

SECTION 33 11 23

AWSS WORK

PART 1 - GENERAL

1.1 DESCRIPTION

- A. The Contractor shall remove and salvage, remove and dispose of as the Contractor's property, install Contractor-furnished and City-furnished materials and equipment, and test, as applicable, the City and County of San Francisco's (CCSF) Auxiliary Water Supply System (AWSS) high-pressure piping where as shown on the Plans, Special Provisions, in accordance with these AWSS Standard Plans and Specifications, and the applicable requirements of the San Francisco Water Department (SFWD).
- B. The Contractor shall perform all work and furnish all materials, other than those specified to be furnished by the City, which are necessary or required to complete the work as shown on the Drawings and as stated in the Special Provisions.
- C. The following AWSS work related to this Section shall be considered incidental to the work of this Section and no separate payment will be made therefore.
 - 1. Concrete work
 - 2. Excavation, pipe bedding, backfill and compaction
 - 3. Restoration of concrete street base, pavement and sidewalk
 - 4. Demolition
 - 5. Shoring
 - 6. Dewatering
 - 7. Informing, coordinating and cooperating with other utility companies whose facilities will conflict with the new AWSS work.
- D. Dewatering shall be considered incidental to trench support work and no separate payments will be made therefore. Dewatering includes removing water that results from leaking through closed AWSS gate valve(s). The Contractor is hereby notified that the SFWD does not guarantee a "dry pipe" condition when the gate valve(s) on the pipeline adjacent to the work location are closed.

1.2 RELATED SECTIONS

- A. Section 01 28 48 Protection of Existing Water and AWSS Facilities (Where applicable) as prepared by the San Francisco Water Department
- B. Section 01 78 39 Project Record Documents
- C. Section 03 10 00 Concrete Formwork
- D. Section 03 20 00 Reinforced Concrete
- E. Section 03 30 00 Cast-in-Place Concrete

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| F. | Section 05 50 00 | Fabricated Metalwork and Miscellaneous Items for AWSS Work |
| G. | Section 31 23 20 | Ground Water Dewatering Controls |
| H. | Section 31 23 26.1 | Excavation and Backfill for AWSS Work |
| I. | Section 32 00 00.1 | Pavement Restoration for AWSS Work |
| J. | Section 33 11 24 | AWSS High Pressure Ductile Iron Gate Valves (Where applicable) |
| K. | Section 33 11 24.1 | AWSS High Pressure Ductile Iron Check Valves (Where applicable) |
| L. | Section 33 11 25 | AWSS High Pressure Ductile Iron Ball Joints (Where applicable) |
| M. | Section 33 11 26 | AWSS Suction Connections (Where applicable) |
| N. | Section 33 11 27 | AWSS Motorized Gate Valve Equipment (Where applicable) |

1.3 SPECIAL INSTRUCTIONS

- A. The Contractor shall perform preliminary excavations “pot-holing” at each location and along any runs of pipe, including hydrant laterals, to determine if they are any utility conflicts. These excavations shall be performed at 10-foot intervals along the new pipe route and shall consist of a minimum 18-inch square shaft. These preliminary excavations shall be considered incidental to the Bid Item for that location.
- B. The Contractor shall have all required pipes, fittings, valves and miscellaneous items to complete the work for a particular location either on the “job site” or at a location in San Francisco, CA, where he/she can bring the items to the “job site” within one (1) hour, before beginning excavation at the “job site”.
- C. The Contractor shall provide the City Representative seven (7) full business days written notice prior to beginning any removal or new work at each particular location, including saw cutting and/or pavement removal work. The City reserve the right to delay the start of work at each particular location for up to seven (7) full business days with accruing any costs when required due to SFWD/SFFD operational requirements and/or unavailability of required personnel.
- D. The use of tandem mechanical joint restraint follower gland assemblies or similar collars that are secured to pipe or fittings by the use of threaded screws/bolts against the pipe or fitting body, shall not be substituted for the AWSS stop/bell collars, welded collar stops and tie rods. Restrain follower gland assemblies or similar collars shall only be installed where called out on the drawings to be furnished and installed for specific locations.
- E. Where discrepancies exist on the drawings between the numbers of material quantities listed in the “Item Table” and as where shown graphically on the plan

layout, the greater quantity of materials shall be provided to complete the design intent. The additional quantity of materials shall be furnished and installed at no additional cost to the City.

1.4 AWSS RECORDS AND STANDARD DRAWINGS

- A. Records of the existing AWSS facilities and AWSS Standard Plans and Specifications are available for examination by Bidders/awarded Contractor/public at: San Francisco Water Department-City Distribution Division, 1990 Newcomb Avenue, San Francisco, CA; or awarded contractors for projects sealed/stamped by San Francisco Department of Public Works engineer: San Francisco Department of Public Works-Mechanical Section, 30 Van Ness Avenue, 5th Floor, San Francisco, CA. Contractors are cautioned that field changes and discrepancies to AWSS drawing records of existing AWSS facilities may have been made. The City makes no representation as to the completeness or accuracy of said records and assumes no responsibility thereto.
- B. Drawing HPL-5573A Rev. 0-Auxiliary Water Supply System Standard Plan for Ductile Iron Pipe Installation and Pipe Trench. Detail drawing is included at the end of this section.

1.5 REFERENCES

- A. AWSS Standard Plans and Specifications, current revisions.
- B. ANSI/AWWA C151/A21.51
- C. ANSI/AWWA C111/A21.11
- D. ANSI B116.42, 1779
- E. State of California Labor Code, Section 6705 and 6707.
- F. State of California Construction Safety Orders, Article 6 - Excavation.
- G. San Francisco Public Utilities Commission/San Francisco Water Department requirements and safety orders.

1.6 SUBMITTALS

- A. Submit complete specifications, catalog information and cuts, descriptive drawings and literature for each equipment item to be furnished under this Section, with all exceptions to the Specifications noted. Provide submittals for:
 - 1. Ductile iron pipe
 - 2. Push-on and mechanical joint gaskets
 - 3. Tandem mechanical joint restrain follower gland assemblies
 - 4. Non-AWSS solid sleeve coupling
 - 5. Concrete precast and cast-in-place valve vaults
 - 6. Paint and sample of paint color
 - 7. Warning tape-provide 3-foot material sample
 - 8. Wax tape and primer

9. Polyethylene sleeve (poly wrap)-provide 3-foot material sample for each size used
 10. Encasement pipe end seal and casing insulators (where items or used on the particular contract)
 11. Contractor's Supervising Plumber(s): Letter documenting experience on installing high-pressure utility piping 12-inches and larger; letter documenting experience as part of a Contractor's crew who have successfully installed AWSS pipe in the City and County of San Francisco; letter documenting experience on pouring lead joints in pipe 16-inches and larger; copy of the D-2 Water Distribution License as issued by the State of California; Journeyman plumber certification or equivalent. Refer to Section 3.1B for additional requirements.
- B. Submit sample 6-inch length of 8-inch diameter ductile iron pipe with two welded collar stops welded at 90-degrees separation (coat welds on one collar stop only) as called for in these Special Provisions. The sample shall be welded by the approved welder who will be welding collar stops for this work. In the event that the welder is changed, the Contractor shall submit another sample collar stop welded to a piece of pipe by the new welder prior to him/her welding collar stops onto the pipe to be installed along with the required welder certifications.
- C. Submit written procedure for melting lead joints and pouring new lead joints.
- D. Submit trench support plans and calculations per Section 31 23 26.1-Excavation and Backfill for AWSS Work.

1.7 MATERIAL SUBMITTALS

- A. Submit and deliver material submittal samples to the Engineer of Record (EOR) for the contract drawings during the submittal review process and prior to beginning any AWSS work. Provide material submittal samples for the following items regardless of the item being installed in this contract:
1. Push-on and mechanical joint gaskets, 8-inch pipe size. One (1) of each
 2. Paint and sample of paint color, 12-inch x 6-inch 16-gauge galvanized steel painted on one (1) side with color to be used on hydrant bonnet
 3. Warning tape-provide 3-foot material sample
 4. One (1) 2-foot minimum roll of wax tape and one (1) ½ pint manufacturer's sealed can of wax primer
 5. Polyethylene sleeve (poly wrap)-provide 3-foot material sample for each size used
 6. Ductile iron AWSS high-pressure hydrant bonnet casting (new), primed and painted (gloss safety black) (one (1) bonnet)
 7. Ductile iron AWSS high-pressure hydrant finish plate-coal tar coating (two (2) pairs)
 8. One (1) set of restraint joint hardware to restraint a 12-inch bell and spigot joint (locking segments and rubber retainer)
 9. One (1) each of the ductile iron covers for the 6-inch valve box cover, frame and dust pan, to be installed in this contract-"HPFS Air Valve", "HPFS Bypass Valve", and "HPFS Hydrant Valve". The covers shall be complete with the 5/8-inch diameter bolt and peened over nut
 10. One (1) Data logging battery powered digital pressure/temperature gauge. ¼-inch NPT inlet, rotating head and display, USB interface, including

software, USB cable, android cable and battery. Pressure range of 0 to 550 PSIG and temperature range of minimum of 185 degrees F. Include original packaging and instructions. Monarch Instrumentation Corp. Model 5396-0373 or an approved equal.

11. One (1) builder's combination tool that incorporates an 18-inch hardened machine divided rule, square, level, plumb, bevel and protractor. Include original packaging and instructions. Starrett Model No. 439-18.
12. Three (1) solid steel plum bobs, nickel plated, 6 ounces, hexagon body. Include original packaging and instructions. Starrett Model No PB-6.

"Material Submittals" to be provided to the City under this paragraph shall be evenly applied to each contract Bid Items for furnishing materials to this contract and no further monies will be paid for their procurement.

"Material Submittals" will not be returned to the Contractor and shall remain the property of the City. The materials will not be counted as part of the materials to be installed in this contract.

1.8 AS-BUILT DRAWINGS

As-Built drawings shall be submitted to the City Representative a minimum of two (2) full business days prior to the scheduled date of the hydrostatic test. Should the As-built drawings not be provided to, or acceptable to, the City Representative, the test shall be cancelled until such time that the drawings are accepted.

- A. Refer to Section 01 78 39-Project Record Documents. In addition, the Contractor shall submit two (2) full size copies of hand-marked As-Built drawings to the City Representative prior to the each hydrostatic pressure test (if more than one test is required to complete the contract work) for the piping being tested. As-built lettering and mark-up shall be made only on copies of the original AWSS contract drawings-not on drawings from other disciplines-should the AWSS work be part of a larger contract. In the event that the drawings are not ready 24-hours (two (2) full business days) prior to the start of the test, the City Representative will cancel the test until such time that the drawings are presented to the City Representative with the Contractor being responsible for any costs from the SFWD for rescheduling. Each length of pipe, including nipples, shall be noted on the drawings with their exact length. The drawing shall include elevations from finished grade to centerline of pipe; distances for off-sets from the original pipe route; and have points of connections, elbows, valves referenced off property lines and corners as required to adequately reproduce the locations. The lettering and mark-ups shall be legible and in red. The drawings shall be stamped "AS-BUILTS" and include the Contractor's company name, the printed name and signature of the Contractor's representative who prepared the as-built drawings along with the name and signature of the Resident Engineer/City Representative who received and reviewed the provided drawings.

1.9 PURCHASING OF SURPLUS AWSS MATERIALS FROM THE SFWD DUE TO CHANGED FIELD CONDITIONS DURING CONSTRUCTION

- A. When required due to changes in field conditions and in order to not delay the project construction schedule, the SFWD at their discretion may make available certain materials from their inventory of surplus AWSS materials for purchase by the Contractor. Prior to obtaining any materials from the SFWD, the Contractor shall furnish a check made out to the City and County of San Francisco (CCSF) for the

SFWD's current price for the materials. The Contractor shall pick-up the fitting(s) from the SFWD Pipe Yard per paragraph 2.3 of this Section.

1.10 PREVAILING WAGES

- A. In accordance with the San Francisco Administrative Code Section 6.22(E), the Contractor and its Subcontractor's shall pay their workers the general rates of prevailing wage based on the type of work performed. The Contractor and its Subcontractors are advised that the City considers the proper classification for employees who install valves, piping and/or motorized valve operators, on this project to be that of Plumbers.
- B. The San Francisco Board of Supervisors annually determines the classified prevailing rates of wages. Printed versions are available from the Deputy Bureau Chief at (415) 554-8362. The rates are also available on-line at <http://www.dir.ca.gov/DLSR/PWD>

1.11 GUARANTEE

- A. Guarantee materials, equipment and workmanship furnished to be free of defects and agree to replace at no additional expense to the City, upon demand within two (2) years after installation is accepted, defective components or installations that may be found to be defective.
- B. Materials as shown on the drawings to be "Furnished by the City" (FC) shall not require the Contractor to warranty the materials although the installation work shall be warranted as noted above.

PART 2 PRODUCTS

The Contractor shall be solely responsible for procuring the required types and quantities of materials for performing the work as shown on the contract documents except for those materials as shown on the drawings as to be "Furnished by the City" (FC). The Contractor is hereby notified that most specialty materials for AWSS work have lead times exceeding 4-5 months and shall schedule their purchasing of materials accordingly.

Not all items described below are furnished/installed in this Contract. Refer to "Item Lists" on the Plan Drawings for the actual quantity and type of material.

2.1 CITY-FURNISHED MATERIALS

- A. The City will furnish certain materials as shown on the drawing to be "**Furnished by the City**" (FC) at no cost to the Contractor for use in the work. Prior to the commencement of work, the Contractor shall submit to the City Representative, a written request for these materials, indicating the type of materials, quantities, and dates when required. A minimum of 72-hour notice (three (3) full business days) shall be given to the City for processing.
- B. The following materials will be furnished by the City:

As specified on the drawings by the callout (FC) - "Furnished by the City"

Note that the City will not furnish any gaskets nor stainless steel bolts/threaded materials, washers or nuts.

2.2 MATERIALS STORAGE YARD

- A. Auxiliary Water Supply System (AWSS) materials are stored at the San Francisco Water Department (SFWD) Pipe Yard, San Francisco, CA, and at various locations throughout San Francisco, CA.
- B. The Contractor shall not enter or remove any material(s) from the SFWD Pipe Yard without providing prior written notification through the Resident Engineer/City Representative and then being accompanied by an authorized SFWD employee. The request shall be made at least 48-hours (two (2) full business days) in advance.

2.3 PICK-UP, LOADING AND HAULING OF MATERIALS FURNISHED BY THE CITY

- A. The Contractor, at his/her own expense, shall provide the necessary crew, hauling equipment, (e.g., fork lift) transportation, etc., for loading and hauling the materials to the construction site.
- B. The Contractor shall notify the City Representative at least 48-hours in advance (two (2) full business days) prior to scheduling an appointment for pick-up from the SFWD Pipe Yard.
- C. No materials shall be released without the list of approved materials.
- D. Should an exchange of material(s) be require, the material(s) to be exchanged shall be returned to the SFWD Pipe Yard before an exchange can be made.

2.4 RETURN OF UNUSED OR EXTRA MATERIAL

- A. The Contractor shall return all unused or extra materials or removed materials specified "Return to City" to the SFWD Pipe Yard or to location in San Francisco, CA as directed by the City Representative. Before the Contractor returns the material, he/she shall notify the City Representative, indicating the type of material and quantities to be returned at least 48 hours (two (2) full business days) in advance.
- B. The Contractor shall not unload any materials at the SFWD Pipe Yard without providing prior notification and unless accompanied by the City Representative.
- C. The Contractor, at his/her own expense, shall provide the necessary crew, hauling equipment, (e.g., fork lift) transportation, etc., for loading and hauling the materials to the SFWD Pipe Yard. The materials shall be located as directed by the City Representative.
- D. The Contractor shall request for and retain for his/her files a receipt from the SFWD for the return of materials.

2.5 MATERIALS

- A. DUCTILE IRON PIPE AND PIPE ENCASUREMENT MATERIALS - The thickness and tolerance of ductile iron pipes including ductile iron pipes used as pipe encasements

(sleeving) shall conform to ANSI/AWWA C151/A21.51 and to the chart reproduced below:

Pipe Size (Inches)	Nominal Thickness Class	Special Wall Thickness AWSS Pipe only (Inches)	Minimum Pipe Encasement Size (Inches)
8	53	0.36	16 Pres. Class 250
10	53	0.38	20 Pres. Class 250
12	53	0.40	24 Pres. Class 200
14	54	0.45	30 Pres. Class 150
16	55	0.49	32 Pres. Class 150
18	56	0.53	36 Pres. Class 150
20	56	0.54	42 Pres. Class 150

Note: AWSS mainline and lateral piping shall be of the Special Thickness Class and encasement shall be of the Pressure Class.

- B. PIPE - All ductile iron pipe shall be manufactured in accordance with and meet all requirements of ANSI/AWWA C151/A21.51. Ductile iron shall have 60,000 psi minimum tensile strength, 42,000 psi minimum yield strength, 10 % elongation and minimum 7 ft.lb. Charpy test value.

Pipe barrels shall maintain the dimensional tolerances as specified for full-length pipe spigots as specified in Table 1 of ANSI/AWWA C151/A21.51. All pipe barrels shall be 100% gauged for the entire pipe length so that pipe diameter and roundness shall not impede assembly into adjoining pipe, fitting or valve bell regardless of what section of the barrel is used. Gauged pipe shall be identified with a ½" green stripe painted around the circumference of the pipe near the spigot end.

C. MINIMUM PIPE NIPPLE LENGTHS

Minimum pipe nipple lengths shall conform to the chart reproduced below unless approved by the City Representative:

Nominal Pipe Size (Inches)	Cast Iron AWSS Pipe (Inches)	Ductile Iron AWSS Pipe (Inches)
8	2'-0"	1'-6"
10	2'-6"	2'-0"
12	3'-0"	2'-0"
14	3'-6"	2'-6"
16	4'-0"	3'-0"
18	4'-0"	3'-0"
20	4'-0"	3'-0"

D. MINIMUM FLANGED PIPE SPOOL LENGTHS

Minimum pipe spool lengths shall conform to the chart reproduced below unless approved by the City Representative:

Nominal Pipe Size (Inches)	Ductile Iron AWSS Pipe (Inches)
8	0'-9"
10	1'-0"
12	1'-0"
14	1'-3"
16	1'-6"
18	2'-0"
20	2'-6"

- E. PIPE JOINTS – All push-on bell and spigot pipe to pipe joints, except those where shown on the drawings to be restraint with AWSS tie rods between bell and stop collars, shall be U.S. Pipe and Foundry Company's TR FLEX or an approved equal restraint joint. 8 through 20-inch pipe bell ends shall have two slots for the insertion of the required number of locking segments and rubber retainer(s). The locking segments and rubber retainers shall be manufacturer by the pipe manufacturer. The joint interior/exterior surfaces where the gasket contacts shall be coated with the pipe manufacturer's joint lubricant.

All field cut section of pipe that are not restrained with the AWSS tie rods and stop/bell collars shall require field welding of the ring for use with the TR FLEX restraint joint. The field weld shall be performed with the manufacturer's field installation kit and per the manufacturer's directions.

Push-on type pipe joints shall be installed with U.S. Pipe and Foundry Company's TYTON gaskets, either standard rubber gaskets or a gasket manufactured from Viton or Fluorel (where called out on the Plans when soil with contaminants is expected), rated for a minimum of 350-psi service and for use with domestic water unless otherwise called out and shall conform to Section 11-2.3 of ANSI/AWWA C111/A21.11. When gaskets from Viton or Fluorel are required, the Contractor shall submit documents with each shipment specifying the gasket material.

The pipe spigot end shall be provided with two painted gauge white lines per U.S. Pipe's TR FLEX requirements for assembly stripe locations.

Flanged pipe joints shall be of the Class 300 and 600 Steel Flanges conforming to ANSI Standard B16.5. Refer to the drawing "Item List" for the pipe/valve/fitting joint type.

- F. PIPE LAY LENGTH

All ductile iron pipe shall be manufactured in 18-foot or 20-foot nominal lengths.

- G. TESTS AND TEST SPECIMENS - Hydrostatic and acceptance tests shall conform to ANSI Specification A21.51. The pipe manufacturer shall furnish in quintuplicate, a written certification to the effect that:

1. The pipe has passed successfully a 500-psi hydrostatic shop test in accordance with the Section 51.9 of ANSI Specification A21.51.
2. The pipe has passed the acceptance test in accordance with Section 51.12 of ANSI Specification A21.51.

The manufacturer shall also submit with the written certification a physical test report tabulation indicating the tensile and impact test results.

Test specimens, as required by ANSI Specification A21.51 for ductile iron pipe shall be furnished by the Contractor, at his/her own expense, to the City Representative for testing by the City.

- H. COATING AND LINING - All restrained push-on pipes shall be cement-mortar lined, double thickness, and seal coated in accordance with the latest revision of ANSI/AWWA C104/A21.4 and in accordance with the requirements of NSF/ANSI 61.

The exterior of ductile iron pipe shall be coated with a layer of arc-sprayed zinc per ISO 8179-1 "Ductile Iron Pipes – External Zinc-Based Coating – Part 1: Metallic zinc with finishing layer".

The zinc coating materials shall be metallic zinc with a zinc content of at least 99.99% by mass and the mass of zinc applied shall be a minimum of 200 g/m² of pipe exterior surface area. A finishing layer of bituminous paint or synthetic resin compatible with the zinc coating shall be applied over the zinc rich paint coating. The finished bituminous coating shall be continuous, smooth, neither brittle when cold nor sticky when exposed to the sun and shall be strongly adherent to the pipe.

- I. MARKING PIPE - Pipe markings shall conform to applicable requirements of ANSI/AWWA C151 and shall include the word "Zinc" in the pipe markings or label. The face of the bell end shall be painted with silver color to identify pipes are coated with zinc.

- J. STAINLESS STEEL TIE RODS, NUTS, AND WASHERS; FLANGE FASTENERS AND GASKETS; AND AWSS MECHANICAL JOINT ACCESSORIES

1. All connecting devices shall be in accordance with Standard Plan HPL-49,102—current revision, or as stated in this Section in the table below. All tie rods, washers, lock washers and threaded rods shall be manufactured from ANSI Type 316 stainless steel. All bolts shall conform to ASTM A193, Symbol 8M (ANSI Type 316 stainless steel). All nuts shall conform to ASTM A194, Symbol 8M (ANSI Type 316 stainless steel).

Nominal Pipe Size (Inches)	Tie Rod Diameter (Inches)
8	1 1/8
10	1 1/4
12	1 3/8
14	1 3/8
16	1 1/2
18	1 3/4
20	1 7/8

2. All flange bolts and nuts shall be in accordance with ANSI B-16.42, 1979 Class 300 and 600 Steel Flanges, except material for the bolts shall be stainless steel, ANSI Type 304 ASTM A 194 B8, Class I and material for the

nuts and washers shall be stainless steel, ANSI Type 304 ASTM A 194 B8, Class I.

3. All flange gaskets shall conform to ANSI/AWWA C111/A21.11 standard. Flange joint gaskets shall be full face, non-asbestos with nitrile NBR binder, 1/8-inch thick, except gasket at hydrant riser is ¼-inch thick.

4. Accessories for AWSS Mechanical Joints

The Contractor shall furnish one (1) set of accessories for each AWSS mechanical joint; which shall include a gland manufactured from either standard rubber for use with domestic water or a gland manufactured from Viton or Fluorel (where called out on the Plans when soil with contaminants is expected); ductile iron follower gland ring with bolt holes; and the required number of tee-head bolts and hexagonal nuts machined/fabricated from ductile iron or "Cor Ten" low alloy steel. Accessories shall be as specified in ANSI A-21.11 - 1972 except that the length of tee-head bolts and their threading shall be as shown in the AWSS Standard Plans, current revision. When glands from Viton or Fluorel are required, the Contractor shall submit documents with each shipment specifying the gland material.

K. FLANGES

Flanges shall be manufactured to either Class 300 or 600 Steel Flange dimensions meeting ANSI Standard B16.5 for the size of pipe and class of flange as called out on the drawings.

Flanges to be installed on pipe ends shall be machined from ductile iron meeting all the requirements of ANSI/AWWA C151/A21.51. The flanges shall be welded onto the pipe at both the interior and exterior diameters. No threading of flanges onto the pipe shall be allowed.

The flanges shall be faced to provide a square and smooth surface. After welding, the welds shall be coated with zinc paint and asphalt coating.

All connecting flanges shall match the existing Class 300 and 600 flange(s) in the field.

L. WIRE BINDERS

No. 10 BWG soft stainless steel wire.

M. AWSS FITTINGS AND CASTINGS

1. The AWSS fittings and castings (mechanical joint and flanged) to be furnished by the Contractor, except those which are specified on the drawings as to be furnished by the City, shall conform to the drawings as prepared by the San Francisco Public Works for the ductile iron AWSS fittings and castings. No other fittings shall be substituted except as stated below for non-standard angle elbows. Requirements of fittings and casting shall be as per those AWSS Standard Plans and Specifications, current revision, unless otherwise indicated.

2. Where patterns are currently not available for a particular required AWSS fitting or casting, the bid price for the work shall include the cost of producing the pattern. The pattern shall become the property of the City and remain at the foundry unless noted in the drawings for the pattern to be returned to the City.
3. When required due to an AWSS elbow of a non-standard angle being required for a particular application, and when approved by the City Representative, an AWSS fittings can be fabricated from welded assemblies of standard steel pipe and plate steel. The pipe wall thickness and MJB/spigot ends shall match those as shown on the drawings for standard AWSS castings. The lugs shall be an integral part of the parent plate and not welded to a bell ring. All internal/external coatings and testing requirements shall match those as applied to standard AWSS castings. When the fitting manufacturer has not previously fabricated AWSS steel fittings, the manufacture shall supply detailed shop drawing to the City for approval and have an approved testing facility perform a tension test on two pairs of sample lugs that are integrally part of a steel plate that would be used for the production of the fittings. The applied force shall be through a simulated tie rod applying four times the force that would be applied when the pipe fittings are hydrostatically pressurized to 450 psig for a minimum of 2 hours.
4. Where size 14-inch and greater lugged fittings are to be installed in the vertical plane per the Contract Drawings, the fittings shall be supplied with the lug orientation as shown on AWSS Standard Drawing HPL 39,411, current revision, for vertical changes in pipe direction. The drawing "Item List" will not differentiate between horizontally and vertically oriented lugged fittings in the listed total quantity.
5. If the foundry is located more than 50-miles from San Francisco, CA, the Contractor shall provide a qualified, independent inspector to inspect and certify quality of materials and workmanship of fittings and castings. Both functions may be performed by the same person.
6. COATING AND LINING-All cast ductile iron and fabricated steel mechanical joint fittings shall be lined with double thickness cement-mortar and seal coating in accordance with ANSI/AWWA C104/A21.4 and shall meet all the requirements of NSF/ANSI 61.

The exterior of ductile iron restraint fittings shall be coated with zinc rich paint coating per ISO 8179-2 "Ductile Iron Pipes – External Zinc Coating – Part 2: Zinc rich paint with finishing layer".

The coating materials for ductile iron fittings shall be a zinc-rich paint with inorganic binder and a zinc content of at least 85% by weight in the dry film and a finishing layer of bituminous paint or synthetic resin compatible with the zinc rich paint. The zinc rich paint coating shall be applied to a dry film thickness (DFT) of between 2.3 to 3.5 mils (.0020" to 0.0035")

7. Before the application of coatings, all fittings and castings shall be inspected to assure compliance with the "Quality of Material and Workmanship" of the SSDPWSF. Dimensional verification required by the AWSS Standard Plans shall include minimum wall thickness of fittings, minimum inside diameter of

bells, minimum outside diameter of spigots, and any dimensions as directed by the City Representative to assure conformance to the Plans and Specifications.

8. Markings of castings specified AWSS Standard Plans or here within shall include the month and year of manufacture along with the individual sequential fitting number based on the quantity of that particular fitting cast for the stated month and year. The stamped number shall be a minimum of 1-inch tall and 1/16-inch deep indentation.

Every casting shall have distinctly cast upon the outside surface in raised letters, not less than ½-inch in height and 1/8-inch in relief: AWSS, the nominal diameter, type of fitting, and the material. For example: AWSS/12" x 10"/MJB REDUCER/DI.

The letters shall be arranged in a manner satisfactory to the City Representative. In the case of elbows, the amount of bend shall also be indicated as required hereinbefore.

The letters and figures for marking casting shall be cast at a distance of not less than 12-inches from any spigot end.

In the case any casting shall be rejected by the City, the letters AWSS shall be ground off by the Contractor under the supervision of the City Representative.

8. The AWSS casting and fittings may be obtained from the following supplier:

Olympic Foundry, Inc.
5200 Airport Way South
Seattle, WA 98108

The above supplier is provided for reference only and no preference or prior approval by the City is expressed or implied. The Contractor shall have the option of borrowing the patterns from the City and having another foundry produce the fittings. The Contractor shall be responsible for all costs to obtain the pattern(s) from the City or current pattern storage location, returning the patterns to the location obtained from, and all other costs related to borrowing the patterns.

9. At the SFWD's discretion, AWSS ductile iron fittings and castings meeting the specifications may be obtained from the City's surplus inventory stock after submitting a request through the City Representative and furnishing a check made out to the City and County of San Francisco (CCSF) for the current price as established by the SFWD. Refer paragraph 1.9 for details.

N. TANDEM MECHANICAL JOINT RESTRAINT ASSEMBLIES

1. The tandem mechanical joint restraint assembly shall consist of one mechanical joint restraint follower gland and a second mechanical joint restraint follower gland having the mechanical joint lip removed at the factory to seat properly behind the first gland. The two follower glands shall be secured to the ductile iron pipe with a plurality of individually-actuating

gripping surfaces to grip the pipe and torque limiting twist-off nuts. The follower glands shall be secured to the connecting fitting with high-strength heavy hex machine bolts with and T-nuts. Joint restraints for 8 to 16-inch diameter pipe shall be rated to restrain pipe and fittings with an internal pressure of 700 PSI, and up to 500 PSI for pipe diameters from 18 to 20-inches. The collars shall have a minimum 2 to 1 safety factor for holding to the pipe.

2. The follower glands shall with cast from A536 ductile iron and T-nuts shall be constructed of high-tensile ductile iron with Fluoropolymer coating. All wedge assemblies and related parts shall be processed through a phosphate wash, rinse, and drying operation prior to coating application. The coating shall consist of a minimum of two coats of liquid thermoset epoxy coating with heat cure to follow each coat. All casting bodies shall be surface pretreated with a phosphate wash, rinse, and sealer before drying. The coating shall be electrostatically applied and heat cured. The coating shall be a polyester based powder to provide corrosion, impact, and UV resistance.

The mechanical joint sealing gasket shall conform to the requirements of ANSI/AWWA C110/A21.10, C111/A21.11, or C153/A21.53 shall be of a design that causes the gasket to deflect approximately 30% during assembly of the mechanical joint. The gasket material shall conform to the requirements of ANSI/AWWA C111/A21.11, section 11-6.4, of the latest revision.

3. The cast collars shall incorporate the manufacturer's name, location and date, along with the model number and size.
4. The restraint assembly shall be cast and manufactured in the United States of America.
5. The tandem mechanical joint restrain collars may be obtained from the following supplier:

EBAA Iron Sales, Inc.
Eastland, TX 76448

The above supplier is provided for reference only and no preference or prior approval by the City is expressed or implied.

O. HYDRANT, SUCTION CONNECTION AND FIREBOAT MANIFOLD PAINT

1. Manufacturer: Carboline Company Carbocoat Model No. 8225 or an approved equal.
2. The coating shall be a quick-dry high gloss alkyd enamel coating that complies with the requirements of less than 250 grams per liter VOC, The coating shall be self priming for primed surfaces, be able to be tinted to match the required colors, and have a solids content by volume of 62%. The DFT shall be 2-3 mils per coat. Standard coating is two coats of paint unless approved by the City Representative.

3. Unprimed metal shall be coated with an Alkyd primer as manufactured by the enamel manufacturer.
4. The colors shall be as follows:

Gloss Black
OSHA Safety Red (Gloss)
OSHA Safety Blue (Gloss)
Gloss White

P. WARNING TAPE

1. Manufacturer: THOR Enterprises, Inc., Line Guard Inc. or approved equal.
2. General: Warning tape shall be non-detectable underground utility marking tape conforming to ASTM D2103. It shall consist of a minimum 4.0-mil overall thickness, inert 100% virgin low-density polyethylene plastic film formulated for extended use underground. The materials shall be acid and alkali resistant. Width of warning tape shall be 6-inches.
3. Color Coding: The tape shall conform to the color code as follows:
 - a. AWSS Pipelines: Warning tape color shall be safety precaution yellow.
4. Message Inscription: The warning tape shall include an inscription in black letters to identify the type of utility pipeline on or over which it is installed. The inscription shall be impregnated with color-fast, lead-free, organic pigments suitable for direct burial and prolonged exposure to the elements normally encountered in moderately corrosive type soils. The height of the message letters shall be 1.5-inches minimum, and the message inscription shall be repeated at approximately 2-foot intervals. The message inscription for the different types of pipelines shall be as follows:
 - a. CCSF AWSS Pipelines: The message on the tape shall be "CAUTION --- SFFD AWSS WATER PIPELINE BELOW".

Q. POLYETHYLENE SLEEVE (POLY WRAP)

1. Manufacturer: US Pipe and Foundry Model No. V-Bio Polyethylene Encasement or an approved equal.
2. The polyethylene sleeve (poly wrap) shall be 8.0-mil overall thickness, be a co-extruded three (3) layer wrap material of Linear Low Density Polyethylene (LLDPE). The wrap shall consist of an UV resistant outer layer, an intermediate layer that shall be impermeable and provide structural strength, and an inner layer that is infused during manufacturing with a proprietary blend of anti-microbial biocide and a volatile corrosion inhibitor. The anti-microbial biocide shall mitigate microbiologically influenced corrosion and the volatile corrosion inhibitor shall control galvanic corrosion.
3. The polyethylene wrap shall meet or exceed ANSI/AWWA C105A221.5, ASTM A674 and ISO 8180 for polyethylene encasement films.

R. PIG LEAD AND YARN

1. Lead shall be in accordance with the requirements for Common, Desilverized Lead of ASTM "Standard Specifications for Pig Lead," Designation B 29.
2. Yarn used for joint packing shall be braided or twisted just packing yarn, uniform, best quality, free from tar.

S. WAX TAPE AND PRIMER

1. Manufacturer: Trenton Corporation Wax Tape No. 1 and Wax Tape Primer, or an approved equal.
2. The wax tape shall be a microcrystalline wax blend saturated into a non-woven synthetic fiber carrier that remains pliable and is resistant to chemicals and bacteria normally found in soils. The tape shall contain no VOCs, be non-flammable, non-toxic and non-carcinogenic. The tape shall be brown in color and have a weight of 4 pounds per square yard.
3. The wax tape primer shall be a blend of microcrystalline wax, plasticizer, and corrosion inhibitors having a paste-like consistency. The primer shall brown in color and have a minimum 350-degree F flash point.

2.6 CONCRETE VALVE VAULTS-MOTORIZED AND NON-MOTORIZED GATE/CHECK VALVES

- A. Refer to the contract drawings for size, number of pipe and manhole openings, and general arrangement of the valve vault. The drawings will also either include structural drawings as prepared by the City for the concrete and rebar work, or require the Contractor to have drawings prepared by their structural engineer who is licensed in the State of California. The prepared drawings shall then be submitted to City for review prior to proceeding with any work to install the valve vault.
- B. All reinforcing steel shall conform to ASTM A615 or ASTM A-706, Grade 60. Steel lifts shall be ASTM, A-36, hot dipped galvanized after fabrication.
- C. All welded wire fabric shall conform to ASTM A185.
- D. Pre-cast concrete shall conform to the following minimum requirements:

Portland Cement	Type II, modified per ASTM C150
Aggregates	ASTM C33
Admixtures	ASTM C494
Compressive Strength, f_c	4,000 PSI, 28 days
- E. Structure shall be designed for AASHTO H-20 in accordance with ASTM Specifications and AASHTO bridge design specifications; and manufactured in accordance with ASTM and ACI specifications.
- F. All pre-cast concrete material shall conform to the requirements set forth in ASTM C478, "Standard Specification for Pre-cast Reinforced Concrete Manhole Sections." Pre-cast reinforced concrete valve vaults shall be delivered to the site as an integrally

poured unit consisting of a box with four walls and a floor with a separate cover whose lip fits the vault. The box and lid shall have the pipe and manhole opening precast along with a bottom sump as shown on the drawings. The pipe penetrations shall have an approved hot dipped galvanized sleeve with weld seep ring cast/welded in place. The walls shall be a minimum of 12-inches thick and inside dimensions that allow a minimum of 12-inches clearance between all sides of the valve and the concrete walls. The interior depth shall be a minimum of 66-inch from bottom of cover to box floor. Each concrete vault shall be cast to suit field conditions, including depths of the AWSS pipe, surrounding utilities, etc. The concrete box and cover may be obtained from the following supplier:

Central Precast Concrete, Inc.
Livermore, CA 94550

The above list is provided for reference only and no preference or prior approval by the City is expressed or implied.

- G No "ring type" circular valve boxes constructed from stacking concrete risers shall be allowed.
- H Cast-in-place concrete shall conform to Class 7-4000-3/4, as specified in the SSDPWSF, current revision. Grout for joints between structural members shall be 1:3 mortar mix or approved compound.
- I. The ductile iron frame(s), cover(s) and dust pan(s) for the manhole shall be as shown in the AWSS Standard Plans for AWSS castings.
- J. The Contractor shall submit a drawing of the cast-in-place or precast concrete vault and cover showing construction details including rebar layout and opening for the ductile iron 23-inch x 23-inch square AWSS manhole cover, frame and dust pan, for review by the City Representative. The drawing shall be stamped by a civil engineer licensed to practice in the State of California. Each concrete vault shall be designed to suit field conditions, including depths of the AWSS pipe, surrounding utilities, etc.
- K. Concrete valve vaults for non-motorized gate valves shall have a single 23-inch square AWSS manhole cover, frame and dust pan. Concrete valve vaults for motorized gate valves shall include the 23-inch AWSS manhole cover, frame and dust pan along with the "HPFS" ductile iron double leaf opening frame and cover as shown on the drawings. The placement of the covers shall be as shown on the drawings.

2.6 CONCRETE VALVE EQUIPMENT PAD-DIRECT BURIED VALVES

- A. Refer to the contract drawings for size, quantity of valve boxes with access covers, fabricated steel valve enclosure, and general arrangement for the direct buried valve. The drawings will also either include structural drawings as prepared by the City for the concrete and rebar work, or require the Contractor to have drawings prepared by their structural engineer who is licensed in the State of California. The prepared drawings shall then be submitted to City for review prior to proceeding with any work to install the valve equipment pad and related fabrications.
- B. All reinforcing steel shall conform to ASTM A615 or ASTM A-706, Grade 60. Steel lifts shall be ASTM, A-36, hot dipped galvanized after fabrication.

- C. All welded wire fabric shall conform to ASTM A185.
- D. Pre-cast concrete shall conform to the following minimum requirements:
- | | |
|-----------------------------|---------------------------------|
| Portland Cement | Type II, modified per ASTM C150 |
| Aggregates | ASTM C33 |
| Admixtures | ASTM C494 |
| Compressive Strength, f_c | 4,000 PSI, 28 days |
- E. Structure shall be designed for AASHTO H-20 in accordance with ASTM Specifications and AASHTO bridge design specifications; and manufactured in accordance with ASTM and ACI specifications.
- F. All pre-cast concrete material shall conform to the requirements set forth in ASTM C478, "Standard Specification for Pre-cast Reinforced Concrete Manhole Sections." Pre-cast reinforced concrete valve equipment pads shall be delivered to the site as an integrally poured unit. Each concrete valve equipment pad shall be cast to suit field conditions, including depths of the AWSS pipe, surrounding utilities, etc.
- G. Cast-in-place concrete shall conform to Class 7-4000-3/4, as specified in the SSDPWSF, current revision. Grout for joints between structural members shall be 1:3 mortar mix or approved compound.
- H. The ductile iron frame(s), cover(s) and dust pan(s) for the valve access openings shall be as shown in the AWSS Standard Plans for AWSS castings.
- J. The Contractor shall submit a drawing of the cast-in-place or precast concrete equipment pad and access cover concrete supports showing construction details including rebar layout and opening for the ductile iron 10-inch square and 9-inch diameter AWSS manhole covers, frames and dust pans, for review by the City Representative. The drawing shall be stamped by a civil engineer licensed to practice in the State of California. Refer to the drawings for additional details to be submitted to the City.
- 2.7 8-INCH HYDRANT GATE VALVES
- A. Refer to Section 33 11 24 – AWSS High Pressure Ductile Iron Gate Valves
- B. Pipe riser for the valve box shall be 10-inch nominal diameter, ductile iron pipe, thickness Class 52 or Schedule 80 blue PVC, not cast iron as shown in Standard Plan HPL-5354, current revision.
- C. The AWSS hydrant gate valve may be obtained from the following supplier:
- Southwest Valve, LLC
7084 North Cedar Avenue, No. 304
Fresno, CA 93720
- The above list is provided for reference only and no preference or prior approval by the City is expressed or implied.

- D. At the SFWD's discretion, high-pressure ductile iron hydrant gate valves meeting the specifications may be obtained from the City's surplus inventory stock after submitting a request through the City Representative and furnishing a check made out to the City and County of San Francisco (CCSF) for the current price as established by the SFWD. Refer paragraph 1.9 for details.

2.8 MAIN LINE GATE VALVES

- A. Refer to Section 33 11 23 – AWSS High Pressure Ductile Iron Gate Valves.
- B. The AWSS main line gate valve may be obtained from the following supplier:

Southwest Valve, LLC
7084 North Cedar Avenue, No. 304
Fresno, CA 93720

The above list is provided for reference only and no preference or prior approval by the City is expressed or implied.

- C. At the SFWD's discretion, high-pressure ductile iron gate valves meeting the specifications may be obtained from the City's surplus inventory stock after submitting a request through the City Representative and furnishing a check made out to the City and County of San Francisco (CCSF) for the current price as established by the SFWD. Refer paragraph 1.9 for details.

2.9 MAIN LINE CHECK VALVES

- A. Refer to Section 33 11 24.1 – AWSS High Pressure Ductile Iron Check Valves.

2.10 HIGH-PRESSURE HYDRANT ASSEMBLY

- A. Hydrants shall be manufactured to the requirements as shown on the set of drawings titled "AWSS – High Pressure Hydrants" and numbered sequentially A-39,480.1 through A-39,488.1. A copy of these drawings may be obtained by through the City Representative.
- B. The AWSS high-pressure hydrant assembly may be obtained from the following supplier:

Olympic Foundry, Inc.
5200 Airport Way South
Seattle, WA 98108

The above supplier is provided for reference only and no preference or prior approval by the City is expressed or implied.

- C. At the SFWD's discretion, high-pressure hydrant assemblies meeting the specifications may be obtained from the City's surplus inventory stock after submitting a request through the City Representative and furnishing a check made out to the City and County of San Francisco (CCSF) for the current price as established by the SFWD. Refer paragraph 1.9 for details.

- D. The ductile iron hydrant finish plates (two (2) per hydrant installation) shall be as shown on AWSS Standard Drawing HPL-5324A.
- 2.11 DUCTILE IRON BALL JOINTS
- A. Refer to Section 33 11 25 – AWSS High Pressure Ductile Iron Ball Joints.
- 2.12 SUCTION CONNECTION MATERIALS
- A. Refer to Section 33 11 26 – AWSS Suction Connections.
- 2.13 FABRICATED STEEL STRONG BACK
- A. The cast steel/carbon steel strong back shall be fabricated as shown on AWSS Standard Drawing HPL5646.7. The drawing provides dimension for both strong backs that sit against a pipe bell and against collar stops (pipe spigot end). Prior to fabrication of the strong back, the Contractor shall field verify the diameter at four (4) locations around the pipe circumference of the pipe where the strong back shall be installed. The Contractor shall also field verify the diameter at four (4) location around the pipe circumference of the pipe bell where the drawings show the tie rods passing over a pipe bell. The Contractor shall mark-up the strong back drawing should their field measurements differ from the drawing and submit to the City Representative for approval prior to fabrication of the strong back.
- 2.14 FLANGED DISMANTLING JOINT
- A. Manufacturer:
 - 1. Romac Industries, Inc. Model No. DJ400, size as shown on the drawings, or an approved equal
 - B. Equipment:
 - 1. The dismantling joint shall be a telescoping flanged fitting which allows the removal of adjacent pipe components and uses tie rod restraints to hold the unit's pieces together. The unit shall be custom designed and fabricated to withstand 450 PSIG. Provide a submittal showing that the custom fabricated joint is rated to 450 PSI with a safety factory of 2.5 and dimensions to match the drawings and specification requirements for approval prior to fabricating.
 - 2. The flanges shall be Class 300 steel flanges conforming to ANSI Standard B16.5.
 - 3. The flanged spool and end ring/body shall be fabricated from ASTM A36 plate. The tie rod restraints and bolts/nuts shall be from Type 316 stainless steel and match the diameter of the fasteners as used for Class 300 steel flanges for the pipe size.
 - 4. The interior and exterior joint surfaces shall be fusion bonded epoxy and shall be resistant to sea water. The gasket shall be compatible with potable and sea water.
 - 5. The joint shall allow for a total movement of 3-inches flange to flange.
- 2.15 VALVE VAULT PIPE SLEEVE
- A. Manufacturer: Link-Seal, Inc. Model Number WS, size to match the pipe being sealed with the modular pipe seal, or an approved equal. The pipe sleeve and modular pipe seal shall be by the same manufacturer.

- B. The inside diameter of the pipe sleeve shall be a minimum of 2-inches in diameter larger than the flange outside diameter or pipe bell outside diameter of the fitting/pipe spool, to the sealed in the vault wall.
- C. The pipe sleeve shall be fabricated from 3/8-inch thick steel, be 12-inches long with a 2-inch wide water stop collar with continuous weld-bead on both sides. The entire unit shall be hot dipped galvanized.

2.16 VALVE VAULT MODULAR PIPE SEAL

- A. Manufacturer: Link-Seal, Inc. Model Number S-316 size to match the pipe being sealed, or an approved equal. The pipe sleeve and modular pipe seal shall be by the same manufacturer.
- B. The modular pipe seal shall consist of a black EPDM seal element, composite pressure plates and Type 316 stainless steel bolts and nuts.
- C. The modular pipe seal shall prevent water intrusion into the vault when used with the pipe sleeve.

2.17 PIPE ENCASEMENT CASING INSULATORS

- A. Manufacturer: Calpico Inc. Model Number PX-SS, size to match the pipe being held.
- B. The casing insulator shall consist of two halves in sizes 4 through 16-inch, have 6-inch band with runners fabricated from HDPE. The runner heights shall ensure that the pipe flange has a minimum clearance of 2-inches off the inside diameter of the pipe encasement.
- C. The fasteners shall be manufactured from Type 316 stainless steel.

2.18 PIPE ENCASEMENT END SEALS

- A. Manufacturer: Calpico Inc. Model Number W, size to match the two pipes being sealed.
- B. The end seals shall be of the split wrap-around style, the ends joined by butyl mastic strips with permanent adhesive, the seal made from a minimum 1/8-inch thick flexible coal tar reinforced with fiberglass to provide an extra tough waterproof membrane.
- C. The two bands and clamps shall be manufactured from Type 316 stainless steel.

2.19 PIPE BEDDING

- A. The pipe bedding depth shall be as shown on Drawing HPL-5573A Rev. 0-Auxiliary Water Supply System Standard Plan for Ductile Iron Pipe Installation and Pipe Trench, as included at the end of this section.
- B. Sand shall be clean of any debris, chlorides and sulphides, and shall be prewashed off site. Sand shall be delivered to the site dry.

2.20 TRENCH SHORING

- A. The requirements below are in addition to the regulatory requirements:
1. All timber and lumber shall conform to the applicable requirements of the National Design Specification for Wood Construction, 1986 Edition, of the National Forest Products Association. Timber and lumber to be left in place shall be pressure treated with chemical preservatives.
 2. All structural steel shall conform to latest editions of the applicable requirements of the American Society for Testing and Materials. Minimum requirements for structural steel shall conform to ASTM A36.
 3. All timber and structural steel used for the support system, whether new or used, shall be sound and free from defects that might impair their strength.
 4. Steel sheet piling shall be rolled steel shapes of the continuous interlocking type, forming a continuous wall when individual sheets are driven side by side. Sheet piling and all accessories shall conform to the requirements of ASTM A328.
 5. Refer to related sections for pavement cutting, trench excavation and support work, backfilling and compaction.

2.21 SPARE PARTS

- A. Extra Materials: The Contractor shall provide the following materials to the City at no additional cost. Items submitted shall be the same as those installed in this Contract. Deliver items to the San Francisco Water Department Pipe Yard, San Francisco, CA, per Paragraph 2.4 of this Section and prior to the final (if more than one test is required to complete the contract work) hydrostatic test. This test will be cancelled should the materials not be delivered to the San Francisco Water Department Pipe Yard, San Francisco, CA per the above requirement.
5. Six (6) 12-foot lengths of stainless steel tie rods (all-thread) for each diameter of tie rods installed in this Contract.
 6. Twelve (12) each of stainless steel nuts, washers and lock washers for each diameter of tie rods installed in this Contract.
 7. One Hundred (100) feet of stainless steel binding wire.
 8. Four (4) mechanical joint sealing gaskets for each pipe size and type installed in this Contract.
 9. Four (4) push-on gaskets for each pipe size installed in this Contract.
 10. Four (4) flange gaskets for each size of pipe flange installed in this Contract.
 11. Two (2) ductile iron hydrant finish plate casting per AWSS Standard Drawing HPL-5324A.
 12. Four (4) sets of restraint joint hardware to restraint a joint for each pipe size installed in this Contract.

13. One (1) each 1-inch thick, 2-inch thick and 6-inch thick ductile iron hydrant risers per AWSS Standard Drawing HPL-397,417A.

"Spare Parts" to be provided to the City under this paragraph shall be evenly applied to each contract Bid Items for furnishing materials to this contract and no further monies will be paid for their procurement.

PART 3 EXECUTION

3.1 REMOVAL AND INSTALLATION OF AWSS FACILITIES

- A. All City and County of San Francisco's (CCSF) Auxiliary Water Supply System (AWSS) removal and new installation work shall be performed in accordance with the AWSS contract documents, including the AWSS Standard Drawings; the Standard Specifications, City and County of San Francisco Department of Public Works, Bureau of Engineering (SSDPWSF); Standard Plans, City and County of San Francisco Department of Public Works, Bureau of Engineering (SPDPWSF); and San Francisco Water Department (SFWD) safety orders and requirements, current revisions.
- B. The Contractor shall install all AWSS facilities with a 12-inch minimum clearance between the AWSS facilities and adjacent utilities, structures, vaults, etc. Should the Contractor discover a clearance of less than 12-inches, he/she shall inform the City Representative immediately in writing for direction on how to proceed.
- C. Only certified Journeyman plumbers who have had documented experience in installing high-pressure utility pipelines over 12-inches in diameter, documented experience working as part of a Contractor's crew and were directly involved in the installation of AWSS pipeline facilities for at least one (1) AWSS construction project, documented experience in pouring lead joints in pipe over 16-inches in diameter, and who hold a D-2 Water Distribution License issued by the State of California, shall supervise the removal, fabrication and installation of AWSS piping, fittings, valves and related facilities.

The Journeyman plumber supervisor shall be at the site and in direct supervision of the Contractor's personnel at all times that AWSS pipe, fittings, valves and related facilities are being removed, fabricated and installed. A Journeyman plumber equivalent shall have completed an apprenticeship program consisting of five (5) years of on-the-job training under a journeyman plumber, hold a D-2 Water Distribution License issued by the State of California, and have completed 1080 hours of classroom instruction along with documented experience working with high-pressure utility pipelines.

Where necessary due to the unavailability of qualified personnel meeting the above requirements, the Contractor may have two (2) approved individuals with the combined required experience and qualifications to supervise the work. Both persons shall be at the site and in direct supervision of the Contractor's personnel at all times that AWSS pipe, fittings, valves and related facilities are being removed, fabricated and installed.

The SFWD AWSS supervisor or SFWD engineering manager shall make the final decision for approving the plumber's qualifications should the experience be less than that as required above.

- D. All personnel, including the supervising plumber, shall have taken all required training/courses and been approved by all governing authorities for the safe handling of lead.
 - E. The Contractor shall contain and properly dispose of all lead and waste by-products, including lead and tin solder that is generated as a part of AWSS demolition and construction work, and all contaminated by-products, in accordance with all applicable rules, regulations and laws governing the handling and disposal of hazardous waste. Payment for solder and lead disposal shall be considered incidental to AWSS Facilities work.
 - F. All personnel performing welds on AWSS piping and pipe encasement shall be certified as per these Special Provisions.
 - G. Pipe to be removed shall not be broken/demolished by the use of a "hoe ram" or other impacting equipment.
 - H. All pipes to be removed shall be cut cleanly at a 90-degree angle to the lay of the pipe. All lead joints shall be melted out at the site and the lead disposed of in a legal manner. There shall be no pulling of pipe whatsoever without first melting and removing the existing lead from lead joints. In instances where lead jointed pipe is pulled and there are leaks in subsequent piping to remain in place, the Contractor will be required to repair the joints without cost to the City.
 - I. The Contractor shall minimize the downtime of existing and new AWSS facilities in the performance of their work due to the emergency nature of the AWSS mainlines and hydrants and operational requirements of the San Francisco Fire Department. The SFWD will not shut down any mainlines or hydrants until the Contractor has all the materials at the site and work has begun to excavate the location where work is to be performed. At any work location where the main shall be placed out of service for a time duration greater than 7 consecutive calendar days and no work is performed or work has stopped for any reason, the Contractor shall provide and install temporary jumper hoses between high-pressure hydrants as directed by the SFWD to provide a water supply to the out-of-service piping. The jumper hoses shall be of the 3-inch size, rated at a minimum of 450 psi and be approved by the SFWD. The placement of the jumper hoses and locations of hydrant to be bridged shall be at the discretion and approval of the SFWD.
 - J. All fees for retesting, additional tests and shutdowns due to the Contractors request(s)/error(s), shall be paid by check directly to the CCSF after their invoice is received. Test(s) and shut down(s) that are requested/required to be performed before 7:00 am and after 3:30 pm will be charged at the overtime rate. No tests or shut downs shall be performed until the SFWD has received the checks for the invoiced amount.
- 3.2 REMOVE, SALVAGE, OR DISPOSE OF EXISTING PIPE, FITTINGS AND VALVES; VALVE BOXES; VALVE VAULTS; MANHOLE FRAMES, COVERS AND DUST PANS

- A. The Contractor shall remove and dispose of as the Contractor's Property, or salvage by cleaning and returning to the San Francisco Water Department Pipe Yard, San Francisco, CA; AWSS pipes, fittings, valves, valve vault manhole frames, covers and dust pans, valve boxes, all where and as shown on the plans and in accordance with these AWSS Standard Plans and Specifications, and the applicable requirements of the SSDPWSF, SFWD requirements, current revisions.
- B. All salvaged materials damaged or improperly removed by the Contractor shall be cause for rejection and replacement by the Contractor at his/her cost.
- C. All salvaged pipes and fittings shall be thoroughly cleaned both inside and outside, by sandblasting, of all dirt, rust, scale, and loose paint. After cleaning, the interior and exterior surfaces of the pipes and fittings shall be coated with two coats of coating as listed in these Special Provisions for coating of AWSS fittings. Fittings in which the ductile iron gland follower tee-bolts are corroded shall have the bolts, nuts and lock washers replaced at no extra cost to the City.
- D. Exterior iron surfaces of any hydrant or valve to be salvaged shall be cleaned by sandblasting and the interior surfaces washed with clean water. After all cleaning is completed, the SFWD shall be given the opportunity to inspect, overhaul or repair, as necessary each such hydrant or valve.

After the SFWD completes work on the hydrant or valve, the exterior surfaces of the hydrant to be salvaged shall be again cleaned and primed with two coats of approved rust preventative primer and painted per these Special Provisions for painting of hydrants with the valve coated per the Special Provisions for coating of AWSS fittings.
- E. All existing pipe lines that are cut and to be abandoned in place per the Plans shall be filled for a minimum length of 4-feet with a non-shrink grout or concrete.

3.3 REMOVING AND SALVAGING OF FIREBOAT WHARF MANIFOLD

- A. The Contractor shall inspect the wharf manifold prior to removing it from the current location, noting any damage to the City Representative in writing. The Contractor shall be responsible for any damage caused to the wharf manifold by the Contractor's removal, storage, rebuilding, or installation of the unit; and shall replace the damaged part(s)/entire assembly as warranted to provide the City with an operable piece of equipment. No repairs shall be made to the cast iron castings.
- B. The Contractor shall disassemble the entire wharf manifold, sandblast the interior and exterior surfaces to bare metal, and coat the interior with an approved coating and the exterior per other portions of this Section for painting. The Contractor shall notify the City Representative in writing should he/she discovers any damage to the interior workings of the unit.
- C. The Contractor shall replace all fasteners with new fasteners manufactured from Type 316 stainless steel. All flange gaskets shall be removed and replaced with approved gaskets.

3.4 INSTALLATION OF FLANGED GATE VALVES AND RELATED ITEMS

- A. The Contractor shall install City-furnished and Contractor-furnished flanged mainline gate valves; hydrant gate valves; valve vaults cover(s), frames(s), dust pan(s); and valve boxes, frame(s), cover(s), and dust pan(s); all where and as shown on the plans and in accordance with the AWSS Standard Plans and Specifications.
- B. Gate valves 12-inches and larger shown on the plans to be installed shall include the furnishing and installation of valve vaults/direct buried equipment pads (refer to the drawings) consisting of a precast or cast-in-place concrete vault and cover, manhole frame(s), cover(s) and dust pan(s) regardless if shown or called out on the plan drawings.
- C. Gate valves 10-inches and smaller shown on the plans to be installed shall include the furnishing and installation of valve boxes consisting of a valve box, riser, frame, cover and dustpan per the AWSS Standard Plans regardless if shown or called out on the plan drawings.

Frames and covers for gate valves shall be orientated over the pipe line in order that the two handles are parallel with pipe line to indicate pipe direction. Note that the cover will only sit in the frame in one direction.

- D. The Contractor shall furnish and install all flange nuts, bolts, lock washers, gaskets and accessories as required for gate valve installation.

3.5 INSTALLATION OF PRECAST OR CAST-IN-PLACE CONCRETE VALVE VAULT

- A. The Contractor shall install the valve vault and cover as shown on the Plans and AWSS Standard Plans, with the vault at an elevation such that the gate valve horizontal centerline is within 5 to 6 ½-feet below the finished street grade and the connecting pipe/fittings centered within the pre-cored pipe openings. The valve vault shall have a minimum clearance of 12-inches with any adjacent utilities and/or structures and be set plumb perpendicular with the pipe and match the existing finished grade along the run of the pipe.
- B. The cored pipe hole openings shall be sealed with a modular mechanical link assembly against the outside surface of the ductile iron pipe and the cast-in-place stainless steel thimble, as shown on the drawings. Where it is not possible to install a thimble and the modular mechanical link assembly, and with the approval of the City Representative, the space between the concrete valve vault opening and the ductile iron pipe, may be filled with an approved non-shrink grout. The non-shrink grout shall be applied in a neat manner and flush with the interior and exterior walls of the vault.
- C. The modular mechanical link assembly and/or or non-shrink grout shall only be installed after the pipe has passed the final hydrostatic test.

3.6 INSTALLATION OF AWSS PIPE THROUGH EXISTING CONCRETE VAULT AND STRUCTURES

- A. The cored pipe hole openings shall be sealed with a modular mechanical link assembly against the outside surface of the ductile iron/cast iron pipe and the cast-in-place stainless steel thimble, as shown on the drawings. Where it is not possible to install a thimble and modular mechanical link assembly, and with the approval of the City Representative, the space between the concrete valve vault opening and the

ductile iron pipe, may be filled with an approved non-shrink grout. The non-shrink grout shall be applied in a neat manner and flush with the interior and exterior walls of the vault.

- B. The modular mechanical link assembly and/or or non-shrink grout shall only be installed after the pipe has passed the final hydrostatic test.
- C. The pipe shall be installed though the existing vault/structure in a manner such that the pipe joints are located outside the vault/structure unless approved in advance and in writing by the City Representative.

3.7 INSTALLATION OF HIGH-PRESSURE HYDRANT ASSEMBLIES

A. General

1. The Contractor shall install the high-pressure fire hydrant assemblies where and as shown on the Plans and in accordance with the AWSS Standard Plans and Specifications, including the following installation drawings HPL-5324.1 and HPL-5950.3, or current revisions.
2. Each hydrant shall be carefully examined, the hydrant elbow and "King" valve thoroughly cleaned, and all dirt and other foreign matter removed, before setting the hydrant in place.
3. Hydrants shall be set exactly plumb, and at the proper elevation. In compacting the backfill, the hydrant shall be kept plumb, and adequate support to prevent future movement shall be provided. Any hydrant which is out of plumb or not firmly support shall be properly reset by the Contractor at his/her expense. The hydrant shall be considered out of plumb when the hydrant is offset greater than ½-inch for its full height from cap to elbow.
4. The reinforced concrete hydrant block shall be poured and cured separately from the concrete thrust block placed behind the hydrant. In the event that both are poured together, the Contractor shall remove both concrete items and install them as separate units at no additional cost to the City.
5. When hydrant risers are required to be furnished with the hydrant where and as shown on the Plans or as field required to the high-pressure hydrant properly at grade, the hydrant riser shall be installed at no additional cost to the City. The Contractor shall provide the stainless steel nuts, bolts and proper gaskets. When hydrant risers are field required but not shown on the Plans, the City at its option will either furnish the hydrant riser of the required size or cover the costs for its manufacture, including the cost of the additional fasteners and gaskets. Hydrant risers can be fabricated in 1, 2, 4, 6, 8, 10, 12-inch thickness, following the AWSS Standard Plans for cast or solid unit as determined by the particular dimension required.
6. The SFWD will furnish and modify the hydrant internal stem extensions when required due to the need to install a hydrant riser. The Contractor shall disassemble the hydrant from the hydrant elbow, insert the riser(s), furnish and install stainless steel bolts, nuts and gasket, and allow for the SFWD to install the stem extension. Bolts, nuts and gaskets will be as specified in

Paragraph 2.5. Gaskets shall be ¼-inch thick and match the ends of hydrant standpipe and riser.

7. Where as shown on the drawings for the hydrant lateral pipe to come into the hydrant at an angle diagonal to the curb, the Contractor shall disassemble the hydrant at the joint between the hydrant elbow and hydrant, rotating the hydrant in order that the hydrant outlet is perpendicular to the curb.
8. Where sidewalks are demolished to remove/install the hydrant, the Contractor shall remove the entire flag up to the next sidewalk joint. No partial flags will be allowed to remain and patching will not be allowed. New sidewalk grades shall match the original grade. The Contractor will not be allowed to "raise" the sidewalk around the hydrant circumference in order to meet the hydrant height requirements shown on the detail drawings.
9. Hydrant finish plates shall be installed around the hydrant; the long side of an individual plate shall be parallel with the sidewalk curb with a deflection of no more than ¼-inch per the plate's long side; and flush with the finished sidewalk grade. The hydrant finish plates shall be cast-in-place when the sidewalk flag is poured. Spacing between the hydrant barrel and plates, and the two plate contact edges, shall be filled with a non-shrink grout.

B. Painting

The Contractor shall paint the above ground portion of the High-pressure hydrant after installation and after the completion of hydrostatic field test with two (2) finish coats of approved high-gloss enamel in accordance with the applicable requirements of the SSDPWSF, current revision, and these Special Provisions. The colors shall be as per Paragraph 2.5 and as directed by the City Representative.

3.8 INSTALLATION OF FIREBOAT WHARF MANIFOLD

A. General

The wharf manifold shall be installed on two (2) concrete support blocks as per the drawings and secure the wharf manifold assembly to the concrete support blocks with cast-in-place Type 316 stainless steel anchor bolts/nuts/washers. The Contractor shall connect the wharf manifold to the new piping and secure with tie rods of the size as shown on the drawings.

B. Painting

The Contractor shall paint the above ground portion of the fireboat wharf manifold after installation and after the completion of hydrostatic field test with two (2) finish coats of approved high-gloss enamel in accordance with the applicable requirements of the SSDPWSF, current revision, and these specifications. The colors shall be Gloss White. The concrete support blocks shall be primed with an appropriate concrete primer and finish coat the blocks in Gloss Red similar to the wharf manifold painting.

3.9 REMOVAL OF LEAD JOINTS

- A. All lead joints of pipes and fittings to be disconnected, or altered by deflection, shall be melted out by means of a welding torch with an appropriate tip.
- B. The Contractor shall comply with all OSHA regulations and SFPUC guidelines for the handling of lead.
- C. All lead shall be disposed of by the Contractor in a legal manner. The Contractor shall provide written proof of the proper disposal of the lead upon request by the City Representative.
- D. Should any air quality control testing or other similar tests be required by the State/City Department of Public Health or similar agencies for the melting out of lead, their costs shall be borne by the Contractor.
- E. All require safety equipment for the pouring of lead joints shall be supplied by the Contractor and worn by all individuals within the trench where lead is being poured or with 15-feet of the lead melting.

3.10 INSTALLATION OF LEAD JOINTS

- A. All lead joint pours shall be witnessed by the City Representative. No joint will be accepted if not poured in the presence of the City Representative. No exceptions will be allowed.
- B. Only one pouring shall be made for each joint. In the event that the joint is not completely filled from one pour, the Contractor shall melt the lead and repour the joint. The joint shall be perfectly clean and dry when the lead is applied. Dross shall be allowed to accumulate in the melting pot.
- C. In pouring lead joints, no pour-through will be allowed. Any point in which lead pours through to the interior of the pipe shall be rejected, the joint disassembled, and all lead removed from the interior of the pipe.
- D. Lead extruded 1/8-inch or less from a joint under pressure may be recaulked upon approval by the City Representative. Lead extrusion greater than 1/8-inch, and those not approved by the City Representative for recaulking, shall be melted out completely and remade. Furthermore, no leakage will be permitted at the joints.
- E. All joints not rendered leak proof by recaulking shall be melted out completely and remade. The hydrostatic field test shall be repeated and repair made as necessary to provide a completely leak proof line.
- F. Pneumatic hammer used for caulking lead joints shall be of the sleeve valve type chipping hammer with a net weight of 10.50 +/- 0.5 pounds, and at 90 psig air pressure shall deliver a minimum of 5.5 foot pounds per blow and approximately 3000 blows per minute.
- G. The Contractor shall comply with all OSHA regulations for the handling of lead.
- H. Additionally, the Journeyman Plumber shall pour one (1) 16-inch pipe size test lead joint in the presence of and for the approval of the City Representative prior to pouring any lead joints on the actual installed pipe.

- I. Should any air quality control testing or other similar tests be required by the State/City Department of Public Health or similar agencies for the pouring of lead, their costs shall be borne by the Contractor.
- J. All require safety equipment for the pouring of lead joints shall be supplied by the Contractor and worn by all individuals within the trench where lead is being poured or with 15-feet of the lead pour.

3.11 INSTALLATION OF DUCTILE IRON PIPE

- A. All restraint push-on bell and spigot pipe to pipe joints shall follow the manufacturer's written directions for installing the restraint pipe. Push-on type pipe joints shall be installed with U.S. Pipe and Foundry Company's TYTON gaskets or an approved equal, either standard rubber gaskets or a gasket manufactured from Viton or Fluorel (where called out on the Plans when soil with contaminants is expected), rated for a minimum of 350-psi service and for use with domestic water unless otherwise called out and shall conform to Section 11-2.3 of ANSI/AWWA C111/A21.11. When gaskets from Viton or Fluorel are required, the Contractor shall submit documents with each shipment specifying the gasket material.
- B. The Contractor shall furnish and install push-on and flanged joint ductile iron pipe, where and as shown on the Plans, and in accordance with these Special Provisions and the AWSS Standard Plans and Specifications.
- C. Maximum vertical/horizontal deflection at push-on and mechanical pipe joints between pipe and pipe and fittings shall be one (1)-degree.
- D. Flanged pipe joints shall be of the Class 300 and 600 Steel Flanges conforming to ANSI Standard B16.5. Refer to the drawing "Item List" for the pipe/valve/fitting joint type.
- E. When the pipe is delivered to the job site, the Contractor shall furnish and install wooded plugs on both ends of all pipe, nipples and pipe spools with a length longer than 36-inches after ensuring that no dirt, refuge or other items have entered the pipe interior.

The wooden plugs shall remain in place until the pipes are in position in the trench and are to be connected. Only at that time shall each plug be removed.

3.12 PIPE NIPPLES

- A. All cutting of pipes or nipples shall be done with a device which, in the judgment of the City Representative, is suitable for this purpose. The cut ends of the pipe or nipples shall be clean and straight, made at an angle of 90-degrees with the longitudinal axis of the pipe. The outside of the cut end shall be tapered about 1/8-inch at an angle of approximately 30-degrees with the centerline of the pipe.
- B. Every reusable nipple cut from a larger piece of pipe shall have painted thereon with yellow paint the word "DUCTILE".
- C. The cutting of all pipes and nipples shall be done as incidental work. All measurements for nipple lengths shall be the responsibility of the Contractor.

- D. Closing nipples shall be cut to an exact length, with a minus tolerance only, not to exceed 1/8-inch. Cut pipe and nipples, other than closing nipples, shall, unless otherwise designated on the Plans, be cut to a plus or minus tolerance of 1/8-inch.
- E. Under no circumstances will forcing, raising or jacking of the pipe be permitted in order to comply with proper length requirements. A realignment in horizontal or vertical directions to comply with the length requirements is also prohibited, unless approved in writing by the City Representative.

3.13 INSTALLATION OF FLANGED DUCTILE IRON FITTINGS

- A. The Contractor shall furnish and install ductile iron pipe fittings, where and as shown on the Plans, and in accordance with these Special Provisions and the AWSS Standard Plans and Specifications.
- B. The Contractor shall furnish and install as incidental work, all required Type 316 stainless steel flange bolts, nuts and washers, and flange gaskets.
- C. The flange bolts shall be tightened to industry standards for the particular flange size with +/-5 foot/pounds.

3.14 INSTALLATION OF FLANGED DISMANTLING JOINT

- A. The dismantling joint shall be installed in order that the unit can be shortened a minimum of 2/3 of its total allowable movement for the unit to be removable from its installed location.
- B. All dismantling joint flanges including fasteners shall be wrapped with an approved wax tape and wax tape primer per the manufacturer's application instructions. All fasteners should be wrapped in accordance with AWWA Standard C217-16. Wax-tape-wrapped valve and fittings should be over-wrapped with polyethylene encasement in accordance with AWWA C105/A21.10-12. The folds, creases, and splices should be taped tight and the ends tightly taped to prevent ingress of groundwater. An appropriate tape to use shall meet AWWA C209-13.

3.15 INSTALLATION OF MECHANICAL JOINT DUCTILE IRON FITTINGS

- A. The Contractor shall furnish and install ductile iron pipe fittings, where and as shown on the Plans, and in accordance with these Special Provisions and the AWSS Standard Plans and Specifications.
- B. The Contractor shall furnish and install as incidental work, all required gland tee bolts, nuts, washers and glands.
- C. Prior to slipping the gasket over any spigot end into the fitting bell, the surface to which the gasket comes in contact shall be thoroughly wire brushed clean of all rust. All foreign material shall be removed and the gland lubricated with a soap and water solution or other approved lubricant in order to facilitate the making of a tight joint. Mechanical joint gland rings and gaskets shall be tightened evenly with a torque wrench by partially tightening the bolts diametrically opposite until the gasket is fully seated. The torque obtained in tightening the bolts shall not be less than 60 foot pounds and not more than 90 foot pounds. In no case shall the Contractor tighten the bolts in excess of 90 foot pounds in an attempt to correct a faulty joint.

- D. The Contractor shall install size 14-inch and greater lugged fittings which are installed in the vertical plane per the Plans with the correct lug orientation as shown on AWSS Standard Drawing HPL 39,411, current revision. The responsibility of furnishing and installing fittings with the proper lug orientation shall be that of the Contractor.

3.16 INSTALLATION OF TANDEM MECHANICAL JOINT RESTRAINT ASSEMBLIES

- A. The tandem mechanical joint restraint assemblies shall only be installed where specifically as shown on the drawings. The Contractor shall follow the manufacturer's written instruction for installing the tandem restrain assemblies. No single mechanical joint restrain follower gland shall be installed in place of the tandem gland assembly. Only complete tandem follower glands supplied directly from the manufacturer shall be installed-no making up of units from separate pieces will allowed.

3.17 INSTALLATION OF AIR VALVE ASSEMBLY

- A. The Contractor shall furnish and install air valve assemblies, where and as shown on the Plans, and in accordance with these Special Provisions and the AWSS Standard Plans and Specifications.
- B. The exact location of the air valve shall be determined in the field by the City Representative.
- C. The air valve boss shall be welded to the pipe per current practices for welding on pressurized vessels and requirements in this Section for the welder and welding quality control. In the event the weld leaks/weepers with the first hydrostatic pressure test, the Contractor shall completely remove the boss, grind the welds down to parent metal and weld a new boss to the pipe. After welding, the welds, boss and exterior pipe coating damaged by the welding shall be coated within 2 hours with an approved coal tar epoxy.
- D. Air valves shown on the plans to be installed shall include the furnishing and installation of a riser, frame, cover and dustpan per the AWSS Standard Plans regardless if shown or called out on the Plans.
- E. The Contractor shall furnish and install all flange nuts, bolts, lock washers, gaskets and accessories as required for the air valve installation.

3.18 INSTALLATION OF DUCTILE IRON BELL COLLARS

- A. The Contractor shall furnish and install ductile iron bell collars, where and as shown on the Plans, and in accordance with these Special Provisions and the AWSS Standard Plans and Specifications.

3.19 INSTALLATION OF DUCTILE IRON STOP COLLARS AND WELDED COLLARS STOPS FOR STOP COLLARS

- A. Prior to performing any welds that will be placed in to service, the certified welder shall weld two (2) test collar stops per the requirements of the Section for welding quality control.

- B. The Contractor shall furnish and install ductile iron stop collars and furnish (unless furnished by the City) and install by welding ductile iron collar stops for such stop collars, where and as shown on the Plans, and in accordance with these AWSS Standard Plans and Specifications, and the requirements of this Section for weld quality controls. The Contractor shall notify the City Representative eight (8) hours in advance prior to welding any collar stops in order that the City Representative can inspect the welds and pipe for any damage to the linings/coatings. The City Representative shall approve each pipe end with welded collar stops in writing and mark in permanent markings on the exterior of the pipe with the words "APPROVED" and the date. Pipe with welded collar stops not so marked and installed shall be removed and inspected by the City Representative. Prior to welding the collar stops, the Contractor shall grind/wire brush to bare metal the area where the collar stops shall be located. The collar stops, welds, and the pipe exterior surface where the coating is removed/damaged by the welding operation, shall be coated within 2 hours of welding with an approved cold tar epoxy.
 - C. The welding of collar stops shall be done in a manner that does not heat the pipe to a condition where the interior concrete lining separates from the pipe material and/or breaks off. In the event that this lining separation occurs under any welded collar stop at the end of a pipe, that section of pipe shall be rejected by the City Representative, cut off and removed from the jobsite.
 - D. All interior pipe surfaces below the accepted welded collar stops shall be manually coated with an approved coal tar epoxy.
- 3.20 INSTALLATION OF DUCTILE IRON GATE AND CHECK VALVES
- A. All gate and check valve flanges including fasteners shall be wrapped with an approved wax tape and wax tape primer per the manufacturer's application instructions. All fasteners should be wrapped in accordance with AWWA Standard C217-16. Wax-tape-wrapped valve and fittings should be over-wrapped with polyethylene encasement in accordance with AWWA C105/A21.10-12. The folds, creases, and splices should be taped tight and the ends tightly taped to prevent ingress of groundwater. An appropriate tape to use shall meet AWWA C209-13.
- 3.21 INSTALLATION OF STAINLESS STEEL TIE RODS, NUTS AND WASHERS
- A. The Contractor shall furnish and install stainless steel tie rods, nuts, washers and lock washers, where and as shown on the Plans, in accordance with these Special Provisions and the AWSS Standard Plans and Specifications.
 - B. All nuts tightened on tie rods shall be brought to a snug fit against the fitting lugs but shall have no excessive tension applied. The Contractor may use the bolting devices as a means of homing the pipe or fitting but shall remove all excessive tension from the nuts and return them to a snug bearing before the hydrostatic field test.
 - C. All installed tie rods shall have a minimum of 1-inch and maximum of 3-inches of threaded end showing past the nut on both ends of the tie rod.
- 3.22 INSTALLATION OF STAINLESS STEEL WIRE BINDERS
- A. The Contractor shall furnish and install stainless steel wire binders to secure the tie rods in place in the lugs/slots of fittings.

- B. The wire binders shall consists of 3 loops (turns) of wire wrapped tightly around the entire set of tie rods with the ends twisted tightly together.
- C. For each set of tie rods less than 14-inches in length (backside to backside of lugs), two sets of wire binder will be required, located equally spaced along the tie rod length.
- D. For each set of tie rods greater than 14-inches in length (backside to backside of lugs), two or more wire binders will be required, spaced 6-inches from the face of the lugs. Additional wire binders will be required on longer tie rods in order that the spacing between wire binders is no greater than 18-inches.

3.23 INSTALLATION OF CONCRETE THRUST BLOCKS

- A. The Contractor shall furnish and install concrete thrust blocks, where and as shown on the Plans, and in accordance the Special Provisions, and the AWSS Standard Plans and Specifications.
- B. Concrete thrust blocks under elbows shall include rebar loops over the fitting bodies to restraint the fitting from moving upwards. The rebar loops shall form a cross over the fitting.
- C. The concrete for the thrust block shall not be "just poured" over the fitting. The Contractor shall install plywood forms for two sides of the thrust block.
- D. Any concrete poured on the fitting which blocks or covers any fasteners or the gland ring shall be removed prior to any tests can take place.
- E. Thrust blocks must bear against undisturbed natural ground. Refer to Plans for thrust block at vertical bends.

3.24 INSTALLATION OF PIPE ENCASEMENTS (SLEEVING)

- A. The Contractor shall furnish and install pipe sleeve encasements, where and as shown on the Plans for pipe encasement, and in accordance with the Special Provisions and the AWSS Standard Plans and Specifications.
- B. The installed pipe shall be secured in the encasement piping by the use of casing insulators. The casing insulators shall be spaced as per the manufacturer's recommendation for the size of ductile iron pipe. Sand shall then be jet compacted to fill the encasement from the bottom to 60 percent of the of the encasement diameter when measured vertically.
- C. Where encasement pipes are longer than one (1) pipe length are required, the Contractor shall join the pipes by either welding the spigot ends or welding the bell and spigot ends. The pipe exterior and interior surfaces where the coating is damaged by the welding operation and the welds shall be coated within 2 hours of welding with an approved cold tar epoxy. Refer to the Plans for the type of weld joint(s) required and requirements in this Section for welder and welding quality control.

- D. Prior to performing any pipe encasement joint welds that will be placed into service, the certified welder shall weld one (1) test encasement pipe joint per the requirements of the Section for welding quality control.
- E. The Contractor shall then install the end seals on both ends of the pipe encasement.

3.25 INSTALLATION OF PROTECTIVE CONCRETE SLAB

- A. The Contractor shall furnish and install the protective concrete slab(s), where and as shown on the Plans, and in accordance with the Special Provisions and the AWSS Standard Plans and Specifications Drawing HPL-5620, current revision.
- B. The protective slab shall be poured on the approved compacted soil and with all sides of the slab to be properly formed with plywood or another approved formwork material.
- C. The Contractor shall obtain the City Representative's approval in writing for the rebar installation and formwork prior to the pouring of the concrete. Should the Contractor pour the concrete prior to inspection by the City Representative and obtaining his/her approval, the Contractor shall remove the protective slab and construct a new protective slab at no additional expense to the City.

3.26 INSTALLATION OF WARNING TAPE

- A. The pipe, fittings and/or pipe encasement shall be installed with a continuous strip of warning tape located 12-inches directly above the pipe and at a distance of 12-inches below the finished grade or at a maximum of 6-inches below a protective concrete pad or concrete street base. The Contractor shall back fill the trench with sand to a depth of 12-inches above the top surface of the pipe, fittings and/or pipe encasement and then lay the warning tape directly over the centerline. The Contractor shall ensure that the warning tape is not removed/damaged during the backfilling of the trench.
- B. Warning tape ends shall overlap each other a minimum of 12-inches and be fastened together with an approved water resistant adhesive tape.

3.27 INSTALLATION OF POLYETHYLENE SLEEVE (POLY WRAP)

- A. The polyethylene sleeving shall be installed per ANSI/AWWS standard C105/A21.5 on all AWSS pipes and fittings except over direct buried gate valves and/or pipe and fittings inside concrete valve vaults. Where the sleeving is placed over tie rods and fitting/collar lugs, the sleeving shall be installed in such a manner to minimize the free space between the sleeving and pipe body.

3.28 HYDROSTATIC FIELD TEST OF AWSS FACILITIES

- A. General - Before acceptance of the new AWSS work by the City, the SFWD will hydrostatically test the new work by pressurizing the line to 350 PSI (or an approved lower pressure when directed by the City Representative) with a SFWD pumper truck and physically check each joint for leakage.
- B. Testing of the New AWSS Facilities

1. At each new pipe joint to be inspected by the SFWD, the Contractor shall provide shoring/trench support meeting/exceeding the requirements of DPW/OSHA regulations in order to have the pipe joint(s) exposed and physically accessible for the duration of the line fill and hydrostatic testing. The City Representative will make the final decision regarding the adequacy of the shoring/trench supports.
2. The Contractor shall be responsible for engineering, furnishing and installing, prior to the test, suitable temporary thrust blocks and other anchorages, to prevent any movement of the AWSS pipeline during the test.
3. The Contractor shall provide all assistance (minimum personnel shall include the journeyman plumber and two laborers) to the SFWD for filling the line during both the line fill and hydrostatic test, including releasing trapped air, etc.
4. When requested by the Contractor through the City Representative, the SFWD will fill the new line to line pressure and allow the pipe to sit for 24-hours. Should the new work be an isolated portion of pipe or there is no available low-pressure hydrant within 400-feet of the new work, the Contractor shall provide a water truck with the required connecting fittings and hoses conforming to the CCSF standards at no cost to the City along with pressurizing the line to be hydrostatically tested to 150 PSI for 24-hours. The Contractor shall also provide the water truck with the require fittings and hoses for the hydrostatic test.
5. For the hydrostatic test, the SFWD shall use their pumper truck to gradually increase the pressure to 350 PSI (or a lower pressure when approved by the City Representative). The final test pressure shall be held for a minimum of 30 minutes prior to the City Representative verifying the joints for leaks.
6. The pressures will be maintained by the SFWD for a sufficient time for the City Representative to visually check for leakage on every pipe, fitting and valve joint, including joint(s) to existing pipes were installed.
7. The test is successful if no leaks are found, including no sweating on new lead joints where applicable, and pipes the do not shift from their installed positions.
8. The City and County of San Francisco may delay the test if a large emergency demand upon fire-fighting equipment requires the withdrawal from active service of pumping equipment. The City and County of San Francisco further reserves the right to deny the use of a pumper truck for a retest where said retest is required due to failure of the Contractor to be present and ready at the original time scheduled for a test or because the installation fails the test due to poor workmanship.
9. Should the SFWD deny the use of the SFWD pumper truck for a retest, the Contractor, shall at his/her own expense, provide the equipment to accomplish the retest to the satisfaction of the City Representative. The City Representative will still witness this retest and subsequently physically check all pipe joints for leakage. The Contractor shall notify the City Representative in writing at least forty-eight hours (two (2) full working days) in advance

thereof of the time when the installation is ready for hydrostatic test. The City Representative will contact the SFWD to schedule/reschedule the actual test.

C. Contractor Responsible for All Cost Related to Retest

Should the test fail, it is the responsibility of the Contractor to provide all labor, material and equipment to fix the leaks and conduct the retest(s) to the satisfaction of the City Representative at no additional cost to the City. This may include, but shall not be limited to, excavating trenches to expose pipes, fittings, cutting into new pipeline, disassembling pipes and fittings, installing new gaskets and glands, etc. Additionally, the Contractor shall be required to pay the standard fee for retesting prior to the retest, whether the test(s) is/are performed by the SFWD or the Contractor.

3.29 RESTORING PAVEMENT AND RELATED IMPROVEMENTS

A. Restoring pavement and related improvements including restoring concrete pavement, concrete road base and asphalt concrete pavement shall be covered in the scope of work as specified in Section 32 00 00.1-Pavement Restoration for AWSS Work, for all areas where the existing street is removed/damaged during construction.

B. Miscellaneous Restoration Work

Sidewalk and pavement restoration shall include the replacement of traffic lane and crosswalk stripes, parking stall markings, and curb painting that are removed/damaged during construction.

3.30 TRENCH EXCAVATION AND BACKFILLING

A. General

1. Excavation and backfilling includes but shall not be limited to excavating for removing and installing AWSS facilities; demolishing and removing existing valve vaults and, if necessary, abandoned underground structures; hauling and disposing of excavated material. The trench depth and width, pipe bedding and backfill, shall be per Drawing HPL-5573A Rev. 0-Auxiliary Water Supply System Standard Plan for Ductile Iron Pipe Installation and Pipe Trench, which is included at the end of this section.
2. Excavating and backfilling shall be in accordance with the applicable requirements of the SSDPWSF, current revision, except as modified herein.
3. Prior to beginning excavation, the Contractor shall notify the utilities that may be affected by the work.
4. The Contractor shall exercise caution and protect and support existing utilities and underground establishments from damage during the entire construction operation without additional compensation from the City.

B. Arrangement with Utility Companies

The Contractor shall make all necessary arrangements with the public service utility companies for any work or alteration of facilities as may be required due to the above described work.

C. Demolition

Abandoned underground boxes, vaults, pipes, and conduits and other enclosures that occupy the site of work, except for AWSS fittings to be salvaged and delivered to the San Francisco Water Department Pipe Yard, San Francisco, CA, as specified herein, shall be demolished and removed from the site as property of the Contractor in accordance with the applicable requirements of the SSDPWSF, current revision.

D. Hauling and Disposal

All excavated materials shall be hauled off-site by the Contractor as his or her property and disposed in a safe and legal manner. Excavated materials may be stockpiled off-site for later use as general backfill materials provided that they conform to the requirements for backfill specified herein.

E. Backfilling

1. Backfilling includes placing and compacting backfill material in trench excavation above the sand/round rock level and under the concrete roadway base, and the excavation faces, as shown on Drawing HPL-5573A Rev. 0-Auxiliary Water Supply System Standard Plan for Ductile Iron Pipe Installation and Pipe Trench, which is included at the end of this section.
2. Backfilling shall not begin until after the City Representative has inspected and approved the structure or installation, complete and in place.
3. Backfilling excavation for pipelines shall be in accordance with the requirements for "Trench Backfill" set forth in the SSDPWSF, current revision.
4. Backfilling excavation for structures shall be in accordance with the requirements for "Structural Backfill" set forth in the SSDPWSF, current revision.
5. Structural backfill shall be placed in spaces within 3-feet of the outer face of the concrete vault in place or between the outer face of the concrete vault and the face of the excavation shoring, whichever is applicable.
6. Backfill shall be speared in lifts having a maximum uncompacted thickness of 8-inches, moisture-conditioned, and shall be compacted to a minimum of 90 percent of relative maximum density in all areas, except within 3-feet below the street pavement section, where a minimum of 95 percent of relative maximum density shall be provided. Lightweight hand tampers shall be used to compact backfill within 5-feet of the new structure.

3.31 EXCAVATION SUPPORT AND DEWATERING

A. General

The work to be done in this section includes furnishing, installing, maintaining and subsequently removing excavation shoring and dewatering systems at the excavation

sites as necessary to enable constructing new underground AWSS facilities in free air and dry conditions.

B. Excavation Shoring

1. Excavation shoring shall be in accordance with the requirements of the SSDPWSF, current revisions, and applicable requirements of Federal and State safety orders, whichever is more restrictive.
2. The type and design of the excavation shoring system used is the responsibility of the Contractor. The Contractor shall submit plans and calculations for the shoring system for review and approval prior to beginning excavation. If such plans vary from the shoring standards established by the State of California Construction Safety Orders, the plans shall be prepared by a Civil Engineer registered in the State of California. The drawings shall include descriptions of the general arrangement, construction details, sequence and schedule of work, materials and safety, measures to be provided. The plans and calculations shall bear the stamp of the City Representative and his or her expiration date and wet signature affixed thereon. Approvals will not relieve the Contractor of the responsibility for providing a safe and satisfactory shoring system.
3. The Contractor is referred to Section 6705 and 607 of the California Labor Code, which shall apply to any excavation five (5) feet or more in depth constructed under this Contract.

C. Dewatering

1. Dewatering includes but is not limited to furnishing, installing, maintaining, operating and subsequently removing dewatering and ground water control systems and disposing of pumped water in accordance with Section 31 23 26.1-Excavation and Backfill for AWSS Work, except as modified herein.
2. Dewatering will be required for reducing the hydrostatic pressure necessary for removing any water that flows from the existing AWSS pipe(s) even when the SFWD has closed the nearest gate valve(s), and for lowering the water table around the excavation to elevations as are required for constructing new underground structures in free air and dry conditions. Such dewatering shall be maintained at not less than 2-feet below the structure foundation subgrade. The water level shall be maintained at this elevation until placement and compaction had been completed.
3. The Contractor shall be solely responsible for the arrangement, locations and depths of the dewatering system necessary to accomplish the work specified herein. The Contractor shall have available at the time sufficient equipment, machinery and piping, including standby pumps, maintained in good working order to take care of emergencies.
4. Methods used for removing and disposing pumped water shall ensure no damage will occur to adjacent property, or to sewers, pavement, utility installation, other facilities and work. Should settlement or any other soil movement occur to dewatering area, the Contractor shall stop immediately

and modify the dewatering system to prevent further soil movement and at no cost to the City.

5. Any water pumped from a trench shall not be disposed of in a catch basin that flows directly either to the San Francisco Bay or the Pacific Ocean. At locations where there is no direct flow to the City's combined sewers through a catch basin, it shall be the Contractor's responsibility to haul and transport the water to an approved location without additional cost to the City.

3.32 FIELD QUALITY CONTROL

- A. The Contractor shall retain the services of an Independent Testing Laboratory to perform all inspections, testing and sampling required by this Section.

Backfill Testing:

1. Contractor's Soils Testing Firm, as a minimum, shall perform all tests herein specified and any additional tests as may be required by SSDPWSF Standard Specifications. Refer to Section 31 23 26.1-Excavation and Backfill for AWSS Work, for additional requirements.

One moisture-dry density curve for each type of soil encountered in subgrades and fills.

- a. Gradation tests for each type of backfill and base material furnished.
- b. Liquid limit test for each material furnished.
- c. Plasticity index for each material furnished.
- d. Field density tests of subgrade and compacted fill material in accordance with ASTM D1556 or ASTM D2922 for each 60-linear feet of trench and for each lift installed.
- e. Moisture content in accordance with ASTM D2216 or ASTM D3017 shall be same frequency as in place field density tests.

Welder Qualifications:

1. All welders employed by the Contractor to perform welding on ductile iron pipe shall be certified welders experienced in the type of welding required including all applicable requirements as prescribed in ASME Boiler and Pressure Vessel Code-Section IX. The Contractor shall submit written documentation from an approved institution that the welder has taken and passed courses for the welding to be performed. The welder shall follow welding instructions furnished by the weld rod supplier. Special attention shall be given to the type and polarity of current and current level to be used.

Weld Quality Control:

1. The Contractor's Independent Testing Laboratory shall inspect and approve in writing the welds on two (2) test welded collar stops and one (1) encasement pipe joint (where encasement pipe are installed with more than

one section of pipe), all at no expense to the City and prior to performing any welds that will be placed into service. For testing purposes, macroetch testing shall be used. Dye penetrate or ultrasonic testing shall not be accepted. The test welding, and testing and inspection of the welds, shall be performed in the presence of the City Representative. The Contractor shall notify the City Representative two (2) days in advance of the test welding and inspection, and of the welding of all field welds.

2. The welds shall be rated according to the method outlined in ASME Boiler Pressure Vessel Code, section VIII, UW-51. Any field welds showing excessive amounts of inclusions, slag, blowholes, surface defects, shallow penetration or any other fault that will weaken weld shall be rejected. All rejected welds shall be repaired to the satisfaction of the City Representative, or at the City Representative's direction, the section of pipe with rejected welds shall be cut off and removed from the job site. Any three (3) rejected welded collar stops or one (1) encasement pipe joint shall require the Contractor to have two (2) sample collar stops or one (1) encasement pipe joint welded, and inspected and approved by the Contractor's Independent Testing Laboratory in the City Representative's presence prior to welding any additional collar stops or encasement pipe joints to be placed into service.
3. Prior to beginning any welding, the metal to be welded shall be cleaned to bare metal by scraping and wire brushing. No welding shall be performed until the surfaces to be welded are clean and free of paint, rust, coatings or any other materials that will weaken the weld.
4. References to SSDPWSF, current revisions, which indicate City will provide sampling and testing shall be understood to mean City may, at its discretion, perform random sampling and testing to verify compliance with the Contract Documents. Such random sampling and testing shall be at no cost to Contractor.
5. The City's random inspections and testing described above shall not relieve the Contractor from performing all inspections and testing required by this Section. Cost of such inspections and testing shall be borne by the Contractor. Payment for inspections and testing is considered incidental to the work in which it pertains and no separate payment will be made.

3.33 SAMPLE PIPE SECTIONS TO BE CUT

- A. The Contractor shall cut by mechanical methods two (2) 1 to 1 ½-inch slices as directed by the City Representative (cut taken perpendicular to length of pipe) of ductile and/or cast iron pipe shown on the Contract Documents as to be removed as follows: 1.) From each hydrant lateral to be removed; 2.) From two locations on each block (maximum block length will be 400-feet) where AWSS pipe is removed. When there are more than one size of pipe being removed on a single block, provide the required pipe slice samples for each pipe diameter being removed; 3.) From any AWSS pipe that crosses through a sewer and is being removed. The slices from the sewer crossing shall be from the pipe directly exposed to the inside of the sewer, and 4.) From the Special Instructions as follows:
 1. None.

- B. The locations for the pipe samples to be cut from the existing pipe shall approved by the City Representative in the field. The cut pipe samples shall be labeled from the pipe line and location cut from and delivered to the Resident Engineer's field office. The pipe samples shall be cleaned of heavy dirt prior to delivery to the City Representative although the coatings, linings and corrosion shall be left intact.

END OF SECTION