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PART II

STANDARD SPECIFICATIONS

PREFACE

The District has adopted as its Standard Specifications for recycled water facilities the "Standard Specifications for Public Works Construction," 2018 edition (Green Book), as modified herein. Each section in Part II, Standard Specifications, is presented in the same number sequence as that contained in the "Standard Specifications for Public Works Construction," 2018 Edition. Each sentence, paragraph or section is intended to delete, replace, amend or supplement the corresponding section in the Green Book.

PART II

STANDARD SPECIFICATIONS

PART 2

CONSTRUCTION MATERIALS

SECTION 200 - ROCK MATERIALS

200-2 UNTREATED BASE MATERIALS

200-2.1 General. The first sentence of the second paragraph of Subsection 200-2.1 is hereby amended as follows:

When base material without further qualifications is specified, the Contractor shall supply crushed miscellaneous base with a minimum R-value of 80.

SECTION 201 - CONCRETE, MORTAR, AND RELATED MATERIALS

201-1 PORTLAND CEMENT CONCRETE

201-1.1 Requirements.

201-1.2 Materials.

201-1.2.1 Portland Cement: The first sentence of the first paragraph of Subsection 201-1.2.1 is hereby amended as follows:

201-1.2.1 **Cement.** All cement to be used or furnished including in precast products, shall be either Type II or Type V Portland cement conforming to ASTM C150.

201-1.4 Mixing

201-1.4.1 Hand Mixing: Subsection 201-1.4.1 is hereby amended as follows:

Hand mixed concrete shall not be allowed.

201-1.6 Prepackaged Unmixed Concrete: Subsection 201-1.6 is hereby added to the Standard Specifications as follows:

201-1.6 Prepackaged Unmixed Concrete. Prepackaged unmixed concrete will be allowed for thrust blocks on main installations 6 inches and smaller provided that all requirements of Subsection 201-1 of the Standard Specifications are met.

201-5 CEMENT MORTAR

201-5.1 General. The first sentence of the fourth paragraph of Subsection 201-5.1 is hereby amended as follows:

Cement mortar shall be used within 30 minutes after mixing with water and shall show no visible signs of setting prior to use.

SECTION 203 - BITUMINOUS MATERIALS

203-6 ASPHALT CONCRETE

203-6.4 Asphalt Concrete Mixtures

203-6.4.1 Class and Grade. Add the following to the end of the first paragraph of Subsection 203-6.4.1:

Unless otherwise superseded by the responsible jurisdictional agency, or permit requirements, asphalt concrete mix designs conforming to the requirements in this section shall be as follows: Base Course (greater than 3-inches thick) – Type II B3 PG 64-10; and Overlay/Surface Course (greater than 1-inch and less than or equal to 2-inches thick) – Type III C3 PG 64-10.

SECTION 209 - PRESSURE PIPE

209-1 IRON PIPE AND FITTINGS

209-1.1 Ductile Iron Pipe (DIP)

209-1.1.2 Materials. Add the following to Subsection 209-1.1.2:

For ductile iron pipe sizes 4-inches to 12-inches in diameter, the minimum wall thickness shall be Pressure Class 350. The minimum wall thickness for flanged spools or grooved end pipe shall be Class 53.

The interior of all pipe and fittings shall be lined with cement-mortar per AWWA C104, double thickness listed in AWWA C014.

Unless otherwise called out on the plans and approved by the Engineer, push-on type joints shall be used. For pipe sizes 16-inches and larger, all pipe joints shall be bonded to provide electrical continuity for corrosion monitoring and future cathodic protection.

All flanges shall be ductile iron and shall be “screwed-on” type in accordance with AWWA C115 and shall be minimum of Class 150 flanges.

Where called for on the plans, pipe and fittings shall be restrained. Restrained joints shall be as specified herein and shall be one of the following types:

a. Flanged fittings (typically used above ground).

b. Where restrained joints are called for on 12-inches in diameter and larger pipe, use a manufactured locking restraint pipe with fittings: "TR-Flex" restrained joint pipe as manufactured by U.S. Pipe & Foundry Company or Clow Water Systems; Flex Ring by American Cast Iron Pipe; Thrust-Lock by Pacific States Cast Iron Pipe Company; or approved equal. The restrained joint shall be a boltless restrained push-on joint design and shall contain a positive axial locking restrained system and capable of deflection after assembly. Restraint of field cut pipe by using U.S. Pipe's "TR Flex Gripper Ring" or approved equal will be permitted as long as the "TR Flex" pipe field weldments are not required. Any restrained joint fitting which will require a pipe filed weldment will **not** be permitted under any circumstances. Restraint of field cut pipe shall be kept to a minimum.

c. Mechanical joints with mechanical joint restraints. Mechanical joints will only be allowed in areas where restrained joints are called for on the plans. The tee-bolts for mechanical joint fittings shall be Type 316 stainless steel. Mechanical joints shall be fitted with joint restraints. Mechanical joint restraints shall be incorporated with the design of the follower gland and shall include a restraining mechanism which, when activated, imparts wedging action against the pipe, increasing its resistance as the pressure increases. The joint shall maintain flexibility after burial. Follower glands shall be manufactured of ductile iron conforming to ASTM A536-80. Torque off bolts shall be tightened per manufacturer's recommendations and shall be inspected by the District prior to backfill. The mechanical joint restraint shall be EBBA Iron "MEGALUG", Ford Products, Romac Products, Sigma, Star Pipe Products or approved equal.

d. Where restrained joints are called for on 8-inches in diameter and smaller pipe, push-on joints shall be restrained with locking gasket rated for 250 psi operating pressure. Joint restraint shall be push-on joint with "Field-Lok" gaskets as manufactured by U.S. Pipe & Foundry Company, Perma-Lock Joint as manufactured by Pacific States Cast Iron Pipe Company or approved equal. "TR-Flex" restraint joint pipe as manufactured by U.S. Pipe or approved equal is also an acceptable option for restraint of push-on joints.

   For 12-inch pipe in diameter applications where the restrained joints are not required for thrust restraint (restraining of carrier pipe within a steel casing), push-on joints can be restrained with locking gasket rated for 250 psi operating pressure as specified above. Push-on joints for 12-inch pipe in diameter cann**ot** be restrained with locking gaskets when thrust restraint is required.

e. Push-on joint pipe with restrained harness assembly. Restraint systems using lugs integral to the pipe shall be cast with the pipe or fitting by the pipe manufacturer. Attachment of angle iron; angle-clips; harness-lugs or tabs by field welding to the ductile iron pipe or fittings is strictly prohibited. All threaded harness parts shall be manufactured of type 316 stainless steel. Restraint of push-on joints shall be of the type utilizing cast lugs, or retaining rings bearing against the pipe shoulders at the bell or fitting.

Ductile-iron fittings shall be made with push-on joints unless restrained joints are called for on the plans. Restrained fittings shall be required where restrained joints are called for on the plans. Joint restraint type shall be as specified above for ductile iron pipe and fittings.

All required test reports and certificates of compliance shall be provided prior to shipment of pipe.

All ductile iron pipe and fittings shall be polyethylene encased in accordance with AWWA C105 and Standard Specification Section 212-12.

209-4 PVC PRESSURE PIPE

209-4.2 Materials. Add the following to Subsection 209-4.2:

PVC pressure pipe shall be manufactured in accordance with AWWA C900. The dimension ration (DR) for C900 PVC pressure pipe shall be DR-14, as a minimum. The pipe shall have gasketed bell end or plain end with elastomeric gasketed coupling.

Fittings shall be ductile iron and shall be in accordance with Standard Specification Section 209-1.

All PVC pipe shall be installed with tracer wire and detectable warning tape in accordance with these Design Criteria and Standards (Standard Drawing RW15).

The manufacturer of the pipe shall furnish an affidavit that all delivered materials comply with the requirements of AWWA C900 and these specifications.

209-7 PIPELINE IDENTIFICATION

209-7.2 Requirements. Add the following to Subsection 209-7.2:

All recycled water piping, valves, valve boxes, services and pipeline appurtenances shall be identified with purple (Pantone 512) identification tape, as well as warning tags and labels. For specific details for recycled water pipe identification, see District Standard Drawing RW16. Identification tape shall extend to all valve boxes, meters, appurtenances, vaults, and exposed piping.

All recycled water piping, valves, and fittings aboveground or in vaults shall be painted purple in color (Pantone 512). Black or white stenciling shall appear on both sides of the pipe with marking: “CAUTION – RECYCLED WATER, DO NOT DRINK” in 5/8-inch letters repeated every three feet.

All buried piping shall either be colored purple (Pantone 522) and embossed or be integrally stamped/marked “CAUTION – RECYCLED WATER, DO NOT DRINK” or be installed with purple identification tape, or a purple polyethylene wrap (color to be Pantone 512).

PVC Pipe: PVC pipe shall be purple, and shall be marked on both sides of the pipe with the wording: “CAUTION: RECYCLED WATER – DO NOT DRINK”.
Lettering shall be a minimum of 1/2-inch high black letters, and shall be repeated every 12-inches. The purple pipe color shall be achieved by adding pigment to the PVC material as the pipe is being manufactured.

Ductile Iron Pipe: Purple identification tape with black lettering identifying the recycled water line. The identification tape shall be an inert plastic film specifically formulated for prolonged underground use. The minimum thickness shall be 4 mils and the overall width of the tape and lettering size shall be the following: pipe 6-inches and smaller in diameter shall have an identification tape width of 6-inches with minimum lettering size of 2-inches. The message: “CAUTION – RECYCLED WATER, DO NOT DRINK” shall repeat every 36-inches. The identification tape shall be fastened to the pipe with plastic adhesive tape banded around the pipe at no mor than 5-foot intervals, or as approved by the Engineer.

As an alternative, the ductile iron pipe and fittings can be polyethylene encased in accordance with AWWA C105 and Standard Specification 212-12 and shall be “purple” in color and shall bear the recycled water identification markings: “CAUTION: RECYCLED WATER – DO NOT DRINK” printed on the field in black letters a minimum of 1-inch high and repeated every 24-inches.

Services and Appurtenances: Purple identification tape with black lettering identifying it to be a recycled water line shall be placed over the top of the pipe and shall be taped to the copper pipe at 2 foot intervals. The identification tape shall extend up into the air valve enclosure assembly, blow-off, meter box, or other appurtenances a minimum of 12-inches, so that it can be read clearly by opening the box or enclosure. The identification tape shall read: “CAUTION: RECYCLED WATER – DO NOT DRINK”.

Warning Tape: Recycled warning tape shall meet the same specifications as the above identification tape and shall be buried above the pipe zone bedding for all pipelines, services and appurtenances a minimum of 12-inches above the pipe.

Warning Tags: The District requires warning tags to be installed on all appurtenances in vaults and aboveground, such as, but not limited to, air valves, blowoffs, and meters. Recycled warning tags shall be inert plastic film specifically formulated for prolonged exposure and shall have a minimum thickness of 10 mils. The warning tags shall be 3-inch by 4-inch with purple background and black lettering and shall have reinforced tie holes and shall be attached with heavy-duty nylon fasteners. The location and quantity of warning tags for each appurtenance will be dictated by each individual application and subject to acceptance by the Engineer.

Valve Boxes: All valve boxes for recycled water facilities shall have the inscription “RW – WBMWD” on the valve box cover.

Tracer wire: A copper tracer wire shall be installed for all non-metallic pipe (PVC Pipe). The tracer wire shall be #12 copper wire with HMWPE insulation and shall be secured to the top or crown of the pipe with plastic adhesive tape every ten (10) feet.

The purpose of the tracer wire is to provide a continuous signal path for electronic pipe locators used to determine the pipe alignment after installation. The wire shall be electrically continuous throughout the pipe system including adjacent service line and appurtenances. The ties or hitches shall be spaced not more than 13 feet apart. At service lines, the wire shall be extended up the pipe and secured by a cable lug under the top nut of one set of bolts. At cul-de-sacs, the wire shall be placed in the same trench with the last long side service lateral and extended into the meter box or secured by a cable lug. At air valve assemblies, the wire shall extend up into the meter box or air valve enclosure. The wire shall be brought to the surface at valve locations and shall be accessible by removing the valve can cover. At blow-off assemblies, the wire shall extend up into the blow-off cover. All splices shall be wrapped with PVC tape. Crimpable copper butt splice kits are permitted in valve cans only.

The contractor shall provide the District with the results of an electrical continuity test. The contractor shall perform the initial electrical continuity test and any subsequent tests required due to the failure of the tracer wire to be electrically continuous.

SECTION 212 - WATER AND SEWER SYSTEM VALVES AND APPURTENANCES

212-1 GENERAL: Add the following to Subsection 212-1:

212-1 GENERAL: The following subsections of 212 will apply to the recycled water system valves and appurtenances.

212-1.1 Submittal Package. The following shall be added to Subsection 212-1.1:

Shop drawings will be required for all valves of all sizes. Shop drawings are required for all recycled water system piping, valves, service, and appurtenances that are to be furnished. The catalog data shall be provided with items, options, sizes, and pressure ratings to be furnished clearly highlighted and indicated on every material submittal. Submittals are required for all recycled water identification materials.

212-1.3 Products Conveying Fluids Other than Potable Water. Amend Subsection 212-1.3 by the following:

The products shall be conveying Title 22 Recycled Water. All pipeline, valves, and pipeline appurtenance materials shall be chemically compatible with Title 22 recycled water.

If any portion of a specified valve is chemically incompatible with the recycled water, the contractor shall submit a valve with appropriate materials stating the reason for the exception.

212-2 FLANGED AND THREADED CONNECTIONS

212-2.3 Flange Drilling. Add the following to Subsection 212-2.3:

All flanges shall have a design pressure of 150 – 250 psi and shall have ductile iron flanges per ANSI B16.42 Class 150 or steel flanges AWWA C207 Class E.

212-2.5 Flange, Coupling, and Harness Bolts, Nuts, and Washers

212-2.5.1 Buried Ferrous or Plastic Piping Applications. Add the following to Subsection 212-2.5.1:

All nuts, bolts, and washers for underground ferrous installations shall be Type 316 stainless steel. All buried flanged connections shall be coated with three coats of eight mils each of low VOC epoxy coating after installation, including nuts, bolts, and flanges and then shall be wrapped with 10-mil polyethylene sheet. Anti-seize lubricant shall be applied to bolts and nuts.

212-2.5.2 Above-ground Ferrous or Plastic Piping Applications. Add the following to Subsection 212-2.5.2:

All nuts, bolts, and washers for above-ground ferrous installations shall be zinc-plated carbon steel. Non-oxide grease shall be applied to bolts and nuts.

212-2.5.5 Above-ground Bronze Piping Applications. Add the following to Subsection 212-2.5.5:

Copper pipe shall be connected to flanged valves and fittings with bronze companion flanges conforming to ANSI B16.24, Class 125 (150 lb. rating) to match the connecting flange. Solder end companion flanges shall be used for copper and threaded companion flanges for brass, or stainless steel pipe connections. All flanged connections shall be made using Type 316 stainless steel bolts and nuts. Washers shall be provided for each nut and shall be of the same material as the nuts.

212-2.7 Flange Gaskets

212-2.7.2 Materials. Add the following to Subsection 212-2.7.2:

Gaskets for flanges joints shall be 1/8-inch thick and made of EPDM or synthetic fiber. The gaskets shall be compatible with recycled water that may have a high chlorine residual.

212-4 VALVE ACTUATORS, EXTENSIONS, AND VALVE BOXES

212-4.2.2 Valve Extension Stems. Add the following to Subsection 212-4.2.2:

Valve stem extension shall be per Standard Drawing RW8.

212-4.2.3 Valve Cans and Covers for Buried Valves

212-4.2.3.2 Materials. Add the following to Subsection 2-212.4.2.3.2:

Valve box and cover shall be per Standard Drawing RW7 and 7A. The valve pipe extension shall be 8-inch SDR 35 pipe. The valve box body and cover shall be 10 1/4-inch diameter with triangular lid Brooks Model 4-TT.

212-5 VALVES

212-5.1 Resilient Wedge Gate Valves. Amend Subsection 212-5.1.2 and 212-5.1.3 with the following:

All valves installed at fittings shall be flanged. Resilient wedge gate valves shall conform to AWWA C509 and the following requirements:

1. Valves shall have a wedge-type resilient seat with the gate fully encapsulated in peroxide cured EPDM rubber. The valve shall be designed for a minimum working pressure of 200 psi. Valves shall have non-rising stems fabricated of Type 304 or 316 stainless steel.

   As an alternative, stem material may be high strength low-zinc bronze alloy. Stem nuts shall be independent of the gate and shall be made of bronze.

2. Materials of construction shall be as follows:

Component	***Material***	***Specification***
Body, Operating Nut, Bonnet, Seal Plate	Ductile Iron	ASTM A536, Grade 65-45-12
Gate	Ductile Iron	ASTM A536, Garde 65-45-12
Stem	Stainless Steel or high-strength, low zinc bronze	AISI 430F; ASTM 582 or Type 316; ASTM B763, CDA 867
Stem Nut	Bronze	ASTM B62
Nuts and Bolts	Stainless Steel	ASTM A193/194, Type 316
Valve Seat	EPDM Rubber	ASTM D412
O-Rings	Synthetic Rubber	ASTM D2000

3. Low-friction, torque reduction thrust bearings shall be provided above and below the stem collar. Stuffing boxes shall be O-ring seal type with two rings located in stem above thrust collar.

4. Each valve shall have a smooth unobstructed waterway free from any sediment pockets.

5. Valves shall have their internal surface epoxy coated, except stainless steel and rubber surface, with epoxy applied by the manufacturer of the valve.

6. Valves shall be American AVK, Clow RW, M&H Style 4067, Mueller A2362, U.S. Pipe, or approved equal.

212-5.2 Butterfly Valves. Amend Subsection 212-5.2.2 and 212-5.2.3 with the following:

All valves installed at fittings shall be flanged. Butterfly valves shall be short body, flanged type, conforming to AWWA C504, Class 150B and the following requirements:

1. Minimum working differential pressure across the valve disc shall be 150 psi. Valve ends shall match the class rating of the valve. For example, Class 150 valves shall have 150-lb flanges. Flanged ends shall be Class 125 drill pattern, ANSI B-16.1 unless otherwise specified. Note that all butterfly valves 12-inch in diameter and larger are required to have flanged ends to meet the requirements for valve leakage.
2. Valve shafts shall be Type 304 or 316 stainless steel for Class 150 valves. Valve shafts may be stub shaft or one-piece units extending completely through the valve disc.
3. The rubber seat shall be made from peroxide-cured EPDM rubber and shall be fastened integrally with the valve body. Rubber seats fastened to the disc by any means shall not be allowed.
4. Valves shall be furnished with operators of the traveling nut or worm gear-type, self-locking in any position, and sealed, gasketed, and lubricated to withstand a submersion in water to 10 psi per Standard Specification Subsection 212-4.4.
5. Materials of construction shall be as follows:

Component	***Material***	***Specification***
Body	Ductile Iron	ASTM A536, Grade 65-45-12
Valve Shaft	Stainless Steel	Type 304 or Type 316
Exposed body cap screws, bolts & nuts	Stainless Steel	ASTM A276, Type 316
Discs	Ductile Iron Stainless Steel	ASTM A536,Grade 65-45 Type 316
Valve Seat	EPDM Rubber	ASTM D412
O-Rings	Synthetic Rubber	ASTM D2000

6. Valves shall have their internal surface epoxy coated, except stainless steel and rubber surface, with epoxy applied by manufacturer of the valve.
7. Valves shall be Pratt Groundhog, Mueller Lineseal, Crispin K-Flow, or approved equal.
8. All butterfly valves 12-inch in diameter and larger shall be flanged to facilitate field testing. Valves shall be field tested in horizontal position. All valves shall be tested bi-directionally after the actuator/operator is installed and the adjustment stops are set. Each side of the valve shall be tested for a duration of at least

5 minutes at the pressure class rating of the valve with zero loss or leakage. The field pressure test shall be witnessed by the District's representative and shall be performed within 75 miles of the project site. A minimum of three working days advance notice to the District for testing scheduling is required.

212-5.6 Air Release, Air/Vacuum, and Combination Air Valves. Amend Subsection 212-5.6 with the following:

Air valves shall be 1-inch or 2-inch combination air valves. Combination air valves shall consist of both an air and vacuum valve and air-release functions contained in one body.

The air and vacuum, float assembly with large venting orifice, shall serve to release and admit large quantities of air when pipelines are filled and drained. The air release shall serve to release small quantities of air that accumulate during pipeline operation.

Valves shall have an operating pressure of 150 psi. Valves shall be APCO 143C/153C Series, Val-Matic Model 201C/202C, Crispin UL10/UL20, or A.R.I. D-040 ST.

Materials of construction for the combination air valve shall be as follows:

Component	***Material***	***Specification***
Body and Cover	Cast Iron, Ductile Iron or stainless steel with reinforced nylon	CI: ASTM A126 Class B DI: ASTM A536: 60-40-18
Float	Stainless Steel or foamed polypropylene	SS: Type 316, ASTM A240 or A276 Polypropylene: ASTM-1895-89
Guide rod, guide bushings	Stainless Steel	AISI Type 316, ASTM A240 or A276
Seat	EPDM	ASTM D412
Valve Trim	Stainless Steel	AISI Type 316, ASTM A240 or A276
Cover Bolts	Stainless steel	AISI Type 316, ASTM A240 or A276

Valves shall be coated on the exterior with paint. Prime coat shall be shop -applied at the place of manufacturer. Finish coat shall be applied in the field. Color of finish coat shall match the color of the adjacent piping.

Interior surfaces of the valves shall be fusion bonded epoxy. Seating areas and plastic, stainless steel, or other high alloy parts shall not be coated.

Vented Cover. Air valves shall be enclosed inside a removable vented cover as shown on District's Standard Drawing RW9. Vented covers shall be manufactured of linear low density polyethylene (LLDPE) as made by Armorcast Products or by Pipeline Products, Inc. The integral color shall be sandstone. The exterior of the vented cover shall be installed with West Basin logo decal as well as with a recycled water label/decal.

212-8 COUPLINGS

212-8.1 Bolted-Sleeve Type Couplings

212-8.1.2 Materials. Add the following to Subsection 212-8.1.2:

Bolted-sleeve type couplings (flexible couplings) shall conform to the following requirements:

1. Ductile iron pipe and PVC pipe couplings shall have center sleeves of ASTM A126 Class B ductile iron with a minimum yield strength of 30,000 psi. Follower rings shall be ductile iron ASTM A536. Minimum center sleeve length shall be 6-inches for pipe sizes up to 6-inches and shall be a minimum of 12-inches for 12-inches and larger pipe diameters.

   Sleeve bolts shall be Type 316 stainless steel and shall conform to ASTM A193 and AWWA C111.

   Flexible couplings for ductile iron and PVC pipe shall be: Baker 228, Dresser Style 153, Ford Style FC1, Romac Style 501, Smith Blair Type 442, or approved equal.

2. Transition couplings for connecting ductile iron pipe or PVC pipe to pipes having different outside diameters shall be ductile iron and shall be Baker Series 246, Dresser, Ford Style FC2A, Smith-Blair Type 441, Romac or approved equal. Sleeve bolts shall be Type 316 stainless steel and shall conform to ASTM A193 (Grade B8M) for bolts and ASTM A194 (Grade B8M) for nuts and shall conform to AWWA C111.
3. Interior surfaces of flexible couplings shall be coated with fusion bonded epoxy. Buried couplings shall be coated with fusion bonded epoxy and shall be wrapped with 8-mil polyethylene wrap per AWWA C105.

212-10 SERVICE LATERALS, METERS AND METER BOXES

212-10.1 Copper Tubing. Amend Subsection 212-10.1 with the following:

Copper piping shall conform to ASTM B88. Piping buried or located beneath floor slabs shall be Type K. Piping located above floors or suspended from ceilings shall be Type L. Copper tubing for recycled water services shall be Type “K” soft copper pipe. Solder shall be silver solder conforming to ASTM B32, Grade Sn94, Sn95 or Sn96. Do not use cored solder. Copper fittings shall be copper conforming to ASTM B75 and ANSI16.22 with solder end joints.

212-10.3 Corporation Stops, Angle Meter Valves, Service Saddles and other Service Materials. Replace Subsection 212-10.3 with the following:

Corporation Stops. Corporation stops shall be manufactured of brass. The inlet shall be iron pipe thread. The outlet shall be flare copper outlet. Corporation stops shall be "ball style" as manufactured by Mueller, James Jones, Ford Meter Box or A.Y. McDonald.

Angle Meter Valve. Angle meter valve shall be of the "ball valve" style and shall be manufactured of brass. The inlet connection shall be flare copper inlet. The outlet fitting shall be meter swivel nut outlet. The inlet and outlet shall form an angle of 90 degrees on a vertical plane through the centerline of the angle meter valve. A rectangular lug and lock wing shall be provided on the top of the fitting to operate the shutoff mechanism. Angle meter valves shall be manufactured by Mueller, James Jones, Ford Meter Box or A.Y. McDonald.

Ball Valve (Air Valve). Ball valve shall be manufactured of brass. Inlet and outlet shall be female iron pipe. Ball valve shall be "ball style" as manufactured by Mueller, James Jones, Ford Meter Box or A.Y. McDonald.

Service Saddles for DIP. Service saddle bodies shall be manufactured of brass, stainless steel or nylon-coated malleable iron. Saddles shall be tapped with an iron pipe thread tap. The seal with the outer wall of the pipe shall be effected with either a rubber gasket or an O-ring. Service saddles shall be manufactured by Mueller, James Jones, Ford Meter Box or A.Y. McDonald.

Service Saddles for PVC Pipe (C900). Service saddles shall be manufactured of brass with stainless steel band. Saddles shall be tapped with an iron pipe thread tap. The strong, extra wide fabricated stainless steel band shall conform to the contour of the pipe O.D. without causing distortion of the pipe. The saddle shall be securely held in place with Type 316 stainless steel hex-head screws or bolts. Service saddles shall be manufactured by Mueller, James Jones, Ford Meter Box or A.Y. McDonald.

Brass Pipe and Nipples. Short threaded nipples and brass pipe shall conform to ASTM B43, regular wall thickness, except that nipples and pipes of sizes 1-inch and smaller shall be extra strong. Threads shall conform to ANSI B1.20.1. Unions for non-buried applications shall be brass conforming to AWWA C800. Unions shall be the same size as the pipe and shall be of the three part type, with either threaded or silver soldered "sweat" hub-end connections.

Connections. Pipe fittings and appurtenances made of dissimilar metals shall be isolated from each other. For applications where a steel pipeline is to be tapped, a tap size plus 1/2-inch heavy half coupling shall be provided with a tap size plus 1/2-inch by tap size reducing insulating bushing (316 stainless steel) as is shown on the District's Standard Drawing RW40.

Stainless Steel Ball Valves. Stainless steel ball valves shall be three-piece body style and shall be manufactured of Type 316 stainless steel. The minimum design operating

pressure shall be 300 psi WOG at a temperature of 150 degrees F. Valves shall have a plastic coated lever operator with a locking mechanism. Valves shall have a full bore ports, female iron pipe thread screwed ends and non-blowout stems. Seat and seals shall be Teflon. Valves shall be Apollo, Sharpe, Xomox, Stockham Figure S-127 or approved equal.

212-12 PAINTING, INTERIOR LINING, AND EXTERIOR COATING.

212-12.1.1 General. *Add the following at the end of Subsection 212-12.1.1:*

Exposed Metal (Atmospheric Weathering Environment). Low VOC Aliphatic Polyurethane with low VOC epoxy-polyamide or amido-amine epoxy primer. A total dry-film consisting of the combined thickness of both a primer and finish coat of 8 mils.

Surface preparation shall be SSPC SP-6 for steel surfaces; NAPF 500-03-05 Clean No. 2 for ductile iron or cast iron surfaces; and SSPC SP-1 for galvanized surfaces and shall be brush blasted or acid etched surface prior to application of prime coat.

Prime coat: Apply one or two coats to a dry-film thickness of 5 mils. For ductile iron surfaces, the ductile iron shall have an asphaltic free surface with a factory applied prime coat the same as the finish coat. Approved manufacturers include: Ameron Amerlock 2 VOC or 400 VOC; Tnemec Series 135 Chembuild with low VOC thinner or L69 Epoxyline; International/Devoe BarRust 231; Sherwin Williams Macropoxy 646-100; or approved equal.

Finish coat: Apply one coat to a dry-film thickness of 3 mils to achieve the total dry-film thickness. Approved manufacturers include: Ameron Amershield VOC; Tnemec Series 1095 Endura-shield; International/Devoe Devthane 379; Sherwin Williams Hi-Solids Polyurethane 100; or approved equal.

Buried Metal. Low VOC epoxy coating. A total dry-film consisting of the combined thickness of both a primer and finish coat shall be 24 mils.

Surface preparation shall be SSPC SP-10.

Prime coat: Apply to a dry-film thickness of 8 mils. Approved manufacturers include: Ameron Amerlock 2 VOC or 400 VOC; Tnemec Series L69 Epoxyline; International/Devoe BarRust 231; or approved equal.

Finish coat: Apply two coats, each with an 8 mil dry-film thickness to achieve the total dry-film thickness. The coating material shall be the same material as the prime coat.

Valve Coating. Interior surface of ferrous metal valves, excluding seating areas and bronze and stainless steel pieces shall be coated with a thermosetting powered epoxy coating.

Surface preparation shall comply with SSPC SP-5. Proturberances which may produce pinhole in the coating shall be removed. Sharp edges shall be rounded. Surface contaminants which may prevent bonding of coating shall be removed.

Coating: Apply to a total dry-film thickness of 12 mils in accordance with manufacturer's recommendations. Approved manufacturer shall be 3M Scotchkote 134.

As an alternative to the thermosetting powdered epoxy coating, the following coating may be used:

Two part low VOC epoxy-polyamide coating. A total dry-film consisting of the combined thickness of both a primer and finish coat shall be 15 mils.

Surface preparation shall comply with SSPC SP-10. Proturberances which may produce pinhole in the coating shall be removed. Sharp edges shall be rounded. Surface contaminants which may prevent bonding of coating shall be removed.

Prime coat: Apply to a dry-film thickness of 5 mils in accordance with manufacturer's recommendation. Approved manufacturers include: Ameron Amerlock 2 VOC or 400 VOC; Tnemec Series L40F Pota Pox; International/Devoe 233H; Sherwin Williams Macropoxy 646-100PW; or approved equal.

Finish coat: Apply two coats, each with a 5 mil dry-film thickness to achieve the total dry-film thickness. The coating material shall be the same material as the prime coat.

Valve Box, Blow-off and Corrosion Test Station Covers. Valve box, blow-off and corrosion test station covers shall be coated with Buried Metal coating system. Color shall be Pantone 512.

Air Valves and Piping. Air valves and piping shall be coated with Exposed Metal coating system. Color shall be Pantone 512.

Polyethylene Encasement. All buried ductile iron pipe, fittings, couplings, and valves shall be encased with a **double layer** of a minimum thickness of 8-mil polyethylene sheeting in accordance with AWWA C105. 2-inch wide polyethylene adhesive tape shall be used to connect the polyethylene encasement at the fittings and appurtenances. All joints between plastic tubes shall be wrapped with 2-inch wide, 10 mil thick, polyethylene adhesive tape, Polyken 900, or Scotchwrap 50, or approved equal.

212-13 MISCELLANEOUS ITEMS

212-13.1 General. Add the following Subsection 212-13.1:

212-13.1 General. The following are additional specifications of recycled water facilities:

Precast Concrete Vaults.

Precast concrete vaults and covers shall conform to the size, shape and dimensions indicated on the construction plans. The ASTM standard and manufacturer shall be stamped on the interior and exterior of the vault. Vault and covers shall be manufactured by Christy Concrete, Eisel Enterprises, Inc., J&R Concrete Products, Inc. Jensen Precast, Olson Precast, or approved equal.

Design loads shall consist of dead loads, live load, impact and in addition, loads due to water table and any other loads which may be imposed upon the structure. Live loads shall be based on H-20 continuous loading per AASHTO standard specifications for highway bridges. Design wheel load shall be 16 kips. The live load shall be that which produces the maximum shear and bending moments in the structure. All vaults located within roadways or driveways shall have traffic covers. Vaults in all other locations shall have parkway covers. All mortar

Hatches may be aluminum or stainless steel construction and shall be fabricated with supports to resist deflection. In general, aluminum hatches may be used in applications of parkway loading (i.e. low-volume traffic with H-5 loading). Aluminum or stainless steel hatches shall be the size and type indicated on the construction drawings. Hardware shall be 316 stainless steel and shall include but not be limited to hinges, threaded pieces, connectors, hold-open arms, springs and spring covers. Hatches shall be equipped with extruded aluminum channel trough frames with 1-1/2 inch drain coupling, flush aluminum drop handles which do not protrude above the cover, a recessed padlock box and stainless steel staple sized for a No. 5 padlock. The hatch shall be manufactured by Bilco, U.S. Foundry or approved equal.

Contractor shall be responsible to install covers so that there are flush with surrounding surface and shall make all necessary adjustments so that the cover meets these requirements. All mortar joints in the precast concrete vault sections shall be made watertight. The joint sealing compound shall be permanently adhesive flexible plastic material complying with Federal Specification SS-S-00210 (GSA-FSS). Joint sealing compound shall be Quickseal by Associated Concrete Products or approved equal. All voids or openings in the vault walls around pipes shall be filled with 3,000 psi concrete or mortar, using an approved epoxy for bonding concrete surfaces.

Precast Concrete Manholes.

Precast reinforced concrete manholes shall comply with ASTM C478, with a minimum wall thickness of 6-inches. The ASTM standard and manufacturer shall be stamped on the interior and exterior of all manhole shafting and cone. Manhole components shall be designed for H-20 highway loads and site soil conditions.

Precast reinforced concrete manholes shall be manufactured by Inland Concrete Products (Oldcastle Precast), Manhole Builders, Manhole Construction Specialist, Olson Precast Company, Precon Products, Southwest Concrete Products, or approved equal.

Manhole frames and covers shall be made of ductile iron conforming to ASTM A536, Class 400, or cast iron conforming to ASTM A46, Class 30 minimum. Casting shall be smooth, clean, and free from blisters, blowholes, and shrinkage. Frames and covers shall be of the traffic type, designed for H-20 loading. The cover shall seat firmly into the frame without rocking. Grind or otherwise finish each cover so that it will fit in its frame without rocking. Match markers sets of frames and covers prior to shipping. Covers for manholes shall have the word “WBMWD RECYCLED WATER” cast thereon in 3-inch high letters, 1/4-inch thickness and 1/4-inch deep. Do not apply any other lettering. Before leaving the foundry, clean castings and subject them to a hammer inspection. Castings shall be dipped twice in a preparation of asphalt and oil applied at a temperature or not less than 290 degrees F, nor more than 310 degrees F.

Manhole frames and covers shall be manufactured by Alhambra Foundry, National Casting, Neenah Foundry, South Bay Foundry, or approved equal.

Exterior Waterproofing. The exterior of concrete vaults shall be coated with a crystalline waterproofing. The waterproofing shall be “XYPEX” crystalline waterproofing. The preparation of and application to the precast concrete surface shall be in accordance with manufacturer’s recommendation. Waterproofing shall consist of one coat of XYPEX “Concentrate” applied at the rate of 1-1/2 pounds per square yard of concrete surface, followed by one coat of “XYPEX “Modified” applied at the rate of 1-1/2 pounds per square yard of concrete surface. Waterproofing shall be applied to all walls from the top of the footing to the top of the walls.

SECTION 215 - CORROSION CONTROL

This Subsection has been added.

215-1 General.

This specification covers pipeline corrosion control and monitoring requirements for the metallic pipelines installed in the District. Items covered in this specification include the installation of: corrosion test stations (pipeline and casings), insulating flange kits, continuity bonds, and sacrificial anodes. Additionally, this specification includes testing and inspection requirements for all corrosion control facilities.

215-2 Materials.

Materials and equipment furnished under this section of the specifications shall be the standard product of manufacturers regularly engaged in the manufacturing of such products and shall be the manufacturer's latest standard design that complies with specification requirements. All materials and equipment shall bear evidence of U.L. approval when U.L. standards exist.

215-2.1 Magnesium Anodes.

Magnesium anodes shall be the high potential alloy with a theoretical energy capacity of 1000 ampere-hours per pound and have a minimum useful output of 500 ampere-hours per pound. Anodes shall be pre-packaged in a special backfill or bare as directed in the design drawings.

1. Chemical Composition (High Potential)

Aluminum	0.01 percent (max)
Manganese	0.5 to 1.3 percent
Zinc	0.002 percent (max)
Copper	0.02 percent (max)
Nickel	0.001 percent (max)
Iron	0.03 percent (max)
Other	0.05 percent each (max) 0.3 percent total (max)
Magnesium	Remainder

2. Size and Weight

   Anodes shall be 48 pound magnesium ingots with a trapezoidal cross section. Ingot size shall be approximately 6" x 5" by 32" long.

3. Anode Construction

   Anodes shall be cast magnesium with a galvanized steel core rod. Recess one end of the anode to provide access to the rod for connection of the lead wire. Silver braze the lead wire to the rod, make the connection mechanically secure before brazing. Insulate the connection to a 600 volt rating by filling the recess

with epoxy and covering any exposed bare steel core or wire with heat shrinkable tubing. The insulating tubing shall extend over the lead wire insulation by not less than one-half inch.

4. Pre-Packaged Magnesium Anodes

   Pre-packaged anodes shall be provided by the supplier completely encased and centered within a cloth bag in a special low resistivity backfill mix with the following composition:

Gypsum	75%
Powdered Bentonite	20%
Anhydrous Sodium Sulfate	5%

   Backfill shall be firmly packed around the anode such that the ingot is approximately in the center of the backfill and surrounded by at least 2-inches of backfill material. The resistivity of the backfill shall be no greater than 50 ohm-cm when tested wet in a soil box with no extraordinary means of compaction.

5. Bare Magnesium Anodes

   Bare magnesium anode ingots can be used at clustered anode installations. Bare anodes must be backfilled with a slurry backfill of the same composition as the backfill supplied with pre-packaged anodes. The slurry shall be prepared and installed as directed below.

215-2.2 Wire and Cable

All cable and wire shall be insulated, single conductor, stranded, copper suitable for direct burial in corrosive soil and water with HMWPE or THWN insulation as indicated on the drawings conforming to U.L. 83 unless otherwise specified. All wire lengths shall be sufficient to reach from its origin to the test box (or destination) without a splice.

1. Anode Lead Wire

   No. 12 AWG stranded copper wire with THWN insulation (color white) and of suitable length to reach from the anode to the test box without a splice.

2. Cathode (Pipe) Lead Wire

   No. 8 AWG with black HMWPE insulation as indicated on the drawings.

3. Test Lead Wire

   No. 2 or No. 8 AWG with black HMWPE insulation as shown in the drawings.

4. Bond Wires

   No. 2 AWG stranded copper with black HMWPE insulation.

5. Casing Leads

   No. 12 AWG stranded copper wire with THWN or THW insulation (color +yellow).

215-2.3 Insulating Flange Kits

1. Gasket

   Full faced, Type "E" phenolic material with rectangular nitrile or Viton O-ring seal for operation between 20°F and 150°F. Use PSI Linebacker gasket or equivalent. Gaskets shall be suitable for the temperature and pressure rating of the piping system in which they are installed.

2. Insulating Sleeves

   1/32-inch thick tube, full length, laminated glass material as per NEMA LI-1 G10 for operation between 20°F and 150°F. For installation at threaded valve flanges, the sleeves shall be half length.

3. Insulating Washers

   1/8-inch thick laminated glass material as per NEMA LI-1 G10 for operation at ambient temperatures to be placed directly adjacent to the flange face.

4. Steel Washers

   1/8-inch thick cadmium plated steel to be placed between the bolt head or nut and the insulating washer.

215-2.4 Insulating Flange Coating (Buried Flanges Only)

1. Standard

   Materials shall be per NACE Standard RP0375-94.

2. Primer

   The flange and bolt surfaces shall be prime coated with a blend of petrolatum, plasticizer, inert fillers and corrosion inhibitor having a paste-like consistency. The primer shall be Trenton Wax-Tape Primer, Central STACprime or equivalent.

3. Wax Tape

   Flange covering material shall be a synthetic felt tape, saturated with a blend of petrolatum, plasticizers, and corrosion inhibitors that is easily formable over irregular surfaces. A compatible petrolatum filler should be used to smooth over irregular surfaces. The Wax-Tape shall be Trenton #1 Wax-Tape, Central STACwrap or equivalent.

4. Outer Covering

   The primed and wax-tape wrapped flange shall be wrapped with a plastic tape covering consisting of three (3) layers of 50 gauge or 10 mil, polyvinylidene chloride or PVC, high cling membranes wound together as a single sheet. The outer covering shall be Trenton Poly-Ply, Central STACguard or equivalent.

215-2.5 At-Grade Test Stations

1. Test Box

   At-grade test boxes shall be round, pre-cast concrete with dimensions of 13-1/2" O.D. by 8" I.D. by 12" high, similar to Brooks type 1 RT with a cast iron supporting ring and lid and shall have sufficient strength to support vehicular traffic. The lid shall be 10" O.D. and cast with the legend "CP Test" using letters not less than 1-1/2 inches high. The test boxes shall be installed flush with grade.

2. Identification Tags

   All test leads shall be identified in each test box with 1-1/2" diameter by 1/16" brass tags. The tags shall be die stamped with "WBMWD", size & service as indicated in the drawings. The tags shall be securely attached to the test leads with uninsulated No. 14 or 16 copper wire.

3. Shunts

   Anode test boxes shall have 0.01 ohm shunts rated at 6 amperes, similar to the Holloway Type RS, and accurate to plus or minus one percent. Shunts shall be attached to anode and cathode lead wires with split bolt connectors as shown in the drawings.

4. Split Bolt Connector

   Split bolt connectors shall be UL 486 copper or brass and sized to accommodate the lead wire and shunt being used.

5. Plastic Tape

   Vinyl plastic electrical tape shall be 8.5 mils thick, 3/4 inch wide.

6. Electrical Insulation Putty

   Electrical insulation putty shall be 125 mils thick, 1-1/2 inches wide.

7. Concrete Pad

   Test boxes mounted in un-paved areas shall have a 24" square by 4" thick concrete pad constructed of ASTM C94 Ready-Mix concrete.

215-2.6 Alumino-Thermic Weld Kit. Cable-to-metal connections shall be made by the alumino-thermic welding process. Weld charge size, alloy and mold size shall be as specified by the manufacturer of the weld kit, and illustrated on drawings. The

Contractor shall insure that the correct charges are used.

215-2.7 Elastomeric Weld Caps. Alumino-thermic welds shall be sealed with a pre-fabricated plastic cap filled with formable mastic compound on a base of elastomeric tape. Weld caps shall be Royston Handy Cap 2 or equivalent.

215-2.8 Weld Coating. All alumino-thermic welds shall be coated with a cold-applied fast-drying mastic consisting of bituminous resin and solvents per Mil. Spec MIL-C-18480B. The minimum coating thickness shall be 25 mils (0.025 inch).

215.2.9 Plastic Warning Tape. Plastic warning tape for buried test leads shall be a minimum of four (4) mils thick and six-inches (6) wide, inert plastic film designed for prolonged use underground. The tape shall have the words, "CAUTION: Cathodic Protection Cable Below," or similar, clearly visible in repeating patterns along its entire length.

SECTION 217 - BEDDING AND BACKFILL MATERIALS

217-1 BEDDING MATERIAL

217-1.1 General. Amend Subsection 217-1.1 by the following:

The pipe base and pipe zone (“pipe bedding zone”) backfill material for PVC Pipe, ductile iron pipe and copper services shall be imported sand with a minimum SE of 30.

The thickness of the pipe base shall be a minimum of 4-inches for copper pipe and a minimum of 6-inches for PVC and ductile iron pipe.

All pipe bedding shall be compacted to a minimum of 90-percent relative compaction.

217-2 TRENCH BACKFILL

217-2.1 General. Add the following to the end of the second paragraph:

Rocks greater than 4 inches in any dimension will not be permitted in backfill placed between 1 foot above the top of any pipe or box and the bottom of pavement sub grade.

PART II

STANDARD SPECIFICATIONS

PART 3

CONSTRUCTION METHODS

SECTION 300 - EARTHWORK

300-4 UNCLASSIFIED FILL

300-4.7 Compacting. The second paragraph of Section 300-4.7 is hereby amended to read as follows:

Each layer of earth fill shall be placed in 8-inch lifts and compacted to obtain a relative compaction of not less than 90 percent as determined by ASTM D-1557, latest revision, or as specified by the Soils Engineer.

SECTION 301 - SUBGRADE PREPARATION, TREATED MATERIALS, AND PLACEMENT OF BASE MATERIALS

301-1 SUBGRADE PREPARATION

301-1.2 Preparation of Sub-grade. Subsection 301-1.2 is supplemented as follows:

After the sub-base has been prepared, a weed killer shall be applied to the entire sub-base surface. Weed killer shall be Karmex 80, as manufactured by Dupont Chemical Company, or Diuron 4L, as manufactured by Drexel Chemical Company, or approved equal. The weed killer shall be applied according the manufacturer's published instructions.

301-1.3 Relative Compaction. *Amend as follows:*

Unless otherwise superseded by other jurisdictional agency, permit requirements, or Special Provisions requirements, sub-base shall be compacted to not less than the minimum relative density shown on the applicable trench pavement sections on the Plans or the Standard Drawings, or per the local jurisdictional agency requirements.

SECTION 302 - ROADWAY SURFACING

302-5 ASPHALT CONCRETE PAVEMENT

302-5.1 General. Subsection 302-5.1 is supplemented as follows:

Unless otherwise superseded by other jurisdictional agency, permit or Special Provisions requirements, the minimum asphalt concrete pavement thickness shall be 4 inches placed upon an 8-inch aggregate base. The asphalt concrete shall be placed in two courses, a base course and a final course. The base course shall be constructed 3 inches in thickness to within 1 inch of the existing surface. The final course shall be a minimum 1 inch in thickness over the trench or as directed by the Engineer.

The final course of the asphalt concrete pavement shall be fog sealed with an asphalt emulsion after compaction. The emulsified asphalt for the fog seal application shall be Type SS-1h and shall be applied per Subsection 302-2.8.2.

302-5.3 Prime Coat. Subsection 302-5.3 is amended as follows:

A prime coat consisting of SC-250 liquid asphalt shall be applied at a rate of 0.25 gallons per square yard. Grade SC-70 liquid asphalt may be used when approved by the Engineer.

SECTION 306 - OPEN TRENCH CONDUIT CONSTRUCTION

306-2 DELIVERY, STORAGE, HANDLING, AND PROTECTION OF PIPELINE MATERAILS, FITTINGS, VALVES, AND APPURTENANCES

Add the following subsection to the end of Subsection 306-2:

306-2.9 Connection to Existing Recycled Water Lines

All connections shall be made only in the presence of the District, and no connection work shall proceed until the District has given notice to proceed. The Contractor shall furnish all pipe, materials, equipment, and labor required to make the connection, as well as assist the District in alleviating any hardships occurred during the shutdown for connections. Standby equipment or materials may be required by the District. The District may postpone or reschedule any shutdown operation if, for any reason, the District believes that the Contractor is improperly prepared with competent personnel, equipment, or materials to proceed with the connection work. If progress is inadequate during the connection operations to complete the connection in the time specified, the District shall order necessary corrective measures. All costs for corrective measures shall be paid by the Contractor.

The District will operate all existing valves. The Contractor shall dewater existing mains, as required, with presence of the District. The Contractor shall be aware that existing valves (if present) may leak and that the installation of connections may be made under wet conditions.

All valves, existing and newly installed, shall be readily accessible at all times to the District for emergency operation.

Contractor shall notify the District a minimum of 10 working days prior to the date of connection. The Contractor shall be responsible for determining in advance the grade, station, and offset of the existing pipelines prior to laying the last 100 feet of the new pipeline. The Contractor, upon approval from the District, shall make necessary cut-to-fit changes, adjusting line and grade as necessary. Where the changes create a high or low point in the pipeline profile, a standard combination air release or blow-off assembly shall be installed if directed by the District. In no event shall the new pipelines be connected to existing facilities until the new pipelines have been successfully pressure tested.

306-3 TRENCH EXCAVATION

306-3.1 General. The third paragraph of Subsection 306-3.1 is hereby amended as follows:

Excavation is all unclassified and shall include the removal of all water and materials of whatever nature encountered, including rock and all other obstructions of any nature that would interfere with the proper execution and completion of the work. Removal of groundwater to a level below the structure subgrade is required.

306-3.4 Minimum and Maximum Width of Trench. Subsection 306-3.4 is hereby supplemented as follows:

For recycled water pipelines, the overall trench width for pipes with diameters of 12 inches or less shall not be more than 16 inches nor less than 12 inches wider than the outside diameter of the pipe barrel (pipe O.D.) to be laid, therein, measured at a point 12 inches above the top of the pipe, exclusive of branches.

Excavating and trenching shall be true to line so that the pipe is centered within the trench and a clear space of not more than 8 inches nor less than 6 inches in width is provided on each side of the pipe O.D.

For recycled water pipelines, the overall trench width for pipes with diameters of 14 inches or greater shall not be more than 24 inches nor less than 16 inches wider than the outside diameter of the pipe barrel (pipe O.D.) to be laid, therein, measured at a point 12 inches above the top of the pipe, exclusive of branches. Excavating and trenching shall be true to line so that the pipe is centered within the trench and a clear space of not more than 12 inches nor less than 8 inches in width is provided on each side of the pipe O.D.

306-3.5 Maximum Length of Open Trench. The first paragraph of Subsection 306-3.5 is amended as follows:

The maximum length of open trench shall be limited to that length that will permit pipe installation, compacted backfilling, and placement of temporary pavement at the end of each working day. Plating will be allowed only at the join points for the next day's work. The jurisdictional agency may have more stricter limitations which will govern.

306-6 BEDDING

306-6.1 General. The first sentence of the second paragraph of Subsection 306-6.1 is hereby amended as follows:

Special bedding shall be provided for all recycled water pipelines, PVC and ductile iron pipe. Bedding shall extend 4 inches below bottom of copper pipe and 6 inches below PVC and ductile iron pipe. All pipes shall have a bedding of imported sand with a SE of 30 minimum.

Add the following to the end of the third paragraph:

Crushed rock bedding shall be placed, when in the opinion of the District, the ground is insufficiently stable to support the pipe. 3/4-inch maximum crushed rock shall be used and shall be per Subsection 200-1.2. The required depth below the grade of the bottom of the pipe will be ordered by the District. The crushed rock bedding shall be carefully placed and sufficiently compacted by tamping so as to support without settlement of the pipe.

Add the following to the end of the fourth paragraph:

All soft, spongy, and unstable material with bottom of the trench shall be removed to a depth not exceeding 2 feet, and as determined by the District, replaced with crushed rock bedding (3/4-inch rock).

Add the following to the end of the subsection:

Cement slurry backfill, if required by the District, shall consist of the one sack (94 pounds) Type II Portland cement added per cubic yard of import sand, except within 6 inches of a buried flexible pipe coupling. In which case, use one-half sack (25 pounds) hydrated lime added per cubic yard of imported sand.

306-6.5 Placement and Compaction

306-6.5.1 General. Add the following to the end of the first paragraph:

Bedding shall be water densified (jetting) or densified by hand or mechanical means prior to backfilling. The densification method shall provide a uniformly compacted embedment of the pipe.

306-8 PREFABRICATED PRESSURE PIPE

306-8.1 General. Add the following prior to the third paragraph:

All recycled water pipe shall be transported, handled, and installed in strict accordance with the manufacturer's recommendations. Pipe laying shall also conform to the requirements of AWWA C900 for PVC pipe and C600 for ductile iron pipe with the manufacturer's recommendations and with approved tools and facilities. Pipe shall not be dropped into trench. Care shall be taken to prevent damage to pipe couplings and gaskets. Pipe joints shall not be deflected either vertically or horizontally beyond the limits specified by the manufacturer. Wood blocking under the pipe in lieu of earth mounds shall not be permitted.

306-8.2 Ductile Iron Pipe

306-8.2.1 General. Add the following Subsection 306-8.2.1:

Under no circumstances shall pipe or accessories be dropped or dumped into the trench. Under no conditions shall cable, rope, or other devices used for lowering pipe or fittings be attached through the pipe or fittings interior. Combined deflections at rubber gasket or flexible coupling joints shall not exceed 75 percent of that recommended by the manufacturer. The Design Engineer may specify even stricter requirements. Fittings shall be supported independently of the pipe. Until thrust blocks and supports are poured, fittings shall be temporarily supported by placing wood skids under the bells so that the pipe is not subjected to the weight of the fitting. All nut and bolt threads shall be lubricated with oil and graphite, "No-Oxide Grease" or "Newer-Seize" prior to installation.

306-8.5 PVC Pressure Pipe

306-8.5.1 General. Add the following Subsection 306-8.5.1:

PVC pipe construction shall conform to AWWA C605 and the manufacturer's installation guide.

Combined deflections at PVC pipe joints with factory-assembled bell couplings shall not exceed that recommended by the manufacturer. The Design Engineer may specify even stricter requirements.

All fittings and valves shall be supported so that the pipe is not subjected to the weight of those appurtenances.

306-8.8 Valves, Hydrants, and Appurtenances

306-8.8.3 Thrust Blocks. Add the following to the end of Subsection 306-8.8.3:

Concrete thrust blocks, anchors, or pipe cradles shall be poured at the locations and with the dimensions shown on the Standard Drawings. Concrete shall be poured

against undisturbed soil and shall make positive contact with the pipe with a minimum thickness of 12 inches. Sand bags may be used to provide form works for thrust blocks or anchors unless otherwise specified. Concrete shall be placed such that bell ends of fittings shall be available for repairs. Concrete placed over joints shall be removed. Reinforcing steel exposed directly to the soil shall be coated with the appropriate coating.

306-8.8.4 Service Connections. Add the following to the end of Subsection 306-8.8.4:

The Contractor shall install recycled water services at the locations shown on the plans in accordance with Standard Drawings. The plans shall indicate the water service station, size, direction, and location of the meter box. The Contractor may open cut or bore service laterals as approved by the District.

306-8.8.6 Miscellaneous Recycled Water Facilities

Add the following to the end of Subsection 306-8.8.6

306-8.8.6.1 Flexible Coupling (All Pipes)

Flexible couplings shall be installed according to the following:

a) Clean each pipe end for a distance of 6 to 8 inches. Remove oil, dirt, loose scale, and rust so that the gaskets will seat on the pipe barrel to provide a positive seal. Wire brushes or non-oily rags may be used, depending on the condition of pipe ends.

b) Slip the follower rings over the pipe ends and slide them back over the cleaned area.

c) Wipe the gaskets clean, immerse them in soapy water or approved gasket lubricant, and slide them over the pipe ends.

d) Clean the coupling middle ring, paying particular attention to flare on the ends where the gasket will seat. Slip the middle ring entirely over one end of the pipe.

e) Position the end of the pipe to be joined to the other pipe such that a 1/2-inch gap is maintained between pipes. Center the coupling middle ring over the gap.

f) Lubricate the pipe and the flares of the middle ring with soapy water or gasket lubricant. Slide the gaskets and followers into place making sure the gaskets are pushed under the middle ring flare all the way around.

g) Insert the bolts. Nuts should be run on with the rounded or chamfered edge toward the follower ring.

h) Wrenching should be done progressively, drawing up the bolts on opposite sides a little at a time and returning to retighten until all bolts have a uniform tightness. During wrenching it is advisable to strike the follower rings with a hammer occasionally to make sure they are seating properly.

Torque application shall be in accordance with the manufacturer's recommendations.

306-8.8.6.2 Valve Installations

The Contractor shall install the valves at the locations shown on the plans and on Standard Drawings. The plans shall indicate the station, size, type, and end condition of all main line valves. The Standard Drawings shall indicate such information for appurtenant installations. Valves shall be installed in a level position with the operating stem vertical, except where shown on the plans.

Butterfly valves operators shall be located on the left-hand side of the valve when standing on the flanged end of the valve (at the tee or cross) and looking through the valve toward the pipe end. Otherwise, the operator shall be installed on the sheet centerline side of the pipeline.

The Contractor shall coat all buried nuts, bolts and washers with appropriate coating. Wrap buried valves with 8-mil polyethylene wrap per AWWA C105.

Valves shall be stabilized and supported separately from the pipeline, as shown on the plans or on the Standard Drawings.

Main line and appurtenant valves shall be tested for leak-proof tightness at the same time the main line is pressure tested.

The Contractor shall install valve boxes at all valve locations, except where shown otherwise on the plans. Valve location ties shall be made by the Contractor and shall be measured from the valve to two locations. One set of plans shall be marked with the tie locations and dimensions and submitted to the District upon completion of the work. Tie locations shall be a chiseled "X" on the curb or a white 4-inch by 4-inch witness post set at the property line, or as required by the District.

306-8.8.6.3 Valve Box Installations

The Contractor shall install valve box cap and rim, sleeves, and valve operator extensions of the type indicated in the Standard Drawings at each valve location shown on the plans in accordance with the Standard Drawings.

Operator extensions and sleeves shall be centered and set plumb over the valve operator nut. Operator extensions, where required, shall be fitted with and AWWA 2-inch square operating nut and a tapered socket end for the valve operating nut. Operator extension shaft, nut, socket, and centering guide shall be painted with one coat of zinc chromate primer after fabrication.

The valve box caps shall be set flush with finished pavement surface. Once pavement restoration is complete, the valve box cap shall be painted with two coats of purple.

306-8.8.6.4 Tapping Sleeves and Valves

Tapping valves shall conform to all requirements for resilient wedge gate valves and the additional requirements listed herein. One end of the tapping valve shall have slotted

bolt holes to fit all standard tapping machines. Seat rings shall be oversized to permit the use of full-size cutters. Tapping sleeves shall be cast iron or steel and shall be mechanical joint. All steel tapping sleeves shall be epoxy coated. Gaskets shall be Buna-N rubber with a wide cross section. All bolts, nuts, and washers shall be Type 316 stainless steel. The tapping sleeve shall be installed in accordance with manufacturer's instructions and to the satisfaction of the District. The pipe barrel shall be thoroughly cleaned with a wire brush to provide a smooth, hard surface for the sleeve. The sleeve shall be pressure tested in the presence of the District prior to tapping. Thrust blocks shall be provided at the tapping sleeve. Proposed tapping sleeves and valves shall be submitted to the Engineer for approval.

306-8.8.6.5 Blow-off Assemblies

The Contractor shall install blow-off installations at the location shown on the plans in accordance with Standard Drawings. The plans shall indicate the outlet station, size, direction, and location of the outlet.

The piping between the outlet valve and the riser shall be at a continuous downgrade of not less than 1/4 inch per foot.

Where blow-offs are placed in sidewalk areas, the sidewalk shall be saw cut and removed to the nearest score line. The cover shall be set to sidewalk grade and the sidewalk replaced. Where blow-offs are placed in unpaved areas, the cover and rim shall be set at the existing ground surface or as directed by the District.

306-8.8.6.6 Combination Air Valve Assemblies

The Contractor shall install combination air valve assembly installations at the location shown on the plans in accordance with Standard Drawings. The plans shall indicate the outlet station, size, direction, and location of the combination air valve assembly.

The piping between the outlet valve and the ell on the air valve riser shall be at a continuous up grade of 1/4 inch per foot. The long axis of the valve shall be set parallel to the street.

The exposed vent pipe and guard posts, where used, shall be painted. The number and position of guard posts, when required, will be shown on the plans or standard drawings.

The tap for the combination air valve shall be made in a level section of the pipe no closer than 18 inches to a bell, coupling, joint, or fitting.

306-8.8.6.7 Precast Vaults and Manholes

The Contractor shall install precast vaults and manholes at the locations shown on the plans or Standard Drawings. The plan or standard drawing shall indicate the station, location, and size of the installation.

Reinforcement steel shall be Grade 40 or Grade 60 billet steel conforming to ASTM A-615 and shall be deformed according to ASTM A-305. Concrete for vaults or manholes shall use Type II cement, and shall develop a minimum strength of 3,250 psi at 28 days in conformance to ASTM C-150. All course and fine aggregate shall conform to ASTM C-33. Concrete for vault and manhole footings shall be poured against undisturbed or well-compacted soil to the dimensions shown on the plan or Standard Drawing.

Fill joints between precast sections of manholes with dry pack crystalline waterproofing plus an outside gun grade elastomeric sealant. The entire exterior of the manhole shall be waterproof. Coat exterior of manholes and vaults with crystalline waterproofing. The exterior walls shall be coated gray. After backfilling is completed and dewatering is stopped the Contractor shall check for any leakage. All leakage shall be repaired by the Contractor.

Set each precast concrete manhole unit plumb on a bed of drypack crystalline to make a watertight joint at least 1-inch thick with the concrete base or with the preceding unit. Point the inside joint and wipe off the excess sealant. Secure the manhole frame to the grade ring with grout and cement mortar fillet. Backfill and compact and replace pavement.

Assemble units so that the cover conforms to the elevation determined by the manhole location as follows: in paved areas, top of cover shall be flush with paving surface; and in shoulder areas, top of cover shall be flush with existing surface where it is in traveled way of shoulder and 0.1 foot above existing surface where outside limits of traveled way but not in the existing roadside ditch.

306-8.9 Pipeline Pressure Testing, Disinfection, and Commissioning

306-8.9.1 General. Add the following to Subsection 306-8.9.1:

All recycled water pipelines shall be flushed and hydrostatically pressure tested prior to acceptance by the District of the pipelines. The District may or may not require the recycled water system components to be disinfected. On a case by case basis, the District will determine whether the recycled water pipeline, appurtenances and services will need to be disinfected. The Contractor shall furnish all labor, equipment, material, and water for the proper cleaning and hydrostatic pressure testing of the pipelines, as well as disinfection if required by the District.

All flushing and hydrostatic testing shall be coordinated with the District and all flushing and disinfection shall be made in the presence of the District. The Contractor shall notify the District not less than 24 hours in advance of the actual time of flushing so that the District may observe the procedure. When the pressure test, chlorination or bacteriological test fail to meet the requirement of the specifications, the Contractor shall make necessary repairs, replacements or repetition of procedures to conform to the specified requirements at his own expense.

306-8.9.2 Hydrostatic Pressure Test

306-8.9.2.1 General. Add the following to the beginning of Subsection 306-8.9.2.1:

All recycled water pipelines, appurtenances and services shall be hydrostatic pressure tested in accordance with this subsection. It is responsibility of the Contractor to obtain all water for filling and testing and to remove excess water from the project area. The Contractor is responsible for any damages as a result of testing operations.

All blow-offs, combination air valves, services and appurtenant facilities shall be tested with the main line pipe.

Before testing, the backfill material shall have been compacted to the required compaction to the ground surface. All concrete anchor and thrust blocks shall be allowed to cure sufficient time to develop adequate resistance to thrust developed during testing (minimum 3 days).

The Contractor takes all responsibility for locating leaks and repairing damage to the pipe bedding, backfill and pavement section resulting from leaks discovered during the pressure test or subsequent pipe failures.

All noticeable leaks shall be stopped regardless of the results of the test and all defective pipe, fittings, valves, and other accessories discovered in consequence of the test shall be removed and replaced. Repair clamps of any kind or type shall not be allowed.

The pump, pipe connection, measuring devices, gages and all other equipment, labor and materials required for performing the leakage test shall be furnished by Contractor. The District may, however, use District's measuring device in place of Contractor's equipment. In case of a difference in the measured leakage rate between the measuring devices, the District's measured leakage shall govern.

The test pressure shall be applied by means of a pump connected to the pipeline in a manner approved by the District. The pressure test shall be maintained on the test section not less than 4 hours. The Contractor may at his convenience conduct a preliminary pressure test at any time prior to the District's pressure test. The results of the preliminary test will not be considered by the District.

The test pressure shall be 50 pounds per square inch in excess of the working pressure (design class of the pipe) shown on the Plans with a minimum test pressure of 200 psi as measured at the lowest elevation of the water main under test or as directed by the Engineer. The test pressure shall be maintained for the duration of the test. Whenever test pressure falls an amount of 5 psi, it shall be restored and the test restarted.

The amount of pipeline footage to be tested at one time shall be determined by the District.

Each section of the water main to be tested shall be slowly filled with water from the nearest source by means approved by the District. The pipeline shall be filled at a rate such that the average velocity of the flow is no greater than 2 feet per second. At no

time shall the maximum velocity of flow exceed the 2 feet per second. The pipelines shall be filled with water and placed under a light pressure for at least 24 hours before the pressure test.

All air shall be vented from all high spots in the pipeline before making any pressure test. If hydrants or other outlets are not available, taps shall be made at the high points to expel the air by the Contractor at his own expense. These taps shall be capped after testing.

306-8.9.2.2 Preparation. Amend Subsection 306-8.9.2.2 with the following:

All new recycled water mains shall be flushed prior to hydrostatic pressure test and disinfection (if required by the District). All flushing shall be made in the presence of the District. The Contractor shall notify the District not less than 24 hours in advance of the actual time of flushing so that the District may observe the procedure.

The flushing velocity to be obtained for pipes shall not be less than 2 feet per second. The Contractor shall make all arrangements as necessary to provide the required flow to obtain the minimum velocity. The Contractor shall take due precaution in providing for adequate drainage from the site.

It is the responsibility of the Contractor to remove the flushing water from the project area. The Contractor is responsible for any damage as a result of flushing operations.

306-8.9.2.3 Allowable Leakage. Table 306-8.9.2.3 shall be amended per the following:

The allowable leakage in PVC or Ductile Iron Pipe listed in the table for the various pressures shall be the allowable leakage in ***Gallons per Four Hours per 1000 feet of pipe.***

306-8.9.4 Disinfection

306-8.9.4.4 Recycled Water System Disinfection Procedures. Add the following prior to the first paragraph:

The District may or may not require the recycled water system components to be disinfected. On a case by case basis, the District will determine whether the recycled water pipeline, appurtenances and services will need to be disinfected. If the District decides that the project's recycled water system components are to be disinfected, then the disinfection shall conform to 306-8.9.4.3, except calcium hypochlorite tablets or granules may be used to disinfect the recycled water mains and services.

306-8.9.4.5 Dechlorination and Flushing. Add the following to Subsection 306-8.9.4.5:

The Contractor shall make all arrangements as necessary to provide the flow required to dechlorinate and remove pollutants from the water flushed from the mains. The Contractor shall take due precaution in providing for adequate drainage from the site. It

is the responsibility of the Contractor to remove the flushing water from the project area and meet all discharge requirements. The Contractor is responsible for any damage as a result of flushing operations.

306-8.9.4.6 Bacteriological Sampling and Testing. Add the following to the beginning of this Subsection:

Bacteriological sampling and testing may not be required for recycled water systems unless specifically requested by the District.

306-12 BACKFILL

306-12.1 General. Add the following to the end of the first paragraph:

Recycled Waterline Trenches – Water densification by means of flooding or jetting will not be allowed, except as permitted, in writing, by the District for designated areas and as also approved by the jurisdictional agency.

Add the following to the end of the eight paragraph:

Except as specified otherwise, trench backfill shall be compacted to a minimum of 90-percent relative compaction.

306-13 TRENCH RESURFACING

306-13.2 Permanent Resurfacing. Add the following to the end of the first paragraph:

For areas with 30 inches or less of asphalt remaining between the edge of the water line trench and the lip of the existing gutter, the existing asphalt shall be removed to the lip of the gutter. The jurisdictional agency may require a greater distance than 30-inches and the jurisdictional agency requirement shall govern.

SECTION 307 - JACKING AND TUNNELING

307-1 JACKING OPERATIONS

307-1.1 General. Add the following to the end of Subsection 307-1.1:

All jacking operations shall conform to the specifications and requirements of the regulatory agency requiring this type of undercrossing (i.e.: CALTRANS, Flood Control, Railroad, County or City). The Contractor shall secure all required permits for construction of the casing pipe and carrier pipe.

The pits for the jacking and boring operations shall be adequately shored to safeguard existing substructures and surface improvements and to ensure against ground movement in the vicinity of the casing portal.

Heavy guide timbers, structural steel, or concrete cradle of sufficient length shall be placed in the approach trench of the jacking pit and firmly bedded on the required line and grade to provide the accurate control of the jacking alignment. Adequate space shall be provided to permit the insertion of the lengths of casing to be jacked. The structure of timbers and structural steel sections shall be anchored to ensure action of the jacks in line with the axis of the casing. A bearing block consisting of a timber or structural steel framework shall be inserted between the jacks and the end of the casing to provide uniform end bearing over the perimeter of the casing and distribute the jacking pressure evenly.

A sectional shield or steel jacking head shall be attached to the leading section of the casing to extend around the outer surface of the upper two-thirds of the casing and protect at least 18-inch beyond the driving end of the casing.

The sectional shield or jacking head shall not protrude more than 1/2-inch outside of the outer casing surface. The head shall be anchored to prevent any wobble or alignment variation during the jacking operation.

To avoid loss of ground outside the casing, excavation shall be restricted to the least clearance necessary to prevent binding and shall be carried out entirely within the jacking head and not in advance of the head. Excavated material shall be removed from the casing as jacking progresses and no accumulation of excavated material within the casing will be permitted.

Allowable grade deviations in horizontal and vertical alignments shall be no greater than 0.2 feet per 100 feet in any direction over the length of the jacking and boring operation. A maximum cumulative deviation shall not exceed 0.5 feet overall.

Immediately after completion of the jacking operations, grout shall be injected through the grout connections of casings 30-inches in diameter and larger in such a manner to completely fill all voids outside the casing pipe resulting from the jacking operation. Where loss of ground outside the casing is suspected, additional grout connections shall be welded to the casing. Grout pressure shall be controlled to avoid deformation of the casing and/or avoid movement of the surrounding ground. After completion of grouting, the grout connections shall be closed with extra heavy black steel threaded plugs.

Before backfilling the jacking and receiving pits, the carrier pipe shall have passed an initial hydrostatic pressure test.

307-1.3 Jacking Steel Casing. Add the following to the end of Subsection 307-1.3:

Steel casing pipe shall be new and conform to ASTM A283, Grade C, ASTM A-570 Grade 30, 33 and ASTM A36 unless noted otherwise. Minimum diameter and thickness shall be as shown on the Standard Drawings. The Contractor shall choose a size of casing at or above the minimum specified, in order that the jacking may be done with a

sufficient degree of accuracy to permit installation of the carrier pipe to the grades shown on the plans and to properly accommodate the largest dimension of the carrier pipe (including the manner of restraint of the carrier pipe).

The Contractor may select a greater diameter or wall thickness as convenient for the method of work and loadings involved or as required by the agency having jurisdiction over the road or railroad crossing.

Casing sections shall be joined by full circumferential welding. Field welds shall be full-penetration bevel welds in accordance with the standards of quality as set forth in the specifications of the American Welding Society.

All welding shall be performed by skilled welders qualified under the provisions of ANSI/AWS D1.1. Welding qualifications shall be certified by an independent local, approved testing agency not more than 6 months prior to commencing work.

Prepare ends of casings for proper bevel weld by providing a 45-degree bevel on the end of one of the two casing pieces being joined.

The annular space between the casing and carrier pipe shall be filled with air blown sand unless the regulatory agency requires cellular concrete (grout).

All carrier pipe within the steel casing shall be restrained (both ductile iron pipe and PVC Pressure Pipe).

Casing seals shall be in accordance with Subsection 212.3.2.3 except as modified herein. The casing seals shall be a minimum of 1/8-inch thick synthetic, rubber designed to fit snugly around the pipe and casing. Casing seals may be one piece with no field seams or the wrap-around style to facilitate installation after the casing and carrier pipe are already installed. Bands and hardware for attachment to pipe and casing OD shall be Type 316 stainless steel.

Pipe skids and blocking shall be in accordance with Subsection 212-3.2 except as herein modified. Skids and blocking shall be manufactured stainless steel casing spacers with composite runner skids. Casing skids shall be bolt-on style with a shell made of at least two halves. The band material shall be manufactured of a minimum 14 gauge T-304 stainless steel and 10 gauge T-304 stainless steel risers when needed. All welds are to be chemically passivated. The runners shall be at least 11 inches long and shall be manufactured of high abrasion resistant and low coefficient of friction, glass filled polymer. Fasteners and hardware for securing the spacers and runners shall be stainless steel. Casing spacers shall have a flexible EPDM liner having a minimum thickness of 0.090 inches with a hardness of Durometer “A” 85-90. The liner shall have a rating of not less than 60,000 VPM and water absorption of 1% maximum. Casing spacers shall be as manufactured by Advance Products & Systems, Inc., Cascade Waterworks Mfg. Co., CCI Pipeline System, Pipeline Seal & Insulator, Inc. or approved equal.

SECTION 310 – PAINTING

310-1 GENERAL

310-1.5 Painting Schedule. Add the following to the end of Subsection 310-1:

310-1.5 Painting Schedule

	Item	Color	No. of Coats
1.	Valve Box Covers	(Primer)	1
		Purple	2
2.	Air Valve/Blow-Off Valves	(Primer)	1
		Purple	2
3.	Vault Covers (Top)	Primer	1
		Purple	2
4.	Air Valve Covers	Primer	1
		Purple	2
5.	Piping and Valves (in vault)	Primer	1
		Purple	2
6.	Guard Posts	Safety Yellow	2

310-6 WATERPROOFING (CONCRETE). Add the following to the end of Section 310-6:

310-6 WATERPROOFING (CONCRETE)

The Contractor shall furnish all material, labor and equipment necessary to waterproof the exterior of all manholes and vaults.

Do not treat concrete surfaces with chemical hardeners or curing agents prior to the application of waterproofing. Examine surfaces to be waterproofed for form tie holes and structural defects, such as honeycombing, rock pockets, l faulty construction joints, cracks, etc. Repair these areas in accordance with Section 303.

Concrete surfaces shall have an open capillary system to provide tooth and suction and shall be clean, free from scale, form oil, latence, curing compounds, and any other foreign matter. Lightly sandblast, water blast, or acid etch with muriatic acid (15% to 20%) to provide a clean absorbent surface. Saturate surfaces to be acid etched with water prior to application of acid.

Vertical surfaces may have a sacked finish. Do not apply a slurry coat of water materials to horizontal concrete deck surfaces which are less than 20 hours old.

Use light sandblasting or etching to remove the surface glaze of dense or steel troweled concrete. Abrasive clean and wash construction joints.

After completing repairs, apply a two-coat system to the concrete surfaces to be treated, apply after curing and finishes are complete. Application of waterproofing and any paint top coatings shall conform to the manufacturer's recommended application procedures. The Contractor shall have the manufacturer's representative advise and /or supervise the waterproofing application in person.

Apply crystalline waterproofing material to concrete which has been thoroughly saturated with clean water. Moisten surfaces to be treated prior to application. Remove free water prior to application of waterproofing material.

Apply crystalline waterproofing to: Exterior walls of concrete vaults and manholes; Points of precast concrete manholes as shown on the plans.

The exterior surfaces shall have a grey color.

Apply second coat when the first coat has reached an initial set. Use light water spray on surfaces to be coated if rapid drying occurs.

Do not backfill against structures for at least seven days after application of waterproofing. Prior to backfilling, check treated surfaces for newly developed cracks. Repair cracks and cure surface for 48 hours before backfilling. Do not backfill with dry material until after complete cure of coating.

Subsection 312 is hereby added as follows:

SECTION 312 - CATHODIC PROTECTION

312-1 General

Cathodic protection installation shall conform to NACE Publication RP0169-92 Recommended Practice, "Control of External Corrosion on Underground or Submerged Metallic Piping Systems" and ANSI C2.

312-2 Bare Anodes (Multiple Ingots)

312-2.1 Ingot Inspection

Each magnesium anode shall be inspected to insure that there are no surface cracks over 1/16-inch thick. Thinner cracks or fissures are normal. Anodes with greater than 1/16-inch thick cracks over 6" long shall be rejected.

312-2.2 Connection Inspection

All lead wires shall be inspected to insure that the lead wire is securely connected to the anode core and that no damage has occurred to the lead wire or its insulation. Anode lead wire to anode connection failures shall require replacement of the complete anode and lead wire assembly.

312-2.3 Assembly

Bare anodes are required at each multiple anode site. The magnesium ingots shall be placed side-by-side at the bottom of a 16-inch diameter augured hole. The long dimension of the ingots shall be vertical. The anodes shall be placed such that they will be fully surrounded by the slurry backfill. The ingots may touch each other.

312-2.4 Location

Anodes are to be installed in augured holes placed just off of the pipeline as indicated in the drawings and at the locations called out on the corrosion test station list in the drawings. The perpendicular distance from the pipe to the anode centerline may, and should, be adjusted up to 10 feet if there are no conflicts with other utilities. Anode positions along the pipe can be adjusted slightly to avoid interference with existing structures. Alternate anode positions, adjusted horizontally more than 10 feet must be approved by the Engineer and recorded on the as-built drawings.

312-2.5 Handling

Care shall be taken to insure that the anode ingot is never lifted, supported, transported or handled by the lead wire. All anodes shall be lowered into the hole using a removable sling or a rope.

312-2.6 Anode Hole Size and Depth

Anode hole shall be 16" (minimum) diameter. The depth of the hole shall be 12 feet minimum, as measured from finish grade to the bottom, or such that the bottom of the anode is 6 feet below pipe invert depth.

312-2.7 Backfill Slurry Preparation

The backfill material shall be mixed in batches with water. Add only enough water to allow the slurry to flow around and conform to the shape of the anode. The slurry shall have the consistency of a thick, but pourable, paste. It is important not to use excessive water.

312-2.8 Anode Hole Backfill

Once the anodes are in the hole they shall be lifted or spaced off the bottom at least 3-inch such that the backfill slurry can completely surround them. Slowly pour the slurry backfill into the hole such that it completely surrounds the anodes and that there are no voids. The slurry shall cover the top of the anodes by at least 3 inches. After the anode is covered with backfill the remainder of the hole shall be filled with native, rock-free soil. The soil shall be tamped and compacted in 18 inch lifts taking care not to damage the anode lead wire.

312-3 Wire and Cable

All buried wires shall be installed, without splices, in a trench with a minimum depth of 24 inches. All wires shall terminate in a test box and shall have 18 inches of slack coiled at the attachment point and in the test box.

312-3.1 Anode Lead Wire

One or two anode lead wires shall be connected to one end of a shunt with a split-bolt connector as shown in the drawings. Splits bolts shall be wrapped with insulating putty and electrical tape.

312-3.2 Pipe Lead Wires

Pipe lead wires shall terminate unconnected in a test box. Connections to anodes, via the shunts, shall be made by the WBMWD representative when the system is activated.

The Contractor shall provide a split-bolt connector (left unwrapped in the test box) for this purpose.

312-3.3 Bond Wires

Two (2) bond wires are required across all non-insulating mechanical joints such as: valves, flanges, couplings and fittings. A third bond wire from the pipe to the valve or coupling is required at buried valves or couplings. Bond wires shall be as short as possible.

312-3.4 Lead Wire Attachment

Test and bond wire leads shall be attached to the pipe using the alumino-thermic weld process as shown in the sketches and as described below.

312-4 Wire Trenching and Backfilling

312-4.1 Trenching

All buried lead wires shall be installed without splices in a trench with a minimum depth of 24 inches.

312-4.2 Wire Backfilling

The bottom of the finished trench shall be sand or stone-free earth. Lead wire shall be centered in the bottom of the trench, covered and tamped in 6 inch layers of stone free earth. Do not stretch or kink the conductor. Do not place roots, wood scraps, organic matter or refuse in the backfill.

312-4.3 Plastic Warning Tape

Plastic warning tape shall be installed in all wire trenches approximately 12 inches below finished grade.

312-4.4 Damaged Wire

Care shall be taken when installing wire and backfilling the trench so that the insulation is not stretched or kinked and that the conductor is not broken, cut or bruised. If wire insulation is damaged during installation, it shall be rejected and replaced completely at the Contractor's expense. All rejected wire shall be removed from the job site at the close of each work day.

312-5 Insulating Flange Kits

312-5.1 Flange Kits

Insulating kits shall be installed as shown on standard drawings and as recommended by the manufacturer. Moisture, soil, or other foreign matter must be carefully prevented from contacting any portion of the mating surfaces prior to installing insulator gaskets. If moisture, soil, or other foreign matter contacts any portion of these surfaces, the entire joint shall be disassembled, cleaned with a suitable solvent and dried prior to reassembly.

312-5.2 Alignment

Alignment pins shall be used to properly align the flange and gasket.

312-5.3 Bolt Tightening

The manufacturer's recommended bolt tightening sequence shall be followed. Bolt insulating sleeves shall be centered within the insulation washers so that the insulating sleeve is not compressed and damaged.

312-6 External Insulating Flange Coating (Buried Flanges Only)

All buried insulating flanges shall be coated with petrolatum tape in accordance with NACE RP0375 and as follows. NACE RP0375 shall govern.

312-6.1 Primer

Flange surfaces must be cleaned of all dirt, dust and loose rust or mill scale by wire brush and by wiping with a clean cloth. The surface shall be dry. Apply primer by hand or brush. A generous coating of primer shall be applied to all surfaces and worked into all crevices. Additional primer shall be applied around bolts, nuts and in threads, and shall completely cover all exposed surfaces and fill all voids. The primer should overlap the pipe coating by a minimum of 3 inches.

312-6.2 Wax-Tape

The petrolatum wax-tape can be applied immediately after primer application. Short lengths of tape shall be cut and carefully molded around each individual bolt, nut and stud-end. After all bolts are covered the tape shall be circumferentially wrapped over the flange with sufficient tension and pressure to provide continuous adhesion without stretching the tape. The tape shall be formed by hand into all voids and spaces. There shall be no gaps or air spaces under the tape. The tape shall be applied with at least a 55% overlap. The wax-tape system shall have a minimum thickness of 50 mils over smooth surfaces and 100 mils over sharp projections such as bolts and nuts.

312-6.3 Outer Covering

The clear plastic outer covering shall be applied by hand such that the material conforms and adheres to the wax-tape surface. Two layers of plastic outer wrapping shall be applied.

312-7 At-Grade Test Stations

312-7.1 Location

At-grade test boxes shall be located at the side of the road just behind the curve and opposite the test wire connection point. In un-paved areas test boxes shall be located directly over the pipe.

312-7.2 Native Soil

Native soil shall be accessible inside all test boxes. The test boxes shall not be filled with sand, gravel, rocks, concrete or any other foreign material. Plastic risers used to protect the test wires during construction shall be removed.

312-7.3 Concrete Pad

A 24-inch square by 4" deep concrete pad is required around each at-grade test station that is not located in a paved area.

312-7.4 Brass Tags

All leads in test boxes shall be identified with brass tags as shown in the standard drawings. The tags shall be securely attached to the lead with a bare No. 14 or 16 copper wire and die stamped with the characters as shown in the standard drawings.

312-8 Wire to Pipe Connections

All connections of copper wires to the cathode/structure shall be made by the alumino-thermic weld method as shown in the standard drawings.

312-8.1 Preparation of Wire and Cable

Use a cutter to prevent deforming cable ends. Do not deform cable. Clean oily or greasy cable with a rapid-drying solvent which leaves no residue. Remove only enough insulation from the cable to allow the thermite weld connection to be made.

312-8.2 Preparation of Metal

Remove all coating, dirt, grime and grease from the metal structure at weld locations by wire brushing and/or use of suitable safe solvents. Clean the structure to a bright, shiny surface free of all serious pits and flaws by using a file. The area of the structure where the attachment is to be made must be absolutely dry.

312-8.3 Wire Position

The wire is to be held at a 30 degree angle to the surface when welding. Only one wire shall be attached with each weld.

312-8.4 Testing of All Completed Welds

As soon as the weld has cooled, the weld shall be tested by the Contractor for strength by striking a sharp blow with a two pound hammer while pulling firmly on the wire. All unsound welds shall be rewelded and retested. All weld slag shall be removed from the weld with a wire brush.

312-8.5 Coating of All Completed Welds

Assure that the area to be coated is thoroughly wire brushed, clean and completely dry. Apply a preformed elastomeric weld cap to all direct buried welds in accordance with the manufacturers recommendations. Apply a generous bituminous mastic coating material over the weld (and weld cap) and to all exposed areas. This coating shall overlap the pipe coating a minimum of three inches. Allow sufficient time to dry before backfilling.

Subsection 313 is hereby added as follows:

SECTION 313 - TESTING AND INSPECTION OF CATHODIC PROTECTION

313-1 Responsibility for Testing

All testing and inspection shall be the responsibility of the Contractor. The Engineer shall be notified before all testing. The Engineer, at his discretion shall be present during all testing. Test reports, prepared by the Contractor, shall be required as indicated below.

313-2 Test Leads and Bond Wire Welds

313-2.1 Test Method

All completed wire connection welds shall be tested for strength by striking the weld with at least two sharp blows with a two pound hammer while pulling firmly on the wire. Welds failing this test shall be re-welded and re-tested. Wire welds shall be spot tested by the Engineer. After backfilling pipe all test lead pairs shall be tested using a standard ohmmeter for broken welds. The resistance shall not exceed 150% of the total wire resistance as determined from published wire data.

313-2.2 Notification

Contractor shall notify the Engineer of Inspector one day in advance of each day test or bond wires are to be installed.

313-2.3 Report

No report required.

313-3 Test Lead Trenching and Backfill

313-3.1 Inspection Method

The depth, trench bottom padding and backfill material shall be measured and inspected.

313-3.2 Notification

Contractor shall notify the Engineer of Inspector one day in advance of each day wire trenches are to be backfilled.

313-3.3 Report

No report required.

313-4 Insulator Testing

313-4.1 Test Method

Insulating flange kits shall be tested prior to coating the flange and backfilling in the presence of the Contractor. The assembled flange shall be tested with an insulator testing device (i.e., Gas Electronics Model 601 Insulation Checker) specifically designed for this purpose. The testing shall be done by a qualified Corrosion Engineer or a technician determined by the Engineer to be trained and qualified in the technique of testing dielectric insulators.

313-4.2 Acceptance

The installation shall be considered complete when the test results indicate that no shorts or partial shorts are present. The Contractor shall assist the Engineer in finding partial shorts or shorted bolts. All disassembly and re-assembly necessary to gain the acceptance of the Engineer shall be done at the Contractor's expense.

313-4.3 Notification for Inspection

The Contractor shall notify the Engineer at least 5 days in advance of the completion of insulator installations.

313-4.4 Report

Contractor shall submit a report identifying each insulator tested by size and station number and confirming acceptance. The Engineer, present at the time of the testing shall be identified by name.

313-5 Continuity Testing

313-5.1 Resistance Technique

Continuity tests shall be conducted by the Contractor under the direct supervision of a Qualified Corrosion Engineer. Pipeline continuity tests shall consist of measuring the linear resistance of individual pipe sections between two adjoining test stations (2 wire minimum) such that the entire line is tested. The resistance of the pipe section is measured by applying a known DC current through the section and measuring the IR drop. Current can be applied through the pipe using any DC source such as a battery. The IR drop shall be measured at least three different current values. Instruments used

shall be sufficiently sensitive to measure a resistance equal to plus or minus 5% of the calculated resistance of the pipe section.

313-5.2 Alternate Techniques

Alternate continuity test methods may be submitted by the Contractor. Alternate methods and criterion for acceptance must be fully described in writing and examples of successful pipeline continuity testing cited with reference names and telephone numbers.

313-5.3 Acceptance

The continuity of the pipeline shall be considered acceptable if the actual resistance measured as described above is equal to or less than 130% of the calculated pipe section resistance. The calculated resistance shall include cylinder resistance, bond clip or wire resistance, and fringing resistance at bonded pipe joints. If the actual resistance is greater than 130% of the calculated value the Contractor shall, at his own expense, locate the open joint or joints, make all necessary corrections and retest until the resistance is less than this criterion.

313-5.4 Notification for Testing

The Contractor shall notify the Engineer at least 5 days in advance of the completion of each pipeline sub-reach (including all joint bonding and installation of test stations) and in advance of road paving operations.

313-5.5 Report

The Corrosion Engineer, retained by the Contractor, shall submit a report which includes all continuity test data, resistance calculations and conclusions for each section of pipe tested. The report must be accepted by the Engineer before the Work is considered complete.

313-6 External Coating at Insulators

313-6.1 Test Method

The Contractor, in the presence of the Engineer, shall inspect the completed flange coating for compliance with these specifications. No insulators shall be backfilled before they are inspected.

313-6.2 Notification

The Contractor shall notify the Engineer at least five days in advance of backfilling all coated insulating flanges.

313-6.3 Report

The Contractor's report confirming insulator acceptance shall also confirm that all buried insulators were coated according to these specifications and examined by the Engineer.

313-7 Corrosion Test Stations

313-7.1 Inspection Method

Each test station shall be visually inspected for compliance with these specifications and local codes and standards. The Engineer shall verify that each lead wire is properly identified with a securely attached brass tag.

313-7.2 Notification

The Contractor shall notify the Engineer when all test stations are complete and ready for testing.

313-7.3 Report

No report required.

313-8 Anode Performance

313-8.1 Installation Inspection

The Engineer shall observe the installation of anodes at his discretion and verify anode location, depth, lead wire condition and proper soaking procedures.

313-8.2 Anode Test Method

A qualified corrosion engineer, retained by the Contractor, shall measure the open circuit potential of each anode with a high impedance voltmeter and a copper/copper sulfate reference cell. The open circuit potential shall be within 50 millivolts of the manufacturer's stated value. The corrosion engineer shall also measure and record the anode current at each anode bed after the system is activated.

313-8.3 System Performance Test Method

All tests shall be conducted by a qualified corrosion engineer. Prior to connecting the anodes to the pipe, the pipe-to-soil potential (unprotected) shall be measured at each test station and at several sites over the pipe (at least 100 feet from anode beds) using a wire reel to maintain connection to the pipe. After all anodes are connected an identical pipe-to-soil potential survey shall be taken and recorded.

313-8.4 Notification

The Contractor shall notify the Engineer at least 5 days prior to the installation of anodes and 5 days prior to the system activation and survey.

313-8.5 Report

The corrosion engineer shall submit a report which includes all test data, conclusions, discussion of system performance and recommendations for modifications and monitoring as required.

313-9 Compliance with Specifications

313-9.1 Deficiencies

Any deficiencies or omissions in materials or workmanship found by these tests shall be rectified by the Contractor at his expense. Deficiencies shall include but are not limited to: unconnected or broken test or anode leads; shallow wire trenches; improper or un-clean wire trench backfill; inadequate wire trench padding; lack of 18-inch slack wire on each test lead at each connection point and in each test box; shorted or partially insulators; inadequate insulator coating; failure to notify the Engineer in sufficient time to test buried insulators; high metallic pipeline resistance; zero current anodes; and improperly mounted test boxes.

SECTION 401 - REMOVAL

401-2 ASPHALT CONCRETE PAVEMENT. Amend Subsection 401-2 with the following:

Prior to removal of existing surfacing, pavement cuts shall be made in accordance with Plans and as specified herein. All pavement cuts shall be neat and straight along both sides of the trench of excavation and parallel to its alignment. Where large irregular surfaces are removed, such trimming or cutting shall be parallel to the roadway centerline or with angles to the same.

After backfilling and compaction, final pavement cuts shall be made by saw cutting (unless permit requirements supersede), to a minimum depth of 2 inches at the location shown in the appropriate trench pavement sections.

SECTION 00700

STANDARD SPECIFICATIONS

WEST BASIN MUNICIPAL WATER DISTRICT

The work to be done under this Contract requires the completion of all work in accordance with the Bidding and Contract Requirements herein, and the current edition of the following Standard Specifications, as modified herein.

The Standard Specifications for this project are defined as the Standard Specifications for Public Works Construction, the 2018 Edition (Green Book) including all supplements, as written and promulgated by the Joint Cooperative Committee of the Southern California Chapter of the Associated General Contractors of California. Copies of these Standard Specifications are available from the publisher, Building News Incorporated, 3055 Overland Avenue, Los Angeles, California 90034, telephone 213/202-7775.

The Standard Specifications set forth above will control the Bidding and Contract Requirements, construction materials, and construction methods for this Contract except as amended by the plans, Supplemental Standard Specifications or other contract documents.

The District and its Representatives are not responsible for job site safety. The District and its Representatives will not direct, supervise or lay out the work of the Contractor or any subcontractor.

The District and its Representatives shall be responsible for their activity and that of their employees on the site. This shall not be construed to relieve the general contractor, or any subcontractor of their obligation to maintain a safe job site. Neither the professional activities nor the presence of The District or its employees and Consultants shall be understood to control the operations of others, nor shall it be construed to be an acceptance of the responsibility for job site safety.

The Contractor shall, in writing, acknowledge responsibility for the job site safety and acknowledges that the District and its Representatives will not have such responsibility and that if the District and its Representatives are sued by one of the Contractor or subcontractor's employees, or anyone else, that the Contractor will indemnify, defend, and hold the District and its Representatives harmless of any and all such claims.