

Millersburg Fire Station

SECTION 00 9111
ADDENDUM NUMBER 1

PARTICULARS

DATE: 02/23/2021
PROJECT: CITY OF MILLERSBURG FIRE STATION 15
ARCHITECT'S PROJECT NUMBER: 20006
OWNER: CITY OF MILLERSBURG
ARCHITECT: SODERSTROM ARCHITECTS

TO: PROSPECTIVE BIDDERS:

THIS ADDENDUM FORMS A PART OF THE CONTRACT DOCUMENTS AND MODIFIES THE ORIGINAL PROCUREMENT DOCUMENTS DATED 2/03/2021, WITH AMENDMENTS AND ADDITIONS NOTED BELOW.

ACKNOWLEDGE RECEIPT OF THIS ADDENDUM IN THE SPACE PROVIDED IN THE BID FORM. FAILURE TO DO SO MAY DISQUALIFY THE BIDDER.

CHANGES TO THE PROJECT MANUAL - INTRODUCTORY REQUIREMENTS, PROCUREMENT REQUIREMENTS AND CONTRACTING REQUIREMENTS:

BID AND QUALIFICATIONS SUBMITTAL EVALUATION

Added BID AND QUALIFICATIONS SUBMITTAL EVALUATION

Section issued in entirety. Note – this section is for informational purposes only, and will be completed by the bid evaluation committee, not the bidders.

SECTION 01 5100 – TEMPORARY UTILITIES

REVISE Part 1 Products, Paragraph 1.07 to read as follows:

1.07 TEMPORARY WATER **AND SEWER** SERVICE

A. Cost of Water **and Sanitary Sewer Services** Used: By Owner.

Section reissued in entirety

CHANGES TO THE PROJECT MANUAL - SPECIFICATIONS:

SECTION 22 1100 – PIPING AND VALVES

Added Part 2- Products, 2.2 PIPING, Paragraph E – Natural Gas Piping and vent lines above grade, and Paragraph F – Drain Waste Vent (DWV) above and below grade piping

Section reissued in entirety

CHANGES TO DRAWINGS:

None with this addendum

BIDDER QUESTIONS

1. Is Civil CAD available for earthwork take-offs
 - A. CAD drawings will not be issued as part of the bid documents. We are requesting a unit cost for over excavation and engineered backflow as part of bid to budget for additional earthwork. CAD files will be provided to the selected contractor once bid is awarded.

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2. While going through the plumbing specs I noticed there is not a spec for DWV piping either underground or above ground. Please confirm piping spec for this system.
 - A. See revised Specification Section 22 1100 issued with this addendum.

APPROVAL OF ADDITIONAL PRODUCTS/SYSTEMS:

ALL CONTRACT DOCUMENT SPECIFICATION REQUIREMENTS APPLY IN TOTAL TO ALL ADDITIONAL MANUFACTURERS AND PRODUCTS LISTED BELOW.

08 5113 – ALUMINUM WINDOWS

Kawneer AA4325 Casement Window as an additional basis of design.

09 3000 – TILING

Ardex – added as approved manufacturer

09 5426 – SUSPENDED WOOD CEILINGS

Geosquare ceiling panels by Geometrik

Rulon Flat Veneer Panels by Rulon

END OF SECTION

BID AND QUALIFICATIONS SUBMITTAL EVALUATION
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Contractor Name: _____

Contractor submittals shall be evaluated in accordance with the criteria outlined in the Invitation to Bid and Contract Documents.

Review and Evaluation. Submittals will be reviewed by a committee. The committee shall evaluate submittals to determine that they comply with the administrative, contractual, and technical requirements of the Invitation to Bid. The committee shall also score the submittals in accordance with the criteria below, in accordance with the criteria outlined in the Invitation to Bid and Contract Documents. **The City may ask follow-up questions of any bidder to clarify responses or contact references for any previous projects, even if reference is not provided by contractor.**

Criteria for Award. Evaluate submittals based on the following criteria:

A.	<p>Mandatory Requirements (Pass/Fail) These requirements will not be scored. Failure to meet any of these qualifications will render the submittal non-responsive.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Signed Proposal (two pages) – <i>with all blanks completed</i> <input type="checkbox"/> Completed Schedule of Contract Prices – <i>signed by an authorized representative of the company who can “execute bids”</i> <input type="checkbox"/> Completed AIA Document A305 – 2020 – <i>Contractor’s Qualification Statement – including Exhibits A through E</i> <input type="checkbox"/> Bid Bond – <i>using City-provided Bid Bond form with no alterations</i> <input type="checkbox"/> Employee Drug Testing Certification Form <input type="checkbox"/> Signed Addenda (<i>if Addenda have been issued</i>) <input type="checkbox"/> First-Tier Subcontractor Disclosure form – signed and if “none” indicate as such 	PASS / FAIL
B.	<p>Contractor Qualifications – 60 points possible</p>	
	<p>1) Experience (AIA C.1, C.2, and Exhibit D)</p> <p>(a) Firm’s and firm’s key personnel experience with essential services facilities, which operate 24-hours, 7- days a week, within the last five years. Comments:</p> <p>(b) Firm’s and firm’s key personnel experience with new construction of fire stations designed for career staff, within the last five years. Comments:</p> <p>(c) Firm’s subs experience with essential services facilities, which operate 24-hours, 7- days a week, within the last five years. Comments:</p>	__ / 20

	<p>(d) Firm's subs experience with new construction of fire stations designed for career staff, within the last five years. Comments:</p> <p>(e) Firm's experience working with the architect of record for this project and for projects of similar scope and value. Comments:</p> <p>(f) Firm's and subs experience with construction of public works facilities, including potable water systems, sanitary sewer, stormwater, and streets. Comments:</p> <p>(g) Firm's use of project management information systems. Comments:</p>	
	<p>2) Financial performance, safety, insurance, and surety (AIA B.1):</p> <p>(a) Contractor has demonstrated ability to execute services in a fiscally responsible and timely manner (AIA A.4). Comments:</p> <p>(b) Contractor's Safety Program (AIA C.3) Comments:</p> <p>(c) Contractor's experience modification rates (AIA C.3.4) Comments:</p> <p>(d) Contractor's ability to provide surety for the project (AIA C.5) Comments:</p> <p>(e) Contractor's ability to identify cost-savings measures (AIA A.4) Comments:</p>	<p>__ / 10</p>
	<p>3) Disputes, crimes, disciplinary actions, and penalties (AIA B.2.1 through B.2.3):</p> <p>(a) Any pending lawsuits filed against Contractor claiming damages >\$75,000, or outstanding judgments, arbitration proceedings, or bond claims against Contractor >\$75,000. Comments:</p> <p>(b) In the last 5 years, any of the following actions against Contractor: 1) Allegations, whether filed or verbally or orally alleged, of failure to complete work; 2) Termination of a work contract for any reason except owner's convenience; 3) Judgments, settlements, or awards >\$75,000;</p>	<p>__ / 15</p>

	<p>4) An entity has filed against Contractor, any lawsuit or has requested arbitration regarding a construction project. Comments:</p> <p>(c) Conviction or indictment of a business-related crime. Comments:</p> <p>(d) Any business or professional license subjected to disciplinary action. Comments:</p> <p>(e) Penalized or fined by a local, state, or federal environmental agency. Comments:</p>	
	<p>4) References (AIA A.4 and Exhibit D)</p> <p>(a) Client feedback Comments:</p> <p>(b) Architect feedback Comments:</p> <p>(c) Bank feedback Comments:</p> <p>(d) Subcontractor feedback Comments:</p>	<p>___ / 15</p>
	Summary of Contractor Qualifications:	___ / 60
C.	<p>Bid Price- 40 points possible</p> <p>All bids within 5% of low bid will receive 40 points 5% - 10% of low bid will receive 35 points 10% - 15% of low bid will receive 30 points 15% - 20% of low bid will receive 25 points 20% - 25% of low bid will receive 20 points Greater than 25% will receive 15 points Comments:</p>	___ / 40
	Evaluation Score / Points Possible	___ /100

SECTION 01 5100

TEMPORARY UTILITIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Temporary Utilities: Provision of electricity, lighting, heat, ventilation, and water.

1.02 RELATED REQUIREMENTS

- A. Section 01 5000 - Temporary Facilities and Controls:
 - 1. Temporary telecommunications services for administrative purposes.
 - 2. Temporary sanitary facilities required by law.

1.03 TEMPORARY ELECTRICITY

- A. Cost: By Contractor.
- B. Provide power service required from utility source.
- C. Power Service Characteristics: 208 volt, 200 ampere, three phase, four wire.
- D. Provide power outlets for construction operations, with branch wiring and distribution boxes located as required. Provide flexible power cords as required.
- E. Provide main service disconnect and over-current protection at convenient location and meter.
- F. Permanent convenience receptacles may be utilized during construction.
- G. Provide adequate distribution equipment, wiring, and outlets to provide single phase branch circuits for power and lighting.
 - 1. Provide 20 ampere duplex outlets, single phase circuits for power tools for every 1000 sq ft of active work area.
 - 2. Provide 20 ampere, single phase branch circuits for lighting.

1.04 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

- A. Provide and maintain incandescent lighting for construction operations to achieve a minimum lighting level of 2 watt/sq ft .
- B. Provide and maintain 1 watt/sq ft lighting to exterior staging and storage areas after dark for security purposes.
- C. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required.
- D. Maintain lighting and provide routine repairs.
- E. Permanent building lighting may be utilized during construction.

1.05 TEMPORARY HEATING

- A. Cost of Energy: By Contractor.
- B. Provide heating devices and heat as needed to maintain specified conditions for construction operations.
 - 1. The use of diesel fired space heaters inside the building is strictly forbidden.
- C. Enclose building prior to activating temporary heat.
- D. Provide temporary heat before any casework or floor materials are delivered to the job site
- E. Maintain minimum ambient temperature of 50 degrees F in areas where construction is in progress, unless indicated otherwise in specifications.
- F. Owner's new heat plant may NOT be used until the following occurs:
 - 1. Compliance with Section 01 5719 - Temporary Environmental Controls
 - 2. Exercise measures to conserve energy.
 - 3. Enclose building prior to activating temporary heat.
 - 4. Provide separate metering and reimburse Owner for cost of energy used.

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- G. Prior to operation of permanent equipment for temporary heating purposes, verify that installation is approved for operation, equipment is lubricated and filters are in place. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts.

1.06 TEMPORARY COOLING

- A. Cost of Energy: By Contractor.
- B. Provide cooling devices and cooling as needed to maintain specified conditions for construction operations.
- C. Maintain maximum ambient temperature of 80 degrees F in areas where construction is in progress, unless indicated otherwise in specifications.
- D. Owner's new cooling plant may NOT be used until the following occurs:
 - 1. Compliance with Section 01 5719 - Temporary Environmental Controls
 - 2. Exercise measures to conserve energy.
 - 3. Enclose building prior to activating temporary cooling.
 - 4. Provide separate metering and reimburse Owner for cost of energy used.
- E. Prior to operation of permanent equipment for temporary cooling purposes, verify that installation is approved for operation, equipment is lubricated and filters are in place. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts.

1.07 TEMPORARY WATER AND SEWER SERVICE

- A. Cost of Water and Sanitary Sewer Services Used: By Owner.
- B. Provide and maintain suitable quality water service for construction operations at time of project mobilization.
- C. Connect to existing water source.
 - 1. Exercise measures to conserve water.
- D. Extend branch piping with outlets located so water is available by hoses with threaded connections. Provide temporary pipe insulation to prevent freezing.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

PIPING AND VALVES

PART 1 GENERAL

1.1 DESCRIPTION

- A This section covers all pipe and pipe fittings and incidental related items as required for complete piping systems.

1.2 REFERENCE

- A The work under this section is subject to requirements of the contract documents including the general conditions, supplementary conditions, and requirements.

1.3 SUBMITTALS

- A Manufacturer's technical data for the following:
 - 1 Pipe.
 - 2 Fittings.
 - 3 Joints.
 - 4 Valves.
 - 5 Unions.
 - 6 Dielectric fittings.
 - 7 Water hammer arrestors.
- B Certificates: Submit performance testing certificates for reduced pressure backflow preventers and double check backflow preventers.

1.4 QUALITY ASSURANCE

- A Order pipe with each length marked with manufacturer's name or trademark and type of pipe; with each shipping unit marked with the purchase order number, metal or alloy designation, temper, size, and supplier's name.
- B Installed material not meeting specification requirements must be replaced with material that meets these specifications without additional cost to Owner.

1.5 DELIVERY, STORAGE, AND HANDLING

- A Promptly inspect shipments to ensure material is undamaged and complies with specifications.
- B Cover pipe to prevent corrosion or deterioration while allowing sufficient ventilation to avoid condensation. Do not store materials directly on grade. Protect pipe, tube, and fitting ends from damage. End caps shall remain in place. Protect fittings, flanges, and unions by storage inside or by durable, waterproof, above ground packaging.
- C Offsite storage agreements will not relieve contractor from using proper storage techniques.
- D Storage and protection methods must allow inspection to verify products.
- E Before shipping, piping shall be cleaned, free of rust and scale, and chemically treated to protect inside of pipe from rusting and furnished with end caps.

PART 2 PRODUCTS

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2.1 MATERIALS

A Materials herein specified shall be new unless otherwise noted.

2.2 PIPING

A Water Piping, Below Grade:

- 1 Copper Tubing: ASTM B88, Type K, hard tempered.
 - a Fittings: ASME B16.22 wrought copper and bronze.
 - b Joints: ASTM B32, Solder Grade 95TA.

B Water Piping, Above Grade:

- 1 Copper Tubing: ASTM B88, Type L, hard tempered.
 - a Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
 - b Joints: Lead free (<0.2 percent) solder, Bridgit or Silvabrite, ASTM B32, solder Grade 95TA; flux, ASTM B813.
 - c Nipples: Red brass pipe, threaded.

C Mechanically Formed Tee Connections and Couplings:

- 1 Mechanically formed fitting system of drill, expansion, and brazing of copper water tube may be provided conforming to the system (T-Drill) listed under National Standard, IAMPO, SBCC, BOCA Plumbing Codes, and Underwriters.
- 2 Joints shall be brazed in accordance with American Welding Society lap joint weld, and Copper Development Association Copper Tube Handbook using BCup Series filler metal. (Note: Soft soldered joints are not permitted.)

D CDA Piping:

- 1 Steel: ASTM A53 Grade B, seamless or ERW, Schedule 40.

E Natural Gas Piping and vent lines above grade:

- 1 Pipe: Black steel pipe, Schedule 40, in accordance with ASTM A120 or A53.
- 2 Fittings: 150-pound screwed malleable iron on 2 inches and below, Schedule 40 welded fittings in accordance with ASTM A234. Fittings below grade shall be welding fittings.

F Drain Waste Vent (DWV) above and below grade piping:

- 1 Hubless, cast-iron soil pipe and fittings above and below Grade
 - a Pipe and Fittings: ASTM A 888 and CISPI 301.
 - 1) Tensile Strength: 21,000 psig minimum.
 - 2) Pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute and listed by NSF International.
 - 3) Each length of pipe and each fitting shall be plainly marked with size, country of origin, and name of manufacturer, or manufacturer's registered trademark by which the manufacturer can be readily identified after installation.
 - b CISPI, Hubless-Piping Couplings:
 - 1) Manufacturers: Subject to compliance with requirements. Provide products by one of the following:

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- i. Ideal Tridon
 - ii. ANACO-Husky
 - iii. Tyler Couplings
 - iv. Mission Rubber Company
 - 2) Standards: ASTM C 1277 and CISPI 310.
 - 3) Description: Shield Assemblies shall consist of stainless-steel bi-directional corrugated shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop. Couplings shall bear the trademark NSF International.
 - c Heavy-Duty, Hubless-Piping Couplings:
 - 1) Manufacturers: Subject to compliance with requirements. Provide products by one of the following:
 - i. Ideal Tridon
 - ii. ANACO-Husky
 - iii. Tyler Couplings
 - iv. Mission Rubber Company
- 2 PVC pipe and fittings
- a Comply with NSF 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping and "NSF-sewer" for plastic sewer piping.
 - 1) Solid-Wall PVC Pipe: ASTM D 2665, drain, waste, and vent.
 - 2) Cellular-Core PVC Pipe: ASTM F 891, Schedule 40.
 - 3) PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns.
 - 4) PVC Pressure Fittings: ASTM D 2466, Socket Type
 - b Primer: ASTM F 656.
 - 1) Primer shall have a VOC content of 550g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24)
 - 2) Adhesive primer shall comply with the testing and product requirements of the California Department of Health Services "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers"
 - c Solvent Cement: ASTM D 2564.
 - 1) PVC solvent cement shall have a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24)
 - 2) Solvent cement shall comply with the testing and product requirements of the California Department of Health Services "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers"
- 3 ABS pipe and fittings

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a Pipe and Fittings:

- 1) Inside and outside layers of pipe shall be manufactured from ABS compound with a minimum cell class of 42222 per ASTM D 3965.
- 2) Center layer of pipe shall be manufactured from PVC compound with a cell class of 11432 per ASTM D 4396.
- 3) Pipe shall be iron pipe size (IPS) Schedule 40 conforming to ASTM F 1488.
- 4) Fittings shall be manufactured from ABS compound with a cell class of 32222 per ASTM D 3965.
- 5) Fittings shall conform to ASTM D 2661.
- 6) Both pipe and fittings shall conform to NSF International Standard 14.

b Solvent Cement: ASTM D 2235.

- 1) Maximum VOC per SCAQMD 1168/316A or BAAQMD Method 40: 325 g/L.
- 2) Solvent Cement meets California South Coast Air Quality Management District (SCAQMD) 1168/316A or BAAQMD Method 40 and various environmental requirements.

2.3 UNIONS AND FLANGES

A General:

- 1 Unions, flanges, and gasket materials to have pressure rating of not less than 150 psig at 180 degrees.

B Copper 3 inches and smaller:

- 1 Wrought copper union, Nibco Figure 733. Mueller Brass or equal.

2.4 VALVES

A Shutoff Valves:

1 Ball Valves:

a Acceptable manufacturer: Apollo.

- 1) Full Port, 2 Piece: Bronze body, stainless steel ball, Teflon seats, stem extension, 600 psi WOG pressure rating.
- 2) Full Port, 3 Piece: Bronze body, chrome plated bronze ball, Teflon seats, stem extension, 600 psi WOG pressure rating.

2 Butterfly Valves:

a Acceptable Manufacturer: Stockham or Grinnell.

- b Lug Type: Ductile iron body, aluminum bronze disc, EPDM liner, 316 stainless steel stem, brass bushings (lower, upper and collar), 200 psi WOG pressure rating, lever handle through 6 inches, gear operator 8 inches and larger.

3 Gate Valves:

a Acceptable Manufacturer: Nibco

- b Size 4 Inches and Larger: Iron body, bronze trim, outside screw and yoke (OS&Y), 125 psi steam pressure rating, bolted bonnet, flanged pipe ends.

B Check Valves:

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- 1 Size 3 Inches and Smaller:
 - a Acceptable Manufacturer: Nibco
 - b Bronze body, Y pattern, Buna N resilient disc, horizontal swing, 200 psi WOG rating, Nibco 413.
- 2 Valves 4 Inches and Larger:
 - a Acceptable Manufacturer: Nibco.
 - b Iron body, horizontal swing, cast bronze disc and seat, 200 psi WOG rating, Nibco F 918.

C Balancing Valves:

- 1 Present for gpm indicated with threaded ends. Acceptable manufacturers: Griswold or pre-approved equal.

2.5 DIELECTRIC FITTINGS

- A Insulating nipple, metal casing, inert thermoplastic lining, Clearflow dielectric fitting by Perfection Corporation.

2.6 WATER HAMMER ARRESTORS

A Mechanical Shockstops:

- 1 Piston-compressed air column type, with sealed air chamber.
- 2 Manufacturers: Watts, Sioux-Chief, and Precision Plumbing Products (PPP), Inc., equal to size shown. Provide access panels when mechanical shockstops are installed in non-accessible concealed locations.

PART 3 EXECUTION

3.1 INSTALLATION (COPPER)

- A Install pipe and fittings in accordance with reference standards, manufacturer's recommendations, and recognized industry practices.
- B Include connections to plumbing fixtures, to equipment by others, and to equipment requiring water. Provide proper backflow and back siphonage protection to safeguard potable water system from contamination.
- C Lay out water system to conform to intent of drawings. Coordinate piping with building features and work of other trades. Plans indicate general routing, provide additional offsets as required. Install piping with necessary swing joints and offsets to allow for expansion. Install shut-off valves on branch lines near mains to avoid long dead-leg branches when valves are closed. Install water piping plumb and square with building. Pitch water pipe to drain with drain valves at low points.
- D Install shut-off valves where indicated and at base of risers to allow isolation of portions of system for repair. Do not install water piping within exterior walls.
- E Protect all copper piping and plastic tubing routed through framing members within one inch of the exposed framing with steel nail shields not less than 18 gauge.
- F Provide protective sleeve covering of ½ inch thick elastomeric pipe insulation where copper or steel piping is embedded in masonry or concrete
- G Provide dielectric fittings between dissimilar piping materials.

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- H Do not route piping through transformer vaults or above transformers, panelboards, or switchboards, including the required service space for this equipment, unless piping is serving this equipment.
- I Install all valves and piping specialties, including items furnished by others, as specified and/or detailed. Provide access to valves and specialties for maintenance. Make connections to equipment, fixtures and systems installed by others where, same requires piping services indicated in this section.
- J Install water pipe using proper pipe and fittings. Use reducing fittings for changes in pipe size.
- K Copper Pipe Joints:
 - 1 Use non-acidic and lead-free flux on cleaned pipe and fittings for soldered joints. Cut pipe square and ream before assembly. Fill joints with solder by capillary action. Solder shall cover joint periphery. Wipe joint clean. Apply heat carefully to prevent damage to pipe, fittings, and valves. Follow manufacturer's recommendations when heating valves and equipment for soldered connections.
- L Mechanically Formed Tee Fittings:
 - 1 Form mechanically extracted collars in continuous operation consisting of drilling pilot hole and drawing out tube surface to form collar having height of not less than 3 times thickness of tube wall. Use adjustable collaring device. Notch and dimple branch tube.
 - 2 To form couplings, anneal end of tubing to be expanded - insert expander and reform tube to accept size OD. Socket expansion shall be at least 3 times base tube wall thickness in depth.
 - 3 Braze joints and couplings in accordance with American Welding Society "lap-joint" weld, and Copper Development Association copper tube handbook using BCup filler metal. (Note: Soft soldered joints will not be permitted.)
- M Maintain piping system in clean condition during installation. Remove dirt and debris from assembly of piping as work progresses. Cap open pipe ends where left unattended or subject to contamination.
- N Install drains at low points in piping system mains and elsewhere as required for system drainage. Drains shall consist of a tee fitting, NPS 3/4-inch ball valve, and short NPS 3/4-inch threaded nipple with cap. Slope piping at a uniform grade of 0.2 percent upward in direction of flow.
- O Use mechanical shockstops to control water hammer. Installed shockstops shall be sized and located according to manufacturer's recommendations or as shown on drawings.
- P Use shockstops with quick-closing valves and at top of risers.
- Q Provide access panels when mechanical shockstops are installed in non-accessible concealed locations.
- R Provide pipe insulation per specification section 22 0700, Plumbing Insulation.

3.2 DIELECTRIC UNIONS AND FLANGES

- A Install dielectric unions or flanges at points where copper-to-steel pipe connection is required in domestic water systems.
- B Install unions on equipment side of shutoff valves for items such as: water heaters, pumps, filters, and similar equipment requiring periodic replacement.
- C Install temporary plugs and caps on openings during construction phase.

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3.3 CLEANING

- A Flush and clean piping prior to testing. Remove corrosion by mechanical or chemical means. Use chemicals that are non-toxic.

3.4 TESTING

- A Water test system may be applied to system in its entirety or in sections. Test piping with water to pressure of 150 psi for 2 hours. No decrease in pressure allowed. Provide pressure gauge with shutoff and bleeder valve at highest point of system tested. Inspect joints in system under test.
 - 1 Defective work or material shall be replaced or repaired as necessary and inspection and test repeated. Repairs shall be made with new materials. No caulking of threaded joints or holes will be allowed.
 - 2 Do not conceal pipe until satisfactorily tested.
 - 3 Testing with air will not be allowed.

3.5 BALANCING

- A Balance water distribution system. Adjust control valves for proper operation. Set balancing valves to maintain hot water in hot water system.
- B Balance flush valves, flow control valves and mixing valves for adequate flow and temperature to plumbing fixtures and equipment.

3.6 DISINFECTION

- A Disinfect water piping in the following manner:
 - 1 Clean and flush water pipe with water until water at remote tap is clear.
 - 2 Fill water systems with solution containing 50 ppm of chlorine (minimum concentration). Allow solution to stay in water system for 24 hours. Alternately use solution of 200 ppm of chlorine (minimum concentration) for 3 hours.
 - 3 Flush water system of chlorine solution.
 - 4 Allow clean water to stand in system for 24 hours. Take sample from remote tap for bacteriological test.
- B Do not use water system for potable water supply until safe bacteriological test is obtained. Repeat steps 1 through 4 until safe water system is obtained.

3.7 BACTERIOLOGICAL TESTS

- A Take representative water samples from water piping and test to ensure bacteriologically safe water supply system. Include HPC test and test for presence of *Pseudomonas aeruginosa* as well as regular coliform bacteria test. HPC test maximum containment level of 500 organisms/ml. Perform bacteriological tests shortly before Substantial Completion. If tests fail, make corrections and retest.

END OF SECTION