

SAN ANTONIO WATER COMPANY UPLAND, CALIFORNIA



CONTRACT DOCUMENTS

**Holly Drive Reservoir - Phase II
In San Antonio Heights, Upland, CA
CO# 1602-U**

**San Antonio Heights
Upland, California**

**BID DATE
September 8, 2020 at 2:00 p.m.**



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The following pages constitute the complete Specification. It shall be the responsibility of the Bidder to verify the inclusion of all the listed pages in the set of documents upon which his bid is submitted.

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**SECTION 1.1
Of
PROCEDURAL DOCUMENTS**

NOTICE INVITING BIDS

NOTICE IS HEREBY GIVEN that San Antonio Water Company, hereinafter referred to as the “Company”, on behalf of and as authorized by the Board of Directors of Company, will receive sealed bids for construction of:

Construction of the Holly Drive Reservoir, Phase II, CO# 1602-U

Bids will be received in the office of San Antonio Water Company up to the hour of **2:00 o'clock p.m. on September, 8, 2020** and then publicly opened and read aloud. Said bids will thereafter be referred to the Board of Directors for consideration.

Bids should be marked on the outside of the sealed envelope:

RE: “Contract Documents and Specifications for Project: **Holly Drive Reservoir, Phase II, CO# 1602-U**”

Mailed or dropped off sealed bids may be delivered to:

San Antonio Water Company
139 North Euclid Avenue
Upland, California 91786

Owner reserves the right to reject any and all proposals, to waive any irregularity or to award the contract to other than the lowest responsible bidder. Bidder may not withdraw the bid for 30 days after the bid opening.

The proposed contract is under and subject to Executive Order 11246, as amended, of September 24, 1965, and to the Equal Employment Opportunity (EEO) and the Federal Labor Provisions.

Each bidder must complete, sign and furnish, with completed bid documents, the “Bidder’s Statement on previous contracts subject to the EEO clause”, a “Certification of Non-segregated Facilities”, and the “Assurance of Minority Business Enterprise Participation” as contained in the Bid Documents.

Prior to the award of this contract, the contractor must file a compliance Report (SF 100), if the contractor has not submitted a complete and accurate Compliance Report within 12 months preceding the date of award.

CONTRACT DOCUMENTS

Copies of the Contract documents may be examined and obtained at the office of San Antonio Water Company, 139 North Euclid Avenue, Upland, California 91786, upon a non-refundable payment of \$25.00 for each hard copy or flash drive set.

If Contract Documents are to be mailed, an added charge of \$10.00 per set will be added to cover handling and cost of postage.

PRE-BID MEETING

Due to gated residential nature of the area, there will be restricted access to the site. A non-mandatory pre-bid meeting / job walk for prospective bidders will be conducted on **August, 27 2020 at 10:00 a.m.** at the San Antonio Water Company Office at 139 North Euclid Avenue.

PLANS AND SPECIFICATIONS

All of the above work is to be done under Contract with the Company and in accordance with those certain plans specifications and drawings prepared by San Antonio Water Company, hereafter called the “Engineer”, and considered and approved by the Board of Directors of Company to which Documents reference is hereby made for a description of said works and improvements.

BONDS

The Contractor will be required to execute a Contract on the Company’s standard form; furnish Contract Performance Bond (100% of contract amount) and Payment (Materials) Bond (50% of contract amount) with a corporate surety in conformance with the Contract Documents, or equivalent substitution in lieu of bonds, each for not less than the aforementioned amount of the total bid price; furnish certificates of insurance evidencing that all insurance coverage required by the Contract Documents has been secured.

PAYMENT

Company payments will be made by check to the Contractor in accordance with the provisions of the specifications and on itemized estimates duly certified and approved by the General Manager of the Company and Engineer submitted in accordance therewith, based on labor and materials incorporated into said works and improvements during the preceding month by the Contractor, less 10% withholding.

Payment shall not be made more often than once each thirty-(30) days. Final payment shall be made thirty-five (35) days subsequent to filing of Notice of Completion.

Contractor is advised that Contractor may, at Contractor’s sole cost and expense, substitute securities equivalent to any monies withheld by the Company to insure performance under the Contract. Such securities shall be deposited with a State or Federally Chartered Bank, located in Upland and as approved by the Company, as escrow agent who shall pay such monies to the Contractor upon satisfactory completion of the Contract. The Contractor shall be the beneficial owner of any securities substituted for monies withheld and shall receive any interest thereon. Securities eligible for investment under this section shall include those listed in Government Code Section 16430 or bank or savings and loan certificates of deposit.

BID SECURITY

All proposals or bids shall be accompanied by a cashier’s or certified check payable to the order of Company, amounting to ten (10) percent of the bid or by a bond in said amount and payable to Company, signed by the Bidder and a corporate surety. Said check shall be forfeited or said bond shall become payable to Company in case the Bidder depositing the same does not, within ten (10) days after written notice, sign the Contract.

AWARD AND EXECUTION

The Award of Contract, if made, will be within thirty (60) calendar days from the date of the bid opening.

Bidders shall agree that the Bid shall be good and may not be withdrawn for a period of thirty (30) calendar days after the scheduled closing time for receiving Bids.

The Contractor shall execute the Contract within ten (10) working days after he has been notified in writing of the award.

The Company hereby reserves the right to reject any and all proposals, to waive any irregularity, and to award the Contract to the lowest responsive and responsible Bidder.

CONTRACTOR'S LICENSE CLASSIFICATION

The prime Contractor must possess the following California Contractor's License:
Class A – General Contractor license at the time of the scheduled bid opening of this Contract.

DATED:

SAN ANTONIO WATER COMPANY



Brian Lee / General Manager

INSTRUCTIONS TO BIDDERS

Bids will be received by the San Antonio Water Company hereinafter called the “**Company**”, at 139 North Euclid Avenue, Upland, California 91786, until **2:00 p.m. September 8, 2020.**

Each Bid proposal must be submitted along with supporting Documents and bid proposals guarantee, all signed in a sealed envelope, and addressed to the Company at the above referenced address. Each sealed envelope containing a Bid must be plainly marked on the outside as:

**Contract Documents and Specifications
For the construction of:**

***Holly Drive Reservoir, Phase II in the San Antonio Heights, Upland, CA. –
CO#1602-U***

and the envelope should bear on the outside the name of the Bidder, his address and his license number. If forwarded by mail, the sealed envelope containing the Bid must be enclosed in another envelope, labeled as shown in the advertisement for Bid, and addressed to:

San Antonio Water Company
139 North Euclid Avenue
Upland, California 91786

Bidders are advised that in selecting a Contractor, Company reserves the right to consider the financial responsibility and general competency of each Bidder, as well as Contractor's reputation within the industry. Company expects each Bidder to fully and truthfully disclose all information required of the Bidder by the Bidding Documents. Each Bidder must be properly licensed and must sign and submit with Contractor's Proposal, Bidding Schedule / Declaration, the Bidder's Statement of Experience and References, Financial Statement (if requested), Plan for Construction, Bidding sheets, list of manufacturers, Bidder's Statement on Previous Contracts subject to EEO Clause, Certification of Non-segregated Facilities, Labor Code Certification, Certificate of Non-Discrimination, License Number Statement and other Supporting Documents. All Bidders shall supply the names and addresses of major material Suppliers and subcontractors as set forth in the bid.

All bid proposals shall be opened and read at the time and place set forth in the Notice Inviting Bids herein. Bidders and/or their authorized representatives are invited to be present. The award, if made, will be made within ten (10) days of the opening. The Company's policy is to award to the lowest responsible Bidder who can comply with the projected delivery and/or completion schedules. The Company may make such investigations as he deems necessary to determine the ability of the Bidder to perform the work, and the Bidder shall furnish to the Company all such information and data for this purpose as the Company may request. The Company reserves the right to reject any Bid if the evidence submitted by, or investigation of, such Bidder fails to satisfy the Company that such Bidder is properly qualified to carry out the obligations of the Agreement and to complete the work contemplated therein. The Company reserves the right to reject any and all bids, to waive any irregularity, minor defects, or to award the subject Contract to other than the lowest Bidder. Notice of Award shall be made to a successful Bidder in writing and mailed to the address as set forth on the signature page of the Bidding Documents.

All Bids must be made on the required Bid forms. All blank spaces for Bid prices must be filled in, in ink or typewritten, and the Bid form must be fully completed and executed when submitted. Only one copy of the Bid form is required.

In the event there is more than one bid item in a Bidding Schedule, the Bidder shall furnish a price for all bid items in the schedule, and failure to do so will render the Proposal informal and may cause its rejection. The Bidder shall state in figures, the unit pieces or the specific sums as the case may be, for which he proposes to supply the labor, materials, supplies or machinery, and completely perform the Contract. The total amount of each item bid and the total amount of the bid shall be stated in words and figures.

If the unit price and total amount named by a Bidder for any items are not in agreement, the unit price alone will be considered, as representing the Bidders intention and the total will be corrected to conform thereto. Quantities set forth in the bidding sheet are estimates of the amount of materials and equipment to be furnished and the amount of work to be done, and are given only as a basis for comparison of bids. Final payment shall be made for the actual final quantities of the items at the unit prices bid in the proposal.

Each Bidder shall complete the attached Bid Proposal and Supporting Documents including any addenda or bulletins issued before receipt of bids and public opening of same. Each blank of each page shall be completed in full. The completed forms shall be without interlineations, alterations, or erasures; however, Bidder may correct errors by striking or lining out mistakes, entering corrections immediately there above and initialing the strikeout.

Company may, at its discretion, reject any bid to which the Bidder has added conditions, limitations, provisions, or any interlineations or alterations. Unauthorized conditions, limitations, or provisions attached to the Proposal will render it non-responsive and may cause its rejection. The completed Proposal forms shall be without interlineation, alterations or erasures. Alternative proposals will not be considered unless specifically requested. **Oral, telephonic proposals or modifications will not be considered.** A person, firm, or corporation shall not be allowed to make or file, or to be interested in, more than one bid, except an alternative bid when specifically requested; provided however, a person, firm, or corporation who has submitted a sub-proposal to a Bidder submitting a Proposal, or who has quoted prices on material to such Bidders, is not thereby disqualified from submitting a sub-proposal or firm quoting prices to other Bidders submitting proposals, or from submitting a Proposal as a prime Contractor. Company may also, at its discretion, reject any bid for which the Bidder has failed to supply all requested information or has misrepresented any of same information. Company will not consider alternative proposals unless they are called for by these instructions or the supplemental proposals on forms other than those bound herein, and those forms shall not be removed from the bound volume.

Separate copies of Bidder's Proposal with Supporting Documents are available for Bidder's use. Bidder shall retain said copies for Contractor's record. They shall not be submitted as a proposal.

Company will not consider any proposal, which is not complete.

Should a Bidder find discrepancies in, or omissions from the Special Provisions, General Provisions, Drawings, or other Documents bound herein, or should Contractor be in doubt as to their meaning, Contractor should immediately notify the Company who may send a written clarification to all Bidders.

If the Bid Proposal is made by an individual, it shall be signed and Contractor's full name and address shall be given; if it is made by a co-partnership, it shall be signed with the co-partnership name by one of the partners, who shall sign Contractor's own name and, in addition, the name and address of each partner shall be given; if it is made by a corporation, the name of the corporation shall be signed by its duly authorized officer, or officers, attested by the corporation seal, and the names and titles of all current officers of the corporation shall be given.

Any bid may be withdrawn prior to the above scheduled time for the opening of Bids or authorized postponement thereof. The Bidder by means of a written request, signed by the Bidder or their properly authorized representative may withdraw the Proposal. Such written request must be delivered to the place stipulated in the Notice Inviting Bids for receipt of proposals prior to the scheduled closing time for receipt of proposals. No Proposal may be withdrawn after the hour fixed for opening bids without making the accompanying certified or cashier's check, or Bidder's bond, subject to forfeiture as liquidated damages in like manner as in the case of failure to execute the Contract of furnish required bonds as hereinafter provided. Any bid received after the time and date specified shall not be considered. No Bidder may withdraw a Bid within ten (10) days after the actual date of the opening thereof. Should there be reasons why the Contract cannot be awarded within the specified period, the time may be extended by mutual agreement between the Company and the Bidder.

Bidders must satisfy themselves of the character of the work to be performed by examination of the site and review of the Drawings and Specifications, including Addenda. Each Bidder is responsible for inspecting the site and for reading and being thoroughly familiar with the Contract Documents. The failure or omission of any Bidder to do any of the foregoing shall in no way relieve any Bidder from any obligation in respect to his Bid. After bids have been submitted, the Bidder shall not assert that there was a misunderstanding concerning the nature of the work to be done.

The Company shall provide to Bidders, prior to Bidding, all information, which is pertinent to, and delineates and describes, the land owned and rights-of-way acquired or to be acquired.

The Contract Documents contain the provisions required for the construction of the Project. Information obtained from an officer, agent, or employee of the Company or any other person shall not affect the risks or obligations assumed by the Contractor or relieve him from fulfilling any of the conditions of the Contract.

Each Bid must be accompanied by a Bid Bond (on the required form) payable to the Company for ten (10) percent of the total amount of the bid. Each bid proposal shall be accompanied by a certified or cashier's check or bid bond (bid bond shall be submitted on the form attached herein), or equivalent substitution of sureties for an amount of not less than 10 percent of the total bid amount named in the Bidding Sheet. Said check, bond or substitute shall be made payable to the Company and shall be given as a guarantee that the Bidder will enter into the Contract described in the Notice Inviting Bids herein if awarded the work. By submitting a proposal, each Bidder agrees that the Company may retain the bid proposal guarantee as liquidated damages if the Bidder is awarded the work but fails to or refuses to timely enter the Contract except as may otherwise be required by California Government Code Sections 37933-37935. As soon as the Bid prices have been compared, the Company will return the Bonds of all except the three lowest responsive and responsible Bidders. When the Agreement is executed, the bonds of the two remaining unsuccessful Bidders will be retained until all Contract Documents have been executed and approved, after which it will be returned.

Bonds and Insurance Certificates must be in the form required by the Company (substitutions are not permitted) and the Company must be authorized to do business in the State of California. Surety Companies executing bonds must possess a certificate of authority from the California Insurance Commissioner authorizing them to write surety insurance defined in Section 105 of the California Insurance Code. Surety Companies executing bond must also appear on the "Treasury List" of companies holding a Certificate of Authority as acceptable surety on Federal Bonds and possess an underwriting authority limitation exceeding the contract amount.

The successful Bidder shall, upon receipt of Notice of Acceptance of Contractor's bid, promptly secure with a responsible corporate surety or sureties approved by the Company, a Payment Bond and a Contract Performance Bond (on the required form), each in the amount of one hundred (100) percent of the Contract Price, will be required for the faithful performance of the Contract. Contractor may, upon written request, and at his sole expense after approval by the Board of Directors, deposit substitute securities referenced in Government Code Section 16430, or bank or savings and loan certificates of deposit, as authorized by Public Contract Code Section 22300 in lieu of retention monies withheld to ensure performance.

Attorneys-in-fact who sign Bid Bonds or Labor and Material Payment Bonds and Contract Performance Bonds must file with each Bond a certified and effective dated copy of the Power of Attorney.

The party to whom the Contract is to be awarded will be required to execute the Agreement and submit the Payment Bond, Contract Performance Bond and Insurance Certificates on the required forms within ten (10) calendar days from the date when the necessary Contract Agreement, Bonds, and Insurance Certificate forms and Notice of Award are delivered to lowest responsive Bidder. A corporation to which an award is made will be required, before the Contract is finally executed, to furnish evidence of its corporate existence and of the authority of the officer signing the Contract and bond for the corporation to so sign. In case of failure of the Bidder to execute the Agreement, the Company may, at its option, consider the Bidder in default; in which case the Bid bond accompanying the proposal shall become the property of the Company.

The Company, within ten (10) days of receipt of acceptable Labor and Material Payment bond, Contract Performance Bond, Insurance Certificate & Special Endorsement, and Agreement signed by the party to whom the Agreement was awarded, shall sign the Agreement and return to such party an executed duplicate of the Agreement. Should the Company not execute the Agreement within such period, the Bidder may, by Written Notice, withdraw his signed Agreement. Such notice of withdrawal shall be effective upon receipt of the notice by the Company.

A Notice to Proceed will be issued by the Company as a part of this Contract within ten (10) days of the execution of the agreement by the Company. Should there be reasons why the Notice to Proceed cannot be issued within such period, the time may be extended by mutual agreement between the Company and Contractor. If the Notice to Proceed has not been issued within the above-specified period or within the period mutually agreed upon, the Contractor may terminate the Agreement without further liability on the part of either party.

The Company may make such investigations as he deems necessary to determine the ability of the Bidder to perform the Work, and the Bidder shall furnish to the Company all such information and data for this purpose as the Company may request. The Company reserves the

right to reject any bid if the evidence submitted by, or investigation of, such Bidder fails to satisfy the Company that such Bidder is properly qualified to carry out the obligations of the Agreement and to complete the Work contemplated therein.

The Company reserves the right to reject all bids.

Award, if made, will be made to the lowest responsive and responsible Bidder, as determined by the Company.

All applicable laws, ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the Project shall apply to the Contract throughout. The Bidder's attention is directed to the Standard Specifications for Public Works construction and modifications of the Special Provisions bound herein for additional requirements of the Proposal and Contract Documents.

Each Bidder is responsible for inspecting the site and for reading and being thoroughly familiar with the Contract Documents. The failure or omission of any Bidder to do any of the foregoing shall in no way relieve any Bidder from any obligation in respect to his Bid.

All work shall be completed within **One Hundred and Ninety (190) calendar days**.

CONTRACTOR'S PROPOSAL

BID PROPOSAL WITH SUPPORTING DOCUMENTS FOR

CO# 1602-U

Construction of the Holly Drive Reservoir, Phase II described in the Bid Schedule.

FROM:

NAME OF BIDDER: _____

BUSINESS ADDRESS: _____

TELEPHONE NO: _____

**TO: BOARD OF DIRECTORS
SAN ANTONIO WATER COMPANY**

Pursuant to your invitation to provide Sealed Bids for the "***Construction of the Holly Drive Reservoir, Phase II in the San Antonio Heights, Upland, CA.***", the undersigned hereby declares that the only persons interested in this Proposal as principals are those named herein, that the Bidder has no connection with any other parties bidding on this project (except for a corporate division of the undersigned which may submit an independent bid), and that this bid has been prepared and submitted independently, without consultation, communication, or agreement with any other Bidder or competitor, without any collusion, fraud, misrepresentation, or deceit.

In submitting this Proposal, the undersigned further declares that they have read the Notice Inviting Bids, the Instruction to Bidders, the unexecuted Contract, and all other Documents incorporated by reference, including the Special Provisions, the Basic Specifications, Modifications thereto, and the Construction Plans and Standard Drawings and that Contractor has inspected the work site and hereby proposes to furnish all materials, machinery, tools, labor and services, and do all the work necessary to complete the Project in accordance with said plans, specifications and provisions at the below stated item prices.

In exchange for consideration of this Proposal by the Company, the Bidder agrees that if Contractor's bid is accepted by the Company, the Bidder will execute said Contract, furnish and provide the items set forth in this Proposal and required by the Contract, the Standard Specifications for Public Works Construction, the Special Provisions and Specifications, and the Construction Plans and Standard Drawings (**all within 190 calendar days**), and will accept as full payment the prices set forth in the Bidding Sheet.

The undersigned further agrees that Contractor shall execute such Contract within ten days from the date of mailing to him of written notice of the Company's acceptance of this proposal and within the same time shall furnish bond(s), along with the required certificates of insurance, and that upon failure to do so within said time, the proposal guaranty shall become the property of the Company as liquidated damages for such failure or refusal, and shall be deposited as monies belonging to the Company; provided that if said Bidder shall execute the Contract and

furnish the required bonds and certificates of insurance within the time aforesaid, Contractor's proposal guaranty shall be returned to him within ten days thereafter.

Bidder agrees with the Company that if the project is not fully completed within said time, he will pay as liquidated damages, the **sum of \$800** for each consecutive calendar day thereafter as provided in the Standard Specifications, and that this amount shall be presumed to be the amount of damages sustained by Company in the event of such a breach by Bidder, as it would be impracticable or extremely difficult to fix the actual damage.

BY: _____

TITLE: _____

PROPOSAL

BIDDING SCHEDULING / DECLARATION

The undersigned agrees that all of the work included in the Proposal shall be completed in **190 calendar days** as provided in the Contract Plans and Specifications. The undersigned further agrees that in case of default in executing the required Contract with necessary bonds within ten (10) working days, from the date of mailing of a notice from the Company that the Contract has been awarded, the proceeds of the check or bond accompanying his bid shall become the property of San Antonio Water Company.

Licensed in accordance with an Act providing for the registration of Contractors.

LICENSE NUMBER: _____

CONTRACTOR: _____

BY: _____

TITLE: _____

BUSINESS ADDRESS:

If an individual, so state. If a firm is co-partnership, state the firm name, and give the names and addresses of all individuals, co-partners, composing the firm. If a corporation, state the legal name of corporation; also, the names of President, Secretary, Manager, and Treasurer thereof, with their business addresses:

Corporate chartered under the laws of the State of: _____

BIDDING SCHEDULE
CO1602-U

CONSTRUCTION OF THE HOLLY DRIVE RESEORVOIR, PHASE II

ITEM NO.	QTY	UNIT	DESCRIPTION	UNIT PRICE (In Figures)	TOTAL AMT. (In Figures)
101	1	LS	Contract bonds, insurance, permits, project management, mobilization of equipment, materials, and labor prior to starting the Work, and demobilizing after completing all Contract Work. (Payment: 60% Mob & 40% Demob.)	\$ _____	\$ _____
			(words)		
102	1	LS	Furnish clearing and grubbing for the entire work zone. Grubbing shall include removal of all items required to construct the proposed improvements. All deleterious materials, organics, vegetation and remnants shall be removed from the site. Materials shall be disposed of in an approved off-site location. Loose, soft, or organic soils or non-engineered fill encountered at the bottom of excavations for areas to receive fills shall be removed.	\$ _____	\$ _____
			(words)		
103	1	LS	Prepare and implement BMPs and Monitoring Program.	\$ _____	\$ _____
			(words)		
104	1	LS	Pothole all existing utility crossings and points of connections.	\$ _____	\$ _____
			(words)		

ITEM NO.	QTY	UNIT	DESCRIPTION	UNIT PRICE (In Figures)	TOTAL AMT. (In Figures)
105	1	LS	Furnish all labor, materials and equipment to install new 3" AC Pavement and 4" Class II Base as shown or implied on the project plans and specifications.	\$ _____	\$ _____
			(words)		
106	1	LS	Furnish trench and excavation protection (including protection of existing improvements required for proper water system operation during construction) in accordance with CAL-OSHA Standards for all excavations greater than 5' in depth.	\$ _____	\$ _____
			(words)		
107	1	LS	Perform complete design of Reservoir and appurtenances in accordance with the Contract Documents and Geotechnical Investigation as specified and shown on the Drawings.	\$ _____	\$ _____
			(words)		
108	1	LS	Furnish all labor, materials and equipment to construct Reservoir concrete foundation (ring wall).	\$ _____	\$ _____
			(words)		

ITEM NO.	QTY	UNIT	DESCRIPTION	UNIT PRICE (In Figures)	TOTAL AMT. (In Figures)
109	1	LS	Furnish all labor, materials and equipment to construct 120,000 gallon Reservoir, including but not limited to tank, stairway, access manholes, overflow drain, inlet/outlet, all other piping, fittings, valves, connections, testing, disinfection per the plans and specifications for a properly operating potable water system.	\$ _____	\$ _____
			(words)		
110	1	LS	Furnish all labor, materials, and equipment to coat the Tank per Specification.	\$ _____	\$ _____
			(words)		
111	1	LS	Furnish all labor, materials and equipment to construct 3'x4'x4' (LxWxD) precast concrete catch basin with grated inlet as shown in Detail 1 on Sheet 8 (D-2) and as implied on the project plans and specifications.	\$ _____	\$ _____
			(words)		
112	6	EA	Furnish all labor, materials and equipment to construct guard post per STD SAWCO-17 where shown on the project plans and specifications.	\$ _____	\$ _____
			(words)		

ITEM NO.	QTY	UNIT	DESCRIPTION	UNIT PRICE (In Figures)	TOTAL AMT. (In Figures)
113	1	LS	Furnish all labor, materials and equipment to install 12" diameter below grade steel overflow and drain pipe. Bid shall include: excavation, backfill, fittings, concrete encasement, thrust blocks, headwall, slope protection cut-off wall, testing, riprap, and other accessories or work required or necessary for a completed and operable pipeline as shown and specified on the project plans and specifications.	\$ _____	\$ _____
			(words)		
114	1	LS	Furnish all labor, materials and equipment to install below grade 8" diameter steel potable water main pipe. The Bid shall include: excavation, backfill, fittings, thrust blocks, slope protection cut-off wall, testing, disinfection, and other accessories or work required or necessary for a completed and operable pipeline as shown and specified on the project plans and specifications.	\$ _____	\$ _____
			(words)		
115	1	LS	Furnish all labor, materials and equipment to install influent/effluent (outside of the tank) 8-inch diameter above grade water main with gate valve, Flex-Tend expansion joint and pipe support as shown or implied on the project plans and specifications.	\$ _____	\$ _____
			(words)		

ITEM NO.	QTY	UNIT	DESCRIPTION	UNIT PRICE (In Figures)	TOTAL AMT. (In Figures)
116	2	EA	Furnish all labor and materials to install 6-inch below grade shut off Gate Valve per STD: SAWCO-5 as shown on the Drawing D-8 (Sheet 14) in Holly Drive.	\$ _____	\$ _____
(words)					
117	1	LS	Furnish all labor, materials to install the submersible level transducer in the new tank. Include all labor and material to relocate the existing TELEMETRY equipment (solar panels, battery cabinets) from the existing tank to new tank.	\$ _____	\$ _____
(words)					
118	1	LS	Furnish all labor, materials and equipment to interior hydro dynamic mixing system per Tideflex Details 1 and 2 on Sheet 15. The Bid shall include: fittings, testing, disinfection, and other accessories or work required or necessary for a completed and operable pipeline as shown and specified on the project plans and specifications.	\$ _____	\$ _____
(words)					
119	1	LS	All other work not included elsewhere as specified and shown on drawings.	\$ _____	\$ _____
(words)					
Total Bid Schedule (Items 101 thru 119) =				\$ _____	

(words)

Name of Person Completing this Bid Form:

Title:

Company Name:

Telephone Number:

NAME OF BIDDER: _____

BIDDING SHEET

In the blanks provided, fill in the prices at which you propose to furnish the scheduled construction, including all labor, materials, equipment, work and methods necessary to complete the work, and all applicable sales and use taxes imposed pursuant to the laws of the State of California.

Bidders are advised that they must include a proportional amount of overhead, profit, sales tax and all other applicable taxes and fees, etc., within the bid prices for each bid item, since the amount of bid under which award will be made, if made, will be determined by the Company after the bids have been received.

Quantities set forth in the Bidding Sheet are estimates of the amount of materials and equipment to be furnished and the amount of work to be done and are given only as a basis for comparison of bids. Final payment shall be made for the actual final quantities of the items at the unit prices bid in the proposal

All Bidders must bid on all Item No.'s.

ADDENDA

Bidder acknowledges receipt of the following Addenda:

_____ DATED _____
_____ DATED _____
_____ DATED _____

The Company's policy is to award to the lowest responsive and responsible Bidder.

However, Bidders are advised that Company reserves the right not to make an award. Bidder agrees to perform all the work described in the Contract Documents for the following unit prices or lump sum:

BIDDER’S STATEMENT OF EXPERIENCE AND REFERENCES

Names and addresses of all members of co-partnership or names and titles of all officers of the corporation:

The bidder declares that the surety (sureties) named in the space provided below have agreed to furnish bonds in the amounts set forth in the Instruction to the Bidders, in the event the Contract is awarded on the basis of this proposal.

Names and addresses of surety or sureties agreeing to furnish bond:

Each Bidder (Contractor) is required to furnish work record for Sub-bidders (Subcontractors). List at least two projects each that the Sub-bidders have completed within the past three- (3) years. Responses must be full and explicit. Use reverse side or additional sheets as necessary. The Sub-bidder’s name should correspond to the names of Subcontractors shown on the following page of Subcontractor performing in excess of one-half of one percent of the total bid price.

PROJECT NAME: _____

DESCRIPTION: _____

CONTRACT AMOUNT: \$ _____ DATE COMPLETED: _____

OWNER’S NAME: _____

ADDRESS: _____

TELEPHONE NO: () _____

PROJECT NAME: _____

DESCRIPTION: _____

CONTRACT AMOUNT: \$ _____ DATE COMPLETED: _____

OWNER’S NAME: _____

ADDRESS: _____

TELEPHONE NO: () _____

PROJECT NAME: _____

DESCRIPTION: _____

CONTRACT AMOUNT: \$ _____ DATE COMPLETED: _____

OWNER’S NAME: _____

ADDRESS: _____

TELEPHONE NO: () _____

FINANCIAL STATEMENT

If requested by the Company, the bidder shall furnish a notarized financial statement, references, and other information, sufficiently comprehensive to permit an appraisal of his current financial condition.

SUBCONTRACTORS

List the name and address of **all subcontractors** who will perform work in or about the work or improvement in excess of one-half of one percent of the total bid price and indicate what part of the work will be done by each such Contractor. (Submit additional sheets if required.) Only one sub-bidder shall be listed for each portion of work.

If the Contractor fails to specify a subcontractor for any portion of the work in excess of one-half (1/2) of one (1) percent of the total Bid to be performed under the Contract, he shall be deemed to have agreed to perform such portion himself and he shall not be permitted to subcontract that portion of the work except under conditions permitted by law.

Subletting or subcontracting of any portion of the work as to which no subcontractor was designated in the original Bid shall only be permitted in case of public emergency or necessity, or otherwise permitted by law, and then only after a finding reduced to writing as a public record of the Company.

Item No. of Work	Name of Firm / Contractor	Location of Mill/Shop/Office	% of Item to be Performed by Subcontractor

Has Bidder, as Contractor, been involved in litigation with any owner of any project within the last ten- (10) years? If so, please describe the projects(s) and the nature and results of any litigation including any lawsuits settled prior to trial.

Has any sub-bidder, as contractor, been involved in litigation with any owner of any project within the last ten (10) years? If so, please describe the project(s) and the nature and results of any litigation including any lawsuits settled prior to trial.

List the name of the person who examined the work site of the proposed work for your firm:

Date of Inspection: _____

LISTING OF MANUFACTURERS

The contractor shall submit this sheet with his bid, completed, to list the manufacturers of materials he intends to use. It shall be understood that where the contractor elects to not use the material manufacturers called for in the Specifications, he will substitute only items of equal quality, durability, functional character and efficiency as determined by the Engineer. The contractor should ascertain prior to bidding the acceptability of substitutes. Only one manufacturer shall be listed for each item.

ITEM OR MATERIAL	MANUFACTURER ADDRESS AND PHONE NUMBER	SUPPLIER ADDRESS AND PHONE NUMBER

No change shall be allowed of any material manufacturer listed after receipt of Bids unless the manufacturer so listed cannot furnish materials meeting the Specifications. Should such change be allowed, there will be no increase in the amount of the bid originally submitted.

In submitting a Bid to a purchasing body, the Bidder offers and agrees that if the Bid is accepted, it will assign to the purchasing body all rights, title and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Section 15) or under the Cartwright Act (Chapter 2 of Part 2 of Division 7 of the business and Professions Code) arising from purchases of goods, materials, or services by the Bidder for sale to the purchasing body pursuant to the bid. Such assignment shall be made and become effective at the time the purchasing body tenders final payment to the Bidder.

RESPECTFULLY SUBMITTED:

Signature

Title

Date

Address

Telephone Number

City, State, Zip

Contractor's License No.

Type of License and Class

Federal Identification No.

SEAL – (IF BID IS BY A CORPORATION)

ATTEST

CERTIFICATE OF NON-DISCRIMINATION

On behalf of the Bidder making this proposal, the undersigned certifies that there will be no discrimination in employment with regards to ethnic group identification, color, religion, sex, age, or physical or mental disability, or national origin; that all applicable laws and directives regarding nondiscrimination in employment will be complied with; and that the principle of equal opportunity in employment will be demonstrated positively and aggressively.

Dated

Name of Bidder

Signature

Typed Name and Title

CERTIFICATION

LABOR CODE - SECTION 1861

I, the undersigned Contractor, am aware of the provisions of Section 3700 ET. Seq. of the Labor Code which requires every employer to be insured against liability for Worker's Compensation or to undertake self-insurance in accordance with the provisions of that Code, and I, the undersigned Contractor, agree to and will comply with such provisions before commencing the performance of the work of this Contract.

CONTRACTOR:

Firm Name

By: _____

By: _____
Second Party

CERTIFICATION OF NON-SEGREGATED FACILITIES
(CONTRACTORS / SUBCONTRACTORS)

(A certification of Non-segregated Facilities must be submitted prior to the award of a contract of subcontract exceeding \$10,000 which is not exempt from the provisions of the Equal Opportunity Clause.)

The federally assisted construction contractor certifies that they do not maintain or provide for their employees any segregated facilities at any of their establishments, and that do not permit their employees to perform their services at any location, under their control, where segregated facilities are maintained. The federally assisted construction contractor certifies further that they will not maintain or provide for their employees any segregated facilities at any of his establishments, and that they will not permit their employees to perform any services at any location, under their control, where segregated facilities are maintained. The federally assisted construction contractor agrees that a breach of this certification is a violation of the Equal Opportunity Clause in this contract. As used in this certification, the term “segregated facilities” means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, sex or national origin, because of habit, local custom, or any other reason. The federally assisted construction contractor agrees that (except where Contractor has obtained identical certifications from proposed subcontractors prior to the award of subcontract exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity Clause, and that they will retain such certifications in Contractor files.

Certification – The information above is true and complete to the best of my knowledge and belief.

Name and Title

Signature

Date

NOTE: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001.

BIDDER’S STATEMENT ON PREVIOUS
CONTRACTS SUBJECT TO EEO CLAUSE

The Bidder shall complete the following statement by checking the appropriate spaces.

The Bidder has _____ has not _____ participated in a previous contract subject to the Equal Opportunity Clause prescribed by Executive Order 11246, as amended, of September 24, 1965.

The Bidder has _____ has not _____ submitted all compliance reports in connection with any such contract due under the applicable filing requirements; and that representatives indicating submission of required compliance reports signed by proposed subcontractors will be obtained prior to award of subcontracts.

If the Bidder has participated in a previous contract subject to the equal opportunity clause and has not submitted compliance reports due under applicable filing requirements, the Bidder shall submit a compliance report on Standard Form 100, “Employee Information Report EEO-1” prior to award of the contract.

NON-COLLUSION AFFIDAVIT

STATE OF CALIFORNIA)

) ss.

COUNTY OF _____)

_____, being first duly sworn, deposes and
(Name of Affiant)

and says that Contractor is _____
(Title)

of _____, the part making the foregoing bid; that the bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, Company, association, organization, or corporation; that the bid is genuine and not collusive or sham; that the Bidder has not directly or indirectly induced or solicited any other Bidder to put in a false or sham bid, and has not directly or indirectly colluded, conspired, connived, or agreed with any Bidder or anyone else to put in a sham bid, or that anyone shall refrain from bidding; that the Bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the Bidder or any other Bidder, or to fix any overhead, profit or cost element of the bid price, or of that of any other Bidder, or to secure any advantage against the public body awarding the Contract of anyone interested in the proposed Contract; that all statements contained in the bid are true; and, further, that the Bidder has not directly or indirectly, submitted their bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid, and will not pay, any fee to any corporation, partnership, Company association, organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham bid.

(Signature)

(Typed Name)

SUBSCRIBED BEFORE ME on this _____ day of _____, 20_____.

(Notary Public)

My Commission Expires: _____

CONTRACTOR’S LICENSING STATEMENT

I, the undersigned Contractor, am aware of State Business and Professions Code, Section 7028.15 which requires that the information shown below shall be included in the bid. Any bid not containing this information, or if this information is subsequently proven to be false shall be considered non-responsive and shall be rejected.

NAME OF CONTRACTOR: _____

BUSINESS ADDRESS: _____

Corporation organized
under the laws of the State of: _____

STATE LICENSE NO. _____

STATE LICENSE CLASSIFICATION _____

STATE LICENSE EXPIRATION DATE _____

I certify under penalty of perjury under the laws of the State of California that the representations made in this Bid are true and correct.

SIGNED: _____

TITLE: _____

DATE: _____

FORM OF BID BOND

KNOW ALL PERSONS BY THESE PRESENTS, that we, the undersigned _____

as Principal, and _____
as Surety, are hereby held and firmly bound unto San Antonio Water Company as owner in the
penal sum of \$ _____

(in words)

for the payment of which, well and truly to be made, we hereby jointly and severally bind
ourselves, our heirs, executors, administrators, successors and assigns.

Signed this _____ day of _____, 2020.

The condition of the above obligation is such that, whereas the Principal has submitted to the
San Antonio Water Company a certain bid, attached hereto and hereby made a part hereof, to
enter in to a Contract in writing for:

Construction of Holly Drive Reservoir, Phase II – CO# 1602-U

NOW, THEREFORE,

- a. If said Bid shall be rejected, or in the alternate,
- b. If said Bid shall be accepted and the Principal shall execute and deliver a Contract in the
form of Contract attached hereto (properly completed in accordance with said Bid) and shall
furnish a bond for their faithful performance of said Contract, and shall in all other respects
perform the agreement created by the acceptance of said Bid.

Then this obligation shall be void; otherwise, the same shall remain in force and effect; it being
expressly understood and agreed that the liability of the Surety for any and all claims hereunder
shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety
and its bond shall be in no way impaired or affected by an extension of the time within which the
Company may accept such Bid; and said Surety does hereby waive notice of any such
extension.

IN WITNESS WHEREOF, the Principal and Surety have hereunto set their hands and seals,
and such of them as are corporations have caused their corporate seals to be hereto affixed and
these presents to be signed by their proper officers, the day and year first mentioned.

SEAL

Principal

Surety

BY: _____

SAN ANTONIO WATER COMPANY
CONSTRUCTION AGREEMENT FOR

CO# 1602-U
Holly Drive Reservoir, Phase II

THIS AGREEMENT, is made and entered into this _____ day of _____, 2020, by and between the **San Antonio Water Company**, a Stockholder owned Mutual Water Company and California Corporation located in Upland, California, hereinafter called the OWNER, and by

_____ ,
a _____
located in _____,

WITNESSETH: That the OWNER and CONTRACTOR have mutually covenanted and agreed with each other as follows:

1. **THE CONTRACT DOCUMENTS.** The complete Contract is comprised of and includes: The Notice Inviting Bids, Instructions to Bidders, the Non-Collusion Affidavit, the accepted Bid Proposal, the Construction Agreement and Bonds, the Certifications of Required Insurance Coverage and Endorsements, the Special Provisions, the Standard Specifications for Public Works Construction – 1997 Edition, Modifications to Standard Specifications, the Plans and Drawings and associated permit(s), all Addenda or Supplemental amendments, provisions, regulations, ordinances, codes, and laws otherwise applicable to the work of improvements are incorporated as though fully set forth herein.

All of the above Documents are intended to cooperate so that any work called for in one and not mentioned in the other, or vice versa, is to be executed the same as if mentioned in all said Documents. The Documents comprising the complete Contract are hereinafter referred to as the Contract Documents.

2. **THE WORK.** CONTRACTOR agrees to furnish all tools, apparatus, facilities, equipment, labor and materials (except that specifically mentioned as being furnished by others) necessary to perform and complete the work in a good and worker like manner as called for, and in the manner designated in, and in strict conformity with the aforesaid Contract Documents.

3. **CONTRACT PRICE.** The OWNER agrees to pay and the CONTRACTOR agrees to accept, in full payment for the work above agreed to be done, the prices set forth in the Bid Proposal (\$ _____) as full compensation for fulfilling all obligations hereunder or as modified by any valid Contract change order. Said compensation shall cover all expenses, losses, damages, and consequences arising out of the nature of work during its progress or prior to its acceptance including those for well and faithfully completing the work and the whole thereof in the manner and time specified in the Contract Documents; and also including those expenses arising from actions of the elements, unforeseen difficulties or obstructions encountered in the prosecution of the work.

4. **DISPUTES PERTAINING TO PAYMENT FOR WORK.** Should any disputes arise respecting the true value of any work done or any work omitted, or of any extra work which the CONTRACTOR may be required to do, or respecting the amount of any payment to the

CONTRACTOR during the performance of this Contract, said dispute shall be decided by arbitration in accordance with the prevailing rules and procedures of the American Arbitration Association and the arbitrators' chosen by the OWNER and the CONTRACTOR, and said arbitrators' decision shall be final and conclusive. Under no condition shall there be a cessation of work by the CONTRACTOR during the dispute. This article does not exclude recovery of damages by either party for delays.

5. PAYMENT. Not later than the 1st day of each calendar month, a partial payment request, from the CONTRACTOR, will be provided to the OWNER for review, approval and funding on the basis of an estimate approved by the Engineer of the work performed since the CONTRACTOR's last partial payment request during the preceding month, if any, with ten (10) percent of the amount of each such estimate retained until the final and execution of a Notice of Acceptance of all work covered by this Contract. Payments due shall be made within 15-days of approval.

The Notice of Acceptance will be in letter form and will include the acceptance signature of the OWNER's representative. Release of CONTRACTOR's retention funds will be 36-days after the recording of the Notice of Completion.

6. TIME FOR COMPLETION AND DAMAGES. All work under this Contract shall be completed within a period of **One Hundred and Nighty (190) calendar days** after the date the CONTRACTOR receives the Notice to Proceed, respectively, unless either period for completion is extended by the OWNER. CONTRACTOR and OWNER are aware of the damages, which may be incurred by OWNER if the Work is not completed within the time specified in this Agreement. Accordingly, OWNER and CONTRACTOR agree that the sum of \$800 per calendar day is a reasonable sum to assess as liquidated damages to OWNER by reason of the failure of CONTRACTOR to complete the Work within the time specified.

7. EXTENSION OF TIME. If the CONTRACTOR is delayed by the acts of negligence of the OWNER, or its employees or agents, or by changes ordered in the work, or by strikes, lockouts, fire, unavoidable casualties, or any causes beyond the CONTRACTOR's reasonable control, or by delay authorized by the OWNER, or by any justifiable cause which the Engineer shall authorize, then the CONTRACTOR shall make out a written claim addressed to the OWNER setting forth the reason for the delay and the extension of time requested and forward a copy of the claim to the Engineer for approval. The Engineer will evaluate the claim and if the claim is justifiable, will request the OWNER's approval. No such extension will be allowed unless written claim therefore has been delivered within three (3) calendar days after the delay became apparent.

This article does not exclude the recovery of damage for delay by either part under other provisions in the Contract Documents and CONTRACTOR specifically acknowledges that he has read and agrees to the provisions in the Contract Documents relating to liquidated damages.

8. INFORMATION AND REPORTS. The CONTRACTOR hereby agrees to provide all information and reports required by the Contract Documents or by Regulations pursuant thereto and shall permit access to its books, records, accounts, other sources of information and its facilities as may be determined by the OWNER to be pertinent to ascertain compliance with such Regulations, orders and instructions. Where any information required of CONTRACTOR is in the exclusive possession of another who fails or refuses to furnish this information, the

CONTRACTOR shall so certify to the OWNER, as appropriate, and shall set forth what efforts it has made to obtain the information.

9. **INDEMNITY AND LITIGATION.** To the fullest extent permitted by law, CONTRACTOR agrees to indemnify and hold harmless OWNER and all of its officers, directors, agents and employees from and against any and all claims, demands, or causes of action, including related expenses, attorney's fees, and costs, based in, arising out of, or in any way related to the Work performed by the CONTRACTOR, or anyone directly or indirectly employed by CONTRACTOR and for which the CONTRACTOR may be liable hereunder.

Should any litigation or arbitration be commenced between the parties hereto concerning said Work, any provision of this Agreement, or the rights and obligations of either in relation hereto, the party prevailing in such litigation shall be entitled, in addition to such other relief as may be granted, to a reasonable sum for its attorney's fees in such litigation, and related costs.

10. **INSURANCE.** CONTRACTOR shall procure and maintain insurance, for protection against claims. Without limiting CONTRACTOR's indemnification, CONTRACTOR agrees to procure and maintain, pursuant to the Specifications, at its sole cost and expense, in a form and content satisfactory to OWNER, during the entire term of this Agreement including any extension thereof, the following policies of insurance:

Coverage (Check if Applicable)	Minimum Limits
(X) Comprehensive General Liability Insurance (including premises and combined operations) not auto	\$1,000,000 per occurrence single limit
() Contractual Liability Insurance Products Liability Insurance	\$1,000,000 limit
(X) Comprehensive Automobile Liability Insurance (including owned, non-owned, and hired automobile hazards)	\$1,000,000 per occurrence combined single limit
() Professional Liability Insurance (providing for a one year discovery period)	\$1,000,000 per occurrence combined single limit
(X) Workers' Compensation/ Employer's Liability Insurance	Statutory \$1,000,000 per occurrence

Conditions: In accordance with Public code Section 20170, the insurance of surety companies who provide or issue the policy shall have been Admitted to do business in the State of California with a credit rating of "A-" or better in the most recent edition of A.M. Best Company Rating guide, and only if they are of a financial category Class VIII or better, unless otherwise waived by the OWNER.

Any insurance maintained by the OWNER shall apply in excess of and not combined with insurance provided by this policy. The OWNER, its officers, directors, agents, employees and representatives shall be named as additional insured on this policy.

Prior to commencement of any work under this Contract, CONTRACTOR shall deliver to the OWNER the required insurance certificates and endorsements confirming the existence of the insurance required by this Contract, and including the applicable clauses reference above and

in the Contract Documents. Such endorsements shall be signed by an authorized representative of the insurance Company and shall include the signatory's Company affiliation and title. Should it be deemed necessary by the OWNER, it shall be the CONTRACTOR's responsibility to see that the OWNER receives documentation, acceptable to the OWNER, which sustains that the individual signing said endorsements is indeed authorized to do so by the insurance Company.

11. SUCCESSORS AND ASSIGNS. OWNER and CONTRACTOR hereby bind themselves, their successors and assigns to the other party hereto in respect to covenants, agreements, and obligations contained in this Agreement. Neither party hereto shall assign or attempt to assign this Agreement in part or as a whole without the prior written consent of the other party hereto.

12. NOTICE. Written notice shall be deemed to have been duly served if delivered in person to the individual or a member of the party's hereto or to an office of the party for which it was intended, or if delivered by registered or certified mail to the last business address known to the party giving the notice.

San Antonio Water Company
139 North Euclid Avenue
Upland, California 91786
FAX: (909) 920-3047
Telephone: (909) 982-4107

FAX: _____
Telephone: _____

13. GOVERNING LAW. This Agreement shall be governed by the laws of the State of California.

14. ENTIRE AGREEMENT. This Agreement constitutes the entire agreement between OWNER and CONTRACTOR and supersedes all prior written or oral understandings, except to the extent specifically referenced and incorporated herein. This Agreement may only be emended, supplemented, modified or canceled by a duly executed written instrument.

15. SEVERABILITY. Any provision or part of the Agreement held to be void or unenforceable under any law or regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon OWNER and CONTRACTOR, who agree that the Agreement shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision as close as possible to expressing the intention of the stricken provision.

16. TIME IS OF THE ESSENCE. The time periods in the Sequence of Work and Construction Schedule and the Time for completion are of the essence of this Agreement. By executing the Agreement, CONTRACTOR confirms that the time periods are reasonable for performing in accordance with the Contract Documents.

17. PARTIES HAVING PRINCIPAL INTEREST. CONTRACTOR affirms that the signatures, titles, and seals set forth hereinafter in execution of this Agreement represent all individuals, firm members, partners, joint ventures, and/or corporate officers having a principal interest herein.

IN WITNESS WHEREOF, the parties hereto have executed, or caused to be executed by their authorized officers, this Agreement in two (2) copies each of which shall be deemed an original and effective as of the date first written above.

OWNER:

CONTRACTOR:

TITLE: _____

PAYMENT BOND
(MATERIALS)

CO# 1602-U
Holly Drive Reservoir, Phase II

KNOW ALL PERSONS BY THESE PRESENTS: That we, _____,
as Principal, and _____,
a corporation organized and existing under the laws of the State of _____,
and duly authorized to transact business under the laws of the State of California, as Surety, are
held and firmly bound unto the SAN ANTONIO WATER COMPANY and to any and all persons,
companies or corporations entitled to file stop notices under Section of the California Civil Code
in the sum of (\$ _____),

(in words)

payable under the terms of the Agreement between _____

_____ and San Antonio Water Company, for which payment well and truly to be made, we bind
ourselves, and heirs, executors and administrators, successors and assigns, jointly and
severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that, if said Principal or their
subcontractors, shall fail to pay for any materials, provisions, provender, or other supplies or
teams, implements or machinery used in, upon, for or about the performance of the Work
Contracted to be done, or shall fail to pay any person, Company or corporation for any labor or
work performed thereon of any kind, or for any amounts required to be deducted, withheld, and
paid over to the Internal Revenue Service and/or Franchise Tax Board from the wages of
employees of said Principal or their subcontractors, the Surety will pay for the same in an
amount not exceeding the sum specified above. In case suit is brought upon this bond, the
Principal and the Surety will pay a reasonable attorney's fee to be fixed by the court having
jurisdiction in the case. In addition to the provisions herein above, it is agreed that this bond will
inure to the benefit of any and all persons, companies and corporations entitled to serve stop
notices, so as to give a right of action to them or their assigns in any suit brought under this
bond.

No final settlement between the OWNER and the CONTRACTOR hereunder shall abridge the
right of any beneficiary hereunder, whose claim may be unsatisfied.

(Signatures and attachments on second page)

IMPORTANT: Surety companies executing bonds must possess a certificate of authority from the California Insurance Commissioner authorizing them to write surety insurance defined in Section 105 of the California Insurance Code. Surety companies executing bond must also appear on the "Treasury List" of companies holding a Certificate of Authority as acceptable Surety on Federal Bonds and possess an underwriting authority limitation exceeding the Contract Amount.

In addition to the attachment of a Notary acknowledgment of the signatures hereto, a copy of the power of attorney to the local representatives of the Bonding Company must also be attached hereto.

IN WITNESS WHEREOF, we have hereunto set our hands and seals this _____ day of _____, in the year _____.

Business Name of Contractor

BY: _____ (SEAL)

TITLE: _____

INDIVIDUAL _____ PARTNERSHIP _____ CORPORATION _____ OTHER _____

If OTHER, explain: _____

SURETY INFORMATION

SURETY NAME: _____

ADDRESS: _____

(SEAL)

TELEPHONE: () _____

SURETY SIGN: _____

TITLE: _____

NOTARY INFORMATION

"SIGNATURE OF SURETY MUST BE ACKNOWLEDGED BEFORE A NOTARY PUBLIC. PLEASE ATTACH APPROPRIATE ACKNOWLEDGMENT FORM."

PERFORMANCE BOND

**CO# 1602-U
Holly Drive Reservoir, Phase II**

KNOW ALL PERSONS BY THESE PRESENTS: That we, _____

_____ as Principal, and _____, a corporation organized and existing under the laws of the State of _____, and duly authorized to transact business under the laws of the State of California, as Surety, are held and firmly bound unto the SAN ANTONIO WATER COMPANY and to any and all persons, companies or corporations entitled to file stop notices under Section of the California Civil Code in the sum of (\$ _____),

_____ (in words)

payable under the terms of the Agreement between _____

_____ and San Antonio Water Company, for which payment well and truly to be made, we bind ourselves, and heirs, executors and administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that, if said Principal, its heirs, executors, administrators, successors or assigns shall in all things stand to and abide by, and well and truly keep and perform the covenants, conditions and agreements in the appended Agreement and any alteration thereof as provided, on Contractor or their part, to be kept and performed at the time and in the manner therein specified, and in all respects according to their intent and meaning; and shall faithfully fulfill the one-year guarantee of all materials and workmanship; and indemnify and save harmless the OWNER, its officers, directors, agents and employees as stipulated in the Agreement, then this obligation shall become null and void; otherwise it shall be and remain in full force and effect. In case suit is brought upon this bond, the Principal and the Surety will pay a reasonable attorney's fee to be fixed by the Court having jurisdiction in the case.

The Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Agreement or to the work to be performed thereunder or the Specifications accompanying the same shall in any way affect its obligations on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Agreement or to the Work or to the Specifications.

No final settlement between the OWNER and the CONTRACTOR hereunder shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

(Signatures and attachments on second page)

IMPORTANT: Surety companies executing bonds must possess a certificate of authority from the California Insurance Commissioner authorizing them to write surety insurance defined in Section 105 of the California Insurance Code. Surety companies executing bonds must also appear on the "Treasury List" of companies holding a Certificate of Authority as acceptable surety on Federal Bonds, and possess an underwriting authority limitation exceeding the Contract Amount.

In addition to the attachment of a Notary acknowledgment of the signatures hereto, a copy of the power of attorney to the local representatives of the Bonding Company must also be attached hereto.

IN WITNESS WHEREOF, we have hereunto set our hands and seals this _____ day of _____, in the year _____.

Business Name of Contractor

BY: _____ (SEAL)

TITLE: _____

INDIVIDUAL _____ PARTNERSHIP _____ CORPORATION _____ OTHER _____

If OTHER, explain: _____

SURETY INFORMATION

SURETY NAME: _____

ADDRESS: _____

(SEAL)

TELEPHONE: () _____

SURETY SIGN: _____

TITLE: _____

NOTARY INFORMATION

"SIGNATURE OF SURETY MUST BE ACKNOWLEDGED BEFORE A NOTARY PUBLIC. PLEASE ATTACH APPROPRIATE ACKNOWLEDGMENT FORM."

GENERAL PROVISIONS SECTION

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SAN ANTONIO WATER COMPANY

GENERAL PROVISIONS

SECTION 1

“TERMS, DEFINITIONS, ABBREVIATIONS, AND SYMBOLS”

The Standard Specifications for the San Antonio Water Company shall be the **STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, 1998 EDITION OR LATEST REVISION THEREOF** (sometimes hereinafter referred to as the *Green Book*), written and promulgated by the Southern California Chapter, American Public Works Association, and Southern California Districts Associated General Contractors of California Joint Cooperative Committee, including all published amendments thereto except for the following amendments, deletions and modifications.

Any conflict arising between these modifications and the Standard Specifications for Public Works Construction shall be resolved by the Engineer, whose decision shall be final.

Modifications to the Standard Specifications for Public Works Construction.

The following amendments, additions and deletions are hereby incorporated:

1-2 Definitions.

Acceptance, Final Acceptance – The formal action by the Owner accepting the Work as being complete.

Accepted Bid – the bid (proposal) accepted by the Owner (**added**).

Agency - As used in the Standard Specifications shall be the Company (**amended**).

Board - The Board of Directors of the Company (**amended**).

Company (or Owner) – The San Antonio Water Company, a stockholder Mutual Water Company and California Corporation, acting through its Board of Directors and General Manager.

County - County of San Bernardino (**added**).

City – City of Upland (**added**)

Engineer - The General Manager of San Antonio Water Company or his authorized and designated employee or agent (**amended**).

Federal - United States of America (**added**).

Laboratory - The official testing laboratory of the San Antonio Water Company or other laboratories designated, in writing, by the Engineer (**added**).

Special Conditions – Modifications to Detailed Technical Provisions (**added**).

Street - Any dedicated right of way for public use as an avenue, highway, lane, alley, court, crossing or intersection (**added**).

Substantial Completion – That date as certified by the Engineer when the construction of the Project or a specified part thereof is sufficiently completed, in accordance with the Contract Documents, so that the Project or specified part can be utilized for the purposes for which it is intended (**added**).

Written Notice – Any notice to any party of the Agreement relative to any part of this Agreement in writing and considered delivered and the service thereof completed, when posted by certified or registered mail to the said party at his last given address, or delivered in person to said party or his authorized representative on the Work (**added**).

1-3.3 Institutions.

ACI - American Concrete Institute (**added**).

AISI - American Iron and Steel Institute (**added**).

A.S.M.E. - The latest American Society of Mechanical Engineers (**added**).

PCA - Portland Cement Association (**added**).

AWWA – American Water Works Association

ASTM – American Society for Testing and Materials

SECTION 1-6**“REQUIREMENTS AND CONDITIONS”**

A new **Section 1-6** hereby is **added** to Section 1 of the *Green Book*, as follows:

1-6.1 Availability of Plans and Specifications: Plans and specifications may be examined at the San Antonio Water Company. Copies of the Notice to Bidders and proposal forms may be obtained from the San Antonio Water Company.

1-6.2 Approximate Estimate: The quantities given in the Notice to Bidders, proposal and contract forms are approximate only, being given as a basis for the comparison of bids, and the Agency does not, expressly or by implication, agree that the actual amount of work will correspond therewith. For work bid on a lump sum price basis, any estimate of quantities is provided for the convenience of Bidders and for comparison of bids and is not guaranteed to be correct by the Agency.

1-6.3 Examination of Plans, Specifications and Site of the Work: The Bidder shall examine carefully the site of the work contemplated and the proposal, plans, specifications and contract forms therefor. It will be assumed that the Bidder has investigated and is satisfied as to the conditions to be encountered, as to the character, quality and quantities of work to be performed and materials to be furnished, and as to the requirements of these specifications, the plans and the contract.

The Bidder acknowledges satisfaction as to the nature and location of the work, the general and local conditions, particularly those bearing upon the availability of transportation, access to the site, disposal, handling and storage of materials, availability of labor, water, electrical power, roads and uncertainties of weather, physical conditions at the site, the conformation and conditions of the ground, the character of equipment and facilities needed preliminary to and during the prosecution of the work, and all other matters which can in any way effect the work or the cost thereof under this contract.

The failure or omission of any Bidder to receive or examine any contract Document, form, instrument, addendum, or other document or to visit the site and become acquainted with conditions then existing shall not relieve any bidder from obligations with respect to the bid or the Contract. The submission of a bid shall be taken as prima facie evidence of compliance with this Section. Bidders shall not at anytime after submission of the bid, dispute or assert that there were any misunderstandings in regard to the nature or amount of work.

1-6.4 Proposal Form: All proposals must be submitted on forms for that purpose furnished by the Company. Letters of transmittal cannot be considered as part of the bid. All proposals shall give the prices proposed, both in writing and figures, and shall be signed by the Bidder, who must give the Bidder's address. The Bidder shall fill out all blanks in the proposal form as therein required. In case of error, unit prices will govern over extensions and written words will govern over numerals, unless it can be established that an obviously incorrect entry has been made.

1-6.5 Rejection of Proposals Containing Alterations or Irregularities: Proposals may be rejected if they show any alterations of form, additions not called for, conditional bids, incomplete bids, or irregularities of any kind. When proposals are signed by an agent, other than an officer or manager of a corporation or a member of a partnership, a power of attorney or written authorization must be on file with the Agency prior to opening bids or shall be submitted with the proposal; otherwise, the proposal will be rejected as irregular and unauthorized.

1-6.6 Proposal Guaranty: All bids shall be presented in a sealed envelope and shall be accompanied by a "Proposal Guaranty" made payable to the Agency and for the amount equal to at least ten percent (10%) of the bid unless otherwise specified on the "Notice Inviting Sealed Bids or Proposals." Said guaranty shall be cash, an unconditional certified or cashier's check, or a bank or postal money order, or bid bond executed as surety by a corporation authorized to issue surety bonds in the State of California.

The check or bond of a Bidder to whom the Contract has been awarded will be returned to him after all of the acts, for the performance of which said security is required, have been fully performed. The checks or bid bonds of the second and third lowest Bidders will returned when the Bidder to whom the Contract has been awarded has properly executed all of the required Contract Documents. Check or bid bonds of other Bidders will returned when their proposals are rejected or in any event, at the expiration of sixty (60) days form the date of opening bids.

1-6.7 Withdrawal of Proposals: Any bid may be withdrawn at any time prior to, but not after, the hour fixed in the public notice for the opening of bids, provided that a request in writing executed by the Bidder or the Bidder's duly authorized representative, for the withdrawal of such bid is filed with the Agency. The withdrawal of a bid shall not prejudice the right of a Bidder to file a new bid.

1-6.8 Disqualification of Bidders: More than one proposal from an individual, a firm or partnership, a corporation or an association under the same or different names will not be considered. Reasonable ground for believing that any Bidder is interested in more than one (1) proposal for the work contemplated will cause the rejection of all proposals in which such Bidder is interested. If there is reason for believing that collusion exists among the Bidders, none of the participants in such collusion will be considered in this or future proposals. Proposals in which the prices are unbalanced may be rejected.

1-6.9 Competency of Bidders: Except as required by California Public Contract Code § 20103.5, prior to the submission of bids, the Contractor shall be licensed in accordance with the provisions of Chapter 9 of Division III of the Business and Professions Code of the State of California and evidence of such license shall be presented to the Engineer on request. The Engineer may require the Bidder to present satisfactory evidence that the Bidder has sufficient experience and is fully prepared with the necessary capital, materials, machinery and skilled workmen to carry out the contract.

1-6.10 Material Guaranty: Before any contract is awarded, Bidders may be required to furnish a complete statement of the origin, composition and manufacture of any or all materials to be used in the construction of the work, together with samples, which samples may be subjected to the tests provided for in these specifications to determine their quality and fitness for the work.

1-6.11 Progress Schedule: The successful Bidder shall submit a progress schedule showing thereon the time proposed to be occupied in prosecuting the various major divisions of the work and the proposed sequence of operations.

SECTION 2 “SCOPE AND CONTROL OF WORK”

Section 2-1 of the *Green Book* hereby is **amended** to read as follows:

2-1 Award and Execution of Contract

2-1.1 Consideration of Bids: Bids will be opened publicly by the Agency’s designated representative on the date and at the time set forth in the "Notice Inviting Sealed Bids or Proposals." The right is reserved by the Agency, by action of the Board, to reject any or all bids, to advertise for new proposals, to negotiate in the open market for a contract at a reasonable price, to purchase in the open market, or to have the work performed by Agency employees, or to abandon the work if, in the judgment of the Board, the best interests of the Agency will be promoted thereby.

2-1.2 Award of Contract: The award of the contract, if it were awarded, will be to the lowest responsible Bidder whose proposal complies with all the requirements prescribed. The award, if made, will be made within sixty (60) calendar days after the opening of the proposals unless otherwise specified in the “Notice to Bidders.”

All bids will be compared on the basis of the Agency's estimate of the quantities of work to be done.

2-1.3 Return of Proposal Guarantees: All proposal guarantees will be held by the Agency until the contract has been signed, after which they will be returned to the respective Bidders whose proposals they accompany. If bids are rejected, the proposal guarantees will be returned after the date of the rejection.

2-1.4 Execution of Contract: The contract shall be signed by the successful Bidder and returned together with the contract bonds, within ten (10) calendar days after the Notice of Award of Contract has been mailed, unless otherwise specified by the Agency.

2-5.2 Precedence of Contract Documents: Section 2-5.2 is hereby amended as follows: Should there be a conflict between the Plans and the Specifications, the plans shall control over the specifications.

2-5.3 Shop Drawings and Submittals: Section 2-5.3 hereby is **amended** by the addition of a new § 2-5.3.4:

2-5.3.4 Shop Drawing Corrections/Notations: If one print of the drawing is returned to the Contractor marked “**NO EXCEPTIONS TAKEN**” or “**MAKE CORRECTIONS NOTED**”, formal revision and re-submittal of said drawing will not be required.

If one print of the drawing is returned to the Contractor marked “**AMEND RESUBMIT**” or “**REJECTED RESUBMIT**”, the Contractor shall revise said drawing and shall resubmit three (3) copies of said revised drawing to the Agency.

Fabrication of an item shall not be commenced before the Agency has reviewed the pertinent shop drawing and returned copies to the Contractor marked either “**NO EXCEPTIONS TAKEN**”, “**MAKE CORRECTIONS NOTED**”, or “**AMEND RESUBMIT.**” Revisions indicated on shop drawings shall be considered as changes necessary to meet the requirements of the Contract Drawings and Specifications and shall not be taken as the basis for claims for extra work. The Contractor shall have no claim for damages or extension of time due to any delay resulting from the Contractor’s having to make the required revisions to shop drawings (unless a review by the Owner of said drawings is delay beyond a reasonable period of time and unless the Contractor can establish that the Agency’s delay in review actually resulted in a delay in the Contractor’s Construction Schedule). The review of said drawings by the Agency will be limited to checking for general agreement with the Specifications and Drawings, and shall in no way relieve the Contractor of responsibility for errors or omissions contained therein nor shall such review operate to waive or modify any provision contained in the Specifications or Contract Drawings. Fabricating dimensions, quantities of material, applicable code requirements and other contract requirements shall be the Contractor’s responsibility.

Pipeline – In order to eliminate excessive field joints or closures, as well as undesirable change in vertical and horizontal alignment, bends, thrust restraints, and appurtenances, the Contractor shall conduct his clearing and benching operations far enough in advance to determine the need for any modifications in alignment prior to the preparation or submittal of shop drawings for approval. Shop drawings shall be submitted to the Engineer for the following items:

- a. Valves (all types)
- b. Piping and fittings (all types)
- c. Couplings
- d. Typical field welding details.
- e. Paint and joint sealer.
- f. Typical detail of connection to existing mains and specs for fittings to be used.
- g. Gauges
- h. Air/Vacs
- i. Concrete mix
- j. Tank
- k. Mixing System

2-9.2 Survey Service: Add the following paragraph at the end of § 2-9.2 of the *Green Book*:

The Owner shall provide necessary surveying adequate for construction, which will include grade and line stakes for the underground piping and appurtenances.

2.11 Inspection: Add the following paragraphs at the end of § 2-11 of the *Green Book*:

The Contractor shall give the Engineer notice of the time when the Contractor or any subcontractor will start the various units or operations of the work. Notice shall be given at least forty-eight (48) hours in advance of starting or resumption time exclusive of Saturdays, Sundays or holidays, for the purpose of permitting the Engineer to make the necessary assignment of a representative or inspector on the work. Any work performed by the Contractor or subcontractor(s) in conflict with said notice shall be removed if so ordered by the Engineer or the representative or inspector on the work.

The inspection of the work shall not relieve the Contractor of any of the obligations to fulfill the contract as prescribed. Defective work shall be made good, and unsuitable materials may be

rejected, notwithstanding the fact that such defective work or unsuitable materials may have been previously overlooked by the Engineer and accepted or estimated for payment.

Any project undertaken by the Agency in cooperation with, or under the control or supervision of, another public or quasi-public entity shall be subject, at all times, to inspection by the participating entity.

SECTION 3
“CHANGES IN WORK”

3-2.1 General: Add the following paragraphs at the end of § 3-2.1 of the *Green Book*:

The Engineer shall approve change Orders that do not exceed the cumulative total of ten percent (10%) of the Contract amount.

Change Orders that exceed the cumulative total of ten percent (10%) of the Contract amount shall be reviewed and approved by the Board in advance of the actual work.

Where changes are necessary due to emergency needs and the cumulative total exceeds ten percent (10%) of the Contract amount, the Change Order shall be approved by the Engineer with subsequent ratification by the Board.

3-5.1 Retention of Imperfect Work: Add to § 3-5 of the *Green Book*:

If any portion of the Work done or materials furnished under the Contract proves defective or not in accordance with specifications and Contract drawings and if the imperfection in the same is not of sufficient magnitude or importance to make to Work dangerous or undesirable, or if the removal of such Work is unpractical or will create conditions which are dangerous or undesirable in the opinion of the Engineer the engineer shall have the right and authority to retain the work instead of requiring it to be removed and reconstructed but shall make such deductions therefor in the payment due the Contractor as may be just and reasonable.

SECTION 4 “CONTROL OF MATERIALS”

4-1.2 Protection of Work and Materials: Add the following paragraph at the end of § 4-1.2 of the *Green Book*:

The Contractor shall properly safeguard all equipment, materials, and work against loss, damage, malicious mischief, or tampering by unauthorized persons until acceptance of the work by the Agency. Locked and covered storage or continuous surveillance by a watchman shall be provided if required to accomplish this purpose.

4-1.3.2 Inspection of Materials not locally produced: Add the following paragraph at the end of § 4-1.3.2 of the *Green Book*:

The Engineer may inspect the production of material, or the manufacture of products at the source of supply. Plant inspection, however, will not be undertaken until the Engineer is assured of the cooperation and assistance of both the Contractor and the material producer. The Engineer, or his duly authorized representative, shall have free entry at all times to such parts of the plants as concerns the manufacture or production of the materials. Adequate facilities shall be furnished free of charge to make the necessary inspection. The Agency assumes no obligation to inspect materials at the source of supply.

4-1.4 Test of Materials: Add the following paragraph at the end of § 4-1.4 of the *Green Book*:

The Company at its option may require testing and/or certification of soils and materials for this project. Any re-testing of soils or materials required by the engineer due to failure of the original test shall be at the Contractor's expense. All expenses incurred for obtaining samples and preparing and restoring field test sites, shall be the responsibility of the Contractor. Full compensation for conforming to the above requirements will be considered as included in the prices bid for various Contract items of Work and no additional compensation will be allowed therefor.

Testing of materials shall be provided by the Agency to insure compliance with Contract Specifications. The Contractor shall notify the Agency in writing two (2) working days in advance for any testing required maintaining progress without delays. Delays caused by the Contractor's failure to provide sufficient notice shall be the responsibility of the Contractor.

4-1.9 Title to Materials Found on the Work: A new § 4-1.9 is added to the *Green Book* as follows:

The Agency reserves the right to retain title to all soils, stone, sand, gravel, and other materials developed and obtained from excavations and other operations connected with the work. Unless otherwise specified in the Special Provisions, neither the Contractor nor any subcontractor shall have any right, title, or interest in or to any such materials. The Contractor will be permitted to use in the work, without charge, any such materials, which meet the requirements of the Specifications and Drawings.

SECTION 5

“UTILITIES”

[No Changes]

SECTION 6
“PROSECUTION, PROGRESS AND ACCEPTANCE OF THE WORK”

6-7.2 Working Day: Add the following paragraphs at the end of § 6-7.2.1 of the *Green Book*:

CONSTRUCTION SCHEDULE:

The Contractor shall furnish a work schedule for the project to the Company and the Engineer as indicated in the Notice of Award. It shall indicate the estimated dates of completion of the various construction phases, from fabrication to field installation and connection to the existing systems.

The Owner reserves the right to alter this schedule in order to activate part of the project or coordinate its completion with other simultaneous construction projects.

The Contractor shall give the Engineer notice of the time when he or his subcontractors will start the various units or operations of the work. Notice shall be given at least forty-eight (48) hours in advance of starting or resumption time exclusive of Saturdays, Sundays or holidays, for the purpose of permitting the Engineer to make the necessary assignment of his representative or inspector on the work. Any work performed by the Contractor or his subcontractors in conflict with said notice shall be removed if so ordered by the Engineer or his representative or inspector on the work.

The inspection of the work shall not relieve the Contractor of any of his obligations to fulfill the contract as prescribed. Defective work shall be made good, and unsuitable materials may be rejected, notwithstanding the fact that such defective work or unsuitable materials may have been previously overlooked by the Engineer and accepted or estimated for payment.

Any project undertaken by the Agency in cooperation with, or under the control or supervision of, another public or quasi-public entity shall be subject, at all times, to inspection by the participating entity.

The first working day of the Contract shall be as indicated in the Contract and the Special Provisions and as follows:

Normal Day: Commencement of performance shall be ten (10) calendar days after date of written Notice to Proceed.

Urgent: No more than two (2) hours after receipt by Contractor of telephone notice to proceed.

Emergency: No more than one-half (1/2) hour after receipt by Contractor of telephone notice to proceed.

WORKDAY

Normal: The Contractor’s working hours shall be limited to the hours between 7:00 a.m. and 4:30 p.m. Monday through Thursday and 7:00 a.m. to 4:00 p.m. on Fridays, excluding the following recognized holidays. Deviation from normal working hours will not be allowed without prior consent of the Company.

New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day (and day after)
Christmas Day

In the event work is allowed by the Company outside of normal working hours, at the request of and for the benefit of the Contractor, inspection service fees may be levied against the Contractor at a rate of \$46.00 per hour, including travel time where applicable, with a minimum hourly charge for four (4) hours. Payment for inspection overtime will be deducted from the Contractors payment.

The above charge may also be levied if inspection services are deemed necessary by the Company as a matter of public safety or to otherwise ensure the quality of the work.

Urgent: The Contractor's working hours shall be from 6:00 a.m. to 9:00 p.m., Monday through Saturday, excluding recognized holidays.

Emergency: The Contractor's working hours shall be any time, any day without exception.

If work is done at night, the Contractor shall provide adequate light for proper prosecution of the work, for the safety of the workmen and the public, and for proper inspection.

6-7.3 Contract Time Accounting

Section 6-7.3 of the *Green Book* is **amended** by changing the term "working days" to calendar days."

6-8 Completion and Acceptance: Add the following paragraph at the end of **§ 6-8** of the *Green Book*:

The Contractor shall provide a surety bond, prior to final pay release. The bond shall be in an approved form and executed by a surety company or companies satisfactory to the Agency, in the amount of ten percent (10%) of the contract price, or one thousand dollars (\$1,000.00), whichever is greater. Said bond shall remain in force for the duration of the guarantee period.

SECTION 7
“RESPONSIBILITIES OF THE CONTRACTOR”

7.0 All references in § 7 to the Division of Industrial Safety shall mean the State Division of Occupational Safety and Health, or its successor agency or agencies.

Section 7-2.2 of the *Green Book* hereby is **amended** to read:

7-2.2 Laws to be Observed: The Contractor shall keep fully informed of all State and National laws and all municipal ordinances and regulations of the Agency which in any manner affect those engaged or employed in the work, or which in any way affect the conduct of the work, and of all such orders and decrees of bodies or tribunals having any jurisdiction or authority over the same.

The Contractor shall at all times observe and comply with, and shall cause all of the Contractor’s agents, employees and subcontractors to observe and comply with all such laws, ordinances, regulations, orders and decrees; and shall protect and indemnify the Agency, the Board and the Engineer, and all of its and their elected and appointed officials, officers, agents and servants against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order or decree, whether by the Contractor or the Contractor’s employees. If any discrepancy or inconsistency is discovered in the plans, drawings, specifications or contract for the work in relation to any such law, ordinance, regulation, order or decree, the Contractor shall forthwith report the same in writing to the Engineer.

7-2.2.6 Contractor's Responsibility for Work: Until the formal acceptance of the work, the Contractor shall have the charge and care thereof, except as provided in § 7-2.2, and shall bear the risk of injury or damage to any part thereof by the action of the elements or from any other cause, whether arising from the execution or from the non-execution of the work. The Contractor shall rebuild, repair, restore and make good all injuries or damages to any portion of the work occasioned by any cause before final acceptance and shall bear the expense thereof, except such injuries or damages as occasioned by Acts of War.

In case of suspension of Work from any cause whatever, the Contractor shall be responsible for all materials and the proper temporary storage thereof.

7-2.2.7 Correction of Errors, Recovery for Errors, Dishonesty or Collusion: The Agency reserves the right to correct any error that may have been made in any estimate that has been paid. The Agency also reserves the right to claim and recover, by process of law, any sums sufficient to correct any error or make good any deficiency in the work resulting from such error or from dishonesty or collusion between any of the parties or individuals having dealings pursuant to the construction of the work, regardless of when such error, dishonesty or collusion shall be discovered.

7-2.2.8 Rights in Materials and Salvage: Ownership of material incorporated in the work is vested in the name of the Agency. Any material delivered and paid for in part by the Agency or any material furnished by the Agency to be incorporated in the work, is or becomes the property of the Agency. Any salvageable materials or installations existing at the site of the work (such as valve boxes and other steel, cast iron or metallic materials) that are the property of the Agency, if they are to be removed, shall be delivered F.O.B. (Free on Board) to the storage yard designated by the Agency. The salvageable materials shall be cleaned of clinging concrete and debris and delivered to the storage yard in the same condition as it existed prior to removal, unless the Engineer instructs the Contractor otherwise.

7-2.2.9 Warranty of Title: No materials, supplies or equipment for the work under this Contract shall be purchased subject to any chattel mortgage or under a conditional sale Contract or other agreement by which an interest therein or any part thereof is retained by the seller or supplier. The Contractor warrants clear and good title, to all materials, supplied and equipment installed and incorporated in the Work, and agrees upon completion of all work to deliver the premises, together with all improvements and appurtenances constructed or placed thereon by him, to the company free from any claims, liens, encumbrances or charges, and further agrees that neither he nor any person, firm, or corporation furnishing any material or labor for work covered by the Contract shall have any right to a lien upon the premises or any improvement installing metering devices or other equipment of utility companies the title of which is commonly retained by the utility Company. Nothing contained in this article, however, shall defeat or impair the right of such persons furnishing materials or labor under any bond given by the Contractor for their protection, or any right under any law permitting such persons to look to funds due the Contractor, which are in the hands of the Company. The provisions of this article shall be inserted in all subcontractors and material Contracts and notices of its provisions shall be given to all persons furnishing materials for the work when no formal Contract is entered into regarding such materials.

Section 7-3 of the *Green Book* hereby is **deleted**, in its entirety. **Insurance requirements are set forth in the contract.**

7-7 Cooperation and Collateral Work.

The contractor is advised of the performance of other work on site requiring coordination and scheduling of tasks and responsibilities as referenced in this section of the *Green Book*.

7-15 Notice and Service Thereof: Add § 7-15 to the *Green Book*:

Any notice required or given by one party to the other under the Contract shall be in writing and shall be dated and signed by the party giving such notice or by a duly authorized representative of such party. Any such notice shall not be effective for any purpose whatever unless served in the following manner:

Notice shall be given to the Company by personal delivery thereof to the Engineer or by depositing the same in the United States mail enclosed in a sealed envelope, registered and with postage prepaid, addressed to:

**General Manager
San Antonio Water Company
139 North Euclid Avenue
Upland, California 91786**

Notice shall be given to the Contractor, by personal delivery thereof to said Contractor or to his authorized representative at the site of the project, or by depositing the same in the United States mail, enclosed in a sealed envelope addressed to said Contractor at the address established for the conduct of the Work under this Contract, postage prepaid and registered.

Notice shall be given to the Surety, or any other person, by personal delivery to said Surety or other person, or by depositing the same in the United States mail, enclosed in a sealed envelope addressed to such Surety or persons at the address of said Surety or persons last communicated by him to the party giving the notice, postage prepaid and registered.

SECTION 8
“FACILITIES FOR AGENCY PERSONNEL”

[No Changes]

**SECTION 9
“MEASUREMENT AND PAYMENT”**

9-3.1 General: Add to this section of the *Green Book* as follows:

Retention funds will be released pursuant to the Public Contract Code Section 7107 except as may be provided for in Civil Code Section 3179 ET. Seq.

9-3.2 Partial and Final Payment: Amend this section of the *Green Book* as follows:

The Contractor, at the pre-construction meeting, shall provide a breakdown of Lump Sum prices by preparing a Schedule of Values, with estimates of completed work on each of the various elements of work on which to base applications for partial payments. The breakdown shall be a true representation of the price for the work covered by the Specifications and Drawings and shall be subject to acceptance by the Engineer. An unbalanced breakdown will not be acceptable. The values assigned to the price breakdown will be used only as a basis for partial payments and not as a basis for additions to or deletions from the Contract Price.

On the 5th day of each month the Contractor shall submit, to the Engineer, a written progress estimate of the work completed. The Engineer will review the estimate and approve it or notify the Contractor of any exceptions. No such progress estimate will be required and no payment will be made when the total number of working days is twenty-five (25) or less or when the value of the work totals less than \$500.00.

Progress payments made after the scheduled completion date shall not constitute a waiver of liquidated damages.

The Contractor may, at Contractor's sole cost and expense, substitute securities equivalent to any monies withheld by the owner to insure performance under the Contract. Such security shall be deposited with the owner or a state or federally chartered bank as escrow agent, who shall pay such monies to the Contractor upon satisfactory completion of the Contract. The Contractor shall be the beneficial owner of any security substituted for monies withheld and shall receive any accrued interest thereon. Securities eligible for investment shall include those listed in government Code Section 16430 or bank or savings and loan certificates of deposit.

WORK PERFORMED WITHOUT DIRECT PAYMENT

Whenever the Contractor is required to perform work or furnish equipment, labor, tools and materials of any class for which no price is fixed in the proposal, it shall be understood that such work, equipment, labor, tools and materials shall be provided without extra charge, allowance, or direct payment of any kind. The cost of performing such work or furnishing such equipment, labor, tools and materials shall be included in the unit bid prices in the Proposal and no additional compensation will be made therefor.

SPECIAL PROVISIONS SECTION

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SAN ANTONIO WATER COMPANY

SPECIAL PROVISIONS

**SECTION 1
“GENERAL REQUIREMENTS”**

1.01 DESCRIPTION OF WORK

The Contractor shall furnish, in accordance with the Specifications, drawings, Storm Water Permit, and San Bernardino County permits, all plant, labor, equipment, and materials required for the construction of the project stated in the Contract Documents and Bidding Schedule.

1.02 SEQUENCE OF WORK

Prior to starting construction, the Contractor shall submit to the Owner a schedule, which shall coordinate the various construction phases, from fabrication to field installation and connection to the existing systems pursuant to Section 7-7 of the Green Book.

1.03 COMPLETION OF WORK

All work must be substantially completed within the time specified in the Contract Documents. Final completion including re-pavement of asphalt surface and clean up must be completed within the time specified in the Contract Documents as well as the conditions set forth in the permit issued by the governing agency. ***If the Contractor does not complete the contracted work in the time allocated per the Specifications and the Notice to Proceed, he shall be liable to the Company for all inspection time for each day after the established Contract completion date that the work remains incomplete. He shall remain liable until the job is approved and accepted by the Company (for extension of time, see General Provisions, Section 6-6.2).***

1.04 LIQUIDATED DAMAGES

The Contractor shall, as provided in Section 6-9 of the General Provisions, pay to the Company as fixed, agreed, and liquidated damages for each calendar days delay, in substantial completion and final completion of the work beyond the time agreed upon, the amount of **\$800.00** per calendar day.

1.05 PRE-CONSTRUCTION MEETING

Following award of Contract, but prior to commencement of work, the Contractor shall schedule a meeting with the Owner, City & County Inspectors, and affected utilities to review proposed construction and shall furnish the following items:

- (A) A schedule of completing the principal items of work (Construction Schedule).
- (B) Projection of monthly payments to be earned (if applicable)

- (C) A list of names, titles, addresses, and telephone numbers of the Contractor's responsible personnel indicating those who may be reached outside of normal working hours for emergency response.
- (D) Provide a signed document stating that the Contractor has contacted the City of Upland Police Department, the City of Upland Fire District, County Fire District and the Chaffey Unified School District (Bus Division) of notification of commencement of work.
- (E) Shop Drawings. All understandings, interpretations and agreements reached at said conference shall be reduced to writing by the Owner and mailed to all parties attending said pre-construction conference.

1.06 FAILURE TO COMPLY

If the Contractor cannot be contacted or fails to respond or refuses to comply with instruction given by the City/County Permit Inspector then, the Company may take corrective action as necessary to protect the roadway and traveling public. The Contractor shall reimburse the Company for any such costs thereof.

1.07 CONSTRUCTION UTILITIES

- (A) **POTABLE WATER** - All drinking water on the site, during construction, shall be furnished by the Contractor and shall be bottled water or water furnished in approved dispensers.
- (B) **CONSTRUCTION WATER** – Water for construction, dust control, testing, compaction and other phases of the work requiring construction water will be provided by the District.

The District will provide a reasonable (not excessive) quantity of water free of charge to the Contractor from the existing potable water system. However, Contractor shall arrange for water meter connection with the District.

- (C) Any excessive construction water shall be furnished by the Contractor at his own expense and no additional allowance will be made therefore.

1.08 PERMITS AND LICENSE

At his own expense, the Contractor shall apply and obtain all other permits (i.e., San Bernardino County permit, Storm Water Permit) and licenses required for the execution of work under this Contract.

1.09 PRIVATE PROPERTY

Any private property damaged by the Contractor's operations shall be repaired or replaced in kind by the Contractor at his own expense and to the satisfaction of the property owner and/or the Company's Inspector.

1.10 AS-BUILT DRAWINGS

The Contractor shall maintain on the job site a set of full size blue-line drawings. On these, he shall mark all as-built conditions, locations, configurations, and other details shown on the original Contract Drawings. Upon completion of work and prior to final acceptance, the as-built drawings shall be turned over to the Company.

1.11 PROTECTION OF EXISTING UTILITIES

The Contractor shall exercise his best effort and care to protect existing utilities (water lines, gas mains, power poles, etc.) against damage from his operations. All damages shall be repaired by the Contractor at his own expense.

1.12 CONSTRUCTION STAKING

The Company shall provide for all field staking during construction per Section 2-9.5 of the General Provisions. ***The Contractor shall provide the Company with five (5) working days advance notice of any required survey staking.***

1.13 BID ITEM FOR SAFETY MEASURES

Each bid proposal submitted under these Specifications for the construction of a pipeline, boring or jacking pits, or similar trenches or open excavations, which are five (5) feet or deeper, or the use of such a trench or open excavation shall contain a separate bid item to provide sheeting, shoring and bracing, or equivalent method, for the protection of life or limb, which shall conform to applicable safety orders, including the Construction Safety Orders of the California Division of Industrial Safety, in accordance with the requirements of the California Occupational Safety and Health Act.

Nothing in this requirement shall be construed to impose tort liability on the awarding body or any of its employees.

1.14 TRENCH SHORING APPROVAL

Any contract for excavation of any trench or trenches five (5) feet or more in depth, the Company shall require submission by the Contractor and acceptance by the awarding body or by a Registered Civil or Structural Engineer to whom authority to accept has been delegated, in advance of excavation, a detailed plan showing the design of shoring, bracing, sloping, or other provisions to be made for worker protection from the hazard of caving ground during the excavation of such trench or trenches. This plan shall be prepared by a Registered Civil or Structural Engineer.

Nothing in this Section shall be deemed to allow the use of a shoring, sloping, or protective system less effective than that required by the safety standards set forth by the State of California Safety Requirements.

Nothing in this Section shall be construed to impose tort liability on the awarding body or any of its employees.

SECTION 2 “EARTHWORK”

2.01 GENERAL

The Contractor shall perform all earthwork required for construction of the proposed improvements as specified and shown. Earthwork includes all plant, labor, equipment, and materials, as required or necessary to clear shrub, excavate, trench, fill, backfill, and grade for the construction of all structures, pipe lines, ditches, embankments, and graded areas.

2.02 UNKNOWN UNDERGROUND FACILITIES

The Company has attempted to show all known underground facilities on the plans. The Contractor’s attention is directed to the possible existence of pipe and other underground improvements, which may or may not be shown on the plans. ***The Contractor shall request Underground Service Alert sufficiently ahead of his excavation (72 hours minimum) to correctly locate the existing underground facilities.*** When the exact location of a utility becomes doubtful, the Contractor shall excavate and expose the utility ahead of trenching operations. The inspector representing the Engineer of Work may adjust the alignment of the pipeline to provide the least amount of interference with the utility as determined by the inspector. All reasonable precautions shall be taken to preserve and protect any such improvements whether shown on the plans or not. Where it is necessary to remove and replace or to relocate such improvements in order to prosecute the work, they shall be removed, maintained, and permanently replaced following a review by the Company and owners of the utility.

2.03 GRADING

In addition to the requirements herein set forth for piping and structural earthwork, all shall be in accordance with the requirements of any other agencies having jurisdiction.

2.04 GENERAL EXCAVATION

Except when specifically provided to the contrary, excavation shall include the removal of all materials of whatever nature encountered, including all obstructions of any nature that would interfere with the proper execution and completion of the work. The removal of said materials shall conform to the lines and grades shown or ordered.

Unless otherwise provided, the areas of construction shall be stripped of all vegetation and debris and such material shall be removed from the site prior to performing any excavation or placing any fill. Excavated material suitable for backfill shall be stored temporarily in such a manner as will facilitate work under the Contract.

Any damage done to private property by reason of work on easements shall be the responsibility of the Contractor. Fences and landscaping, which are removed or damaged by the Contractor, shall be restored to their original condition at the Contractor’s expense.

The Contractor shall furnish, place, and maintain all supports and shoring that may be required for the sides of the excavations, and all pumping, ditching, or other approved measures for the

removal or exclusion of water, including taking care of storm water reaching the site of the work from any source so as to prevent damage to the work or adjoining property.

Excavation shall be sloped or otherwise supported in a safe manner in accordance with applicable state and federal industrial safety requirements. Barriers shall be placed at each end of all excavations and at such places as may be necessary along excavations to prevent accidents. All excavations shall be performed, protected, and supported as required for safety and in the manner set forth in the operating rules, orders, and regulations prescribed by the Division of Industrial Safety of the Department of Industrial Relations of the State of California.

2.05 PIPELINE TRENCH EXCAVATION

Unless otherwise shown or ordered, excavation for pipelines, fittings, valves, and appurtenances, shall be open-cut trenches. The bottom of the trench shall have a minimum width equal to the outside diameter of the pipe plus 12 inches and a maximum width equal to the outside diameter of the pipe plus 20 inches. Except when otherwise shown or ordered by the Company, the bottom of the trench shall be excavated uniformly to the grade of the bottom of the pipe. Rounding out the trench to form a cradle for the pipe will not be required.

- (A) TRENCH OVER-EXCAVATED WHERE SHOWN** – Trenches shall be over-excavated where shown, to the depth shown, and backfilled to the grade of the bottom of the pipe with suitably selected granular material or with sand. Said backfill shall be brought to optimum moisture content and compacted to 95 percent of maximum dry density where the pipeline trench passes under structures, and 90 percent elsewhere. Work specified in this subsection shall be performed by the Contractor at his own expense.
- (B) TRENCH OVER-EXCAVATED WHEN ORDERED** – Trenches shall be over-excavated beyond the depth shown, when ordered by the Inspector and in areas where poor soil (soft, spongy, or unstable material) or rock is encountered. Such over-excavation shall be to the depth ordered by the Inspector. The trench then shall be refilled to the grade of the bottom of the pipe with either selected granular material obtained from the excavation, sand, or crushed rock, at the option of the Company. When crushed rock bedding is ordered, the material shall be a well-graded material (Class II Aggregate Base). Bedding shall be placed in layers, brought to optimum moisture content, and compacted to 95 percent of maximum dry density where the pipeline trench passes under structures and 90 percent elsewhere. All work specified in this Subsection shall be performed by the Contractor at his own expense when the over-excavation ordered by the Company is less than 6 inches below the limits shown. When the over-excavation ordered by the Company is 6 inches or greater below the limits shown, additional payment will be made to the Contractor for that portion of the additional payment will be made under a separate unit price bid item for over-excavation and bedding if such bid item has been established. Otherwise, payment will be made in accordance with a negotiated price for execution of a change order.
- (C) OVER-EXCAVATION NOT ORDERED, SPECIFIED, OR SHOWN** – Any excavation carried below the grade ordered, specified, or shown, shall be refilled to the required grade with suitably selected granular material. Such material shall be moistened as required and compacted to 95 percent of the maximum dry density under structures and 90 percent elsewhere. The Contractor at his own expense shall perform such work.

2.06 SITE GRADING

After stripping has been done, all areas covered by the work, including excavated and filled sections shall be graded uniformly to the lines and grades indicated on the Drawings. The finished surface shall be reasonably smooth and well compacted. All excavated material suitable for fill shall be transported to and placed in the fill area within the limits of the work. All excavated materials which are unsuitable for fill shall be disposed of by the Contractor at his own expense. During construction, excavation and filling shall be performed in a manner and sequence that will provide drainage at all times. Ditches shall be cut accurately to the cross-sections and grades indicated. Any excessive ditch excavation shall be backfilled to grade with suitable, thoroughly compacted material or with suitable stone or cobble to form an adequate paving.

2.07 ROCK EXCAVATION AND BLASTING

Rock excavation shall include removal and disposal of the following:

- (a) All boulders measuring 1/3 of a cubic yard or more in volume
- (b) All rock material in ledges, bedding deposits, and un-stratified masses which cannot be removed without systematic drilling and blasting
- (c) Concrete or masonry structures which have been abandoned
- (d) Conglomerate deposits which are so firmly cemented that they possess the characteristics of solid rock and which cannot be removed without systematic drilling and blasting.

All operations, storage, and handling of explosives shall be according to provisions of Division II, Part I, of the Health and Safety Code, State of California, and shall comply with all State, County, and local laws. Drilling and blasting are to be done only by personnel skilled in such operations. All necessary precautions shall be taken for protection of life and property. Warnings shall be given to nearby property owners that blasting is in progress. Safety mats shall be used to restrict flying particles. The Contractor shall size each blast to minimize nuisance and reduce the possibility of damage to local structures.

2.08 DISPOSAL OF EXCESS EXCAVATED MATERIAL

The Contractor shall remove and dispose of all excess excavated or waste material at his own expense.

Excavated material shall not be deposited on private property unless the Contractor furnish written permission, duly assigned by the owner of the private property involved, to the owner before such material is placed on private property.

2.09 BACKFILL (GENERAL)

Backfill shall not be dropped directly upon any structure or pipe. Materials used for backfill shall be selected material, free from grass, roots, brush, or other vegetation, or boulders having maximum dimension larger than twelve inches. Material coming within six inches of any structure or pipe shall be free of rocks or unbroken masses of earthy materials having maximum dimensions larger than three inches. Backfill shall not be placed around or upon any structure until the concrete has attained sufficient strength to withstand the loads imposed. Backfill around water retaining structures shall not be placed until the structures have been tested, and the structures shall be full of water while backfill is being placed.

Whenever the excavated material is unsuitable for backfill, the Contractor shall arrange for and furnish imported backfill material at his own expense.

All compaction shall be done in accordance with the applicable City requirements and regulations

2.10 PIPELINE TRENCH BACKFILL

- (A) Pipeline trenches shall be backfilled to a level 12 inches above the top of the pipe with selected sandy material obtained from the excavation; provided if, in the Engineer's opinion, said material is unsuitable for backfill purposes, imported material having a sand equivalent value of not less than 20 shall be used for this portion of the trench backfill. Imported sand backfill, when ordered by the Engineer, will be paid for under a separate unit price bid item if such bid item has been established; otherwise, payment will be made in accordance with negotiated price. Such material shall be compacted to 85 percent of maximum dry density.
- (B) After the initial portion of backfill has been placed as specified above, and after all excess water has completely drained from the trench, backfilling of the remainder of the trench may proceed. The remaining portion of the backfill shall be selected material obtained from the excavation per Section 2.12. Each layer shall be moistened and placed in horizontal layers. Each layer shall be tamped, rolled or otherwise compacted to 95 percent of maximum dry density where the trench is located under structures and 90 percent of maximum dry density within the top 3 feet.
- (C) Backfill around and beneath structures, and beneath paved areas except where otherwise specified for a particular structure or ordered by the Engineer, backfill placed around and beneath structures, and beneath paved areas, shall be placed in horizontal layers not to exceed 8 inches in thickness, as measured before compaction, where compaction is attained by mechanical means. Where the use of sheepsfoot rollers is impractical, the layers shall not exceed 6 inches in thickness before compaction, and compaction shall be attained by means of hand-operated power-driven tampers. The backfill shall be brought up evenly with each layer moistened and compacted by mechanical means to 95 percent of maximum dry density beneath structures and beneath paved areas, and 90 percent of maximum dry density around the sides of structures within the top 3 feet of the top of pipe.

2.11 COMPACTION TESTS

All compaction tests required by the Company shall be performed by the Company or its agent at the Company's expense. However, in the event these tests prove the compaction to be unacceptable to either the governing agency or the Owner, all cost for subsequent test will be deducted from the progress payments to the contractor.

In-place soil densities shall be determined by testing in accordance with the latest published edition of the ASTM D-1556 sand cone method or ASTM D-2922 for nuclear method.

Optimum soil moisture-density relations shall be established in accordance with the method of test specified in the latest published edition of ASTM Standard D-1557 method C.

In either case, the tests will be scheduled within 24 hours of the Contractor's request for tests, at locations to be selected by the Owner and/or the governing agency. However, tests shall not be scheduled until a minimum 4 hours work is available for the testing laboratory, as determined by the Engineer. Results of these tests shall then be available within 24 hours.

Required depth for testing relative compaction will be at top of pipe zone and every 3 feet thereafter. (reference standard trench repair detail)

In accordance with provisions for guarantee of the work, the Contractor shall return at his expense to correct any backfill conditions subsequently found to be substandard by either failure or more extensive testing. The Contractor shall provide all labor and equipment necessary to prepare for all tests and to assist the soils engineer in taking the tests, as directed by the Engineer. The Contractor's attention is directed to additional provisions related to testing contained in Section 4-1.4 of the General Provisions.

SECTION 3 “ASPHALT PAVING”

3.01 GENERAL

This Section covers the furnishing and placement of asphalt concrete required for the repair and replacement of pavement at the construction site, along streets, private driveways, drainage easements and parking areas damaged by Contractor’s operations. Where pavement is within the rights-of-way of the State Division of Highways, the County Transportation Department, County Flood Control District, and any City of other governmental agency having jurisdiction, paving shall be done in accordance with the requirements and the provisions of the permits issued by those agencies for the construction within their respective rights-of-way. Such requirements and provisions, where applicable, shall take precedence and supersede the provisions of these specifications. As specified in Section 2013 and in these technical specifications shall be the minimum requirement. In any case, the highway surface excavated or damaged by the Contractor shall be replaced in as good or better condition as the same was before such work was begun.

3.02 TEMPORARY PAVEMENT REPAIR

Place a minimum of 3 inches of aggregate base bedding material in the trench, then place 2 inches of compacted “cold mix” or regular asphalt concrete flush with existing pavement surface. On primary roads, after tacking the existing pavement and placement of base, AR 4000, Type B, 1/2 inch maximum hot mixed asphalt concrete shall be placed and compacted to finish grade

3.03 PERMANENT PAVEMENT REPAIR

Shall be performed by a licensed paving contractor.

3.04 SPREADING AND ROLLING EQUIPMENT

- (A) All distribution and spreading equipment shall conform to the Standard Specifications for Public Works Construction, Section 302-5.5. Additionally, all self propelled vibrating screen paving machines shall have no more than a (1) foot extension on its spreader box.
- (B) All rolling equipment shall conform to the Standard Specifications for Public Works Construction Section 302-5.6.

**SECTION 4
“MATERIAL”**

4.01 MATERIALS FURNISHED BY THE CONTRACTOR

Except as otherwise stated on the bidding sheets, these Special Provisions, or ordered by the Company, all material shall be furnished by the Contractor. Contractor shall furnish all material noted with the following provisions applying:

- (A)** The Contractor shall furnish the Company, as soon as issued duplicate copies of all orders placed outside the Contractor’s plant for articles or materials to be furnished by the Contractor for incorporation in the work.
- (B)** The Contractor shall also furnish the Company with Certificates of Compliance respecting the character of the material to be used.

SECTION 5 “INSTALLATION OF PIPE”

5.01 GENERAL

The work covered in this section includes the furnishing, installation, and testing of pipe, fittings, and all required appurtenances as shown on the plans. Water line shall be either ductile iron pipe (DIP), or steel pipe (CLML&W steel or CML& steel) as specified herein. In addition to the referenced AWWA Standards, pipe handling, storage and installation shall be in accordance with the following instructions.

- (A) **INSPECTION** – Examine the pipe and fittings for cracks, dents, abrasions, or other flaws prior to installation. Mark defective pipe and remove from the site.

- (B) **DUCTILE PIPE AND FITTINGS** – Install DIP per AWWA Standard C600. Proper and suitable tools and appliances for safe handling of pipe and fittings shall be employed. Care shall be exercised to avoid damage to pipe and fittings. All pipe and fittings shall be carefully examined by the Contractor for defects at the time of laying, and no defective pipe or fittings shall be installed. The engineer may waive rejection on the condition that cradling or encasement is provided or the corrective measures taken. All such work shall be done at the Contractor’s expense. All pipe and fittings shall be thoroughly clean at the time of installation and shall be handled in such a manner as to maintain this condition by preventing the entrance of foreign material. Whenever workmen are absent from the job site, open ends of pipe shall be kept plugged. Each section of pipe shall be accurately laid to the required line and grade and shall have a firm bearing for its full length except for a minimum distance at bell holes. After the socket and plain end are wiped clean of all sand and dirt, the plain end should be entered into the socket. It is essential that pipe and fittings be kept level and in straight alignment and that the pipe sections be pulled together slowly to assure proper installation. Joints shall not be deflected beyond the maximum values as specified by the manufacturer.

- (C) **STEEL PIPE** – Steel pipe shall be cement lined and coated (CML & C) for buried pipe and (CML & painted for above ground installations. Installation shall be in accordance with Section 207-10 “Steel Pipe” of the Standard Specifications for Public Works Construction, 1997 Edition or latest edition, the project plans and the Special Provisions of the San Antonio Water Company. Pipe shall standard steel cylinder with weld ends. All joints shall be solid welded.

The cement mortar coating on buried steel pipe in the vicinity of couplings shall be removed to facilitate the installation of the coupling. The extent of coating removal shall be only the minimum required for proper installation and function of the coupling.

Trench excavation, bedding and structure backfill shall be in accordance with the San Antonio Water Company’s Typical Backfill Schematic.

Full compensation for furnishing all labor, materials, tools, equipment and incidentals for doing all the work involved in the construction of CML&C steel water main, complete in place, shall be considered as included in the contract unit price per lineal

foot paid for CML&C water main, and no additional compensation will be allowed therefor.

- (D) FITTINGS** – Water main fittings, tees, bends and reducers shall be made of the same material and finish as the main line. Couplings, adapters, flanges and other appurtenances shall be in conformance with the San Antonio Water Company Special provisions covering construction materials. Steel welded fittings, which meet the San Antonio Water Company Special Provisions, are acceptable for bends and reducers.

Full compensation for furnishing all labor, materials, tools, equipment and incidentals for doing all the work involved in the construction of the water main fittings, tees, bends and reducers, complete in place, shall be considered as included in the contract unit price for the fitting, tee, bend or reducer and no additional compensation will be allowed therefore.

SECTION 6
“INSTALLATION OF VALVES, HYDRANTS, AND FITTINGS”

6.01 VALVES

The work covered in this section includes the furnishing, installation, and testing of valves and all required appurtenances as shown on the plans and specified in Section 15100.

Buried Valves: Unless otherwise indicated on the plans, all line valves shall be buried with the exception of all geared valves (or any other valves indicated on the plans), which shall be set in valve vaults or manholes. The operating nut on a buried valve shall be readily accessible for operation through a valve box which has been set to finish grade and in a vertical position. Rubber ring grooves of valves shall be inspected before installation by the Contractor for ridges or holes, which would interfere with the rubber ring. Interference with the rubber ring shall be corrected to a satisfactory connection or the valves replaced, as required by the Company. All valves shall have the same rubber-ring groove profile as the profile in the groove on the pipe couplings furnished with the pipe. All gate valves shall be anchored in concrete as specified by these Special Provisions and Standard Drawings herein. The anchor shall bear against undisturbed ground in all cases, except where unstable conditions are encountered, in unstable conditions, the bearing surface shall be as directed by the Inspector

Valve boxes shall be firmly supported and shall be kept centered and plumb over the wrench nut of the valve; the box cover shall be flush with the surface of the finished pavement or at any other level designated by the Inspector.

6.02 AIR AND VACUUM RELEASE VALVES

Air and vacuum release valves shall be installed as shown on the job plans.

**SECTION 7
“THRUST BLOCKS AND ANCHOR BLOCKS”**

7.01 GENERAL

Anchors and thrust blocks shall be constructed as specified herein and/or shown on the Standard Drawings or where directed by the Inspector and as specified herein. In general, thrust blocks and anchors must be placed at all angles greater than five degrees, at changes in pipe size, at cast-iron fittings, at hydrant locations and on steep slopes.

Steel rods used for tie downs and enforcement shall be Rebar No. 4 coated with Minnesota Mining and Manufacturing EC44, Koppers Bitumastic 505 (Supertank), or an approved equal.

Concrete used will be a minimum class rating of 450-C-2000.

7.02 THRUST BLOCKS

The area and design of the bearing surface shall be as specified by the Standard Drawing for thrust blocks. The bearing surface shall be against undisturbed ground in all cases, except where unstable conditions are encountered. In unstable conditions, the bearing surface shall be as directed by the Inspector. Unless otherwise directed by the Inspector, the thrust blocks shall be placed so that the pipe and fitting joints are accessible for repair. Polyethylene shall be installed between the fitting and concrete to provide as a bond break.

SECTION 8 “CLEANING AND DISINFECTION OF WATER MAINS”

8.01 GENERAL

Disinfection of water mains applies to all construction involving *domestic* pipelines. After the pipelines have been cleaned and tested, but before they have been connected to the existing system, disinfection shall be accomplished. In the event groundwater is encountered and it is impossible to prevent its entrance into the mains, or the mains are not free from dirt, they shall be thoroughly flushed prior to disinfecting. During the chlorinating process, all valves and facilities shall be operated. All water mains, water services, attached appurtenances, and connections if any shall be disinfected in accordance with the latest revision of AWWA C601 and as specified herein.

8.02 DISINFECTION OF WATER MAINS

- a. Tablet Disinfection – Tablet disinfection may be used. This method may be used only for lines when scrupulous cleanliness has been exercised. It shall not be used if water or foreign material has entered the main, or if dewatering and repairs are required because preliminary flushing cannot be used. Where tablet disinfection is permitted, the disinfection solution shall be made by the use of hypochlorite tablets attached by means of gasket cement to the inside top of the lengths of pipe as they are being laid, followed by the filling of the main with water. The amount of adhesives shall be limited to the smallest practicable amount applied to one side of the tablet only. The tablets shall have an average weight of 5 grams each and shall contain not less than 70 percent of available chlorine.
- b. Residual Chlorine Test – After 24 hours of retention, the hypochlorite solution will be tested by the Engineer, and to be acceptable, shall have a minimum of twenty-five (25) parts per million of residual chlorine.
- c. Additional Disinfection – If the test results are not satisfactory, the Contractor shall provide a 2-inch outlet for the connection of injection type chlorination equipment, after which the Contractor shall inject chlorine solution into the main for the necessary additional disinfection.

8.03 FLUSHING OF WATER MAINS

Following the period of retention and after testing of residual chlorine by the Owner, the chlorinated water shall be thoroughly flushed from the line until the replacement water throughout the length of the pipeline is comparable in quality to the water served the public for the existing system. The Owner shall take the necessary samples for bacteriological tests in accordance with the State Department of Public Health Standards.

Care shall be taken that the water is flushed from the line at its extremities and that the services are free of chlorinated water before being placed in service.

The chlorinated water may be used later for the testing of other lines, or if not so used, shall be disposed of by the Contractor. The Company will not be responsible for loss or damage

resulting from such disposal. When a hypochlorite solution has been used for disinfecting the main, the flushing shall be in a direction opposite to that from which the line was filled.

The Contractor shall furnish all equipment in good operating condition, labor, material, and water necessary for chlorinating and flushing the pipeline and for certification of the pipeline disinfecting.

The Company may require chlorinating of new water main facilities to be done by an independent chlorinating company who will provide a certified operator for the duration of the tests and a certified chlorinating result to the Engineer.

SECTION 9 “HYDROSTATIC TESTING & LEAKAGE ALLOWANCE”

9.01 GENERAL

Hydrostatic and leakage test specifications applies to all construction involving pipelines, whether it is a main construction, booster plant piping, or reservoir piping, excepting reservoir drain lines.

The required test pressures shall be applied by a pump connected to the pipe in a manner satisfactory to the Engineer. The Contractor shall provide calibrated meters for measurement of the leakage, necessary bulkhead, piping, gauges, pumps, power, and labor, and perform and furnish everything necessary for making all tests required, at his own expense and shall furnish to the Engineer copies of all tests performed.

The Contractor, at his own expense, shall do all excavation necessary to locate and repair leaks or other defects which may develop under test, including removal of backfill already placed, and shall replace such excavated material and shall make all repairs necessary to the required water tightness, after which the required tests shall be repeated until the pipe and fittings meet the requirements set forth herein.

9.02 HYDROSTATIC TESTING

Upon completion of the laying, joining, backfilling and compacting of backfill, and at least seven days after the last concrete thrust device has been placed, the pipe and fittings involved in the construction shall be filled with water for a minimum of 24 hours. Care shall be taken to see that all air vents are open during the filling, and after the section has been completely filled, it shall be allowed to stand under a light pressure for a sufficient length of time to allow any cement mortar lining to absorb and to allow the escape of air from any air pockets. During this period, all fittings and connections shall be examined for leaks. If any are found, they shall be stopped. A test pressure 50% greater than the class of pipe and fittings shall then be applied to sections and maintained for a four-hour period. Test sections will be chosen which give, as nearly as possible, constant pressure throughout the section with the pressure being measured at the lowest point. Any noticeable leaks shall be stopped and any defective pipe shall be replaced with new sections.

The test shall be made prior to connecting the new line with the existing Company's pipes and mains. The test shall further be conducted with the open ends of pipes, valves, and fittings suitably closed. Valves shall be operated during the test period.

The test shall be conducted in the following manner. All air shall be expelled from the pipe. To accomplish this, if air valves, hydrants, or other outlets are not available, taps shall be made at the high points to expel the air, and these taps shall be tightly plugged afterwards. The pressure in the pipeline shall then be pumped up to the specified test pressure. When the test pressure has been reached, pumping shall be discontinued until the pressure in the line has dropped 5 psi, at which time the pressure shall again be pumped up to the specified test pressure. This procedure shall be repeated until four hours have elapsed from the time the specified test pressure was first applied. At the end of the four-hour test period, the pressure shall be pumped up to the test pressure for the last time.

Contractor shall provide at his own expense, the installation and material for all temporary blowoffs.

9.03 LEAKAGE ALLOWANCE

The leakage allowance shall be in accordance with the latest revision of AWWA C-600. The leakage shall be considered, as the total amount of water pumped into the pipeline during the four-hour period including the amount required in reaching the test pressure for the final time. Leakage shall not exceed the rate of 11.65 gallons per inch of diameter per mile of pipe per 24 hours. Any noticeable leak shall be stopped and all defective pipe, fittings, valves, and other accessories discovered in consequence of the test, shall be removed and replaced by the Contractor with sound material and the test shall be repeated until the total leakage during a test of two hours duration does not exceed the rate specified below. The following table indicates the leakage allowance for various sizes of pipe and is equal to the number of gallons per hour test per 1,000 feet of pipe being tested.

**ALLOWABLE LEAKAGE
STEEL & DIP PER 1000 FEET OF PIPELINE*
(GALLONS PER HOUR)**

Pipe Test Pressure at Lowest Point in Line (psig)

Avg. Test Pressure (psi)	NOMINAL PIPE DIAMETER / INCHES										
	3	4	6	8	10	12	14	16	18	20	24
450	0.48	0.64	0.95	1.27	1.59	1.91	2.23	2.55	2.87	3.18	3.82
400	2.45	0.60	0.90	1.20	1.50	1.80	2.10	2.40	2.70	3.00	3.60
350	0.42	0.56	0.84	1.12	1.40	1.69	1.97	2.25	2.53	2.81	3.37
300	0.39	0.52	0.78	1.04	1.30	1.56	1.82	2.08	2.34	2.60	3.12
275	0.37	0.50	0.75	1.00	1.24	1.49	1.74	1.99	2.24	2.49	2.99
250	0.36	0.47	0.71	0.95	1.19	1.42	1.66	1.90	2.14	2.37	2.85
225	0.34	0.45	0.68	0.90	1.13	1.35	1.58	1.80	2.03	2.25	2.70
200	0.32	0.43	0.64	0.85	1.06	1.28	1.48	1.70	1.91	2.12	2.55
175	0.30	0.40	0.59	0.80	0.99	1.19	1.39	1.59	1.79	1.98	2.38
150	0.28	0.37	0.55	0.74	0.92	1.10	1.29	1.47	1.66	1.84	2.21
125	0.25	0.34	0.50	0.67	0.84	1.01	1.18	1.34	1.51	1.68	2.01
100	0.23	0.30	0.45	0.60	0.75	0.90	1.05	1.20	1.35	1.50	1.80

- * If the pipeline under test contains sections of various diameters, the allowable leakage will be the sum of the computed leakage for each size.

MATERIALS SECTION

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SAN ANTONIO WATER COMPANY

MATERIALS

**SECTION 1
“CONTROL OF MATERIALS”**

1.01 SAMPLES AND TESTS

(Not Applicable)

1.02 DEFECTIVE MATERIALS

All materials not conforming to these Specifications shall be considered defective, and all such materials whether in place or not, shall be rejected and shall be removed immediately from the site of the work unless otherwise permitted by the Agency. No rejected material, the defects of which have been subsequently corrected, shall be used until approved in writing by the Agency.

SECTION 2 “PORTLAND CEMENT CONCRETE REINFORCING”

2.01 GENERAL AND CLASSES

All Portland Cement Concrete shall conform to the provisions of Section 201 of the Standard Specifications for Public Works Construction, latest edition, except as herein modified. The cement aggregate content for the various classes of concrete shall be as specified in Subsection 201-1.1.2 of the aforementioned Standards.

2.02 CEMENT

Portland Cement, including Portland Cement used in pre--cast products, shall be Type II and/or Type V, conforming to ASTM C150.

2.03 PORTLAND CEMENT

Portland Cement Concrete shall be composed of Portland Cement, fine aggregate, coarse aggregate, and water proportioned and mixed to produce a smooth dense workable mixture. It can be of the ready-mix variety as produced by any reliable ready-mix concrete firm.

2.04 REINFORCING STEEL

Reinforcing steel shall be deformed bars from new billet stock or intermediate grade conforming to the requirements of the latest revision of ASTM A15 and A305, and shall be of the required sizes and shapes and placed where shown on the Drawings or prescribed by the Company. The reinforcement shall be so secured in portion that it will not be displaced during the depositing of concrete. All reinforcing steel shall be completely encased in concrete. Wire mesh shall conform to ASTM A185. All bars shall be bent cold and at the time of concrete placement. They shall be free from rust, scale, oil, or any other coating which would reduce or destroy the bond between concrete and steel.

2.05 PRECAST CONCRETE VAULT STRUCTURES

Per Plan.

2.06 AGGREGATE FOR USE IN CONCRETE

All aggregates for use in concrete shall conform to the requirements as set forth in the Standard Specifications for Public Works Construction, Subsection 200-1. Aggregates shall be of such character that it will be possible to produce workable concrete within the limits of slump and water content in Subsections 201-1.1.2 and 201-1.3.3 of the Standard Specifications for Public Works Construction, latest edition.

CONSTRUCTION OF THE HOLLY DRIVE RESERVOIR PHASE II

TECHNICAL SPECIFICATIONS

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**SECTION 01000
SUMMARY OF WORK**

PART 1 – GENERAL

1.1 WORK UNDER THIS CONTRACT

- A. The CONTRACTOR shall furnish all labor, materials, equipment and means to construct the project entitled **HOLLY DRIVE RESERVOIR, PHASE II**, as shown on the Drawings and described herein. The work includes, but is not limited to, the following:
1. Construction of Holly Drive Reservoir on the Company's existing Tank Site, and offsite valve installation or replacement. Construction improvements include but are not limited to; clearing and grubbing, tank foundation, 120,000 gallon tank, piping, valves, fittings, couplings, thrust blocks, utility vault, drainage, headwall, concrete work, curb and gutter, engineered fill, compactions, rock subgrade, precise grading, storm water BMPs and abandonment of the exiting 60,000 gallon tank. In addition to the construction of the Holly Drive Reservoir and all system components, the construction includes offsite shut off valve installation along Holly Drive as specified and shown on the Drawings.
 2. The existing water reservoir must remain in service during construction with allowance for the Company to assist with shutdowns for appropriate tie-ins and pipeline appurtenances to be constructed as specified in Section 01010 Work Restrictions and Sequence of Work.
 3. Tank Level Controls: The Company will furnish the submersible level transducer and it will be the Contractors responsibility to install the submersible level transducer in the new tank.
 4. Telemetry System will be furnished by the Company during the construction of the tank. Tank levels and alarms will be control remotely by PLC installed at the Booster Station Site. The Company SCADA system via Ethernet radio will provide communication between the tank site and booster station site. Programing of SCADA related equipment will be performed by the Company's SCADA Consultant. It will be the Contractors responsibility to relocate the existing TELEMETRY (SCADA) equipment (solar panels, battery cabinets) from the exiting 60,000 gallon tank to the new 120,000 gallon tank per the Company's recommendations.

1.1 LOCATION

- A. All work is to be performed on property owned by San Bernardino County with San Antonio Water Company as an easement holder. The property is adjacent to 2682 Holly Drive, and along the Holly Drive, Upland, California, 91784 in San Bernardino County.

1.2 COMPLETION OF WORK

- A. All work shall be completed within the number of calendar days consistent with the Contract Completion Schedule noted in the Information for Bidders. If work is not completed within the number of calendar days specified, Contractor shall bear all

additional expenses incurred after contract completion schedule.

1.3 LIQUIDATED DAMAGES

- A. As defined in Contract Documents, the amount fixed for liquidated damages for delay in completion of Contract work is \$800 per day.

1.4 HOURS OF WORK

- A. The Contractor's activities shall be confined to an eight-hour shift between the hours of 8:00 a.m. and 4:30 p.m. Monday through Thursday and 8:00 a.m. to 4:00 pm on Fridays, excluding holidays. Deviation from these hours will not be permitted without the prior consent of the Engineer, except in emergencies involving immediate hazard to persons or property. In the event of either a requested or emergency deviation, inspection service fees for Owner personnel and any third-party inspector will be charged against the Contractor. The service fees will be calculated at overtime rates including benefits, overhead, and travel time. The service fees will be deducted from any amounts due the Contractor. Charges will be made for any change to extraordinary work hours, including standby time due to late crew arrival or "no-show" by crew.
- B. Inspections requested by or made necessary as a result of actions by the Contractor on Saturdays, Sundays or holidays must be scheduled and approved by Engineer and paid for by Contractor at the prevailing rate for overtime or holiday work.

1.5 SITE INSPECTION

- A. It shall be the Contractor's responsibility to make all examinations, inspections, field studies and measurements necessary for his own determination of the character of conditions that will be encountered in the work and to fully determine all related cost factors.
- B. Contractors may obtain assistance in inspecting the site by calling the Company by telephone at (909) 982-4107.

1.6 DEFINITIONS

- A. "Engineer" refers to the person authorized by the Company to oversee the execution of the contract, acting either directly or through his properly authorized agents, each agent acting only within the scope of authority delegated to him.
- B. "Company" and "Owner" refers to the San Antonio Water Company.
- C. "Company Inspector" refers to the person authorized by the Company to oversee the coating and painting operations and construction activities acting only within the scope of authority delegated to him.

1.7 WORK BY OTHERS

- A. Where two or more contracts are being performed at one time on the same site or adjacent land in such manner that work under one contract may interfere with work under another, the OWNER will determine the sequence and order of the Work in either

or both contracts. When the site of one contract is the necessary or convenient means of access for performance of the work under another, the OWNER may grant privilege of access or other reasonable privilege to the contractor so desiring, to the extent, amount and in manner and at time that the OWNER may determine. No OWNER determination of method or time or sequence or order of the work or access privilege shall be the basis for a claim for delay or damage except under provisions of the General Conditions for temporary suspensions of the work. The CONTRACTOR shall conduct its operations so as to cause a minimum of interference with the work of such other contractors, and shall cooperate fully with such contractors to allow continued safe access to their respective portions of the site, as required to perform work under their respective contracts.

1.8 CONTRACTOR USE OF SITE

The job site is located in a private gated community.

- A. Access to Reservoir Site: Access is limited to the chain link enclosed tank site, adjacent site pad and access road.
- B. Access to Holly Drive: Due to gated residential nature of the area, there is a restricted access to the Holly Drive and must be coordinated with the Company prior to Construction. **The Company will provide a temporary access code for the duration of the Project.**
- C. Time restrictions for performing all work shall be as specified on applicable permits and in applicable local ordinances.
- D. Utility outages and shutdown: Shall be coordinated with the Company sufficiently in advance of the need to assure that service to Company's customers will not be affected.
- E. The CONTRACTOR may not have exclusive use of the site during construction operations. CONTRACTOR may be required to work concurrently with in close proximity to the COMPANY and to coordinate his work with the work of the COMPANY.
- F. Since the job site is located in a private gated community, it will be Contractor responsibility to obtain written permission from the private property owners to store or park any equipment, parts or excavation/backfill materials. A copy of said permission shall be provided to the Company prior to construction

1.9 WORK SEQUENCE

- A. The work shall be carried on at such places on the project and also in such order or precedence as may be found necessary by the Engineer to expedite the completion of the project. After work has begun on any portion of designated part of the project, it shall be carried forward to its final completion. All work shall conform to the provisions of the approved Contractor's schedule and as specified in Section 01010 Work Restrictions and Sequence of Work.
- B. The Contractor shall cooperate fully with all utility forces of the Owner or forces of other public or private agencies engaged in the relocation, altering, or otherwise rearranging of any facilities which interfere with the progress of the work, and shall schedule the work

so as to minimize interference with said relocation, altering, or other rearranging of facilities.

1.10 ABBREVIATIONS

Wherever the following abbreviations are used they shall have the meanings indicated:

AASHTO....	American Association of the State Highway and Transportation Officials
ACI.....	American Concrete Institute
AGA.....	American Gas Association
AGMA.....	American Gear Manufacturer's Association
AI.....	The Asphalt Institute
AIA.....	American Institute of Architects
AISC.....	American Institute of Steel Construction
AISI.....	American Iron & Steel Institute
AITC.....	American Institute of Timber Construction
ANSI.....	American National Standards Institute
APA.....	American Plywood Association
API.....	American Petroleum Institute
ASCE.....	American Society of Civil Engineers
ASHRAE....	American Society of Heating, Refrigerating, and Air Conditioning Engineers
ASME.....	American Society of Mechanical Engineers
ASQC.....	American Society for Quality Control
ASTM.....	American Society for Testing and Materials
AWPA.....	American Wood Preservers Association
AWPI.....	American Wood Preservers Institute
AWS.....	American Welding Society
AWWA.....	American Water Works Association
CBM.....	Certified Ballast Manufacturers
CLFMI....	Chain Link Fence Manufacturers Institute
CRSI.....	Concrete Reinforcement and Steel Institute
ETL.....	Electrical Test Laboratories
EPA.....	Environmental Protection Agency
IEEE.....	Institute of Electrical and Electronics Engineers
IPCEA....	Insulated Power Cable Engineers Association
ISA.....	Instrument Society of America
ISO.....	Insurance Services Office
NACE.....	National Association of Corrosion Engineers
NEC.....	National Electrical Code
NEMA.....	National Electrical Manufacturers Association
NFPA.....	National Fire Protection Association
NFPA.....	National Forest Products Association
OSHA.....	Occupational Safety and Health Act of 1970
PCA.....	Portland Cement Association
SAE.....	Society of Automotive Engineers
SSPC.....	Society for Protective Coatings
UBC.....	Uniform Building Code, International Conference of Building Officials

ULI.....	Underwriters' Laboratories, Inc.
WCLIB....	West Coast Lumber Inspection Bureau
WCRSI....	Western Concrete Reinforcing Steel Institute
WRI.....	Wire Reinforcement Institute
WWPA.....	Western Wood Products Association

PART 2 – PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 COORDINATION AND MEETINGS

A. PRE-BID CONFERENCE

1. A Non-Mandatory, but **strongly recommended**, Pre-Bid Conference for the project will be conducted by the Engineer at Company's office, follow by the site visit. The object of the Pre-Bid Conference is to acquaint bidders with existing facility and site. The conditions and requirements of the plans and specifications shall govern over any information presented at the Pre-Bid Conference, unless amended in writing by the Engineer. The property is located within the gated community; therefore, the site visit will be limited prior to construction.

B. PRE-CONSTRUCTION CONFERENCE

1. A Pre-Construction Conference shall be scheduled upon issuance of Notice of Award. The Owner, Contractor and Engineer shall be present. The sequence of work will be discussed and will be mutually agreed upon to ensure the work is accomplished and completed as stated in the Contract, and to allow for inspection and operations flexibility by Owner. A schedule of work to be accomplished and a list of labor, material and equipment rates for additional work will be established and maintained throughout the project. Contractor shall furnish resumes of all personnel assigned to project, and a complete set of approved submittal data for use by inspection personnel.
2. Where applicable, Contractor shall submit manufacturers' literature and Material Safety Data Sheets (MSDS) on all materials to be used. Contractor shall maintain copies of MSDS's at jobsite at all times.

PART 4 – MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. The work described herein will not be measured for payment.

4.2 PAYMENT

- A. The work described herein will not be paid for separately. Payment for these items will be included in the price for pay items of associated work.

END OF SECTION

SECTION 01010
WORK RESTRICTION AND SEQUENCE OF WORK

PART 1 – GENERAL

The work restrictions and sequence of work described below are requirements during construction of the Holly Drive Reservoir and offsite valve installation and replacement. These requirements are applicable during all work required for the construction, testing, and operation of the project. All work shall be completed in accordance with this specification and the contract drawings and specifications.

1.1 CONSTRAINTS ON SEQUENCE AND SCHEDULING OF WORK

- A. All components of the work must be completed to ensure that the operation and control of the Company's existing and proposed system components are maintained to ensure continuous operation and control of the Company's existing water reservoir.
- B. Contractor shall conduct work in a manner that will not impair the operational capabilities of essential elements of the Company's existing facilities or reduce the operating capacity of said facilities, unless specifically outlined in this specification.
- C. Contractor shall include costs in his bid price for compliance with the specific sequencing limitations and all the constraints, temporary facilities, and the related general factors pertaining to maintaining the full operational existing Holly Drive Reservoir, and all related systems.
- D. Prior to commencing work, Contractor shall submit for the Company's approval, an overall schedule of the work to be completed. Where work involves sequencing requirements to construction of new reservoir, removal or abandonment of the existing facilities, a detailed project schedule with narrative descriptions for the proposed Sequence of Work shall be provided.
- E. Contractor shall be responsible for enforcing safety measures throughout the duration of construction and shall leave the site secure between work shifts.

1.2 INTERRUPTION OF EXISTING COMPANY FACILITIES

- A. Contractor shall execute the work while the Company's existing Holly Drive Reservoir is in operation.
- B. Contractor shall not begin alterations until Company's written permission has been received.
- C. Isolation of individual facilities will require valve closures and draining of existing pipe.
- D. All valves shall be operated by the Company's staff or at the direction of the Company's staff.

1.3 OPERATIONS AND MAINTENANCE ACCESS

- A. Contractor shall provide safe, continuous access to all existing facilities, pipelines, valves and appurtenances for Company staff.

1.4 UTILITIES

- A. Maintain in service all electrical, telephone, water, gas, and other utilities within the project area. Provide temporary utilities when necessary.
- B. Contractor shall provide advance notice to and utilize the services of Underground Services Alert (USA) for location and marking of underground utilities operated by utility agencies other than the Company. Contractor shall call 811 for marking of all underground utilities.
- C. Provide a minimum of 72 hours advance notice to Company's Inspector for marking/locating Company's underground facilities as specified in SP, Section 2.02.

1.5 GENERAL REQUIREMENTS

- A. The work sequence and restrictions presented herein do not include all items affecting completion of the work but are intended to describe some of the critical events necessary to minimize disruption of the existing facilities and to ensure compliance with project requirements. It is the Contractor's responsibility to identify any additional constraints for completion of the work, and keep the existing systems and facilities fully operational at all times.
- B. Contractor shall comply with shutdown constraints to keep the existing facilities operational as required by the Company.
- C. Prior to beginning construction, Contractor shall excavate, expose, and determine ("pothole") the exact size, elevation, and horizontal location of each and every potential interference, including, but not limited to, all facilities specifically shown (location and/or depth) on the Drawings. In addition, Contractor shall field verify all locations and dimensions at connections with existing piping systems. If necessary, Contractor shall revise the plans or dimensions in order to meet the tie-in time constraint without violating the intent of the design. All Contractor revisions shall be approved by the Company prior to any work.
- D. Contractor shall complete all possible portions of new construction and/or modifications to existing facilities, prior to making any connection to existing facilities.
- E. All parts, fabrications, and other components necessary to complete the work during the shutdown and startup must be at the job site prior to final scheduling of the shutdown unless otherwise authorized herein or by the Company.
- F. Contractor shall be responsible for all dewatering, evacuation of all fluids and gases from the existing facilities, proposed work area, nuisance water in excavations for pipelines and abandonments, and all other work associated with making connections to the existing facilities with the specified shutdown limitations.

- G. Contractor shall mark-up red-lined as-built notes on the drawings to identify any corrections or additions to the plans as a result of this work.

1.6 WORK SEQUENCE

In accordance with the operational limitations of the existing systems, the following sections describe work restrictions and sequencing constraints.

A. General Requirements

1. Existing Holly Drive Reservoir must remain in service until the construction of new Holly Drive Reservoir, valving, piping, and all appurtenances are complete and operational.
2. Notification to SAWCO's Administrator, or designee, shall be 48 hours prior to start of construction.
3. All temporary and permanent piping shall be assembled in advance, prior to commencing shutdown work, unless otherwise noted. Locate temporary facilities in a manner that minimizes interference to the Company's operation and maintenance personnel.
4. When required, the Company will isolate existing reservoir and supply water mains. This is not anticipated to happen prior to completion, testing and disinfection of the new Reservoir and all appurtenances. All work shall be coordinated with the Company.

B. Detailed Sequence of Work

An anticipated construction sequence for this portion of work is presented below and shown on the drawings. The Contractor may submit to the Company an alternate sequence for approval. The Company reserves the right to reject the proposed alternate construction sequence. The construction sequence is generally anticipated to be completed in steps described as follows:

1. Construction of new Holly Drive Reservoir, supply/discharge and overflow piping, and all appurtenances.
2. Installation of offsite valves shall be coordinated with SAWCO.
3. Installation of temporary piping, valves, and appurtenances required to conduct field testing and disinfection.
4. Testing disinfection of new facility. The testing and disinfection shall be closely coordinated with the Company.
5. SCADA system: It will be the Contractor's responsibility to relocate all telemetry equipment from the existing tank to new tank. Installation of level transducer and programming of SCADA related equipment will be performed by Company.

6. Tank Level Controls and Telemetry System – The submersible level transducer will be furnished by SAWCO and installed by the Contractor. Tank levels and alarms will be remotely control by PLC installed at the Booster Station Site. The Company's SCADA system via Ethernet radio will provide communication between tank site and booster station site.
7. After successful testing and disinfection of new reservoir system, the new reservoir will be placed into service. Connections to existing system shall be strictly coordinated with the Company.
8. Completion of all site improvements, including precise grading, paving, clean-up, and final punch list items.

PART 2 – EXECUTION

2.01 COORDINATION OF WORK

- A. Contractor shall maintain overall coordination of work execution.
- B. Contractor shall obtain schedules from subcontractors and suppliers and assume responsibility for correctness.
- C. Contractor shall incorporate schedules from subcontractors and suppliers into Progress Schedule to plan for and comply with work, sequencing, and shutdown constraints.
- D. Work by others: Where proper execution of the work depends upon work by others, inspect and promptly report discrepancies and defects.

PART 3 – MEASUREMENT AND PAYMENT

3.1 MEASUREMENT

- E. The work described herein will not be measured for payment.

3.2 PAYMENT

- F. The work described herein will not be paid for separately. Payment for these items will be included in the price for pay items of associated work.

END OF SECTION

**SECTION 01300
SUBMITTALS**

PART 1 - GENERAL

1.1 SHOP DRAWINGS

- A. The CONTRACTOR shall promptly supply to the ENGINEER for approval, shop drawings with details and schedules for all items contained in the list of required Shop Drawings included at the end of this Section, or for other items as may be required by the ENGINEER.
- B. Six (6) copies of all drawings, schedules and brochures shall be submitted for approval, unless otherwise stated. Black line prints, blue line prints or reproducible transparencies are required. Blueprints (white lines on a blue background) are not acceptable. Each submittal shall have the job name on it and the appropriate specification section or contract drawing reference.
- C. The CONTRACTOR shall identify and bring to the attention of the ENGINEER any deviations to the Contract Documents contained in the submittal. For shop drawings being resubmitted the CONTRACTOR shall identify and bring to the attention of the ENGINEER any revisions other than those originally requested by the ENGINEER.
- D. Allow not less than 14 calendar days for review and response to submittals. Review may be delayed if contingent on receipt of other submittals. Upon timely written request by contractor, the Engineer will make reasonable efforts to shorten review periods which may fall on Contractor's critical path.
- E. It is emphasized that the ENGINEER'S approval of CONTRACTOR'S submitted data is for general conformance to the Contract Drawings and Specifications, but subject to the detailed requirements of Drawings and Specifications. Although the ENGINEER may check submitted data in more or less detail, such checking is an effort to discover errors and omissions in CONTRACTOR'S drawings and to assist the CONTRACTOR in coordinating and expediting his work, and shall in no way relieve the CONTRACTOR of his responsibility to engineer the details of the Work in such manner that the purpose and intent of the Contract will be achieved, nor shall such detail check by the ENGINEER be construed as placing on the ENGINEER, any responsibility for the accuracy, and for proper fit, functioning and performance of any phase of the Work included under this Contract.

1.2 SAMPLES

- A. When required by the ENGINEER or where noted in other Sections of these specifications, samples or materials shall be submitted for approval.
- B. Submit samples to illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

- C. Submit samples of finishes from the full range of manufacturer's standard colors, textures, and patterns for ENGINEER'S selection.
- D. Include identification on each sample, with full project information.
- E. Submit the number or samples specified in individual specification sections; one of which will be retained by ENGINEER.
- F. Reviewed samples, which may be used in the Work, are indicated in individual specification sections.

1.3 RECORD DRAWINGS

- A. The Contractor shall keep and maintain, at the Site, one record set of Drawings. On these, it shall mark all project conditions, locations, configurations, and any other changes or deviations which may vary from the information represented on the original Contract Drawings, including buried or concealed construction and utility features which are revealed during the course of construction. Special attention shall be given to recording the horizontal and vertical location of all buried utilities that differ from the locations indicated, or which were not indicated on the Contract Drawings. Said record drawings shall be supplemented by any detailed sketches as necessary or directed to indicate, fully, the Work as actually constructed.
- B. The Record drawings shall be accessible to the Engineer at all times during the construction period.
- C. Final payment will not be acted upon until the Record drawings have been prepared and delivered to the Engineer.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

PART 4 – MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. The work described herein will not be measured for payment.

4.2 PAYMENT

- A. The work described herein will not be paid for separately. Payment for these items will be included in the price for pay items of associated work.

END OF SECTION

**SECTION 02100
SITE PREPARATION**

PART 1 – GENERAL

1.1 DESCRIPTION

- A. This Section describes the work necessary during the CONTRACTOR'S initial move onto the Site to protect existing fences, pavement, potable water reservoir, water pipeline, valves, any other water accessories, walls, storm water drainage patterns, and associated improvements, private properties, and streets from damage due to trees or other objects dislodged during the construction process, clearing, grubbing and stripping.
- B. The Contractor shall provide all labor, material, tools, equipment necessary to perform all construction layout, control and reference staking for satisfactory completion of the project.

1.2 RELATED SECTIONS

- A. Section 01000 – SUMMARY OF WORK
- B. Section 02200 – EARTHWORK
- C. Section 3300 – CAST IN PLACE CONCRETE

1.3 SITE INSPECTION

- A. Prior to moving onto the Site, the CONTRACTOR shall inspect the Site conditions and review maps of the Site and off-site pipeline routes and facilities delineating the OWNER's property and right-of-way lines.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Hubs shall be 1½ inch x 1½ inch x 16-inch oak and witness stakes shall be 1-inch x 1-inch x 36-inch oak or other hardwood.

PART 3 - EXECUTION

3.1 PRIMARY SITE ACCESS

- A. The CONTRACTOR shall develop any necessary access to the Site, including access barriers to prohibit entry of unauthorized persons.
- B. Utility Interference: Where existing utilities interfere with the Work, notify the utility owner and the ENGINEER before proceeding in accordance with the General Conditions.

3.2 CLEARING, GRUBBING AND STRIPPING

- A. Construction areas shall be cleared of grass and weeds to at least a depth of six inches and cleared of structures, pavement, concrete or masonry debris, trees, logs upturned stumps, loose boulders, and any other objectionable material of any kind which would interfere with the performance or completion of the WORK, create a hazard to safety, or impair the subsequent usefulness of the WORK, or obstruct its operation. Loose boulders shall be removed from the Site. Trees and other natural vegetation outside the actual lines of construction shall be protected from damage during construction as directed by the ENGINEER.
- B. Within the limits of clearing, the areas below the natural ground surface shall be grubbed to a depth necessary to remove all stumps, roots, buried logs, and all other objectionable material. Any debris or waste shall be removed if found on the Site. All objectionable material from the clearing and grubbing process shall be removed from the Site and wasted in approved safe locations.
- C. Unless otherwise indicated, native trees larger than three inches in diameter at the base shall not be removed without the ENGINEER'S approval. The removal of any trees, shrubs, fences, or other improvements outside of rights-of-way, if necessary, for the CONTRACTOR'S choice of means and methods, shall be arranged with the owner of the property, and shall be removed and replaced, at no additional cost to the OWNER.

3.3 OVEREXCAVATION, REGRADING AND BACKFILL UNDER RESERVOIR

- A. After the designated areas have been cleared and grubbed, the designated areas will require over excavation, regrading and backfill, consisting of the removal and/or stockpiling of undesirable soils. The ground surface shall be re-contoured for keying the fill and removing severe or abrupt changes in the topography of the Site. Over-excavation and backfill shall be accomplished in accordance with the geotechnical investigation report in Appendix A.

3.4 CONSTRUCTION STAKING

- A. Control benchmarks and grades are identified on the plans. Subsequent control stakes as may be required shall be placed and maintained by the CONTRACTOR. Benchmarks, monuments and other permanent reference points, if unnecessarily disturbed or destroyed, will be restored by the OWNER at the CONTRACTOR'S expense.
- B. Hubs with tacks shall be used for all control points, centerline or baseline offsets and structure stakeout and shall be accompanied by witness stakes marked with the pertinent information. For supplemental stakeout only, witness stakes alone may be used. For laser grade control and the verification of the laser elevation a hub with witness shall be provided.
- C. If impacted during construction activities, each removed marker shall be re-established by the CONTRACTOR'S surveyor.

PART 4 – MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

A. The work described herein will be measured for payment as Lump Sum item.

4.2 PAYMENT

A. Payments for these items will be paid at the contract lump sum price stated in the Schedule of Pay Items. Payments shall constitute full compensation for all materials, equipment and incidentals to satisfactory complete the work.

END OF SECTION

SECTION 02200 EARTHWORK

PART 1 – GENERAL

1.1 DESCRIPTION

- A. Earthwork describes the work including loosening, removing, loading, transporting, depositing and compacting in its final location of all materials, wet and dry, as required for purposes of construction of all Work shown; the furnishing, placing and removing of all sheeting and bracing necessary to safely support the sides of the excavations; all pumping, ditching, draining and other required measures for the removal or exclusion of water; the supporting of structures above and below the ground; all backfilling around structures and all backfilling of trenches and pits; the disposal of excess excavated materials, and all other incidental earthwork as shown.

1.2 RELATED SECTIONS

- A. Section 01000 – SUMMARY OF WORK
- B. Section 01300 – SUBMITTALS
- C. Section 02100 – SITE PREPARATION

1.3 REFERENCES

- A. The geotechnical investigation reports prepared for this project are made as part of the project specifications. Appendix A contains certain portions of the geotechnical study for reference. The Contractor shall be familiar with these recommendations and complete the work in accordance with these recommendations.
- B. ASTM C136 Sieve Analysis of fine and Coarse Aggregates
- C. ASTM D1556 Density and Unit Weight of Soil in Place by the Sand Cone Method
- D. ASTM D1557 Laboratory Compaction Characteristics of Soil Using Modified Effort
- E. ASTM D2922 Density of Soil and Soil Aggregate in Place by Nuclear Methods (Shallow Depth)
- F. ASTM D4253 Maximum Index Density and Unit Weight of Soils Using Vibratory Table
- G. ASTM D4254 Maximum Index Density and Unit Weight of Soils and Calculation of Relative Density
- H. Caltrans Test Method 216
- I. Caltrans Test Method 217 Sand equivalence

1.4 SUBMITTALS

- A. The CONTRACTOR shall submit a copy of the excavation permit issued by the California Department of Industrial Safety.
- B. A detailed plan for design of shoring, bracing, sloping or other excavation shall be submitted a minimum of 5 days before CONTRACTOR begins excavation.
- C. The CONTRACTOR shall submit samples of all materials proposed to be used in the work in accordance with the requirements in Section 01300, SUBMITTALS.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. GENERAL: Fill, backfill and embankment materials shall be selected or processed clean, fine earth, rock, or sand, free from grass, roots, brush, other vegetation or miscellaneous inorganic debris and inert rubble.
- B. Fill and backfill materials shall be free of rocks or unbroken masses of earth materials having a maximum dimension larger than 3 inches.
- C. Fill material shall have an Expansion Index (EI) less than 20.
- D. Suitable Materials: Materials not defined as unsuitable below are defined as suitable materials and may be used in fills, backfilling, and embankment construction subject to the indicated limitations. In addition, when acceptable to the ENGINEER, some of the material listed as unsuitable may be used when thoroughly mixed with suitable material to form a stable composite.
- E. Suitable materials may be obtained from on-site excavations, may be processed on-site materials, or may be imported. If imported materials are required by this Section or to meet the quantity requirements of the project, the CONTRACTOR shall provide the imported materials at no additional expense to the OWNER, unless a unit price item is included for imported materials in the bidding schedule.
- F. The following soil and backfill materials shall be defined and specified:
 - 1. Pipe Zone Material - Material from below pipe to less than 12 inches above top of pipe shall be sand or gravel in compliance with ASTM D1557 minimum sand equivalence of 30 material free from shale, sod, stones and clods over 2 inches in diameter, roots, trash, organic material and other debris.
 - 2. Trench Zone Material – Material in pipe trench above pipe zone and below street zone shall be suitable soil material in compliance with ASTM D1557.
 - 3. Surface Zone Material – Material in upper 12 inches of trench to finish surface in unimproved or landscaped areas shall be suitable topsoil in compliance with ASTM D1557.
 - 4. No material greater than two inches in any dimension shall be placed within one foot of any pipe, valve or structure.
 - 5. All backfill within 24-inches of ductile-iron fittings or valves shall be clean, washed sand.

2.2 UNSUITABLE MATERIAL

- A. Soils which cannot be compacted sufficiently to achieve the density specified for the intended use.
- B. Rocks larger than three (3) inches in the largest dimension shall not be placed within

the fill. Rocks larger than one (1) inch shall not be placed within the upper 12 inches of subgrade soils.

- C. Materials that contain hazardous or designated waste materials including petroleum hydrocarbons, pesticides, heavy metals, and any material which may be classified as hazardous or toxic according to applicable regulations.
- D. Soils that contain greater concentrations of chloride or sulfate ions, or have a soil resistivity or pH less than the existing on-site soils.
- E. When material for the excavation is unsuitable for use in backfill, it shall be disposed of off-site and suitable material that is capable of being compacted to the required relative density shall be arranged for and furnished by the Contractor at his expense.

PART 3 - EXECUTION

3.1 EXCAVATION – GENERAL

- A. The existence and location of existing underground facilities shown on the plans were obtained by a search of the available records. To the best of our knowledge, no other facilities exist except as shown on the plans. The possibility exists of pipe and other underground improvements which may or may not be shown on the plans. Preserve and protect any such improvements whether shown or not. Where necessary to remove and replace or to relocate such improvements in order to prosecute the Work, they shall be removed, maintained and permanently replaced by the Contractor at his expense, except as otherwise provided in the Contract documents.
- B. Control grading to prevent water running into excavations. Do not obstruct surface drainage. Provide swales, gutters temporary drains or other means of channeling flow without interruption around excavation.
- C. Preserve existing drainage patterns except as otherwise shown. Where construction methods cause temporary obstruction of drainage patterns, provide temporary facilities adequate for expected flows and a means of emergency removal of the obstruction.
- D. Provide and maintain ample means and devices and promptly remove and properly dispose of all water from any source entering the excavation or other parts of work. Dewatering methods shall ensure preservation of final lines and grades of bottoms of excavations. Said methods may include well points, sump points, suitable rock or gravel placed below required bedding for drainage and pumping purposes, temporary pipelines, and other means that will not be detrimental to the proposed construction. Contractor is responsible for obtaining all water discharge permits required.
- E. Contractor must stay in compliance with Section SC-8 (Sandbag Barrier) STORMWATER POLLUTION PREVENTION PLAN (SWPPP) and/or San Bernardino County applicable BMPs for the discharge of storm water associated with construction activities.

- F. Do not place concrete footings in water. Do not allow water to rise over Work until concrete or mortar has set at least eight hours.
- G. During excavation, place the excavated material only within the working area. Do not obstruct any roadways or access ways.

3.2 SITE EXCAVATION

- A. Stripping: Strip all vegetation such as roots, brush, heavy sods, heavy growth or grass and all decayed vegetable matter, rubbish and other unsuitable materials within area of Work prior to starting excavation or embankment. Trees and other natural growths outside the actual lines of construction operations shall not be destroyed and such measures as are necessary shall be taken by the Contractor, at his own expense, for the protection thereof.
- B. After stripping, excavation of whatever substances are encountered within grading limits of the Work shall be carried to lines and grades shown. All suitable excavated material shall be used to meet embankment and backfill requirements of Work. Material in excess or not suitable for embankment or backfill shall be disposed of as specified herein.
- C. Areas to receive embankment or fill shall be benched, if sloping, and scarified to a depth of 6-inches, then compacted as required to complete the project or to at least 90 percent of the laboratory maximum dry density. All fill should be compacted at moisture content within three (3) percent of optimum moisture content. Do not deposit unsuitable material in fill areas where compaction is required.
- D. Finish: All areas covered by the Work, including excavated and filled sections and transition areas, shall be uniformly graded to elevations shown. Finished surface shall be reasonably smooth, compacted, and free from irregular surface changes. Round edges of spoil and borrow areas to blend into natural contours. The degree of finish ordinarily obtainable from a blade grader will be satisfactory for open areas, but hand grading and raking will be required around structures and walkways. Finished surface shall be not more than 0.1 foot above or below established grade and sloped to prevent ponding.

3.3 STRUCTURAL EXCAVATION

- A. Structure excavation shall conform to these Specifications and to Section 300-3, "Structure Excavation and Backfill," of the Standard Specifications.
- B. Provide excavation of whatever nature is required for construction of the work.
- C. Refer to the referenced soil reports for difficulties which may be encountered during excavation.
- D. All existing colluvial material and/or undocumented fill shall be removed under each structure. The soils investigation indicates the depth of these soils to be six to eight feet below the ground surface.
- E. Excavate and remove unacceptable earth materials encountered within areas

scheduled for subgrade construction. Unacceptable materials include, but are not limited to, cobbles greater than 6 inches in diameter, trash, vegetation, debris, undocumented fill and colluvial materials.

- F. Over-excavation under each structure shall be to the following limits, whichever is greater:
 - 1. Removal of all colluvial material and/or undocumented fill.
 - 2. A minimum of three feet below the bottom of the structure's footing.
 - 3. To a minimum five feet laterally beyond the structure outline.
- G. When excavating for footings, take care not to disturb bottom of excavation. Trim bottoms to required lines and grades to leave solid base to receive concrete.
- H. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without review of the Owner's Representative.
 - 1. If excavations for footings and foundations are made deeper than indicated or ordered, fill with same concrete as specified for footings at Contractor's expense.
 - 2. If excavations for slabs, curbs and gutters or flatwork are made deeper than indicated, fill to required level beneath slabs or flatwork with coarse, fresh water sand or non-expansive sandy soil. Compaction shall be at optimum moisture content to 95% density, ASTM D1557.

3.4 TRENCH EXCAVATION

- A. Alignment and Grades: Alignment and grade for pipe shall be field verified by potholing prior to preparing shop drawings or fabrication of pipe. When flow line is shown, it shall be the invert or interior bottom of pipe. When top of pipe is shown, it shall be the exterior of pipe barrel. In absence of such profile grade, pipe shall be laid on a straight grade to permit compete drainage and to provide a minimum of 36-inches of cover to finish ground or street subgrade unless otherwise shown.
- B. The Contractor shall excavate and expose buried points of connection to existing utilities where indicated on the Drawings for connections and before fabrication of pipe and the data obtained shall be used in preparing shop drawings.
- C. In accordance with Industrial Safety requirements and Green Book, the Contractor is required to obtain a permit for the excavation of trench which is five feet or more in depth and into which a person is required to descend. The Contractor shall furnish all labor, equipment and materials required to design, construct and remove all sheeting, shoring and bracing or other equivalent method of support for the walls of open excavations required for the construction of this project.
- D. Trench Width: Overall trench width measured at a level of one foot above the top of pipe shall not exceed the limits listed as follows:
 - 1. Nominal Inside Pipe Diameter of 4" to 12" – Minimum width equal to OD plus 12"

and Maximum width equal to OD plus 16”.

2. Nominal Inside Pipe Diameter of 14” to 48” – Minimum width equals OD plus 16” and Maximum width equal to OD plus 24”.
 3. Excavation and trenching shall be true to line so that the pipe is centered in the trench.
- E. Grade Trench Bottom: Provide smooth, firm and stable foundation such that each pipe section will be continually in contact with the bedding along the extreme bottom of the pipe. Excavation for pipe bells and welding shall be made as required. If excessively wet, soft, spongy, unstable or similarly unsuitable material is encountered at subgrade, it shall be removed and replaced by gravel of sufficient thickness to form an unyielding foundation. The Contractor shall maintain adequate dewatering procedures to ensure that an otherwise stable foundation will not be rendered unfit due to accumulation of water in trench.
1. Should large gravel, cobbles or rock be encountered at the trench bottom or pipe subgrade, they shall be removed from beneath the pipe and replaced with granular material which shall be compacted to provide uniform support and a firm foundation.

3.5 VAULT AND CATCH BASIN EXCAVATION

- A. Vault excavation shall have a flat bottom conforming to the grade at which the existing pipe is laid. Vault bottom shall be laid upon firm soil cut true and even, so that bottom of the vault will have a bearing for its full length. Any part of the excavation cut below the needed grade by the Contractor shall be corrected with approved material and thoroughly compacted.
- B. When the bottom material uncovered is soft and in the opinion of the Engineer cannot support the vault, excavate a further depth and/or width and refill to needed elevation. Remove boulders and large stones and refill to grade with a material approved by Engineer, then thoroughly compacted.
- C. Excavation for construction shall be carried out to lines and grades shown and as required to provide working clearance and safe construction slopes and to emplace shoring, sheeting, bracing and other Work required.

3.6 BACKFILL GENERAL

- A. The fill material placed on the scarified and compacted soil should be compacted as specified and shown on the drawings for construction of the retaining wall or at least to 90 percent of laboratory maximum dry density, and the top 24 inches of the fill underlying the concrete ring foundation should be compacted to 95 percent of the laboratory maximum dry density.
- B. All fill should be compacted at moisture condition to within three (3) percent of optimum for fine-grained soils.
- C. Flooding, ponding or jetting shall not be used for fill around reservoir ring walls.

- D. Equipment weighing more than 10,000 pounds shall not be used closer to ring walls than a horizontal distance equal to the depth of the fill at that time. Hand operated power compaction equipment shall be used where use of heavier equipment is impractical or restricted due to weight limitations.
- E. Material for mechanical compacted backfill shall be placed in lifts which shall not exceed the following depth:
 - 1. Impact, free fall or stomping equipment – maximum lift depth of 3 feet. Not permitted over rigid or cement mortar lined pipe.
 - 2. Vibratory equipment with smooth contact surface – maximum lift depth of 2 feet.
 - 3. Rolling equipment, including vibratory interrupted surface equipment – maximum 1 foot.
 - 4. Hand directed mechanical tampers – maximum lift depth of 6 inches.

3.7 TRENCH BACKFILL

- A. The pipe bedding is defined as the portion of the trench between the trench subgrade and the bottom of the pipe. After compacting the bedding, the Contractor shall perform a final trim using a stringline for establishing grade, such that each pipe section when first laid shall be continually in contact with the bedding along the extreme bottom of the pipe. Excavation for pipe bells and welding shall be made as required.
- B. After pipe has been properly laid, exterior joints grouted and inspected, backfilling shall be commenced. Compaction method or methods used shall result in obtaining the compaction of the backfill in the various specified zones and within the maximum lifts specified. Compaction methods used shall not damage pipe, adjacent ground, existing improvements or improvements installed as part of Work.
- C. If a moveable trench shield is used during excavation, pipe installation, and backfill operations, the shield shall be moved by lifting the shield free of the trench bottom or backfill and then moving the shield horizontally. The Contractor shall not drag trench shields along the trench causing damage or displacement to the trench sidewalls, the pipe or the bedding and backfill.
- D. Water settling may be used in pipe zone and trench zone in lieu of mechanical compaction, only where material being backfilled is sufficiently sandy and permeable so that specified compaction is achieved. Compaction by saturation shall be accomplished by inserting a pipe, through which water is being supplied under pressure, to the bottom of the lift of material to be consolidated, and applying to each square yard or lesser surface area in this manner sufficient water to completely saturate the backfill, there over and cause obvious settlement.
 - 1. Vibrating compacting equipment may be necessary to supplement water saturation process where required densities cannot be attained by saturation alone.

2. If water does not readily drain from trench, it shall be removed by sump pump.
- E. Trench Backfill by Zones: Backfill shall be constructed by zones, regardless of compaction method used. The compaction requirements for each zone shall be as follows, unless otherwise specified.
1. Pipe Zone Backfill: Backfill from below pipe to less than 12 inches above top of pipe. The pipe shall be backfilled with the specified material per Section 2.1 E. to 90% compaction. The Contractor shall exercise care to prevent damage to the pipeline coating, cathodic bonds and the pipe itself during the installation and backfill operations. Backfill shall be placed in layers simultaneously on each side of the pipe for full trench width. In placing and compacting backfill give particular attention to underside of pipe and fittings to provide firm support along full pipe length.
 2. Trench Zone Backfill: Backfill in pipe trench above pipe zone and below Surface Zone. The zone shall be backfilled with the specified material per Section 2.1 E. to 90% compaction. Backfill may be either mechanical compaction or water settling, based on characteristics of material.
 3. Surface Zone Backfill: Upper 12 inches of trench to finish surface. Zone shall be backfilled with the specified material per Section 2.1 E. If finish surface is in unimproved or landscape area, 80% compaction is sufficient. If finish surface is within travel way compaction shall be 90%. If finish surface is to be paved, compaction shall be 95%.

3.8 COMPACTION

- A. Degree of Compaction. The ratio, expressed as a percentage, of the in-place dry density of the compacted fill material to the maximum dry density of the same material as determined by ASTM Test Designation D1557.
- B. Methods. Fill material shall be compacted by mechanical means only in uniform lifts not exceeding 8 inches in un-compacted thickness. The moisture content of fill material at time of compaction shall be within 2 percent of laboratory optimum. Each lift shall be thoroughly mixed before compaction to insure uniform distribution of moisture.
- C. Compaction Limits.
1. Earth fill including the foundation fill beneath the reservoir or utility vaults shall be compacted to a minimum degree of compaction of 95 percent as determined by ASTM Test Designation D1557. Field density tests shall be performed in accordance with either ASTM Test Designation D1556-82 (Sand-Cone Method) or ASTM Test Designation D2922-81 and D3017-78 (Nuclear Probe Method). The locations and number of field density tests shall be determined by the Company. The results of these tests and compliance with these specifications shall be the basis upon which satisfactory completion of work shall be judged by the Company. See the geotechnical report in Appendix A.

2. Areas under asphalt paving shall be scarified to a depth of 12", worked to a finely divided condition with all rocks larger than 3" removed and moisture conditioned and compacted to 95 percent of optimum as determined by ASTM Test Designation D1557.

3.9 FIELD TESTING

- A. Compaction testing method for pipelines shall be per the Standard Specifications. Compaction testing method for structural foundation shall be per the five (5) layer test ASTM Standard D-1557 of the latest edition. Compaction test will be performed by the Owner as required. The Contractor shall pay all costs for any retesting of work not conforming to the Specifications and the Contract Drawings.

PART 4 – MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. The work described herein will be measured for payment as Lump Sum item.

4.2 PAYMENT

- A. Payments for these items will be paid at the contract lump sum price stated in the Schedule of Pay Items. Payments shall constitute full compensation for all materials, equipment and incidentals to satisfactory complete the work.

END OF SECTION

**SECTION 02513
ASPHALT CONCRETE PAVING**

PART 1 – GENERAL

1.1 DESCRIPTION

- A. This Section includes materials, testing, and installation of asphalt concrete pavement, aggregate base course, and prime, tack, and seal coats.

1.2 RELATED SECTIONS

- A. Section 01000 – SUMMARY OF WORK
- B. Section 02200 – EARTHWORK
- C. Section 3 of Special Provision – Asphalt Paving

1.3 REFERENCED STANDARDS

- A. Standard Specifications for Public Works Construction, Latest Edition (“Standard Specifications”).

1.4 SUBMITTALS

- A. Submit three copies of a report from a testing laboratory verifying that aggregate material contains less than 1% asbestos by weight or volume and conforms to the specified gradations or characteristics. Submit batch test prior to permanent paving.

1.5 TESTING FOR COMPACTION

The Owner will test for compaction as described herein and in Section 02200, Earthwork.

PART 2 - MATERIALS

2.1 ASPHALT CONCRETE PAVING

Asphalt concrete paving shall conform to III-C2-AR-4000 as listed in Section 400-4 of the Standard Specifications for Public Work Construction (Standard Specifications).

2.2 AGGREGATE BASE COURSE

Aggregate base shall be crushed aggregate base as specified in Section 400-2 of the Standard Specifications. Aggregate shall contain less than 1% asbestos by weight or volume.

2.3 PRIME COAT

Apply prime coat to all areas to be paved. Prime coat shall be slow curing (SC-70) in accordance with Section 203-2 of the Standard Specifications.

2.4 TACK COAT

Tack coat shall conform to Section 302-5.4 of the Standard Specifications and shall be either AR 1000 paving asphalt or Grade SS-1h emulsified asphalt.

2.5 ASPHALT

Asphalt shall be viscosity grade AR 4000 or AR 8000. Asphalt content in the pavement shall be 5.5% to 6.0%.

2.6 AGGREGATE FOR ASPHALT CONCRETE

Aggregate shall be in accordance with Sections 400-1.1 and 400-1.2 of the Standard Specifications. Aggregate shall contain less than 1% asbestos by weight or volume.

2.7 SLURRY SEAL COAT

Seal slurry shall be Type II slurry seal per Section 37 of the State Specifications or Emulsion Aggregate Slurry with Type II grade aggregate per Section 203-5 of the Standard Specifications.

PART 3 - EXECUTION

3.1 PAVEMENT REMOVAL

- A. Initially cut asphalt concrete pavement with pneumatic pavement cutter or other equipment at the limits of the excavation and remove the pavement. After backfilling the excavation, saw cut asphalt concrete pavement to a minimum depth of eight inches at a point not less than twelve inches outside the limits of the excavation or the previous pavement cut, whichever is greater, and remove the additional pavement.
- B. Make arrangements for and dispose of the removed pavement.
- C. Final pavement saw cuts will be straight along both sides of trenches, parallel to the pipeline alignment or perpendicular to same, parallel to vault sides, and provide clean, solid, vertical faces free from loose material. Saw cut and remove damaged or disturbed adjoining pavement.

3.2 PAVEMENT REPLACEMENT

- A. The final asphalt surface course shall be two inches thick with total asphalt thickness of six inches.

3.3 INSTALLATION

Producing, hauling, placing, compacting and finishing of asphalt concrete shall conform to Section 302-5 of the Standard Specifications. Apply seal coat to all paving except open asphalt concrete.

3.4 PREPARATION OF SUBGRADE

- A. Excavate and shape subgrade to line, grade, and cross-section to twelve inches below top of pavement.
- B. Compact the top six inches of subgrade to 90% relative compaction.
- C. The finished subgrade shall be within a tolerance of ± 0.08 of a foot of the grade and shall be smooth and free from irregularities and at the specified relative compaction.

3.5 PLACING PRIME COAT

Apply prime coat to the surface of the leveling course of aggregate base at the rate of 0.25 gallon per square yard per Section 302-5.3 of the Standard Specifications.

3.6 PLACING TACK COAT

Apply tack coat on surfaces to receive finish pavement per Section 302-5.4 of the Standard Specifications. Apply tack coat to metal or concrete surfaces that will be in contact with the asphalt concrete paving.

3.7 PLACING ASPHALT PAVING

Place asphalt paving to a minimum thickness of six inches. Install in accordance with Section 302-5 of the Standard Specifications.

3.8 COMPACTION OF ASPHALT CONCRETE PAVING

Compact until roller marks are eliminated and a density of 92% minimum to 98% maximum has been attained per ASTM D 2041.

3.9 APPLYING SLURRY SEAL COAT

After final paving, apply slurry seal coat at the rate of 10 to 18 pounds of dry aggregate per square yard to the repaved section and to any area damaged by the Contractor during construction.

3.10 SURFACE TOLERANCE

After paving has been installed and compacted, spray water over the entire paved area. Correct any areas where water collects and does not drain away.

3.11 PROTECTION

Immediately after placement, protect pavement from mechanical injury for two days.

PART 4 – MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

A. The work described herein will be measured for payment as Lump Sum Items.

4.2 PAYMENT

A. Payments for these items will be paid at the contract lump sum price stated in the Schedule of Pay Items. Payments shall constitute full compensation for all materials, equipment and incidentals to satisfactory complete the work.

END OF SECTION

SECTION 3100 CONCRETE FORMWORK

PART 1 – GENERAL

1.1 SCOPE

- A. The work includes the furnishing and installing and removing of forms for all cast-in-place concrete work as shown and noted on the plans and specified herein.

1.2 CODES AND STANDARDS

- A. The American Concrete Institute’s “Recommended Practice for Concrete Formwork”, ACI 347, and the Uniform Building Code, Section 2606, are hereby made a direct part of this specification, and all concrete formwork included in this contract shall conform with the applicable requirements therein except as specified otherwise herein.

1.3 RELATED WORK

- A. Section 01000: SUMMARY OF WORK
- B. Section 03200: CONCRETE REINFORCEMENT
- C. Section 03300: CAST-IN-PLACE CONCRETE

1.4 QUALITY ASSURANCE

- A. Design of structures shown on drawings includes no allowance for imposed construction loads. Provide forms, shoring and falsework adequate for dead loads and live loads plus imposed loads during construction.
- B. It shall be the Contractor’s responsibility to design, construct and maintain safe forms, shoring and falsework at all times in accordance with applicable OSHA regulations.
- C. Tolerances of formwork shall comply with ACI 117. Failure of finished concrete work to meet specified tolerances shall be remedied at Contractor’s expense.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Boards for unexposed concrete, not otherwise scheduled or specified, shall be Douglas Fir, conforming to the “Standard Grading and Dressing Rules No. 16”, most current edition, of the West Coast Lumber Inspection Bureau. Boards shall be S4S. Contractor at his option, may use plywood for forms in lieu of boards. Plywood, if used shall be “B-B Plyform Class I Exterior” grade, conforming to U.S. Products Standard PS 1, 5/8” minimum thickness. Plywood used for exposed concrete shall be a high density overlay type especially manufactured for form work.

- B. FORM TIES AND SPREADERS: Standard metal form clamp assembly, of type acting as spreaders and leaving no metal within 2” of concrete face. Inner tie rod shall be left in concrete when forms are removed. Submit samples and manufacturer’s specifications to Engineer for review and approval of District before using. Wood spreaders will not be permitted.
- C. FORM COATING: Nongrain raising and nonstaining type that will not leave residual matter on surface of concrete or adversely affect proper bonding of subsequent application of other material applied to concrete surface. Coatings containing mineral oils or other nondrying ingredients are not permitted.

PART 3 - EXECUTION

3.1 CONSTRUCTION

- A. Earth Forms: Construct wood edge strips at each side of trench at top to secure reinforcing and prevent trench from sloughing. Form sides of footings where earth sloughs. Earth forms shall be tamped firm and cleaned of all debris and loose material before depositing concrete.
- B. Formwork – General: The engineering and construction of all formwork, shoring and bracing shall be carried out by and under the direction of the Contractor, who shall be responsible for the engineering, construction, maintenance, and safety of all formwork during the entire construction period.
- C. The formwork shall be designed for the loads and lateral pressures outlined in Part 3, Section 102, of ACI 347.
- D. Wood forms shall be constructed of sound material, shall be of the correct shape and dimensions, mortar tight, and of sufficient strength, and so braced and tied together that the movement of men, equipment, materials, or placing and vibrating the concrete will not distort the forms from their design shape under all imposed loads. The form shall be so constructed that they may be easily removed without damage to the concrete. Before concrete is placed in any form, the horizontal and vertical positions of the form shall be carefully verified and all inaccuracies corrected. All wedging and bracing shall be completed in advance of placing of concrete.
- E. Framing and Bracing: Framing bracing, supporting members, and centering shall be of ample size and strength to safely carry, without deflection, all dead and live loads to which forms may be subjected, and shall be spaced sufficiently close to prevent any bulging or sagging of forms. Concrete out of line, level, or plumb will be cause for rejection of the whole work affected.
- F. Tolerances: Variation from plumb in lines, surfaces and arises shall not exceed 1/8” in 10 feet.
- G. Chamfered Corners: All exposed corners shall be chamfered 3/4”, unless shown otherwise on plans. Provide molding in forms for all chamfering required.

- H. Form Ties: Form ties shall be of sufficient strength and used in sufficient quantities to prevent spreading of the forms. Ties shall be placed at least 2” away from the finished surface of the concrete.
- I. Arrangement: Arrange formwork to allow proper erection sequence and to permit form removal without damage to concrete.
- J. Embedded Items: Provisions shall be made for pipes, sleeves, anchors, inserts, reglets, anchor slots, nailers, and other features. No wood other than necessary nailing blocks shall be imbedded in concrete. Complete cooperation shall be extended to suppliers of imbedded items from other trades as required. All imbedded items shall be securely anchored in correct location and alignment prior to placing concrete. All imbedded items shall be subject to Engineer’s review, inspection and approval.
- K. Coating of Forms: Thoroughly clean forms and coat with specified form coating before each use. Do not reuse any form for exposed work which cannot be reconditioned to “like new” condition. Apply form coating to all forms before placing reinforcing steel.
- L. Inspection: Prior to placing of any concrete, and after placement of reinforcing steel in the forms, contractor shall notify Owner so that proper inspection may be made. Such notification shall be made at least 24 hours in advance of placing concrete to permit proper arrangements to be made for inspection.
- M. Rejection of Defective Work Due to Improper Forms: Any movement or bellying of forms during construction or variations in excess of the tolerances specified will be considered just cause for the removal of such forms and, in addition, the concrete work so affected. Reconstruction of forms and new concrete (including disposal of rejected materials) shall be furnished at no additional cost to the Owner.

3.2 REMOVAL OF FORMS

- A. The minimum time for forms and shoring to remain in place for slabs on grade and sides of footings shall be 24 hours.
- B. During the period that forms are in place on the concrete work, said forms shall be kept wet at all times.
- C. Re-use of Forms: Clean and recondition form material before each re-use. Unsatisfactory material shall be rejected and removed from the site.

PART 4 – MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. The work described herein will not be measured for payment.

4.2 PAYMENT

- A. The work described herein will not be paid for separately. Payment for these items will be included in the price for pay items of associated work.

END OF SECTION

**SECTION 3200
CONCRETE REINFORCEMENT**

PART 1 – GENERAL

1.1 SCOPE

- A. The work includes the furnishing and installing of reinforcing steel for all cast-in-place concrete. Contractor shall check project or drawings for anchors, inserts, conduits, sleeves, and any other items which are required to be cast in concrete, and shall make necessary provisions as required so that reinforcing steel will not interfere with the placement of such embedded items.

1.2 CODES AND STANDARDS

- A. Except as modified by the requirements specified herein and/or the details on the drawings, all work included in this section shall conform to the applicable provisions of the following codes and standards:
 - 1. “California Building Code”: 2007 Edition, Chapter 19, Concrete as adopted by City of Riverside.
 - 2. Concrete Reinforcing Steel Institute (CRSI): “Recommended Practice for Placing Reinforcing Bars”, lasted edition.
 - 3. American Concrete Institute (ACI): “Manual of Standard Practice for Detailing Reinforced Concrete Structures”, ACI 315, latest edition.
 - 4. American Society for Testing and Materials (ASTM): The Specifications and standards hereinafter referred to, latest edition.

1.3 RELATED WORK

- A. Section 01000: SUMMARY OF WORK
- B. Section 03100: CONCRETE FORMWORK
- C. Section 03300: CAST-IN-PLACE CONCRETE

1.4 SUBMITTALS

- A. Mill affidavits, stating the grades and physical and chemical properties of the reinforcing steel, and conformance with ASTM Specifications, shall be submitted to the Engineer for review and approval by Owner before delivery of the steel to the job site.
- B. Shop bending diagrams, placing lists and drawings of reinforcing steel shall be submitted to the Engineer, including actual bar lengths to nearest inch measured to intersection of tangent extensions of the outside bar surface. Bar placement diagrams shall clearly show dimensions of each bar splice.

- C. Engineer's review shall be general and approval will not relieve Contractor of responsibility for accuracy.

1.5 STORAGE

- A. Reinforcing steel shall be transported to the building site, stored and covered in a manner which will insure that no damage shall occur to it from moisture, dirt, grease, or any other cause that might impair bond to concrete.
- B. A sufficient supply of approved reinforcing steel shall be stored on the building site at all times to ensure that there will be no delay of the work. Identification of steel shall be maintained after bundles are broken.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Reinforcing Bars: New, deformed, billet steel bars conforming to ASTM A615-82(S1) Grade 60 unless otherwise indicated. Deliver bars new and free from rust and mill scale in original bundles with mill tags intact.
- B. Accessories: Reinforcement accessories, consisting of spacers, chairs, ties, and similar items shall be provided as required for spacing, assembling, and supporting reinforcement in place. Use no aluminum, galvanized steel, plastic or stainless-steel supports or accessories. Supports shall conform to the applicable requirements of the CRSI Standards Chapter 3 specified herein. Use precast concrete block supports with embedded wire ties or dowels for placement on grade or on membranes.
- C. Tie Wire: Tie wire for reinforcement shall be 16 gauge or heavier, where indicated or specified, black or galvanized steel wire, conforming to ASTM A82-79.

PART 3 - EXECUTION

3.1 FABRICATION

- A. Fabrication of steel reinforcement shall be in accordance with the details shown on the plans. Where specific details are not shown or noted, comply with the applicable requirements of the "Codes and Standards" hereinbefore specified.
- B. Bars shall be accurately bent, cut, and placed as indicated on the drawings. Bars shall be bent cold; heating of bars will not be permitted. Bars shall not be bent or straightened in any manner that will injure the material. Bars with kinks or bends not scheduled will be rejected.

3.2 PLACING

- A. General: Place reinforcing steel as indicated and in accordance with the applicable requirements of referenced specified. Install reinforcement accurately and secure against movement, particularly under the weight of workmen and placement of concrete.

1. Clean reinforcement of loose rust and mill scale, earth, and other materials which may reduce or destroy bond with concrete.
- B. Reinforcing Supports: Support reinforcing bars above earth and on forms by concrete blocks or other approved noncorrodible supports. Support legs of accessories in forms without embedding in form surface. Space chairs and accessories to conform with CRSI's "Recommended Practice for Placing Bar Supports". No wood will be permitted inside forms.
- C. Placing and Tying: Set reinforcing in place, and rigidly and securely tie or wire with 16 gauge steel tie wire in the position indicated, or as directed. Point ends of wire away from forms.
- D. Spacing: Minimum center to center distance between parallel bars shall be in accordance with the details on the plans or, where not shown, the clear spacing shall be 2 times the bar diameter but in no case less than 1-1/2" nor less than 1-1/3" times the maximum size aggregate.
- E. Splices: Laps of splices, where shown or noted on plans, shall be adequate to transfer stress by bond. Splicing shall meet requirements of ACI 318 and applicable building codes unless noted otherwise on drawings. Splices of adjacent bars shall be staggered with no more than 50% of the laps at any given joint. Reinforcing bars marked continuous shall be spliced with a minimum lap of (40) bar diameters in masonry and (30) bar diameters in concrete. Approved mechanical coupling may be used for horizontal steel.
- F. Dowels: Dowels shall be tied securely in place before concrete is deposited. In the event there are no bars in position to which dowels may be tied, No. 3 minimum shall be added to provide proper support and anchorage. Bending of dowels after placement of concrete will not be permitted.
- G. Welding of reinforcing bars is not permitted.
- H. Cleaning: Reinforcement, at time of pour, shall be free of all coatings that would impair bond to concrete.
- I. Additional Reinforcing: Provide additional reinforcing bars at sleeves and openings as indicated or required. Where additional bars are not shown for such location, obtain Engineer instructions and provide additional bars as directed; at no extra cost to the Owner.

3.3 INSPECTION

- A. Contractor shall notify Engineer at least 24 hours ahead of each concrete pour, and no concrete shall be placed until all reinforcing steel has been installed, inspected and approved by the Inspector.
- B. The following reinforcing steel work will be considered defective and shall be removed and replaced at no additional cost to the Owner.

1. Bars with kinks or bends not shown on drawings.
2. Bars injured due to bending or straightening.
3. Bars heated for bending.
4. Reinforcement not placed in accordance with the plans and/or specifications.

PART 4 – MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. The work described herein will not be measured for payment.

4.2 PAYMENT

- A. The work described herein will not be paid for separately. Payment for these items will be included in the price for pay items of associated work.

END OF SECTION

**SECTION 3300
CAST-IN-PLACE CONCRETE**

PART 1 – GENERAL

1.1 SCOPE

- A. The work includes the furnishing and installing of cast-in-place concrete work as shown and noted on the drawings and specified herein.

1.2 CODES AND STANDARDS

- A. Except as modified by the requirements specified herein and/or the details on the drawings, all work included in this section shall conform to the applicable provisions of the following codes and standards:
1. “California Building Code”: Latest Edition.
 2. American Concrete Institute (ACI): “Building Code Requirements for Reinforced Concrete”. ACI 318-71.
 3. American Society for Testing and Materials (ASTM): The specifications and standards hereinafter to, latest edition.

1.3 RELATED WORK

- A. Section 01000: SUMMARY OF WORK
B. Section 03100: CONCRETE FORMWORK
C. Section 03200: CONCRETE REINFORCEMENT

1.4 MIX DESIGNS

- A. Designs of concrete mixes, including recommended amounts of admixture and water to be used in the mixes, shall be obtained by the Contractor from a recognized independent testing laboratory. Costs of obtaining the mix designs shall be paid for by the Contractor. Contractor shall be responsible for incorporating into the structure, concrete of the minimum strengths specified. The contractor shall submit design for concrete for the Engineer’s review. Concrete mix design shall bear the signatures and seal of a California Registered Civil Engineer.
- B. At Contractor’s expense, the Testing Laboratory shall perform preliminary testing in accordance with the following requirements. Utilizing materials similar to those intended for this project, together with a minimum of three certified test reports of the 28-day strength and drying shrinkage of the proposed concrete mix. These results shall be submitted to the Engineer.
- C. In lieu of trial batch testing, Contractor may submit previously designed, tested and successfully used concrete mixes using materials similar to those intended for this project, together with a minimum of three certified test reports of 28-day strength of the proposed concrete mix.

1.5 CONCRETE STRENGTHS AND PROPORTIONS

- A. Provide concrete with the following minimum compressive strength of 4000 (Class A) at 28 days with; maximum aggregate size of 1 1/2", minimum of 6.0 sacks of cement per cubic yard and maximum slump of 3 1/2".
- B. The exact proportions of the mix, including amounts of admixture (if any) and water, shall be determined by the Testing Laboratory or Mill, based cement and aggregate submitted by the Contractor.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. PORTLAND CEMENT: ASTM C150, Type II Portland cement.
- B. FINE AGGREGATE: ASTM C33, Gradation shall be 15% to 30% passing #50 screen and 5% to 10% passing #100 screen. Fineness modulus less than 3.00.
- C. COARSE AGGREGATE: ASTM C33, Clean, hard fine-grained sound crushed rock or washed gravel from pits acceptable to Engineer. Gradation from 1/4" to maximum sizes specified.
- D. ADMIXTURE: ASTM C-494, of a type that increases workability and reduces water demand, but will not increase shrinkage. Admixture shall be submitted to Engineer for review and approval. Admixtures shall be free of chlorides or triethanolamine.
- E. WATER: Clean and potable, free of impurities detrimental to concrete.
- F. CURING-SEALER: Curing and sealing shall be one of the following acrylate resin compounds or equal.
 - 1. Aqua Resin Cure, as manufactured by Burke Concrete Accessories, San Jose California.
 - 2. Masterkure 200W, as manufactured by Master Builders Technologies, Cleveland Ohio.
- G. SHEET CURING MATERIALS: ASTM C171, waterproof paper, polyethylene film or white burlap-polyethylene sheet of 30 mils, non-staining.

PART 3 – EXECUTION

3.1 MIXING

- A. Use ready-mixed concrete mixed and delivered in accordance with the requirements of ASTM C 94 latest revision, and UBC Standard No. 26-13. In the event concrete is mixed at a central batching plant, arrange delivery so intervals between batches are kept at a minimum, and in any event not more than 30 minutes. No water shall be added during transit or at the Project site without the Inspector's approval. Place concrete within maximum transit time of 90 minutes after cement has been mixed

with aggregate and water. Trucks shall be in first-class condition and kept in constant rotation during delivery.

1. When temperature of concrete is 85 degrees F or above, reduce holding time to 45 minutes.

3.2 CONVEYING AND PLACING CONCRETE

- A. NOTIFICATION: Notify the Owner's Inspector at least two working days in advance of the placing of any concrete.
- B. FORMS: Before placing concrete, forms shall be thoroughly inspected. All wood chips, dirt, etc., shall be removed, all temporary bracing and cleats taken out, all openings for pipes, etc., properly boxed, all forms properly secured in their correct position and made tight, all reinforcement, anchors, and embedded items secured in their proper places. Concrete which may be on the forms or reinforcement and which is set and dry shall be cleaned off and the forms and steel washed off before proceeding.
- C. Sprinkle semiporous subgrades with water sufficiently to eliminate suction, but free from standing water or mud.

3.3 HANDLING AND DEPOSITING

- A. Complete concreting, once started, in a continuous operation until the section of approved sized and shape is completed.
- B. Handle concrete as rapidly as practical from the mixer to place of final deposit by methods which prevent the separation or loss of ingredients. Deposit in its final position to avoid rehandling or flowing.
 1. Do not drop concrete freely where reinforcing will cause segregation, nor more than 4 feet. Deposit concrete to maintain a plastic surface approximately horizontal.
 2. Do not deposit concrete that has partially hardened.
 3. Pumping: Maintain controls for proportioning, mixing, adjustment of mix and placement in accordance with ACI 301 and ACI 304.2R

3.4 VIBRATING AND COMPACTING

- A. Consolidate and compact concrete by suitable means during the operation of placing and depositing, and thoroughly work around reinforcement, embedded items, and into the corners of the forms. Use internal vibrators, and keep out of contact with reinforcement and wood forms. Do not use vibrators in a manner that forces mortar between individual form members.
- B. Vibrate close to the forms but do not continue at one spot to the extent that large areas of grout are formed or heavier aggregates are caused to settle. Take care not to disturb concrete which has taken its initial set.

3.5 TEMPERATURE AND WEATHER REQUIREMENTS

- A. Maximum placing temperature of concrete, when deposited, shall be 85 degrees F. If the weather causes the placing temperature to exceed 85 degrees f, cool the mix by wetting aggregate or other appropriate methods specified in ACI 305-77, Hot Weather Concreting; a copy of which shall be kept at the job site at all times.
- B. Do not place concrete during rain or freezing weather unless approved measures are taken to prevent damage to concrete.

3.6 PATCHING

- A. Immediately after stripping forms, patch minor defects, form tie holes, honeycombed areas, before concrete is thoroughly dry. Remove ledges and bulges. Repair gravel pockets by cutting out to solid surface, form key, and thoroughly wet before placing patching mortar. Use patching mortar consisting of one part cement to two parts fine sand; compact into place and neatly finish to match surface. Grind or fill surfaces to produce level, true planes.

3.7 CONCRETE SLAB FINISHES

- A. STEEL TROWEL FINISH: Screed, wood float, and steel trowel surfaces. Provide a smooth, hard, dense, impervious surface, free of defects. Mechanical troweling machines may be used if the desired finish and level tolerances can be obtained by their use.

3.8 CURING AND SEALING

- A. Protect concrete from injurious action of the elements and defacement of any nature during construction operations.
- B. Keep concrete in a thoroughly moist condition from the time it is placed until it has cured for at least 14 days. Keep all forms sufficiently wet to prevent drying out of the concrete. Allow no slabs to become dry at any time until curing operations are complete.
- C. Cure with curing-sealing compound. Apply by method and at rates recommended by manufacturer.

3.9 DEFECTIVE WORK

- A. Defective concrete work shall be removed and replaced at Contractor's expense.

3.10 TESTING

- A. The Contractor shall supply test cylinders of fresh concrete pours for use by Engineer and/or Owner in accordance with Subsection 201.1.1.4 of the "Green Book". Slump testing per ASTM C143 shall be accomplished at the $\frac{1}{4}$ point and $\frac{3}{4}$ point of each batch. The maximum slump for concrete to be used in footings and

- slabs shall be three (3) inches; the maximum slump for all other concrete shall be four (4) inches.
- B. Cylinder sampling shall be performed by the Owner in accordance to ASTM C31. Sample each 100 cy concrete and each separate mix design placed on any day. Make a minimum of four (4) cylinders per 100 cy of concrete. First test will be at 7 days, second test at 28 days and remaining cylinders will be held to verify test results, if needed.
1. Backfilling against concrete shall not be performed until the concrete has reached a minimum of 70% of the design strength.
- C. All concrete which fails to meet the ACI requirements and these specifications, is subject to removal and replacement at no additional cost to the Owner.

PART 4 – MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. The work described herein will be measured for payment as a Lump Sum Item.

4.2 PAYMENT

- A. Payments for these items will be paid at the contract lump sum price stated in the Schedule of Pay Items. Payments shall constitute full compensation for all materials, equipment and incidentals to satisfactory complete the work.

END OF SECTION

SECTION 09961 COATINGS

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. Coat surfaces to include:
 - a. Surfaces described in Finish Schedule and notes on Drawings.
 - b. Exterior or interior piping, regardless of type of factory-applied finish, where color coding required.
 - c. Color coded equipment and piping.
 - d. Exposed interior and exterior structural steel surfaces.
 - e. Exterior and interior appurtenances.
2. Labeling and directional arrows on piping, equipment with valves or electrical connections, valves, and ducts whether coated or not.
3. Do not coat unless specifically noted otherwise:
 - a. Underground equipment and piping.
 - b. Factory-finished trim.
 - c. Stainless steel.
 - d. PVC or reinforced plastic piping.
 - e. Galvanized surfaces.
 - f. Aluminum Items.
4. Do not coat over any code-required labels such as UL and Factory Mutual, or any equipment identification, performance rating, name, or nomenclature plates.

B. Equipment manufacturer is responsible for surface preparation and coatings of equipment, motors, and appurtenances. Equipment to be coated and coating system are identified in equipment Specification section(s).

1.2 DEFINITIONS

A. Definitions as used in Room Schedule and schedules.

1. Coatings: Heavy duty finishes for use on any surfaces, especially surfaces subject to submerged, high moisture, splash or chemical environment.
2. Ambient Conditions:
 - a. Chemical: Surface subject to corrosive chemical splash or fumes.
 - b. Moist: Surface subject to wet areas such as shower rooms and rooms with open tanks.
 - c. Normal: Surface subject to normal temperatures and humidity such as found in offices and corridors.

3. Splash: Surface subject to frequent washing and chemical splash.
 4. Submerged P: Surface submerged in potable water plus 1 ft 0 in. above high liquid level.
 5. Submerged NP: Surface submerged in non-potable liquid such as sewage and sludge plus 1 ft 0 in. above high liquid level.
- B. First Coat: Field prime, factory prime, or shop prime. When only one coat is required, first coat is finish coat.
- C. Second or Third Coats: Successive finish coats applied over first coat.

1.3 SUBMITTALS

A. Product Data:

1. Submit manufacturer's literature stating application recommendations and generic makeup of each type of coating scheduled.

B. Samples:

1. Actual color samples available for each type of coating scheduled.

C. Miscellaneous:

1. Letter of Certification/Shop Painting:

- a. CONTRACTOR has option of shop coating materials and equipment partially or totally.
- b. If CONTRACTOR applies coatings in factory submit following:
 - 1) Coatings used.
 - 2) Manufacturer's written certificate factory-applied coating system is identical to, or exceeds, specified requirements.
 - 3) Requirements for touch-up or coating.
 - 4) History of coating performance in same environment.
- c. Submit following for factory-applied first coat.

- 1) First coat used.
- 2) CONTRACTOR'S certification factory-applied first coat is compatible with field-applied finish coats.

2. Certification:

- a. Certification by the manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs).

3. Schedules:

- a. Submit schedule of proposed coating systems within 30 calendar days of Award of Contract.
- b. Schedule of proposed coating systems shall identify same information as shown in coating schedule.

D. Submit in accordance with Section 01300.

1.4 QUALITY ASSURANCE

A. Applicator Qualifications:

1. Engage an experienced applicator who has successfully completed coating system applications similar in material and extent to those indicated for Project.

B. Single-Source Responsibility:

1. Provide coating material produced by same manufacturer for each system. Use only thinners recommended by manufacturer and only within recommended limits.

C. Manufacturer shall supply products that comply with local restrictions controlling use of volatile organic compounds (VOC's).

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver material in original, sealed, unopened packages and containers bearing manufacturer's name. Each container shall have manufacturer's printed label stating type of coating, color of coating, instructions for reducing, and spreading rate.

B. Protect and heat or cool material storage location to maintain temperature ranges recommended by coating manufacturer for most sensitive coating, but not less than 55°F.

C. Keep storage area neat and clean and replace or repair damage thereto or to its surroundings.

D. Avoid danger of fire. Deposit cleaning rags and waste materials in metal containers having tight covers or remove from building each night. Provide fire extinguishers of type recommended by coating manufacturer in areas of storage and where finishing is occurring. Allow no smoking or open containers of solvents. Store solvents in safety cans.

E. Empty containers shall have labels canceled and be clearly marked as to use.

F. Upon Substantial Completion, remaining material will become property of OWNER. Seal material as required for storage, marked as to contents and shelf life, and store where required by OWNER.

1.6 PROJECT/SITE CONDITIONS

A. Environmental Requirements:

1. Do not apply exterior coating in cold, foggy, damp or rainy weather.
2. Apply no finish in rooms where dust is being generated.
3. Do not apply exterior coating when temperature is lower than 50°F or as required by manufacturer.
4. Maintain interior temperature and relative humidity of space, as recommended by coating manufacturer, 24 hrs before applying and until coating is cured.

B. Protection:

1. Cover materials and surfaces, including floors, adjoining or below Work with clean drop cloths or canvas.
2. Remove hardware, accessories, plates, lighting fixtures, and similar items or provide protection by masking. Upon completion, replace above items or remove protection and clean.
3. Maintain manufacturer's environmental requirements while coating dries.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Coatings:

1. Tnemec. Compton CA. Tel # 310-637-2363. Contact: Tony Hobbs
2. Approved equal.

2.2 MATERIALS

A. Coatings:

1. Meet South Coast Air Quality Management District regulations.
2. Coatings shall meet surface burning characteristics as required by code and established by ASTM E84.

2.3 COLORS

A. Colors shall be selected and approved by ENGINEER.

B. Prior to beginning work, ENGINEER will provide color coordinating schedule for Owner approval.

C. Coat access doors, and grilles to match color of adjacent wall or ceiling surfaces.

- D. In areas scheduled for finishing, coat exposed piping, conduit, and ducts to match adjacent or near surfaces, except for color coding.
- E. Rooms and spaces may have certain walls coated different color than other walls in same room and ceilings and trim may be different color or colors than walls.
- F. Equipment Colors:
 - 1. Equipment includes equipment, motors, and structural supports, fasteners, and attached portions of electrical conduit.
 - 2. Coat equipment same color as piping equipment serves.

2.4 MIXING AND TINTING

- A. Each coat shall be slightly darker than preceding coat, unless otherwise approved.
- B. Tint undercoats similar to finish coats.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. If surfaces to be finished cannot be put into proper condition for finishing by customary cleaning, sanding, and puttying operations or if surfaces were improperly primed by others, report defects to ENGINEER, in writing, or assume responsibility and correct unsatisfactory finish resulting from improper surfaces. Commencement of Work indicates acceptance of surfaces.
- B. Materials removed and replaced to correct defects due to Work placed on unsuitable surfaces shall be at CONTRACTOR'S expense.
- C. Where surface dryness is questioned, test with dampness indicating instrument. Do not apply coatings over surfaces where moisture content exceeds that permitted in manufacturer's printed instructions.
- D. Provide coats compatible with the surface and prior coats.

3.2 SURFACE PREPARATION AND TOUCH-UP

- A. General:
 - 1. Surfaces, including floors shall be clean, dry, and free of loose dirt, dust, and foreign matter before applying coating.
 - 2. Comply with coating manufacturer's recommendations for surface preparation.
- B. Gypsum Board: Fill scratches, nicks, and uneven areas with spackling compound and sand flush with surface.

C. Ungalvanized Ferrous Metal:

1. General:

- a. Round or chamfer sharp edges and grind smooth burrs, jagged edges, and surface defects.
- b. Prepare welds and adjacent areas to remove undercutting or reverse ridges on weld bead, weld spatter on or adjacent to weld or area to be coated, and sharp peaks or ridges along weld bead. Grind embedded pieces of electrode or wire flush with adjacent surface of weld bead.
- c. Coat surfaces same day prepared. Re-prepare surfaces starting to rust before coating.

2. Cleaning Methods:

- a. Workmanship for metal surface preparation as specified shall conform with SSPC specifications as follows:

- 1) SP-1: Solvent Cleaning
- 2) SP-2: Hand Tool Cleaning
- 3) SP-3: Power Tool Cleaning
- 4) SP-5: White Metal Blast Cleaning
- 5) SP-6: Commercial Blast Cleaning
- 6) SP-7: Brush-off Blast Cleaning
- 7) SP-8: Pickling
- 8) SP-10: Near-White Blast Cleaning
- 9) SP-13: Surface Preparation of Concrete

- b. Wherever “solvent cleaning,” “hand tool cleaning,” “wire brushing,” or “blast cleaning,” or similar words of equal intent used in Specifications or coating manufacturer’s specifications, they shall be understood to refer to applicable SSPC specifications listed above.
- c. Use hand tools to clean areas that cannot be cleaned by power tools.

3. Shop Preparation: Equipment, structural steel, metal doors and frames, metal louvers, and similar items may be shop-prepared and first coat applied at CONTRACTOR’S option. Centrifugal wheel blast cleaning is acceptable alternate to shop blast cleaning. Clean and prime in accordance with this section.

4. Field Touch-Up: Sandblast items and equipment as specified to restore damaged surfaces previously shop or field blasted and first coat applied. Materials, equipment, procedures, and safety equipment for personnel shall conform to SSPC.

D. Galvanized Metal:

1. Touch-up damaged areas with zinc-rich primer.
2. Prepare galvanized metal surfaces to be coated as required for system being applied.

E. Masonry:

1. Remove loose grit and mortar.
 2. Remove grease, oil, dirt, salts or other chemicals, loose materials or other foreign matter by solvent, detergent or other suitable cleaning methods.
 3. Allow mortar joints to cure for 28-days.
- F. Cast-in-Place Concrete/Precast Concrete:
1. Do not begin surface preparation until 30 days after concrete has been placed.
 2. Remove grease, oil, dirt, salts or other chemicals, loose materials or other foreign matter by solvent, detergent or other suitable cleaning methods.
 3. Brush-blast in accordance with SSPC-SP13 Surface Preparation of Concrete all surfaces to be coated to create surface profile similar to medium (60-80) grit sandpaper. Care should be taken not to open up bugholes and voids in concrete by overblasting substrate. All large bugholes and voids created by blasting objective shall be filled with appropriate filler prior to painting surface. Surface must be clean, dry and free of oil, grease and other contaminants. If brush-off blasting is impractical, acid etch with muriatic acid solution and wash with water or neutralizing agent as required by coating manufacturer. Surface blasting may be done at precast plant or on-site before units are installed.
- G. Plastic:
1. Solvent clean pipe in accordance with manufacturer's recommendations.
 2. Hand sand with medium grit sandpaper to provide tooth for coating system.
 3. Large areas may be power sanded or brush-off blasted, provided sufficient controls employed so surface roughened without removing excessive material.

3.3 APPLICATION

A. General Requirements:

1. Spread evenly and flow on smoothly without runs, lumps or sags.
2. Make edges of coating adjoining other materials or colors sharp and clean without overlapping.
3. Number of coats and film thickness required is same regardless of application method. Do not apply succeeding coats until previous coat has cured as required by manufacturer. Where sanding is required, according to manufacturer's direction, sand between applications to produce smooth, even surface.
 - a. Finish edges of doors as specified for faces. Apply one coat finish on tops and bottoms of doors after fitting.
4. Term "exposed surfaces" includes areas visible when permanent or built-in fixtures, convector covers, covers for finned tube radiation, grilles, and similar components

are in place. Extend coatings in these areas, as required, to maintain system's integrity and provide desired protection.

- a. Coat surfaces behind movable equipment and furniture same as similar exposed surfaces.
- b. Coat back sides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
- c. Omit first coat on metal surfaces that have been shop-primed and touch-up painted.

5. Manufacturer-Applied Coating Systems:

- a. Repair abraded areas on factory-finished items in accordance with manufacturer's directions.
- b. Blend repaired areas into original finish.

6. Application Procedures:

- a. Apply coatings by brush, roller, spray, or other applicators according to manufacturer's instructions.

B. Priming and Sealing:

1. Refer to Coating Schedule for specific coating material.
2. Shop:
 - a. Shop first coat for ferrous metal shall comply with SSPC guidelines, and as specified in Coating Schedules of this Specification.
 - b. Hand or power sand chipped, peeled or abraded first coat and feather edges. Spot coat areas with specified first coat.
 - c. Prior to application of finish coats, clean shop-first coat surfaces free of dirt, oil, and grease.
 - d. Prepare and prime holdback areas as required for specified coating system.

3.4 FIELD QUALITY CONTROL

A. Sampling of Materials:

1. ENGINEER reserves right to select unopened containers of materials furnished for project and have materials tested at an independent testing laboratory. OWNER will pay for first tests.
2. Retests of rejected materials and tests of replacement materials shall be paid for by CONTRACTOR.
3. Remainder of contents of containers not required for testing will be returned to CONTRACTOR.

B. Coverage:

1. Before beginning Work, finish one complete room, space surface, or item of each

color scheme required, showing selected colors, finished texture, material, and workmanship. After approval, sample rooms or items shall serve as standard for similar Work throughout building.

2. If coverage is not acceptable to ENGINEER, ENGINEER reserves right to require extra application of paint at no extra cost to OWNER.
3. Work at site where coat of material is applied will be inspected by ENGINEER before application of succeeding specified coat, otherwise no credit for coat applied will be given and CONTRACTOR automatically assumes responsibility to recoat Work in question. Furnish ENGINEER report of particular coat applied and when completed for inspection to comply with above.

3.5 COATINGS SCHEDULE

A. General:

1. Unless otherwise noted, Tnemec products are identified in this schedule to establish quality and type desired only.
2. Scheduled thickness or coverage rate is as recommended by Tnemec. If other manufacturers are proposed and accepted, manufacturer's requirements shall be followed, but in no case may thickness, number of coats, or coverage rate be less.
3. DFT = dry film thickness (mils/coat). DFT shown is for spray application. Additional coats may be required if brushed and rolled.
4. sfpg = sq ft/gal (per coat).
5. Examples of surface to be coated are not all inclusive.

B. Standard Coating Schedule:

Example Surfaces	Surface Preparation	Tnemec Coating Low V.O.C - LEED EQ 4.2 Coatings
SYSTEM 1-C (PRECAST CONCRETE, CAST-IN-PLACE CONCRETE, NORMAL INTERIOR MOIST/INTERIOR SPLASH, SEMI-GLOSS SHEEN, 2-COAT SYSTEM)		
Walls, Ceilings	SSPC-SP13	"Series 218 MortarClad" epoxy modified mortar to fill bug holes and voids. First Coat - 4.0 to 6.0 DFT/ "Series L69 Hi-Build Epoxoline" polyamidoamine epoxy. Second Coat – 4.0 to 6.0 DFT/"Series L69-Hi-Build Epoxoline polyamidoamine epoxy.
SYSTEM 2-C (CONCRETE MASONRY, INTERIOR MOIST/INTERIOR SPLASH SEMI-GLOSS SHEEN, 3-COAT SYSTEM)		
Walls	Masonry, Clean and dry.	First Coat - 166 sq ft/gal sprayed and backrolled. "Series L69 Hi-Build Epoxoline" polyamidoamine epoxy. Second Coat - 8.0 to 10.0 DFT/"Series L69 Hi-Build Epoxoline" polyamidoamine epoxy. Third Coat – 8.0 to 10.0 DFT/"Series L69 Hi-Build Epoxoline" polyamidoamine epoxy.
SYSTEM 3-C (FERROUS METALS, INTERIOR MOIST/INTERIOR SPLASH, SEMI-GLOSS SHEEN, MAX. TEMP. 250°F, 3-COAT SYSTEM)		
Equipment, Pipes, Structural Members, Louvers, Pipe Hangers	SSPC-SP6	First Coat - 3.0 to 5.0 DFT/"Series L69 Hi-Build Epoxoline or L140 Pota-Pox Plus" polyamidoamine epoxy. Second Coat - 4.0 to 6.0 DFT/"Series L69 Hi-Build Epoxoline" polyamidoamine epoxy. Third Coat – 4.0 to 6.0 DFT/"Series L69 Hi-Build Epoxoline" polyamidoamine epoxy.
SYSTEM 4-C (FERROUS METALS, EXTERIOR NORMAL TO SPLASH, GLOSS OR SEMI-GLOSS SHEEN, MAX. TEMP. 250°F, 3-COAT SYSTEM)		
Equipment, Pipe, Structural Members	SSPC-SP6	First Coat – 3.0 to 5.0 DFT/"Series L69 Hi-Build Epoxoline or L140 Pota-Pox Plus" polyamidoamine epoxy. Second Coat – 3.0 to 5.0 DFT/"Series L69 Hi-Build Epoxoline" polyamidoamine epoxy. Third - Coat – 2.0 to 3.0 DFT/"Series 1095 Endura-Shield acrylic polyurethane.
SYSTEM 5-C (FERROUS METALS, INTERIOR-EXTERIOR MOIST/SPLASH, SEMI-GLOSS SHEEN, 2-COAT SYSTEM OVER FACTORY FINISH.)		

<p>Factory Primed Hollow Metal Doors and Frames, Miscellaneous Metals and Equipment</p>	<p>Light Sand</p>	<p>First Coat – 2.0 to 3.0 DFT/"Series L69 Hi-Build Epoxoline" polyamidoamine epoxy. Second Coat (Interior) - 2.0 to 3.0 DFT/ "Series L69 Hi-Build Epoxoline" polyamidoamine epoxy. Second Coat (Exterior) - 2.0 to 3.0 DFT/"Series 1095 Endura-Shield acrylic polyurethane.</p>
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Example Surfaces	Surface Preparation	Tnemec Coating Low V.O.C - LEED EQ 4.2
SYSTEM 6-C (FERROUS METALS, CONCRETE, DUCTILE IRON SUBMERGED NP, "COLOR" GLOSS SHEEN, 3-COAT SYSTEM ON METAL, 2-COAT SYSTEM ON CONCRETE)		
Equipment, Pipes, Tanks, Structural Fabrications.	Ferrous Metal SSPC-SP10 Concrete – SSPC-SP13 New Ductile Iron – SSPC-SP10	First Coat - 3.0 to 4.0 DFT/ "Series L69 Epoxoline or L140 Pota-Pox Plus" polyamidoamine epoxy 1255 Beige. Second Coat - 6.0 to 8.0 DFT/"Series L69 Hi-Build Epoxoline" polyamidoamine epoxy. Third Coat - 6.0 to 8.0 DFT/ "Series L69 Hi-Build Epoxoline" polyamidoamine epoxy. (Third coat not required on concrete.)
SYSTEM 8-C (PVC, INTERIOR ALL CONDITIONS, SEMI-GLOSS SHEEN, 1-COAT SYSTEM)		
Pipes, Equipment, Vinyl Coated Pipe Insulation	Lightly Sanded	First Coat - 5.0 DFT/ "Series L69 Hi-Build Epoxoline" polyamidoamine epoxy.
SYSTEM 9-C (PVC, EXTERIOR ALL CONDITIONS, GLOSS SHEEN, 2-COAT SYSTEM)		
Pipes, Equipment	Lightly Sanded	First Coat - 3.0 DFT/"Series L69-1255 Beige Hi-Build Epoxoline" polyamidoamine epoxy. Second Coat – 2.0 to 3.0 DFT/"Series 1095 Endura-Shield acrylic polyurethane.
SYSTEM 10-C (GALVANIZED METAL (not shop primed), INTERIOR SPLASH/INTERIOR MOIST, SEMI-GLOSS SHEEN, 1-COAT SYSTEM)		
Ductwork, Miscellaneous Supports, Conduit, Piping	Sweep blast or mechanically abraded followed by SSPC-SP1.	First Coat – 2.0 to 4.0 DFT/ "Series L69 Hi-Build Epoxoline" polyamidoamine epoxy Second Coat. 2.0 to 4.0 DFT/ L69 Epoxoline
SYSTEM 14-C (DISSIMILAR METAL PROTECTION, 1-COAT SYSTEM)		
Dissimilar Material Protection	As required by material	First Coat - 3.0 to 5.0 DFT "Series L69 Hi-Build Epoxoline" polyamidoamine epoxy.
SYSTEM 15-C (VINYL-COATED PIPE OR DUCT INSULATION, INTERIOR, ALL CONDITIONS, LOW SHEEN, 1-COAT SYSTEM)		
Vinyl-Coated Pipe and Duct Insulation	Hand Sanded	First Coat - 4.0 to 6.0 DFT "Series L69 Hi-Build Epoxoline" polyamidoamine epoxy.
SYSTEM 20-C (FERROUS METALS SUBMERGED NP, "COLOR" GLOSS SHEEN, 3-COAT SYSTEM ON METAL)		
Equipment Steel Steel Pipe	SSPC-SP10	First Coat: 4.0 to 6.0 DFT. L69 Epoxoline Second Coat: 6.0 to 8.0 DFT. L69 Epoxoline Third Coat: 6.0 to 8.0 DFT. L69 Epoxoline

SYSTEM 42-C (DUCTILE IRON, INTERIOR MOIST, SPLASH-SEMI-GLOSS SHEEN, MAX. TEMP. 135°F, 2 COAT SYSTEM.)		
Ductile Iron Pipe & Equipment	SSPC-SP6	First Coat – 3.0 to 4.0 DFT/"Series L69 Epoxoline or L140 Pota-Pox" polyamidoamine epoxy. Second Coat – 4.0 to 6.0 DFT/"Series L69 Hi-Build Epoxoline" polyamidoamine epoxy. Third Coat – 4.0 to 6.0 DFT/"Series L69 Hi-Build Epoxoline polyamidoamine epoxy.
SYSTEM 45-C (FERROUS METALS, INTERIOR/EXTERIOR MOIST, SPLASH SEMI-GLOSS SHEEN, MAX. TEMP. 250°F, 2 COAT SYSTEM OVER FACTORY FINISH)		
Motors and Similar Equipment	Lightly sand, followed by	First Coat - 2.0 to 3.0 DFT "Series 135 Chembuild modified polyamidoamine epoxy.

Example Surfaces	Surface Preparation	Tnemec Coating Low V.O.C - LEED EQ 4.2 Coatings
	SSPC-SP1.	Coat (Interior) - 2.0 to 3.0 DFT "Series L69 Color Hi-Build Epoxoline" polyamidoamine epoxy. Second Coat (Exterior) - 2.0 to 3.0 DFT "Series 1095 Endura-Shield acrylic polyurethane.
SYSTEM 46-C (DUCTILE IRON, EXTERIOR, SEMI-GLOSS SHEEN, TEMP. 135°F, 3 COAT SYSTEM)		
Ductile Iron Pipe and equipment	SSPC-SP6	First Coat - 3.0 to 4.0 DFT/"Series L140-1211 Pota-Pox Plus" polyamidoamine epoxy. Second Coat - 4.0 to 6.0 DFT/"Series L69-Color Hi-Build Epoxoline" polyamidoamine epoxy. Third Coat - 2.0 to 3.0 DFT "Series 1095 Endura-Shield acrylic polyurethane.

3.6 SYSTEMS COLOR CODING AND LABELING SCHEDULE

- A. Colors for piping and equipment in piping systems shall be as described in Part 2 of this Specification.

3.7 FINAL TOUCH-UP

- A. Prior to Substantial Completion, examine coated surfaces and retouch or refinish to leave surfaces in condition acceptable to ENGINEER.
- B. After doors have been fitted and hung, refinish edges, tops, and bottoms.

3.8 CLEANING

- A. Before Substantial Completion, remove masking, coating, and other material from floors, glass, and other surfaces and remove rubbish and accumulated materials of whatever nature not caused by other trades from premises and leave in clean, orderly condition, with floors broom clean.

PART 4 – MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

A. The work described herein will not be measured for payment.

4.2 PAYMENT

A. The work described herein will not be paid for separately. Payment for these items will be included in the price for pay items of associated work.

END OF SECTION

**SECTION 09962
TECHNICAL SPECIFICATIONS
WELDED TANK COATING**

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Scope Contractor shall furnish all labor, materials and equipment and perform all operations necessary for coating and painting the proposed welded steel Tank (reservoir) as shown on the Drawings and as specified herein. All ferrous metal shall be coated/painted in accordance with these specifications, except reservoir accessories specified to be hot-dipped galvanized. Unless specified otherwise, areas to be coated shall consist of all interior surfaces, including but not limited to shell, roof plates, framing, reinforcing, ladder, piping, vents, nozzles, and access manholes. Unless specified otherwise, areas to be painted shall consist of all exterior surfaces, including but not limited to shell, roof, roof hatch, reservoir vent, ladder, and cage. Unless specified otherwise, reservoir materials specified to be aluminum or stainless steel do not require coating.

1.02 REFERENCED SECTIONS

The following Sections are referenced in this Section:

1. Section 01300 – Submittals
2. Section 13300 – Water Storage Tanks

1.03 REFERENCE PUBLICATIONS

- A. Specifications and Standards – All surface preparation and material application shall comply with American Water Works Association Standard D-102, latest edition, Steel Structures Painting Council Specifications, and manufacturer's recommendations.

1.04 CONTRACTOR QUALIFICATIONS

- A. The coating and painting contractor shall be a licensed Painting and Decorating Contractor in the State of California (C-33 Classification), and Steel Structures Painting Council QP1 for field coatings and QP3 for shop coatings. If not a QP3 shop certified shop coatings applicator, all components must be blasted and primed in the field. Contractor shall have a minimum of five (5) years practical experience and successful history in the application of specified products to surfaces of steel water storage tank(s). The Contractor shall substantiate this requirement by furnishing a written list of references. Contractor's QP certifications and references must be submitted with bidding documents.

1.05 QUALITY ASSURANCE

- A. General: Quality assurance procedures and practices per SSPC QP1 and 3 shall be utilized to monitor all phases of surface preparation, application and inspection throughout the duration of the project.
- B. All coating contractor's employees must be NACE / SSPC certified. Field foreman must be minimum NACE II certified.
- C. All materials furnished and all work accomplished under the Contract shall be subject to inspection by the Engineer. The Contractor shall be held strictly to the true intent of the Specifications in regard to quality of materials, workmanship, and diligent execution of the Contract.
- D. Work accomplished in the absence of prescribed inspection may be required to be removed and replaced under the proper inspection, and the entire cost of removal and replacement, including the cost of all materials which may be furnished by the Owner and used in the work thus removed, shall be borne by the Contractor, regardless of whether the work removed is found to be defective or not. Work covered up without the authority of the Engineer, shall, upon order of the Engineer, be uncovered to the extent required, and the Contractor shall similarly bear the entire cost of accomplishing all the work and furnishing all the materials necessary for the removal of the covering and its subsequent replacement, as directed and approved by the Engineer.
- E. Except as otherwise provided herein, the cost for inspection will be paid by Owner.
 - 1. All surface preparation and priming operations accomplished offsite may be monitored by an Owner appointed quality control inspector.
 - 2. The Contractor shall notify the Engineer a minimum of 14 days in advance of shop cleaning and priming operations.
 - 3. If shop work is not scheduled on a consecutive basis to facilitate scheduling of an offsite inspector, expenses incurred by multiple trips to shop will be borne by Contractor.
- F. The Engineer will make, or have made, such tests as he deems necessary to assure the work is being accomplished in accordance with the requirements of the Contract. Unless otherwise specified in the Special Conditions, the cost of such testing will be borne by the Owner. In the event such tests reveal non-compliance with the requirements of the Contract, the Contractor shall bear the cost of such corrective measures deemed necessary by the Engineer, as well as the cost of subsequent retesting and re-inspection. It is understood and agreed the making of tests shall not constitute an acceptance of any portion of the work, nor relieve the Contractor from compliance with the terms of the Contract.

1.06 SUBMITTALS

- A. Contractor shall comply with Section 1300 and prior to scheduling any work, Contractor shall submit the following to Owner:

1. Construction schedule showing order in which Contractor proposes to carry out work, dates of anticipated commencement and completion of work and salient components thereof, and estimated percentage of work to be completed at any time during construction period.
2. Manufacturer's data sheets for each coating, painting and caulking material proposed to be used.
3. Manufacturer's recommendations for height profile for each coating and painting material to be used.
4. For exterior paint finish coat only, complete color chart for finish color selection by Owner.
5. ANSI/NSF Standard 61 certifications for all interior tank coatings and materials in contact with tank water.

B. Owner shall approve the above work prior to Contractor beginning any work.

1.07 DELIVERY AND STORAGE

- A. All materials shall be delivered to the site in the manufacturer's sealed containers. Each container shall be labeled by the manufacturer, and the label shall be intact upon delivery. Labels shall give the manufacturer's name, brand, type of paint, batch number, color of paint, date of manufacture, storage life and instructions for reducing. Job mixing or job tinting may be done when approved by the Engineer and for sample colors.
- B. The Contractor shall store all paint materials and equipment in a storage place protected from weather and excessive heat and cold. Necessary precautions shall be taken to reduce hazards to a minimum. Materials exceeding the storage life recommended by the manufacturer shall be removed from the site.

1.08 SEQUENCE OF WORK

- A. Sequence of Work – All coating work shall be performed at job site except as stated herein. Unless specified otherwise, reservoir coating and painting shall be performed in the following sequence:
 - a. Reservoir interiors surfaces.
 - b. Reservoir exterior surfaces.
- B. After the reservoir interior surface coating has been completed, Owner will inspect same for specified dry film thickness. Said inspection will require approximately three working days. Contractor shall temporarily terminate work until said inspection is completed. Contractor shall repair all defects in reservoir interior surface coating prior to beginning reservoir exterior coating work. All repairs shall be performed as directed by Owner at no cost to Owner. If repair work is required, Owner will inspect same and additional time will be required

therefor. Contractor shall temporarily terminate work until said inspection is completed.

- C. After the reservoir interior surface thickness inspection has been completed, Contractor shall perform holiday detection on same. Contractor shall repair all defects in reservoir interior surface coating at no cost to Owner until all holidays are eliminated. All holidays shall be repaired by Contractor. Reservoir interior surface coating shall be completed, inspected, repaired, and approved by Owner prior to starting reservoir exterior work.

1.09 WARRANTY

- A. Warranty – Contractor shall provide a warranty for the tank coating system. As a minimum, the warranty shall cover corrosion of the interior and exterior tank surfaces for a period of five (5) years from the date of project acceptance. The warranty shall be submitted for review and approval by Owner at the same time the tank fabrication drawings are submitted.

1.10 INSPECTION

- A. Inspection –

- a. Field Inspection – Unless specified otherwise, Owner will inspect the work as follows:

- i. Equipment – At the first on site inspection, Contractor shall provide Owner with written information concerning all equipment to be utilized. Said information shall include type, model, serial number, and year manufactured. Contractor shall provide any additional information requested. All equipment shall be clean and in good working order with all appropriate safety devices. Equipment which leaks, routinely malfunctions, creates a safety hazard, creates an environmental hazard, or fails to meet Owner or manufacturer requirements shall be removed from the site.

- ii. Surface Preparation – To facilitate inspection, Contractor shall on the first day of sandblasting operations, sandblast sample metal panels furnished by Contractor to the degree specified herein. After Owner determines that specific panels meet the requirements of the specification, they shall be coated with a clear, nonyellowing finish (provided by Contractor). Panels shall be prepared for each type of sandblasting specified and shall be maintained and utilized by Owner for all Contract work.

After each section of the reservoir has been sandblasted, it shall be inspected and approved by Owner prior to the application of any coating or paint. Owner will inspect for specified height profile by the use of a profile meter. To allow Owner the opportunity to inspect each sandblasted area, Contractor shall clean said surfaces with a fine bristle broom and air and furnish scaffolding and lighting (including moving of same) to permit inspection as requested by Owner.

- iii. Material Preparation – Owner shall approve all onsite paint or coating material preparation including unsealing and opening of all material containers, material mixing, mixing equipment, addition of thinners, and temperature of all material prior to application.
 - iv. Coating – Each coat shall be approved by Owner for specified cleaning before subsequent coats are applied. All areas coated or painted without said approval shall be sandblasted to remove all coatings and recoated after the specified inspection.
 - v. Dry Film Thickness Verification – Owner will perform dry film thickness (DFT) measurements. All areas will be measured for specified dry film thickness utilizing Electronic Mil Gauge. All areas not meeting the specified dry film thickness shall be recoated and repaired by Contractor as directed by Owner. All repairs shall be performed at no cost to Owner.
 - vi. Holiday Detection – Contractor shall perform holiday detection and shall provide all equipment for same. Holiday detection devices shall be Tinker-Razor Models AP and AP-W, or approved equal. All interior surfaces shall be holiday tested with special emphasis on bolts, welds, and edges. All areas with holidays shall be recoated and repaired by Contractor as directed by Owner. All repairs shall be performed at no cost to Owner. Owner will observe all holiday detection performed by Contractor.
 - vii. Illumination and Scaffolding – Whenever and wherever required by Inspector, Contractor shall furnish illumination (level of illumination as determined by Owner) and scaffolding (level of scaffolding as determined by Owner) to permit inspection prior to acceptance of work. Contractor shall move lights and scaffolding as directed by Inspector to enable him to inspect all surfaces, inside and out.
- b. Shop Inspection – Shop inspection shall be performed by an independent NACE certified inspection firm retained and paid for by the Contractor. Said firm shall be selected by the Contractor and approved by the Owner prior to commencing work. Inspector shall submit daily field reports directly to the Owner by electronic mail each work day. Prior to shipment of tank materials to the project site, the independent inspection firm shall submit a certified report to the Owner containing results of all shop inspections and tests for coating thickness, including a summary of any deficiencies and corrective action for same. Test results shall be correlated to a lettered/numbered diagram of all tank panels. In addition, the report shall include a certification statement from the inspection firm stating that all shop blasting and priming was performed in compliance with these Contract Documents.
- c. Warranty Inspection – Warranty inspection shall be conducted during the eleventh month following completion of all work and filing of the Notice of Acceptance. The draining of the tank will be accomplished when there will be minimum inconvenience to the Owner. The warranty inspection shall be performed in the presence of the Owner. All defective work shall be repaired

or replaced in accordance with the original specifications and to the satisfaction of the Owner.

- i. Notification – The Owner shall establish the date for the inspection and shall notify the Contractor at least 30 days in advance. The Owner will drain the tanks and Contractor shall provide, at his own expense, suitable lighting, scaffolding, and ventilation for the inspection.
- ii. Interior Inspection – The entire interior coating system shall be visually inspected. All defective coating as well as damaged or rusting spots of the tank shall be satisfactorily repaired by and at the sole expense of the Contractor. All repaired areas shall then be electrically tested as specified herein and repair/electrical testing procedure repeated until surface is acceptable to the Owner.
- iii. Exterior Inspection – The entire exterior coating system shall be visually inspected. All defective coating as well as damaged or rusting spots of the tank shall be satisfactorily repaired by and at the sole expense of the Contractor.
- iv. Inspection Report – The Contractor shall prepare and deliver to the Owner an inspection report covering the first anniversary inspection, setting forth the number and type of failures observed, the percentage of the surface area where failure has occurred, and the names of the persons making the inspection.
- v. Schedule – Upon completion of inspection and receipt of Inspection Report as noted herein, Owner shall establish a date for Contractor to proceed with remedial work.
- vi. Remedial Work – Any location where coating has peeled, bubbled, or cracked and any location where rusting is evident shall be considered to be a failure of the system. The Contractor shall make repairs at all points where failures are observed by removing the deteriorated coating, cleaning the surface, and reapplying the same system. If the area of failure exceeds 25 percent of a coated surface, the entire affected panel may be required to be removed and replaced with a new panel based on the Owner's sole judgment in accordance with these specifications.
- vii. Upon completion of interior warranty remedial work, Contractor shall disinfect tank as specified herein.
- viii. Costs – All noted costs for Contractor's inspection and all costs for repair shall be borne by the Contractor. In figuring his bid, the Contractor shall include an appropriate amount for inspection, repair, and disinfection as no additional allowance will be paid by the Owner for said inspection, repair, and disinfection.

- d. Payment for Inspection – Owner will provide one free field inspection for each sandblasting, coating, and painting application. Contractor will be charged for all additional inspections of sandblasting, coating, and painting applications. Owner will also provide one free final inspection consisting of dry film thickness measurements and holiday detection observation. If work does not meet requirements of these Basic Welded Steel Water Storage Reservoir Coating and Painting Specifications, Contractor will be charged for all subsequent inspections required to insure compliance with said Specifications.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. All paint and coating materials furnished for each coating system shall be the products of a single manufacturer. Only compatible materials shall be used in the work. Particular attention shall be directed to compatibility of primers and finish coats.
- B. The volatile organic content (VOC) of the applied coatings, as determined in accordance with ASTM D3960, shall comply with prevailing air pollution regulations of South Coast Air Quality Management District (SCAQMD) Rule 1113.
- C. If the specified products are not available in formulations that meet applicable regulations on VOC levels at time of application, the Contractor shall submit for review products of equivalent quality and function that comply with regulations in effect at that time.
- D. No request for substitution of an “equal” will be considered which decreases the film thickness designated, the number of coats to be applied, solids content by volume, the general type of coating, paint, or primer, or the quantity, quality and type of ingredients in the coatings specified. Paints not listed in the specifications shall be submitted with certified ingredients analysis so that a complete comparison between specified and proposed paint may be made.
- E. Materials for interior coating shall not contain Tetrachloroethylene (PCE).
- F. All materials including thinners shall be delivered to jobsite in original containers bearing manufacturer's name, brand, and batch number. They shall not be opened or used until Inspector has physically inspected the contents and obtained necessary data from information printed on containers or labels. All materials opened or not approved shall be removed from the work site before any work shall begin.
- G. Only full, previously unopened containers of coating material shall be utilized during each coating session unless the Contractor receives Owner approval to do otherwise prior to opening the containers. Any mixed unused material shall be discarded. Partial amounts of dual component material shall be measured utilizing Owner approved measuring containers prior to mixing.

- H. All thinners must be approved and measured prior to placement in the coating material. Any amount of thinner added to the coating material without the Owner's approval may result in the rejection of that material for use.

2.02 COLORS

- A. All colors and shades of colors of all coats of paint shall be as indicated or selected by the Owner. Each coat shall be of a slightly different shade, to facilitate inspection of surface coverage of each coat. Finish colors shall be as selected from the manufacturer's standard color samples by the Owner.

2.03 MANUFACTURERS

- A. Protective coatings shall be:
- a. TNE MEC series as manufactured by Tnemec Company, Incorporated of Compton, California. Basis of Design. Tel # 310-637-2363. Contact: Tony Hobbs.
 - b. Equivalent materials of Carboline, PPG or other manufacturers may be substituted only by approval of the engineer. Equivalent products shall demonstrate equivalent or greater performance based on Tnemec performance criteria. Requests for substitution shall include manufacturer's literature for each product giving the name, generic type, descriptive information, solids by volume, recommended film thicknesses and a list of five projects where each product has been used and rendered satisfactory service. No request for substitution shall be considered that would decrease film thickness or offer a change in the generic type of coating specified.

2.04 COATING

- A. Coating for Interior Surfaces (AWWA Inside Coating System No. 2 As Modified Herein) – Roof and Rafters.
- a. Prime Coat – Prime coat shall be Tnemec Series 94-H2O Hydro-Zinc, or approved equal; it shall consist of one coat applied to a minimum dry film thickness of two and one half (2.5) mils.
 - b. Finish Coat – Finish coat shall be Tnemec Series L140F Pota-Pox Plus, or approved equal; it shall consist of two or more coats applied to a minimum dry film thickness of 4-6 mils per coat.
 - c. Total Thickness – The total dry film thickness of the interior coating system shall be a minimum of thirteen (13) mils. If portions of the interior coating are less than 11 mils DFT, a third coat of epoxy shall be required.
 - d. Application Requirements – At least 72 hours shall elapse between coats. Materials shall be stirred thoroughly with a slow speed power mixer until a smooth uniform consistency is obtained. Compound shall be mixed in exact proportions specified by manufacturer. The material shall not be thinned except possibly in cold weather, and then only in strict accordance with the manufacturer's written recommendations. Coatings shall not be applied when

the surface temperature of the area to be coated is below 50° F or above 100° F.

- e. Dry Film Thickness Verification – Owner will measure the thickness of each coating to insure that the specified dry film thickness has been obtained and shall take final measurements 7 days after application of the finish coat.
- f. Drying Time – A minimum of 14 days shall elapse between application of the finish coat and filling the tank with water for disinfection, filling, testing, and sampling.
- g. Color – Each coat shall be a different color than the preceding coat. The final coat shall be white. All coats shall be NSF Standard 61 certified.

B. Coating for Interior Surfaces (AWWA Inside Coating System No. 3 As Modified Herein) – Shell and Floor.

- a. Prime Coat – Prime coat shall be Tnemec Series 94-H2O Hydro-Zinc, or approved equal; it shall consist of one coat applied to a minimum dry film thickness of two and one half (2.5) mils.
- b. Finish Coat – Finish coat shall be Tnemec Series 22 Epoxoline, or approved equal; it shall consist of one or two coats applied to a minimum total dry film thickness of 20 – 25 mils.
- c. Total Thickness – The total dry film thickness of the interior coating system shall be a minimum of twenty five (25) mils.
- d. Application Requirements – Materials shall be stirred thoroughly with a slow speed power mixer until a smooth uniform consistency is obtained. Compound shall be mixed in exact proportions specified by manufacturer. The material shall not be thinned except possibly in cold weather, and then only in strict accordance with the manufacturer's written recommendations. Coatings shall not be applied when the surface temperature of the area to be coated is below 60° F or above 100° F.
- e. Dry Film Thickness Verification – Owner will measure the thickness of each coating to insure that the specified dry film thickness has been obtained and shall take final measurements 7 days after application of the finish coat.
- f. Drying Time – A minimum of 14 days shall elapse between application of the finish coat and filling the tank with water for disinfection, filling, testing, and sampling.
- g. Color – Each coat shall be a different color than the preceding coat. The final coat shall be white. All coats shall be NSF Standard 61 certified.

C. Coating for Exterior Surfaces (AWWA Outside Coating System No. 6 – As Modified Herein) –

- a. Prime Coat – Prime coat shall be Tnemec Series 94-H2O Hydro-Zinc, or approved equal; it shall consist of one coat applied to a minimum dry film thickness of two and one half (2.5) mils.
- b. Intermediate Coat – Intermediate coat shall be Tnemec Series L140F Pota-Pox Plus, or approved equal; it shall consist of one coat applied to a minimum dry film thickness of 2-4 mils.
- c. Finish Coat – Finish coat shall be Tnemec Series 1095 Endura-Shield, or approved equal; it shall consist of one coat applied to a minimum dry film thickness of 2-4 mils.
- d. Total Thickness – The total dry film thickness of the exterior coating system shall be eight (8) mils minimum.
- e. Application Requirements – At least 48 hours shall elapse between applications of all coats.
- f. Dry Film Thickness Verification – Inspector will measure the thickness of each coating to insure the specified dry film thickness has been obtained and shall take final measurements 5 days after application of finish coat.
- g. Color – Each coat shall be of a different color than the preceding coat. Intermediate coat shall be similar to but slightly lighter in color than the finish coat.

All colors shall be approved by Owner prior to painting. Contractor shall submit a current chart of the manufacturer's available colors to Owner well in advance of painting operations. If the color or colors applied do not conform to those approved by Owner, applicator shall change the color or colors to Owner's satisfaction.

2.04 CAULKING

- A. Caulking – Caulking shall be a one component, polyurethane-based sealant, meeting ASTM-C-920, Type S, Grade NS, Class 35 and NSF Standard 61 for potable water contact. Caulking shall be Sikaflex- 1a, or approved equal.

PART 3 – EXECUTION

3.01 SURFACE PREPARATION

- A. General – All surfaces shall be sandblasted by the dry sandblasting method. Sand used in the sandblasting operation shall be washed and graded. It shall be free of contaminants that could interfere with adhesion of coating or paint to be applied. Maximum particle size of abrasive particles shall produce a height profile in accordance with the recommendations of the coating or paint manufacturer. At all times during the blast cleaning operations, means shall be employed to insure that existing paint or coating shall not be exposed to abrasion from blast cleaning operations. All surfaces must be clean, dry, and free of any dirt, dust, grease, oil,

salt, and other deleterious materials before any protective coatings or paints are applied.

- a. Interior Surfaces – Preparation of all interior surfaces to receive protective coatings shall be blast cleaned to "near-white" metal in conformance with Steel Structures Painting Council Surface Preparation Specification SSPC-SP10 Near White Blast with a 2 mil angular anchor profile (95% of each square inch shall be free from all visible residues). Wooden wedges shall be placed between roof plates and rafters. Wedges shall be positioned to provide a 1" minimum gap between roof plates and rafters. Roof plates shall not be bent or deformed while inserting wedges. Wedges shall be repositioned during blasting operations to ensure that all areas are blasted.
- b. Exterior Surfaces – Unless specified otherwise, preparation of all exterior surfaces to receive protective paints shall be "commercial blast cleaned" metal in conformance with Steel Structures Painting Council Surface Preparation Specification SSPC-SP10 Near White Blast with a 2 mil angular anchor profile. (95% of each square inch shall be free from all visible residues). Cleaned surfaces shall be approved by Owner prior to the application of any paint. All areas where existing primer has been removed or steel is exposed shall be sandblasted to "commercial blast cleaned" metal.

3.02 COATING AND PAINTING APPLICATION

A. Coating and Painting Application

- a. First Coat – The application of the prime coat shall immediately follow surface preparation; it shall be completed within the period of an 8-hour working day. Contractor shall use a fine bristle broom and air to clean surfaces after sandblasting and prior to application of prime coat. Any such cleaned areas not receiving prime coat within said 8-hour period shall be re-blasted prior to application of prime coat. All sandblasted areas shall be approved by Owner prior to application of the coating or paint. Any areas coated without Owner's approval shall be re-sandblasted to remove all coating, inspected, and then recoated.
- b. Additional Coats – Contractor shall allow previous coat to thoroughly dry as specified herein before cleaning same. Contractor shall use a fine bristle broom and air to remove dust and other matter from each coat prior to application of any additional coats. All areas to receive additional coats shall be approved by Owner prior to application of said additional coats. Any areas receiving additional coats without Owner's approval shall be re-sandblasted to remove all coating, inspected, and then recoated.
- c. Special Coats and Caulking –
 - i. Inaccessible Areas – Prior to erection, all interior surfaces that will be made inaccessible after erection shall be sandblasted as specified herein and shall receive the complete coating system as specified herein. Such surfaces shall include but shall not be limited to the top

flanges of rafters, the top flanges of girders, column caps, column bearing plates, and earthquake bars.

Contractor shall coordinate work in inaccessible areas with separate Reservoir Contractor. Contractor shall develop coating work schedule based on Reservoir Contractor's work schedule. He shall coordinate, organize, and perform his work sufficiently in advance of Reservoir Contractor's work so that Reservoir Contractor can accommodate Coating Contractor.

Wooden wedges shall be placed between roof plates and rafters. Wedges shall be positioned to provide a 1" minimum gap between the roof plates and rafters. Roof plates shall not be bent or deformed while inserting wedges. Wedges shall be repositioned during coating operations to ensure that all areas are coated. All wooden wedge material adhering to the coating shall be removed and the coating repaired to the Owner's approval.

- ii. Brushed Applied Coat – All sharp edges, nuts, bolts, welds, joints, connections, and similar surfaces shall receive a brush applied coat of the specified coating prior to application of each complete coat.
 - iii. Caulking – Contractor shall fully seal with continuous caulking all interior roof joints (plate overlaps) and the interior tank wall to roof joint along the entire tank perimeter. Contractor shall apply caulking a minimum of one week following the application of the final coat of epoxy, and at least 72 hours prior to holiday detection of adjacent coated surfaces. The caulking shall be applied per manufacturer's printed instructions. Contractor shall thoroughly clean all epoxy coated surface areas with clean white rags prior to application of the caulking.
- B. Ventilation – Ventilating fans shall be attached to all reservoir shell manholes to provide air exhaust near bottom of reservoir. All reservoir roof openings shall be left open to provide air supply. Fans shall be located as necessary to provide proper air movement throughout the entire reservoir.
- i. During coating application, Contractor shall ventilate tank coating with ventilating fans with a capacity of at least 300 cfm per gallon of coating applied per hour.
 - ii. At the end of each work day, Contractor shall force ventilate reservoir interior until the next work day with a minimum of one complete air change each hour. Contractor shall force ventilate reservoir interior over weekends and holidays with one complete air change each hour. Ventilation fans shall operate 24 hours each day. Without restricting proper ventilation, Contractor shall prevent sand, dust or other material from adhering to the coating by the use of barriers, screen or other Owner approved methods. Damaged surfaces shall be repaired to the Owners satisfaction.

- iii. After each reservoir interior coat has been completed, Contractor shall force ventilate reservoir interior for a minimum of 72 hours with one complete air change each hour. Ventilation fans shall operate 24 hours each day. Coatings shall be protected when placing fans and any damaged areas shall be repaired under Owner's supervision and holiday tested at the Contractor's expense.
 - iv. After reservoir interior coating has been completed, inspected, and accepted by Owner, Contractor shall force ventilate reservoir interior for a minimum of 14 days with one complete air change each hour. Ventilation fans shall operate 24 hours each day.
 - v. Contractor shall furnish all required equipment and labor to ventilate reservoir interior including fans, generators, fuel, vandal proof protective barriers, wind barriers, and manpower to insure adherence to the ventilation requirements.
- C. Safety – During sandblasting operations and coating and painting applications, Contractor shall use head protection, fire protection, and respiratory devices in accordance with AWWA D-102, latest edition. Use of these devices shall be mandatory and strictly enforced by the Contractor as his total responsibility. Owner's representatives will not be continuously present and shall not be responsible or liable for enforcing Contractor's adherence to these and other lawfully mandatory safety practices.
- D. Skilled Craftsmen – All work shall be performed by skilled craftsmen who are qualified to perform the required work in a manner compatible with the best standards of practice found in the trade.
- E. Restrictions –
- i. Material shall not be applied when the surrounding air temperature or temperature of the surface to be coated is below 40°F. Material shall not be applied to wet or damp surfaces, in rain, fog, or when the temperature is less than 5°F above the dewpoint. Material shall not be applied when it is expected the air temperature will drop below 40°F or less than 5°F above the dewpoint within 8 hours after application of material.
 - ii. Material shall not be applied when the surrounding air temperature or temperature of the surface to be coated exceeds 110°F. Material shall not be applied when the relative humidity exceeds 70 percent. Material shall not be applied when it is expected the air temperature or temperature of the surface will exceed 110°F within 2 hours following application of material.
 - iii. Material shall not be applied when wind conditions may cause overspray, dust, sand or other material to adhere to the coated surface. Damaged surfaces shall be repaired to the Owners satisfaction.
- F. Curing of Reservoir Coating – Contractor shall provide all equipment and manpower necessary to provide continuous supplemental heat and dehumidification of the

reservoir interior as required to maintain proper curing conditions as recommended by the coating manufacturer. Said requirement shall apply throughout coating and curing operations, including overnight, over holidays, over weekends, between coats, and during the fourteen (14) day curing period.

- i. During weekends and during the fourteen (14) day curing period, Contractor shall monitor heating, dehumidifying, and ventilating equipment and shall provide fuel as required to keep equipment operating continuously. Contractor shall furnish fuel supply tanks with a minimum capacity for seventy-two (72) hours of continuous heating. During weekends, holidays, and the fourteen (14) day curing period, Contractor shall provide all maintenance required to make immediate repair in the event of equipment failure.

- G. Shop Priming – Reservoir shall be field sandblasted and primed, unless shop priming is requested in writing by the Contractor and approved by Owner.

When shop priming of the reservoir is allowed by Owner, Contractor shall shop prime reservoir exterior surfaces, reservoir roof interior, and roof supporting structure (rafters, girders, rafter clips, column caps, and earthquake bars) as follows:

- a. Surface Preparation – All interior and exterior surfaces shall be cleaned to SSPC-SP10 Near White Blast Clean all in accordance with the Contract Documents.
- b. Application – Application of prime coat shall immediately follow surface preparation; it shall be completed within the period of 8 hours. Any such cleaned areas not receiving prime coat within said 8 hour period shall be recleaned prior to application of prime coat. All cleaned areas shall be approved by the Coating Inspector prior to application of any coating or paint. Any areas coated without the Coating Inspector's approval shall be recleaned to remove all coating, inspected, and then recoated. Upon completion of cleaning and priming, all coated or painted components shall be cured for a minimum of two hours at 60° F prior to stacking or handling components.
- c. Materials – All interior and exterior surfaces of reservoir, including reservoir roof supporting structure shall be primed with Tnemec 94-H20 Hydro-Zinc Organic Zinc Rich Primer, including all weld seams or approved equal to a minimum dry film thickness of two and one half (2.5) mils (unless noted otherwise).
- d. Transportation –
 - i. In transit, spacers shall be used to separate all plates and components. In addition, all shop primed steel shall be completely covered to protect the steel and prevent deposition of road salts, fuel residue, and contaminants.
 - ii. Loaded steel shall be bound with padded chains or ribbon binders.

e. Field Application –

- i. If damage to primer in a specific area exceeds 50% of the total surface of that specific area as determined by Owner, Contractor shall blast clean entire said area and reapply the primer in accordance with the Contract Documents.
- ii. Primed surfaces which have been exposed to excessive sunlight or have exceeded the manufacturer's recommended recoat time shall be scarified and a second coating of paint shall be applied. Procedures for surface preparation shall be as determined by the Owner.
- iii. Upon completion of tank erection all surfaces shall be thoroughly scrubbed and washed with a detergent cleanser and rinsed with high pressure water until all surfaces are free from dirt, grease, oil, and all other surface contaminants.
- iv. After surfaces are clean and prior to application of intermediate coat, surfaces shall be inspected and approved by Owner. Any areas not approved by Owner shall be repaired as follows:
 1. Reservoir Exterior Surfaces – All areas uncoated in the shop (weld hold back areas) or damaged during shipping, erection, and exposure shall be spot blast cleaned to "commercial" in accordance with the Contract Documents. All blast cleaned areas shall be approved by Owner and then receive a prime coat. Thereafter, all exterior surfaces shall receive the second and third coat in accordance with the Contract Documents.
 2. Reservoir Interior and Roof Supporting Structure – All areas uncoated in the shop (weld hold back areas) or damaged during shipping, erection, and exposure shall be spot blast cleaned to "nearwhite" in accordance with the Contract Documents. All said blast cleaned areas shall be approved by Owner and then receive a prime coat. Thereafter, the reservoir interior, including roof supporting structure, shall receive the second and third coat in accordance with the Contract Documents.
- v. Field repair shall extend beyond the heat affected zone of the welds.
- vi. After blast cleaning of defective or damaged areas, edges shall be feathered to provide a smooth transition between shop primed and field primed surfaces.

3.03 SITE REQUIREMENTS

A. Requirements Regarding Worksite and Vicinity

- a. Contractor shall not perform work outside work site limits and shall not leave said work site except to enter or leave the area via the access road.

- b. Contractor is obligated to keep visual impact of the Work site to a minimum, and to prevent damage to all existing structures, private property, and residences in vicinity of Work site. Contractor shall restore all areas altered by construction to pre-job conditions and shall meet the requirements of Owner. Such areas shall include, but shall not be limited to, areas used for travel, parking, and storage of vehicles, equipment and materials.
- c. Contractor shall utilize existing roads in such a manner as to not damage existing roads or adjacent properties. Any damage to same shall be repaired by Contractor to the satisfaction of the Owner and to any agency having jurisdiction over roadway.
- d. Work shall be performed to prevent fires and air pollution in accordance with the General Requirements. Said prevention shall apply to travel on access roads as well as on the work sites. All equipment shall be provided with spark arrestors and readily accessible fire extinguishers shall be kept on site.
- e. Contractor shall limit construction noise to a maximum continuous level of 65 dBA, as measured at the reservoir site's property line between the hours of 7:00 AM to 5:00 PM, Monday through Friday. This maximum continuous level shall decrease to 55 dBA on holidays and all other times, if work during those times is approved by Owner. Contractor shall be able to demonstrate compliance with noise limits by taking and recording noise measurements when requested to do so by the Owner. Contractor may use any Owner approved method to limit construction noise including the placement of acoustic skirts or curtains around the equipment and/or work area, placement of a barrier wall around the site, and/or providing high performance mufflers for the equipment engines.
- f. Contractor shall prevent all dust or sand from blowing off the reservoir site. Contractor may use any Owner approved method to prevent said dust or sand from blowing offsite including the placement of temporary shield, screens, or covers, proper containment, and the use of self contained sand blasting equipment.
- g. Contractor shall prevent overspray from blowing off the reservoir site during coating operation. Contractor may use any Owner approved overspray protection or shall limit coating the reservoir to periods when wind speeds are minimal.
- h. The Owner has the right at any time to analyze noise, blowing dust, overspray, or any other applicable condition, and require preventive measures to be implemented by the Contractor prior to proceeding.

If a complaint is received, the Contractor shall cease operations immediately, inform the Owner of the complaint, take corrective actions, and receive permission from the Owner in order to proceed. All corrective actions shall be provided by the Contractor at no additional cost to the Owner. The Contractor shall immediately repair any damages resulting from said complaint at no

cost to the Owner. Any costs incurred by the Owner for said complaints shall be reimbursed by the Contractor

- i. Sandblast Sand and Removed Coating – All sandblast sand, removed coating, and any other residual debris shall be collected, removed from the site, and disposed of at an approved legal disposal site. Said material shall be collected and directly moved from site. Said materials shall not be stockpiled outside the reservoir prior to removal and disposal.

3.04 CLEANUP

- A. During all coating operations, site shall be kept clean and free of all empty buckets, paint cans, trash, and any other material which gives the site an untidy appearance. Contractor shall provide a trash dumpster, shall clean site daily, and place all said materials in dumpster. Said dumpster shall be emptied a minimum of once a week. Upon completion of the work, all staging, scaffolding, containers, rags, pieces of paint, and all materials and equipment used in the performance of the work shall be removed from the site. All damage to surfaces resulting from the work shall be cleaned, repaired, or refinished to the complete satisfaction of Owner.

3.05 ADDITIONAL MATERIAL TO OWNER

- A. Following completion of work, Contractor shall supply Owner with a minimum of one gallon of each finish coat utilized in coating the reservoir interior and exterior. Life span of material delivered to the Owner shall be a minimum of one year at the time of delivery and color of material shall be identical to that utilized in coating the reservoirs.

PART 4 – MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. The work described herein will be measured for payment as Lump Sum item.

4.2 PAYMENT

- A. Payments for these items will be paid at the contract lump sum price stated in the Schedule of Pay Items. Payments shall constitute full compensation for all materials, equipment and incidentals to satisfactory complete the work.

END OF SECTION

SECTION 11268 RESERVOIR HYDRODYNAMIC MIXING SYSTEM (HMS)

PART 1 – GENERAL

1.1. DESCRIPTION

The Hydrodynamic Mixing System (HMS) is defined as a supplemental system installed within a potable water storage reservoir which passively utilizes the energy provided by the inlet water supply (via pumped or gravity head) and generates a sufficient inlet momentum to achieve a complete homogeneous blending of the water volume within the reservoir with the inlet supply flow. Determination of Complete Homogeneous Blending shall be defined by the modeling requirements and supporting hydraulic analysis as conducted by each individual manufacturer for their specific system configuration as defined within these specifications. System submittals not providing this validation shall not be considered as a viable Hydrodynamic Mixing System (HMS) and shall not be accepted as an equivalent to this system specification.

The specifications in this section include all components of the Reservoir Hydrodynamic Mixing System (HMS) consisting of a bi-directional flow manifold equipped with variable orifice duckbill inlet nozzles and outlet flow check valves that are NSF61 certified. The HMS manufacturer shall be responsible for designing the system in accordance with the hydrodynamic criteria defined within these specifications and submit design calculations verifying compliance in accordance with the submittal requirements. The following is a description of the Hydrodynamic Mixing System.

All modeling and hydraulic and mixing calculations pertaining to the HMS shall originate from the duckbill valve manufacturer.

The complete Hydrodynamic Mixing System shall be supplied by the variable orifice nozzle manufacturer to maintain single source responsibility for the system. The complete system shall be defined as all piping and appurtenances within the tank downstream of the tank penetration. Appurtenances include pipe, fittings, horizontal and vertical pipe supports, expansion joints, variable orifice duckbill check valves, and any other equipment specified within this section of the specifications.

1.2. RELATED SECTIONS

A. Refer to the following Specification section(s) for additional requirements:

1. Section 01300 – SUBMITTALS
2. Section 09961 – COATINGS
3. Section 13300 – WELDEDSTEEL TANK
4. Section 15076 – PIPING AND APPURTENANCES

1.3. MANUFACTURERS

The approved manufacturer for this system to be included within the Base Bid shall be manufactured by Red Valve Company/Tideflex Technologies, Pittsburgh, PA 15220.

Manufacturer's and/or contractors submitting an alternative to the named Red Valve/Tideflex Technologies mixing system shall be responsible for obtaining any and all proprietary rights, license fees, royalties, technology licenses, and/or permissions required to provide such a system. The Manufacturer shall indemnify and hold harmless the Owner and Engineer against all claims, damages, losses, and expenses arising out of any infringement of patent rights or copyright incident relating to this system. Alternate mixing systems, even if listed by name, shall comply with the performance specifications in this section.

1.4. SUBMITTALS

A. Furnish submittals in accordance with the requirements of Section 01300, Submittals and as specified herein.

B. Independent CFD Modeling Validation

- a. The mixing system designer/supplier must supply data or report from at least one project where an independent company conducted CFD modeling on their mixing system design and the modeling results verified the design achieved complete mixing.

C. Full Scale Tracer Study Validation

- a. The mixing system designer/supplier must supply data or report from at least one project where a full scale tracer study using calcium chloride was conducted on a circular reservoir and the tracer study results verified the mixing system design achieved complete mixing.
- b. The mixing system designer/supplier must supply data or report from at least one project where a full scale tracer study using calcium chloride was conducted on an elevated tank and the tracer study results verified the mixing system design achieved complete mixing.

1.4.1 TIDEFLEX INLET NOZZLE AND WATERFLEX OUTLET VALVE TESTING AND VALIDATION

A. Verification of independent hydraulic testing to determine headloss and jet velocity characteristics on a minimum of eight (8) sizes of duckbill valves ranging from 2" through 48". The testing must include multiple constructions (stiffness) within each size and must have been conducted for free discharge (discharge to atmosphere) and submerged conditions.

B. Verification of Independent Laboratory Testing for Manufacturing Consistency - the duckbill valve manufacturer shall provide summary documentation of a report conducted by an Independent Laboratory for hydraulic testing where multiple duckbill valves (at least four) of the same size and construction (stiffness) were tested to validate the submitted headloss characteristics and to prove the

repeatability and consistency of the manufacturing process to produce the same hydraulic characteristics.

- C. Report of independent testing that studied the flow distribution characteristics of duckbill valves installed on multiport manifolds. The manufacturer must have been in the business of manufacturing duckbill valves at the time the report was published.
- D. Verification of Finite Element Analysis (FEA) of duckbill valves. The duckbill valve manufacturer shall provide summary documentation of Finite Element Analysis modeling on representative duckbill nozzle sizes to determine deflection, stress and strain characteristics under various load conditions. Modeling must have been done for flowing conditions (positive differential pressure) and reverse differential pressure.
- E. Verification of independent hydraulic testing to determine headloss characteristics on a minimum of three (3) sizes of perforated disc/elastomeric membrane check valves ranging from 6" through 36". Testing must have been conducted with and without the membrane installed. At least two (2) sizes shall have tested two (2) different membrane thicknesses.
- F. Verification of Finite Element Analysis (FEA) modeling on a perforated disc/elastomeric membrane check valve to determine stress and deflection characteristics under reverse differential pressure.

1.4.2 VALIDATION OF LONG-TERM PERFORMANCE

- A. The mixing system designer/supplier must supply at least one inspection report showing proper operation of, and no deterioration of, the duckbill valves after being in service in a water storage tank mixing application for a minimum of 10 years.

1.4.3 NSF61 CERTIFICATION

- A. Copy of the NSF61 Certified listing for the valves used in the Hydraulic Mixing System (HMS).
- B. The valves themselves must be NSF61 certified, not just the elastomer used in construction of the valves. NSF61 approved/certified materials will not be accepted in lieu of valve certification.
- C. The NSF61 Certification for the valves must be for a minimum volume of 2,000 gallons. Valves with NSF61 Certification for minimum volume of greater than 2,000 gallons are not acceptable.

1.4.4 TEST REPORT ON ELASTOMER EXPOSURE TO CHLORINE AND CHLORAMINE

- A. Copy of test report from an accredited independent laboratory that confirmed there is no degradation in the elastomer when exposed to chlorine and chloramine per the ASTM D471-98 "Standard Test Method for Rubber Property – Effect of Liquids."

1.4.5 SYSTEM INSTALLATION DRAWINGS

- A. The duckbill valve manufacturer shall be responsible for providing engineering installation drawings of the complete manifold piping system as supplied by the manufacturer. These drawings shall include plan view piping arrangement, sections and elevations as required, support bracket installation details, duckbill nozzle orientation details, and all dimensions required for locating the system within the specified dimensions of the tank.
- B. Six (6) sets of plans shall be provided to the Engineer for review and approval.
- C. Drawings shall be a minimum of 11 x 17 inches and provided in digital PDF format.
- D. Two (2) sets of final fabrication and installation drawings shall be included with the shipment of the manifold piping equipment.

1.4.6 DESIGN CALCULATIONS

- A. All Design Calculations, curves, and reference information listed below must originate and be submitted by the duckbill valve manufacturer. **Calculations, curves, and reference information provided by contractors relating to the HMS are not allowed.** The duckbill valve manufacturer MUST include within the submittal package the following design calculations, curves, and reference information:
 - a. Calculations showing the fill time required, under isothermal conditions, for the HMS system to achieve complete mix of the reservoir volume at minimum, average and peak fill rates. Complete mixing defined as 95% homogenous solution. The theory and equations used in calculating the mixing times must be from a published AWWA reference manual or paper. The reference document(s) must be submitted with the equations and calculations.
 - b. Calculations showing the water level drawdown required to achieve complete mixing on the fill cycles at minimum, average, and peak flow rates.
 - c. Calculations of average storage tank water age for both fill-then-draw, and simultaneous fill and draw scenarios. Theory used in calculating water age must be submitted with the calculations.
 - d. A representative Computational Fluid Dynamics (CFD) model evaluation of the proposed HMS system configuration applied within a reservoir of similar geometry. Model output documentation shall include all design variables applied for the simulation, plot of the 3-D geometry showing the mesh definition, velocity magnitude vector and contour plots at different cross-sections throughout the water volume, simulated tracer animations showing the spatial and temporal distribution of inlet water in real time during the fill cycle.

- e. Hydraulic calculations showing the resulting jet velocities of each inlet nozzle at minimum, average, and peak fill rates.
- f. Hydraulic calculations showing the flow distribution among all inlet ports at minimum, average, and peak fill rates.
- g. Manifold hydraulic calculations showing the total headloss of the HMS at minimum, average, and peak fill and draw rates. Headloss shall include all minor losses and headloss of nozzles and outlet check valves.
- h. Hydraulic curves showing thrust vs. flow for the inlet nozzles.
- i. Hydraulic curves for each outlet check valves showing headloss vs. flow.
- j. Calculations showing the terminal rise height of the jets that discharge at an angle above horizontal. The terminal rise height shall be calculated assuming 10°F and 20°F colder inlet water and calculated at minimum, average and peak fill rates. The theory and equations used to calculate the terminal rise height shall be included.
- k. Hydraulic curves for each inlet nozzle of Densimetric Froude number vs. flow
- l. If the calculations and supporting data provided do not show compliance with the hydrodynamic requirements of the system as interpreted by the Engineer or Owner then the submittal shall be rejected.

1.4.7 INSTALLATION, OPERATION AND MAINTENANCE MANUALS

- A. After final approval of the submittals by the Engineer, the HMS valve manufacturer shall provide one (1) Digital copy of the Installation, Operation and Maintenance (IOM) Manual for the mixing system. Hard copies of the IOM manual can be requested and will be made available at a fee.
- B. The IOM manual shall include the following information as a minimum:
 - a. A Cover page listing project specifics
 - b. Table of contents
 - c. Completed sections for the following: equipment list, shipment and storage instructions, assembly and installation instructions, safety notice, operating instructions, troubleshooting guide, and spare parts list.
 - d. Copy of hydraulic, mixing, and water age design calculations for the mixing system and all associates supporting curves and calculations.
 - e. Copy of complete set of the installation plans.
 - f. Copies of valve IOMs, NSF61 Certification listing, chlorine/chloramine exposure test report.
 - g. All validation documentation.
 - h. Component specification sheets for any specialized items supplied with the system.

1.5. MATERIAL SOURCING (DOMESTIC / INTERNATIONAL)

The steel material sourcing shall be in accordance with AIS (State Revolving Fund – American Iron & Steel Requirement).

1.6. Referenced Standards

American National Standards Institute (ANSI)

B16.1 – Cast Iron Pipe Flanges and Flanged Fittings

B16.5 – Pipe Flanges and Flanged Fittings

B36.10 – American National Standard Weights and Dimensions of Welded and Seamless Wrought Steel Pipe

American Society for Testing and Materials (ASTM)

A53 – Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

A234 – Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service

A240 – Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications

A351 – Standard Specification for Castings, Austenitic, Austenitic-Ferritic (Duplex), for Pressure-Containing Parts

A536 – Standard Specification for Ductile Iron Castings

C110 – Ductile Iron and Gray-Iron Fittings, 3 In. through 48 In. for Water

D1330 – Standard Specification for Rubber-Sheet Gaskets

D1784 – PVC/CPVC Pipe Compounds

D1785 – PVC Pipe, Schedules 40, 80 & 120

D2466 – PVC Solvent Cement

D2855 – PVC Solvent Joints

D3261 – Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Fittings

D3915 – PVC Pipe Fitting Compounds

American Iron and Steel Institute (AISI)

AISI 304 – 304 Stainless Steel Plate

AISI 316 – 316 Stainless Steel Plate

AISI 1040 – Carbon Steel Plate

American Water Works Association (AWWA)

C104 – Cement-Mortar Lining of Ductile Iron Pipe and fittings for Water

C110 – Ductile-Iron and Gray-Iron Fittings, 3 In. through 48 In. for Water

C115 – Flange Ductile Iron Pipe with Ductile Iron or Gray Iron Threaded Flanges

C200 - AWWA Standard for Steel Water Pipe 6” and Larger

C207 – Standard for Steel Pipe Flanges for Waterworks Service – Size 4 In. to 144 In.

C220 – AWWA Standard for Stainless Steel Pipe, 4” and Larger

C900 – AWWA Standard for Polyvinyl Chloride (PVC) Pressure Pipe, 4 In. Through 12 In. for Water Distribution

C905 – AWWA Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 In Through 48 In. for Water Transmission and Distribution

C906 – AWWA Standard for Polyethylene (PE) Pressure Pipe and Fittings, 4 In. Through 63 In. for Water Distribution

American Water Works Association Research Foundation (AwwaRF)

Project No. E20-J08 – Physical Modeling of Mixing in Water Storage Tanks
(Forthcoming)

National Sanitation Foundation (NSF)

NSF Standard 14 – Plastic Piping System Components and Related Materials

NSF Standard 61 – Drinking Water System Components – Health Effects

PART 2 – PRODUCT

2.1 TIDEFLEX VARIABLE ORIFICE DUCKBILL INLET NOZZLES

Inlet ports/nozzles shall be duckbill-style check valves that allow fluid to enter the reservoir during fill cycles and prevent flow in the reverse direction through the nozzle during draw periods. Inlet ports/nozzles may not be fixed-diameter ports or pipes.

- A. The flange drilling shall conform to ANSI B16.1 Class 125/ANSI B16.5, Class 150 standards. The duckbill valve shall be furnished with stainless steel 316 back-up rings for installation.
- B. The duckbill valves shall be NSF61 Certified. NSF61 approved/Certified materials will not be accepted in lieu of valve certification.
- C. Inlet ports/nozzles shall have a variable diameter vs. flow hydraulic profile that provides a non-linear jet velocity vs. flow characteristic and a linear headloss vs. flow characteristic. The hydraulic characteristics of the duckbill valves shall be defined by “Hydraulic Code”.
- D. The inlet ports/nozzles shall discharge an elliptically shaped jet. The nozzle must have been modeled by an independent laboratory using Laser Induced Fluorescence (LIF).
- E. Manufacturer shall have conducted independent hydraulic testing to determine headloss and jet velocity characteristics on a minimum of eight (8) sizes of duckbill valves ranging from 2” through 48”. The testing must include multiple constructions (stiffness) within each size and must have been conducted for free discharge (discharge to atmosphere) and submerged conditions.
- F. Manufacturer shall have conducted an independent hydraulic test where multiple valves (at least four) of the same size and construction (stiffness) were tested to validate the submitted headloss characteristics and to prove the repeatability of the manufacturing process to produce the same hydraulic characteristics.
- G. Manufacturer shall have conducted independent hydraulic testing to study the flow distribution characteristics of duckbill valves installed on multipoint manifolds.
- H. Manufacturer to have conducted Finite Element Analysis (FEA) on various duckbill valves to determine deflection, stress, and strain characteristics under various load conditions. Modeling must have been done for flowing conditions (positive differential pressure) and reverse differential pressure.

- I. Manufacturer must have conducted in-house backpressure testing on duckbill valves ranging from ¾" to 48".
- J. Manufacturer shall have at least fifteen (10) years' experience in the manufacturing of "duckbill" style elastomeric valves.
- K. Manufacturer must have duckbill valves installed on manifold piping systems in at least 100 distribution system reservoirs.
- L. Manufacturer must have representative inspection videos showing the duckbill valves discharging water into the reservoir during an initial fill (unsubmerged). Manufacturer must also have representative underwater inspection videos showing the operation of the valves when submerged. Representative videos shall be submitted to the engineer.
- M. The duckbill style nozzles shall be one-piece elastomer matrix with internal fabric reinforcing designed to produce the required discharge velocity and minimum headloss requirements as stipulated in the Submittals section. The flange portion shall be an integral portion of the nozzle with fabric reinforcing spanning across the joint between the flange and nozzle body.
- N. The elastomer used in construction of the duckbill valves must have been tested by an accredited independent laboratory that confirmed there is no degradation in the elastomer when exposed to chlorine and chloramine per the ASTM D471-98 "Standard Test Method for Rubber Property – Effect of Liquids."
- O. The manufacturer's name, plant location, serial number and product part number which designates nozzle size, material and construction specifications shall be bonded onto the surface of the nozzle.

2.2 WATERFLEX OUTLET CHECK VALVES

The outlet flow valves shall be perforated disc type with elastomeric membrane.

- A. The valves shall be NSF61 Certified. NSF61 approved/Certified materials will not be accepted in lieu of valve certification.
- B. The perforated disc shall be fabricated of stainless steel 304 plate with or without welded support gussets depending on maximum backpressure. The disc shall be flanged and drilled to mate with ANSI B16.1, Class 125/ANSI B16.5 Class 150 flanges. The disc shall have three (3) tapped holes used for fastening the membrane and support rod to the disc with stainless steel 304 bolts, nuts, and lock washers. The top of the disc shall be tapped and supplied with lifting eyebolt for installation.
- C. The membrane shall be circular, one piece rubber construction with fabric reinforcement. The diameter of the membrane shall allow adequate clearance between the membrane O.D. and the pipe I.D. The membrane shall be vulcanized with a specified convex radius to produce a compression set to allow

the membrane to seal against the perforated disc at low reverse differential pressure.

- D. The support rod shall be stainless steel 304 and drilled with three (3) longitudinal holes to allow fastening of rod to membrane and perforated disc.
- E. When line pressure inside the valve exceeds the backpressure outside the valve, the line pressure forces the membrane to open, allowing flow to pass through the perforations in the disc. When backpressure exceeds the line pressure, the membrane seats on the perforated disc preventing backflow.
- F. The valve allows flow out of the reservoir during draw cycles and prevents flow into the reservoir during fill cycles.
- G. The elastomer used in construction of the membrane must have been tested by an accredited independent laboratory that confirmed there is no degradation in the elastomer when exposed to chlorine and chloramine per the ASTM D471-98 "Standard Test Method for Rubber Property – Effect of Liquids."
- H. The manufacturer's name, plant location, serial number and product part number which designates membrane size, material and construction specifications shall be bonded onto the surface of the membrane.

2.3 POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS

All PVC pipe and PVC fittings shall be a minimum Schedule 80 in accordance with ASTM D1785-83.

- A. PVC pipe and fittings shall be NSF61 approved for potable water.
- B. PVC pipe compounds shall be in accordance with the standards listed in Section 3.0: Referenced Standards.
- C. PVC solvent and solvent joints shall be in accordance with the standards listed in Section 3.0: Referenced Standards.
- D. Field solvent welding will not be allowed unless approved by the Engineer.
- E. All pipe joints that are to be field connected shall be PVC Van Stone-type flanges. Flange drilling to be in accordance with ANSI B16.1/B16.5.
- F. All fittings shall have the same pressure rating as the pipe unless otherwise noted.

2.4 HIGH DENSITY POLYETHYLENE (HDPE) PIPE AND FITTINGS

- A. Two (2) Inches and Smaller – Pipe shall be manufactured from a PE4710 resin listed with the Plastic Pipe Institute (PPI) as TR-4. The resin material will meet the specifications of ASTM D3350-99 with a cell classification of PE345464C. Pipe shall have a manufacturing standard of ASTM D2737 (CTS). Pipe shall be DR 9 (200psi WPR) unless otherwise specified on the plans. The pipe shall contain no recycled compounds except that generated in the manufacturer's own plant from

resin of the same specification from the same raw material. All pipes shall be suitable for use as pressure conduits, and per AWWA C901, have nominal burst values of three (3) times the Working Pressure Rating (WPR) of the pipe. Pipe shall also have the following agency listing of NSF 14.

- B. Four (4) Inches and Larger - Pipe shall be manufactured from a PE4710 resin listed with the Plastic Pipe Institute (PPI) as TR-4. The resin material will meet the specifications of ASTM D3350-99 with a cell classification of PE345464C. Pipe shall have a manufacturing standard of ASTM F714. Pipe O.D. sizes 4" to 24" shall be available in steel pipe sizes (IPS) and ductile iron pipe sizes (DIPS). Pipe O.D. sizes 26" to 54" shall be available in steel pipe sizes (IPS). Pipe shall be DR 17 (100psi WPR) for pipe sizes up to 36" unless otherwise specified on the plans. The pipe shall contain no recycled compounds except that generated in the manufacturer's own plant from resin of the same specification from the same raw material. All pipes shall be suitable for use as pressure conduits, listed as NSF 14, and per AWWA C906 Pressure Class (PC) 100 have a nominal burst value of three and one-half (3 ½) times the Working Pressure Rating (WPR) of the pipe.
- C. Pipe fittings and flanged connections, to be joined by thermal butt-fusion, shall be of the same type, grade, and class of polyethylene compound and supplied from the same raw material supplier.
- D. Sidewall fusions for connections to outlet piping shall be performed in accordance with HDPE pipe and fitting manufacturer's specifications. The heating irons used for sidewall fusion shall have an inside diameter equal to the outside diameter of the HDPE pipe being fused. The size of the heating iron shall be ¼ inch larger than the size of the outlet branch being fused.
- E. Field fusion welding will not be allowed unless specified or approved by the Engineer.
- F. Socket fusion, hot gas fusion, threading, solvents, and epoxies will not be used to join HDPE pipe.
- G. Butt Fusion Fittings - Fittings shall be PE4710 HDPE, Cell Classification of PE345464C as determined by ASTM D3350-99, and approved for AWWA use. Butt Fusion Fittings shall have a manufacturing standard of ASTM D3261. Molded & fabricated fittings shall have a pressure rating equal to the pipe unless otherwise specified in the plans. Fabricated fittings are to be manufactured using Data Loggers. Temperature, fusion pressure and a graphic representation of the fusion cycle shall be part of the quality control records. All fittings shall be suitable for use as pressure conduits, and per AWWA C906, have nominal burst values of three and one-half (3 ½) times the Working Pressure Rating (WPR) of the fitting.
- H. Electrofusion Fittings - Fittings shall be PE4710 HDPE, Cell Classification of PE345464C as determined by ASTM D3350-99. Electrofusion Fittings shall have a manufacturing standard of ASTM F1055. Fittings shall have a pressure rating equal to the pipe unless otherwise specified on the plans. All electrofusion fittings shall be suitable for use as pressure conduits, and per AWWA C906, have

nominal burst values of three and one-half (3 ½) times the Working Pressure Rating (WPR) of the fitting.

- I. Flanged pipe sections for mechanical joining shall be comprised of HDPE flange adapters and Stainless Steel 316 slip-on backup rings. Flange adapters shall conform to PE4710 HDPE, Cell Classification PE345464C as determined by ASTM D3350-99. Stainless Steel 316 slip-on backup rings shall conform to ASTM A351CF8M.

2.5 DUCTILE IRON PIPE AND FITTINGS

- A. Flanged ductile iron pipe shall be Class 53 and conform to AWWA C115 / ANSI A21.15.
- B. Flanges shall be faced and drilled after being screwed onto the pipe and be 90 degrees with the longitudinal axis of the pipe.
- C. Flanged ductile iron fittings shall conform to AWWA C110 / ANSI A21.10.
- D. Pipe and fitting flanges shall be drilled to ANSI B16.1 Class 125 standards.
- E. All flanged pipe and fittings shall be cement-mortar lined conforming to AWWA C104 / ANSI A21.4.
- F. All flange pipe and fittings shall be shop-coated with an NSF61 Certified primer, 3-5 mils DFT. Paint shall be Tnemec 20 Pota-Pox or Tnemec N140 Pota-Pox Plus unless otherwise specified. Coating shall be in accordance with coating manufacturer's specifications.

2.6 CARBON STEEL PIPE AND FITTINGS

- A. Carbon steel pipe and fittings shall conform to the associated standards listed in Section of Reference Standards.
- B. Dimensions for carbon steel fittings shall conform to AWWA C110, unless otherwise specified.
- C. Pipe and fittings shall be Schedule Standard wall thickness conforming to ANSI B36.10-1985.
- D. All flanges shall be carbon steel ring flanges conforming to AWWA C207 Class D, unless otherwise specified on the drawings. Flange drilling pattern shall be in accordance with ANSI B16.1/B16.5 standards.
- E. Ring flanges shall be continuously welded on both sides.
- F. Welding of carbon steel pipe and fittings shall be in accordance with the Reference standards.
- G. All butt welds shall be fully penetrated with gas shielding to the interior and exterior of the joint.

- H. Welded cross-sections shall have a thickness equal to or greater than the welded material.
- I. Field welding of carbon steel pipe and fittings will not be allowed unless approved by the Engineer.
- J. All welded joints shall be free of sharp edges and burrs.
- K. Coating of the inside of carbon steel pipe and fittings is not required, unless otherwise specified.
- L. Coating of the outside of carbon steel pipe and fittings shall be performed in the field, by the contractor, following installation of the manifold piping system. Surface preparation and coating procedures shall be in accordance with standards listed in Coatings specification.

2.7 STAINLESS STEEL PIPE AND FITTINGS

- A. Stainless steel pipe and fittings shall conform to the associated standards listed in Section 3.0: Reference Standards.
- B. Dimensions for stainless steel fittings shall conform to AWWA C110, unless otherwise specified.
- C. Piping shall be Schedule 10s stainless steel 304L fabricated from material per ASTM-A240.
- D. All flanges shall be plate ring flanges, unless otherwise specified on the drawings. Flange drilling pattern shall be in accordance with ANSI B16.1/B16.5 standards.
- E. Ring flanges shall be continuously welded on both sides.
- F. All welded joints shall be free of sharp edges and burrs.
- G. All shop welds shall be manually scrubbed or brushed with non-metallic pads or stainless steel wire brushes to remove weld discoloration. Welds to be chemically passivated with nitric or citric acid.
- H. Field welding of stainless steel pipe and fittings will not be allowed unless approved by the Engineer.

2.8 FLANGE GASKETS

- A. Flange gaskets shall be full-faced and shall be in accordance with ASTM D1330.
- B. Flange gasket drilling pattern shall conform to ANSI B16.1/B16.5.
- C. Flange gaskets shall be 1/8" thick.
- D. Gasket material shall be EPDM.

2.9 FASTENERS

- A. Hex head bolts and nuts shall be stainless steel 316 conforming to ANSI/ASME B18.2.1 and ANSI/ASME B18.2.2.
- B. Plastic insulating sleeve/washers shall be utilized to isolate dissimilar bolt and flange metals where required.

2.10 PIPE SUPPORTS

- A. For field welded, plain end, carbon steel pipe, the pipe supports shall be carbon steel in accordance with the associated standards and be welded directly between the tank floor, shell, access tube, or wet riser and the carbon steel piping. The pipe supports shall be flat plates, structural angle iron or channel.

For flanged pipe in carbon steel tanks, the pipe supports shall be carbon steel with a stainless steel 304 U-bolt in accordance with the associated standards. For flanged pipe in concrete or bolted tanks, all components of the pipe supports shall be stainless steel 304 in accordance with the associated standards.

- B. The pipe supports shall consist of four components:
 - a. A base plate. For all-stainless steel pipe supports, the base plate will have four thru holes for expansion anchors and a pipe welded to the base plate with a hex nut welded to the top of the pipe to serve as a guide for the all-thread of the top-works weldment.
 - b. For carbon steel supports, a top-works weldment that consists of structural channel and angle iron. The angle iron has predrilled holes for the U-bolt. The TMS piping shall rest on the angle iron and the U-bolt is used to retain the TMS pipe.
 - c. For stainless steel supports, a top-works weldment that consists of structural angle iron with predrilled holes for the U-bolt. The TMS piping shall rest on the angle iron and the U-bolt is used to retain the TMS pipe. All-thread rod shall be welded to the bottom of the angle iron and shall thread into the hex nut of the base plate weldment. The top-works weldment can be rotated into or out of the hex nut to provide height adjustability.
 - d. U-bolt with four hex nuts.
 - e. An 1/8" thick EPDM strip with a length equivalent to the circumference of the pipe. The strip shall be placed between the pipe and the angle iron and U-bolt.
- C. For steel tanks, the channel of the top-works weldment shall be field fit and modified to the required length. The channel shall then be field welded to the base plate.
- D. For steel tanks, the base plate shall be field welded to the tank floor or shell. The location of the base plate shall avoid welded joints in the floor/shell plates.
- E. For concrete tanks, the support shall be anchored to the concrete floor with stud type expansion anchors, the pull-out rating of the combined anchors shall be a minimum of 10 times greater than the static weight of the vertical pipe section.

- F. Plastic insulating sleeve/washers shall be utilized to isolate dissimilar metals where required

PART 3 – EXECUTION

3.1 COATINGS

Following installation of the manifold system, all carbon steel and ductile iron pipe, fittings, bolted connections, pipe supports, and appurtenances shall be coated according to the interior tank paint specification as specified by the Engineer.

- A. Surface preparation and coating procedures shall be provided by the Engineer and the coating supplier.
- B. Tideflex and Waterflex Valves shall not be coated. The valves shall EITHER BE MASKED OR BE mounted after coating of the tank and piping. Contractor to ensure masking materials are removed after coating.

3.2 DELIVERY, STORAGE, AND MATERIAL HANDLING

- A. Individual nozzles and outlet valves shall be packaged separately from the piping equipment.
- B. All flanges shall be protected by using plastic inserts or plank wood, pipe sections are to be fully supported to prevent pipe deflection or damage to fittings or connections.
- C.
- D. All equipment shall be shipped on pallets capable of fully supporting the pipe sections across their entire length. Pallets should be accessible for fork lift transport or strap and hoist means without causing any load to the pipe equipment.
- E. All stainless steel components shall be stored separately away from any carbon steel components or other materials that could stain or deface the stainless steel finish from run-off of oxidized ferrous materials.
- F. All pipe equipment should be covered and stored in areas free from contact with construction site sediment erosion to prevent accumulation of materials within the pipe and fittings.
- G. Duckbill nozzles should be protected from contact with rigid objects during handling and storage. The contractor shall be responsible for replacing any duckbill nozzles or elastomeric components that are damaged after arrival on the site through installation and start-up of the system.

3.3 INSTALLATION

- A. Installation of the manifold system shall be in accordance with the installation plans and guidelines provided by the HMS manufacturer, and as specified in the installation section of the IOM manual, and the requirements defined in these specifications.

3.4 INSTALLATION INSPECTION AND START-UP TESTING PROCEDURES

- A. The HMS manufacturer's authorized representative shall provide one (1) day inspection to verify that the system has been installed in accordance with the design specifications and installation drawings. It is recommended the flow testing described below is conducted the same day once the representative confirms proper installation of the system.
- B. The inspection representative shall provide signed inspection documents confirming the date of the inspection and approval of the installation.
- C. Start-Up Flow Testing
 - a. Following installation of the complete manifold piping system, the contractor shall open the upstream isolation valve to allow flow into the tank through the manifold system. The isolation valve must be opened slowly to prevent surge or over-pressurization of the manifold system. The isolation valve must be fully opened to inspect the flow characteristics of the manifold system.
 - b. The contractor shall take videos and photos during the filling operation and submit them to the HMS manufacturer. Videos and photos are to confirm:
 - 1. There is no leakage in the piping system.
 - 2. That all of the duckbill inlet nozzles are discharging flow into the tank. The only exception is for a system where the duckbill nozzles are at different elevations. If the water level is not at the elevation of higher duckbill nozzles, those may not discharge flow until the water level approaches those nozzles.

3.5 WARRANTY

- A. All piping, pipe supports, expansion joints, and anchors shall be warranted by the HMS manufacturer against failure under design conditions for a period of one (1) year from the date of final installation certification.
- B. Duckbill inlet nozzles and perforated disc/elastomeric membrane outlet check valves shall be warranted by the manufacturer against failure under design operating conditions for a period of one (1) year from the date of final installation certification. Elastomer components damaged as a result of maintenance activities, foreign debris, or excessive exposure to direct ultraviolet and thermal radiation shall be excluded warranted coverage.

PART 4 – MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. The work described herein will be measured for payment as Lump Sum item.

4.2 PAYMENT

- A. Payments for these items will be paid at the contract lump sum price stated in the Schedule of Pay Items. Payments shall constitute full compensation for all materials,

equipment and incidentals to satisfactory complete the work.

END OF SECTION

**SECTION 13300
WELDED STEEL TANK**

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Design, engineering, fabrication, and erection of a new 120,000 gallon welded steel tank, and includes designing, furnishing, erecting, painting, testing, cleaning, and disinfecting. Tank shall conform to AWWA D100-11 (most recent standard revision) and as specified herein.
- a. General – The construction of new 120,000 gallon welded steel water storage tank; shall include but not limited to, installation of a new reinforced concrete ringwall foundation; furnishing all labor, materials, equipment, and methods, excepting all labor, materials, equipment, and methods specifically stated as being furnished by others, in order to provide the Owner with a complete, correctly upgraded water storage tank with specified appurtenances, in accordance with these Detailed Technical Specifications, and Drawings. Contractor shall be required to meet all applicable provisions of AWWA Standard D100-11 for welded steel water storage tank.
- b. Steel Plates – All steel plate furnished under these specifications shall be “prime” quality material manufactured by an approved steel mill. All steel plate furnished shall be accompanied by mill certificates prepares by the manufacturer. Both the mill certificates and the steel plate shall be free of gouges and/or waves. No “secondary” quality steel, such as end of mill runs, etc., is allowed.
- c. Water Testing - Contractor shall be responsible for a 24-hour water test of the tank and appurtenances, and he shall check all materials installed, making any repairs and/or adjustments necessary in order to provide the Owner with a correctly functioning water.
- d. Tank Level Controls and Telemetry System – The submersible level transducer will be furnish and installed by SAWCO. Tank levels and alarms will be remotely control by PLC installed at the Booster Station Site. The District SCADA system via Ethernet radio will provide communication between tank site and booster station site. Programing of SCADA related equipment will be performed by the District’s SCADA Consultant.

1.02 REFERENCED SECTIONS

- A. The following Sections are referenced in this Section
1. Section 01300 – Submittals
 2. Section 03300 – Cast-in-Place Concrete
 3. Section 09961 – Coating Systems
 4. Section 09962 – Steel Tank Interior and Exterior Coating
 5. Section 11268 – Reservoir Hydrodynamic Mixing System

1.03 QUALITY ASSURANCE

A. Erection Contractor Qualifications

1. Tank shall be designed, engineered, and stamped by tank fabricator/erector who has minimum ten years' experience. Tank Contractor must carry Errors and Omissions (Professional Liability) insurance of not less than \$2.0 million dollars.
2. All work in connection with design, engineering, fabrication, and erection of the tank(s) shall be performed by a competent and experienced Tank Contractor with California Class A license, registered with the Department of Industrial Relations (DIR), and minimum ten years' experience.
3. The Tank Contractor must have previously constructed a minimum of ten welded steel water storage tanks of a similar size or larger.
4. Below are preapproved to bid this project for tank design, engineering, fabrication, and erection. **To be considered an 'or-equal', tank Contractor must submit his qualifications to Owner's for pre-approval a minimum of 14 calendar days prior to bid opening:
 - a. Paso Robles – Brown Minneapolis Tank, Inc.
 - b. Chicago Bridge and Iron, Inc.
 - c. Caldwell Tank, Inc.
 - d. Associated Tank Constructors, Inc.
 - e. Or Equal**

B. Design Responsibility

1. The Tank Contractor shall provide certification, signed by a California Registered Civil or Structural Engineer, stating that all members, elements and connections of and to the tank are designed to withstand required loads and forces. Certification shall list the codes and specifications to which structural design conforms. Tank construction drawings, noted under Submittals of these specifications, shall bear the stamp of a California Registered Civil or Structural Engineer. Tank Contractor shall provide with bid documents a copy of Professional Liability insurance of not less than \$3.0 Million coverage (minimum).

C. Welding

1. Welding terms are as defined in AWS Standard Welding Terms and Definitions. Procedure specifications, procedure qualification tests, and welder's performance tests shall be in accordance with latest provisions of either AWS Standard Qualification Procedure or ASME Boiler and Pressure Vessel Code, Section IX Welding Qualifications.
2. Requalification tests shall be required for welders that have not been using required welding procedures during previous six-month period.

3. Protection shall be provided against radiation from arc where arc-welding operations might be viewed within harmful range by persons other than actual welders and welding operators.
 4. Items of equipment for welding and oxygen cutting shall be so designed, manufactured and in such condition as to enable qualified welders and welding operators to follow procedures and attain results specified.
 5. General requirements for materials, design, shop fabrication, erection, welding, testing, and accessories shall conform to American Welding Society Standards and AWWA Standard for Welded Carbon Steel Tanks for Water Storage, Designation AWWA D100-11, except as otherwise noted. AWWA D100-11, Section 14 shall not be used.
- D. Erection of the tank is to be by the tank manufacturer. The tank erector must be fully responsible for the entire installation including tank erection, and the ultimate water tightness of the complete installation.

1.04 REFERENCES

- A. This section contains references to the following documents. They are a part of this section as specified and modified. The latest edition of referenced publications in effect at the time of the bid shall govern. In case of a conflict between the requirements of this section and those of the listed documents, the more restrictive requirements shall govern.

Reference	Title
AISI	Pocketbook of AISI Standard Steels
ASTM A36/A36M	Standard Specification for Carbon Structural Steel
ASTM A105	Standard Specification for Carbon Steel Forgings for Piping Applications
ASTM A123	Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A153	Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A307	Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength
ASTM A992	Standard Specification for Structural Steel Shapes
ASTM C33	Standard Specification for Concrete Aggregates
ASTM C40	Standard Test Method for Organic Impurities in Fine Aggregates for Concrete
F3125/F3125M	Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions
AWWA C200	Standard for Steel Water Pipe, 6 Inch and Larger
AWWA C205	Standard for Cement-Mortar Protective Lining and Coating for Steel Water Pipe, 4 in. and Larger, Shop Applied
AWWA C206	Standard for Field Welding of Steel Water Pipe
AWWA C207	Standard for Steel Pipe Flanges for Waterworks Service, Sizes 4 In. Through 144 In.

Reference	Title
AWWA C652	Standard for Disinfection of Water Storage Facilities
AWWA D100-11	Standard for Welded Carbon Steel Tanks for Water Storage
AWWA D102-14	Standard for Coatings Steel Water Storage Tanks
Cal/OSHA	California Occupational Safety and Health Act
CBC	California Building Code
NSF/ANSI 61	Drinking Water System Components – Health Effects
UL 96A	Standard for Installation Requirements for Lightning Protection Systems

1.05 SUBMITTALS

- A. General – Contractor shall submit to the Owner for approval, prior to commencing construction:
- a. The complete design calculations required in the Special Conditions herein. All submittals shall include both completed design calculations and complete drawings submitted together and signed by a civil engineer registered in the state of California.
 - b. Complete detailed drawings of the tank showing connection details, appurtenances details, dimensions, sizes, thicknesses of plates and members; details of welded joints; fabrication and erection of steel work; bill of materials; including all accessories and other pertinent data.
 - c. The shop drawings shall show concrete foundation height, width, circumference (inside and outside), number and size of reinforcement, anchor bolt size and location, construction and erection details of all accessories and related work, and all other pertinent data concerning the construction of the tank foundation.
 - d. Horizontal and vertical loadings, erection and settlement tolerances, and maximum loads imparted to the foundation and estimated weight of tank.
 - e. Structural calculations of the tank and accessory items, including tank anchor bolts, prepared and signed by a Civil or Structural Engineer currently licensed in the State of California. The name and address of the responsible engineer shall appear on the cover of the submitted calculations. The submittal shall include a description of structural design, loading conditions, seismic anchorage calculations and details, and codes used in establishing the allowable stresses and safety factors.
 - f. Catalog cuts and descriptions of standard manufactured items.
 - g. Complete manufacturer's data on shop prime coatings in accordance with Section 09962.
 - h. AWS or ASME Section IX reports certifying that welding procedures, welder, and welding operators are qualified, prior to any construction.
 - i. Actual welding procedures for review prior to start of construction.

- j. Two copies of test results for Procedure and Welder Certification properly certified in accordance with AWWA Standard D100-11, Paragraph 8.2.1 and 8.2.2.1.
 - k. Written report upon conclusion of field welding and testing concerning quality of field welding and in accordance with AWWA D100-11, Section 11.2.
 - l. Radiograph Evaluation Report: Certified copies, in duplicate.
 - m. Submittals shall verify compliance with the Contract Documents, and shall include drawings and descriptive information in sufficient detail to show the kind, size, arrangement, and the operation of component materials and devices; the external connections, anchorages, and supports required; the performance correlation with other materials and equipment. When an item consists of components from several sources, Contractor's initial submittal shall be complete including all components.
 - n. All submittals, regardless of origin, shall be stamped with the approval of Contractor and identified with the name and number of this Contract, Contractor's name, and reference to applicable specification paragraphs and Contract Drawings. Each submittal shall indicate the intended use of the item in the Work. When catalog pages are submitted, applicable items shall be clearly identified and inapplicable data crossed out. The current revision, issue number, and date shall be indicated on all drawings and other descriptive data.
 - o. Contractor shall be solely responsible for the completeness of each submittal. Contractor's stamp of approval is a representation to Engineer that Contractor accepts sole responsibility for determining and verifying all quantities, dimensions, field construction criteria, materials, catalog numbers, and similar data, and that Contractor has reviewed and coordinated each submittal with the requirements of the Work and the Contract Documents.
 - p. Six (6) copies of each drawing and the necessary data shall be submitted to Engineer. Engineer will return two marked copies (or one marked reproducible copy) to Contractor. Facsimile (fax) copies will not be acceptable. Engineer will not accept submittals from anyone but Contractor. Submittals shall be consecutively numbered in direct sequence of submittal and without division by subcontracts or trades. Shop drawings shall be submitted with promptness and in an orderly sequence so as to cause no delay in prosecution of the work.
 - q. Contractor shall accept full responsibility for the completeness of each resubmittal. Contractor shall verify that all corrected data and additional information previously requested by Engineer are provided on the resubmittal.
2. Use of Computer Programs - Should the Contractor use a computer program for the said design calculations, the output shall be of a form that easily facilitates checking

(i.e. intermediate steps in each calculation shall be provided). Computer output with the selected design member only will not be acceptable.

3. Additional Required Submittals – In addition to the tank shop drawings and calculations, Contractor shall submit to the Owner for approval, within the time-frame outlined above, the following data concerning this contract:
 - a. Concrete mix design and take off of reinforcing bar requirements, including concrete forming.
 - b. Certified sieve analysis of Class II base material (if needed).
4. Contractor Responsibility – The Owner’s approval of the Contractor’s submittal shall not relieve the Contractor from having the entire responsibility for the correctness of details and dimensions. The Contractor shall assume all responsibility and risk for misfits due to any errors in the Contractor’s submittal data.
5. Deviations – All deviations from the Contract Documents shall be identified as deviations on each submittal and shall be tabulated in Contractor’s letter of transmittal. Such submittals shall, as pertinent to the deviation, indicate essential details of all changes proposed by Contractor (including modifications to other facilities that may be a result of the deviation) and all required piping.
6. Commencement of Work - No portion of the work requiring a shop drawings submittal shall be commenced until the submittal has been reviewed by the Engineer and returned to the Contractor with a notation indicating that resubmittal is not required.
7. Engineer’s Review
 - a. Engineer’s review of submittals covers only general conformity to the Drawings and Specifications, external connections, and dimensions that affect the layout; it does not indicate thorough review of all dimensions, quantities, and details of the material, equipment, device, or item covered.
 - b. Engineer’s review shall not relieve Contractor of sole responsibility for errors, omissions, or deviations in the drawings and data, nor of Contractor’s sole responsibility for compliance with the Contract Documents.
 - c. Engineer’s submittal review period will be fifteen (15) consecutive number of calendar days and shall commence on the first calendar day following receipt of the submittal or resubmittal back to the Contractor shall not be considered a part of the submittal review period.
8. Resubmittals
 - a. When corrected copies are resubmitted, Contractor shall direct specific attention to all revisions in writing and shall list separately any revisions made other than those called for by Engineer on previous submittals. Requirements specified for initial submittals shall also apply to resubmittals. Resubmittals

shall bear the number of the first submittal followed by a point number (1.1, 1.2, etc).

- b. When resubmittals are needed, resubmittals shall be made within fifteen (15) days of the date on the letter returning the material to be modified or corrected as required, unless within the number of days, as required. Contractor submits an acceptable request for an extension of time, listing the reasons why the resubmittal cannot be completed within the stipulated time.
- c. The need for more than one resubmittal, or any other delay in obtaining Engineer's review of submittals, will not entitle Contractor to extension of the Contract Times unless delay of the Work is the direct result of a change in the Work authorized by a Change Order or failure of Engineer to review and return any submittal to Contractor within the specified review period.

1.06 DESIGN CRITERIA

A. General – The data included herein is specific to the welded steel tank to be upgraded under this Contract for the Owner.

B. Tank Data –

- a. Nominal Capacity = 0.12 MG
- b. Nominal Diameter = 32 Feet
- c. Nominal Shell Height = 25 Feet
- d. Floor Elevation; Top Elevation of Ringwall = 2664.50 Feet
- e. Overflow Lip Elevation (High Water Level, HWL) = 2684.50 Feet
- f. Centerline Pipe Elevation of Side Drain = 2666.75
- g. Centerline Elevation of 1 ¼" Shell Outlets = 2667.0 Feet
- h. Side Drain Diameter = 8 Inches
- i. Inside Overflow Diameter = 24 inch with cone reducer down to 12 inch pipe.
- j. Press Brake Roof to be utilized.

C. WATER STORAGE SEISMIC DESIGN.

1. Seismic – The Contractor's seismic calculations shall be based upon AWWA D100-11, Section 13. The tank shall be checked for overturning moment, shell compression force, and hydrodynamic seismic hoop stresses. The tank shall be anchored. The appropriate seismic coefficients and shall apply as minimums in the calculation for the overturning Moment, "M"
2. Buckling – The Contractor shall perform buckling calculations with respect to wind loading requirements stated herein, in accordance with AWWA D100-11, with the safety factor incorporated therein. In addition, the Contractor shall perform buckling calculations, with respect to seismic loading requirements stated herein, and per AWWA D100-11 Section 13 with pressure stability not considered.
3. Tank Shell Thickness – For the static condition, the thickness of cylindrical shell plates stressed by pressure of the tank contents shall be computed per the formula set forth in AWWA D100-11 Sec. 3.7, "Cylindrical Shell Plates". For the

hydrodynamic condition, seismic hoop tensile stresses shall be determined per Section 13.5.4.2.3 for the specified vertical acceleration.

4. Design Freeboard – The design freeboard for the tank (distance between maximum shell heights to the maximum water level) is 5'-0". For sloshing calculations operational, normal maximum operation water level (MOL) is 1.0 feet below overflow height per Agency water level records. Therefore, the tank will have a MOL of 20.0 feet for sloshing calculation purposes.
5. Allowable Soil Bearing – The reinforced concrete ringwall and other reinforced concrete footings shall be designed based upon an allowable soil bearing of 3,000 psf for dead plus live loads as specified in the Preliminary Geotechnical Investigation, Prepared by LOR Geotechnical Group, Inc., dated December 5, 2016.
6. Corrosion Allowance and Steel Thickness
 - a. Provide corrosion allowance of 1/16-inch added to all steel plates and shapes in contact with water.
 - b. Provide shell, bottom, and annular plates not less than 5/16-inch thick including corrosion allowance.
 - c. All other steel plates and shapes shall be minimum 1/4-inch thick, including the corrosion allowance. This includes and is not limited to tank roof, roof structure, and columns.
 - d. Where required per tank manufacturer design, provide additional thickness above specified minimum steel thicknesses for earthquake or wind loads.

1.07 WARRANTY

- A. The tank manufacturer must include a warranty on tank materials and workmanship for a specified period. As a minimum, the warranty must provide assurance against defects in material, coatings and workmanship for a period of five (5) years after Notice of Acceptance has been issued or tank placed into service (whichever comes first).
- B. Anniversary inspection requirements and failure criteria shall be in accordance with AWWA D102, Section 5, except as modified herein.
 1. A first anniversary warranty inspection will be conducted by the Owner, approximately eleven (11) months from the date of recording the Notice of Acceptance. The Owner shall establish the date of the inspection and will notify the Contractor at least thirty (30) calendar days in advance of the inspection. The tank will be drained for the inspection by the Owner.
 2. The fifth-year warranty will be conducted by the Tank Contractor, approximately eleven (58) months from the date of recording the Notice of Acceptance. The Owner shall establish the date of the inspection and will notify the Contractor at least thirty (30) calendar days in advance of the inspection. The tank will be dove by certified diver per AWWA D101 with NACE III inspector. Report to be provided by Tank Contractor within 14

calendar days of dive. All repairs (See paragraphs D through H below) will be responsibility of Tank Contractor within 60 days of inspection report.

- C. The Contractor shall furnish ventilation, scaffolding, and lighting equipment as necessary for warranty inspections, and shall be present for such inspections.
- D. Inspection Report:
 - 1. The Owner will prepare and deliver to the Contractor a report of the warranty inspection, prior to the expiration of the 12-month warranty period.
 - 2. The inspection report will set forth the number and types of failures observed, the percentage of surface area where failures have occurred, and the names of the persons making the inspections.
 - 3. Photographs or reports of the coating imperfections or failures shall be considered acceptable evidence of failure.
- E. Failure:
 - 1. Any location where coating has delaminated, peeled, blistered, or cracked; and any location where rusting is evident will be considered a failure of the coating system, unless, in the opinion of the Owner, the location in question is inaccessible per AWWA D102-06, Section 5.2.3.
- F. Remedial Work:
 - 1. Repair all failures by removing the deteriorated coating, cleaning the surface, and recoating with the same system in accordance with this Section.
 - 2. With the approval of the Owner, surface preparation of small failures (areas less than 1 sq./ft) may be made by cleaning to bare metal in accordance with appropriate SSPC-SP standards.
- G. Schedule of Remedial Work:
 - 1. The Owner shall establish a starting date and reasonable time of completion for the remedial work. The starting date shall be no more than thirty (30) calendar days after the submittal of the inspection report to the Contractor.
 - 2. Should the Contractor fail to start the remedial work within ten (10) calendar days after the starting date established by the Owner, the Owner may at its option perform the remedial work, and the Contractor shall pay the Owner the actual cost of such work, plus 20 percent to cover added engineering and administrative cost.
- H. Upon completion of inspection and any necessary repairs the Owner shall disinfect the tank, fill with water, and sample water to confirm compliance with State Health Department Drinking Water Standards.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Tank Foundation (Concrete Ringwall)

1. Tank Foundation – The minimum requirement for the tank foundation shall meet requirements set forth on the Drawings. The proposed ringwall is to be constructed in one continuous pour. Quantities and sizing for circumferential, top and bottom reinforcing steel shall be, as a minimum as shown on the Structural Sheets. Contractor shall submit ringwall foundation design for approval by Owner. The minimum requirements of installation of concrete ringwall shall comply with the Structural Sheets. The concrete ringwall shall be designed and constructed in accordance with the highest and most stringent requirements, but no less than the specified minimum requirements. The tank shall be anchored to the ringwall with anchor rods as shown on the Structural Sheets and the anchor chair design shall correlate with the anchor rod design. Anchor chair assemblies shall be designed in accordance with AWWA D100-11. Contractor shall provide signed and stamped design details and calculations for review and approval by the Engineer.
2. Reinforcing Steel – All reinforcing steel for the concrete ringwall(s) and foundations shall be 100% tied, or as directed by the Owner or Field Inspector.
3. Forming – Unless otherwise approved by Owner, ringwalls shall be full formed (with chamfer installed in forms) as approved by Owner using $\frac{3}{4}$ " plywood adequately braced Use snap tie bolts for spacers; or other method as approved by the Owner. Earth forms may be used for footings only where the soil is firm and stable and the concrete will not be exposed. Where earth forms are to be used, excavations shall be cut near and accurate to size for placing of concrete directly against the excavation.
 - a. Any movement or bellying of forms during construction of variations in excess of the tolerances specified will be considered just cause for the removal of such forms and, in addition, the concrete work so affected.
 - b. Reconstruction of forms and new concrete (including disposal of rejected materials) shall be furnished at no additional cost to the Owner.
 - c. Two (2) working days prior to pouring concrete, Contractor shall notify Owner so that forms can be checked by survey crew for correctness of elevation.
 - d. Concrete shall not be ordered until forms are approved by inspector for concrete placement.
4. Concrete – Concrete for ringwall shall meet the compressive strengths listed on the Structural Sheets.

5. Ringwall Tolerances – Ringwall shall be level within $\pm 1/8$ " in any 30-foot circumference under the shell.
 - a. The levelness on the circumference shall not vary by more than $\pm 1/4$ " from any established plane.
6. Oil Sand/Class II Base For Tank – The oil-sand mixture and Class II base material shall conform to the applicable sections of the State of California Department of Transportation Standard Specifications, 2015 or latest edition, and shall have the following characteristics:
 - a. Oil-Sand Mixture – The oil-sand mixture shall be plant mixed asphalt-sand, with sand mix base, No. 4 maximum gradation per Section 39-2.02 of Caltrans Standard Specifications, mixed with 7% ($\pm 1\%$) by weight SC 800 liquid asphalt per Section 93-1.01. Mixing, transporting, and placing of the asphalt-sand plant mix shall be in accordance with all applicable provisions of Section 39.
 - b. Aggregate Base – The aggregate base shall consist of Class II base material conforming to the specifications – $3/4$ " maximum gradation per Section 26-1.02B of Caltrans Standard Specifications.
 - c. Tolerances – The top of the oil-sand foundation shall be smooth and level within plus or minus $1/8$ " in any 30' circumferential length. No point in the circumference of the foundation shall vary more than plus or minus $1/4$ " from the average elevation.
7. Concrete Pour Procedure – Concrete pouring procedure and sequence shall be approved by Owner no less than two working days prior to beginning of all pours.
8. Concrete Requirements
 - a. At least two vibrators, as approved by Owner, will be required to be utilized at jobsite (1 additional vibrator shall be provided at jobsite as a standby).
 - b. Unless otherwise approved by Owner, Contractor shall use pumpers for concrete pour(s).
 - c. The approved concrete mix delivered jobsite shall all be from the same plant.
 - d. Reinforced concrete ringwall shall be allowed to cure for at least seven (7) days prior to installation of Class 2 base and oil-sand foundation.

B. Tank

1. Tank General

- a. Tank plate shall be of hot rolled steel conforming to ASTM A36 and supporting framework shall conform to ASTM A992, all free of scale, pitting, or other surface defects.

- b. Nonstructural steel bars, angles, clips, and similar items shall comply with ASTM A36.
 - c. Steel bolts shall comply with ASTM A325, Grade A.
 - d. High strength steel bolts shall comply with ASTM F3125.
 - e. Steel assemblies and welding shall meet the requirements of Section 8 of AWWA D100-11.
 - f. Steel water pipe 6 inches and larger in diameter shall comply with AWWA C200, Section 15150. All steel water pipe shall be cement mortar lined per AWWA C205 except water pipe to be welded to the bottom plates shall be epoxy lined in accordance with Section 09900. Flanges shall conform to AWWA C207. Welding shall be in accordance with AWWA C206.
 - g. Steel Prime Coats: Designated metal surfaces shall be prime coated in accordance with Section 09962.
 - h. Prior to erection of tank, all steel surfaces made inaccessible after erection (except underside of bottom plates) shall be cleaned as specified herein and shall receive the coating/paint system for the specific area. This includes, but is not limited to, metal to metal contact areas, e.g. bolted joints, and inaccessible areas, e.g. interior of overflow pipe, stilling wells and interior/exterior of drain pipe.
 - i. A tank bearing pad shall be installed on top of the concrete encasements and column foundations as shown on the Drawings. The bearing pad shall consist of asphalt impregnated cellular fibers and shall be Fiber Expansion Joint as supplied by W.R. Meadows, Inc. or approved equal.
 - j. Non-shrink, non-metallic grout shall be installed on top of the concrete ringwall foundation beneath the tank bottom plates as shown on the Drawings. The non-shrink, non-metallic grout shall be per Section 03600.
 - k. Asphalt board or asphalt expansion joint material shall comply with ASTM D994.
 - l. Caulking mastic must be 100% solids epoxy or approved equal.
2. Tank Roof
- a. The tank roof shall be of the conical type with curved 3-foot knuckle section, with internal support beams and columns. Roof plates shall not be less than 1/4-inch thick.
 - b. Roof support column shall be tubular and hermetically sealed and shall be provided with base bearing plates. All roof plates are to be seal welded and all rafters are to be seal welded to roof plates.

- c. Center column shall be designed so that a minimum of 104" clear opening at center of tank and directly under tank center vent for elimination of all inaccessible coating areas.
- d. Bottom joints between roof plates shall be seal welded as well as all rafters to roof lengths shall be fully seal welded for their entire length with no inaccessible areas. Column base plate shall be seal-welded to the bottom plate.
- e. Design live load for the roof shall be at least 20 psf with no reduction factor allowed. Roof and its supporting members (rafters, girders and columns) are also required to be designed for the vertical acceleration force due to an earthquake. The magnitude of vertical acceleration shall be determined. Supporting columns shall also be designed for the hydrodynamic forces of an earthquake. Select roof beams with adequate lateral stiffness to prevent buckling or provide bridging.

3. Tank Shell

- a. Shell plates shall be cold rolled to the tank radius prior to the removal of mill scale. Field rolling / radius will not be permitted for any shell ring.
- b. Shell plates shall include all vertical plates and the plates used to form the curved knuckle section at the top of the shell.
- c. Horizontal and vertical joints shall be butt welded on each side with full penetration.

4. Tank Bottom

- a. The tank bottom shall be assembled by the lap joint method of construction as specified in AWWA D100-11, Section 8.

5. Tank Fabrication

- a. All tank sub-assemblies and accessories, including shell manholes, interior ladders, and overflow pipes, shall be fabricated in accordance with AWWA D100, Section 7.
- b. All exterior stairs, guard rails, brackets, hatch covers, pins and fasteners must be steel that is hot dipped galvanized per ASTM A123/153 after fabrication. HDG parts will not be field painted with tank exterior coatings

6. Tank Coatings, Filling, and Disinfection

- a. Coating system shall be applied in accordance with the requirements of AWWA D102-06 and as specified in Sections 09962.

C. TANK APPURTENANCES

1. General – The Contractor shall furnish the appurtenances described herein and on the contract drawings on the water storage tank unless specified otherwise herein.
2. Orientation For Appurtenances – The final exact orientation of tank appurtenances shall be approved by the Owner prior to installation
3. Pipe Connection:
 - a. One (1) 8" dia. side outlet drain, extra strong steel pipe, extending 18" inside tank wall with plain end and 18" outside shell with ASA 150lb. flanged end to mate gate valve per Contract Drawings.
 - b. One (1) 12" dia. Overflow, with 24" long, 24" x 12" cone reducing concentrically from top to bottom; standard weight steel 90° bends; extra strong shell penetration nozzle piping; 12" std. wt. vertical descent piping with stainless steel screen; as shown on overflow detail.
 - c. One (1) 316 S.S. Interior ladder, including fiberglass safety rail equipment (full height ladder). Safety rail clamps to be 316 S.S. and insulated by ¼" rubberized material between attachment points and the ladder.
 - d. One (1) Provide Safety Cable System: ¼" 316 S.S. wire rope around center cent with plastic sleeve and two cable leads and eye hook (plate/u-bolt arrangement) located within roof hatch. Use compression type wire rope clams with thimble at roof hatch end of cable leads and connect to eye hook with safety snap hooks (400 lb. WL)
 - e. One (1) 8" dia. side inlet/outlet; extra strong steel pipe, extending 18" inside tank wall with plain end and 8" outside shell with ASA 150lb. flanged end to mate gate valve per Contract Drawings.
 - f. One (1) 1 ¼" dia. 3000# full couplings welded to shell for sampling nozzle outlet.
 - g. One (1) 36" square Roof Hatch per contract drawings.
 - h. Two (2) 36" Dia. Access Manhole per contract drawings.
4. Outlet Reinforcement – All outlets greater than 3" in diameter shall have full plate thickness reinforcement with sizing per the A.P.I. 650 Standards.
5. Roof Vent
 - a. A properly sized vent assembly in accordance with AWWA D100 must be furnished and installed above the maximum water level of sufficient capacity so that at maximum design rate of water fill or withdrawal (3,600 gpm), the resulting interior design pressure / vacuum must not exceed +2.0 / -0.5 ounces per square inch.
 - b. The overflow pipe shall not be considered to be a tank vent.

- c. The vent cover shall be constructed of aluminum or reinforced fiberglass (FRP) and shall be so designed to prevent the entrance of birds and/or animals, or insects, or foreign materials. Vent screens shall be 16 mesh (1/16" opening size) 316 or 317 stainless steel.
 - d. Where stainless steel bolts are in contact with dissimilar metals, use insulating sleeves and phenolic washers.
6. Roof Hatch
- a. 36" x 36" hinged, spring assisted, roof hatch conforming to AWWA D100-11 shall be provided directly over the interior ladder. The hatch cover shall be ¼" aluminum and bolted to 4" carbon coated curb.
 - b. The hatch cover shall have a downward overlap of at least one inches.
 - c. The hatch shall be watertight and shall not allow any runoff into the tank interior. Provide ¼" channel gasket over hatch curb all around.
 - d. Provide hatch cover with a stainless-steel hasp for locking with a heavy-duty padlock and provisions to lock in the open position.
 - e. The hatch shall be supplied with stainless steel hardware.
 - f. The roof hatch shall be located as shown on the Drawings. The District will provide a padlock and keys.
7. Roof Guardrail – Guardrails and toe board shall be provided at roof access hatch and ladder as indicated on the project drawings.
8. Shell Access Manway
- a. Two (2) circular, 30-inch diameter shell access manways conforming to the requirements of Section 7.4.4 of AWWA D100-11, with davit supported, inward opening, dished covers shall be provided in the side wall of the tank.
 - b. The manhole shall provide a watertight seal.
 - c. Fasteners shall be hot-dipped galvanized.
9. Exterior and Interior Ladder - The ladder shall meet current OSHA requirements. A vandal guard shall be installed as detailed on the plans.

PART 3 - EXECUTION

3.01 GENERAL

- A. Tank erection shall be completed in compliance with AWWA D100-11, Section 14.

- B. Inspection of tank shall be in compliance with AWWA D100-11, Section 11 and 14 and paid for by owner.
- C. In accordance with requirements set forth by regulatory agencies applicable to the construction industry and in accordance with manufacturer's instructions, the Contractor shall provide and require the use of personal lifesaving equipment for persons working on or about the site. As a minimum, personal lifesaving equipment shall properly address protection of those persons in the following categories:
 - 1. Head and face protection
 - 2. Respiratory devices (for painting)
 - 3. Ventilation
 - 4. Sound levels
 - 5. Lighting
 - 6. Temporary ladders and scaffolding
 - 7. Welding safety practices
- D. The Contractor shall conduct all operations in a clean and sanitary manner. Special care shall be taken to keep the tank interior free of waste materials.
- E. The Contractor shall clear the area within the foundation of all leaves, trash, and other debris prior to installation of tank. All cleared materials shall be disposed of in a manner, and in areas, as directed by the District.
- F. The tank fabricator must field verify the foundation elevation and the tolerances of the in-place foundation. Any deviations must be reported to the Engineer for correction before proceeding with any work. All tank underground piping must be in place prior to the commencement of tank erection.

3.02 EARTHWORK

- A. All excavation, structural fill, and structural backfill in connection with foundation preparation and construction must be done according to the requirements of the drawings and of contract documents. All trench excavation, pipe laying, and pipe bedding and backfill must be done according to the requirements of the drawings and specifications.

3.03 CONCRETE

- A. All concrete work for tank foundations and floor slabs must be done according to contract documents.

3.04 WELDING

- A. No welding shall be allowed when surfaces are wet or when air temperature is lower than 20 degrees F, unless abutting edges of plates being welded are carefully preheated to temperature warm to hand within radius of one-foot of weld.

- B. All moisture present at point of welding shall be driven off by heat before welding commences. Where required by the approved weld procedure, wind breaks shall be provided for protection of welding operations.
- C. All welds, including tack welds in final welds shall be made by certified welder. Tack welds shall be cleaned and thoroughly fused with final weld. Defective, cracked or broken tack welds shall be removed before final welding. Tack welds shall be removed from joints where stress is primary, if welding is to be manual. Depressions, undercuts, or gouges in base metal or weld metal caused by removal of staging clips, lugs, and braces shall be filled-in with sound weld metal and ground to smooth surface even with plate or weld.
- D. Each welder's identification mark shall be placed with crayon or paint (or stamping) near welds made. All weldments shall be properly associated with welder.
- E. All weld metal shall be sound throughout, without cracks in any weld or weld pass. All welds shall be free from overlap, and base weld shall be free from undercutting. All craters shall be filled to full cross section of welds.
- F. The Contractor shall box and seal weld any areas or surfaces difficult or inaccessible for future cleaning and painting by brush, rollers, or spray methods.

3.05 FIELD QUALITY CONTROL

- A. Qualification of Welders
 - 1. The Contractor shall certify welders and welding operators in accordance Specifications.
 - 2. Keep records of welders in accordance with AWWA D100-11, Section 8.
- B. Weld Testing
 - 1. Steel tank shall be inspected and tested in accordance with provisions of AWWA D100-11. All inspections and testing shall be completed under direct observation of the District and, as they require, by inspectors representing the District of Hayward.
 - 2. Inspection of field welding shall be performed in accordance with the applicable provisions of AWWA D100-11, Section 11. The Contractor shall be responsible for inspecting and ensuring the quality of field welding. Weld quality shall be determined by spot radiographs or test segments, or both, of the number and location set forth in AWWA D100-11, Section 11 and as required herein by this specification.
 - 3. If welding is unsatisfactory or indicates inferior workmanship, Contractor shall correct all inferior welding and inferior workmanship and retest at no additional compensation.

4. At the conclusion of field welding, the Contractor shall submit a written report from a qualified, registered professional engineer registered in California certifying that the field welding was inspected in accordance with the applicable portions of AWWA D100-11. The report shall include:
 - a. A statement of welder's credentials
 - b. A summary of examination of radiographs and test segments,
 - c. Identification of unacceptable radiographs and test segments
 - d. A summary of action taken to correct unsatisfactory welds
5. The Contractor shall retain radiographs and test segments for at least three years, and shall, upon written request, make them available to the District for examination.
6. The District retains the right to hire an independent testing firm at any time at the District's sole discretion to monitor welding of the tank and to verify that the Contractor is erecting the tank in accordance with the specifications. If disagreement arises between evaluation report submitted by Contractor's employed testing laboratory and independent testing firm, Contractor may employ another independent laboratory, designated by the District, to make additional spot X-rays. If additional X-ray examinations indicate unsatisfactory welding, new tests shall be paid for by Contractor.
7. As a minimum, radiographs shall be taken at the following locations:
 - a. At tank shell joints. For welds of same type and thickness in structure, subject to primary stress, take one radiograph of first 10-feet of completed joint welded by each welder or welding operator. Thereafter, without regard to number of welds or welding operators working, take one additional radiograph of welding from each additional 40 feet and any remaining major fraction. Include 30 percent of junctures of joints subject to primary stress and secondary stress, with a minimum of ten such intersections.
 - b. 100 percent of repair welds.
8. Radiographs shall be examined and evaluated after approximately one-third, two-thirds, and at completion of welding on tank. A minimum of 16-inches of weld length shall be provided for examination for each radiograph. Two penetrameters shall be used for each film, placed at end of exposure adjacent and parallel to weld. Fluorescent type (so called calcium tungstate) screens are prohibited. Use lead screen type when using intensifying screens. Use fine-grained film or extra-fine grain film, coarse grain high-speed film is prohibited. Provide a shell plate diagram showing radiograph locations.

C. Vacuum Testing

1. After tank bottom is completely welded and bottom ring attached, all welded seams in bottom shall be tested by using strong soap solution or linseed oil

and a vacuum box. Repair and retest all seams that fail test until no leakage exists.

D. Tank Filling and Leakage Testing

1. Filling Operation

- a. After completion of field fabrication, erection and coating, the tank shall be filled with water to check water tightness.
- b. The performance of the tank shall be monitored for faults before and during filling and testing, including settlement.
- c. Fault monitoring
 - 1) Includes observation of leaks, distortions and taking levels at points marked on shell base plate around tank perimeter.
 - 2) If the fault monitoring indicates danger of tank failure, the Contractor shall immediately cease filling operations and empty the tank.
 - 3) The Contractor shall have the tank manufacturer investigate the cause of the fault and report findings to the District.
 - 4) The District may also jointly investigate the cause of the fault with its own forces or engineering consultants.
 - 5) If the District determines the fault is caused by the Contractor's failure to comply with the requirements of the Contract Documents, the Contractor shall correct the cause of the fault and repair the damage to the tank at no cost to the District.
 - 6) If the District determines the observed fault is not the responsibility of the Contractor, the District will negotiate the scope and cost of the repair with the Contractor.

2. Tank Leakage Testing

- a. Full water load maintained in tank for at least 48 hours during monitoring.
- b. Leaks, which shall be defined as any noticeable moisture on the outside of the tank when the tank is full, shall be repaired by cutting out defective welds and re-welding and restoration of the coating system.
- c. No repair work shall be done until the tank can be drained and conditions are suitable for coating damaged surfaces.
- d. Repairs and re-tests shall be made at no additional cost to the District.

E. All costs associated with testing must be paid by the Contractor.

3.06 TANK FILLING PROCEDURE

1. General – After the construction of the tank and before the filling and testing, the Owner may establish survey points on the tank for vertical control.
2. Tank Filling – The tank (complete including approved interior and exterior coating) shall then be filled to not more than one-half its full capacity and the survey points checked periodically (up to a two-week period) to assure that any settlement which may have taken place has stopped.
 - a. Maximum settlement shall be limited to one-half inch (1/2”) unless otherwise approved by geotechnical engineer.
 - b. The tank can then be filled to capacity and a final check for settlement made.
 - c. The water will be provided by others at no cost to the Contractor.

3.07 FINAL CLEANING AND CHLORINATION

1. General – The Contractor shall clean and chlorinate the completed water tank in accordance with A.W.W.A. C652 (latest), Section 4.2 Chlorination Method 2 as modified herein. Bidder shall coordinate directly with Owner regarding availability of construction water.
 - a. Disinfection shall be accomplished after protective coating has been applied to the interior surfaces and has been totally cured.
 - b. All water disposed of by the Contractor shall be dechlorinated and NPDES Permit obtained for such discharges.
2. Cleaning of Interior
 - a. Prior to disinfecting, the complete interior shall be cleaned with an approved cleaner or detergent applied via high pressure hot solution method. Immersed areas shall be scrubbed with brush or similar implement, which will apply force and pressure to the surface to completely remove residual solvents and other surface contaminants.
 - b. Cleaned surfaces shall then be rinsed with clean water. Residual water and contamination removed during washing process shall be thoroughly flushed from tank. Contractor shall obtain approval of Company prior to draining any residual water to waste. This operation shall be accomplished after completion of interior coating work as directed by the Owner.
3. Disinfection – After completion of cleaning cycle as noted above, all interior surfaces shall be jet washed with a chlorine solution having a content of 200 PPM. Chlorine solution, which accumulates on the bottom, shall be drained to waste. Contractor shall obtain approval of Company prior to draining any high strength chlorinated water to waste. Rinsing with clean water is not required unless directed by Owner.

4. Filling Of Tank and Bacteriological Testing – Once the tank has been completely filled, the tank will be isolated from the water system and the Company will take a Bac-T Test. Should the Bac-T test fail, the Contractor will be responsible for reimbursing the Owner for the water and will required to re-chlorinate the tank as described above until the Bac-T tests are negative.

3.08 TEST AND GUARANTEE

The Owner will be responsible for filling the tank with water, (as per the “Tank Filling Procedure” herein) and water-testing the tank for a 24-hour period. The Contractor shall guarantee the tank against any defect in workmanship and material for an eighteen-month period, beginning with the date of final payment, and shall make all repairs or replacements necessary by any defects, without cost to the Owner during the guarantee period.

3.09 CONSTRUCTION WATER

1. General – Water for construction, dust control, testing, compaction and other phases of the work requiring construction water will be provided by the District as described in Special Provision, Item 1.07 (B).
2. Temporary Piping – The Contractor shall furnish and install all necessary temporary piping, fittings, connections, pumps, gages, etc., required to provide approved facilities to deliver filling and testing water into the tank and, obtain construction water to be used in compacting earth backfill.
3. The District will install the temporary water meter at the construction site to monitor the water consumption during the duration of the Project.

3.10 POTHOLING OF EXISTING UTILITIES BY CONTRACTOR

1. General – The Engineer has shown from a field check and/or record research the approximate location of known underground waterline interference facilities. Other underground facilities, not shown on the Drawings, may exist.
2. Responsibility – It shall be the Contractor’s responsibility to locate, protect, preserve, etc. all existing underground or overhead facilities in accordance with other applicable provisions of the Technical Specifications, and Drawings.
 - a. Contractor shall field determine the exact location and depth of all existing underground interference and immediately notify the Owner in the event there is a conflict with the proposed pipeline alignments or grades.
 - b. Contractor shall “pothole” all utility line crossings and points of connection prior to beginning any construction. Contractor shall provide the complete potholing data information to the owner for review and approval.
3. Payment – Payment for potholing of the all existing utility crossings and connections points shall be in accordance with the specific bid item for potholing as listed on the bidding sheet, and no additional compensation shall be made therefore.

4. Adjustments In Alignment And Grade – The Owner reserves the right to make minor adjustments in alignment and grade, all at no additional cost to the Owner.

PART 4 – MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. The work described herein will be measured for payment as a Lump Sum Item.

4.2 PAYMENT

- A. Payments for these items will be paid at the contract lump sum price stated in the Schedule of Pay Items. Payments shall constitute full compensation for all materials, equipment and incidentals to satisfactory complete the work.

END OF SECTION

**SECTION 15076
PIPING AND APPURTENANCES**

PART 1 – GENERAL

1.1 DESCRIPTION

- A. This Section includes materials, testing, equipment, and installation of all pipe, fittings, valves, closure pieces, supports, bolts, nuts, gaskets, jointing materials and appurtenances as shown and specified and shall furnish and install all auxiliary piping and appurtenances as required for a complete and workable piping system in strict accordance with the plans and specifications.
1. Buried Pipe – Cement mortar lined and coated fully welded pipe
 2. Above grade pipe – epoxy lined and painted fully welded steel pipe

1.2 RELATED SECTIONS

- A. Refer to the following Specification section(s) for additional requirements:
1. Section 01300 – SUBMITTALS
 2. Section 02200 – EARTHWORK
 3. Section 03300 – CAST-IN-PLACE CONCRETE

1.3 REFERENCES

- A. ASTM A283 Low and Intermediate Tensile Strength Carbon Steel Plates, Shapes and Bars
- B. ASTM A570 Hot-rolled Carbon Steel Sheet and Strip, Structural Quality
- C. ASTM C150 Portland Cement
- D. AWWA C200 Steel Water Pipe 6 inches and Larger
- E. AWWA C205 Cement-Mortar Protective Lining and Coating for Steel Water Pipe
- F. AWWA C206 Field Welding of Steel Water Pipe
- G. AWWA C207 Steel Pipe Flanges
- H. AWWA C208 Dimensions for Fabricated Steel Water Pipe Fittings
- I. AWWA C210 Liquid Epoxy Coating Systems for Interior and Exterior of Steel Water Pipelines
- J. AWWA C213 Fusion-Bonded Epoxy Coating for the Interior and Exterior of Steel Water Pipelines
- K. AWWA C602 Cement-Mortar Lining of Water Pipelines 4-in and Larger in Place
- L. AWWA M11 Steel Pipe Guide for Design and Installation
- M. Standard Specifications Public Works Construction

1.4 QUALITY ASSURANCE

- A. Use adequate number of skilled workmen who are thoroughly trained and experienced in the necessary trades and crafts and who are completely familiar with the specified requirements and methods needed for the proper performance of the work of this section.

- B. The manufacture is responsible for the performance of all inspection requirements as specified in AWWA Standards. In addition, all pipe and fittings to be installed under this Contract may be inspected at the plant by Owner for compliance with these Specifications or by an independent testing laboratory selected by the Owner.
- C. Inspection of the pipe and fittings will also be made by the Owner or other representatives of the Owner after delivery. The pipe shall be subject to rejection at any time on account of failure to meet any of the Specification requirements, even though sample pipes may have been accepted as satisfactory at the place of manufacture. Pipe rejected after delivery shall be marked for identification and shall be removed from the job at once.
- D. All pipe and fittings shall be hydrostatically tested at the plant to 50 percent above the normal operating pressure or 150 psig, whichever is greater. If the fittings are made from hydrostatically tested pipe then only dye testing of the welds is required. Any pin holes or porous welds which may be revealed by the test shall be chipped out and rewelded and the pipe or fitting retested.
- E. Adequate strutting shall be provided so as to avoid damage to the pipe and fittings during handling, storage, hauling, and installation. The strutting shall be placed as soon as practicable after the mortar lining has been applied and shall remain in place while the pipe is loaded, transported, unloaded, installed, and backfilled at the jobsite. The strutting materials, size and spacing shall be adequate to support the earth backfill plus any greater loads which may be imposed by the backfilling and compaction equipment.

1.5 SUBMITTALS

- A. Furnish submittals in accordance with the requirements of Section 01300, SUBMITTALS.
- B. The following submittals are required:
 - 1. Shop drawings with a tabulated layout schedule showing the location of each piece, by mark number, for the entire job, method of manufacture and installation of pipe, joint details, fittings, anchorage, and any appurtenances.
 - 2. Prior to shipment of pipe, submit certified test reports that the pipe for the Contract was manufactured and tested in accordance with the AWWA standards specified herein.
 - 3. Submit weld procedure specifications, procedure qualification records including all destructive and non-destructive test results and welding bead profiles as required along with individual qualifications certificates. The Engineer shall be present during qualification of weld procedure.

PART 2 - PRODUCTS

2.1 STEEL PIPING MATERIALS

The steel pipe for water services shall conform to the latest revision of SAWCO Material Specification and shall comply with these specifications as applicable.

A. General Requirements

1. Steel pipe with nominal diameters from 4-inch to 20-inch shall conform to ASTM A 106, A 53 Grade B or A 139 Grade B standard weight class as the minimum.
2. Steel Pipe greater than 20-inches shall conform to AWWA C200 and AWWA M-11 except as modified herein or as required by the engineer for special circumstances.
3. Pipe shall be designed for a minimum of 150 psi working pressure with an additional 50% of the working pressure allowance for surge pressure unless otherwise specified. Pipe design shall be in accordance with AWWA M-11.
4. Pipe shall be designed to cover conditions as shown on the plans. The design for deflection shall be in accordance with AWWA M-11.
5. Use of an enhanced /better soil backfill to limit deflection will be allowed with approval by the engineer. (Criteria will be based on AWWA M-11)
6. Pipe for use with sleeve-type couplings shall have plain ends at right angles to the axis.
7. Pipe is to be furnished in joint lengths up to 50 ft. net laying lengths with special lengths, field trim pieces and closure pieces as required by plan and profile for location of elbows, tees, reducers and other in-line fittings. The pipe fabricator shall prepare a pipe-laying schedule showing the location of each piece by mark number with station and invert elevation at each bell end.

B. Fittings

Unless otherwise shown on the Plans:

1. All specials and fittings shall conform to the dimensions of AWWA Standard C208.
2. Pipe material used in fittings shall be of the same material and thickness as the pipe.
3. The minimum radius of elbows shall be 2.5 times the pipe diameter and the maximum miter angle on each section of the elbow shall not

exceed 11 1/4 degrees (One cut elbow up to 22 1/2 deg.).

4. If elbow radius is less than 2.5 x pipe diameter, stresses shall be checked per AWWA M-11 and wall thickness or yield strength increased if necessary.
5. Fittings shall be equal in pressure design strength.
6. Specials and fittings, unless otherwise shown on the Plans, shall be made of segment ally welded sections from hydrostatically tested pipe, with ends compatible with the type of joint or coupling specified for the pipe.
7. All welds made after hydrostatic testing of the straight sections of pipe shall be checked per the requirements of AWWA C-200 Section 5.2.2.1

C. Joints

1. Rolled-Groove Rubber Gasket Joint: the standard joint shall be rolled-groove rubber gasket joint unless otherwise noted on the plans. Rolled-grooved rubber gasket joints shall conform to AWWA C200 Standard and as shown in Chapter 8 of AWWA M-11.

The o-ring rubber gasket shall have sufficient volume to approximately fill the area of the groove and shall conform to AWWA C200.

The joint shall be suitable for a safe working pressure equal to the class of pipe furnished and shall operate satisfactorily with a deflection angle, the tangent of which is not to exceed $1.00/D$ where D is the outside diameter of the pipe in inches with a pull-out of 1 inch.

Rolled-Groove Rubber Gasket Joints may be furnished only by a manufacturer who has furnished pipe with joints of similar design for comparable working pressure. Pipe diameter, pipe length, and wall thickness that has been in successful service for a period of at least 5 years.

2. Lap weld: Lap field welded joints shall be used where tied joints are indicated on the plans. The standard bell shall provide for a 2 1/2-inch lap. The minimum lap shall be 1 inch. The design maximum joint deflection or offset shall be a 1" joint pull.

D. Mechanical Couplings:

1. Mechanical couplings where indicated on the plans shall be Romac Style 501, 400RG, Dresser style 38 or 138, Smith Blair Style 411, Baker Style 200, EBBAIRON Series 3800, or equal.
2. Insulating mechanical couplings where indicated on the plans shall be double insulated Romac, Smith Blair Style 416, Baker Style 216, or

equal.

3. Mechanical couplings shall be rated to meet or exceed the working pressures and surge pressure of the pipe.
4. Couplings for buried service shall have all metal parts painted with Epoxy paint and conform to AWWA C219.
5. Pipe ends for mechanical couplings shall conform to AWWA C200 and M-11.
6. The shop applied outside coating shall be held back as required for field assembly of the mechanical coupling or to the harness lugs or rings. Harness lugs or rings and pipe ends shall be painted with one shop coat of epoxy conforming to AWWA C210. The inside lining shall be continuous to the end of the pipe.

E. Flanges

1. Flanges shall be in accordance with AWWA C207 Class D for operating pressures to 175 psi on 4 inch through 12 inch diameter, and operating pressures to 150 psi on diameters over 12 inches; or Flanges shall be AWWA C207 Class E for operating pressures up to 275 psi; or Flanges shall be AWWA C207 Class F for pressures to 300 psi. (drilling matches ANSI B 16.5 Class 250) Shop lining and coating shall be continuous to the end of the pipe or back of the flange. Flange faces shall be shop coated with a soluble rust preventive compound.
2. Gaskets: Full face, 1/8-inch thick, cloth-inserted rubber, Garlock 3000, John Crane Co. Style 777 or equal.
3. Bolts and Nuts for Flanges
 - a. Bolts for flanges located indoors and in enclosed vaults and structures shall be carbon steel, ASTM A307, Grade B for class B and D flanges and nuts shall be ASTM A563, Grade A heavy hex. Bolts for class E and F flanges shall be ASTM A 193 grade B7 and nuts shall be ASTM A194, grade 2 H, heavy hex.
 - b. Bolts for buried and submerged flanges and flanges located outdoors above ground or in open vaults in structures shall be TYPE 316 stainless steel conforming to ASTM A193, Grade B8M, Class 1 for class B and D Flanges with ASTM 194, Grade 8M nuts. For Class E and F flanges the bolts shall be ASTM A194 grade 2H nuts with bolt and nuts to be zinc plated in accordance with ASTM B633

F. Linings and Coatings

1. Polyethylene Tape Coating

- a. Prefabricated Multi-layer Cold Applied Tape Coating - the coating system for straight-line pipe shall be in accordance with AWWA Standard C214. The system shall consist of three layers of polyethylene material with a nominal thickness of 80 mills when complete.
- b. Coating Repair: Coating repair shall be made using tape and primer conforming to AWWA Standard C209, Type II. The tape and primer shall be compatible with the tape system used for straight-line pipe.
- c. Coating of Fittings, Specials and Joints
 - 1) General – Fittings, specials and joints which cannot be machine coated in accordance with above, shall be coated in accordance with AWWA Standard C209. Prefabricated tape shall be Type II and shall be compatible with the tape system used for straight-line pipe. The system shall consist of 3 layers consisting of the following: Alternate coating methods for fittings specials and field joints would be Shrink sleeves per C-216, or paint per C-210, C-218, or C-222. The field coating shall completely encapsulate the joint bonds on o-ring joints.
 - 2) Coating Repair - Coating repair for fittings and specials shall be in accordance with the procedure described above for straight-line pipe and as recommended by the manufacturer.

2. Other Coating Systems if specified shall be governed by the appropriate American Water Works Association standard.

3. Cement Mortar per AWWA 205

a. Cement Mortar Lining of Steel Pipe

- 1) Except as otherwise provided in AWWA Standard C 205, interior surface of all steel pipe, fittings and specials shall be cleaned and lined in the shop with cement-mortar lining applied centrifugally in conformity with AWWA Standard C205.
- 2) The pipe ends shall be left bare where field joints occur as shown on the Plans. Ends of the linings shall be left square and uniform. Feathered or uneven edges will not be permitted.
- 3) Defective linings as identified in AWWA C- 205 shall be removed from the pipe wall and shall be replaced to the

full thickness required. Defective linings shall be cut back to a square shoulder in order to avoid feather edged joints.

- 4) Cement mortar lining shall be kept moist during storage and shipping.

b. Fittings:

- 1) Fittings shall be lined and coated per AWWA C205.

2.2 GASKETS

- A. Except as otherwise provided, gaskets for flanged joints shall be 1/16 inch thick laminated non-asbestos fiber, Cranite, or an approved equal.
- B. Wherever blind flanges are shown, the gaskets shall consist of 1/16 inch thick reinforced rubber which shall cover the entire inside surface of the blind flange and shall be cemented to the surface of the blind flange or as approved by the Engineer.

2.3 NUTS AND BOLTS

- A. All bolts, cap screws, anchor bolts and nuts that are buried or in contact with water shall be 316 Stainless Steel.
- B. All bolts, cap screws, anchor bolts and nuts that are above ground shall be ASTM A307 Steel galvanized after fabrication.
- C. All other hardware shall be of the size, type and number as required and recommended by the piping, or fitting manufacturer and as specified herein.

2.4 FLEXIBLE EXPANSION CONNECTION (FEC):

The FEC shall be manufactured of ductile iron per ANSI/AWWA C153/A21.53. The FEC shall have flanged connections on each end.

- A. The FEC shall be an integral double ball and socket type flexible joint combined with a sliding barrel type expansion joint providing 15 degrees of lateral deflection at each socket. A minimum 3" clearance shall be provided from the ground in the offset position. All pressure containing parts shall be lined with a minimum of 15 mils of Fusion Bonded Epoxy per ANSI/AWWA C213.
- B. The unit shall be factory tested with all manufacturer's specifications. Installation shall be in accordance with the manufacturer's requirements.
- C. The FEC shall be a "Flex-tend" manufactured by EBBA Iron Sales, Inc., or approved equal.

PART 3 - EXECUTION

3.1 GENERAL

- A. Pothole and make field measurements needed to install pipe before submitting shop drawings or ordering. Make minor changes in dimensions and alignments as needed to avoid utilities or structural conflicts.
- B. Trench Preparation: Earthwork shall be carried out in accordance with Section 02200, EARTHWORK. Pipe laying shall be scheduled so that the bell end of the pipe faces in the direction of laying. Prior to laying the pipe, the bottom of the trench shall be graded and prepared to provide uniform bearing throughout the entire length of each joint. Excavation shall be made as needed to facilitate removal of handling devices after the pipe is laid and to permit adequate access to the joints for field welding or connection operations and for application of coating on field joints.
- C. Lined and coated pipe shall be handled, stored and shipped in a manner that will prevent damage to the lining and/or coating. Pipe shall be handled with multiple wide fabric slings, padded cradles, or other devices acceptable to the Engineer, which are designed and constructed to prevent damage to the pipe coating. Metal chains, cables, tongs, metal tools, heavy objects or other equipment likely to cause damage to the pipe or coating shall not be used. The pipe shall not be rolled and shall be secured to prevent accidental rolling.
- D. All pipe and fittings, special and couplings shall be examined before installing, and no piece shall be installed which is found defective. Any damage to the coatings or linings shall be repaired as acceptable to the Owner.
- E. If any defective pipe is discovered after it has been installed, it shall be removed and replaced with a sound pipe in a satisfactory manner by the Contractor, at his own expense.
- F. All exposed piping shall be adequately supported with devices of appropriate design. Where details are shown, the supports shall conform there to and shall be placed as indicated; provided that support for all piping shall be complete and adequate regardless of whether or not supporting devices are specifically called for on the drawings.
- G. All pipe shall be fabricated in the shop in accordance with the plans, specifications and shop drawings. Field fabrication of any pipe shall not be allowed unless the Contractor has submitted, to the District, a written request to perform pipe fabrication in the field. Field fabrication of any pipe shall not be performed until approval of the Contractor's request has been received. All field fabrication work shall be inspected during fabrication and prior to installation. It shall be the Contractor's responsibility to notify the Engineer a minimum of 24 hours prior to any field fabrication work.

3.2 INSTALLATION

- A. Install pipe according to manufactures' installation and warranty requirements. Manufactures requirements for installation, application, connection, erection, maintenance, operating, cleaning, conditioning, and startup of products shall be strictly followed.
- B. Pipe shall be furnished and installed by the Contractor at the location shown on the Plans and Submittals. Each section of pipe shall be laid in the order and position shown on the laying diagrams and to the line and grade shown. Pipe shall be laid directly on the bedding material. Bumping of the pipe in the trench will not be permitted. Fabric slings and spreader bar shall be used for handling coated pipe.
- C. The Contractor shall regulate his equipment and construction operations such that the loading of the pipe does not exceed the loads for which the pipe is designed and manufactured. Sandbags shall be used to support the pipe when stockpiled.
- D. The Contractor shall permit and aid in the inspection of coating on the pipe at the time of installation and shall repair any damage before lowering the pipe into place.
- E. The Contractor shall take all necessary precautions to prevent the pipe from floating due to water entering the trench from any source, shall assume full responsibility for any damage due to this cause, and shall restore and replace the pipe to its specified condition and grade if it is displaced due to flotation.
- F. Except for short runs, which may be permitted by the Engineer, pipe shall not be laid uphill on grades exceeding 10 percent. Pipe which is laid on a downhill grade shall be blocked and held in place until sufficient support is furnished by the following pipe to prevent movement.
- G. As pipe laying progresses, the Contractor shall keep the pipe interior free of all debris. The Contractor shall completely clean the interior of the pipe of all sand, dirt, and any other debris following completion of pipe laying, pointing or joints as applicable, and any necessary interior repairs prior to testing and disinfecting the completed pipeline.
- H. At all times when the pipe laying is not in progress, open end of pipes shall be closed with tight-fitting cap, plug or other approved means to prevent entrance of animals and foreign matter into the pipe.
- I. Good alignment shall be preserved during installation. The deflections at joints shall not exceed that recommended by the manufacturer. Fittings for closures, in addition to those shown on the Drawings, shall be provided. These fittings shall be cut to fit pieces for any make up required for proper construction.
- J. Unless otherwise approved by the Owner, all metallic pipelines requiring joint bonding, including cement mortar lined and coated steel pipe (CML&C), shall be tested for electrical continuity upon completion of construction and prior to

acceptance by the Owner in accordance with Subsection 306-1.4.10 of the Standard Specifications for Public Works Construction, Latest Edition.

- K. Connections to existing closed valves or isolated sections of active domestic water mains are permissible under direct Owner inspection and approval by a Owner Engineer or Inspector. During construction and prior to pressure test, all valves will be equipped with a test plate, which will be provided by the Contractor.

3.3 Installation of Steel Pipe

- A. General: Steel pipe shall be installed as specified in Special Provision, Section 5 and as specified herein. The Contractor shall furnish all steel piping including fittings, couplings, specials, pipe supports, eyebolts, nuts, and accessories which are shown in the contract documents and as required for proper connection to existing piping. The Contractor's attention is directed to the fact that the exact location and elevation of existing piping must be determined in the field prior to fabrication of connecting piping.

All steel pipe and specials may be either milled pipe or fabricated pipe and, in either case, shall be fabricated to the sizes, dimensions and shapes as indicated in the contract documents. Unless otherwise indicated in the contract documents, all steel pipe, bends, or specials, shall have an outside diameter minimum wall thickness as specified and shown on the Drawing.

- B. Any pipe section, fitting, or special which shows dents, kinks, abrupt changes of curvature other than specified, or any other damage will be rejected. Any pipe section, fittings, or special section that has been dropped from a truck or crane will be rejected. The Contractor shall, at his own expense, replace or recondition each rejected section. All reconditioning procedures must first be presented to the Engineer for review and approval.
- C. Ends of Sections: Ends of pipe sections, bends, and specials shall be beveled for field welding, unless shown otherwise in the contract documents.
- D. Seams: All piping shall be made from steel plate rolled into cylinders or sections thereof, with not more than two longitudinal butt welds, or shall be spirally formed and butt welded. Girth seams shall be butt welded and shall not be closer than 6 feet apart except in specials and bends.
- E. Length Tolerance: Standard and special sections shall be within 1/16 inch (plus or minus) of the specified or theoretical lengths.
- F. Welded Joints: Except where ends are shown in the contract documents to be joined by mechanical couplings, all joints for steel pipe installed on the in open trench shall be welded.

Welders appointed to do welding on steel pipe shall present to the Inspector and Engineer all applicable 4F and 5G certifications. All welds shall be sound; free from embedded scale and slag; shall have a tensile strength across the weld not less than that of the thinner of the connected sections, and shall be watertight.

Butt welds shall be used for all welded joints in line-pipe assemblies and in the fabrication of bends and other specials. All welds shall be subject to pre-manufacturing inspection and available to the Inspector and Engineer upon request.

Welding for field joints shall conform to the latest provision of AWWA "Standard Specifications for Field Welding of Steel Water Pipe Joints, C206" or most applicable approved equal provision. Parties involved in the construction of main(s) shall pay special attention to the latest provision of AWWA "Standard Specifications for Field Welding of Steel Water Pipe Joints, C206, "Control of Temperature Stresses" or most applicable approved equal provision. After welding, the joints shall be prepared, primed, and painted, or wrapped in accordance with Item "Protective Coating," of these Specifications. Joint preparation shall include mechanical grinding in order to remove all slag, splatter, rough edges, and surface irregularities.

Leaks in welds shall be repaired by chipping out the defective material and re-welded. No hammering will be permitted.

- G. Protective Coatings: All steel pipe, bends, and specials shall be prepared, primed, painted, or wrapped in the field as specified in Item 2.1.F of this specification and herein.
1. Exterior Surfaces Above Ground: Exterior surfaces of all new pipe and appurtenances installed shall be thoroughly cleaned to bare metal by high speed wire brushing, scraping, or other suitable methods approved by the Engineer, given a single coat of industrial grade, rust inhibitive primer, and two finish coats of aluminum paint.
 2. Exterior Surfaces Underground: Exterior surfaces of all steel pipe, bends, and specials which are to be installed in open trench shall be thoroughly cleaned to bare metal by high speed wire brushing, scraping, or other suitable methods approved by the Engineer, given a single coat of rust inhibitive primer, and wrapped with polyvinyl tape in accordance with the latest provision of AWWA C203-91, "Protective Coatings for Steel Water Pipelines" or most applicable approved equal provision.
 3. Buried Couplings: Mechanical couplings which are to be installed underground shall be protected in accordance with Item "Protective Coatings," of these Specifications.
 4. Field Welded Joints: After installation of pipe, bends, and specials, all ends of pipe adjacent to welded field joints, including the weld proper, shall be cleaned, primed, painted or wrapped as specified for the pipe adjacent to the weld.
 5. Interior Surfaces: The interior surfaces of all steel pipe, fittings and specials shall be cleaned by sandblasting and then primed and coated with a cement mortar lining. Cement mortar-lined and coated steel pipe shall be used for mains 4 inches and larger.

6. All cement-lined steel pipe shall be prepared with the following processes:
 - a. Steel pipe shall not be tested until the factory-applied mortar lining and coatings on all piping and specials have been in place for a minimum of 14 days. Steel piping with cement mortar field applied to the interior of the pipe shall not be filled with water until a minimum of 8 hours has elapsed after the final placement of cement mortar, unless otherwise approved by the Engineer.
 - b.
 - c. Contractor to submit details of all specials, and of the lining and coating.
 - d.
 - e. Use lining conforming to the latest provision of AWWA C205 or most applicable approved equal provision, except as be noted otherwise in the contract documents.
 - f.
 - g. Cement used in mortar lining shall be Portland Cement, per the latest provision of ASTM C150 or most applicable approved equal provision, Type II or V for lining.
 - h.
 - i. Pipe shall be cement mortar lined in the shop by the centrifugal process, in accordance with the latest provision of AWWA C205 or most applicable approved equal provision.
 - j.
 - k. Cement mortar-lined pipe shall be braced as required to maintain roundness during the shipping and handling activities and shall have ends capped prior to shipment. For pipe 14 inch nominal diameter and larger, the finished ID after lining shall be the nominal size. For pipe 12 inch nominal diameter and smaller, standard OD pipe sizes shall be furnished.
- H. Trench, Bedding and Backfilling: All trenching, bedding and backfilling for steel piping to be laid in open trench shall be in accordance with the requirements specified in Special Provision, Section 2 and as specified herein.

3.4 FIELD WELDING

- A. All field welding shall be in accordance with the requirements of AWWA C206 and the American Welding Society and field welding shall be done by welders certified for this contract.
- B. Field welds, connections and damaged areas shall be epoxy coated, finished painted and patched using the same materials as originally applied, and in accordance with manufacturers' instructions.
- C. All joints in welded steel pipe shall be circumferentially welded in the field using slip-bell joints or butt-welding straps. Where butt straps are used, 5 inch diameter hand holes shall be provided to facilitate repair of the mortar lining.

3.5 COMPLETION OF MORTAR JOINTS

- A. In case of mortar coated pipe, after the welding is completed and inspected by the Engineer, the outside annular space between pipe sections shall be completely filled with grout. The grout shall be poured in such a manner that all exposed portions of the metal joint shall be completely protected with cement mortar. Grout used on the outside of joints shall be a fixture of 1 part of cement to 3 parts of sand by weight, and shall be sufficiently fluid to permit it to be poured into the joint spaces. It shall be poured down one side of the pipe and allowed to flow up the other side. The outside mortar joints shall be properly formed by the use of heavy-duty diaphragms as manufactured by Industrial Specialties, El Monte California, or approved equal.
- B. Where butt-straps or closure pieces are used, both the interior and exterior surfaces of the butt-straps or closure pieces shall be given a coating equivalent to the factory-applied cement mortar coating and in such cases shall be reinforced with wire mesh. Any interior cement mortar lining shall be similarly reinforced where the exposed length of the butt-strap or closure piece, as measured between the ends of connected pipe sections exceeds 4-inches.
- C. Backfill the trench before applying interior lining at field welded joints.
- D. In the case of mortar lined pipe in sizes smaller than 24 inches in diameter, hand holes shall be used.
- E. Working inside the pipe, remove foreign substances which adhere to the steel joint rings, clean them, and pack cement mortar into each joint. Before placing the joint mortar material against the surfaces of the lining, the surfaces shall be carefully cleaned, have all soap removed, and then be wetted to provide a good bond between the lining and the joining mortar. Finish the surface with a steel trowel to match the adjoining pipes.
- F. Remove excess mortar and other construction debris from the pipe interior.

3.6 PIPELINE CLOSURE ASSEMBLIES

- A. Center the shaped steel butt straps over the ends of the pipe sections they are to join as shown on the Plans. No angular deflections will be allowed at butt-strap joints.
- B. Cement mortar line closure assemblies to a thickness at least equal to the adjoining pipe sections.

3.7 CLEANING, DISINFECTION AND TESTING

- A. The Contractor will only be allowed to perform a pressure test on a water line when all valves adjacent to active water lines are protected with a test plate.
- B. Disinfect and test the pipe in accordance with Section 15040, PRESSURE TESTING, DISINFECTION AND FLUSHING OF PIPELINES.

PART 4 – MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

A. The work described herein will be measured for payment as Lump Sum Items.

4.2 PAYMENT

A. Payments for these items will be paid at the contract lump sum price stated in the Schedule of Pay Items. Payments shall constitute full compensation for all materials, equipment and incidentals to satisfactory complete the work.

END OF SECTION

SECTION 15100 VALVES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This Section includes materials, testing, and installation of manually operated valves and check valves.

1.2 RELATED WORK

- A. Section 01300: SUBMITTALS
- B. Section 15076: PIPING AND APPURTENANCES

1.3 SUBMITTALS

- A. Furnish submittals in accordance with the requirements of Section 01300, SUBMITTALS. The following submittals are required:
 - 1. Manufacturer's catalog data and detail construction sheets showing all valve parts and describing material of construction by material and specification (such as AISI, ASTM, SAE, or CDA).
 - 2. Valve dimensions including laying lengths. Show dimensions and orientation of valve operators, as installed on the valves.
 - 3. Valve linings and coatings.

PART 2 - MATERIALS

2.1 GENERAL

- A. Provide valves complete with operating handwheels, levers, chainwheels, extension stems, floor stands, worm gear operators, operating nuts, chains, and wrenches required for operation. All valves shall be new and of current manufacture. Valves shall have the name of the manufacturer and the size of the valve cast or molded onto the valve body or bonnet or shown on a permanently attached plate.

2.2 VALVES

- A. Gate Valves 3-Inches up to 12-inch: Valves shall conform to the latest revision of SAWCO approved Material List.
 - 1. General Requirement of the Gate Valve
 - a. Except as otherwise modified or supplemented herein, AWWA Standard C509-01 or the latest revision thereof, shall govern the design, component materials, construction; manufacture and testing of all resilient seated gate valves. Valves shall be suitable for frequent

operation as well as service involving long periods of inactivity. Valves shall be NSF-61 certified.

- b. The minimum design working water pressure for gate valves with nominal diameters of 3 in., 4 in., 6 in., 8 in., 10 in., and 12 in. shall be 200 psig unless otherwise specified.
- c. Valves shall be resilient-seated types, bronze mounted with non-rising stems. The closure member shall be fully encapsulated by an elastomer without thin spots or voids. When open the valve shall have a clear, full- port, unobstructed waterway.
- d. Gray iron, ductile iron, steel, brass and bronze materials shall meet or exceed the material requirements of Section 2: Materials of AWWA C509-09.
- e. Gaskets, O-rings, Coatings, and elastomers shall meet or exceed the material requirements of Section 2: Materials of AWWA C509-09.
- f. The gate valves shall be designed and constructed for installation in either a horizontal or vertical position. For buried installation, the valves shall be designed with stem in the vertical position and shall be furnished for mounting in a horizontal pipeline, unless otherwise specified.
- g. All above ground valve ends shall be furnish with flanges conforming to the American Standards for Class 150 Cast Iron Pipe Flanges and Flanged Fittings B16.1. Valve for underground installation shall be flanged and shall be furnish with flanged adapter
- h. All gate valves shall open right (clockwise), unless otherwise specified.
- i. The following parts of the valve shall be made of ductile iron: bonnet, body, yoke, wrench nut, O-ring packing plate or seal plate, and gland follower. The gate shall be made of ductile iron.
- j. Enclosed and buried valves shall be coated inside and outside with a fusion bonded epoxy having nominal 8 mils dry film thickness, which meets or exceeds AWWA C550-01 and to the maximum extent possible shall be free of holidays. All coatings in contact with the potable water shall be approved for potable water immersion service per ANSI/NSF Standard 61.
- k. The Contractor shall submit with his proposal three sets of certified drawings showing the principal dimensions, general construction and material specification of the valve proposed. The number of turns to open (close) shall be clearly noted in the valve information submitted with the proposal documents. The number of turns to open or close the valve shall be consistent for each valve size for each approved

manufacturer.

- I. Flanged Ends: The end flanges of flanged valves shall conform to dimensions and drillings of ANSI/AWWA C110/A21.10 or ANSI B16.1, Class 125. Mechanical Joint Ends: Mechanical joint bell dimensions shall conform to ANSI/AWWA C111/A21.11. Push-on Joints: Push-on joints shall conform to the requirements of ANSI/AWWA C111/A21.11.
- m. The resilient seat gate valves shall be watertight well fitted and free of structural defects.

2. Manufacturer:

As specified in SAWCO Approved Material List, gate valves furnished under this specification shall be supplied from the San Antonio Water System approved manufacturer list.

Approved Manufacturer for sizes three to twelve inches:

- a. Flanged: Resilient Seated, epoxy lined and coated, ductile iron body Gate Valves as manufactured by Mueller or American AVK.
- b. Threaded 1"-3" resilient seated, epoxy lined and coated, ductile iron body as manufactured by Mueller or American AVK.
- c. Threaded x Flange 1 ½" x2" bronze body as manufactured by Stockham.
- d. Threaded ½"-3" bronze body as manufactured by Apollo, (made in USA).

3. Testing

All gate valves shall be tested per manufacturer recommendations, as specified herein and Special Provision, Section 9.

4. Painting

All exterior and interior surfaces of the valve shall be coated with epoxy, N.S.F. 61 certified. The epoxy shall have a nominal dry film thickness of 8 mils, and shall be in accordance with AWWA C550, latest revision. Coating shall be as close to holiday free as is technologically possible.

B. Ball Valves 3-Inches and Smaller: Ball valves for water service shall conform to the followings:

1. General:
 - a. Type: Non-lubricated and capable of sealing in either direction.

- b. End Connections: Threaded or solder ends for sizes smaller than 3 inch. Class 150 flanged for sizes 3-inch and larger. Flanges shall conform to ANSI/ASME B16.1 standard.
 - c. Body: Top entry, two or three piece.
 - d. Ball: Full port.
 - e. Stem: Blowout proof (when assembled).
 - f. Stem Packing: Manually adjustable while valve is under pressure.
 - g. Shafts: Rigidly connected to the ball by a positive means. The connection shall be designed to transmit torque equivalent to at least 75 percent of the torsional strength of the shaft.
 - h. Handles: Stainless steel latch lock handle with vinyl grip and stainless steel nut designed to open and close the valve under operating conditions.
 - i. Temperature Limits: Suitable for operation between minus 20 and 350 degrees.
2. Materials:
- a. Valves in Copper Lines: Bronze body.
 - b. Valves in Steel and Ductile Iron Piping: Valves 1-1/2 inch and smaller: Type 316 stainless steel with a pressure rating not less than 300 psig WOG. Valves larger than 1-1/2 inch: Ductile iron, cast steel, or bronze.
 - c. Ball: Type 316 stainless steel.
 - d. Bolts: Type 316 stainless steel.
 - e. Seats: TFE.
 - f. Stem Seals: TFE or Viton.
 - g. Bearings: Self-lubricated, corrosion resistant material that will not contaminate potable water.
3. Manufacturers: Apollo® valves as manufactured by Conbraco Industries.

C. Air/Vacuum Valve

Valves shall be combination air and vacuum relief type and shall conform to these specifications and latest revision of SAWCO approved Material List. Combination air and vacuum relief valves shall provide for both automatic air release under system pressure and to allow air movement during filling or draining operations or water

column separation. The combination valve may be housed in a single casting. The housing shall be designed to incorporate conventional or kinetic flow principles to properly vent the air without premature closure.

1. General Requirement
 - a. Valves furnished under this specification shall conform to ANSI/NSF Standard 60 for direct additives and ANSI/NSF Standard 61 for indirect additives. And shall be manufactured per ANSI/AWWA C512 latest edition.
 - b. Ductile Iron Valve Body and cover shall be in accordance with ASTM A536 65-45-12.
 - c. Inlet sizes smaller than 3 inches shall be screwed (NPT) and shall be Flanged 3" through 8". The inlet and outlet of the valve shall have the same cross-sectional area.
 - d. Metallic Internal seat trim float arm and pivot pin shall be stainless steel type 316. Metallic Floats shall be stainless steel ASTM A 240. Other stainless steel metal internal parts shall be stainless steel ASTM A240 or ASTM A276.
 - e. Stainless steel floats shall be equipped with stainless steel type 316 fasteners and capable of withstanding maximum system surge pressure without failure.
 - f. Valve body shall have a test pressure rating of 300 psi and working pressure rating of 150 psi.
2. Manufacturers: One of the following, or equal:
 - a. Cla-Val
 - b. Crispin

2.3 PAINTING AND COATING

All exterior and interior surfaces of the valve shall be coated with epoxy, N.S.F. 61 certified. The epoxy shall have a nominal dry film thickness in accordance with AWWA C550, latest revision. Coating shall be as close to holiday free as is technologically possible.

- A. Above Ground Valves or Valves in Vaults: Coat metal valves (except bronze and stainless-steel valves) located above ground or in vaults and structures shall be a minimum of 8.0 mil fusion bonded epoxy coating inside and outside. Handwheels shall receive the same coating as the valves.
- B. Buried Valves: Coat buried metal valves and extension stems at the factory with a minimum of 8.0 mil fusion bonded epoxy coating inside and outside.

2.4 VALVE OPERATORS

- A. Operators for Exposed Valves Smaller Than 6-Inches: Provide lever or wrench operators having adjustable, open stop memory positions for exposed valves smaller than 6-inches.
- B. Operators for Buried and Submerged Valves
 - 1. Provide direct acting 2-inch square AWWA operating nuts for all buried and submerged valves less than 6-inches, and for buried and submerged gate valves less than 24-inches.
 - 2. Provide watertight shaft seals and watertight valve and actuator cover gaskets. Provide totally enclosed operators designed for buried or submerged service.
- C. Operating Torque Requirement for Buried Valves: Design operators on buried valves to produce the required torque on the operating nut with a maximum input of 150-foot pounds.
- D. Opening Direction: Valve operators, handwheels, or levers shall open by turning counterclockwise.
- E. Position Indicators: Provide valve position indicators for all above ground valves.

2.5 EXTENSION STEMS FOR BURIED VALVE OPERATORS

- A. Where the depth of the valve is such that its operating nut is more than 4-feet below grade, provide operating extension stems to bring the operating nut to a point between 24 to 36-inches below the surface of the ground and/or box cover. Extension stems shall be Type 316 Stainless steel solid core, and shall be complete with 2-inch-square operating nut. Provide stem with a 1/8-inch center guide to keep stem centered. Do not use pinned couplings.

2.6 OPERATOR WELLS FOR BURIED VALVES

- A. General: Valve operator wells shall be 8-inch Class 150 PVC c-gov.
- B. Valve Well Caps: Valve well caps shall be cast-iron or ductile iron and shall be designed to rest without a frame on a cast-in-place concrete ring surrounding the valve extension pipe. Taper the cap skirt for a close fit inside the upper sleeve portion of the valve well. Minimum weight of nominal 10-inch cap shall be 40 pounds. Color for potable waterlines shall be caterpillar yellow.
- C. Manufacturers: Valve wells for potable water lines shall be Brooks 4TT CVWD LFD, V4-T LID and valve was manufactured by J&R Concrete Products or approved equal. Valve boxes for reclaimed water lines shall be Brooks 4TT, Eisel Enterprises, Inc. H & C 4TT, or approved equal.

PART 3 – EXECUTION

3.1 JOINTS

- A. Flanged Joints: Bolt holes of flanged valves shall straddle the horizontal and vertical centerlines of the pipe run to which the valves are attached. Clean flanges by wire brushing before installing flanged valves. Clean flange bolts and nuts by wire brushing, lubricate threads with oil and graphite, and tighten nuts uniformly and progressively. If flanges leak under pressure testing, loosen or remove nuts and bolts, reseal or replace the gasket; reinstall or re-tighten the bolts and nuts; and re-test the joint. Joints shall be watertight.
- B. Threaded Joints: Clean threaded joints by wire brushing or swabbing. Apply Teflon joint compound or Teflon tape to pipe threads before installing threaded valves. Joints shall be watertight.

3.2 VALVE INSTALLATION

- A. Valves in Horizontal Piping: Unless otherwise indicated on the drawings, install valves in horizontal runs of pipe having centerline elevations 4'-6", or less, above the floor, with their operating stems vertical. Install valves in horizontal runs of pipe having centerline elevations between 4'-6" and 6'-9" above the floor with their operating stems horizontal.
- B. Valves in Vertical Piping: Install valves on vertical runs of pipe that are next to walls with their stems horizontal, away from the wall. Install valves on vertical runs of pipe that are not located next to walls with their stems horizontal, oriented to facilitate valve operation.
- C. Buried Valves: Wrap buried valves with two layers of 8-mil polyethylene wrap per AWWA C105.
- D. Valve Supports: Anchor valves in concrete as shown on the valve detail drawings. Concrete supports are not required for valves bolted to flanged pipe or fittings.
- E. Backfill: Backfill within 24-inches of valves shall be clean washed sand in accordance with the requirements of Section 02200, EARTHWORK.

3.3 VALVE BOXES

- A. Firmly support valve boxes and keep them centered and plumb over the operating nut of the valve. Do not use beveled sections of pipe at the top of the valve extension pipe. The top cut shall be square and machine made. In new tracts, and where pavement has not been placed, the valve extension risers for "key valves" shall extend well above the ground level to permit ease of location in case of emergency shutoffs. The final valve box elevation shall be flush with the finished pavement surface, or at the level shown on Drawing.

3.4 VALVE LEAKAGE TESTING

- A. Unless otherwise specified, each valve body shall be shop tested drip tight at 200 psi minimum, and shall test pressure equal to twice its design water-working pressure.
- B. Test valves for leakage at the same time that the connecting pipelines are tested.

PART 4 - PAYMENT

4.2 Measurement

- A. The work described herein will not be measured for payment.

4.3 Payment

- A. The work described herein will not be paid for separately. Payment for these items will be included in the price for pay items associated with work.

END OF SECTION