SECTION 211100 - FACILITY FIRE-SUPPRESSION WATER-SERVICE PIPING

Revise this Section by deleting and inserting text to meet Project-specific requirements.

Do not use this section if the project is not one contract which would be identified as a “N” Fire Protection.

1. GENERAL
	* + 1. RELATED DOCUMENTS
				1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
			2. SUMMARY
				1. Section includes fire-suppression water-service piping and related components outside the building [**and service entrance piping through floor into the building**] [**and service entrance piping through wall into the building**] and the following:

Pipes, fittings, and specialties.

Fire-suppression specialty valves.

Backflow preventers

Concrete vaults.

Protective enclosures.

Alarm devices.

Utility companies usually provide water meters and bill charges directly or through Contractor to Director’s Representative. Contact utility company serving the site for information. Delete first paragraph below if water meters are provided by utility company or Contractor. If utility company furnishes water meters, identify the company here, specify what it does, and revise text to suit Project.

* + - * 1. Utility-furnished products include water meters that are furnished to the site, ready for installation.
				2. Related Requirements:

Retain subparagraphs below to cross-reference requirements Contractor might expect to find in this Section but are specified in other Sections.

Section 211116 "Facility Fire Hydrants" for AWWA and UL-listed, dry- and wet-barrel fire hydrants.

Section 211119 "Fire-Department Connections" for exposed-, flush-, and yard-type, fire-department connections.

Section 211200 "Fire-Suppression Standpipes" for fire-suppression standpipes inside the building.

* + - 1. SUBMITTALS
				1. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
				2. Manufacturer’s installation instructions shall be provided along with product data.
				3. Submittals shall be provided in the order in which they are specified and tabbed (for combined submittals).
				4. Product data for each type of product: catalog sheets, specifications, and installation instruction indicating UL or FM approved for each product.

Include plans, elevations, sections, and attachment details.

Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

* + - * 1. Shop Drawings: Follow the Standard for the Installation of Private Fire Service Mains and Their Appurtenances as per NFPA 24 “Standard for the Installation of Private Fire Service Mains and Their Appurtenances”.

Detail precast concrete vault assemblies and indicate dimensions, method of field assembly, and components.

Retain subparagraph below if equipment includes wiring.

Include diagrams for power, signal, and control wiring.

* + - * 1. Field Test Report: Test Certificates and Test Form to be used for projects. Use NFPA 24 "Standard for the Installation of Private Fire Service Mains and Their Appurtenances”.
				2. Contractor’s Material and Test Certificate for Underground Piping.
				3. Installer Qualification Data: Persons engaged with the installation of private fire service mains and their appurtenances, shall have a minimum of 5 years while in the employ of a company or companies engaged in the installation of water service systems and fire service mains and their appurtenances.

Name of each person who will be performing the work.

Upon request, furnish names and addresses of the required number of similar projects that each person has worked on which meets the experience criteria.

Retain "Coordination Drawings" Paragraph below for situations where limited space necessitates maximum utilization for efficient installation of different components or if coordination is required for installation of products and materials by separate installers. Preparation of coordination drawings requires the participation of each trade involved in installations within the limited space.

* + - * 1. Coordination Drawings: For piping and specialties including relation to other services in same area, drawn to scale. Show piping and specialty sizes and valves, meter and specialty locations, and elevations.
				2. Field quality-control reports.
			1. QUALITY ASSURANCE

Retain and revise "Regulatory Requirements" Paragraph below to suit Project, or delete if not applicable.

* + - * 1. Regulatory Requirements:

Comply with requirements of utility company supplying the water. Include tapping of water mains and backflow prevention.

Comply with standards of authorities having jurisdiction for fire-suppression water-service piping, including materials, hose threads, installation, and testing.

Comply with the State Department of Health Sanitary Code for cross connection control, and other standards listed in part 2 of this section.

Where conflicts occur between the referenced standards, the most stringent requirements shall apply.

* + - * 1. Piping materials shall bear label, stamp, or other markings of specified testing agency.
				2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70 “Standard for Electrical Safety in the Workplace”, by a qualified testing agency, and marked for intended location and application.
				3. Comply with FM Global's "Approval Guide" or UL's "Fire Protection Equipment Directory" for fire-service-main products.
				4. NFPA Compliance: Comply with NFPA 24 “Standard for the Installation of Private Fire Service Mains and Their Appurtenances” for materials, installations, tests, flushing, and valve and hydrant supervision for fire-suppression water-service piping.
			1. DELIVERY, STORAGE, AND HANDLING
				1. Preparation for Transport: Prepare valves, including fire hydrants, according to the following:

Ensure that valves are dry and internally protected against rust and corrosion.

Protect valves against damage to threaded ends and flange faces.

Set valves in best position for handling. Set valves closed to prevent rattling.

* + - * 1. During Storage: Use precautions for valves, including fire hydrants, according to the following:

Do not remove end protectors unless necessary for inspection; then reinstall for storage.

Protect from weather. Store indoors and maintain temperature higher than ambient dew point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.

* + - * 1. Handling: Use sling to handle valves and fire hydrants if size requires handling by crane or lift. Rig valves to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.
				2. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.
				3. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.
				4. Protect flanges, fittings, and specialties from moisture and dirt.
				5. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.
			1. PROJECT CONDITIONS

Retain this article if interruption of existing water-distribution service is required.

* + - * 1. Interruption of Existing Fire-Suppression Water-Service Piping: Do not interrupt service to facilities occupied by facility personnel or others unless permitted under the following conditions and then only after arranging to provide temporary water-distribution service according to requirements indicated:

Follow the Impairment Procedures as per NFPA 25 “Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems” & NFPA 13 “Standard for the Installation of Sprinkler Systems” standard.

Notify Director’s Representative no fewer than two (2) days in advance of proposed interruption of Existing Fire Suppression Water-Service Piping as per IFC follow requirements in 901.7 Systems out of service. Approved fire watch shall be provided for all occupants left unprotected by the shutdown until the fire protection system has water service returned on.

Before shutting down the Existing Fire Suppression Water-Service to perform the work, notify the Director’s Representative in writing, and the local fire department that the system is to be shut down temporarily. Give schedule which states date and time of proposed shut down and approximate length of time that the system will be out of service. Request instructions for precautions that should be taken during the shutdown period.

Do not proceed with interruption of water service without Director’s Representative's written permission.

Return the existing system to pre-shutdown operation immediately after Work has been completed. Give written notice to the Director’s Representative that the system has been returned to pre-shutdown operation.

1. PRODUCTS

Manufacturers and products listed in SpecAgent and MasterWorks Paragraph Builder are neither recommended nor endorsed by the AIA or Deltek. Before inserting names, verify that manufacturers and products listed there comply with requirements retained or revised in descriptions and are both available and suitable for the intended applications.

First five articles below include examples of materials used for water-distribution piping. See "Writing Guide" Article in the Evaluations.

* + - 1. COPPER TUBE AND FITTINGS

Tube in "Soft Copper Tube" Paragraph below is available in NPS 1/8 to NPS 12.

* + - * 1. Soft Copper Tube: [**ASTM B88, Type K**] [**and**] [**ASTM B88, Type L**], water tube, annealed temper.

Tube in "Hard Copper Tube" Paragraph below is available in NPS 1/8 to NPS 12.

* + - * 1. Hard Copper Tube: [**ASTM B88, Type K**] [**and**] [**ASTM B88, Type L**], water tube, drawn temper.
				2. Copper, Solder-Joint Fittings: ASME B16.18 “Cast Copper Alloy Solder Joint Pressure Fittings”, cast-copper-alloy or ASME B16.22 “Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings”, wrought-copper, solder-joint pressure type. Furnish only wrought-copper fittings if indicated.

Flanges in "Bronze Flanges" Paragraph below are available in NPS 1/2 to NPS 12.

* + - * 1. Bronze Flanges: ASME B16.24 “Cast Copper Alloy Pipe Flanges, Flanged Fittings, and Valves: Classes 150, 300, 600, 900, 1500 and 2500”, Class 150, with solder-joint end. Furnish Class 300 flanges if required to match piping.

Unions in "Copper Unions" Paragraph below are available in NPS 1/4 to NPS 4. NFPA 13 limits unions to NPS 2 and smaller.

* + - * 1. Copper Unions: MSS SP-123 “Non-Ferrous Threaded and Solder-Joint Unions for Use with Copper Water Tube”, cast-copper-alloy, hexagonal-stock body with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.
			1. DUCTILE-IRON PIPE AND FITTINGS

Ductile-iron pipe is intended for fire-suppression water-service-piping outside the building and underslab within the building.

Pipe in "Grooved-Joint, Ductile-Iron Pipe" Paragraph below is available in NPS 3 to NPS 24.

* + - * 1. Grooved-Joint, Ductile-Iron Pipe: AWWA C151 “Standard for Ductile-Iron Pipe, Centrifugally Cast”, with cut, rounded-grooved ends.

Pipe in "Mechanical-Joint, Ductile-Iron Pipe" Paragraph below is available in NPS 3 to NPS 24.

* + - * 1. Mechanical-Joint, Ductile-Iron Pipe: AWWA C151 “Standard for Ductile-Iron Pipe, Centrifugally Cast”, with mechanical-joint bell and plain spigot end.

Pipe in "Push-on-Joint, Ductile-Iron Pipe" Paragraph below is available in NPS 3 to NPS 48.

* + - * 1. Push-on-Joint, Ductile-Iron Pipe: AWWA C151 “Standard for Ductile-Iron Pipe, Centrifugally Cast”, with push-on-joint bell and plain spigot end.
				2. Grooved-End, Ductile-Iron Pipe Appurtenances:

Manufacturers:

Anvil International.

Smith-Cooper International.

Victaulic Company.

Approved equivalent.

Fittings and couplings in "Grooved-End, Ductile-Iron Fittings" and "Grooved-End, Ductile-Iron-Piping Couplings" subparagraphs below are available in NPS 3 to NPS 24.

Grooved-End, Ductile-Iron Fittings: ASTM A47 “Standard Specification for Ferritic Malleable Iron Castings”, malleable-iron castings or ASTM A536 “Standard Specification for Ductile Iron Castings”, ductile-iron castings with dimensions matching pipe.

Grooved-End, Ductile-Iron-Piping Couplings: AWWA C606 “Standard for Grooved and Shouldered Joints”, for ductile-iron-pipe dimensions. Include ferrous housing sections, gasket suitable for water, and bolts and nuts.

* + - * 1. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110 “Standard for Ductile-Iron and Gray-Iron Fittings”, ductile- or gray-iron standard pattern or AWWA C153 “Standard for Ductile-Iron Compact Fittings”, ductile-iron compact pattern.

Glands, Gaskets, and Bolts: AWWA C111 “Standard for Rubber-Gasket Joints for Ductile-iron Pressure Pipe and Fittings”, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

Fittings in "Push-on-Joint, Ductile-Iron Fittings" Paragraph below are available in NPS 3 to NPS 48.

* + - * 1. Push-on-Joint, Ductile-Iron Fittings: AWWA C153 “Standard for Ductile-Iron Compact Fittings”, ductile-iron compact pattern.

Gaskets: AWWA C111 “Standard for Rubber-Gasket Joints for Ductile-iron Pressure Pipe and Fittings”, rubber.

Flanges in "Flanges" Paragraph below are available in NPS 1 to NPS 96.

* + - * 1. Flanges: ASME B16.1 “Gray Iron Pipe Flanges and Flanges Fittings Classes 25, 125 and 250”, Class 125, cast iron.
			1. PE PIPE AND FITTINGS

Pipe in "PE, Fire-Service Pipe" Paragraph below is FM Global approved in NPS 2 to NPS 12.

* + - * 1. PE, Fire-Service Pipe: FM Global approved, with minimum thickness equivalent to [**Class 150**] [**and**] [**Class 200**].
				2. Molded PE Fittings: FM Global approved; PE butt-fusion type, made to match PE pipe dimensions and class.
			1. PVC PIPE AND FITTINGS

Pipe in "PVC Pipe" Paragraph below is UL listed in NPS 4 to NPS 12.

* + - * 1. PVC Pipe: [**AWWA C900**] [**or**] [**UL 1285**], [**Class 150**] [**and**] [**Class 200**], with bell end with gasket, and with spigot end.
				2. PVC Fittings: [**AWWA C900**] [**or**] [**UL 1285**], [**Class 150**] [**and**] [**Class 200**], with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.
			1. SPECIAL PIPE FITTINGS
				1. Ductile-Iron Flexible Expansion Joints:

Description: Compound, ductile-iron fitting with combination of flanged and mechanical-joint ends complying with AWWA C110 “Standard for Ductile-Iron and Gray-Iron Fittings” or AWWA C153 “Standard for Ductile-Iron Compact Fittings”. Include two gasketed ball-joint sections and one or more gasketed sleeve sections. Assemble components for offset and expansion indicated. Include AWWA C111 “Standard for Rubber-Gasket Joints for Ductile-iron Pressure Pipe and Fittings”, ductile-iron glands, rubber gaskets, and steel bolts.

Pressure Rating: 250 psig minimum.

* + - * 1. Ductile-Iron Deflection Fittings:

Description: Compound, ductile-iron coupling fitting with sleeve and one or two flexing sections for up to 15-degree deflection, gaskets, and restrained-joint ends complying with AWWA C110 “Standard for Ductile-Iron and Gray-Iron Fittings” or AWWA C153 “Standard for Ductile-Iron Compact Fittings”. Include AWWA C111 “Standard for Rubber-Gasket Joints for Ductile-iron Pressure Pipe and Fittings”, ductile-iron glands, rubber gaskets, and steel bolts.

Pressure Rating: 250 psig minimum.

* + - 1. ENCASEMENT FOR PIPING

Many authorities having jurisdiction do not permit direct burial of fire-suppression water-service piping. If allowed by authorities having jurisdiction, consider installing underground piping in a PVC conduit.

* + - * 1. Standard: ASTM A674 “Standard Practice for Polyethylene Encasement for Ductile Iron Pipe” or AWWA C105 “Standard for Polyethylene Encasement for Ductile-Iron Pipe Systems”.
				2. Material: [**Linear low-density PE film of 0.008-inch minimum thickness**] [**or**] [**high-density, cross-laminated PE film of 0.004-inch minimum thickness**].
				3. Form: [**Sheet**] [**or**] [**tube**].
				4. Color: [**Black**] [**or**] [**natural**] <**Insert color**>.
			1. JOINING MATERIALS
				1. Gaskets for Ferrous Piping and Copper-Alloy Tubing: ASME B16.21 “Nonmetallic Flat Gaskets for Pipe Flanges”, asbestos free.
				2. Brazing Filler Metals: AWS A5.8 “Filler Metals for Brazing & Braze Welding”, BCuP Series.
			2. PIPING SPECIALTIES
				1. Transition Fittings: Manufactured fitting or coupling same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.
				2. Tubular-Sleeve Pipe Couplings:

Description: Metal, bolted, sleeve-type, reducing or transition coupling, with center sleeve, gaskets, end rings, and bolt fasteners, and with ends of same sizes as piping to be joined.

Standard: AWWA C219 “Standard for Bolted, Sleeve-Type Couplings for Plain-End Pipe”.

Center-Sleeve Material: [**Manufacturer's standard**] [**Carbon steel**] [**Stainless steel**] [**Ductile iron**] [**Malleable iron**].

Gasket Material: Natural or synthetic rubber.

Pressure Rating: [**150 psig**] [**200 psig**] <**Insert value**> minimum.

Metal Component Finish: Corrosion-resistant coating or material.

* + - 1. CORPORATION VALVES

Caution: High-pressure valves in this article are rated for 150 psig, but most manufacturers' valves have a higher pressure rating.

Retain "Corporation Valves" Paragraph below for tapping connections NPS 2 and smaller.

* + - * 1. Corporation Valves: Comply with AWWA C800 “Standard for Underground Service Line Valves and Fittings”. Include saddle and valve compatible with tapping machine[**and manifold**].

Service Saddle: Copper alloy with seal and AWWA C800 “Standard for Underground Service Line Valves and Fittings”, threaded outlet for corporation valve.

Corporation Valve: Bronze body and ground-key plug, with AWWA C800 “Standard for Underground Service Line Valves and Fittings”, threaded inlet and outlet matching service piping material.

Retain "Manifold" Subparagraph below if utility company requires multiple connections.

Manifold: Copper fitting with two to four inlets as required, with ends matching corporation valves and outlet matching service piping material.

* + - * 1. Meter Valves: Comply with AWWA C800 “Standard for Underground Service Line Valves and Fittings” for high-pressure, service-line valves. Include angle- or straight-through-pattern bronze body, ground-key plug or ball, and wide tee head, with inlet and outlet matching service piping material.
			1. CURB VALVES

Caution: High-pressure valves in this article are rated for 150 psig, but most manufacturers' valves have a higher pressure rating.

* + - * 1. Manufacturers:

[Mueller Co. LLC; Mueller Water Products, Inc.](https://products-specpoint.mydeltek.com/products/company/f0611e01-39c4-4624-8ead-8490420fe76a?groupby=sectionNumber%2520false%252CproductType%2520false&sortby=sectionNumber%252CproductType%252Ctype%252ClastUpdated%2520desc&ia=true&defaultFilter=true&df=%27Mueller+Co.+LLC%3B+Mueller+Water+Products%5Cu002c+Inc.%27%25%7C%25%27Mueller+Co.+LLC%3B+Mueller+Water+Products%5Cu002c+Inc.%27)

A.Y. McDonald Mfg. Co.

Amcast industrial Corporation.

Red Hed Manufacturing Company; a division of Everett J. Prescott, Inc.

Approved equivalent.

* + - * 1. Curb Valves: Comply with AWWA C800 “Standard for Underground Service Line Valves and Fittings” for high-pressure, service-line valves. Valve has bronze body, ground-key plug or ball, wide tee head, and inlet and outlet matching service piping material.
				2. Service Boxes for Curb Valves: Similar to AWWA M44 “Standard for Distribution Valves: Selection, Installation, Field Testing, and Maintenance” requirements for cast-iron valve boxes. Include cast-iron telescoping top section of length required for depth of burial of valve, plug with lettering "WATER," and bottom section with base that fits over curb valve and with a barrel approximately 3 inches in diameter.

Shutoff Rods: Steel; with tee-handle with one pointed end, stem of length to operate deepest buried valve, and slotted end matching curb valve.

* + - * 1. Meter Valves: Comply with AWWA C800 “Standard for Underground Service Line Valves and Fittings” for high-pressure, service-line valves. Include angle- or straight-through-pattern bronze body, ground-key plug or ball, and wide tee head, with inlet and outlet matching service piping material.
			1. DETECTOR CHECK VALVES
				1. [Manufacturers:](http://www.specagent.com/LookUp/?ulid=1264&mf=04&src=wd)

[WATTS; A Watts Water Technologies Company.](https://products-specpoint.mydeltek.com/products/company/2e5d5377-6aec-43d6-b62e-507c395e75fa?groupby=sectionNumber%2520false%252CproductType%2520false&sortby=sectionNumber%252CproductType%252Ctype%252ClastUpdated%2520desc&ia=true&defaultFilter=true&sp=%27221119+-+DOMESTIC+WATER+PIPING+SPECIALTIES%27%25%7C%25%27Reduced-Pressure-Principle+Backflow+Preventers%27)

[Zurn.](https://products-specpoint.mydeltek.com/products/company/b933eb0d-85b4-412d-83b4-7f7a9ac036ac?groupby=sectionNumber%2520false%252CproductType%2520false&sortby=sectionNumber%252CproductType%252Ctype%252ClastUpdated%2520desc&ia=true&defaultFilter=true&sp=%27221119+-+DOMESTIC+WATER+PIPING+SPECIALTIES%27%25%7C%25%27Reduced-Pressure-Principle+Backflow+Preventers%27)

Approved equivalent.

* + - * 1. Description: Galvanized cast-iron body, bolted cover with air-bleed device for access to internal parts, and flanged ends. Include one-piece bronze disc with bronze bushings, pivot, and replaceable seat. Include threaded bypass taps in inlet and outlet for bypass meter connection. Set valve to allow minimal water flow through bypass meter when major water flow is required.
				2. Standards: UL 312 “Standard for Safety Check Valves for Fire-Protection Service” and FM Global's "Approval Guide."
				3. Pressure Rating: 175 psig.
				4. Water Meter: AWWA C700 “Standard for Cold-Water Meters-Displacement Type, Bronze Main Case”, disc type, at least one-fourth size of detector check valve. Include meter, bypass piping, gate valves, check valve, and connections to detector check valve.
			1. WATER METERS
				1. Water meters are furnished by utility company.

If utility company furnishes water meters, identify utility company in "Summary" Article and delete remaining paragraphs in this article. If water meters are specified in this Section, delete paragraph above, retain remaining paragraphs below, and revise to suit Project.

Retain "Displacement-Type Water Meters," "Turbine-Type Water Meters," or "Compound-Type Water Meters" Paragraph below. Verify, with utility company and authorities having jurisdiction, type of meter required.

* + - * 1. Displacement-Type Water Meters:

Description: With bronze main case.

Standard: AWWA C700 “Standard for Cold-Water Meters-Displacement Type, Bronze Main Case”.

Registration: Flow in [**gallons**] [**cubic feet**].

* + - * 1. Turbine-Type Water Meters:

Standard: AWWA C701 “Standard for Cold-Water Meters-Turbine Type, for Customer Service”.

Registration: Flow in [**gallons**] [**cubic feet**].

* + - * 1. Compound-Type Water Meters:

Standard: AWWA C702 “Standard for Cold-Water Meters-Compound Type”.

Registration: Flow in [**gallons**] [**cubic feet**].

Retain one of two "Remote Registration System" paragraphs below if required; revise to suit Project.

* + - * 1. Remote Registration System:

Description: Water supply company's standard; direct-reading type. Include meter modified with signal-transmitting assembly, low-voltage connecting wiring, and remote register assembly.

Standard: AWWA C706 “Standard for Direct-Reading, Remote-Registration Systems for Cold-Water Meters”.

Registration: Flow in [**gallons**] [**cubic feet**].

* + - * 1. Remote Registration System:

Description: Water supply company's standard; encoder type. Include meter modified with signal-transmitting assembly, low-voltage connecting wiring, and remote register assembly.

Standard: AWWA C707 “Standard for Encoder-Type Remote-Registration Systems for Cold-Water Meters”.

Registration: Flow in [**gallons**] [**cubic feet**].

Retain "Data-Acquisition Units" or "Visible Display Units" Subparagraph below; revise to suit Project.

Data-Acquisition Units: Comply with water supply company's requirements for type and quantity.

Visible Display Units: Comply with water supply company's requirements for type and quantity.

* + - 1. DETECTOR-TYPE WATER METERS

Retain "AWWA, Detector Check Water Meters" or "Fire-Protection, Detector Check Water Meters" Paragraph below. Verify, with utility company and authorities having jurisdiction, type of meter required.

* + - * 1. AWWA, Detector Check Water Meters:

Description: Main line, turbine meter with second meter on bypass.

Standard: AWWA C703 “Standard for Cold-Water Meters-Fire-Service Type”.

Registration: Flow in [**gallons**] [**cubic feet**].

Pressure Rating: 150 psig.

Bypass Meter: [**AWWA C701, turbine**] [**AWWA C702, compound**]-type, bronze case.

Size: At least one-half nominal size of main-line meter.

* + - * 1. Fire-Protection, Detector Check Water Meters:

Description: Main-line turbine meter with strainer and second meter on bypass.

Standards: UL's "Fire Protection Equipment Directory" listing and FM Global's "Approval Guide."

Registration: Flow in [**gallons**] [**cubic feet**].

Pressure Rating: 175 psig minimum.

Bypass Meter: AWWA C701 “Standard for Cold-Water Meters-Turbine Type, for Customer Service”, turbine-type, bronze case.

Size: At least NPS 2.

Retain one of two "Remote Registration System" paragraphs below if required, and revise to suit Project.

* + - * 1. Remote Registration System:

Description: Water supply company's standard; direct-reading type. Include meter modified with signal-transmitting assembly, low-voltage connecting wiring, and remote register assembly.

Standard: AWWA C706 “Standard for Direct-Reading, Remote-Registration Systems for Cold-Water Meters”.

Registration: Flow in [**gallons**] [**cubic feet**].

* + - * 1. Remote Registration System:

Description: Water supply company's standard; encoder type. Include meter modified with signal-transmitting assembly, low-voltage connecting wiring, and remote register assembly.

Standard: AWWA C707 “Standard for Encoder-Type Remote-Registration Systems for Cold-Water Meters”.

Registration: Flow in [**gallons**] [**cubic feet**].

Retain "Data-Acquisition Units" or "Visible Display Units" Subparagraph below and revise to suit Project.

Data-Acquisition Units: Comply with water supply company's requirements for type and quantity.

Visible Display Units: Comply with water supply company's requirements for type and quantity.

* + - 1. PRESSURE-REDUCING VALVES

Copy "Water Regulators" Paragraph below and re-edit for each type of water regulator required.

Water regulators in paragraph are available in NPS 1/2 to NPS 3.

* + - * 1. Water Regulators:

[Manufacturers:](http://www.specagent.com/LookUp/?ulid=1272&mf=04&src=wd)

[WATTS; A Watts Water Technologies Company.](https://products-specpoint.mydeltek.com/products/company/2e5d5377-6aec-43d6-b62e-507c395e75fa?groupby=sectionNumber%2520false%252CproductType%2520false&sortby=sectionNumber%252CproductType%252Ctype%252ClastUpdated%2520desc&ia=true&defaultFilter=true&sp=%27221119+-+DOMESTIC+WATER+PIPING+SPECIALTIES%27%25%7C%25%27Reduced-Pressure-Principle+Backflow+Preventers%27)

[Zurn.](https://products-specpoint.mydeltek.com/products/company/b933eb0d-85b4-412d-83b4-7f7a9ac036ac?groupby=sectionNumber%2520false%252CproductType%2520false&sortby=sectionNumber%252CproductType%252Ctype%252ClastUpdated%2520desc&ia=true&defaultFilter=true&sp=%27221119+-+DOMESTIC+WATER+PIPING+SPECIALTIES%27%25%7C%25%27Reduced-Pressure-Principle+Backflow+Preventers%27)

Approved equivalent.

Standard: ASSE 1003 “Performance Requirements for Water Pressure Reducing Valves for Potable Water Distribution Systems”.

Pressure Rating: Initial pressure of 150 psig.

Size: <**Insert NPS**>.

Design Flow Rate: <**Insert gpm**>.

Design Inlet Pressure: <**Insert psig**>.

Design Outlet Pressure Setting: <**Insert psig**>.

Body Material: Bronze[**with chrome-plated finish**] for NPS 2 and smaller; cast iron[**with interior lining complying with AWWA C550 or that is FDA approved**] for NPS 2-1/2 and NPS 3.

End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and NPS 3.

Copy "Water Control Valves" Paragraph below and re-edit for each type of water control valve required.

Water control valves in paragraph are available in NPS 1-1/4 and larger.

* + - * 1. Water Control Valves:

Manufacturers:

GA Industries.

[Apollo Valves; a part of Aalberts Integrated Piping Systems](https://products-specpoint.mydeltek.com/products/company/c5065d92-c118-4c46-98d7-3813db66bdd2?groupby=sectionNumber%2520false%252CproductType%2520false&sortby=sectionNumber%252CproductType%252Ctype%252ClastUpdated%2520desc&ia=true&defaultFilter=true&sp=%27221116+-+DOMESTIC+WATER+PIPING%27%25%7C%25%27Appurtenances+for+Grooved-End%5Cu002c+Ductile-Iron+Pipe%27).

CLA-VAL Automatic Control Valves.

Dorot Control Valves Inc.

Flomatic Corporation.

OCV Control Valves.

WATTS Water Technologies.

Zurn Water, LLC.

Approved equivalent.

Description: Pilot-operation, diaphragm-type, single-seated main water control valve with AWWA C550 “Standard for Protective Interior Coatings for Valves and Hydrants” or FDA-approved, interior epoxy coating. Include small pilot control valve, restrictor device, specialty fittings, and sensor piping.

Pressure Rating: Initial pressure of 150 psig minimum.

Main Valve Body: Cast or ductile iron with AWWA C550 “Standard for Protective Interior Coatings for Valves and Hydrants” or FDA-approved, interior epoxy coating; or stainless-steel body.

Size: <**Insert NPS**>.

Pattern: [**Angle**] [**Globe**]-valve design.

Trim: Stainless steel.

Design Flow Rate: <**Insert gpm**>.

Design Inlet Pressure: <**Insert psig**>.

Design Outlet Pressure Setting: <**Insert psig**>.

End Connections: Threaded for NPS 2 and smaller; [**flanged**] <**Insert type**> for NPS 2-1/2 and larger.

* + - 1. BACKFLOW PREVENTERS

Verify, with authorities having jurisdiction, whether AWWA, or UL-listed, or FM Global-approved backflow preventers are required.

Copy "Reduced-Pressure-Principle Backflow Preventers" Paragraph below and re-edit for each type of reduced-pressure-principle backflow preventer required.

Reduced-pressure-principle backflow preventers in paragraph are for high hazard and are available in NPS 3/4 to NPS 10.

* + - * 1. All backflow preventers shall conform to ASSE Standard 1015, AWWA C-510, USC Specifications manual for cross connection control, and listed as acceptable in the New York State Department of Health, Environmental Health Manual.
				2. Reduced-Pressure-Principle Backflow Preventers:

[Manufacturers:](http://www.specagent.com/LookUp/?ulid=1280&mf=04&src=wd)

[Apollo Valves; a part of Aalberts Integrated Piping Systems](https://products-specpoint.mydeltek.com/products/company/c5065d92-c118-4c46-98d7-3813db66bdd2?groupby=sectionNumber%2520false%252CproductType%2520false&sortby=sectionNumber%252CproductType%252Ctype%252ClastUpdated%2520desc&ia=true&defaultFilter=true&sp=%27221116+-+DOMESTIC+WATER+PIPING%27%25%7C%25%27Appurtenances+for+Grooved-End%5Cu002c+Ductile-Iron+Pipe%27).

[Zurn.](https://products-specpoint.mydeltek.com/products/company/b933eb0d-85b4-412d-83b4-7f7a9ac036ac?groupby=sectionNumber%2520false%252CproductType%2520false&sortby=sectionNumber%252CproductType%252Ctype%252ClastUpdated%2520desc&ia=true&defaultFilter=true&sp=%27221119+-+DOMESTIC+WATER+PIPING+SPECIALTIES%27%25%7C%25%27Reduced-Pressure-Principle+Backflow+Preventers%27)

Ames Fire & Waterworks; A WATTS Brand

FEBCO; A WATTS Brand.

Approved equivalent.

Standard: [ASSE 1013] [or] [AWWA C511].

Operation: Continuous-pressure applications.

Pressure Loss: [**12 psig**] <**Insert value**> maximum, through middle one-third of flow range.

Size: <**Insert NPS**>.

Design Flow Rate: <**Insert gpm**>.

Selected Unit Flow Range Limits: <**Insert gpm**>.

Pressure Loss at Design Flow Rate: <**Insert psig**> for NPS 2 and smaller; <**Insert psig**> for NPS 2-1/2 and larger.

Body Material: Bronze for NPS 2 and smaller; [**cast iron with interior lining complying with AWWA C550 or that is FDA approved**] [**steel with interior lining complying with AWWA C550 or that is FDA approved**] [**stainless steel**] for NPS 2-1/2 and larger.

End Connections: Threaded for NPS 2 and smaller; [**flanged**] <**Insert type**> for NPS 2-1/2 and larger.

Configuration: Designed for [**horizontal, straight through**] [**vertical inlet, horizontal center section, and vertical outlet**] [**vertical**] <**Insert configuration**> flow.

Accessories:

Valves: Ball type with threaded ends on inlet and outlet of NPS 2 and smaller; OS&Y gate type with flanged ends on inlet and outlet of NPS 2-1/2 and larger.

Air-Gap Fitting: ASME A112.1.2 “Air Gaps in Plumbing Systems (For Plumbing Fixtures and Water-Connected Receptors)”, matching backflow preventer connection.

Copy "Double-Check, Backflow-Prevention Assemblies" Paragraph below and re-edit for each type of double-check, backflow-prevention assembly required.

Double-check, backflow-prevention assemblies in paragraph are for low hazard and are available in NPS 3/4 to NPS 10.

* + - * 1. Double-Check, Backflow-Prevention Assemblies:

[Manufacturers:](http://www.specagent.com/LookUp/?ulid=1280&mf=04&src=wd)

[Apollo Valves; a part of Aalberts Integrated Piping Systems](https://products-specpoint.mydeltek.com/products/company/c5065d92-c118-4c46-98d7-3813db66bdd2?groupby=sectionNumber%2520false%252CproductType%2520false&sortby=sectionNumber%252CproductType%252Ctype%252ClastUpdated%2520desc&ia=true&defaultFilter=true&sp=%27221116+-+DOMESTIC+WATER+PIPING%27%25%7C%25%27Appurtenances+for+Grooved-End%5Cu002c+Ductile-Iron+Pipe%27).

[Zurn.](https://products-specpoint.mydeltek.com/products/company/b933eb0d-85b4-412d-83b4-7f7a9ac036ac?groupby=sectionNumber%2520false%252CproductType%2520false&sortby=sectionNumber%252CproductType%252Ctype%252ClastUpdated%2520desc&ia=true&defaultFilter=true&sp=%27221119+-+DOMESTIC+WATER+PIPING+SPECIALTIES%27%25%7C%25%27Reduced-Pressure-Principle+Backflow+Preventers%27)

Ames Fire & Waterworks; A WATTS Brand.

FEBCO; A WATTS Brand.

Approved equivalent.

Standard: [ASSE 1015] [or] [AWWA C510].

Operation: Continuous-pressure applications unless otherwise indicated.

Pressure Loss: [**5 psig**] <**Insert value**> maximum, through middle one-third of flow range.

Size: <**Insert NPS**>.

Design Flow Rate: <**Insert gpm**>.

Selected Unit Flow Range Limits: <**Insert gpm**>.

Pressure Loss at Design Flow Rate: <**Insert psig**> for NPS 2 and smaller; <**Insert psig**> for NPS 2-1/2 and larger.

Body Material: Bronze for NPS 2 and smaller; [**cast iron with interior lining complying with AWWA C550 or that is FDA approved**] [**steel with interior lining complying with AWWA C550 or that is FDA approved**] [**stainless steel**] for NPS 2-1/2 and larger.

End Connections: Threaded for NPS 2 and smaller; [**flanged**] <**Insert type**> for NPS 2-1/2 and larger.

Configuration: Designed for [**horizontal, straight through**] <**Insert configuration**> flow.

Accessories: Ball valves with threaded ends on inlet and outlet of NPS 2 and smaller; OS&Y gate valves with flanged ends on inlet and outlet of NPS 2-1/2 and larger.

Copy "Reduced-Pressure-Detector, Fire-Protection Backflow Preventer Assemblies" Paragraph below and re-edit for each type of reduced-pressure-detector, fire-protection backflow preventer assembly required.

Reduced-pressure-detector, fire-protection backflow preventer assemblies in paragraph are for high hazard and are available in NPS 3 to NPS 10.

* + - * 1. Reduced-Pressure-Detector, Fire-Protection Backflow Preventer Assemblies:

[Manufacturers:](http://www.specagent.com/LookUp/?ulid=1280&mf=04&src=wd)

[Ames Fire & Waterworks; A Watts Water Technologies Company.](https://products-specpoint.mydeltek.com/products/company/ec6ecd3a-1dc7-4c84-b66c-3571abfec6c8?groupby=sectionNumber%2520false%252CproductType%2520false&sortby=sectionNumber%252CproductType%252Ctype%252ClastUpdated%2520desc&ia=true&defaultFilter=true&sp=%27331415+-+SITE+WATER+DISTRIBUTION+PIPING%27%25%7C%25%27Backflow+Preventers+-+Reduced-Pressure-Detector%5Cu002c+Fire-Protection+Assembly%27)

[Apollo Valves; a part of Aalberts Integrated Piping Systems](https://products-specpoint.mydeltek.com/products/company/c5065d92-c118-4c46-98d7-3813db66bdd2?groupby=sectionNumber%2520false%252CproductType%2520false&sortby=sectionNumber%252CproductType%252Ctype%252ClastUpdated%2520desc&ia=true&defaultFilter=true&sp=%27221116+-+DOMESTIC+WATER+PIPING%27%25%7C%25%27Appurtenances+for+Grooved-End%5Cu002c+Ductile-Iron+Pipe%27).

[Zurn.](https://products-specpoint.mydeltek.com/products/company/b933eb0d-85b4-412d-83b4-7f7a9ac036ac?groupby=sectionNumber%2520false%252CproductType%2520false&sortby=sectionNumber%252CproductType%252Ctype%252ClastUpdated%2520desc&ia=true&defaultFilter=true&sp=%27221119+-+DOMESTIC+WATER+PIPING+SPECIALTIES%27%25%7C%25%27Reduced-Pressure-Principle+Backflow+Preventers%27)

Approved equivalent.

Standards: ASSE 1047 “Performance Requirements for Reduced Pressure Detector Backflow Prevention Assemblies” and UL's "Fire Protection Equipment Directory" listing or FM Global's "Approval Guide."

Operation: Continuous-pressure applications.

Pressure Loss: [**12 psig**] <**Insert value**> maximum, through middle one-third of flow range.

Size: <**Insert NPS**>.

Design Flow Rate: <**Insert gpm**>.

Selected Unit Flow Range Limits: <**Insert gpm**>.

Pressure Loss at Design Flow Rate: <**Insert psig**>.

Body Material: [**Cast iron with interior lining complying with AWWA C550 or that is FDA approved**] [**Steel with interior lining complying with AWWA C550 or that is FDA approved**] [**Stainless steel**].

End Connections: Flanged.

Configuration: Designed for [**horizontal, straight through**] [**vertical inlet, horizontal center section, and vertical outlet**] [**vertical**] <**Insert configuration**> flow.

Accessories:

Valves: UL 262 “Standard for Gate Valves for Fire-Protection Service” and FM Global's "Approval Guide" listing; OS&Y gate type with flanged ends on inlet and outlet.

Air-Gap Fitting: ASME A112.1.2 “Air Gaps in Plumbing Systems (For Plumbing Fixtures and Water-Connected Receptors)”, matching backflow preventer connection.

Bypass: With displacement-type water meter, shutoff valves, and reduced-pressure backflow preventer.

Copy "Double-Check, Detector-Assembly Backflow Preventers" Paragraph below and re-edit for each type of double-check, detector-assembly backflow preventer required.

Double-check, detector-assembly backflow preventers in paragraph are for low hazard and are available in NPS 3 to NPS 10.

* + - * 1. Double-Check, Detector-Assembly Backflow Preventers:

[Manufacturers:](http://www.specagent.com/LookUp/?ulid=1280&mf=04&src=wd)

[Ames Fire & Waterworks; A Watts Water Technologies Company.](https://products-specpoint.mydeltek.com/products/company/ec6ecd3a-1dc7-4c84-b66c-3571abfec6c8?groupby=sectionNumber%2520false%252CproductType%2520false&sortby=sectionNumber%252CproductType%252Ctype%252ClastUpdated%2520desc&ia=true&defaultFilter=true&sp=%27331415+-+SITE+WATER+DISTRIBUTION+PIPING%27%25%7C%25%27Backflow+Preventers+-+Reduced-Pressure-Detector%5Cu002c+Fire-Protection+Assembly%27)

[Apollo Valves; a part of Aalberts Integrated Piping Systems](https://products-specpoint.mydeltek.com/products/company/c5065d92-c118-4c46-98d7-3813db66bdd2?groupby=sectionNumber%2520false%252CproductType%2520false&sortby=sectionNumber%252CproductType%252Ctype%252ClastUpdated%2520desc&ia=true&defaultFilter=true&sp=%27221116+-+DOMESTIC+WATER+PIPING%27%25%7C%25%27Appurtenances+for+Grooved-End%5Cu002c+Ductile-Iron+Pipe%27).

[Zurn.](https://products-specpoint.mydeltek.com/products/company/b933eb0d-85b4-412d-83b4-7f7a9ac036ac?groupby=sectionNumber%2520false%252CproductType%2520false&sortby=sectionNumber%252CproductType%252Ctype%252ClastUpdated%2520desc&ia=true&defaultFilter=true&sp=%27221119+-+DOMESTIC+WATER+PIPING+SPECIALTIES%27%25%7C%25%27Reduced-Pressure-Principle+Backflow+Preventers%27)

Approved equivalent.

Standards: ASSE 1048 “Performance Requirements for Double Check Detector Fire Protection Backflow Prevention Assemblies” and UL's "Fire Protection Equipment Directory" listing or FM Global's "Approval Guide."

Operation: Continuous-pressure applications.

Pressure Loss: [**5 psig**] <**Insert value**> maximum, through middle one-third of flow range.

Size: <**Insert NPS**>.

Design Flow Rate: <**Insert gpm**>.

Selected Unit Flow Range Limits: <**Insert gpm**>.

Pressure Loss at Design Flow Rate: <**Insert psig**>.

Body Material: [**Cast iron with interior lining complying with AWWA C550 or that is FDA approved**] [**Steel with interior lining complying with AWWA C550 or that is FDA approved**] [**Stainless steel**].

End Connections: Flanged.

Configuration: Designed for [**horizontal, straight through**] [**vertical inlet, horizontal center section, and vertical outlet**] [**vertical**] <**Insert configuration**> flow.

Accessories:

Valves: UL 262 “Standard for Gate Valves for Fire-Protection Service” and FM Global's "Approval Guide" listing; OS&Y gate type with flanged ends on inlet and outlet.

Bypass: With displacement-type water meter, shutoff valves, and reduced-pressure backflow preventer.

Copy "Backflow Preventer Test Kits" Paragraph below and re-edit for each type of backflow preventer test kit required.

* + - * 1. Backflow Preventer Test Kits:

[Manufacturers:](http://www.specagent.com/LookUp/?ulid=1280&mf=04&src=wd)

[Ames Fire & Waterworks; A Watts Water Technologies Company.](https://products-specpoint.mydeltek.com/products/company/ec6ecd3a-1dc7-4c84-b66c-3571abfec6c8?groupby=sectionNumber%2520false%252CproductType%2520false&sortby=sectionNumber%252CproductType%252Ctype%252ClastUpdated%2520desc&ia=true&defaultFilter=true&sp=%27331415+-+SITE+WATER+DISTRIBUTION+PIPING%27%25%7C%25%27Backflow+Preventers+-+Reduced-Pressure-Detector%5Cu002c+Fire-Protection+Assembly%27)

[Apollo Valves; a part of Aalberts Integrated Piping Systems](https://products-specpoint.mydeltek.com/products/company/c5065d92-c118-4c46-98d7-3813db66bdd2?groupby=sectionNumber%2520false%252CproductType%2520false&sortby=sectionNumber%252CproductType%252Ctype%252ClastUpdated%2520desc&ia=true&defaultFilter=true&sp=%27221116+-+DOMESTIC+WATER+PIPING%27%25%7C%25%27Appurtenances+for+Grooved-End%5Cu002c+Ductile-Iron+Pipe%27).

[Zurn.](https://products-specpoint.mydeltek.com/products/company/b933eb0d-85b4-412d-83b4-7f7a9ac036ac?groupby=sectionNumber%2520false%252CproductType%2520false&sortby=sectionNumber%252CproductType%252Ctype%252ClastUpdated%2520desc&ia=true&defaultFilter=true&sp=%27221119+-+DOMESTIC+WATER+PIPING+SPECIALTIES%27%25%7C%25%27Reduced-Pressure-Principle+Backflow+Preventers%27)

Approved equivalent.

Description: Factory calibrated, with gages, fittings, hoses, and carrying case with test-procedure instructions.

* + - 1. CONCRETE VAULTS

Retain this article if vaults are required and are not specified in Section 033000 "Cast-in-Place Concrete."

* + - * 1. Description: Precast, reinforced-concrete vault, designed for A-16 load designation according to ASTM C857 “Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures”, and made according to ASTM C858 “Standard Specification for Underground Precast Concrete Utility Structures”.
				2. Ladder: ASTM A36 “Standard Specification for Carbon Structural Steel”, steel ladder; or PE-encased steel steps.

Retain one of two "Manhole" paragraphs below.

* + - * 1. Manhole: ASTM A48 “Standard Specification for Gray Iron Castings”, Class No. 35A minimum tensile strength, gray-iron traffic frame and cover.

Dimension: 24-inch minimum diameter unless otherwise indicated.

* + - * 1. Manhole: ASTM A536 “Standard Specification for Ductile Iron Castings”, Grade 60-40-18, ductile-iron traffic frame and cover.

Dimension: 24-inch minimum diameter unless otherwise indicated.

* + - * 1. Drain: ASME A112.6.3 “Floor and Trench Drains”, cast-iron floor drain with outlet of size indicated. Include body anchor flange, light-duty cast-iron grate, bottom outlet, and integral or field-installed bronze ball or clapper-type backwater valve.
			1. PROTECTIVE ENCLOSURES
				1. Freeze-Protection Enclosures:

[Manufacturers:](http://www.specagent.com/LookUp/?ulid=1272&mf=04&src=wd)

[WATTS; A Watts Water Technologies Company.](https://products-specpoint.mydeltek.com/products/company/2e5d5377-6aec-43d6-b62e-507c395e75fa?groupby=sectionNumber%2520false%252CproductType%2520false&sortby=sectionNumber%252CproductType%252Ctype%252ClastUpdated%2520desc&ia=true&defaultFilter=true&sp=%27221119+-+DOMESTIC+WATER+PIPING+SPECIALTIES%27%25%7C%25%27Reduced-Pressure-Principle+Backflow+Preventers%27)

Safe-T-Cover

Bonar Plastics

AquaSHIELD

BF Products Inc.

DekoRRa Products LLC.

Hot Box: Hubbell Power Systems, Inc.

HydroCowl, Inc.

G&C Enclosures.

Dunco Manufacturing, Inc.

Approved equivalent.

Description: Insulated enclosure designed to protect aboveground water piping, equipment, or specialties from freezing and damage, with heat source to maintain minimum internal temperature of 40 deg F when external temperatures reach as low as minus 34 deg F.

Standard: ASSE 1060 “Performance Requirements for Outdoor Enclosures for Fluid Conveying Components”.

Retain "Class I" or "Class I-V" Subparagraph below.

Class I: For equipment or devices other than pressure or atmospheric vacuum breakers.

Class I-V: For pressure or atmospheric vacuum breaker equipment or devices. Include drain opening in housing.

Retain two subparagraphs below with "Class I" or "Class I-V" Subparagraph above. Revise below to suit Project.

Housing: Reinforced[**-aluminum**] [**or**] [**-fiberglass**] <**Insert housing**> construction.

Size: Of dimensions indicated, but not less than those required for access and service of protected unit.

Drain opening for units with drain connection.

Access doors with locking devices.

Insulation inside housing.

Anchoring devices for attaching housing to concrete base.

Features in subparagraph below require additional temperature data; insert here or show on Drawings.

Electric heating cable or heater with self-limiting temperature control.

Class II and Class II-V freeze-retardant enclosures are also available, but they are not included in this Section. ASSE 1060 is unclear on requirements for these enclosures.

* + - 1. ALARM DEVICES
				1. General: UL 753 “Standard for Alarm Accessories for Automatic Water-Supply Control Valves for Fire Protection Service” and FM Global's "Approval Guide" listing, of types and sizes to mate and match piping and equipment.

Devices in "Water-Flow Indicators," "Supervisory Switches," and "Pressure Switches" paragraphs below are usually located inside the building and are specified in Section 211200 "Fire-Suppression Standpipes" and Section 211313 "Wet-Pipe Sprinkler Systems." Verify requirements with authorities having jurisdiction. Indicators in first paragraph mount on pipe with vane in water and can be used with wet-barrel fire hydrants.

* + - * 1. Water-Flow Indicators: Vane-type water-flow detector, rated for 250-psig working pressure; designed for horizontal or vertical installation; with two single-pole, double-throw circuit switches to provide isolated alarm and auxiliary contacts, 7 A, 125-V ac and 0.25 A, 24-V dc; complete with factory-set, field-adjustable retard element to prevent false signals and tamperproof cover that sends signal when cover is removed.

Switches in "Supervisory Switches" Paragraph below mount on stem of OS&Y gate valves and on indicator posts.

* + - * 1. Supervisory Switches: Single pole, double throw; designed to signal valve in other than fully open position.

Switches in "Pressure Switches" Paragraph below mount on barrel of dry-barrel fire hydrants.

* + - * 1. Pressure Switches: Single pole, double throw; designed to signal increase in pressure.
1. EXECUTION
	* + 1. PIPING INSTALLATION

Retain one of two "Water-Main Connection" paragraphs below. Retain first paragraph if tap is made by utility company; retain second if tap is made by Contractor.

* + - * 1. Water-Main Connection: Arrange with water supply company for tap of size and in location indicated in water main.
				2. Water-Main Connection: Tap water main according to requirements of water supply company and of size and in location indicated.

Retain first paragraph below for tapping of pipe with connections larger than NPS 2.

* + - * 1. Make connections larger than NPS 2 with tapping machine according to the following:

Install tapping sleeve and tapping valve according to MSS SP-60 “Connecting Flange Joints between Tapping Sleeves and Tapping Valves”.

Install tapping sleeve on pipe to be tapped. Position flanged outlet for gate valve.

Use tapping machine compatible with valve and tapping sleeve; cut hole in main. Remove tapping machine and connect water-service piping.

Install gate valve onto tapping sleeve. Comply with MSS SP-60 “Connecting Flange Joints between Tapping Sleeves and Tapping Valves”. Install valve with stem pointing up and with valve box.

Retain first paragraph below for tapping of pipe with connections NPS 2 and smaller.

* + - * 1. Make connections NPS 2 and smaller with drilling machine according to the following:

Install service-saddle assemblies and corporation valves in size, quantity, and arrangement required by utility company's standards.

Install service-saddle assemblies on water-service pipe to be tapped. Position outlets for corporation valves.

Use drilling machine compatible with service-saddle assemblies and corporation valves. Drill hole in main. Remove drilling machine and connect water-service piping.

Install corporation valves into service-saddle assemblies.

Install manifold for multiple taps in water main.

Install curb valve in water-service piping with head pointing up and with service box.

* + - * 1. Comply with NFPA 24 “Standard for the Installation of Private Fire Service Mains and Their Appurtenances” for fire-service-main piping materials and installation.
				2. Install copper tube and fittings according to CDA's "Copper Tube Handbook."

Retain subparagraph below if required.

Install encasement for tubing according to ASTM A674 “Standard Practice for Polyethylene Encasement for Ductile Iron Pipe” or AWWA C105 “Standard for Polyethylene Encasement for Ductile-Iron Pipe Systems”.

* + - * 1. Install ductile-iron, water-service piping according to AWWA C600 “Standard for Installation of Ductile-Iron Mains and Their Appurtenances” and AWWA M41 “Standard for Ductile-Iron Pipe and Fittings”.

Retain subparagraph below if required.

Install encasement for piping according to ASTM A674 “Standard Practice for Polyethylene Encasement for Ductile Iron Pipe” or AWWA C105 “Standard for Polyethylene Encasement for Ductile-Iron Pipe Systems”.

* + - * 1. Install PE pipe according to ASTM D2774 “Standard Practice for Underground Installation of Thermoplastic Pressure Piping” and ASTM F645 “Standard Guide for Selection, Design, and Installation of Thermoplastic Water-Pressure Piping Systems”.
				2. Install PVC, AWWA pipe according to ASTM F645 “Standard Guide for Selection, Design, and Installation of Thermoplastic Water-Pressure Piping Systems” and AWWA M23 “Standard for PVC Pipe-Design and Installation”.

Revise first paragraph below for required minimum depth if known.

* + - * 1. Bury piping with depth of cover over top at least [**48 inches**] <**Insert dimension**>, with top at least [**12 inches**] <**Insert dimension**> below level of maximum frost penetration, and according to the following:
				2. Install piping by tunneling or jacking, or combination of both, under streets and other obstructions that cannot be disturbed.
				3. Extend fire-suppression water-service piping and connect to water-supply source and building fire-suppression water-service piping systems at locations and pipe sizes indicated.

Terminate fire-suppression water-service piping within the building at the [**floor slab**] [**wall**] until building-water-piping systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building's fire-suppression water-service piping systems when those systems are installed.

Retain first paragraph below for piping with gasketed joints and revise to suit Project; delete if not required.

* + - * 1. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.
				2. Comply with requirements for fire-suppression water-service piping inside the building in the following Sections:

Section 211200 "Fire-Suppression Standpipes"

Section 211313 "Wet-Pipe Sprinkler Systems

Section 211316 "Dry-Pipe Sprinkler Systems"

* + - * 1. Comply with requirements in Section 210524 "Backflow Preventers” for fire-service water piping inside the building.
				2. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 210517 "Sleeves and Sleeve Seals for Fire-Suppression Piping."

Retain paragraph below for piping that penetrates an exterior concrete wall or concrete slab.

* + - * 1. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 210517 "Sleeves and Sleeve Seals for Fire-Suppression Piping."
			1. JOINT CONSTRUCTION
				1. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure rating same as or higher than systems pressure rating for aboveground applications unless otherwise indicated.
				2. Install unions adjacent to each valve in tubing NPS 2 and smaller.
				3. Install flanges, flange adaptors, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.
				4. Ream ends of tubes and remove burrs.
				5. Remove scale, slag, dirt, and debris from outside and inside of pipes, tubes, and fittings before assembly.
				6. Copper-Tubing, Brazed Joints: Join copper tube and fittings according to CDA's "Copper Tube Handbook," "Brazed Joints" Chapter.
				7. Ductile-Iron Piping, Gasketed Joints for Fire-Service-Main Piping: UL 194 “Standard for Gasketed Joints for Ductile-Iron Pipe and Fittings for Fire Protection Service”.
				8. Ductile-Iron Piping, Grooved Joints: Cut-groove pipe. Assemble joints with grooved-end, ductile-iron-piping couplings, gaskets, lubricant, and bolts.
				9. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with bolts according to ASME B31.9 “Building Services Piping”.
				10. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D2657 “Standard Practice for Heat Fusion Joining of Polyolefin Pipe and Fittings”.
				11. PVC Piping Gasketed Joints: Use joining materials according to AWWA C900 “Standard for Polyvinyl Chloride Pressure Pipe and Fabricated Fittings, 4 in. Through 12 in., for Water Transmission and Distribution”. Construct joints with elastomeric seals and lubricant according to ASTM D2774 “Standard Practice for Underground Installation of Thermoplastic Pressure Piping” or ASTM D3139 “Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals”.
				12. Dissimilar Materials Piping Joints: Use adapters compatible with both piping materials, with OD, and with system working pressure.
				13. Do not use flanges or unions for underground piping.
			2. ANCHORAGE INSTALLATION

Delete this article if anchorages are not required.

* + - * 1. Anchorage, General: Install water-distribution piping with restrained joints. Anchorages and restrained-joint types that may be used include the following:

Retain subparagraphs below for types of anchorages and restrained joints permitted.

Concrete thrust blocks.

Locking mechanical joints.

Set-screw mechanical retainer glands.

Bolted flanged joints.

Heat-fused joints.

Pipe clamps and tie rods.

<**Insert devices**>.

* + - * 1. Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches in fire-suppression water-service piping according to NFPA 24 “Standard for the Installation of Private Fire Service Mains and Their Appurtenances” and the following:

Gasketed-Joint, Ductile-Iron, Water-Service Piping: According to AWWA C600 “Standard for Installation of Ductile-Iron Mains and Their Appurtenances”.

Gasketed-Joint, PVC Water-Service Piping: According to AWWA M23 “Standard for PVC Pipe-Design and Installation”.

* + - * 1. Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces of installed ferrous anchorage devices.
			1. VALVE INSTALLATION
				1. AWWA Gate Valves: Comply with AWWA C600 “Standard for Installation of Ductile-Iron Mains and Their Appurtenances” and AWWA M44 “Standard for Distribution Valves: Selection, Installation, Field Testing, and Maintenance”. Install each underground valve with stem pointing up and with valve box.
				2. AWWA Valves Other Than Gate Valves: Comply with AWWA C600 “Standard for Installation of Ductile-Iron Mains and Their Appurtenances” and AWWA M44 “Standard for Distribution Valves: Selection, Installation, Field Testing, and Maintenance”.
				3. UL-Listed or FM Global-Approved Gate Valves: Comply with NFPA 24 “Standard for the Installation of Private Fire Service Mains and Their Appurtenances”. Install each underground valve and valves in vaults with stem pointing up and with vertical cast-iron indicator post.
				4. UL-Listed or FM Global-Approved Valves Other Than Gate Valves: Comply with NFPA 24 “Standard for the Installation of Private Fire Service Mains and Their Appurtenances”.
				5. MSS Valves: Install as component of connected piping system.
				6. Corporation Valves and Curb Valves: Install each underground curb valve with head pointed up and with service box.
				7. Pressure-Reducing Valves: Install in vault or aboveground between shutoff valves.[**Install full-size valved bypass.**]
				8. Support valves and piping, not direct buried, on concrete piers. Comply with requirements for concrete piers in Section 033000 "Cast-in-Place Concrete."
			2. DETECTOR CHECK VALVE INSTALLATION
				1. Install in vault or aboveground.
				2. Install for proper direction of flow. Install bypass with water meter, gate valves on each side of meter, and check valve downstream from meter.
				3. Support detector check valves and piping with corrosive resent pipe hangers, braces, saddles, and stanchions which shall be adequately supported and/or restrained to prevent lateral movement.
			3. WATER METER INSTALLATION

Delete this article if utility company provides water meters.

* + - * 1. Install water meters, piping, and specialties according to utility company's written instructions.

Retain one or more of three "Water Meters" paragraphs below.

* + - * 1. Water Meters: Install [**displacement**] [**turbine**]-type water meters NPS 2 and smaller in meter boxes with shutoff valves on water meter inlets. Include valves on water meter outlets, and include valved bypass around meters unless prohibited by authorities having jurisdiction.
				2. Water Meters: Install [**compound**] [**turbine**]-type water meters NPS 3 and larger in meter vaults. Include shutoff valves on water meter inlets and outlets, and include valved bypass around meters. Support meters, valves, and piping on brick or concrete piers.
				3. Water Meters: Install detector-type water meters in meter vault according to AWWA M6 “Standard for Water Meters- Selection, Installation, Testing, and Maintenance”. Include shutoff valves on water meter inlets and outlets, and include full-size valved bypass around meters. Support meters, valves, and piping on brick or concrete piers.
				4. Support water meters and piping NPS 3 and larger with corrosive resent pipe hangers, braces, saddles, and stanchions which shall be adequately supported and/or restrained to prevent lateral movement.
			1. ROUGHING-IN FOR WATER METERS

Retain this article if Contractor is to rough-in for water meters to be installed by utility company.

* + - * 1. Rough-in piping and specialties for water meter installation according to utility company's written instructions.
			1. BACKFLOW PREVENTER INSTALLATION
				1. Install backflow preventers of type, size, and capacity indicated. Include valves and test cocks. Install according to requirements of plumbing and health department and authorities having jurisdiction.
				2. Do not install backflow preventers that have relief drain in vault or in other spaces subject to flooding.
				3. Do not install bypass piping around backflow preventers.

Revise or delete paragraph below to suit Project.

* + - * 1. Support NPS 2-1/2 and larger backflow preventers and piping with corrosive resent pipe hangers, braces, saddles, and stanchions which shall adequately support and/ or restrained to prevent lateral movement.
			1. CONCRETE VAULT INSTALLATION
				1. Install precast concrete vaults according to ASTM C891 “Standard Practice for Installation of Underground Precast Concrete Utility Structures”.
			2. PROTECTIVE ENCLOSURE INSTALLATION
				1. Install concrete base level and with top approximately [**2 inches**] <**Insert dimension**> above grade.
				2. Install protective enclosure over valves and equipment.
				3. Anchor protective enclosure to concrete base.
			3. FIRE-DEPARTMENT CONNECTION INSTALLATION
				1. Install ball drip valves at each check valve for fire-department connection to mains.
				2. Install protective pipe bollards [**on two sides of**] [**on three sides of**] <**Insert arrangement**> each freestanding fire-department connection. Pipe bollards are specified in Section 055000 "Metal Fabrications."
			4. ALARM DEVICE INSTALLATION

Delete this article if alarm devices are specified in Section 211200 "Fire-Suppression Standpipes" or Section 221313 "Wet-Pipe Sprinkler Systems."

* + - * 1. General: Comply with NFPA 24 “Standard for the Installation of Private Fire Service Mains and Their Appurtenances” for devices and methods of valve supervision. Underground valves with valve box do not require supervision.

Retain "Supervisory Switches" or "Locking and Sealing" Paragraph below to suit requirements of authorities having jurisdiction.

* + - * 1. Supervisory Switches: Supervise valves in open position.

Valves: Grind away portion of exposed valve stem. Bolt switch, with plunger in stem depression, to OS&Y gate-valve yoke.

Indicator Posts: Drill and thread hole in upper-barrel section at target plate. Install switch, with toggle against target plate, on barrel of indicator post.

* + - * 1. Locking and Sealing: Secure unsupervised valves as follows:

Valves: Install chain and padlock on open OS&Y gate valve.

Post Indicators: Install padlock on wrench on indicator post.

* + - * 1. Valve Locking Devices:

Padlock: FPPI Break Shackle Locks-#764.40/keyed alike furnished with 2 keys for each lock.

Key Tags: 1-1/2 in. dia., brass, stamped with valve number and service specified in Section 210553.

Fasteners: Brass wire link chain with S-hooks.

* + - * 1. Pressure Switches: Drill and thread hole in exposed barrel of fire hydrant. Install switch.
				2. Water-Flow Indicators: Install in water-service piping in vault. Select indicator with saddle and vane matching pipe size. Drill hole in pipe, insert vane, and bolt saddle to pipe.
			1. CONNECTIONS

Coordinate piping installations and specialty arrangements with Drawings and with requirements specified. If Drawings are explicit enough, these requirements may be reduced or omitted.

* + - * 1. Connect fire-suppression water-service piping to [**utility water main**] [**existing water main**] <**Insert piping system**>. Use [**tapping sleeve and tapping valve**] [**service clamp and corporation valve**] <**Insert method**>.
				2. Connect fire-suppression water-service piping to interior fire-suppression piping.
				3. Connect waste piping from concrete vault drains to [**sanitary sewerage system. Comply with requirements in Section 221313 "Facility Sanitary Sewers" for connection to sanitary sewer**] [**storm-drainage system.**
			1. FIELD QUALITY CONTROL

Revise this article to suit requirements of authorities having jurisdiction.

* + - * 1. Use test procedure prescribed by NFPA 24 “Standard for the Installation of Private Fire Service Mains and Their Appurtenances” for Flushing of Piping and Hydrostatic Testing of underground piping. Flushing operation shall be continued for sufficient time to ensure thorough cleaning. Flow in accordance with Table 10.10.2.1.3. Hydrostatic Test of all piping and attached appurtenances subjected to system working pressure shall be hydrostatically tested at 200 psi or 50 psi in excess of the system working pressure, whichever is greater and shall maintain that pressure at +/- 5psi for 2 hours.
				2. Piping Tests: Conduct piping tests before joints are covered and after concrete thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.
				3. Prepare test and inspection form: Use NFPA 24 “Contractor’s Material and Test Certificate” for Underground Piping shown in Figure 10.10.1.
				4. All testing is witnessed by Director’s Representative.
			1. IDENTIFICATION

water-service piping with electrically insulated fittings.

* + - * 1. Permanently attach equipment nameplate or marker indicating plastic fire-suppression water-service piping or fire-suppression water-service piping with electrically insulated fittings, on main electrical meter panel. Comply with requirements for identifying devices in Section 220553 "Identification for Plumbing Piping and Equipment."
			1. CLEANING

Revise this article to suit requirements of authorities having jurisdiction.

* + - * 1. Clean[**and disinfect**] fire-suppression water-service piping as follows:

Purge new piping systems and parts of existing systems that have been altered, extended, or repaired before use.

Retain first subparagraph below for fire-protection-water piping not connected to potable-water supply.

Use purging[**and disinfecting**] procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in NFPA 24 “Standard for the Installation of Private Fire Service Mains and Their Appurtenances “ for flushing of piping. Flush piping system with clean, potable water until dirty water does not appear at points of outlet.

Retain subparagraph below for fire-suppression water-service piping connected to potable-water supply.

Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in AWWA C651 “Standard for Disinfecting Water Mains” or do as follows:

Retain one of first two subparagraphs below.

Fill system or part of system with water/chlorine solution containing at least 50 ppm of chlorine; isolate and allow it to stand for 24 hours.

Drain system or part of system of previous solution and refill with water/chlorine solution containing at least 200 ppm of chlorine; isolate and allow it to stand for three hours.

After standing time, flush system with clean, potable water until no chlorine remains in water coming from system.

Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows evidence of contamination.

* + - * 1. Prepare reports of purging[**and disinfecting**] activities.
			1. PIPING SCHEDULE

See Editing Instruction No. 2 in the Evaluations for cautions about selecting products.

Retain one or more piping applications in this article. Coordinate with materials specified in Part 2.

Retain "one of" option in first paragraph below to allow Contractor to select piping materials from those retained.

* + - * 1. Underground fire-suppression water-service piping [**NPS 2 and smaller**] <**Insert pipe size range**> shall be[**one of**] the following:

Retain one or both subparagraphs below. If using more than one type of material and joining method, identify various materials on Drawings and show points of transition from one material to another.

[**Hard**] [**Soft**] copper tube, [**ASTM B88, Type K**] [**ASTM B88, Type L**]; [**wrought-copper, solder-joint fittings; and brazed**] [**copper, pressure-seal fittings; and pressure-sealed**] joints.

NPS 2 PE, [**Class 150**] [**Class 200**], fire-service pipe; molded PE fittings; and heat-fusion joints.

Retain "one of" option in first paragraph below to allow Contractor to select piping materials from those retained.

* + - * 1. Underground fire-suppression water-service piping NPS 3 shall be[**one of**] the following:

Retain one or more of five subparagraphs below. If using more than one type of material and joining method, identify various materials on Drawings and show points of transition from one material to another.

[**Hard**] [**Soft**] copper tube, [**ASTM B88, Type K**] [**ASTM B88, Type L**]; [**wrought-copper, solder-joint fittings; and brazed**] [**copper, pressure-seal fittings; and pressure-sealed**] joints.

Grooved-end, ductile-iron pipe; grooved-end, ductile-iron pipe appurtenances; and grooved joints.

Mechanical-joint, ductile-iron pipe; mechanical-joint, [**ductile- or gray-iron, standard-pattern**] [**or**] [**ductile-iron, compact-pattern**] fittings; glands, gaskets, and bolts; and gasketed joints.

Push-on-joint, ductile-iron pipe; push-on-joint, ductile-iron compact-pattern fittings; and gasketed joints.

PE, [**Class 150**] [**Class 200**], fire-service pipe; molded PE fittings; and heat-fusion joints.

Retain "one of" option in first paragraph below to allow Contractor to select piping materials from those retained.

* + - * 1. Underground fire-suppression water-service piping NPS 4 shall be[**one of**] the following:

Retain one or more of seven subparagraphs below. If using more than one type of material and joining method, identify various materials on Drawings and show points of transition from one material to another.

[**Hard**] [**Soft**] copper tube, [**ASTM B88, Type K**] [**ASTM B88, Type L**]; [**wrought-copper, solder-joint fittings; and brazed**] [**copper, pressure-seal fittings; and pressure-sealed**] joints.

Grooved-end, ductile-iron pipe; grooved-end, ductile-iron pipe appurtenances; and grooved joints.

Mechanical-joint, ductile-iron pipe; mechanical-joint, [**ductile- or gray-iron, standard-pattern**] [**or**] [**ductile-iron, compact-pattern**] fittings; glands, gaskets, and bolts; and gasketed joints.

Push-on-joint, ductile-iron pipe; push-on-joint, ductile-iron compact-pattern fittings; and gasketed joints.

PE, [**Class 150**] [**Class 200**], fire-service pipe; molded PE fittings; and heat-fusion joints.

PVC, [**Class 150**] [**Class 200**] pipe listed for fire-protection service; PVC fittings of same class as pipe; and gasketed joints.

Retain "one of" option in first paragraph below to allow Contractor to select piping materials from those retained.

* + - * 1. Underground fire-suppression water-service piping [**NPS 6 to NPS 12**] <**Insert pipe size range**> shall be[**one of**] the following:

Retain one or more of six subparagraphs below. If using more than one type of material and joining method, identify various materials on Drawings and show points of transition from one material to another.

Grooved-end, ductile-iron pipe; grooved-end, ductile-iron pipe appurtenances; and grooved joints.

Mechanical-joint, ductile-iron pipe; mechanical-joint, [**ductile- or gray-iron, standard-pattern**] [**or**] [**ductile-iron, compact-pattern**] fittings; glands, gaskets, and bolts; and gasketed joints.

Push-on-joint, ductile-iron pipe; push-on-joint, ductile-iron compact-pattern fittings; and gasketed joints.

PE, [**Class 150**] [**Class 200**], fire-service pipe; molded PE fittings; and heat-fusion joints.

PVC, [**Class 150**] [**Class 200**] pipe listed for fire-protection service; PVC fittings of same class as pipe; and gasketed joints.

* + - * 1. [**Aboveground**] [**and**] [**vault**] fire-suppression water-service piping [**NPS 2 and smaller**] <**Insert pipe size range**> shall be hard copper tube, [**ASTM B88, Type K**] [**ASTM B88, Type L**]; [**wrought- or cast-copper-alloy, solder-joint fittings; and brazed**] [**copper, pressure-seal fittings; and pressure-sealed**] joints.

Retain "one of" option in first paragraph below to allow Contractor to select piping materials from those retained.

* + - * 1. [**Aboveground**] [**and**] [**vault**] fire-suppression water-service piping [**NPS 3 and NPS 4**] <**Insert pipe size range**> shall be[**one of**] the following:

Retain one or both subparagraphs below. If using more than one type of material and joining method, identify various materials on Drawings and show points of transition from one material to another.

Hard copper tube, [**ASTM B88, Type K**] [**ASTM B88, Type L**]; [**wrought-copper, solder-joint fittings; and brazed**] [**copper, pressure-seal fittings; and pressure-sealed**] joints.

Grooved-end, ductile-iron pipe; grooved-end, ductile-iron pipe appurtenances; and grooved joints.

* + - * 1. [**Aboveground**] [**and**] [**vault**] fire-suppression water-service piping [**NPS 5 to NPS 12**] <**Insert pipe size range**> shall be grooved-end, ductile-iron pipe; grooved-end, ductile-iron pipe appurtenances; and grooved joints.

Piping in three paragraphs below is for fire-suppression water-service piping that is installed, buried in earth, below the lowest floor, and within the building footprint; retain if required.

* + - * 1. Under slab fire-suppression water-service piping [**NPS 2 and smaller**] <**Insert pipe size range**> shall be [**hard**] [**soft**] copper tube, [**ASTM B88, Type K**] [**ASTM B88, Type L**]; [**wrought-copper, solder-joint fittings; and brazed**] [**copper, pressure-seal fittings; and pressure-sealed**] joints.

Retain "one of" option in first paragraph below to allow Contractor to select piping materials from those retained.

* + - * 1. Under slab fire-suppression water-service piping [**NPS 3 and NPS 4**] <**Insert pipe size range**> shall be[**one of**] the following:

Retain one or more of four subparagraphs below. If using more than one type of material and joining method, identify various materials on Drawings and show points of transition from one material to another.

[**Hard**] [**Soft**] copper tube, [**ASTM B88, Type K**] [**ASTM B88, Type L**]; [**wrought-copper, solder-joint fittings; and brazed**] [**copper, pressure-seal fittings; and pressure-sealed**] joints.

Grooved-end, ductile-iron pipe; grooved-end, ductile-iron pipe appurtenances; and grooved joints.

Mechanical-joint, ductile-iron pipe; mechanical-joint, [**ductile- or gray-iron, standard-pattern**] [**or**] [**ductile-iron, compact-pattern**] fittings; glands, gaskets, and bolts; and restrained, gasketed joints.

Push-on-joint, ductile-iron pipe; push-on-joint, ductile-iron compact-pattern fittings; and restrained, gasketed joints.

Retain "one of" option in paragraph below to allow Contractor to select piping materials from those retained.

* + - * 1. Underslab fire-suppression water-service piping [**NPS 6 to NPS 12**] <**Insert pipe size range**> shall be[**one of**] the following:

Retain one or more of three subparagraphs below. If using more than one type of material and joining method, identify various materials on Drawings and show points of transition from one material to another.

Grooved-end, ductile-iron pipe; grooved-end, ductile-iron pipe appurtenances; and grooved joints.

Mechanical-joint, ductile-iron pipe; mechanical-joint, [**ductile- or gray-iron, standard-pattern**] [**or**] [**ductile-iron, compact-pattern**] fittings; glands, gaskets, and bolts; and restrained, gasketed joints.

Push-on-joint, ductile-iron pipe; push-on-joint, ductile-iron compact-pattern fittings; and restrained, gasketed joints.

* + - 1. VALVE SCHEDULE

See Editing Instruction No. 2 in the Evaluations for cautions about selecting products.

Retain one or more valve applications in this article. Coordinate with materials specified in Part 2.

* + - * 1. Underground fire-suppression water-service shutoff valves NPS 2 and smaller shall be corporation valves or curb valves with ends compatible with piping.
				2. Vault fire-suppression water-service shutoff valves NPS 2 and smaller shall be [**Class 125, MSS, bronze, nonrising stem**] [**or**] [**UL-listed or FM Global-approved, OS&Y, bronze,**] gate valves.

Retain "one of" option in first paragraph below to allow Contractor to select valve materials from those retained.

* + - * 1. Underground fire-suppression water-service shutoff valves NPS 3 and larger shall be[**one of**] the following:

Retain one or more of three subparagraphs below. If using more than one type of valve, identify various valve types on Drawings.

200-psig, AWWA, iron, non-rising-stem, [**metal**] [**resilient**]-seated gate valves.

250-psig, AWWA, iron, non-rising-stem, resilient-seated gate valves.

[**175-psig**] [**250-psig**], UL-listed or FM Global-approved, iron, nonrising-stem gate valves.

* + - * 1. Indicator-post underground fire-suppression water-service valves NPS 3 and larger shall be [**175-psig**] [**250-psig**], UL-listed or FM Global-approved, iron, nonrising-stem gate valves with indicator-post flange.

Retain "one of" option in first paragraph below to allow Contractor to select valve materials from those retained.

* + - * 1. Standard-pressure, [**aboveground**] [**and**] [**vault**] fire-suppression water-service shutoff valves NPS 3 and larger shall be[**one of**] the following:

Retain one or more of four subparagraphs below. If using more than one type of valve, identify various valve types on Drawings.

200-psig, AWWA, iron, OS&Y, [**metal**] [**resilient**]-seated gate valves.

250-psig, AWWA, iron, OS&Y, resilient-seated gate valves.

[**175-psig**] [**250-psig**], UL-listed or FM Global-approved, iron, OS&Y gate valves.

[**AWWA**] [**or**] [**UL-listed or FM Global-approved**] butterfly valves.

Retain "one of" option in paragraph below to allow Contractor to select valve materials from those retained.

* + - * 1. Fire-suppression water-service check valves NPS 3 and larger shall be[**one of**] the following:

Retain one or both subparagraphs below. If using more than one type of valve, identify various valve types on Drawings.

[**AWWA**] [**or**] [**UL-listed or FM Global-approved**] check valves.

UL-listed or FM Global-approved detector check valves.

END OF SECTION 211100