UNIVERSITY OF TEXAS
OFPC PROJECT NO.
REPLACEMENT OF DOMESTIC SURGE TANK
E&C Proj. 3139.00

SECTION 00 01 07 – SEAL PAGE

E&C Engineers & Consultants Inc., Plumbing Engineer for the project, is responsible for the following Specification Sections

DIVISION 22 Plumbing

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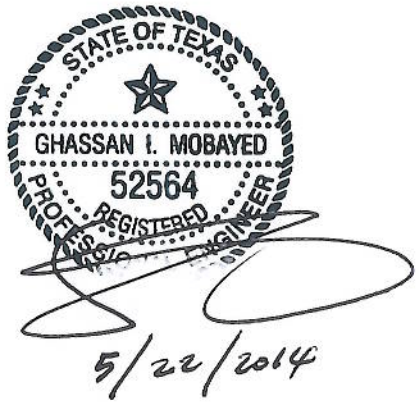

SECTION 21 00 00 – BASIC MECHANICAL REQUIREMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Basic Mechanical Requirements specifically applicable to Division 21 Sections, in addition to Division 1 - General Requirements.

1.02 RELATED DOCUMENTS:

A. All work covered by this Section of these Specifications shall be accomplished in accordance with all applicable provisions of the Contract Documents and any addenda or directives which may be issued herewith, or otherwise.

1.03 GENERAL:

A. The Contractor shall execute all work hereinafter specified or indicated on accompanying Drawings. Contractor shall provide all equipment necessary and usually furnished in connection with such work and systems whether or not mentioned specifically herein or on the Drawings.

B. The Contractor shall be responsible for fitting his material and apparatus into the building and shall carefully lay out his work at the site to conform to the structural conditions, to avoid all obstructions, to conform to the details of the installation and thereby to provide an integrated satisfactory operating installation.

C. The Drawings are necessarily diagrammatic by their nature, and are not intended to show every connection in detail or every pipe or conduit in its exact location. These details are subject to the requirements of standards referenced elsewhere in these specifications, and structural and architectural conditions. The Contractor shall carefully investigate the existing conditions. Work shall be organized and laid out in finished portions of the building. All exposed work shall be installed parallel or perpendicular to the lines of the building unless otherwise noted.

D. When the mechanical Drawings do not give exact details as to the elevation of pipe the Contractor shall physically arrange the systems to fit in the space available at the elevations intended with proper grades for the functioning of the system involved in a neat and workmanlike manner. The Drawings do not show all required offsets, control lines, pilot lines and other location details.

1.04 DEFINITIONS: (Note: These definitions are included here to clarify the direction and intention of this specification. The list given here is not by any means complete. For further clarification as required, contractor shall contact the designated owners representative.)

A. CONCEALED / EXPOSED: ~ areas are those areas which cannot be seen by the building occupants. Exposed areas are all areas which are exposed to view by the building occupants, including under counters, inside cabinets and closets, plus all mechanical rooms.

B. General Requirements: The provisions of requirements of other Division 1 sections apply to entire work of contract and, where so indicated, to other elements which are included in project. Basic contract definitions are included in the General Conditions.

C. Indicated: The term "indicated" is a cross reference to graphic representations, notes or schedules on drawings, to other paragraphs or schedules in the Specifications, and to similar means of recording requirements on contract documents. Where terms such as "shown", "noted", "scheduled", and "specified" are used in lieu of "indicated", it is for the purpose of helping reader locate the cross reference, and no limitation of location is intended except as specifically noted.

D. Directed, requested, etc.: Where not otherwise explained, terms such as "directed", "requested", "authorized", "selected", "approved", "required", "accepted", and "permitted" mean directed by Architect/Engineer", "requested by Architect/Engineer" and similar phrases. However, no such implied meaning will be interpreted to extend Architect's/Engineer's responsibility into Contractor's area of construction supervision and job safety.

E. And/Or: Where "and/or" is used in these Specifications or on the Drawings, it shall mean "that situations exist where either one or both conditions occur or are required and shall not be interpreted to permit an option on the part of the Contractor.

F. Approve: Where used in conjunction with Architect's/Engineer's response to submittals, requests, applications, inquiries, reports and claims by Contractor, the meaning of term "approved" will be held to limitations to Architect's/Engineer's responsibilities and duties as specified in General and Supplementary Conditions. In no case will "approval" by Architect/Engineer be interpreted as a release of Contractor from responsibilities to fulfill requirements of contract documents or to extend Architect's/Engineer's responsibility into Contractor's area of construction supervision and job safety.

G. As required: Where "as required" is used in these Specifications or on the drawings, it shall mean "that situations exist that are not necessarily described in detail or indicated that may cause the contractor certain complications in performing the work described or indicated. These complications entail the normal coordination activities expected of the Contractor where multiple trades are involved and new or existing construction causes deviations to otherwise simplistic approaches to the work to be performed. The term shall not be interpreted to permit an option on the part of the Contractor to achieve the end result."

H. Furnish:

1. The term "furnish" is used to mean "supply and deliver to project site, ready for unloading, unpacking, assemble, installation, and similar operations."

2. Where "furnish" applies to work for which the installation is not otherwise specified, "furnish" in such case shall mean "furnish and install."

I. Install: The term "install" is used to describe operations at project site including "unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning and similar operation."

J. Provide: The term "provide" means "to furnish and install, complete and ready for intended use."

1.05 PERMITS, UTILITY CONNECTIONS AND INSPECTIONS:

A. All work performed on this project is under the authority of the State of Texas, therefore no local construction fees or construction permits will be required except as may be required for new service taps, or new or modified connections to City controlled services. If

inspections by City personnel are specifically required by this document, then the Contractor is responsible for any fees or permits in connection to those requirements.

B. Compliance: The Contractor shall comply in every respect with all requirements of National Fire Protection Association, local Fire Department regulations and utility company requirements. In no case does this relieve the Contractor of the responsibility of complying with these Specifications and Drawings where specified conditions are of higher quality than the requirements of the above-specified authorities. Where requirements of the Specifications and Drawings are more lenient than the requirements of the above authorities having jurisdiction, the Contractor shall make installations in compliance with the requirements of the above authorities with no extra compensation.

1.06 CONTRACT DOCUMENTS:

A. All dimensional information related to new structures shall be taken from the appropriate Drawings. All dimensional information related to existing facilities shall be taken from actual measurements made by the Contractor on the site.

B. The interrelation of the Specifications, the Drawings, and the schedules are as follows: The Specifications determine the nature and setting of the several materials, the Drawings establish the quantities, dimensions and details, and the schedules give the performance characteristics. If the Contractor requires additional clarification, he shall request it in writing, following the contractually prescribed information flow requirements.

C. Should the Drawings or Specifications conflict within themselves, or with each other, the better quality, or greater size or quantity of work or materials shall be performed or furnished.

1.07 SUBMITTALS

A. Refer to Uniform General Conditions.

B. Proposed Products List: Include Products specified in the following Sections:

1. Section 15050 - Piping, Valves and Fittings

2. Section 15140 - Sleeves, Flashings, Supports and Anchors

C. Submit shop drawings and product data grouped to include complete submittals of related systems, products, and accessories in a single submittal.

D. Mark dimensions and values in units to match those specified.

E. Submit Fabrication Drawings whenever (1) equipment proposed varies in physical size and arrangement from that indicated on the Drawings, thus causing rearrangement of equipment space, (2) where tight spaces require extreme coordination between ductwork, piping, conduit, and other equipment, (3) where called for elsewhere in these Specifications; and (4) where specifically requested by the Architect/Engineer. Fabrication Drawings shall be made at no additional charge to the Owner or the Architect/Engineer.

F. All required Fabrication Drawings, except as noted otherwise, shall be prepared at a scale of not less than 1/4" = 1'-0". Fabrication Drawings for ductwork, air handling units, and sections in Mechanical Rooms shall be drawn at a minimum scale of 3/8" = 1'-0". Submit three blueline prints of each Fabrication Drawing to the Architect/Engineer for review.

Reproduction and submittal of the Construction Documents is not acceptable. The Architect/Engineer will review the drawing and return one print with comments.

1.08 SUBSTITUTION OF MATERIALS AND EQUIPMENT:

A. Refer to General Conditions for substitution of materials and equipment.

B. General: Within thirty days after the date of contract award or work order, whichever is later, and before purchasing or starting installation of materials or equipment, the Contractor shall submit for review, a complete list of suppliers, contractors and manufacturers for all materials and equipment which will be submitted for incorporation into the project. The list shall be arranged in accordance with the organization of the Specifications. This initial list shall include the manufacturer's name and type or catalog number as required to identify the quality of material or equipment proposed. This list will be reviewed by the Engineer and the Owner and will be returned to the Contractor with comments as to which items are acceptable without further submittal data and which items will require detailed submittal data for further review and subsequent approval. The initial list shall be submitted as herein specified. Materials and equipment requiring detailed submittal data shall be submitted with sufficient data to indicate that all requirements of these Specifications have been met and samples shall be furnished when requested. All manufacturer's data used as part of the submittal shall have all inapplicable features crossed out or deleted in a manner that will clearly indicate exactly what is to be furnished.

C. It is not the intent of the Drawings and/or Specifications to limit products to any particular manufacturer nor to discriminate against an "APPROVED EQUAL" product as produced by another manufacturer. Some proprietary products are mentioned to set a definite standard for acceptance and to serve as a reference in comparison with other products. When a manufacturer's name appears in these Specifications, it is not to be construed that the manufacturer is unconditionally acceptable as a provider of equipment for this project. The successful manufacturer or supplier shall meet all of the provisions of the appropriate specification(s).

D. The specified products have been used in preparing the Drawings and Specifications and thus establish minimum qualities with which substitutes must at least equal to be considered acceptable. The burden of proof of equality rests with the Contractor. The decision of the designer is final.

E. When requested by the Architect/Engineer, the Contractor shall provide a sample of the proposed substitute item. In some cases, samples of both the specified item and the proposed item shall be provided for comparison purposes.

F. Timeliness: The burden of timeliness in the complete cycle of submittal data, shop Drawings, and sample processing is on the Contractor. The Contractor shall allow a minimum of six (6) weeks time frame for review of each submission by the office of the design discipline involved after receipt of such submissions by that design discipline. The Contractor is responsible for allowing sufficient time in the construction schedule to cover the aforementioned cycles of data processing, including time for all resubmittal cycles on unacceptable materials, equipment, etc. covered by the data submitted. Construction delays and/or lack of timeliness in the above regard are the responsibility of the Contractor and will not be considered in any request for scheduled construction time extensions and/or additional costs to the Owner.

G. All equipment installed on this project shall have local representation, local factory authorized service, and a local stock of repair parts.

H. Acceptance of materials and equipment will be based on manufacturer's published data and will be tentative subject to the submission of complete shop Drawings indicating compliance with the contract documents and that adequate and acceptable clearances for entry, servicing, and maintenance will exist. Acceptance of materials and equipment under this provision shall not be construed as authorizing any deviations from the Specifications, unless the attention of the Architect/Engineer has been directed in writing to the specific deviations. Data submitted shall not contain unrelated information unless all pertinent information is properly identified.

I. Certification: The Contractor shall carefully examine all data forwarded for approval and shall sign a certificate to the effect that the data has been carefully checked and found to be correct with respect to dimensions and available space and that the equipment complies with all requirements of the Specifications.

J. Physical Size of Equipment: Space is critical; therefore, equipment of larger sizes than shown, even though of specified manufacturer, will not be acceptable unless it can be demonstrated that ample space exists for proper installation, operation, and maintenance.

K. Materials and Equipment Lists: Eight (8) copies of the list of materials and equipment, the name of manufacturer, trade name, type, and catalog number shall be submitted to the Architect/Engineer. The lists shall be accompanied by eight (8) sets of pictorial and descriptive data derived from the manufacturers' catalogs, sales literature, or incorporated in the Shop Drawings. Such lists shall include but will not be limited to the following items:

_____.

L. Should a substitution be accepted, and should the substitute material prove defective, or otherwise unsatisfactory for the service intended within the guarantee period, this material or equipment shall be replaced with the material or equipment specified at no additional cost to the Owner.

1.09 MATERIALS AND WORKMANSHIP:

A. All materials, unless otherwise specified, shall be new, free from all defects, suitable for the intended use, and of the best quality of their respective kinds. Materials and equipment shall be installed in accordance with the manufacturer's recommendations and the best standard practice for the type of work involved. All work shall be executed by mechanics skilled in their respective trades, and the installations shall provide a neat, precise appearance. Materials and/or equipment damaged in shipment or otherwise damaged prior to installation shall not be repaired at the job site but shall be replaced with new materials and/or equipment.

B. The responsibility for the furnishing of the proper equipment and/or material and seeing that it is installed as intended by the manufacturer, rests entirely upon the Contractor who shall request advice and supervisory assistance from the representative of specific manufacturers during the installation.

1.10 FLAME SPREAD PROPERTIES OF MATERIALS:

A. Materials and adhesives incorporated in this project shall conform to NFPA Standard 255, "Method of Test of Surface Burning Characteristics of Building Materials" and NFPA 90. The classification shall not exceed a flame spread rating of 25 for all materials, adhesives, finishes, etc., specified for each system, and shall not exceed a smoke developed rating of 50.

1.11 REGULATORY REQUIREMENTS

A. The "Authority Having Jurisdiction" over the project described by these documents is the Owner, as an Agency of the State of Texas. As such, it is required that the installation shall meet the minimum standards prescribed in the latest editions of the following listed codes and standards, which are made a part of these Specifications. All referenced codes and standards shall be those current at the date of issue of the design documents.

B. National Fire Protection Association Standards (NFPA):

1. NFPA No. 13, Sprinkler System, Installation
2. NFPA No. 14, Standpipes and Hose Systems
3. NFPA No. 20, Centrifugal Fire Pumps
4. NFPA No. 37, Stationary Combustion Engines & Gas Turbines
5. NFPA No. 45, Fire Protection for Laboratories Using Chemicals
6. NFPA No. 51, Welding & Cutting, Oxygen-Fuel Gas Systems
7. NFPA No. 54, Gas Appliances, Piping, National Fuel Gas Code
8. NFPA No. 70, National Electrical Code
9. NFPA No. 72D, Proprietary Signaling Systems
10. NFPA No. 78, Lightning Protection Code
11. NFPA No. 88A, Standard for Parking Structures
12. NFPA No. 90A, Air Conditioning Systems
13. NFPA No. 91, Blower & Exhaust Systems
14. NFPA No. 99, Health Care Facilities
15. NFPA No. 101, Life Safety Code
16. NFPA No. 200, Series, Building Construction
17. NFPA No. 211, Chimneys, Fireplaces, Vent Systems
18. NFPA No. 241, Standard for Safeguarding Construction, Alteration and Demolition Operations
19. NFPA No. 255, Method of Test of Surface Burning Characteristics of Building Materials
20. NFPA No. 258, Standard Research Test Method for Determining Smoke Generation of Solid Materials

C. C. American National Standards Institute (ANSI):

1. A40.8, National Plumbing Code

2. B31.1, Power Piping

3. B9.1, Safety Code for Mechanical Refrigeration

D. American Gas Association Publications (AGA): Directory of Approved Gas Appliances and Tested Accessories

E. American Society of Mechanical Engineers (ASME): Boiler and Pressure Vessel Codes

F. Air Conditioning and Refrigeration Institute Standards (ARI): All standards related to refrigeration and air conditioning equipment and piping furnished under these Specifications.

G. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA): All current editions of applicable manuals and standards (See Sections 15890 and 15910).

H. Air Moving and Conditioning Association (AMCA): All current editions of applicable manuals and standards.

I. American Society of Testing Materials (ASTM): All current editions of applicable manuals and standards.

J. American Water Works Association (AWWA): All current editions of applicable manuals and standards.

K. National Electrical Manufacturers' Association (NEMA): All current editions of applicable manuals and standards.

L. City of Houston , Fire Department as may be applicable to construction on this site.

M. Uniform Building Code, (Includes the International Mechanical and International Plumbing Codes)

N. Texas Occupational Safety Act: All applicable safety standards

O. Occupational Safety and Health Act (OSHA)

P. ADA and ANSI Standards: All work shall be in accord with all regulations and requirements of the Standards and Specifications for Handicapped and Disabled for the Construction of Public Buildings and Facilities in the State of Texas Usable by Physically Handicapped and Disabled persons, ANSI Standards and the requirements of the American Disabilities Act.

Q. Refer to Specification Sections hereinafter bound for additional Codes and Standards.

R. All materials and workmanship shall comply with all applicable state and national codes, Specifications, and industry standards. In all cases where Underwriters' Laboratories, Inc. have established standards for a particular type material, such material shall comply with these standards. Evidence of compliance shall be the UL "label" or "listing" under Re-Examination Service.

S. The Contract Documents are intended to comply with the aforementioned rules and regulations; however, some discrepancies may occur. Where such discrepancies occur, the Contractor shall immediately notify the Architect/Engineer in writing of said discrepancies and apply for an interpretation. Should the discovery and notification occur after the execution of a contract, any additional work required for compliance with said regulations shall be paid for as covered by Division 1 of these Contract Documents, providing no work of fabrication of materials has been accomplished in a manner of

noncompliance. Should the Contractor fabricate and/or install materials and/or workmanship in such a manner that does not comply with the applicable codes, rules and regulations, the Contractor who performed such work shall bear all costs arising in correcting these deficiencies to comply with said rules and regulations.

1.12 GENERAL MATERIALS AND EQUIPMENT REQUIREMENTS:

A. Storage at Site: The Contractor shall not receive material or equipment at the job site until there is suitable space provided to properly protect equipment from rust, drip, humidity, and dust damage.

B. Capacities shall be not less than those indicated but shall be such that no component or system becomes inoperative or is damaged because of startup or other overload conditions.

C. Conformance with Agency Requirements: Where materials or equipment are specified to be approved, listed, tested, or labeled by the Underwriters' Laboratories, Inc., or constructed and/or tested in accordance with the standards of the American Society of Mechanical Engineers or the Air Moving and Conditioning Association, the Contractor shall submit proof that the items furnished under this Section of the Specifications conform to such requirements. The label of the Underwriters Laboratories, Inc., applied to the item will be acceptable as sufficient evidence that the items conform to such requirements. The ASME stamp or the AMCA label will be acceptable as sufficient evidence that the items conform to the respective requirements.

D. Nameplates: Each major component of equipment shall have the manufacturer's name, address, and catalog number on a plate securely attached to the item of equipment. All data on nameplates shall be legible at the time of Final Inspection.

E. Prevention of Rust: Standard factory finish will be acceptable on equipment specified by model number; otherwise, surfaces of ferrous metal shall be given a rust inhibiting coating. The treatment shall withstand 200 hours in salt spray fog test, in accordance with Method 6061 of Federal Standard No. 141. Immediately after completion of the test, the specimen shall show no signs of wrinkling or cracking and no signs of rust creepage beyond 1/8" on either side of the scratch mark. Where rust inhibitor coating is specified hereinafter, any treatment that will pass the above test is acceptable unless a specific coating is specified except that coal tar or asphalt type coating will not be acceptable unless so stated for a specific item. Where steel is specified to be hot-dip galvanized, mill-galvanized sheet steel may be used provided all raw edges are painted with a zinc-pigmented paint conforming to Military Specification MIL-P-26915.

F. Protection from Moving Parts: Belts, pulleys, chains, gears, couplings, projecting set screws, keys, and other rotating parts shall be fully enclosed or properly guarded for personnel protection.

G. Verification of Dimensions: The Contractor shall be responsible for the coordination and proper relation of his work to the building structure and to the work of all trades. The Contractor shall visit the premises and become thoroughly familiar with all details of the work and working conditions, to verify all dimensions in the field, and to advise the Architect/Engineer of any discrepancy before performing any work. Adjustments to the work required in order to facilitate a coordinated installation shall be made at no additional cost to the Owner or the Architect/Engineer.

1.13 PROJECT/SITE CONDITIONS

A. Install Work in locations shown on Drawings, unless prevented by Project conditions.

B. Prepare drawings showing proposed rearrangement of Work to meet Project conditions, including changes to Work specified in other Sections. Obtain permission of [Owner] [Architect/Engineer] before proceeding.

1.14 MANUFACTURER'S RECOMMENDATIONS

A. The manufacturer's published directions shall be followed in the delivery, storage, protection, installation, piping, and wiring of all equipment and material. The Contractor shall promptly notify the Architect/Engineer, in writing, of any conflict between the requirements of the Contract Documents and the manufacturers' directions, and shall obtain the Architect/Engineer's instructions before proceeding with the work. Should the Contractor perform any such work that does not comply with the manufacturers' directions or such instructions from the Architect/Engineer, he shall bear all costs arising in connection with the deficiencies.

1.15 SPACE AND EQUIPMENT ARRANGEMENT:

A. The size of mechanical and electrical equipment indicated on the Drawings is based on the dimensions of a particular manufacturer. While other manufacturers may be acceptable, it is the responsibility of the Contractor to determine if the equipment he proposes to furnish will fit in the space. Fabrication Drawings shall be prepared when required by the Architect/Engineer or Owner to indicate a suitable arrangement.

B. All equipment shall be installed in a manner to permit access to all surfaces. All valves, motors, drives, filters, and other accessory items shall be installed in a position to allow removal for service without disassembly of another part.

1.16 LARGE APPARATUS:

A. Any large piece of apparatus which is to be installed in any space in the building, and which is too large to permit access through stairways, doorways, or shafts shall be brought to the job and placed in the space before the enclosing structure is completed. Following placement in the space, such apparatus shall be thoroughly, completely protected from damage as hereinafter specified.

1.17 PROTECTION:

A. The Contractor shall at all times take such precautions as may be necessary to properly protect all materials and equipment from damage from the time of delivery until the completion of the work. This shall include the erection of all required temporary shelters and supports to adequately protect any items stored in the open on the site from the weather, the ground and surrounding work; the cribbing of any items above the floor of the construction; and the covering of items in the incomplete building with tarpaulins or other protective covering; the installation of electric heaters in electrical switchgear and similar equipment to prevent moisture damage. Failure on the part of the Contractor to comply with the above will be sufficient cause for the rejection of the items in question.

B. Take particular care not to damage the building structure in performing work. All finished floors, step treads, and finished surfaces shall be covered to prevent any damage by workmen or their tools and equipment during the construction of the building.

C. Equipment and materials shall be protected from rust both before and after installation. Any equipment or materials found in a rusty condition at the time of final inspection must be cleaned of rust and repainted as specified elsewhere in these Specifications.

1.18 COOPERATION BETWEEN TRADES AND WITH OTHER CONTRACTORS:

A. Each trade, subcontractor, and/or Contractor must work in harmony with the various other trades, subcontractors and/or Contractors on the job as may be required to facilitate the progress to the best advantage of the job as a whole. Each trade, subcontractor, and/or Contractor must pursue its work promptly and carefully so as not to delay the general progress of the job. This Contractor shall work in harmony with Contractors working under other contracts on the premises.

1.19 SUPERVISION:

A. Each Contractor and subcontractor shall keep a competent superintendent or foreman on the job at all times. (Refer to the Uniform General Conditions for additional information concerning supervision.)

B. It shall be the responsibility of each superintendent to study all Drawings and familiarize himself with the work to be done by other trades. He shall coordinate his work with other trades and before material is fabricated or installed, make sure that his work will not cause an interference with another trade. Where interferences are encountered, they shall be resolved at the job site by the superintendents involved. Where interferences cannot be resolved without major changes to the Drawings, the matter shall be referred to the A/E for ruling.

1.20 SITE OBSERVATION:

A. Site observation by the Engineer is for the express purpose of verifying compliance by the Contractor with the Contract Documents, and shall not be construed as construction supervision nor indication of approval of the manner or location in which the work is being performed as being a safe practice or place.

1.21 PRECEDENCE OF MATERIALS

A. The specifications determine the nature and setting of materials and equipment. The drawings establish quantities, dimensions and details.

B. The installation precedence of materials shall be as follows. Note that if an interference is encountered, this shall guide the contractor in the determination of which trade shall be given the "Right-of-Way".

Building lines
Structural Members
Soil and Drain Piping
Condensate Drains
Vent Piping
Supply, Return, and Outside Air Ductwork

Exhaust Ductwork
HVAC Water and Steam Piping
Steam Condensate Piping
Fire Protection Piping
Natural Gas Piping
Domestic Water (Cold and Hot)
Refrigerant Piping
Electrical Conduit

1.22 INSTALLATION METHODS:

A. Where to Expose: In mechanical rooms, janitor's closets tight against pan soffits in exposed "Tee" structures, or storage spaces, but only where necessary, piping may be run exposed. All exposed piping shall be run in the most aesthetic, inconspicuous manner, and parallel or perpendicular to the building lines.

B. Support: All piping, ducts and conduits shall be adequately and properly supported from the building structure by means of hanger rods or clamps to walls as herein specified.

C. Maintaining Clearance: Where limited space is available above the ceilings below concrete beams or other deep projections, pipe and conduit shall be sleeved through the projection where it crosses, rather than hung below them in a manner to provide maximum above-floor clearance. Sleeves shall be as herein specified. Approval shall be obtained from the Architect/Engineer for each penetration.

D. All pipe, conduits, etc., shall be cut accurately to measurements established at the building and shall be worked into place without springing or forcing. All ducts, pipes and conduits run exposed in machinery and equipment rooms shall be installed parallel to the building lines, except that piping shall be sloped to obtain the proper pitch. Piping, ducts and conduits run in furred ceilings, etc., shall be similarly installed, except as otherwise shown. Conduits in furred ceilings and in other concealed spaces shall be neatly grouped and racked indicating good workmanship. All conduit and pipe openings shall be kept closed until the systems are closed with final connections.

1. All piping not directly buried in the ground shall be considered as "interior piping".

1.23 OPERATION PRIOR TO COMPLETION:

A. When any piece of mechanical equipment is operable and it is to the advantage of the Contractor to operate the equipment, he may do so, providing that he properly supervises the operation, and has the Construction Inspector's written permission to do so. The warranty period shall, however, not commence until such time as the equipment is operated for the beneficial use of the Owner, or date of substantial completion, whichever occurs first.

B. Regardless of whether or not the equipment has or has not been operated, the Contractor shall properly clean the equipment, install clean filter media, properly adjust, and complete all deficiency list items before final acceptance by the Owner. The date of acceptance and performance certification will be the same date.

1.24 EXISTING FACILITIES:

A. The Contractor shall be responsible for loss or damage to the existing facilities caused by him and his workmen, and shall be responsible for repairing or replacing such loss or

damage. The Contractor shall send proper notices, make necessary arrangements, and perform other services required for the care, protection and in service maintenance of all plumbing, heating, air conditioning, and ventilating services for the new and existing facilities. The Contractor shall erect temporary barricades, with necessary safety devices, as required to protect personnel from injury, removing all such temporary protection upon completion of the work.

B. The Contractor shall provide temporary or new services to all existing facilities as required to maintain their proper operation when normal services are disrupted as a result of the work being accomplished under this project.

C. Where existing construction is removed to provide working and extension access to existing utilities, Contractor shall remove doors, piping, conduit, outlet boxes, wiring, light fixtures, air conditioning ductwork and equipment, etc., to provide this access and shall reinstall same upon completion of work in the areas affected.

D. Where partitions, walls, floors, or ceilings of existing construction are indicated to be removed, all Contractors shall remove and reinstall in locations approved by the Architect/Engineer all devices required for the operation of the various systems installed in the existing construction. This is to include but is not limited to temperature controls system devices, electrical switches, relays, fixtures, piping, conduit, etc.

E. Outages of services as required by the new installation will be permitted but only at a time approved by the Owner. The Contractor shall allow the Owner two weeks in order to schedule required outages. The time allowed for outages will not be during normal working hours unless otherwise approved by the Owner. All costs of outages, including overtime charges, shall be included in the contract amount.

1.25 DEMOLITION AND RELOCATION:

A. The Contractor shall modify, remove, and/or relocate all materials and items so indicated on the Drawings or required by the installation of new facilities. All removals and/or dismantling shall be conducted in a manner as to produce maximum salvage. Salvage materials shall remain the property of the Owner, and shall be delivered to such destination or otherwise disposed of as directed by the Owner. Materials and/or items scheduled for relocation and which are damaged during dismantling or reassembly operations shall be repaired and restored to good operative condition. The Contractor may, at his discretion, and upon the approval of the Owner, substitute new materials and/or items of like design and quality in lieu of materials and/or items to be relocated.

B. All items which are to be relocated shall be carefully removed in reverse to original assembly or placement and protected until relocated. The Contractor shall clean and repair and provide all new materials, fittings, and appurtenances required to complete the relocations and to restore to good operative order. All relocations shall be performed by workmen skilled in the work and in accordance with standard practice of the trades involved.

C. When items scheduled for relocation and/or reuse are found to be in damaged condition before work has been started on dismantling, the Contractor shall call the attention of the Owner to such items and receive further instructions before removal. Items damaged in repositioning operations are the Contractor's responsibility and shall be repaired or replaced by the Contractor as approved by the Owner, at no additional cost to the Owner.

D. Service lines and wiring to items to be removed, salvaged, or relocated shall be removed to points indicated on the Drawings, specified, or acceptable to the Owner. Service lines and wiring not scheduled for reuse shall be removed to the points at which reuse is to be continued or service is to remain. Such services shall be sealed, capped, or otherwise tied-off or disconnected in a safe manner acceptable to the Owner. All disconnections or connections into the existing facilities shall be done in such a manner as to result in minimum interruption of services to adjacent occupied areas. Services to existing areas or facilities which must remain in operation during the construction period shall not be interrupted without prior specific approval of the Owner as hereinbefore specified.

1.26 CHECKING AND TESTING MATERIALS AND/OR EQUIPMENT:

A. Before the work is accepted, an authorized representative of the manufacturer of the installed materials and/or equipment shall personally inspect the installation and operation of his materials and/or equipment to determine that it is properly installed and in proper operating order. The qualifications of the representative shall be appropriate to the technical requirements of the installation. The qualifications of the representative shall be submitted to the owner for approval. The decision of the owner concerning the appropriateness of the representative shall be final. Testing and checking shall be accomplished during the course of the work where required by work being concealed, and at the completion of the work otherwise. In addition, the Contractor shall submit to the Architect/Engineer a signed statement from each representative certifying as follows: "I certify that the materials and/or equipment listed below have been personally inspected by the undersigned authorized manufacturer's representative and is properly installed and operating in accordance with the manufacturer's recommendations".

B. Check inspections shall include plumbing equipment, heating, air conditioning, insulation, ventilating equipment, controls, mechanical equipment and such other items hereinafter specified or specifically designated by the Architect/Engineer.

1.27 TESTS:

A. The Contractor shall make, at no additional cost to the Owner, any tests deemed necessary by the inspection departments having jurisdiction, and in the National Fire Protection Association, ASTM, etc. Standards listed. The Contractor shall provide all equipment, materials, and labor for making such tests. Reasonable amounts of fuel and electrical energy costs for system tests will be paid by the Owner. Fuel and electrical energy costs for system adjustment and tests which follow beneficial occupancy by the Owner will be borne by the Owner.

B. Additional tests specified hereinafter under the various Specification Sections shall be made.

C. The Construction Inspector shall be notified in writing at least 10 working days prior to each test and other Specification requirements requiring action on the part of the Construction Inspector. All equipment shall be placed in operation and tested for proper automatic control requirements before the balancing agency starts their work.

D. Maintain Log of Tests as hereinafter specified.

E. See Specifications hereinafter for additional tests and requirements.

1.28 LOG OF TESTS:

A. All tests shall have pertinent data logged by the Contractor at the time of testing. Data shall include date, time, personnel, description, and extent of system tested, test conditions, test results, specified results, and other pertinent data. Data shall be delivered to the Architect/Engineer as specified under "Requirements for Final Acceptance". All Test Log entries shall be legibly signed by the Project Contractor or his authorized job superintendent.

1.29 COOPERATION AND CLEANUP:

A. It shall be the responsibility of each trade to cooperate fully with the other trades on the job to help keep the job site in a clean and safe condition. At the end of each day's work, each trade shall properly store all of his tools, equipment and materials and shall clean his debris from the job. Upon the completion of the job, each trade shall immediately remove all of his tools, equipment, any surplus materials and all debris caused by that portion of the work.

1.30 CLEANING AND PAINTING:

A. All equipment, piping, conduit, ductwork, grilles, insulation, etc., furnished and installed in exposed areas under Divisions 15 and 16 of these Specifications and as hereinafter specified shall be cleaned, prepared, and painted according to the following specification. In the event of a conflict between the specifications referenced, the provisions of this specification shall prevail only for Division 15 and Division 16 work.

B. All purchased equipment furnished by the mechanical and electrical subcontractors shall be delivered to the job with a suitable factory protective finish with the colors hereinafter specified. The following materials shall not be painted: copper, galvanized metal, stainless steel, fiberglass, PVC, and PVDF.

C. Before painting, materials and equipment surfaces shall be thoroughly cleaned of cement, plaster, and other foreign materials, and all oil and grease spots shall be removed. Such surfaces shall be carefully wiped and all cracks and corners scraped out. Exposed metal work shall be carefully brushed down with the steel brushes to remove rust and other spots and left smooth and clean.

D. Color of finish painting in Mechanical Rooms shall be painted in accordance with The University of Texas Standard Color Schedule for machinery spaces using Pratt and Lambert, Inc.'s "Effector" enamel, or approved equal. For painting purposes, the equipment and piping inside of builtup air handling units shall be painted the same as if they were within the walls of a Mechanical Room. Two coats shall be applied with a light tint first coat and deep color for final coat. Colors shall be as follows:

(Note to engineer: Modify the material of this section to acrylic latex if painting is to be done in a hazardous environment.)

ITEM	COLOR	"P and L" PAINT NUMBER
Equipment Bases	Light Green	YG493M (Winter Pear)
Equipment	Green	YG511Y (Biscay Green)
Piping (Insulated and Uninsulated)	Light Gray	B798M (London Fog)
Hanger Rods	Same as "Piping" above	
Steam Traps and Metal Exposed to High Temperatures	Same as "Piping" above, high temp rated	
Atmospheric Relief Line	Same as "Piping" above	
Ductwork, AHU, Fans and Insulation	Buff	Y354M (Tawny Gold)
Valve Hand Wheels	Blu	B726M (Siam Blue)
Pump Couplings and Fuel Gas Piping (including natural gas, LPG, etc.)	Safety Yellow	Y361M (Daisy Yellow)
Fire Protection Equipment and Piping	Safety Red	R131R (Vibrant Red)

Note that the paint specified above is included for purposes of establishing a quality which shall be used on this project. The proposed paint shall be submitted, and alternatives will be considered using the submittal procedures specified in this document.

PART 2 PRODUCTS

2.01 Year 2000 Performance Warranty
For purposes of this warranty, the following definitions shall apply:

A. "Accurately" shall be defined to include:

1. Calculations correctly performed using four digit year processing;
2. Functionality on-line, batch, including but not limited to, entry, inquiry, maintenance and updates support four digit year processing;
3. Interfaces and reports must support four digit year processing;

4. Successful translation into year 2000 with valid date (e.g. CC/YY/MM/DD) without human intervention. Additional representations for week, hour, minute and second, if required, complies with the international standard ISO 8601:1988, "Data elements and interchange formats - Information exchange Representation of dates and time." When ordinal dates are used, the ISO standard format CCYYDDD is used;

5. Processing with four digit year after transition to any date beyond the year 2000 without human intervention;

6. Correct results in forward and backward date calculations spanning century boundaries;

7. Correct leap year calculations; and

8. Correct forward and backward date calculations spanning century boundaries, including conversion of previous years stored, recorded or entered as two digits.

B. "Date integrity" shall mean all manipulations of time-related data (dates, durations, days of week, etc.) will produce desired results for all valid date values within the application domain.

C. "Explicit century" shall mean date elements in interfaces and data storage permit specifying century to eliminate date ambiguity.

D. "Extraordinary actions" shall be defined to mean any action outside the normal documented processing steps identified in the product's reference documentation.

E. "General integrity" shall mean no value for current date will cause interruptions in desired operation- especially from the 20th to 21st centuries.

F. "Implicit century" shall mean for any data element without century, the correct century is unambiguous for all manipulations involving that element.

G. "Product" or "products" shall be defined to include, but is not limited to, any supplied or supported hardware, software, firmware and/or micro code.

H. "Valid date" shall be defined as a date containing a four digit year, a two digit month and a two digit day., or the ISO 8601:1988, Data elements - Information Exchange - Representation of dates and times". When ordinal dates are used, ISO standard format of CCYYDDD is used.

I. The contractor warrants that product(s) delivered and installed under this contract shall be able to accurately process valid date data when used in accordance with the product documentation provided by the contractor and require no extraordinary actions on the part of the Owner or its personnel. Products under this Contract possess general integrity, date integrity, explicit and implicit century capabilities. If the Contract requires that specific products must perform as a system in accordance with the foregoing warranty, then the warranty shall apply to those listed products as a system. The duration of this warranty and the remedies available the Owner for breach of this warranty shall be as defined in, and subject to, the terms and conditions contained in this Contract; provided, that notwithstanding any provision to the contrary in such commercial warranty or warranties, the remedies available to the Owner under this warranty shall include repair or replacement of any supplied product whose non-compliance is discovered and made known to the contractor in writing within one year after final acceptance, as that term is defined elsewhere in the contract. Nothing in this warranty shall be considered to limit any rights or remedies

the Owner may otherwise have under this contract with respect to defects other than Year 2000 performance.

J. Prior to final acceptance the Owner may require demonstration of correct system operation without manual intervention before and after roll over between the following dates:

Dec 31, 1998 - Jan 1, 1999 Tests for use of 9's as control code errors
Sep 9, 1999 - Sep 10, 1999 "
Dec 31, 1999 - Jan 1, 2000 Tests century digits rollover
Feb 28, 2000 - Feb 29, 2000 Tests recognition of leap year
Feb 29, 2000 - Mar 1, 2000 "
Mar 31, 2000 - Apr 1, 2000 "
Apr 30, 2000 - May 1, 2000 "
Dec 31, 2000 - Jan 1, 2001 Tests millennium rollover
Feb 28, 2001 - Mar 1, 2001 Tests recognition of no leap year
Dec 31, 2009 - Jan 1, 2010 Tests normal decade rollover
Dec 31, 2027 - Jan 1, 2028 ”

PART 3 EXECUTION

3.01 PIPE PRESSURE TESTS:

A. The following lines shall be tested at the stated pressure for the length of time noted:

Service	Testing Medium	Testing Pressure (PSIG)	Time in Hours
Domestic Cold Water	Water	150	24

B. Where leaks occur, the pipe shall be repaired and the tests repeated. No leaks shall be corrected by peening. Defective piping and joints shall be removed and replaced.

END OF SECTION

- 21 00 00 -

SECTION 21 41 23 – DOMESTIC WATER SURGE TANK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.

1.02 SUMMARY

A. Provide inside building domestic water storage tank system including; water tank, fill valves, controls, level sensing apparatus, alarm systems, control panels and relays, pipe connections, tank coatings and all accessories for a complete, operable, approved system that is acceptable to the Owner and Code Authorities. These systems shall be the unit responsibility of one supplier. Supplier shall be responsible for all required field installed electrical wire/conduit related to the tank level control system to maintain a single source of responsibility.

B. Tank systems covered by this section shall be located within interior locations having temperatures maintained between 40 and 100 degrees Fahrenheit.

1.03 REFERENCE STANDARDS

A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.

B. All reference amendments adopted prior to the effective date of this Contract shall be applicable to this Project.

C. All materials, installation and Workmanship shall comply with the applicable requirements and standards addressed within the following references:

1. ASTM A36 - Specifications for Structural Steel
2. AWS - American Welding Society, Inc.
3. AISC - American Institute of Steel Construction
4. SSPC-SP10 - Surface Preparation Steel Tanks
5. ANSI/NSF - Standard 61-Potable Water Tank Coatings
6. Steel Structures Painting - Manual, Volume 1, Good Painting Practices
7. City of Houston Plumbing Code

1.04 QUALITY ASSURANCE

A. Systems design shall be in conformance with the City of Houston Plumbing Code.

B. Obtain and become familiar with requirements of Owner's insurance underwriter and incorporate all applicable provisions for compliance.

C. Thoroughly and clearly document all Project related communications with code and regulatory agents and expediently forward communication documentation to UT Project Manager.

D. Tanks shall be constructed in accordance with AWS Specifications for vessel fabrication, with structural design in accordance with AISC latest issue.

E. All materials shall be new to assure against the possibility of contamination from previous usage.

F. Manufacturers shall maintain a local service organization and spare parts available from local stock.

G. Control panels shall be completely wired and tested prior to shipment.

1.05 SUBMITTALS

A. General:

1. No Work shall be performed until the Shop Drawings, and product data have been approved by UT. This will require early processing of all submittals. The Contractor is solely liable for any Work performed or material purchases made prior to this approval.

B. Product Data:

1. Include dimensioned fabrication Drawings of water tanks indicating all components and accessories.

2. Include drawing of annunciator panel, giving information including front panel elevation, nameplate text, component list, dimensions and wiring diagram.

3. Include cut sheets for tank fill valves, level alarm switches, accessories, and alarms.

4. Identify field connections for power supply, field wiring and BAS interface points. Include list of auxiliary points for BAS interface as described in Contract Documents.

5. Provide material and coating specifications.

C. Record Documents:

1. Record actual locations of tank, valves, pipe connections and control panels.

2. Provide certification of Drawings by a Structural Engineer, registered in the State of Texas, bearing seal and signature.

3. Provide written certification from the lining applicator verifying tank coating was provided and applied as specified and that the tests were performed and successful results obtained.

4. Provide full written description of manufacturer’s warranty.

D. Operation and Maintenance Data:

1. Operation and Maintenance Data: Include components of system, servicing requirements, Record Drawings, inspection data, component installation instructions, exploded valve assembly views, wiring diagrams, tank coating cleaning recommendations, replacement part numbers and availability, preventive maintenance schedule, preventive maintenance recommendations and procedures, location and contact numbers of service depot

1.06 DELIVERY, STORAGE AND HANDLING

A. Accept tank and components on Site in factory packing. Inspect for damage. Comply with manufacturers rigging and installation instructions.

B. Protect tank and components from physical damage including effects of weather, water, and construction debris.

C. Provide temporary inlet and outlet caps, and maintain in place until installation.

PART 2 - PRODUCTS

2.01 GENERAL

A. All materials shall meet or exceed all applicable referenced standards, federal, state and local requirements, and conform to codes and ordinances of authorities having jurisdiction.

2.02 ACCEPTABLE MANUFACTURERS

A. Tank - Unitank Systems by Albert Sterling & Associates, Inc.

B. Tank Coatings – McCrory Engineering, Inc. / Ameron

C. Level Alarms - Unipoint, Cougar Controls

D. Fill Valves - Cla-Val, Bermad

2.03 WATER TANK SYSTEM

A. Water Tank:

1. Provide circular tank system for domestic water storage with capacities of usable water as indicated on Contract Drawings.

2. Tank fittings and accessories shall include the following as a minimum and such other items as required for a complete operational, code compliant system and as indicated on the contact Drawings. Pipe connection sizes shall be as indicated on Contract Drawings.

a. Top - 1/4” steel plate minimum, ASTM A36.

b. Sides and bottom - ¼” steel plate minimum, ASTM A36.

c. Steel channel stiffeners welded to top and sides where required.

d. 24” x 24” manway with gasketed cover in top of tank.

e. 24” x 24” manway with bolted and gasketed cover in sidewall of tank.

f. Stainless steel ladders inside tank and coated ladder on outside of tank.

g. A return bend vent pipe with an area not less than one half of the area of the overflow riser; vent opening and overflow riser covered with a metallic screen of not less than one hundred (100) mesh.

h. 150 psi ANSI flanges and 3000 psi forged steel half couplings. (Provide stainless steel flanged nozzles and half couplings for domestic water compartment.)

i. Provide quantity of (2), 2" half couplings for level transmitter and backup level switches. Locate coupling on top of tank adjacent to ladder.

j. Provide (2) spare 2" couplings on top of tank.

k. Water level gauge consisting of two and one half inch angle valves with ball checks, ¼" needle drain valve with 5/8" rigid plastic Site glass on each tank or compartment. Rigid plastic sight glass to be run inside continuous baked urethane coated Unistrut to provide physical protection.

l. Metal nameplate affixed to tank giving the name of fabricator, date of fabrication and serial number of tank.

m. Domestic pump suction with 2' x 2' anti-vortex plate.

n. Overflow on domestic water storage tank.

2.04 WATER TANK PROTECTIVE COATING

A. All primers and paint coating shall comply with referenced standards for use on potable water systems.

B. Tank coating system shall be applied by a certified applicator approved by the manufacturer.

C. Surface Preparation: After fabrication and prior to applying interior tank coating, inside of tank shall be thoroughly cleaned and abrasive blasted on all interior surfaces including ceiling, floor, walls, manways, and nipples to NASE #2 near white surface to obtain a minimum surface profile of 2 mils.

D. Application shall conform to standards of Steel Structures Painting Manual, Volume 1, Good Painting Practice.

E. Interior Surfaces: Inside coating and top of tank coating will be McCrory-500 Epoxy Lining system and shall be applied with a minimum of two (2) coats to a minimum 15 to 18 mil D.F.T. (dry film thickness) to all interior surfaces including interior of nozzles and to the top of the tank. Tank coating system shall be manufactured and installed by McCrory Engineering, Inc. A Certificate of Compliance stating that the lining was installed in accordance with these specifications shall be provided by the Manufacturer/Applicator. McCrory Engineering, Inc. warranty for McCrory-500 is (6) six years utilizing the McCrory Engineering Preventative Maintenance program of inspections of the application in year 2 and 4 following the application.

F. Exterior Surfaces: Paint the outside of the tank, except top and bottom, with a shop coat of Ameron Amercoat 185H, 2 to 3 mils DFT, fast drying, lead and chromate free, rust inhibitive alkyd metal universal primer. One coat Ameron Amercoat 78HB quick dry coal tar epoxy, 16 mils DFT, shall be applied to the bottom of the tank. After the tank has been erected at the site another coat of primer and a final coat of finish paint shall be applied under another Division.

G. Set the bottom of the tank in a coat of mastic that completely covers the area under the tank. The thickness of the mastic shall be as recommended by the manufacturer to form a monolithic, highly impermeable membrane system compatible with the material of the tank. Mastic shall be Ameron Amercoat 78HB quick dry coal tar epoxy.

2.05 LEVEL ALARM SYSTEM

A. Provide level alarm and valve control sensors and level signal panel with all control relays, terminals, level sensing equipment alarms, and all other apparatus and accessories specified or necessary for complete signal and valve control system. System shall be the unit responsibility of one supplier and shall include all related field control wiring.

B. Provide the following and such other items as detailed on the Drawings:

1. Level Transmitter: continuous level sensor for measurement of full tank usable height Sensor shall have a 316 stainless steel housing with 316 stainless steel diaphragm seal, polyurethane or tefzel reinforced cable with vent tube and hydrophobic filter. Sensor shall feature a standoff plate to provide protection to seal, equal to Blue Ribbon Corp. Model 01. Provide 4-20mA signal and installation cable and fittings as required.

2. Back-up Level Devices: Provide back-up control probes equal to Gems 3G/3W2 316 Stainless steel to provide for redundant High Level Alarm (HLA) and redundant Low Level Alarm (LLA). Integrate back-up probes with control system.

3. Level Alarm and Valve Control Panel (120 volts, AC)

a. Cougar Controls UL 508a listed custom level control and alarm panel, NEMA 4X fiberglass enclosure.

b. Provide graphical HMI display/user interface on front of panel.

c. Display shall indicate tank level in real time, valve status and control set points.

d. Common alarm buzzer with silencing push button.

e. High and Low Level Alarm indication and water level readouts for each compartment.

f. When anti-flood block valve is provided, panel shall control valve and monitor/indicate valve position.

g. Auxiliary alarm contacts for remote alarm devices and BAS interface for each alarm condition. Provide a BAS aux. contact for general alarm/power monitoring of Controller. On fire tank applications provide a second set of aux. HLA & LLA alarm contacts for the fire alarm system.

h. Numbered terminal strip for field connections to sensors and remote alarm devices.

i. Duplex solenoid fill valve control with automatic alternation of lead valve and means of manually selecting the lead valve should a valve be out of service.

j. Fill valve HOA switch for each valve and valve 'ON' indication for each valve.

k. High level signal with block valve control when indicated.

l. Backup HLA and LLA switch contacts for both back-up operation and alarm indication.

2.06 FILL VALVES

A. Fill valves shall be sized and piped as indicated on Contract Drawings.

B. Provide Cla-Val No. 136G-03ABY normally closed, self contained solenoid fill valves with stainless steel trim, to be activated by the level transmitter.

C. Each water storage compartment shall be served by at least two fill valves. Valve operation shall be lead/lag with the lead fill valve automatically alternated after each fill cycle.

2.07 BLOCK VALVES

A. Block valves shall be sized and piped as indicated on Contract Drawings.

B. Provide normally open, self contained motor operated valve with external position indication and position feedback switches, equal to . Block valves shall be activated by the high level signal from the respective tank or tank compartment. Provide bi-directional dead-end service butterfly valve as follows:

1. Lug Style Body – Cast Iron, Ductile Iron or Carbon Steel

2. Disc – Stainless Steel or Aluminum Bronze

3. Stem – Stainless Steel

4. Seat – EPDM, Buna-N or Viton/FKM

5. Valve shall be equal to DelVal Series 50/52

6. Actuator Housing – Aluminum housing with weather resistant coating

7. Actuator Gearing – Self locking, double worm design to provide high output torque.

8. Actuator Seal – Provide IP 67 rated sealing

9. Actuator Limit Switches – Provide Open/Closed adjustable limit switches with two auxiliary switches

10. Actuator Heater – Provide internal heater toprevent condensation

11. Actuator – Provide manual override, visual position indication, Open/Close adjustable stops and related valve mounting hardware as required.

C. Block valve shall not be required where the tank overflow discharges directly outside the building.

PART 3 - EXECUTION

3.01 INSTALLATION, TESTING AND START-UP

A. Installation shall meet or exceed all applicable federal, state and local requirements, referenced standards and conform to codes and ordinances of authorities having jurisdiction.

B. All installation shall be in accordance with manufacturer's published recommendations.

C. Provide 4" thick reinforced concrete housekeeping pad under water tank system.

D. Provide individual manual shutoff valves to isolate each fill valve for servicing. Manual shutoff valves that isolate fire protection water supply shall be provided with tamper switches.

E. Provide block valves on tank fill lines only when tank overflows cannot discharge by gravity onto grade through an exterior wall.

F. Provide full line size valve bypass up to 2-1/2" around block and fill valves for tank compartment to allow manual filling.

G. Electrical power serving tank level control and monitoring shall be from emergency source.

H. Coordinate BAS points list and testing of points with BAS Contractor.

I. Tank water levels for the Level Alarm and Valve Control System shall be field selectable. Levels shall be as indicated on Contract Drawings and as recommended by the tank manufacturer.

J. Provide a representative of the Level Alarm and Valve Control System manufacturer to supervise the final adjustment of the level alarm and valve control system after installation is complete.

K. Provide a representative of the Level Alarm and Valve Control System manufacturer, after success completion of commissioning integrated systems test, to instruct the Owner's operating personnel in its use.

L. Wiring between components on the tank and the control panel included within this specification shall be responsibility of the Alarm and Valve System Supplier. Power to panel by Division 16.

M. All flow switches, valve supervisory switches and alarms installed within fire protection water supply shall be coordinated with the Fire Alarm Contractor for a complete, operable and approved system.

N. Interior Coating Inspection:

1. Inspection to commence only after the coating has sufficiently cured, usually one to five days. (Consult the coating manufacturer for specific curing schedule.)

2. Film Thickness: check with a non-destructive, magnetic pull-off type gauge such as a Mikrotest Model DFG-100 or electronic thickness gauge. Verify accuracy of thickness gauge with National Bureau of Standards certified thickness calibration plates.

3. Holiday Test: Furnish a 67-½ volt DC, 80,000 ohm Tinker-Rasor wet sponge holiday detector, or equal, and test all interior surfaces for holidays.

3.02 WARRANTY

A. The complete system shall be warranted in writing against defects in materials or Workmanship under normal use and service for a period of one year after date of Substantial Completion.

B. Contractor shall completely clean surge tank and flush lines of debris prior of final inspection.

END OF SECTION 21 41 23

SECTION 22 10 00 – PLUMBING PIPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions shall apply to this Section.

B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.

1.02 SUMMARY

A. Provide materials and installation for installation of Domestic Water Piping, Domestic Water Valves, Testing and other normal parts that make the systems operable, code compliant and acceptable to the authorities having jurisdiction.

1.03 REFERENCE STANDARDS

A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.

B. All reference amendments adopted prior to the effective date of this Contract shall be applicable to this Project.

C. All materials, installation and workmanship shall comply with the applicable requirements and standards addressed within the following references:

1. 2009 Edition of the International Plumbing Code.

2. NSF/ANSI 61 : Drinking Water System Components - Health Effects.

3. NSF/ANSI 372 : Drinking Water System Components – Lead Content

1.04 QUALITY ASSURANCE

A. Manufacturer’s name and pressure rating shall be permanently marked on valve body.

B. Manufacturer Qualifications: Company shall have minimum three years documented experience specializing in manufacturing the products specified in this section.

C. All grooved joint couplings, fittings, flanges, valves, and specialties of the same type shall be the products of a single manufacturer. Grooving tools shall be of the same manufacturer as the grooved components.

D. Installer Qualifications:

1. Company shall have minimum three years documented experience specializing in performing the work of this section.

2. Installation of plumbing systems shall be performed by individuals licensed by the Texas State Board of Plumbing Examiners as a Journeyman or Master Plumber. Installation may be performed by Apprentice Plumbers provided they are registered with the Texas State Board of Plumbing examiners and under direct supervision of a licensed plumber. All installation shall be supervised by a licensed Master Plumber.

1.05 SUBMITTALS

A. Product Data:

1. Code and Standards compliance, manufacturer's data for pipe, fittings, valves and all other products included within this specification section.

2. Grooved joint valves, couplings and fittings shall be specifically identified with the applicable style or series designation.

3. Manufacturer’s installation instructions.

B. Record Documents:

1. Record actual locations of valves, etc. and prepare valve charts.

2. Test reports and inspection certification for all systems listed herein.

3. Provide a certificate of completion detailing the domestic water system chlorination procedure and all laboratory test results.

4. Provide full written description of manufacturer’s warranty.

C. Operation and Maintenance Data:

1. Include components of system, servicing requirements, Record Drawings, inspection data, installation instructions, exploded assembly views, replacement part numbers and availability, location and contact numbers of service depot.

1.06 DELIVERY, STORAGE AND HANDLING

A. All materials shall be new, undamaged, and free of rust.

B. Accept valves on Site in shipping containers and maintain in place until installation.

C. Provide temporary protective coating and end plugs on valves not packaged within containers. Maintain in place until installation.

D. Provide temporary end caps and closures on pipe and fittings. Maintain in place until installation.

E. Protect installed piping, valves and associated materials during progression of the construction period to avoid clogging with dirt, and debris and to prevent damage, rust, etc. Remove dirt and debris and repair materials as work progresses and isolate parts of completed system from uncompleted parts.

F. Protect all materials that are to be installed within this project from exposure to rain, freezing temperatures and direct sunlight. EXCEPTION: Materials manufactured for exterior locations.

PART 2 - PRODUCTS

2.01 GENERAL

A. All materials shall meet or exceed all applicable referenced standards, federal, state and local requirements, and conform to codes and ordinances of authorities having jurisdiction.

B. Provide materials as specified herein and indicated on Contract Drawings. All materials and work shall meet or exceed all applicable Federal and State requirements and conform to adopted codes and ordinances of authorities having jurisdiction.

C. Pressure ratings of pipe, fittings, couplings, valves, and all other appurtenances shall be suitable for the anticipated system pressures in which they are installed.

D. .

2.02 DOMESTIC WATER PIPING (COLD WATER)

A. All materials within domestic water distribution systems that may come in contact with the potable water delivered shall be UL classified in accordance with ANSI / NSF-61 for cold potable water service, and shall be certified to the low lead requirements of NSF-372. Manufacturer must provide written documentation of compliance.

B. Unburied piping sizes 2-1/2” and larger may be type “L” hard drawn copper and wrought copper or cast copper alloy roll groove fittings Style 607 Quick Vic utilizing no-sweat coupling with NSF 61 and NSF 372 approved gasket for cold water, and flange adapter Style 641 assemblies as manufactured by Victaulic or Owner approved equal by Anvil or match existing installation.

1. Flaring of tube and fitting ends to IPS dimensions is not allowed.

2. Provide a phenolic flange washer with flange adapter when the mating flange face is not a smooth, hard surface. Refer to manufacturer’s installation instructions for additional details.

C. Unburied piping sizes ½” through 4" installed within occupied buildings for modifying existing systems may utilize copper press fittings when the following conditions are met:

1. Written approval of the Owner's Property Manager shall be obtained prior to bidding.

2. Fittings shall be installed in portions of systems having an operating pressure that will not exceed 200 p.s.i.g.

3. Fittings shall conform to the material and sizing requirements of ASME B16.18 or ASME B16.22.

4. O-rings for copper press fittings shall be EPDM. Copper press fittings shall be rated at 200 psi working pressure and 250 degree working temperature.

5. All copper press fittings, couplings and specialties shall be manufactured by Viega.

6. Installation tools shall be as recommended by the fittings manufacturer.

D. Solder for copper piping shall be lead-free Tin/Copper/Silver/Nickle(optional) solder conforming to ASTM B32, Wolverine Silvabrite 100 Lead-Free Solder or Harris Nick Lead-Free Solder. Use water soluble flux recommended by solder manufacturer and conforming to ASTM B813 and NSF 61, Wolverine Silvabrite 100 Water Soluable Flux or Bridgit Water Soluble Paste Flux.

E. Dielectric waterway fittings shall have a copper-silicon casting or a zinc electroplated steel pipe body with high temperature stabilized polyolefin polymer liner; manufactured by Victaulic, Style 647 or PPP, Inc. Series 19000, or Owner approved equal by Anvil.

F. Dielectric unions shall be rated at 250 psi, ground-joint type with inert, non-corrosive thermoplastic sleeve. End connection materials shall be compatible with respective piping materials; manufactured by EPCO Sales, Inc or Watts. Provide models to suit applicable transitions.

G. Dielectric flanges shall be rated at 175 psi, have nylon bolt isolators and dielectric gasket. Materials shall be compatible with respective piping materials; manufactured by EPCO Sales, Inc or Watts. Provide models to suit applicable transitions.

H. Pipe joint compound shall be lead-free, non-toxic, non-hardening and compliant with ANSI/NSF 61 and Federal Specification TT-S-1732. Temperature service range of -15ºF to +400ºF, manufactured by Hercules “MegaLoc” or approved equal by Rectorseal, La-Co or Oatey.

2.03 DOMESTIC WATER VALVES: (COLD WATER)

A. All materials within domestic water distribution systems that may come in contact with the potable water delivered shall comply with ANSI/NSF Standard 61.

B. All brass and bronze valve materials within domestic water distribution systems that may come in contact with the potable water delivered shall have no more than 15% zinc content.

C. Similar types of valves shall be the product of one manufacturer; i.e., all butterfly valves shall be of the same manufacturer, all ball valves shall be of the same manufacturer, etc.

D. Line Shut-Off Valves 2-1/2” and larger where system operating pressure will not exceed 160 p.s.i.g. shall be 200 WOG threaded lug type ductile iron body butterfly valve with extended neck, lockable lever handle, 416 stainless steel stem, aluminum bronze disc, EPDM liner and seal, suitable for bi-directional flow and dead end service with downstream flange removed. Acceptable valves are NIBCO Model LD-2000, or approved equivalent model by Keystone, Jamesbury, Milwaukee, Crane or Apollo.

E. Line Shut-Off Valves 2-1/2” and larger installed within systems having design operating pressures between 160 and 250 p.s.i.g. shall be threaded lug type ductile iron body butterfly valve with extended neck, lockable lever handle, 316 stainless steel stem and disc, EPDM liner and seal, suitable for bi-directional flow and dead end service with downstream flange removed. Acceptable valves are NIBCO Model LD-3022, or approved equivalent model by Keystone, Jamesbury, Dezurik, Milwaukee, Crane or Apollo.

F. Line Shut-Off Valves 2-1/2" and larger installed in roll grooved copper systems may be 300 psi roll grooved end type bronze body butterfly valve with lockable lever handle, aluminum bronze disc, with pressure responsive Grade CHP Fluoroelastomer seat, stem shall be offset from the disc centerline to provide complete 360-degree circumferential seating, suitable for bi-directional flow and dead end service. Manufactured by Victaulic Series 608N or Anvil Model B680.

G. Provide stem extensions of a non-thermal conducting material for valves in insulated lines to allow unobstructed operation.

PART 3 - EXECUTION

3.01 PREPARATION

A. Ream pipes and tubes. Remove burrs, scale and dirt, inside and outside, before assembly. Remove foreign material from piping.

B. Prepare piping connections to equipment with flanges or unions.

3.02 INSTALLATION

A. Installation shall meet or exceed all applicable federal, state and local requirements, referenced standards and conform to codes and ordinances of authorities having jurisdiction.

B. All installation shall be in accordance with manufacturer's published recommendations.

C. General

1. Care shall be exercised to avoid all cross connections and to construct the plumbing systems in a manner which eliminates the possibility of water contamination.

2. Install all materials and products in accordance with manufacturer's published recommendations. Use tools manufactured for the installation of the specific material or product.

3. Wipe all paste residue and excess solder from all solder joints.

4. Heat generated by soldering procedures shall not be transmitted to valves, copper alloy roll groove fittings, copper press fittings, no-hub clamps, or any other components installed within the piping system that may be damaged due to high temperatures. Contractor shall take all precautions necessary, including utilizing wet wrapping or allowing heated piping to cool to ambient temperature before attachment.

5. Pipe joints, no-hub clamps, flanges, unions, etc., shall not directly contact or be encased in concrete, or be located within wall, floor or roof penetrations.

6. Route piping in direct orderly manner and maintain proper grades. Installation shall conserve headroom and interfere as little as possible with use of spaces. Route exposed piping parallel to walls. Group piping whenever practical at common elevations.

7. Install piping to allow for expansion and Contraction without stressing pipe, joints or connected equipment.

8. Furnish all supports required by the piping included in this specification section.

9. Piping shall be insulated in accordance with Contract Documents.

10. Provide clearance for installation of insulation and for access to valves, air vents, drains, unions, etc.

11. Provide dielectric isolation device where non-ferrous components connect to ferrous components. Devices shall be dielectric union, coupling or dielectric flange fitting.

12. All piping shall be isolated from building structures, including partition studs, to prevent transmission of vibration and noise.

13. Isolate all bare copper pipe from ferrous building materials. “Tape is not an acceptable isolator.

D. Domestic Water System

1. Install all water piping to allow all piping within the system to be drained at low points.

2. Solder joint fittings shall not be installed within 24" of a copper press fitting.

E. Domestic Water Valves

1. Domestic water shut-off valves shall be installed where shown on Drawings, at each fixture and piece of equipment, at each branch take-off from mains, at the base of each riser, and at each battery of fixtures.

2. When altering or connecting to existing domestic water systems, verify that existing line shut-off valves provide positive isolation from the sections of piping serving areas outside of the Project Boundaries. Install new line shut-off valves where valves do not exist to provide positive isolation.

3. Install shut-off valves with stems upright or horizontal, not inverted.

4. Where threaded valves are installed in copper piping systems special care shall be taken to avoid damaging the valve or its parts due to overheating. Install copper or bronze male adapters in each inlet of threaded valves. Sweat solder adapters to pipe prior to connecting to valve body.

3.03 TESTING AND CLEANING

A. General

1. Equipment, material, power, and labor necessary for the cleaning, flushing, sterilization, inspection and testing of systems covered within this Specification Section shall be furnished by the Plumbing Contractor. All testing and inspection procedures shall be in accordance with Division 01 and Special Condition requirements of this Contract.

2. For any requested inspection, the Contractor shall complete prior inspections and tests to ensure that items are ready for inspection and acceptance by the Owner and/or Architect/Engineer. The Contractor shall be responsible for any and all costs incurred by Owner and/or Owner representatives, including consultants, resulting from a review or inspection that was scheduled prematurely.

3. The Contractor shall conduct the tests and the Owner's Construction Inspector will witness and approve the results.

4. Verify systems are complete, flushed and clean prior to testing. Isolate all equipment subject to damage from test pressure. Test and inspect for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. Piping being tested shall not leak nor show any loss in test pressure for duration specified.

5. Leave piping uninsulated, uncovered and unconcealed until it has been tested and approved. Where any portion of piping system must be concealed before completion of entire system, the portion shall be tested separately as specified for the entire system prior to concealment. Contractor shall expose all untested covered or concealed piping.

6. In cases of minor installation and repairs where specified water and/or air test procedures are deemed impractical, Contractor shall obtain written approval from Owner's Representative to perform alternate testing and inspection procedures. Alternate testing and inspection procedures for minor installation and repairs shall include visual evaluation of installed components by Owner's Representative during a simulation of use.

7. The water utilized for tests shall be obtained from a potable source of supply.

8. Prepare testing reports. If testing is performed in segments, submit separate report for each segment, complete with diagram or clear description of applicable portion of piping. After inspection has been approved or portions thereof, certify in writing the time, date, name and title of the persons reviewing the test. This shall also include the description of what portion of the system has been approved. Obtain approval signature by Owner's Representative. A complete record shall be maintained of all testing that has been approved, and shall be made available at the job Site. Upon completion of the work, all records and certifications approving testing requirements shall be submitted to the Owner's Representative before final payment is made.

9. Gauges used for testing shall have increments as follows:

   a. Tests requiring a pressure of 10 psi or less shall utilize a testing gauge having increments of 0.10 psi or less.

   b. Tests requiring a pressure of greater than 10 psi but less than or equal to 100 psi shall utilize a testing gauge having increments of 1 psi or less.

   c. Tests requiring a pressure of greater than 100 psi shall utilize a testing gauge having increments of 2 psi or less.

B. Domestic Water System

1. Testing:

a. Subject piping system to a hydrostatic pressure of at least 125 pounds per square inch gauge, but not less than the operating pressure under which it is to be used, for a period of no less than 12 hours. During test period, all pipe, fittings and accessories in the particular piping system that is being tested shall be carefully inspected. If leaks are detected, such leaks shall be stopped and the hydrostatic test shall again be applied. This procedure shall be repeated until no leaks are detected for an entire 12 hour period. This pressure shall be held for a test period of at least 15 minutes while being witnessed by the Owner's Representative.

b. EXCEPTION: Piping located above sensitive areas and/or equipment that may be damaged or become contaminated due to test water leakage shall be tested with oil-free air in lieu of water.

2. Flushing, Cleaning and Disinfection:

a. Where specified procedures are deemed impractical, Contractor shall obtain written approval from Owner’s Representative to perform alternate flushing, cleaning and/or disinfection procedures.

b. After completion of the testing, all new and/or altered water piping systems shall be thoroughly sterilized with a solution containing not less than 50 parts per million of available chlorine. Do not exceed 150 parts per million at any time. Introduce chlorine into the supply stream at a rate sufficient to provide a uniform concentration throughout the system. All outlets shall be opened and closed several times. When the specified level of chlorine is detected at every outlet in the system, close all valves to prevent release of water from the system for 24 hours. At the completion of the 24 hour disinfection period, test every outlet for a minimum chlorine residual of fifty parts per million. This minimum residual must be present to proceed with flushing. Flush the system with clean water at a sufficient velocity until the residual chlorine detected at every outlet is within 0.2 parts per million of the normal water supply’s level.

c. Sufficient samples must be taken no sooner than 24 hours after sterilization and flushing to represent the extent and complexity of the affected water system, along with a control sample to indicate municipal water quality at the time of testing. Send water samples to an accredited laboratory to perform qualitative and quantitative bacteriological analysis in accordance with AWWA C651. Contractor shall obtain written certification from the independent testing agency stating that the water samples meet Federal and State guidelines for safe drinking water. Upon satisfactory completion of all procedures, and receipt of acceptable laboratory test results, obtain written approval by Owner's representative. Failure to fully comply with the above procedures will result in a requirement to repeat the procedure until acceptable results are achieved, at no additional cost to the Owner.

d. Prior to injection of chlorine into the piping system, strategically place signs stating “Heavily Chlorinated Water - Do Not Drink”, and protect all outlets to prevent use during disinfection and flushing procedures.

END OF SECTION 22 10 00