

Technical Specifications

Division 1 General Requirements

1-1.01 Approved Plans Required

No work will be commenced on any water facilities which are intended to be attached to the District's system unless the Contractor is in possession of complete, fully-approved plans and specifications bearing the signature of the General Manager or his duly authorized representative, and covering all phases of the proposed construction.

An exception to this requirement would be the installation of a single item such as a water service, fire hydrant or fire service.

1-1.02 Contractor's License

All contractors performing work for the District or performing work on projects, which are to be accepted by the District, must be duly licensed under the laws of California to do or perform such work.

1-1.03 Reference to Standards

Whenever standards (such as AWWA, ASTM, etc.) are referred to in these specifications, said reference will be to the latest officially adopted revision thereof.

From time to time these improvement standards, technical specifications and standard details will be revised. It will be the engineer/contractor's responsibility to obtain the latest revision thereof prior to design and installation.

1-1.04 Permits, Licenses, and Fees

The Contractor will, at no expense to the District, obtain all necessary permits and licenses for construction of the project, give all necessary notices, and pay all fees required by law. Contractor will promptly furnish the District copies of all finally approved permits secured by the Contractor in the performance of his contract.

1-1.05 Compliance with Laws

The Contractor will conduct the work in compliance with all existing State and Federal safety laws and County and Municipal ordinances and regulations limiting or controlling the work in any manner.

1-1.06 Construction Safety

All construction of water systems intended to be connected to the District's system must be constructed in strict compliance with the statutory safety requirements of the State of California as set forth in California Administrative Code, Title 8 and all amendments thereto.

1-1.07 Work in Sacramento County Rights-of-Way, Easements, and Waterways

Any Contractor performing construction within Sacramento County rights-of-way, easements, and waterways will be in possession of County-approved plans or a County Encroachment Permit and will comply with all conditions imposed therein, all at no expense to the District.

1-1.08 Existing Facilities and Utilities

The Contractor will be responsible to determine and verify the location of existing facilities and/or utilities. Damage to any existing pipeline, service or other utility, fence building or other structure or to landscaping or other improvements will be the responsibility of the Contractor and will be repaired or replaced by the Contractor at his expense and to the satisfaction of the District.

The District recommends the Contractor take photographs of the existing as-is conditions prior to beginning work.

1-1.09 Pre-Construction Meeting

An on-site meeting with the District Inspector, Consulting Engineer, County Inspector, and Contractor must be held at least two days in advance of construction to inspect materials, schedule inspections, review the approved water system construction plans, and schedule any tie-in connections. Pre-construction meetings will not be scheduled until all items in B-10 have been received including submittal of the material list, guarantee letter, and encroachment/maintenance bond submitted.

1-1.10 Materials Approval

At least ten days prior to the pre-construction meeting, the Contractor will furnish to the District for approval a list of all materials proposed to be used in constructing the water system, including manufacturer, actual location of manufacture, and model number of each item.

1-1.11 Required Notice

The Contractor will notify the District three days prior to commencement of construction and will furnish the District at least two days notice when inspections are required, when pipe is in the ground prior to backfilling, when service and main valves are installed, when initial backfill has been placed, when ready for the hydrostatic test, and will keep the District informed generally as to progress of construction.

1-1.12 Inspection Requirements

Any improvement constructed in accordance with the approved plans, the Special Conditions, and the General and Standard Technical Specifications, for which it is intended or required that the District will assume maintenance responsibility, will be inspected during construction by an authorized representative of the District. Any improvements constructed without the inspection as provided above or constructed different from the contrary to the order or instructions of the District will not be accepted by the District for maintenance purposes and permission to connect with the existing system will be denied.

Within ten days after receiving the request for final inspection, the District will inspect the work. The Contractor, Consulting Engineer, and Developer will be notified in writing as to any particular defects or deficiencies to be remedied. The Contractor will proceed to correct any such defects or deficiencies at the earliest possible date. At such time as the work has been completed, a second inspection will be made by the District to determine if previously mentioned defects have been repaired, altered, and completed in accordance with the plans. The District will not accept any work or project until all defects have been remedied to its satisfaction.

1-1.13 Water System Information

Sacramento Suburban Water District is a member of the U.S.A. One-Call Program, Call U.S.A. 48 hours in advance for public water system information.

1-1.14 Water System Shutdown

Only District personnel will make all water system shutdowns. **UNDER NO CIRCUMSTANCES WILL ANYONE OTHER THAN A REPRESENTATIVE OF THE DISTRICT OPEN OR CLOSE ANY VALVE IN A DISTRICT SYSTEM.**

Shutdowns for the purpose of making connections to existing mains must be scheduled at least three working days in advance and are only permitted on Tuesday, Wednesday, or Thursday. The District will advise the Contractor of the hours during which shutdowns may be made. All connections must be supervised and controlled by District personnel. No shutdowns will be permitted until the District Inspector verifies that Contractor is physically present and prepared to assist making the connection with personnel, materials, and appurtenances as specified on approved plans.

Night work as required shall be scheduled through the District pending available personnel, time and coordination of customers affected by the proposed shutdown. Night work will require payment of additional inspection fees in advance of the proposed work as determine by the District.

Tie-ins will not be allowed to District facilities on the Tuesday following a District holiday or on the Thursday prior to a District holiday.

1-1.15 Traffic Control

When working in streets, the Contractor will take adequate precautions for the protection of the traveling public. Barricades, warning lights and signs, and flagmen, where necessary, will be maintained in accordance with the latest revision of the Caltrans “Manual of Traffic Controls” or County of Sacramento “Improvement Standards” until the excavation is refilled, the obstruction removed, and the roadway made safe for the traveling public. At its discretion, the District may require the Contractor to submit and obtain Sacramento County’s approval of a traffic control plan before the District will approve plans and/or authorize a shutdown.

1-1.16 As-Built Drawings

The Contractor will maintain one set of construction drawings to be used for keeping a record of all changes made during construction. The Contractor will be responsible for keeping these drawings and neatly noting all changes with colored pencil or ink. The District will check these drawings, and partial payments will not be made to the Contractor until the check made by the District verifies that the records are being properly kept. These construction drawings are to be kept in neat order and will be delivered to the Consulting Engineer at the completion of the project. Upon completion of revised as-built drawings, said drawings will be delivered as per B-12.

1-1.17 Disposal of Trench Soil

Surplus material excavated from pipeline trenches will become the property of the Contractor and will be disposed of legally in conformance with applicable County ordinances. The Contractor will promptly furnish to the District copies of all grading permits and written permissions from landowners secured by the Contractor to dispose of trench soil.

1-1.18 Guarantee and Maintenance Bond

Prior to commencement of the work accomplished under District-approved plans, and as a condition of final acceptance herein, the Contractor will execute and deliver to the District a guarantee of the materials, workmanship, and/or equipment that he or she will have constructed or installed in the course of said work. This guarantee will be in the form attached hereto and will remain in full force and effect for a period of one year from the date upon which the District accepts the work. Should any failure of the work occur within the guarantee period, which can be attributed to faulty materials, poor workmanship, or defective equipment, the Contractor will promptly make the needed repairs at his expense. A completed guarantee form will be required before each job performed by a Contractor in the Sacramento Suburban Water District. **THE DISTRICT WILL NOT ACCEPT THE GUARANTEE LETTER AND NO WORK SHALL BEGIN UNLESS THE LETTER IS PLACED ON THE CONTRACTOR’S LETTERHEAD, SIGNED BY THE CONTRACTOR, FILLED OUT COMPLETELY AND INCLUDES THE STATEMENT OF FINAL COST OF THE WATER SYSTEM.**

Prior to commencement of any work performed in Sacramento Suburban Water District, each Contractor will be required to furnish an overall guarantee/maintenance bond or corporate surety bond, payable to the District, issued by an acceptable surety company authorized to do business in the State of California, to protect the District against the results of faulty materials, poor workmanship, or defective equipment, and to guarantee the Contractor’s responsibility for each

completed work or project, as outlined above, for a period of one year from the date the District accepts the work or project. The bond also will cover all subsequent jobs performed by the Contractor in the Sacramento Suburban Water District, if such works or projects are being constructed simultaneously or serially. The time limit of such bond will begin from the date the District first accepts the bond and will end on the anniversary date of the acceptance letter. The Contractor will obtain the bond on forms furnished by the District in the sum of not less than \$7,000.00. It will be the Contractor's responsibility to renew the bond on the anniversary date so as to cover all jobs that are started after initial bond submittal and so that it remains in effect for at least one year after the District accepts the last work on the project and issues an acceptance letter. Should the Contractor be unable to obtain a bond for the project, then the Developer will furnish a bond. Said bond will only cover the project and will be no less than 50% of the contract amount for water facilities and be in effect for a period of one year from the date of the District's acceptance of the work or project.

GUARANTEE

(To be submitted on Contractor's letterhead)

Sacramento Suburban Water District ("District")
3701 Marconi Avenue, Suite 100
Sacramento, CA 95821

Dear Sir or Madam:

We hereby unconditionally guarantee that the construction performed under approved plans and/or contract dated _____, 20____, for the project entitled _____ will be done in accordance with the approved drawings and specifications and that work as installed will fulfill requirements of the guarantee included in the specifications. We agree to repair and/or replace at our sole cost and expense, and to the satisfaction of the District and its engineers, any or all of our work, together with any other adjacent work which may be displaced by doing so, that may prove to be defective in workmanship or materials within a period of one year from date of acceptance of above-named project by District, without any expense to said District, ordinary wear and tear excepted. We further guarantee that we will leave the site of any repair or replacement work in satisfactory working order and condition.

In the event of our failure to comply with the above-mentioned conditions, within ten days after being notified in writing by the District, we, collectively or separately, do hereby authorize the District to have said defects repaired and made good at our expense, and we will honor and pay the costs and charges therefore upon demand. In the event of such failure on our part, we further promise to pay such reasonable litigation costs, including attorney's fees and expert witness fees and costs, as a court with jurisdiction in the matter shall decide, should the enforcement or interpretation of this guarantee or any part thereof require legal action.

Company Name (Print)

Address

Phone Number

Contractor's License Number

Contractor's Signature

Print Name

The contract amount for water construction only: _____

Technical Specifications

Division 2 Pipelines & Appurtenances

Section 1: Materials

2-1.01 Materials and Brand Names

All materials and equipment furnished under these specifications will be new and of a quality equal to that specified in this Section. Materials or equipment specified herein by brand or trade name or catalog designation are so specified or designated because they are known to be suitable for the operating service required of them. It is, however, not the purpose of these specifications to eliminate other material or equipment of equally demonstrated design and functional quality and efficiency. However, all material proposed to be used will carry the AWWA stamp of approval with test results to verify the material satisfies AWWA Standards and will be subject to approval by the District as specified in Subsection 1-1.10.

2-1.02 Material Testing

All testing requirements of the specifications will be conducted by the pipe manufacturer or his representative within the State of California and the resulting tests will be certified by an established, reputable firm acceptable to the District operating in the materials testing field.

2-1.03 Water Pipe

Pipe used in the construction of water distribution systems may be any of the types specified below, unless a particular type is specified or shown on the approved plans. It will be the regular product of a firm who has successfully manufacturer comparable pipe for at least three years.

Ductile Iron Pipe

Ductile Iron pipe (D.I.P.) will be thickness Class 50 or Pressure Class 350 unless specified otherwise and will conform to AWWA Standard C-151. All ductile pipes will be cement mortar lined and seal coated in conformance with AWWA Standard C-104. Joints will be of a bell and spigot type conforming to AWWA Standard C-111, such as “Tyton Joint:” manufactured by U.S. Pipe and Foundry Co or “Fastite” manufactured by American DIP Co... Standard laying length will be 18 to 20 feet. Installation will conform to these specifications and AWWA Standard C-600.

Ductile iron pipe used for trench-less methods or laid under culverts will be minimum thickness Class 53 or Pressure Class 350.

Ductile Iron Pipe will be used under all culverts and will extend a minimum 5 feet beyond outside edge of the culvert as per Standard Detail No. 25. No joints will be located under the culvert.

Polyethylene Encasement will be required for all Ductile Iron Pipe installation, including fittings, valves, etc. Encasement material and installation methods will conform to AWWA Standard C-105.

All runs of water pipe will have a No. 10 gauge solid, insulated, soft drawn copper wire affixed along the top of the pipe taped with 20 mil black tape. Blue caution tape shall be laid along the top of the initial backfill to facilitate notification of facilities. Installation will conform to Standard Detail No. 4.

2-1.04 Water Pipe Fittings

All junctions will be flange connected, unless otherwise noted. All bends, elbows, tees, crosses, and special fittings will be flanged unless otherwise noted and will conform to the following requirements. Tie-ins to **existing facilities** will be performed per Standard Details 21, 22, and 23 or in accordance with the following if conditions warrant.

- (1) Flanged tee, should a valve be required on the existing main or should the main be mortar lined steel pipe as per Standard Details 21, 22, and 23.
- (2) Stainless steel tapping saddle for runs on existing mains with no additional valves on the existing main. Stainless steel tapping saddles will not be used on mortar lined steel pipe 14 inches or smaller unless directed by District. However, the tapping saddle will only be used when the run is as per the following chart:

Existing Main Size	Maximum Allowable Tap Size
4-Inch	None
6-Inch	None
8-Inch	6-Inch Max.
10-Inch	8-Inch Max.
12-Inch	8-Inch Max.
14-Inch	None
16-Inch	12-Inch Max.
20-Inch	16-Inch Max.
24-Inch	16-Inch Max.

(a) Fittings for Water Pipeline

Fittings will conform to AWWA Standards C-110 and C-153, Class 250, Ductile Iron only. Gaskets will conform to AWWA Standard C-111. Joints will be flanged or mechanical joint with mega lug type restraints, unless otherwise specified or shown on plans. Rubber-ring push-on joints for A.C. Pipe conforming to AWWA Standards C-110 and C-153 may be employed for 6-inch diameter or smaller pipe only. Field restrain type gaskets will be used as necessary in conjunction with restraint type fittings.

(b) Fabricated Steel Items

Fabricated adapter fittings and specials will be made up of steel pipe, conforming to ASTM Designation A53, 35,000 P.S.I. Minimum Yield Strength, 1/4-inch wall, except 20-inch diameter through 24-inch diameter, which will be 3/8-inch wall, greater than 24-inch through 36-inch will be 1/2-inch wall thickness. Welding fitting will be seamless steel conforming to ASTM Designation A-234. Flanges will be Class "D," slip-on welding flanges welding front and back and faced, and all in accordance with AWWA Standard C-207. Pipe, fittings, and flanges will be lined and coated, 12 to 15-mil thickness with a Fusion Bonded Epoxy Coating conforming to AWWA Standard C-213. The lining and coating material will be 100% solids, thermosetting, fusion bonded, dry powder epoxy resin such as "Scotchkote No. 302" (3M Co.) or approved equivalent applied by the fluidized bed method only.

2-1.05 Conductor Pipe

Pipe used as a conductor under a highway, railroad, or other location will be welded steel pipe manufactured of ASTM Designation A-245, commercial grade steel. All joints will be butt-welded. Welded steel conductor will have a minimum wall thickness of 1/4-inch for sizes up to and including 24-inch in diameter, 5/16-inch for sizes 27-inch to 36-inch diameter, and 3/8 inch for sizes greater than 36-inch to 42-inch diameter. Conductor pipes greater than 42-inches in diameter will be designed by the Consulting Engineer and approved by the District prior to use.

Conductor casing will be used for all trench-less methods unless otherwise directed by District.

2-1.06 Valves and Valve Boxes

Installation of valves, valve boxes, and appurtenances will conform to Standard Detail No. 5 and as specified herein.

(a) Valves

All valves will be Class 150 and will meet or exceed the requirements of AWWA Standard C-504 for Butterfly type and AWWA Standard C-509 or C-515 for Resilient Seat type gate valves.

Valves will be suitable for buried service, will be equipped with a 2-inch square operating nut, and will open CCW. Unless shown or otherwise noted on the plans, valves will be furnished with flanged, mechanical joint or push-on ends, conforming to the requirements set forth herein for water pipe fittings.

The type of valves will be of the following:

Butterfly Valves – Pratt, Mueller, DeZurich, or approved equivalent.

Gate Valve – American Flow Control (AFC), Kennedy, Mueller, Clow, or approved equivalent.

Butterfly valves will be used on 10-inch diameter or larger pipe, and Resilient Seat gate valves will be used on 8-inch or smaller pipe or unless otherwise noted. Butterfly valve shall have seat in body, not on disc.

(b) Valve Boxes

Valve boxes located in non-traffic or traffic areas will be P-51 FORNI or Christy G-5, having a cast iron face and cast iron traffic lid. Covers will be marked “WATER” and will have a tight fit in the box.

Valve box risers will be fabricated from 8-inch diameter PVC (SDR-35) or C-900 PVC pipe and 8-inch – No. 10GA steel well casing or equivalent.

(c) Valve Operating Extension

A valve operating extension will be required whenever the valve is installed such that the operating nut is more than 48 inches below finishing grade. The valve operating extension will be fabricated from steel elements to the dimensions shown on Standard Detail No. 5.

(d) Valve Aliners

Valve aliners will be required on all valves placed in Sacramento Suburban Water District. Aliners will be installed as shown on Standard Detail No. 5A and be sized to fit within the riser pipe as designated by these specifications.

2-1.07 Fire Hydrants

Fire hydrants and appurtenances will be furnished and installed in conformance with Standard Detail No. 6, as designated on the plans, and as specified herein.

The hydrant main valve will be minimum 5 1/4 inch diameter; will open CCW, with bronze-to-bronze seating. The foot piece will have mechanical joint inlet with mega lug type restraints, for connection to the 6-inch diameter ductile iron pipe hydrant lateral.

Hose nozzles will be threaded-in, with one (1) 4 1/2-inch diameter Pumper Outlet and two 2 1/2-inch Hose Outlets, having "National Standard Fire Hose Coupling Screw Threads," conforming to ASA Standard B26 or unless otherwise specified. The hydrant nozzle caps will be securely chained to the body. Pumper Outlet will face the street or traffic lane unless specified otherwise. In the event that the hydrant must be disassembled to rotate the pumper outlet so that it faces the street, new gaskets will be applied to the hydrant when it is reassembled.

Even though not indicated on the plans, every fire hydrant installation must have a 6-inch resilient seat gate valve installed on the 6-inch lateral at the tee from the main and all piping will be restrained from hydrant tee to hydrant foot piece.

Fire hydrants 50 feet or longer from the connecting water main shall have an 8-inch lateral and valve.

All fire hydrants will be staked for location and finished grade prior to construction by a licensed surveyor or civil engineer.

"Steamer" fire hydrants will be wet-barrel type, will meet or exceed the requirements of AWWA Standard C-503 and will be CLOW Model No. 960 or 860, JONES Model J4060, or approved equal. Hydrants must be a traffic-type equipped with an approved break-off protection device, such as LBI Model No. 400 BOCVA or AVK Series 2488 or James Jones Model J5000 series. The portion of the completed hydrant above the "breakable" flange will be finish-painted with "RUST-O-CRYLIC" No. 5747 Yellow. Installation will conform to Standard Detail No. 6. All fire hydrants will be traffic protected by guard posts as per Standard Detail #7 unless otherwise noted.

2-1.08 Service Lines and Fittings

Service lines and fittings will be furnished and installed in conformance with Standard Detail Nos. 12, 13, 14, 15, and 16, and as specified herein.

(a) Service Saddles

Service saddles will conform to the following, depending on the type and size of water main on to which they are to be mounted.

Ductile Iron Pipe: 6-inch through 12-inch diameter; brass body, double strap brass saddle casing, drilled and tapped for corporation stop, and be of all brass and will be of the following: JAMES JONES 979, ROMAC 202B, FORD 202B, ROCKWELL 323, MUELLER BR2B or approved equal.

Ductile Iron Pipe: 16-inch through 24-inch diameter; brass body, stainless steel band of brass, drilled and tapped for corporation stop, and will be of the following:

JAMES JONES 979, MEULLER BR2B, FORD 202BS, ROCKWELL 323, or approved equal.

Cast Iron saddles will not be used in Sacramento Suburban Water District unless approved by the District.

(b) Corporation Stop

Corporation stops will be ball valves and lead free brass (ASTM Designation B62) with a standard male iron pipe thread inlet and compression (“Pack Joint”) outlet for copper tubing. Corporation stops will be of the following models, or approved equal, conforming to the following table of sizes:

Service Size	FORD Model No.	JAMES JONES Model No.	McDONALD Model No.	MUELLER Model No.	
1”	FB1100NL	J-1435SG	74704-BT	B-25028NL	
1 1/2”	FB1100NL	J-1935SG	74704-BT	B-25028NL	
2”	FB1100NL	J-1935SG	74704-BT	B-25028NL	

(c) Service Line

Service lines in sizes up to and including 2 inches in diameter will be polyethylene-coated “Type K” copper tubing soft tempered, meeting ASTM Designation B88. Service lines larger than 2 inches in diameter up to and including 4 inches will be Ductile Iron Pipe Class 50, 53, or Pressure Class 350 with Bell and Spigot joints. Service lines larger than 4 inches in diameter will conform to Section 1.03 and 1.04 herein.

(d) Meter Setters and Fittings

Meter setters will be copper with full port angle ball meter stop valve with lock wing on the inlet side and outlet side. Connection to inlet piping will be compression type pack joint inlet or CTS quick joint and FIP outlet with a double purpose coupling on 1-inch setters. Setters for 1 1/2 inches and 2 inches will be copper with flange full port angle ball meter stop valve with lock wings on inlet and outlet side with high bypass (bypass tee not drilled). Connection to inlet piping will be compression type pack joint or CTS quick joint inlet and a FIP outlet.

Service Size	FORD Model No.	MUELLER Model No.	McDONALD Model No.
1”	VBB74-84W-41-44-	390B2478----04NL	

	FP-Q-NL		739-410JJQD44
1 1/2"	VBB66-18HB-11-66NL	B2423-99000NL	720R618WWFF665
2"	VBB77-18HB-11-77NL	B2423-99000NL	720R718WDF775

Boxes will be of the type listed below:

Service Size	Box	Lids	
		Non - Traffic	Traffic
¾" & 1"	Armorcast, RPM P6001868x12 (Rotocast 13"x 24") B-30	Armorcast A6001969-H10	Steel Lid
	Armorcast, RPM A6001946PCx12 (Polymer 13"x 24") B-30	Armorcast A6001969-H10	Steel Lid
	Carson – 13242005 (Polymer 1324-12PPC Body Gray H10/20) B-30	Carson MSCBC1324SPC01-H10	Steel Lid
	Carson MSBCF1324-12X – B-30	Carson MSCBC1324SPC01-H10	Steel Lid
1 1/2 & 2"	Armorcast, RPM P600153 4x18 (Rotocast 17"x 30") B-36	Armorcast A6001947-T-H10	Steel Lid
	Armorcast, RPM A6001640PCx18 (Polymer 17"x 30") B-36	Armorcast A6001947-T-H10	Steel Lid
	Carson – 17302009 (Polymer 1730-18PPC Body Gray H10/20) B-36	Carson MSCBC1730SPC01-H10	Steel Lid
	Carson MSBCF1730-18 – B-36	Carson MSCBC1730SPC01-H10	Steel Lid
3" & 4"	Armorcast RPM A6001430PCx18 – B-48	Armorcast A6001470TA-H10	Steel Lid
	Brooks 68 – B-68	68-THR	Steel Lid
	Carson – 380481003 B-68	30484003	Steel Lid

All steel lids for traffic situations are to match size of box and constructed from diamond plate material with 1 7/8-inch diameter hole drilled in a 5/8-inch diameter recessed 3-inch diameter depression at 3 ½ -inches equal distance from any corner of lid for radio read antenna.

2-1.09 Flexible and Transition Couplings

Flexible couplings and transition couplings will be bolted, with ductile iron sleeve and end rings, ROMAC MODEL 501, FORD FC2-12L, or SMITH BLAIR No. 413, or approved equal. Flexible and transition couplings must be 12-inch minimum in length unless otherwise directed by District.

If applicable and approved by District inspector, wide or extended range couplings are approved for use in SSWD. The extended range couplings shall also be bolted with ductile iron sleeve and end rings, Ford FC2W-12L or approved equal. All couplings shall be minimum 12-inches long.

2-1.10 Sampling Stations

Sampling stations for coliform testing will be a P6002010 Armorcast Water Sampling Station, manufactured by the Armorcast Company. Sampling Stations will be installed per Standard Detail No. 24.

Technical Specifications

Division 2 Pipeline and Appurtenances

Section 2: Installation and Construction

2-2.01 Trench Excavation

Trench excavation will include removal of all materials or obstructions of any nature, the installation and removal of all sheeting and bracing, and the control of water, necessary to construct mains, services, or other works. Unless otherwise indicated on the drawings or permitted by the District, excavation will be open cut.

(a) Trench Depth and Width

Trenches will be dug to an even laying grade to a depth sufficient to provide 36 inches of minimum cover over the pipe measured from the finished grade. For pipe diameters larger than 12 inches, minimum cover will be 42 inches measured from the finished grade.

The minimum clear width of trench at the top of pipe will be 18 inches or 12 inches greater than the outside diameter of the barrel of the pipe, whichever is greater.

The maximum clear width of trench at the top of the pipe will be the outside diameter of the pipe plus 24 inches. The Contractor will conduct his operations to limit top widths to the above-specified maximum at the top of the pipe unless the District allows a greater allowable width.

If trench widths at the top of the pipe as specified above are exceeded by any amount, for any reason, the Contractor will provide at his own expense stronger pipe, improved bedding conditions, or concrete protection, as approved by the District, to meet the load requirements of the condition.

(b) Cutting of Pavement

When the trench is in an existing paved area, the pavement will be sawed or scored on neat lines parallel with and equidistant from, the trench centerline. Pavement between lines will be broken and removed immediately ahead of the trenching operations. The width of the pavement removed will be sufficient that the trenching operation does not damage the edges of the pavement left in place. When existing pavement is concrete, it will be sawed to a neat line 6 inches wider on each side than the actual trench width or as specified by Sacramento County Improvement Standards.

(c) Bracing and Shoring

All construction of water systems intended to be connected with the District's system must be constructed in strict compliance with the statutory safety requirements of the State of California as set forth in California Administrative Code, Title 8, and all amendments thereto, and all applicable County and District ordinances, rules, orders and regulations. Any violation by the Contractor of any safety law, ordinance, order, rule or regulation will be sufficient cause for the District to immediately suspend the work. No compensation for losses incurred by the Contractor for such a suspension will be allowed.

Insofar as possible, sheeting will not extend below the bottom of the pipe barrel. All sheeting, timbering, lagging, and bracing will, unless otherwise required by the District, be removed during backfilling, and in such a manner as to prevent any movement of the ground or damage to the piping or to other structures. When the District requires that sheet piling, lagging, and bracing be left in place, such materials will be cut off where designated and the upper part withdrawn, with compacting of backfill to proceed as it is removed.

(d) Maximum Length of Trench Open

There will be no more than a maximum of 100 feet of open trench, unless otherwise authorized by the District for each operation. The remainder of the trench will be backfilled and compacted, and when in streets, opened to traffic as soon as possible.

(e) Control of Water

When water is encountered, the Contractor will furnish, install, maintain and operate all necessary machinery, appliances, and equipment to keep the excavation reasonably free from water until the placing of the bedding material, laying and jointing of pipe and fittings, pouring of concrete, and placing of the initial backfill has been completed, inspected, and approved, and all danger of flotation and other damage is removed. Ground water pumped from the trench will be disposed of in such a manner as will not cause injury to public or private property or constitute a nuisance or menace to the public, and the disposal method will be subject to the approval of the State Regional Water Quality Control Board.

(f) Special Foundation Treatment

Whenever the bottom of the trench is soft or rocky or, in the opinion of the District, otherwise unsuitable as a foundation for the pipe, the unsuitable material will be removed to a depth such that when replaced with imported crushed rock or gravel, it will provide a stable and satisfactory foundation. The imported crushed rock or gravel will be graduated so that 100% will pass the 3/4-inch sieve and not more than 10% will pass the No. 8 sieve.

When the trench bottom is cobbled or of any other material, which, in the opinion of the District, might allow loss of sand bedding, the bedding material will be crushed rock or gravel graduated so that 100% will pass the 3/4-inch sieve and not more than 15% will pass the 1/2-inch sieve.

2-2.02 Trench Bottom Preparation and Pipe Bedding

Unless otherwise specified, the trench will be excavated so as to provide a minimum of 4 inches between pipe barrel and undisturbed earth. This undercutting will be refilled with either clean, imported sand, thoroughly compacted into place, or with native material 3 inches in diameter or smaller as per Section 2.2.06 herein.

When approved by the District, pipe may be supported on earth mounds where the trench bottom is solid and firm mounds can be built that will hold the pipe from settling during and after assembly until initial backfill has been placed in accordance with Section 2-2.06 herein. The location and number of earth mound supports will be in accordance with the pipe manufacturer's recommendations.

Supporting pipe on blocks will not be permitted.

2-2.03 Pipe and Fitting Installation

All pipe, valves, fittings, and appurtenances will be installed in accordance with the manufacturer's recommendations and according to accepted water works practice. Each section of pipe and each fitting will be thoroughly cleaned out before it is installed. All pipe, fittings, valves, etc. will be carefully lowered into the trench by suitable tools or equipment in such a manner as to prevent any damage, particularly to the lining and coating. When required by the District, approved slings will be used to lower the pipe. Under no circumstances will pipe or accessories be dropped into the trench. All pipe, valves, fittings, and appurtenances, before lowering into the trench, will be examined for defects. Any defective, damaged, or unsound materials will be rejected. All material must be new and in good condition.

The pipe will be laid true to line with no visible change in alignment at any joint unless curved alignment is shown on the plan, in which case the maximum deflection at any joint will not exceed the manufacturer's recommendations for the type of pipe joint being used.

Under no circumstances shall small sections of pipe be installed unnecessarily unless approved by the District.

No bells or fittings shall be installed within 4 feet under any structure unless approved by the District.

Thrust blocks of Class "B" concrete will be cast in place at all horizontal or vertical bends of four (4) degrees or more, behind each plug, tee, or cross which is valved or plugged in such a manner that it can act as a tee or elbow, and at the back of each fire hydrant. The thrust block will extend from the fitting to undisturbed soil, will be kept clear of the joints, and will be of such bearing area as to assure adequate resistance to the force to be encountered. All bolts,

valves, and flanges will be covered with plastic wrap, 4 mil thick minimum prior to pouring concrete thrust blocks. Size of blocking will be in accordance with Standard Detail No. 3.

Whenever pipe laying is discontinued for an hour or more, the open end of all mains and fittings will be closed with watertight plugs or bulkheads. The plug or bulkhead will not be removed unless, or until, the trench is dry. Pipe will not be laid when the condition of the trench or the weather is unsuitable.

All pipe jointing, including the maximum deflection of joints in curved alignments, will be in accordance with accepted best practices and as detailed in the manufacturer's installation manual. Both joint surfaces will be clean before joints are made. Materials used in jointing the pipe will only be that furnished with the pipe or recommended by the manufacturer.

When necessary to cut pipe, it will be neatly and squarely cut to length using methods recommended by the manufacturer.

2-2.04 Placing Locating Wire and Caution Tape

All runs of non-metallic and metallic water pipe will have a No. 10 gauge solid, insulated, soft drawn copper wire affixed along the top of the pipe taped on the poly wrap with 20 mil black tape. Blue caution tape, 12-inch wide non-metallic, shall be placed on top of the sand backfill over the center of the pipe prior to initial backfill. The wire will be stubbed up inside each valve box and placed as shown on Standard Detail No. 4. Locating wire will have 3/64-inch type TW insulation.

Prior to placement of final paving, contractor shall perform a continuity test to confirm, locate and repair any breaks in the locator wire identified in the test. The cost of the test, repairs or replace will be borne by the contractor. The contractor is advised to use care in the installation and backfilling operations to prevent damage to the wire.

2-2.05 Setting Valves, Fire Hydrants, and Blow-Off Assemblies and Air Release Assemblies

Installation of valves, valve boxes, and appurtenances will conform to Standard Detail No. 5 and these specifications. Whenever valves are to be installed at a pipeline junction, the valves will be flange-connected to the tee or cross fittings.

Installation of fire hydrants will conform to Standard Detail No. 6 and these specifications. Guard posts will conform to Standard Detail No. 7.

Fire Hydrants will stand plumb with the pumper outlet facing the street. The pumper outlet of "steamer" hydrants will be set at least 18 inches above the sidewalk or finished ground surface, whichever is higher. A minimum 6-inch lateral will serve the hydrant from the main, containing a valve to enable repairs to be made to the hydrant without shutting down the main. Hydrant laterals greater than 50 feet in length will be 8-inch minimum diameter or as necessary to provide required fire flows. The Sacramento Suburban Water District will determine size. In no case will a fire hydrant be installed within 3 feet of a building or any other structure that would limit access. Hydrants will be located 4 feet back of walk or curbs and in planters whereby sufficient

space is available for guard posts as shown in Standard Detail No. 7. Hydrants may be required to be relocated to attain the sufficient space.

Blow-off assemblies will be constructed as shown on Standard Detail Nos. 8 and 9. The location will be such that there will be no possibility of back siphonage into the distribution system.

Air release assemblies will be constructed as shown on Standard Detail No. 11. The location will be such that the assembly functions as designed.

2-2.06 Initial Backfill

The trench will be backfilled using either sand or native material as per Standard Detail No. 2 provided that all native materials are free of debris, organic matter, or pieces larger than 3 inches in diameter. Existing job excavated material larger than 3 inches in diameter can be used; however, it must be crushed to 3-inch diameter or smaller prior to placement. The initial backfill will be carefully placed so as not to disturb or damage the pipe and will be brought up evenly on both sides. If the existing native material, in the Inspector's opinion, is unsuitable or the particular area requires additional pipe support, then that section or sections of trench will be backfilled initially with sand to a point 6 inches above the pipe thoroughly and evenly on both sides of the pipe to avoid disturbing or damaging the pipe.

Compaction by flooding will be permitted subject to District approval and when made by water jetting or other approved methods adequate to completely saturate the bedding and initial backfill. Flooding will be regulated to prevent flotation or uplift of pipes and Contractor will replace or re-lay as necessary any damaged pipe. When the intermediate backfill is to be compacted mechanically, the bedding and initial backfill will first be fully compacted by flooding.

2-2.07 Intermediate and/or Top Backfill

Backfill will be furnished and placed in conformance with Standard Detail No. 2 and these specifications. All backfill will be placed and compacted to a minimum relative compaction of 90 percent as determined by the test method currently being employed by the County of Sacramento unless specified otherwise in the Special Provisions or County Encroachment Permit.

(a) Backfill within Existing Improved Streets and Under Paving

Mechanical compaction methods will be employed for all installations in this category, except as hereinafter provided. Intermediate backfill material will be Class 2 Aggregate Base, 1 1/2-inch maximum particle size, conforming to Sacramento County Standard Specification SS-17, for all streets as specified by County standards.

(b) Backfill in New Subdivision Streets and Unimproved Rights-of-Way

Backfill will be "Imported Select Material," conforming to Sacramento County Standard Specification SS-10 and compacted by mechanical methods. Subject to specific prior approval from the District, job excavated material; free of debris, organic

matter, or pieces less than 3 inches may be used for intermediate backfill, compacted by jetting as specified hereinafter.

Jetting will be performed with suitable pipe jets approved by the District, but in no case will the jet pipe be less than 1 1/2 inches in diameter, nor will the flow be less than 20 GPM. The jetting pipe will be long enough to reach the bottom of the backfill layer and water will be discharged continuously as the pipe is slowly withdrawn in order to thoroughly saturate the material and cause it to slump to its maximum compaction. Proceeding upgrade, jet points will be staggered from side to side of the ditch at intervals not to exceed 6 feet or closer if necessary to insure that the backfill takes all possible subsidence. All "bridges" in the backfill material will be completely broken down during the jetting process. No jetting operations will be allowed that will, in the opinion of the District, jeopardize in any manner the stability of the pipeline in the trench. Jetting operations done any time except during regular working hours will have prior approval of the District.

2-2.08 Other Backfill Requirements

In addition to the requirements outlined above, the following conditions will govern when applicable.

(a) Bracing and Shoring

Where bracing and shoring is used in the trench, the backfill will be carried to a height sufficient to prevent the surrounding ground from cracking and caving into the trench before the bracing and shoring is removed. Backfill of the pit excavated for boring operations will be made in the same manner as above specified for trenches. Bracing or shoring permits and details may be required prior to any pipe inlaying.

(b) Backfill of Service Lines

If water service lines are installed by open cut methods, the service line trench will be backfilled in the same manner as the water main trench.

2-2.09 Installation of Water Services

Water service will be furnished and installed in conformance with Standard Detail Nos. 12, 13, 14, 15, and 16.

Applicable codes prohibiting the laying of water pipe in the same trench as the sewer service will be rigidly enforced.

(a) Connections to Existing Mains

The District will make Service connections to existing mains. The District may authorize a contractor, who is licensed to perform and is active in underground pipeline construction and installation, to make the connections to existing mains. Service

connections connected to existing mains must be made by using materials and equipment to make taps under pressure without removing the main from service.

(b) Installing Meter Setters and Meter Boxes

Contractor will install all meter setters with a water meter of proper size. After backfilling of a service line is completed, a “can-like” cover will physically protect the meter setter until the meter box is set. Should there be any damage (i.e. vandalism, theft, and freezing) to the meter setter, meter, and meter box prior to system acceptance; the Contractor will replace the damaged unit with a new one, at no cost to the District.

All meter boxes will be set with the top cover flush with the abutting sidewalk or finished grade and will be solidly founded and backfilled so there is no settlement. The District will install the meter transponder head once the meter box has been placed at its proper grade.

2-2.10 Threaded Joints

Threaded joints for service connections, air release assemblies, etc. will be made with Teflon Plumber’s Tape. **NO JOINT COMPOUND WILL BE USED.**

2-2.11 Water Facilities Corrosion Protection

All underground water facilities shall be protected for potential corrosion activities. Ductile iron pipe shall be protected with polyethylene encasement per manufacturer’s specifications. Tees, ells, valves and special fitting shall be wrapped in plastic 4 mil thick minimum prior to any pouring of concrete or backfill. New copper water services shall be protected with a polyethylene coated encasement. Existing copper service lines meeting District standards shall be modified and reused per District details. Two – 4-pound high purity copper service line anodes shall be buried below the new installed meter setter. Anodes shall be connected to the existing copper service line with a brass cable-to-pipe clamp.

2-2.12 Boring and Jacking

Where specified or permitted by the District, the water main will be placed in a conductor pipe under a roadway, railroad, or other obstruction by boring and jacking. The District before proceeding with the work will approve the equipment and method of operation.

Excavation for the boring operation will be the minimum necessary to satisfactorily complete the work. Bracing and shoring will be adequate to protect workmen and any adjacent structure or roadbed.

(a) Installation of Conductor

The Conductor will be jacked simultaneously with the boring operation. The bored hole will not be more than 0.1 feet larger in diameter than the outside diameter of the

conductor. Adjoining sections of the conductor will be fully welded together. The conductor will extend 5.0 feet minimum on each side of the bore, or as specified.

(b) Placing Pipe in Conductor

Pipe sections will be jointed outside the conductor and then slid into place. The pipe will be strapped with casing insulators, Calpico Model PC or M, or approved equivalent, centered at points approximately 1/5 the pipe length from each end.

The space between the pipe and the conductor will be left as is or filled with sand as specified by the District. The ends of the conductor will be end sealed with a Calpico, Model W, or as specified by the District.

(c) Backpacking of Voids

Whenever, in the opinion of the District, the nature of the soil indicates the likelihood of ground loss which would result in a greater space between the outer surface of the conductor than herein allowed, the Contractor will take immediate steps to prevent such occurrences by installing a jacking head extending at least 18 inches from the leading edge of the conductor. The jacking head will cover the upper 2/3 of the conductor and project not more than 1/2 inch beyond the conductor's outer surface. Excavation will not be made in advance of this jacking head.

Voids greater than allowable will be filled with sand, soil, cement, or grout as directed by the District. Where voids are suspected, the District may direct the Contractor to drill the conductor, pressure inject grout to refusal, and then to repair the drilled hole. Grouting pressure will not exceed 50 P.S.I. at the nozzle.

2-2.13 Clean Up

During the progress of the work, the Contractor will keep the entire job in a clean and orderly condition. Any spillage resulting from hauling operations along or across existing streets/road will be removed and cleaned immediately by the Contractor. He will govern his operations and methods at all times to minimize dust problems within the area of the work or along adjacent properties. Water or dust palliative will be applied as required to provide adequate dust control to complete satisfaction of the District.

2-2.14 Hydrostatic Tests

After completion of the installation, the Contractor will test all piping to the pressure specified below. The Contractor will furnish all material, equipment, and labor for such testing. The water services will be considered as part of the main for test purposes.

In no case will there be placement of permanent pavement prior to successful completion of the test. Thrust blocks will have been in place for at least 36 hours if high-early strength cement was used or at least 4 days if standard cement was utilized.

Each section of the system to be tested will be slowly filled with water, and all air will be expelled from the pipe. The release of the air can be accomplished by opening hydrants and service line cocks at the high points of the system and the blow-offs at all dead ends. The valve controlling the admission of water into the section of pipe to be tested should be opened wide before shutting the hydrants or blow-offs. After the system has been filled with water and all air expelled, all the valves controlling the section to be tested will be closed, and the line will remain in this condition for a period of not less than 24 hours.

The pipe will then be refilled, if necessary, and subjected to a pressure of not less than 150 P.S.I., or the service pressure plus 50 pounds, whichever is greater, for a period of 2 hours.

The allowable leakage in the test section will be in accordance with AAWA C-600 and will not exceed 0.0919 gallons per hour per inch diameter per 1,000 feet of main being tested.

All leaks will be corrected immediately and the system again subjected to the same test for a period of 2 hours. Even if the leakage is less than allowable, all observed leaks should be repaired.

The Contractor will take all necessary precautions to prevent any joints from drawing while the pipelines and their appurtenances are being tested and will, at his own expense, repair any damage to the pipes and their appurtenances or any other structures resulting from or caused by these tests.

2-2.15 Disinfection and Flushing of Water Lines

After all other work has been completed, and prior to placing in service, all water lines will be completely disinfected in accordance with AAWA Standard C-651 and Section 12B of Sacramento County Ordinance No. 508.

The main will be flushed as thoroughly as possible with the water pressure outlets available, prior to chlorination. However, if calcium hypochlorite tablets are attached to the pipe at the time of installation for the purpose of sterilization, it will not be possible to flush the main prior to disinfection. It will therefore be necessary that extreme care be exercised in keeping the pipe clean during installation. It will be the Contractor's responsibility to obtain from the State Regional Water Quality Control Board a **WASTE WATER DISCHARGE PERMIT** to expel the chlorinated water into the storm drain system. As a requirement of the permit, the contractor shall monitor the sediment and chlorine residual during flushing. The District shall provide forms for the monitoring. The forms must be completed and returned to the District as a condition of water service. The number of calcium hypochlorite tablets used will be in accordance with the following table, which is based on 6-8 tablets per ounce. Proportionately more tablets will be required if they are of a smaller size.

Tablets Required Per Pipe Length					
Length of Pipe Section	Pipe Diameter				
	6"	8"	10"	12"	16"

12' to 13'	2	3	4	6	8
16' to 18'	2	4	6	8	10

Pipes greater than 16" will require tablets proportionately as to the sizes as listed in this table.

Prior to acceptance of the system by the District, all mains will be thoroughly flushed and successfully tested for bacteriology quality.

2-2.16 Regulations Relating to Sanitary Hazards

All construction will conform to applicable regulations relative to safeguarding the public health, particularly the regulations relating to cross-connections as established by the California Administrative Code, Title 17, Chapter V, and Sections 7583-7622.

2-2.17 Water Used in Construction

Water used for testing and flushing or any other construction operation that is taken from a District system will be paid for at the District's current construction water rate. The Contractor is to furnish the District with true and accurate records of the amount of water used. Before drawing water from a District system, the Contractor will make application for a hydrant permit for such service with the District. At a minimum a hydrant meter with backflow assembly or a backflow assembly will be required prior to connection from the water truck to the fire hydrant. The Contractor can obtain one from the District. A \$2,300.00 deposit will be required. The deposit will be returned once the hydrant meter with backflow assembly or backflow assembly is returned. The Contractor may provide its own, provided it shows proof that the hydrant meter with backflow assembly has been tested and satisfies all safe operation criteria and is performing within the operating limits of the American Water Works Association Standards.

2.2.18 Water Service / Main Abandonment

Water facility abandonment shall be according to one of the following methods:

- Water mains are normally abandoned in place unless otherwise noted. Water mains not in use shall be disconnected and capped with concrete minimum 24-inches into the pipe and mushroom around the pipe 12-inches beyond end of pipe. Water mains that will remain in service shall be capped with a cast iron fitting made for that type of pipeline material. A concrete thrust block shall be placed against the cap. The size shall be in accordance to standard Detail 3.
- All valves on abandon waterlines shall be abandon in place and the risers removed and backfilled.
- Existing tees shall be removed unless otherwise noted. Tee shall be replaced with section of pipe and flex couplings.
- Water services shall be abandoned per General Note #12. The District shall determine the type of abandonment for the situation, but shall be no less than, removal of saddle and placement of a full circle 20-inch minimum wide stainless steel repair clamp. For steel

water mains with weld-on couplings, the coupling shall be completely removed from the water main as directed by the District and placement of a full circle 20-inch minimum wide stainless steel repair clamp. All bare metal shall be protected as directed by the District prior to backfill.

DIVISION 3 SUPERVISORY CONTROL AND DATA ACQUISITION

Section 3 Technical Specifications

The District has developed a separate set of Supervisory Control and Data Acquisition (SCADA) design standards for use on any District project in which SCADA is a component. These standards are to be used by District staff, project engineers, consultants, developers and/or contractors in order to achieve uniformity and consistency on all SCADA work within the District's facilities. In time, through application of the design standards to projects on a consistent basis, the District intends to achieve a high degree of automation and consistent water production data across the entire SCADA system. For these standards to be successful, it is MANDATORY that they be applied to all SCADA projects and any other water facility projects in which SCADA is a component. They may be used either directly or indirectly together with other District manuals.

The developed SCADA Standards cover the following areas:

- SCADA Standards Governance
- Standard No. 1 – Programmable Logic Controller Hardware
- Standard No. 2 – Programmable Logic Controller Software
- Standard No. 3 – Human-Machine Interface
- Standard No. 4 – SCADA System Network
- Standard No. 5 – SCADA System Security

The SCADA Standards can be reviewed or found on the District's web site.