NOTICE TO CONTRACTORS,
PROPOSAL,
AGREEMENT, &
SPECIAL PROVISIONS

FOR CONSTRUCTION ON
Project No: 19-33
Dried Solids Laydown Area

IN STANISLAUS COUNTY,
TURLOCK, CALIFORNIA.

Development Services Department/Engineering Division

Phone: (209) 668 5417
Contact Person: Stephen Fremming, PE

Nathan Bray, PE
Interim Development Services Director / City Engineer

Proposals shall be delivered to Turlock, California
at or before 2:00 PM on October 2, 2019
at the office of the City Engineer,
Development Services: Engineering Division
156 S. Broadway, Suite 150
Turlock, CA 95380

Bid Set
August 9, 2019

REGISTERED PROFESSIONAL ENGINEER
NATHAN B. BRAY
76642
8/27/19
CIVIL
STATE OF CALIFORNIA

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CITY OF TURLOCK, CALIFORNIA
NOTICE TO CONTRACTORS

Sealed proposals will be received by the City Engineer of the City of Turlock, Development Services/Engineering Division, 156 S. Broadway, Suite 150, Turlock, California 95380, until 2:00 PM on October 2, 2019, for:

City Project No. 19-33
Dried Solids Storage Area

In accordance with and as described and provided in the plans, specifications and the proposed form of contract therefore, all of which are on file in the office of the City Engineer, and to which special reference is hereby made.

No verbal, telegraphic, electronic mail, facsimile, or telephone Proposals shall be considered.

Proposals are required to be complete and for the entire work, materials and improvements unless the contrary is indicated in the specifications.

In accordance with the provisions of California Business and professions Code, Section 7028, Contractor shall possess one of the following Contractor license(s) at the time of bid and for the duration of the contract:

A-General Engineering Contractor

Failure to possess the specified license(s) shall render the Bid as non-responsive, shall act as a bar to award of the contract to any Bidder not possessing said license(s) at the time of Bid opening and shall result in the forfeiture of the security of said Bidder. Furthermore, any Bidder or Contractor not so licensed shall be subject to all legal penalties imposed by law, including, but not limited to, any appropriate disciplinary action by the Contractor's License Board.

A mandatory pre-bid meeting will be held on site commencing at the Turlock Regional Water Quality Control Facility public parking lot located at 901 S. Walnut Road at 9:30 AM on September 18, 2019. Attendance is mandatory for bidders submitting a bid on the project.

Each proposal must be accompanied by cash, cashier's check, or check certified by a responsible bank, or by a bid bond, the proposed form of which is on file in the office of the City Engineer of said City and to which special reference is hereby made in a sum not less than ten percent (10%) of the total amount bid, payable to the City of Turlock as liquidated damages in the case the bidder is awarded the contract and fails within ten (10) days after the date of mailing to him by the City Engineer of a notice of award of the contract and that the contract is ready for signature to execute the above-mentioned written contract and file with the City Engineer satisfactory insurance certificates as required by the terms of said contract and satisfactory bonds as required by law for the faithful performance of said contract and for the protection of material, men and laborers. Special reference is hereby made to Sections 5100, et. seq., of the Public Contracts Code of the State of California and to the proposed forms for said bonds now on file in the office of the said City Engineer for further particulars regarding bonds.

Pursuant to Section 1773 of the Labor Code, the general prevailing wage rates in the county Stanislaus in which the work is to be done have been determined by the Director of the California Department of Industrial Relations. These wages are set forth in the General Prevailing Wage Rates for this project, available at 156 S. Broadway St, Turlock, CA 95380 and available from the California Department of Industrial Relations' Internet web site at http://www.dir.ca.gov/DLSR/PWD.

Bidders' attention is directed to the insurance requirements in the contract. It is highly recommended that bidders confer with their respective insurance carriers or brokers to determine in advance of bid submission the availability of insurance certificates and endorsements prescribed and provided herein. If an apparent low bidder fails to comply strictly with the insurance requirements, that bidder may be disqualified from award of the contract.

No proposal will be considered unless made on forms furnished by the City Engineer of said City at his office of said City. Each proposal must be sealed, and the envelope containing the same must be addressed to the City Engineer of the City of Turlock and must be plainly marked. Each proposal shall clearly identify the bidders name and address on the sealed envelope.

Each bid shall separately state in figures the price offered for the approximate quantity of each item set forth and shall also state in words and figures the total contract price. Quantities set forth in the proposal form and in the specifications are approximate only, being given as a basis for comparison of bids, and the City of Turlock does not expressly or implied agree that the actual amount of work or materials will correspond therewith, but reserves the right to increase or decrease the amount of any class or portion of the work or materials as may be deemed necessary by the City Engineer.

Proposals may not be withdrawn for a period of sixty (60) days after the time fixed for opening of proposals. The City Council of the City of Turlock reserves the right to reject any and all proposals or any part thereof and to waive any errors or informalities in any proposals and to set and act as sole judge of the merit and qualifications of the equipment, supplies or services offered.

At the request and expense of Contractor, pursuant to Division 2, Part 5, Section 22300, et. seq., of the Public Contracts Code, securities equivalent to any funds withheld as retention from progress payments made under this contract may be deposited with the City of Turlock or with a State or Federally chartered bank as escrow agent, who shall pay such moneys to Contractor upon completion of the contract.

Copies of the Contract Documents, including Instructions to Bidders, Bid Proposal forms, Plans and Specifications, may be downloaded from the engineering division’s web site or purchased for a non-refundable fee of **Fifty Dollars ($50.00)** at the Office of the City Engineer, 156 S. Broadway, Ste. 150, Turlock, CA 95380, Phone (209) 668-5520. For additional information, go to **http://www.CityofTurlock.org/capitalprojects**

The U.S. Department of Transportation (DOT) provides a toll-free “hotline” service to report bid rigging activities. Bid rigging activities can be reported Mondays through Fridays, between 8:00 a.m. and 5:00 p.m., Eastern Time, Telephone No. 1-800-424-9071. Anyone with knowledge of possible bid rigging, bidder collusion, or other fraudulent activities should use the “hotline” to report these activities. The “hotline” is part of the DOT’s continuing effort to identify and investigate highway construction contract fraud and is operated under the direction of the DOT Inspector General. All information will be treated confidentially and caller anonymity will be respected.

No contractor or subcontractor may be listed on a bid proposal for a public works unless registered with the Department of Industrial Relations pursuant to Labor Code Section 1725.5. No contractor or subcontractor may be awarded a contract for public work on a public works unless registered with the Department of Industrial Relations pursuant to Labor Code Section 1725.5.

This project is subject to compliance monitoring and enforcement by the Department of Industrial Relations. The contractors and subcontractors must furnish electronic certified payroll records to the Labor Commissioner.

The contractor shall post job site notices prescribed by regulation. (See 8 Calif. Code Reg. §16451(d) for the notice that previously was required for projects monitored by the CMU.)

DATED: 8/27/19

CITY OF TURLOCK

by: _____

Nathan Bray, PE
Interim Development Services Director /
City Engineer

PROPOSAL

City Project No. 19-33
Dried Solids Laydown Area

City of Turlock, California

DATED:_____

to: The Honorable City Council of the City of Turlock, California:

NAME OF BIDDER:_____

BUSINESS ADDRESS:_____

PLACE OF RESIDENCE:_____

Bids are to be submitted for the entire work. The amount of the bid for comparison purposes will be the total of all items. The bidder shall set forth for each unit basis item of work a unit price and a total for the item, and for each lump sum item a total for the item, all in clearly legible figures in the respective spaces provided for that purpose.

In the case of unit basis items, the amount set forth under the "Item total" column shall be the product of the unit price bid and the estimated quantity for the item. in case of discrepancy between the unit price and the total set forth for a unit basis item, the unit price shall prevail except as provided in (a) or (b), as follows:

(a) If the amount set forth as unit price is unreadable or otherwise unclear, or is omitted, or is the same as the amount as the entry in the item total column, then the amount set forth in the item total column for the item shall prevail and shall be divided by the estimated quantity for the item and the price thus obtained shall be the unit price;

(b) (Decimal Errors) If the product of the entered unit price and the estimated quantity is exactly off by a factor of ten, one hundred, etc., or one-tenth, or one-hundredth, etc. from the entered total, the discrepancy will be resolved by using the entered unit price or item total, whichever most closely approximates percentage wise the unit price or item total in the Department's Final Estimate of cost.

The Contractor shall submit the following at the time of Bid in order for the Bid to be considered responsive:

- Completed Proposal, pages . 4 – 14 .

In accordance with the annexed Notice to Contractors, the undersigned, as bidder, declares that he has carefully examined the location of the proposed work, the plans, specifications and technical requirements therefore, and the proposed forms of contract and bonds mentioned or referred to in said Notice and on file in the office of the City Engineer of the City of Turlock, together with the prevailing rate of per diem wages for each craft or type of workmen needed to execute said contract; and he proposes and agrees that if this proposal is accepted, he will furnish all labor, materials, equipment, plant transportation, service, sales taxes, permit fees and other costs necessary to complete the construction in strict conformity to the plans and specifications and he will enter into a written contract with the City of Turlock in the form of contract on file in the Office of the City Engineer for such purposes, and that he will execute and/or provide all bonds and insurance certificates required by law and/or by said contract and/or mentioned in said Notice to Contractors all in accordance with and subject to all applicable laws, and that he will take in full payment therefore the following unit prices, to wit:

BIDDING FORM

PROJECT NO.: 19-33
PROJECT NAME: DRIED SOLIDS STORAGE AREA
BID OPENING DATE AND TIME: OCTOBER 2, 2019 AT 2:00 PM
CONTRACTOR:_____

Bid Item No.	Quantity/ Units	Description	Unit Price	Total Amount
1.	Lump sum	Mobilization/Demobilization (not to exceed $100,000)	--	
2.	Lump sum	Permits and Traffic Control	--	
3.	Lump sum	Sheeting, Shoring, Bracing and Excavation Safety Measures	--	
Earthwork				
4.	6.0 AC	Clearing, Stripping and Grubbing		
5.	13,500 CY	Excavation		
6.	5,500 CY	Place and Compact Fill		
Drainage				
7.	4 EA	60-Inch-Diameter Manhole		
8.	850 LF	18-Inch HDPE Profile Wall Pipe		
9.	400 LF	24-Inch HDPE Profile Wall Pipe		
10.	9 EA	Single Grate Concrete Catch Basin		
Laydown and Washdown Areas				
11.	24,500 SF	Reinforced Concrete Washdown Area		
12.	Lump sum	Reinforced Concrete Vactor Dump Facility	--	
13.	14,000 SY	Soil-Cement Subgrade		
14.	950 CY	Reinforced Concrete Push Wall		
15.	11,000 SY	Asphalt-Concrete Paving		
16.	1,000 LF	Valley Gutter		

Bid Item No.	Quantity/ Units	Description	Unit Price	Total Amount
Permanent Project Roads				
17.	12,000 SY	Subgrade Preparation		
18.	1,840 CY	Class 2 Aggregate Base		
19.	4,960 SY	Asphalt-Concrete Paving		
20.	3 EA	Commercial Driveway Access		
21.	2,400 LF	Curb and Gutter		
Recycled Water Distribution				
22.	1 EA	Connection to Existing 8” RW Main		
23.	950 LF	6” C-900 PVC Distribution Pipe		
24.	3 EA	Fire Hydrants		
25.	10 EA	Line Valves		
Site Electrical				
26.	1,300 LF	12kV Electrical Duct Bank 4x4” and 2x2” Conduit		
27.	5 EA	4’x4’ Electrical Pull Box		
28.	750 LF	2x1” Street Lighting Conduit		
29.	7 EA	No. 5 Electrical Pull Box		
30.	4 EA	Street Lighting Base		

Bidder has examined and carefully studied the Bidding documents and other related data identified in the Bidding Documents and the following Addenda, receipt of which is hereby acknowledged.

ADDENDA

No. _____ Date _____ Signed _____
No. _____ Date _____ Signed _____
No. _____ Date _____ Signed _____
No. _____ Date _____ Signed _____

TOTAL BID WRITTEN IN FIGURES: $__,__ __ __ __ , __ __ __. __ __
TOTAL BID WRITTEN IN WORDS: _____

COMPANY'S NAME: _____

BY: _____

ADDRESS: _____
(Number) (Street)

_____
(City) (State) (ZIP)

CONTRACTOR'S PHONE #:_____

NOTE: CONTRACTOR WILL BE REQUIRED TO LIST THEIR LICENSE NUMBER, EXPIRATION DATE, AND APPROPRIATE STATEMENT REGARDING PERJURY AND SIGNED BY INDIVIDUAL AUTHORIZED TO DO SO. FAILURE TO INCLUDE THE ABOVE ITEMS MAY CAUSE SAID CONTRACTOR'S BID TO BE REJECTED.

_____, Contractor's License #_____, Class__
(Company's Name)

Expires_____. DIR #:_____

This information is true, is provided as per Section 7028.15 of the Business and Professions Code, and is made herein under penalty of perjury.

_____
(Bidder's Signature) (Date)

If the proposal is accepted and the undersigned shall fail to contract as aforesaid and fail to file with the City insurance certificates as required by said contract, within fourteen (14) days after the bidder has received notice from the City Engineer or his representative of the City of Turlock that the contract has been awarded to bidder and is ready for signature, the City of Turlock may, at its option, determine that the bidder has abandoned his contract, and thereupon this proposal and the acceptance thereof shall be null and void.

Also accompanying this proposal is an affidavit of noncollusion and questionnaire to general contractors, a statement of proposed subcontractors, if any, the address of mill, shop or office of any subcontractor, and a statement of work to be performed by subcontractors.

The names and addresses of persons interested in the foregoing proposal as principals are as follows:

(**IMPORTANT NOTICE**: If bidder or other interested person is a corporation, state legal name of corporation, also names of the president, secretary, treasurer, and manager thereof; if a partnership, state true name of firm, also names of all individual copartners composing firm; if bidder or other interested person is an individual, state first and last name in full.)

Licensed in accordance with an act providing for the registration of Contractors,
License No._____Expiration Date_____.

DATED:_____, 20_____

Address:_____

Phone:_____

_____
Signature of Bidder

NOTE: If bidder is a corporation, the legal name of the corporation shall be set forth above together with the signature of the officers authorized to sign contracts on behalf of the corporation; if bidder is a co partnership, the true name of the firm shall be set forth above together with the signature of the partner or partners authorized to sign contracts in behalf of the co partnership; and, if bidder is an individual, his signature shall be placed above. If a signature is by an agent other than an officer of a corporation or a member of the partnership, a Power of Attorney must be on file with the City Clerk prior to opening or submitted with the bid; otherwise, the bid will be disregarded as irregular and unauthorized.

AFFIDAVIT

The undersigned bidder, being first duly sworn, deposes and says that he/she are the party making the foregoing proposal or bid, that this bid is genuine and not collusive or sham, that said bidder has not colluded, conspired, connived or agreed, directly or indirectly, with any other person or bidder, to put in a sham bid, or that said other person shall refrain from bidding, and has not in any manner sought by collusion to secure any advantage against the said City or any person interested in said improvement, for him/herself or any other person.

_____

Signature of Bidder

Jurat (Government Code Section 8202)

State of California

County of _____

Subscribed and sworn to (or affirmed) before me on this _____ day of _____, 20_____

by _____ proved to me on the basis of satisfactory evidence to be the person(s) who appeared before me.

(AFFIX SEAL)

_____

NOTARY PUBLIC SIGNATURE

_____

NOTARY PUBLIC PRINTED NAME

INFORMATION REQUIRED OF BIDDER

The bidder is required to provide the following information. Additional sheets may be attached if necessary.

Contractor's mailing address:_____

Contractor's telephone number:_____

Number of years' experience as a contractor in construction work or installation work similar to that required in these specifications:

_____

Name of person who inspected the site of the proposed work for your firm:

_____

Date of Inspection:_____

List at least four projects of comparable size and scope completed as of recent date:

Project No. and Title: _____
Class and Type of Work: _____
Name, Address, and Phone No. of Owner _____
Registered Engineer in Charge of Project: _____
Total Contract Amount: _____
Contract Amount You Performed: _____
Name of Prime Contractor if you were Sub: _____
Date Completed: _____
Liquidated Damages Assessed: _____

Project No. and Title: _____
Class and Type of Work: _____
Name, Address, and Phone No. of Owner _____
Registered Engineer in Charge of Project: _____
Total Contract Amount: _____
Contract Amount You Performed: _____
Name of Prime Contractor if you were Sub: _____
Date Completed: _____
Liquidated Damages Assessed: _____

Project No. and Title: _____
Class and Type of Work: _____
Name, Address, and Phone No. of Owner _____
Registered Engineer in Charge of Project: _____
Total Contract Amount: _____
Contract Amount You Performed: _____
Name of Prime Contractor if you were Sub : _____
Date Completed: _____

Liquidated Damages Assessed: _____

Project No. and Title: _____
Class and Type of Work: _____
Name, Address, and Phone No. of Owner _____
Registered Engineer in Charge of Project: _____
Total Contract Amount: _____
Contract Amount You Performed: _____
Name of Prime Contractor if you were Sub : _____
Date Completed: _____
Liquidated Damages Assessed: _____

BIDDER'S BOND

KNOW ALL MEN BY THESE PRESENTS:
That we _____
as BIDDER, and _____
as SURETY a corporation duly organized under the laws of the State of _____
and duly licensed to become sole Surety on bonds required and authorized by the State of California, as SURETY, are held and firmly bound unto the City of Turlock, hereinafter called the City, in the penal sum of TEN PERCENT (10%) OF THE TOTAL AMOUNT OF THE BID of the Bidder above named, submitted by said Bidder to the City, for the work described below, for the payment of which sum in lawful money of the United States, well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents. in no case shall the liability of the Surety hereunder exceed the sum _____

_____
Dollars ($_____).

THE CONDITION OF THIS OBLIGATION IS SUCH THAT, whereas the bidder has submitted the above-mentioned bid to the City for certain construction specifically described as follows for which bids are to be opened at Engineering Division, Development Services Department, City Hall, 156 S. Broadway Suite 150, Turlock, California, on

_____, _____, 20____, at_____.
(day) (date) (time)

for **Project No. 19-33 "Dried Solids Storage Area"**

NOW, THEREFORE, if the aforesaid Bidder is awarded the contract and, within the time manner required under the specifications after the prescribed forms are presented to him for signature, enters into a written contract in the prescribed form in accordance with the bid, and files the two bonds with the City, one to guarantee faithful performance and the other to guarantee payment for labor and materials as required by law, then obligation shall be null and void; otherwise, it shall be and remain in full force and virtue.

In the event suit is brought upon this bond by the Obligee and judgment is recovered, the Surety shall pay all costs incurred by the Obligee in such a suit, including a reasonable attorney's fee to be fixed by the court.

IN WITNESS WHEREOF, we have hereunto set our hands and seals on this _____day of _____, 201_.

BIDDER

_____**(SEAL)**
(Bidder's Name and Corporate Seal)

_____
(Signature)

_____
(Print Name and Title)

(ATTACH ACKNOWLEDGMENT OF BIDDER)

SURETY

_____**(SEAL)**
(Surety's Name and Corporate Seal)

_____
(Signature)

_____
(Print Name and Title)

(ATTACH ACKNOWLEDGMENT OF SURETY'S ATTORNEY-IN-FACT)

NOTE: ATTACH CERTIFIED COPY OF POWER OF ATTORNEY

SUBCONTRACTORS

City Project No. 19-33

Dried Solids Storage Area

Prime Contractor:_____ DIR NUMBER:_____

Pursuant to California Public Contract Code §4100, the Bidder shall list each subcontractor who will perform Work or labor or who will render service to the prime Contractor in or about the construction of the Work or improvement, or a subcontractor duly licensed who, under subcontract to the prime Contractor, specially fabricates and installs a portion of the Work or improvement according to detailed Drawings contained in the Contract Documents, in an amount in excess of 1/2 of 1 percent of the prime Contractor's total Bid or, in the case of Bids or offers for the construction of streets or highways, including bridges, in excess of 1/2 of 1 percent of the prime Contractor's total Bid or $10,000, whichever is greater. After the opening of Bids, no changes or substitutions will be allowed except as otherwise provided by law. The listing of more than one subcontractor for each item of Work to be performed with the words "and/or" will not be permitted.

IF NO SUBCONTRACTORS WILL FURNISH WORK, THEN WRITE "NONE" BELOW IN THE SPACE PROVIDED.

NAME	LICENSE NUMBER	DIR NUMBER	ADDRESS	WORK ITEMS TO BE PERFORMED AND % OF ITEM

AGREEMENT

FOR PUBLIC IMPROVEMENT

Project No. 19-33

DRIED SOLIDS STORAGE AREA

THIS PUBLIC IMPROVEMENT AGREEMENT (the "Agreement") is entered into by and between the CITY OF TURLOCK, a California municipal corporation ("City"), and _____, a _____ ("Contractor"), on this _____ day of _____ 20__ (the "Effective Date"). City and Contractor may be collectively referred to herein as the "Parties" or individually as "Party." There are no other parties to this Agreement.

RECITALS

A. City seeks a duly qualified and licensed firm experienced in the construction of Project No. 19-33, "DRIED SOLIDS STORAGE AREA" (the "Project").

B. The Project involves the expenditure of funds in excess of $5,000 and constitutes a "public project" pursuant to Public Contract Code section 20161.

C. Contractor has made a proposal to City to provide construction services, a copy of which is attached and incorporated hereto as **Exhibit A** (the "Services").

D. City has determined it is necessary and desirable to employ the services of Contractor to perform construction work on the Project.

E. City has taken appropriate proceedings to authorize construction of the Project and execution of this contract pursuant to Public Contract Code section 20160 et seq.; specifically, on _____, 20___, at a duly noticed meeting of the City Council of the City of Turlock, this

contract for the construction of the improvements hereinafter described was awarded to Contractor as the lowest responsive and responsible bidder for said improvements.

NOW, THEREFORE, in consideration of the promises and covenants set forth below, the Parties agree as follows:

AGREEMENT

1. Contract Documents

This Agreement, together with the following documents, are collectively referred to herein as the "Contract Documents":

i. Notice to Bidders;
ii. Contractor's Bid or Proposal accepted by City;
iii. General Conditions, Supplementary Conditions, and Special Provisions of the City of Turlock for Project No. 19-33, "DRIED SOLIDS STORAGE AREA;"
iv. Plans and detailed drawings prepared for this Project and approved by City ("Project Plans");
v. All bonds and insurance required by the Contract Documents;
vi. Any and all supplemental agreements amending, decreasing, or extending the work contemplated or which may be required to complete the work in a substantial and acceptable manner; and
vii. The current edition of the City of Turlock Standard Specifications and Drawings.

All of the Contract Documents are intended to incorporate the terms of the others 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 will hereinafter be referred to as the "Contract." In case of any dispute regarding the terms of the Contract, the decision of the City Engineer shall be final.

2. Term

The Contract shall be effective as of the Effective Date first stated above. Contractor shall not commence work on the Project until it has been given notice by City ("Notice to Proceed"). The Contract shall terminate one (1) year after City accepts Contractor's performance of the Services (the "Term"), unless the Parties mutually agree in writing to terminate the Contract earlier or extend the Term in an agreed writing executed by both Parties.

3. Scope of Work

(a) *Services.* Contractor shall perform the Services described in Exhibit A, subject to all terms and conditions in the Contract. Contractor shall not receive additional compensation for the performance of any Services not described therein.

(b) *Modification.* City, at any time, by written order, may make changes within the general scope of the work under this Agreement or issue additional instructions, require additional work or direct deletion of work. Contractor shall not proceed with any change involving an increase or decrease in the Contract Price, as defined in Section 4 of this Agreement, or the Completion Schedule without prior written authorization from City. Contractor shall not be entitled to compensation for the performance of any such unauthorized work. Contractor further waives any and all right or remedy by way of restitution or quantum meruit for any and all extra or changed work performed without express and prior written authorization of City. Notwithstanding the foregoing, Contractor shall promptly commence and diligently complete any change to the work subject to City's written authorization issued pursuant to this Section ; Contractor shall not be relieved or excused from its prompt commencement of diligent completion of any change subject to City's written authorization by virtue of the absence or inability of Contractor and City to agree upon the extent of any adjustment to the Completion Schedule or Contract Price on account of such change. The issuance of a Change Order pursuant to this Section 3 in connection with any change authorized by City shall not be deemed a condition precedent to Contractor's obligation to promptly commence and diligently complete any such change authorized by City hereunder. City's right to make changes shall not invalidate the Contract nor relieve Contractor of any liability or other obligations under the Contract. Any requirement of notice of changes in the scope of work to Contractor's surety shall be the responsibility of Contractor.

(c) *Specific Materials & Performance of Work.* Contractor shall furnish all tools, equipment, facilities, labor, and materials necessary to perform and complete, in good workmanlike manner, the work of general construction as called for and in the manner designated in, and in strict conformity with, the plans and specifications for said work entitled, "General Conditions and Special Provisions for Project No. 19-33, "DRIED SOLIDS STORAGE AREA." The equipment, apparatus, facilities, labor, and material shall be furnished, and said work performed and completed as required by the Contract under the direction and supervision, and subject to the approval, of the City Engineer of or City Engineer's designated agent.

(d) *Exhibits.* All "Exhibits" referred to below or attached hereto are, by this reference, incorporated into the Contract.

	Exhibit Designation	Exhibit Title
1.	Exhibit A	Scope of Services
2.	Exhibit B	Payment by Force Account
3.	Exhibit C	Workers' Compensation Insurance Certification
4.	Exhibit D	Performance Bond
5.	Exhibit E	Payment Bond

4. Contract Price

City shall pay, and Contractor shall accept in full payment for the work set forth above in Section 3, Scope of Work, an amount not to exceed _____ Dollars ($_____.00) (the "Contract Price"). Said amount shall be paid pursuant to Section 8 of this Agreement. The Contract Price may only be changed by a contract change order. The value of any work covered by a contract change order for an adjustment in the Contract Price will be determined in the sole discretion of City as follows:

(a) If the work performed is on the basis of unit prices contained in the Contract Documents, the change order will be determined in accordance with the provisions in Section 4-1.05, "Changes and Extra Work", of the Caltrans Standard Specifications, as applicable; or

(b) If the work performed is not included on the engineer's estimate associated with a unit price, the change order will be by a mutually agreed lump sum; or

(c) If the change order is not determined as described above in either subdivision (a) or (b), the change order will be determined on the basis of force account in accordance with the provisions set forth in Exhibit B, "Payment by Force Account," attached hereto and incorporated herein by reference.

5. Time for Performance

The time fixed for the commencement of work under the Contract is within ten (10) working days after the Notice to Proceed has been issued. The work on this project, including all punch list items, shall be completed on or before the expiration of one hundred forty five (145) working days (the "Completion Date") beginning on the first day of work or no later than the tenth day after the Notice to Proceed has been issued.

(a) *Right of City to Increase Working Days*: If Contractor fails to complete the Services by the Completion Date, the City Engineer shall have the right to increase the number of working days in the amount the City Engineer may determine will best serve the interests of City, and if the City Engineer desires to increase said number of working days, the City Engineer shall have the further right to charge Contractor and deduct from the final payment for the work the actual cost of engineering, inspection, superintendence, and other overhead expenses which are directly chargeable to Contractor, and which accrue during the period of such extension, except that the cost of the final service and preparation of the final estimates shall not be included in such charges. No extension of

time for completion of Services under the Contract shall be considered unless requested by Contractor at least twenty (20) calendar days prior to the Completion Date, in writing, to the City Engineer.

The Completion Date may only be changed by a contract change order. The value of any work covered by a contract change order for an adjustment in the Completion Date will be determined as follows:

i. Additional working days will be awarded where the amount of time is mutually agreed upon by Contractor and the City Engineer; or

ii. Additional working days will be awarded where Contractor is prevented from completing any part of the work identified on the critical path and:

1. where the delay is caused by acts of public enemy, fire, floods, tsunamis, earthquakes, epidemics, quarantine restrictions, strikes, labor disputes, shortage of materials and freight embargos, provided that Contractor shall notify Engineer in writing of the causes of delay within fifteen (15) days from the beginning of that delay; or
2. where the delay is caused by actions beyond the control of Contractor; or
3. where the delay is caused by actions or failure to act by the City Engineer.

Contractor shall not be entitled to an adjustment in the Completion Date for delays within the control of Contractor. Delays resulting from and within the control of a subcontractor or supplier of Contractor shall be deemed to be delays within the control of Contractor.

(b) *Excusable Delays.* Contractor shall not be in breach of the Contract in the event that performance of Services is temporarily interrupted or discontinued due to a "Force Majeure" event which is defined as: riots, wars, sabotage, civil disturbances, insurrections, or explosions; natural disasters, such as floods, earthquakes, landslides, and fires; strikes, lockouts, and other labor disturbances; or other catastrophic events, which are beyond the reasonable control of Contractor. Force Majeure does not include Contractor's financial inability to perform, Contractor's failure to obtain any necessary permits or licenses from other governmental agencies, or Contractor's failure to obtain the right to use the facilities of any public utility where such failure is due solely to the acts or omissions of Contractor. If Contractor's performance of the Services is delayed by an excusable delay, the Completion Date shall be extended for such reasonable time as determined by the City Engineer. Extensions in time must be requested by Contractor within fifteen (15) calendar days of the excusable delay in order to receive consideration.

(c) *Emergency - Additional Time for Performance - Procurement of Materials.* If, because of war or other declared national emergency, the federal or state government restricts, regulates, or controls the procurement and allocation of labor or materials, or both, and if solely because of said restrictions, regulations or controls, Contractor is, through no fault of Contractor, unable to perform the Services, or the work is thereby suspended or delayed, any of the following steps may be taken:

i. City may, pursuant to resolution of the City Council, grant Contractor additional time for the performance of the Contract, sufficient to compensate in time, for delay or suspension.

To qualify for such extension in time, Contractor within ten (10) days of Contractor's discovering such inability to perform, shall notify the City Engineer in writing thereof, and give specific reasons therefore; the City Engineer shall thereupon have sixty (60) days within which to procure such needed materials or labor as is specified in this agreement, or permit substitution, or provide for changes in the work in accordance with subdivision (b) of this Section.

Substituted materials, or changes in the work, or both, shall be ordered in writing by the City Engineer, and the concurrence of the City Council shall not be necessary. All reasonable expenses of such procurement incurred by the City Engineer shall be defrayed by the Contractor; or

ii. If such materials or labor cannot be procured through legitimate channels within sixty (60) days after the filing of the aforesaid notice, either Party may, upon thirty (30) days' written notice to the other, terminate this agreement. In such event, Contractor shall be compensated for all work executed upon a unit basis in proportion to the amount of the work completed, or upon a cost-plus-ten-percent (10%) basis, whichever is the lesser. Materials on the ground, in process of fabrication or in route upon the date of notice of termination specially ordered for the Project and which cannot be utilized by Contractor, shall be compensated for by City at cost, including freight, provided Contractor shall take all steps possible to minimize this obligation; or

iii. The City Council, by resolution, may suspend the Contract until the cause of inability to perform is removed for a period of not to exceed sixty (60) days.

If the Contract is not canceled, and the inability of Contractor to perform continues without fault on Contractor's part, beyond the time during which the Contract may have been suspended, as herein above provided, the City Council may further suspend the Contract, or either Party hereto may, without incurring any liability, elect to declare the Contract terminated upon the ground of impossibility of performance. In the event City declares this agreement

terminated, such declaration shall be authorized by the City Council by resolution, and Contractor shall be notified in writing thereof within five (5) days after the adoption of such resolution. Upon such termination, Contractor shall be entitled to proportionate compensation at the Contract Price for such portion of the Contract as may have been performed; or

iv. City may terminate the Contract, in which case Contractor shall be entitled to proportionate compensation at the agreed rate for such portion of the Contract as may have been performed. Such termination shall be authorized by resolution of the City Council. Notice thereof shall be forthwith given in writing to Contractor, and the Contract shall be terminated upon receipt by Contractor of such notice.

In the event of the termination provided in this sub-paragraph (iv), none of the covenants, conditions or provisions hereof shall apply to the Services not performed, and City shall be liable to Contractor for the proportionate compensation last herein mentioned.

(d) *Delay Damages.* In the event Contractor, for any reason, fails to perform the Services to the satisfaction of the City Engineer by the Completion Date, City may, in accordance with Section 7203 of the Public Contract Code, in lieu of any other of its rights authorized by Section 6 of this agreement, deduct from payments or credits due Contractor after such breach a sum equal to Two Thousand Five Hundred Dollars ($2,500.00) for each calendar day beyond the Completion Date. This deduction shall not be considered a penalty but shall be considered as delay damages. The aforementioned rate of deduction is an amount agreed to by the Parties as reasonably representing additional construction engineering costs incurred by City if Contractor fails to complete the Services by the Completion Date. However, any deduction assessed as delay damages shall not relieve Contractor from liability for any damages or costs resulting from delays to other contractors on the project or other projects caused by a failure of the assessed Contractor to complete the Services by the Completion Date. Due account shall be taken of any time extensions granted to Contractor by City. Permitting Contractor to continue work beyond the Completion Date shall not operate as a waiver on the part of City of any of its rights under the Contract nor shall it relieve Contractor from liability for any damages or costs resulting from delays to other contractors on the project or other projects caused by a failure of the assessed Contractor to complete the Services by the Completion Date.

6. Termination

(a) *Option of City to Terminate Contract for Failure to Complete Services.* If a Party should fail to perform any of its obligations hereunder within the time and in the manner herein provided, or otherwise violates any of the terms of the Contract (the "Defaulting Party"), the other Party shall give notice to the Defaulting Party and allow the Defaulting Party ten (10) days to correct such deficiency. If the Defaulting Party does not correct such deficiency, the other Party may immediately terminate the Contract by giving written notice of such termination, stating the reason for such termination. In such

event, Contractor shall be entitled to receive payment for all Services satisfactorily rendered until such termination, provided, however, there shall be deducted from such amount the amount of damage, if any, sustained by virtue of any breach of the Contract by Contractor, including Delay Damages. If payment under the Contract is based upon a lump sum in total or by individual task, payment for Services satisfactorily rendered shall be an amount which bears the same ratio to the total fees specified in this Agreement as the Services satisfactorily rendered hereunder by Contractor to the total services otherwise required to be performed for such total fee, provided, however, that there shall be deducted from such amount the amount of damage, if any sustained by City by virtue of any breach of the Contract by Contractor. Upon termination, Contractor shall deliver copies of all Work Product, as defined in Section 19 of this Agreement, to City. If District terminates the Contract before Contractor commences any Services hereunder, City shall not be obligated to make any payment to Contractor.

(b) If Contractor should be adjudged bankrupt or if it should make a general assignment for the benefit of its creditors, or if a receiver should be appointed on account of its insolvency, or if it or any of its subcontractors should violate any of the provisions of the Contract, City may serve written notice upon it and its surety of its intention to terminate the Contract. Such notice shall contain the reasons for City's intention to terminate the Contract, and unless such violations shall cease within five (5) calendar days after serving of such notice, the Contract shall cease and terminate upon the expiration of said five (5) calendar days. In the event of any such termination, City shall immediately serve written notice thereof upon the surety and Contractor, and the surety shall have the right to take over and perform the Contract; provided however, that, if the surety does not give City written notice of its intention to take over and perform the Contract or does not commence performance thereof within thirty (30) calendar days from the date of the service of such notice, City may take over the work and prosecute the same to completion by contract or any other method it may deem advisable, for the account and at the expense of Contractor, and Contractor and its surety shall be jointly liable to City for any excess cost occasioned City thereby, and in such event City may, without liability for so doing, take possession of and utilize in completing the work, such materials, appliances, and other property belonging to Contractor as may be on the Project site and necessary thereof.

7. Liability for Breach

Neither Party waives the right to recover direct damages against the other for breach of the Contract, including any amount necessary to compensate City for all detriment proximately caused by Contractor's failure to perform its obligations hereunder or which in the ordinary course of things would be likely to result therefrom. City reserves the right to offset such damages against any payments owed to Contractor. City shall not, in any manner, be liable for special or consequential damages, including but not limited to Contractor's actual or projected lost profits had Contractor completed the Services required by the Contract. In the event of termination by either Party, copies of all finished or unfinished Work Product, as defined in Section 19 of this Agreement, shall become the property of City. Notwithstanding the foregoing, in no event shall City be liable, regardless of whether any claim is based on contract or tort, for any special, consequential, indirect or incidental damages, including, but not limited to, lost profits or revenue, arising out of or in connection with the Contract or the Services performed in connection with the Contract.

8. Compensation

City shall make Payments to Contractor in accordance with the provisions of Section 9 of the General Conditions in legally executed and regularly issued warrants of City, drawn on the appropriate fund or funds as required by law and order of the City Council thereof. Contractor shall be administered a progress payment approximately every thirty (30) calendar days from the time work begins according to the payment schedule furnished by the City Engineer at the time work begins. Contractor shall provide access at all reasonable times to all reports, contract records, contract documents, contract files, and personnel necessary to audit and verify Contractor's charges to City under this Contract.

Monthly progress payments in the amount of 95 percent (95%) of the value of the work will be made to Contractor based on the Contractor's estimate and the schedule of prices contained in the accepted bid. The remaining 5 percent (5%) will be retained by City as partial security for the fulfillment of the Contract except that at any time after 50 percent (50%) of the work has been completed, if the City Engineer finds that satisfactory progress is being made and the Project's critical path of work are on schedule, City may discontinue any further retention. Such discontinuance will only be made upon the written request of Contractor. City may, at any time the City Engineer finds that satisfactory progress is not being made, again institute retention of 5 percent (5%) as specified above. Payment will be made as soon as possible after the preparation of the Contractor's estimate. City shall pay the remaining 5 percent (5%) of the value of the Services completed under this Contract, if unencumbered by retentions for claims, not sooner than the expiration of thirty-five (35) calendar days from the date of acceptance of the work completed by Contractor by the City Council and not later than sixty (60) days from the "completion" of the Services as said term is defined in Public Contract Code section 7107(c).

No estimate or payment shall be made if, in the judgment of the City Engineer, the work is not proceeding in accordance with the provisions of the Contract, or when, in his judgment, the total value of the work done since the last estimate amounts to less than $1,000. No progress payments will be made if the time allotted for the job is thirty (30) working days or less. Payment of any progress payment, or the acceptance thereof by Contractor, shall not constitute acceptance of the work performed under this Contractor, or any portion thereof, and shall in no way reduce the liability of Contractor to replace unsatisfactory work or materials, though the unsatisfactory character of such work or materials may not have been apparent or detected at the time such payment was made.

Additionally, as a precondition to City's progress payments hereunder, Contractor shall provide to City, prior to payment, unconditional waivers and releases of stop notices pursuant to Civil Code section 8128 et seq. from each subcontractor and materials supplier. The form of said waivers and releases shall be as set forth in Civil Code section 3262(d)(2).

Pursuant to Public Contract Code section 22300 et seq., Contractor may request the right to substitute securities for any moneys withheld by City to ensure the performance required of Contractor under the Contract, or that City make payment of retentions earned directly into an escrow account established at the expense of Contractor.

9. Disputes Pertaining to Payment for Work

Should any dispute arise respecting the true value of any work performed, of any work omitted, or of any extra work which Contractor may be required to do, or respecting the size of any payment to Contractor during the performance of the Contract, such dispute shall be decided by the City Engineer, and the decision of the latter shall be final and conclusive. The Parties agree to comply with the claims resolution procedures set forth in Public Contract Code section 9204 when applicable.

(a) Claims Processing. Any submission of a claim by Contractor must comply with the requirements of Public Contract Code section 9204. Upon receipt of a claim pursuant to this section, City shall conduct a reasonable review of the claim and, within a period not to exceed forty-five (45) days, shall provide Contractor a written statement identifying what portion of the claim is disputed and what portion is undisputed. Upon receipt of a claim, the Parties may, by mutual agreement, extend the time period provided in this subdivision. Contractor shall furnish reasonable documentation to support the claim. Any payment due on an undisputed portion of the claim shall be processed and made within sixty (60) days after City issues its written statement. If Contractor disputes City's written response, or if City fails to respond to a claim issued pursuant to this section within the time prescribed, Contractor may demand in writing an informal conference to meet and confer for settlement of the issues in dispute.

(b) *Meet-and-Confer Conference.* Upon receipt of a demand in writing sent by registered mail or certified mail, return receipt requested, City shall schedule a meet-and-confer conference within thirty (30) days for settlement of the dispute. Within ten (10) business days following the conclusion of the meet-and-confer conference, if the claim or any portion of the claim remains in dispute, City shall provide the claimant a written statement identifying the portion of the claim that remains in dispute and the portion that is undisputed. Any payment due on an undisputed portion of the claim shall be processed and made within sixty (60) days after the City issues its written statement.

(c) *Nonbinding Mediation.* Any disputed portion of the claim, as identified by Contractor in writing, shall be submitted to nonbinding mediation, with th Parties sharing the associated costs equally. The Parties shall mutually agree to a mediator within ten (10) business days after the disputed portion of the claim has been identified in writing. If the Parties cannot agree upon a mediator, each party shall select a mediator and those mediators shall select a qualified neutral third party to mediate with regard to the disputed portion of the claim. Each Party shall bear the fees and costs charged by its respective mediator in connection with the selection of the neutral mediator. If mediation is unsuccessful, the parts of the claim remaining in dispute shall be subject judicial review pursuant to Section 23 of this Agreement.

Notwithstanding any claim, dispute, or other disagreement between the Parties regarding performance under the Contract, the scope of work hereunder, or any other matter arising out of or related to, in any manner, the Contract, Contractor shall proceed diligently with performance of the Services in

accordance with City's written direction, pending any final determination or decision regarding any such claim, dispute, or disagreement.

10. Permits and Care of Work

Contractor shall, at Contractor's expense, obtain all necessary permits and licenses for the construction of each improvement, give all necessary notices and pay all fees and taxes required by law, except those City fees set forth in Section 1 of the Special Provisions. Contractor has examined the Project site and is familiar with its topography and condition, location of property lines, easements, building lines, and other physical factors and limitations affecting the performance of the Contract. Contractor, at Contractor's expense, shall obtain any permission necessary for any operations conducted off the property owned or controlled by City. Contractor shall be responsible for the proper care and protection of all materials delivered and work performed until completion and final acceptance.

11. Public Works and Payment of Prevailing Wage

(a) *Monitoring and Enforcement.* In accordance with the provisions of Sections 1725.5, 1771.1, 1771.3, and 1771.4 of the Labor Code, all work performed under the Contract is subject to compliance monitoring and enforcement by the Department of Industrial Relations ("DIR"). All work performed by Contractor or its subcontractors under the Contract is subject to the requirements of Labor Code section 1720 et seq. It is not a violation of this section for an unregistered contractor to submit a bid that is authorized by Section 7029.1 of the Business and Professions Code or by Section 10164 or 20103.5 of the Public Contract Code, provided the contractor is registered to perform public work pursuant to Section 1725.5 of the Labor Code at the time the contract is awarded. Contractor and its subcontractors shall furnish the records specified in Section 1776 of the Labor Code directly to the Labor Commissioner, at least monthly, in the format prescribed by the Labor Commissioner.

In accordance with the provisions of Section 1773.3 of the Labor Code, City shall provide notice to DIR of the award of this Contract within thirty (30) working days of the award. The notice shall be transmitted electronically in a format specified by DIR and shall include the name of Contractor, any subcontractor listed on the successful bid, the bid and contract award dates, the contract amount, the estimated start and completion dates, Project location, and any additional information DIR specifies that aids in the administration and enforcement of Section 1720 et seq. of the Labor Code.

(b) *Wages & Hours of Employment*: In the performance of the Services under the Contract, eight (8) hours shall be the maximum hours of labor on any calendar day, and the minimum wages of compensation of persons performing labor in the execution of this agreement shall be the current prevailing scale of wages determined by DIR for the community. Contractor shall forfeit as penalty Twenty-five and no/100ths Dollars ($25.00) to be paid to City for each workman employed in the execution of the Contract by Contractor or its subcontractor(s), for each calendar day during which any workman is required or permitted to labor more than eight (8) hours, in violation of provisions of Labor

Code section 1810 et seq. Contractor shall post prevailing wage rates at the Project no later than the first day Contractor commences performance of the Services under the Contract.

12. Superintendence by Contractor

Contractor shall give personal superintendence to the work on the Project or have a competent foreman or superintendent satisfactory to the City Engineer on the Project at all times during construction and performance of work under the Contract, with authority to act for Contractor.

13. Inspection and Testing by City

Contractor shall at all times maintain proper facilities and provide safe access for inspection by City to all parts of the work performed on the Project and to the shops wherein the work is in preparation. Contractor shall notify City with sufficient time in advance of the manufacture of production materials to be supplied by Contractor under the Contract in order for City to arrange for mill or factory inspection and testing of same. Any materials shipped by Contractor from factory prior to having satisfactorily passed such testing and inspection by City's representative or prior to the receipt of notice from such representative that such testing and inspection will not be required shall not be incorporated on the Project. Contractor shall also furnish to City, in triplicate, certified copies of all factory and mill test reports upon request.

14. Conformity with Law and Safety

Contractor shall observe and comply with all applicable laws, ordinances, codes, and regulations of governmental agencies, including federal, state, municipal, and local governing bodies having jurisdiction over any or all of the scope of Services, including all provisions of the Occupational Safety and Health Act of 1979 as amended, all California Occupational Safety and Health Regulations, the California Building Code, the American with Disabilities Act, any copyright, patent, or trademark law, and all other applicable federal, state, municipal, and local safety regulations, appropriate trade association safety standards, and appropriate equipment manufacturer instructions. All Services performed by Contractor or its subcontractors must be in accordance with these laws, ordinances, codes, and regulations. Contractor's failure to comply with any laws, ordinances, codes, or regulations applicable to the performance of the Services hereunder shall constitute a breach of contract. In cases where standards conflict, the standard providing the highest degree of protection shall prevail.

If a death, serious personal injury or substantial property damage occurs in connection with the performance of the Contract, Contractor shall immediately notify City's risk manager by telephone. If any accident occurs in connection with the Contract, Contractor shall promptly submit a written report to City, in such form as City may require. This report shall include the following information: (a) name and address of the injured or deceased person(s); (b) name and address of Contractor's subcontractor,

if any; (c) name and address of Contractor's liability insurance carrier; and (d) a detailed description of the accident, including whether any of City's equipment, tools, or materials were involved.

If a release of a hazardous material, substance, or waste occurs in connection with the performance of the Contract, Contractor shall immediately notify City. Contractor shall not store hazardous materials or hazardous waste within City limits without a proper permit from City.

15. Other Contracts

City may award other contracts for additional work on the Project, and Contractor shall fully cooperate with such other contractors and carefully fit Contractor's own work to that provided under other contracts as may be directed by the City Engineer. Contractor shall not commit or permit any act which will interfere with the performance of work by any other contractor.

16. Bonds

Concurrently with the execution hereof, Contractor shall furnish, on the forms provided herein as **Exhibits D and E**, respectively, corporate surety bonds to the benefit of City, issued by a surety company acceptable to City and authorized and admitted to do business in the state of California, as follows:

(a) *Faithful Performance Bond.* In an amount equal to at least one hundred percent (100%) of the Contract Price as security for the faithful performance of the Contract. The bond shall contain a provision that the surety thereon waives the provisions of Sections 2819 and 2845 of the Civil Code.

(b) Payment Bond. In an amount equal to at least one hundred percent (100%) of the Contract Price as security for the payment of all persons performing labor and furnishing materials in connection with the Contract. The bond shall be in accordance with the provisions of Sections 3225, 3226, and 3247 through 3252, inclusive, of the Civil Code and Section 13020 of the Unemployment Insurance Code of California. Said bond shall also contain a provision that the surety thereon waives the provisions of Sections 2819 and 2845 of the Civil Code.

The surety companies shall familiarize themselves with all provisions and conditions of the Contract. It is understood and agreed that the surety or sureties waive the right of special notification of any modification or alterations, omissions or reductions, extra or additional work, extensions of time, or any other act or acts by City or its authorized agents under the terms of this Contract and failure to so notify the surety or sureties of such changes shall in no way relieve the surety or sureties of their obligations under the Contract.

17. Indemnification:

(a) *Indemnity for Professional Liability*. When the law establishes a professional standard of care for Contractor's Services, to the fullest extent permitted by law, Contractor shall indemnify, protect, defend, and hold harmless City and any and all of its elective and appointive boards, officers, officials, agents, employees or volunteers ("City's Agents") from and against any and all losses, liabilities, damages, costs, and expenses, including legal counsel's fees and costs but only to the extent Contractor or its subcontractors are responsible for such damages, liabilities and costs on a comparative basis of fault between Contractor or its subcontractors and City in the performance of professional services under the Contract. Contractor shall not be obligated to defend or indemnify City for City's own negligence or for the negligence of others.

(b) *Indemnity for other than Professional Liability*. Other than in the performance of professional services and to the full extent permitted by law, Contractor shall indemnify, defend, and hold harmless City and any and City's Agents from and against any liability, including liability for claims, suits, actions, arbitration proceedings, administrative proceedings, regulatory proceedings, losses, expenses or costs of any kind, whether actual, alleged or threatened, including legal counsel's fees and costs, court costs, interest, defense costs, and expert witness fees, where the same arise out of, are a consequence of, or are in any way attributable to, in whole or in part, the performance of the Contract by Contractor or by any individual or agency for which Contractor is legally liable, including, but not limited to, officers, agents, employees, or subcontractors of Contractor.

18. Contractor's Insurance

Concurrently with the execution hereof, Contractor shall furnish City with satisfactory proof of carriage of the insurance required under this section, and that Contractor shall give City at least sixty (60) days prior notice of the cancellation of any policy during the Term of this contract. Contractor shall not commence work under this Agreement until Contractor has obtained City's approval regarding all insurance requirements, forms, endorsements, amounts, and carrier ratings, nor shall Contractor allow any subcontractor to commence work on a subcontract until all similar insurance required of the subcontractor shall have been so obtained and approved. Contractor shall procure and maintain for the duration of the Contract insurance against claims for injuries to persons or damages to property which may arise from or in connection with the performance of the Services hereunder by Contractor, its agents, representatives, employees or subcontractors. Failure to maintain or renew coverage or to provide evidence of renewal may constitute a material breach of the Contract. Any available insurance proceeds in excess of the specified minimum limits and coverage shall be available to City.

(a) *General Liability Insurance*. Contractor shall maintain commercial general liability insurance with coverage at least as broad as Insurance Services Office form CG 00 01, in an amount not less than Two Million Dollars ($2,000,000) per occurrence, Four Million Dollars ($4,000,000) general aggregate, for bodily injury, personal injury, and property damage, including, without limitation, blanket contractual liability and coverage for explosion, collapse, and underground property damage hazards. Contractor's general liability policies shall be primary and not seek contribution from City's coverages and be endorsed using Insurance Services Office form CG 20 10 to provide that City and its

officers, officials, employees, and agents shall be additional insureds under such policies. For construction contracts, an endorsement providing completed operations to the additional insured, ISO form CG 20 37, is also required. The policy shall contain, or be endorsed to contain, the following provisions:

(1) City, its elective and appointive boards, officers, agents, employees, and volunteers are to be covered as additional insureds with respect to liability arising out of work or operations performed by or on behalf of Contractor, including materials, parts or equipment furnished in connection with such work or operations, which coverage shall be maintained in effect for at least three (3) years following the completion of the work specified in the Contract. General liability coverage can be provided in the form of an endorsement to Contractor's insurance (at least as broad as CG 20 10 for ongoing operations and CG 20 37 for products/completed operations), or as a separate Owners and Contractors Protective Liability policy providing both ongoing operations and completed operations coverage.

(2) For any claims related to the Project, Contractor's insurance coverage shall be primary insurance as respects City and any insurance or self-insurance maintained by City shall be excess of Contractor's insurance and shall not contribute with it.

(3) In the event of cancellation, non-renewal, or material change that reduces or restricts the insurance coverage afforded to City under the Contract, the insurer, broker/producer, or Contractor shall provide City with thirty (30) days' prior written notice of such cancellation, non-renewal, or material change.

(4) Coverage shall not extend to any indemnity coverage for the active negligence of the additional insured in any case where an agreement to indemnify the additional insured would be invalid under Subdivision (b) of Section 2782 of the Civil Code.

(b) *Workers' Compensation Insurance*. Contractor shall maintain Workers' Compensation Insurance (Statutory Limits) and Employer's Liability Insurance with limits of at least One Million Dollars ($1,000,000). Contractor shall submit to City, along with the certificate of insurance, a Waiver of Subrogation endorsement in favor of City, its officers, agents, employees, and volunteers.

(c) *Auto Insurance*. Contractor shall provide auto liability coverage for owned, non-owned, and hired autos using ISO Business Auto Coverage form CA 00 01, or the exact equivalent, with a limit of no less than Two Million Dollars ($2,000,000) per accident. If Contractor owns no vehicles, this requirement may be met through a non-owned auto endorsement to the CGL policy.

(d) *Builder's Risk Insurance.* Upon commencement of construction and with approval of City, Contractor shall obtain and maintain Builder's Risk/Course of Construction insurance. The policy shall be provided for replacement value on an "all-risk" basis. City shall be named as Loss Payee on the policy and there shall be no coinsurance penalty provision in any such policy. The policy must include: (1) coverage for removal of debris and insuring the buildings, structures, machinery, equipment, materials, facilities, fixtures, and all other properties constituting a part of the project; (2) coverage with limits sufficient to insure the full replacement value of any property or equipment stored either on or off the project site, whether provided from within a Builder's Risk policy or through the addition of an Installation Floater. Such insurance shall be on a form acceptable to City to ensure adequacy of terms and limits. Contractor shall not be required to maintain property insurance for any portion of the Project following transfer of control thereof to City.

(e) *Contractors Pollution Insurance*. Pollution Coverage shall be provided on a Contractors Pollution Liability form, or other form acceptable to City, providing coverage for liability arising out of sudden, accidental, and gradual pollution and remediation. The policy limit shall be no less than One Million Dollars ($1,000,000) per claim. All activities contemplated in the Contract shall be specifically scheduled on the policy as "covered operations." The policy shall provide coverage for the hauling of waste from the Project site to the final disposal location, including non-owned disposal sites.

(f) *Professional Liability Insurance*. When applicable, Contractor shall maintain professional liability insurance that insures against professional errors and omissions that may be made in performing the Services to be rendered in connection with the Contract, in the minimum amount of One Million Dollars ($1,000,000) per claim and in the aggregate. Any policy inception date, continuity date, or retroactive date must be before the effective date of this Agreement, and Contractor agrees to maintain continuous coverage through a period no less than three (3) years after completion of the services required by the Contract.

(g) *Deductibles and Self-Insured Retentions*. Upon request of City, any deductibles or self-insured retentions must be declared to and approved by City. At the option of City, either: (1) the insurer shall reduce or eliminate such deductibles or self-insured retentions as respects City and City's Agents; or (2) Contractor shall provide a financial guarantee satisfactory to City guaranteeing payment of losses and related investigations, claim administration, and defense expenses.

(h) *Acceptability of Insurers*. Insurance is to be placed with insurers with a current A.M. Best's rating of no less than A-:VII or with an insurer to which City has provided prior approval.

(i) *Verification of Coverage*. Contractor shall furnish City with original certificates and amendatory endorsements or copies of the applicable policy language effecting coverage required by this Section 18. All certificates and endorsements are to be received and approved by City before work commences. However, failure to obtain the required documents prior to the work beginning shall not

waive Contractor's obligation to provide them. City reserves the right, at any time, to require complete, certified copies of all required insurance policies and endorsements.

(j) *Waiver of Subrogation*. With the exception of professional liability, Contractor hereby agrees to waive subrogation which any insurer of Contractor may acquire from Contractor by virtue of the payment of any loss. The commercial general liability policy and workers' compensation policy shall be endorsed to contain a waiver of subrogation in favor of City for all work performed by Contractor, its agents, employees, independent contractors and subcontractors. Contractor agrees to obtain any endorsement that may be necessary to affect this waiver of subrogation.

(k) *Subcontractors*. Contractor shall include all subcontractors as insureds under its policies or shall furnish separate certificates and endorsements for each subcontractor. All coverages for subcontractors shall be subject to all of the requirements stated herein.

19. Ownership of Work Product

Any and all work, artwork, copy, posters, billboards, photographs, videotapes, audiotapes, systems designs, software, reports, designs, specifications, drawings, diagrams, surveys, source codes, professional or technical information or data, photographs, notes, letters, emails, or any original works of authorship created by contractor or its subcontractors or subcontractors in connection with Services performed under the Contract ("Work Product") shall be works for hire as defined under Title 17 of the United States Code, and all copyrights in such works are the property of City. In the event that it is ever determined that any Work Product created by Contractor or its subcontractors or subcontractors under the Contract are not works for hire under U.S. law, Contractor hereby assigns all copyrights to such Work Product to City. With the prior written approval of the City Engineer, Contractor may retain and use copies of such Work Product for reference and as documentation of its experience and capabilities.

All Work Product shall become the property of City irrespective of where located or stored and Contractor agrees to deliver all such documents and information to City, without charge and in whatever form it exists, upon the Completion Date, as may be extended. Contractor shall have no ownership interest in such Work Product.

All Work Product of Contractor under the Contract, including written information which City will cause to be distributed for either internal or public circulation, including both preliminary and final drafts, shall be delivered to City in both printed and electronic form, or as may be specific in Exhibit A.

When the Contract is terminated, Contractor agrees to return to City all documents, drawings, photographs, and other written or graphic material, however produced, that it received from City or City's Agents, in connection with the performance of its Services under the Contract. All materials shall be returned in the same condition as received.

20. Taxes

Payment of any taxes, including California sales and use taxes, levied upon the Contract, the transaction, or the Services or goods delivered pursuant hereto, shall be the obligation of Contractor. Contractor shall cooperate with City to the full extent possible to maximize the local allocation of California sales and use tax to City. Such cooperation shall include, but not be limited to:

(a) *Use Tax Direct Payment Permits.* Contractor shall apply for, obtain, and utilize, to the maximum extent reasonable, a California Use Tax Direct Payment Permit.

(b) *Purchases of $500,000 or More.* Contractor shall require vendors and suppliers located outside California from whom Contractor makes purchases of $500,000 or more to allocate the use tax to City.

21. Independent Contractor

At all times during the Term of the Contract, Contractor shall be deemed to be an independent contractor and shall be wholly responsible for the manner in which Contractor performs the Services required under the Contract. Contractor shall be liable for its acts and omissions, and those of its employees, contractors, subcontractors, representatives, volunteers, and its agents. Nothing contained herein shall be construed as creating an employment, agency, or partnership relationship between City and Contractor. City shall have the right to control Contractor only insofar as the result of Contractor's Services rendered pursuant to the Contract; however, City shall not have the right to control the means by which Contractor accomplishes Services rendered pursuant to the Contract.

22. Contractor Not Agent

Except as City may specify in writing, Contractor shall have no authority, express or implied, to act on behalf of City in any capacity whatsoever as an agent. Contractor shall have no authority, express or implied, pursuant to the Contract to bind City to any obligation whatsoever.

23. Arbitration of Disputes

All claims, disputes, and other matters in question between City and Contractor arising out of, or relating to, this Contract or the breach thereof, including claims of Contractor for extra compensation of Services related to the project, shall be decided by arbitration before a single arbitrator in accordance with the provisions of Sections 1281 through 1284.2 of the Code of Civil Procedure (the "Arbitration Laws") unless the Parties mutually agree otherwise. The provisions of Section 1283.05 of the Arbitration Laws apply to any arbitration proceeding except as otherwise provided in the Contract. The arbitrator shall have authority to decide all issues between the Parties including, but not limited to, claims for extras, delay, and liquidated damages, if any, provided for the Contract, matters involving

defects in the Services performed by Contractor or its subcontractors, rights to payment, and whether the necessary procedures for arbitration have been followed. The award rendered by the arbitrator shall be final and judgment may be entered upon it in accordance with applicable law in any court having competent jurisdiction thereof.

Notice of the demand for arbitration shall be filed in writing with the other Party. The demand for arbitration shall be made within a reasonable time after the claim, dispute, or other matter in question has arisen, and in no event shall it be made after the date when institution of legal or equitable proceedings based on such claim, dispute, or other matter in question would be barred by the applicable statute of limitations.

The parties shall jointly appoint an arbitrator within fifteen (15) calendar days of the date of giving the notice of the demand for arbitration. If the Parties are unable to jointly agree upon the appointment of an arbitrator within said fifteen (15) calendar day period, and do not agree in writing to extend said period for a fixed period, then either Party may seek to have the arbitrator appointed by the Superior Court of Stanislaus County in accordance with the Arbitration Laws.

If any proceeding is brought to contest the right to arbitrate and it is determined that such right exists, the losing Party shall pay all costs and attorney's fees incurred by the prevailing Party.

In addition to the other rules of law which may be applicable to any arbitration hereunder, the following shall apply:

(a) Promptly upon the filing of the arbitration, each Party shall be required to set forth in writing and to serve upon each other Party a detailed statement of its contentions of fact and law.

(b) All Parties to the arbitration shall be entitled to the discovery procedures provided under Section 1283.05 of the California Code of Civil Procedure.

(c) The arbitration shall be commenced and conducted as expeditiously as possible consistent with affording reasonable discovery as provided herein.

(d) These additional rules shall be implemented and applied by the arbitrator.

The costs of arbitration shall be borne by the Parties as determined by the arbitrator, but each Party shall bear its own attorney's fees associated with the dispute with the other Party and to the arbitration.

24. Provisions Cumulative

The provisions of the Contract are cumulative, and in addition to and not in limitation of, any other rights or remedies available to City.

25. Notices

All notices shall be in writing and delivered in person or transmitted by certified mail, postage prepaid. Any Party hereto may at any time, by giving ten (10) days' written notice to the other Party hereto, designate any other address in substitution of the address to which such notice or communication shall be given. Such notices or communications shall be given to the Parties at their addresses set forth below.

If to City:
City of Turlock
Attn: City Engineer
156 S. Broadway, Suite 150
Turlock, CA 95380-5461

With courtesy copies to:
Churchwell White LLP
Attn: Douglas L. White, City Attorney
1414 K Street, 3rd Floor
Sacramento, CA 95814

If to Contractor:
_____
_____
_____

If to Contractor's Sureties:
_____
_____
_____
_____

26. City Contract Administrator: The City's contract administrator and contact person for this Agreement is:

Stephen Fremming
City of Turlock Engineering Division
156 S. Broadway, Suite 150
Turlock, California 95380-5461
Telephone: (209) 668-5417
E-mail:sfremming@turlock.ca.us

27. Interpretation

As used herein, any gender includes each other gender, the singular includes the plural and vice versa.

28. Antitrust Claims

Contractor or its subcontractors offer and agree to assign to City all rights, title, and interest to any causes of action under Section Four of the Clayton Act and the Cartwright Act concerning antitrust claims.

29. Use of City Project Number

Contractor or its subcontractors agree to use the aforementioned City project number on all maps, drawings, submittals, billing, and written correspondence that involve City staff or contracted consultants. Nothing in this section shall preclude Contractor or its subcontractors from using their own project numbers for their own internal use.

30. No Conflict of Interest

Contractor represents that no conflict of interest will be created under state or federal law by entering into or in carrying out the Contract.

31. Confidentiality

Contractor understands and agrees that, in the performance of Services under the Contract, or in the contemplation thereof, Contractor may have access to private or confidential information that may be owned or controlled by City and that such information may contain proprietary or confidential details, the disclosure of which to third parties may be damaging to City ("Confidential Information"). Contractor shall not, either during or after the Term, disclose to any third party any Confidential Information without the prior written consent of City. If City gives Contractor written authorization to make any such disclosure, Contractor shall do so only within the limits and to the extent of that authorization. Contractor may be directed or advised by the City Attorney on various matters relating to the performance of Services on the Project or on other matters pertaining to the Project, and in such event, Contractor agrees that it will treat all communications between itself, its employees, and its subcontracts as being communications which are within the attorney-client privilege.

32. Modification

No alteration, amendment, modification, or termination of the Contract shall be valid unless made in writing and executed by all Parties to the Contract.

33. Waiver

No covenant, term, or condition or the breach thereof shall be deemed waived, except by written consent of the Party against whom the waiver is claimed, and any waiver of the breach of any covenant, term, or condition shall not be deemed to be a waiver of any preceding or succeeding breach of the same or any other covenant, term, or condition.

34. Assignment

No Party to the Contract shall assign, transfer, or otherwise dispose of this Agreement in whole or in party to any individual, firm, or corporation without the prior written consent of the other Party. Subject to the foregoing provisions, the Contract shall be binding upon, and inure to the benefit of, the respective successors and assigns of the Parties hereto.

35. Authority

All Parties to this Agreement warrant and represent that they have the power and authority to enter into this Agreement and the names, titles, and capacities herein stated on behalf of any entities, persons, states, or firms represented or purported to be represented by such entities, person, states, or firms and that all former requirements necessary or required by state or federal law in order to enter into the Contract have been fully complied with. Further, by entering into this Agreement, neither Party hereto shall have breached the terms or conditions of any other contract or agreement to which such Party is obligated, which such breach would have a material effect hereon.

36. Governing Law

The Contract shall be governed and construed in accordance with the laws of the state of California.

37. Severability

If the Contract in its entirety is determined by an arbitrator or a court of competent jurisdiction to be invalid or unenforceable, the Contract shall automatically terminate as of the date of final entry of judgment. If any provision of the Contract shall be determined to be invalid and unenforceable, or if any provision of the Contract is rendered invalid or unenforceable according the terms of any federal or state statute, which becomes effective after the Effective Date of this Agreement, the remaining provisions shall continue in full force and effect and shall be construed to give effect to the intent of this Agreement.

38. Counterparts

This Agreement may be executed simultaneously and in several counterparts, each of which shall be deemed an original but together shall constitute one and the same instrument.

39. Mandatory and Permissive

"Shall" and "will" and "agrees" are mandatory. "May" and "can" are permissive.

40. Headings

Headings used in this Agreement are for reference purposes only and shall not be considered in construing this Agreement.

41. Attorney's Fees and Costs

Except as expressly provided for in Section 23 of this Agreement, if any action at law or in equity, including action for declaratory relief, is brought to enforce or interpret the provisions of the Contract, the prevailing Party shall be entitled to reasonable attorney's fees and costs, which may be set by the court in the same action or in a separate action brought for that purpose, in addition to any other relief to which such Party may be entitled.

42. Necessary Acts and Further Assurances

The Parties shall, at their own cost and expense, execute and deliver such further documents and instruments and shall take such other actions as may be reasonably required or appropriate to evidence or carry out the intent and purposes of the Contract.

[*Signatures on Following Page*]

IN WITNESS WHEREOF, three identical counterparts of this agreement, consisting of a total of 24 pages, each of which counterparts shall for all purposes be deemed an original of said agreement, have been duly executed by the parties hereinabove named, on the day and year first herein above written.

CONTRACTOR
corporation

By: _____

_____
Print Name

Address:_____
_____
_____
Phone: _____
Date: _____

Federal Tax ID or Social Security No:

_____

DIR Registration Number:

_____

Attach Contractor's Seal Here

CITY OF TURLOCK, a municipal

By: _____
Michael I. Cooke, Interim City Manager

Date: _____

APPROVED AS TO SUFFICIENCY:

By: _____
Nathan Bray, Interim Development Services Director/City Engineer

APPROVED AS TO FORM:

By: _____
Douglas L. White, City Attorney

ATTEST:

By: _____
Jennifer Land, City Clerk

EXHIBIT A
SCOPE OF SERVICES

EXHIBIT B
PAYMENT BY FORCE ACCOUNT

For work paid by force account, the City Engineer compares City's records to Contractor's daily force account work report. When the City Engineer and Contractor agree on the contents of the daily force account work reports, the City Engineer accepts the report and City pays for the work. If the records differ, City pays for the work based only on the information shown on City's records. If a subcontractor performs work at force account, work paid at force account will be accepted at an additional 2 percent (2%) markup to the total cost of that work, including markups, as reimbursement for additional administrative costs. The markups specified in labor, materials, and equipment includes compensation for all delay costs, overhead costs, and profit. If an item's unit price is adjusted for work-character changes, City excludes Contractor's cost of determining the adjustment. Payment for owner-operated labor and equipment is made at the market-priced invoice submitted.

A. Labor. Labor payment is full compensation for the cost of labor used in the direct performance of the work plus a 5 percent (5%) markup, as set forth below, and consistent with California Labor Code section 1770 et seq. Force account labor payment consists of:

1. Employer payment to the worker for:

    1.1 Basic hourly wage
    1.2 Health and welfare
    1.3 Pension
    1.4 Vacation
    1.5 Training
    1.6 Other State and federal recognized fringe benefit payments

2. Labor surcharge percentage in *Labor Surcharge and Equipment Rental Rates* current during the work paid at force account for:

    2.1 Workers' compensation insurance
    2.2 Social security
    2.3 Medicare
    2.4 Federal unemployment insurance
    2.5 State unemployment insurance
    2.6 State training taxes

3. Subsistence and travel allowances paid to the workers

4. Employer payment to supervisors, if authorized

The 5 percent (5%) markup consists of payment for all overhead costs related to labor but not designated as costs of labor used in the direct performance of the work including:

(a) Home office overhead
(b) Field office overhead
(c) Bond costs
(d) Profit
(e) Labor liability insurance
(f) Other fixed or administrative costs that are not costs of labor used in the direct performance of the work

B. Materials. Material payment is full compensation for materials the Contractor furnishes and uses in the work. The City Engineer determines the cost based on the material purchase price, including delivery charges, except:

1. A 5 percent markup is added;

2. Supplier discounts are subtracted whether the Contractor takes them or not;

3. If the City Engineer believes the material purchase prices are excessive, City pays the lowest current wholesale price for a similar material quantity;

4. If Contractor procured the materials from a source Contractor wholly or partially own, the determined cost is based on the lower of the:

   4.1 Price paid by the purchaser for similar materials from that source on Contract items; and
   4.2 Current wholesale price for those materials;

5 If Contractor does not submit a material cost record within thirty (30) days of billing, the determined cost is based on the lowest wholesale price:

   5.1 During that period
   5.2 In the quantities used

C. Equipment Rental. Equipment rental payment is full compensation for:

1. Rental equipment costs, including moving rental equipment to and from the change order work site using its own power.

2. Transport equipment costs for rental equipment that cannot be transported economically using its own power. No payment is made during transport for the transported equipment.

(a)

3. 5 percent markup.

If Contractor wants to return the equipment to a location other than its original location, the payment to move the equipment must not exceed the cost of returning the equipment to its original location. If Contractor uses the equipment for work other than work paid by force account, the transportation cost is included in the other work.

Before moving or loading the equipment, Contractor must obtain authorization for the equipment rental's original location.

The City Engineer determines rental costs:

1. Using rates in *Labor Surcharge and Equipment Rental Rates*:

    1.1. By classifying equipment using manufacturer's ratings and manufacturer-approved changes.
    1.2. Current during the work paid by force account.
    1.3. Regardless of equipment ownership but City uses the rental document rates or minimum rental cost terms if:
        1.3.1. Rented from equipment business Contractor does not own.
        1.3.2. The Labor Surcharge and Equipment Rental Rates hourly rate is $10.00 per hour or less.

2. Using rates established by the City Engineer for equipment not listed in *Labor Surcharge and Equipment Rental Rates*. Contractor may submit cost information that helps the City Engineer establish the rental rate but City uses the rental document rates or minimum rental cost terms if:
    2.1. Rented from equipment business Contractor does not own.
    2.2. The City Engineer establishes a rate of $10.00 per hour or less.

3. Using rates for transport equipment not exceeding the hourly rates charged by established haulers.

Equipment rental rates include the cost of:

1. Fuel
2. Oil
7. Repairs and maintenance
8. Depreciation

3. Lubrication
4. Supplies
5. Small tools that are not consumed by use
6. Necessary attachments
9. Storage
10. Insurance
11. Incidentals

City pays for small tools consumed by use. The City Engineer determines payment for small tools consumed by use based on Contractor-submitted invoices.

The City Engineer may authorize rates in excess of those in the *Labor Surcharge and Equipment Rental Rates* if:

1. Contractor submits a request to use rented equipment
2. Equipment is not available from Contractor's normal sources or from one of Contractor's subcontractors
3. Rented equipment is from an independent rental company
4. Proposed equipment rental rate is reasonable
5. The City Engineer authorizes the equipment source and the rental rate before Contractor uses the equipment

D. Equipment on the Job Site. For equipment on the job site at the time required to perform work paid by force account, the time paid is the time:

(b)

1. To move the equipment to the location of work paid by force account plus an equal amount of time to move the equipment to another location on the job site when the work paid by force account is completed

2. To load and unload equipment

3. Equipment is operated to perform work paid by force account and:
   3.1. Hourly rates are paid in 1/2-hour increments
   3.2. Daily rates are paid in 1/2-day increments

E. Equipment Not on the Job Site Required for Original-Contract Work. For equipment not on the job site at the time required to perform work paid by force account and required for original-Contract work, the time paid is the time the equipment is operated to perform work paid by force account and the time to move the equipment to a location on the job site when the work paid by force account is completed.

The minimum total time paid is:

1. 1 day if daily rates are paid

2. 8 hours if hourly rates are paid

If daily rates are recorded, equipment:

1. Idled is paid as 1/2 day
2. Operated four (4) hours or less is paid as 1/2 day
3. Operated four (4) hours or more is paid as one (1) day

If the minimum total time exceeds eight (8) hours and if hourly rates are listed, City rounds up hours operated to the nearest 1/2-hour increment and pays based on the hours shown in the following table. The table does not apply when equipment is not operated due to breakdowns, in which case rental hours are the hours the equipment was operated.

Equipment Rental Hours

Hours operated	Hours paid
0.0	4.00
0.5	4.25
1.0	4.50
1.5	4.75
2.0	5.00
2.5	5.25
3.0	5.50
3.5	5.75
4.0	6.00
4.5	6.25
5.0	6.50
5.5	6.75
6.0	7.00
6.5	7.25
7.0	7.5
7.5	7.75
≥8.0	hours used

F. Equipment Not on the Job Site Not Required for Original-Contract Work. For equipment not on the job site at the time required to perform work paid by force account and not required for original-Contract work, the time paid is the time:

1. To move the equipment to the location of work paid by force account plus an equal amount of time to return the equipment to its source when the work paid by force account is completed

2. To load and unload equipment

3. Equipment is operated to perform work paid by force account

G. Non-Owner-Operated Dump Truck Rental. Contractor shall submit the rental rate for non-owner-operated dump truck rental to City. The City Engineer shall determine the payment rate. Payment for non-owner-operated dump truck rental is for the cost of renting a dump truck, including its driver. For the purpose of markup payment only, the non-owner-operated dump truck is rental equipment and the owner is a subcontractor.

The above markups shall constitute full compensation for all home office overhead, field office overhead, bond costs, profit, labor liability insurance, and other fixed or administrative costs that are not costs specifically designated as cost or equipment rental as stated above. The total payment made as provided above shall be deemed to be the actual cost of the work and shall constitute full compensation therefor.

When extra work to be paid for on a force account basis is performed by a subcontractor, an additional markup of 2 percent (2%) will be added to the total cost of that extra work including all markups specified in this Section. The additional 2 percent (2%) markup shall reimburse Contractor for additional administrative costs, and no other additional payment will be made by reason of performance of the extra work by a subcontractor.

EXHIBIT C
WORKERS' COMPENSATION INSURANCE CERTIFICATION

Pursuant to Section 18(b) of the Agreement, Contractor certifies as follows:

I am aware of the provisions of Section 3700 of the Labor Code which require 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 will comply with such provisions before commencing the performance of the work of this contract.

Signed: _____ Date: _____

_____
(Typed or Printed Name)

Business Address (Street Address, City, State & Zip Code):

_____

_____

_____

Business Phone: ( ) _____

EXHIBIT D
PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS:

WHEREAS, the **City of Turlock,** State of California, has awarded to _____, hereinafter designated as the "Principal," a contract for **Project No. 19-33, "DRIED SOLIDS STORAGE AREA";** and,

WHEREAS, said Principal is required under the terms of said contract to furnish a bond for the faithful performance of said contract.

NOW, THEREFORE, we the Principal, and _____ as Surety, are held and firmly bound unto the City of Turlock in the penal sum of _____ **($_____)**, lawful money of the United States for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, or assigns jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that if the above bounden Principal, or Principal's 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 said contract and any alteration thereof made as therein provided, on the Principal's part, to be kept and performed at the time and in the manner therein specified and in all respects according to their true intent and meaning; and shall defend, indemnify and save harmless the City of Turlock, its officers and agents as therein stipulated, then this obligation shall become null and void; otherwise it shall be and remain in full force and virtue.

And the Surety, for value received hereby stipulates and agrees that, in accordance with the Plans, Standard Specifications, Special Provisions, and other contract documents, no change, extension of time, alteration, or addition to the terms of the contract, or to the work to be performed hereunder, or to the specifications accompanying the same shall in anywise affect its obligations on this bond, and it does hereby waive notice of any such change, extension of time, alteration of additions to the terms of the Contract to the work, or to the specifications.

The City of Turlock reserves the right to refuse use of any Contractor assigned by any surety to complete the work.

[*Signatures on Following Page*]

IN WITNESS WHEREOF, the above-bound parties have executed this instrument under their seals this _____ day of _____, 20__, the name and corporate seals of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

(Corporate Seal) **Principal** _____

By _____

Title _____

(Attach Notarial Acknowledgment)

(Corporate Seal) **Surety** _____

Address _____

Phone No.: ( )_____ Fax No.: ( ) _____

By _____
Attorneys-in-Fact

Title _____

(Attach Notarial Acknowledgment)

<u>NOTE TO SURETY COMPANY</u>: There must be submitted a certified copy of unrevoked resolution of authority for the attorneys-in-fact.

(Seal) **Witness** _____

Approved as to form:

_____
Risk Manager

EXHIBIT E
PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS:

WHEREAS, the **City of Turlock**, a municipal corporation, has awarded to _____, hereinafter designated as the "Principal", a contract for **Project No. 19-33, "DRIED SOLIDS STORAGE AREA"**; and

WHEREAS, said Principal is required to furnish a bond in connection with said contract, to secure payment of claims of laborers, mechanics, or materialmen employed on work under said contract, as provided by law.

NOW, THEREFORE, we the undersigned Principal and Surety are held and firmly bound unto the City of Turlock in the sum of _____ **($_____),** said sum being equal to the estimated amount payable by said City of Turlock under the terms of the contract, for which payment well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, or assigns jointly and severally, firmly by these presents.

THE CONDITIONS OF THIS OBLIGATION ARE SUCH that if said Principal, or Principal's heirs, executors, administrators, successors, or assigns, or subcontractors shall fail to pay for any material, provisions, provender, or other supplies, implements, or machinery used in, upon, for or about the performance of the work contracted to be done, or for any work or labor thereon of any kind, or for amounts due under the Unemployment Insurance Code with respect to such work or labor, or for any amounts required to be deducted, withheld, and paid over to the Franchise Tax Board from these wages of employees of the Contractor and Contractor's subcontractors pursuant to the Revenue and Taxation Code, with respect to such work and labor, the Surety or Sureties hereon will pay for the same in an amount not exceeding the sum specified in this bond, otherwise the above obligation shall be void. In case suit is brought upon this bond, said Surety will pay a reasonable attorney's fee to be fixed by the court.

This bond shall inure to the benefit of any and all persons, companies, and corporations entitled to file claims under Section 3138 of the Civil Code of the State of California so as to give a right of action to them or their assigns in any suit brought upon this bond.

Said Surety, for value received, hereby stipulates and agrees that, in accordance with the Plans, Standard Specifications, Special Provisions, and other Contract Documents, no change, extension of time, alteration or addition to the terms of the contract, or to the work to be performed there under, or to the specifications accompanying the same, shall in anywise 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 contract, or to the work, or to the specifications.

IN WITNESS WHEREOF, the above-bound parties have executed this instrument under their seals this _____ day of _____, 20__, the name and corporate seals of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

(Corporate Seal) **Principal** _____

By _____

Title _____

(Attach Notarial Acknowledgment)

(Corporate Seal) **Surety** _____

Address _____

Phone No.: ( )_____ Fax No.: ( ) _____

By _____
Attorneys-in-Fact

Title _____

(Attach Notarial Acknowledgment)

<u>NOTE TO SURETY COMPANY</u>: There must be submitted a certified copy of unrevoked resolution of authority for the attorneys-in-fact.

(Seal) **Witness** _____

Approved as to form:

_____
Risk Manager

ESCROW FOR SECURITY DEPOSIT

IN LIEU OF RETENTION

This Escrow Agreement is made and entered into by and between the **City of Turlock**, whose address is 156 S. Broadway, Turlock, CA, 95380, hereinafter called "City",_____, whose address is _____, hereinafter called "Contractor", and _____, whose address is _____, hereinafter called "Escrow Agent."

For the consideration hereinafter set forth, the City, Contractor, and Escrow Agent agree as follows:

1. Pursuant to Section 22300 of the Public Contract Code of the State of California, Contractor has the option to deposit securities with Escrow Agent as a substitute for retention earnings required to be withheld by City pursuant to the construction contract entered into between the City and Contractor for **Project No. 19-33, Dried Solids Storage Area** in the amount of _____ dated _____ (hereinafter referred to as the "Contract"). Alternatively, on written request of the Contractor, the City shall make payments of the retention earnings directly to the Escrow Agent. When Contractor deposits the securities as substitute for Contract earnings, the Escrow Agent shall notify the City within 10 days of the deposit. The market value of the securities at the time of the substitution shall be at least equal to the cash amount then required to be withheld as retention under the terms of the Contract amount between the City and Contractor. Securities shall be held in the name of _____, and shall designate the Contractor as the beneficial owner.

The Contractor shall select and initial one of the following options:

2. [ ] The City shall make progress payments to the Contractor for such funds that otherwise would be withheld from progress payments pursuant to the Contract provisions, provided that the Escrow Agent holds securities in the form and amount specified above,

OR

3. [ ] The City shall make payment of retentions earned directly to the Escrow Agent. The Escrow Agent shall hold them for the benefit of the Contractor until such time as the escrow created under this Contract is terminated. The Contractor may direct the investments of the payments into securities. All terms and conditions of this agreement and the rights and responsibilities of the parties shall be equally applicable and binding when the City pays the Escrow Agent directly.

4. Contractor shall be responsible for paying all fees for the expenses incurred by Escrow Agent in administering the Escrow Account and all expenses of the City. These expenses and payment terms shall be determined by the City, Contractor, and Escrow Agent.

5. The interest earned on the securities or the money market accounts held in escrow and all interest earned shall be for the sole use of the Contractor and shall be subject to withdrawal by Contractor at any time and from time to time without notice to the City.

6. Contractor shall have the right to withdraw all or any part of the principal in the escrow account only by written notice to Escrow Agent accompanied by written authorization from City to the Escrow Agent that City consents to the withdrawal of the amount sought to be withdrawn by Contractor.

7. The City shall have a right to draw upon the securities in the event of default by the Contractor. Upon seven day's written notice to the Escrow Agent from the City of the default, the Escrow Agent shall immediately convert the securities to cash and shall distribute the cash as instructed by the City.

8. Upon receipt of written notification from the City certifying that the Contract is final and complete, and that the Contractor has complied with all requirements and procedures applicable to the Contract, Escrow Agent shall release to Contractor all securities and interest on deposit less escrow fees and charges of

the escrow account. The escrow shall be closed immediately upon disbursement of all monies and securities on deposit and payments of fees and charges.

9. Escrow Agent shall rely on the written notifications from the City and the Contractor pursuant to Sections (5) to (8) inclusive, of this agreement and the City and Contractor shall hold Escrow Agent harmless from Escrow Agent's release and disbursement of the securities and interest as set forth above.

10. Contractor authorizes the Escrow Agent to issue monthly statements of the status of the funds held in the escrow account to the City. Escrow Agent shall issue said statements on a monthly basis and mail to: City of Turlock, ATTN: Finance Department, 835 East 14th Street, Turlock, CA 94577.

11. The names of the persons who are authorized to give written notice or to receive written notice on behalf of the City and on behalf of Contractor in connection with the foregoing, and exemplars of their respective signatures, are as follows:

On behalf of City:

_____
Title

_____
Name

On behalf of Contractor:

_____
Title

_____
Name

On behalf of Escrow Agent:

_____
Title

_____
Name

_____
Signature

_____
Address

At the time the escrow account is opened, the City and Contractor shall deliver to the Escrow Agent a fully executed counterpart of this agreement.

IN WITNESS WHEREOF, the parties have executed this agreement by their proper officers on the date first set forth above.

City:	**Contractor:**
_____	_____
Title	Title
_____	_____
Name	Name
_____	_____
Signature	Signature
_____	_____
Address	Address

SPECIAL PROVISIONS

City Project No. 19-33
Dried Solids Storage Area

SECTION 1 - SPECIFICATIONS AND PLANS

SPECIAL NOTES:

1. Official bid documents including plans and specifications are available online at http://www.CityofTurlock.org/capitalprojects. All bids submitted for this project must conform to the requirements of the official bid documents, including plans and specifications.
2. Contractor's attention is drawn to Section 5.18 "Order of Work" of these Special Provisions.
3. The City has not secured a staging yard for this project. The Contractor shall secure their own staging yard if the site work area is insufficient. Prior to occupying property not owned by the Contractor, Contractor shall furnish a signed agreement between property owner and Contractor stating terms of use for property.

1.01 SPECIFICATIONS:

The work described herein shall be done in accordance with the current City of Turlock Standard Specifications and the 2010 Edition of the State of California, Department of Transportation Standard Specifications and Standard Plans (with exception that English units are to be used in place of metric) and in accordance with the following Special Provisions.

The Contract Documents are complementary; what is required by one is as binding as if required by all.

It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that may reasonably be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the intended result will be provided whether or not specifically called for at no additional cost to City.

Clarifications and interpretations of the Contract Documents shall be issued by Engineer.

in case of conflict or discrepancy between any of the Contract Documents, the order of documents listed below shall be the order of precedence, with the first item listed having the highest precedence.

1. Contract Change Order (Modifications or changes last in time are first in precedence).
2. Addenda to Contract Agreement
3. Contract Agreement
4. Permits
5. Special Provisions
6. Notice Inviting Bids and Instructions to Bidders
7. Project Drawings
8. City of Turlock Standard Specifications
9. Caltrans Standard Specifications
10. City of Turlock Standard Drawings
11. Caltrans Standard Plans

With regards to discrepancies or conflicts between written dimensions given on drawings and the scaled measurements, the written dimensions shall govern.

With regards to discrepancies or conflicts between large-scale drawings and small-scale drawings, the larger scale shall govern.

With regards to discrepancies or conflicts between detailed drawings and referenced standard drawings or plans, the detailed drawings shall govern.

In the event where provisions of codes, safety orders, contract documents, referenced manufacturer's specifications or industry standards are in conflict, the more restrictive and higher quality shall govern.

Should it appear that the work to be done or any of the matters relative thereto are not sufficiently detailed or explained in these specifications, the special provisions, or the plans, the Contractor shall apply to the Engineer in writing for such further explanations as may be necessary and shall conform to them as part of the contract. All responses from the Engineer shall also be in writing. In the event of any doubt or question arising respecting the true meaning of these specifications, the special provisions or the plans, reference shall be made to the Engineer, whose decision thereon shall be final.

1.02 CONTRACTOR'S RESPONSIBILITY:

The Contractor shall examine carefully the site of the work and the plans and specifications therefore. The Contractor shall investigate to their satisfaction as to conditions to be encountered, the character, quality and quantity of surface, subsurface materials or obstacles to be encountered, the work to be performed, materials to be furnished, and as to the requirements of the bid, plans and specifications of the contract.

1.03 COMPLETENESS AND ACCURACY OF PLANS AND SPECIFICATIONS:

Pursuant to the California Public Contract Code, the bidder is required to review architectural or engineering plans and specifications prior to submission of a bid, and report any errors and omissions noted by Contractor to the architect, engineer or owner five days prior to the bid opening date.

SECTION 2 - PROPOSAL REQUIREMENTS AND CONDITIONS

2.01 GENERAL:

The Contractor's attention is directed to the "Notice to Contractor" for the date, time and location of the mandatory Pre-Bid meeting, if applicable.

The bidder's attention is directed to the provisions in Proposal for this bid for the requirements and conditions which the bidder must observe in the preparation of and the submission of the bid.

The Contractor shall acknowledge on the Bidding Form with signature of all addendums issued. Failure to acknowledge by signature may result in determining the bid unresponsive.

The bidder's bond shall conform to the bond form in the Bid book for the project and shall be properly filled out and executed. The bidder's bond form included in that book must be used.

in conformance with Public Contract Code Section 7106, a Noncollusion Affidavit is included in the Bid book. Signing the Bid book shall also constitute signature of the Noncollusion Affidavit.

The contractor, sub recipient or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of Title 49 CFR (Code of Federal Regulations) part 26 in the award and administration of US DOT assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy, as the recipient deems appropriate. Each subcontract signed by the bidder must include this assurance.

Failure of the bidder to fulfill the requirements of the Special Provisions for submittals required to be furnished after bid opening, including but not limited to escrowed bid documents, where applicable, may subject the bidder to a determination of the bidder's responsibility in the event it is the apparent low bidder on a future public works contracts.

2.02 EXISTING UTILITIES, FACILITIES, AND SITE CONDITIONS:

The actual sizes, locations and materials of existing utilities and facilities shown on the plans may vary from what is shown on the plans. Attention is directed to the possible existence of underground facilities not indicated on the plans or in the special provisions. Contractor shall be responsible for verifying the locations

and nature of the existing utilities, protecting them from damage and notifying Engineer of their location and nature.

Contractor shall examine carefully the site of the work. It is assumed that Contractor has investigated and is satisfied as to the conditions to be encountered as to the character, quality and quantities of work to be performed.

Although the City of Turlock's soil conditions are homogenous and sandy in nature, various subsurface conditions such as hardpan, and ground water may be encountered. The City of Turlock will not be held responsible in any way for the type and character of subsurface conditions encountered. If a subsurface report is desired by Contractor, it will be Contractor's responsibility and expense to verify the subsurface conditions by boring or other means necessary prior to bidding and/or performing work. Attention is directed to Section 5.17, "Preservation of Property," of these special provisions during boring and other miscellaneous operations.

Full compensation for furnishing all labor, materials, tools, equipment (including dewatering devices), and incidentals, and for doing all the work involved with and/or in verifying existing utilities, facilities, site and subsurface conditions as specified above, shall be considered as included in the prices paid for the various contract items of work and no additional compensation will be allowed therefore.

2.03 ESCROW BID DOCUMENTS

1. SCOPE

The lowest Bidder, whose bid is deemed responsive, shall submit, within the specified time after receipt of Bids, one copy of all documentary information generated in preparation of Bid prices for this Project. This material is hereinafter referred to as "Escrow Bid Documents." The Escrow Bid Documents of the Successful Bidder will be held in escrow for the duration of the contract.

The Successful Bidder agrees, as a condition of award of the contract, that the Escrow Bid Documents constitute the complete, only, and all documentary information used in preparation of his Bid. No other Bid preparation information shall be considered in resolving disputes.

Nothing in the Escrow Bid Documents shall change or modify the terms or conditions of the Contract Documents.

2. OWNERSHIP

The Escrow Bid Documents are, and shall always remain, the property of CONTRACTOR, subject only to joint review by CITY and CONTRACTOR, as provided herein.

CITY stipulates and expressly acknowledges that the Escrow Bid Documents, as defined herein, constitute trade secrets. This acknowledgment is based on CITY's express understanding that the information contained in the Escrow Bid Documents is not known outside the Bidder's business, is known only to a limited extent and only by a limited number of employees of the Bidder, is safeguarded while in Bidder's possession, is extremely valuable to Bidder, and could be extremely valuable to Bidder's competitors by virtue of it reflecting Bidder's contemplated techniques of construction. CITY acknowledges that the Bidder expended substantial sums of money in developing the information included in the Escrow Bid Documents and further acknowledges that it would be difficult for a competitor to replicate the information contained therein. CITY further acknowledges that the Escrow Bid Documents and the information contained therein are made available to CITY only because such action is an express prerequisite to award of the contract. CITY further acknowledges that the Escrow Bid Documents include a compilation of information used in the Bidder's business, intended to give the Bidder an opportunity to obtain an advantage over competitors who do not know of or use the contents of the documentation. CITY agrees to safeguard the Escrow Bid Documents, and all information contained therein, against disclosure to the fullest extent permitted by law.

3. PROGRAM

Escrow Bid Documents will be used to assist in the negotiation of price adjustments and Change Orders and in the settlement of disputes, claims, and other controversies. They will not be used for pre-award evaluation

of CONTRACTOR's anticipated methods of construction or to assess CONTRACTOR's qualifications for performing the Work.

4. FORMAT AND CONTENTS

Bidders may submit Escrow Bid Documents in their usual cost estimating format. It is not the intention of this section to cause the Bidder extra work during the preparation of the Bid, but to ensure that the Escrow Bid Documents will be adequate to enable complete understanding and proper interpretation for their intended use. The Escrow Bid Documents shall be in the language of the Specifications.

The Escrow Bid Documents shall include all quantity takeoffs; crew; equipment; calculations of rates of production and progress; copies of quotations from equipment manufacturers, Subcontractors, and Suppliers; and memoranda, narratives, consultants' reports, add/deduct sheets, and all other information used by the Bidder to arrive at the prices contained in the Bidding Form. Estimated costs should be broken down into the Bidder's usual estimate categories, such as direct labor, repair labor, equipment operation, equipment ownership, expendable materials, permanent materials, and subcontract costs as appropriate. Plant and equipment and indirect costs should be detailed in the Bidder's usual format. CONTRACTOR's allocation of plant and equipment, indirect costs, contingencies, markup, and other items to each Bid item shall be included.

Bidding Documents provided by the CITY should not be included in the Escrow Bid Documents unless needed to comply with the requirements of this section.

5. SUBMITTAL

The Escrow Bid Documents shall be submitted in a sealed container within five working days, as requested in writing from the City. The container shall be clearly marked on the outside with the Bidder's name, date of submittal, project name, and the words "Escrow Bid Documents."

The Escrow Bid Documents shall be accompanied with a certification signed by an individual authorized by the Bidder to execute the Bidding Form, stating that the material in the Escrow Documentation constitutes the complete, only, and all documentary information used in preparation of the Bid and that he has personally examined the contents of the Escrow Bid Documents container and has found that the documents in the container are complete.

Prior to award, Escrow Bid Documents of the apparent Contractor will be unsealed, examined, organized, and inventoried by representatives of CITY, together with members of CONTRACTOR's staff who are knowledgeable in how the Bid was prepared. This examination is to ensure that the Escrow Bid Documents are authentic, legible, and complete. It will not include review or approval of proposed construction methods, estimating assumptions or interpretations of Contract Documents. This examination is subject to the condition that, as trade secrets, the Escrow Bid Documents are proprietary and confidential as described in Paragraph 2. Examination will not alter any condition(s) or term(s) of the contract.

If all the documentation required in Part 4, "Format and Contents," has not been included in the original submittal, additional documentation shall be submitted, at CITY's discretion, prior to award of the contract. The detailed breakdown of estimated costs shall be reconciled and revised, if appropriate, by agreement between CONTRACTOR and CITY before making the award.

If the contract is not awarded to the apparent Successful Bidder, the Escrow Bid Documents of the Bidder next to be considered for award shall be processed as described above.

Timely submission of complete Escrow Bid Documents is an essential element of the Bidder's responsibility and a prerequisite to contract award. Failure to provide the necessary Escrow Bid Documents will be sufficient cause for CITY to reject the Bid.

If the Bidder's proposal is based on subcontracting any part of the Work, each Subcontractor whose total subcontract price exceeds 5 percent of the total Contract Price proposed by the Bidder shall provide separate Escrow Bid Documents to be included with those of the Bidder. These documents will be opened and examined in the same manner and at the same time as the examination described above for the apparent Successful Bidder.

If CONTRACTOR subcontracts any portion of the Work after award, CITY retains the right to require CONTRACTOR to submit Escrow Bid Documents from the Subcontractor before the subcontract is approved.

Escrow Bid Documents submitted by unsuccessful Bidders will be returned unopened, unless opened as provided above, as soon as they are no longer needed by CITY and no later than immediately following award of the contract.

6. STORAGE

The Escrow Bid Documents of the Contractor will be placed in escrow prior to award of the contract, for the life of the contract, in a mutually agreeable institution. The cost of storage will be paid by CITY.

7. EXAMINATION AFTER AWARD OF CONTRACT

The Escrow Bid Documents shall be examined by both CITY and CONTRACTOR, at any time deemed necessary after award of the contract by either CITY or CONTRACTOR, to assist in the negotiation of price adjustments and Change Orders, or the settlement of disputes.

Examination of the Escrow Bid Documents after award of the contract is subject to the following conditions:

A. As trade secrets, the Escrow Bid Documents are proprietary and confidential as described in Paragraph 2.

B. CITY and CONTRACTOR shall each designate, in writing to the other party and a minimum of 10 days prior to examination, representatives who are authorized to examine the Escrow Bid Documents. No other person shall have access to the Escrow Bid Documents.

C. Access to the Escrow Bid Documents will take place only in the presence of duly designated representatives of both CITY and CONTRACTOR.

8. FINAL DISPOSITION

The Escrow Bid Documents will be returned to CONTRACTOR at such time as the contract has been completed and final settlement has been achieved.

SECTION 3 - AWARD AND EXECUTION OF CONTRACT

3.01 GENERAL:

The Contractor's attention is directed to the provisions in the Contract for the requirements and conditions concerning award and execution of contract.

The contract shall be executed by the successful bidder and shall be returned, together with the contract bonds and insurance, to the City so that it is received within 10 working days after the bidder has received the contract for execution. Failure to do so shall be just cause for forfeiture of the proposal guaranty. The executed contract documents shall be delivered to the following address:

Attention: Tania Hernandez
City of Turlock, Engineering Division
156 S Broadway, Suite 150
Turlock, CA 95380

3.02 BID PROTEST:

Bid protests are due in writing by the seventh calendar day after the bid opening and are to be delivered to the following address:

Nathan Bray, PE
156 S Broadway Suite 150
Turlock, CA 95380

Bid protest must be submitted with a non-refundable fee of $250.00 to review and respond to the repost.

The Low Bidder shall respond to the bid protest upon notification by the Engineer.

The award of the contract, if it be awarded, will be to the lowest responsible bidder whose bid complies with all the requirements prescribed.

SECTION 4 - BEGINNING OF WORK, TIME OF COMPLETION AND DELAY DAMAGES

Attention is directed to Section 6 “Time For Performance” of the Agreement.

At no time shall construction begin prior to the issuance of the Notice to Proceed. Any work performed prior to the Notice to Proceed shall be done at the Contractor’s own risk and payment will not be made therefor.

The Contractor shall follow the sequence of construction and progress of work as specified in Section 5.18, “Order of Work,” of these Special Provisions.

Should the Contractor choose to work on a Saturday, Sunday or Legal Holiday as defined in Section 5.11 “Working Hours,” of these Special Provisions, the Contractor shall reimburse the City of Turlock the actual cost of engineering, inspection, testing, superintendent, and/or other overhead expenses which are directly chargeable to the contract. Should such work be undertaken at the request of the City, reimbursement will not be required.

Attention is directed to Section 9 “Delay Damages” of the Agreement.

A pre-construction meeting will be held between Contractor and City prior to the beginning of construction. The exact time and place of this conference will be determined by City after award of the construction contract.

City shall furnish to Contractor five hard copies of the Contract Documents and plans. Contractor may produce additional copies as needed at Contractor’s expense.

SECTION 5 - GENERAL

5.01 LABOR NONDISCRIMINATION:
Attention is directed to the following Notice that is required by Chapter 5 of Division 4 of Title 2, California Code of Regulations.

NOTICE OF REQUIREMENT FOR NONDISCRIMINATION PROGRAM
(GOV. CODE, SECTION 12990)

Your attention is called to the "Nondiscrimination Clause", set forth in Section 7 1.01A(4), "Labor Nondiscrimination," of the Caltrans Standard Specifications, which is applicable to all nonexempt state contracts and subcontracts, and to the "Standard California Nondiscrimination Construction Contract Specifications" set forth therein. The Specifications are applicable to all nonexempt state construction contracts and subcontracts of $5,000 or more.

5.02 PREVAILING WAGE:
Attention is directed to Section 7-1.02K "Labor Code," of the Caltrans Standard Specifications.

Pursuant to Section 1773 of the Labor Code, the general prevailing wage rates in the county Stanislaus in which the work is to be done have been determined by the Director of the California Department of Industrial Relations. These wages are set forth in the General Prevailing Wage Rates for this project, available at 156 S. Broadway St, Turlock, CA 95380 and available from the California Department of Industrial Relations’ Internet web site at http://www.dir.ca.gov/DLSR/PWD

5.03 REMOVAL OF ASBESTOS AND HAZARDOUS SUBSTANCES:
When the presence of asbestos or hazardous substances are not shown on the plans or indicated in the specifications and the Contractor encounters materials which the Contractor reasonably believes to be asbestos or a hazardous substance as defined in Section 25914.1 of the Health and Safety Code, and the asbestos or hazardous substance has not been rendered harmless, the Contractor may continue work in unaffected areas reasonably believed to be safe. The Contractor shall immediately cease work in the affected area and report the condition to the Engineer in writing.

in conformance with Section 25914.1 of the Health and Safety Code, removal of asbestos or hazardous substances including exploratory work to identify and determine the extent of the asbestos or hazardous substance will be performed by separate contract.

If delay of work in the area delays the current controlling operation, the delay will be considered a right of way delay and the Contractor will be compensated for the delay in conformance with the provisions in Section 8 1.07, "Delays," of the Caltrans Standard Specifications.

5.04 SUBCONTRACTING:
No subcontract releases the Contractor from the contract or relieves the Contractor of their responsibility for a subcontractor's work.

If the Contractor violates Pub Cont Code § 4100 et seq., the City may exercise the remedies provided under Pub Cont Code § 4110. The City may refer the violation to the Contractors State License Board as provided under Pub Cont Code § 4111.

Each subcontract must comply with the contract.

Each subcontractor must have an active and valid State contractor's license with a classification appropriate for the work to be performed (Bus & Prof Code, § 7000 et seq.).

At the pre-construction meeting, prior to starting work, Contractor shall submit a complete listing of subcontractors and the value of the work each subcontractor will perform. This list shall contain all information identified on Exhibit 12-G of the Local Assistance Procedures Manuel.

Before subcontracted work starts, submit a Subcontracting Request form.

Do not use a debarred contractor; a current list of debarred contractors is available at the Department of Industrial Relations' Web site.

Upon request by the Engineer, immediately remove and not again use a subcontractor who fails to prosecute the work satisfactorily.

5.05 PROMPT PROGRESS PAYMENT TO SUBCONTRACTORS:
A prime contractor or subcontractor shall pay any subcontractor not later than 10 days of receipt of each progress payment in accordance with the provision in Section 7108.5 of the California Business and Professions Code concerning prompt payment to subcontractors. The 10 days is applicable unless a longer period is agreed to in writing. Any delay or postponement of payment over 30 days may take place only for good cause and with the agency’s prior written approval. Any violation of Section 7108.5 shall subject the violating contractor or subcontractor to the penalties, sanction and other remedies of that section. This requirement shall not be construed to limit or impair any contractual, administrative, or judicial remedies otherwise available to the contractor or subcontractor in the event of a dispute involving late payment or nonpayment by the prime contractor, deficient subcontract performance, or noncompliance by a subcontractor.

5.06 PROMPT PAYMENT OF FUNDS WITHHELD TO SUBCONTRACTORS:
The agency shall hold retainage from the prime contractor and shall make prompt and regular incremental acceptances of portions, as determined by the agency, of the contract work, and pay retainage to the prime contractor based on these acceptances. The prime contractor, or subcontractor, shall return all monies

withheld in retention from a subcontractor within 30 days after receiving payment for work satisfactorily completed and accepted including incremental acceptances of portions of the contract work by the agency. Federal law (49CFR26.29) requires that any delay or postponement of payment over 30 days may take place only for good cause and with the agency's prior written approval. Any violation of this provision shall subject the violating prime contractor or subcontractor to the penalties, sanctions and other remedies specified in Section 7108.5 of the Business and Professions Code. These requirements shall not be construed to limit or impair any contractual, administrative, or judicial remedies otherwise available to the prime contractor or subcontractor in the event of a dispute involving late payment or nonpayment by the prime contractor, deficient subcontract performance, or noncompliance by a subcontractor.

5.07 PAYMENTS:
Attention is directed to Section 21, "Payments to Contractor," of the Agreement.

At the end of each month the Contractor shall submit a proposed progress invoice. The invoice shall delineate each bid item, the amount of work performed for the invoice period (previous month) and the total amount of work performed to date. A sample invoice with all of the required items will be given to the Contractor at the pre-construction meeting.

The Engineer will review the progress invoice and after any changes the Engineer makes, will issue an official invoice for the Contractor to sign. The Contractor shall sign the official invoice and return to the Engineer. After the Engineer receives the signed, official invoice, the progress payment will be processed.

Retention in the amount of 5% of the progress payment amount shall be held from all progress payments. Retention will be released 35 days after the Notice of Completion has been filed, insofar as no stop notices were filed.

5.08 GUARANTY:
Attention is directed to Section 9-4, "Guaranty," of the City of Turlock Standard Specifications.

5.09 PUBLIC SAFETY:
in addition to any other measures taken by Contractor pursuant to the provisions of the Standard Specifications and the General Conditions, Contractor shall install temporary precast concrete barrier rail between any lane carrying public traffic and any excavation, obstacle or storage area when the following conditions exist:

Excavations: Any excavation, the near edge of which is 12 feet or less from the edge of the lane, except;

(a) Excavations covered with sheet steel or concrete covers of adequate thickness to prevent accidental entry by traffic or the public.

(b) Excavations less than one foot deep.

(c) Trenches less than one foot wide for irrigation pipe or electrical conduit or excavations less than one foot in diameter.

(d) Excavations parallel to the lane for the purpose of pavement widening or reconstruction.

(e) Excavations in side slopes where the slope is steeper than 4:1.

(f) Excavations protected by existing barrier or railing.

At the end of each working day, if a difference of 0.50 feet exists between the elevation of the existing pavement and the elevation of any excavation within 2 feet of the traveled way, material shall be placed and compacted against the vertical cuts adjacent to the traveled way. During excavation operations, native material may be used for this purpose, however, once the placing of the structural section commences, structural material shall be used. The material shall be placed to the level of the elevation of the top of the existing pavement and tapered at a slope of 4:1 or flatter to the bottom of the excavation. Treated base shall not be used for the taper. Full compensation for placing the material on a 4:1 slope, regardless of the number of times it is required, and

subsequent removing or reshaping of the material to the lines and grades shown on the plans shall be considered as included in the cost for other contract items of work and no additional compensation will be allowed therefore.

Personal vehicles of Contractor's employees shall not be parked on the traveled way or shoulders, including any section closed to public traffic. Whenever vehicles or equipment are parked on the shoulder within 6 feet of a traffic lane, the shoulder area shall be closed with traffic cones or portable delineators placed on a taper in advance of the parked vehicles or equipment and along the edge of the pavement at 25 foot intervals to a point not less than 25 feet past the last vehicle or piece of equipment.

A minimum of one paved traffic lane, not less than 12 feet wide, shall be open for use by public traffic in each direction of travel. The full width of the traveled way shall be open for use by public traffic on Saturdays, Sundays and designated legal holidays, after 4:00 p.m. on Fridays and the day preceding designated legal holidays and when construction operations are not actively in progress.

5.10 SOUND CONTROL REQUIREMENTS:
Sound control shall be in accordance with Section 7 1.01I, “Sound Control Requirements,” of the Caltrans Standard Specifications and these special provisions.

The noise level from Contractor's operations, between the hours of 9:00 p.m. and 6:00 a.m., shall not exceed 86 dba at a distance of 50 feet. This requirement in no way relieves Contractor from responsibility for complying with local ordinances regulating noise level.

Said noise level requirements shall apply to all equipment on the job or related to the job, including but not limited to trucks, transit mixers or transient equipment that may or may not be owned by Contractor. The use of loud sound signals shall be avoided in favor of light warnings except those required by safety law for the protection of personnel.

Full compensation for conforming to the requirements of this section shall be considered as included in the prices paid for the various contract items of work involved and no additional compensation will be allowed therefore.

5.11 WORKING HOURS:
Contractor's working hours shall be between 7:00 a.m. and 5:00 p.m., Monday through Friday, excluding legal holidays.

Contractor shall notify Engineer 48 hours prior to beginning work.

Contractor shall not work outside the above-mentioned working hours without prior written consent of Engineer.

Designated legal holidays are: January 1st, the third Monday in January, the third Monday in February, the last Monday in May, July 4th, the first Monday in September, November 11th, Thanksgiving Day, the day after Thanksgiving, and December 25th. When a designated legal holiday falls on a Sunday, the following Monday shall be a designated legal holiday. When a designated legal holiday falls on a Saturday, the preceding Friday shall be a designated legal holiday.

5.12 UNDERGROUND SERVICE ALERT REQUIREMENTS:
Contractor shall contact Underground Service Alert of Northern California at least 48 hours in advance of any construction activity, will or could damage or affect any underground utility or subsurface improvement, and obtain an inquiry identification number. Contractor shall notify Underground Service Alert in the event of change in the project limits or change in original work previously shown on the plans or indicated in the specifications. Contractor shall not commence construction prior to City Inspector receiving City's notice from USA North regarding this construction activity.

5.13 DUST CONTROL:
Dust Control shall conform to the provisions in Section 10, “Dust Control”, of the Standard Specifications and these special provisions.

Full compensation for Dust Control will be considered as included in the various contract items of work requiring Dust Control, as determined by Engineer, and no separate payment will be made therefor.

5.14 WATERING:
Watering shall be in accordance with Section 17, “Watering,” of the Caltrans Standard Specifications.

Full compensation for Watering will be considered as included in the various contract items of work requiring Watering, as determined by Engineer, and no separate payment will be made therefor.

5.16 PROGRESS SCHEDULE:
Contractor shall furnish City with a Critical Path Method progress schedule. The progress schedule shall show the construction activities extending for the duration of the working days. Any deviation from the outline must be approved by Engineer. Contractor shall not be allowed to start construction activities until the progress schedule is accepted by Engineer.

Contractor shall furnish one copy of scheduling software for use by Engineer. Software shall be MS Project, SureTrak, or equal. Software shall remain with Engineer after completion of contract.

5.17 PRESERVATION OF PROPERTY:
The work performed in connection with various existing facilities shall be in accordance with Section 7-8, “Preservation of Property,” of the Standard Specifications and these special provisions.

Due care shall be exercised to avoid injury or damage to existing improvements or facilities, utility facilities, adjacent property, and roadside trees, shrubs and other plants that are to remain in place.

Roadside trees, shrubs and other plants that are not to be removed and pole lines, fences, signs, markers and monuments, buildings and structures, conduits, pipelines under or above aground, sewer and water lines, sprinkler systems above or below ground, all roadway facilities, and any other improvements or facilities within or adjacent to the right-of-way shall be protected from injury or damage, and if ordered by Engineer, Contractor shall provide and install suitable safeguards, approved by Engineer, to protect such objects from injury or damage. If such objects are injured or damaged by reason of Contractor's operations they shall be replaced or restored at Contractor's expense. The facilities shall be replaced or restored to a condition as good or better as when Contractor entered upon the work, or as good as required by the specifications accompanying the contract, if any such objects are a part of the work being performed under the contract. Engineer may make or cause to be made such temporary repairs as necessary to restore to service any damaged facility. The cost of such repairs shall be borne by Contractor and may be deducted from any moneys due or to become due to Contractor under the contract.

The fact that any underground facility is not shown upon the plans shall not relieve Contractor of his responsibility under Section 2.02, “Existing Utilities and Facilities”, of these provisions. It shall be Contractor's responsibility, pursuant thereto, to ascertain the location of such underground improvements or facilities that may be subject to damage by reason of his operations.

Full compensation for furnishing all labor materials, tools, equipment, and incidentals, and for doing all the work involved in protecting or repairing property as specified above, shall be considered as included in the prices paid for the various contract items of work and no additional compensation will be allowed therefore.

5.18 ORDER OF WORK:
The project consists of several loosely connected elements. In general, the Contractor shall determine the schedule of construction for each element. However, impacts to the day to day operation of the WWTP should be minimized.

5.19 AS-BUILTS:
Provide and maintain on the jobsite one complete set of prints of all drawings which form a part of the contract. Immediately after each portion of the work is installed, indicate all deviations from the original design shown in the drawings either by additional sketches or ink thereon. Upon completion of the job, deliver this record set

to the Owner's Representative. The Contractor shall identify all utilities that are located in the field. The NOC will not be issued until acceptable as-builts have been received by the Engineer.

5.21 TESTING:

Unless otherwise noted, City of Turlock will supply all acceptance testing. Coordination of said testing is the responsibility of Contractor through the project's inspector. The Contractor shall provide at least 24 hours' notice to the Engineer in advance of needing acceptance testing. If the Contractor request testing and the Contractor is not ready for the testing to occur, the Contractor shall be back charged the cover the cost of the testing firm.

At sites chosen by the project inspector, City's testing laboratory will conduct all tests. Contractor shall supply any necessary equipment and or labor required to obtain all samples for the completion of the testing process.

City of Turlock shall compensate the testing laboratory for all initial tests. Secondary and all other follow-up tests required due to failure of initial testing shall be reimbursed to City of Turlock based on the following schedule:

Water sample test: $300.00 Per Test
Compaction test: $100.00 Per Test

5.22 SUBMITTALS:

5.22.1. Shop Drawings

A. The use of contract drawing reproductions for shop drawings is subject to rejection.

B. Submit shop drawings in .pdf format compatible with Adobe Acrobat Version 9. Files 5 MB or less may be submitted to the Owner's Representative via email. Submit files larger than 5 MB by means of an FTP server, USB flash drive, or as approved by Owner's Representative. Pages shall be scanned at a resolution necessary for readability. Scans shall be in color where appropriate for clarity. Superfluous catalog pages shall be excluded from submittals. Clearly indicate the specification section and drawing number to which each shop drawing is referenced.

C. If the Contractor submits shop drawings of equipment by manufacturers other than those listed in the specifications, provide the following information with the submittal:

1. The name and address of at least three companies or agencies that are currently using the equipment.

2. The name and telephone number of at least one person at each of the above companies or agencies whom the Owner's Representative may contact.

3. A description of the equipment that was installed at the above locations. The description shall be in sufficient detail to allow the Owner's Representative to compare it with the equipment that is proposed to be installed in this project.

D. For materials originating outside of the United States for which tests are required, provide recertification and retesting by an independent domestic testing laboratory.

5.22.2. Submittal Requirements

A. Make submittals promptly in such sequence as to cause no delay in the work. Schedule submission a minimum of 30 calendar days before reviewed submittals will be needed.

B. Submittals shall contain:

1. The date of submission and the dates of any previous submissions.

2. The project title and number.

3. Contract identification.

4. The names of:

   a. Contractor.

   b. Supplier.

   c. Manufacturer.

5. Identification of the product, with the specification section number.

6. Field dimensions, clearly identified as such.

7. Relationship to adjacent or critical features of the work or materials.

8. Identification of deviations from contract documents.

9. Identification of revisions on resubmittals.

10. A 5-inch by 5-inch blank space for stamps of the Owner's Representative.

11. Contractor's stamp, initialed or signed, shall certify Contractor's review of submittal, verification of products, field measurements and field construction criteria, and coordination of the information within the submittal that the product meets the requirements of the work and of the contract documents.

5.22.3. Submittal Format

A. Each submittal shall have a transmittal form. A sample transmittal form is included at the end of this section. Every page in a submittal shall be numbered in sequence.

B. Where product data from a manufacturer is submitted, clearly mark which model is proposed, with all pertinent data, capacities, dimensions, clearances, diagrams, controls, connections, anchorage, and supports. Present a sufficient level of detail for assessment of compliance with the contract documents.

C. Each submittal shall be assigned a unique number. Submittals shall be numbered sequentially. The submittal numbers shall be clearly noted on the transmittal. Original submittals shall be assigned a numeric submittal number. Resubmittals shall bear an alphanumeric system which consists of the number assigned to the original submittal for that item followed by a letter of the alphabet to represent that it is a subsequent submittal of the original. For example, if Submittal 25 requires a resubmittal, the first resubmittal will bear the designation "25-A" and the second resubmittal will bear the designation "25-B" and so on.

D. Disorganized submittals that do not meet the requirements above will be returned without review.

5.22.4. Resubmittals

Resubmittal of submittals will be reviewed and returned in the same review period as for the original submittal. It is considered reasonable that the Contractor shall make a complete and acceptable submittal by the second submission of a submittal item. The Owner's Representative reserves the right to withhold monies due to the Contractor to cover additional costs of any review beyond the second submittal.

5.23 CLAIMS AND DISPUTES:

See Section 11 of Agreement for claims and disputes.

5.24 PRESERVATION OF EXISTING MONUMENTS:

Preservation of existing monuments shall be Contractor's responsibility. Contractor shall notify Engineer of all monuments that may/will be disturbed by construction operations. Engineer will tie off said monuments and provide Contractor a notice to proceed.

Once Contractor is finished with its construction operations, Engineer will relocate the monuments. Contractor shall install a monument will with concrete collar at each location which shall conform to the provisions in Section 22-1 "Survey Monuments" and Drawing M-1 "Monument Detail," of the Standard Specifications and these special provisions.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved with protecting existing monuments as specified above, shall be considered as included in the prices paid for the various contract items of work and no additional compensation will be allowed therefore.

5.25 BUSINESS LICENSE:

Contractor shall obtain a City of Turlock business license prior to issuance of the Notice to Proceed. The cost of the business license is fifty cents per thousand dollars in revenue. Business Licenses are obtained through the Finance Division at Turlock City Hall, 156 S. Broadway, Suite 114. Additional information can be found on the City's website at:

http://ci.Turlock.ca.us/doingbusinessinTurlock/businesslicenses/newbusinesslicense.asp

Full compensation for obtaining a business license as specified above shall be considered as included in the prices paid for the various contract items of work and no additional compensation will be allowed therefore.

5.26 INTERNET BASED CONSTRUCTION MANAGEMENT SYSTEM:

General

The Engineer and Contractor shall utilize Virtual Project Manager (http://www.virtual-pm.com/), herein after called VPM, for submission of all data and documents (unless specified otherwise in this Section) throughout the duration of the Contract. VPM is an electronic project management system accessible through the Internet used to create, share, and review construction management documentation. VPM is provided by the Engineer at no cost to the Contractor. VPM will be made available to all Contractors' personnel, subcontractor personnel, suppliers, consultants, Engineer, and any of Engineer's representatives or agents. The joint use of this system is to facilitate electronic exchange of information, automation of key processes, electronic notification of project activity, and overall management of contract documentation. VPM shall be the primary means of project information submission and management.

The Engineer will establish the Contractor's access to VPM by enabling access and assigning user profiles to Contractor personnel, including subcontractors and suppliers, as requested by Contractor. All authorized personnel shall have an individual user profile; no joint-use or shared user profiles will be allowed. Each user profile shall be assigned to a user group and have specific permission settings and privileges based on the user's need within VPM. Entry of information exchanged and transferred between the Contractor and its subcontractors and suppliers on VPM shall be the responsibility of the Contractor.

The Contractor shall use computer hardware and software that meets the requirements of the VPM system. As recommendations are modified by VPM, the Contractor will upgrade their system(s) to meet or exceed the recommendations. Upgrading of the Contractor's computer systems will not be justification for a cost or time modification to the Contract. The Contractor shall ensure its own connectivity to VPM through their internet service provider.

The Contractor shall be responsible for the validity of the information they place in VPM, for the training of their personnel to understand and utilize VPM, as well as the provision and accessibility of adequate resources to connect with VPM. Accepted users shall be knowledgeable in the use of computers, including Internet browsers, email programs, and the Portable Document Format (PDF) document type. The Contractor shall utilize the existing forms in VPM to the maximum extent possible. If a form does not exist in VPM the Contractor must include their own form or a form provided by the Engineer as an attachment to a submittal, RFI, or other

document within VPM. Note that only the following file types are accepted as attachments to documents within VPM: PDF files, Microsoft Word (DOC) files, Microsoft Excel (XLS) files, picture files (JPG, TIFF, BMP, JPEG, etc.). PDF documents will be created through electronic conversion prior to uploading, such as through a "print to file" feature or "save as pdf" feature, rather than optically scanned whenever possible.

Contractor shall provide a list of key VPM personnel for the Engineer's acceptance. The list shall include the following information: first name, last name, address, title, office phone number, cell phone number, and email address. The Engineer is responsible for adding and removing users from the system and establishing read, write, and approval permission levels.

Company Documents

This area is reserved for general documentation not related to a specific project. Only the Engineer shall post content in this area. Examples of content found in this area are: the City of Turlock Standard Specifications and Drawings, the 2010 Caltrans Standard Specifications, and the 2010 Caltrans Standard Plans. All files are in PDF format.

Project Summary

The project summary tab provides an overall summary of the project. It includes the current weather, the working days remaining and a summary of work for the past week. The summary of work is generated from the City's project inspector and the daily logs. This tab is for information only and the Contractor shall not take any action here.

Task Manager

The project schedule the Contractor submits is converted into a format that is uploaded by the Engineer into the task manager tab. The Contractor is responsible for providing schedule updates to the Engineer whenever the work progress in a manner different than the approved schedule.

Change Order Manager

The change order manager tab shall be used to track project change orders. Any potential change orders shall be tracked as a Request for Information (RFI) in the RFI tab. Once the Engineer agrees that a RFI will result in a contract change order, a new contract change order shall be created by the Engineer in the change order manager tab. The Engineer will finalize the contract change order through this tab. Once the change order is finalized, the Engineer will present the contract change order at a City Council meeting. After City Council approval the Engineer will make payment on the contract change order.

Transmittals

The transmittal tab shall be used to communicate general project information amongst all parties as well as used by the Contractor in the submission of certified payroll reports. The Engineer will upload the project-specific information including: bid documents, conformed plans, conformed specifications and the Notice to Proceed to the transmittal tab.

The Contractor shall submit certified payroll reports on a weekly basis through the transmittal tab. Each week shall have a separate transmittal where all the certified payroll reports and statements of non-performance for each contractor shall be posted.

Submittals

All submittals shall be submitted through the submittal tab. The preferred document type is PDF.

Before making submittals, the Contractor shall ensure that products and materials will be available in the quantities and in the time required by the Contract and the approved schedule of activities. Each submittal shall be legible and clearly identify, by highlighting, arrows or other defined and permanent mark, the products and materials proposed for use.

All submittals shall be generated from the prime contractor and any submittals that are uploaded by subcontractors or suppliers will not be reviewed. Contractor shall carefully review all subcontractor and suppliers submittals before submitting it to the Engineer for review. If a submittal contains extraneous

information, unmarked options or is otherwise incomplete, it will be rejected and the Contractor shall make corrections and upload the resubmittal. Any resubmittal shall be made to the same transmittal item in VPM.

Submittals shall be processed by the Engineer within ten working days after upload to VPM. The Engineer will review submittals for general conformance with the Contract Documents and standards. Such review by the Engineer shall not relieve the Contractor of any responsibility for full compliance with the Contract Documents. Unless specifically authorized to do so by the Engineer, the Contractor shall not procure, manufacture, or fabricate any part of the contract work until submittals related to said contract work have been approved by the Engineer.

Each submittal shall have a unique title that is comprised of the item followed by a comma and the section of the specifications that reference the item (e.g. Minor Concrete, Section 8.01). The submittal type shall either be project materials or project information. The submittal description shall be used to identify any pertinent information or list a description of the item being submitted.

Certificates of compliance shall be submitted through the submittal tab. The submittal type shall be “certificate of compliance”.

The Contractor shall submit progress invoices on the last working day of the month through the transmittal tab (select “progress invoice” for the type). The Engineer will review the submitted content and if found acceptable the Engineer will upload an official invoice for the Contractor to sign. The Contractor shall sign in blue ink and upload the signed invoice to the same transmittal where the Engineer will then process for payment.

RFIs

The RFI tab shall be used to request information from the Contractor to the Engineer. The Contractor shall create a RFI upon recognition of any event or question of fact arising from the contract work. The RFI type for this submittal shall be “Request for Information.” The Engineer will also utilize the RFI tab in a similar manner when there is a question for the Contractor; this RFI type shall be “Response Required.”

The Engineer will respond to a RFI submitted by the Contractor within five days. The Contractor shall proceed with the work unless otherwise ordered.

Daily Logs

The daily log tab is used by the City to document the activities of the work, any correspondence or direction given in the field, safety concerns and general comments about the project. The Contractor may view the contents of this tab for reference purposes. The information entered into the daily log tab is used to populate the project summary tab.

WSWD

The weekly statement of working days will be posted to the WSWD tab. VPM automatically generates the WSWD from the information entered into the daily log tab. The WSWD shows the working days and non-working days charged for the reporting week, any time adjustments, a work completion date with the remaining working days left in the contract and the controlling activities for the week.

The Contractor will be allowed 15 days from the last working day of the weekly statement to protest in writing the correctness of the statement. The Contractor shall submit a transmittal stating what is being protested and the reasons for protest. The Engineer will respond to the protest. The Contractor may protest the Engineer’s response by submitting a claim in accordance with Section 5.23 “Claims and Disputes” of the special provisions.

SECTION 6 - DESCRIPTION OF WORK

The work consists, in general, of construction of a dried solids storage area 330 feet square (108.900 square feet in area) paved with asphalt, soil cement, subgrade improvements, and drainage. Additional work includes the provision of a concrete washdown area, Vactor dumping structure, recycled water distribution mains,

electrical conduit, vaults and street light bases for future lighting and electrical distribution. The new facilities will be served by an improved access road, and surrounded by a perimeter reinforced concrete push wall.

SECTION 7 - CONSTRUCTION DETAILS

Compensation for all work specified to be performed under this contract and shown on the drawings will be made under payment items listed herein and shown on the Bid Schedule. The contract prices for the said payment items shall be full compensation for all of the costs connected therewith including all labor, materials, tools, equipment, and incidentals furnished and doing all the work involved in completing the items of work including final cleanup as specified herein. It is the intent of this contract that the sum of all prices listed in the Bid Schedule shall represent the total lump sum cost of all work shown on the drawings and specified herein. Where items of work are not specifically defined in the schedule or included in the bid items, including mobilization and demobilization, these items shall be included in those bid items which are most closely related to the required work.

Separate payment will not be made for any item which is not specifically set forth in the bid items contained in the Proposal. Therefore, the Contractor's entire compensation for doing all work in accordance with the Contract Documents shall be included in the prices stated in the Proposal.

SECTION 8 - BID ITEM DESCRIPTIONS

Bid Item 1 - Mobilization and Demobilization

This item is a lump-sum bid for preparatory work and operations including, but not limited to, those necessary for the movement of personnel, equipment, supplies, and incidentals to the project site; for obtaining permits, bonds, and insurance; and for all other work and operations which must be performed or costs incurred prior to beginning work on the various contract items on the project site. This bid item is limited to a maximum of $100,000. Mobilization payment shall be made at the time of the first monthly pay request and shall be limited to 80 percent of the bid amount. Demobilization and removal of all equipment, supplies, and incidentals at the conclusion of the work is also included and shall be paid in the amount of 20 percent of the bid amount at the last monthly pay request.

Bid Item 2 - Permits and Traffic Control

This is a lump-sum bid item for all permits and traffic control required for the project. Payment will be made at the contract lump-sum bid price and shall be divided equally throughout the length of the contract.

Bid Item 3 - Sheeting, Shoring, Bracing, and Excavation Safety Measures

This is a lump-sum bid item for sheeting, shoring, bracing, and excavation safety measures for the protection of life and limb, in conformance with the applicable safety orders, shall be made at the contract lump-sum bid price and shall be divided equally throughout the length of the associated pipeline.

Bid Item 4 - Earthwork: Clearing, Stripping, and Grubbing

This is a unit-price bid item for stripping, grubbing, and clearing within the work area limits shown in the drawings, and shall include all costs for the following:

- Removing, transporting, and disposing of organic topsoil, grass and grass roots, and other objectionable material remaining after clearing.
- Removing, transporting, and disposing of top 2 inches of existing topsoil from primary staging/stockpile area and grassland topsoil salvage areas in accordance with the specifications.
- Removing, transporting, and disposing of tree and shrub stumps and root systems and backfilling the grubbed holes.
- Removing, transporting, and disposing of asphalt, concrete, and/or pavement.

Measurement for payment will be made in acres stripped, grubbed, and cleared in accordance with the specifications. Payment will be made at the unit price per acre bid

Bid Item 5 - Earthwork: Excavation

This is a unit-price bid item in cubic yards for material excavated in place to lines, grades, and dimensions shown in the drawings and from the designated on-site borrow area. Payment will be made at the unit price per cubic yard bid, which price shall include all costs for the following:

- Excavating the materials.
- Transporting excavated materials from the sites of excavation to points of final use, to temporary stockpiles including placing the materials into separate stockpiles designated for each type of material, and from the temporary stockpiles to points of final use.
- Rehandling excavated materials which have been deposited temporarily in stockpiles.
- Screening and removal of oversize or unsuitable material from otherwise suitable materials and disposal of the oversize or unsuitable material.
- Disposal of excavated materials not suitable or required for the permanent construction to designated stockpile areas on site.

The Contractor shall be entitled to no additional allowance above the unit price bid for borrow excavation on account of the designation by the Owner's Representative of the various portions of the borrow area from which materials are to be obtained, on account of the depths of cut which are required to be made, or on account of the location where materials are transported.

Bid Item 6 - Earthwork: Place and Compact Fill

This is a unit-price bid item for cubic yards of material placed to lines, grades, and dimensions shown in the drawings.

Payment will be made at the unit price per cubic yard bid, which price shall include all costs for the following:

- Conditioning the materials at the excavation site prior to excavation or at the stockpile areas prior to transporting to points of final use.
- Transporting the embankment fill materials directly from excavation or from temporary stockpiles to points of final use.
- Placing and compacting the material in place.

Bid Item 7 - Drainage: 60-Inch-Diameter Manhole

This is a unit-price bid per each for junction structures with manholes installed at the locations shown in the drawings. Payment will be made at the unit price per each junction structure with manhole lid, which price shall include costs for furnishing materials, labor, equipment, and installing junction structures with manhole complete.

Bid Item 8 - Drainage: 18-inch HDPE Profile Wall Pipe (HDPE)

This is a unit-price bid item per linear foot of 18-inch HDPE profile wall pipe and fittings placed to lines and grades, including pipe excavation and placing and compacting bedding material and backfill, as shown in drawings and in accordance with the specifications. Payment will be made at the unit price per linear foot bid, which price shall include costs for materials, labor, equipment, incidentals, and installation of 18-inch HDPE profile wall pipe.

Bid Item 9 - Drainage: 24-inch HDPE Profile Wall Pipe (HDPE)

This is a unit-price bid item per linear foot for 24-inch HDPE profile wall pipe and fittings placed to lines and grades, including pipe excavation and placing and compacting bedding material and backfill, as shown in drawings and in accordance with the specifications. Payment will be made at the unit price per linear foot bid, which price shall include costs for materials, labor, equipment, incidentals, and installation of 24-inch HDPE profile wall pipe.

Bid Item 10 - Drainage: Single Grate Concrete Catch Basin

This is a unit-price bid item per each for single-grate concrete catch basins installed at the locations shown in the drawings. Payment will be made at the unit price per each catch basin bid, which price shall include costs for furnishing materials, labor, equipment, and installing the catch basins complete.

Bid Item 11 - Laydown and Washdown Areas: Construct Reinforced Concrete Washdown Area
This is a unit-price bid item per square foot for constructing reinforced concrete laydown and washdown areas as shown in the drawings. Payment will be made at the unit price per square foot bid, which price shall include costs for constructing the reinforced concrete surfaces complete in accordance with the specifications.

Bid Item 12 - Laydown and Washdown Areas: Construct Reinforced Concrete Vactor Dump Facility
This is a lump-sum bid item for the concrete vactor dump facility constructed at the location shown in the drawings including constructing the reinforced concrete structure complete in accordance with the specifications.

Bid Item 13 - Laydown and Washdown Areas: Soil-Cement Subgrade
This is a unit-price bid item per square yard for furnishing, placing, and treating subgrade in accordance with the specifications and as shown on the drawings.

Bid Item 14 - Laydown and Washdown Areas: Construct Reinforced Concrete Push Wall
This is a unit-price bid item per square foot of vertical surface area for constructing the concrete push wall complete as shown in the drawings and in accordance with the specifications.

Bid Item 15 - Laydown and Washdown Areas: Asphalt-Concrete Paving
This is a unit-price bid item per square foot of surface area for asphalt concrete paving of the laydown area, including final grading, laydown area pavement, delineation of bays, pavement markers, and striping, as shown in the drawings and in accordance with the specifications.

Bid Item 16 - Laydown and Washdown Areas: Reinforced Concrete Valley Gutter
This is a unit-price bid item per linear foot for reinforced concrete valley gutter installed at the locations in the drawings and in accordance with the specifications. Costs shall include materials, labor, equipment, and incidentals for installation of valley gutters including excavation.

Bid Item 17 - Permanent Project Roads: Subgrade Preparation
This is a unit-price bid item per square yard for subgrade preparation beneath permanent project roads at the locations shown in the drawings and in accordance with the specifications. Subgrade preparation shall include all labor, materials, tools, equipment, and incidentals required for preparing for, furnishing, and installing subgrade preparation.

Bid Item 18 - Permanent Project Roads: Class 2 Aggregate Base
This is a unit-price bid item per cubic yard of Class 2 aggregate base installed beneath permanent project roads at the locations shown in the drawings and in accordance with the specifications. The unit price bid for Class 2 aggregate base shall include full compensation for providing all labor, materials, tools, equipment, and incidentals required for preparing for, furnishing, and installing Class 2 aggregate base.

Bid Item 19 - Permanent Project Roads: Asphalt Concrete Paving
This is a unit-price bid item per square yard for asphalt concrete paving installed for permanent project roads at the locations shown in the drawings and in accordance with the specifications. Costs shall include full compensation for providing all labor, materials, tools, equipment, and incidentals required for preparing for, furnishing, and installing asphalt concrete paving including header board where specified. Asphalt concrete paving for trench resurfacing in existing roads is not included. Trench resurfacing shall be included in the associated bid item for pipe or conduit.

Bid Item 20 - Permanent Project Roads: Construct Commercial Driveway Access
This is a lump-sum bid item for each commercial driveway access constructed at the locations shown in the drawings and include costs for constructing the reinforced concrete surfaces complete in accordance with the specifications.

Bid Item 21 - Permanent Project Roads: Curb and Gutter
This is a unit-price bid item per linear foot for concrete curb and gutter installed at the locations in the drawings and in accordance with the specifications and include all costs for materials, labor, equipment, and incidentals for installation of curb and gutter including excavation.

Bid Item 22 - Recycled Water Distribution: Connection to Existing 8" R/W Main

This is a lump-sum bid item for connecting with piping and appurtenances at the location in the drawings and in accordance with the specifications and include materials, labor, equipment, construction, coordination with the Owner:

- Potholing of existing facilities prior to construction
- Excavation for to expose the existing pipe
- Hot tapping the existing 8" R/W main which shall remain in service
- Pipe including welds, fittings, valves, and pipe encasement
- Backfill, compaction, and reinstatement of the existing road surfaces

The pipeline connection lump sum includes piping and appurtenances as defined in the drawings from the existing R/W main to the tapping valve at STA 0+03.50

Bid Item 23 - Recycled Water Distribution: 6-inch C-900 PVC Distribution Pipe

This is a unit-price bid item per linear foot of 6-inch Class C-900 PVC pipe and pipe fittings placed to lines and grades shown in drawings and in accordance with the specifications. Costs shall include materials, labor, equipment, incidentals, and installation of 6-inch Class C-900 PVC pipe including the following:

- Pipe excavation and trenching
- Placing and compacting bedding material and backfill
- Resurfacing of existing site roads not identified as new construction

Bid Item 24 - Recycled Water Distribution: Fire Hydrants

This is a unit-price bid item per each for fire hydrants installed at the locations shown in the drawings. Payment will be made at the unit price per each hydrant per City of Turlock Standard, which price shall include costs for furnishing materials, labor, equipment, to install the hydrant complete including 6-inch diameter C-900 PVC pipe, valves, fittings, thrust blocks, trenching, backfilling, and concrete pad.

Bid Item 25 - Recycled Water Distribution: Line Valves

This is a unit-price bid item per each for line valves installed at the locations shown in the drawings. Payment will be made at the unit price per each gate valve per City of Turlock Standard, which price shall include costs for furnishing materials, labor, equipment, to install the valve complete including Schedule 40 PVC riser, valve cover and body, fittings, thrust blocks, trenching, backfilling, and concrete collar.

Bid Item 26 - Site Electrical: 12kV Electrical Duct bank 4x4" and 2x2" Conduit

This is a unit-price bid item per linear foot for electrical conduit bank containing four 4-inch conduits and two 2-inch conduits as shown in the drawings and in accordance with the specifications. Cost shall include furnishing materials, labor, equipment, testing, incidentals, and construction of the following:

- Excavation and trenching
- Electrical and control conduit
- Placing and compacting bedding material and backfill
- Resurfacing of existing site roads not identified as new construction

Bid Item 27 - Site Electrical: 4'x4' Electrical Pull Box

This is a unit-price bid item per each for 4-foot by 4-foot electrical pullboxes as shown in the drawings and in accordance with the specifications. Cost shall include furnishing materials, labor, equipment, testing, incidentals, and construction of the following:

- Excavation
- Installation of electrical pull boxes
- Placing and compacting bedding material and backfill
- Resurfacing of existing site roads not identified as new construction

Bid Item 28 - Site Electrical: 2x1" Street Lighting Conduit

This is a lump-sum bid item per linear foot for street lighting conduit bank containing two 1-inch conduits as shown in the drawings and in accordance with the specifications. Cost shall include furnishing materials, labor, equipment, testing, incidentals, and construction of the following:

- Excavation and trenching
- Electrical conduits
- Placing and compacting bedding material and backfill

Bid Item 29 - Site Electrical: No. 5 Electrical Pull Box

This is a lump-sum bid item for 4-foot by 4-foot electrical pull boxes as shown in the drawings and in accordance with the specifications. Cost shall include furnishing materials, labor, equipment, testing, incidentals, and construction of the following:

- Excavation
- Installation of electrical pullbox
- Placing and compacting bedding material and backfill

Bid Item 30 - Site Electrical: Street Lighting Base

This is a unit-price bid item for street lighting bases as shown in the drawings and in accordance with the specifications and per City of Turlock Standard Drawing E-3. Cost shall include furnishing materials, labor, equipment, testing, incidentals, and construction of the following:

- Excavation
- Installation of reinforced concrete base
- Spiral ground wire
- Anchor bolts to suit Ameron Company Catalog No. N 2512 per City of Turlock Standard Drawing E-2

TECHNICAL SPECIFICATIONS

SECTION 011100 COORDINATION OF WORK, PERMITS, AND REGULATIONS

1.01 DESCRIPTION

This section generally describes the project and includes work sequence and schedule, Contractor's use of premises, maintenance and operation of existing facilities, construction survey staking, permits, and regulations.

1.02 LOCATION OF PROJECT SITE

The project site is located at the Regional Water Quality Control Facility (RWQCF) at 901 S. Walnut Road, Turlock, CA.

1.03 WORK SEQUENCE AND SCHEDULE

Coordinate any disruption to the RWQCF's normal operation with the Owner and Owner's Representative.

1.04 CONTRACTOR'S USE OF PREMISES

Do not encroach on any portion of the RWQCF premises except as shown on the plans.

1.05 MAINTENANCE AND OPERATION OF EXISTING FACILITIES

Coordinate deliveries to minimize disruption to the daily operation of the RWQCF. Deliveries must be made through the back entrance to the facility on Kilroy Road.

1.06 CONSTRUCTION SURVEY STAKING

See Section 015100.

1.07 PERMITS

A. The Contractor shall prepare and submit Permit Registration Documents required under the Construction Activities Storm Water General Permit (99-08-DWQ) as described in Section 015721. Under this permit the Contractor is required to prepare the Storm Water Pollution Prevention Plan and pay appurtenant fees

B. Obtain and pay the fees for the following permits:

Name or Type of Permit	Name, Address, Telephone Number of Permitting Agency
Encroachment Permit (This is a no-fee permit)	City of Turlock Engineering Division 156 S. Broadway, Suite 150 Turlock, CA 95380 (209) 668-5520 Fax (209) 668-5563
Dust Control Plan	San Joaquin Valley Air Pollution Control District Northern Region Office 4800 Enterprise Way Modesto, CA 95356 (209) 557-6400

State Water Resources Control Board (SWRCB) – Construction Activities Storm Water General Permit (2009-0009-DWQ) (SWPPP)	State Water Resources Control Board Sacramento, CA (916) 341-5536

Contact the permitting agencies listed above for current fees associated with each permit.

C. The permits contain requirements that affect the cost of project work and some permanent permits require supplementary work permits and fees to execute construction. Comply with the permit requirements and obtain and pay the fees involved with the supplementary work permits.

END OF SECTION

SECTION 012000 MEASUREMENT AND PAYMENT

1.01 WORK LISTED IN THE SCHEDULE OF WORK ITEMS

A. Work under this contract will be paid on a unit price or lump-sum basis as outlined on the Bidding Form for the quantity of work installed.

B. The unit prices and lump-sum prices include full compensation for furnishing the labor, materials, tools, and equipment and doing all the work involved to complete the work included in the contract documents.

C. The application for payment will be for a specific item based on the percentage completed or quantity installed. The percentage complete will be based on the value of the partially completed work relative to the value of the item when entirely completed and ready for service.

1.02 WORK NOT LISTED IN THE SCHEDULE OF WORK ITEMS

A. Items in the Special Provisions, general requirements, and specifications which are not listed in the Bidding Form are, in general, applicable to more than one listed work item, and no separate work item is provided therefor. Include the cost of work not listed but necessary to complete the project designated in the contract documents in the various listed work items of the Bidding Form.

B. The bids for the work are intended to establish a total cost for the work in its entirety. Should the Contractor feel that the cost for the work has not been established by specific items in the Bidding Form, include the cost for that work in some related bid item so that the Proposal for the project reflects the total cost for completing the work in its entirety.

1.03 MEASUREMENT AND PAYMENT FOR PIPELINES

A. Payment will be by the linear foot for each diameter and for each pipe designation (including fittings and other pipe sections) measured horizontally over the pipe centerline.

B. Measurement of the design laying length includes the design joint or creep space within the pipe bell between the mortar linings of adjoining pipes.

C. The unit price paid for pipe includes full compensation for furnishing the labor, materials, tools, and equipment and doing all work involved to provide the pipe.

D. The unit price paid for pipe includes full compensation for pressure or leakage testing.

1.04 FURNISHING AND MAINTAINING DEWATERING AND UNWATERING FACILITIES

Furnishing and maintaining dewatering and unwatering facilities for diversion and control of water during the contract period will not be paid as a separate item. The costs of furnishing and maintaining such facilities shall be included in the various listed work items of the Bid Schedule for which the dewatering and unwatering facilities are required.

END OF SECTION

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SECTION 015100 CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

1.01 CONSTRUCTION WATER

A. Related Work Specified Elsewhere:

1. Earthwork: 312300.

2. Trenching, Backfilling, and Compacting: 312316.

3. General Concrete Construction: 030500.

B. The Contractor may obtain No. 2 recycled water from existing RWQCF fill station located at the facility entrance on Walnut Road and supply labor and equipment to collect, load, transport, and apply water as necessary for compaction of materials, dust control, and other construction use. No. 2 construction water used on this project shall not be charged to the contractor.

C. If No. 2 recycled water is deemed by the City to be insufficient for construction water purposes, potable water may be utilized upon issuance of a monthly hydrant use permit. There is no fee for construction water on City capital improvement projects. A deposit will be required to obtain a water meter which shall be used and is for informational purposes only. An approved backflow device shall be provided by the contractor. Contact the Municipal Services Division to apply for the permit:156 S. Broadway Suite 270, Turlock, CA 95380209-668-5590

D. Include the cost of construction water in the appropriate bid item to which it is appurtenant. The cost shall include full compensation for furnishing all labor, materials, tools, and equipment and doing all the work necessary to develop a sufficient water supply and furnishing the necessary equipment for applying the water as described in these specifications.

1.02 ELECTRICAL POWER--CONSTRUCTION PHASE

Provide for the purchase of power or provide portable power for the construction of the project where existing outlets are not available. Provide for the extension of utility lines to the point of usage. The cost of power shall be included in the appropriate bid items to which it is appurtenant and shall include full compensation for furnishing all labor, materials, tools, and equipment required to obtain and distribute power for construction purposes.

1.03 FIRE DANGER

Minimize fire danger in the vicinity of and adjacent to the construction site. Provide labor and equipment to protect the surrounding private property from fire damage resulting from construction operations.

1.04 TRAFFIC REGULATION

See Section 011100.

1.05 CONSTRUCTION STAKING

A. The Owner will furnish construction staking to execute the work as described below. The Contractor shall make timely demands of the Owner for such staking. A written notice of not less than three working days will be required in advance of setting stakes. Preserve construction stakes, reference points, and other survey points. In case of their loss or destruction, the Contractor shall be liable for and charged with the cost of their replacement and of any expense

resulting from their loss or disturbance. Such surveys shall constitute instructions from the Owner. Do not proceed with the work that requires construction staking until construction stakes have been provided.

B. The Owner will establish two base lines at right angles and one benchmark in the project site. Preserve these points and transfer from them distances and elevations necessary for the execution of the structural and piping work.

C. In addition, the Owner will establish the following points:

1. Corners of the laydown area

2. Buried pipelines larger than 6 inches: One set of offset line and grade stakes at 25-foot intervals.

3. Centerline stakes of roads at 50-foot intervals.

4. Toes of slopes over 4 feet high with grade stakes at 100-foot intervals.

D. Should the Owner's Representative be required to reset construction stakes, the charges for such work will be deducted from the progress payments for the Contractor, for the month in which the surveying work is done.

E. The construction staking provided by the Owner's Representative will be only for those items specified to be constructed or reconstructed in the drawings or in the specifications. Any additional construction stakes required for the replacement of existing staking that have been removed or disturbed by the Contractor shall be the Contractor's responsibility.

1.06 ACCESS ROADS AND PARKING AREAS

A. Obtain access to project site through the existing gate on S. Walnut Road. Keep access roads clear at all times so that the Owner’s vehicles have access to the operational areas of the RWQCF.

B. The Contractor and his employees will not be permitted to park their vehicles in the Owner's parking lot.

1.07 OPERATING DIGESTERS

A. Observe safety precautions in vicinity of operating digesters which contain digester gases, including methane, hydrogen sulfide, and carbon dioxide.

1.08 HAZARDOUS MATERIAL PROCEDURES

A. Hazardous materials are those defined by CFR and California Health and Safety Code, Section 25117.

B. When hazardous materials have been found:

1. Prepare and initiate implementation of plan of action.

2. Notify immediately Owner, Engineer, and other affected persons.

3. Notify such agencies as are required to be notified by laws and regulations within the time stipulated by such Laws and Regulations.

4. Designate a Certified Industrial Hygienist to issue pertinent instructions and recommendations for protection of workers and other affected persons' health and safety.

5. Identify and contact subcontractors and licensed personnel qualified to undertake storage, removal, transportation, disposal, and other remedial work required by, and in accordance with, laws and regulations.

C. Forward to Engineer copies of reports, permits, receipts, and other documentation related to remedial work.

D. Assume responsibility for worker health and safety, including health and safety of subcontractors and their workers. Instruct workers on recognition and reporting of materials that may be hazardous.

E. File requests for adjustments to Contract Times and Contract Price due to the finding of Hazardous Materials in the Work site in accordance with Contract Documents. Minimize delays by continuing performance of the work in areas not affected by hazardous materials operations.

END OF SECTION

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SECTION 015721 STORMWATER POLLUTION PREVENTION CONSTRUCTION ACTIVITIES: BEST MANAGEMENT PRACTICES

PART 1 - GENERAL

1.01 DESCRIPTION

This section includes requirements for the preparation and implementation of the Stormwater Pollution Prevention Plan (SWPPP) for the Contractor's construction activities. This document (and other identified in this Section will be used for the purpose of applying for and obtaining a State of California General Construction Activity Stormwater Permit. This permit authorizes the discharge of stormwater associated with construction activities from the construction site.

1.02 NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES).

A. State of California, State Water Resources Control Board, Regional Water Quality Control Board (SWRCB).

B. United States Code of Federal Regulation (CFR):

1. Protection of Environmental:

a. Determination of reportable quantities for hazardous substance.

b. 302 - Designation, reportable quantities, and notification.

1.03 SUBMITTALS

A. Submit shop drawings in accordance with Special Provisions.

B. Construction General Permit:

1. The Contractor shall prepare and submit all Permit Registration Documents (PRD’s) to the Engineer and Construction Manager for review, approval, and certification by the Legally Responsible Person (LRP) prior to start of work and mobilization.

2. The LRP will electronically submit the PRDs to the Stormwater Multiple Application and Report Tracking System (SMARTS) to obtain approval of the Construction General Permit (CGP).

3. The PRDs shall include but are not limited to the Notice of Intent (NOI), Risk Determination Worksheet, Site Maps, Stormwater Pollution Prevention Plan (SWPPP), Annual Fee’s and Owner Certification. It shall also include all other reports, calculations, studies, exhibits, and documentation required to obtain the CGP.

4. The Contractor shall provide a Qualified SWPPP Practitioner (QSP), who will be responsible for maintaining the existing CGP active throughout the duration of the project:

a. The Contractor shall be responsible for providing all reports required by the CGP (monitoring, inspection, Rain Event Action Plans, sampling, exceedance reports, annual reports, etc.) to the Engineer and Construction Manager for review.

b. Upon approval, the Contractor’s QSP shall upload the information to SMARTS.

c. Time sensitive reports involving monitoring data shall be provided as soon as the information is made available.

d. All other reports shall be provided to the Engineer and Construction Manager a minimum of 2 weeks prior to their deadline for submittal to the SWRCB through SMARTS.

e. All CGP documents shall be submitted to the Owner for reference and a copy shall be located on site at all times.

C. Pollution Prevention Plan:

1. Prepare and submit a site-specific Stormwater Pollution Prevention Plan (SWPPP) in accordance with Section A of the General Construction Activity Stormwater Permit to the Owner for reference.

2. Prepare and submit a monitoring program and reporting plan in accordance with Section B of the General Construction Activity Stormwater Permit to the Owner for reference.

3. Submit to the Owner for reference a Stormwater Pollution Prevention Plan detailing the placement of physical Best Management Practices (BMPs) required for installation and the methods used to comply with those BMPs directed at operational procedures, Monitoring Program, and Reporting Plan.

4. The plan shall specifically address and detail changes from the alternatives called out in this Section. The Contractor's preferred techniques shall show how it will comply with the stated objectives of the program.

5. The SWPPP shall be prepared and amended by a Qualified SWPPP Developer (QSD), as defined by the CGP.

D. The Contractor shall submit a copy of the BMP Handbook with each BMP to be utilized check marked to show compliance or marked to show deviation.

E. The entire plan shall be kept and maintained by the Contractor on the construction site during the duration of the project.

F. The Contractor shall be responsible for taking the proper actions to prevent contaminants and sediments from entering the storm sewer drainage system should any unforeseen circumstance occur. The Contractor shall take immediate action if directed by the Engineer or Construction Manager, or if the Contractor observes contaminants and/or sediments entering the storm drainage system, to prevent further stormwater from entering the system.

1.04 REGULATORY REQUIREMENTS

A. The Contractor shall comply with the State Water Resources Control Board, Regional Water Quality Control Board, county, city, and other local agency requirements regarding stormwater discharges and management.

B. The Contractor shall not begin any construction work until the Owner receives the State of California General Construction Activity Stormwater Permit. The Contractor shall allow the Owner 30 days to obtain this permit after receipt of the information listed in this Section.

C. The Contractor shall comply with the following prohibitions and limitations, which are contained in the Stormwater Permit:

1. Discharge prohibitions:

    a. Discharges of materials other than stormwater, which are not otherwise regulated by a NPDES permit, to a separate stormwater sewer system or water of the nation are prohibited.

    b. Stormwater discharges shall not cause or threaten to cause pollution, contamination (including sediment), or nuisance.

    c. Stormwater discharges regulated by this General Permit shall not contain a hazardous substance equal to or in excess of a reportable quantity listed in 40 CFR 117 and 40 CFR 302.

2. Receiving water limitations:

    a. Stormwater discharges to any surface or groundwater shall not adversely impact human health or the environment.

    b. Stormwater discharge shall not cause or contribute to a violation of any applicable water quality standards contained in the California Ocean Plan, Inland Surface Waters and Enclosed Bays and Estuaries Plan, or the applicable Regional Water Board's Basin Plan.

D. Requirements:

1. In order to comply with the permit mandates the Stanislaus County has developed a County-Wide Stormwater Pollution Prevention Program and Best Management Practices (BMPs) that are suggested to be utilized by the Contractor. BMPs are measures or practices used to reduce the amount of pollution entering surface water. BMPs may take the form of a process, activity, or physical structure. Some BMPs are simple and can be put into place immediately, while others are more complicated and require extensive planning or space. They may be inexpensive or costly to implement. No additional compensation shall be made for implementation of BMPs.

2. The Stanislaus County-Wide Stormwater Pollution Prevention Program and Summary of BMPs are available for review at the Owner's Water Quality Control Plant.

1.05 STORMWATER POLLUTION PREVENTION PLAN IMPLEMENTATION

The Contractor's QSP shall implement all activities required by the General Permit and as detailed in the Stormwater Pollution Prevention Plan, Monitoring Program, and Reporting Plan.

1.06 NON-STORMWATER MANAGEMENT

The Stormwater Pollution Prevention Plan shall discuss any non-stormwater sources (i.e., landscaping irrigation, pipe flushing, street washing, and dewatering). In addition, the Plan shall include standard observation measures and best management practices, including best available technologies economically achievable and best conventional pollutant control technologies that are to be implemented in order to reduce the pollutant loading to the waters.

1.07 AMENDMENTS

A. The Contractor's QSP shall amend the Stormwater Pollution Prevention Plan, Monitoring Program, and Reporting Plan whenever there is a change in construction or operations which may affect the discharge of pollutants to stormwater.

B. The Stormwater Pollution Prevention Plan shall also be amended if it is in violation of any conditions of the General Permit or has not achieved the general objective of reducing pollutants in stormwater discharges.

C. All amendments shall be completed at no additional cost to the Owner.

1.08 ANNUAL SUMMARY

A. Contractor:

1. Prepare an annual summary report (annual report) in accordance with all Regional Water Quality Control Board requirements.

2. Utilize the annual report form available in the SMARTS and submit it to the Engineer and Construction Manager a minimum of 2 weeks prior to the deadline for submittal.

3. Upon approval of the report by the Engineer or Construction Manager, the LRP will review and certify the report for final submittal via SMARTS.

1.09 NOTICE OF TERMINATION

The Contractor shall provide all necessary information for the completion of a Notice of Termination (NOT) upon completion of all construction activities (refer to Section C of the General Construction Activity Stormwater Permit for general requirements). Upon review of the information submitted, the LRP will certify and submit the NOT via SMARTS.

PART 2 - MATERIALS

Not used.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

A. The project-specific SWPPP shall be prepared in compliance with the Statewide Construction Activities Storm Water General Permit No. 2009-0009-DWQ to prevent adverse impacts to nearby drainages associated with construction-related incidental spills. This plan shall include a description of BMPs, spill prevention measures, spill containment equipment, and monitoring requirements.

B. Nonhazardous material/waste management:

1. Designated area: The Contractor shall propose designated areas of the project site, for approval by the Engineer or Construction Manager, suitable for material delivery, storage, and waste collection that, to the maximum extent practicable, are near construction entrances and away from catch basins, gutters, drainage courses, and creeks.

2. Granular material:

a. The Contractor shall store granular material at least 50 feet away from catch basin and curb returns.

b. The Contractor shall not allow granular material to enter storm drains, creeks, or rivers.

c. When rain is forecast within 24 hours or during wet weather, the Engineer or Construction Manager may require the Contractor to cover granular material with a tarpaulin and to surround the material with sand bags:

(1) All stockpiles are required to be protected immediately if they are not scheduled to be used within 14 days.

3. Dust control: The Contractor shall use non-potable water to control dust on a daily basis or as directed by the Construction Manager.

4. Street sweeping and vacuuming:

a. At the end of each working day or as directed by the Engineer or Construction Manager, the Contractor shall clean and sweep roadways and on-site paved areas of all materials attributed to or involved in the work.

b. The Contractor shall not use water to flush down streets in place of street sweeping.

c. Additionally, the Contractor shall not use kick brooms or sweeper attachments.

C. Spill prevention and control:

1. The Contractor shall keep a stockpile of spill cleanup materials, such as rags or absorbents, readily accessible on-site.

2. The Contractor shall immediately contain and prevent leaks and spills from entering storm drains, and properly clean up and dispose of the waste and cleanup materials:

a. If the waste is hazardous, the Contractor shall dispose of hazardous waste only at authorized and permitted treatment, storage, and disposal facilities, and use only licensed hazardous waste haulers to remove the waste off-site, unless quantities to be transported are below applicable threshold limits for transportation specified in state and federal regulations.

3. The Contractor shall not wash any spilled material into streets, gutters, storm drains, creeks, or rivers and shall not bury spilled hazardous materials.

4. The Contractor shall immediately report any hazardous materials spill to the Owner, Engineer, and Construction Manager for reporting to all applicable regulatory agencies.

D. Vehicle/equipment cleaning:

1. The Contractor shall not perform vehicle or equipment cleaning on-site or in the street using soaps, solvents, degreasers, steam cleaning equipment, or equivalent methods.

2. The Contractor shall perform vehicle or equipment cleaning, with water only, in a designated, bermed area that will not allow rinse water to run off-site or into streets, gutters, storm drains, creeks or rivers.

E. Vehicle/equipment maintenance and fueling:

1. The Contractor shall perform maintenance and fueling of vehicles or equipment in designated, bermed area(s) or over a drip pan that will not allow run-on of stormwater or runoff of spills.

2. The Contractor shall use secondary containment, such as a drip pan, to catch leaks or spills any time that vehicle or equipment fluids are dispensed, changed, or poured.

3. The Contractor shall keep a stockpile of spill cleanup materials, such as rags or absorbents, readily accessible on-site.

4. The Contractor shall clean up leaks and spills of vehicle or equipment fluids immediately and dispose of the waste and cleanup materials as hazardous waste, as described in section ”Spill prevention and control“ above.

5. The Contractor shall not wash any spilled material into streets, gutters, storm drains, creeks, or rivers and shall not bury spilled hazardous materials.

6. The Contractor shall report any hazardous materials spill to the Owner, Engineer, and Construction Manager and all applicable regulatory agencies.

7. The Contractor shall inspect vehicles and equipment arriving on-site for leaking fluids and shall promptly repair leaking vehicles and equipment. Drip pans shall be used to catch leaks until repairs are made.

8. The Contractor shall recycle waste oil and antifreeze, to the maximum extent practicable.

9. The Contractor shall comply with federal, state, and city requirements for aboveground storage tanks.

F. Contractor training and awareness:

1. Contractor’s QSP shall train all employees/subcontractors on the stormwater pollution prevention requirements contained in these specifications.

2. Contractor’s QSP shall inform subcontractors of the stormwater pollution prevention contract requirements and include appropriate subcontract provisions to ensure that these requirements are met.

3. Contractor shall post warning signs in areas treated with chemicals.

3.02 SPECIFIC REQUIREMENTS

A. Pipeline construction:

1. If rain occurs during or within three days after concrete is placed for any structures, spread and secure plastic sheets or tarps over the concrete in such a manner to prevent rain from coming in contact with the concrete.

2. Wash out concrete trucks in a designated area where the material cannot run off into the stream or percolate into the groundwater. This area shall be specified on all applicable construction plans and be in place before any concrete is poured.

3. Upon entering the site and regularly thereafter, inspect and maintain equipment prior to working. Repair any leaks or hoses/fittings in poor condition before the equipment begins work.

B. Paving operations:

1. Project site management:

a. When rain is forecast within 24 hours or during wet weather, the Engineer or Construction Manager may prevent the Contractor from paving.

b. The Engineer or Construction Manager may direct the Contractor to protect drainage courses by using control measures, such as earth dike, straw bale, and sand bag, to divert runoff or trap and filter sediment in addition to those already shown on the construction plan sheets.

c. The Contractor shall place drip pans or absorbent material under paving

d. equipment when not in use.

e. The Contractor shall cover catch basins and manholes when paving or applying seal coat, tack coat, slurry seal, or fog seal.

f. If the paving operation includes an on-site mixing plant, the Contractor shall comply with applicable federal, state, and local General Industrial Activities Stormwater Permit requirements.

2. Paving waste management:

a. The Contractor shall not sweep or wash down excess sand (placed as part of a sand seal or to absorb excess oil) into gutters, storm drains, or creeks. Instead, the Contractor shall either collect the sand and return it to the stockpile or dispose of it in a trash container.

b. The Contractor shall not use water to wash down fresh asphalt concrete pavement.

C. Sawcutting:

1. During saw cutting, the Contractor shall cover or barricade catch basins using control measures, such as filter fabric, straw bales, sand bags, and fine gravel dams, to keep slurry out of the storm drain system. When protecting a catch basin, the Contractor shall ensure that the entire opening is covered.

2. The Contractor shall vacuum saw cut slurry and pick up the waste prior to moving to the next location or at the end of each working day, whichever is sooner.

3. If saw cut slurry enters catch basins, the Contractor shall remove the slurry from the storm drain system immediately.

D. Concrete, grout, and mortar waste management:

1. Material management: The Contractor shall store concrete, grout, and mortar away from drainage areas and ensure that these materials do not enter the storm drain system.

2. Concrete truck/equipment washout:

a. The Contractor shall not washout concrete trucks or equipment into streets, gutters, storm drains, creeks, or rivers. Washout areas should be located at least 50 feet from storm drains, open ditches, or water bodies.

b. The Contractor shall perform washout of concrete trucks or equipment in a designated area: Washout site should be lined so there is no discharge into the underlying soil.

3. Exposed aggregate concrete wash water: The Contractor shall avoid creating runoff from washing of exposed aggregate concrete. .The Contractor shall collect and return sweepings from exposed aggregate concrete to a stockpile or dispose of the waste in a trash container.

END OF SECTION

SECTION 020120 PROTECTING EXISTING UNDERGROUND UTILITIES

PART 1 - GENERAL

1.01 DESCRIPTION

This section includes materials and procedures for protecting existing underground utilities.

1.02 RELATED WORK SPECIFIED ELSEWHERE

Trenching, Backfilling, and Compacting: 312316.

PART 2 - MATERIALS

2.01 REPLACEMENT IN KIND

Except as indicated below or as specifically authorized by the Owner's Representative, reconstruct utilities with new material of the same size, type, and quality as that removed.

PART 3 - EXECUTION

3.01 GENERAL

A. Replace in kind street improvements, such as curbs and gutters, barricades, traffic islands, signalization, fences, signs, etc., that are cut, removed, damaged, or otherwise disturbed by the construction.

B. Where utilities are parallel to or cross the construction but do not conflict with the permanent work to be constructed, follow the procedures given below and as indicated in the drawings. Notify the utility owner 48 hours in advance of the crossing construction and coordinate the construction schedule with the utility owner's requirements. For utility crossings not shown in the drawings, refer to the Special Provisions and the instructions of the Owner's Representative for guidance.

C. Determine the true location and depth of utilities and service connections which may be affected by or affect the work. Determine the type, material, and condition of these utilities. In order to provide sufficient lead-time to resolve unforeseen conflicts, order materials and take appropriate measures to ensure that there is no delay in work.

3.02 PROCEDURES

A. Protect in Place: Protect utilities in place, unless abandoned, and maintain the utility in service, unless otherwise specified in the drawings or in the specifications.

B. Cut and Plug Ends: Cut abandoned utility lines and plug the ends. Plug storm drains and sewers with an 8-inch wall of brick and mortar. Cap waterlines with a cast-iron cap or install a 3-foot-long concrete plug. Dispose of the cut pipe as unsuitable material.

C. Remove and Reconstruct: Where so indicated in the drawings or as required by the Owner's Representative, remove the utility and, after passage, reconstruct it with new materials. Provide temporary service for the disconnected utility.

3.03 COMPACTION

A. Utilities Protected in Place: Backfill and compact under and around the utility so that no voids are left.

B. Utilities Reconstructed: Prior to replacement of the utility, backfill the trench and compact to an elevation 1 foot above the top of the ends of the utility. Excavate a cross trench of the proper width for the utility and lay, backfill, and compact.

C. Alternative Construction--Sand-Cement Slurry: Sand-cement slurry consisting of one sack (94 pounds) of portland cement per cubic yard of sand and sufficient moisture for workability may be substituted for other backfill materials to aid in reducing compaction difficulties. Submit specific methods and procedures for the review of the Owner's Representative prior to construction.

3.04 SPECIAL CONSTRUCTION

A. Reinforced Concrete Beam: Where indicated in the drawings or as determined by the Owner's Representative, support utilities by a reinforced concrete beam as shown on the utility support details in the drawings. The primary purpose of the beam is to prevent settlement of the utility line after construction. The Contractor is responsible for the protection of the utility during construction and shall incorporate the beam as part of the protection.

B. Concrete Support Wall: Where indicated in the drawings or as determined by the Owner's Representative, support the utilities by a concrete support wall as shown on the utility support details in the drawings. The purpose of the concrete support wall is to prevent settlement of the utility line after construction. The Contractor is responsible for the protection of the utility during construction.

3.05 THRUST BLOCKS ON WATERLINES

A. The Contractor's attention is called to thrust blocks for waterlines whose thrust is in the direction of the new excavation and, therefore, may be affected by the construction. These waterlines are owned and operated by the Owner. Protect thrust blocks in place or shore to resist the thrust by a means approved by the Owner's water division superintendent and reconstruct. If the thrust blocks are exposed or rendered to be ineffective in the opinion of the Owner's Representative, reconstruct them to bear against firm unexcavated or backfill material.

B. Provide firm support by backfilling that portion of the trench for a distance of 2 feet on each side of the thrust block to be reconstructed from the pipe bedding to the pavement subgrade, with either:

1. Sand-cement slurry (94 pounds of cement per cubic yard).

2. The native material compacted to a relative compaction of 95%.

C. Then excavate the backfill material for construction of the thrust block.

D. Test compaction of the backfill material before pouring any concrete thrust block. Use Class C concrete per Section 030500 for reconstruction.

END OF SECTION

SECTION 020130 CONNECTIONS TO EXISTING BURIED PIPELINES

PART 1 - GENERAL

1.01 DESCRIPTION

This section includes materials and installation of hot-tap connections to existing buried ductile-iron, steel and PVC (cast-iron outside diameter) pipelines.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Protecting Existing Underground Utilities: 020120.

B. Polyethylene Sheet Encasement: 099754.

C. Fusion-Bonded Epoxy Linings and Coatings: 099761.

D. Manual, Check, and Process Valves: 400520.

1.03 SUBMITTALS

A. Submit shop drawings in accordance with the Special Provisions.

B. Submit manufacturer's catalog data for tapping sleeves. Show coatings.

PART 2 - MATERIALS

2.01 TAPPING SLEEVES FOR ASBESTOS CEMENT, DUCTILE-IRON, STEEL AND PVC (CAST-IRON OUTSIDE DIAMETER) PIPES

A. Tapping sleeves shall comply with MSS SP-60, and MSS SP-113.

B. Tapping Sleeve for Ductile-Iron and PVC (Cast-Iron Outside Diameter) Pipes: Mueller H-615 or equal.

C. Tapping Sleeve for Asbestos Cement Pipe: Mueller H-619 or equal.

D. Pressure rating shall be at least 200 psi for piping 12 inches and smaller and at least 150 psi for piping 14 through 24 inches.

2.02 COATING FOR TAPPING SLEEVES

Coat with fusion-bonded epoxy per Section 099761 and polyethylene wrap per Section 099754.

2.03 TAPPING GATE VALVES

Type V-137 per Section 400520.

2.04 CONNECTIONS TO EXISTING PIPES

Provide a fabricated steel collar with nozzle. Minimum thickness of collar plate and nozzle shell shall be 3/8 inch. Width of collar from the inside surface of the outlet to the outside edge of the

collar shall be one-third to one-half of the diameter of the outlet. Collar may be oval or rectangular with rounded corners. An entire wrapper plate may be substituted for the collar. Steel material shall have a minimum yield stress of 30,000 psi.

2.05 LINE STOPPING FOR EXISTING RECYCLED WATER MAIN

A. Before beginning line stop installation, the Contractor shall coordinate work with the City of Turlock Municipal Services Department.

B. The outside and inside diameters of the existing pipeline are required prior to ordering the tapping fitting and line stopper. Using the exposed portion of the pipeline, determine the outside diameter and inside diameter of the existing main for providing to the line stopping equipment manufacturer. Determine the pipe wall thickness by ultrasonic testing.

C. The line stop tapping fitting shall be a full encirclement split tee, Type 304 stainless steel, assembled with either a bolted or clamped connection. Bolts shall be steel, ASTM A325 heavy hex. Seal the line stop tapping fitting to the existing main with a nonasbestos synthetic rubber gasket. Construct the gasket from the following materials: Buna-N, Teflon, Kevlar aramid fiber, or acrylic fiber bound by nitrile. The split tee outlet flange shall be Class 125 per AWWA C115. Bolts and nuts for the flange shall be carbon steel, ASTM A307, Grade B. The Contractor has the option of either using a fully expandable rubber stopper rated to a minimum of 100 psi or carbon steel pivoting head with Buna-N sealing element rated to a minimum of 100 psi as the line stopping head mechanism. The temporary removable valve shall be a resilient wedge gate valve rated at 150 psi. The line stop and accessories shall be HYDRA-STOP, IPSCO, or equal.

PART 3 - EXECUTION

3.01 VERIFICATION OF PIPE OUTSIDE DIAMETER PRIOR TO INSTALLATION

Excavate the points of connection prior to submittal of shop drawings. Verify outside diameter prior to ordering materials.

3.02 WRAPPING OR COATING TAPPING SLEEVES

After installation, wrap the entire sleeve and tapping valve with polyethylene sheet wrap per Section 099754.

3.03 INSTALLING CONNECTIONS TO EXISTING PIPES

A. Remove any existing coating to a point 3 inches beyond the area of the pipe that will be covered by the collar or wrapper.

B. Weld the collar to the pipe shell. Weld the entire circumference of the collar.

C. After installation, wrap the entire connection and tapping valve with polyethylene sheet wrap per Section 099754.

3.04 LINE STOPPING PROCEDURE

A. Install concrete and support thrust blocking before installing the temporary pressure tapping machinery and valve. After tapping and line stopping operations have been completed, seal the tee fitting with an ASTM A36 steel pin-locked completion plug with Buna-N O-ring seal. After the completion plug has been successfully installed, close the fitting with a blind flange meeting the requirements of AWWA C110.

B. Any damage that occurs due to the Contractor's work to the line stop fitting, accessories, or existing main shall be repaired at Contractor's expense.

C. Dispose of water and existing pipe at no additional cost to the Owner. Comply with NPDES permit requirements. Any violation of permit requirements shall be the sole responsibility of the Contractor.

END OF SECTION

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SECTION 030500 GENERAL CONCRETE CONSTRUCTION

PART 1 - GENERAL

1.01 DESCRIPTION

This section includes materials, installation, and testing of formwork, reinforcing steel, joints, concrete, and finishing and curing for general concrete construction.

1.02 RELATED WORK SPECIFIED ELSEWHERE

Concrete Curbs, Gutters, and Sidewalks: 321613.

1.03 SUBMITTALS

A. Submit shop drawings in accordance with the Special Provisions.

B. Prepare concrete and mortar mix designs and laboratory 7-day and 28-day compressive tests or submit test reports of 7- and 28-day compressive tests of the mix where the same mix has been used on two previous projects. Submit mix design in writing for review by the Owner at least 15 days before placing of any concrete.

C. Submit manufacturer's catalog data and descriptive literature for form coatings and curing compound, bond breakers, joint sealant, backing rod, joint filler, control joints, and expansion joint dowels.

D. Submit mill test certificates identifying chemical and physical analyses of each load of reinforcing steel delivered. If mill test reports are unavailable and the quantity of steel for a structure exceeds 5 tons, provide a laboratory test to prove conformance with the specified ASTM standard.

E. Submit reinforcing bending lists and placing drawings for all reinforcing. Placing drawings shall indicate all openings (mechanical, electrical, equipment, and architectural) Placing drawings shall be coordinated with the concrete placing schedule. Each bending list and placing drawing submitted shall be complete for each major element of a structure (grade slabs, footings, walls, deck, floor, or roof slabs) including dowels and corner bars. Furnishing such lists shall not be construed that the lists will be reviewed for accuracy. The Contractor shall be wholly and completely responsible for the accuracy of the lists and for furnishing and placing reinforcing steel in accordance with the details shown in the drawings and as specified. Placing drawings shall be prepared by the Contractor and shall not incorporate photocopies of the contract drawings.

F. Submit 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.

PART 2 - MATERIALS

2.01 NONDOMESTIC CEMENT AND ADDITIVES

A. The use of nondomestic cement and additives in concrete may be permitted only after review of a written request to use such materials. The request to use nondomestic materials shall include a chemical analysis that indicates the material meets the project specifications. Certifications that state the nondomestic materials meet the project requirements will not be accepted.

B. Test reports for concrete materials shall be current to within three months of inclusion into the project and shall be identifiable to the materials supplied.

2.02 FORMWORK

A. Design forms according to ACI 347.

B. Class I Forms: Use steel forms, ply form, or smooth-surface plywood 3/4-inch minimum thickness for straight surfaces and 1/2-inch minimum thickness for curved surfaces.

C. Class II Forms: Use plywood in good condition, metal, or smooth-planed boards free from large or loose knots with tongue and groove or ship lap joints.

D. Class II forms may be used for exterior concrete surfaces that are 1 foot or more below finished grade. Use Class I forms for all other surfaces.

E. Coat forms with form release agent.

2.03 BOND BREAKER

Bond breaker shall be a nonstaining type which will provide a positive bond prevention, such as Williams Tilt-Up Compound, as manufactured by Williams Distributors, Inc., Seattle, Washington; Silcoseal 77, as manufactured by SCA Construction Supply Division, Superior Concrete Accessories, Franklin Park, Illinois; or equal.

2.04 FORM RELEASE AGENT

A. Form release agent shall effectively prevent absorption of moisture and prevent bond with the concrete. Agent shall be nonstaining and nontoxic after 30 days.

B. For steel forms, release agent shall prevent discoloration of the concrete due to rust.

2.05 REINFORCING STEEL

A. Reinforcement shall conform to ASTM A615 or A706, Grade 60.

B. Fabricate reinforcing in accordance with the current edition of the Manual of Standard Practice, published by the Concrete Reinforcing Steel Institute. Bend reinforcing steel cold.

C. Deliver reinforcing steel to the site bundled and with identifying tags.

2.06 TIE WIRE

Tie wire shall be 16 gauge minimum, black, soft annealed.

2.07 BAR SUPPORTS

Bar supports in beams and slabs exposed to view after form stripping shall be galvanized and plastic coated. Use concrete supports for reinforcing in concrete placed on grade.

2.08 BAR COUPLERS

Reinforcing steel bar splicing couplers shall be a mechanical type as manufactured by Dayton Barsplice Inc. or equal. Use couplers that do not reduce tensile or ultimate strength of bars.

2.09 JOINT SEALANT FOR CONCRETE STRUCTURES

A. Joint sealant shall be a multipart, gray, nonstaining, nonsagging, gun grade polyurethane sealant, which cures at ambient temperature to a firm, flexible, resilient, tear-resistant rubber. Sealant shall comply with ASTM C920, Type M, Grade P, Class 25 for horizontal joints and Grade NS, Class 25 for vertical joints and be recommended by the manufacturer for continuous immersion in water.

Characteristic or Parameter	Technical Requirements
Pot life	1 to 3 hours
Hardness	35 Shore A, ±5, ASTM D2240
Elongation	650%, ASTM D412
Tensile strength	200 psi, ASTM D412
Peel strength on concrete	No adhesion loss at 25 pounds
Temperature service range	40°F to 167°F
Immersion in water	Continuous

B. Sealant shall be Tremco Vulkem 227 or Sikaflex-2CNS (for Grade NS, Class 25), Sikaflex-2CSL of Sika Corporation or Vulkem 245 (for Type M, Grade P, Class 25), or equal. Troweling of sealants into joints will not be permitted.

2.10 BACKING ROD FOR EXPANSION JOINTS

Backing rod shall be an extruded closed-cell polyethylene foam rod, such as Minicel backer rod, manufactured by Industrial Systems Department, Plastic Products Group of Hercules, Inc., Middletown, Delaware; Ethafoam SB, as manufactured by Dow Chemical Company, Midland, Michigan; or equal. The rod shall be 1/4 inch larger in diameter than the joint width. Where possible, provide full-length sections for the joint; minimize splices. Apply backup rod and bond breaker tape in expansion joints.

2.11 BOND BREAKER TAPE

Bond breaker tape shall be an adhesive-backed glazed butyl or polyethylene tape that will adhere to the premolded joint material or concrete surface. The tape shall be the same width as the joint. The tape shall be compatible with the sealant.

2.12 PREFORMED CONTROL JOINT

Preformed control joint shall be a one-piece, flexible, PVC joint former, such as Kold-Seal Zip-Per Strip KSF-150-50-50, manufactured by Vinylex Corp., Knoxville, Tennessee, or a one-piece steel strip with preformed groove, such as Keyed Kold Retained Kap, manufactured by Burke Concrete Accessories, Inc., San Mateo, California, or equal. Provide the preformed control joint material in full-length unspliced pieces.

2.13 PREMOLDED JOINT FILLER

Joint filler shall be preformed, nonextruded type constructed of closed-cell neoprene conforming to ASTM D1752, Type I, as manufactured by W. R. Grace Company of Cambridge, Massachusetts; W. R. Meadows, Inc., Elgin, Illinois; or equal.

2.14 CEMENT

A. Use domestic portland cement that conforms to ASTM C150 and C595, Type II.

B. Use only one brand of cement in any individual structure. Use no cement that has become damaged, partially set, lumpy, or caked. Reject the entire contents of the sack or container that contains such cement. Use no salvaged or reclaimed cement.

C. Maximum tricalcium aluminate shall not exceed 8%. The maximum percent alkalies shall not exceed 0.6%.

2.15 AGGREGATES

Aggregates shall be natural rock, sand, or crushed natural rock and shall comply with ASTM C33, and shall contain less than 1% asbestos by weight or volume. Aggregates shall be free from any substances that will react with the cement alkalies, as determined by Appendix X-1 of ASTM C33.

2.16 WATER AND ICE

Use water and ice that is clean and free from objectionable quantities of organic matter, alkali, salts, and other impurities that might reduce the strength, durability, or otherwise adversely affect the quality of the concrete. Water shall not contain more than 500 mg/L of chlorides or more than 500 mg/L of sulfate.

2.17 CONCRETE ADMIXTURES

A. Class A concrete shall contain an air-entraining admixture conforming to ASTM C260. Admixtures shall be Master Builders MB-AE 90, Sika AER, or equal.

B. Class A concrete shall contain a water-reducing admixture conforming to ASTM C494, Type A. It shall be compatible with the air-entraining admixtures. The amount of admixture added to the concrete shall be in accordance with the manufacturer's recommendations. Admixture shall be Master Builders Pozzolith polymer-type normal setting, Plastocrete 161 or Plastiment, Sika Chemical Corporation, or equal.

C. Mineral Admixture: Class A concrete shall contain a mineral admixture, fly ash Class F, conforming to ASTM C618, not to exceed or replace more than 15% of the cement material required without the mineral admixture.

D. Do not use any admixture that contains chlorides or other corrosive elements in any concrete. Admixtures shall be nontoxic after 30 days.

2.18 GROUT

A. Nonshrink grout shall conform to ASTM C1107 and to these specifications. Use a nongas-liberating type, cement base, premixed product requiring only the addition of water for the required consistency. Grout shall be UPCON High Flow, Master Flow 928, or equal. Components shall be inorganic.

B. Ordinary type grout (dry pack) shall consist of one part portland cement to two parts sand (100% passing a No. 8 sieve). Add sufficient water to form a damp formable consistency.

C. Expansive Grout: Premixed, cementitious mixture with a minimum 28-day strength of 3,500 psi. Provide air-entraining admixture as recommended by the manufacturer.

D. Epoxy Grout:

1. Mix the two components of epoxy bonding compound in compliance with the manufacturer's instructions.

2. Use sand that is oven dry and meets the following gradation requirements for epoxy grout:

Sieve Size	No. 8	No. 50	No. 100
% Passing	100	30 ±15	5 ±5

2.19 GROUT BEDDING FOR HORIZONTAL JOINTS

The grout placed on horizontal construction joints shall be a mixture of cement, sand, and water in the same proportions and strength used in the overplaced concrete with coarse aggregate omitted.

2.20 REPAIR MORTAR

A. Mortar used for repair of concrete voids shall be made of the same materials as used for concrete, except that the coarse aggregate shall be omitted or the mortar shall consist of not more than one part cement to two and one-half parts sand by damp loose volume. The quantity of mixing water shall be no more than necessary for handling and placing.

B. Materials for repair of major defects or cracks shall be in accordance with “Repair of Defects and Cracks” specified in Part 3.

2.21 BONDING COMPOUND

A. Epoxy bonding compound shall be Sikadur 32 Hi-Mod, Sika Chemical Corporation, Lyndhurst, New Jersey; Concresive by BASF; Euco Epoxy 452 by Euclid Chemical Company; or equal.

B. Nonepoxy bonding compound shall be Weldcrete by Larsen Products Corp., Link by Sta-Dry Manufacturing Corp., Euco Weld by Euclid Chemical Co., or equivalent. The compound shall be rewettable for up to two weeks.

2.22 CONCRETE MIX DESIGN

A. Conform to ASTM C94, except as modified by these specifications.

B. Air content as determined by ASTM C231 shall be 4% ±1%.

C. Maximum water-cement ratio for Class A concrete = 0.45 by weight.

D. Use classes of concrete as described in the following table:

Class	Type of Work	28-Day Compressive Strength (in psi)	Minimum Cement Content (in lbs per C.Y.)
A	Concrete for all structures and concrete not otherwise specified. Concrete fill at structure foundations, cradle, supports across pipe trenches, and reinforced pipe encasement.	4,000	564
B	Pavement	3,000	500
C	Floor grout and miscellaneous unreinforced concrete.	2,000	376

E. Measure slump in accordance with ASTM C143. Slump shall be as follows:

Slab on grade or heavy sections wider (in plan view) than 3 feet	3 inches maximum
Footings, walls, suspended slabs, beams, and columns	4 inches maximum
Pavement	2 inches maximum
Floor grout	4 inches maximum

Proportion and produce the concrete to have a maximum slump as shown. A tolerance of up to 1 inch above the indicated maximum shall be allowed for individual batches provided the average for all batches or the most recent 10 batches tested, whichever is fewer, does not exceed the maximum limit. Concrete of lower than usual slump may be used provided it is properly placed and consolidated.

F. Aggregate size shall be 3/4 inch maximum for slabs and sections 8 inches thick and less. Aggregate size shall be 1 inch maximum for slabs and sections greater than 8 inches and less than 17 inches. Aggregate size shall be 1 1/2 inches maximum for all larger slabs and sections. Aggregate size for floor grout shall be maximum 3/8 inch.

G. Combined aggregate grading shall be as shown in the following table:

Sieve Sizes	Maximum Aggregate Size		
	1 1/2"	1"	3/4"
	Percent Passing		
2"	100	---	---
1 1/2"	90 - 100	100	---
1"	50 - 86	90 - 100	100
3/4"	45 - 75	55 - 100	90 - 100
3/8"	38 - 55	45 - 75	60 - 80
No. 4	30 - 45	35 - 60	40 - 60
No. 8	23 - 38	27 - 45	30 - 45
No. 16	17 - 33	20 - 35	20 - 35
No. 30	10 - 22	12 - 25	13 - 23
No. 50	4 - 10	5 - 15	5 - 15
No. 100	1 - 3	1 - 5	0 - 5
No. 200	0 - 2	0 - 2	0 - 2

H. Mix design for pumped concrete shall produce a plastic and workable mix. The percentage of sand in the mix shall be based on the void content of the coarse aggregate.

2.23 SLURRY CEMENT BACKFILL

A. Slurry cement backfill shall consist of a fluid, workable mixture of aggregate, cement, and water.

B. Aggregate shall be either:

1. Material selected from excavation, imported material, or a combination thereof, free from organic matter and other deleterious materials and meeting the following gradation:

Sieve Sieves	Percentage Passing
1 1/2 inches	100
1 inch	80 to 100
3/4 inch	60 to 100
3/8 inch	50 to 100
No. 4	40 to 80
No. 100	10 to 40

2. Commercial quality concrete sand.

C. Proportion the aggregate, cement, and water by either weight or volume. Include at least 188 pounds of cement per cubic yard produced. The water content shall be sufficient to produce a fluid, workable mix that will flow and can be pumped without segregation of the aggregate while being placed.

D. Thoroughly machine-mix the materials for the slurry cement backfill in pugmill, rotary drum, or other mixer. Continue the mixing until the cement and water are thoroughly dispersed throughout the material. Place slurry cement backfill within one hour after mixing.

2.24 CURING COMPOUND

A. Curing compound shall conform to ASTM C309, Type 1 Class A.

B. Curing compound shall be compatible with required finishes and coatings and shall meet the State of California Clean Air Quality Standards which limit the quantity of volatile organic compounds to 350 grams per liter.

2.25 CLEAR FLOOR HARDENER (SURFACE APPLIED)

Floor hardener shall be a colorless, aqueous solution of zinc and/or magnesium fluosilicate. Each gallon of the fluosilicate solution shall contain not less than 2 pounds of crystals. Hardener shall be Saniseal, a product of Master Builders Company, Cleveland, Ohio; Hornolith, a product of Grace Construction Materials, Cambridge, Massachusetts; Lapidolith, a product of Sonneborn, Minneapolis, Minnesota; or equal. The solution shall be delivered ready for use in the manufacturer's original sealed containers.

2.26 MATS, PAPER, AND SHEETING FOR CURING

A. Burlap mats shall conform to AASHTO M182.

B. Sisal-kraft paper and polyethylene sheets shall conform to ASTM C171.

2.27 REINFORCING DOWEL ADHESIVE

Dowel anchor adhesive shall be HIT-RE 500-SD by Hilti; Sikadur 31, Hi-Mod Gel by Sika; or equal.

PART 3 - EXECUTION

3.01 FORM TOLERANCES

A. Failure of the forms to produce the specified concrete surface and surface tolerance shall be grounds for rejection of the concrete work. Rejected work shall be repaired or replaced at no additional cost to the Owner.

B. The following table indicates tolerances or allowable variations from dimensions or positions of structural concrete work:

	Maximum Tolerance (inch)
Sleeves and inserts	+1/4 -1/4
Projected ends of anchors	+1/4 -0.0
Anchor bolt setting	+1/4 -1/4
Finished concrete, all locations	+1/4 -1/4 in 10 feet
	Max ±1 inch in total length

The planes or axes from which the above tolerances are to be measured shall be as follows:

Sleeves and inserts:	Centerline of sleeve or insert.
Projected ends of anchors:	Plane perpendicular to the end of the anchor as located in the drawings.
Anchor bolt setting:	Centerline of anchor bolt.
Finish concrete:	The concrete surface as defined in the drawings.

Where equipment is to be installed, comply with manufacturer's tolerances if more restrictive than above.

3.02 FORM SURFACE PREPARATION

A. Clean form surfaces to be in contact with concrete of foreign material prior to installation.

B. Coat form surfaces in contact with concrete with a release agent prior to form installation.

3.03 FORM REUSE

Reuse only forms that provide a uniform surface texture on exposed concrete surfaces. Apply light sanding or other surface treatment between uses for uniform texture. Plug unused tie rod holes with corks, shave flush, and sand the concrete surface side. Do not patch forms other than filling tie rod holes, except in the case of Class II forms. Do not use metal patching discs on Class I forms.

3.04 REMOVAL OF FORMS

A. Forms and shoring for elevated structural slabs or beams shall remain in place until the concrete has reached a compressive strength equal to the specified 28-day compressive strength as determined by test cylinders. Do not remove supports and reshore. The following table indicates the minimum allowable time after the last cast concrete is placed before forms, shoring, or wall bracing may be removed:

Sides of footings and encasements	24 hours
Walls, vertical sides of beams, girders, columns, and similar members not supporting loads	48 hours
Slabs, beams, and girders	10 days (forms only)
Shoring for slabs, beams, and girders	Until concrete strength reaches specified 28-day strength
Wall bracing	Until top or roof slab concrete reaches specified 28-day strength

B. Do not remove forms from concrete that has been placed with outside air temperature below 50°F without first determining if the concrete has properly set without regard for time. Do not apply heavy loading on green concrete. Immediately after forms are removed, the surface of the concrete shall be carefully examined and any irregularities in the surface shall be repaired and finished as specified.

3.05 FORMED OPENINGS

Openings shall be of sufficient size to permit final alignment of pipes or other items without deflection or offsets of any kind. Allow space for packing where items pass through the wall to ensure watertightness. Provide openings with continuous keyways and water stops. Provide a slight flare to facilitate grouting and the escape of entrained air during grouting.

3.06 EMBEDDED ITEMS

Set anchor bolts and other embedded items accurately and hold securely in position until the concrete is placed and set. Check all special castings, channels, or other metal parts that are to be embedded in the concrete prior to and again after concreting. Check nailing blocks, plugs, and strips necessary for the attachment of trim, finish, and similar work prior to concreting.

3.07 BEVELED EDGES (CHAMFER)

Form 3/4-inch beveled edges on exposed concrete edges and corners, beam soffit corners, and where indicated in the drawings. Reentrant corners in concrete members shall not have fillets, unless otherwise shown in the drawings. The top edges of slabs, walkways, beams, and walls may be beveled with an edging trowel in lieu of using chamfer strips.

3.08 CONSTRUCTION JOINTS

A. Provide construction joints where shown in the drawings.

B. Place expansion joint fillers every 30 feet in straight runs of walks, at right-angle turns, and wherever concrete walks butt into vertical surfaces.

C. For control joints of nonstructural slabs, provide partial depth plastic strips set flush with finished surface or 1/8-inch-wide joints cut with a diamond saw. Use control joints one-quarter to one-third the depth of the slab unless otherwise indicated.

D. When it is necessary to make a joint because of an emergency, furnish and place reinforcing dowels across the joint normal to the face of joint created if not normal to specified reinforcement and at the centerline of the concrete section being terminated. Carefully remove set concrete to a plane but rough surface near normal to adjacent formed or finish surfaces. Embed and extend dowels 48 bar diameters each side of the joint. Size and spacing of dowels shall match the largest reinforcing in the member but no closer than 6 inches on center. Furnishing and placing such reinforcing steel shall be at the Contractor's expense.

E. After a concrete placement pour has been completed to the construction joint and the concrete has hardened, thoroughly clean the entire surface of the joint of surface laitance, loose or defective concrete, and foreign material. Expose clean aggregate by sandblasting and thoroughly cleaning the surface of construction joints before placing the new concrete. Cover horizontal construction joints with grout bedding. Spread uniformly and work thoroughly into all irregularities of the surface. The consistency of the mortar shall be suitable for placing and working and shall be placed immediately prior to placing new concrete.

F. In case of emergency, place additional construction joints. (An interval of 45 minutes constitutes cause for an emergency construction joint.)

3.09 EXPANSION JOINTS

Provide expansion joints with continuous edge reservoirs, which shall be filled with a joint sealant. Leave the material used for forming the reservoirs in place until immediately before the grooves

are cleaned and filled with joint sealant. After removing edge forms from the reservoir, remove grout, loose concrete, and fins; then sandblast the slots. Allow the reservoirs to become thoroughly dry; then blow out the reservoirs and immediately prime and fill with the expansion joint sealant and backup materials. The primer used shall be supplied by the same manufacturer supplying the joint sealant.

3.10 TIME BETWEEN POURS

Place beams, girders, brackets, column capitals, and haunches monolithically as part of the floor or roof system, unless otherwise indicated in the drawings.

3.11 INSTALLATION OF PREMOLDED JOINT FILLER

Install in joint accurately as shown. Attach to concrete with a bonding agent recommended by the joint sealant and joint filler manufacturer for compatibility.

3.12 INSTALLATION OF JOINT SEALANTS

A. Immediately before installing the joint sealant, clean the joint cavity by sandblasting or power wire brushing. Install bond breaker tape per manufacturer's instructions.

B. After the joints have been prepared as described above, apply the joint sealant. Apply the primer, if required, and joint sealant only with the equipment and methods recommended by the joint sealant manufacturer. Application criteria for the sealant materials, such as temperature and moisture requirements and primer cure time, shall be in accordance with the recommendations of the sealant manufacturer.

C. Apply masking tape along the edges of the exposed surface of the exposed joints. Trowel the joints smooth with a tuck pointing tool wiped with a solvent recommended by the sealant manufacturer.

D. After the sealant has been applied, remove the masking tape and any sealant spillage.

3.13 PLACING REINFORCEMENT

A. Place reinforcing steel in accordance with the current edition of Recommended Practice for Placing Reinforcing Bars, published by the Concrete Reinforcing Steel Institute.

B. Place reinforcing in accordance with the following, unless otherwise indicated:

1. Reinforcement indicated in the drawings is continuous through the structure to the farthest extent possible. Terminate bars and hooks 2 inches clear from faces of concrete.

2. Splices may be used to provide continuity due to bar length limitations. Minimum length of bars spliced for this reason is 30 feet. Splicing of reinforcement that is detailed to be continuous in the drawings is not permitted.

C. Reinforcing steel, before being positioned and just prior to placing concrete, shall be free from loose mill and rust scale and from any coatings that may destroy or reduce the bond. Clean reinforcing steel by sandblasting or wire brushing and remove mortar, oil, or dirt to remove materials that may reduce the bond.

D. Do not straighten or rebend reinforcing steel in the field.

E. Position reinforcing steel in accordance with the drawings and secure by using annealed wire ties or clips at intersections and support by concrete or metal supports, spacers, or metal hangers. Do not place metal clips or supports in contact with the forms. Bend tie wires away from the forms to provide the specified concrete coverage. Bars, in addition to those shown in the drawings, which may be found necessary or desirable by the Contractor for the purpose of securing reinforcement in position shall be provided by the Contractor at his own expense.

F. Place reinforcement a minimum of 2 inches clear of any metal pipe or fittings.

G. Secure reinforcing dowels in place prior to placing concrete. Do not press dowels into the concrete after the concrete has been placed.

H. Roll wire mesh used for reinforcement flat before placing concrete. Support and tie wire mesh to prevent movement during concrete placement.

3.14 SITE-MIXED CONCRETE

Conform to ACI 304.

3.15 READY-MIXED CONCRETE

Conform to ASTM C94.

3.16 PLACING CONCRETE

Conform to ACI 304.

3.17 PUMPING CONCRETE

Conform to ACI 304.2R-91.

3.18 WEATHER REQUIREMENTS

A. Conform to ACI 305 for placing during hot weather.

B. Conform to ACI 306 for placing during cold weather.

3.19 BACKFILL AGAINST WALLS

A. Do not place backfill against walls until the concrete has obtained a compressive strength equal to the specified 28-day compressive strength. Where backfill is to be placed on both sides of the wall, place the backfill uniformly on both sides.

B. Do not backfill the walls of structures that are laterally restrained or supported by suspended slabs or slabs on grade until the slab is poured and the concrete has reached the specified compressive strength.

3.20 PLACING SLURRY CEMENT BACKFILL

Place slurry cement backfill in a uniform manner that will prevent voids in, or segregation of, the backfill. Remove foreign material that falls into the excavation or trench. Do not commence backfilling over or place any material over the slurry cement backfill until at least four hours after placing the slurry cement backfill, except that when concrete sand is used for the aggregate and the in-place material is free draining, backfilling may commence as soon as the surface water is gone.

3.21 CONCRETE FINISHES

A. Complete concrete surfaces in accordance with the following schedule:

Finish Designation	Area Applied
F-1	Beams, columns, and exterior walls not exposed to view.
F-3	Beams, columns, and walls of structures or buildings exposed to view. Underside of formed floors or slabs.
F-4	Exterior and interior surfaces to be coated.
S-1	Slabs and floors to be covered with concrete or grout.
S-4	Slabs and floors of structures or buildings exposed to view.
S-5	Slabs and floors at slopes greater than 10% and stairs.
E-1	Exposed edges. EXCEPTION: edges normally covered with earth.
E-2	Top of walls, beams, and similar unformed surfaces.

B. Finish F-1: Repair defective concrete, fill depressions deeper than 1/2 inch, and fill tie holes.

Finish F-3: In addition to Finish F-1, remove fins, fill depressions 1/4 inch or deeper, fill depressions and airholes with mortar. Dampen surfaces and then spread a slurry consisting of one part cement and one and one-half parts sand by damp loose volume, over the surface with clean burlap pads or sponge rubber floats. Remove any surplus by scraping and then rubbing with clean burlap.

Finish F-4: Repair defective concrete, remove fins, fill depressions 1/16 inch or deeper, fill tie holes, remove mortar spatter, and remove bulges higher than 1/16 inch.

Finish S-1: Screed to grade without special finish.

Finish S-4: Steel trowel finish without local depressions or high points and apply a light hair-broom finish. Do not use stiff bristle brooms or brushes. Leave hair-broom lines parallel to the direction of slab drainage.

Finish S-5: Steel trowel finish without local depressions or high points. Apply a stiff bristle broom finish. Leave broom lines parallel to the direction of slope drainage.

Finish E-1: Provide chamfer or beveled edges.

Finish E-2: Strike smooth and float to an F-3 or F-4 finish.

3.22 CURING CONCRETE

A. Conform to ACI 308.

B. Water cure with burlap mats unless optional curing methods are permitted.

C. Do not use curing compound on surfaces that are to be coated.

D. It is the responsibility of the Contractor to select the appropriate curing method in response to climatical and/or site conditions occurring at the time of concrete placement. Take appropriate

measures as described in ACI 305 and 306 for protecting and curing concrete during hot and cold weather.

3.23 REPAIR OF DEFECTS AND CRACKS

A. Do not repair defects until concrete has been evaluated by the Owner's Representative.

B. Surface Defects:

1. Repair surface defects that are smaller than 1 foot across in any direction and are less than 1/2 inch in depth.

2. Repair by removing the honeycombed and other defective concrete down to sound concrete, cut or grind edges perpendicular to the surface and at least 3/8 inch deep, abrasive clean and thoroughly dampen the surface, work into the surface an epoxy bonding agent, and fill the hole with one part cement to one part fine sand. Match the finish on the adjacent concrete, and cure as specified.

C. Severe Defects:

1. Repair severe defects that are larger than surface defects but do not appear to affect the structural integrity of the structure.

2. Repair by removing the honeycombed and other defective concrete down to sound concrete, make edges of the repair area perpendicular to the surface, as required above, sandblast the sound concrete surface, coat the exposed surfaces with epoxy bonding compound, place nonshrink grout, match the finish on the adjacent concrete, and cure as specified.

D. Repair minor cracks in concrete structures that are wider than 1/10 inch by cutting out a square edged and uniformly aligned joint 3/8 inch wide by 3/4 inch deep, preparing exposed surfaces of the joint, priming the joint, and applying polyurethane joint sealant.

E. If the cracks are major or affect the hydraulic capacity or function of the element, the Owner's Representative may require the concrete to be repaired by epoxy injection.

F. Major Defects and Cracks: If the defects affect the structural integrity of the structure or if patching does not satisfactorily restore quality and appearance to the surface, the Owner’s Representative may require the concrete to be removed and replaced.

3.24 CONCRETE TESTS

A. Concrete quality testing will be performed on the concrete by an independent testing laboratory retained by the Contractor as follows:

1. Frequency of Sampling: Cast four concrete test cylinders from each 100 cubic yards, or fraction thereof, of each class of concrete placed in any one day. Sampling and curing of cylinders shall conform to ASTM C31.

2. Strength Testing: Test cylinders in accordance with ASTM C39. Test one cylinder at 7 days for information; test two cylinders at 28 days for acceptance; and hold one cylinder for verification. Strength acceptance will be based on the average of the strengths of the two cylinders tested at 28 days. If one cylinder of a 28-day test manifests evidence of improper sampling, molding, or testing, other than low strength, discard it and use the fourth cylinder for the test result.

3. Determine concrete slump by ASTM C143 with each strength test sampling and as required to establish consistency.

4. Determine air content of the concrete using ASTM C231 to verify the percentage of air in the concrete immediately prior to depositing in forms.

5. The average value of concrete strength tests shall be equal to or greater than the specified 28-day strength. No test shall be less than 90% of the specified 28-day strength.

6. If the 28-day strength tests fail to meet the specified minimum compressive strength, the concrete will be assumed to be defective and one set of three cores from each area may be taken as selected by the Owner and in accordance with ASTM C42. If the average compressive strength of the set of three concrete cores fails to equal 90% of the specified minimum compressive strength or if any single core is less than 75% of the minimum compressive strength, the concrete will be considered defective. The Owner may require additional coring, nondestructive load testing, or repair of defective concrete. Costs of coring, testing of cores, load testing, and required repairing pertaining thereto shall be paid by the Contractor at no extra cost to the Owner.

B. To facilitate concrete sampling and testing, the Contractor shall:

1. Furnish labor to assist the Owner in obtaining and handling samples at the project site.

2. Advise the Owner in advance of concrete placing operations to allow for scheduling and completion of quality testing.

3. Provide and maintain facilities for safe storage and proper curing of concrete test specimens on the project site, as required by ASTM C31.

END OF SECTION

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SECTION 034210 PRECAST CIRCULAR CONCRETE MANHOLES

PART 1 - GENERAL

1.01 DESCRIPTION

This section includes design, materials, testing, and installation of precast circular concrete manholes.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. General Concrete Construction: 030500.

B. Trenching, Backfilling, and Compacting: 312316.

C. Leakage and Infiltration Testing: 330130.

D. HDPE Profile Wall Pipe: 333118.

1.03 SUBMITTALS

A. Submit shop drawings in accordance with the Special Provisions.

B. Submit manufacturer's catalog data on precast concrete manholes, frames, , and covers. Show dimensions and materials of construction by ASTM reference and grade. Show lettering on manhole covers.

PART 2 - MATERIALS

2.01 PRECAST CIRCULAR CONCRETE MANHOLES

A. Precast circular concrete manholes shall comply with ASTM C478, except that the wall thickness shall be 6 inches minimum. Minimum manhole diameter shall be 48 inches. Design manholes for the depths shown in the drawings, assuming a soil density of 130 pounds per cubic foot.

B. Minimum allowable steel shall be hoops of No. 4 wire cast into each unit.

C. Precast top sections shall be eccentric cone except where shown otherwise in the drawings.

D. Design joints using a butyl rubber sealant per ASTM C990.

2.02 CONCRETE

A. Cement for manholes shall conform to ASTM C150, Type II or IV.

B. Concrete used in pouring the manhole base shall be Class A per Section 030500.

2.03 STEPS OR RUNGS

A. Cast manholes without steps (ladder rungs).

2.04 MANHOLE FRAMES AND COVERS

A. Manhole frames and covers shall be made of cast iron conforming to ASTM A48, Class 30. Castings shall be smooth, clean, and free from blisters, blowholes, and shrinkage. Frames and covers shall be designed for H20-44 traffic loads. The cover shall seat firmly into the frame without rocking.

B. Grind or otherwise finish each cover so that it will fit in its frame without rocking. Frames and covers shall be matchmarked in sets before shipping to the site.

C. Sewer manhole covers shall have the word “STORM DRAIN” and the letters as indicated in the drawings cast thereon. Do not apply any other lettering.

D. Before leaving the foundry, clean castings and subject them to a hammer inspection.

2.05 SEALING COMPOUND AND MORTAR

Butyl rubber sealing compound shall comply with ASTM C990. Mortar shall comply with ASTM C387, Type S, or use grout complying with Section 030500.

2.06 PIPE CONNECTIONS FOR SEWER MANHOLES

Provide resilient watertight connectors between the manhole and piping in accordance with ASTM C923. Connections shall consist of a chemically resistant neoprene EPDM flexible boot, locking ring, and pipe clamp(s). The locking ring shall be stainless steel and shall lock the boot into the preformed opening in the manhole. The pipe clamp shall be stainless steel. Alternatively, cast the flexible boot in the manhole and eliminate the locking ring. Pipe connections shall be Kor-N-Seal (Dukor Corporation), Z-Lok-XP (A-Lok Products, Inc.), or equal.

PART 3 - EXECUTION

3.01 MANHOLE BASE

A. Excavate for the manhole and install a crushed rock base, 12 inches thick, per Section 312316. Crushed rock base material shall extend 1 foot beyond the outside edge of the concrete manhole base. Compact to 90% relative density.

B. Form and pour concrete bases as one monolithic pour.

3.02 INSTALLING MANHOLES

A. Set each precast concrete manhole unit plumb on a bed of sealant or mortar to make a watertight joint at least 1/2 inch thick with the concrete base or with the preceding unit. Point the inside joint and wipe off the excess sealant or mortar. Secure the manhole frame to the grade ring with grout and cement mortar fillet. Backfill, compact, and replace pavement.

B. Assemble units so that the cover conforms to the elevation determined by the manhole location as follows:

1. In Paved Areas: Top of cover shall be flush with the paving surface.

2. In Shoulder Areas: Top of cover shall be flush with existing surface where it is in traveled way of shoulder and 0.1 foot above existing surface where outside limits of traveled way but not in the existing roadside ditch.

3. In Roadside Ditch or Unpaved Open Areas: Top of cover shall be 18 inches above the ground surface.

3.03 SEALING AND GROUTING OF MANHOLE SECTIONS

Clean ends of precast sections of foreign materials. Place two wraps of butyl rubber sealing compound around the groove of the lower section. Set next section in place. Fill remaining interior and exterior joint cavity completely with mortar of the proper consistency. Trowel interior and exterior surfaces smooth on tongue-and-groove joints. Wipe off any excess grout from the interior and exterior of the joints. Prevent mortar from drying out by applying curing compound or comparable method. Chip out and replace cracked or defective mortar. Completed manhole shall be rigid and watertight.

3.04 LEAKAGE TESTING OF SEWER MANHOLES

Test manholes for leakage along with the pipe.

3.05 BACKFILL AROUND MANHOLES

Backfill and compact around the manholes using native material, per Section 312316 and the pipe specification.

END OF SECTION

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SECTION 034215 PRECAST RECTANGULAR CONCRETE MANHOLES

PART 1 - GENERAL

1.01 DESCRIPTION

This section includes materials, design, and installation of precast rectangular concrete manholes.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. General Concrete Construction: 030500.

B. Precast Circular Concrete Manholes: 034210.

C. Underground Electrical Duct Systems: 260543.

D. Trenching, Compacting, and Backfilling: 312316.

E. Leakage and Infiltration Testing: 330130.

1.03 SUBMITTALS

A. Submit shop drawings in accordance with the Special Provisions.

B. Submit manufacturer's catalog data on precast concrete manholes, frames, and covers. Show dimensions of manholes and thicknesses of walls, floors, and top slabs. Show reinforcing wire and steel. Show materials of construction by ASTM reference and grade.

C. Submit manufacturer's design calculations and certification that manhole design and construction comply with the referenced ASTM specifications (e.g., ASTM C857 and C858).

PART 2 - MATERIALS

2.01 PRECAST RECTANGULAR CONCRETE MANHOLES

A. Precast concrete manholes shall comply with ASTM C858 except as modified herein. Minimum size shall be 48 inches square. Design manholes for the depths shown in the drawings, assuming a soil density of 130 pounds per cubic foot.

B. Design loads shall be in accordance with ASTM C857. Traffic loads shall conform to load designation A-16 per Table 1. Soil lateral loads shall be as determined by ASTM C857 or loadings specified in the project soils report, whichever is greater. Alternate design by the strength design method shall include a load factor of 1.7 times the lateral earth or hydrostatic pressures.

C. Minimum wall thickness shall be 6 inches. Design knockout wall panels to accommodate loading pressures.

D. Precast top sections shall be flat slab, except where shown otherwise in the drawings.

E. Design joints using a butyl rubber sealant per ASTM C990.

2.02 CONCRETE

A. Cement for manholes shall conform to ASTM C150, Type II or IV.

B. Concrete used in pouring the manhole base shall be Class A per Section 030500.

2.03 STEPS OR RUNGS

Cast manholes without steps (ladder rungs).

2.04 MANHOLE FRAMES AND COVERS

A. Manhole frames and covers shall be made of cast iron conforming to ASTM A48, Class 30. Castings shall be smooth, clean, and free from blisters, blowholes, and shrinkage. Frames and covers shall be of the traffic type. The cover shall seat firmly into the frame without rocking.

B. Grind or otherwise finish each cover so that it will fit in its frame without rocking. Frames and covers shall be matchmarked in sets before shipping to the site.

C. Sewer manhole covers shall have the word "SEWER" cast thereon. Do not apply any other lettering.

D. Before leaving the foundry, clean castings and subject them to a hammer inspection.

2.05 SEALING COMPOUND AND MORTAR

Butyl rubber sealing compound shall comply with ASTM C990. Mortar shall comply with ASTM C387, Type S, or use grout complying with Section 030500.

2.06 CRUSHED ROCK FOR MANHOLE BASE

Crushed rock shall comply with Section 312316. Crushed rock shall be the same material as the pipe bedding. If rock is not used for the pipe bedding, use 3/4-inch crushed rock for the manhole base.

PART 3 - EXECUTION

3.01 MANHOLE BASE

A. Excavate for the manhole and install a crushed rock base, 12 inches thick, per Section 312316. Crushed rock base material shall extend 1 foot beyond the outside edge of the concrete manhole base. Compact to 90% relative density.

B. Form and pour concrete bases as one monolithic pour.

3.02 INSTALLING MANHOLES

A. Set each precast concrete manhole unit plumb on a bed of sealant or mortar to make a watertight joint at least 1/2 inch thick with the concrete base or with the preceding unit. Point the inside joint and wipe off the excess sealant or mortar. Secure the manhole frame to the grade ring with grout and cement mortar fillet. Backfill, compact, and replace pavement.

B. Assemble units so that the cover conforms to the elevation determined by the manhole location as follows:

1. In Paved Areas: Top of cover shall be flush with the paving surface.

2. In Shoulder Areas: Top of cover shall be flush with existing surface where it is in traveled way or shoulder and 0.1 foot above existing surface where outside limits of traveled way but not in the existing roadside ditch.

3. In Roadside Ditch or Unpaved Open Areas: Top of cover shall be 18 inches above the ground surface.

3.03 SEALING AND GROUTING OF MANHOLE SECTIONS

Clean ends of precast sections of foreign materials. Place a bed of grout in and completely around the groove of the lower section. Set next section in place. Fill remaining interior and exterior joint cavity completely with mortar of the proper consistency. Trowel interior and exterior surfaces smooth on tongue-and-groove joints. Wipe off any excess grout from the interior and exterior of the joints. Prevent mortar from drying out by applying curing compound or comparable method. Chip out and replace cracked or defective mortar. Completed manhole shall be rigid and watertight.

3.04 LEAKAGE TESTING OF SEWER MANHOLES

Test manholes for leakage along with the pipe.

3.05 BACKFILL AROUND MANHOLES

Backfill and compact around the manholes using native material, per Section 312316 and the pipe specification.

END OF SECTION

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SECTION 099000 PAINTING AND COATING

PART 1 - GENERAL

1.01 DESCRIPTION

This section includes materials and application of painting and coating systems for the following surfaces:

A. Submerged metal.

B. Exposed metal.

C. Buried metal.

1.02 RELATED WORK SPECIFIED ELSEWHERE

Fusion-Bonded Epoxy Linings and Coatings: 099761.

1.03 SUBMITTALS

A. Submit shop drawings in accordance with the Special Provisions.

B. Submit manufacturer’s data sheets showing the following information:

1. Percent solids by volume.

2. Minimum and maximum recommended dry-film thickness per coat for prime, intermediate, and finish coats.

3. Recommended surface preparation.

4. Recommended thinners.

5. Statement verifying that the specified prime coat is recommended by the manufacturer for use with the specified intermediate and finish coats.

6. Application instructions including recommended equipment and temperature limitations.

7. Curing requirements and instructions.

C. Submit color swatches.

D. Submit certificate identifying the type and gradation of abrasives used for surface preparation.

E. Submit material safety data sheets for each coating.

PART 2 - MATERIALS

2.01 PAINTING AND COATING SYSTEMS

The following index lists the various painting and coating systems by service and generic type:

PAINT COATINGS SYSTEM INDEX

No.	Title	Generic Coating
Submerged Metal Coating Systems		
7.	Submerged Metal, Potable or Nonpotable Water	Epoxy
Exposed Metal Coating Systems		
15.	Exposed Metal, Atmospheric Weathering Environment	Epoxy
Buried Metal Coating Systems		
21.	Buried Metal	Epoxy
24.	Buried Metal	Corrosion-resisting grease
25.	Buried Metal Piping and Tubing	Coal-tar, wax, and polyethylene tape wrap or extruded polyethylene

These systems are specified in detail in the following paragraphs. For each coating, the required surface preparation, prime coat, intermediate coat (if required), topcoat, and coating thicknesses are described. Mil thicknesses shown are minimum dry-film thicknesses.

2.02 SUBMERGED METAL COATING SYSTEMS

A. System No. 7--Submerged Metal, Potable or Nonpotable Water:

Type: Epoxy.

Service Conditions: For use with structures, valves, piping, or equipment immersed in potable or nonpotable water. Coating system shall be certified for NSF/ANSI Standard 61 Drinking Water Systems-Health Effects.

Surface Preparation: SSPC SP-10.

Coating System: Apply the manufacturer’s recommended number of coats to attain the specified minimum coating thickness. Products: Devoe Bar-Rust 233H, Tnemec 100, Sherwin-Williams Tank Clad HS B62-80, PPG AQUAPON® LT NSF Low Temperature Epoxy Coatings 95-172, Carboline Carboguard 891, Ameron 395, International Interline 785HS, Carboline Plasite 9133, Keysite 740, Scotchkote 306, or equal; 24 mils total. Color of topcoat: white. Each coat shall be different color than the one preceding it.

2.03 EXPOSED METAL COATING SYSTEMS

A. System No. 10--Exposed Metal, Corrosive Environment:

Type: High-build epoxy intermediate coat having a minimum volume solids of 60%, with an inorganic zinc prime coat and a pigmented polyurethane finish coat having a minimum volume solids of 52%.

Service Conditions: For use with metal structures or pipes subjected to water condensation; chemical fumes, such as hydrogen sulfide; salt spray; and chemical contact.

Surface Preparation: SSPC SP-10.

Prime Coat: Self-curing, two-component inorganic zinc-rich coating recommended by the manufacturer for overcoating with a high-build epoxy finish coat. Minimum zinc content shall be 12 pounds per gallon. Apply to a thickness of 3 mils. Products: Tnemec 90E-92, Devoe Catha-Coat 304 or 304V, International Interzinc 22HS, PPG Dimetcote 9HS, Sherwin-Williams Zinc-Clad II Plus, PPG METALHIDE® 28 Inorganic Zinc-Rich Primer 97-672, or equal.

Intermediate Coat: Tnemec 104, Devoe Devran 224HS or 231, International Interseal 670HS, PPG Amercoat 385, Carboline Carboguard 890, Sherwin-Williams Macropoxy 646 B58-600, PPG PITT-GUARD® Direct-to-Rust Epoxy Mastic Coating 97-145 series, or equal; 5 mils.

Finish Coat: Two-component pigmented acrylic or aliphatic polyurethane recommended by the manufacturer for overcoating a high-build epoxy coating. Apply to a thickness of at least 2 mils. Products: Tnemec Series 1075, Devoe Devthane 379, International Interline 990HS, PPG Amercoat 450HS, Sherwin-Williams Hi-Solids Polyurethane B65-300, PPG PITTHANE® Ultra Gloss Urethane Enamel 95-812 series, or equal.

2.04 BURIED METAL COATING SYSTEMS

A. System No. 21--Buried Metal:

Type: High solids epoxy or phenolic epoxy having a minimum volume solids of 80% (ASTM D2697).

Service Conditions: Buried metal, such as valves, flanges, bolts, nuts, structural steel, and fittings.

Surface Preparation: SSPC SP-10.

Coating System: Apply three or more coats of Ameron 400, Tnemec 104HS or 80, ICI Devoe Bar-Rust 233H, Carboline 890LT, Sherwin-Williams Tank Clad HS B62-80 series, or equal; 30 mils total. Maximum thickness of an individual coating shall not exceed the manufacturer’s recommendation.

B. System No. 24--Buried Metal:

Type: Corrosion-resisting grease.

Service Conditions: Buried metal, such as bolts, bolt threads, tie rods, and nuts.

Surface Preparation: SSPC SP-6.

Coating: NO-OX-ID GG-2 as manufactured by Sanchem, Inc. Apply to a minimum thickness of 1/4 inch.

C. System No. 25--Buried Metal Piping and Tubing:

Type: Cold-applied coal-tar tape or hot-applied coal-tar tape.

Service Conditions: Buried ferrous and nonferrous piping and tubing.

Coat with one of the following systems:

1. Wrap with cold-applied coal-tar tape conforming to AWWA C209. Minimum thickness of tape shall be 35 mils. Apply tape with manufacturer’s prime coat. Tape shall be Tapecoat CT, Protecto-Wrap 200, or equal.

2. Wrap with hot-applied coal-tar tape conforming to AWWA C203, Section 4.6. Minimum thickness of tape shall be 50 mils. Apply tape with manufacturer's recommended prime coat. Tape shall be Tapecoat 20, Protecto-Wrap 110, or equal.

Use chloride-free primers with the above coatings when applying to stainless steel piping or tubing.

Coat field joints of buried piping that has a shop-applied coating with primer and tape conforming to AWWA C209. Use Type 1 tape of 35-mil thickness. Products: Protection Engineering Co. Protectowrap 200 GT, Tapecoat CT10/40W, Polyken 930-35, or equal.

Perform electrical inspection of shop and field coating in accordance with Section 5 of AWWA C209.

Install buried pipes with wrapped coatings by extending the wrapping to the first joint after entering a building, penetrating a slab, or 6 inches above finished grade. Wrap joints spirally with a minimum overlap of 50% of the tape width.

2.05 ABRASIVES FOR SURFACE PREPARATION

A. Abrasives used for preparation of ferrous (excluding stainless steel) surfaces shall be one of the following:

1. 16 to 30 or 16 to 40 mesh silica sand or mineral grit.

2. 20 to 40 mesh garnet.

3. Crushed iron slag, 100% retained on No. 80 mesh.

4. SAE Grade G-40 or G-50 iron or steel grit.

B. In the above gradations, 100% of the material shall pass through the first stated sieve size and 100% shall be retained on the second stated sieve size.

PART 3 - EXECUTION

3.01 WEATHER CONDITIONS

A. Do not paint in the rain, wind, snow, mist, and fog or when steel or metal surface temperatures are less than 5°F above the dew point.

B. Do not apply paint when the relative humidity is above 85%.

C. Do not paint when temperature of metal to be painted is above 120°F.

D. Do not apply alkyd, inorganic zinc, silicone aluminum, or silicone acrylic paints if air or surface temperature is below 40°F or expected to be below 40°F within 24 hours.

E. Do not apply epoxy, acrylic latex, and polyurethane paints on an exterior or interior surface if air or surface temperature is below 60°F or expected to drop below 60°F in 24 hours.

3.02 SURFACE PREPARATION PROCEDURES

A. Remove oil and grease from metal surfaces in accordance with SSPC SP-1. Use clean cloths and cleaning solvents and wipe dry with clean cloths. Do not leave a film or greasy residue on the cleaned surfaces before abrasive blasting.

B. Remove weld spatter and weld slag from metal surfaces and grind smoothly rough welds, beads, peaked corners, and sharp edges including erection lugs in accordance with SSPC SP-2 and SSPC SP-3. Grind 0.020 inch (minimum) off the weld caps on pipe weld seams. Grind outside sharp corners, such as the outside edges of flanges, to a minimum radius of 1/4 inch.

C. Do not abrasive blast or prepare more surface area in one day than can be coated in one day; prepare surfaces and apply coatings the same day. Remove sharp edges, burrs, and weld spatter.

D. Do not abrasive blast PVC or equipment. Do not abrasive blast epoxy- or enamel-coated pipe that has already been factory coated, except to repair scratched or damaged coatings.

E. For carbon steel, do not touch the surface between the time of abrasive blasting and the time the coating is applied. Apply coatings within two hours of blasting or before any rust bloom forms.

F. Surface preparation shall conform with the SSPC specifications as follows:

Solvent Cleaning	SP-1
Hand Tool Cleaning	SP-2
Power Tool Cleaning	SP-3
White Metal Blast Cleaning	SP-5
Commercial Blast Cleaning	SP-6
Brush-Off Blast Cleaning	SP-7
Pickling	SP-8
Near-White Blast Cleaning	SP-10
Power Tool Cleaning to Bare Metal	SP-11
Surface Preparation and Cleaning of Steel and Other Hard Materials by High- and Ultrahigh-Pressure Water Jetting Prior to Recoating	SP-12
Surface Preparation of Concrete	SP-13

G. Wherever the words “solvent cleaning,” “hand tool cleaning,” “wire brushing,” or “blast cleaning” or similar words are used in these specifications or in paint manufacturer’s specifications, they shall be understood to refer to the applicable SSPC (Society for Protective Coatings), surface preparation specifications listed above.

H. For carbon steel surfaces, after abrasive blast cleaning, the height of the surface profile shall be 2 to 3 mils. Verify the surface profile by measuring with an impresser tape acceptable to the Owner’s Representative. Perform a minimum of one test per 100 square feet of surface area. Testing shall be witnessed by the Owner’s Representative. The impresser tape used in the test shall be permanently marked with the date, time, and locations where the test was made. Test results shall be promptly presented to the Owner’s Representative.

I. Do not apply any part of a coating system before the Owner’s Representative has reviewed the surface preparation. If coating has been applied without this review, if directed by the Owner’s

Representative, remove the applied coating by abrasive blasting and reapply the coat in accordance with this specification.

3.03 ABRASIVE BLAST CLEANING

A. Use dry abrasive blast cleaning for metal surfaces. Do not use abrasives in automatic equipment that have become contaminated. When shop or field blast cleaning with handheld nozzles, do not recycle or reuse blast particles.

B. After abrasive blast cleaning and prior to application of coating, dry clean surfaces to be coated by dusting, sweeping, and vacuuming to remove residue from blasting. Apply the specified primer or touch-up coating within the period of an eight-hour working day. Do not apply coating over damp or moist surfaces. Reclean prior to application of primer or touch-up coating any blast cleaned surface not coated within said eight-hour period.

C. Keep the area of the work in a clean condition and do not permit blasting particles to accumulate and constitute a nuisance or hazard.

D. During abrasive blast cleaning, prevent damage to adjacent coatings. Schedule blast cleaning and coating such that dust, dirt, blast particles, old coatings, rust, mill scale, etc., will not damage or fall upon wet or newly coated surfaces.

3.04 PROCEDURES FOR ITEMS HAVING SHOP-APPLIED PRIME COATS

A. After application of primer to surfaces, allow coating to cure for a minimum of two hours before handling to minimize damage.

B. When loading for shipment to the project site, use spacers and other protective devices to separate items to prevent damaging the shop-primed surfaces during transit and unloading. If wood spacers are used, remove wood splinters and particles from the shop-primed surfaces after separation. Use padded chains or ribbon binders to secure the loaded items and minimize damage to the shop-primed surfaces.

C. Cover shop-primed items 100% with protective coverings or tarpaulins to prevent deposition of road salts, fuel residue, and other contaminants in transit.

D. Handle shop-primed items with care during unloading, installation, and erection operations to minimize damage. Do not place or store shop-primed items on the ground or on top of other work unless ground or work is covered with a protective covering or tarpaulin. Place shop-primed items above the ground upon platforms, skids, or other supports.

3.05 FIELD TOUCH-UP OF SHOP-APPLIED PRIME COATS

A. Remove oil and grease surface contaminants on metal surfaces in accordance with SSPC SP-1. Use clean rags wetted with a degreasing solution, rinse with clean water, and wipe dry.

B. Remove dust, dirt, salts, moisture, chalking primers, or other surface contaminants that will affect the adhesion or durability of the coating system. Use a high-pressure water blaster or scrub surfaces with a broom or brush wetted with a solution of trisodium phosphate, detergent, and water. Rinse scrubbed surfaces with clean water.

C. Remove loose or peeling primer and other surface contaminants not easily removed by the previous cleaning methods in accordance with SSPC SP-7. Take care that remaining primers are not damaged by the blast cleaning operation. Remaining primers shall be firmly bonded to the steel surfaces with blast cleaned edges feathered.

D. Remove rust, scaling, or primer damaged by welding or during shipment, storage, and erection in accordance with SSPC SP-10. Take care that remaining primers are not damaged by the blast cleaning operation. Areas smaller than 1 square inch may be prepared per SSPC SP-11. Remaining primers shall be firmly bonded to the steel surfaces with cleaned edges feathered.

E. Use repair procedures on damaged primer that protects adjacent primer. Blast cleaning may require the use of lower air pressure, smaller nozzles, and abrasive particle sizes, short blast nozzle distance from surface, shielding, and/or masking.

F. After abrasive blast cleaning of damaged and defective areas, remove dust, blast particles, and other debris by dusting, sweeping, and vacuuming; then apply the specified touch-up coating.

G. Other surfaces that are shop primed shall receive a field touch-up of the same primer used in the original prime coat.

3.06 PAINTING SYSTEMS

A. All materials of a specified painting system, including primer, intermediate, and finish coats, shall be produced by the same manufacturer. Thinners, cleaners, driers, and other additives shall be as recommended by the paint manufacturer for the particular coating system.

B. Deliver paints to the jobsite in the original, unopened containers.

3.07 PAINT STORAGE AND MIXING

A. Store and mix materials only in areas designated for that purpose by the Owner's Representative. The area shall be well-ventilated, with precautionary measures taken to prevent fire hazards. Post "No Smoking" signs. Storage and mixing areas shall be clean and free of rags, waste, and scrapings. Tightly close containers after each use. Store paint at an ambient temperature from 50°F to 100°F.

B. Prepare multiple-component coatings using all of the contents of the container for each component as packaged by the paint manufacturer. Do not use partial batches. Do not use multiple-component coatings that have been mixed beyond their pot life. Provide small quantity kits for touch-up painting and for painting other small areas. Mix only the components specified and furnished by the paint manufacturer. Do not intermix additional components for reasons of color or otherwise, even within the same generic type of coating.

3.08 PROCEDURES FOR THE APPLICATION OF COATINGS

A. Conform to the requirements of SSPC PA-1. Follow the recommendations of the coating manufacturer including the selection of spray equipment, brushes, rollers, cleaners, thinners, mixing, drying time, temperature and humidity of application, and safety precautions.

B. Stir, strain, and keep coating materials at a uniform consistency during application. Power mix components. For multiple component materials, premix each component before combining. Apply each coating evenly, free of brush marks, sags, runs, and other evidence of poor workmanship. Use a different shade or tint on succeeding coating applications to indicate coverage where possible. Finished surfaces shall be free from defects or blemishes.

C. Do not use thinners unless recommended by the coating manufacturer. If thinning is allowed, do not exceed the maximum allowable amount of thinner per gallon of coating material. Stir coating materials at all times when adding thinner. Do not flood the coating material surface with thinner prior to mixing. Do not reduce coating materials more than is absolutely necessary to obtain the proper application characteristics and to obtain the specified dry-film thicknesses.

D. Remove dust, blast particles, and other debris from blast cleaned surfaces by dusting, sweeping, and vacuuming. Allow ventilator fans to clean airborne dust to provide good visibility of working area prior to coating applications. Remove dust from coated surfaces by dusting, sweeping, and vacuuming prior to applying succeeding coats.

E. Apply coating systems to the specified minimum dry-film thicknesses as determined per SSPC PA-2.

F. Apply primer immediately after blast cleaning and before any surface rusting occurs, or any dust, dirt, or any foreign matter has accumulated. Reclean surfaces by blast cleaning that have surface colored or become moist prior to coating application.

G. Apply a brush coat of primer on welds, sharp edges, nuts, bolts, and irregular surfaces prior to the application of the primer and finish coat. Apply the brush coat prior to and in conjunction with the spray coat application. Apply the spray coat over the brush coat.

H. Before applying subsequent coats, allow the primer and intermediate coats to dry for the minimum curing time recommended by the manufacturer. In no case shall the time between coats exceed the manufacturer's recommendation.

I. Each coat shall cover the surface of the preceding coat completely, and there shall be a visually perceptible difference in applied shade or tint of colors.

J. Applied coating systems shall be cured at 75°F or higher for 48 hours. If temperature is lower than 75°F, curing time shall be in accordance with printed recommendations of the manufacturer, unless otherwise allowed by the Owner's Representative.

K. Assembled parts shall be disassembled sufficiently before painting or coating to ensure complete coverage by the required coating.

3.09 SURFACES NOT TO BE COATED

Do not paint the following surfaces unless otherwise noted in the drawings or in other specification sections. Protect during the painting of adjacent areas:

A. Concrete walkways.

B. Mortar-coated pipe and fittings.

C. Stainless steel.

D. Metal letters.

E. Glass.

F. Roofings.

G. Fencing.

H. Copper tubing, red brass piping, and PVC piping except where such piping occurs in rooms where the walls are painted, or required for color coding.

I. Electrical fixtures except for factory coatings.

J. Nameplates.

K. Grease fittings.

L. Brass and copper, submerged.

M. Buried pipe, unless specifically required in the piping specifications.

N. Fiberglass items, unless specifically required in the FRP specifications.

O. Aluminum handrail, stairs, and grating.

3.10 PROTECTION OF SURFACES NOT TO BE PAINTED

Remove, mask, or otherwise protect hardware, lighting fixtures, switchplates, aluminum surfaces, machined surfaces, couplings, shafts, bearings, nameplates on machinery, and other surfaces not intended to be painted. Provide drop cloths to prevent paint materials from falling on or marring adjacent surfaces. Protect working parts of mechanical and electrical equipment from damage during surface preparation and painting process. Mask openings in motors to prevent paint and other materials from entering the motors.

3.11 SURFACES TO BE COATED

The exact coating to be applied in any location is not designated by the descriptive phrases in the coating system titles such as “corrosive environment,” “buried metal,” or “submerged metal.” Coat surfaces with the specific coating systems as described below:

A. Coat mechanical equipment, such as pumps, as described in the various mechanical equipment specifications. Color of finish coat shall match the color of the connecting piping.

B. Coat aboveground and exposed piping or piping in vaults and structures as described below in the various piping specifications. Color of finish coat shall be determined by the Owner.

C. Coat valves as described in the various valve specifications. Aboveground valves, or valves in vaults and structures, shall match the color of the connecting piping.

D. Coat buried flanges, nuts and bolts, valves, flexible pipe couplings, exposed rebar in thrust blocks, and valve boxes as specified in the particular specifications for the above items.

E. Coat PVC exposed to ultraviolet light.

3.12 DRY-FILM THICKNESS TESTING

A. Measure coating thickness specified for carbon steel surfaces with a magnetic-type dry-film thickness gauge in accordance with SSPC PA-2. Provide certification that the gauge has been calibrated by a certified laboratory within the past six months. Provide dry-film thickness gauge as manufactured by Mikrotest or Elcometer.

B. Test the finish coat of metal surfaces (except zinc primer and galvanizing) for holidays and discontinuities with an electrical holiday detector, low-voltage, wet-sponge type. Provide measuring equipment. Provide certification that the gauge has been calibrated by a certified laboratory within the past six months. Provide detector as manufactured by Tinker and Rasor or K-D Bird Dog.

C. Check each coat for the correct dry-film thickness. Do not measure within eight hours after application of the coating.

D. For metal surfaces, make five separate spot measurements (average of three readings) spaced evenly over each 100 square feet of area (or fraction thereof) to be measured. Make three readings for each spot measurement of either the substrate or the paint. Move the probe or detector a distance of 1 to 3 inches for each new gauge reading. Discard any unusually high or low reading that cannot be repeated consistently. Take the average (mean) of the three readings as the spot measurement. The average of five spot measurements for each such 100-square-foot area shall not be less than the specified thickness. No single spot measurement in any 100-square-foot area shall be less than 80%, or more than 120%, of the specified thickness. One of three readings which are averaged to produce each spot measurement may underrun by a greater amount as defined by SSPC PA-2.

E. Perform tests in the presence of the Owner's Representative.

3.13 REPAIR OF IMPROPERLY COATED SURFACES

If the item has an improper finish color or insufficient film thickness, clean and topcoat the surface with the specified paint material to obtain the specified color and coverage. Sandblast or power-sand visible areas of chipped, peeled, or abraded paint, feathering the edges. Then prime and finish coat in accordance with the specifications. Work shall be free of runs, bridges, shiners, laps, or other imperfections. All repair work shall be completed at no cost to the owner.

3.14 CLEANING

A. During the progress of the work, remove discarded materials, rubbish, cans, and rags at the end of each day's work.

B. Thoroughly clean brushes and other application equipment at the end of each period of use and when changing to another paint or color.

C. Upon completion of painting work, remove masking tape, tarps, and other protective materials, using care not to damage finished surfaces.

END OF SECTION

SECTION 099754 POLYETHYLENE SHEET ENCASEMENT (AWWA C105)

PART 1 - GENERAL

1.01 DESCRIPTION

This section includes materials and installation of a polyethylene sheet encasement for buried ductile iron pipe, fittings, and valves.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Trenching, Backfilling, and Compacting: 312316.

B. General Piping Requirements: 400500.

C. Ductile-Iron Pipe: 402040.

D. PVC Distribution Pipe (AWWA C900 and C909): 402092

1.03 SUBMITTALS

A. Submit shop drawings in accordance with the Special Provisions.

B. Submit manufacturer's catalog literature and product data sheets describing the physical, chemical, and electrical properties of the encasement material.

PART 2 - MATERIALS

2.01 POLYETHYLENE WRAP

A. The encasement shall consist of low-density polyethylene wrap of at least 8-mil thickness conforming to AWWA C105. Color: blue, black, or purple.

B. Polyethylene encasement for ductile-iron pipe shall be supplied as a flat tube meeting the dimensions of Table 1 in AWWA C105 and shall be supplied by the ductile-iron pipe manufacturer.

2.02 PLASTIC ADHESIVE TAPE

A. Tape shall consist of polyolefin backing and adhesive which bonds to common pipeline coatings including polyethylene.

B. Minimum Width: 2 inches.

C. Products: Canusa Wrapid Tape; Tapecoat 35; Polyken 934; AA Thread Seal Tape, Inc.; or equal.

PART 3 - EXECUTION

3.01 APPLICATION OF MOLDABLE MASTIC FILLER TO IRREGULAR ADJACENT SURFACES

When the adjacent joints are bell-and-spigot or mechanical joints and any associated welding specifications do not require an external full fillet weld, apply a moldable mastic filler (per Section 400500) at the step-down area prior to the application of the sheet encasement and tape.

3.02 APPLYING SHEET COATING TO BURIED PIPING AND FITTINGS

A. Apply wrapping per AWWA C105 as modified herein.

B. Apply a single wrapping.

C. Install the polyethylene to completely encase the pipe and fittings to provide a watertight corrosion barrier. Continuously secure overlaps and ends of sheet and tube with polyethylene tape. Make circumferential seams with two complete wraps, with no exposed edges. Tape longitudinal seams and longitudinal overlaps, extending tape beyond and beneath circumferential seams.

D. Wrap bell-spigot interfaces, restrained joint components, and other irregular surfaces with wax tape or moldable sealant prior to placing polyethylene encasement.

E. Minimize voids beneath polyethylene. Place circumferential or spiral wraps of polyethylene tape at 2-foot intervals along the barrel of the pipe to minimize the space between the pipe and the polyethylene.

F. Overlap adjoining polyethylene tube coatings a minimum of 1 foot and wrap prior to placing concrete anchors, collars, supports, or thrust blocks. Hand wrap the polyethylene sheet, apply two complete wraps with no exposed edges to provide a watertight corrosion barrier, and secure in place with 2-inch-wide plastic adhesive tape.

3.03 APPLYING SHEET COATING TO BURIED VALVES

A. Wrap flanges and other irregular surfaces with wax tape or moldable sealant. Press tightly into place leaving no voids underneath and a smooth surface under coating for polyethylene sheet.

B. Wrap with a flat sheet of polyethylene. Place the sheet under the valve and the flanges or joints with the connecting pipe and fold in half. Extend the sheet to the valve stem and secure the sheet in place with 2-inch-wide plastic adhesive tape. Apply a second layer and secure with tape. Make two complete wraps, with no exposed edges, to provide a watertight corrosion barrier. Secure the sheets with tape around the valve stem below the operating nut and around the barrel of the connecting pipe to prevent the entrance of water and soil. Place concrete anchor and support blocks after the wrap has been installed.

3.04 APPLYING SHEET COATING TO BURIED FLEXIBLE PIPE COUPLINGS

A. Wrap irregular surfaces with wax tape or moldable sealant. Press tightly into place leaving no voids underneath and a smooth surface under coating for polyethylene sheet.

B. Apply two layers or wraps around the coupling. Overlap the adjoining pipe or fitting a minimum of 1 foot and secure in place with tape. Provide sufficient slack in polyethylene to allow backfill to be placed around fitting without tearing polyethylene. Apply tape around the entire circumference of the overlapped section on the adjoining pipe or fitting in two complete wraps, with no exposed edges, to provide a watertight corrosion barrier.

3.05 REPAIR OF POLYETHYLENE MATERIAL

Repair polyethylene material that is damaged during installation. Use polyethylene sheet, place over damaged or torn area, and secure in place with 2-inch-wide plastic adhesive tape.

3.06 APPLYING SHEET COATING TO EXISTING BURIED PIPING

When connecting polyethylene-encased pipe or fittings to existing pipe, expose existing pipe, thoroughly clean the surface, and securely tape the end of the polyethylene to the existing as specified above. When the existing pipe is polyethylene encased, wrap new polyethylene encasement over the existing, with overlap of at least 2 feet. Tape securely as specified above.

3.07 BACKFILL FOR POLYETHYLENE-WRAPPED PIPE, VALVES, AND FITTINGS

Place sand backfill within 1 foot of the pipe, valves, and fittings wrapped with polyethylene encasement per Section 312316.

3.08 REPAIR OF POLYETHYLENE AT SERVICE TAPS

A. Wrap two or three layers of polyethylene adhesive tape completely around the pipe to cover the area where the tapping machine and chain will be mounted.

B. Mount the tapping machine on the pipe area covered by the polyethylene tape. Then make the tap and install the corporation stop directly through the tape and polyethylene.

C. After making the direct service connection, inspect the entire circumferential area for damage and make repairs.

D. To minimize the possibility of dissimilar metal corrosion at service connections, wrap the corporation stop a minimum clear distance of 3 feet of copper service pipes with polyethylene or dielectric tape.

END OF SECTION

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SECTION 099761 FUSION-BONDED EPOXY LININGS AND COATINGS

PART 1 - GENERAL

1.01 DESCRIPTION

This section includes materials, application, and testing of one-part, fusion-bonded, heat-cured, thermosetting, 100% solids epoxy linings and coatings on cast-iron and ductile-iron equipment, such as valves, flexible pipe couplings, and pipe.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Painting and Coating: 099000.

B. Flexible Pipe Couplings: 400722.

C. Ductile Iron Pipe: 402040.

1.03 SUBMITTALS

A. Submit shop drawings in accordance with the Special Provisions.

B. Submit manufacturer's catalog literature and product data sheets, describing the physical and chemical properties of the epoxy coating. Describe application and curing procedure.

C. Submit coating application test records for measuring coating thickness and holiday detection for each item or pipe section and fitting. Describe repair procedures used.

PART 2 - MATERIALS

2.01 PIPING AND EQUIPMENT SURFACES

A. The Contractor shall require the equipment suppliers to provide equipment that is free of salts, oil, and grease to the coating applicator.

B. The Contractor shall require pipe suppliers to provide bare pipe that is free of salts, oil, and grease to the coating applicator.

2.02 SHOP-APPLIED EPOXY LINING AND COATING

Lining and coating shall be a 100% solids, thermosetting, fusion-bonded, dry powder epoxy resin: Scotchkote 134 or 206N, Valspar "Pipeclad 1500 Red," or equal. Epoxy lining and coating shall be certified to NSF/ANSI Standard 61 Drinking Water Systems – Health Effects and meet or exceed the following requirements:

Hardness (minimum)	Barcol 17 (ASTM D2583) Rockwell 50 ("M" scale)
Abrasion resistance (maximum value)	1,000 cycles: 0.05 gram removed
	5,000 cycles: 0.115 gram removed
	ASTM D1044, Tabor CS 17 wheel, 1,000-gram weight
Adhesion (minimum)	3,000 psi (Elcometer)
Tensile strength	7,300 psi (ASTM D2370)
Penetration	0 mil (ASTM G17)
Adhesion overlap shear, 1/8-inch steel panel, 0.010 glue line	4,300 psi, ASTM D1002
Impact (minimum value)	100 inch-pounds (Gardner 5/8-inch diameter tup)

2.03 FIELD-APPLIED EPOXY COATING FOR PATCHING

Use a minimum 80% solids liquid epoxy resin, such as Scotchkote 306 or 323.

2.04 PAINTING AND COATING OF GROOVED-END AND FLEXIBLE PIPE COUPLINGS

Line and coat couplings the same as the pipe. Color shall match the color of the pipe fusion epoxy coating.

PART 3 - EXECUTION

3.01 SHOP APPLICATION OF FUSION-BONDED EPOXY LINING AND COATING--GENERAL

A. Grind surface irregularities, welds, and weld spatter smooth before applying the epoxy. The allowable grind area shall not exceed 0.25 square foot per location, and the maximum total grind area shall not exceed 1 square foot per item or piece of equipment. Do not use any item, pipe, or piece of equipment in which these requirements cannot be met.

B. Remove surface imperfections, such as slivers, scales, burrs, weld spatter, and gouges. Grind outside sharp corners, such as the outside edges of flanges, to a minimum radius of 1/4 inch.

C. Uniformly preheat the pipe, item, or piece of equipment prior to blast cleaning to remove moisture from the surface. The preheat shall be sufficient to ensure that the surface temperature is at least 5°F above the dew point temperature during blast cleaning and inspection.

D. Sandblast surfaces per SSPC SP-5. Protect beveled pipe ends from the abrasive blast cleaning.

E. Apply lining and coating by the electrostatic spray or fluidized bed process. Minimum thickness of lining or coating shall be 15 mils. Heat and cure per the epoxy manufacturer's recommendations. The heat source shall not leave a residue or contaminant on the metal surface. Do not allow oxidation of surfaces to occur prior to coating. Do not permit surfaces to flash rust before coating.

3.02 SHOP APPLICATION OF FUSION-BONDED EPOXY LINING AND COATING TO PIPE--ADDITIONAL REQUIREMENTS

A. Apply lining and coating per AWWA C213 except as modified herein.

B. Grind 0.020 inch (minimum) off the weld caps on the pipe weld seams before beginning the surface preparation and heating of the pipe.

3.03 SHOP APPLICATION OF FUSION-BONDED EPOXY LINING AND COATING TO JOINT AREAS OF DUCTILE-IRON AND CAST-IRON FITTINGS--ADDITIONAL REQUIREMENTS

Limit the protective coating thickness in the joints of ductile-iron and cast-iron fittings to maintain a leak-proof joint. However, the coating thickness in the joint area shall not be less than 4 mils.

3.04 QUALITY OF LINING AND COATING APPLICATIONS

The cured lining or coating shall be smooth and glossy, with no graininess or roughness. The lining or coating shall have no blisters, cracks, bubbles, underfilm voids, mechanical damage, discontinuities, or holidays.

3.05 FACTORY TESTING OF COATING--GENERAL

A. Test linings and coatings with a low-voltage wet sponge holiday detector. Test pipe linings and coatings per AWWA C213, Section 5.3.3. If the number of holidays or pinholes is fewer than one per 20 square feet of coating surface, repair the holidays and pinholes by applying the coating manufacturer's recommended patching compound to each holiday or pinhole and retest. If the number of pinholes and holidays exceeds one per 20 square feet of coating surface, remove the entire lining or coating and recoat the item or pipe.

B. Measure the coating thickness at three locations on each item or piece of equipment or pipe section using a coating thickness gauge calibrated at least once per eight-hour shift. Record each measured thickness value. Where individual measured thickness values are less than the specified minimum thickness, measure the coating thickness at three additional points around the defective area. The average of these measurements shall exceed the specified minimum thickness value, and no individual thickness value shall be more than 2 mils below or 3 mils above the specified minimum value. If a section of the pipe, item, or piece of equipment does not meet these criteria, remove the entire lining or coating and recoat the entire item or piece of equipment.

3.06 FACTORY INSPECTION OF LINING AND COATING OF PIPE--ADDITIONAL REQUIREMENTS

Check for coating defects on the weld seam centerlines. There shall be no porous blisters, craters, or pimples lying along the peak of the weld crown.

3.07 SHIPPING, STORAGE, AND HANDLING

A. When loading piping, fittings, couplings, or other coated items for shipment to the project site, use spacers and other protective devices to separate pipes or other coated items to prevent damaging the coated surfaces during transit and unloading. If wood spacers are used, remove wood splinters and particles from the coated surfaces after separation. Use padded chains or ribbon binders to secure the loaded pipe or other coated items and minimize damage.

B. Do not load or unload pipe, fittings, couplings, or other coated items by inserting forklift tines or lifting chains inside the pipe or item. Use nonmetallic slings, padded chains, or padded forklift tines to lift pipe or other coated items.

C. Cover piping or other coated items 100% with protective coverings or tarpaulins to prevent deposition of road salts, fuel residue, and other contaminants in transit.

D. Provide stulls, braces, and supports for piping during shipping and storage such that out-of-roundness or deflection does not exceed 0.5% of the pipe diameter.

E. Handle piping and other coated items with care during the unloading, installation, and erection operations to minimize damage. Do not place or store pipe or other coated items on the ground or on top of other work unless ground or work is covered with a protective covering or tarpaulin. Place pipe or other coated items above the ground upon platforms, skids, or other supports.

F. Store piping or other coated items at the site on pallets to prevent direct contact with ground or floor. Cover pipe or coated items during storage with protective coverings or tarpaulins to prevent deposition of rainwater, salt air, dirt, dust, and other contaminants.

G. Do not allow piping or other coated items to contact metal, concrete, or other surfaces during storage, handling, or installation and erection at the site that could damage or scratch the coating.

3.08 FIELD REPAIRS

Patch scratches and damaged areas incurred while installing fusion-bonded epoxy coated items with a two-component, 80% solids (minimum), liquid epoxy resin. Wire brush or sandblast the damaged areas per SSPC SP-10. Lightly abrade or sandblast the coating or lining on the sides of the damaged area before applying the liquid epoxy coating. Apply an epoxy coating to defective linings and coatings to areas smaller than 20 square inches. Patched areas shall overlap the parent or base coating a minimum of 0.5 inch. If a defective area exceeds 20 square inches, remove the entire lining and coating and recoat the entire item or piece of equipment. Apply the liquid epoxy coating to a minimum dry-film thickness of 15 mils. Repairs shall be completed at no cost to the owner.

END OF SECTION

SECTION 221628 TRENCH DRAIN SYSTEM

PART 1 - GENERAL

1.01 DESCRIPTION

This section includes materials and installation of a precast trench drain system.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. General Concrete Construction: 030500.

B. Fusion Bonded Epoxy Linings and Coatings: 099761.

1.03 SUBMITTALS

A. Submit shop drawings in accordance with the Special Provisions.

B. Submit layout and dimensional drawings of the drain system. Show sizes and locations of outlets and connections.

C. Show materials, characteristics, and physical properties of the trench drain material. Show type of resin used.

D. Show grating and frame materials of construction, design loadings, and type of resin used.

PART 2 - MATERIALS

2.01 TRENCH DRAIN SYSTEM MANUFACTURERS

Trench drain systems shall be "Polydrain" System “PP12-12.502E.GB-G21E” as manufactured by Polydrain, Inc., Troutman, North Carolina, or equal.

2.02 TRENCH DRAIN CONSTRUCTION AND DESIGN

A. The trench drain system shall consist of prefabricated channels manufactured using polyester polymer concrete consisting of pre-sloped channels with nominal 12” inside width having vertical sides and a trapezoidal or rounded bottom. The interior surface of the trench drain shall be a smooth, pore-free surface. The channels shall join to each other with tongue-and-groove joints using a chemical-resistant resin adhesive. The design of the trench drains shall include anchoring ribs to lock the channel mechanically into a concrete floor slab or pavement. The channels shall contain seats for grating covers cast into the channel walls.

B. The channels shall be manufactured from a formulation of quartz aggregates and inert fillers bonded together with a polyester resin. The material shall have the following characteristics:

1. Compressive Strength: 14,000 psi minimum.

2. Tensile Strength: 1,200 psi minimum.

3. Bending Strength: 3,000 psi minimum.

4. Moisture Absorption: 0.20% maximum.

2.03 GRATING

Grating ductile iron conforming to ASTM A 536-84 with a minimum inlet area of 0.81ft2/Lft. Grates shall meet a minimum vertical proof load of 50,220 lbs by utilizing a 9” x 9” centered contact area without failure.

2.04 FRAMES

Black polymer coated 2.0” x 2.0” x .188” steel angle frames conforming to ASTM A36. Grate frames to provide a minimum of 1.25 square inches concrete bearing area with 3.25 square inches of concrete contact per inch of trench length on each side. Grates shall be retained with non-threaded non-removable pins along the frames.

2.05 VERTICAL OUTLET CONNECTIONS

Outlets shall be size 6 inches, integrally attached to the bottom of the trench drains.

2.06 COATING OF DUCTILE-IRON GRATING

Coat ductile-iron grating and frames with fusion-bonded epoxy per Section 099761

2.07 JOINT SEALANT ADHESIVE

Joint sealant shall be PolySeal II two-part epoxy or equal.

PART 3 - EXECUTION

3.01 INSTALLATION

Embed the trench drains in a concrete encasement. The concrete shall be Class A per Section 030500 and shall extend a minimum of 4 inches all around the trench drain.

3.02 JOINTS

Seal the joints between channel sections with adhesive.

END OF SECTION

SECTION 260500 GENERAL ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.01 DESCRIPTION

This section includes materials, installation, and testing of the electrical system.

1.02 SUBMITTALS

A. Submit shop drawings in accordance with the Special Provisions.

B. In submitted catalog cuts, cross out items shown that are not pertinent to this project. Where catalog cuts list manufacturer's standard options, cross out those options not intended to be provided and clearly highlight those options that are to be provided.

1.03 REGULATORY AGENCIES AND STANDARDS

A. See Special Provisions.

B. Electrical work shall comply with the NEC as amended by the CEC and local city code where applicable.

1.04 QUALITY CONTROL

Materials, appliances, equipment, and devices shall conform to the applicable UL standards. The label of, or listing by, UL is required for all electrical equipment.

1.05 POWER FOR CONSTRUCTION

Provide for or purchase power for construction in accordance with Section 015100.

1.06 LOCATIONS

A. Use equipment, materials, and wiring methods suitable for the types of locations in which they are located as defined below.

B. Definitions of Types of Locations:

1. Dry Locations: Indoor areas which do not fall within the definitions below for wet, damp, hazardous, or corrosive locations and which are not otherwise designated in the drawings.

2. Wet Locations: Locations exposed to the weather, whether under a roof or not, unless otherwise designated in the drawings.

3. Corrosive Locations: Areas identified in drawings.

PART 2 - MATERIALS

2.01 GENERAL

A. Similar materials and equipment shall be the product of a single manufacturer.

B. Provide only products which are new, undamaged, and in the original cartons or containers.

C. Materials and equipment shall be the standard products of manufacturers regularly engaged in the production of such material and shall be the manufacturer's current design.

D. Materials and equipment shall be suitable for storage, installation, and operation at an ambient temperature of 0°C to 40°C except where more stringent conditions are stated in individual equipment specifications.

E. Electrical equipment and panels shall be factory finished with manufacturer's standard primer and enamel topcoats, unless stated otherwise in the individual equipment specifications. Provide 1 pint of the equipment manufacturer's touchup paint per 500 square feet of painted surface for repair of damaged enamel topcoats.

PART 3 - EXECUTION

3.01 INSTALLATION

A. The drawings indicate connections for typical equipment only. If the equipment furnished is different from what is shown, provide the modifications necessary for a safe and properly operating installation in accordance with the equipment manufacturer's recommendations.

B. The drawings diagrammatically indicate the desired location and arrangement of outlets, conduit runs, equipment, and other items. Field determine exact location based on physical size and arrangement of equipment, finished elevations, and obstructions.

C. Work or equipment not indicated or specified which is necessary for the complete and proper operation of the electrical systems shall be accomplished without additional cost to the Owner.

D. Seal weathertight equipment or components exposed to the weather.

E. Protect equipment outlets and conduit openings with factory-made plugs or caps whenever work is not in progress at that point.

3.02 REMOVAL OF MATERIALS AND EQUIPMENT

Unless otherwise noted, remove existing electrical materials and equipment from areas indicated for demolition. Remove materials no longer used. Remove existing unused wires.

END OF SECTION

SECTION 260543 UNDERGROUND ELECTRICAL DUCT SYSTEMS

PART 1 - GENERAL

1.01 DESCRIPTION

This section includes materials, installation, and testing of ducts, pull boxes, and related materials for power and signal system wiring.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. General Concrete Construction: 030500.

B. Trenching, Backfilling, and Compacting: 312316.

1.03 DEFINITIONS

A. Pull Box: A subsurface enclosure that has a bottom and is used with underground lines, into which personnel can reach but do not enter, for the purpose of installing, operating, or maintaining equipment, cabling, or both. Use pull boxes with 12-inch by 22-inch minimum inside dimensions, unless otherwise indicated or required.

B. Duct: The general term for an electrical conduit or raceway, either metallic or nonmetallic, for use under ground, embedded in earth or in concrete.

C. Duct Bank: A group of two or more ducts in a continuous run between two points.

1.04 SUBMITTALS

A. Submit shop drawings in accordance with the Special Provisions.

B. Submit product data for the following:

1. Ducts, fittings, and joining cement.

2. Pull boxes.

3. Warning tape.

C. Submit shop drawings for precast pull boxes showing duct or raceway entry types and sizes, locations and elevations of duct banks and individual ducts, reinforcement details, and cover design. Include dimensioned detailed locations of cable rack inserts, pulling irons, and sumps.

1.05 QUALITY CONTROL

A. UL Compliance and Labeling: Comply with requirements of UL standards. Provide duct products and components listed and labeled by UL or Electrical Testing Laboratory, Inc. (ETL).

B. ANSI Compliance: Comply with requirements of ANSI C2, National Electrical Safety Code, pertaining to construction and installation of underground conduit systems, vaults, manholes, and handholes.

C. Code Compliance: Comply with requirements of NEC.

D. Prefabricators: Provide products of firms regularly engaged in manufacture of factory-fabricated pull boxes of types and sizes required, whose products have been in satisfactory use in similar service for not less than three years.

1.06 DELIVERY, STORAGE, AND HANDLING

Deliver ducts to site with ends capped. Store nonmetallic ducts with supports to prevent bending, warping, and deforming.

PART 2 - MATERIALS

2.01 IDENTIFICATION

A. Provide bead weld on enclosure covers to indicate usage as follows:

1. "ELECTRIC - LV" (for systems 600 volts or less).

2. "ELECTRIC - HV" (for systems above 600 volts).

3. "SIGNAL" (for telephone, instrumentation, or communications systems).

B. Identify enclosure number as indicated in drawings.

2.02 RIGID NONMETALLIC CONDUIT (PVC) AND FITTINGS

A. Conduit: PVC Schedule 40, 90°C rise rating, conforming to NEMA TC-2 Type EC-40 and UL 651.

B. Provide long-radius elbows for 90 degree bends.

C. Couplings, Adapters, End Bells, Expansion Couplings, Elbows, and Turns of 30 Degrees: Factory-made in accordance with NEMA TC-2 and TC-3.

D. Joint Cement: As recommended by manufacturer as suitable for the climate, furnished with instructions to achieve watertight joints.

E. Manufacturers: Carlon, Condux, or equal.

2.03 PULL BOXES

A. Provide pull boxes, for pulling, splicing, and terminating conductors, in types and sizes indicated.

B. Pull Boxes: Precast concrete, closed bottom with sump and hot-dipped galvanized steel traffic-rated covers, designed to AASHTO HS20-44 loading. Provide with pulling irons and cable racks.

C. Cover Hold downs: Stainless steel, penta-head, flush with cover, bolts.

D. Sump: Cast in bottom of pull boxes with cover and discharge pipe.

E. Pull boxes shall have identification on covers pertaining to type of service or as indicated in the drawings.

F. Manufacturer: Brooks Products, Associated Concrete Products, or equal.

2.04 ACCESSORIES

A. Cable Racks: Hot-dipped galvanized steel, adjustable brackets with glazed porcelain saddle insulators.

B. Sump Covers: Cast-iron, slotted or perforated, hinged.

2.05 WARNING TAPE

A 6-inch-wide magnetically detectable warning tape with red protective polyethylene jacket resistant to alkalies, acids, and other destructive elements. The polyethylene tape shall be continuously imprinted "CAUTION--ELECTRICAL CONDUIT BELOW" unless otherwise indicated or directed by the Owner's Representative.

2.06 CONCRETE

Provide concrete as specified in Section 030500.

PART 3 - EXECUTION

3.01 TRENCHING AND BACKFILLING

See Section 312316.

3.02 DUCT LAYOUT

A. Underground ducts shall be concrete encased.

B. Where other utility piping systems are encountered or are being installed along a duct route, maintain a 12-inch minimum separation between duct and other systems at crossings and when running in parallel.

C. Do not place ducts over valves or couplings in other piping systems.

D. Minimum Cover: 24-inch minimum cover over top of concrete for concrete-encased ducts.

3.03 DUCT INSTALLATION

A. Comply with the installation provisions of NEMA TC2 and TC6, except as modified below.

B. Use factory-made conduit spacers to provide 2-inch minimum separation between conduits. Locate spacers not less than 4 feet center-to-center along entire length of ducts. Secure ducts and spacers to prevent movement during placement of concrete.

C. Place duct couplings side-by-side horizontally but staggered at least 6 inches vertically.

D. Make joints in accordance with manufacturer's recommendations. In the absence of specific recommendations, make the joints as follows:

1. Brush a plastic solvent cement on the inside of the coupling and on the outside of the duct ends.

2. Slip duct and fitting together with a quick one-quarter turn to set the joints.

E. Duct Entrances to Pull Boxes: Provide end bells for ducts. Grout end bells into pull box walls from both sides to provide watertight entrances.

F. Install expansion fittings. Expansion fittings are required when the duct is left exposed in trenches for a period of time during which the duct temperature can vary more than 2 degrees. Install expansion fittings near the fixed end of the run and 100 feet on center.

3.04 CONCRETE ENCASEMENT OF CONDUITS

A. Encase duct in Class C concrete with color additive for identification purposes as specified in Section 030500 or with red stain or dye applied to the top surface of the concrete encasement. Make duct construction monolithic. Do not exceed the indicated outside dimensions of the duct by more than 1 inch vertically or 4 inches horizontally. Do not backfill for a period of at least 24 hours after pouring concrete.

B. Maintain 2-inch minimum separation between conduits and 3-inch minimum concrete encasement around ducts.

C. Extend the concrete encasement under floor slabs or equipment mounting pads to the point of raceway termination.

D. Reinforcing:

Place No. 4 reinforcing bars 36 inches long, spaced a maximum of 12 inches around the perimeter (with a minimum of four bars total) per duct bank end at the connection at each pull box.

E. Pour each envelope between pull boxes in one continuous operation. Where more than one pour is necessary, terminate each pour in a vertical plane and install 3/4-inch reinforcing rod dowels extending 18 inches into the concrete on each side of the joint near the corners of the envelope.

3.05 PULL BOXES

A. Install pull boxes where indicated in the drawings.

B. Provide a 6-inch gravel base below pull boxes.

3.06 IDENTIFICATION

A. Bury warning tape approximately 12 inches above all concrete-encased duct banks.

B. Align tapes and planks within 3 inches of the centerline of the conduit or duct.

3.07 ACCEPTANCE TEST

A. Pull a mandrel of a diameter approximately 1/4 inch less than the duct inside diameter, through each duct.

B. Pull a bristle brush of a diameter approximately 1/4 inch greater than the duct inside diameter through each duct to remove debris.

C. Provide 200-pound minimum strength nylon pull rope in each spare conduit.

D. Repair or replace any portion of the duct through which the mandrel and brush will not pass at the Contractor's expense.

END OF SECTION

SECTION 311100 CLEARING, STRIPPING, AND GRUBBING

PART 1 - GENERAL

1.01 DESCRIPTION

This section describes the work included in clearing, stripping, grubbing, and preparing the project site for construction operations.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Existing Conditions: Special Provisions.

B. Protecting Existing Underground Utilities: 020120.

C. Earthwork: 312300.

D. Trenching, Backfilling, and Compacting: 312316.

1.03 CLEARING

Remove and dispose of trees, snags, stumps, shrubs, brush, limbs, sticks, branches, and other vegetative growth. Remove rocks, tiles, and lumps of concrete. Remove all evidence of their presence from the surface. Remove and dispose of trash piles and rubbish. Protect structures and piping above and below ground, trees, shrubs, and vegetative growth which are not designated for removal.

1.04 STRIPPING

Remove and dispose of organic sod, topsoil to a depth of 8 inches, grass and grass roots, and other objectionable material remaining after clearing from the areas designated to be stripped.

1.05 GRUBBING

After clearing and stripping, remove and dispose of wood or root matter, including stumps, logs, trunks, roots, or root systems greater than 1 inch in diameter or thickness to a depth of 12 inches below the ground surface.

PART 2 - MATERIALS

Not used.

PART 3 - EXECUTION

3.01 CLEARING, STRIPPING, AND GRUBBING AREAS AND LIMITS

A. Clear, strip, and grub excavation and embankment areas associated with new structures, slabs, walks, and roadways.

B. Clear and strip stockpile areas.

C. Limits of clearing, stripping, and grubbing:

1. Excavation, Excluding Trenches: 5 feet beyond tops of cut slopes.

2. Trench excavation for piping and electrical conduits: 3 feet from edge of trench.

3. Earth Fill: 5 feet beyond toe of permanent fill as indicated in the drawings.

4. Streets, Roadways, and Parking Areas: 10 feet from toe of fill or top of cut.

3.02 DISPOSAL OF CLEARING AND GRUBBING DEBRIS

Do not burn combustible materials. Remove cleared and grubbed material from the worksite and dispose.

3.03 DISPOSAL OF STRIPPED MATERIAL

Retain stripped material on site.

END OF SECTION

SECTION 312300 EARTHWORK

PART 1 - GENERAL

1.01 DESCRIPTION

This section includes materials, testing, and installation of earthwork for excavations, fills, and embankments for roadways, structures, and sites.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Existing Conditions: Special Provisions.

B. Protecting Existing Underground Utilities: 020120.

C. General Concrete Construction: 030500.

D. Clearing, Stripping, and Grubbing: 311100.

E. Trenching, Backfilling, and Compacting: 312316.

F. Soil Cement: 313213.

1.03 SUBMITTALS

A. Submit excavation and shoring drawings for worker protection in accordance with the Special Provisions.

B. Submit six copies of a report from a testing laboratory verifying that the material contains less than 0.25% asbestos by weight or volume and conforms to the gradation specified. Submit asbestos test results with the submittals for materials gradation. Material gradation reports without the accompanying asbestos test results will be rejected as incomplete.

1.04 TESTING FOR COMPACTION

A. The Owner will test for compaction and relative density as described below.

B. Determine the density of soil in place by the sand cone method, ASTM D1556 or by nuclear methods, ASTM D6938. Additional sand cones and densities will be required if the backfill material is visually variable. The minimum depth for the sand cone test hole shall be 12 inches. The minimum size shall be 8 inches, and size 16/30 or 10/20 silica sand shall be used. Compaction tests will be performed for each lift or layer.

C. Determine laboratory moisture-density relations of soils per ASTM D698. If nuclear methods are used for in-place density determination, the compaction test results for maximum dry density and optimum water content shall be adjusted in accordance with ASTM D4718. This will be required for determination of percent relative compaction and moisture variation from optimum.

D. Determine the relative density of cohesionless soils per ASTM D4253 and D4254.

E. Sample materials per ASTM D75.

F. "Relative compaction" is the ratio, expressed as a percentage, of the inplace dry density to the laboratory maximum dry density.

G. Compaction shall be deemed to comply with the specifications when no test falls below the specified relative compaction. The Contractor shall pay the costs of any retesting of work not conforming to the specifications.

1.05 DISPOSAL OF EXCESS MATERIALS

Stockpile screened materials meeting the requirements of fill or structural fill and not required by the Contract Documents for fill or structural fill on the project site at a location west of the laydown area adjacent to the existing stockpiles. Coordinate exact stockpile location with Owner.

Material not conforming to the requirements for fill or structural fill including rocks larger than 3 inches, asbestos, organic matter, clods, clay balls, broken pavement, and other deleterious materials shall be removed from the project site and disposed of in a lawful manner.

1.06 MATERIAL AVAILABILITY

A. Obtain backfill material from onsite borrow areas (dirt piles) as designated in the drawings.

B. For biding purposes, assume the excavated materials from can be characterized as follows:

1. 10% of the excavated volume will consist of debris that will be disposed at a Class III Landfill

2. 5% of the excavated volume will consist of concrete and rubble.

3. The remaining 85% of the excavated volume will be ¾-inch minus soil material.

PART 2 - MATERIALS

2.01 STRUCTURAL FILL

A. Structural fill is material that is to be placed beneath structures to the limits indicated in the drawings. Native earth may be used and shall be excavated fine-grained materials free from roots, debris, rocks larger than 3 inches, asbestos, organic matter, clods, clay balls, broken pavement, and other deleterious materials. Less than 50% shall pass a No. 200 sieve. At least 40% shall pass a No. 4 sieve. The coarser materials shall be well distributed throughout the finer material.

B. Backfill shall be moisture conditioned to within approximately 2% of the optimum moisture content prior to being placed in trench.

C. Surface strippings and material from on-site borrow areas (dirt piles) must not be incorporated into structural fill unless the organic content is less than 3 percent by weight (ASTM D2474).

A. Excavated onsite material may be used for structural backfill provided it conforms to the above specifications for structural backfill material.

2.02 FILL

Fill material is material that is to be placed in locations that are not to be constructed as structural fill. Fill material shall be the same as structural fill except that organic content upto 6% by weigh will be allowed.

2.03 WATER FOR COMPACTION

Water shall be free of organic materials and shall have a pH of 7.0 to 9.0, a maximum chloride concentration of 500 mg/L, and a maximum sulfate concentration of 500 mg/L. Provide all water needed for earthwork. Provide temporary piping and valves to convey water from the source to the point of use. Provide any meters if the water is taken from a city, water district, or agency pipeline.

PART 3 - EXECUTION

3.01 EXCAVATION

A. Excavations shall have sloping, sheeting, shoring, and bracing conforming with 29CFR1926 Subpart P-Excavations, CAL/OSHA requirements, and the Special Provisions.

B. Excavation is unclassified. Perform excavation regardless of the type, nature, or condition of the material encountered to accomplish the construction. Do not operate excavation equipment within 5 feet of existing structures or newly completed construction. Excavate with hand tools in these areas.

C. After the required excavation has been completed, the Owner will observe the exposed subgrade to determine the need for any additional excavation. It is the intent that additional excavation is to be conducted in all areas within the influence of the structure where unacceptable subgrade materials exist at the exposed subgrade. Overexcavation shall extent laterally 5 feet beyond the edge of foundations and down to native material or at least 12 inches below the bottom of footing, whichever is deeper. Refill the overexcavated areas with structural fill material.

D. The Contractor will not receive any additional payment for refill material used for his convenience.

3.02 LIMITS OF FOUNDATION EXCAVATION

Excavate to the depths and widths needed to accomplish the construction. Allow for forms, working space, structural fill, and site grading. Do not excavate for footings, slabs, or conduits below elevations indicated. Unless unacceptable material is encountered and overexcavation is authorized by the Owner, backfill overexcavations with compacted structural fill material. Correct cuts below grade by benching adjoining areas and creating a smooth transition. The Contractor shall bear all costs for correcting unauthorized overexcavated areas.

3.03 PREPARATION OF FOUNDATION SUBGRADE

A. The finished subgrade shall be within a tolerance of ±0.08 of a foot of the grade and cross section indicated, shall be smooth and free from irregularities, and shall be at the specified relative compaction. The subgrade shall extend over the full width and extend 5 feet beyond the edge of the foundations.

B. Remove soft material encountered and replace with structural backfill. Fill holes and depressions to the required line, grade, and cross sections with structural backfill.

C. If rock is encountered at final grade, overexcavate to a depth of 4 inches and place structural backfill to establish final grade.

3.04 PREPARATION FOR PLACING FILL OR BACKFILL

A. After excavation of existing material or removal of unacceptable material at the exposed subgrade, scarify the final subgrade surface to a depth of 8 inches and compact to 95% relative compaction.

B. Remove foreign materials and trash from the excavation before placing any fill material. Obtain the specified compressive strength and finish of concrete work per Section 030500 before backfilling.

3.05 PLACING AND COMPACTING FILL AND STRUCTURAL FILL

A. Excavated material may be used for fill and structural fill providing all deleterious materials have been removed from the stockpiled material.

B. Place in maximum 8-inch lifts and compact each lift to 95% relative compaction.

C. Where fill is to be constructed on slopes steeper than 3:1, bench the fill into competent undisturbed materials as the fill progresses up the slope. Benches shall be sloped at least 2% into the slope and shall be of a width at least equal to the height of fill lift.

3.06 PLACING AND COMPACTING STRUCTURAL BACKFILL

A. Place structural backfill material around piping, structures, channels, and other areas, including authorized overexcavation areas, to the lines and grades shown or specified. Do not exceed loose lifts of 8 inches.

B. Limits of Structural Backfill: Limits of structural backfill shall be 5.0 feet from edge of footing and shall extend at a 1:1 slope to the finish grade.

C. Compact each lift to 95% relative compaction, unless otherwise shown in the drawings. Stop structural backfill at least 6 inches below finished grade in all areas where topsoil is to be placed.

D. Backfill around concrete structures as specified in Section 030500.

E. Do not operate earthmoving equipment within 5 feet of walls of concrete structures. Place and compact backfill adjacent to concrete walls with hand-operated tampers or other equipment that will not damage the structure.

3.07 MOISTURE CONTROL

During the compacting operations, maintain optimum practicable moisture content required for compaction purposes in each lift of the material. Maintain uniform moisture content throughout the lift. Insofar as practicable, add water to the material at the site of excavation. Supplement by sprinkling the material. At the time of compaction, the water content of the material shall be at optimum water content or within 2 percentage points above optimum. Aerate material containing excessive moisture by blading, discing, or harrowing to hasten the drying process.

3.08 SITE GRADING

Perform earthwork to the lines and grades shown in the drawings. Shape, trim, and finish slopes of channels to conform to the lines, grades, and cross sections as shown. Remove exposed roots

and loose rocks exceeding 3 inches in diameter. Round tops of banks to circular curves of not less than a 6-foot radius. Neatly and smoothly trim rounded surfaces. Do not overexcavate and backfill to achieve the proper grade.

END OF SECTION

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SECTION 312316 TRENCHING, BACKFILLING, AND COMPACTING

PART 1 - GENERAL

1.01 DESCRIPTION

This section includes materials, testing, and installation for pipeline and ductbank trench excavation, backfilling, and compacting.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Existing Conditions: Special Provisions.

B. Protecting Existing Underground Utilities: 020120.

C. General Concrete Construction: 030500.

D. Clearing, Stripping, and Grubbing: 311100.

E. Earthwork: 312300.

F. Asphalt Concrete Paving (California): 321216.

G. Concrete Curbs, Gutters, and Sidewalks: 321613.

1.03 SUBMITTALS

A. Submit six copies of a report from a testing laboratory verifying that material contains less than 0.25% asbestos by weight or volume and conforms to the specified gradations or characteristics for pea gravel, granular material, imported sand, rock refill for foundation stabilization, and water. Submit asbestos test results with the submittals for materials gradation. Material gradation reports without the accompanying asbestos test results will be rejected as incomplete.

B. Submit method(s) of compaction including removal sequence of shoring where used.

1.04 TESTING FOR COMPACTION

A. The Owner will test for compaction as described in Section 312300.

B. Where compaction tests indicate a failure to meet the specified compaction, the Owner will take additional tests every 25 feet in each direction until the extent of the failing area is identified. Rework the entire failed area until the specified compaction has been achieved.

1.05 PAVEMENT ZONE

The pavement zone includes the asphalt concrete and aggregate base pavement section placed over the trench backfill.

1.06 STREET ZONE

The street zone is the top 30 inches of the trench immediately below the pavement zone in paved areas. Where the depth of cover over the pipe does not permit the full specified thickness of the

street zone, construct a thinner street zone, extending from the top of the pipe zone to the bottom of the pavement zone.

1.07 TRENCH ZONE

The trench zone includes the portion of the trench from the top of the pipe zone to the bottom of the street zone in paved areas or to the existing surface in unpaved areas. If the resulting trench zone is less than 24 inches thick, the street zone shall extend to the top of the pipe zone and there shall be no separate trench zone.

1.08 PIPE ZONE

The pipe zone shall include the full width of trench from the bottom of the pipe or conduit to a horizontal level above the top of the pipe, as specified below. Where multiple pipes or conduits are placed in the same trench, the pipe zone shall extend from the bottom of the lowest pipe to a horizontal level above the top of the highest or topmost pipe. Thickness of pipe zone above the highest top of pipe shall be as follows unless otherwise shown in the drawings or otherwise described in the specifications for the particular type of pipe installed.

Pipe Diameter	Thickness of Pipe Zone Above Top of Pipe
6 inches or smaller	6 inches
8 inches and larger	12 inches

1.09 PIPE BASE OR BEDDING

The pipe base or bedding shall be defined as a layer of material immediately below the bottom of the pipe or conduit and extending over the full trench width in which the pipe is bedded. Thickness of pipe base shall be as follows unless otherwise shown in the drawings or otherwise described in the specifications for the particular type of pipe installed.

Pipe Diameter	Thickness of Pipe Base
16 inches and smaller	4 inches
18 inches and larger	6 inches

PART 2 - MATERIALS

2.01 NATIVE EARTH BACKFILL--STREET AND TRENCH ZONES

Backfill used above the pipe zone shall meet the requirements of structural fill per section 312300.

2.02 GRAVEL AND CRUSHED ROCK--PIPE ZONE AND PIPE BASE

A. Gravel or crushed rock material shall contain less than 0.25% asbestos by weight or volume and shall meet the following gradation:

Sieve Sizes	Designated Gravel Size			
	1-1/2-Inch	1-Inch	3/4-Inch	3/8-Inch
	Percent Passing	Percent Passing	Percent Passing	Percent Passing
2 inches	100	-	-	-
1 1/2 inches	90 to 100	100	-	-
1 inch	20 to 55	90 to 100	100	-
3/4 inch	0 to 15	30 to 60	90 to 100	-
1/2 inch	-	0 to 20	30 to 60	100
3/8 inch	0 to 5	-	0 to 20	90 to 100
No. 4	-	0 to 5	0 to 5	30 to 60
No. 8	-	-	-	0 to 10

B. Use 3/8-inch size unless indicated otherwise in the drawings.

2.03 WATER FOR COMPACTION

See Section 312300.

PART 3 - EXECUTION

3.01 SLOPING, SHEETING, SHORING, AND BRACING OF TRENCHES

Trenches shall have sloping, sheeting, shoring, and bracing conforming with 29CFR1926, Subpart P--Excavations, CAL/OSHA requirements, and the Special Provisions.

3.02 SIDEWALK, PAVEMENT, AND CURB REMOVAL

Cut bituminous and concrete pavements regardless of the thickness and curbs and sidewalks prior to excavation of the trenches with a pavement saw or pavement cutter. Width of the pavement cut shall be at least equal to the required width of the trench at ground surface. Haul pavement and concrete materials from the site. Do not use for trench backfill.

3.03 TRENCH EXCAVATION

A. Excavate the trench to the lines and grades shown in the drawings with allowance for pipe thickness, sheeting and shoring if used, and for pipe base or special bedding. If the trench is excavated below the required grade, refill any part of the trench excavated below the grade at no additional cost to the Owner with granular material. Place the refilling material over the full width of trench in compacted layers not exceeding 6 inches deep to the established grade with allowance for the pipe base or special bedding.

B. Trench widths in the pipe zone shall be as shown in the drawings. If no details are shown, maximum width shall be 18 inches greater than the pipe outside diameter. Comply with 29CFR Part 1926 Subpart P--Excavations. Trench width at the top of the trench will not be limited except where width of excavation would undercut adjacent structures and footings. In such case, width of trench shall be such that there is at least 2 feet between the top edge of the trench and the structure or footing.

C. Construct trenches in rock by removing rock to a minimum of 6 inches below bottom of pipe and backfilling with granular material.

3.04 TRENCH EXCAVATION IN BACKFILL AND EMBANKMENT AREAS

A. Construct and compact the fill to an elevation of 1-foot minimum over the top of the largest pipe or conduit to be installed.

B. Excavate trench in the compacted fill.

3.05 LOCATION OF EXCAVATED MATERIAL

A. During trench excavation, place the excavated material only within the working area. Do not obstruct any roadways or streets. Do not place trench spoil over pipe, buried utilities, manholes, or vaults. Conform to federal, state, and local codes governing the safe loading of trenches with excavated material.

B. Locate trench spoil piles at least 15 feet from the tops of the slopes of trenches. Do not operate cranes and other equipment on the same side of the trench as the spoil piles.

3.06 LENGTH OF OPEN TRENCH

Limit the length of open trench to 300 feet in advance of pipe laying or amount of pipe installed in one working day. All trenches shall be backfilled at the end of the working day. No trenches shall be left open overnight.

3.07 DEWATERING

Provide and maintain means and devices to remove and dispose of water entering the trench excavation during the time the trench is being prepared for the pipe laying, during the laying of the pipe, and until the backfill at the pipe zone has been completed. These provisions shall apply during both working and nonworking hours, including lunchtime, evenings, weekends, and holidays. Dispose of the water in a manner to prevent damage to adjacent property and in accordance with regulatory agency requirements. Do not drain trench water through the pipeline under construction.

3.08 FOUNDATION STABILIZATION

A. After the required excavation has been completed, the Owner will inspect the exposed subgrade to determine the need for any additional excavation. It is the intent that additional excavation be conducted in all areas within the influence of the pipeline where unacceptable materials exist at the exposed subgrade. Overexcavation shall include the removal of all such unacceptable material that exist directly beneath the pipeline to a width 24 inches greater than the pipe outside diameter and to the depth required.

B. Place filter fabric on the bottom of the trench and up the sides a sufficient height to retain rock refill material. Backfill the trench to subgrade of pipe base with rock refill material for foundation stabilization. Place the foundation stabilization material over the full width of the trench and compact in layers not exceeding 8 inches deep to the required grade. Foundation stabilization work shall be executed in accordance with a change order.

C. Structural fill used by the Contractor for his convenience will not be cause for any additional payment.

3.09 INSTALLING BURIED PIPING

A. Grade the bottom of the trench to the line and grade to which the pipe is to be laid, with allowance for pipe thickness. Remove hard spots that would prevent a uniform thickness of bedding. Place the specified thickness of pipe base material over the full width of trench. Grade the top of the pipe base ahead of the pipe laying to provide firm, continuous, uniform support along the full length of pipe, and compact to the relative compaction specified herein. Before laying each section of the pipe, check the grade and correct any irregularities.

B. Excavate bell holes at each joint to permit proper assembly and inspection of the entire joint. Fill the area excavated for the joints with the bedding material specified or indicated in the drawings for use in the pipe zone.

C. Inspect each pipe and fitting before lowering the buried pipe or fitting into the trench. Inspect the interior and exterior protective coatings. Patch damaged areas in the field with material recommended by the protective coating manufacturer. Clean ends of pipe thoroughly. Remove foreign matter and dirt from inside of pipe and keep clean during and after installation.

D. Handle pipe in such a manner as to avoid damage to the pipe. Do not drop or dump pipe into trenches under any circumstances.

E. When installing pipe, do not deviate more than 1 inch from line or 1/4 inch from grade. Measure elevation at the pipe invert.

F. After pipe has been bedded, place pipe zone material simultaneously on both sides of the pipe, in maximum 8-inch lifts, keeping the level of backfill the same on each side. Carefully place the material around the pipe so that the pipe barrel is completely supported and no voids or uncompacted areas are left beneath the pipe. Use particular care in placing material on the underside of the pipe to prevent lateral movement during subsequent backfilling.

G. Compact each lift to the relative compaction specified herein.

H. Push the backfill material carefully onto the backfill previously placed in the pipe zone. If no backfill material is otherwise specified or indicated, use granular material for backfill. Do not permit free-fall of the material until at least 2 feet of cover is provided over the top of the pipe. Do not drop sharp, heavy pieces of material directly onto the pipe or the tamped material around the pipe. Do not operate heavy equipment or a sheepsfoot wheel mounted on a backhoe over the pipe until at least 3 feet or one-half of the internal diameter, whichever is greater, of backfill has been placed and compacted over the pipe.

I. When the pipe laying is not in progress, including the noon hours, close the open ends of pipe. Do not allow trench water, animals, or foreign material to enter the pipe.

J. Keep the trench dry until the pipe laying and jointing are completed.

3.10 BACKFILL COMPACTION

A. Unless otherwise shown in the drawings or otherwise described in the specifications for the particular type of pipe installed, relative compaction in pipe trenches shall be as follows:

1. Pipe Zone: 90% relative compaction.

2. Backfill in Trench Zone Not Beneath Paving: 95% relative compaction. Compact backfill within embankment above the pipe zone to the same relative compaction as the adjacent embankment as specified in Section 312300.

3. Backfill in Trench Zone to Street Zone in Paved Areas: 95% relative compaction.

4. Backfill in Street Zone in Paved Areas: 95% relative compaction.

5. Refill for Overexcavation: 90% relative density.

B. Compact trench backfill to the specified relative compaction. Compact by using mechanical compaction or hand tamping. Do not use high-impact hammer-type equipment except where the pipe manufacturer warrants in writing that such use will not damage the pipe.

C. Compact material placed within 12 inches of the outer surface of the pipe by hand tamping only.

D. Do not use any axle-driven or tractor-drawn compaction equipment within 5 feet of building walls, foundations, and other structures.

3.11 MATERIAL REPLACEMENT

Remove and replace any trenching and backfilling material that does not meet the specifications, at the Contractor's expense.

END OF SECTION

SECTION 313213 SOIL-CEMENT

PART 1 - GENERAL

1.01 DESCRIPTION

This section includes materials, placement, and testing of soil-cement mixture for use as a compacted road base.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. General Concrete Construction: 030500.

B. Clearing, Stripping, and Grubbing: 311100.

C. Earthwork: 312300.

1.03 SUBMITTALS

A. The Contractor shall develop and submit a mix design and to be approved by the Owner.

B. Send field and laboratory test results to the Owner's Representative within 10 days of completion of said tests.

1.04 TESTING FOR MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTROL

A. The Contractor will test for compaction as described below.

B. Determine laboratory maximum dry density of soil-cement and optimum moisture content per ASTM D1557.

C. Determine in-place moisture density relations of soil-cement per ASTM D1556.

D. "Relative compaction" is the ratio, expressed as a percentage, of the in-place dry density to the laboratory maximum dry density.

E. Submit the name of an independent testing laboratory for review by the Owner's Representative. Submit a design mix prepared by the testing laboratory for review by the Owner's Representative.

F. The Contractor shall pay the costs of retesting for work not conforming to the specifications.

PART 2 - MATERIALS

2.01 SOIL-CEMENT DESIGN

A. Soil-cement shall consist of a combination of earth, portland cement, and water uniformly mixed, moistened, and compacted and shaped to conform to the lines, grades, and cross-sections shown in the drawings.

B. Provide a design such that the compressive strength of the installed soil-cement is 300 psi in seven days.

C. Determine compressive strength per ASTM D1632 and D1633.

2.02 SOIL

A. Use local or hauled-in clean soil.

B. Soil shall consist of excavated material, select material from source areas, a combination of these materials, or select aggregate material, proportioned as directed by the Owner's Representative.

C. Soil shall have the following gradation:

Sieve Size	Percent Passing By Weight
2 inches	100
No. 4	55 maximum
No. 200	5 to 35

D. At the completion of soil-cement mixing, the soil aggregate shall be pulverized so that 100% by dry weight passes a 1-inch sieve and at least 80% passes a No. 4 sieve exclusive of gravel or stone retained on the sieves.

E. Soil shall not be deleterious to the mixture. The distribution and gradation of materials in the soil-cement shall not result in lenses, pockets, streaks, or layers of materials differing in texture or gradation from surrounding material.

F. If unstable soil conditions occur during construction, replace unstable material with a minimum of two feet of Class II aggregate base or 18 inches of soil cement. The aggregate base should be compacted to 95% relative compaction, and soil cement should follow recommendations herein.

2.03 CEMENT

A. Portland cement shall comply with ASTM C150/150M, type II or Type V.

B. Different brands of cement, cement of the same brand from different mills, or different types of cement shall not be mixed during any continuous pour. Store different brands or types of cement separately.

C. Use only portland cements containing less than 0.6% alkali, calculated as Na_2O (percent Na_2O plus 0.658 x % K_2O), in combination with coarse or fine aggregates from alkali reactive aggregate.

D. Cement varying more than 5% from designated weights (94 pounds per sack) shall be rejected (1) in carload lots if the average of 50 sacks taken at random is less than the designated weights, and (2) in individual sacks, if tests disclose that sacks vary more than 5% from designated weights and still the average of 50 sacks is greater than the designated weight. In the second instance, the cement may be used provided the proper adjustment per sack is made; such adjustment to be made by weight only.

E. Do not use cement which is partially set or which is lumpy or caked. The entire contents of the sack of cement or the container of bulk cement that contains damaged, partially set, or lumps of caked cement will be rejected. Do not use cement salvaged from discarded or used sacks.

2.04 FLY ASH AND POZZOLAN ADMIXTURES

Admixtures, if used, shall comply with ASTM C618.

2.05 WATER

A. Water shall be free of acid, alkali, or organic materials and shall have a pH of 7.0 to 9.0.

B. Water supplies that are approved by a public health department may be accepted without being tested. Water from other sources shall be tested before use and shall not contain impurities in excess of the following limits:

Alkalinity (calculated in terms of calcium carbonate)	500 mg/L
Total organic solids	500 mg/L
Total inorganic solids	800 mg/L
Total chlorides (as chloride)	500 mg/L
Total sulfate	500 mg/L

C. Provide water needed for soil-cement. Provide temporary piping and valves to convey water from the source to the point of use. Provide meters if the water is taken from a water district or agency pipeline.

PART 3 - EXECUTION

3.01 COMPOSITION AND PROPORTIONING

A. Do not process the soil-cement until tests of the soil to be used have been completed and the exact proportion of cement required for the particular soil has been determined.

B. The quantity of water required will be the amount necessary for optimum moisture content in the compacted mixture. This quantity will vary with the nature of the soil. Determine according to ASTM D558 (AASHTO T134). The water content shall be sufficient to produce a fluid, workable mix that will flow without segregation of the aggregate or soil while being placed.

3.02 EXCAVATION AND PREPARATION OF SUBGRADE

See Section 312300.

3.03 PREPARATION OF SOIL AGGREGATE

A. Remove unsuitable material and add suitable material prior to the application of cement. Pulverize the soil to be treated for sufficient width and depth to give the compacted cross-section shown in the drawings. Pulverizing shall continue until 80% of the soil, by dry weight, exclusive of gravel, shell, or stone larger than 3/4 inch, will pass a No. 4 sieve. Manipulate the pulverized soil until the moisture in the soil does not exceed the percentage of the optimum moisture specified for the soil-cement mixture.Materials Mixed in Place

B. Form the material to be used for the soil-cement into windrows. Shape and size the windrows to uniform cross-section, flatten or slightly touch the tops thereof to receive a uniform spread of cement. The size of the windrow can be passed through a traveling mixer at each mixing operation.

C. Shape the soil to the approximate cross-section shown in the drawings, and spread the designated quantity of cement uniformly over the surface in one operation. Do not vary the rate in excess of 10% from the required rate. Add the portland cement to the windrow such that correct and uniform proportions will enter the mixer at all times.

D. Immediately after the cement has been distributed, mix it with the loose soil with a machine that will produce the specified mixture. Shape the mixture to the approximate lines and grades shown in the drawings. The mixer may be of the pugmill, auger, or transverse shaft type that mixes the materials by means of revolving paddles that lift the loose material from the subgrade.

E. The traveling mixer shall introduce water at the time of mixing through a metering device. Apply water by means that will supply a uniform ratio of water to the amount of material passing through the mixer and produce a completed mixture with uniform moisture content. Do not permit water to leak from equipment. Do not add water from any source except through the metering device. Accomplish mixing in at least two passes of the material through the mixer. Continue mixing until the resulting mixture is entirely uniform in cement content, moisture, and the distribution of coarse and fine particles. Make at least one pass before any water is added to the material.

F. Control and operate the device such that the mixer, on each pass, picks up the material to be treated and, at the same time, avoids cutting into the subgrade or picking up unmixed material on successive passes.

G. Control the lengths of sections to be mixed at any one time to permit compliance with the time requirements specified herein.

H. The mixed material shall have a uniform color reaction within standard phenolphthalein pH indicator for the full treatment depth.

I. After final mixing operations have been completed, spread and compact the mixture. The minimum depth of cement treatment is 12 inches. It is recommended the section is extended to the depth operating equipment can achieve compaction, typically 18 inches.

3.04 MIXING WATER WITH SOIL-CEMENT MATERIAL

Not more than two hours shall elapse between the time water is added to the soil-cement material and the time of completion, compaction, and trimming.

3.05 SOIL-CEMENT CONSTRUCTION

The surface of the finished cement treated base, at any point, shall not vary more than 0.1 foot above or below the grade shown in the drawings.

3.06 COMPACTING AND FINISHING

A. Compaction shall commence within 30 minutes after the mixture is placed on the grade and shall proceed continuously until completed. Complete final compaction of the mixture to the specified density within 2 hours after the application of water during the mixing operation.

B. Shape to specified lines, grades, and cross-sections. Remove imprints left by equipment. Surface shall be free of compaction planes, cracks, ridges, or loose material.

C. Compact the mixture to 95% relative compaction. After compacting and trimming, the finished subgrade or base shall conform to the required grade and cross-section.

D. At the time of compaction, the moisture content as defined in ASTM D558 shall not be below optimum or more than 2% above optimum. Moisture content shall be less than the quantity that causes the soil-cement to become unstable during compaction.

E. After the mixture is compacted, reshape the surface of the base to the required lines, grades, and cross-section and then lightly scarify to loosen imprints left by the compacting or shaping equipment until a uniform, even surface mulch of approximately 1 inch in thickness is obtained. Then thoroughly roll and compact the surface.

3.07 CONSTRUCTION JOINTS

A. At the end of each day's construction, form a straight transverse joint by cutting back into the completed work to form a true vertical face. Remove any soil-cement that is less than the full section depth.

B. Build soil-cement for large, wide areas in a series of parallel lanes of convenient length and width. Form straight longitudinal joints at the edge of each day's construction by cutting back into the completed work to form a true vertical face free of loose or shattered material.

C. Assure that no dry or unmixed material is present on the joint edge before placing soil-cement against the construction joint. Ensure that the joints are vertical and that material in the joint area is mixed and thoroughly compacted.

3.08 WEATHER LIMITATIONS

A. Do not apply soil-cement unless the temperature is at least 40°F in the shade and rising.

B. If rain falls during cement-spreading operations, stop the spreading and mix the cement already spread into the soil mass. Begin compacting immediately and continue until the soil-cement is completely compacted.

3.09 CURING

A. Keep the soil-cement continuously moist until the cure coat is applied by additional wetting before, during, and after this final shaping operation.

B. Apply a coat of diluted asphaltic emulsion to the finished surface when it is damp but free of standing water. The application rate of asphaltic emulsion must be from 0.13 to 0.25 gal/sq yd. Do not water after applying asphaltic emulsion.

C. Protect soil-cement from freezing during the curing period. Insulation blankets or straw may be used.

D. Do not open to traffic without authorization.

3.10 MICROCRACKING

During the period from 48 to 72 hours after compaction, microcrack the surface by applying three single passes with a 12-ton vibratory steel drum roller at maximum amplitude traveling from 2 to 3 mph, regardless of whether asphaltic emulsion has been applied. Microcracking may be performed before or after the application of asphaltic emulsion.

3.11 MAINTENANCE AND REPAIR

Maintain the soil-cement in good condition. Repair defects (cracks, ridges, compaction planes, inadequate thickness, or areas of unacceptable compressive strength) by removing soil-cement to the full depth, with vertical cuts, and replacing with either soil-cement or concrete (Class C per Section 030500).

3.12 FIELD-TESTING DURING PLACEMENT

Perform the following tests during placement:

A. Determine cement content, moisture content, "in-place" density, and thickness (maximum spacing of test holes: 1,000 feet). Notify the Owner's Representative immediately of any deviation from the design mix.

B. Perform a laboratory density test and prepare two compression test cylinders for each 1,000 square feet. Moist cure by seven days and test for compressive strength per ASTM D1633, Method A. Minimum acceptance standards shall be the specified compressive strengths.

3.13 THICKNESS TESTING

Test for thickness by core drilling cylinders in the in-place soil-cement. Conduct tests in the following manner:

A. Take one core for every 1,000 square feet of in-place soil-cement at a location selected by the Owner.

B. Measure the thickness of each core. The average of all cores for the project shall be at least the specified thickness. No cores shall show a thickness below the specified thickness.

C. If the cores do not meet these requirements, remove and replace the soil-cement in thin areas, cure, and retest. Limits of soil-cement replacement shall be accomplished by 1/2-inch-deep saw cutting at edges of removal.

D. Refill core holes with soil-cement or Class C concrete per Section 030500.

END OF SECTION

SECTION 321216 ASPHALT CONCRETE PAVING (CALIFORNIA)

PART 1 - GENERAL

1.01 DESCRIPTION

This section includes materials, testing, and installation of asphalt concrete pavement, aggregate base course, herbicide, prime coat, tack coat, seal coat, striping paint, and pavement markers.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Earthwork: 312300.

B. Concrete Curbs, Gutters, and Sidewalks: 321613.

1.03 SUBMITTALS

A. Submit six 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.

B. Submit manufacturer's certificate of compliance or product literature for the following materials:

1. Aggregate: Gradation.

2. Asphalt for Binder: Type and grade.

3. Prime Coat: Type and grade of asphalt.

4. Tack Coat: Type and grade of asphalt.

5. Seal Coat: Type and grade of asphalt.

6. Mixes: Conforms to job-mix formula.

7. Herbicide.

8. Paint for striping.

1.04 TESTING FOR COMPACTION

A. The Owner will test for compaction as described in Section 312300.

B. Determine the density of soil in place by the sand cone method, ASTM D1556 or by nuclear methods, ASTM D6938. Additional sand cones and densities will be required if the backfill material is visually variable. The minimum depth for the sand cone test hole shall be 12 inches. The minimum size shall be 8 inches, and size 16/30 or 10/20 silica sand shall be used. Compaction tests will be performed for each lift or layer.

C. Determine laboratory moisture-density relations of soils by ASTM D1557. If nuclear methods are used for in-place density determination, adjust the compaction test results for maximum dry density and optimum water content in accordance with ASTM D4718. This will be required for determination of percent relative compaction and moisture variation from optimum.

D. Determine the relative density of cohesionless soils by ASTM D4253 and D4254.

E. Sample backfill materials by ASTM D75.

F. "Relative compaction" is the ratio, expressed as a percentage, of the inplace dry density to the laboratory maximum dry density.

G. Compaction shall be deemed to comply with the specifications when no test falls below the specified relative compaction. The Contractor shall pay the costs of any retesting of work not conforming to the specifications.

1.05 STANDARD SPECIFICATIONS

Wherever reference is made to the Caltrans Standard Specifications, such reference shall mean the State of California, Department of Transportation Standard Specifications, 2015 edition.

PART 2 - MATERIALS

2.01 ASPHALT CONCRETE PAVING

Asphalt concrete paving shall conform to Type A HMA in Section 39 of the Caltrans Standard Specifications, having 1/2-inch-maximum medium grading.

2.02 AGGREGATE BASE COURSE

Aggregate base shall be Class 2 aggregate base, 3/4-inch-maximum size per Section 26 of the Caltrans Standard Specifications. Aggregate shall contain less than 0.25% asbestos by weight or volume.

2.03 PRIME COAT

All areas to be paved shall receive prime coat. Prime coat shall be per Section 39-4.02 in the Caltrans Standard Specifications.

2.04 TACK COAT

Tack coat shall conform with Section 94, Grade SS1h in the Caltrans Standard Specifications.

2.05 ASPHALT

Asphalt shall be Performance Grade PG 70-10 per Section 92 in the Caltrans Standard Specifications. Asphalt content in the pavement shall be 5.5% to 6.0%.

2.06 AGGREGATE FOR ASPHALT CONCRETE

Aggregate shall be Type A per Section 39-2.02 in the Caltrans Standard Specifications. Aggregate shall contain less than 0.25% asbestos by weight or volume.

2.07 SEAL COAT

Seal coat shall be fog type per Section 37 of the Caltrans Standard Specifications.

2.08 WOOD HEADERS

Size of wood headers shall be 2 inches by the depth of the asphalt concrete paving; minimum size shall be 2 inches by 4 inches. Wood shall be Douglas fir No. 1. Wood shall comply with Section 57 of the Caltrans Standard Specifications.

2.09 HERBICIDE OR WEED KILLER

Use Gallery (Isoxaben) or Surflan (Oryzalin) by Dow AgroSciences, Pre-M (Pendimethalin) by American Cyanamid Co., or equal.

2.10 PAINT FOR STRIPING AND MARKING

Provide white paint per Section 84 of the Caltrans Standard Specifications.

PART 3 - EXECUTION

3.01 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 2 inches at a point not less than 9 inches outside the limits of the excavation or the previous pavement cut, whichever is greater, and remove the additional pavement.

B. Saw cut concrete pavement, including cross gutters, curbs and gutters, sidewalks, and driveways, to a minimum depth of 1 1/2 inches at a point 1 foot beyond the edge of the excavation and remove the pavement. The concrete pavement may initially be cut at the limits of the excavation by other methods prior to removal and the saw cut made after backfilling the excavation. If the saw cut falls within 3 feet of a concrete joint or pavement edge, remove the concrete to the joint or edge.

C. Make arrangements for and dispose of the removed pavement.

D. Final pavement saw cuts shall be straight along both sides of trenches, parallel to the pipeline alignment, and provide clean, solid, vertical faces free from loose material. Saw cut and remove damaged or disturbed adjoining pavement. Saw cuts shall be parallel to the pipeline alignment or the roadway centerline or perpendicular to same.

3.02 PAVEMENT REPLACEMENT

A. Backfill, compaction, and the permanent paving, except for the final asphalt surface course, shall be complete at all times to a point not to exceed 1,300 feet behind any working heading. The final asphalt surface course shall be 2 inches thick. Place temporary striping after the base course of A.C. pavement has been completed in the same configuration as the existing permanent striping so that traffic can be returned to normal patterns. This striping shall be considered temporary and is the Contractor's responsibility to place and maintain.

3.03 INSTALLATION

Producing, hauling, placing, compacting, and finishing of asphalt concrete shall conform to Section 39 of the Caltrans Standard Specifications. Apply seal coat to all paving except open asphalt concrete.

3.04 CONNECTIONS WITH EXISTING PAVEMENT

Where new paving joins existing paving, chip the existing surfaces 12 inches back from the joint line so that there will be sufficient depth to provide a minimum of 1 inch of asphalt concrete. Dispose of waste material offsite. Tack chipped areas prior to placing the asphalt concrete. Meet lines shall be straight and the edges vertical. Paint the edges of meet line cuts with liquid asphalt or emulsified asphalt prior to placing asphalt concrete. After placing the asphalt concrete, seal the meet line by painting with a liquid asphalt or emulsified asphalt and then immediately cover with clean, dry sand.

3.05 PREPARATION OF SUBGRADE

A. This section applies to areas without soil cement base.

B. Excavate and shape subgrade to line, grade, and cross section shown in the drawings. The subgrade shall be considered to extend over the full width of the base course.

C. Scarify and cultivate the top 6 inches of subgrade when the subgrade consists of dry soils which are impervious to the penetration of water, soils which contain excessive amounts of moisture which may result in unstable foundations, soils which are nonuniform in character which may result in nonuniform relative compactions and subsequent differential settlements of finished surfaces, or when pavement is to be placed directly on the roadbed material.

D. After rough grading has been completed, when scarifying and cultivating are required, loosen the roadbed to a depth of at least 6 inches. Work the loosened material to a finely divided condition and remove rocks larger than 3 inches in diameter. Bring the moisture content to optimum by the addition of water, by the addition and blending of dry material, or by the drying of existing material. Compact the material to the specified relative compaction.

E. Uniform pervious soils that allow the immediate penetration of water or uniform impervious soils which will allow the penetration of water to a depth of at least 6 inches after the addition of a suitable wetting agent will not require scarifying and cultivating. When scarifying and cultivating are not required, bring the moisture content of the top 6 inches of the subgrade material to optimum by the addition of water at the surface, and compact the material to the specified relative compaction.

F. Remove soft material disclosed by the subgrade preparation, replace with aggregate base course material, and recompact.

G. Compact the top 6 inches of subgrade to 95% relative compaction.

H. The finished subgrade shall be within a tolerance of ±0.08 of a foot of the grade and cross-section shown and shall be smooth and free from irregularities and at the specified relative compaction.

3.06 INSTALLING WOOD HEADERS

Provide wood header at edges of paving except where paving is adjacent to concrete slabs, gutters, walks, existing paving, or structures.

3.07 PLACING AGGREGATE BASE COURSE

For sections without soil cement base, place aggregate base course to a minimum thickness of 4 inches, unless shown otherwise in the drawings. Compact to 95% relative compaction. Install in accordance with Section 26 of the Caltrans Standard Specifications.

3.08 COMPACTION OF AGGREGATE BASE AND LEVELING COURSES

Compaction and rolling shall begin at the outer edges of the surfacing and continue toward the center. Apply water uniformly throughout the material to provide moisture for obtaining the specified compaction. Compact each layer to the specified relative compaction before placing the next layer.

3.09 APPLYING HERBICIDE OR WEED KILLER

Apply weed killer or herbicide on base prior to placing pavement. Apply herbicide along with water at the rate recommended by the manufacturer to control dawny brome grass, puncture vine, and plaintain. Apply from outside of curb to opposite outside of curb and for the full width of roadways and parking areas.

3.10 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 39-4.02 in the Caltrans Standard Specifications.

3.11 PLACING TACK COAT

Apply tack coat on surfaces to receive finish pavement per Section 39-4.02 in the Caltrans Standard Specifications. Apply tack coat to metal or concrete surfaces that will be in contact with the asphalt concrete paving.

3.12 PLACING ASPHALT PAVING

Place asphalt paving to a minimum thickness of 4 inches unless otherwise shown in the drawings. Install in accordance with Section 39-6 in the Caltrans Standard Specifications.

3.13 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 D2041.

3.14 APPLYING SEAL COAT

Apply fog-type seal coat at the rate of 0.05 to 0.10 gallon per square yard.

3.15 SURFACE TOLERANCE

A. Finished grade shall not deviate more than 0.02 foot in elevation from the grade indicated in the drawings. Slopes shall not vary more than 1/4 inch in 10 feet from the slopes shown in the drawings.

B. 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.

3.16 APPLYING PAINT FOR STRIPING AND MARKING

Apply in accordance with Section 84 of the Caltrans Standard Specifications.

END OF SECTION

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SECTION 321613 CONCRETE CURBS, GUTTERS, AND SIDEWALKS

PART 1 - GENERAL

1.01 DESCRIPTION

This section includes materials and installation of concrete curbs, gutters, and sidewalks.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. General Concrete Construction: 030500.

B. Earthwork: 312300.

1.03 SUBMITTALS

Submit a report from a testing laboratory verifying that crushed rock and aggregate material contains less than 0.25% asbestos by weight or volume and conforms to the specified gradations or characteristics.

1.04 TESTING FOR COMPACTION

The Owner will test for compaction as described in Section 312300.

1.05 STANDARD SPECIFICATIONS

Wherever reference is made in this section to the State Specifications, such reference shall be understood to mean the State of California, Department of Transportation Standard Specifications.

PART 2 - MATERIALS

2.01 FORMS

A. Forms shall conform to the requirements of Section 030500. Provide stakes and bracing materials to hold forms securely in place.

B. Materials for sidewalk forms shall be 2-inch dressed lumber straight and free from defects, or standard metal forms. Where short-radius forms are required, 1-inch dressed lumber or plywood may be used. Provide stakes and bracing materials to hold forms securely in place.

2.02 CRUSHED ROCK BASE

Clean 3/4-inch and smaller crushed rock or crushed gravel, free from foreign material and containing less than 0.25% asbestos by weight or volume and conforming to Class 2 aggregate base per Section 26, State of California Standard Specifications.

2.03 EXPANSION JOINT FILLER

Expansion joint filler shall be 1/2 inch thick for curbs and 1/4 inch thick for sidewalks and shall conform to premolded joint filler in Section 030500.

2.04 CONCRETE

Concrete shall be Class A per Section 030500, except that the maximum water-cement ratio for concrete in curbs and gutters shall be 0.55.

2.05 REINFORCING STEEL

Conform to Section 030500.

2.06 CURING COMPOUND

Curing compound shall be as specified in Section 030500.

2.07 EXCAVATION AND BACKFILL

Conform to Section 312300.

PART 3 - EXECUTION

3.01 PREPARATION OF SUBGRADE

Excavate and shape subgrade to line, grade, and cross-section. Compact subgrade until the top 12 inches are compacted to 90% relative compaction. Remove all soft material disclosed by compacting and replace with crushed rock base. The finished subgrade shall be within a tolerance of ±0.08 of a foot of the grade and cross-section shown and shall be smooth and free from irregularities at the specified relative compaction. The subgrade shall be considered to extend over the full width of the base course.

3.02 PLACING CRUSHED ROCK BASE

After the subgrade for curbs, sidewalks, and roadway slabs is compacted and at the proper grade, spread crushed rock base material. Sprinkle with water and compact. Top of the compacted gravel shall be at the proper level to receive the concrete. Compact crushed rock base to 90% relative density. Curbs and sidewalks shall receive 4 inches or more of compacted crushed rock base material.

3.03 SETTING FORMS

A. Conform to Section 030500.

B. Forms on the face of the curb shall not have any horizontal joints within 7 inches of the top of the curb. Brace forms to prevent change of shape or movement in any direction resulting from the weight of the concrete during placement. Construct short-radius curved forms to exact radius. Tops of forms shall not depart from gradeline more than 1/8 inch when checked with a 10-foot straightedge. Alignment of straight sections shall not vary more than 1/8 inch in 10 feet.

3.04 CURB CONSTRUCTION

A. Construct curbs to line and grade shown. Curbs shall conform to the details shown.

B. Construct ramps in accordance with the details and locations as shown in the drawings.

C. Place preformed asphalt-impregnated expansion joints at intervals not exceeding 45 feet or less than 15 feet, at the beginning and end of curved portions of the curb, at each change in thickness

in section, at the end of curbs at buildings and other structures, and at connections to existing curbs.

D. Place contraction joints in the curb at uniform intervals not exceeding 15 feet.

E. As soon as the concrete has set sufficiently to support its own weight, remove the front form and finish exposed surfaces. Finish formed face by rubbing with a burlap sack or similar device that will produce a uniformly textured surface, free of form marks, honeycomb, and other defects. Remove and replace defective concrete at the Contractor's expense. Upon completion of the finishing, apply curing compound to exposed surfaces of the curb. Curing shall continue for a minimum of five days.

F. Upon completion of the curing period, but not before seven days have elapsed since pouring the concrete, backfill the curb with earth free from rocks 2 inches and larger and other foreign material. Tamp backfill firmly in place.

G. Finished curb shall present a uniform appearance for both grade and alignment. Remove any section of curb showing abrupt changes in alignment or grade or that is more than 1/4 inch away from its location as staked and construct new curb in its place at no additional cost to the Owner.

END OF SECTION

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SECTION 330130 LEAKAGE AND INFILTRATION TESTING

PART 1 - GENERAL

1.01 DESCRIPTION

This section includes testing of gravity pipelines, sewers, culverts, drains, and manholes not intended to be pressurized in excess of 5 psi or 12 feet head of water. Leakage test is by internal air pressure or water. Infiltration test is by measurement of rate of flow of water.

PART 2 - MATERIALS

2.01 TEST PLUGS

Inflatable and expandable type, braced to contain 5 psi over the pipe cross-section area.

2.02 PRESSURE-RELIEF VALVE

Set to limit the internal pipe test pressure to 5 psi.

PART 3 - EXECUTION

3.01 SELECTION OF ALTERNATE TEST CRITERIA

A. When more than one pipe size is included in a test section, determine the test time by the criteria of ASTM C924 for concrete pipe.

B. If the entire test section is submerged in groundwater, test for infiltration only.

3.02 PREPARATION OF THE PIPELINE

A. Prior to testing, flush and clean the pipeline to wet the pipe surface and clean out debris.

B. Plug pipe outlets, including stoppers in laterals, to resist the leakage test pressure.

3.03 LEAKAGE TEST

A. Test for leakage by means of an air test or a water test. Test each section of pipe between manholes, along with the manholes. Use the air test where the difference in elevation between the invert of the upper structure and the invert of the lower structure is more than 10 feet.

B. Test each section of pipe subsequent to the last backfill compacting operation.

3.04 WATER TEST

A. Test each section of pipe between two successive structures by closing the lower end of the pipe to be tested and the inlet pipe of the upper structure with plugs or stoppers. Fill the pipe and structure with water to a point 4 feet above the invert of the open pipe in the upper structure or to a height of 10 feet above the invert of the sewer in the lower structure, whichever gives the least hydrostatic pressure on the lower structure.

B. The total leakage shall be the decrease in volume of water in the upper structure. The leakage shall not exceed 0.025 gpm per inch of nominal diameter of pipe per 1,000 feet of pipe being tested.

C. If the leakage is greater than allowed, overhaul the pipe and, if necessary, replace and re-lay until the joints and pipe comply with this test. Complete tests before trench is paved.

3.05 AIR TEST

A. Conduct air tests per the following standards:

Pipe Material	Specification Section	ASTM Specification
HDPE	333118	F1417, Table 1

B. Test each section of pipe between two successive manholes by plugging pipe outlets with test plugs. Add air slowly until the internal pressure is raised to 4.0 psig. The compressor used to add air to the pipe shall have a blowoff valve set at 5 psig so that the internal pressure in the pipe never exceeds 5 psig. Maintain the internal pressure of 4 psig for at least two minutes to allow the air temperature to stabilize, then disconnect the air supply and allow the pressure to decrease to 3.5 psig. Measure the time in minutes that is required for the internal air pressure to drop from 3.5 psig to 2.5 psig. Compare the results with the values tabulated in the referenced ASTM specifications in paragraph A above.

C. If the pressure drop from 3.5 psig to 2.5 psig occurs in less time than the specified values, overhaul the pipe and, if necessary, replace and re-lay the pipe until the joints and pipe hold satisfactorily under this test.

D. Guard against the sudden expulsion of a poorly installed plug or a plug that is partially deflated.

3.06 MANHOLE TEST

A. Watertightness of manholes may be tested in connection with hydrostatic tests of the pipeline or at the time the manhole is completed and backfilled. Repair any leakage as a result of testing.

B. Fill the manhole with water to an elevation 1 foot below the bottom of the cone section with a maximum water depth of 20 feet. Where the manholes are tested with the pipeline, no additional leakage will be allowed above that for the main line pipe.

C. Where a separate manhole leakage test is performed or requested by the Owner's Representative, plug inlets and outlets with stoppers or plugs and fill the manhole to the limits indicated above. The maximum allowable drop in the water surface shall be 1/2 inch for each 15-minute period of testing.

3.07 CORRECTION OF OBSERVED LEAKS

Even though the infiltration is less than the maximum acceptable, stop any individual leaks that may be observed.

3.08 INSPECTION BY CONTRACTOR FOR DAMAGED OR DEFECTIVE PIPE IN PLACE

A. After backfilling and pavement replacement is complete and upon completion of the air test or infiltration test, inspect the pipe for damage and other defects by means of closed circuit

television (CCTV). Television inspection shall be in accordance with the Standard Specifications for Public Works Construction (SSPWC), Section 500-1.1.5.

B. Schedule the inspection in advance with the Owner's Representative.

C. If the CCTV inspection indicates any defects, excavate and repair or replace the faulty materials and construction and restore the work and the damage to work of others.

END OF SECTION

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SECTION 333118 HDPE PROFILE WALL PIPE

PART 1 - GENERAL

1.01 DESCRIPTION

This section includes materials, testing, and installation of HDPE profile wall pipe, fittings, and appurtenances conforming to ASTM F894. The pipe to be installed is identified in the drawings by nominal diameter of pipe in inches followed by the abbreviation HDPE.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Earthwork: 312300.

B. Trenching, Backfilling, and Compaction: 312316.

C. Leakage and Infiltration Testing: 330130.

1.03 SUBMITTALS

A. Submit shop drawings in accordance with the Special Provisions.

B. Provide an affidavit that the pipe complies with ASTM F894 and that the gasket conforms to ASTM F477. Submit copies of the following manufacturer-required tests conducted on project pipe furnished:

1. Ring Stiffness Constant (RSC) qualification tests.

2. RSC quality control testing for the pipe supplied.

3. Flattening resistance of pipe.

4. Joint tightness per ASTM D3212.

5. Laboratory tests of gaskets per ASTM F477.

6. Record of additional tests after test sample failure.

7. Laboratory test confirming base materials used in the manufacture of the pipe, per ASTM D1248 or D3350.

8. Laboratory tests of hydrostatic design basis per ASTM D2837, for base materials used in manufacture of the pipe.

C. The HDPE pipe manufacturer shall certify that pipe provided meets all requirements of this specification. Provide a copy of test results indicating certification with a lot or shipment. Failure to provide such test results can be cause for rejection of the lot or shipment.

D. Submit manufacturer's catalog data, outline drawings, material description, and details of connection to structures and other types and sizes of pipe. Submit calculations for pipe RSC and estimated installed short- and long-term deflection. "Long term" is defined as one year after installation of backfill.

E. The HDPE pipe manufacturer shall submit a written quality control procedure. In general, the manufacturer shall follow the "In-Plant Quality Control Program for 14-Inch and Larger Diameter Polyethylene Pipe" appearing in Annex A4 of the latest edition of ASTM D2513.

1.04 INSPECTION

A. The HDPE pipe manufacturer shall permit access of the Owner's Representative to the manufacturer's facilities to inspect manufacturing facilities. Access shall be permitted at any time.

B. The Owner reserves the right to inspect each shipment upon delivery. If, in any lot or shipment, there are items not meeting the specifications, that lot may be rejected at the option of the Owner. A lot shall mean all material covered by a single item on the order. The fact that a product has been successfully inspected or that performance tests were successfully performed by the Owner shall not relieve manufacturer of responsibility in the case of later discovery of any manufacturing material flaws or defects.

PART 2 - MATERIALS

2.01 PIPE

A. HDPE pipe and fittings shall have a minimum RSC of 160. The pipe shall conform to ASTM F894. The pipe shall be ribbed for stiffness and shall have integral bell-and-spigot joints. The pipe shall be homogeneous in structure; uniform in color, density, and physical properties; white in color; UV stabilized; impervious to moisture; free from cracks, broken extremities, holes, foreign inclusions, or other imperfections. Clean rework material generated by the manufacturer's own production work may be used in the process, provided it makes up less than 10% of the total material used and the pipe produced meets the requirements of this specification.

B. HDPE pipe shall be externally ribbed and shall be manufactured by the continuous winding of extruded HDPE material upon a mandrel to produce the nominal diameter. Ribs shall be completely fused to the pipe wall. The pipe ends shall be square with the longitudinal axis, and bells shall be true, circular, and concentric with the barrel of the pipe.

2.02 QUALITY CONTROL

A. The following imperfections in a pipe or special fitting will be considered injurious and cause for rejection without consideration:

1. Any cracks in the pipe barrel, bell, or spigot;

2. Any indication of a nonhomogeneous mixture;

3. Any deviation greater than 1/16 inch per lineal foot in any 8-foot length;

4. Any broken or damaged areas on the barrel, bell, spigot, or gasket; or

5. Any signs of a welding failure or similar manufacturing defect.

B. Pipe and special fittings shall comply with the requirements of these specifications.

2.03 IDENTIFICATION AND MARKING

Mark each length of pipe according to ASTM F894.

2.04 FACTORY TESTS

A. Before being used in any work under these specifications, pipe shall be subjected to and shall meet the requirements of the following tests specified in ASTM F894:

1. RSC qualification of pipe barrel and pipe bells,

2. RSC quality control,

3. Flattening, and

4. Joint tightness.

B. Take samples for each of the tests listed above as follows:

1. One length for each class of project pipe from the first 10% of the lengths manufactured, one at approximately 50% of manufacture, and one from the final 15% of the pipe manufactured, or

2. One length from each 1,200 feet of each class of project pipe,

whichever produces the greater number of test specimens. When any sample fails to meet a specified test requirement, perform additional tests to determine which items are acceptable of those produced from the same equipment as of the last favorable test. Reject pipe that fails to meet any test requirement.

C. Notify the Owner's Representative a minimum of two weeks in advance of the date, time, and place of testing of project pipe. All costs of furnishing, transporting, and handling the pipe for testing and of conducting the tests shall be borne by the Contractor.

2.05 JOINTS

A. Provide the pipe with integral bell-and-spigot joint rings designed to be field joined using an elastomeric gasket. The RSC of any bell-and-spigot joint, when assembled, shall be at least equal to the RSC of the adjacent pipe.

B. Assemble a minimum of three bell-and-spigot joints for each size and class of pipe, and determine the RSC of joint assembly using the same test procedures as for the pipe shell.

C. Confirm the integrity of the joint assembly in accordance with ASTM D3212 with an imposed deflection of 5% of the diameter.

2.06 GASKETS

A. Gaskets shall be molded or produced from an extruded shape approved by the pipe manufacturer and spliced into a circular form. The basic polymer shall not be natural rubber. Gaskets shall comply with the requirements of ASTM F477. Store gaskets in original shipping containers, protected from direct sunlight, and remove only as necessary for installation.

B. The lubricant used for pipe joint assembly shall be as recommended by the gasket manufacturer and have no detrimental effect on the gasket or pipe.

2.07 MANDREL FOR FIELD TESTING OF PIPE DEFLECTION

A. The mandrel shall be a rigid, nonadjustable, odd-numbering-leg (nine legs minimum) mandrel having an effective length not less than its nominal diameter.

B. The mandrel shall have a minimum diameter at any point along the full length as follows:

1. Base inside diameter as shown in Table X2.1 in ASTM F894.

2. Minimum mandrel diameter equals 97% of the base inside diameter for net short-term deflection.

3. Minimum mandrel diameter equals 95.5% of the base inside diameter for net long-term deflection.

C. The mandrel shall be fabricated of steel; fitted with pulling rings at each end; stamped or engraved on some segment other than a runner indicating the pipe material specification, nominal size, and mandrel outside diameter (e.g., PVC, F 894-18"-mandrel actual diameter); and furnished in a carrying case labeled with the same data as stamped or engraved on the mandrel.

PART 3 - EXECUTION

3.01 DELIVERY AND TEMPORARY STORAGE OF PIPE

A. Ship, store, and place the pipe at a storage yard or installation site, supporting the pipe uniformly on flat, level ground with no rocks or other objects under the pipe. Avoid scratching or damaging the pipe. Do not stack higher than two rows or with weight on bells. To minimize out-of-roundness and curvature due to thermal expansion, cover to protect from sunlight. Alternatively, pipe may be stored in a shaded area.

3.02 HANDLING PIPE IN TRENCHES

A. See Section 312316.

B. Do not install pipe that does not meet the tolerances specified in these specifications.

C. Install in accordance with ASTM D2321, except as modified herein.

D. Lay pipe without break, upgrade from structure to structure, with the bell ends of the pipe facing upgrade. Lay pipe in such a manner as to form a close, concentric joint with the adjoining pipe and prevent offsets of the flow line.

E. Install the gasket in accordance with the pipe manufacturer's instructions using the materials, lubricants, and equipment recommended by said manufacturer.

F. Backfill pipe zone immediately after pipe has been bedded and joined. Prevent movement of pipe while backfilling. Carefully place the material around the pipe so that the pipe barrel is completely supported and that no voids or uncompacted areas are left beneath the pipe or in between stiffening ribs. Backfill material placed under the haunches shall be shovel sliced. Use particular care in placing material on the underside of the pipe to prevent lateral movement during subsequent backfilling. Limit unbackfilled, installed pipe to five sections maximum. Avoid extended exposure to sun.

G. Backfill materials in the zone between the trench bottom and to a point 12 inches above the top of the pipe shall be per Section 312316.

H. Compact by means of vibratory equipment or by hand tamping. Apply backfill in layers having a maximum thickness of 8 inches. Do not add successive layers unless the previous layer is compacted to 90% relative compaction. Compact material placed within 12 inches of the outer surface of the pipe by hand tamping only.

I. Monitor pipe deflections during compaction, and limit the total elongation of the vertical diameter of the pipe to 1.5% of the reference inside diameter. Deflection measurements shall be taken when the pipe is backfilled to its crown.

J. Do not use sheepsfoot rollers or equipment with similar loads or AASHTO H 20 wheel loads until a minimum of one pipe diameter of backfill has been placed over the top of the pipe.

3.03 SAGS OR STANDING WATER IN PIPE

A. Sags or standing water in pipe shall meet the following criteria:

Pipe Slope	Complies With Specifications	Does Not Comply With Specs Resulting in No Payment	Does Not Comply With Specs and Reconstruction is Required
Less than 0.4%	Less than 1/4-inch sag	Greater than 1/2-inch sag	Greater than 1-inch sag
Less than or equal to 0.7%	Less than 1/2-inch sag	Greater than 1-inch sag	Greater than 2-inch sag
Greater than 0.7%	Less than 1-inch sag	Greater than 1-1/2-inch sag	Greater than 3-inch sag

B. If standing water depth in the sag exceeds the value listed under "No Payment," then to compensate for anticipated higher than average pipeline operation and maintenance cost, no payment will be made for the installed portion of pipe. The nonpayment amount shall include all construction costs including such items as excavation, pipe installation, backfilling, and resurfacing for the full length of standing water. Due to unacceptably high operation and maintenance costs and poor system reliability, pipeline portions with sag depths exceeding those listed for "Reconstruction is Required" will be rejected. Reconstruction of the length of standing water plus 20 feet on each side of the standing water will be required. Remove and do not reuse damaged pipe.

3.04 ASSEMBLY OF PIPE JOINT

A. The spigot and bell or bell coupling shall be dirt free and slide together without displacing the rubber gasket ring.

B. If the pipe is not perfectly round, lay the bell end of the pipe with the elongated diameter in the vertical position for joining to the matching elongated spigot of the adjacent pipe. Do not use pipe sections that have maximum inside diameters greater than allowed in ASTM F894.

C. Insert the gasket into the groove in the spigot just before joining the pipes. First clean the groove. Observe the correct direction of the shaped gasket ring. Slip a screwdriver or other smooth object under the gasket and run it around the outside circumference of the pipe spigot two or three times to equalize the tension in the gasket. Check that the gasket ring is completely seated.

D. Lubricate the spigot over the taper and up to the full insertion mark with the lubricant supplied by the pipe manufacturer. If the lubricated pipe end touches dirt, clean the pipe end and reapply lubricant.

E. Insert the spigot into the bell and force it slowly and carefully into position.

F. Check that the gasket has not left the groove during assembly by passing a feeler gauge around the completed joint. If the gasket has left the groove, then disassemble the joint and replace the gasket.

3.05 INSTALLING MANHOLES

A. Construct manholes in accordance with the design, size, and details and at the locations shown in the drawings.

B. Manhole locations are fixed and cannot be moved to accommodate pipe manufacturing or laying. If necessary, provide special pipe lengths to meet manhole location requirements.

C. Construct manholes without steps unless otherwise shown in the drawings.

D. Perform trench excavation and backfill in accordance with Section 312316.

3.06 CONNECTION TO STRUCTURES, MANHOLES, AND ENCASEMENTS

Provide leak-free connections of HDPE pipe to structures, manholes, and encasements. Cut a core wall closure pipe, as shown in the drawings, to the required length with "Tomahawk" feature and insert in the structure or encasement as shown. Align the bell and seat as for bell-and-spigot joint. Grout in place. As an alternative, furnish and install standard HDPE pipe and grout in place as shown in the drawings. Backfill around stub outs and closure pieces as required for the pipe zone. Refer to the connection details shown in the drawings.

3.07 FIELD TESTING OF PIPE DEFLECTION

A. The net short-term (15 days after backfill) deflection shall not exceed 3% of the reference inside diameter of the pipe. The net long-term (one year after backfill) deflection shall not exceed 4.5% of the reference inside diameter of the pipe. The reference diameter for both the elongations and the net short-term and long-term deflections shall be the measured vertical diameter within the tolerances of ASTM F894 as the pipe lays in the trench, prior to any backfilling. Perform a deflection test of the pipe by use of a nine-point mandrel pulled through the pipe. The pipe shall pass both the physical measurement of deflections and the mandrel testing. If the specified deflections are exceeded, remove and reinstall the pipes. The Contractor may, at his option, strut the pipe during installation in order to achieve the deflection and tolerance criteria specified. No struts or other temporary supports shall be in place at the time measurements are taken.

B. Measure each pipe section at the quarter-length, mid-length, and three-quarter length. The average inside diameter tolerance, out-of-roundness, and all deflection criteria shall be met at all measured locations. Uncover any overdeflected pipe and, if not damaged, reinstall. Remove damaged pipe from the site. Any pipe subjected to any method or process other than removal, which attempts, even successfully, to reduce or cure any overdeflection, shall be uncovered, removed from the site, and replaced with new pipe.

C. In order to make all elongation deflection tests of the installed pipe, the Contractor shall furnish all equipment and manpower required to make the section to be tested comply with CAL/OSHA requirements for entering and conducting such test. Equipment shall include, but not be limited to, blowers, ladders, harnesses for personnel, companion personnel, lighting (underground

inspection with possible wet conditions), and assistance to the Owner's Representative in making such measurements. All costs associated with furnishing equipment and personnel shall be included in the contract unit price for the item to which it is appurtenant.

D. All costs incurred by the Contractor attributable to mandrel and deflection testing, including any delays, shall be borne by the Contractor at no cost to the Owner.

E. Eleven months after the project has been accepted as complete, the Contractor shall return to the project and conduct a mandrel test as stated above using the same approved type of mandrel as used in the short-term deflection testing. Any deflections greater than 4.5% of the average inside diameter after 11 months after acceptance of the work will require the Contractor to either repair or dig up and replace. Correction by the use of a re-rounder is unacceptable and shall not be allowed.

3.08 FIELD TESTING FOR LEAKAGE AND INFILTRATION

A. The completed HDPE sewer pipes shall be watertight. Test each section of HDPE sewer between two successive structures or encasements for leakage and for infiltration per Section 330130.

B. Test each section of sewer after the last backfill compaction operation where, in the opinion of the Owner's Representative, heavy compaction equipment or any of the operations of the Contractor or others may have damaged or affected the required watertight integrity of the pipe, structure, and appurtenances. Provide all material required for the tests and bear all costs in connection therewith. Perform tests in the presence of the Owner's Representative.

C. If the leakage or infiltration rate, as shown by the tests specified herein, is greater than the amount specified, repair the pipe joints or, if necessary, remove and relay the pipe. The sewer will not be considered acceptable until the leakage and infiltration rate, as determined by test, is less than the allowable.

1. Leakage Test: The Contractor, at his option, shall air test or water test for leakage. Test per Section 330130.

2. Test for Infiltration: See Section 330130.

3.09 PLUGS

Plugs and joints for plugs shall withstand the internal pressure of the leakage and infiltration test; however, joints shall be made in such a manner that they may be removed without injury to the socket. Plugs shall be approved by the manufacturer prior to review by the Owner.

3.10 WATERTIGHTNESS OF MANHOLES

Manholes and appurtenances shall be watertight and free from infiltration. The adequacy of manholes and appurtenances as to watertightness shall be determined when ordered by the Owner by filling the manhole with water. When testing of the manholes is ordered, said test may be made in connection with the hydrostatic test of the pipeline. Any evidence of leakage as a result of testing shall be repaired to the satisfaction of the Owner at the sole expense of the Contractor. All costs of making and testing manholes for watertightness shall be included in the various contract unit prices, and no additional allowance will be made therefor.

END OF SECTION

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SECTION 400500 GENERAL PIPING REQUIREMENTS

PART 1 - GENERAL

1.01 DESCRIPTION

This section describes the general requirements for selecting piping materials; selecting the associated bolts, nuts, and gaskets for flanges for the various piping services in the project; and miscellaneous piping items.

1.02 SUBMITTALS

A. Submit shop drawings in accordance with the Special Provisions.

B. Submit affidavit of compliance with referenced standards (e.g., AWWA, ANSI, ASTM, etc.).

C. Submit certified copies of mill test reports for bolts and nuts, including coatings if specified. Provide recertification by an independent domestic testing laboratory for materials originating outside of the United States.

D. Submit manufacturer's data sheet for gaskets supplied showing dimensions and bolting recommendations.

1.03 DEFINITIONS OF BURIED AND EXPOSED PIPING

A. Buried piping is piping buried in the soil, commencing at the wall or beneath the slab of a structure. Where a coating is specified, provide the coating up to the structure wall. Piping encased in concrete is considered to be buried. Do not coat encased pipe.

B. Exposed piping is piping in any of the following conditions or locations:

1. Above ground.

2. Inside buildings, vaults, or other structures.

3. In underground concrete trenches or galleries.

1.04 PIPING SERVICE

Piping service is determined by the fluid conveyed, regardless of the pipe designation. For example, pipes designated "Air Low Pressure," "Air High Pressure," and "Air" are all considered to be in air service.

PART 2 - MATERIALS

2.01 MATERIALS SELECTION AND ALTERNATIVE MATERIALS

The drawings may show alternative piping materials for certain services. In such cases, the same pipe material shall be used for all pipe sizes in all locations for the given piping service. Do not intermix piping materials.

2.02 THREAD FORMING FOR STAINLESS STEEL BOLTS

Form threads by means of rolling, not cutting or grinding.

2.03 BOLTS AND NUTS FOR FLANGES FOR STEEL AND DUCTILE-IRON PIPING

A. Bolts and nuts for Class 125 or 150 flanges (including AWWA C207, Class D) located indoors, ASTM A307, Grade B, hot-dipped galvanized per ASTM F2329.

B. Bolts and nuts for buried or submerged Class 125 or 150 flanges and Class 125 or 150 flanges located outdoors above ground or in vaults and structures shall be Type 304 stainless steel conforming to ASTM A193, Grade B8 for bolts and ASTM A194, Grade 8M for nuts.

C. Provide washers for each nut. Washers shall be of the same material as the nuts.

2.04 LUBRICANT FOR STAINLESS STEEL BOLTS AND NUTS

Lubricant shall be chloride free and shall be RAMCO TG-50, Anti-Seize by RAMCO, Specialty Lubricants Corporation Husky™ Lube O'Seal, or equal.

2.05 GASKETS FOR FLANGES FOR STEEL PIPING IN WATER SERVICE

Gaskets for flat face and raised face flanges shall be, NSF 61 certified, 1/8-inch thick and shall be one of the following nonasbestos materials:

A. EPDM rubber with a Shore "A" hardness of 75 to 85. Gaskets shall be suitable for a pressure of 200 psi at a temperature of 180°F. Products: Garlock Rubber Sheet Style 98206 or equal.

2.06 GASKETS FOR FLANGES FOR PVC PIPING

Gaskets for flanged joints shall be NSF 61 certified, full faced, 1/8-inch thick, having a hardness of 50 to 70 durometer A. Gasket material shall be EPR. Products: Garlock Stress Saver XP or equal.

PART 3 - EXECUTION

3.01 INSTALLING PIPE SPOOLS IN CONCRETE

Install pipes in walls and slabs before placing concrete. See Section 030500.

3.02 RAISED FACE AND FLAT FACE FLANGES

Where a raised face flange connects to a flat-faced flange, remove the raised face of the flange.

3.03 INSTALLING ABOVEGROUND OR EXPOSED PIPING

A. Provide pipe hangers and supports as detailed in the drawings.

B. Install pipe without springing, forcing, or stressing the pipe or any adjacent connecting valves or equipment.

3.04 INSTALLING FLANGED PIPING

A. Set pipe with the flange bolt holes straddling the pipe horizontal and vertical centerline. Install pipe without springing, forcing, or stressing the pipe or any adjacent connecting valves or equipment. Before bolting up, align flange faces to the design plane within 1/16 inch per foot measured across any diameter. Align flange bolt holes within 1/8-inch maximum offset.

B. Inspect each gasket to verify that it is the correct size, material, and type for the specified service and that it is clean and undamaged. Examine bolts or studs, nuts, and washers for defects such as burrs or cracks and rust and replace as needed.

C. Clean flanges by wire brushing before installing flanged fittings. Clean flange bolts and nuts by wire brushing, lubricate carbon steel bolts with oil and graphite, and tighten nuts uniformly and progressively.

D. Bolt lengths shall extend completely through their nuts. Any that fail to do so shall be considered acceptably engaged if the lack of complete engagement is not more than one thread.

E. Do not use more than one gasket between contact faces in assembling a flanged joint.

F. Tighten the bolts to the manufacturer’s specifications, using the recommended cross bolt pattern in multiple steps of increasing torque, until the final torque requirements are achieved. Do not over torque.

G. If flanges leak under pressure testing, loosen or remove the nuts and bolts, reset or replace the gasket, reinstall or retighten the bolts and nuts, and retest the joints. Joints shall be watertight.

3.05 INSTALLING BLIND FLANGES

A. At outlets not indicated to be connected to valves or to other pipes and to complete the installed pipeline hydrostatic test, provide blind flanges with bolts, nuts, and gaskets.

B. Coat the inside face of blind flanges per Section 099000, System No. 7.

3.06 INSTALLING GROOVED-END PIPING

A. Install grooved-end pipe and fittings in accordance with the coupling manufacturer's recommendations and the following.

B. Clean loose scale, rust, oil, grease, and dirt from the pipe or fitting groove before installing coupling. Apply the coupling manufacturer's gasket lubricant to the gasket exterior including lips, pipe ends, and housing interiors.

C. Fasten coupling alternately and evenly until coupling halves are seated. Use torques as recommended by the coupling manufacturer.

3.07 INSTALLATION OF STAINLESS STEEL BOLTS AND NUTS

Prior to assembly, coat threaded portions of stainless steel bolts and nuts with lubricant.

END OF SECTION

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SECTION 400515 PRESSURE TESTING OF PIPING

PART 1 - GENERAL

1.01 DESCRIPTION

This section specifies the cleaning and hydrostatic and leakage testing of pressure piping for water distribution and transmission mains.

1.02 RELATED WORK SPECIFIED ELSEWHERE

Manual, Check, and Process Valves: 400520.

1.03 SUBMITTALS

A. Submit shop drawings in accordance with the Special Provisions.

B. Submit test bulkhead locations and design calculations, pipe attachment details, and methods to prevent excessive pipe wall stresses.

C. Submit test records to the Owner's Representative upon completion of the testing.

1.04 TEST PRESSURES

Test pressures for the various services and types of piping are shown in the subsection on “Test Pressure and Test Fluids” in Part 3.

1.05 TESTING RECORDS

Provide records of each piping installation during the testing. These records shall include:

A. Date and times of test.

B. Identification of pipeline or pipeline section tested or retested.

C. Identification of pipeline material.

D. Identification of pipe specification.

E. Test fluid.

F. Test pressure at low point in pipeline or pipeline section.

G. Remarks: Leaks identified (type and location), types of repairs, or corrections made.

H. Certification by Contractor that the leakage rate measured conformed to the specifications.

PART 2 - MATERIALS

2.01 VENTS AND DRAINS FOR ABOVEGROUND PIPING

Install vents on the high points of aboveground piping, whether shown in the drawings or not. Install drains on low points of aboveground piping, whether shown in the drawings or not. Provide a valve at each vent or drain point. Valves shall be 3/4 inch for piping 3 inches and larger and 1/2 inch for piping smaller than 3 inches. Valves shall be as specified in Section 400520, Type 100 unless otherwise shown in the drawings.

2.02 MANUAL AIR-RELEASE VALVES FOR BURIED PIPING

Provide temporary manual air-release valves at test bulkheads for pipeline test. Construct the pipe outlet in the same manner as for a permanent air valve and after use, seal with a blind flange, pipe cap, or plug and coat the same as the adjacent pipe.

2.03 TEST BULKHEADS

Design and fabricate test bulkheads per Section VIII of the ASME Boiler and Pressure Vessel Code. Materials shall comply with Part UCS of said code. Design pressure shall be at least 2.0 times the specified test pressure for the section of pipe containing the bulkhead. Limit stresses to 70% of yield strength of the bulkhead material at the bulkhead design pressure. Include air-release and water drainage connections.

2.04 TESTING FLUID

A. Testing fluid shall be water

B. For potable water pipelines, obtain and use only potable water for hydrostatic testing.

C. Submit request for use of water from waterlines of Owner 48 hours in advance.

D. The Contractor may obtain the water from the Owner at the Owner's rate of charges.

2.05 TESTING EQUIPMENT

Provide calibrated pressure gauges, pipes, bulkheads, pumps, chart recorder, and meters to perform the hydrostatic testing.

PART 3 - EXECUTION

3.01 TESTING PREPARATION

A. Pipes shall be in place, backfilled, and anchored before commencing pressure testing.

B. Conduct pressure tests on exposed and aboveground piping after the piping has been installed and attached to the pipe supports, hangers, anchors, expansion joints, valves, and meters.

C. For buried piping, the pipe may be partially backfilled and the joints left exposed for inspection during an initial leakage test. Perform the final pressure test, however, after completely backfilling and compacting the trench.

D. Provide any temporary piping needed to carry the test fluid to the piping that is to be tested. After the test has been completed and demonstrated to comply with the specifications, disconnect and

remove temporary piping. Do not remove exposed vent and drain valves at the high and low points in the tested piping; remove any temporary buried valves and cap the associated outlets. Plug taps or connections to the existing piping from which the test fluid was obtained.

E. Provide temporary drain lines needed to carry testing fluid away from the pipe being tested. Remove such temporary drain lines after completing the pressure testing. Pipes shall remain full after testing.

F. Prior to starting the test, the Contractor shall notify the Owner's Representative.

3.02 CLEANING

A. Before conducting hydrostatic tests, flush pipes with water to remove dirt and debris. Maintain a flushing velocity of at least 3 fps for water testing. Flush pipes for time period as given by the formula

$$T = \frac{2L}{3}$$

in which:

T = flushing time (seconds)
L = pipe length (feet)

3.03 TESTING AND DISINFECTION SEQUENCE FOR POTABLE WATER PIPING

A. Perform required disinfection after hydrostatic testing, except when pipeline being tested is connected to a potable waterline.

B. Locate and install test bulkheads, valves, connections to existing pipelines, and other appurtenances in a manner to provide an air gap separation between existing potable water pipelines and the pipeline being tested. Disinfect water and pipeline being tested before hydrostatic testing when connected to a potable waterline.

3.04 LENGTH OF TEST SECTION FOR BURIED PIPING

The maximum length of test section for buried pipe of 12 inches or smaller in diameter is 3,500 feet; for buried pipe larger than 12 inches, 1 mile. Provide intermediate test bulkheads where the pipeline length exceeds these limits.

3.05 INITIAL PIPELINE FILLING FOR HYDROSTATIC TESTING

Maximum rate of filling shall not cause water velocity in pipeline to exceed 1 fps. Filling may be facilitated by removing automatic air valves and releasing air manually.

3.06 TESTING NEW PIPE WHICH CONNECTS TO EXISTING PIPE

Prior to testing new pipelines that are to be connected to existing pipelines, isolate the new line from the existing line by means of test bulkheads, spectacle flanges, or blind flanges. After successfully testing the new line, remove test bulkheads or flanges and connect to the existing piping.

3.07 HYDROSTATIC TESTING OF ABOVEGROUND OR EXPOSED PIPING

A. Open vents at high points of the piping system to purge air while filling the pipe with water. Venting during system filling may also be provided by temporarily loosening flanges.

B. Subject the piping system to the test pressure indicated. Maintain the test pressure for a minimum of four hours. Examine joints, fittings, valves, and connections for leaks. The piping system shall show zero leakage or weeping. Correct leaks and retest until zero leakage is obtained.

3.08 HYDROSTATIC TESTING OF BURIED PIPING

A. Where any section of the piping contains concrete thrust blocks or encasement, do not perform the pressure test until at least 10 days after placing the concrete. When testing mortar-lined or PVC piping, fill the pipe to be tested with water and allow it to soak for at least 48 hours to absorb water before conducting the pressure test.

B. Apply and maintain the test pressure by means of a positive displacement hydraulic force pump.

C. Maintain the test pressure for four hours by restoring it whenever it falls an amount of 5 psi.

D. After the test pressure is reached, use a meter to measure the additional water added to maintain the pressure. This amount of water is the loss due to leakage in the piping system. The allowable leakage volume is defined by the formula

$$L = \frac{HND(P)^{1/2}}{C}$$

in which:

L = allowable leakage (gallons)
H = specified test period (hours)
N = number of rubber-gasketed joints in the pipe tested
D = diameter of the pipe (inches)
P = specified test pressure (psig)
C = 7,400

E. The allowable leakage for buried piping having threaded, brazed, or welded (including solvent welded) joints shall be zero.

F. Repair and retest any pipes showing leakage rates greater than that allowed in the above criteria.

3.09 REPETITION OF TEST

If the actual leakage exceeds the allowable, locate and correct the faulty work and repeat the test. Restore the work and all damage resulting from the leak and its repair. Eliminate visible leakage.

3.10 BULKHEAD AND TEST FACILITY REMOVAL

After a satisfactory test, remove the testing fluid, remove test bulkheads and other test facilities, and restore the pipe coatings.

3.11 TEST PRESSURE AND TEST FLUIDS

A. Testing and design pressures (psig) shall be as listed below:

Pipe Service	Pipe Material	Testing Fluid	Design Pressure	Test Pressure
Recycled water	PVC	Recycled water	75	150

END OF SECTION

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SECTION 400520 MANUAL, CHECK, AND PROCESS VALVES

PART 1 - GENERAL

A. Description

This section includes materials, testing, and installation of manually operated valves, check valves, and process valves including gate, butterfly, ball, globe, and gauge valves.

B. Related Work Specified Elsewhere

1. Fusion-Bonded Epoxy Linings and Coatings: 099761.

2. Polyethylene Sheet Encasement (AWWA C105): 099754.

3. Fire Hydrants: City of Turlock Standard Specifications.

4. General Piping Requirements: 400500.

5. Pressure Testing of Piping: 400515.

C. Submittals

1. Submit shop drawings in accordance with the Special Provisions.

2. Submit manufacturer's catalog data and detail construction sheets showing all valve parts. Describe each part by material of construction, specification (such as AISI, ASTM, SAE, or CDA), and grade or type.

3. Show valve dimensions including laying lengths. Show port sizes. Show dimensions and orientation of valve actuators, as installed on the valves. Show location of internal stops for gear actuators. State differential pressure and fluid velocity used to size actuators. For worm-gear actuators, state the radius of the gear sector in contact with the worm and state the handwheel diameter.

4. Show valve linings and coatings. Submit manufacturer's catalog data and descriptive literature.

5. Submit a report verifying that the valve interior linings and exterior coatings have been tested for holidays and lining thickness. Describe test results and repair procedures for each valve. Do not ship valves to project site until the reports have been returned by the Owner's Representative and marked "Resubmittal not required."

6. For butterfly and eccentric plug valves, show the clear diameter or size of the port. Show the actual area of the port as a percentage of the area as calculated for the nominal valve size.

PART 2 - MATERIALS

A. General

For buried locations, valves with mechanical joint ends may be substituted for the flanged ends specified provided the mechanical joint ends are compatible with the pipe ends.

B. Valve Actuators

1. Provide lever or wrench actuators for exposed valves 6 inches and smaller. For larger valves, provide handwheels.

2. Where manually operated valves (size 4 inches and larger) are installed with their centerlines more than 5 feet 9 inches above the floor, provide chainwheel and guide actuators.

3. Provide 2-inch AWWA operating nuts for buried and submerged valves.

4. Provide enclosed gear actuators on butterfly, ball, and plug valves 8 inches and larger, unless electric valve actuators are shown in the drawings. Gear actuators for valves 8 inches through 20 inches shall be of the worm and gear, or of the traveling nut type. Gear actuators for valves 24 inches and larger shall be of the worm and gear types.

5. Traveling nut and worm and gear actuators shall be of the totally enclosed design so proportioned as to permit operation of the valve under full differential pressure rating of the valve with a maximum pull of 80 pounds on the handwheel or crank. Provide stop limiting devices in the actuators in the open and closed positions. Actuators shall be of the self-locking type to prevent the disc or plug from creeping. Design actuator components between the input and the stop-limiting devices to withstand without damage a pull of 200 pounds for handwheel or chainwheel actuators and an input torque of 300 foot-pounds for operating nuts when operating against the stops.

6. Design actuators on buried valves to produce the required torque on the operating nut with a maximum input of 150 foot-pounds.

7. Valve actuators, handwheels, or levers shall open by turning counterclockwise.

C. Cast-Iron Valve Boxes for Buried Valves

1. Valve boxes shall be two-piece sliding type, cast iron, with extension shafts. Units shall be as manufactured by Tyler Pipe, Geneco, Star Pipe Products, or equal. Extension pipes shall be as shown in the drawings.

2. Coat buried cast-iron pieces per Section 099000, System No. 21.

D. Indicator Posts

Indicator posts for buried gate valves in fire protection service shall be UL listed, FM approved for use on valves of sizes 4 through 12 inches. Provide a target or sign visible through a window on both sides of the post that indicates the open or shut position of the gate valve. Working parts shall be fully enclosed for weather protection. Body shall be cast or ductile iron. Provide post extension if trench is deeper than can be served by manufacturer's standard post. Coat buried portion of indicator posts per Section 099000, System No. 21. Products: Nibco NIP-1, Stockham Fig. G-951, or equal.

E. Extension Stems for Buried and Submerged Valve Actuators

1. Where the depth of the valve is such that its centerline is more than 4 feet below grade, provide operating extension stems to bring the operating nut to a point 6 inches below the surface of the ground and/or box cover. Where the valve is submerged, provide operating extension stems to bring the operating nut to 6 inches above the water surface. Extension stems shall be Type 316 stainless steel, solid core, and shall be complete with 2-inch-square operating nut. The connections of the extension stems to the operating nuts and to the valves shall withstand without damage a pull of 300 foot-pounds.

2. Extension stem diameters shall be as tabulated below:

Valve Size (inches)	**Minimum Extension Stem Diameter (inches)**
2	3/4
3, 4	7/8
6	1
8	1-1/8
10, 12	1-1/4

F. Bolts and Nuts for Flanged Valves

Bolts and nuts for flanged valves shall be as described in Section 400500.

G. Gaskets for Flanges

Gaskets for flanged end valves shall be as described in Section 400500.

H. Painting and Coating

1. Coat metal valves located above ground or in vaults and structures the same as the adjacent piping. If the adjacent piping is not coated, then coat valves per Section 099761. Coat handwheels the same as the valves.

2. Coat buried metal valves at the place of manufacture per Section 099761.

3. Coat submerged metal valves, stem guides, extension stems, and bonnets at the place of manufacture per Section 099761.

4. Line the interior metal parts of metal valves 4 inches and larger, excluding seating areas and bronze and stainless steel pieces, per Section 099761. Apply lining at the place of manufacture.

5. Test the valve interior linings and exterior coatings at the factory with a low-voltage (22.5 to 80 volts, with approximately 80,000-ohm resistance) holiday detector, using a sponge saturated with a 0.5% sodium chloride solution. The lining shall be holiday free.

6. Measure the thickness of the valve interior linings per Section 099761. Repair areas having insufficient film thickness per Section 099761.

I. Packing, O-Rings, and Gaskets

Unless otherwise stated in the detailed valve specifications, packing, O-rings, and gaskets shall be one of the following materials:

1. Teflon.

2. Kevlar aramid fiber.

3. Acrylic or aramid fiber bound by nitrile. Products: Garlock Multi-Swell Style 3760-U or equal.

4. Buna-N (nitrile).

J. Rubber Seats

Rubber seats shall be made of a rubber compound that is resistant to free chlorine and monochloramine concentrations up to 10 mg/l in the fluid conveyed.

K. Valves

1. Gate Valves:

a. Type 137—Ductile-Iron Resilient Wedge Tapping Gate Valves 4 Through 16 Inches (AWWA C515):

Valves shall comply with AWWA C515 and the following. Valves shall be of the bolted bonnet type with nonrising stems. Valve stems shall be Type 304 or 316 stainless steel or cast, forged, or rolled bronze. Stem nuts shall be made of solid bronze. Bronze for internal working parts, including stems, shall not contain more than 2% aluminum or more than 7% zinc. Bronze shall conform to ASTM B62 or ASTM B584 (Alloy C83600), except the stem bronze shall have a minimum tensile strength of 60,000 psi, a minimum yield strength of 30,000 psi, and a minimum of 10% elongation in 2 inches (ASTM B584 or B763, Alloy C87600 or C99500). Body bolts shall be Type 316 stainless steel. Ends shall be flanged, Class 125, ASME B16.1. One end shall have slotted bolt holes per AWWA C515, paragraph 4.4.1.4.2 to fit tapping machines.

Provide reduction thrust bearings above the stem collar. Stuffing boxes shall be O-ring seal type with two rings located in stem above thrust collar. Each valve shall have a smooth unobstructed waterway free from any sediment pockets.

Valves shall be lined and coated at the place of manufacture with either fusion-bonded epoxy or heat-cured liquid epoxy. Minimum epoxy thickness shall be 8 mils.

Manufacturers: Clow, AVK, American Flow Control, Mueller, Waterous, Kennedy, or equal.

b. Type 185—Ductile-Iron Resilient Wedge Gate Valves 4 Inches Through 36 Inches (AWWA C515):

Valves shall comply with AWWA C515 and the following. Valves shall be of the bolted-bonnet type with nonrising stems. Valve stems shall be Type 304 or 316 stainless steel or cast, forged, or rolled bronze. Provide operating nut for buried valves. Provide handwheel for exposed valves. Stem nuts shall be made of solid bronze. Bronze shall conform to ASTM B62 or ASTM B584 (Alloy C83600), except

the stem bronze shall have a minimum tensile strength of 60,000 psi, a minimum yield strength of 30,000 psi, and a minimum of 10% elongation in 2 inches (ASTM B584 or B763, Alloy C87600 or C99500). Body bolts shall be Type 316 stainless steel. End connections for exposed valves shall be flanged. End connections for buried valves shall be mechanical joint type.

Provide reduction thrust bearings above the stem collar. Stuffing boxes shall be O-ring seal type with two rings located in stem above thrust collar. Each valve shall have a smooth unobstructed waterway free from any sediment pockets.

Valves shall be lined and coated at the place of manufacture with either fusion-bonded epoxy or heat-cured liquid epoxy. Minimum epoxy thickness shall be 8 mils.

Manufacturers: Clow, AVK, American Flow Control, Waterous, Kennedy, or equal.

PART 3 - EXECUTION

A. Joints

1. 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 the nuts and bolts, reseat or replace the gasket, reinstall or retighten the bolts and nuts, and retest the joints. Joints shall be watertight.

2. 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. Install lug-type valves with separate hex head machine bolts at each bolt hole and each flange (two bolts per valve bolt hole).

4. Install grooved-end couplings for valves in accordance with Section 400500.

B. Installing Buried Valves

1. Connect the valve, coat the flanges, apply tape wrapping or polyethylene encasement, and place and compact the backfill to the height of the valve stem.

2. Place block pads under the extension pipe to maintain the valve box vertical during backfilling and repaving and to prevent the extension pipe from contacting the valve bonnet.

3. Mount the upper slip pipe of the extension in midposition and secure with backfill around the extension pipe. Pour the concrete ring allowing a depression so the valve box cap will be flush with the pavement surface.

C. Field Coating Buried Valves

1. Coat flanges of buried valves and the flanges of the adjacent piping, and the bolts and nuts of flanges and mechanical joints, per Section 099761.

2. Wrap buried metal valves 6 inches and larger in two layers of polyethylene conforming to AWWA C105, 8 mils in thickness each. Pass the two sheets of polyethylene under the valve and the coated flanges or joints with the connecting pipe and draw the sheets around the

valve body, the valve bonnet, and the connecting pipe. Secure the sheets with plastic adhesive tape about the valve stem below the operating nut and about the barrel of the connecting pipe to prevent the entrance of soil. Fold overlaps twice and tape. Backfill the valve with care to avoid damaging the polyethylene.

D. Valve Leakage Testing

Test valves for leakage at the same time that the connecting pipelines are tested. See Section 400515 for pressure testing requirements. Protect or isolate any parts of valves, actuators, or control and instrumentation systems whose pressure rating is less than the pressure test. Valves shall show zero leakage. Repair or replace any leaking valves and retest.

E. Valve Field Testing

Operate manual valves through three full cycles of opening and closing. Valves shall operate from full open to full close without sticking or binding. Do not backfill buried valves until after verifying that valves operate from full open to full closed. If valves stick or bind, or do not operate from full open to full closed, repair or replace the valve and repeat the tests.

END OF SECTION

SECTION 402040 DUCTILE-IRON PIPE

PART 1 - GENERAL

1.01 DESCRIPTION

This section describes materials, testing, and installation of ductile-iron pipe and fittings 16 inches and smaller.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Painting and Coating: 099000.

B. Polyethylene Sheet Encasement (AWWA C105): 099754.

C. Fusion Bonded Epoxy Linings and Coatings: 099761

D. Trenching, Backfilling, and Compacting: 312316.

E. General Piping Requirements: 400500.

F. Pressure Testing of Piping: 400515.

1.03 SUBMITTALS

A. Submit shop drawings in accordance with the Special Provisions.

B. Provide an affidavit of compliance with standards referenced in this specification, e.g., AWWA C151. Submit copy of report of pressure tests for qualifying the designs of all sizes and types of AWWA C153 fittings that are being used in the project. The pressure test shall demonstrate that the minimum safety factor described in AWWA C153, Section 5.5 is met.

C. Provide the following information:

1. Lining thickness.

2. Wall thickness.

3. Show deflections at push-on and mechanical joints.

4. Submit joint and fitting details and manufacturer’s data sheets.

D. Submit calculations and test data proving that the proposed restrained joint arrangement can transmit the required forces with a minimum safety factor of 1.5.

E. Submit test report on physical properties of rubber compound used in the gaskets.

F. Submit drawing or manufacturer's data sheet showing flange facing, including design of facing serrations.

G. Submit weld procedure specification, procedure qualification record, and welder's qualifications prior to any welding to ductile-iron pipe.

PART 2 - MATERIALS

2.01 PIPE

Pipe shall be cast ductile (nodular) iron, conforming to AWWA C151.

2.02 PIPE WALL THICKNESS

A. Minimum wall thicknesses for pipe having grooved-end joints shall be as shown in the following table:

Pipe and Fitting Sizes (inches)	**Wall Thickness***
16 and smaller	Special Class 53
*Special Class and Pressure Class per AWWA C151.	

B. Minimum wall thickness for pipe having push-on or mechanical joints, restrained joints, plain ends, or cast flange ends shall be Class 150 unless otherwise shown in the drawings.

C. Minimum wall thickness for pipe having threaded flanges shall be Special Class 53 or Pressure Class 350.

D. Minimum pipe wall thickness required for corporation stops and tapped outlets shall be in accordance with Table A.1 of AWWA C151 for three full threads for design pressures up to 250 psi and four full threads for design pressures over 250 to 350 psi.

2.03 FITTINGS

A. Fittings 48 inches and smaller shall conform to AWWA C110 with a minimum pressure rating of 250 psi. Material shall be cast or ductile iron. Flanges shall be flat faced.

B. Mechanical joint fittings conforming to AWWA C153 may be used in lieu of AWWA C110 fittings.

C. Grooved-end fittings shall conform to AWWA C110 with grooved ends conforming to AWWA C606, radius cut rigid joints. Fitting material shall conform to ASTM A48, Class 30; ASTM A126, Class B; or ASTM A536, Grade 65-42-10. Wall thickness of ductile-iron (ASTM A536) fittings shall conform to AWWA C110 or C153; wall thickness of cast-iron fittings shall conform to AWWA C110. Fittings and couplings shall be furnished by the same manufacturer.

D. Material for fittings with welded-on bosses shall have a Charpy notch impact value of minimum 10 ft-lbs under the conditions defined in AWWA C151. Test completed welds by the liquid penetrant method per ASTM E165.

2.04 FLANGES

A. Flanges shall be solid back, Class 125 per AWWA C115. Flanges on pipe shall be either cast or threaded. Material shall be ductile iron.

B. Flanged pipe and fittings shall be shop fabricated, not field fabricated. Threaded flanges shall comply with AWWA C115. Flanges shall be individually fitted and machine tightened in the shop, then machined flat and perpendicular to the pipe barrel. Flanges shall be backfaced parallel to the face of flange. Prior to assembly of the flange onto the pipe, apply a thread compound to the threads to provide a leak-free connection. There shall be zero leakage through the threads at a hydrostatic test pressure of 250 psi without the use of the gasket.

2.05 PIPE LINING AND COATING

A. Line and coat pipe with a fusion bonded epoxy per Section 099761. Lining and coating systems shall be certified to NSF/ANSI Standard 61 Drinking Water Systems – Health Effects.

2.06 GROOVED-END COUPLINGS

A. Grooved-end pipe couplings shall be ductile iron, ASTM A536 (Grade 65-45-12). Gaskets shall be halogenated butyl rubber or EPDM and shall conform to ASTM D2000.

B. Bolts in exposed service shall conform to ASTM A183, 110,000-psi tensile strength. Bolts in buried or submerged service shall be ASTM A193, Grade B8, Class 2.

C. Couplings for pipe 24 inches and smaller shall conform to AWWA C606 for flexible radius ductile-iron pipe, except where rigid radius couplings are required to connect to fittings. Couplings for pipe sizes 30 and 36 inches shall be in accordance with the coupling manufacturer's published literature for tolerances and dimensions for flexible and rigid radius cut joints. Couplings shall be Victaulic Style 31, Gustin-Bacon No. 500, or equal.

D. Grooved-end adapter flanges for piping 24 inches and smaller having an operating pressure of 150 psi and less shall be Victaulic Style 341 or 342 or equal. Flange dimensions shall conform to ASME B16.1, Class 125.

E. Grooved-end transition couplings for connecting ductile-iron pipe 12 inches and smaller to steel pipe shall be Victaulic Style 307 or equal.

2.07 GASKETS FOR FLANGES

See Section 400500.

2.08 GASKETS FOR MECHANICAL, PUSH-ON, AND RESTRAINED JOINTS

Synthetic or natural rubber in accordance with AWWA C111.

2.09 BOLTS AND NUTS FOR FLANGES

See Section 400500.

2.10 OUTLETS AND NOZZLES

A. For outlets larger than 2 inches in exposed piping, use a tee with a flanged outlet.

B. For outlets larger than 2 inches in buried piping, use a tee with a restrained joint outlet.

C. Outlets of size 2 inches and smaller shall be of the thredolet type, per MSS SP-97 and AWWA Manual M11 (2004 edition), Figure 13-26. Outlets shall be 3,000-pound WOG forged steel per ASTM A105 or ASTM A216, Grade WCB. Threads shall comply with ASME B1.20.1. Outlets shall be Bonney Forge Co. "Thredolet," Allied Piping Products Co. "Branchlet," or equal.

2.11 JOINTS

A. Joints in aboveground or submerged piping or piping located in vaults and structures shall be grooved end or flanged.

B. Joints in buried piping shall be of the restrained push-on or mechanical-joint type per AWWA C111 except where flanged joints are required to connect to valves, meters, and other equipment.

C. Restrained joints for piping 6 inches and larger shall be American Cast Iron Pipe "Lok-Ring" or "Flex-Ring," U.S. Pipe "TR-Flex," or equal. Weldments for restrained joints shall be tested by the liquid penetrant method per ASTM E165. Restrained joints for field closures shall be “Megalug” by EBAA Iron.

D. Restrained joints in 4-inch-diameter buried piping shall be American Cast Iron Pipe Company “Fast-Grip,” U.S. Pipe Field-lok gasket within Tyton joint pipe and fittings, or equal. Joint restraint shall be certified to four times rated pressure of 200 psi by Factory Mutual.

E. Where thrust restraint is called for in the drawings, provide pipe with restrained joints capable of transmitting 1.5 times the thrust, as calculated by the following equation:

$$T = 1.5 * (0.785 * P * D^2)$$

where:

P = Pressure class of pipe in psi.
D = Outside diameter of pipe in inches.
T = Thrust in pounds.

2.12 MECHANICAL JOINT RESTRAINT SYSTEM USING FOLLOWER RING AND WEDGES

The restraining mechanism shall consist of a follower gland having a seal gasket and individually actuated wedges that increase their resistance to pullout as pressure or external forces increase. The system manufacturer shall provide all the components (follower ring, wedges, and gaskets) for the restraining device. The device shall be capable of full mechanical joint deflection during assembly, and the flexibility of the joint shall be maintained after burial. The joint restraint ring and its wedging components shall be constructed of ductile iron conforming to ASTM A536, Grade 60-42-10. The wedges shall be ductile iron, heat-treated to a minimum hardness of 370 BHN. Dimensions of the gland shall be such that it can be used with mechanical joint bells conforming to AWWA C111 and AWWA C153. The design shall use torque limiting twist-off nuts to provide actuation of the restraining wedges. The mechanical joint restraint shall be available in the size range of 3 through 48 inches. Minimum rated pressure shall be 350 psi for sizes 16 inches and smaller and 250 psi in sizes 18 inches and larger. Products: Megalug Series 1100 as manufactured by EBAA Iron, Inc., or equal.

2.13 DUCTILE-IRON PIPE WELDMENTS

A. All welding to ductile-iron pipe, such as for bosses, joint restraint, and joint bond cables, shall be done at the place of manufacture of the pipe. Perform welding by skilled welders experienced in the method and materials to be used. Welders shall be qualified under the standard qualification procedures of the ASME Boiler and Pressure Vessel Code, Section IX, Welding Qualifications.

B. Welds shall be of uniform composition, neat, smooth, full strength, and ductile. Completely grind out porosity and cracks, trapped welding flux, and other defects in the welds in such a manner that will permit proper and complete repair by welding.

C. Completed welds shall be inspected at the place of manufacture by the liquid penetrant method. Conform to the requirements specified in ASTM E165, Method A, Type I or Type II. The materials used shall be water washable and nonflammable.

PART 3 - EXECUTION

3.01 DELIVERY, UNLOADING, AND TEMPORARY STORAGE OF PIPE AT SITE

A. Use unloading and installation procedures that avoid cracking of the lining. If necessary, use plastic sheet bulkheads to close pipe ends and keep cement-mortar lining moist.

B. Deliver the pipe alongside the pipelaying access road over which the pipe trailer-tractors can travel under their own power. Place the pipe in the order in which it is to be installed and secure it from rolling.

C. Do not move pipe by inserting any devices or pieces of equipment into the pipe barrel. Field repair linings damaged by unloading or installation procedures.

3.02 SANITATION OF PIPE INTERIOR

A. During laying operations, do not place tools, clothing, or other materials in the pipe.

B. When pipelaying is not in progress, close the ends of the installed pipe by a child- and vermin-proof plug.

3.03 INSTALLING FLANGED PIPE AND FITTINGS

Install in accordance with Section 400500. Cut the bore of the gaskets such that the gaskets do not protrude into the pipe when the flange bolts are tightened.

3.04 INSTALLING GROOVED-END PIPE AND FITTINGS

See Section 400500.

3.05 INSTALLING BURIED PIPING

A. Install in accordance with AWWA C600, Section 312316, and as follows.

B. When installing piping in trenches, do not deviate more than 1 inch from line or 1/4 inch from grade. Measure for grade at the pipe invert.

C. Assemble restrained joints per manufacturer's instructions.

3.06 JOINT DEFLECTIONS FOR BURIED PIPE

A. Do not exceed the following deflection angles for unrestrained buried pipe joints:

Pipe Size (inches)	**Maximum Deflection (degrees)**	
	Push-On Joint	**Mechanical Joint**
4	4	6 1/2
6	4	5 1/2
8	4	4
10	4	4
12	4	4

B. For restrained joints, do not exceed 80% of the manufacturer's recommended maximum deflections.

C. Assemble joints in accordance with AWWA C600 and the manufacturer's recommendations.

3.07 INSTALLING ABOVEGROUND OR EXPOSED PIPING

See Section 400500.

3.08 PAINTING AND COATING

A. Coat pipe located above ground and in vaults and structures per Section 099761.

B. Coat buried pipe, buried flanges and buried mechanical and restrained joint bolts, nuts, and glands per Section 099761.

C. Line and coat exposed grooved-end couplings the same as the pipe exterior coating. Lining and coating systems shall be certified to NSF/ANSI Standard 61 Drinking Water Systems – Health Effects.

3.09 POLYETHYLENE ENCASEMENT OF BURIED PIPE AND FITTINGS

Wrap buried pipe, fittings, grooved-end couplings, and joints with polyethylene per Section 099754.

3.10 CLEANING PIPE

Sweep pipe clean of all dirt and debris. If hardened mud exists in the pipe, remove with the use of pressurized water hoses.

3.11 FIELD HYDROSTATIC TESTING

Test pressures are shown in Section 400515. Test in accordance with Section 400515.

END OF SECTION

SECTION 402092 PVC DISTRIBUTION PIPE (AWWA C900 AND C909)

PART 1 - GENERAL

1.01 DESCRIPTION

This section includes materials, installation, and testing of PVC distribution pipe conforming to AWWA C900. Size range is 4 through 12 inches.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Painting and Coating: 099000.

B. Trenching, Backfilling, and Compacting: 312316.

C. General Piping Requirements: 400500.

D. Pressure Testing of Piping: 400515.

1.03 SUBMITTALS

A. Submit shop drawings in accordance with the Special Provisions.

B. Provide affidavit of compliance with AWWA C900.

C. Submit fully dimensioned cross-section of the bell and barrel of the pipe. Show the bell maximum outside diameter in the pressurized area and its minimum wall thickness at the same location.

D. Submit copies of the following manufacturer-required tests conducted on project pipe:

1. Quick-burst strength of pipe and couplings.

2. Flattening resistance of pipe.

3. Record of additional tests after test sample failure.

E. Submit manufacturer's literature of ductile-iron fittings including dimensions, thickness, weight, coating, lining, and a statement of inspection and compliance with the acceptance tests of AWWA C110 or C153. Submit copy of report of pressure tests for qualifying the designs of all sizes and types of AWWA C153 fittings that are being used in the project. The pressure test shall demonstrate that the minimum safety factor described in AWWA C153, Section 53-15 is met.

F. Submit outline drawings and materials description of service connection saddles, corporation stops, and pipe plugs.

PART 2 - MATERIALS

2.01 PIPE

AWWA C900, rubber-ring gasket bell end or plain end with elastomeric gasket coupling, DR 18, cast iron equivalent outside diameter, material cell classification 12454-B per ASTM D1784.

2.02 PVC PIPE COLORING AND MARKING FOR RECLAIMED WATER SERVICE

PVC pipe shall be purple (Pantone 522) and shall be marked on both sides of the pipe with the wording "CAUTION: RECLAIMED WATER--DO NOT DRINK." The lettering shall be minimum 1 inch high, black, and shall be repeated at intervals not exceeding 60 inches. The purple coloring shall be achieved by adding pigment to the PVC material as the pipe is being manufactured.

2.03 FITTINGS

A. Fittings shall conform to AWWA C110 with a minimum pressure rating of 250 psi. Size bells specifically for outside diameter of cast-iron equivalent PVC pipe including rubber-ring retaining groove.

B. Mechanical joint fittings conforming to AWWA C153 may be used in lieu of AWWA C110 fittings.

2.04 LINING AND COATING FOR FITTINGS

Line and coat fittings with a fusion bonded epoxy per Section 099761.

2.05 FLANGES

Flanges on outlets of fittings shall be Class 125 per ASME B16.1.

2.06 GASKETS FOR FLANGES

See Section 400500.

2.07 BOLTS AND NUTS FOR FLANGES

See Section 400500.

2.08 OUTLETS AND NOZZLES

For outlets larger than 2 inches, use a tee with a flanged outlet.

PART 3 - EXECUTION

3.01 PRODUCT MARKING

Legibly mark pipe at 5-foot intervals and each coupling to identify the nominal diameter, the outside diameter base, that is, cast-iron or steel pipe (IPS), the material code for pipe and couplings, the dimension ratio number, AWWA C900, and the wording "CAUTION: RECLAIMED WATER--DO NOT DRINK.".

3.02 DELIVERY AND TEMPORARY STORAGE OF PIPE

A. Ship, store, and place pipe at the installation site, supporting the pipe uniformly. Avoid scratching the pipe surface. Do not stack higher than 4 feet or with weight on bells. Cover to protect from sunlight.

B. Do not install pipe that is gouged or scratched forming a clear depression.

3.03 PIPE LAYOUT FOR CURVED ALIGNMENT

Pipe lengths may be bent for curved alignment but to no smaller radius curve than the following:

Pipe Diameter (inches)	Minimum Curve Radius (feet)
4	400
6	600
8	800
10	1,000
12	1,200

3.04 HANDLING PIPE

Hoist pipe with mechanical equipment using a cloth belt sling or a continuous fiber rope that avoids scratching the pipe. Do not use a chain. Pipes up to 12 inches in diameter may be lowered by rolling on two ropes controlled by snubbing. Pipes up to 6 inches in diameter may be lifted by hand.

3.05 INSTALLING BURIED PIPING

A. Install in accordance with AWWA C605, Section 312316, and as follows.

B. Backfill materials in the pipe zone shall be imported sand. Do not add successive layers unless the previous layer is compacted to 95% relative compaction per ASTM D1557.

C. Compact material placed within 12 inches of the outer surface of the pipe by hand tamping only.

D. Compact trench backfill to the specified relative compaction. Do not float pipe. Do not use high-impact hammer-type equipment except where the pipe manufacturer warrants in writing that such use will not damage the pipe.

3.06 ASSEMBLY OF PIPE JOINT

A. The spigot and bell or bell coupling shall be dirt free and slide together without displacing the rubber ring. Lay the pipe section with the bell coupling facing the direction of laying.

B. Insert the rubber ring into the groove in the bell in the trench just before joining the pipes. First clean the groove. Observe the correct direction of the shaped ring. Feel that the ring is completely seated.

C. Lubricate the spigot over the taper and up to the full insertion mark with the lubricant supplied by the pipe manufacturer. If the lubricated pipe end touches dirt, clean the pipe end and reapply lubricant.

D. Insert the spigot into the bell and force it slowly into position.

E. Check that the rubber ring has not left the groove during assembly by passing a feeler gauge around the completed joint.

3.07 WRAPPING FITTINGS

Wrap buried cast-iron fittings with polyethylene per Section 099754.

3.08 FIELD HYDROSTATIC TESTING

Test pressures are shown in Section 400515. Test in accordance with Section 400515.

END OF SECTION