SECTION 331100

WATER UTILITY DISTRIBUTION PIPING

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***NOTE TO SPECIFIER***

*Use this Specification Section for Mail Processing Facilities.*

***This is a Type 1 Specification with completely editable text; therefore, any portion of the text can be modified by the A/E preparing the Solicitation Package to suit the project.***

*For Design/Build projects, do not delete the Notes to Specifier in this Section so that they may be available to Design/Build entity when preparing the Construction Documents.*

*For the Design/Build entity, this specification is intended as a guide for the Architect/Engineer preparing the Construction Documents.*

*The MPF specifications may also be used for Design/Bid/Build projects. In either case, it is the responsibility of the design professional to edit the Specifications Sections as appropriate for the project.*

*Text shown in brackets must be modified as needed for project specific requirements.* *See the “Using the USPS Guide Specifications” document in Folder C for more information.*

*The last date that USPS revised this standard specification section occurs in two places, at the end of this section and in the Table of Contents. If the date in this section matches the date in the Table of Contents, then you are using the latest version. Do not delete or revise the “last revised” date at the end of the section during the development of the Project Manual.*

*The footer in this section should be edited to replace the text, “USPS MPF SPECIFICATION” with the project name, and the blank date in the center should be replaced with the submission date, for interim design reviews, or the issue date of the completed Project Manual.*

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1. GENERAL
	1. SUMMARY
		1. Section Includes:
			1. Domestic water system pipe and fittings.
			2. Connection of domestic water system to municipal water system.

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**NOTE TO SPECIFIER**

Use paragraphs 3 and 4 below when building has a fire sprinkler system as part of the Work.

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* + - 1. Fire protection water system pipe, fittings, valves, and hydrants.
			2. Connection of fire protection water system to municipal water system.
		1. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
		2. Related Sections:
			1. Section 312300 - Excavation and Fill: Earthwork for utilities.
			2. Section 033000 - Cast-In-Place Concrete: Concrete for thrust blocks.
	1. REFERENCES
		1. American Society of Mechanical Engineers (ASME):
			1. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
			2. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
		2. American Society for Testing and Materials (ASTM):
			1. ASTM B 88 - Specification for Seamless Copper water Tube.
			2. ASTM D 1785 - Specification for Polyvinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80, and 120.
			3. ASTM D 2241 - Specification for Polyvinyl Chloride (PVC) Pressure Rated Pipe (SDR Series).
			4. ASTM D 3034 - Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
			5. ASTM D 3139 - Specification for Joints for Plastic Pressure Pipes using Flexible Elastomeric Seals.
		3. American Water Works Association (AWWA):
			1. AWWA C 110 - Gray-Iron Fittings, 3 inches Through 48 Inches, for Water and Other Liquids.
			2. AWWA C 111 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
			3. AWWA C 151 - Ductile‑Iron Pipe, Centrifugally Cast in Metal Molds or Sand‑Lined Molds, for Water or Other Liquids.
			4. AWWA C 504 - Rubber Seated Butterfly Valves.
			5. AWWA C 509 - Resilient Seated Gate Valves 3 inch through 12 inch NPS, for Water and Sewage Systems.
			6. AWWA C 600 - Installation of Ductile‑Iron Water Mains and Appurtenances.
			7. AWWA C 900 - Standard for Polyvinyl Chloride (PVC) Pressure Pipe, 4 inch through 12 inch, for Water.
	2. DEFINITIONS
		1. Bedding: Fill placed under, beside and directly over pipe, prior to subsequent backfill operations.
	3. SUBMITTALS
		1. Section 013300 - Submittal Procedures: Procedures for submittals.
		2. Product Data: Data for each type of pipe, pipe fitting, valve and accessory specified.
		3. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
			1. Project Record Documents: Accurately record the following:
				1. Locations of piping mains, valves, connections, and top of pipe elevations.
				2. Identify and describe unexpected variations to subsoil conditions and location of uncharted utilities.
	4. QUALITY ASSURANCE
		1. Regulatory Requirements: Perform work in accordance with utility company requirements and local authority having jurisdiction requirements.
		2. Valves: Manufacturer's name and pressure rating marked on valve body.
	5. DELIVERY, STORAGE, AND HANDLING
		1. Section 016000 - Product Requirements: Transport, handle, store, and protect Products.
		2. Deliver and store valves in shipping containers with labeling in place.
1. PRODUCTS
	1. PIPE
		1. Pipe sizes less than 3 inch that are installed below grade and outside building shall comply with one or combination of following:
			1. Seamless Copper Tubing: Type "K" soft copper to comply with ASTM B 88 latest edition and installed with wrought copper (95‑5 Tin Antimony solder joint) fittings in accordance with ASME B16.22.
			2. Polyvinyl Chloride (PVC) Water Pipe: Pipe shall conform to ASTM D 2241 with an SDR 21 rating and shall be continually marked with manufacturer's name, pipe size, cell classification, SDR rating, and ASTM D 1785 classification. Pipe joints shall be integrally molded bell ends in accordance with ASTM D 3139 with factory supplied elastomeric gaskets and lubricant.
		2. Pipe sizes 3 inch and larger that are installed below grade and outside building shall comply with one of the following:
			1. Ductile Iron Water Pipe: In accordance with AWWA C 151, Fittings shall be either mechanical joint or push‑on joint complying with AWWA C 110 or AWWA C‑111 (CLASS 50).
			2. Polyvinyl Chloride (PVC) Water Pipe: Pipe shall meet the requirements of AWWA C‑900 and comply with ASTM D 2241, rated SDR 21 (Class 150). Pipe shall be continually marked as for smaller pipes. Pipe joints shall be integrally molded bell ends in accordance with ASTM D 3034, Table 2, with factory supplied elastomeric gaskets and lubricant.
	2. GATE VALVES ‑ 2 Inches and Larger
		1. Manufacturers: Mueller Resilient Seat Gate Valves.
		2. AWWA C509, Iron body, bronze mounted double disc, parallel seat type, non‑rising stem with square nut, single wedge, resilient seat, flanged or mechanical joint ends, control rod, post indicator where indicated on Drawings, extension box and valve key.
		3. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
	3. BALL VALVES ‑ 2 Inches and Smaller
		1. Manufacturers: Mueller Oriseal.
		2. Brass body, Teflon coated brass ball, rubber seats and stem seals, Tee stem pre‑drilled for control rod, AWWA compression inlet end, compression outlet with electrical ground connector, with control rod, extension box and valve key.
		3. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
	4. BUTTERFLY VALVES ‑ 2 inches to 24 inches
		1. AWWA C504, iron body, bronze disc, resilient replaceable seat, water or lug ends, infinite position lever handle.

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**NOTE TO SPECIFIER**

Use paragraph below when building has a fire sprinkler system as part of the Work.

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* 1. Check valves, post indicator valves, and backflow preventors
		1. Specified in Section 210000 - Fire Suppression.

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**NOTE TO SPECIFIER**

Use HYDRANTS below when building has a fire sprinkler system as part of the Work.

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* 1. HYDRANTS
		1. Hydrant: Type as required by utility company, local authority having jurisdiction, and as indicated on Drawings.
		2. Hydrant Extensions: Provide in multiples of 6 inches with rod and coupling to increase barrel length.
		3. Hose and Stream Connection: Match sizes with utility company, two hose nozzles, one pumper nozzle. Provide connection type as required by local fire marshall and by governing agencies having jurisdiction.
		4. Finish: Primer and two coats of enamel or special coating to color as required by utility company.
	2. ACCESSORIES
		1. Concrete for Thrust Blocks: Section 033000. Place thrust blocking consisting of 2,500 psi concrete to provide sufficient bearing area to transmit unbalanced thrust from bends, tees, caps, or plugs to undisturbed soil without loading undisturbed soil in excess of 2,500 pounds per square foot when water main pressure is 100 psi.

Pipe Tees 90˚ Bend 45˚ Bend 22˚ Bend 11˚ Bend

Diameter Sq. Ft. Sq. Ft. Sq. Ft. Sq. Ft. Sq. Ft.

3" 1.0 1.0 1.0 1.0 1.0

4" 1.0 1.0 1.0 1.0 1.0

6" 1.5 2.0 1.0 1.0 1.0

8" 2.5 3.5 1.8 1.0 1.0

10" 4.0 5.5 2.8 1.5 1.0

12" 6.0 8.0 4.0 2.0 1.5

14" 8.0 11.0 5.5 3.0 2.0

16" 10.0 14.2 7.0 4.0 3.0

18" 21.0 21.0 12.0 6.0 4.0

* + 1. Locked Mechanical Joint fittings shall be installed where vertical changes in direction are required and, if approved by Contracting Officer, can be installed in lieu of the above thrust blocking requirements.

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**NOTE TO SPECIFIER**

OPTION 1: Use paragraph below when building DOES NOT HAVE a FIRE SPRINKLER SYSTEM as part of the Work.

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* + 1. Trace Wire: Magnetic detectable conductor, clear brightly colored plastic covered, imprinted with "DOMESTIC WATER SERVICE" in large letters.

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**NOTE TO SPECIFIER**

OPTION 2: Use paragraph below when building HAS a FIRE SPRINKLER SYSTEM as part of the Work.

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* + 1. Trace Wire: Magnetic detectable conductor, clear brightly colored plastic covered, imprinted in large letters.
			1. Domestic Water Lines: "DOMESTIC WATER SERVICE"
			2. Fire Protection Water Lines: "FIRE PROTECTION WATER SERVICE"
1. EXECUTION
	1. EXAMINATION
		1. Section 017300 - Execution: Verification of existing conditions before starting work.
		2. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
			1. Verify trench cut, excavations, dimensions, and elevations are as indicated on Drawings.
		3. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
		4. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.
	2. PREPARATION
		1. Hand trim excavations to required elevations. Correct over excavation with fine aggregate.
		2. Remove large stones or other hard matter which could damage pipe or impede consistent backfilling or compaction.
		3. Cut pipe ends square, ream pipe and tube ends and remove burrs.
		4. Remove scale and dirt, on inside and outside, before assembly.
		5. Prepare pipe for connections to equipment with flanges or unions.
	3. BEDDING
		1. Excavate pipe trench and place bedding material in accordance with Section 312300 for work of this Section. Provide trench wall shoring as required.
		2. Form and place concrete for pipe thrust restraints at any change of pipe direction and at fittings as indicated on Drawings. Place concrete to permit full access to pipe and pipe accessories. Provide thrust restraint bearing on subsoil per schedule on Drawings.
		3. Place bedding material at trench bottom, level fill materials in one continuous layer not exceeding 6 inches compacted depth, each layer. Place compacted bedding material to elevation of paving subgrade as indicated on Drawings.
		4. Maintain optimum moisture content of bedding material to attain required compaction density.
		5. Remove excess backfill and excavated material from site.
	4. INSTALLATION ‑ PIPE AND FITTINGS
		1. Maintain separation of water main from sanitary and storm sewer piping in accordance with state or local code.
		2. Install pipe and fittings in accordance with AWWA C600.
		3. Install pipe to allow for expansion and contraction without stressing pipe or joints or as specified by pipe manufacturer.
		4. Install access fittings in accordance with local codes to permit disinfection of water system performed under this Section.
		5. Connections with Existing Pipelines: Where connections are made between new work and existing piping, make connection using suitable fittings for conditions encountered. Make each connection with existing pipe at time and under conditions which least interfere with operation of existing pipeline and in compliance with the local utility company.
		6. Form and place concrete for thrust blocks or other specified methods of retainage at each change of direction or end of pipe main.
		7. Establish elevations of buried piping in accordance with Section 312300 for work in this Section.
		8. Backfill trench in accordance with Section 312300.
		9. Install trace wire continuous buried 10 inches below finish grade, above pipe line. Trace wire shall be in accordance with local utilities standards.

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**NOTE TO SPECIFIER**

Use VALVES AND HYDRANTS below when building has a fire sprinkler system as part of the Work.

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* 1. INSTALLATION ‑ VALVES AND HYDRANTS
		1. Install gate valves as indicated on Drawings and supported on concrete pads with valve stem vertical and plumb. Install valve boxes in a manner that will not transmit loads, stress, or shock to valve body. Center valve box over operating nut of valve vertical and plumb. Securely fit valve box together leaving cover flush with finished surface.
		2. Install fire hydrant assemblies as indicated on Drawings in vertical and plum position with stream/pumper nozzle pointed perpendicular to traffic where hydrant is adjacent to a street, roadway or parking lot drive or toward the protected building unless otherwise directed by local authorities. Support hydrant assembly on concrete pad and firmly braced on side opposite inlet pipe against undisturbed soil and concrete blocking. Place minimum of 6 cu. ft. of crushed stone or gravel around hydrant base and barrel after thrust blocking has cured at least 24 hours. Exercise care when backfilling and compacting so proper vertical position will not be altered.
		3. Provide a drainage pit 36 inches square by 24 inches deep filled with 2 inch washed gravel. Encase elbow of hydrant in gravel to 6 inches above drain opening. Do not connect drain opening to sewer.
		4. Paint hydrants in accordance with local utility company requirements.
	2. DISINFECTION OF DOMESTIC WATER PIPING SYSTEM
		1. Disinfect distribution system with chlorine before acceptance for domestic operation. Amount of chlorine shall be such as to provide dosage of not less than 50 parts/million. Thoroughly flush lines before introduction of chlorinating materials and after contact period of not less than 24 hours, system shall be flushed with clean water until residual chlorine content is not greater than 1.0 part/million. Open and close valves in lines being disinfected several times during contact period. After disinfection, take water sample and bacteriological test in accordance with AWWA specifications. Do not place distribution system in service until approval is obtained from applicable governing authorities.
	3. SERVICE CONNECTIONS
		1. Provide water service connection in compliance with utility company requirements including reduced pressure backflow preventer if required and water meter with by‑pass valves and sand strainer.
	4. FIELD QUALITY CONTROL
		1. Section 014000 - Quality Requirements: Field testing and inspection.
		2. Site Tests:
			1. Compaction:
				1. Perform inspections prior to and immediately after placing bedding.
				2. Perform tests as specified in Section 312300.
			2. Piping: Water distribution system pipe installed below grade and outside building shall be tested in accordance with following procedures:
				1. Perform the testing of pipe materials, joints, and/or other materials incorporated into the construction of water mains and force mains to determine leakage and watertightness. All pressure pipeline shall be tested in accordance with Section 4 of AWWA C600 latest edition. In the event any state or local code requires a more stringent test, the more stringent shall apply.
				2. Pressure Test: After the pipe has been laid, all newly laid pipe or any valved section thereof shall be subjected to a hydrostatic pressure of at least 1.5 times the working pressure at the point of testing and not less than 1.25 times the working pressure at the highest point along the test section.
				3. Leakage Test: The leakage test shall be conducted concurrently with the pressure test. Leakage is defined as the quantity of water that must be supplied into the newly laid pipeline, or any valved section thereof, to maintain pressure within 5 psi of the specified test pressure after the air in the pipeline has been expelled and the pipeline has been filled with water. Leakage shall not be measured by a drop in pressure in a test section over a period of time. No pipeline installation will be accepted if the leakage is greater than that determined by the following formula:

 \_\_SD P\_\_

 L = 133200

 L = allowable leakage, (gallons per hour)

 S = length of pipe tested, (feet)

 D = nominal diameter of pipe, (inches)

 P = average test pressure during test, (psig)

* + - * 1. Visible Leakage: All visible leaks shall be repaired regardless of the amount of leakage.
				2. Acceptance of Installation: If any test of pipe laid in place discloses leakage greater than that specified, the Contractor shall, at his own expense, locate the leak and make repairs as necessary until the leakage is within the specified allowance. Contractor shall supply all water for testing at no additional cost to United States Postal Service.
				3. Provide one copy of results of meter test and hydrostatic pressure test to Contracting Officer and utility company upon completion of water distribution backfilling operations.

END OF SECTION

USPS MPF Specification Last Revised: 10/1/2022