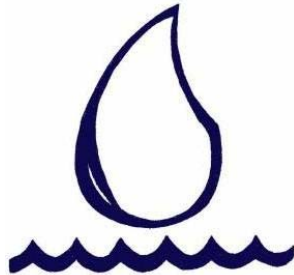


**PURISSIMA HILLS WATER DISTRICT
LOS ALTOS HILLS, CALIFORNIA**



**STANDARD SPECIFICATIONS
AND
STANDARD DRAWINGS**

JUNE 2020



Pakpour Consulting Group, Inc.

STANDARD SPECIFICATION

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SECTION 01 33 00 - SUBMITTALS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Work included in this section consists of furnishing various submittal items as listed herein, as required for the work.

1.02 SUBMITTAL PROCEDURE

- A. The Contractor shall deliver all applicable submittals listed in the schedule included in this section a minimum of twenty (20) days before the anticipated start of construction. This time limit shall not apply to those items to be furnished during the course of the work or near or at the conclusion of the work, such as test reports and record drawings. Two (2) hard copies or electronic files in PDF format of all submittal materials shall be furnished. Prior to the installation of materials, the Contractor shall submit two (2) hard copies or electronic files in PDF format of corrected final submittal material. Installation shall not commence until submittal material has been reviewed by the District, and final submittals have been delivered.
- B. The Contractor shall use the following procedure in submitting and processing submittals for review by the District:
 - 1. Each submittal item shall be forwarded to the District with an individual transmittal letter or form. The letter or form shall include the following items:
 - a. Project name.
 - b. Submittal number.
 - c. Description of submittal item.
 - d. Specification section and drawing references.
 - e. Certification by the Contractor's representative that the submittal is complete and correct.
- C. When required in a specific specification section, a "Letter of Compliance" shall be furnished stating that material and/or equipment furnished complies with the specifications.
- D. The District reserves the right to require submittals in addition to those called for herein.

1.03 SHOP DRAWINGS

- A. The term "shop drawings" includes drawings, diagrams, layouts, schematics, descriptive literature, illustrations, furnished by the Contractor to explain in detail specific portions of the work required by the contract.
- B. The Contractor shall coordinate all such drawings, and review them for legibility, accuracy, completeness, and compliance with contract requirements and shall so indicate that such coordination and review has been done by signing the transmittal letters. Shop drawings submitted to the District without evidence of Contractor's review will be returned for resubmission.
- C. Review by the District shall not relieve the Contractor from responsibility for any errors or omissions in such drawings, nor from responsibility for complying with requirements of this contract. If shop drawings show variations from contract requirements, the Contractor shall describe such variations in writing, separate from the drawings, at the time of submission. All such variations must be approved by the District.
- D. In these Standard Specifications, whenever the trade name of a product or the name of a manufacturer appears, it shall be understood to specify the product so identified and no equivalent is allowed. If the District Standards Specifications allow for the use of an equivalent data may be submitted by the Contractor for a period of fifteen (15) days from receipt of the Notice to Proceed to substantiate a request for substitution as an equivalent item.
- E. Wherever in these Standard Specifications, or in any orders that may be given by the District pursuant to or supplementing the specifications, it is provided that the Contractor shall furnish materials for which no detailed specifications are set forth, the materials shall conform to accepted quality standards for materials of the kind required, with due consideration for the use to which they are to be put.

1.04 SAMPLES AND TESTS

- A. The source supply of each material furnished shall be approved by the District, unless the District advises the Contractor to the contrary at least ten (10) calendar days prior to the time when delivery is started, of any of the material used in work. Representative preliminary samples of the character and quality prescribed and the manufacturer's test certificates pertaining thereto shall be submitted by the Contractor for all materials to be used in work, as required by these Standard Specifications or as requested by the District.
- B. All tests of materials will be made in accordance with commonly recognized standards of national organizations, and such special methods and tests as are prescribed in these project specifications. The approval of any material based on sample tests and/or certificates will be considered as general approval only, and will not constitute a waiver of the District's right to demand full compliance with the Contract requirements. After delivery of materials to the job, the District will make such check tests as deemed

necessary in each instance and may reject materials, equipment, or accessories which fail to meet the check tests, even though such materials have previously been given general approval.

- C. Laboratory test reports shall cite the contract requirements, the test of analysis procedures used, the actual test results, and includes a statement that the item tested or analyzed conforms or fails to conform to specification requirements. All test reports shall be signed by a representative of the testing laboratory authorized to sign certified test reports.
- D. The cost of all testing will be borne by the District, except for the following situations: (1) The Contractor shall assume all costs of retesting materials which fail to meet Contract requirements; (2) The Contractor shall assume all costs of testing materials offered in substitution of those found to be deficient; (3) The Contractor shall assume all costs of testing materials offered in lieu of specified materials, to prove their quality equivalence.

1.05 CERTIFICATES

- A. For those items called for in individual sections of these Standard Specifications or shown on project drawings, furnish certificates from manufacturers, suppliers, or other certifying that materials or equipment being furnished under the contract comply with the requirements of these Standard Specifications.

1.06 PROGRESS SCHEDULES

- A. The Contractor shall submit a schedule at the preconstruction meeting for the project showing the estimated startup and completion date for each element of the work, in conformance with the requirements of the Standard Specifications.

1.07 TRAFFIC CONTROL PLAN

- A. The Contractor shall notify the Town of Los Altos Hills, the Santa Clara County Central Fire Protection District, the Santa Clara County Sheriff's Department, and the County of Santa Clara Road and Airport (if applicable) at least seventy-two (72) hours in advance whenever lane closures are planned. Such notification shall include the details and location of such closure, its anticipated duration, and traffic control and signing to be used during such closure.

1.08 RECORD DRAWINGS

- A. Using colored ink, each Contractor shall make changes on a set of clean prints. Indicate all changes and revisions to the original design that affect the permanent structures and will exist in the completed work. Reference underground utilities to semi-permanent or permanent physical objects. Reference water, sewer, telephone, storm drain, gas, and electric lines to corners of buildings and survey markers.

- B. The record drawings shall be kept current. Project record drawings are the property of the District. The original hard copies of the record drawings shall be delivered to the District before project closeout.

1.09 SUBMITTAL SCHEDULE

- A. The list below is a general representation of materials to be used on the project. The Contractor is responsible for reviewing each individual specification section for specific requirements to ensure all material information is submitted and reviewed.

Section No.	Item
	Safety Plan per the General Standard Specifications
01 50 00	Staging Plan Best Management Practices Plan
01 52 00	Traffic Control Plan
01 57 23	Water Pollution Control Plan
01 70 00	Tests Certificates and Guarantees Record Drawings
03 30 00	Concrete Rebar
26 42 10	Catalog Data on Anodes Cables Cable to Pipe Connections Test Stations Terminal Boxes Cable Warning Tape, Identification Tags Insulating Flange Materials Joint Coating Material Bitumastic Coating for Flange Hardware
31 80 00	Subgrade Material Bedding Material Aggregate Base Written Shoring Safety Plan (prepared by a registered Civil Engineer)
32 10 00	Aggregate Base Aggregate Surfacing Asphaltic Concrete Bonding Coat and Crack Seal Temporary Paving Controlled Density Fill Type II Slurry Seal Striping Materials (striping and markers)

33 14 13		Ductile Iron Pipe Thrust-Resistant Restraint for Ductile Iron Pipe Thrust Blocks Hardware Tubing and Fittings V-Bio Polyethylene Encasement and Tape Marker Tape for Buried Piping Disinfection Plans Disposal of Chlorine Water Chlorine Water Disposal/Treatment
33 14 20		Gate Valves Gate Valve Marker Post Gate Valve Extensions Pressure Reducing Valves Blow-Off Assembly Materials Service Connection Fittings and Valves Combination Air Valve Materials Valve and Meter Boxes Hydrants Assembly Materials

PART 2 MATERIALS - NONE

PART 3 EXECUTION - NONE

*****END OF SECTION*****

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SECTION 01 45 00 - QUALITY CONTROL

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Work included under this section consists of performing or conforming to quality control procedures and requirements as listed herein and in the various sections that comprise these Standard Specifications.

1.02 GENERAL QUALITY

- A. All material shall be new and of a quality equivalent to that specified.
- B. The work shall be executed in conformity with the best accepted standard practice of the trade so as to contribute to maximum efficiency of operation, accessibility and appearance, and minimum cost of maintenance and construction of future alterations and additions.

1.03 QUALITY IN ABSENCE OF DETAILED SPECIFICATIONS

- A. Whenever the Contractor shall furnish materials or manufactured articles or shall do work for which no detailed specifications are set forth, the materials or manufactured articles shall be of the normal commercial grade in quality and workmanship obtained from firms normally furnishing such materials or equipment or, if not ordinarily carried in stock, shall conform to the usual standards for first-class materials or articles of the kind required with due consideration of the use to which they are to be put. In general, the work performed shall conform with the intent to secure the normal commercial standard of construction and equipment of the work as a whole or in part.

1.04 DEFECTIVE MATERIALS

- A. All materials not conforming to these Standard Specifications shall be considered defective, and all such materials, whether in place or not, will be rejected and shall be immediately removed from the site of the work unless otherwise permitted to remain by the District. Rejected materials, the defects of which have been subsequently corrected, shall not be used until approval in writing has been obtained from the District. Upon failure of the Contractor to comply with any order of the District made under the Standard Specifications of this article, the District shall have the authority to remove and replace defective materials and to deduct the cost of the same from any monies due or to become due to the Contractor.

1.05 GUARANTEE

- A. All materials and workmanship shall be guaranteed by the Contractor for a period of two (2) years from the date of initial operation or the date of acceptance thereof, whichever is later, against all defects that might render the work unsatisfactory for the intended

purpose. Defective materials and workmanship occurring during the guarantee period shall be replaced by the Contractor at his expense, together with the repair or replacement of any adjacent work which may be damaged or displaced in the process.

- B. In addition to the above guarantee, the Contractor shall assign to the District all material guarantees issued by manufacturers or subcontractors, which guarantees to extend beyond the two (2) year period stipulated.

PART 2 MATERIALS - NONE

PART 3 EXECUTION - NONE

*****END OF SECTION*****

SECTION 01 70 00 - PROJECT CLOSEOUT

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Work included under this section consists of conforming to the job completion-related requirements of other sections in these Standard Specifications and of furnishing various materials needed to complete the project.

1.02 SUBMITTALS

- A. Tests
 - 1. Submit any test results done during the course of the work and not previously submitted in accordance with applicable sections of these Standard Specifications.
- B. Certificates and Guarantees
 - 1. Furnish all certificates and/or guarantees as required by individual Standard Specifications Sections and in accordance with applicable sections of these Standard Specifications.
- C. Record Drawings
 - 1. Furnish record drawings.

1.03 INSPECTION

- A. Final Inspection
 - 1. Submit written certification that project, or designated portion of the project, is substantially complete, and request, in writing, a final inspection. The District will make an inspection within ten (10) days of receipt of the request.
 - 2. Should the District determine that the work is substantially complete, the District will prepare a punch list of deficiencies that do not preclude operation and use of the facility; however, final payment will be withheld until all deficiencies are corrected, and all close-out requirements of the encroachment permits are met.
 - 3. Prior to the District accepting the project, the Contractor shall perform a final sweep using a regenerating air type street sweeper along the project limits fourteen (14) days after the final paving and striping operations. Work shall be coordinated with the District inspector.
 - 4. Until receipt of a letter of final acceptance, the Contractor shall be responsible for the work.

B. Post Construction Inspection

1. Prior to the expiration of the performance bond, and approximately twenty-three (23) months from the date of final acceptance, the District will inspect the project to determine whether corrective work is needed. The Contractor will be notified in writing of any deficiencies. The Contractor must begin corrective work on the noted deficiencies within ten (10) days after receipt of notification.

PART 2 MATERIALS - NONE

PART 3 EXECUTION

3.01 CLEANING

- A. Cleanup and cleaning shall be done in accordance with applicable sections of these Standard Specifications.

*****END OF SECTION*****

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Work included under this section consists of furnishing and installing all materials, supplies, equipment, tools, transportation, and facilities, and performing all labor and services necessary for, required in connection with, or properly incidental to furnishing and installing cast-in-place concrete work as described in this section of the specifications, shown on the accompanying drawings, or reasonably implied therefrom except as hereinafter specifically excluded.
- B. Defective Work
 - 1. Work considered to be defective may be ordered by the District to be replaced, in which case the Contractor shall remove and replace the defective work at their expense.
- C. Applicable Standards
 - 1. All concrete shall be mixed, delivered, placed, finished, and cured in accordance with Sections 51 - Concrete Structures, and Section 90 - Concrete, of the latest requirements of Caltrans Standard Specifications, and with American Concrete Institute (ACI) 301-11 - Standard Specifications for Structural Concrete.

1.02 SUBMITTALS

- A. The Contractor shall make submittals for the following as required by Section 01 33 00 - Submittals.
 - 1. Mix Designs in compliance with ACI and Caltrans procedures for each class of concrete on the project, and shall show names and brands of all materials, proportions, slump, strength, gradations of coarse and fine aggregates, and location to be used.
 - 2. Manufacturer's data including catalog cuts, drawings, samples, and letters of compliance as appropriate for epoxies, grout, admixtures, curing compounds, chemical hardeners, moisture barriers, water stops, and other items as referenced elsewhere.
 - 3. Shop Drawings and mill certificates for reinforcing steel that show diagrammatic elevations of all walls, footings, columns, beams, slabs, etc. at a scale sufficiently large enough to show clearly the positions and erection marks of reinforcing bars, their dowels, and splices. Shop drawings shall show details for congested areas and connections. Contract drawings shall not be reproduced in whole or in part. Contract drawings modified into shop drawings will be returned without review.

4. Concrete placement schedule shall show all proposed construction joint locations, limits of each placement sequence, the order of placement, any type of joint at each joint location.

B. Approval of Testing Agencies and Reports

1. Any laboratory where testing of materials is to be performed shall receive prior approval from the District. Documentary evidence, satisfactory to the District, that the material has passed the required inspection and testing must be furnished prior to the incorporation of such materials in work, and rejected materials must be promptly removed from the premises. Lab reports shall show the name of the testing agency, date of testing, types of tests performed and shall be signed by a principal of the testing agency who is a licensed Civil Engineer in the State of California.

PART 2 MATERIALS

2.01 FORMWORK

- A. Plywood formwork shall be 5/8-inch plywood, Exterior Type, DFPA Grade "Concrete Form Exterior", or better.

2.02 PORTLAND CEMENT

- A. Portland cement shall conform to ASTM C150 for Type II cement, or Type II-V modified for corrosive environments. Use one standard brand throughout all work.
 1. Fly ash shall conform to ASTM C618 for Class F fly ash. Fly ash percentages shall conform to the latest requirements of Caltrans Standard Specifications.

2.03 ADDITIVES

- A. Water reducing additive shall conform to ASTM C-494 Type A
- B. Water reducing and retarding shall conform to ASTM C-494 Type D
- C. Retarding shall conform to ASTM C-494 Type B

2.04 CONCRETE AGGREGATES

- A. Concrete aggregates shall conform to Section 90 - Concrete of the latest requirements of Caltrans Standard Specifications for hardrock concrete aggregates.

2.05 WATER

- A. Water shall be clean and free from deleterious amounts of acids, alkalies, or organic materials.

2.06 CONCRETE

- A. All structures, minor structures, foundations, and slabs shall be constructed of concrete as specified in Section 51 - Concrete Structures, of the latest requirements of Caltrans Standard Specifications and shall develop a minimum compressive strength of 3,600 psi at twenty-eight 28 days.
- B. The maximum water-cement ratio shall be 0.45. If a pozzolan is used in the concrete, the maximum water-cement plus pozzolan ratio shall be 0.45.
- C. The slump shall be 3-inches minimum and 4.5-inches maximum for footing slabs and walls. The slump shall be 1-inch minimum and 4-inches maximum for other slabs, beams, and columns.

2.07 CONTROLLED DENSITY FILL (2-SACK SLURRY)

- A. Controlled density fill shall consist of fluid, workable mixture of aggregate, cement, and water. The aggregate cement and water shall be proportioned by weight. 188 pounds of cement shall be used for each cubic yard of material. The water content shall be sufficient to produce a fluid, workable mix that will flow and can be pumped without segregation of the aggregate while being placed.
- B. The controlled density fill should have a twenty-eight (28) day compressive strength of no more than 300 psi. The aggregate (sand) should conform to ASTM C33 (for gradation) and should have a Sand Equivalent of no less than 75.

2.08 BARS

- A. Bars for reinforcing shall be deformed, domestic steel bars conforming to ASTM A706, Grade 60, except that for Minor structures as defined in the latest requirements of Caltrans Standard Specifications, ASTM A615, Grade 60 may be used.

2.09 WIRE

- A. Wire for tying reinforcement in place shall be No. 18 or heavier, AWG black annealed.

2.10 THRUST BLOCKS

- A. Thrust blocks shall be constructed of 2,000 psi, high early strength, minor concrete, as defined in Section 90 – Concrete, of the latest requirements of Caltrans Standard Specifications with a minimum 505 pounds of cementations material per cubic yard.

PART 3 EXECUTION

3.01 FORMWORK

- A. Forms shall be designed and constructed in accordance with the requirements of Section 51 - Concrete Structures, of the latest requirements of Caltrans Standard Specifications, and ACI 301-11.
- B. The forms shall be smooth, mortar-tight, true to the required lines and grades, and of sufficient strength to resist springing out of shape during the placing and vibrating of concrete. All dirt, chips, sawdust, and other foreign matter shall be completely removed before the concrete is deposited therein. Forms previously used shall be thoroughly cleaned of all dirt, mortar, and the foreign matter before being reused. Before concrete is placed in forms, all inside surfaces of the forms shall be thoroughly coated with a form sealer. The form sealer shall be of high penetrating quality, leaving no film on the surface of the forms that can be absorbed by the concrete or be incompatible with concrete paint.
- C. All exposed sharp edges shall be rounded or chamfered with triangular fillets, 3/4-inch unless shown otherwise on the drawings.
- D. Forms shall be removed in such a manner and at such time so as to ensure the complete safety of the structure and proper curing of the concrete.

3.02 INSTALLATION OF REINFORCING STEEL

- A. Reinforcing steel shall be cleaned, fabricated, placed, tied, and supported in accordance with the ACI detailing manual, SP-66(04), and Section 52 – Reinforcement, of the latest Caltrans Standard Specifications.
- B. Steel reinforcement shall be accurately placed and shall be supported and secured against displacement by the use of adequate and proper supporting and spacing devices, tie wires, etc., so that it will remain in its correct location in the finished work. No supporting devices shall be used that will impede the placement of concrete.
- C. The clear spacing between parallel bars shall be not less than 1-1/2 times the normal diameter of the maximum size aggregate and, in no case, less than 1-1/2-inches except at splices, which shall be wired together. Concrete cover, and other reinforcing spacing requirements, shall conform to the latest requirements of the ACI 318 2011 version.
- D. Reinforcing steel shall extend to the far face of the concrete and terminate in a 90° hook.
- E. Lap splice lengths shall be per the latest edition of ACI 318, dependent on bar orientation and confinement.

3.03 PLACEMENT OF CONCRETE

- A. Place concrete so that a uniform appearance of surfaces will be obtained, and the concrete will be free of all rock pockets, honeycombs, and voids.

3.04 CURING

- A. Freshly deposited concrete shall be protected from premature drying and excessively hot or cold temperatures, and shall be maintained with minimal moisture loss at a relatively constant temperature for the period of time necessary for the hydration of the cement and proper hardening of the concrete.

3.05 CONSTRUCTION JOINTS

- A. Joints not shown on the Drawings shall be so made and located as to least impair the strength of the structure. A pour schedule for each structure showing all construction joints shall be submitted to the District for review.
- B. The surfaces of all concrete joints shall be thoroughly cleaned, and all laitance removed by sandblasting. In preparation for the next pour, the joints shall be dampened. Where directed by the District, joints shall be intentionally roughed as described in the Standard Specifications to the amplitude of 1/4-inch.

3.06 EXPANSION JOINTS

- A. Pre-molded expansion joint material shall be installed where concrete walks abut buildings, walls, and curbs, where shown on the Drawings and at 20-feet on centers maximum, where not specifically shown.

3.07 EMBEDDED ITEMS

- A. All sleeves, inserts, anchors, ladders, and other embedded items required for adjoining work or for its support shall be placed prior to concreting. Embedded items shall be positioned accurately and supported against displacement. Voids in sleeves, inserts, and anchor bolt slots shall be filled temporarily with a readily removable material to prevent the entry of concrete into the voids.

3.08 REPAIR OF SURFACE DEFECTS

- A. All tie holes and all repairable defective areas shall be patched immediately after form removal in accordance with the applicable provisions of Section 51 - Concrete Structures, of the latest requirements of Caltrans Standard Specifications.
- B. Finishes
 - 1. Schedule of Finishes

<u>Element</u>	<u>Finish</u>
Walls not exposed	Ordinary Surface Finish
Exposed walls	Class 1 Finish
Exposed slabs	Broom finish

2. Ordinary and Class 1 Surface Finishes

- a. Shall conform to the latest Standard Specifications.

3. Broom Finish

- a. Concrete shall first be finished with power floats, then with power trowels, and final by hand trowels before it is given a coarse, scored texture by drawing a broom, or burlap belt, across the slab surface.

3.09 CONCRETE COMPRESSIVE STRENGTH TESTS

- A. Concrete will be tested and inspected as work progresses. One compressive strength test shall be made for each pour and as described in the Standard Specifications. One complete test shall consist of making three (3) cylinders in accordance with ASTM C31, storing the cylinders for twenty-four (24) hours at the pour site, delivering the cylinders to the testing laboratory, testing one (1) cylinder at seven (7) days and the other two (2) cylinders at twenty-eight (28) days in accordance with ASTM C39. Four copies of certified test results shall be forwarded to the District upon completion of the testing.

3.10 CONCRETE SLUMP TESTS

- A. Each pour shall be tested for slump at the beginning of the pour, at the time the sample for the strength test is taken, and whenever the consistency of the concrete appears to vary. The test shall conform to ASTM C143.

*****END OF SECTION*****

SECTION 26 42 10 – CATHODIC PROTECTION OF DUCTILE IRON WATER MAIN

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Work included in this section consists of the components of the cathodic protection system, including magnesium anodes, cables, insulating joints, test stations, and any other work necessary to complete the installation. The scope of work includes, but not limited to, the following:
1. Cathodic protection of ductile iron pipe and fittings associated with the water main.
 2. Encasement of all ductile iron pipe, fittings, and laterals associated with V-Bio polyethylene wrap.
 3. Cathodic protection of steel casings associated with the water main.
 4. Coating of a steel casing with an abrasion resistant coating.
 5. Bonding of non-welded pipe joints.
 6. Trenching, drilling, and other excavation.
 7. Installation of magnesium anodes, cables, test stations, insulating joints, and coatings.
 8. Backfill and compaction of backfill.
 9. Electrical isolation of the new water mains from existing water mains utilizing insulating joints.
 10. Isolation of the new water mains from foreign water mains utilizing an additional layer of V-Bio polyethylene wrap.
 11. Electrical isolation ductile iron laterals from the water main and the water meters and building connections.
 12. Provide shop drawings, reports, permits, and obtain District approval where required.
 13. Correction of all deficiencies.
 14. Cleanup and restoration of surface.
 15. The work shall include the provision of all materials, equipment, and apparatus not specifically mentioned herein or noted on the plans, but which are necessary to complete the work specified.

1.02 QUALITY ASSURANCE

A. GENERAL

1. All work shall be performed to the satisfaction of the District.

B. MATERIALS

1. The Contractor shall not substitute for the specified materials unless approved by the District.

C. TESTING

1. Electrical continuity of the water mains, proper operation of anodes, test leads and all other cathodic protection components shall be tested by the Contractor and approved by the Project Corrosion Engineer, in order to ensure proper installation and operation. The Contractor shall be responsible for the correction of all deficiencies identified by the testing and all costs incurred for retesting prior to final acceptance.

D. COMPACTION

1. Compaction of backfill for anodes and trenches shall be per District standards.

1.03 REQUIREMENTS

1. All buried ductile iron pipe, fittings, and appurtenances associated with the water main and laterals will be encased in V-Bio polyethylene as specified elsewhere.
2. Galvanic cathodic protection shall be installed on all buried ferrous metal pipe, valves, fittings, casings, laterals, and appurtenances.
3. All rubber gaskets, mechanical joints, and flexible couplings shall be bonded along the entire buried length of the metallic pipe.
4. Insulating joints shall be installed to electrically isolate the subject water mains from existing water mains, water meters, water laterals. Below grade, insulating joints shall be tested and approved by the Project Corrosion Engineer prior to coating and backfilling.
5. An additional layer of V-Bio polyethylene shall be installed when subject water mains are crossing foreign metallic pipes.
6. Test stations shall be installed at all locations designated on the plans.

1.04 CODE REQUIREMENTS

- A. All materials, workmanship, and installation shall conform to all requirements of the legally constituted authority having jurisdiction. These authorities include but are not limited to, the District, the latest revision of the State of California, Department of

Industrial Relations, Division of Industrial Safety Orders of the Industrial Accident Commission, and all other applicable State, County, or Town codes and regulations. Nothing in the drawings or specifications is to be construed to permit work not conforming to these regulations and codes. Where larger size or better grade materials than required by these regulations and codes are specified, the specifications and drawings shall have precedence.

1.05 REFERENCES

- A. This section contains references to the following documents. They are a part of this section as specified and modified. In case of a conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.
1. American Society of Testing and Materials (ASTM)
 2. National Electrical Manufacturers Association (NEMA)
 3. American Water Works Association (AWWA)
 4. National Association of Corrosion Engineers (NACE)
 5. American National Standards Institute (ANSI)
 6. Underwriter's Laboratories, Inc. (UL)

1.06 SUBMITTALS

- A. Prior to commencing work, the Contractor shall submit copies of the following items in accordance with Section 01 33 00 – Submittals:
1. A complete list of cathodic protection equipment and material, including name and manufacturer, catalog number, size, finish, and any other pertinent data necessary for proper identification and to determine conformance with specifications.

1.07 INTERFERENCE AND EXACT LOCATIONS

- A. The Contractor shall coordinate and properly relate this work to the site and the work of all trades. The general locations of the facilities are shown on the drawings. However, the Contractor shall visit the premises and thoroughly familiarize himself with all details of the work and working conditions, verify existing conditions in the field, determine the exact locations of existing water mains and structures and advise the District of any discrepancy that may prevent or hinder the specified work from being completed. The Contractor shall be solely responsible for locating and marking underground structures so as to avoid damage during construction.

PART 2 MATERIALS

2.01 GENERAL

- A. All materials shall conform to the requirements set forth herein or as designated on the drawings unless otherwise specified. All materials must be new, free from defects, and shall be of the best commercial quality for the purpose specified. The Contractor shall furnish all necessary items and accessories not shown on the drawings or specified herein, but which are required to fully carry out the specified intent of the work, without additional cost to the Owner.

2.02 MAGNESIUM ANODES

- A. Magnesium anodes for the ductile iron water main/fittings shall be High Potential, Magnesium. The bare magnesium ingot shall weigh 32 pounds and shall measure 5.5-inches by 5.75-inches by 19 and 7/8-inches long. The packaged anode shall weigh 70 pounds and shall be 8-inches in diameter and 28-inches long. Each anode shall be cast with a steel core, and the core shall protrude from one end and shall be of sufficient length to permit attachment of a lead wire.
- B. Each anode shall conform to the following chemical composition:

Chemical Composition

Aluminum	0.01% Max.
Manganese	0.5 to 1.3%
Copper	0.02% Max
Silicon	0.05% Max.
Iron	0.03% Max.
Nickel	0.001% Max.
Other Impurities, Each	0.05% Max.
Magnesium	Balance

- C. Each anode shall be furnished with a lead wire attached to one end of the steel core, and the wire shall be of sufficient length to attach to the test station as shown on the drawings. The wire shall be connected to the steel core by silver soldering, and the connection shall be mechanically secured before soldering. The entire connection shall be insulated with an electrical potting compound. The cable attached to the anode shall be No. 10 AWG, Type THHN/THWN stranded, single conductor copper.
- D. The anode shall be prepackaged in a permeable cloth bag filled with a mixture of 75% ground hydrated gypsum, 20% powdered bentonite, and 5% anhydrous sodium sulfate. Backfill shall have a grain size so that 100% is capable of passing through a 100-mesh screen. The mixture shall be firmly packed around the anode within the cloth bag by means of adequate vibration so that the magnesium ingot is completely surrounded with a minimum 1-inch of backfill material.

2.03 CABLES

- A. Cables used for joint bonding shall be single conductor, stranded copper, Type CP, insulated for 600 volts with High Molecular Weight Polyethylene (HMWPE) in accordance with the requirements of ASTM D 1248, Type 1, Class A, Category 5, Grades E4 & E5 with tensile strengths per J1 and J2.
- B. All cables for anodes and test stations shall be Type THHN/THWN, stranded, copper, sized and with color as shown on the drawings.
- C. Insulation Color
 - 1. Proposed Pipe: White
 - 2. Existing Pipe: Red
 - 3. Anode or Anode Header Cable: Black

2.04 CABLE-TO-PIPE CONNECTIONS

- A. Ductile Iron Pipe
 - 1. EXOTHERMIC WELD EQUIPMENT
 - a. Weld Equipment Manufacturers: From one of the following manufacturers, or approved equal:
 - 1) Erico Products, "Cadweld".
 - 2) Continental Industries, Inc., "Thermoweld".
 - b. Cable Connections to Pipe and Fittings: Manufacturer's standard exothermic weld kits, unless indicated otherwise on Drawings.
 - c. Use copper wire sleeves and individual components from one manufacturer when making welds.
 - d. Cable-to-Pipe Coating Material: Coating material for cable-to-pipe connections shall be Handy Caps & Roybond 747 primer as manufactured by Royston products or Propoxy 20 epoxy putty as manufactured by the Hercules Chemical Company or approved equal.

2.05 SPLICE TO ANODE HEADER CABLE

- A. Anode to header cable splices shall be with a proper sized Burndy Crimpit or Thomas & Betts C tap crimp connector or two Burndy copper split bolts.

- B. Scotch® linerless rubber splicing tape 130C.
- C. Scotch® premium vinyl electrical tape Super 33+.

2.06 TEST STATION

- A. Traffic Valve Box: Christy G05T Box.
- B. Valve Box Covers: Cast iron, with legend "CP TEST".

2.07 TERMINAL BOXES

- A. Type
 - 1. Terminal boxes shall be locking type, constructed of high-impact, molded Lexan plastic.
- B. Hardware
 - 1. The test box shall be provided with sufficient hardware and terminals for each cable as shown on the drawings. All test station hardware, including nuts, bolts and shorting straps shall be nickel-plated brass. Terminal Boxes for the anode test stations shall be supplied with 6 or 8 amp, 0.01 ohm shunts.
 - 2. The terminal box and all hardware shall be from the same manufacturer.
- C. Cable Terminations
 - 1. If terminal posts with washers and nuts are utilized, all cables that terminate in the terminal boxes shall have ring type connectors that are sized appropriately for the terminal bolts. The ring connectors shall be either a soldered ring type connection or a heavy duty, compression type crimp connection. With the compression type crimp connection, a crimping tool shall be provided.
 - 2. If binding post terminals are utilized, ring connectors are not required.
- D. Color
 - 1. The terminal boxes for the water lines shall be blue in color.
- E. Subject to Compliance with the Contract Documents the following Manufacturers are acceptable:
 - 1. Model "Big Fink", Cott Manufacturing Company
 - 2. Model T-3, Tinker & Rasor
 - 3. Or equal.
- F. Identification Plate

1. The identification plate for the terminal boxes shall be 3-inch diameter, 3/16-inch thick, engraved micarta board as shown in the drawings.
2. The plate shall be bolted to the test station box lid with a 1/8-inch brass bolt of minimum length.

2.08 CABLE WARNING TAPE

- A. All buried test station and anode cables shall have plastic warning tape installed a minimum of 12-inches above the top of the cables for the entire buried length of the cables. The warning tape shall be 6-inch wide and shall be yellow with black lettering with the legend "CAUTION, CATHODIC PROTECTION CABLES BURIED BELOW" in 4-inch high lettering printed at a minimum of 7-foot intervals along the entire buried length of the cable.

2.09 CABLE IDENTIFICATION TAGS

- A. All cables in the terminal boxes shall be identified. The identification tag shall be typed on a heat shrinkable tube applied to each end of the wire:
- B. Heat shrinkable tube shall be a permanent, non-smearing, solvent resistant type, similar to Brady, Raychem TMS, or approved equal.

2.10 INSULATING FLANGED JOINTS

- A. Insulating flanges shall be installed to electrically isolate the proposed water main from existing water mains or piping inside of a building. The insulating flange kit shall be suitable for water service, and shall comply with NSF-61, such as LineBacker 61 manufactured by PSI or Trojan G-10 w/EPDM seal manufactured by APS, suitable for wet and dry locations. Each insulating flange set shall consist of a full-face central gasket, a full-length sleeve for each flange bolt, and two insulating washers with two steel washers for each bolt. The full-face type central gasket shall be 1/8-inch thick sheet packing, having a dielectric constant of 300 volts per mil, minimum. Bolt sleeves shall be fabric reinforced phenolic resin or mylar, and insulating washers shall be constructed of fabric reinforced phenolic resin. The complete assembly shall have an ANSI pressure rating equal to that of the flanges between which it is installed.

2.11 BURIED INSULATING JOINT COATING MATERIAL

- A. Coatings for buried insulating flanges and insulating couplings shall consist of a non-conductive, petrolatum-based coating system, such as Trenton Wax Tape #1 by The Trenton Corporation, or equal. The coating system shall consist of a prime coat as an initial surface preparation to displace moisture on the surface and to improve adhesion of the wax tape. A wrap material shall be used to provide a smooth contour on the surface of the joint as well as for protection of the substrate. An over wrap shall be used as a final coating to provide increased mechanical strength of the coating. The prime coat shall be

a petrolatum material with corrosion inhibitors and plasticizers. The wrap coat shall be a synthetic fabric saturated with a blend of petroleum wax, plasticizers and corrosion inhibitors. The over wrap shall be plasticized, self-adhesive PVC tape.

2.12 EPOXY COATING FOR STEEL CASING

- A. The coating system for the buried portion of the steel casings shall be one of the following:
 - 1. Amerlock® 400 epoxy coating manufactured by PPG Amercoat,
 - 2. Scotchkote 328 abrasive resistant epoxy coating manufactured by 3M™, or
 - 3. Approved equal.

2.13 HEAT SHRINK WRAP FOR STEEL CASING JOINTS

- A. The heat shrink system for the steel casing welds shall be one of the following:
 - 1. DDX directional drilling kit manufactured by Canusa-CPS, or
 - 2. Approved equal.

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

- A. All materials, workmanship and installation shall conform to all requirements of the legally constituted authority having jurisdiction. These authorities include, but are not limited to, the District, the latest revision of the State of California, Department of Industrial Relations, Division of Industrial Safety, Electrical Orders; The National Electric Code, General Construction Safety Orders of the Industrial Accident Commission; and all other applicable State, County, or Town codes and regulations. Nothing in the drawings or specifications is to be construed to permit work not conforming to these regulations and codes. Where larger size or better grade materials than required by these regulations and codes are specified, the specifications and drawings shall have precedence.

3.02 STORAGE OF MATERIALS

- A. All materials and equipment to be used in construction shall be stored in such a manner to be protected from detrimental effects from the elements. If warehouse storage cannot be provided, materials and equipment shall be stacked well above ground level and protected from the elements with plastic sheeting or other method as appropriate.

3.03 MAGNESIUM ANODES

- A. Anodes shall be installed in the trench horizontally or vertically as shown in the drawings after excavation to proper depth, equal to the bottom of the pipeline, a minimum of 5 feet from the water mains. Spacing between anodes wire connection shall be 10-feet

minimum, when multiple anodes are installed at a single test station location as shown on the drawings. Prior to placing anodes in the trench or hole, paper or plastic bags shall be removed, but the cloth bag shall remain around the anode. Care shall be exercised during installation to prevent damage to the cloth bag and loss of backfill material. After placing anodes in the trench, native soil, free of rocks and other foreign objects shall be placed around the anode to a minimum cover of one foot above the anode. Remainder of the trench shall then be backfilled with native soil. During installation, anodes shall not be supported or handled by use of attached wires.

- B. The number of anodes to be installed at each test station is designated on the drawings.

3.04 CABLES

- A. Cables buried in the ground shall be direct buried and shall be laid straight, without kinks. The cable shall have a minimum cover of 30-inches. Each cable run shall be continuous in length and free of joints or splices unless shown otherwise in the drawings. Care shall be exercised during installation to avoid punctures, cuts, and similar damage to insulation. Any damage to insulation will require replacement of the entire cable length. Backfill surrounding the cables shall be native soil free of foreign materials. Cable warning tape shall be installed 12-inches above the entire buried length of the cable.

3.05 EXOTHERMIC WELDS

- A. Install exothermic weld connections in accordance with the Drawings.
- B. Remove coating materials from the surface over an area just sufficient to make the connection.
- C. Clean steel surfaces to white metal by grinding or filing prior to welding the conductor. Resin impregnated grinding wheels are not permitted.
- D. Do not bury connections to the structures or piping until the Engineer has inspected the connections and given permission to backfill. Connections made in violation of this provision will be rejected.
- E. Test exothermic welds for adherence to the pipe and for electrical continuity between the pipe and wires.
- F. Use a 16-ounce hammer for testing adherence by striking a blow using a moderate amount of force to the weld. Take care to avoid hitting the wires.
- G. All defective welds shall be removed and replaced.
- H. All exposed surfaces of ductile iron and surrounding surface shall be cleaned of contaminants and coated with Royston Roybond 747 primer. After the primer has dried, the Royston Handy Cap shall be applied. As an alternative the exposed metal surfaces

shall be covered with a minimum thickness of 1/4-inch of Propoxy 20 epoxy putty as shown on the drawings.

3.06 TEST STATIONS

- A. Test stations shall be installed at locations designated on the drawings and at all anode installation locations. Provide a concrete collar where anode test stations are to be installed in native soil. Set collar level flush with top of curb or finish grade in paved areas and 2-inches above grade in landscaped and unimproved areas. Provide a minimum of 18-inches of slack for each cable in each test station. Sufficient slack shall be provided to allow removal of the terminal box from the test station without disconnecting any of the cables. The terminal end of each cable shall be identified with the structure identification using the permanent cable identification tags.

3.07 JOINT BONDING

- A. All non-welded rubber gasket joints, mechanical joints, flange joints and threaded joints shall be bonded with one or two #4 or one #6 or one #8 AWG/HMWPE stranded copper cable, as shown on the drawings. The overall length of the conductor shall permit maximum movement of the pipe joint without transferring any tensile stress to the cable, per pipe manufacturer's recommendations. The bonded pipe sections shall be tested for continuity, prior to backfilling.

3.08 INSULATING FLANGED JOINTS

- A. All insulating components of the insulating flanged gasket set shall be cleaned of all dirt, grease, oil and other foreign materials immediately prior to assembly. Bolt holes in mating flanges shall be properly aligned at the time bolts and insulating sleeves are inserted to prevent damage to the insulation. After flanged bolts have been tightened, each insulating washer shall be inspected for cracks or other damage. All damaged washers shall be replaced. After assembly, resistance between each bolt and flange shall be measured with an approved ohmmeter, and the minimum resistance shall be 50,000 ohms. Where the insulating joint is assembled in the shop and shipped as a unit, resistance shall be measured in the shop between the flanges and between each bolt and flange and shall meet the above requirements. In addition, the completed assembly shall be tested with a flange insulation tester such as Gas Electronics Model 601 or equal for the integrity of insulation. In cases where the insulating flange is assembled in the field the completed assembly shall be tested with a flange insulation tester such as Gas Electronics Model 601, or equal prior to backfilling. All buried insulating flanged joints shall be coated as shown on the drawings and specified below.

3.09 COATING INSULATING FLANGED JOINTS

- A. Surfaces shall be cleaned of all dirt, grease, oil and other foreign materials immediately prior to coating. Remove loose rust, paint and other foreign matter in accordance with SSPC SP2 or SP3. A prime coating shall be applied in a uniform coating over the entire

surface to be wrapped. A liberal coating shall be applied to threads, cavities, shoulders, pits and other irregularities. A fill coating shall be molded and packed onto irregular surfaces such as flanges, valves or flexible couplings to create a smooth profile prior to wrapping. A wrap coating shall be spirally wrapped using a minimum of 55% overlap to ensure a double thickness of material. At the completion of each roll the overlaps shall be smoothed by hand in the direction of the spiral to ensure sealing of the overlap. A 2-inch overlap shall be maintained when overlapping one roll with the end of a new roll. Overlap shall occur on the top half of the pipeline. The over wrap shall be plasticized, self-adhesive PVC tape. This guard coating shall be spirally over-wrapped using a 55% overlap to ensure a double coating.

3.10 EPOXY COATING FOR STEEL CASINGS

- A. Amerlock® 400 - The exterior surface of the steel casing shall be prepared according to SSPC-SP-10 with a 2 to 4 mil profile. The prepared surface shall be coated with two coats of PPG Amercoat Amerlock® 400 epoxy coating (or equal) for a minimum total dry film thickness (DFT) of 10 mils. Follow the manufacturer's recommendations for drying times required.
- B. Scotchkote 328 - The exterior surface of the steel casing shall be prepared according to SSPC-SP-10 with a 1 to 4 mil profile. The prepared surface shall be coated as soon as possible but no more than 4 hours after blasting with one or two coats of Scotchkote 328 epoxy coating for a minimum total dry film thickness (DFT) of 40 mils. Follow the manufacturer's recommendations for drying times required.

3.11 HEAT SHRINK WRAP FOR STEEL CASING JOINTS

- A. DDX - The cut-back area at the joint welds shall be field coated. Remove all loose rust, dirt, moisture, grease or other contaminants from surface. Power-tool clean (SSPC-SP3) or hand-tool clean (SSPC-SP2) the cut-back surface area. Abrade the adjacent coating surface to at least 1-inch (25 mm) distance past all cut-back coating edges. Ensure abraded surface is cleaned of any debris with use of an air blast of lint free cloth. With metal between 104-120°F (40-50°C), apply 4-6 mils (100-150 microns) epoxy primer mixture to cut-back surface only. Do not apply to adjacent coating. Pre-heat applied epoxy and adjacent coating to a minimum 158°F (70°C), epoxy should now be dried to the touch. Install the primary sleeve centered over the joint, following manufacturer's recommendation for overlap, heating, and removal of trapped air. Ensuring that primary sleeve and coating are at minimum 158°F (70°C), install sacrificial sleeve centered on edge of primary sleeve on the bore direction side. Follow the manufacturer's recommendations for overlap, heating, and removal of trapped air of the sacrificial sleeve and visual inspection of the entire kit installation.

3.12 DOUBLE POLYETHYLENE ENCASEMENT AT FOREIGN PIPELINE CROSSING

- A. Install a second layer at crossings with foreign metallic pipelines that are smaller than 8-inch in diameter and are cathodically protected.
- B. After install the first layer of polyethylene encasement as specified elsewhere, install a second layer of polyethylene that is 10 feet long and centered at the crossing.

3.13 ENERGIZING AND TESTING

- A. After the Contractor has completed the installation of the cathodic protection system, the system will be energized, tested, and adjusted by the Project Corrosion Engineer to assure conformance with the specifications. The tests will include electrical continuity of the pipeline, electrical isolation with laterals and other structures as shown on the drawings, pipe-to-soil potential measurements at all test stations, laterals, fire hydrants and all available test points. Pipe-to-soil potentials on both sides of any insulating flanges, anode current output, etc. All insulating flanges shall be tested with a flange insulation tester such as Gas Electronics Model 601, or equal prior to backfilling. All bonded pipe sections shall be tested for electrical continuity prior to backfilling. All testing results shall be reviewed and approved by the Owner's Agent. A polarized potential of -0.85 volts vs a copper sulfate electrode at all available test locations shall be considered as adequate level of cathodic protection. Anode current output shall not exceed a value of 60 mA per anode. Excessive anode current shall be controlled utilizing fixed power resistors. Any and all deficiencies shall be corrected by the Contractor at the Contractor's expense and retested prior to final acceptance. All retesting shall be at the Contractor's expense.
- B. The Contractor shall provide a written report, prepared by the Project Corrosion Engineer, documenting the results of the testing and recommending corrective work, as required to comply with the contract documents, to the Owner. At a minimum, the report shall include the following:
 - 1. Continuity testing results.
 - 2. Native pipe-to-soil potentials, polarized pipe-to-soil potentials, anode current outputs, insulating joint testing and other measurements and results.
 - 3. Corrosion Engineer review certification.

*****END OF SECTION*****

SECTION 31 80 00 - TRENCH EXCAVATION, BEDDING, AND BACKFILL

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Work included under this section consists of furnishing all necessary labor, materials, tools, equipment, and services in connection with and reasonably incidental to clearing, saw-cutting/grinding pavement, excavating, installing bedding and backfill material, and disposing of excess excavated materials required for the construction of water mains and storm drains. Work required shall also include the furnishing of all materials and equipment necessary for the construction and installation of all temporary shoring, sheeting and bracing and other facilities which may be necessary to perform the excavations and to place and compact the bedding and backfill, and the subsequent removal of such sheeting, bracing and other facilities.
- B. Excavation and backfill shall be in accordance with the Standard Drawings and these Standard Specifications.

PART 2 MATERIALS

2.01 BEDDING MATERIAL

- A. Bedding material shall be "Quarry Fines," produced by Stevens Creek Quarry, Cupertino, CA, free of organic material and clay.

2.02 AGGREGATE BASE (CLASS 2)

- A. Aggregate base shall conform to the requirements of Section 26 – Aggregate Bases of Caltrans Standard Specifications excluding processed reclaimed asphalt concrete. Grading and Quality Characteristics requirements shall meet 3/4-inch maximum, Class 2 material.

2.03 DRAIN ROCK

- A. Drain rock shall be 3/4-inch crushed rock.

2.04 PAVEMENT

- A. Pavement shall conform to the requirements in Section 32 10 00 - Paving, Restoration, and Resurfacing Work of these Standard Specifications.

PART 3 EXECUTION

3.01 CONSTRUCTION ACROSS IMPROVED AREAS

- A. Asphalt concrete pavement or driveways removed or damaged in connection with construction shall be rebuilt to these Standard Specifications and have the same quality

as the portion removed. Where pavement or driveways must be removed, they shall be saw-cut prior to excavation.

- B. The Contractor may, when approved by the District, tunnel under driveways. Where existing driveways are removed or damaged by the Contractor, the Contractor shall replace after completion of the installation of the water main or utilities with the same type and quality of material as that which was removed or damaged.

3.02 UNDERGROUND OBSTRUCTIONS

- A. The Contractor shall notify North USA at (811) a minimum of two (2) working days before proceeding with the work. Work may not begin until utilities marked.
- B. The Contractor shall determine the exact location of all existing utilities before commencing work, and agrees to be fully responsible for any and all damages by the Contractor's failure to exactly locate and preserve any and all underground utilities.
- C. Excavation and other work under or adjacent to existing water mains, conduits, or structures of any kind, shall be executed in such a manner as not to interfere with the safe operation and use of such installations. Should any damage occur to these facilities during the operations of the Contractor, they shall immediately notify the District and the facility owner(s) or authorities and shall arrange for the immediate repair of the facilities at his own expense. If any conflicts are encountered during construction, the District shall be notified immediately.

3.03 TRENCH EXCAVATION

- A. Trench Width
 - 1. In all cases, trenches must be of sufficient width to permit the proper jointing of the pipe. However, trenches wider than the maximums specified herein will result in a greater earth load on the pipe than it was designed for; consequently, if the maximum trench widths specified are exceeded by the Contractor without the written permission of the District, the Contractor will be required, at their own expense for both labor and material, to provide a higher class of pipe or to embed the pipe in a concrete cradle as directed by the District.
 - 2. Permissible trench widths are as follows: For all pipes up to and including 18-inches diameter, and in all types of soil, maximum trench width of 24-inches greater than the outside diameter of the pipe will be permitted. This shall be interpreted to permit a maximum of no more than 12-inches on each side of the pipe. This clearance shall be measured from the outside of the barrel of the pipe to the sides of the trench and shall include any sheeting used. The minimum width of un-shored trenches shall be 12-inches plus the outside diameter of the pipe (a minimum of 6-inches on each side of the pipe). Where shoring is required the Contractor shall allow sufficient width to comply with codes and regulatory safety requirements.

B. "T" Cut

1. A second saw-cut/grind operation is required prior to final paving to achieve the "T"-cut section as shown on the standard drawings. Saw-cutting a wider trench during initial trench excavation to achieve a "T" cut section will not be allowed.

C. Shoring

1. The Contractor shall furnish, place and maintain shoring and bracing as may be required to support the sides of excavations for the protection of workers, to facilitate the work; to prevent damage to manholes, structures, and water mains being constructed; to protect adjacent embankments, structures or facilities from damage; and as required by applicable local, State and Federal safety codes.
2. Shoring shall be removed by the Contractor unless field conditions make the removal of sheeting impractical. In such case, the District may permit portions of the sheeting to be cut off to a specified depth and to remain in the trench. Backfill shall be brought to one foot above the top of the pipe before sheeting may be removed.
3. When trenching or excavation over 5-feet in depth, under the Labor Code Section 6705, Contractor shall provide the following:
 - a. Written and detailed plan covering trench and excavation safety procedures that meets CalOSHA requirements under the Construction Safety Orders Sections 1539-1543.
 - b. Submit a written safety plan reviewed and approved by a registered civil or structure engineer for review and approval prior to the start at work.
 - c. Assign a competent person to supervise trenching and excavation operations when work is being performed.
 - d. The Contractor shall obtain and provide the District a copy of a CalOSHA permit for all trench and excavation operations.
4. The Contractor must provide ladders or a safe access within 25-feet of a work area in trenches 4-feet or deeper.

D. Dewatering

1. During water main excavation and backfill operations, the Contractor shall provide temporary drains, diversion ditches, pumps, cofferdams, or other devices as may be necessary to remove surface water or groundwater from the work area. Unless otherwise specifically permitted by the District, water, either of surface or subsurface origin, will not be permitted in the trenches or in new or existing water mains at any time during construction and until backfilling over the top of the pipe has been

completed; nor will the groundwater level in the trench be permitted to rise above an elevation 4-inches below the invert of the pipe. If trench has been flooded prior to placement of bedding material, the bottom of the native trench shall be compacted to the satisfaction of the District. Special care shall be taken during dewatering to ensure compliance with Storm Water Pollution Control Plan.

2. All excavations shall be kept free from water during the time when concrete is being placed and until such time as water will not be detrimental to the finished work. Dewatering trenches, when required, may be accomplished in any manner the Contractor desires, provided the method is acceptable to the District. Any damage resulting from the failure of the chosen method to operate properly shall be the responsibility of the Contractor and shall be repaired in a manner satisfactory to the District, at the Contractor's expense.

E. Structural Clearances

1. Excavation near structures such as catch basins, manholes, and drain inlets shall be sufficient to leave at least 12-inches between the outer surfaces of the structure and the sides of the excavation.

F. Care of Excavated Material

1. All material excavated from trenches and piled adjacent to the trench, or in a roadway or public thoroughfare, must be piled and maintained in such a manner that the toe of the slope of the excavated material is at least a lateral distance equal to the height of the excavation from the edge of the trench. It shall also be piled so that as little inconvenience as possible is caused to public travel. Free access shall be provided to all fire hydrants, water valves, and meters, and all other conduits shall be kept clean to allow free flow of storm water.

G. Open Trench

1. Unless otherwise directed by the District or stated otherwise on the project drawings, no trench shall be excavated more than 200-feet, nor left unfilled past construction working hours or non-working hours.
2. All trenches in roads, whether located on the project roads or in an easement, shall either be backfilled or plated during non-working hours.

H. Excavation Below Grade

1. Except where unsatisfactory native subgrade material exists, no excavation below the bottom of the water main bedding will be permitted. If, for any reason other than unsatisfactory subgrade, excess material is excavated beyond the limits specified for bedding, such excavation below grade shall be replaced beneath the pipe zone with thoroughly compacted subgrade material at the expense of the Contractor.

Unsatisfactory subgrade material shall be removed and replaced as directed by the District.

I. Tree Roots

1. Tree roots two inches or more in diameter at adjacent trees shall not be cut without prior approval of a licensed arborist or the District. Material shall be removed from around root system to avoid damage thereto. Roots shall be protected with burlap wrapping while exposed.

J. Excavation

1. All excavation is unclassified. Work shall consist of performing all excavation operations regardless of the character of subsurface conditions. The Contractor shall make their own evaluation of the type of materials which may be encountered.

K. Excavated Trench Material Disposal

1. Any excess material resulting from trench excavation shall be disposed of offsite by the Contractor own expense in a manner satisfactory to the District. Such excess material may be deposited on private property if so, requested by the property owner and their approval, proper permits shall be obtained for the pertinent local agencies by the property owner and the Contractor. It is recommended that disposed of materials be recycled wherever possible.

L. Trench Plates

1. When backfilling operations of an excavation in the traveled way, whether transverse or longitudinal, cannot be properly completed within a work day, steel plate bridging with a non-skid surface and shoring shall be required to preserve unobstructed traffic flow. Smooth surface plates are not allowed. No more than two (2) trench plates in length will be allowed unless directed by the District.
2. Trench plates shall be A-36 grade steel, non-skid, a minimum of 1-inch thick, and rated for H/20 loading or greater.
3. Tack weld plates together when using multiple plates.
4. The Contractor shall maintain trench plates at all time and respond to and correct shifting trench plates regardless of the time of day. If the Contractor fails to correct sinking backfill material or shifting trench plates in a timely manner, the District reserves the right to correct the problem at the expense of the Contractor.
5. In the event pending inclement weather or other conditions as determined by the District may adversely affect the use of trench plates, they shall be removed, the excavation backfilled, and the surface secured with temporary asphalt.

3.04 TRENCH BACKFILL

A. General

1. No backfilling shall commence until the pipe has been inspected and approved by the District, until concrete in masonry structures such as thrust blocks or encasement has attained a proper strength, and until required fittings are installed and inspected.
2. In backfilling the trench, the Contractor shall take all necessary precautions to prevent damage or shifting of the pipe. Backfilling from the sides of the trench will be permitted after sufficient material has first been carefully placed over the pipe to such a depth as is acceptable to the District.
3. Any backfill which becomes displaced or depressed during construction or during the warranty period, shall be refilled, shaped, and restored to proper grade as frequently as is necessary until the surface is unyielding, at the Contractor's expense.
4. Placement and compaction operation shall be done in 12-inches maximum loose lifts unless otherwise specified by the District. Lifts shall be compacted by the use of mechanical means approved by the District. Compaction equipment or methods that produce horizontal or vertical earth pressures, which may cause excessive displacement or may damage the water main or structure, shall not be used. Ponding or jetting of backfill materials will not be permitted. The trench excavation and adjacent areas shall be backfilled to the grades existing prior to construction.

B. Pipe Embedment Zone Definitions

1. Quarry fines bedding shall be defined as the area between the bottom of the pipe and 4-inches below the bottom of the pipe. Pipe Bedding shall consist of leveling the bottom of the trench and furnishing, placing, and compacting quarry fines or other specified material as shown on the project drawings and as specified herein.
2. Quarry fines backfill shall be defined as the area between the pipe, the sides of the trench, and 12-inches above the pipe. Pipe Backfill shall consist of furnishing, placing and compacting quarry fines above the pipe or other specified material as shown on the project drawings and as specified herein.
3. Bedding and backfill material shall be compacted to 90% relative compaction and placed in three lifts. Quarry fines shall be placed in no more than 12-inches lifts or as specified here in. Vibratory plate will not be allowed to compact the pipe backfill.

C. Pipe Embedment Zone Lifts

1. **Lift One** – The first lift shall consist of placing 4-inches of compacted quarry fines to the satisfaction of the District prior to the placement of the pipe. The pipe shall be placed prior to the second lift.

2. **Lift Two** – The second lift shall consist of placing quarry fines around the pipe to the top of the pipe to the satisfaction of the District. The top of the pipe shall be visible prior to the start of compaction for the second lift. Compaction of the backfill around the pipe shall be performed by a pneumatic means such as a “Powder Puff.” No other means of compaction tool shall be allowed without prior approval by the District. Contractor shall use extreme care to avoid hitting the pipe and V-Bio polyethylene wrapping while compacting.
3. **Lift Three** – The third lift shall consist of placing and compacting 12-inches of quarry fines until required total depth above the pipe is achieved.

D. Pipe Upper Level Zone

1. “Type A” Trench (Paved Surfaces)
 - a. Defined as backfilling the trench with Class 2 Aggregate Base and compacting it in uniform layers to a relative density of 95%. Temporary pavement of 2-inches minimum thickness shall be placed and maintained to the satisfaction of the District. Compact temporary pavement per Section 32 10 00 - Paving, Restoration, and Resurfacing. The existing paved surface shall then be replaced with a minimum 6-inches thickness of asphalt concrete within 30 days of placing temporary pavement.
2. “Type B” Trench (Graveled Areas and Road Shoulders/Town of Los Altos Hills Pathway)
 - a. Defined as backfilling the trench with Class 2 Aggregate Base and compacting it in uniform layers to a relative compaction of 95% to the surface.
 - b. If trench located within the Town of Los Altos Hills pathway, top 6-inches shall be placed per Town’s Pathway Standard Details.
3. “Type C” Trench (Unimproved Areas)
 - a. Defined as backfilling with native material removed from the trench and compacting it in uniform layers to a relative density of 90%. Material removed from the trench shall be deposited at a suitable site acquired by the Contractor or on abutting property if requested by the property owner, in writing.
4. “Type D” (Controlled Density Fill)
 - a. Defined as backfilling the trench with controlled density fill as defined in Section 03 30 00 – Cast in Place Concrete to within 6-inches minimum of the surface.

E. Subgrade

1. If the bottom of the trench contains stones or other hard objects which would interfere with the proper placement of bedding material or is unsatisfactory for supporting the pipe, it shall be removed to a depth to be determined by the District and backfilled with bedding material as directed by the District.
2. If water is encountered in the trench or the District inspector determines the subgrade below the pipe embedment zone is unstable, the Contractor shall excavate an additional 12-inches and install 3/4-inches crushed drain rock to within 4-inches minimum of the bottom of the pipe.

F. Compaction Tests

1. The Contractor is responsible achieving the compaction requirements of these specifications. At its discretion the District may perform compaction tests on its own to determine the adequacy of the trench bedding and. Retesting for compaction required by a failing test shall be paid for by the Contractor.

*****END OF SECTION*****

SECTION 32 10 00 - PAVING, RESTORATION, AND RESURFACING WORK

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Work required under this section consists of furnishing all labor, materials, tools, and equipment incidental to placing new asphalt concrete. Paving shall include asphalt concrete surfacing and untreated aggregate base course. Paved and gravel roads includes excavation, filling, spreading, and compaction of the filled areas to conform to the lines, grades, and slopes as shown on the drawings. The work also includes furnishing, installing and maintaining temporary paving and trench plates during construction.

1.02 SUBMITTALS

- A. The Contractor shall submit manufacturer data including catalog cuts, drawings and samples, as appropriate, and letter(s) of compliance as required by Section 01 33 00 - Submittals.

PART 2 MATERIALS

2.01 AGGREGATE BASE/SURFACING

- A. Aggregate shall conform to the requirements of Section 26 - Aggregate Bases, of the latest requirements of Caltrans Standard Specifications. Grading requirements shall be for 3/4-inch Class 2 aggregate base.

2.02 ASPHALT CONCRETE

- A. HMA shall conform to local agencies Standard and Specification and Section 39 - Asphalt Concrete, of the latest requirements of Caltrans Standard Specifications.

2.03 ASPHALT BINDER

- A. Asphalt binding shall be Grade PG 64-10 per Section 92 - Asphalt Binders, of Caltrans Standard Specifications.

2.04 TACK COAT

- A. Material for covering all (vertical and horizontal) surfaces of old pavement shall be asphalt emulsion Types SS-1 or RS-1 conforming Section 94 - Asphalt Emulsions, of the latest requirements of Caltrans Standard Specifications.

2.05 TEMPORARY PAVING

- A. Temporary pavement shall consist of 2-inches of cold mix asphalt over Class 2 aggregate base. The aggregate base shall be equal in depth to the new pavement structural section or more. The aggregate base shall be brought within 2- inches of the top of the existing

pavement and covered with temporary “cold mix” asphalt paving using an SC-250, SC-800 or approved equal. All temporary surfacing shall be installed the same day as backfilling and shall be level with existing pavement.

2.06 SLURRY SEAL

- A. Slurry seal shall be Type II conforming Section 37 - Bituminous Seals, of the latest requirements of Caltrans Standard Specifications.

2.07 STRIPING AND PAVEMENT MARKINGS

- A. Striping and pavement markings shall be thermoplastic per Section 84 – Markings, of the latest requirements of Caltrans Standard Specifications.
- B. Striping shall be placed in a continuous operation. The Contractor shall ensure there is enough material to prevent any stopping during placement. No overlapping of striping material or markings is permitted.

PART 3 EXECUTION

3.01 AGGREGATE BASE COURSE

- A. The aggregate base course shall be spread and compacted on the prepared subgrade. The base course material shall be placed in 6-inch max compacted layers and shall be compacted to a minimum relative density of 95%, or for water main work be spread and compacted as described under Section 31 80 00 - Trench Excavation, Bedding, and Backfill.

3.02 AGGREGATE SURFACING COURSE

- A. Gravel road surfacing shall be an aggregate course applied to the base course after compaction in the same manner as specified for the aggregate base course. The surface course shall be placed in one layer. Special care shall be taken to maintain crown or slope for drainage.

3.03 TACK COAT

- A. Apply tack coat to all horizontal and vertical surfaces of existing pavement and to vertical surfaces of curbs, gutters, conforms, and construction joints before placing asphalt concrete on or against them, at the rate of 0.10 gallons per square yard.

3.04 TEMPORARY PAVING

- A. Temporary paving shall be installed over all trenches to a thickness of 2-inches. Temporary paving shall be installed on the same day as acceptable trench compaction is obtained and base material installed and shall be smoothed out using a vibratory plate or other means approved by the District. No tire/wheel rolling compaction will be allowed.

Temporary paving shall be maintained on a daily basis until permanent paving is installed. The final paving operation shall occur within thirty (30) days of placing temporary paving.

3.05 ASPHALT CONCRETE

- A. Asphalt concrete shall be placed in accordance with local agencies Standard and Specifications and Section 39 - Asphalt Concrete, of the latest requirements of Caltrans Standard Specifications for method compaction.
 - 1. Minimum Temperature: The minimum temperature of asphalt concrete delivered to the site shall be at least 250° F, and no more than 370° F.
 - 2. Lift Thickness: Where the total thickness of asphalt concrete to be placed is greater than 3-inches, place in lifts of equal thickness, none of which shall exceed 3-inches.

3.06 SLURRY SEAL

- A. Slurry seal shall be placed in accordance with Section 37 - Bituminous Seals, of the latest Caltrans Standard Specifications. Slurry seal shall fully cure prior to traffic striping/marketing placement.
- B. Temporary traffic delineators (floppies, etc.) shall be removed prior to slurry seal placement.

3.07 TRAFFIC STRIPING

- A. Traffic striping shall be placed, per Town/County requirements, minimum two weeks after placing slurry seal, and shall comply with Section 84 – Markings, of the latest requirements of Caltrans Standard Specifications. All damaged striping and reflectors shall be replaced in kind to duplicate, insofar as possible, pre-construction striping. Cat track shall be approved by the Town/County prior to placing any striping and/or marking.

3.08 DAMAGE REPAIR

- A. The Contractor shall be responsible for any damage to existing infrastructures such as curbs, gutters, sidewalks, driveways and any asphalt concrete, liquid asphalt or asphaltic emulsion stains occurring during the course of this Contract. Stains shall be cleaned by sandblasting or any other method satisfactory to the District.

*****END OF SECTION*****

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SECTION 33 14 10 - ABANDONMENT OF EXISTING WATER MAIN AND FACILITIES

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Work included under this section consists of furnishing all necessary labor, materials, tools, equipment, and services necessary to abandon existing water main facilities as specified herein.
- B. Where indicated on the plans, the existing water main and any appurtenances connected to it or part of it, including but not limited to, hydrants, blowoffs, air release valves, service connections and gate valves shall be abandoned.

PART 2 MATERIALS

2.01 AGGREGATE BASE

- A. Aggregate base shall be as specified in Section 31 80 00 - Trench Excavation, Bedding and Backfill".

2.02 PAVEMENT REPLACEMENT

- A. Paving replacement materials and methods shall be as specified in Section 32 10 00 - Paving, Restoration and Resurfacing Work.

PART 3 EXECUTION

3.01 ABANDONMENT OF EXISTING WATER MAIN & FACILITIES

- A. The procedure described herein shall apply, as applicable, to all water mains and appurtenances designated for abandonment.
 - 1. This work shall not be done until the new water main has been successfully tested and is in operation. All work shall be coordinated with the District.
 - 2. After fire hydrant / check valve relocation, the existing hydrant/check valve shall be abandoned by cutting a minimum 18-inches below grade and concrete capping the pipe after the relocated hydrant assemblies have been installed and tested. The Contractor shall deliver the removed hydrants to the District's corporation yard. Stand pipes shall become the property of the Contractor. The Contractor shall also remove any hydrant marker posts for abandoned hydrants.
 - 3. Remove valve boxes (but not extensions of those boxes) and covers on valves located on water mains, fire hydrant runs, and blowoffs to be abandoned. Remove any valve marker posts for abandoned valves. Removed boxes, covers and marker posts shall become the property of the Contractor.

4. Remove existing meters and their respective boxes. The abandonment and removal of the existing meter box shall include removal of the angle meter stop and crimping the copper line within 2-feet of the meter box. Meters are to be delivered to the District's corporation yard. At the discretion of the District, the existing meter boxes, angle meter stops, and copper segments shall also be salvaged and delivered to the District's yard
5. Services on live water mains shall be abandoned at the water main by installing a Smith-Blair stainless steel clamp as directed by District.
6. The new meter box for the service and/or PRV shall be installed after the abandonment and removal of the existing copper line and angle meter stop.
7. Water mains to be abandoned shall be drained until no water is visible in the pipe. Cut, drain, and plug/cap both ends of all existing water mains and tees with fittings approved by the District.
8. Backfill shall be in accordance with Section 31 80 00 - Trench Excavation, Bedding and Backfill.
9. Restore paved surface as specified in Section 32 10 00 - Paving, Restoration and Resurfacing Work.
10. All abandoned facilities shall be water-tight.
11. Contractor shall use due care when working with asbestos cement pipe and shall comply with all applicable laws and regulations regarding such work. When cutting asbestos cement pipe, Contractor shall ensure that adequate means are used to protect its workers and the environment against asbestos exposure. Asbestos cement pipe shall not be cut with a saw or comparable dust-generating tool, unless adequate encapsulation is provided. Asbestos cement pipe removed by the Contractor's operations shall become his property and be properly bagged and disposed of in an approved manner as required by federal, state, and local regulations.

*****END OF SECTION*****

SECTION 33 14 13 – WATER MAIN

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Work included under this section consists of furnishing and installing all water main piping, fittings and appurtenances shown on the project drawings and as specified herein.
 - 1. All water mains, including hydrant runs and tie-ins, shall be constructed entirely of Class 50 zinc coated ductile iron pipe with restrained joint, bond together per Section 26 42 10 – Cathodic Protection of Ductile Iron Water Main; wrapped in low density V-Bio polyethylene film.

1.02 SUBMITTALS

- A. The Contractor shall submit manufacturers' data including catalog cuts, drawings and samples, as appropriate, and letter(s) of compliance as required by Section 01 33 00 - Submittals.

PART 2 MATERIALS

2.01 DUCTILE IRON (DI) PIPE

- A. General
 - 1. Ductile iron pipe shall conform to ANSI A21.50 and A21.51 (AWWA C150 and C151) and shall be Zinc Coated Class 50 pipe with the minimum working pressure of 350 psi.
- B. Joints
 - 1. Buried pipe shall all have restrained push-on joints (“Field Lok,”) unless specified otherwise. At fittings and tie-ins, pipe shall have restrained push-on joints, mechanical joints (mega-lugs), or flanged joints as directed by the District. Mechanical joints may be used for closures, subject to meeting thrust restraint requirements. Flanged ends, or plain ends with restrained couplings, shall be used for piping above ground.
 - 2. For mechanical joints, dimensional and material requirements for pipe ends, glands, bolts, nuts and gaskets shall conform to ANSI A21.11 (AWWA C111).
 - 3. For flanged joints, ends of pipe and fittings shall be provided with ductile iron flanges conforming to ANSI A21.10 and A21.15 (AWWA C110 and C115), as applicable. All flanged connections shall use U.S. Pipe “Ring Flange-Tyte” gaskets capable of withstanding pressures up to 350 psi.

C. Fittings

1. Fittings shall be ductile iron conforming to ANSI A21.53 (AWWA C153) for mechanical joints and ANSI A21.10 (AWWA C110) for flanged and push-on joints, with push-on joint bell design to fit the particular make of the pipe furnished or to fit a pipe-to-fitting adapter unless specified on the plans. Fittings shall have a pressure rating at least equivalent to that of the pipe used.

D. Coating and Lining

1. Buried ductile iron pipe, sleeves and fittings shall be class 50 zinc coated and cement-mortar lined. The lining shall conform to the Standard Specifications of AWWA C104. All above ground fittings and couplings shall be fusion epoxy lined and coated.

E. V-Bio Polyethylene Encasement

1. All buried ductile iron pipe and fittings shall be wrapped in low density V-Bio polyethylene in accordance with AWWA C105, Method A. The tape used to secure the encasement shall be black polyethylene pipe wrap tape, minimum 10 mil thick. No other tape is allowed.

F. Pipe End Caps During Transport / Storage

1. The interior of all pipe, fittings, and other accessories shall be kept clean and free from organic matter at all times. All pipes shall be delivered to the construction site with end caps on both ends. End cap components must adhere sufficiently to withstand the stresses caused by wind during shipment. Pipes delivered on-site with damage shall be immediately field cleaned to remove all undesirable material along the entire length of the pipe interior. New end caps shall be installed after cleaning.
2. Cut pipe lengths of 5-feet or less, fittings, and valves do not require end caps but shall be field cleaned prior to installation.

2.02 THRUST RESTRAINTS

A. Push-On Joint Locking Gasket

1. The locking gasket type restrained joint shall consist of stainless steel locking segments molded into the gasket that shall grip the spigot end of the pipe to prevent joint separation. This restrained joint system shall be "Field Lok", manufactured by U.S. Pipe for ductile iron pipe or equivalent.

B. Mechanical Joint Restraint

1. Mechanical joint fittings shall be EBAA Iron "Megalug". Bolts, nuts, and washers shall be low alloy (Corten).
2. Wedge gaskets shall be used with all mechanical joints. Standard mechanical joint gaskets are not allowed.

2.03 THRUST BLOCKS

- A. Concrete thrust blocks are optional except where required on the drawings. Thrust blocks shall be constructed per the Standard Drawings and Section 03 30 00 – Cast in Place Concrete

2.04 PIPE CONNECTORS

A. Flexible Couplings

1. Flexible couplings shall be Smith-Blair Quantum Coupling No. 462, or approved equivalent. Flex coupling must conform to latest AWWA C-219, with Type 316 stainless steel bolts, nuts, and washers.

B. Flanged Coupling Adapters

1. Flanged coupling adapters shall be Tyler MJxFE adapter. Flanges, spools and sleeves shall be high strength ductile iron with Type 316 stainless steel bolts, nuts, and washers.
2. Flange gaskets shall conform to Section 2.01 – Ductile Iron Pipe, Sub-Section B, Joints.

C. Tapping Sleeves

1. Tapping sleeves shall be JCM Industries 6432, all type 316 stainless steel bodies, designed for ductile iron, cast iron or PVC pipe. No tapping sleeves shall be used for asbestos cement pipe.

2.05 HARDWARE

- A. All bolts, nuts and washers, and restraining tie rods and associated hardware, used with flanged fittings, couplings and appurtenances shall be Type 316 stainless steel for all buried and exposed applications. All bolts shall be furnished with finished hexagonal nuts. The dimensions of all heads and nuts shall be not less than those required for the American Standard regular, and the height shall be sufficient to break the bolt in the body portion when tested. Threads shall be American Standard screw thread, coarse thread series.
- B. Type 316 stainless steel bolts and nuts hardware shall be used one time per application. Reusing Type 316 stainless steel hardware is not permitted.

- C. Mechanical joint hardware EBAA shall be high strength, low alloy (Corten).

2.06 TUBING AND FITTINGS

- A. Copper tubing and fittings used for service connections and reconnections shall be copper Type K, soft, and conform to ASTM 88.

2.07 MARKER TAPE FOR BURIED PIPING

- A. Marker tape shall be metallic foil bonded to plastic film not less than 2-inches wide. The adhesive shall be colored and be compatible with the foil and film. Film shall be inert polyethylene plastic with thickness not less than 10 mil.
- B. The buried utility line tape shall be identified with an appropriate imprint such as "Caution: Water Main Below" and the identification repeated at approximately 24-inch intervals. Letters shall be 3/4-inch high minimum. The tape shall have a blue imprint.
- C. Marking and warning tape shall be as manufactured by Calpico, Inc., Allen Systems, Inc., Reef Industries, or equivalent.

PART 3 EXECUTION

3.01 TRENCH EXCAVATION, BEDDING AND BACKFILL

- A. Trench excavation, bedding and backfill work shall be performed in accordance the project plans and Section 31 80 00 - Trench Excavation, Bedding and Backfill.

3.02 EXISTING UTILITIES AND STRUCTURES

- A. The locations of underground utilities and drainage facilities, where shown on the project drawings, are approximate only. It is the Contractor's responsibility to determine the exact locations of all existing utilities. Where existing culverts, underground facilities, under-ground structures, power, telephone or guy poles or guy wires interfere with construction, the Contractor shall be responsible for coordinating with the appropriate utility companies before removing or relocating any interfering utilities providing that the interfering utilities are shown on the drawings or are visible above grade.

3.03 HANDLING AND DISTRIBUTION OF MATERIALS

- A. Pipe and appurtenances shall be stored in a manner to avoid damage to the materials and to linings and coatings.
- B. The pipe shall be protected to prevent entrance of foreign materials during installation.
- C. All pipe and fittings shall be carefully examined for defects, and no piece shall be installed which is known to be defective. Special care shall be taken to avoid leaving bits of wood, dirt, or foreign particles in the pipe.

- D. All pipe and fittings shall be carefully handled at all times and at no time while loading, unloading, moving, or installing any lined pipe and fittings shall be dropped. All pipe and fittings shall be handled by mechanical means. Wye belt sling shall be used for all coated pipe.

3.04 INSTALLATION OF BURIED PRESSURE PIPING

A. General

1. Pipe, fittings, and appurtenances shall be installed in accordance with the manufacturer's instructions and in accordance with the latest AWWA C600.
2. The Contractor shall furnish such parts and pieces as may be necessary to complete the fixtures and apparatus in accordance with best practices of the trade and to the satisfaction of the District.

B. Alignment

1. Piping shall be installed as indicated on the project drawings. Where not detailed, exposed pipe shall be installed in straight horizontal and vertical runs parallel to the axis of the structures.
2. Parallel runs of pipe shall be grouped and kept uniformly parallel. Bends and fittings shall be properly located to maintain uniform spacing and elevation of pipe groups at changes of direction and at branch connections.
3. All pipe shall be carefully placed and supported, and proper lined and grade. Minor adjustments may be necessary to avoid architectural and structural features. Major relocations shall be approved by the District.
4. Project drawings are diagrammatic for piping that is not shown in detail. Size of piping and their location are indicated, but it is not limited to show every offset and fitting nor every structural difficulty that may be encountered during the installation for the work. The pipe alignment shall be varied from indicated on the project's drawings without extra expense to the District where necessary to complete the fixtures and apparatus in accordance with the best practice of the trade and to the satisfaction of the District.
5. The allowable angle of deflection at any joint shall not exceed the amount recommended by the pipe, or coupling, manufacturer for the particular pipe size used.
6. A minimum 3-foot homogeneous length of pipe shall be installed before and after any fitting, valve or other appurtenance. Any sections less than 3-feet will not be permitted.

7. Trench dams shall be placed on new water main alignments where slopes exceed 10% or as directed by the District and shall be placed every 100-feet in accordance with the Standard Drawings.

C. Valves

1. Valves shall be set with the stems upward and in vertical position, unless indicated otherwise on the drawings. The Contractor shall not operate existing District valves at any time.

D. Joints

1. Pipe shall be assembled and joined in accordance with the manufacturer's published instructions for the type of pipe and joint used. All portions of the joints shall be thoroughly cleaned before the sections of pipe are assembled. The ends of each pipe shall abut against the next pipe section in such a manner that there will be no unevenness of any kind along the bottom half of the interior of the pipe.
2. Where mechanical joints are used with ductile iron pipe, the pipe shall be marked in such a manner that it can be determined after installation that the pipe is properly seated.

E. Pipe Plugs

1. When pipe laying is not in progress, the open ends of the installed pipe shall be closed with a water tight plug. The plug shall be fitted with means for venting. When practical, the plug shall remain in place until the trench is pumped completely dry. Care must be taken to prevent pipe flotation if the trench fills with water.

F. Thrust Resistance

1. Restrained joints shall be provided on all joints, at all bends, vertical bends, tee branches, and dead ends for ductile iron pipe.
2. Concrete thrust blocks shall be cast between undisturbed ground and the fitting to be anchored as shown on Standard Drawings. Blocks shall be poured so that the pipe and the fitting will be accessible for repairs.
3. Restraints must be used throughout the full length of any DI pipe installed in a casing to the nearest fitting on each side of the casing (i.e., the casing installation does not provide effective thrust restraint).
4. Where restraints are used, the manufacturer's written instruction for installation shall be followed.

G. Encasement for Ductile Iron Pipe and Fittings

1. Encasement for ductile iron pipe and fittings shall be in accordance with ANSI/AWWA C105/A21.5-05 Method A.
2. Ductile iron pipe and fittings shall be encased with the encasement prior to placement in the trench. Encasement shall be cut approximately 2-feet. longer than the length of the pipe. It shall be slipped around the pipe, centering it to provide a 1-foot. overlap on each adjacent pipe section and bunching it in an accordion-fashion lengthwise until it clears the pipe end.
3. After assembling the pipe joint, the overlap of the encasement from the preceding shall be pulled over to the new length of pipe and secured in place. Then, the overlap end of the encasement from the new pipe section shall be slip over to the preceding pipe and secured in place. Installation of the next section of pipe shall be in the same manner.
4. The excess encasement along the length of the pipe shall be folded back and secured at quarter points. The slack of the pipe shall be snug but not tight.
5. Encasement cuts, tears, punctures, or other damage to the encasement shall be repaired with adhesive tape or with a short length of encasement sheet wrapped around the damaged area.
6. Bends, reducers, offsets, and other appurtenances shall be covered with encasement in the same manner as the pipe.

H. Marker Tape Installation

1. Tape shall be installed in the backfill centered over the water main, as shown on the Standard Drawings.

I. Cathodic Protection

1. Cathodic protection for buried metallic pipe, fitting and appurtenances shall be used per Section 26 42 10 - Cathodic Protection of Ductile Iron Water Main.

J. Disinfection

1. Water main disinfection shall be in accordance with the AWWA C651 and shall be supervised by the District. The Contractor shall not disinfect the water main until they have coordinated with the District.
2. The Contractor shall submit disinfection methodology and material information for District review and approval prior to disinfection, per Section 01 33 00 – Submittals.
3. Filling and contact time shall be per AWWA C651. When installation is completed, the water main shall be filled with water at a rate to ensure the water within the water

main will flow at a velocity no greater than 1 ft/sec (0.3 m/sec). Precautions shall be taken to ensure air pockets are eliminated. This water shall remain in the pipe for at least twenty-four (24) hours. If the water temperature is less than 41° F (5° C), the water shall remain in the water main for at least forty-eight (48) hours.

K. Bacteriological Test

1. Standard conditions:

- a. After the final flushing and before the new water main is connected to the distribution system, two (2) consecutive sets of acceptable samples, taken at least twenty-four (24) hours apart, shall be collected from the new water main. At least one (1) set of samples shall be collected from every 1,200-feet of the new water main, plus one set from the end of the line and at least one set from each branch. Samples shall be tested for bacteriological (chemical and physical) quality in accordance with the most recent *Standard Methods for the Examination of Water and Wastewater* (AWWA, 6666 W. Quincy Avenue, Denver, CO 80232, (303) 794-7711, APHA, 800 I Street, NW, Washington, DC 20001, (202) 777-2742, or WEF, 601 Wythe Street, Alexandria, VA 22314-1994, (800) 666-0203). Water shall show absence of coliform organisms, and the chlorine residual shall be within 0.4 mg/l of the chlorine residual of the water being used to fill the new water main and HPC count shall be less than 500 colony-forming units (cfu) per ml. If the first sample test fails the District will require additional tests to find the turbidity, pH, and a standard heterotrophic plate count (HPC) level.

2. Special conditions:

- a. If excessive quantities of dirt, debris, or trench water have entered the new water main, bacteriological samples shall be taken at intervals of approximately 200-feet or as directed by the District. Additional samples shall be taken of water that stood in the new water main for at least sixteen (16) hours after final flushing has been completed.

3. Sampling Procedure:

Samples for bacteriological analysis shall be collected in sterile bottles treated with sodium thiosulfate, as required by *Standard Methods of the Examination of Water and Wastewater*. No hose or fire hydrant shall be used in the collection of samples without prior approval from the District. If no other sampling ports are available, a well-flushed fire hydrant with a hose bib may be used with the understanding they do not represent optimum sampling conditions. A corporation-stop with a copper standpipe assembly or a temporary combination blow-off assembly may be used for sampling the new water main. The sampling pipe must be dedicated and clean, disinfected and flushed prior to sampling. There should be no water in the trench up to the connection for sampling. All

samples shall be collected by the District and shall be delivered to the lab within 8 hours after collection.

4. Sample Results.

- a. If sample results from the lab indicate a measured coliform organism and/or HPC greater than 500 colony-forming units (cfu) per mL, flushing should be resumed and another coliform and HPC set of samples should be taken until no coliform are present and the HPC is less than 500 cfu/mL.

5. Record of Compliance.

- a. The record of compliance shall be the bacteriological test results certifying the water sampled from the new water main is free of coliform bacteria contamination.

6. Re-disinfection

- a. If the initial disinfection fails to produce satisfactory bacteriological results, the new water main shall be re-flushed, re-chlorinated, and re-sampled at the expense of the Contractor. If check samples also fail to produce acceptable results, the water main shall be re-chlorinated until satisfactory results are obtained – that being two (2) consecutive sets of acceptable samples taken twenty-four (24) hours apart.

L. Tie-ins

1. Final connection to existing water main shall be in accordance with latest AWWA C651.
2. Water main and all appurtenances must be completely installed, flushed, disinfected, and satisfactory bacteriological sample results received prior to permanent connections being made to the active distribution system. The new pipe, fitting, and valve(s) required for the connection shall be swabbed with a minimum 1-5% solution of chlorine just prior to installation.
3. District shall be notified at least two (2) working days in advance of any scheduled tie-ins.
4. No tie-ins, or shutdowns, will be allowed on Fridays or the day preceding a holiday.
5. No shutdown shall exceed six (6) hours in duration.

3.05 INSTALLATION OF ABOVE GROUND EXPOSED PRESSURE PIPING

A. General

1. Pipe, fittings, and appurtenances shall be installed in accordance with the manufacturer's specifications and related section 3.04 of these Standard Specifications or as directed by the District.

B. Exposed Pipe

1. Extreme care shall be taken to ensure watertight joints. All pipe shall be free of all dirt and grease to secure a tight bond with concrete or waterproof material.
2. Metallic pipe shall be coated with fusion epoxy bound.

3.06 CASING

A. Fittings

1. Field locks shall not be used on the first fittings on the pipe coming out of the steel casing.

3.07 PRESSURE PIPE ACCEPTANCE TESTS

- A. All newly installed sections of pressure piping including but not limited to service connections shall be pressure and leak tested as described herein. Testing procedures shall be in accordance with the requirements of latest AWWA C600 for ductile iron pipe and latest AWWA C605 for PVC pipe as modified herein. The tests may be run simultaneously at the Contractor's option.
- B. For buried pressure water mains, tests shall be made on sections not to exceed 2500-feet in length. All necessary equipment, material and labor required shall be furnished by the Contractor. The District will monitor all testing operations. Testing against new valves is permitted at the Contractor's risk. No testing is permitted against existing system valves.
- C. Tests can only occur after the trench has been backfilled.
- D. The test pressure shall not be less than 1.25 times the stated working pressure of the water main measured at the highest elevation along the test section and not less than 1.5 times the stated working pressure at the lowest elevation of the test section. The test pressure in the main shall be maintained for a period of two (2) hours. The test pressure shall not vary by more than ± 5 psi for the duration of the test. The water required to maintain the test pressure within the allowance pressure loss shall be measured by means of a graduated barrel, drum or similar device at the pump suction.
- E. No leakage shall be permitted for exposed piping.
- F. Allowable leakage for buried pipe shall be as follows:

$$+L = \left(\frac{SD\sqrt{P}}{148,000} \right) \times 2$$

L = testing allowance (makeup water) (gph for 2 hours)

S = length of pipe tested (ft)

D = nominal diameter of the pipe (in.)

P = average test pressure during the hydrostatic test (psi [gauge])

Allowable Leakage for DI (gal/1000 ft./2 hrs.)

Test Pressure	6-inch	8-Inch	10-Inch	12-Inch
150 psi	0.99	1.32	1.66	1.99
175 psi	1.07	1.43	1.79	2.15
200 psi	1.15	1.53	1.91	2.29

- G. Should testing disclose leakage in excess of that required in the preceding table, defective joints or pipe shall be located, repaired and retested until satisfactory at no additional cost to the District.

3.08 FLUSHING AND DECHLORINATION

- A. Flushing and dechlorination of the water main shall be supervised by the District. The Contractor shall not flush or dechlorinate the water main until they have coordinated with the District.
- B. A Flushing/Dechlorination Plan and Water Pollution Control Plan must be approved by the District prior to any flushing or draining of the new/abandoned water main and appurtenances.
- C. Prior to any flushing, the Contractor shall install and secure BMP's at storm drain inlets/catch basins. Repair, replace, and secure BMP's if needed before proceeding with the flushing operation.
- D. A flushing sock shall be installed to treat chlorinated water with dechlorination tablets.
- E. All foreign matter shall be flushed from the water main prior to disinfection. Hoses, temporary piping, or other devices shall be provided to dispose of flushing water without damage to adjacent properties. An approved backflow device shall be used when flushing and filling newly-constructed mains.
- F. Following chlorination, all treated water shall be flushed from the mains until the replacement water shall, upon testing, both chemically and bacteriologically, be proven

equal to the water quality at the point of supply. Chlorination shall be repeated, if necessary, by the Contractor if the replacement water does not prove equal to the water quality at the point of supply. Actual testing of the bacteriological water sample for chlorine residual shall be conducted by District personnel.

- G. A disposal plan of chlorine-water mixture shall be submitted to the District five (5) working days in advanced for review. Upon approval of the disposal plan by the District, the Contractor may proceed with disposal of the chlorine-water mixture per Storm Water Pollution Control Plan\Erosion Control.
- H. The Contractor shall not allow the treated water to discharge onto open surface or waterway without adequate dechlorination or other satisfactory method of reducing the chlorine concentration to zero.

3.09 CUTTING AND DISPOSAL OF EXISTING ASBESTOS CEMENT PIPE

- A. Contractor shall use due care when working with asbestos cement pipe and shall comply with applicable laws and regulations regarding such work.
- B. Snap cutters shall be used to cut asbestos cement pipe. When cutting asbestos cement pipe, Contractor shall ensure that adequate means are used to protect its workers and the environment against asbestos exposure.
- C. Asbestos cement pipe shall not be cut with a saw or comparable dust-generating tool.
- D. Asbestos cement pipe removed by the Contractor's operations shall become their property and be properly bagged and disposed of in an approved manner as required by federal, state and local regulations.

*****END OF SECTION*****

SECTION 33 14 20 - VALVES AND APPURTENANCES

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Work included under this section consists of furnishing and installing valves and appurtenances as shown on the Standard Drawings and as specified herein.

1.02 SUBMITTALS

- A. The Contractor shall submit manufacturer's data including catalog cuts, drawings and letter(s) of compliance as required by Section 01 33 00 - Submittals.

PART 2 MATERIALS

2.01 GENERAL

- A. Brass goods furnished under this section shall be new and unused. All fittings shall conform to latest ANSI/AWWA Standard C800.
- B. All brass components in contact with potable water must be made from either CDA/UNS Brass Alloys C89520 or C89833 with a maximum lead content of .25% by weight. Brass alloys not listed in AWWA C800, Paragraph 4.1.2, are not approved. Brass saddles shall be made from CDA/UNS C83600.
- C. All fittings shall be stamped or embossed with a mark or name indicating that the product is manufactured from the low-lead alloy as specified above.

2.02 GATE VALVES

- A. Gate valves shall be Mueller A-2362 and have either flanged or mechanical joint ends as shown on the Standard Drawings. The valve shall be resilient seat and fully comply with the latest AWWA C509, and also be UL listed and FM approved. The valves shall be tested and certified to ANSI/NSF 61.
- B. The valve shall have a 350 psig working pressure. Each valve shall be factory seat tested to 350 psig and shell tested to 500 psig. Buried valves shall be NRS (non-rising stem), equipped with a 2-inches square operating nut (open left), and have an arrow cast on the operating nut opening direction. The bolt that attaches the operating nut to the stem shall be recessed into the operating nut so as not to interfere with valve wrench operation.
- C. All main line and/or branch valves shall be 6-inch or larger in diameter and shall match the water main size, with flanged or mechanical joint ends or push-on with FieldLok. Valves smaller than 6-inches shall require prior written approval by the District. Flanges shall be dimensioned, faced and drilled in accordance with ANSI B16.1 for Class 125 unless

stated otherwise on the drawings or the specifications. All necessary caulking materials, gaskets, bolts, and nuts shall be provided. All valves shall be protected from damage before installation and until completion of work.

- D. All buried valves shall be furnished with Type 316 stainless steel valve stem packing and bonnet bolts. All external flanged bolts, nuts and washers for all valves shall be Type 316 stainless steel. Corten T-bolts are allowed on mechanical joints.
- E. The valve stem shall be made standard bronze material. The stem shall have at least one "anti-friction" thrust washer above and below the stem collar to reduce operating torque. The design of the NRS valve stem shall be such that if excessive input torque is applied, stem failure shall occur above the stuffing box at such a point as to enable the operation of the valve with a pipe wrench or other readily available tool. Valves with two-piece stem collars are unacceptable.
- F. The NRS valves shall have a stuffing box (with dirt seal) that is o-ring sealed. Two o-rings shall be placed above and one o-ring below the stem thrust collar. The thrust collar shall be factory lubricated. The thrust collar and its lubrication shall be isolated by the o-rings from the waterway and from outside contamination providing permanent lubrication for long term ease of operation. Valves without a stuffing box are unacceptable. Valves without at least three stem o-rings are also unacceptable.
- G. The valve disc and guide lugs must be fully (100%) encapsulated in EPDM. The peel strength shall not be less than 75 lbs/in. Guide caps of an Acetal bearing material shall be placed over solid guide lugs to prevent abrasion and to reduce the operating torque. Guide lugs placed over bare metal are not acceptable.
- H. The valves shall have all internal and external ferrous surfaces coated with a fusion bonded thermosetting powder epoxy coating of 10 mils nominal thickness. The coating shall conform to AWWA C550.
- I. The valves shall be warranted by the manufacturer against defects in materials or workmanship for a period of ten (10) years from the date of manufacture. The manufacturing facility for the valves must have current ISO certification.

2.03 GATE VALVE EXTENSION

- A. Gate valve extensions are required on any valve nuts installed more than 3-feet below finished grade or as directed by the District. Gate valve extensions shall be Fiberplas stem extensions model FPL 200-220, manufacturer by Pipeline Products.
- B. The Contractor shall cut the valve extension tubing such that the top of extension nut is installed at least 18-inches but no more than 24-inches below the finished grade.

2.04 HYDRANTS

- A. Hydrants shall be Clow 960 (wet barrel) with Clow Valve model LB400 break-off check valve assembly. The break-off check valve assembly shall have Type 316 stainless steel bolts and nuts between the body and extension/riser.
- B. Hydrants shall have two 2-1/2-inches outlets and one 4-inches pumper outlet. Hydrants shall have a 6-inches flanged inlet per the Standard Drawings.
- C. The Contractor shall have various hydrant bury lengths on hand to accommodate varying field conditions. The bury length selected shall be such that the bottom of the break-off flange is at least 1-inch but no more than 4-inches above finished grade.
- D. Hydrants and all metal above the concrete collar shall be factory painted “safety yellow” using a self-priming, semi-gloss, high solids polyurethane 2114 Series and 249-22 Catalyst as manufactured by Pinnacle. Contractor shall submit a color sample for review.
- E. All bolts, nuts and washers, and restraining tie rods and associated hardware, used with flanged fittings, couplings and appurtenances shall be Type 316 stainless steel.

2.05 COMBINATION AIR VALVES

- A. Combination air valves shall be capable of positive action in releasing air accumulations in water mains under full line operating pressure and shall vent or exhaust air during filling and draining operations. Valves shall be of the size and pressure rating indicated on the project drawings or if not so indicated shall be 1-inch with a 5/64-inch orifice and simple type lever, rated for operation at 300 psi minimum for water main 8-inches and smaller, and 2-inches with a 3/32-inch orifice and simple type lever, rated for operation at 300 psi minimum for water main 10-inches and larger. Valve interiors and exteriors shall be coated with an NSF/ANSI 61 certified fusion bonded epoxy in accordance with AWWA C550. Combination air valve shall be Val-Matic 201CDISV.2 for 1-inch and Val-Matic 202CDISV.2 for 2-inch valve.

2.06 METER VALVES AND COUPLINGS

- A. All service fittings shall be certified as suitable for contact with drinking water by an ANSI accredited organization in accordance with ANSI/NSF Standard 61, Drinking Water Systems Components – Health Effects.
- B. Compression ball angle meter valves shall be angle pattern, with lock wing. Compression ball angle meter valves for 1-inch meter connections shall be Mueller B-24258N. Compression ball angle meter valves for 1-1/2-inches and 2-inches meter connections shall be Mueller B-24276N.
- C. When a 3/4-inch meter is being installed, two (2) Ford A-34-NL meter adapters shall be installed on the inlet and/or outlet sides of the meter. When (3/4 X 1) inch meter is begin

installed, one (1) Ford A-44-NL meter adapter shall be installed on the outlet side of the meter.

- D. Meter couplings shall be Mueller H-10871N (insulated).
- E. Residential ball valve shall be Red White 5044AB
- F. When the customer's water service is PVC, Mueller V-15442 (female) or V-15440 (male), a Pack Joint connection shall be used.

2.07 CORPORATION STOPS

- A. Corporation stops shall be Mueller N-35008N (insulated), with inlet AWWA taper thread and outlet compression connection for 1-inch, 1-1/2-inches and 2-inches service connection.
- B. Corporation stops shall be Mueller B-30045N (insulated) on a 1-inch and 2-inches combination air valve.

2.08 SERVICE SADDLES

- A. Service saddles shall be bronze with neoprene gaskets with double bronze straps, Mueller No. BR2B "CC", sized for the exact outside diameters of the pipes on which they will be installed.

2.09 BLOWOFF ASSEMBLY

- A. Blowoff assemblies shall have a 2-inches vertical FIP inlet and 2-inches NIP for mains 6-inches and smaller, or 4-inches vertical FIP inlet and 4-inches MIP outlet for mains 8-inches and larger.

2.10 BACKFLOW PREVENTER

- A. Backflow preventer shall operate on the reduced pressure principle and shall consist of two (2) spring-loaded check valves and a spring-loaded, diaphragm actuated, differential pressure relief valve located between the two (2) check valves, in accordance with the Standard Drawings. The backflow preventer assembly shall meet all applicable requirements of latest AWWA C511 and shall be included on the most current "List of Approved Backflow Prevention Assemblies" issued by the California Department of Public Health (CDPH).
- B. Backflow preventer shall be provided on all service connections to properties having a supplemental source of water, wells, fire sprinkler system, irrigation system that has an automatic chemical feeding control, pumps, multi-story buildings or any other instances that has a potential to contaminate potable water supply or as directed by the District.
- C. Reduced pressure backflow preventer assembly shall be Wilkins 975XL2TCU or 375XL for 3/4-inch to 2-inches and Wilkins 375DA for 2-1/2-inches and greater.

2.11 VALVE AND METER BOXES

- A. Valve boxes shall be Christy “Machined Faced” Model G05T (traffic valve) with G505CT (cast iron) cover. Covers shall be marked "WATER". Concrete extension pieces shall be provided with each box as required. For deep bury conditions for valve boxes, pipe extensions shall be 8-inch SDR 35 PVC.
- B. For 3/4-inch or 1-inch meters, meter boxes shall be Fibrelyte FL30T. For 1-1/2-inches or 2-inches meters, meter box shall be Fibrelyte FL36T. Meter Lids shall be marked “WATER” and have one probe hole, made for Badger Beacon with Orion radio readers. Traffic rated cover shall be provided in traffic area and where directed by the District.
- C. For 1-inch service PRVs, boxes shall be Christy BX09B with a BX09D reinforced concrete lid or as noted on the project plans. For 2-inches service PRVs, boxes shall be Christy B16B with a B16G reinforced concrete lid or as noted on the project plans.
- D. Boxes for the 4-inches blowoff assembly shall be Christy Model B1324 (H/20 loading) with a B1324-61JH steel checker plate cover.
- E. Boxes installed in driveways and other paved areas shall be traffic rated boxes and covers.

2.12 PRESSURE REDUCING VALVE

- A. The pressure reducing valve shall be installed according to the project plans. Contractor shall submit for review and approval shop drawings for the pressure reducing valve and vault assembly.
- B. Pressure reducing valve shall be a Cla Val, models approved by the District, and installed per the plans and manufacturer’s recommendation.
- C. Pipe supports shall be installed per detail drawings.
- D. Pressure gages shall be liquid filled and accommodated pressure shown on plans.
- E. After the pressure reducing valve and vault has been installed, the vault shall be cleaned from all construction debris.
- F. All bolts, nuts and washers, and restraining tie rods and associated hardware, used with flanged fittings, couplings and appurtenances shall be Type 316 stainless steel.
- G. Contractor shall coordinate with District for a temporary shutdown.

PART 3 EXECUTION

3.01 VALVES INSTALLATION

- A. Valves shall be carefully installed in their respective positions, accessible for operation and repair, and free from all distortion and strain, with joints made as specified, and shall

be left in satisfactory operating condition. Buried gate valves, and valve boxes, shall be installed in accordance with the Standard Drawings.

- B. Before installation, all valves and appurtenances shall be thoroughly cleaned of all foreign material, and shall be inspected for proper operation, both opening and closing and to verify that the valves seat properly. Valves shall be installed so that the stems are vertical.
- C. A marker post shall be installed adjacent to each gate valve, combination air valve, and blow-off assembly. The location for each post will be selected by the District based on field conditions.
- D. Valves located within 10-feet of a fitting shall be moved directly to the fitting and connected via a flanged joint or as directed by the District.

3.02 VALVE AND METER BOX INSTALLATION

- A. Valve boxes shall be centered and set plumb over the wrench nuts of the valves and shall not transmit shock or stress to the valves. Valve box covers shall be set flush with the surface of the finished grade or as directed by the District. Backfill shall be placed around the valve boxes and thoroughly compacted to a 95% relative in such a manner that will not damage or displace the valve box from proper alignment or grade. Misaligned valve boxes shall be re-excavated, replumbed, and backfilled at the Contractor's expense. No riser or extension rings are allowed. 8-inches SDR 35 PVC pipe extensions shall overlap the gate valve box a minimum of 6-inches.
- B. Water meter boxes shall be the last item set after the existing angle meter and copper piping is removed. Meter boxes shall be set parallel to the service line following the slope of existing ground. After the box is set and aligned with the meter, the contractor may use native material, aggregate base, or fines to backfill around the box or as directed by the District. Soil within a 12-inches perimeter of the box shall be compacted to a relative density of 90% using a pneumatic device such as a "Powder Puff" or other mechanical means approved by the District.
- C. Finished box elevation shall be 1-inch above finished grade when located in non-traffic areas and flush with pavement when located in traffic areas and pathways.
- D. Contractor shall set the box "knockout" in-line with service, and a 1-inch clearance between the box and service line. The box shall not sit on top of the service line.
- E. After the box has been set and compacted, any debris and dirt inside the box shall be removed and disposed of to the District's satisfaction.
- F. Contractor shall bear the responsibility of private property structures such as mail boxes, retaining walls, landscaping, etc., during construction.

3.03 SERVICES CONNECTION INSTALLATION

- A. All services shall be 1-inch or 2-inches in size and installed in conformance with the Standard Drawings.
- B. Applications for services larger than 1-inch require hydraulic calculation justification and prior approval from the District. Services larger than 2-inches also require submitting a shop drawing.
- C. Contractor is responsible to determine ahead of time the necessary material to connect the service with the resident's service line. Contractor shall coordinate with the District to determine the configuration and location of the service.
- D. Direct tapping of ductile iron pipe shall be done using the "preferred method" described in AWWA C600, Section 4.8 to preserve the integrity of the existing encasement. This method requires the application of two or three layers of polyethylene adhesive tape completely around the pipe to cover the area where the tapping machine and chain will be mounted. The corporation stop shall then be installed directly through the polyethylene tape and encasement. If damaged, the encasement and/or tape shall be repaired with tape.
- E. Direct tapping of PVC pipe shall be done using the "preferred method" described in AWWA C605, Section 6.4.
- F. Service relocations shall be done by "freezing" the service line with CO₂, or other approved method by the District to temporary discontinue the supply of water while relocating the service. Crimping will not be allowed to temporary block the supply of water.

3.04 FIRE HYDRANT INSTALLATION

- A. Fire hydrants shall be plumbed vertical and installed in accordance with the Standard Drawings. Fire hydrants shall be set so the bury line mark on the break-off is level with finish grade.
- B. All hydrants shall be flushed and tested after installation to ensure a sound setting and smooth operation. All valves shall close drip tight.
- C. All hydrants shall be flushed and tested after installation to ensure a sound setting and smooth operation. All valves shall close drip tight.
- D. Contractor shall install a blue, two-way, reflective pavement marker at each fire hydrant location as directed by the local agencies. If the marker does not adhere to existing ground, place it on top the gate valve cover located directly off the main. The markers shall be furnished and installed in accordance with Section 84 – Markings of the Standard Specifications. Fire hydrant valve lid and rim shall be painted direct to metal yellow.

3.05 BLOW-OFF ASSEMBLY INSTALLATION

- A. Blow-off assembly shall be installed in accordance with the Standard Drawings.

3.06 COMBINATION AIR VALVE INSTALLATION

- A. Combination air valves shall be plumbed vertical and installed in accordance with the Standard Drawings.

3.07 BACKFLOW PREVENTER INSTALLATION

- A. Backflow preventer shall be installed horizontal and level, with the minimum clearances for obstructions as shown on the Standard Drawings. Vertical installations are allowed but require District approval prior to design and installation. A ball valve shall be installed on both sides of the backflow preventer assembly. Mueller's H-15531N compression x MIPT 90's shall be used at both ends of the assembly to allow removal of the unit in the event of a malfunction. Backflow preventers assembly shall be tested and certified prior to being put in service. Valves failing the test shall be replaced, and retested.
- B. Contractor is responsible to determine ahead of time the necessary material to connect the backflow preventer with the resident's service line. Contractor shall coordinate with the District to determine the configuration and location of the backflow preventer.

*****END OF SECTION*****