

SHIREMANSTOWN BOROUGH COUNCIL
SHIREMANSTOWN BOROUGH STORAGE AND MAINTENANCE BUILDING

Section 6
Contract 15609.655-4

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PLUMBING - Contract 15609.655-4

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**SECTION 1
SPECIAL CONDITIONS
Contract 4 - Plumbing**

A. GENERAL

1. Scope of Project

a. Location

The Project is a new municipal storage and maintenance building for the Owner (Shiremanstown Borough) located along East Strawberry Alley, adjacent to the municipal building on 1 Park Lane in Shiremanstown Borough, Cumberland County, Pennsylvania in accordance with the Contract Documents.

b. Scope

It is the intent of the drawings and specifications to describe the construction of the municipal garage to be performed under separate prime contracts (the "Prime Contracts") as described below. Each Prime Contractor shall furnish all labor, materials, equipment, machinery, apparatus and tools and perform all operations necessary to install, equip and put into satisfactory operation the Work specified and shown on the Plans.

Any labor, materials, equipment, or apparatus not specifically mentioned in the plans or specifications which may be necessary for the proper completion of the entire Work shall be furnished by each Prime Contractor without additional compensation.

c. Contract Documents

The Contract Documents as defined in the Standard Contract Provisions which are made a part hereof. In the event of any inconsistency, the provisions of this Division I shall control.

d. Starting and Completing Work

The Contract work shall be started immediately upon receipt of a written notice from the Owner and shall be continued in full force until completion, unless approval to suspend work is granted by the Owner or unless delays occur due to unfavorable weather.

Before filing his bid, the Bidder shall have made all arrangements to be fully equipped to expeditiously carry on all work in case he is awarded a Contract and shall have made all arrangements to permit immediate transportation to the site of the work of all equipment, materials and other facilities required to execute the work.

In scheduling his operations, the Contractor shall take into consideration all delays that may occur due to unfavorable weather; failure of public utilities or others to install, remove or adjust their structures when required; and the uncertainties prevailing on account of a national emergency in regard to obtaining critical materials and labor to complete the various portions of such work in time.

e. Release of Lien

The Contractor shall provide to the Shiremanstown Borough Council a Release of Lien in a format acceptable to the Borough and properly signed by all tradesmen or suppliers which provided either materials or labor for the work performed under this contract. This Release of Lien shall be presented to the Shiremanstown Borough at the time of application for final payment.

2. Summary

- a. This Section includes a summary of each contract, including responsibilities for coordination and temporary facilities and controls.
- b. Specific requirements of each contract are also indicated in individual Specification Sections and on Drawings.
- c. Related Sections include the following:
 - 1) Section 2- Work Restrictions: Use of the Project site and for requirements for continued Owner occupancy of premises.
 - 2) Section 3 - Submittal and Testing Procedures.

3. Definitions

a. Permanent Enclosure

As determined by Architect/Engineer, permanent or temporary roofing, which is complete, insulated, and weathertight; exterior walls are insulated and weathertight; and all openings are closed with permanent construction or substantial temporary closures.

4. Prime Contracts

- a. Prime contracts for Project include the following:
 - Contract 1 – General Construction (Contract 15609.655-1)
 - Contract 2 – Mechanical Construction (Contract 15609.655-2)
 - Contract 3 – Electrical Construction (Contract 15609.655-3)
 - Contract 4 – Plumbing Construction (Contract 15609.655-4)

5. Coordination

a. Project Coordinator shall be responsible for coordination among all Prime Contractors.

1) General Construction Contractor ("General Contractor") shall act as the Project Coordinator.

b. General Contractor

1) The General Contractor shall have coordination responsibility of all and each prime contractors. This shall include:

a) Providing a master project schedule ("Master Project Schedule") which includes each separate Prime Contractor's scheduled responsibilities for delivery dates, installation, construction and critical activities for the Project.

b) Direct, schedule and control onsite activities of each separate Prime Contractor.

c) Provide specific directions to each Prime Contractor when unforeseen interferences impact the progress of the work.

2) The General Contractor shall be experienced in administration and supervision of building construction, including the scheduling and coordination of plumbing, HVAC and electrical work.

3) The coordination activities of the General Contractor include, but are not limited to, the following:

a. Provide overall coordination of the Work.

b. Coordinate shared access to workspaces.

c. Coordinate product selections for compatibility.

d. Provide overall coordination of temporary facilities and controls.

e. Coordinate, schedule, and approve interruptions of permanent and temporary utilities, including those necessary to make connections for temporary services.

f. Coordinate construction and operations of the Work with work performed by each contract.

g. Prepare Coordination Drawings (if and as required) to coordinate work by more than one contract.

h. Coordinate sequencing and scheduling of the Work.

j. Provide quality-assurance and quality-control services.

- k. Coordinate sequence of activities to accommodate tests and inspections, and coordinate schedule of tests and inspections with the testing laboratory.
- l. Provide information necessary to adjust, move, or relocate existing utility structures affected by construction.
- m. Set elevations provided by the Engineer. The General Contractor shall also be responsible for setting all corners, batterboards, off-set stakes and other construction lines from property lines or other reference points provided by the Engineer.
- n. Provide waste collection and progress cleaning of common areas and coordinate waste collection, recycling and progress cleaning of areas or pieces of equipment where more than one contractor has worked.
- o. Coordinate cutting and patching of all the Work.
- p. Coordinate protection of the Work.
- q. Coordinate preparation of Project Record Documents; all information from all contractors is to be integrated to form one combined record set.
- r. Print and submit Record CAD Drawings if installations by more than one contractor are indicated on the same Contract Drawing or Shop Drawing.
- s. Collect Record Specification Sections from other contractors, collate Sections into numeric order, and submit one complete set.
- t. Coordinate preparation of operation and maintenance manuals; all information from all contractors is to be integrated to form one combined record set.

c. Prime Contractors

- 1) Each Prime Contractor shall be responsible to the General Contractor to coordinate that Prime Contractor's onsite activities. This includes submission of detailed information relating to the scheduling activities of material procurement, delivery dates, installation timeframes and notification of required work to be completed by other Prime Contractors prior to the installation of each Prime Contractor's work.
- 2) All onsite interferences with other trades shall be coordinated with the General Contractor. Unforeseen conditions that may arise and necessitate a Construction Change Directive shall be conveyed to the Engineer but shall be coordinated with the General Contractor.

- 3) The General Contractor shall be experienced in administration and supervision of building of building construction, including the scheduling and coordination of mechanical, plumbing and electrical work.

6. Schedules

a. Pre-Award Information

The apparent low bidder for each Prime Contract shall, within ten (10) working days following notification of its status as apparent low bidder, provide the Engineer with an intended schedule for work to be completed. The Engineer shall transmit the information to the apparent General Contractor low bidder.

b. Master Project Schedule

Within ten (10) working days following receipt of the information set forth in subsection a. above, the apparent low bidder for the General Construction Contract shall provide the Engineer with a Master Project Schedule which incorporates the schedules of the other Prime Contractors and which Master Project Schedule shall be controlling on all of the Prime Contractors thereafter.

Upon receipt, the Engineer shall provide a copy of the Master Project Schedule to each Prime Contractor along with the Notice of Award. No changes or deviations from the Master Project Schedule shall be permitted without approval from the Engineer and, if the change or deviation involves an extension in the time for completing the required Work, a written change order or directive as the case may be.

c. Form of Schedule

The Master Project Schedule shall be a critical path schedule in such form as is approved by the Engineer.

- d. Failure to adhere to the Master Project Schedule by any Prime Contractor shall be considered a default of that Prime Contractor.

7. All Prime Contracts

a. Extent of Contract

Unless the Contract Documents contain a more specific description of the Work, names and terminology on Drawings and in Specification Sections determine which contract includes a specific element of Project.

- 1) All Work described in this Section for each contract shall be complete systems and assemblies, including products, components, accessories, and installation required by the Contract Documents.

- 2) Local custom and trade-union jurisdictional settlements do not control the scope of the Work of each contract. When a potential jurisdictional dispute or similar interruption of work is first identified or threatened, affected contractors shall negotiate a reasonable settlement to avoid or minimize interruption and delays.
- 3) Trenches for the Work of each contract shall be coordinated with and provided by the General Contractor unless otherwise specified (electrical service). See General Contractor specification for trenching specifications.
- 4) Selective demolition for the work of each contract shall be coordinated with the General Contractor and shall be provided by each Prime Contractor for its own work.
- 5) Cutting and patching for the Work of each contract shall be coordinated with the General Contractor and shall be provided by each Prime Contractor for its own Work.
- 6) Firestopping for the Work of each contract shall be coordinated with the General Contractor and shall be provided by each Prime Contractor for its own Work.

b. Substitutions

Each contractor shall cooperate with other contractors involved to coordinate approved substitutions with remainder of the Work.

c. Temporary Facilities and Controls

Each Prime Contractor is responsible as follows:

1) Access to the Construction Site

Access for all Prime Contractors to the Project site is the responsibility of the General Contractor, which shall construct and maintain temporary roads as necessary. Temporary roads shall be adequate to permit the entrance and egress of construction and supply vehicles of all contractors at all times during the construction period. No contractor/worker, or any subcontractor or supplier shall be permitted to use the existing driveways or any portion of the existing parking facilities without the approval of the Engineer.

2) Temporary Services

Each Prime Contractor is specifically responsible for the installation, operations, maintenance and removal of each temporary service or facility, usually recognized as related to that contractor's normal scope of work.

3) Use/Utility Charges

a) General

All utility charges for temporary facilities shall be paid for by the General Contractor. The Owner will not assume responsibility for any utility costs until the Certificate of Completion has been issued for the Project. Use charges (i.e., tapping fees, 3Ø power) will be paid by the Owner.

b) Sanitary Sewer Service

There shall be no discharge into the existing sanitary sewer system without prior written authorization by the Borough Engineer.

c) Water Service

Cost of all metered water service used by each Prime Contractor shall be the responsibility of the General Contractor.

For Shiremanstown Borough facility construction, water can be provided by the Borough from the existing service line at the Borough Office for low volume service, at the discretion of the Borough. Borough reserves the right to halt provision of water at its discretion.

d) Electrical Power Service

The cost for all temporary electric power service at the Project Site by all Prime Contractors shall be the responsibility of the General Contractor.

For Shiremanstown Borough facility construction, electricity can be provided by the Borough from the existing service line at the Borough building or alternate location for general service, at the discretion of the Borough. Borough reserves the right to halt provision of electricity at its discretion.

e) Utility Extensions

The cost of extending utilities to and on the Project Site shall be as is otherwise set forth in the plans and specifications.

f) Security and Protection Facilities

The General Contractor shall be responsible for installing temporary enclosures around partially completed areas of construction and provide lockable entrances to prevent unauthorized entrance, vandalism, theft and similar violations of security. Each Prime Contractor shall be responsible for securing that contractor's own equipment and materials. In the event of loss, the Owner shall not be responsible. Each Prime Contractor shall be responsible to secure the Project work area at the end of each workday.

d. Right of Property

No Prime Contractor shall have any right in any property or materials taken from any excavation and no earth, sand or other material from the Site shall be removed before any fill operations, except with the approval of the Engineer. The provisions of this paragraph shall not be construed to relieve any Prime Contractor of any of its obligations to remove and dispose of any excavated material with or without re-handling at its cost and expense as otherwise provided in the specifications.

e. Concrete Mix Computations

In addition to the requirements of the specification "Concrete Construction," the Contractor shall employ a testing laboratory to prepare computations of the concrete mixes to be used, and submit the computations to the Engineer for approval. Such approval will not relieve the Contractor of responsibility of the mixes.

f. Minimum Wage Rates

The applicable Pennsylvania prevailing wage determination for this Project are attached to the Contract Documents and shall be complied with in accordance with the instructions to bidders.

g. Painting Work by Others

All pipe, conduit, equipment installed under the Electrical Prime Contract (Contract 15609.655-3) shall be painted by the General Contractor (Contract 15609.655-1). Colors shall be as directed by the Engineer.

h. Safety and Health Regulations

Each Prime Contractor shall comply with the Department of Labor, Safety and Health Administration Regulations for construction promulgated under the Occupational, Safety and Health Act of 1970 (P.L. 91-596) and under Section 107 of the Contract Hours and Safety Act (P.L. 91-54).

i. Miscellaneous

1) Vehicle Removal and Barricades

Removal of vehicles, barricading and other operations necessary for the completion of the required work for each Prime Contractor is the responsibility of that Contractor.

2) Designated Representative

Each Prime Contractor shall provide at least one responsible worker to answer emergency calls on a 24-hour basis and perform emergency service during non-working hours for any condition resulting from that Prime Contractor's construction activities which may present a hazard to the Project or to the public. This worker shall make himself available at any time of the day or night and any day of the week for any required emergency work and shall have available a proper vehicle, supplies and materials together with such authority as is required from the Prime Contractor to adequately perform his duties hereunder. If a contractor is notified of a deficiency which is not corrected within two hours from the time of notification, then the Owner may initiate repairs and the responsible Prime Contractor will be back charged.

3) Changes in the Project

Any changes in the Project which involve cost adjustments shall be only in accordance with the change order procedures otherwise set forth in the General Conditions.

4) Payments

Payments to each Prime Contractor shall be in accordance with payment applications as otherwise set forth in the general conditions and shall be in accordance with a lump sum contract price.

5) Time for Completion and Liquidated Damages

The responsibility to perform the Work for each Prime Contract shall commence upon receipt of a Notice to Proceed from the Engineer and shall continue in full force until completion which shall be within **180 (one hundred eighty) calendar days** from the date of receipt of the Notice to Proceed from each Prime Contract. No delays will be permitted unless a change order granting an extension of time is issued and approved by the Owner.

The parties recognize that the Owner will incur damages if the Project is not completed within the 180 day time period, and also recognize that these damages shall be difficult to ascertain or quantify. After reasonable investigation and consideration, and by executing the Contract, each Prime Contractor agree that **\$1000 per day** is a best effort estimate for damages resulting from delay in completion to the Owner. The Prime Contractors also agree that any damages resulting from failure to perform and complete the Work under each Prime Contract shall result in additional damages as are otherwise permitted to the Owner under applicable Pennsylvania law and which shall include additional engineering fees, inspection work and any other damages which are properly recoverable.

6) Insurance

Each Prime Contractor shall provide evidence of coverage of insurances as required under the General Conditions.

7) Indemnification

Each Prime Contractor shall indemnify and hold harmless the Owner, the Engineer and their respective agents and employees from and against all claims, damages, losses and expenses, including attorney's fees arising out of or resulting from the performance of that Prime Contractor's Work, providing that any such claim, damage, loss or expense is:

- a) attributable to bodily injury, sickness, disease or death or to injury to or destruction of tangible property including the loss of use resulting therefrom.
- b) caused in whole or in part by any intentional or negligent act or omission of a Prime Contractor, its employees, subcontractors, suppliers or materialmen or anyone directly or indirectly employed by any of them or anyone for whose acts may be liable, regardless of whether or not it is caused in part by anyone indemnified hereunder.
- c) in any and all claims against the Owner or any of its agents or employees by any employee of any Prime Contractor, any subcontractor, supplier or materialmen of any of them, the indemnification obligation under this section shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the Contractor under workman's compensation acts, disability acts or other employee's benefit acts.

8) Release of Liens

All Contractors shall provide Owner a release of liens properly signed by all tradesmen, suppliers, subcontractors and subcontractors of subcontractors or anyone who has provided materials or labor for the Work performed under any Prime Contract. The release of liens shall be presented to the Engineer prior to the payment of the final retainage for any Prime Contractor's entitlement.

9) Operation and Maintenance Manuals

Each Prime Contractor shall collect two sets of catalog data including instructions for operations and care of all equipment, diagram, drawings, etc. for all pieces of equipment furnished under that Prime Contractor's

contract. The data shall be submitted to the General Contractor who shall reduce it into a single notebook form and suitably indexed. In addition to the data provided herein, the information contained shall include any and all manufacturer or supplier warranties which are issued pursuant to the required Work under the Contract. The General Contractor shall cause the same to be delivered to the Engineer prior to the release of final payment. This record shall also include the plan location and elevation of all underground piping and utilities and shall include "as built" buildings.

8. General Construction Contract

- a. Work in the General Construction Contract includes, but is not limited to, the following:
- 1) Site preparation, including cleaning and relocations and earthwork.
 - 2) Site improvements, including site development furnishings and equipment and seeding/restoration.
 - 3) Stormwater inlets, piping, stone and all components to install the required stormwater management system.
 - 4) Sanitary sewer lateral from oil/water separator to existing lateral.
 - 5) Water supply lateral from existing supply to new building.
 - 6) Oil-Water Separator and installation.
 - 7) Tunnels and trenching for site utilities.
 - 8) Foundations, including footings, foundation walls.
 - 9) Slabs-on-grade, including earthwork, subdrainage systems, and insulation.
 - 10) Paving and concrete as depicted on the plan for the site.
 - 11) Permanent Signs installation (signs provided by Borough).
 - 12) Concrete Bollards, Wheel Stops, and Concrete Bin Blocks and installation
 - 13) Below-grade building construction, including excavation, backfill, and thermal and moisture protection.
 - 14) Superstructure, including floor mezzanine and roof construction.
 - 15) Exterior closure, including walls, parapets, doors, windows and louvers.
 - 16) Roofing, including coverings, flashings, roof specialties and openings.

- 17) Interior construction, including partitions, doors, interior windows, and fittings.
- 18) Interior finishes.
- 19) Furnishings, including casework (no furniture or appliances).
- b. Temporary facilities and controls in the General Construction Contract include, but are not limited to, the following:
 - 1) Temporary facilities and controls that are not otherwise specifically assigned to the Plumbing Contract, HVAC/Mechanical Contract or Electrical Contract.
 - 2) Unpiped sewers and drainage, including drainage ditches, dry wells, stabilization ponds, and containers. There shall be no discharge into the sanitary sewer system without prior written authorization by the Owner.
 - 3) Stormwater control, including the following:
 - a. Erosion and sediment controls
 - b. Foundation drainage system.
 - c. Site drainage system.
 - 4) Unpiped portable or temporary toilet fixtures, wash facilities, and drinking water facilities, including disposable supplies.
 - 5) Temporary enclosure for building exterior, except as indicated.
 - 6) Dewatering facilities and drains.
 - 7) General hoisting facilities for materials and personnel, up to 2 tons (2000 kg).
 - 8) Project identification and temporary signs as shall be designed and paid for by the General Construction Contractor.
 - 9) General waste recycling and disposal facilities.
 - 10) Temporary fire-protection equipment.
 - 11) Security enclosure and lockup.
 - 12) Traffic Control
 - 13) Environmental protection.
 - 14) Restoration of Owner's existing facilities used as temporary facilities.
 - 15) Soil stabilization; sedimentation and erosion control.

c. Miscellaneous

- 1) The General Contractor shall be responsible for determining the exact location of all utilities on the site and shall protect the utilities during the course of the work performed by all Prime Contractors. Notwithstanding, each Prime Contractor, shall at the discretion of the utility involved, repair or have repaired all damage to any utility which the result of the work of that Prime Contractor at no cost to the Owner. In the event that any utilities interfere with the installation of new building or appurtenances, each Prime Contractor must allow for such interference in his bid. Each Prime Contractor is required to comply with all provisions of Act 287 of the Commonwealth of Pennsylvania effective April 9, 1975. The cost of any required utility location shall be included in the General Contractor's lump sum bid on the proposal form.
- 2) Safety of the General Public. The General Contractor shall be responsible for the safety of the general public in or about the site at all times. All excavated areas shall be backfilled daily or roped off with lighted barricading.
- 3) The General Contractor is responsible for the obtaining of all necessary permits (i.e., building permit, excavation permit, etc.) from Shiremanstown Borough, Cumberland County or any governmental body having legal jurisdiction over the same. The cost of all permits shall be included in the bid price of the General Contractor.

9. Plumbing Contract

- a. Work in the Plumbing Contract includes, but is not limited to, the following:
 - 1) Site water supply and distribution.
 - 2) Site sanitary sewer, including oil/water separator.
 - 3) External and internal trench drains up to storm sewer system and oil/water separator on sanitary sewer.
 - 4) Site gas line service connection
 - 5) Site special plumbing systems.
 - 6) Plumbing fixtures.
 - 7) Domestic water distribution.
 - 8) Sanitary waste.

- 9) Plumbing connections to equipment furnished by the General Construction Contract, Plumbing Contract, HVAC/Mechanical Contract and Electrical Contract.
- b. Temporary facilities and controls in the Plumbing Contract include, but are not limited to, the following:
 - 1) Piped water service.
 - 2) Piped temporary toilet fixtures, wash facilities, and drinking water facilities.
 - 3) Plumbing connections to existing systems and temporary facilities and controls furnished by the General Construction Contract, Plumbing Contract, HVAC/ Mechanical Contract and Electrical Contract.

10. HVAC/Mechanical Contract

- a. Work in the HVAC/Mechanical Contract includes, but is not limited to, the following:
 - 1) Heat generation.
 - 2) Refrigeration.
 - 3) HVAC distribution.
 - 4) Terminal and packaged units.
 - 5) HVAC instrumentation and controls.
 - 6) HVAC testing, adjusting, and balancing.
 - 7) Mechanical connections to equipment furnished by the General Construction Contract, Plumbing Contract, HVAC/Mechanical Contract and Electrical Contract.
- b. Temporary facilities and controls in the Mechanical Contract include, but are not limited to, the following:
 - 1) Temporary heat and ventilation.

11. Electrical Contract

- a. Work in the Electrical Contract includes, but is not limited to, the following:
 - 1) Site electrical distribution (See site drawings).
 - 2) Site lighting.

- 3) Electrical service and distribution.
 - 4) Lighting and branch wiring.
 - 5) Telecommunications, security, computer wiring and audio-visual wiring. Equipment will be supplied by others.
 - 8) Electrical connections to equipment furnished by the General Construction Contract, Plumbing Contract, HVAC/Mechanical Contract and Electrical Contract.
- b. Temporary facilities and controls in the Electrical Contract include, but are not limited to, the following:
- 1) Electric power service and distribution.
 - 2) Lighting, including site lighting.
 - 3) Electrical connections to existing systems and temporary facilities and controls furnished by the General Construction Contract, Plumbing Contract, HVAC/ Mechanical Contract and Electrical Contract.

12. Separate Contracts

Any additional separate contracts will be secured by the Owner. Coordinate work prior to completion of rooms and final work. The following work will be provided by the Owner.

- a. Telephone and Data System Equipment
- b. Security System Equipment
- c. Furniture

13. Progress of the Work

- a. All scheduling and sequencing of the Construction Work shall be coordinated with the Owner.
- b. It is essential that the Contractors communicate on this job. A list of Contractors will be supplied by the Engineer prior to the start of work. The Contractors are directed to check on the progress of each contract to maintain a smooth flow of trades through the duration of the project. The General Construction Contractor (Contract 15609.655-1) shall act as the project coordinator. The Owner and Engineer will not be responsible for changes or rework necessary due to lack of coordination between Contractors.

Upon award of the project, the General Contractor (Contract 15609.655-1) shall arrange and conduct a sequencing and scheduling meeting with all contracts. Prior to construction, a master project schedule shall be submitted to the Borough for review and approval.

14. Subsurface Conditions

From investigations, including surveys made at the site, it is assumed that physical conditions are approximate, as indicated on the drawings, but the nature of the materials below the surface or the depth to satisfactory foundations, are not guaranteed. No additional compensation shall be paid for rock or any other subsurface condition. The Contractors expressly assumes the risk of any unexpected subsurface condition. No boring has been performed.

15. Non-Classified Excavation

All excavation shall be unclassified. The Contractors are hereby advised that where rock is encountered within the lines and grades shown on the drawings or described by the specifications for lump sum items on the contract proposal, removal of same will be paid for as a part of the applicable lump sum price bid and no extra compensation will be made therefore.

16. Project Photographs

Prior to construction, the General Contractor shall furnish three (3) sets of photographs of the site from four (4) views. During construction, the Contractor shall provide three (3) sets of detailed project photographs each month during construction. Copies of the photographs shall be supplied to the Engineer with pay applications.

17. Cleaning

a. General

1) Description

- a) Throughout the construction period, maintain the renovation area in a standard of cleanliness as described in this Section.
- b) Owner requires that this project generate the least amount of trash and waste possible. All Contractors shall comply with Section 017419 Construction Waste Management and Disposal.

2) Quality Assurance

- c) Conduct daily inspections and more often, if necessary, to verify that requirements for cleanliness are being met.
- d) In addition to the standards described in this Section, comply with pertinent requirements of governmental agencies having jurisdiction.

b. Products

1) Cleaning Materials and Equipment

Provide required personnel, equipment and materials needed to maintain the specified standard of cleanliness for a clean and neat site.

2) Compatibility

Use only the cleaning materials and equipment which are compatible with the surface being cleaned, as recommended by the manufacturer of the material.

c. Execution

1) Progress Cleaning

a) General

- (1) Retain stored items in an orderly arrangement allowing maximum access, not impeding traffic and providing required protection of materials.
- (2) Do not allow accumulation of scrap, debris, waste material and other items not required for construction of this work.
- (3) At least once each week, and more often if necessary, completely remove all scrap, debris and waste material from the job site.
- (4) Provide adequate storage for all items awaiting removal from the job site, observing requirements for fire protection and protection of the environment.

b) Building

- (1) At the end of each day's work, inspect the building and pick up all scrap, debris and waste material. Remove such items to the place designated for their storage.
- (2) At the end of each day's work, sweep interior spaces clean; free from dust and other material capable of being removed by use of reasonable effort and a handheld broom.
- (3) As required preparatory to installation of succeeding materials, clean the building or pertinent portions thereof to the degree of cleanliness recommended by the manufacturer of the succeeding material, using equipment and materials required to achieve the necessary cleanliness.

- (4) Following the installation of finish floor materials, the finish floor shall be kept clean and protected at all times while work is being performed in the space in which finish materials are installed; free from foreign material which may be injurious to the finish floor material.

2) Final Cleaning

- a) Final cleaning shall be provided by skilled cleaners using commercial quality building maintenance equipment and materials.
- b) Prior to completion of the work, remove from the buildings job site all tools, surplus materials, equipment, scrap, debris, and waste. Conduct final progress cleaning as described in Article C.1 above.

c) Building

(1) Exterior

- (a) Remove all traces of soil, waste materials, smudges and other foreign matter from exterior surfaces.
- b) In the event of stubborn stains not removable with water, the Architect may require other additional cleaning at no additional cost to the Owner.

(2) Interior

- (a) Remove all traces of soil, waste materials, smudges and other foreign matter from interior surfaces.
- (b) Remove all traces of splashed material from adjacent surfaces.
- (c) Remove paint droppings, spots, stains and dirt from finished surfaces.

(3) Polished Surfaces

To surfaces requiring routine application of buffed polish, apply the polish recommended by the manufacturer of the material being polished.

- d) Schedule final cleaning as approved by the Engineer to enable the Owner to accept a completely clean facility.

- e) Final acceptance of the building is contingent on approval of final cleaning.

3) Cleaning During Partial Occupancy

Should the Owner occupy the work of any portion thereof prior to its completion by the Contractor and acceptance by the Owner, responsibilities for interim and final cleaning shall be as determined by the Engineer.

B. UTILITIES

The Contractor shall determine the exact location of all utilities affected by this work and shall protect the utilities during the course of the work. The Contractor shall, at the discretion of the utility involved, repair or have repaired all damage to the utilities, which is a result of the work, at no cost to the Owner. These utilities may interfere with the installation of the new lines or appurtenances and the Contractor must allow for such interference in his bid. The Contractor will be required to comply with all provisions of Act 287 of the Commonwealth of Pennsylvania, effective April 9, 1975. The cost of utility location shall be included in the Contractor's lump sum bid on the Proposal Form.

C. SAFETY OF GENERAL PUBLIC

The Contractor shall be responsible for the safety of the general public in or about the project site at all times. Excavated areas shall be backfilled daily or roped off with lighted barricading. Entrances to driveways and adjoining residents shall have sound steel plating or wood planking of uniform thickness, with handrails and adequate lighting across excavated areas to provide for a safe travel way to each residence. Notification to adjoining residents is to be given by the Contractor within a reasonable time to facilitate their arrival or departure from the residence. Notification to the Borough Council shall be given prior to any traffic restrictions, detours or road closings for coordination purposes.

D. COMPARISON OF BIDS

The bid proposals will be compared on the basis of the sum of the unit prices that appear on the Proposal Form. For a bid to be acceptable, unit prices for additions or deductions must agree with the total lump-sum price breakdown.

E. CONTRACT DRAWINGS AND SPECIFICATIONS

The plan copies or drawings of this project, prepared by Gibson-Thomas Engineering Co., Inc. and KD3 Design Studio, Inc., are included in these contract documents and on PennBID are hereby made an integral part of these contract Documents and Specifications. One set of the Contractor's drawings and Specifications shall be available at the job site at all times for use by the Engineer or his authorized representative.

F. BASIS OF PAYMENT

The work required by this Contract shall be paid for as detailed in the Standard Contract Provisions. Monthly payments will be made during the progress of the work, based upon the value of the work done as detailed in the Standard Contract Provisions. Adjustments in payments because of changes in the construction from that indicated in the Contract Drawings and Specifications, or by exigencies of the work and as authorized by the Engineer, will be in accordance with the requirements of the Standard Contract Provisions.

G. PAYMENT OF PREVAILING WAGES

The Contractor must compensate all employees associated with this project in accordance with the prevailing wage determinations made a part of these contract documents. The prevailing wage information must be displayed at a high-visibility site located in the contract work area. Pennsylvania Prevailing Wages apply to this project.

H. PRE-CONSTRUCTION CONFERENCE

A pre-construction conference will be held with Borough and Borough Engineer prior to the commencement of the project. Working sequence, scheduling, traffic control and safety will be discussed and determined with Borough President and Borough Engineer.

I. CONSTRUCTION STAKE-OUT

The contractor will be furnished with all benchmarks and field information from the original survey notes. The contractor will be responsible for the stakeout of all construction work included in this contract. This work shall be subject to the approval of the Engineer.

J. TEMPORARY SERVICES

It shall be the responsibility of the General Contractor to provide temporary services throughout the entire period of construction and until the work performed under his contract is completed and the placed in operation with the Owner's personnel. The temporary services shall include heat and water, as follows:

a. Temporary Heat

Prior to enclosure of the pump pit building or portions thereof, and when weather conditions indicate the necessity for temporary heat as determined by the Engineer, the General Contractor shall provide, maintain, operate and pay all costs including fuel for the sufficient number of approved portable heaters so the progress of the work is not impeded.

After the pump pit building or portions thereof are enclosed and the outside temperature falls below 50° F during normal working hours or below 35° F at any other time, the General Contractor shall provide for temporary heat. A tank shall be considered "enclosed" when (a) the exterior walls have been completed; and (b) when openings are closed with either temporary or permanent closures.

The General Contractor shall operate portable heaters or maintain a temporary heating system. The General Contractor shall pay all costs including fuel for the operation and maintenance of the equipment, either temporary or permanent, to provide adequate heat. The tank or tanks shall be maintained at a minimum temperature of 50° F except when a lower temperature is authorized by the Engineer. The General Contractor shall remove all soot, smudges and other deposits from walls and all exposed surfaces which are the result of the use of any temporary heating equipment including the use of the permanent heating system for temporary heat purposes. He shall not do any finish work until all such surfaces are properly cleaned. The General Contractor shall be responsible for the dismantling and/or removal of portable heaters and other temporary heating apparatus and equipment.

K. COORDINATION OF WORK – ALL CONTRACTS

It is essential that the Contractors communicate on this job. A list of Contractors will be supplied by the Engineer prior to the start of work. The Contractors are directed to check on the progress of each contract to maintain a smooth flow of trades throughout the duration of the project. The Owner and Engineer will not be responsible for changes or rework necessary due to lack of coordination between Contractors.

END OF SECTION

A. GENERAL

Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

This Section includes work restrictions for the Project.

a. During the construction period each Prime Contractor shall coordinate its use of the premises for construction operations, including use of the site, compliance with state and local procedures and regulations regarding the use of site and surrounding public ways.

- 1) Limits: Confine construction operations to areas of new construction.
- 2) Clean wheels of construction vehicles before leaving construction site. Keep Owner's access roads and public roads free of construction dirt.
- 3) The Contractor shall coordinate with the Owner or his representative for the purpose of defining and regulating temporary lay-down and storage areas, temporary utility hookups, and any other items which may require the use of various portions of the site.

Working hours and times for delivery of material and removal of debris and trash shall be as follows:

- 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

SECTION 3 SUBMITTAL AND TESTING PROCEDURES

A. GENERAL

1. Related Documents

- a. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.
- b. Certain specification sections contain additional submittal procedures for specified items. The requirements stated therein shall be primary for those items.

2. Summary

- a. This Section includes administrative and procedural requirements for submittals, including the following:
 - 1) Shop Drawings.
 - 2) Product Data.
 - 3) Samples.
 - 4) Informational Submittals: Miscellaneous submittals
 - 5) Requests for Information (RFI); requests for clarification and interpretation.

3. Definitions

- a. Action Submittals: Written and graphic information that requires Architect/Engineer's responsive action.
- b. Informational Submittals: Written information that does not require Architect/Engineer's approval. Submittals may be rejected for not complying with requirements.

4. Submittal Procedures

- a. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1) Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2) Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

- a) Architect/Engineer reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

b. Processing Time

Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect/Engineer's receipt of submittal.

- 1) Initial Review: Allow 10 days for initial review of each submittal. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. Architect/Engineer will advise Contractor when a submittal being processed must be delayed for coordination.
- 2) Concurrent Review: Where concurrent review of submittals by Architect/Engineer's consultants, Owner, or other parties is required, allow 14 days for initial review of each submittal.
- 3) If intermediate submittal is necessary, process it in same manner as initial submittal.
- 4) Allow 10 days for processing each resubmittal.
- 5) No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing.

c. Identification

Place a permanent label or title block on each submittal for identification.

- 1) Indicate name of firm or entity that prepared each submittal on label or title block.
- 2) Provide a space on label or beside title block to record review and approval markings and action taken by Architect/Engineer.
- 3) Include the following information on label for processing and recording action taken:
 - a) Project name.
 - b) Date.
 - c) Name and address of Architect/Engineer.
 - d) Name and address of Contractor.
 - e) Name and address of subcontractor.
 - f) Name and address of supplier.
 - g) Name of manufacturer.
 - h) Unique identifier, including revision number.
 - i) Number and title of appropriate Specification Section.
 - j) Drawing number and detail references, as appropriate.

k) Other necessary identification.

d. Deviations

Highlight, encircle, or otherwise identify deviations from the Contract Documents on submittals.

e. Additional Copies

Unless additional copies are required for final submittal, and unless Architect/Engineer observes noncompliance with provisions of the Contract Documents, initial submittal may serve as final submittal.

f. Transmittal

Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect/Engineer return submittals, without review, received from sources other than Contractor.

- 1) Paper or Electronic submittals may be provided, except for color and texture approvals. Send to or Email to Borough Engineer for distribution.
- 2) On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect/Engineer on previous submittals, and deviations from requirements of the Contract Documents, including minor variations and limitations. Include the same label information as the related submittal.
- 3) Include Contractor's certification stating that information submitted complies with requirements of the Contract Documents.
- 4) Transmittal Form: Provide locations on form for the following information:
 - a. Project name.
 - b. Date.
 - c. Destination (To:).
 - d. Source (From:).
 - e. Names of subcontractor, manufacturer, and supplier.
 - f. Category and type of submittal.
 - g. Submittal purpose and description.
 - h. Submittal and transmittal distribution record.
 - i. Remarks.
 - j. Signature of transmitter.

g. Distribution

Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

h. Use for Construction

Use only final submittals with mark indicating action taken by Architect/Engineer in connection with construction.

i. Requests for clarification or interpretation including Request for Information (RFI) shall be in writing (mailed or emailed) to the Engineer – copy Architect.

B. PRODUCTS

1. Action Submittals

a. Shop Drawings

Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

1) Preparation: Include the following information, as applicable:

- a) Dimensions.
- b) Identification of products.
- c) Fabrication and installation drawings.
- d) Roughing-in and setting diagrams.
- e) Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
- f) Shopwork manufacturing instructions.
- g) Templates and patterns.
- h) Schedules.
- i) Design calculations.
- j) Compliance with specified standards.
- k) Notation of coordination requirements.
- l) Notation of dimensions established by field measurement.

2) Wiring Diagrams

Differentiate between manufacturer-installed and field-installed wiring.

5) Sheet Size

Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 40 inches.

4) Number of Copies

Submit 5 prints for the Architect/Engineer's review.

- a) The Architect/Engineer will stamp each submittal with a uniform action stamp; refer to Article 3.02
- b) Distribution: Contractor is responsible for distributing required prints of shop drawings to his subcontractors and material suppliers after review by the Architect/Engineer.
- c) One copy of each shop drawing shall be kept at the project site.
- d) Contractor shall submit one copy of each shop drawing to the Owner at the end of the project as a "Record Document."

b. Samples

Prepare physical units of materials or products, including the following:

1) Samples for Initial Selection

Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

2) Samples for Verification

Submit full-size units or Samples of size indicated, prepared from the same material to be used for the Work, cured and finished in manner specified, and physically identical with the product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

3) Preparation

Mount, display, or package Samples in manner specified to facilitate review of qualities indicated. Prepare Samples to match Architect/Engineer's sample where so indicated. Attach label on unexposed side that includes the following:

- a) Generic description of Sample.

- b) Product name or name of manufacturer.
- c) Sample source.

4) Additional Information

On an attached separate sheet, prepared on Contractor's letterhead, provide the following:

- a) Size limitations.
 - b) Compliance with recognized standards.
 - c) Availability.
 - d) Delivery time.
- 5) Submit Samples for review of kind, color, pattern, and texture for a final check of these characteristics with other elements and for a comparison of these characteristics between final submittal and actual component as delivered and installed.
- a) If variation in color, pattern, texture, or other characteristic is inherent in the product represented by a Sample, submit at least 3 sets of paired units that show approximate limits of the variations.
 - b) Refer to individual Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.

6) Number of Samples for Initial Selection

Submit 1 full set of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect/Engineer will return submittal with options selected.

7) Number of Samples for Verification

Submit 3 sets of Samples. Architect/Engineer will retain 1 Sample set; remainder will be returned.

- a) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.

8) Disposition

Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

- a) Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.

- b) Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

- c. Product Schedule or List

Prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

- 1) Type of product. Include unique identifier for each product.
- 2) Number and name of room or space.
- 3) Location within room or space.

- 2. Architecture/Engineer's Action

- a. General

Architect/Engineer will not review submittals that do not bear Contractor's approval stamp and will return them without action.

- b. Action Submittals

Architect/Engineer will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect/Engineer will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:

- 1) Architect/Engineer's action on shop drawings will result in making one of five notations on them; namely "SATISFACTORY," "UNSATISFACTORY," "SATISFACTORY AS NOTED," "SATISFACTORY AS NOTED, REVISIONS REQUIRED," or "UNSATISFACTORY, REVISE AND RESUBMIT."
- 2) Final Unrestricted Release: When the Architect/Engineer marks a submittal "SATISFACTORY," the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents. Final payment depends on that compliance.
- 3) Final-But-Restricted Release: When the Architect/Engineer marks a submittal "SATISFACTORY AS NOTED" the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents. Final payment depends on that compliance.
 - a) Resubmit to Architect/Engineer a file copy of submittal stamped by Architect/Engineer as "SATISFACTORY AS NOTED," after the corrections have been made.
- 4) Returned for Re-submittal: When the Architect/Engineer marks a submittal "SATISFACTORY AS NOTED, REVISIONS REQUIRED," or

"UNSATISFACTORY, REVISE AND RESUBMIT," do not proceed with Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal according to the notations; resubmit without delay. Repeat if necessary to obtain different action mark.

a) Do not use, or allow others to use, submittals marked "UNSATISFACTORY," "SATISFACTORY AS NOTED, REVISIONS REQUIRED," or "UNSATISFACTORY, REVISE AND RESUBMIT," at the Project Site or elsewhere where Work is in progress.

3. Other Action: Where a submittal is for information or record purposes or special processing or other activity, the Architect/Engineer will return the submittal marked "Action Not Required."

c. Informational Submittals

Architect/Engineer will review each submittal and will not return it, or will reject and return it if it does not comply with requirements. Architect/Engineer will forward each submittal to appropriate party.

d. Submittals not required by the Contract Documents will not be reviewed and may be discarded.

C. TESTING

As required by applicable specification sections.

END OF SECTION

SECTION 4 GENERAL PLUMBING (22000)

A. GENERAL

1. RELATED DOCUMENTS

All Contract Drawings, Specification Sections, Drawings, Addendums, and general provisions of the Contract, including, but not limited to, General Conditions of the Construction Contract and Instructions to Bidders, apply to the Work outlined in this Section.

2. WORK INCLUDED

These Specifications and accompanying Drawings are intended to cover the furnishing of all labor, materials, equipment and services necessary for the complete installation of new plumbing systems. Small items of material, equipment and appurtenances not mentioned in detail or shown on the Drawings, but necessary for complete and operational systems, shall be furnished and installed by this Contractor without additional charge to the Owner and shall be included under this Contract.

- a. Visit the site and verify all conditions.
- b. Coordinate all utility tap-ins. Borough will pay all tap in fees.
- c. Plumbing work per Plumbing Drawing and the Site Drawings.
- d. Interior sanitary sewer systems with all required waste, vents and connections to existing system as per local codes.
- e. Interior water distribution system with all required hot and cold piping, valves and fittings.
- f. Insulation of all new water piping as specified herein.
- g. Connect to oil/water and dirt separator, provided by General Contractor as shown on the Drawings.
- h. Cutting and patching of all openings required for plumbing.
- i. Provide all plumbing fixtures, equipment, floor drains, trench drains, cleanouts, etc., required for complete system.
- j. Provide water heater, vent, and trim as specified.
- k. Provide underground gas line from existing meter at existing building to the new building. Trenching and restoration by General Contractor.
- l. Provide interior gas line with taps for used by the mechanical contractor.

3. CODES AND REGULATIONS

- a. All Work and materials shall conform, but not be limited to, the following general regulatory agencies and codes. Note that individual specification Sections may refer to more specific codes which are also applicable:
 - 1) Shiremanstown Borough regulations and ordinances.
 - 2) Pennsylvania Department of Labor and Industry.
 - 3) Occupational Safety and Health Administration (OSHA).
 - 4) NSF
 - 5) ASME
 - 6) NEMA
 - 7) BOCA
 - 8) NFPA 70
 - 9) ASPE
 - 10) Americans With Disabilities Act of 1990
 - 11) Pennsylvania Department of Environmental Protection (DEP).
 - 12) Federal Environmental Protection Agency (EPA).
- b. Absolutely no extra claim for compensation shall be allowed for changes necessitated by Code compliance regardless of how shown, or specified, and the bidding Contractor hereby waives all his rights to such extra compensation.

4. QUALITY ASSURANCE

- a. All plumbing work shall be performed under the direct supervision of a Registered Master Plumber.

5. PERMITS, INSPECTIONS, FEES AND CHARGES

- a. The Borough will pay for all permits. The Contractor shall pay for all inspections.
- b. The Contractor shall give all requisite notice to all authorities having jurisdiction (AHJ), and shall obtain all permits, provide deposits, and inspection fees necessary for the installation of the Work.
- c. Certificates of Inspection: deliver free of charge to the Owner before final payment is made. Inspection shall be performed for all aspects of the wiring system.

6. COORDINATION OF WORK WITH OTHER TRADES AND SCHEDULING

- a. It is imperative that This Contractor coordinate his work with the Project Manager, General Contractor and all other trades involved with the installation of his equipment or working in

the same building areas in which he is working.

- b. The National Electrical Code gives the Electrical Contractor the right of way for space above his equipment such as panel boards, motor controls centers, distribution boards, transformers, etc. It is extremely important to coordinate all piping installations with the E.C.
- c. The spacing between the water heater combustion air intake and the vent is critical as is the spacing to the boiler combustion air intake and vent. It is very important to coordinate the installation of the intake and vent with the Mechanical Contractor.

7. WORK NOT INCLUDED IN THIS CONTRACT

- a. Finish patching and painting.
- b. Site storm sewerage to the catch basins.
- c. Exterior Sanitary lateral.
- d. Trenching and Restoration

8. ROOF PENETRATIONS

This Contractor shall be responsible for the cutting of the roof for the purpose of installing plumbing vents, and provide required new flashings of type and style required.

9. CUTTING AND PATCHING

- a. This Contractor shall be responsible for all cutting and rough patching required by him for the proper accomplishment of his work and the installation of piping and all equipment.
- b. Coordinate necessary floor slab penetrations. No building structural members, including the floor slab, shall be cut, drilled or removed if the building integrity will be compromised in any way for the installation of this work.
- c. Concrete or asphalt shall be saw cut and patched to match the original surface.

10. LEAD CONTAINING PRODUCTS

- a. All faucets, bubblers, stops, pipe, valves and fittings installed at the point of use shall be certified to comply with NSF-61, Section 9 as a "lead free" product. All such products shall specifically comply with the *Safe Drinking Water Act*.
- b. This requirement does not apply to control valves, pressure reducing valves, backflow preventers and related in line items that are not installed at the point of use and are not regulated by the *Safe Drinking Water Act*.
- c. Endpoint devices that are not designed to dispense water for human consumption are also excluded from this requirement. Examples include: boiler feed valves, T&P valves, and valves with hose threads.

- d. Lead containing solder and fluxes are strictly prohibited.
- e. Proof of NSF compliance shall be included with the submittal drawings and with the final documentation of all regulated products.

11. PIPING – GENERAL REQUIREMENTS

- a. The various piping systems shall be installed in general, as shown on the Drawings. Piping shall be installed so as not to interfere with lighting outlets, conduits, ducts, etc. Piping shall be run concealed in finished portions of the building.
- b. Piping shall be cut accurately and shall be worked into place without springing or forcing. Piping shall be installed to provide for proper drainage and to permit free expansion and contraction without lifting or tilting the connected equipment or causing damage to the structure. All changes in direction shall be made with fittings. All piping shall be thoroughly cleaned before erection.

12. RECORD DRAWINGS

- a. The Contractor shall keep an accurate record of all deviations from the Contract Documents.
- b. The Contractor shall correctly and neatly enter in red pencil any deviations to the Contract Documents and shall keep the Contract Documents available at the jobsite for inspection.
- c. "As built" drawings and documents shall be turned over to the Owner upon completion.

13. TEMPORARY WATER

- a. Provide, install and maintain temporary water service facilities.

14. TESTS

- a. At completion of the job and before final acceptance, the water system as a whole shall be given a final test with all plumbing fixtures tested and proved to be operating in compliance with installation requirements. Any improperly operating plumbing components shall be replaced by the Contractor without additional cost to the Owner or General Contractor. The tests shall be made only in the presence of the Owner and the design Professional(s). Full satisfaction shall be guaranteed by the Contractor.

B. PRODUCTS (Not applicable).

C. EXECUTION (Not applicable).

END OF SECTION 22000

SECTION 017419

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.01 WASTE MANAGEMENT REQUIREMENTS

- A Owner requires that this project generate the least amount of trash and waste possible.
- B Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.
- C Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.
- D Required Recycling, Salvage, and Reuse: The following may not be disposed of in landfills or by incineration:
 - 1. Aluminum and plastic beverage containers.
 - 2. Corrugated cardboard.
 - 3. Wood pallets.
 - 4. Clean dimensional wood.
 - 5. Metals, including packaging banding, metal studs, sheet metal, structural steel, piping, reinforcing bars, door frames, and other items made of steel, iron, galvanized steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze.
 - 6. Glass.
 - 7. Gypsum drywall and plaster.
 - 8. Plastic buckets.
- E Contractor Reporting Responsibilities: Submit periodic Waste Disposal Reports; report landfill disposal, incineration, recycling, salvage, and reuse regardless of to whom the cost or savings accrues; use the same units of measure on required reports.
- F Develop and follow a Waste Management Plan designed to implement these requirements.
- G Methods of trash/waste disposal that are not acceptable are:
 - 1. Burning on the project site.
 - 2. Burying on the project site.
 - 3. Dumping or burying on other property, public or private.
 - 4. Other illegal dumping or burying.
- H Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

1.02 DEFINITIONS

- A Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.
- B Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.

- C Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity or reactivity.
- D Nonhazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity, or reactivity.
- E Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.
- F Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.
- G Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.
- H Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
- I Return: To give back reusable items or unused products to vendors for credit.
- J Reuse: To reuse a construction waste material in some manner on the project site.
- K Salvage: To remove a waste material from the project site to another site for resale or reuse by others.
- L Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.
- M Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.
- N Toxic: Poisonous to humans either immediately or after a long period of exposure.
- O Trash: Any product or material unable to be reused, returned, recycled, or salvaged.
- P Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

1.03 SUBMITTALS

- A Submit Waste Management Plan within 30 Calendar days after receipt of Notice of Award of Bid, or prior to any trash or waste removal, whichever occurs sooner; submit projection of all trash and waste that will require disposal and alternatives to landfilling.
- B Waste Management Plan: Include the following information:
 1. Analysis of the trash and waste projected to be generated during the entire project construction cycle, including types and quantities.
 2. Landfill Options: The name, address, and telephone number of the landfill(s) where trash/waste will be disposed of, the applicable landfill tipping fee(s), and the projected cost of disposing of all project trash/waste in the landfill(s).
 3. Landfill Alternatives: List all waste materials that will be diverted from landfills by reuse, salvage, or recycling.
 - a. List each material proposed to be salvaged, reused, or recycled.
 - b. List the local market for each material.
 4. Meetings: Describe regular meetings to be held to address waste prevention, reduction, recycling, salvage, reuse, and disposal.

5. Materials Handling Procedures: Describe the means by which materials to be diverted from landfills will be protected from contamination and prepared for acceptance by designated facilities; include separation procedures for recyclables, storage, and packaging.
 6. Transportation: Identify the destination and means of transportation of materials to be recycled; i.e. whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler.
- C Waste Disposal Reports: Submit at specified intervals, with details of quantities of trash and waste, means of disposal or reuse, and costs; show both totals to date and since last report.
1. Submit updated Report with each Application for Progress Payment; failure to submit Report will delay payment.
 2. Submit Report on a form acceptable to Owner.
 3. Landfill Disposal: Include the following information:
 - a. Identification of material.
 - b. Amount, in tons or cubic yards, of trash/waste material from the project disposed of in landfills.
 - c. State the identity of landfills, total amount of tipping fees paid to landfill, and total disposal cost.
 - d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
 4. Incinerator Disposal: Include the following information:
 - a. Identification of material.
 - b. Amount, in tons or cubic yards, of trash/waste material from the project delivered to incinerators.
 - c. State the identity of incinerators, total amount of fees paid to incinerator, and total disposal cost.
 - d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
 5. Recycled and Salvaged Materials: Include the following information for each:
 - a. Identification of material, including those retrieved by installer for use on other projects.
 - b. Amount, in tons or cubic yards, date removed from the project site, and receiving party.
 - c. Transportation cost, amount paid or received for the material, and the net total cost or savings of salvage or recycling each material.
 - d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
 - e. Certification by receiving party that materials will not be disposed of in landfills or by incineration.
 6. Other Disposal Methods: Include information similar to that described above, as appropriate to disposal method.

PART 3 EXECUTION

2.01 WASTE MANAGEMENT PLAN IMPLEMENTATION

- A Manager: Designate an on-site person or persons responsible for instructing workers and overseeing and documenting results of the Waste Management Plan.
- B Communication: Distribute copies of the Waste Management Plan to job site foreman, each subcontractor, Owner, and Architect.
- C Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.
- D Meetings: Discuss trash/waste management goals and issues at project meetings.
 - 1. Prebid meeting.
 - 2. Preconstruction meeting.
 - 3. Regular job-site meetings.
- E Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.
 - 1. As a minimum, provide:
 - a. Separate area for storage of materials to be reused on-site, such as wood cut-offs for blocking.
 - b. Separate dumpsters for each category of recyclable.
 - c. Recycling bins at worker lunch area.
 - 2. Provide containers as required.
 - 3. Provide adequate space for pick-up and delivery and convenience to subcontractors.
 - 4. Keep recycling and trash/waste bin areas neat and clean and clearly marked in order to avoid contamination of materials.
- F Hazardous Wastes: Separate, store, and dispose of hazardous wastes according to applicable regulations.
- G Recycling: Separate, store, protect, and handle at the site identified recyclable waste products in order to prevent contamination of materials and to maximize recyclability of identified materials. Arrange for timely pickups from the site or deliveries to recycling facility in order to prevent contamination of recyclable materials.
- H Reuse of Materials On-Site: Set aside, sort, and protect separated products in preparation for reuse.
- I Salvage: Set aside, sort, and protect products to be salvaged for reuse off-site.

END OF SECTION

SECTION 220513

COMMON MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT

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 SUMMARY

- A. Section includes general requirements for single-phase and polyphase, general-purpose, horizontal, small and medium, squirrel-cage induction motors for use on ac power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.

1.3 COORDINATION

- A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:
 - 1. Motor controllers.
 - 2. Torque, speed, and horsepower requirements of the load.
 - 3. Ratings and characteristics of supply circuit and required control sequence.
 - 4. Ambient and environmental conditions of installation location.

PART 2 - PRODUCTS

2.1 GENERAL MOTOR REQUIREMENTS

- A. Comply with NEMA MG 1 unless otherwise indicated.
- B. Comply with IEEE 841 for severe-duty motors.

2.2 MOTOR CHARACTERISTICS

- A. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 feet above sea level.

- B. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

2.3 POLYPHASE MOTORS

- A. Description: NEMA MG 1, Design B, medium induction motor.
- B. Efficiency: Energy efficient, as defined in NEMA MG 1.
- C. Service Factor: 1.15.
- D. Multispeed Motors: Variable torque.
 - 1. For motors with 2:1 speed ratio, consequent pole, single winding.
 - 2. For motors with other than 2:1 speed ratio, separate winding for each speed.
- E. Multispeed Motors: Separate winding for each speed.
- F. Rotor: Random-wound, squirrel cage.
- G. Bearings: Regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading.
- H. Temperature Rise: Match insulation rating.
- I. Insulation: Class F.
- J. Code Letter Designation:
 - 1. Motors 15 HP and Larger: NEMA starting Code F or Code G.
 - 2. Motors Smaller than 15 HP: Manufacturer's standard starting characteristic.
- K. Enclosure Material: Cast iron for motor frame sizes 324T and larger; rolled steel for motor frame sizes smaller than 324T.

2.4 POLYPHASE MOTORS WITH ADDITIONAL REQUIREMENTS

- A. Motors Used with Reduced-Voltage and Multispeed Controllers: Match wiring connection requirements for controller with required motor leads. Provide terminals in motor terminal box, suited to control method.
- B. Motors Used with Variable Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.

1. Windings: Copper magnet wire with moisture-resistant insulation varnish, designed and tested to resist transient spikes, high frequencies, and short time rise pulses produced by pulse-width modulated inverters.
 2. Energy- and Premium-Efficient Motors: Class B temperature rise; Class F insulation.
 3. Inverter-Duty Motors: Class F temperature rise; Class H insulation.
 4. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.
- C. Severe-Duty Motors: Comply with IEEE 841, with 1.15 minimum service factor.

2.5 SINGLE-PHASE MOTORS

- A. Motors larger than 1/20 hp shall be one of the following, to suit starting torque and requirements of specific motor application:
1. Permanent-split capacitor.
 2. Split phase.
 3. Capacitor start, inductor run.
 4. Capacitor start, capacitor run.
- B. Multispeed Motors: Variable-torque, permanent-split-capacitor type.
- C. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.
- D. Motors 1/20 HP and Smaller: Shaded-pole type.
- E. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

SECTION 220517

SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING

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 SUMMARY

- A. Section Includes:
 - 1. Sleeves.
 - 2. Stack-sleeve fittings.
 - 3. Sleeve-seal systems.
 - 4. Sleeve-seal fittings.
 - 5. Grout.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 SLEEVES

- A. Cast-Iron Wall Pipes: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.
- B. Galvanized-Steel Wall Pipes: ASTM A 53/A 53M, Schedule 40, with plain ends and welded steel collar; zinc coated.
- C. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.
- D. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.

- E. Galvanized-Steel-Sheet Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
- F. Molded-PE or -PP Sleeves: Removable, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.
- G. Molded-PVC Sleeves: With nailing flange for attaching to wooden forms.

2.2 SLEEVE-SEAL SYSTEMS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Advance Products & Systems, Inc.
 - 2. CALPICO, Inc.
 - 3. Metraflex Company (The).
 - 4. Pipeline Seal and Insulator, Inc.
 - 5. Proco Products, Inc.
- B. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.
 - 1. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
 - 2. Pressure Plates: Stainless steel.
 - 3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements.

2.3 SLEEVE-SEAL FITTINGS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Presealed Systems.
- B. Description: Manufactured plastic, sleeve-type, waterstop assembly made for imbedding in concrete slab or wall. Unit has plastic or rubber waterstop collar with center opening to match piping OD.

2.4 GROUT

- A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

- B. Characteristics: Nonshrink; recommended for interior and exterior applications.
- C. Design Mix: 5000-psi, 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

- A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.
- B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch annular clear space between piping and concrete slabs and walls.
 - 1. Sleeves are not required for core-drilled holes.
- C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.
 - 1. Permanent sleeves are not required for holes in slabs formed by molded-PE or -PP sleeves.
 - 2. Cut sleeves to length for mounting flush with both surfaces.
 - a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.
 - 3. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.
- D. Install sleeves for pipes passing through interior partitions.
 - 1. Cut sleeves to length for mounting flush with both surfaces.
 - 2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
 - 3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint. Comply with requirements for sealants specified in Section 079200 "Joint Sealants."
- E. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Section 078413 "Penetration Firestopping."

3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

- A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building.
- B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, assemble sleeve-seal system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

3.3 SLEEVE-SEAL-FITTING INSTALLATION

- A. Install sleeve-seal fittings in new walls and slabs as they are constructed.
- B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.
- C. Secure nailing flanges to concrete forms.
- D. Using grout, seal the space around outside of sleeve-seal fittings.

3.4 SLEEVE AND SLEEVE-SEAL SCHEDULE

- A. Use sleeves and sleeve seals for the following piping-penetration applications:
 - 1. Exterior Concrete Walls above Grade:
 - a. Piping Smaller Than NPS 6: Cast-iron wall sleeves.
 - 2. Exterior Concrete Walls below Grade:
 - a. Piping Smaller Than NPS 6: Cast-iron wall sleeves with sleeve-seal system.
 - 1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.
 - 3. Concrete Slabs-on-Grade:
 - a. Piping Smaller Than NPS 6: Sleeve-seal fittings.
 - 4. Interior Partitions:
 - a. Piping Smaller Than NPS 6: PVC-pipe sleeves.

END OF SECTION

SECTION 220518

ESCUTCHEONS FOR PLUMBING PIPING

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 SUMMARY

- A. Section Includes:
 - 1. Escutcheons.
 - 2. Floor plates.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 ESCUTCHEONS

- A. One-Piece, Cast-Brass Type: With polished, chrome-plated finish and setscrew fastener.
- B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with chrome-plated finish and spring-clip fasteners.
- C. One-Piece, Stamped-Steel Type: With chrome-plated finish and spring-clip fasteners.

2.2 FLOOR PLATES

- A. One-Piece Floor Plates: Cast-iron flange with holes for fasteners.
- B. Split-Casting Floor Plates: Cast brass with concealed hinge.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.
- B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of insulated piping and with OD that completely covers opening.
 - 1. Escutcheons for New Piping:
 - a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
 - b. Chrome-Plated Piping: One-piece, cast-brass[or split-casting brass] type with polished, chrome-plated finish.
 - c. Insulated Piping: One-piece, stamped-steel type.
 - d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished, chrome-plated finish.
 - e. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, stamped-steel type.
 - f. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, cast-brass type with polished, chrome-plated finish.
 - g. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, stamped-steel type.
 - h. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass type with polished, chrome-plated finish.
 - i. Bare Piping in Unfinished Service Spaces: One-piece, stamped-steel type.
 - j. Bare Piping in Equipment Rooms: One-piece, cast-brass type with polished, chrome-plated finish.
 - k. Bare Piping in Equipment Rooms: One-piece, stamped-steel type[or split-plate, stamped-steel type with concealed hinge] [or split-plate, stamped-steel type with exposed-rivet hinge].

3.2 FIELD QUALITY CONTROL

- A. Replace broken and damaged escutcheons and floor plates using new materials.

END OF SECTION

SECTION 220523

GENERAL-DUTY VALVES FOR PLUMBING PIPING

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 SUMMARY

- A. Section Includes:
 - 1. Bronze angle valves.
 - 2. Brass ball valves.
 - 3. Bronze swing check valves.
 - 4. Bronze globe valves.

1.3 DEFINITIONS

- A. CWP: Cold working pressure.
- B. EPDM: Ethylene propylene copolymer rubber.
- C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.
- D. NRS: Nonrising stem.
- E. OS&Y: Outside screw and yoke.
- F. RS: Rising stem.
- G. SWP: Steam working pressure.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of valve indicated.

1.5 QUALITY ASSURANCE

- A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.
- B. ASME Compliance:
 - 1. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
 - 2. ASME B31.1 for power piping valves.
 - 3. ASME B31.9 for building services piping valves.
- C. NSF Compliance: NSF 61 for valve materials for potable-water service.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Prepare valves for shipping as follows:
 - 1. Protect internal parts against rust and corrosion.
 - 2. Protect threads, flange faces, grooves, and weld ends.
 - 3. Set angle, gate, and globe valves closed to prevent rattling.
 - 4. Set ball and plug valves open to minimize exposure of functional surfaces.
 - 5. Set butterfly valves closed or slightly open.
 - 6. Block check valves in either closed or open position.
- B. Use the following precautions during storage:
 - 1. Maintain valve end protection.
 - 2. Store valves indoors and maintain at higher than ambient dew point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.
- C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

- A. Refer to valve schedule articles for applications of valves.
- B. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

- C. Valve Sizes: Same as upstream piping unless otherwise indicated.
- D. Valve Actuator Types:
 - 1. Gear Actuator: For quarter-turn valves NPS 8 and larger.
 - 2. Handwheel: For valves other than quarter-turn types.
 - 3. Handlever: For quarter-turn valves NPS 6 and smaller.
- E. Valves in Insulated Piping: With 2-inch stem extensions and the following features:
 - 1. Gate Valves: With rising stem.
 - 2. Ball Valves: With extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
 - 3. Butterfly Valves: With extended neck.
- F. Valve-End Connections:
 - 1. Flanged: With flanges according to ASME B16.1 for iron valves.
 - 2. Grooved: With grooves according to AWWA C606.
 - 3. Solder Joint: With sockets according to ASME B16.18.
 - 4. Threaded: With threads according to ASME B1.20.1.
- G. Valve Bypass and Drain Connections: MSS SP-45.

2.2 BRONZE ANGLE VALVES

- A. Class 150, Bronze Angle Valves with Nonmetallic Disc:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Crane Co.; Crane Valve Group; Crane Valves.
 - b. Crane Co.; Crane Valve Group; Jenkins Valves.
 - c. Crane Co.; Crane Valve Group; Stockham Division.
 - d. Hammond Valve.
 - e. Milwaukee Valve Company.
 - f. NIBCO INC.
 - g. Powell Valves.
 - 2. Description:
 - a. Standard: MSS SP-80, Type 2.
 - b. CWP Rating: 300 psig.
 - c. Body Material: ASTM B 62, bronze with integral seat and union-ring bonnet.

- d. Ends: Threaded.
- e. Stem: Bronze.
- f. Disc: PTFE or TFE.
- g. Packing: Asbestos free.
- h. Handwheel: Malleable iron, bronze, or aluminum.

2.3 BRONZE BALL VALVES

A. Two-Piece, Full-Port, Bronze Ball Valves with Stainless-Steel Trim:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Conbraco Industries, Inc.; Apollo Valves.
 - b. Crane Co.; Crane Valve Group; Crane Valves.
 - c. Hammond Valve.
 - d. Lance Valves; a division of Advanced Thermal Systems, Inc.
 - e. Milwaukee Valve Company.
 - f. NIBCO INC.
 - g. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
2. Description:
 - a. Standard: MSS SP-110.
 - b. SWP Rating: 150 psig.
 - c. CWP Rating: 600 psig.
 - d. Body Design: Two piece.
 - e. Body Material: Bronze.
 - f. Ends: Threaded.
 - g. Seats: PTFE or TFE.
 - h. Stem: Stainless steel.
 - i. Ball: Stainless steel, vented.
 - j. Port: Full.

2.4 BRONZE SWING CHECK VALVES

A. Class 150, Bronze Swing Check Valves with Nonmetallic Disc:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Crane Co.; Crane Valve Group; Crane Valves.
 - b. Crane Co.; Crane Valve Group; Jenkins Valves.
 - c. Hammond Valve.
 - d. Milwaukee Valve Company.

- e. NIBCO INC.
 - f. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
2. Description:
- a. Standard: MSS SP-80, Type 4.
 - b. CWP Rating: 300 psig.
 - c. Body Design: Horizontal flow.
 - d. Body Material: ASTM B 62, bronze.
 - e. Ends: Threaded.
 - f. Disc: PTFE or TFE.

2.5 BRONZE GLOBE VALVES

A. Class 150, Bronze Globe Valves with Nonmetallic Disc:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Crane Co.; Crane Valve Group; Crane Valves.
 - b. Hammond Valve.
 - c. Kitz Corporation.
 - d. Milwaukee Valve Company.
 - e. NIBCO INC.
 - f. Powell Valves.
 - g. Red-White Valve Corporation.
 - h. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
2. Description:
 - a. Standard: MSS SP-80, Type 2.
 - b. CWP Rating: 300 psig.
 - c. Body Material: ASTM B 62, bronze with integral seat and union-ring bonnet.
 - d. Ends: Threaded.
 - e. Stem: Bronze.
 - f. Disc: PTFE or TFE.
 - g. Packing: Asbestos free.
 - h. Handwheel: Malleable iron[, bronze, or aluminum].

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.
- B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.
- C. Examine threads on valve and mating pipe for form and cleanliness.
- D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.
- E. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE INSTALLATION

- A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
- B. Locate valves for easy access and provide separate support where necessary.
- C. Install valves in horizontal piping with stem at or above center of pipe.
- D. Install valves in position to allow full stem movement.
- E. Install check valves for proper direction of flow and as follows:
 - 1. Swing Check Valves: In horizontal position with hinge pin level.

3.3 ADJUSTING

- A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.4 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

- A. If valve applications are not indicated, use the following:

1. Shutoff Service: Ball valves.
 2. Throttling Service: Globe valves.
- B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP classes or CWP ratings may be substituted.
- C. Select valves, except wafer types, with the following end connections:
1. For Copper Tubing, NPS 2 and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.

3.5 DOMESTIC, HOT- AND COLD-WATER VALVE SCHEDULE

- A. Pipe NPS 2 and Smaller:
1. Bronze and Brass Valves: May be provided with solder-joint ends instead of threaded ends.
 2. Bronze Angle Valves: Class 150, nonmetallic disc.
 3. Ball Valves: Two piece, full port, brass or bronze with stainless-steel trim.
 4. Bronze Swing Check Valves: Class 150, nonmetallic disc.
 5. Bronze Globe Valves: Class 150, nonmetallic disc.

END OF SECTION

SECTION 230548

VIBRATION CONTROLS FOR HVAC PIPING AND EQUIPMENT

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 SUMMARY

- A. This Section includes the following:
 - 1. Isolation pads.
 - 2. Elastomeric hangers.

1.3 DEFINITIONS

- A. IBC: International Building Code.
- B. ICC-ES: ICC-Evaluation Service.
- C. OSHPD: Office of Statewide Health Planning and Development for the State of California.

1.4 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Include rated load, rated deflection, and overload capacity for each vibration isolation device.
- B. Delegated-Design Submittal: For vibration isolation and seismic-restraint details indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 1. Design Calculations: Calculate static and dynamic loading due to equipment weight and operation, forces required to select vibration isolators.

- a. Coordinate design calculations with wind load calculations required for equipment mounted outdoors. Comply with requirements in other Sections for equipment mounted outdoors.
2. Riser Supports: Include riser diagrams and calculations showing anticipated expansion and contraction at each support point, initial and final loads on building structure, spring deflection changes. Include certification that riser system has been examined for excessive stress and that none will exist.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Show coordination of seismic bracing for HVAC piping and equipment with other systems and equipment in the vicinity, including other supports and seismic restraints.
- B. Qualification Data: For professional engineer and testing agency.
- C. Welding certificates.
- D. Field quality-control test reports.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For air-mounting systems to include in operation and maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
- B. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.
- C. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

PART 2 - PRODUCTS

2.1 VIBRATION ISOLATORS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Ace Mountings Co., Inc.
 - 2. Amber/Booth Company, Inc.
 - 3. California Dynamics Corporation.
 - 4. Isolation Technology, Inc.
 - 5. Kinetics Noise Control.
 - 6. Mason Industries.
 - 7. Vibration Eliminator Co., Inc.
 - 8. Vibration Isolation.
 - 9. Vibration Mountings & Controls, Inc.
- B. Pads: Arranged in single or multiple layers of sufficient stiffness for uniform loading over pad area, molded with a nonslip pattern and galvanized-steel baseplates, and factory cut to sizes that match requirements of supported equipment.
 - 1. Resilient Material: Oil- and water-resistant neoprene.
- C. Elastomeric Hangers: Single or double-deflection type, fitted with molded, oil-resistant elastomeric isolator elements bonded to steel housings with threaded connections for hanger rods. Color-code or otherwise identify to indicate capacity range.

2.2 FACTORY FINISHES

- A. Finish: Manufacturer's standard prime-coat finish ready for field painting.
- B. Finish: Manufacturer's standard paint applied to factory-assembled and -tested equipment before shipping.
 - 1. Powder coating on springs and housings.
 - 2. All hardware shall be galvanized. Hot-dip galvanize metal components for exterior use.
 - 3. Baked enamel or powder coat for metal components on isolators for interior use.
 - 4. Color-code or otherwise mark vibration isolation and seismic[- and wind]-control devices to indicate capacity range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and equipment to receive vibration isolation control devices for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Examine roughing-in of reinforcement and cast-in-place anchors to verify actual locations before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLICATIONS

- A. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static and seismic loads within specified loading limits.

3.3 VIBRATION-CONTROL DEVICE INSTALLATION

- A. Comply with requirements in Section 077200 "Roof Accessories" for installation of roof curbs, equipment supports, and roof penetrations.
- B. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.
- C. Drilled-in Anchors:
 - 1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
 - 2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
 - 3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
 - 4. Adhesive Anchors: Clean holes to remove loose material and drilling dust prior to installation of adhesive. Place adhesive in holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.
 - 5. Set anchors to manufacturer's recommended torque, using a torque wrench.

6. Install zinc-coated steel anchors for interior and stainless-steel anchors for exterior applications.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform tests and inspections.
- C. Tests and Inspections:
 1. Provide evidence of recent calibration of test equipment by a testing agency acceptable to authorities having jurisdiction.
 2. Schedule test with Owner, through Architect, before connecting anchorage device to restrained component (unless postconnection testing has been approved), and with at least seven days' advance notice.
 3. Obtain Architect's approval before transmitting test loads to structure. Provide temporary load-spreading members.
 4. Test at least four of each type and size of installed anchors and fasteners selected by Architect.
 5. Test to 90 percent of rated proof load of device.
 6. Measure isolator deflection.
 7. If a device fails test, modify all installations of same type and retest until satisfactory results are achieved.
- D. Remove and replace malfunctioning units and retest as specified above.
- E. Prepare test and inspection reports.

3.5 ADJUSTING

- A. Adjust isolators after piping system is at operating weight.

END OF SECTION

SECTION 221319

SANITARY WASTE PIPING SPECIALTIES

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 SUMMARY

- A. Section Includes:
 - 1. Cleanouts.
 - 2. Floor drains.
 - 3. Trench drains.

1.3 DEFINITIONS

- A. ABS: Acrylonitrile-butadiene-styrene plastic.
- B. FOG: Fats, oils, and greases.
- C. FRP: Fiberglass-reinforced plastic.
- D. HDPE: High-density polyethylene plastic.
- E. PE: Polyethylene plastic.
- F. PP: Polypropylene plastic.
- G. PVC: Polyvinyl chloride plastic.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and accessories for the following:
 - 1. Floor drains
 - 2. Trench drains

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For drainage piping specialties to include in emergency, operation, and maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic sanitary piping specialty components.

1.7 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Section 033000 "Cast-in-Place Concrete."
- B. Coordinate size and location of roof penetrations.

PART 2 - PRODUCTS

2.1 CLEANOUTS

- A. **Exposed Metal Cleanouts:**
 - 1. ASME A112.36.2M, Cast-Iron Cleanouts:
 - a. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1) Josam Company.
 - 2) MIFAB, Inc.
 - 3) Smith, Jay R. Mfg. Co.
 - 4) Tyler Pipe.
 - 5) Watts Drainage Products.
 - 6) Zurn Plumbing Products Group.

2. Standard: ASME A112.36.2M for cast iron. for cleanout test tee.
3. Size: Same as connected drainage piping
4. Body Material: Hub-and-spigot, cast-iron soil pipe T-branch as required to match connected piping.
5. Closure: Countersunk, brass plug.
6. Closure Plug Size: Same as or not more than one size smaller than cleanout size.
7. Closure: Stainless-steel plug with seal.

B. Metal Floor Cleanouts:

1. ASME A112.36.2M, Cast-Iron Cleanouts:
 - a. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1) Josam Company.
 - 2) Oatey.
 - 3) Sioux Chief Manufacturing Co., Inc.
 - 4) Smith, Jay R. Mfg. Co.
 - 5) Tyler Pipe.
 - 6) Watts Drainage Products.
 - 7) Zurn Plumbing Products Group.
2. Standard: ASME A112.36.2M for adjustable housing.
3. Size: Same as connected branch.
4. Type: Threaded, adjustable housing.
5. Body or Ferrule: Cast iron.
6. Outlet Connection: Threaded.
7. Closure: Brass plug with straight threads and gasket.
8. Adjustable Housing Material: Cast iron with threads.
9. Frame and Cover Material and Finish: Nickel-bronze, copper alloy.
10. Frame and Cover Shape: Round.
11. Top Loading Classification: Light Duty.
12. Riser: ASTM A 74, Service class, cast-iron drainage pipe fitting and riser to cleanout.
13. Standard: ASME A112.3.1.
14. Size: Same as connected branch.

C. Cast-Iron Wall Cleanouts:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Josam Company; Josam Div.
 - b. MIFAB, Inc.
 - c. Smith, Jay R. Mfg. Co.

- d. Tyler Pipe; Wade Div.
 - e. Watts Drainage Products.
 - f. Zurn Plumbing Products Group; Specification Drainage Operation.
2. Standard: ASME A112.36.2M. Include wall access.
 3. Size: Same as connected drainage piping.
 4. Body: Hub-and-spigot, cast-iron soil pipe T-branch as required to match connected piping.
 5. Closure: Countersunk] brass plug.
 6. Closure Plug Size: Same as or not more than one size smaller than cleanout size.
 7. Wall Access: Round, flat, chrome-plated brass or stainless-steel cover plate with screw.

2.2 FLOOR DRAINS

A. Cast-Iron Floor Drains FD-1:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Commercial Enameling Co.
 - b. Josam Company; Josam Div.
 - c. MIFAB, Inc.
 - d. Prier Products, Inc.
 - e. Smith, Jay R. Mfg. Co.
 - f. Tyler Pipe; Wade Div.
 - g. Watts Drainage Products.
 - h. Zurn Plumbing Products Group;
2. Floor drain, Dura-Coated cast iron body with bottom outlet, combination invertible membrane clamp and adjustable collar with seepage slots and “type B” polished nickel bronze, light duty heel-proof strainer.

2.3 TRENCH DRAINS

A. Trench Drains TD-1:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Josam Company; Josam Div.
 - b. MIFAB, Inc.
 - c. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - d. Tyler Pipe; Wade Div.
 - e. Watts Drainage Products Inc.
 - f. Zurn Plumbing Products Group; Specification Drainage Operation.

2. Channels are 80" long, 6.25" wide reveal and have a 4" throat. Modular channel sections are made of 0% water absorbent HDPE. Channels have a positive mechanical connection between channel sections that will not separate during the installation and mechanically lock into the concrete surround a minimum of every 10". Channels weigh less than 2.31 lbs per linear foot, have a smooth, 1.5" radiused self cleaning bottom with a Manning's coefficient of 0.009 and 0.75% or neutral 0% built in slope. Channels have rebar clips standard to secure trench in its final location. Channels are provided with standard DGC grates that lock down with lockdown bars to the channel and is not intended for dynamic traffic loadings.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:
 1. Size same as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
 2. Locate at each change in direction of piping greater than 45 degrees.
 3. Locate at minimum intervals of 50 feet for piping NPS 4 and smaller and 100 feet for larger piping.
 4. Locate at base of each vertical soil and waste stack.
- B. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.
- C. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.
- D. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.
 1. Position floor drains for easy access and maintenance.
 2. Set floor drains below elevation of surrounding finished floor to allow floor drainage. Set with grates depressed according to the following drainage area radii:
 - a. Radius, 30 Inches or Less: Equivalent to 1 percent slope, but not less than 1/4-inch total depression.
 - b. Radius, 30 to 60 Inches: Equivalent to 1 percent slope.
 - c. Radius, 60 Inches or Larger: Equivalent to 1 percent slope, but not greater than 1-inch total depression.

3. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
 4. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.
- E. Install trench drains at low points of surface areas to be drained. Set grates of drains flush with finished surface, unless otherwise indicated.
 - F. Install roof flashing assemblies on sanitary stack vents and vent stacks that extend through roof.
 - G. Install flashing fittings on sanitary stack vents and vent stacks that extend through roof.
 - H. Install frost-resistant vent terminals on each vent pipe passing through roof. Maintain 1-inch clearance between vent pipe and roof substrate.
 - I. Install wood-blocking reinforcement for wall-mounting-type specialties.
 - J. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.

3.2 CONNECTIONS

- A. Install piping adjacent to equipment to allow service and maintenance.

3.3 FIELD QUALITY CONTROL

- A. Tests and Inspections:
 1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.4 PROTECTION

- A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.
- B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION

SECTION 223400

FUEL-FIRED, DOMESTIC-WATER HEATERS

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 SUMMARY

- A. Section Includes:
 - 1. Gas-fired, tankless, domestic-water heaters.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type and size of domestic-water heater indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Shop Drawings:
 - 1. Wiring Diagrams: For power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of commercial, gas-fired, domestic-water heater, from manufacturer.
- B. Domestic-Water Heater Labeling: Certified and labeled by testing agency acceptable to authorities having jurisdiction.
- C. Source quality-control reports.
- D. Field quality-control reports.
- E. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For fuel-fired, domestic-water heaters to include in emergency, operation, and maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. ASHRAE/IESNA Compliance: Fabricate and label fuel-fired, domestic-water heaters to comply with ASHRAE/IESNA 90.1.
- C. ASME Compliance:
 - 1. Where ASME-code construction is indicated, fabricate and label commercial, domestic-water heater storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
 - 2. Where ASME-code construction is indicated, fabricate and label commercial, finned-tube, domestic-water heaters to comply with ASME Boiler and Pressure Vessel Code: Section IV.
- D. NSF Compliance: Fabricate and label equipment components that will be in contact with potable water to comply with NSF 61, "Drinking Water System Components - Health Effects."

1.7 COORDINATION

- A. Coordinate sizes and locations of concrete bases with actual equipment provided.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of fuel-fired, domestic-water heaters that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including storage tank and supports.
 - b. Faulty operation of controls.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal use.

2. Warranty Periods: From date of Substantial Completion.
 - a. Gas-Fired, Tankless, Domestic-Water Heaters:
 - 1) Heat Exchanger: Five years.
 - 2) Controls and Other Components: Three years.

PART 2 - PRODUCTS

2.1 GAS-FIRED, TANKLESS, DOMESTIC-WATER HEATERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 1. Bosch Water Heating.
 2. Bradford White Corporation.
 3. Rheem Manufacturing Company; Rheem Water Heating.
 4. Rinnai Corporation.
 5. Smith, A. O. Water Products Co.; a division of A. O. Smith Corporation.
 6. State Industries.
- B. Water heater shall be fully modulating, on-demand, condensing gas fired tankless water heater. The heater shall have ¾" male NPT water and gas connection. The inlet gas supply pressures shall be 4.0" WC up to 10.5 " WC. The indoor heater shall incorporate an integrated temperature controller that will provide diagnostic information, fault history, and heater set temperature. The heater shall operate using 120/60 power source. The indoor heater will incorporate a factory installed power cord.
- C. The indoor heater shall be vented with 4" diameter schedule 40 PVC vent pipe with a length not to exceed 100 feet. The intake pipe shall also be PVC.
- D. The water heater shall use a commercial-grade copper, fin tube primary heat exchanger with quick release brass or bronze waterways. The secondary heat exchanger shall be constructed from stainless steel 316L. The heater shall be controlled by an on-board solid-state printed circuit board which uses the following factory installed components: thermistors to monitor water temperature and exhaust temperature; a flow sensor to measure flow rate; a flame sensor to monitor combustion ; an Air-Fuel Ratio Rod to measure and adjust air input in order to maintain optimal combustion efficiency. The heater also consists of in-line fusing and surge absorbers for electrical surge protection, and electronic spark igniter, aluminized stainless steel burners, hi-limit temperature switches to monitor water and exhaust temperatures, modulating gas valve, dual freeze protection that will automatically fire the heater and use heating blocks to protect the heat exchanger, and an overheat cutoff fuse.

- E. The heater models are design certified by CSA according to ANSI Z21.10.3 – CSA 4.3 approved, Energy Star qualified, and has a minimum uniform energy factory of 0.93.

2.2 SOURCE QUALITY CONTROL

- A. Factory Tests: Test and inspect assembled domestic-water heaters specified to be ASME-code construction, according to ASME Boiler and Pressure Vessel Code.
- B. Hydrostatically test commercial domestic-water heaters to minimum of one and one-half times pressure rating before shipment.
- C. Domestic-water heaters will be considered defective if they do not pass tests and inspections. Comply with requirements in Section 014000 "Quality Requirements" for retesting and reinspecting requirements and Section 017300 "Execution" for requirements for correcting the Work.
- D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 DOMESTIC-WATER HEATER INSTALLATION

- A. Tankless, Domestic-Water Heater Mounting: Install tankless, domestic-water heaters at least 18 inches on wall bracket.
 - 1. Maintain manufacturer's recommended clearances.
 - 2. Arrange units so controls and devices that require servicing are accessible.
 - 3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 4. Install anchor bolts to elevations required for proper attachment to supported equipment.
 - 5. Anchor domestic-water heaters to substrate.
- B. Install domestic-water heaters level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.
 - 1. Install shutoff valves on domestic-water-supply piping to domestic-water heaters and on domestic-hot-water outlet piping. Comply with requirements for shutoff valves specified in Section 220523 "General-Duty Valves for Plumbing Piping."
- C. Install gas-fired, domestic-water heaters according to NFPA 54.

1. Install gas shutoff valves on gas supply piping to gas-fired, domestic-water heaters without shutoff valves.
 2. Install gas pressure regulators on gas supplies to gas-fired, domestic-water heaters without gas pressure regulators if gas pressure regulators are required to reduce gas pressure at burner.
 3. Install automatic gas valves on gas supplies to gas-fired, domestic-water heaters if required for operation of safety control.
- D. Install combination temperature-and-pressure relief valves in water piping for domestic-water heaters without storage. Extend commercial-water-heater relief-valve outlet, with drain piping same as domestic-water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.
- E. Install water-heater drain piping as indirect waste to spill by positive air gap into open drains or over floor drains. Install hose-end drain valves at low points in water piping for domestic-water heaters that do not have tank drains.
- F. Install thermometer on outlet piping of domestic-water heaters. Comply with requirements for thermometers specified in Section 220519 "Meters and Gages for Plumbing Piping."
- G. Fill domestic-water heaters with water.
- H. Charge domestic-water compression tanks with air.

3.2 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Where installing piping adjacent to fuel-fired, domestic-water heaters, allow space for service and maintenance of water heaters. Arrange piping for easy removal of domestic-water heaters.

3.3 IDENTIFICATION

- A. Identify system components. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.4 FIELD QUALITY CONTROL

- A. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
 2. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 3. Operational Test: After electrical circuitry has been energized, start units to confirm proper operation.
 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- B. Domestic-water heaters will be considered defective if they do not pass tests and inspections. Comply with requirements in Section 014000 "Quality Requirements" for retesting and reinspecting requirements and Section 017300 "Execution" for requirements for correcting the Work.
- C. Prepare test and inspection reports.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain gas-fired, tankless domestic-water heaters.

END OF SECTION