SECTION 15000
GENERAL PIPING SYSTEM AND APPURTENANCES

PART 1 - GENERAL

1.01 DESCRIPTION.

This section describes the requirements and procedures for piping systems (pressure pipe and gravity sewer pipe) and appurtenances that apply to a number of other complimentary Specification Sections. The items are listed in this section to avoid repetition in sections elsewhere. This section includes, but is not limited to, temporary pipelines, wet taps, flexible pipe couplings, grooved and shouldered end couplings, joint restraint systems, field touch up, bolts, nuts, polyethylene wrap, warning/identification tape, tracer wire, gate well and extension stems, meter boxes, abandonment and removal of existing facilities, salvage, and disposal.

1.02 REFERENCE STANDARDS.

The publications listed below form part of this specification to the extent referenced and are referred to in the text by the basic designation only. Reference shall be made to the latest edition of said standards unless otherwise called for.

AWWA C105	Polyethylene Encasement for Ductile-Iron Pipe Systems
AWWA C111	Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
AWWA M11	Steel Pipe - A Guide for Design and Installation
AWWA	Guidelines for Distribution of Non-Potable Water
ASTM A 108	Standard Specification for Steel Bars, Carbon, Cold Finished, Standard Quality
ASTM A 183	Standard Specification for Carbon Steel Track Bolts and Nuts
ASTM A 283/ 283M	Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates, Shapes and Bars
ASTM A 307	Standard Specification for Carbon Steel Bolts and Studs
ASTM A 325/A 325M	Standard Specification for High-Strength Bolts for Structural Steel Joints
ASTM A 510/A 510M	Standard Specification for General Requirements for Wire Rods and Course Round Wire, Carbon Steel ASTM A 512 -Standard Specification for Cold-Drawn Buttweld Carbon Steel Mechanical Tubing
ASTM A 536	Standard Specification for Ductile Iron Castings
ASTM F 594	Specification for Stainless Steel Nuts
ANSI B1.1	Unified Inch Screw Threads
ANSI B1.2	Gages and Gauging for Unified Inch Screw Threads NSF -National Sanitation Foundation SSPWC - Standard Specifications for Public Works Construction ("Greenbook") California Administrative Code, Title 22

1.03 RELATED WORK SPECIFIED ELSEWHERE.

Technical Standard Specifications 02221 and all of Division 15.

1.04 LINING CONTAMINATION PREVENTION.

Volatile organic compounds present in the linings of items in contact with potable water or recycled water shall not exceed concentrations allowed by the latest requirements of the State Office of Drinking Water and Department of Health Services. Some products and materials may also require proof of NSF certification on the lining materials to be used.

1.05 PIPE TAPPING (WET TAP).

All pipe tap (wet tap) connections to existing pipelines, whether for mainline extension or service laterals, shall be performed by the Contractor. The Contractor shall provide materials and labor to excavate, pour thrust block, backfill, compact, and repair pavement as indicated in this Section.

1.06 JOINT RESTRAINT SYSTEMS.

Joint Restraint Systems may be used for PVC or ductile-iron pipe when shown on the Approved Plans or with prior approval of the District Engineer. Contractor shall submit shop drawings and catalog data for joint restraint systems in accordance with all Division

1.07 POLYETHYLENE ENCASEMENT.

Polyethylene encasement shall be used for all ferrous metal materials not otherwise protectively coated.

A. Polyethylene or plastic wrap or sleeves shall be used for the protection of buried ductile-iron pipe, appurtenances, and valves.

B. Purple-colored polyethylene wrap or sleeves may also be installed around buried pipe for recycled water identification.

1.08 WARNING/IDENTIFICATION TAPE.

Warning/identification tape shall be installed to identify location of underground utilities and to act as a warning against accidental excavation of buried utilities. Warning/identification tape shall be used on all underground water and recycled water mains, potable and recycled water irrigation systems, sewer mains, sewer force mains, and all related appurtenances. Warning/identification tape shall also be used on cathodic protection wiring systems and tracer wire brought into and out of access ports.

1.09 TRACER WIRE.

Tracer wire shall be installed on all buried water, recycled water mains, sewer mains, sewer force mains, and all related appurtenances for the purpose of providing a continuous signal path used to determine pipe alignment after installation.

1.10 VALVE WELLS.

Valve Wells shall be used for buried valves 2 inch and larger, unless otherwise indicated on VCMWD Standard Drawings. Valve well lids shall be used on all valve wells.

1.11 VALVE STEM EXTENSIONS.

Valves 2 inch and larger require valve stem extensions to be installed when the valve-operating nut is more than 6 feet below grade or as required by the District Engineer.

1.12 CURB IDENTIFICATION MARK FOR SERVICES.

The Contractor shall mark the location of all potable water, recycled water and sewer laterals at the curb crossing by stamping the face of the curb in 2 inch high letters as described below:

A. Potable water laterals shall be stamped with a letter "W".

B. Recycled water laterals shall be stamped with the letters "RW".

C. Sewer laterals shall be stamped with a letter "S".

1.13 FIELD REPAIR OF DAMAGED COATINGS.

All surfaces of metallic appurtenances in contact with potable water and not protected from corrosion by another system shall be shop-coated by the manufacturer. Appurtenances with damaged coatings shall be repaired or replaced as directed by the District Engineer. Touch-up of damaged surfaces, when allowed by the District Engineer, shall be performed in accordance with the manufacturer's recommendations.

PART 2 – MATERIALS.

2.01 FLEXIBLE PIPE COUPLINGS.

Flexible pipe couplings shall be in accordance with the as described below:

A. Steel Couplings shall have middle rings made of steel conforming to ASTM A 36/A 36M, A 53 (Type E or S), or A 512 having a minimum yield strength of 30,000 psi. Follower rings shall be ductile-iron per ASTM A 536, or steel per ASTM A 108, Grade 1018 or ASTM A 510, Grade 1018. Minimum middle ring length shall be 7-inches for pipe sized 6-inch through 24-inch.

B. Sleeve bolts shall be made of stainless steel per ASTM A193 and shall have minimum yield strength of 40,000 psi, ultimate yield strength of 60,000 psi, and shall conform to AWWA C111.

C. Use plain-end pipe with flexible couplings per AWWA C200. Provide joint harnesses per AWWA M11 for aboveground applications where indicated on the Approved Plans. Manufacturers, or approved equal, shall be:

1. EBAA Mega-Coupling Series 3800

2. Romac Style 400

3. Dresser, Style 38

4. Smith-Blair, Style 411

D. Coatings for joint harnesses shall be fusion bonded epoxy. The buried joint harnesses shall be coated with a petrolatum/wax tape coating. Clean oil, scale, rust, and dirt from the pipe ends and touch up the epoxy coating and allow time for curing before installing the coupling. Clean the gaskets before installing.

E. Follow the manufacturer's recommendations for installation and bolt torque using a properly calibrated torque wrench. Lubricate the bolt threads with graphite prior to installation.

2.02 GROOVED END OR SHOULDERED COUPLINGS FOR DUCTILE IRON OR STEEL PIPE.

Grooved end or shouldered couplings shall be as described below:

A. Use square-cut shouldered or grooved ends per AWWA C606. Grooved-end couplings shall be malleable iron per ASTM A 47, or ductile iron per ASTM A 536. Gaskets shall be per ASTM D 2000.

B. Bolts for exposed service shall conform to ASTM A 183, 10,000 psi tensile strength.

2.03 JOINT RESTRAINT SYSTEMS.

Joint Restraint Systems shall be ductile-iron and shall consist of a split-ring restraint with machined (not cast) serrations on the inside diameter and connecting bolts.

2.04 BOLTS AND NUTS.

Bolts and nuts shall be as indicated below

A. Zinc-plated coated bolts and nuts shall be used for the installation of pipelines up to 36-inch diameter, not be in contact with water, and shall be carbon steel conforming to ASTM A307, Grade A, unless otherwise indicated on the approved drawings. Bolts and nuts shall have standard ANSI B1.1, Class 2A coarse threads. All threads shall have anti seize applied prior to installation.

B. Unless otherwise shown on the Drawings, stainless steel bolts and nuts shall be used for submerged flanges, flanges located in a wet or moist environment and locations where bolts are in contact with water, intermittently or continuously. Bolts and nuts shall be Type 316 stainless steel conforming to ASTM A193, Grade B8M for bolts, and Grade 8M for nuts. All threads shall have anti seize applied prior to installation.

C. All bolt heads and nuts shall be hexagonal, except where special shapes are required. Bolts shall be of such length that not less than ¼-inch or more than ½-inch shall project past the nut in tightened position.

2.05 POLYETHYLENE ENCASEMENT.

Polyethylene encasement shall be as indicated below. Polyethylene materials shall be kept out of direct sunlight exposure.

A. Polyethylene wrap and sleeves shall be a minimum 0.008-inches or 8 mil thick linear

low-density polyethylene film in accordance with AWWA C105.

B. Polyethylene wrap and sleeves shall be clear for use with potable water and purple for use with recycled water.

C. Polyethylene encasement shall be secured with 2-inch wide polyethylene or vinyl adhesive tape or with plastic tie straps.

2.06 WARNING/IDENTIFICATION TAPE.

Warning/identification tape shall be as indicated below.

A. Tape shall be detectable tape with a minimum of 5 mil thickness and with a .35 mil solid aluminum foil core and a width of 6 - inches. The construction shall be .8 mil clear film, reverse printed with a repeating warning message and laminated to aluminum foil with a 3.75 mil clear film backing. The lettering on all tapes shall be a minimum of 1" unless otherwise specified by the District Engineer. Tape used with the installation of onsite potable and recycled water irrigation systems shall be a minimum of 3-inches wide

B. Tape shall be puncture-resistant and shall have an elongation of two times its original length before parting.

C. Tape shall be colored to identify the type of utility intended for identification. Printed message and tape color shall be as follows:

Printed Message	Tape Color
Caution: Waterline Buried Below	Blue
Caution: Recycled Waterline Buried Below	Purple
Caution: Sewer line Buried Below	Green
Caution: Cathodic Protection Cable Buried Below	Red
Caution: Electric Line Buried Below	Red

Ink used to print messages shall be permanently fixed to tape and shall be black in color with message printed continuously throughout.

2.07 TRACER WIRE. Tracer wire shall be as indicated below.

A. Tracer wire shall be #12 AWG solid copper UF type wire with cross-linked polyethylene insulation. The insulation shall be white or yellow in color.

B. Wire splices (at pipe tees, crosses and laterals) shall be accomplished using a direct bury silicone-filled capsule tube with standard wire nut or silicone-filled wire nut connectors of the appropriate size.

2.08 VALVE WELLS.

A. Valve wells for all buried valves larger than 2 inch shall be 8 inch diameter SL 100 SDR41 pipe.

B. Valve well lids shall be circular ductile-iron. Lids shall be cast with the District's initials and the word "WATER" for use on potable water systems, the word "RECYCLED" for use on recycled water systems, or the word "SEWER" for use on wastewater systems.

1. Valve well lids for valves shall be in accordance with VCMWD Standard Drawing W-25 consisting of a two-piece machined ductile-iron frame and lid, 1208N.

2.09 VALVE STEM EXTENSIONS.

Stem extensions shall be complete with operating nut, location ring, and lower socket to fit valve-operating nuts. The configuration of the extension stem socket shall match that of the valve it operates.

A. Valve stem extensions for all valves may be round or square hot-dipped galvanized steel tubing of solid design (no pinned couplings permitted) with guides in accordance with VCMWD Standard Drawings W-23 and W-24.

PART 3 – EXECUTION.

3.01 CONNECTION TO EXISTING FACILITIES (WET TAPS AND CUT-IN INSTALLATIONS).

Unless otherwise indicated on the Approved Plans or specifically directed by the District Engineer, all connections to existing facilities, including wet taps on active pipelines and cut-in installations, shall be performed by Contractor. All wet taps shall be performed in accordance to District Standard or as directed by the District Engineer. All wet tap valve and nozzles shall be air of hydrostatically tested prior to tapping.

Cut-in installations shall follow the following shutdown procedure:

Shutdown periods for existing facilities shall be kept to a minimum and the Contractor shall schedule his/her work accordingly. The Contractor shall give 4 full working days' advance written notice to the District Engineer of his/her desire for an existing valve to be operated, an existing facility to be shut down, a pipeline drained, or a service to be turned off, using the request form provided by the District. No valve or other control device of the water system shall be operated by the Contractor without the approval of the District Engineer. The District will operate the existing valve, shut down the existing District facility or service, or supervise the draining of a line by the Contractor. Shutdowns of existing facilities can only be scheduled Tuesday through Thursday, be a maximum of 8 hours, within the hours of 8:00am to 4:00pm, and any individual customer cannot be without water service more than two (2) times in any calendar week nor two (2) consecutive days due to a requested shutdown. If, in the opinion of the District Engineer, the shutdown cannot be accomplished in an 8-hour period, Contractor will be required to provide necessary means for temporary water service to affected customers during the outage.

Shutdown requests will not be considered by the District until the Contractor has positively located the existing pipe or facility, all pressure and bacteriological tests have been successful, and the

Contractor has all material to be used for the connection at the project site and has made arrangements for all required labor and equipment.

3.02 FLEXIBLE PIPE COUPLINGS.

Flexible pipe couplings shall be installed in accordance with the manufacturers' recommendations.

3.03 GROOVED-END OR SHOULDERED COUPLINGS FOR DUCTILE-IRON OR STEEL PIPE.

Grooved-end or shouldered couplings shall be installed in accordance with the manufacturer's recommendations.

3.04 JOINT RESTRAINT SYSTEMS.

Joint Restraint Systems shall be installed as shown on the Approved Drawings, in accordance with the manufacturers' recommendations.

3.05 BOLTS AND NUTS.

A. All bolts and nuts shall be new and unused. Bolts shall not be reused once tightened. Used bolts and nuts shall be discarded and removed from the job site.

B. Bolts and nuts shall be cleaned, if needed, by wire brushing and shall be lubricated with anti-seize prior to assembly.

C. Tighten nuts uniformly and progressively in a "star" pattern.

D. Buried bolts and nuts shall receive a heavy coat of protective non-oxide grease prior to being wrapped with polyethylene.

E. All bolts shall be coated with an anti-seize compound.

3.06 POLYETHYLENE ENCASEMENT.

A. Polyethylene encasement shall completely encase and cover all metal surfaces.

1. Pipe and pipe-shaped appurtenances: All ductile-iron pipe and pipe-shaped appurtenances such as bends, reducers and offsets shall be encased with polyethylene sleeves in accordance with Method A described in AWWA C105, or with polyethylene wrap in accordance with Method C described in AWWA C105.

2. Odd-Shaped Appurtenances: Odd-Shaped Appurtenances such as tees and crosses shall be encased with polyethylene wrap in accordance with AWWA C105.

3. Valves: Valves shall be encased with polyethylene wrap in accordance with AWWA C105 such that only the stem and operating nut are exposed and the wrap shall be attached so that valve operation will not disturb the wrapping or break the seal.

B. Polyethylene sleeves shall be secured with polyethylene or vinyl adhesive tape or plastic tie straps at the ends and quarter points along the sleeve in a manner that will hold the sleeve securely in place during backfill. Polyethylene wrap shall be secured with polyethylene or vinyl adhesive tape or plastic tie straps in a manner that will hold

the wrap securely in place during backfill.

3.07 WARNING/IDENTIFICATION TAPE.

Warning/Identification Tape shall be installed as described below and in accordance with VCMWD Standard Drawings.

A. Tape shall be placed at the top of the pipe zone 12 inch above and centered over the utility intended for identification. Tape used with onsite potable and recycled water irrigation systems shall be installed at 12 inch above the pipe.

B. Tape shall be installed with the printed side up and run continuously along the entire length of the utility intended for identification. Tape shall be installed on the main piping and all appurtenant laterals, including blowoffs, air valve assemblies, fire hydrants, and services. Tape splices shall overlap a minimum of (24”) for continuous coverage.

C. Tape shall be installed prior to placement of the Trench Zone Backfill.

3.08 TRACER WIRE.

Tracer wire shall be installed as described below and in accordance with VCMWD Standard Drawings.

A. Tracer wire shall be installed with all water, recycled water mains, sewer mains, sewer force mains, and all related appurtenances.

B. Wire shall be placed on the top centerline of the pipeline and shall run continuously along the entire length of pipe prior to placement of trench backfill. Wire shall be mechanically and electrically continuous throughout the pipeline, including within pipe casings.

C. Tracer wire shall be secured to the pipe at 6 foot intervals with plastic adhesive tape, duct tape or plastic tie straps. The wire may alternately be secured to the pipe by looping the tracer wire around itself such that tracer wire remains continuous atop the pipe during backfill operations.

D. Tracer wire access ports shall be installed in accordance with VCMWD Standard Drawings within the concrete splash pad of all fire hydrants installed as a part of the work. In addition, tracer wire may terminate within meter boxes, blow off boxes, CP test boxes or air valve enclosures as shown on the Approved Drawings or as directed by the District Engineer at intervals of not more than (1,000'). Locations of all tracer wire access ports installed shall be noted on the field record drawings.

E. Wire shall extend into the access port and shall terminate with a coiled (24") length of wire. All tracer wire not attached to piping shall be installed, without splices, within a conduit at a minimum depth of (24”) in accordance with the Standard Drawings.

F. Splices shall be installed only when necessary and shall be made using wire connectors selected and approved by the District Engineer.

G. The Contractor shall test tracer wire for electrical continuity in the presence of the District Engineer prior to the installation of any paving over atop pipelines or

appurtenances. Testing shall be accomplished using a device capable of detecting improper connections or ground fault interruptions.

3.09 VALVE WELLS.

Valve wells shall be installed as shown on VCMWD Standard Drawing W-25.

3.10 VALVE STEM EXTENSIONS.

All valve stem extension shall be installed in accordance with VCMWD Standard Drawings W-23 and W-24.

3.11 REMOVAL OF PIPELINES AND APPURTENANCES.

A. Existing pipe and appurtenances shall be completely removed when indicated on the Approved Plans or as directed by the District Engineer. All materials removed during construction operations shall be disposed of.

3.12 DISPOSAL.

All materials removed during construction operations and not identified by the District Engineer shall be legally disposed of in accordance with all applicable Local, State, and Federal requirements.

Disposal of asbestos-cement pipe requires special handling and attention, including but not limited to, encapsulation within airtight packaging, submittal of certification letters and/or waste profile statements, and the use of a Cal-OSHA registered asbestos abatement contractor to transport and dispose of such wastes. The District Engineer shall be provided with copies of all applicable documentation regarding the transportation and disposal of asbestos-cement pipe. Contractor shall comply with all applicable regulations and all requirements of the disposal site. Contractor is responsible for all costs associated with disposal of materials, specifically including any materials that may contain asbestos.

END OF SECTION 15000