

- A. Submit project close out documents after the final inspection and all punch list items are complete.
- B. Record (AS-BUILT) Drawings shall include the following:
 - 1. Record drawings shall be an accurate record of corrections, variations, and deviations, including those required by change orders to the contract documents.
 - 2. Record changes daily on a set of plans kept at the job site.
 - 3. Submit record drawing marked as noted above to Architect for review prior to request for final payment.
 - 4. Marked record drawings will be returned to Contractor for use in preparing final record drawings.
 - 5. Final Record Drawings: Provide one complete set of prints, and one electronic copy in AutoCAD or Revit format indicating the actual completed installation of the work.
- C. Prior to the issuance of a certificate for final payment, submit to Architect and obtain his approval of the following:
 - 1. Record drawings – As noted above.
 - 2. Water balance report (Electronic pdf).
 - 3. Equipment Submittal Data (Electronic pdf).
 - 4. Equipment operating and maintenance manuals (Electronic pdf and 2 hard copies).
 - 5. Equipment warranty dates and guarantees (Electronic pdf and 2 hard copies).
 - 6. Pressure vessel certificates (Electronic pdf).
 - 7. List of Owner's Personnel who have received operating and maintenance instructions.
 - 8. Certificate that all domestic water systems have been disinfected in accordance with the Specifications.
 - 9. Letter certifying and signed by Owner or his representative that the Owner or his representative has received the extra materials specified for each system

- D. Submit factory start-up/field reports for all equipment and systems specified. (See Specifications)
 - 1. Domestic Water Heaters
 - 2. Recirculation Pumps
 - 3. Backflow preventers

1.15 TEMPORARY USE OF PLUMBING EQUIPMENT

- A. Use of new installed plumbing equipment to provide plumbing services during construction will be permitted subject to compliance with the requirements of Division 01, Section “Temporary Facilities and Controls”, Article “Temporary Utility Installation”, and the following:
 - 1. Domestic water heaters, domestic booster pumps, and other equipment specified to have factory supervised start-up shall have had such start-up.
 - 2. Units shall be properly lubricated, balanced, and aligned. Vibrations must be eliminated.
 - 3. Plumbing equipment must be operated as a complete system and be fully maintained by operating personnel.
- B. Prior to final inspection, the equipment or parts used which show wear and tear beyond normal, shall be replaced with identical replacements, at no additional cost to the Owner. Operation of the equipment on a temporary basis during construction does not constitute substantial completion or beneficial use by the owner.
- C. This paragraph shall not reduce the requirements of the mechanical specification sections.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

END OF SECTION 220100