NWP NACIMIENTO WATER PROJECT

San Luis Obispo County Flood Control & Water Conservation District

CONTRACT NO. 300187.08.05

Specification 05

PIPELINE SOUTH
UNITS G, G1, H1, and T11

PART 1

Specification Divisions 0, 1, 2, 3, 5, 7, 9, 13, 15, and 16

PART 2

Appendices and DVD

PART 3

Standard Details

PART 4

Contract Drawings

San Luis Obispo, California

2007

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NWP NACIMIENTO WATER PROJECT

San Luis Obispo County Flood Control & Water Conservation District

SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

Construction of the Nacimiento Water Project PIPELINE SOUTH Units G, G1, H1, and T11

CONTRACT NO. 300187.08.05

Contract Documents CONFORMED SET

August 2007

BLACK & VEATCH
building a world of difference™

B&V Project No. 137522

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CONTRACT DOCUMENTS
CONFORMED SET

The Contract Documents are as specified in Article 6 of the Agreement. The DESIGNER has prepared this conformed set of Contract Documents by incorporating Addenda items into the Bid set of the Contract Documents. The preparation of the conformed set of Contract Documents is entirely for the convenience of the user during administration of the Project. Veracity must be resolved with the Contract Documents.

In addition, the following is noted:

- A copy of the Bid tabulation follows this page (included in Part 1 only) and is provided for reference and information.
- A copy of the Questions and Answers relevant to the contract, as tabulated on the DISTRICT'S Project construction website during the Bidding period, have been included in Appendix F for reference and information.
- Several environmental reports referenced in "Mitigation, Monitoring, and Compensation Plan", dated November 2006 and included in Appendix D-1, were excluded within Appendix D-1 of the Bid set, but have now been provided within Appendix D-1 of the Conformed Set (refer to Question and Answer Item No. 158).

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San Luis Obispo County Flood Control and Water Conservation District

Nacimiento Water Project
Contract 300187.08.05 - Pipeline South
Tabulation of Bid Results

BID OPENING: August 2, 2007

Bid Item	Unit ID	Description	Designer's Opinion of Construction Cost				Southern Cal Pipeline		Mountain Cascade		Specialty Construction		Papich		ARB		John Madonna		Teichert	
			Unit	Estimated Quantity	Unit Price	Bid Amount	Unit Price	Bid Amount	Unit Price	Bid Amount	Unit Price	Bid Amount	Unit Price	Bid Amount	Unit Price	Bid Amount	Unit Price	Bid Amount	Unit Price	Bid Amount
1	All	Mobilization	LS	1		$ 360,000		$ 360,000		$ 360,000		$ 360,000		$ 360,000		$ 360,000		$ 360,000		$ 360,000
2	- -	Shoring, Sheeting and Bracing for the following Units:																		
2a	G	Pipeline (18-Inch)	LS	1		$ 165,000.00		$ 36,236.00		$ 15,000.00		$ 60,162.00		$ 8,300.00		$ 168,000.00		$ 220,000.00		$ 640,000.00
2b	G1	Pipeline (18-Inch)	LS	1		$ 84,000.00		$ 34,036.00		$ 10,000.00		$ 86,000.00		$ 11,000.00		$ 43,000.00		$ 110,000.00		$ 590,000.00
2c	H1	Pipeline (12-Inch)	LS	1		$ 52,000.00		$ 27,636.00		$ 5,000.00		$ 180,000.00		$ 16,600.00		$ 39,000.00		$ 100,000.00		$ 350,000.00
2d	T11	SLO Turnout	LS	1		$ 9,000.00		$ 16,236.00		$ 2,500.00		$ 48,000.00		$ 11,000.00		$ 2,000.00		$ 70,000.00		$ 2,000.00
3	All	Environmental Mitigation Costs	LS	1		$ 153,000.00		$ 150,000.00		$ 150,000.00		$ 450,000.00		$ 255,300.00		$ 79,700.00		$ 1,150,000.00		$ 438,000.00
4	- -	Installation of Fiber Optic Conduit & Cable System for the following Units:																		
4a	G, G1, H1	Units G, G1, H1	LS	1		$ 745,000.00		$ 1,000,000.00		$ 650,000.00		$ 1,500,000.00		$ 722,000.00		$ 1,415,000.00		$ 700,000.00		$ 530,000.00
4b	T11	SLO Turnout	LS	1		$ 6,700.00		$ 10,000.00		$ 2,500.00		$ 34,500.00		$ 28,000.00		$ 60,897.00		$ 40,000.00		$ 4,000.00
5	G	Pipeline (18-Inch)	LF	36,400	$ 215.00	$ 7,826,000.00	$ 210.00	$ 7,644,000.00	$ 199.00	$ 7,243,600.00	$ 184.00	$ 6,697,600.00	$ 145.00	$ 5,278,000.00	$ 230.00	$ 8,372,000.00	$ 192.00	$ 6,988,800.00	$ 225.00	$ 8,190,000.00
6	G	Salinas River Crossing - South (18-Inch)	LS	1		$ 410,000.00		$ 400,000.00		$ 1,400,000.00		$ 1,630,000.00		$ 2,053,000.00		$ 1,060,000.00		$ 2,400,000.00		$ 1,130,000.00
7	G1	Pipeline (18-Inch)	LF	15,785	$ 250.00	$ 3,946,250.00	$ 210.00	$ 3,314,850.00	$ 310.00	$ 4,893,350.00	$ 285.00	$ 4,498,725.00	$ 214.00	$ 3,377,990.00	$ 352.00	$ 5,556,320.00	$ 225.00	$ 3,551,625.00	$ 342.00	$ 5,398,470.00
8	H1	Pipeline (12-Inch)	LF	14,040	$ 170.00	$ 2,386,800.00	$ 140.00	$ 1,965,600.00	$ 210.00	$ 2,948,400.00	$ 265.00	$ 3,720,600.00	$ 206.00	$ 2,892,240.00	$ 237.00	$ 3,327,480.00	$ 128.00	$ 1,797,120.00	$ 270.00	$ 3,790,800.00
9	T11	SLO Turnout	LS	1		$ 450,000.00		$ 365,000.00		$ 350,000.00		$ 460,751.00		$ 380,000.00		$ 625,000.00		$ 460,000.00		$ 320,000.00
10	- -	Allowance - Contaminated Soils	LS	1		$ 150,000.00		$ 150,000.00		$ 150,000.00		$ 150,000.00		$ 150,000.00		$ 150,000.00		$ 150,000.00		$ 150,000.00
11	- -	Allowance - Contaminated Groundwater	LS	1		$ 50,000.00		$ 50,000.00		$ 50,000.00		$ 50,000.00		$ 50,000.00		$ 50,000.00		$ 50,000.00		$ 50,000.00
12	- -	Allowance - Change in Pipe Alignment or Profile Due to Utility Conflict	LS	1		$ 300,000.00		$ 300,000.00		$ 300,000.00		$ 300,000.00		$ 300,000.00		$ 300,000.00		$ 300,000.00		$ 300,000.00
13	- -	Subgrade Stabilization in Soft, Unstable Soils	LF	13,000	$ 17.50	$ 227,500.00	$ 25.00	$ 325,000.00	$ 10.00	$ 130,000.00	$ 38.00	$ 494,000.00	$ 7.00	$ 91,000.00	$ 23.00	$ 299,000.00	$ 24.00	$ 312,000.00	$ 26.00	$ 338,000.00
14	- -	All Other Work	LS	1		$ 878,750.00		$ 184,000.00		$ 500,000.00		$ 28,000.00		$ 4,951,000.00		$ 1,000.00		$ 3,500,000.00		$ 1,400,000.00
					TOTAL	$ 18,200,000.00	TOTAL	$ 16,332,594	TOTAL	$ 19,160,350.00	TOTAL	$ 20,748,338.00	TOTAL	$ 20,935,430.00	TOTAL	$ 21,908,397.00	TOTAL	$ 22,259,545.00	TOTAL	$ 23,981,270.00

BLACK & VEATCH CORPORATION

NACIMIENTO WATER PROJECT
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DIVISION 0
BIDDING AND CONTRACT REQUIREMENTS

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BIDDING REQUIREMENTS

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SECTION 00020 – INVITATION TO BID

Sealed Proposals will be received at the office of the County Clerk, 1055 Monterey Street, Room D 120, San Luis Obispo, California 93408 until 3:00 P.M. (local time) on August 2, 2007, which Bids will then be opened and declared at 3:15 P.M. (local time) on the above mentioned date at a public meeting at 1055 Monterey Street, Room D 120, by the County Clerk, acting as the Secretary of the Board of Supervisors of the San Luis Obispo County Flood Control and Water Conservation District ("District") for the following District Project:

CONSTRUCTION OF THE
PIPELINE SOUTH
UNITS G, G1, H1, and T11
FOR THE
NACIMIENTO WATER PROJECT
CONTRACT NO. 300187.08.05
SPECIFICATION 05

Any Bid received at the Office of the County Clerk after 3:00 P.M. on the date specified above shall not be considered, and shall be returned to the BIDDER unopened.

The proposed WORK is generally described as follows:

Construction of the Pipeline South portion of the NWP, approximately 67,000 feet of 18-inch to 12-inch diameter raw water pipeline, which includes the Unit G Pipeline from Rocky Canyon Pump Station Discharge to Route 58/Maria Avenue; Unit G1 Pipeline from Route 58/Maria Avenue to Cuesta Tunnel Tank Inlet; and Unit H1 Pipeline from Cuesta Tunnel to San Luis Obispo Turnout; and Unit T11 – City of San Luis Obispo Turnout.

WORK for the pipeline includes site clearing and preparation; pipe manufacture / fabrication and pipe deliveries; trenching, pipeline installation, and backfilling; connecting to existing facilities, sheeting, shoring and bracing; road and highway crossings and trenchless construction; creek crossings; river crossing; linings and coatings; specials and appurtenances; corrosion monitoring; off-site disposal of excavated materials; imported backfill materials; pavement restoration; traffic and pedestrian control; temporary access; locating, potholing, and protecting of existing utilities; pipeline pressure and leakage testing; installation and testing of fiber optic conduit and cable; obtaining permits and complying with permit conditions; complying with environmental mitigation and CEQA / NEPA requirements; tree protection; coordination with other DISTRICT contractors; hazardous materials removal and disposal; and site restoration.

WORK for the turnout includes connection to main pipeline, site clearing and preparation; pipe manufacture / fabrication and pipe deliveries; trenching, pipeline installation, and backfilling; sheeting, shoring and bracing; linings and coatings; specials and appurtenances; corrosion monitoring; off-site disposal of excavated materials; imported backfill materials; temporary access; locating, potholing, and protecting of existing utilities; pipeline pressure and leakage testing; and turnout facility construction including sitework, vault construction,

flow meter, isolation valves, flow control valves, and electrical and instrumentation and control systems.

The DESIGNER'S opinion of probable construction cost is $18,200,000.

Contract Documents for this Project (including Specifications, half-sized set of the Drawings, and other pertinent documents) can be purchased at the following location:

ASAP Reprographics
495 Morro Bay Blvd.
Morro Bay, CA 93442

or,

Call ASAP Reprographics, (805) 772-6921, and ask for Vicki.

Checks shall be made payable to: San Luis Obispo County Flood Control and Water Conservation District, or "SLOFCWCD".

A list of plan rooms where the documents can be viewed is posted on the DISTRICT'S project web site: http://www.slocounty.ca.gov/PW/NacWP.htm

Contract Documents may be purchased there for $150.00 per set, including tax, or may be overnight mailed using the CONTRACTOR'S overnight shipping account information provided at the time of order. When requesting Contract Documents remotely, payment shall be first received prior to mailing of the Contract Documents. A full size set of the plans is not available for purchase, but can be printed from the DVD located within the Contract Documents once the CONTRACTOR purchases the set. Payment for the Contract Documents is not refundable, and must be received prior to shipment.

Pursuant to the provisions of Section 1773 of the Labor Code of the State of California, the DISTRICT has obtained from the Director of the Department of Industrial Relations of the State of California the general prevailing rate of per diem wages and the general prevailing rate for holiday and overtime work for the locality in which the WORK is to be performed for each needed craft, classification of type of workman. Copies of said prevailing rates are on file at the DISTRICT'S principal office and shall be available to any interested party upon request. A copy of said prevailing rates can also be obtained from the Department of Industrial Relations' web site address which is www.dir.ca.gov/dlsr/pwd/. During construction of the WORK, the ENGINEER shall post a copy of said prevailing rates at the Site of the WORK.

Attention is directed to the provisions of Sections 1770-1781 of the California Labor Code concerning the payment of prevailing wages. BIDDERS are advised that any contractor who is awarded a public works project and intends to use a craft or classification not shown on the general prevailing wage determination may be required to pay the wage rate of that craft or classification most closely related to it as shown in the general determinations effective at the time of the call for Bids. Pursuant to California Labor Code Section 1777.5, BIDDER agrees to be responsible for complying with said section concerning the employment of apprentices and apprenticeable occupations.

The successful BIDDER and BIDDER'S agents, employees, and Subcontractors shall comply with all applicable provisions of the California Labor Code and all federal, state, and local Laws and Regulations that affect the hours of work, wages, and other compensation of employees, non-discrimination, and other conduct of the WORK.

The BIDDER'S attention is directed to Section 00430, "List of Subcontractors," regarding the requirement that proposed Subcontractors be listed in the BIDDER'S proposal. A form for listing Subcontractors, as required, is included in the section titled, "Bid Proposal and Forms" of this book. This form must be completed and submitted with BIDDER'S Bid proposal.

All Bonds and endorsements thereto to be submitted pursuant to this contract shall be written by a company authorized to do surety business in the State of California with a rating of "A-" or better as rated by the current edition of Best's Key Rating Guide as published by A.M. Best Company, Oldwick, New Jersey 08858.

Each Bid must be accompanied by a Bid Security, namely cash, a certified check, a cashier's check, or a Bid Bond, in the amount of ten percent (10%) of the total of the Bid. Said checks shall be made payable to the San Luis Obispo County Flood Control and Water Conservation District. Said Bid Bond shall be on the form provided in the Bid Forms. Said Bid Security shall be a guarantee that the BIDDER, if awarded the contract, will enter into a contract for the performance thereof satisfactory to said Board of Supervisors.

Within fifteen (15) calendar Days after receipt of a Notice of Award, the successful BIDDER shall execute an Agreement with DISTRICT in the form prescribed herein.

At the time of execution of the Agreement, the successful BIDDER shall have submitted the certificates of insurance stipulated in the General Conditions, and, in addition thereto, shall furnish a Performance Bond in the sum of one hundred percent (100%) of the contract Bid to guarantee the performance of the contract, and a Payment Bond in the sum of one hundred percent (100%) of the contract Bid. The Bond forms are included in the Section entitled "Bid Forms". Also at the time of execution of the Agreement, the successful BIDDER shall have submitted the recycling plan required in the Contract Documents.

The Board of Supervisor's reserves the right to reject any or all Bids, and to waive technical errors, discrepancies, or any informality in the Bids or bidding, if to do so seems to best serve the public interest.

The successful BIDDER shall be licensed to perform the WORK in accordance with the laws of the State of California, and shall possess a Class "A" - General Engineering Contractor License at the time of submitting the Bid. The CONTRACTOR shall perform, with the CONTRACTOR'S own employees, contract WORK amounting to not less than 50 percent of the original total Contract Price, except that any part of the WORK that is uniquely special and needing to be performed by a subcontractor having a specialty contractor's license may be performed by subcontract and the amount of any part of the WORK that is uniquely special and is performed by subcontract may be deducted from the original total Contract Price before computing the amount of WORK required to be

performed by the CONTRACTOR with the CONTRACTOR'S own organization. Failure of the BIDDER to be properly and adequately licensed shall render CONTRACTOR ineligible to execute the contract and shall result in the forfeiture of the Bid Security.

Any Addenda issued before the time in which to submit Bids expires shall form a part of the contract documents and shall be covered in the Bid. BIDDERS shall acknowledge and confirm receipt of any and all Addenda in their Bid proposal.

The successful BIDDER will be permitted to substitute securities for moneys withheld under the Agreement in accordance with the provisions of the Public Contract Code Section 22300.

SPECIAL INSTRUCTIONS TO BIDDERS: BIDDERS must satisfy themselves by personal examination of the location of the proposed Project and by such other means as they prefer as to the actual conditions and requirements of the Project, and shall not at any time after submission of the Bid dispute, complain, or assert that there was any misunderstanding in regard to the nature or amount of work to be done.

PRE-BID CONFERENCE: **Prospective BIDDERS are required to attend a mandatory pre-bid conference and optional site-tour of the proposed Project site which will be conducted by the ENGINEER** on June 5, 2007 from 8:00 a.m. to 11:00 a.m. The pre-bid conference will be held at the following location:

Library Community Room
San Luis Obispo City / County Library
995 Palm Street
San Luis Obispo, CA 93401

The pre-bid conference will include discussion of construction issues and contract requirements by the DISTRICT and the ENGINEER. Optional tours of the project site and viewing of the geotechnical samples will follow the Pre-Bid Conference. The Pre-Bid Conference is mandatory. Any bid submitted by a BIDDER not represented at the Pre-Bid Conference will be deemed non-responsive and rejected by the DISTRICT.

By order of the Board of Supervisors of the San Luis Obispo County Flood Control and Water Conservation District made this _____ day of _____, 2007.

County Clerk and Ex-officio Clerk of the
Board of Supervisors

By: _____
Deputy Clerk

<< End of Section 00020>>

SECTION 00025 – SIGNATURES AND STAMPS

The Contract Documents for Nacimiento Water Project Contract No. 300187.08.05, PIPELINE SOUTH, presented herein have been prepared by or under the direction of the following registered engineer(s):

PREPARED BY:

Steven N. Foellmi 4/25/07

DESIGNER'S Project Manager Date
Steven N. Foellmi, P.E.
Black & Veatch Corporation

Paul R Kneitz 04/20/07

DESIGNER'S Deputy Project Manager Date
Lead Engineer – System Design, Intake and Facilities
Paul R. Kneitz, P.E.
Black & Veatch Corporation

A.E. Romer 4-23-07

DESIGNER'S Lead Engineer – Pipelines Date
Andy E. Romer, P.E.
Boyle Engineering Company

RECOMMEND FOR APPROVAL AND ADVERTISING BY DISTRICT:

John R Hollenbeck 26 APRIL 2007

Nacimiento Project Manager Date
John R. Hollenbeck, P.E.

APPROVED BY:

Noel King 4/26/07

Public Works Director Date
Noel King

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SECTION 00100 – INSTRUCTIONS TO BIDDERS

ARTICLE 1 - DEFINED TERMS

1.1 Terms used in these Instructions to Bidders and Section 00020 "Invitation to Bid" shall have the meanings assigned to them in the General Conditions and in the Supplementary General Conditions. Additional terms used in these Instructions to BIDDERs shall have the meanings indicated below, which are applicable to both the singular and plural thereof.

A. Successful BIDDER - The lowest qualified, responsible, and responsive BIDDER to whom DISTRICT (on the basis of DISTRICT'S evaluation as herein provided) makes an award.

ARTICLE 2 - COPIES OF CONTRACT DOCUMENTS

2.1 For availability of Contract Documents, refer to Section 00020 - Invitation to Bid.

2.2 Complete sets of Contract Documents must be used in preparing Bids; DISTRICT will assume no responsibility for errors or misrepresentations resulting from the use of incomplete sets of Contract Documents.

2.3 DISTRICT, in making copies of Contract Documents available on the above terms, do so only for the purpose of obtaining Bids for the WORK and do not confer a license or grant for any other use.

ARTICLE 3 - INTERPRETATIONS AND ADDENDA

3.1 All questions about the meaning or intent of the Contract Documents shall be submitted to the DISTRICT electronically through the DISTRICT'S web site at the following url: http://www.slocounty.ca.gov/PW/NacWP.htm

Follow the links on the web page to locate the Construction Bidding Phase page which provides a Bidder Questions input form for submitting questions. All questions must reference the CONTRACT number, section number or drawing number, and clearly state the question or request for clarification. All questions must be received no later than 10 days before the contract bid opening date.

Answers to all questions will be posted approximately weekly on the DISTRICT'S web site as defined above on the Construction Bidding Phase page as Answers to Bidders Questions. It is the BIDDER'S responsibility to access the DISTRICT'S web site to review the answers to bidder questions. Answers to questions will not be distributed individually to the plan holders.

Interpretations or Clarifications considered necessary by the DISTRICT in response to such questions will be issued by Addenda mailed or delivered to all parties recorded by the DISTRICT as having received the Contract Documents. Questions received less than 10 Days prior to the date for opening of Bids may

not be answered. Only answers issued by Addenda will be binding. Oral and other interpretations or Clarifications will be without legal effect.

3.2 Addenda may also be issued to make other additions, deletions, or revisions to the Contract Documents.

ARTICLE 4 - EXAMINATION OF CONTRACT DOCUMENTS, OTHER RELATED DATA, AND SITE

4.1 It is the responsibility of each BIDDER before submitting a Bid to:

A. Examine and carefully study the Contract Documents, including any Addenda and other related data identified in the Contract Documents;

B. Become knowledgeable of the general, local, and Site conditions that may affect cost, progress, and performance of the WORK;

C. Become knowledgeable of and satisfy BIDDER as to all Federal, State, and local Laws and Regulations that may affect cost, progress, or performance of the WORK;

D. Not Used;

E. Obtain and carefully study all additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and underground facilities) at or contiguous to the Site which may affect cost, progress, or performance of the WORK or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by BIDDER, including any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Contract Documents and safety precautions and programs incident thereto;

F. Agree at the time of submitting its Bid that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for performance of the WORK at the Bid price and within the times and in accordance with the other terms and conditions of the Contract Documents;

G. Become aware of the general nature of the WORK to be performed by DISTRICT or others at the Site that relates to the WORK indicated in the Contract Documents;

H. Correlate the information known to BIDDER, information and observations obtained from visits to the Site, reports and Drawings identified in the Contract Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Contract Documents;

I. Promptly give DISTRICT written Notice of all conflicts, errors, ambiguities, or discrepancies that BIDDER discovers in the Contract Documents; and

J. Determine that the Contract Documents are sufficient to indicate and convey understanding of all terms and conditions for the performance of the WORK.

4.2 Subsurface and Physical Conditions

A. Reference is made to the Supplementary General Conditions for identification of those reports of explorations and tests of subsurface conditions at the site that have been utilized by the DESIGNER in the preparation of the Contract Documents. The CONTRACTOR may rely upon the accuracy of the technical data contained in such reports; however, the interpretation of such technical data, including any interpolation or extrapolation thereof, together with nontechnical data, interpretations, and opinions contained in such reports or the completeness thereof is the responsibility of the CONTRACTOR.

4.3 Provisions concerning responsibilities for the adequacy of data furnished to prospective BIDDERS with respect to subsurface conditions and possible changes in the Contract Documents due to differing or unanticipated conditions appear in Paragraphs 4.2, 4.3, and 4.4 of the General Conditions.

4.4 Before submitting a Bid, each BIDDER may, at BIDDER'S own expense, make or obtain any additional examinations, investigations, explorations, tests, and studies and obtain any additional information and data which pertain to subsurface or physical conditions at or contiguous to the site or otherwise, which may affect cost, progress, performance, or furnishing of the WORK and which BIDDER deems necessary to determine its Bid for performing and furnishing the WORK in accordance with the time, price, and other terms and conditions of the Contract Documents.

4.5 The submission of a Bid will constitute an incontrovertible representation and stipulation by BIDDER that:

A. That without exception the Bid is premised upon performing and furnishing the WORK required by the Contract Documents;

B. That the BIDDER has given DISTRICT written Notice of all conflicts, errors, ambiguities, and discrepancies that BIDDER has discovered in the Contract Documents;

C. That the Contract Documents are sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the WORK;

D. That the Bid includes all applicable federal, state, and local taxes and fees; and

E. BIDDER has complied with every requirement concerning examination of the Contract Documents and the Site.

4.6 The failure or neglect of the BIDDER to receive or examine any of the Contract Documents shall in no way relieve the BIDDER from any obligations required by the Contract Documents. No claims for additional compensations will be allowed which is based upon lack of knowledge of the provisions or content of any Contract Document.

ARTICLE 5 - PRE-BID CONFERENCE

5.1 For pre-bid conference information, refer to Section 00020 - Invitation to Bid.

ARTICLE 6 - PREPARATION OF BIDS

6.1 The Bid Forms listed in the Table of Contents are bound in the Contract Documents and shall not be removed therefrom unless otherwise specified. The Bid Forms shall be completed in ink.

6.2 All blanks in the Bid Form shall be filled. A Bid price shall be indicated for each Bid item listed therein, or the words "No Bid", "No Change", or other appropriate phrase shall be entered.

6.3 A Bid by a corporation shall be executed in the corporate name by the president or the vice-president or by another corporate officer. Such Bid shall be accompanied by the BIDDER-supplied Certificate of Authority to sign, attested by the secretary or assistant secretary, and with the corporate seal affixed. The corporate address and state of incorporation must appear below the signature.

6.4 A Bid by a partnership shall be executed in the partnership name and signed by a managing partner, accompanied by the BIDDER-supplied Certificate of Authority to sign, and his/her title must appear under the signature and the official address of the partnership must appear below the signature.

6.5 A Bid by a joint venture shall be executed in the joint venture name and be signed by a joint venture managing partner, accompanied by the BIDDER-supplied Certificate of Authority to sign, and his/her title must appear under the signature and the official address of the joint venture must appear below the signature.

6.6 A Bid by an individual shall show the BIDDER's name.

6.7 The names of all persons signing shall be legibly printed below their signatures. A Bid by a person who affixes to its signature the word "president", "secretary", "agent", or other designation without disclosing its principal may be held to be the Bid of the individual signing. When requested by DISTRICT, evidence of the authority of the person signing shall be furnished.

6.8 The Bid shall contain an acknowledgment of receipt of all Addenda, in accordance with Section 00400, “Bid Forms”.

6.9 The following is a list of required forms or documents that must be completed and provided with the Base Bid and Alternative Pipeline Bid:

A. Section 00400, Bid Forms (Base Bid)

Section 00400, Bid Forms (Alternative Pipeline Bid); i.e., prices for both Base Bid and Alternative Pipe Bid must be submitted or the Bid will be considered non-responsive.

B. Bid Security, as either a payment as described in Article 12, or as a Bid Bond using the form in Section 00410, "Bid Bond".

C. Section 00430, List of Subcontractors

D. Section 00453, Noncollusion Affidavit

E. Section 00454, Worker's Compensation Certification

F. Section 00456, Certification Regarding Debarment, Suspension, and Other Responsibility Matters

6.10 All Proposals must be submitted, filed, made, and executed in accordance with State and Federal law relating to Bids for contracts of their nature whether said laws are expressly referred to herein or not.

ARTICLE 7 – SUBSTITUTE AND "OR-EQUAL" ITEMS

7.1 The contract, if awarded, will be on the basis of materials and equipment specified or described in the Contract Documents without consideration of possible substitute or "or-equal" items. Application for review of substitute or "or-equal" materials or equipment will not be considered by DISTRICT until after the Effective Date of the Agreement. The procedure for CONTRACTOR'S submission of an application for review of a proposed substitute or "or-equal" items is set forth in Section 01600, "Products, Materials, Equipment and Substitutions".

7.2 The term "without exception", when used in the Contract Documents following the name of a Supplier or a proprietary item of equipment, product, or material, shall mean that the sources of the product are limited to the listed Suppliers or products and that no like, equivalent, or "or-equal" item and no substitution will be permitted.

ARTICLE 8 – (INTENTIONALLY BLANK)

ARTICLE 9 – QUANTITIES OF WORK

9.1 The quantities of WORK or material stated in the unit price items of the Bid are supplied only to give an indication of the general scope of the WORK. The DISTRICT does not expressly or by implication agree that the actual amount of WORK or material will correspond therewith. The DISTRICT reserves the right after award to increase or decrease the quantity of any unit price item of the

WORK, in accordance with Article 10.2 of Section 00700, by an amount up to and including 25 percent of any Bid item, without a change in the unit price.

9.2 In the event the DISTRICT increases the quantity of any unit price item of the WORK by an amount greater than 25 percent of any Bid item, and the ENGINEER determines that the unit price of the Bid item has increased or decreased by more than 25 percent of its unit price in the Bid, the ENGINEER may appropriately adjust the unit price of the item in the interest of the DISTRICT or approve a unit price adjustment requested by the CONTRACTOR in writing. Said adjustment of unit price shall only apply to the unit price of unit price items of the WORK in excess of 125 percent of the original Bid item. All changes discussed above shall be accomplished by Change Order, as specified in Section 00700, Articles 10-12.

ARTICLE 10 – SUBCONTRACTORS, SUPPLIERS, AND OTHERS

10.1 Pursuant to California Labor Code Section 1777.5, BIDDER agrees to be responsible for complying with said section concerning the employment of apprentices and apprenticeable occupations.

10.2 The BIDDER'S attention is also directed to Section 00430, "List of Subcontractors", regarding the requirement that proposed Subcontractors be listed in the BIDDER'S proposal. This section includes a form for listing Subcontractors. This form must be completed and submitted with BIDDER'S proposal. The List of Subcontractors shall include the name and the location of the place of business of each Subcontractor, Supplier, and other individuals or entities who will perform WORK or labor or render service to the CONTRACTOR in or about the construction of the WORK, or a Subcontractor licensed by the State of California who, under subcontract to the CONTRACTOR, specially fabricates and installs a portion of the WORK according to detailed Drawings contained in the plans and Specifications, in an amount in excess of one-half of one percent (0.5%) of the BIDDER'S total Bid. If, after due investigation, DISTRICT, DESIGNER, or ENGINEER has reasonable objection to any proposed Subcontractor, Supplier, or other individual or entity, DISTRICT may, before the Notice of Award is given, request the apparent Successful BIDDER to submit an acceptable substitute without an increase in the Bid.

10.3 If the apparent Successful BIDDER declines to make any such substitution, DISTRICT may award the contract to the next lowest BIDDER that proposes to use acceptable Subcontractors, Suppliers, and other individuals and entities. Declining to make requested substitutions will not constitute grounds for sacrificing the Bid security of any BIDDER. Any Subcontractor, Supplier, or other individual or entity so listed which DISTRICT, DESIGNER, or ENGINEER makes no written objection to prior to the giving of the Notice of Award will be deemed acceptable to DISTRICT, DESIGNER, and ENGINEER subject to revocation of such acceptance after the Effective Date of the Agreement subject to DISTRICT'S review of the Subcontractor, Supplier, or other individual or entity's qualifications as specified in the Technical Specifications.

10.4 No Subcontractor who is ineligible to bid or work on, or be awarded, a public works project pursuant to Section 1777.1 or 1777.7 of the Labor Code shall bid

on, be awarded, or perform WORK as a Subcontractor pursuant to Section 1777.1 or 1777.7 of the Labor Code.

10.5 CONTRACTOR shall not be required to employ any Subcontractor, individual, or entity against whom CONTRACTOR has a reasonable objection.

10.6 Any Bid conditioned upon furnishing equipment or materials which are not responsive to the Contract Documents will be rejected.

ARTICLE 11 – (INTENTIONALLY BLANK)

ARTICLE 12 - BID SECURITY, BONDS AND INSURANCE

12.1 Each Bid must be accompanied by a Bid Security, namely cash, a certified check, a cashier's check, or a Bid Bond, in the amount of ten percent (10%) of the total of the Bid. Said checks shall be made payable to the San Luis Obispo County Flood Control and Water Conservation District. If the BIDDER elects to furnish a Bid Bond as its Bid Security, the BIDDER shall use the Bid Bond form bound herein. Bid Bonds shall comply with the requirements applicable to the Payment and Performance Bonds contained in the General Conditions. Said Bid Security shall be a guarantee that the BIDDER, if awarded the contract, will enter into a contract for the performance thereof satisfactory to said Board of Supervisors.

12.2 The Bid Security of the Successful BIDDER will be retained until such BIDDER has executed the Agreement in accordance with Article 23, and met the other conditions of the Notice of Award, whereupon the Bid Security will be returned. If the Successful BIDDER fails to execute and deliver the Agreement in accordance with Article 23 within the number of Days set forth therein, then the DISTRICT may annul the Notice of Award and the Bid Security of that BIDDER will be forfeited.

12.3 Within 15 Days after issuing the Notice of Award, the DISTRICT will, if requested, return the Bid Securities accompanying such Bids to BIDDERS who did not rank as the lowest three. All other Bid Securities will be held until the Agreement has been finally executed by the apparent lowest responsive and responsible BIDDER. They will then be returned, if requested, to the respective BIDDERS whose Bids they accompany.

12.4 The General Conditions set forth the DISTRICT'S requirements as to the Performance Bond, Payment Bond, and insurance. When the Successful BIDDER delivers the executed Agreement to DISTRICT, it shall be accompanied by such Bonds and certificates for all required insurance.

12.5 With reference to Article 22.2, all provisions of the Bid (security, Bid Bond, insurance etc) shall be based on the Base Bid. If the contract is awarded on the basis of one or more of the alternatives described for the Alternative Pipeline Bid, CONTRACTOR shall provide the additional amount of Payment and Performance Bonds and insurance to reflect the Alternative Bid Price contract amount.

ARTICLE 13 - SUBMISSION OF BIDS

13.1 Bids shall be submitted at the time and place indicated in the Invitation to Bid, or at the modified time and place indicated by Addendum. Bids shall be addressed to:

San Luis Obispo County
Office of the County Clerk
1055 Monterey Street, Room D120
San Luis Obispo, California 93408

13.2 The Bid shall be submitted in a sealed envelope which shall be plainly marked in the upper left hand corner with the name, license number, and address of the BIDDER and shall be accompanied by the Bid security and other required documents. The envelope shall bear the words "BID FOR" followed by the title of the Contract Documents for the WORK, the names of the DISTRICT, the address where Bids are to be delivered or mailed to, and the date and hour of opening of Bids.

13.3 BIDDER shall assume full responsibility for timely delivery at the location designated for receipt of Bids. Bids received after the time and date for receipt of Bids will be returned unopened.

13.4 Oral, telephone, facsimile, electronic mail, or telegraph Bids are invalid and will not receive consideration.

13.5 Bid Forms and documents described in Paragraph 6.9 are required to be filled out and returned: these completed documents constitute the Bid.

ARTICLE 14- OPENING OF BIDS

14.1 Bids will be publicly opened at the time and place indicated in the Invitation to Bid and, unless obviously non-responsive, read aloud. An abstract of the amounts of the Base Bids and major alternatives (if any) will be made available to BIDDERS after the opening of Bids.

14.2 All Bids shall remain subject to acceptance for the number of Days set forth in the Bid Form, but the DISTRICT may, in its sole discretion, release any Bid and return that Bid Security prior to the end of that period.

14.3 Bid Protest Procedure. Any Bid protest must be submitted in writing to the Director of Public Works – County Government Center, Room 207, San Luis Obispo, CA 93408 – before 5 p.m. of the 10th business day following Bid opening.

A. The initial protest document shall contain a complete statement of the basis for the protest and all evidence and documents supporting the protest available to the protesting party.

B. The protest shall refer to the specific portion of the document which forms the basis for the protest.

C. The protest shall include the name, address and telephone number of the person representing the protesting party.

D. The party filing the protest shall concurrently transmit a copy of the initial protest document and any attached documentation to all other parties with a direct financial interest which may be adversely affected by the outcome of the protest. Such parties shall include all other BIDDERS or proposers who appear to have a reasonable prospect of receiving an award depending upon the outcome of the protest.

E. The DISTRICT'S Board of Supervisors will issue a decision on the protest.

F. The procedure and time limits set forth in this paragraph are mandatory and are the BIDDER'S sole and exclusive remedy in the event of Bid protest and failure to comply with these procedures shall constitute a waiver of any right to further pursue the Bid protest, including filing a Government Code Claim or legal proceedings.

ARTICLE 15 - WITHDRAWAL OF BID & BIDDER'S RELIEF

15.1 Withdrawal. This Bid may be withdrawn, in writing, prior to the time fixed in the Invitation to Bid for the opening of Bids. It is understood and agreed that this Bid will not be withdrawn after the time fixed in the Notice to BIDDERS for the opening of Bids. BIDDER further agrees that the failure of the DISTRICT to open Bids for this Project exactly at the time fixed in said Invitation to Bid shall not extend the time within which Bids may be withdrawn.

15.2 Relief of BIDDERS. Attention is directed to the provisions of Public Contract Code Sections 5100 to 5107, inclusive, concerning relief of BIDDERS and in particular to the requirement therein, that if the BIDDER claims a mistake was made in the Bid presented, the BIDDER shall give the DISTRICT written Notice within 5 Days after the opening of the Bids of the alleged mistake, specifying in the Notice in detail how the mistake occurred.

ARTICLE 16 – MODIFICATIONS AND UNAUTHORIZED ALTERNATIVE BIDS.

16.1 Conditions, limitations, or provisions attached to the Bid shall render it informal and may cause its rejection as being non-responsive. The completed Bid Forms shall be without interlineations, alterations, or erasures in the printed text. Proposals may be rejected if they show any alterations of form, additions not called for, conditional Bids, incomplete Bids, erasures, or irregularities of any kind. If the Bid amount is changed after the amount has been once inserted, the change should be initialed. Alternative Bids will not be considered unless called for.

ARTICLE 17 – DISCREPANCIES IN BIDS

17.1 The BIDDER shall furnish a price for all Bid items in the Bid Form, and failure to do so will render the Bid non-responsive and may cause its rejection.

17.2 In the event there are unit price Bid items in the Bid Form and the amount indicated for a unit price Bid item does not equal the product of the unit price and the quantity, the unit price shall govern and the amount will be corrected accordingly, and the BIDDER shall be bound by said correction. However, if the amount set forth as a unit price is ambiguous, unintelligible or uncertain for any cause, or is omitted, or is the same amount as the entry in the "Total" column, then the amount set forth in the "Total" column for the item shall prevail and shall be divided by the estimated quantity for the item to obtain a unit price.

17.3 In the event that the total indicated in the Bid Form does not agree with the corrected dollar sum of the prices bid on the individual items, the prices bid on the individual items shall govern and the total for the Bid Form will be corrected accordingly, and the BIDDER shall be bound by said correction.

ARTICLE 18 – DISQUALIFICATION OF BIDDERS

18.1 More than one Bid from an individual, firm partnership, corporation, or association under the same or different names will not be considered. If the DISTRICT believes that any BIDDER is interested in more than one Bid for the WORK contemplated, all Bids in which such BIDDER is interested will be rejected. If the DISTRICT believes that collusion exists among BIDDERS, all Bids of said BIDDERS will be rejected. A party who has quoted prices to a BIDDER is not hereby disqualified from quoting prices to other BIDDERS, or from submitting a Bid directly for the WORK.

ARTICLE 19 – EVALUATION OF BIDS

19.1 DISTRICT reserves the right to reject any or all Bids, including without limitation the rights to reject any or all nonconforming, non-responsive, unbalanced, or conditional Bids. DISTRICT further reserves the right to reject the Bid of any BIDDER whom it finds, after reasonable inquiry and evaluation, to be non-responsive. DISTRICT may also reject the Bid of any BIDDER if DISTRICT believes that it would not be in the best interest of the Project to make an award to that BIDDER. DISTRICT also reserves the right to waive all informalities not involving price, time, or changes in the WORK, and to negotiate contract terms with the Successful BIDDER.

19.2 In evaluating Bids, DISTRICT will consider whether or not the Bids comply with the prescribed requirements, unit prices, and other data as may be requested in the Bid Forms or prior to the Notice of Award. The Successful BIDDER will be determined on the basis of the Base Bid submitted.

19.3 DISTRICT may conduct such investigations as DISTRICT deems necessary to assist in the evaluation of any Bid and to establish the responsibility, qualifications, and financial ability of BIDDERS, proposed Subcontractors, Suppliers, and other individuals or entities to perform and furnish the WORK in accordance with the Contract Documents.

ARTICLE 20 – COMPETENCY AND QUALIFICATIONS OF BIDDERS

20.1 The successful BIDDER shall be licensed to perform the WORK in accordance with the laws of the State of California, and shall possess a Class "A" - General Engineering Contractor License at the time of submitting the Bid. The CONTRACTOR shall perform, with the CONTRACTOR'S own employees, contract WORK amounting to not less than 50 percent of the original total Contract Price, except that any "Specialty Items" needing to be performed by a subcontractor having a specialty contractor's license may be performed by subcontract and the amount of any "Specialty Items" performed by subcontract may be deducted from the original total Contract Price before computing the amount of WORK required to be performed by the CONTRACTOR with the CONTRACTOR'S own organization. Failure of the BIDDER to be properly and adequately licensed shall render CONTRACTOR ineligible to execute the contract and shall result in the forfeiture of the Bid Security.

20.2 No BIDDER who is ineligible to bid or work on, or be awarded, a public works project pursuant to Section 1777.1 or 1777.7 of the Labor Code shall bid on or be awarded this contract pursuant to Section 1777.1 or 1777.7 of the Labor Code.

ARTICLE 21 – ESCROW BID DOCUMENTS

21.1 This specification requires that the two low BIDDERS 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," and the requirements are described in Article 2.7 of the General Conditions. The Escrow Bid Documents of the successful BIDDER will be held in escrow for the duration of the contract. The 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 <u>not</u> be used for pre-award evaluation of the CONTRACTOR'S anticipated methods of construction or to assess the CONTRACTOR'S qualifications for performing the WORK.

21.2 The successful BIDDER agrees, as a condition of the award of the contract, that the Escrow Bid Documents constitute all of the information used in preparation of this Bid, and that no other Bid preparation information shall be considered in resolving disputes.

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

ARTICLE 22 - AWARD OF CONTRACT

22.1 Award of contract, if awarded, will be made to the lowest, responsive, responsible BIDDER who's Bid complies with the requirements of the Contract Documents. Unless otherwise indicated, a single award will be made for all Bid items in the individual Bid Forms. Such Notice of Award, if awarded, will be awarded within 60 Days after the opening of Bids. If the lowest responsive, responsible BIDDER refuses or fails to execute the Agreement, the DISTRICT'S Board of Supervisors may award the contract to the second lowest responsive, responsible BIDDER. Such Notice of Award, if awarded, will be awarded within 105 Days after the opening of Bids. If the second lowest responsive, responsible BIDDER refuses or fails to execute the Agreement, the DISTRICT'S Board of Supervisors may award the contract to the third lowest responsive, responsible BIDDER. Such Notice of Award, if awarded, will be awarded within 150 Days after the opening of Bids. The periods of time specified above within which the award of contract may be made shall be subject to extension for such further period as may be agreed upon in writing between the DISTRICT and the BIDDER concerned.

22.2 Although the Successful BIDDER will be determined on the basis of the Base Bid, the DISTRICT may award the contract based on accepting the Alternative Pipeline Bid for some or all of the Bid Items, as specified in Section 01011, "Alternative Pipeline Bid."

ARTICLE 23 - EXECUTION OF AGREEMENT

23.1 The BIDDER will sign and deliver to the DISTRICT the written Agreement, together with all certificates, Bonds, and the recycling plan required by the Contract Documents within 15 Days after receipt of the DISTRICT'S Notice of Award. Failure or refusal to enter into an Agreement as herein provided or to conform to any of the stipulated requirements in connection therewith shall be just cause for annulment of the award and forfeiture of the Bid security. On the failure or refusal of such second or third lowest BIDDER to execute the Agreement, each such BIDDER'S Bid securities shall be likewise forfeited to the DISTRICT.

ARTICLE 24 - CONTRACT TIMES

24.1 The Contract Times shall be as set forth in Section 00500, "Agreement."

ARTICLE 25 - LIQUIDATED DAMAGES

25.1 Provisions for liquidated damages, if any, shall be as set forth in Section 00500, "Agreement."

ARTICLE 26 – TEAM-BUILDING

26.1 The DISTRICT intends to encourage the foundation of a cohesive working relationship with the CONTRACTOR and its Subcontractors. This working relationship will be structured to draw on the strengths of each organization to

identify and achieve reciprocal goals. The objectives are effective and efficient contract performance, intended to achieve completion within budget, on schedule, and in accordance with the Contract Documents.

26.2 To implement this working relationship, it is anticipated that within 60 Days of the Notice to Proceed, a full-day workshop (facilitated by a third party) will be conducted, to be attended by the DISTRICT, CONTRACTOR, key Subcontractors and Suppliers, DESIGNER and ENGINEER.

ARTICLE 27 – (INTENTIONALLY BLANK)

ARTICLE 28 – PREVAILING WAGES

28.1 For information on prevailing wages, refer to Section 00020 - Invitation to Bid.

ARTICLE 29 – WORKER'S COMPENSATION REQUIREMENT

29.1 The BIDDER should be aware that in accordance with Section 3700 of the California Labor Code, it will, if awarded the contract, be required to secure the payment of compensation to its employees and execute the worker's Compensation Certification in the form contained in these Contract Documents.

ARTICLE 30 - (INTENTIONALLY BLANK)

ARTICLE 31 – (INTENTIONALLY BLANK)

ARTICLE 32 – ESCROW ACCOUNT FOR SUBSTITUTION OF SECURITIES

The BIDDER should be aware that in accordance with Section 22300 of the Public Contract Code, it will, if awarded the contract, be permitted to substitute securities for moneys withheld under the contract in accordance with the provisions of the Escrow Agreement included under Contract Forms.

<< End of Section 00100 >>

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BID FORMS

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Southern Cal Pipeline

BID FORMS

Contract 300187.08.05
Addendum No. 3

Attachment 1 - Revised Bid Forms dated 07/24/07

SO CAL
PIPELINE

CONSTRUCTION OF THE
PIPELINE SOUTH
UNITS G, G1, H1, and T11
FOR THE
NACIMIENTO WATER PROJECT
CONTRACT NO. 300187.08.05
SPECIFICATION 05

TO: THE BOARD OF SUPERVISORS OF THE SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT, STATE OF CALIFORNIA

Pursuant to and in compliance with your Invitation to Bid and Instructions to BIDDERS, the undersigned, as BIDDER, declares that the only person or parties interested in this proposal as principals are those named herein; that this proposal is made without collusion with any other person, firm or corporation; that he/she is 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 he/she will comply with such provisions before commencing the performance of the WORK of this Agreement; that he/she has carefully examined the location of the proposed WORK, the annexed proposed form of contract, and he/she proposes, and agrees if this proposal is accepted, that he/she will contract with the Board of Supervisors of the San Luis Obispo County Flood Control and Water Conservation District in the form of the copy of the contract annexed hereto, to provide all necessary machinery, tools, apparatus and other equipment needed, and to do all of the WORK and furnish all the materials specified in the contract, in the manner and the time herein prescribed, and that he/she will take in full payment therefore the following lump sum and unit price amounts. The following construction shall be based on the Contract Times specified in Section 00500, "Agreement."

Base Bid for Contract 300187.08.05

Bid Item	Unit ID	Description	Unit	Estimated Quantity	Unit Price	Amount
1	All	Mobilization	LS	1	--	$360,000
2		Shoring, Sheeting and Bracing for the following Units:				
2a	G	Pipeline (18-Inch)	LS	1	--	$ 36,236 00
2b	G1	Pipeline (18-Inch)	LS	1	--	$ 34,036 00
2c	H1	Pipeline (12-Inch)	LS	1	--	$ 27,636 00
2d	T11	SLO Turnout	LS	1	--	$ 16,236 00
3	All	Environmental Mitigation Costs	LS	1	--	$ 150,000 00

Bid Item	Unit ID	Description	Unit	Estimated Quantity	Unit Price	Amount
4		Installation of Fiber Optic Conduit and Cable System for the following Units:				
4a	G, G1, H1	Units G, G1, H1	LS	1	--	$1,000,000.00
4b	T11	SLO Turnout	LS	1	--	$10,000.00
5	G	Pipeline (18-Inch)	LF	36,400	$210.-	$7,644,000.00
6	G	Salinas River Crossing – South (18-Inch)	LS	1	--	$400,000.00
7	G1	Pipeline (18-Inch)	LF	15,785	$210.-	$3,314,850.00
8	H1	Pipeline (12-Inch)	LF	14,040	$140.-	$1,965,600.00
9	T11	SLO Turnout	LS	1	--	$365,000.00
10	--	Allowance - Contaminated Soils	LS	1	--	$150,000
11	--	Allowance – Contaminated Groundwater	LS	1	--	$50,000
12	--	Allowance - Change in Pipe Alignment or Profile Due to Utility Conflict	LS	1	--	$300,000
13	--	Subgrade Stabilization in Soft, Unstable Soils	LF	13,000	$25.-	$325,000.00
14	--	All Other Work	LS	1	--	$184,000.00

Total Bid Price in Figures: $16,332,594.00

Base Bid for Contract 300187.08.05

Total Bid Price in Words: SIXTEEN MILLION THREE HUNDRED THIRTY TWO THOUSAND AND FIVE HUNDRED NINETY FOUR DOLLARS

Alternative Pipeline Bid for Contract 300187.08.05

As Described in Specification Section 01011

**For each alternative, select the applicable pricing by circling "ADD" or "DEDUCT".*

ALTERNATIVE A – For providing 24-inch diameter pipe in lieu of 18-inch diameter pipe for Unit G as described in Bid Item 5 above, based on the requirements specified in Section 01011, the Bid Price Amount in the Base Bid Schedule above shall be increased or decreased by the price listed below:

(ADD) **(DEDUCT) *** **LUMP SUM PRICE of (in words)**

ONE MILLION FOUR HUNDRED FIFTY SIX THOUSAND DOLLARS

($ 1,456,000 00)

ALTERNATIVE B – For providing 24-inch crossing of the Salinas River in lieu of 18-inch crossing as described in Bid Item 6 above, based on the requirements specified in Section 01011, the Bid Price Amount in the Base Bid Schedule above shall be increased or decreased by the price listed below:

(ADD) **(DEDUCT) *** **LUMP SUM PRICE of (in words)**

TEN THOUSAND EIGHT HUNDRED DOLLARS

($ 10,800 00)

ALTERNATIVE C – For providing 24-inch diameter pipe in lieu of 18-inch diameter pipe for Unit G1 as described in Bid Item 7 above, based on the requirements specified in Section 01011, the Bid Price Amount in the Base Bid Schedule above shall be increased or decreased by the price listed below:

(ADD) **(DEDUCT) *** **LUMP SUM PRICE of (in words)**

SIX HUNDRED THIRTY ONE THOUSAND AND FOUR HUNDRED DOLLARS

($ 631,400 00)

BIDDER represents that he/she has hereinabove set forth for each Bid item an amount for the item, all in clearly legible figures in the respective spaces provided for that purpose.

BIDDER declares that he/she has read, and agrees to, the provisions of the Contract Documents, including, but not limited to, the General Conditions, Section 00700, and Supplementary General Conditions, Section 00800.

Accompanying this proposal is a Bid Security, as either a payment as described in Article 12 of the Instructions to Bidders, or as a Bid Bond using the form in Section 00410, "Bid Bond". Also accompanying this proposal in the form presented herein, is a "List of Subcontractors"

This Bid may be withdrawn, in writing, prior to the time fixed in the Invitation to Bid for the opening of Bids. It is understood and agreed that this Bid will not be withdrawn after the time fixed in the Notice to Bidders for the opening of Bids. BIDDER further agrees that the failure of the DISTRICT to open Bids for this Project exactly at the time fixed in said Invitation to Bid shall not extend the time within which Bids may be withdrawn.

All Bids shall remain subject to acceptance by the DISTRICT for a minimum of 60 Days from the opening of the Bids. In the event the lowest responsive, responsible BIDDER refuses or fails to execute the Agreement, then all Bids shall be subject to acceptance within the time requirements for Article 22, Award of Contract, specified in the Instruction to Bidders – Section 00100.

The undersigned BIDDER will sign and deliver to the San Luis Obispo County Flood Control and Water Conservation District the written Agreement, together with the certificates and Bonds described in the Contract Documents, within fifteen (15) calendar Days after the undersigned has received Notice that the contract has been awarded to him/her.

A BIDDER must submit a Bid Security accompanying this Bid in one of the following forms: cash, Bond, cashier's check, or certified check. The proceeds thereof shall become the property of the San Luis Obispo County Flood Control and Water Conservation District if the Bid is withdrawn after the time fixed in the Invitation to Bid and Instructions to BIDDERS for opening of Bids, or if the BIDDER shall fail within fifteen (15) Days after receiving a Notice of Award to execute a contract with the DISTRICT and furnish all certificates and Bonds required by the Instructions to Bidders and said Board of Supervisors.

ADDENDA – The undersigned acknowledges and confirms the receipt of Addenda Nos.,

Addenda Number	Date
1	5/30/2007
2	6/27/2007
3	7/24/2007
4	7/27/2007

and agrees that said addenda are covered in the Bid and shall form a part of the Contract Documents.

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 co-partners composing firm; if BIDDER or other interested person is an individual, state first and last names in full.

SOUTHERN CALIFORNIA PIPELINE CONSTRUCTION INC.

JOEL SPEAR / PRESIDENT , LINDA SPEAR / VICE PRESIDENT

BIDDER warrants and represents that he/she is licensed in accordance with an Act provided for the registration of Contractors, License No. 618835, Class A, License Expiration Date 5/31/2009. (Note: The successful BIDDER must possess the license classification specified in the Invitation to Bid and Instructions to Bidders).

Name of BIDDER SOUTHERN CALIFORNIA PIPELINE

Signature of BIDDER

Printed Name and Title JOEL SPEAR / PRESIDENT

Business Address 15991 RED HILL AVENUE, #200
TUSTIN, CA 92780

Telephone Number 714 - 838 - 3079

Date 8/2/2007

NOTICE: If BIDDER is a corporation, the legal name of the corporation shall be set forth above together with the signature of the officer or officers authorized to sign contract in behalf of the corporation; if BIDDER is a 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 on behalf of the partnership; and if the BIDDER is an individual, his signature shall be placed above; if BIDDER is a joint venture, the true name of the joint venture shall be set forth above together with the signature of the authorized agent of the joint venture. If signature is by an agent, other than an officer of a corporation or a member of a partnership, or a principal of a joint venture, a Power of Attorney must be on file with the DISTRICT prior to opening of Bids or submitted with the Bid; otherwise, the Bid will be disregarded as irregular and unauthorized.

PLEASE RETURN THIS FORM WITH YOUR BID PROPOSAL

<< End of Section 00400>>

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SECTION 00410 – BID BOND

KNOW ALL MEN BY THESE PRESENTS:

That we, SOUTHERN CALIFORNIA PIPELINE CONSTRUCTION, INC.

as Principal, and ARCH INSURANCE COMPANY

as Surety, are held and firmly bound unto the San Luis Obispo County Flood Control and Water Conservation District, State of California (Herein after called DISTRICT) in the penal sum of Ten Percent (10%) of the total aggregate amount of the Bid of the Principal above named, submitted by said Principal to DISTRICT 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 this Surety hereunder exceed the sum of TEN PERCENT OF TOTAL BID AMOUNT----------

----------($ 10% OF TOTAL BID------).

THE CONDITION OF THIS OBLIGATION IS SUCH,

That whereas a Bid to the DISTRICT for certain construction WORK referenced below, for which Bids are to be opened on AUGUST 2, 20 07, has been submitted by Principal to DISTRICT for:

CONSTRUCTION OF THE
PIPELINE SOUTH
UNITS G, G1, H1, and T11
FOR THE
NACIMIENTO WATER PROJECT
CONTRACT NO. 300187.08.05
SPECIFICATION 05

NOW, THEREFORE, if the aforesaid Principal shall not withdraw said Bid after the time fixed in the Invitation to Bid and Instructions to BIDDERS for the opening of the same, and shall within fifteen (15) calendar Days after receipt of written Notice that the contract has been awarded to him/her, enter into a written Agreement with DISTRICT, in the prescribed form, in accordance with the Bid as accepted, and file with the DISTRICT the Performance Bond, Payment Bond, and certificates of insurance as specified in Article 5 of the General Conditions, as required by law, then this obligation shall be null and void; otherwise, it shall remain in full force and effect, and the penal sum guaranteed by this Bond shall be forfeited to the DISTRICT.

Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of said contract or to the WORK to be performed thereunder or the Specifications accompanying the same shall in any manner affect its obligations on this Bond, and it does hereby waive Notice of any such change, extension, alteration, or addition.

In the event suit is brought upon said Bond by DISTRICT and judgment is recovered, the Surety shall pay all costs incurred by DISTRICT in such suit, including a reasonable attorney's fee to be fixed by the court. Death of the Principal shall not relieve Surety of its obligations hereunder.

IN WITNESS WHEREOF, we have hereunto set our hands and seals on this 31ST day of JULY, 20 07.

BY: _____ (Seal)

JOEL SPEAR / PRESIDENT (Seal)

SOUTHERN CALIFORNIA PIPELINE CONSTRUCTION, INC. (Seal)

Principal

BY: Paul Boucher (Seal)

PAUL BOUCHER, ATTORNEY-IN-FACT (Seal)

ARCH INSURANCE COMPANY (Seal)

Surety

135 N. LOS ROBLES AVE., #825

PASADENA, CA 91101

Address

NOTE:

Signatures of those executing for Surety must be properly acknowledged.

<< End of Section 00410>>

PLEASE RETURN THIS FORM WITH YOUR BID PROPOSAL

STATE OF CALIFORNIA

COUNTY OF LOS ANGELES

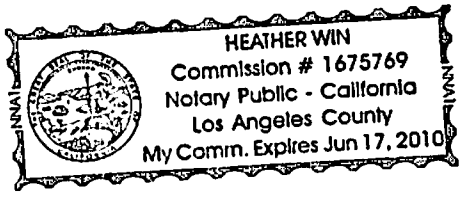
Bond No. N/A

On JULY 31, 2007, before me, HEATHER WIN, a Notary Public in and for the above county, personally appeared PAUL BOUCHER to me personally known, who, being by me duly sworn, did state that he/she is Attorney-in-Fact of ARCH INSURANCE COMPANY, a corporation organized and existing under the laws of the state of MISSOURI, that the seal affixed to the foregoing instrument is the corporate seal of the said corporation, that the instrument was signed, sealed, and executed in behalf of said corporation by authority of its Board of Directors, and further acknowledged the said instrument and the execution thereof to be the voluntary act and deed of said corporation by his voluntarily executed.

IN WITNESS WHEREOF, I have hereunto subscribed by name and affixed my official seal the day and year first above written.

My Commission Expires: JUNE 17, 2010

Heather Win
Notary Public



POWER OF ATTORNEY

Know All Men By These Presents:

That the Arch Insurance Company, a corporation organized and existing under the laws of the State of Missouri, having its principal office in Kansas City, Missouri (hereinafter referred to as the "Company") does hereby appoint

Keith W. Newell, Paul Boucher, and Maria A. Quiroz of Los Angeles, CA (EACH)

its true and lawful Attorney(s)-in-Fact, to make, execute, seal, and deliver from the date of issuance of this power for and on its behalf as surety, and as its act and deed:

Any and all bonds and undertakings

EXCEPTION: NO AUTHORITY is granted to make, execute, seal and deliver bonds or undertakings that guarantee the payment or collection of any promissory note, check, draft or letter of credit.

This authority does not permit the same obligation to be split into two or more bonds in order to bring each such bond within the dollar limit of authority as set forth herein.

The Company may revoke this appointment at any time.

The execution of such bonds and undertakings in pursuance of these presents shall be as binding upon the said Company as fully and amply to all intents and purposes, as if the same had been duly executed and acknowledged by its regularly elected officers at its principal office in Kansas City, Missouri.

This Power of Attorney is executed by authority of resolutions adopted by unanimous consent of the Board of Directors of the Company on March 3, 2003, true and accurate copies of which are hereinafter set forth and are hereby certified to by the undersigned Secretary as being in full force and effect:

"VOTED, That the Chairman of the Board, the President, or any Vice President, or their appointees designated in writing and filed with the Secretary, or the Secretary shall have the power and authority to appoint agents and attorneys-in-fact, and to authorize them to execute on behalf of the Company, and attach the seal of the Company thereto, bonds and undertakings, recognizances, contracts of indemnity and other writings, obligatory in the nature thereof, and any such officers of the Company may appoint agents for acceptance of process."

This Power of Attorney is signed, sealed and certified by facsimile under and by authority of the following resolution adopted by the unanimous consent of the Board of Directors of the Company on March 3, 2003:

VOTED, That the signature of the Chairman of the Board, the President, or any Vice President, or their appointees designated in writing and filed with the Secretary, and the signature of the Secretary, the seal of the Company, and certifications by the Secretary, may be affixed by facsimile on any power of attorney or bond executed pursuant to the resolution adopted by the Board of Directors on March 3, 2003, and any such power so executed, sealed and certified with respect to any bond or undertaking to which it is attached, shall continue to be valid and binding upon the Company.

In Testimony Whereof, the Company has caused this instrument to be signed and its corporate seal to be affixed by their authorized officers, this 5th day of December, 2006.

Arch Insurance Company

Attested and Certified

Martin J. Nilsen, Secretary

Edward M. Titus, Vice President

STATE OF NEW YORK SS

COUNTY OF NEW YORK SS

I Peter J. Calleo, a Notary Public, do hereby certify that Edward M. Titus and Martin J. Nilsen personally known to me to be the same persons whose names are respectively as Vice President and Secretary of the Arch Insurance Company, a Corporation organized and existing under the laws of the State of Missouri, subscribed to the foregoing instrument, appeared before me this day in person and severally acknowledged that they being thereunto duly authorized signed, sealed with the corporate seal and delivered the said instrument as the free and voluntary act of said corporation and as their own free and voluntary acts for the uses and purposes therein set forth.

PETER J. CALLEO, ESQ.
Notary Public, State of New York
No. 02CA6109336
Qualified in New York County
Commission Expires May 3, 2008

Peter J. Calleo, Notary Public
My commission expires 5-03-2008

CERTIFICATION

I, Martin J. Nilsen, Secretary of the Arch Insurance Company, do hereby certify that the attached Power of Attorney dated on behalf of the person(s) as listed above is a true and correct copy and that the same has been in full force and effect since the date thereof and is in full force and effect on the date of this certificate; and I do further certify that the said Edward M. Titus, who executed the Power of Attorney as Vice President, was on the date of execution of the attached Power of Attorney the duly elected Vice President of the Arch Insurance Company.

IN TESTIMONY WHEREOF, I have hereunto subscribed my name and affixed the corporate seal of the Arch Insurance Company on this 31ST day of JULY, 20 07.

Martin J. Nilsen, Secretary

This Power of Attorney limits the acts of those named therein to the bonds and undertakings specifically named therein and they have no authority to bind the Company except in the manner and to the extent herein stated.

PLEASE SEND ALL CLAIM INQUIRIES RELATING TO THIS BOND TO THE FOLLOWING ADDRESS:

Arch Contractors & Developers Group
135 N. Robles Ave., Ste. 825
Pasadena, CA 91101

SECTION 00430 – LIST OF SUBCONTRACTORS

CONSTRUCTION OF THE
PIPELINE SOUTH
UNITS G, G1, H1, and T11
FOR THE
NACIMIENTO WATER PROJECT
CONTRACT NO. 300187.08.05
SPECIFICATION 05

In compliance with the provisions of Sections 4100-4114 of the Public Contract Code of the State of California and any amendments thereto, the undersigned BIDDER sets forth the following:

a. The name and location of the place of business of each Subcontractor who will perform work or labor, or render service to the undersigned BIDDER (prime contractor) in or about the construction of the WORK or improvement, or a Subcontractor licensed by the State of California who, under subcontract to the BIDDER (prime contractor), specially fabricates and/or installs a portion of the WORK or improvement according to detailed drawings contained in the plans and Specifications, in the amount in excess of one-half of one percent of the undersigned BIDDER'S (prime contractor's) total Bid.

b. BIDDER shall list in table below the portion of the WORK which will be done by each such Subcontractor. Only one Subcontractor shall be listed for each such portion. Substitution of a listed Subcontractor may not occur absent Notice to the listed Subcontractor and a reasonable opportunity for that Subcontractor to object, and, thereafter, approval of the substitution by the DISTRICT. No substitution of a listed Contractor may occur except as authorized by Public Contract Code, Sections 4107 and 4107.5.

By: _____
(BIDDER's Signature)

NOTE: When there is a failure to list a Subcontractor, as required, the law provides that the CONTRACTOR agrees to do the WORK with his or her own forces. In such case, BIDDER must be authorized to perform said WORK. Any Bid not complying with the provisions hereof may be rejected. Also note the requirements of Article 20.1 of Section 00100 regarding amount of WORK to be self-performed by the BIDDER. Any Bid not complying with the provisions of said article hereof may be rejected.

PLEASE RETURN THIS FORM WITH YOUR BID PROPOSAL

Bid Form Item and Description of Subcontractor's WORK	Subcontractor	Address	Approximate Dollar Value for Subcontractor's WORK
ITEM # 5,6,7,8 / BORE	GOLDEN STATE BORING	2028 E. CEDAR ST. ONTARIO, CA 91761	$1,018,590 —
ITEM # 4 / FIBER OPTIC	LIGHT SOURCE 1	23935 FAMBROUGH ST. NEWHALL, CA	$334,000 —
ITEM # 5,7,9 / ASPHALT	UNION ASPHALT	1625 EAST DONOVAN RD., STA. MARIA, CA	$522,000 —
ITEM # 14 / BRIDGE	CONTECH BRIDGE SOLUTIONS	8301 STATE Hwy 29 NORTH ALEXANDRIA, MN	$87,900 —

PLEASE RETURN THIS FORM WITH YOUR BID PROPOSAL

SOUTHERN CALIFORNIA PIPELINE CONST., INC.
1100 IRVINE BLVD. #37
TUSTIN, CA 92780
(714) 838-3079 * FAX (714) 838-0222

TRANSMITTAL SHEET

TO: John Zanussi	FROM: Joel Spear/Mark Baul
COMPANY: JACOBS	DATE: 8/3/07
PHONE NUMBER: 805-231-9778	TOTAL NO. OF PAGES: 2
FAX NUMBER: 805-788-2768	SO CAL JOB #:
RE: PIPELINE SOUTH UNITS G, G1,H1, & T11 CONTRACT# 300187.08.05 SPECIFICATION 05	YOUR REFERENCE NUMBER:

☑ URGENT ☐ FOR REVIEW ☐ PLEASE COMMENT ☐ PLEASE REPLY ☐ PLEASE RECYCLE

Notes/Comments:

PLEASE SEE ATTACHED LIST OF SUBCONTRACTORS PAGE 00430-2

NWP Nacimiento Water Project
RECEIVED
AUG - 3 2007
FILE NO. 300187 -

Bid Form Item and Description of Subcontractor's WORK	Subcontractor	Address	Approximate Dollar Value for Subcontractor's WORK
ITEM # 5,6,7,8 / BORE	GOLDEN STATE BORING	2028 E. CEDAR ST. ONTARIO, CA 91761	$1,018,590.—
ITEM # 4 / FIBER OPTIC	LIGHT SOURCE	23935 FAMBROUGH ST. NEWHALL, CA	$334,000.—
ITEM # 5,7,9 / ASPHALT	UNION ASPHALT	1625 EAST DONOVAN RD., STA. MARIA, CA	$522,000.—
ITEM # 14 / BRIDGE	CONTECH BRIDGE SOLUTIONS	8301 STATE HWY 29 NORTH ALEXANDRIA, MN	$87,900.—
4,5,6,7,8,9 / VALVES & APPURTENANCES	YO FIRE	11120 WESTERN AVE., STANTON, CA	$1,041,213.—
5,6,7,8,9 / HYDROSEEDING	ACACIA	604 S. SAN MARCOS ROAD, SANTA BARBARA, CA	$58,125.—
9 / ELECTRICAL WORK	SAPPHIRE ELECTRIC	5725 KEARNY VILLA RD., SAN DIEGO, CA	$69,000.—
5,6,7,8,9 / GEOTECHNICAL SERVICE	BUENA GEOTECHNICAL SERVICES	3850 RAMADA DRIVE, PASO ROBLES, CA	$40,945.—
5,6,7,8,9 / SURVEY	FLEMING SURVEY	200 E. FESLER, SUITE 204, SANTA MARIA, CA	$225,000.—
5,6,7,8 / PIPE	U.S. PIPE	1375 MAGNOLIA AVE., CORONA, CA	$2,049,381.28
5,6,7,8,9 / AGGREGATES	UNION ASPHALT	1625 EAST DONOVAN RD., STA. MARIA, CA	$460,000.—
5,6,7,8,9 / AGGREGATES	CENTRAL COAST TRANSFER	1163 ARROYO GRANDE, CA	$460,000.—
5,6,7,8,9 / AGGREGATES	HANSON	131 SUBURBAN RD., SAN LUIS OBISPO, CA	$460,000.—

PLEASE RETURN THIS FORM WITH YOUR BID PROPOSAL

SECTION 00453 – NONCOLLUSION AFFIDAVIT

CONSTRUCTION OF THE
PIPELINE SOUTH
UNITS G, G1, H1, and T11
FOR THE
NACIMIENTO WATER PROJECT
CONTRACT NO. 300187.08.05
SPECIFICATION 05

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

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

AUGUST 02, 2007 [Date]

PRESIDENT

Signature and Title of BIDDER

PLEASE RETURN THIS FORM WITH YOUR BID PROPOSAL

<< End of Section 00453>>

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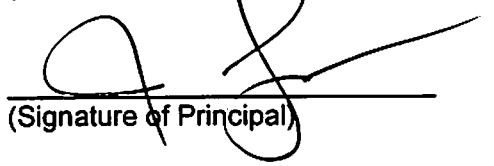
SECTION 00454 – WORKER'S COMPENSATION CERTIFICATION (Sample Form)

CONSTRUCTION OF THE
PIPELINE SOUTH
UNITS G, G1, H1, and T11
FOR THE
NACIMIENTO WATER PROJECT
CONTRACT NO. 300187.08.05
SPECIFICATION 05

WORKER'S COMPENSATION CERTIFICATION TO BE EXECUTED BY CONTRACTOR BEFORE START OF CONSTRUCTION

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 Agreement.

SOUTHERN CALIFORNIA PIPELINE
(Name of Contractor)



(Signature of Principal)

<< End of Section 00454>>

PLEASE RETURN THIS FORM WITH YOUR BID PROPOSAL

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SECTION 00456 – CERTIFICATION REGARDING DEBARMENT, SUSPENSION, AND OTHER RESPONSIBILITY MATTERS

Name of BIDDER (Company/Entity): SOUTHERN CALIFORNIA PIPELINE

The BIDDER certifies to the best of its knowledge and belief that it and its principals:

(a) Have not been debarred, suspended, proposed for debarment, declared ineligible, or voluntarily or otherwise excluded from covered transactions by a government entity (Federal, State, or local) within the three year period preceeding this proposal.

(b) Have not within a three year period preceding this proposal been convicted of or had a civil verdict or judgment rendered against them for any act or omission in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property, or fraud or the making of false claims;

(c) Are not presently indicted for or otherwise criminally or civilly charged by a government entity (Federal, State, or local) with commission of any of the offenses enumerated in paragraphs (a) and (b) of this certification; and

(d) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

I understand that a false statement on this certification may be grounds for rejection of this proposal or termination of the award.

JOEL SPEAR / PRESIDENT

Name and Title of Authorized Representative (Typed / Printed)

Signature of Authorized Representative

8/2/2007

Date

☐ I am unable to certify to the above statements; my signed and certified explanation is attached.

PLEASE RETURN THIS FORM WITH BID PROPOSAL

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CONTRACT FORMS

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SECTION 00500 – AGREEMENT

THIS AGREEMENT is dated as of the _____ day of _____ in the year 2007 by and between San Luis Obispo County Flood Control and Water Conservation District (hereinafter called DISTRICT) and _____ (hereinafter called CONTRACTOR).

DISTRICT and CONTRACTOR, in consideration of the mutual covenants hereinafter set forth, agree as follows:

ARTICLE 1. WORK.

That the CONTRACTOR will, at his own cost and expense, do all the WORK and furnish all the equipment and materials necessary to perform and complete in good and workmanlike manner to the satisfaction of the Board of Supervisors of the DISTRICT, for

CONSTRUCTION OF THE
PIPELINE SOUTH
UNITS G, G1, H1, and T11
FOR THE
NACIMIENTO WATER PROJECT
CONTRACT NO. 300187.08.05
SPECIFICATION 05

all in strict accordance with the Contract Documents.

ARTICLE 2. CONTRACT TIMES.

The CONTRACTOR shall begin work on the Commencement Date specified in the DISTRICT'S Notice to Proceed ("NTP"), and the WORK to be accomplished under this Agreement shall be completed within the time limits provided below for completion of intermediate Milestones, Substantial Completion, and Final Completion.

No.	Milestone	Time Limit
1	Substantial Completion	690 successive Days after the Commencement Date stated in the Notice to Proceed
2	Final Completion	780 successive Days after the Commencement Date stated in the Notice to Proceed

The above time limits may only be changed by a Change Order issued pursuant to Articles 10 and 12 of the General Conditions.

ARTICLE 3. LIQUIDATED DAMAGES AND INCENTITVE PROVISIONS.

A. Liquidated Damages.

DISTRICT and the CONTRACTOR recognize that time is of the essence of this Agreement and that the DISTRICT will suffer significant additional financial costs and expenses if the WORK is not completed within the Contract Times specified in Article 2 above. They also recognize the delays, expense, and difficulties involved in proving in a legal preceding the actual loss suffered by the DISTRICT if said WORK is not completed on time. Accordingly, instead of requiring any such proof, the DISTRICT and the CONTRACTOR agree that as liquidated damages for delay (but not as a penalty), the CONTRACTOR shall pay the DISTRICT in accordance with the following table:

No.	Milestone	Liquidated Damages, until Milestone is Completed	Maximum Limit
1	Substantial Completion	$5,740 Per Day	Unlimited
2	Final Completion	$1,000 Per Day	Unlimited

For each day completion of WORK is delayed beyond any of the Contract Times listed in Article 2 above, the CONTRACTOR shall pay to the DISTRICT liquidated damages pursuant to the table set forth above. The DISTRICT may deduct said liquidated damages from any payments due (or to become due) CONTRACTOR under this Agreement.

B. Incentive Provision.

If the CONTRACTOR completes the WORK associated with a specified Milestone as evidenced by an early completion certificate jointly executed by the ENGINEER and the CONTRACTOR, then the DISTRICT will allow additional payment for such early completion as specified in the following table:

No.	Milestone	Incentive for Completion Ahead of Milestone Specified	Maximum Limit
1	Substantial Completion	$1,400 Per Day	$50,000
2	Final Completion	$0 Per Day	$0

Payment of the incentive will be authorized on the final payment request following the execution of the early completion certificate executed jointly by the CONTRACTOR and the ENGINEER, and submitted with the final payment request.

ARTICLE 4. CONTRACT PRICE.

The CONTRACTOR will receive and accept and the DISTRICT will pay the prices specified in the attached Bid, which is incorporated herein by reference, as full compensation for furnishing all labor, materials, and equipment for doing all the WORK contemplated and embraced in this Agreement. To the extent permitted by law, the CONTRACTOR assumes during the progress of the WORK and before its acceptance, any and all loss or damage arising out of the nature of the WORK aforesaid or from the action of the elements, or from any unforeseen difficulties or obstructions which may arise or be encountered in the prosecution of the WORK until its acceptance by the DISTRICT. CONTRACTOR assumes any and all expenses incurred by or in consequence of suspension or discontinuance of WORK, for well and faithfully completing the WORK, and the whole thereof, in the manner and to the requirements of the Contract Documents.

ARTICLE 5. PAYMENT PROCEDURES.

CONTRACTOR shall submit Applications for Payment in accordance with Article 14 of the General Conditions. Applications for Payment will be processed by ENGINEER as provided in the General Conditions.

ARTICLE 6. CONTRACT DOCUMENTS.

The full, complete and exclusive contract between the DISTRICT and CONTRACTOR hereto shall consist of the following identified documents (the "Contract Documents"):

A. Invitation to Bid (Section 00020)
B. Signatures and Stamps (Section 00025)
C. Instructions to Bidders (Section 00100)
D. Bid Forms (Section 00400)
E. Bid Bond (Section 00410)
F. List of Subcontractors (Section 00430)
G. Non-Collusion Affidavit (Section 00453)
H. Worker's Compensation Certification (Section 00454)
I. Certification Regarding Debarment, Suspension, and Other Responsibility Matters (Section 00456)
J. Agreement (Section 00500)
K. Performance Bond (Section 00510)
L. Payment Bond (Section 00520)
M. General Conditions (Section 00700)
N. Supplementary General Conditions (Section 00800)
O. Insurance Certificates and Endorsements
P. General Requirements (Specifications Division 1 and appendices thereto)
Q. Technical Specifications (Division 2 – 16)
R. Drawings
S. Standard Details

T. Notice of Award, Notice to Proceed
U. Addenda
V. Change Orders
W. Field Orders.

There are no Contract Documents other than those listed in this Article 6. The Contract Documents may only be amended by Change Order as provided in Paragraph 10, 11, and 12 of the General Conditions.

ARTICLE 7. ASSIGNMENT AND NOVATION

No assignment by a party hereto of any rights under or interests in the Contract Documents will be binding on another party hereto without the written consent of the party sought to be bound; and specifically but without limitation monies that may become due and monies that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

DISTRICT and CONTRACTOR each binds itself, its partners, successors, assigns and legal representatives to the other party hereto, its partners, successors, assigns and legal representatives in respect of all covenants, agreements and obligations contained in the Contract Documents.

<< Signatures on following page>>

IN WITNESS WHEREOF, DISTRICT and CONTRACTOR have caused this Agreement to be executed the day and year first above written.

SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

By: _____
Chairperson of the Board of Supervisors
San Luis Obispo County Flood Control and Water Conservation District

ATTEST:

_____
Clerk of the Board of Supervisors
San Luis Obispo County Flood Control and Water Conservation District

By: _____
Deputy Clerk

_____
CONTRACTOR

APPROVAL RECOMMENDED:
NOEL KING

By: Noel King
Director of Public Works

Date: 4/18/07

By: _____

_____
(Printed Name and Title)

Date Signed:

_____

APPROVED AS TO FORM AND LEGAL EFFECT:
JAMES B. LINDHOLM, JR.
County Counsel

By: Patrick K. Toon

Date: 4/18/07

By: _____

_____
(Printed Name and Title)

Date Signed:

_____

AGREEMENT CERTIFICATE
(if Corporation)

STATE OF)
) SS:
COUNTY OF)

I HEREBY CERTIFY that a meeting of the Board of Directors of the _____

_____

a corporation existing under the laws of the State of _____, held on _____, 20__, the following resolution was duly passed and adopted:

"RESOLVED, that, _____ as _____ President of the Corporation, be and is hereby authorized to execute the Agreement dated _____, 20__, to the San Luis Obispo County Flood Control and Water Conservation District by this corporation and that his execution thereof, attested by the Secretary of the Corporation, and with the Corporate Seal affixed, shall be the official act and deed of this Corporation."

I further certify that said resolution is now in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the official seal of the corporation this _____, day of _____, 20__.

_____
Secretary

(SEAL)

AGREEMENT CERTIFICATE
(if Partnership)

STATE OF)
) SS:
COUNTY OF)

I HEREBY CERTIFY that a meeting of the Partners of the _____

_____

a partnership existing under the laws of the State of _____, held on _____, 20__, the following resolution was duly passed and adopted:

"RESOLVED, that, _____ as _____ of the Partnership, be and is hereby authorized to execute the Agreement dated _____, 20__, to the San Luis Obispo County Flood Control and Water Conservation District by this partnership and that his execution thereof, attested by the _____ shall be the official act and deed of this Partnership."

I further certify that said resolution is now in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand this _____, day of _____, 20__.

_____
Partner

(SEAL)

AGREEMENT CERTIFICATE
(if Joint Venture)

STATE OF)
) SS:
COUNTY OF)

I HEREBY CERTIFY that a meeting of the Principals of the _____

_____

a joint venture existing under the laws of the State of _____, held on _____, 20__, the following resolution was duly passed and adopted:

"RESOLVED, that _____, as _____ of the Joint Venture, be and is hereby authorized to execute the Agreement dated _____, 20__ to the San Luis Obispo County Flood Control and Water Conservation District by this joint venture and that his execution thereof, attested by the shall be the official act and deed of this Joint Venture."

I further certify that said resolution is now in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand this _____, day of _____, 20__.

_____
Authorized Agent

(SEAL)

<<End of Section 00500>>

SECTION 00510 – PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: That

WHEREAS, the Board of Supervisors of the San Luis Obispo County Flood Control and Water Conservation District, State of California, has awarded to

_____

(hereinafter designated as "Principal") a contract for construction of the Nacimiento Water Project Pipeline South pursuant to the Contract Documents (as defined in Article 1 of the General Conditions (Section 00700) of Contract No. 300187.08.05); 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 San Luis Obispo County Flood Control and Water Conservation District, (hereinafter called "DISTRICT"), in the penal sum of

_____

($_____), lawful money of the United States, to be paid to the DISTRICT, for which payment we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents, to the DISTRICT.

The condition of this obligation is such that if the above bounded Principal, or its heirs, executors, administrators, successors or assigns, shall in all respects stand to and abide by, and well and truly keep and perform the covenants, conditions and agreements in the said contract and any alteration thereof made as therein provided, 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 indemnify and save harmless DISTRICT, its officers, agents, and employees, as therein

stipulated, then this obligation shall become null and void; otherwise it shall be and remain in full force virtue and effect.

And the said Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the WORK to be performed hereunder, or the Specifications accompanying the same shall in any way affect its obligations on this Bond, and it does hereby waive Notice of any such change, extension of time, alteration, or additions to the terms of the contract or to the WORK or to the Specifications.

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

Death of the Principal shall not relieve Surety of its obligations hereunder.

IN WITNESS WHEREOF, one identical counterpart of this instrument, which shall for all purposes be deemed an original thereof, has been duly executed by Principal and Surety above named, on the _____ day of _____, 20____.

_____ (Seal)

_____ (Seal)

_____ (Seal)
Principal

_____ (Seal)

_____ (Seal)

_____ (Seal)
Surety

_____

_____
Address

NOTE:

Signatures of those executing for Surety must be properly acknowledged.

<<End of Section 00510>>

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SECTION 00520 – PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS:

WHEREAS, the Board of Supervisors of the San Luis Obispo County Flood Control and Water Conservation District, State of California, and _____ (herein after designated as "Principal") have entered into an agreement for _____

_____

_____

which said Agreement, and all of the Contract Documents attached to or forming a part of said Agreement, are hereby referred to and made a part hereof; and

WHEREAS, pursuant to law, the Principal is required before entering upon the performance of the WORK, to file a good and sufficient Bond with the body by whom the contract is awarded, to secure claims to which reference is made in Sections 3247 through 3252, inclusive, of the Civil Code of California, and Sections 3181, 3110, 3111 and 3112 of the Civil Code of California,

NOW, THEREFORE, said Principal and the undersigned

_____

as corporate surety, are held and firmly bound unto the San Luis Obispo County Flood Control and Water Conservation District, and unto all laborers, materialmen and other persons referred to in said statutes in the sum of _____

_____($_____),

lawful money of the United States, for the payment of which sum well and truly made, we bind ourselves, our heirs, executors, administrators, successors, or assigns, jointly and severally by these presents.

The condition of this obligation is such that if the said Principal, his/her or its heirs, executors, administrators, successors or assigns, or Subcontractors, shall fail to pay any of the persons named in Civil Code Section 3181, or amounts due under the Unemployment Insurance Code with respect to WORK or labor performed by any such claimant, or any amounts required to be deducted, withheld, and paid over to the Employment Development Department from the wages of employees of the Principal and his Subcontractors pursuant to Section 13020 of the Unemployment Insurance Code, with respect to such WORK and labor, that the surety herein 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, the said surety will pay a reasonable attorney's fee to be fixed by the court.

This Bond shall inure to the benefit of any of the persons named in Civil Code Section 3181 as to give a right of action to such persons or their assigns in any suit brought upon this Bond.

Should the condition of this Bond be fully performed, then this obligation shall become null and void, otherwise it shall be and remain in full force, virtue and effect.

And the said Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration, or addition to the terms of said contract or to the WORK to be performed hereunder or the Specifications accompanying the same shall in any manner effect its obligations on this Bond, and it does hereby waive Notice of any such change, extension, alteration, or addition.

Death of the Principal shall not relieve Surety of its obligations hereunder.

IN WITNESS WHEREOF, one identical counterpart of this instrument, which shall for all purposes be deemed an original thereof, has been duly executed by Principal and Surety above named, on the _____ day of _____, 20____.

_____ (Seal)

_____ (Seal)

_____ (Seal)
Principal

_____ (Seal)

_____ (Seal)

_____ (Seal)
Surety

_____

_____
Address

NOTE:

Signatures of those executing for Surety must be properly acknowledged.

<< End of Section 00520 >>

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SECTION 00525 – ESCROW AGREEMENT

FOR SECURITY DEPOSITS IN LIEU OF RETENTION

This Escrow Agreement is made and entered into by and between the San Luis Obispo County Flood Control and Water Conservation District, whose address is San Luis Obispo County Government Center, Room 207, 976 Osos Street, San Luis Obispo, California, 93408 (hereinafter called "DISTRICT"), _____whose address is _____ (hereinafter called "CONTRACTOR"); and _____, a state or federally chartered bank in California whose address is_____ (hereinafter called "Escrow Agent").

For the consideration hereinafter set forth, the DISTRICT, 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 the DISTRICT pursuant to the Agreement entered into between the DISTRICT and CONTRACTOR for _____ in the amount of _____ Dollars ($_____), and dated _____, 20___, (the "Agreement"). Alternatively, on written request of the CONTRACTOR, the DISTRICT shall make payments of the retention earnings directly to the Escrow Agent. When CONTRACTOR deposits the securities as a substitute for retention earnings, the Escrow Agent shall notify the DISTRICT within ten (10) calendar Days of the deposit. The market value of the securities at the time of the substitution, as valued by the DISTRICT, shall be at least equal to the cash amount then required to be withheld as retention under the terms of the Agreement between the DISTRICT and CONTRACTOR. If the DISTRICT determines that the securities are not adequate it will notify CONTRACTOR and Escrow Agent, and CONTRACTOR shall deposit additional security as further determined by the DISTRICT. Securities shall be held in the name of the DISTRICT and shall designate the CONTRACTOR as the beneficial owner.

2. Thereafter, DISTRICT shall make progress payments to the CONTRACTOR for such funds which otherwise would be withheld from progress payments pursuant to the

Agreement provisions, provided that the Escrow Agent holds securities in the form and amount specified above.

3. When the DISTRICT makes payment of retentions earned directly to the Escrow Agent, the Escrow Agent shall hold them for benefit of the CONTRACTOR until such time as the escrow created under this Escrow Agreement is terminated. The CONTRACTOR may direct the investment of the payments into securities. All terms and conditions of this Escrow Agreement and the rights and responsibilities of the parties shall be equally applicable and binding when the DISTRICT pays the Escrow Agent directly.

4. The 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 DISTRICT. These expenses and payment terms shall be determined by the DISTRICT, CONTRACTOR, and Escrow Agent.

5. The interest earned on the securities or the money market accounts held in escrow and all interest earned on that interest shall be for the sole account of CONTRACTOR and shall be subject to withdrawal by CONTRACTOR at any time and from time to time without Notice to the DISTRICT.

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 DISTRICT to the Escrow Agent that DISTRICT consents to the withdrawal of the amount sought to be withdrawn by CONTRACTOR.

7. The DISTRICT shall have the right to draw upon the securities or any amount paid directly to Escrow Agent in the event of default by the CONTRACTOR. Upon seven (7) Days written Notice to the Escrow Agent from the DISTRICT of the default, the Escrow Agent shall immediately convert the securities to cash and shall distribute the cash.

8. Upon receipt of written notification from the DISTRICT certifying that the Agreement is final and complete, and that the CONTRACTOR has complied with all requirements and procedures applicable to the Agreement, 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 moneys and securities on deposit and payment of fees and charges.

9. Escrow Agent shall rely on the written notifications from the DISTRICT and CONTRACTOR pursuant to Sections (5), (6), (7), and (8) of this Agreement and the DISTRICT and CONTRACTOR shall hold Escrow Agent harmless from Escrow Agent's release and disbursement of the securities and interest as set forth above.

10. Pursuant to Public Contract Code section 22300, CONTRACTOR shall pay to each Subcontractor, not later than twenty (20) Days after receipt of the payment, the respective amount of interest earned, net of costs attributed to retention withheld from each Subcontractor, on the amount of retention withheld to insure the performance of the CONTRACTOR.

11. Securities eligible for investment under this Agreement, as provided by Public Contract Code section 22300, shall be those listed in section 16430 of the Government Code, bank or savings and loan certificates of deposit, interest bearing demand deposit accounts, standby letters of credit, or any other security mutually agreed to by the CONTRACTOR and DISTRICT.

12. The names of the persons who are authorized to give written Notice or to receive written Notice on behalf of the DISTRICT, the CONTRACTOR, and the Escrow Agent in connection with the foregoing, and exemplars of their respective signatures are as follows:

ON BEHALF OF DISTRICT:

_____

Title

_____

Name

_____

Signature

ON BEHALF OF CONTRACTOR:

_____

Title

_____

Name

_____

Signature

ON BEHALF OF ESCROW AGENT:

_____

Title

_____

Name

_____

Signature

At the time the Escrow Account is opened, the DISTRICT 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.

DISTRICT:

_____

Title

_____

Name

_____

Signature

CONTRACTOR:

_____

Title

_____

Name

_____

Signature

ESCROW AGENT:

_____

Title

_____

Name

_____

Signature

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CONDITIONS OF THE CONTRACT

- **General Conditions**
- **Supplementary General Conditions**

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SECTION 00700 – GENERAL CONDITIONS

TABLE OF CONTENTS

ARTICLE 1 - DEFINITIONS

Wherever used in these General Conditions or in the other Contract Documents the following terms have the meanings indicated (which are applicable to both the singular and plural thereof). Where an entire word is in upper case in the definitions and is found in lower case in the Contract Documents, the lower case use of the word shall connotes its ordinary meaning within the context it is used. Throughout the Contract Documents, use of the conjunctive term "and" or the disjunctive term "or" shall mean "and/or" unless the context within which the term is used would make it clearly repugnant to expand the plain meaning of the term to include its conjunctive/disjunctive counterpart.

Addenda - Written or graphic instruments issued prior to the opening of Bids which make clarifications, additions, deletions, or revisions to the Contract Documents.

Agreement - The written document signed by the DISTRICT and the CONTRACTOR which incorporates all of the Contract Documents. The form of the Agreement is set forth in Section 00500.

Application for Payment - The form acceptable to the ENGINEER which is to be used by the CONTRACTOR to request progress or final payment and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

Asbestos - Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.

Bid - The offer or proposal of the BIDDER submitted on the prescribed form setting forth the price or prices for the WORK.

BIDDER – The individual or entity that submits a Bid directly to the DISTRICT.

Bonds - Bid, Performance, and Payment Bonds and other instruments which protect against loss due to inability or refusal of the CONTRACTOR to perform.

Change Order - A document recommended by the ENGINEER, which is signed by the CONTRACTOR and the DISTRICT, and authorizes an addition, deletion, or revision in the WORK, or an adjustment in the Contract Price or the Contract Time(s), issued on or after the Effective Date of the Agreement.

Change Proposal - A document prepared by the CONTRACTOR at the request of the DISTRICT, which proposes changes to the WORK and/or changes to the Contract Price and/or Contract Time.

Certificate of Substantial Completion - A form signed by the ENGINEER and the CONTRACTOR recommending to the DISTRICT that all the WORK is substantially complete and fixing the date of Substantial Completion.

Clarification - A document issued by the ENGINEER to the CONTRACTOR that interprets the requirement(s) and/or design intent of the Contract Documents, but does

not represent an addition, deletion, or revision in the WORK or an adjustment in the Contract Price or the Contract Time(s).

Commencement Date - The date established in the Notice to Proceed for the initiation of Contract Time(s) for completion of the Project.

Construction Manager – See definition for ENGINEER.

Contract Documents - The full, complete and exclusive contract between the DISTRICT and CONTRACTOR hereto consisting of the following identified documents:

1. Invitation to Bid (Section 00020)
2. Signatures and Stamps (Section 00025)
3. Instructions to Bidders (Section 00100)
4. Bid Forms (Section 00400)
5. Bid Bond (Section 00410)
6. List of Subcontractors (Section 00430)
7. Non-Collusion Affidavit (Section 00453)
8. Worker's Compensation Certification (Section 00454)
9. Certification Regarding Debarment, Suspension, and Other Responsibility Matters (Section 00456)
10. Agreement (Section 00500)
11. Performance Bond (Section 00510)
12. Payment Bond (Section 00520)
13. General Conditions (Section 00700)
14. Supplementary General Conditions (Section 00800)
15. Insurance Certificates and Endorsements
16. General Requirements (Specifications Division 1 and appendices thereto)
17. Technical Specifications (Division 2 – 16)
18. Drawings
19. Standard Details
20. Notice of Award, Notice to Proceed
21. Addenda
22. Change Orders
23. Field Orders.

Contract Number – The DISTRICT's Work Breakdown Structure (WBS) accounting number (300187.08) concatenated with the construction package's specification number (01 to 05) in the form of 300187.08.xx, where xx is the specification number.

Contract Price - The total monies payable by the DISTRICT to the CONTRACTOR under the terms and conditions of the Contract Documents.

Contract Time(s) - The number or numbers of successive Days or dates stated in Article 2 of the Agreement (Section 00500) for the completion of the whole, or any specified portion of the WORK.

CONTRACTOR - The individual, partnership, corporation, joint-venture, or other legal entity with whom the DISTRICT has executed the Agreement.

County – The County of San Luis Obispo, California

Critical Path – The Critical Path derived in accordance with the Critical Path Method scheduling described in Section 01310 of the Technical Specifications.

Day - A calendar day of 24 hours measured from midnight to the next midnight.

Defective Work - Work that is unsatisfactory, faulty, or deficient; or that does not conform to the Contract Documents; or that does not meet the requirements of any inspection, reference standard, test, or approval referred to in the Contract Documents; or work that has been damaged prior to the ENGINEER'S recommendation of final payment.

DESIGNER - The DESIGNER is defined as the firm of Black & Veatch Corporation.

Director – The Director of the Public Works Department of the County.

DISTRICT - The San Luis Obispo County Flood Control and Water Conservation District, located at the County Government Center, Room 207, San Luis Obispo, California 93408.

Drawings - The drawings, plans, maps, profiles, diagrams, and other graphic representations which provide more detail regarding the character, location, nature, extent, and scope of the construction WORK and which have been prepared by the DESIGNER and which are referred to in the Contract Documents. Shop Drawings are not Drawings as so defined.

Effective Date of the Agreement - The date indicated in the Agreement on which it becomes effective, but if no such date is indicated it means the date on which the Agreement is signed and delivered by the DISTRICT after it was first signed and delivered by the CONTRACTOR to the DISTRICT.

ENGINEER - The ENGINEER is defined as the Construction Manager, a designated representative of the DISTRICT, named as Jacobs Civil Inc, a subsidiary of Jacobs Engineering Group, Inc.

Environmental Monitor – A representative of the ENGINEER regarding environmental mitigation measures. (CONTRACTOR is at all times responsible for complying with all environmental mitigation measures referenced in the Contract Documents.)

Field Order - A written order, or other written directive, issued by the ENGINEER which requires minor changes in the WORK but which does not involve a change in the Contract Price or the Contract Time(s).

Final Completion - Refers to the date identified in the Notice of Completion, executed by the ENGINEER and CONTRACTOR, notifying the DISTRICT that all WORK is complete. All WORK shall be finished before establishing the Final Completion date.

General Requirements - Division 1 of the Technical Specifications.

Hazardous Waste - The term Hazardous Waste shall have the meaning provided in California Health and Safety Code Section 25117 as amended from time to time.

Inclement Weather – Abnormal weather conditions which, as determined by the ENGINEER, prevent the CONTRACTOR from proceeding with at least 75 percent of the normal labor and equipment force engaged on the WORK for at least 60 percent of the total daily time being currently spent on the WORK. In order for weather conditions to be considered abnormal, the weather condition must be both abnormally severe in its intensity and unusually long in its duration.

Laws and Regulations; Laws or Regulations - Any and all applicable laws, rules, regulations, ordinances, codes, and/or orders of any and all governmental bodies, agencies, authorities and courts having jurisdiction.

Material Safety Data Sheet - A standard formatted information sheet, prepared by a material manufacturer, describing the potential hazards, physical properties, and procedures for safe use of a material.

Milestone - A principal event specified in the Contract Documents relating to an intermediate completion date of a separately identifiable part of the WORK or a period of time within which the separately identifiable part of the WORK should be performed prior to Substantial Completion of all the WORK.

Nacimiento Water Project – The project described in the Nacimiento Water Project Environmental Impact Report SCH #2001061022 certified by the County of San Luis Obispo Flood Control and Water Conservation District's Board of Supervisors on January 6, 2004.

Notice of Award - The written notice by the DISTRICT to the apparent successful BIDDER stating that upon compliance by the apparent successful BIDDER with the conditions precedent enumerated in the Contract Documents within the time specified, the DISTRICT will enter into an Agreement.

Notice of Completion - A form signed by the ENGINEER and the CONTRACTOR recommending to the DISTRICT that the WORK is complete and fixing the date of Final Completion of all the WORK. Upon acceptance of the WORK by the DISTRICT'S governing body, the form is signed and filed with the County Recorder. This filing starts the 30 Day lien filing period on the WORK.

Notice of Termination – The written Notice of Termination of the Agreement issued by DISTRICT or CONTRACTOR pursuant to Article 15 of Section 00700.

Notice to Proceed - The written notice issued by the DISTRICT to the CONTRACTOR authorizing the CONTRACTOR to proceed with the WORK and establishing the date of commencement of the Contract Time(s).

Paragraph – Refers to a designated heading or paragraph herein, and includes all paragraphs and subparagraphs within said designated heading or paragraph. (For example, a reference to Paragraph 10.3 refers to all of the provisions between "10.3" and "10.4". Similarly, a reference to Paragraph 10.0.A refers to all of the provisions between "10.3.A" and "10.3.B".

Partial Utilization - Use by the DISTRICT of a substantially completed part of the WORK for the purpose for which it is intended prior to Substantial Completion of all the WORK.

PCBs - Polychlorinated biphenyls.

Petroleum - Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Wastes and crude oils.

Project - The undertaking by the CONTRACTOR for the total construction of the WORK described in the Contract Documents.

Project Manager - CONTRACTOR'S representative at the WORK site with authority to act on behalf of the CONTRACTOR. The Project Manager must be technically qualified and English-speaking. The Project Manager is to remain at the site of the WORK while WORK is in progress and shall be available by phone 24 hours a Day, 7 Days a week.

Radioactive Material - Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.

Request for Change Order – A written request made by the CONTRACTOR to the ENGINEER for an adjustment in the Contract Price and/or Contract Time(s) as the result of a CONTRACTOR claimed change to the WORK.

Request for Information (RFI) – A request from the CONTRACTOR to the ENGINEER seeking an interpretation or a clarification of some requirement of the Contract Documents.

Resident Project Representative - The authorized representative of the ENGINEER who is assigned to the site or any part thereof.

Shop Drawings - All Drawings, diagrams, illustrations, schedules, and other data which are specifically prepared by or for the CONTRACTOR and submitted by the CONTRACTOR to illustrate some portion of WORK and all illustrations, brochures, schedules, performance charts, instructions, and diagrams to illustrate material or equipment for some portion of the WORK.

Site or site – Shall refer to the WORK site unless otherwise specified.

Specifications - (Same definition as for Technical Specifications hereinafter).

Stop Notice - A legal remedy for Subcontractors and Suppliers who contribute to public works, but who are not paid for their work, which secures payment from construction funds possessed by the DISTRICT. For public property, the Stop Notice remedy is designed to substitute for mechanic's lien rights.

Subcontractor - Any person or business entity that contracts with the CONTRACTOR for performance of a part of the WORK at the site or is a Supplier of materials (either bulk, consumable, or specially fabricated) or equipment utilized for the WORK.

Substantial Completion - Refers to the date identified in the Certificate of Substantial Completion, executed by the ENGINEER and the CONTRACTOR, notifying the DISTRICT that the WORK has progressed to the point where it is sufficiently complete, as set forth in the Supplementary General Conditions, so that the WORK can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to any WORK refer to any portion of WORK that has progressed to the point described above.

Supplementary General Conditions - The part of the Contract Documents (set forth in Section 00800) which make additions, deletions, or revisions to these General Conditions.

Supplier – Any person or business entity that contracts with the CONTRACTOR to provide materials (either bulk, consumable, or specially fabricated) or equipment. A Supplier is a Subcontractor.

Technical Specifications - Divisions 1 through 16 of the Contract Documents consisting of the General Requirements and written technical descriptions of products and execution of the WORK.

Unit – an operating segment of the Nacimiento Water Project as defined in the "Nacimiento Project Water Delivery Entitlement Contracts".

Utilities - All pipelines, conduits, ducts, cables, wires, tracks, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities which have been installed underground or above the ground to furnish any of the following existing services or materials either functioning or nonfunctioning: water, sewage, sludge, drainage, fluids, electricity, gases, steam, liquid Petroleum products, telephone or other communications, cable television, traffic control, or other control systems.

WORK - All the work specified, indicated, shown or contemplated by the Contract Documents, including all alterations, amendments or extensions thereof made by Change Order or other written orders of the ENGINEER and/or the DISTRICT. WORK includes the result of performing or furnishing labor and furnishing and incorporating materials and equipment into the construction, and performing or furnishing services and furnishing documents, all as required by the Contract Documents. WORK is often described in its functionally complete form, and CONTRACTOR is responsible for implementing the proper means, methods, and procedures to achieve the required result.

ARTICLE 2 - PRELIMINARY MATTERS

2.1 DELIVERY OF BONDS AND INSURANCE CERTIFICATES

A. When the CONTRACTOR delivers the signed Agreement to the DISTRICT, the CONTRACTOR shall also deliver to the DISTRICT such Bonds and certificates as the CONTRACTOR may be required to furnish in accordance with the Contract Documents. The recycling plan specified in Section 02055, "Mandatory Recycling Requirements", shall also be submitted.

2.2 COPIES OF DOCUMENTS

A. The DISTRICT will furnish to the CONTRACTOR the required number of copies of the Contract Documents specified in the Supplementary General Conditions.

2.3 COMMENCEMENT OF CONTRACT TIMES; NOTICE TO PROCEED

A. The Contract Time(s) will start to run on the Commencement Date stated in the Notice to Proceed.

2.4 STARTING THE WORK

A. The CONTRACTOR shall begin to perform the WORK on the Commencement Date stated in the Notice to Proceed, but no work shall be done at the site prior to said Commencement Date.

B. Before undertaking each part of the WORK, the CONTRACTOR shall carefully study and compare the Contract Documents and check and verify pertinent figures shown thereon and all applicable field measurements. The CONTRACTOR shall promptly report in writing to the ENGINEER any conflict, error, or discrepancy which the CONTRACTOR may discover and shall obtain a written interpretation or Clarification from the ENGINEER before proceeding with any WORK affected thereby.

BEFORE STARTING THE WORK

C. Preliminary Schedules. Within 10 days after the Effective Date of the Agreement (unless otherwise specified in the General Conditions), CONTRACTOR shall submit to ENGINEER for timely review:

1. Initial CPM Construction Schedule and associated documents as specified in Section 01310, "Construction Scheduling";

2. A preliminary schedule of submittals of Shop Drawings, samples, and proposed substitutes ("or-equal") submittals;

3. A preliminary schedule of values for all of the WORK which includes quantities and prices of items which when added together equal the Contract Price and subdivides the WORK into component parts in

sufficient detail to serve as the basis for progress payments during performance of the WORK. Such prices will include an appropriate amount of overhead and profit applicable to each item of WORK.

4. A preliminary schedule of all permits, licenses, insurance, bonds, and other documents the CONTRACTOR shall obtain. The schedule shall indicate, for all permits, the agency required to grant the permit and the expected date of submittal for the permit and required date for receipt of the permit.

SUBCONTRACTOR MOBILIZATION MEETING

D. Prior to the start of each major Subcontractor's site WORK, the CONTRACTOR, the involved Subcontractor and the ENGINEER shall attend a pre-start meeting to discuss the schedule, coordination, procedures, and other administrative issues.

2.5 PRECONSTRUCTION CONFERENCE

A. The CONTRACTOR is required to attend a preconstruction conference. This conference will be attended by the ENGINEER, DISTRICT and others as appropriate in order to discuss the WORK in accordance with the applicable procedures specified in Section 01200, “Project Meetings.”

B. As part of the preconstruction conference, the CONTRACTOR is required to receive a briefing on the environmental requirements for the Project. The briefing will be conducted by the County’s Environmental Division in order to discuss the WORK in accordance with the applicable procedures specified in Section 01030, “Environmental Mitigation.”

2.6 INITIAL ACCEPTANCE OF SUBMITTALS

A. At least 10 days before submission of the first Application for Payment a conference attended by CONTRACTOR, ENGINEER, and others as appropriate will be held to review the acceptability to ENGINEER as provided below for schedules submitted in accordance with Paragraph 2.4. As a minimum, the CONTRACTOR’S Project Manager and construction scheduler shall attend. CONTRACTOR shall have an additional 10 Days to make corrections and adjustments and to complete and resubmit the schedules and meet with the ENGINEER to review. No progress payment shall be made to CONTRACTOR until acceptable schedules are submitted to ENGINEER.

1. The progress schedule will be acceptable to ENGINEER if it provides an orderly progression of the WORK to completion within the Contract Time(s). Such acceptance will not impose on ENGINEER or DISTRICT responsibility for the progress schedule, for sequencing, scheduling, or progress of the WORK nor interfere with or relieve CONTRACTOR from CONTRACTOR’S full responsibility therefore.

2. CONTRACTOR'S schedule of submittals will be acceptable to ENGINEER if it provides a workable arrangement for reviewing and processing the required submittals.

3. CONTRACTOR'S schedule of values will be acceptable to ENGINEER as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the WORK.

4. A preliminary schedule of all permits, licenses, insurance, bonds, and other documents the CONTRACTOR shall obtain will be acceptable to the ENGINEER if it indicates, for all permits, the agency required to grant the permit and the expected date of submittal for the permit and required date for receipt of the permit. Also, the schedule shall include all insurance and bonds required by the Contract Documents.

5. The review and/or acceptance of any of the aforementioned schedules by ENGINEER or DISTRICT shall be for the limited purposes of payment application evaluation and other scheduling and performance evaluation. No review or acceptance of any such schedules, nor any evaluations based on such schedules, shall relieve the CONTRACTOR of its responsibility for properly scheduling, sequencing and performing the WORK in compliance with the Contract Documents.

2.7 ESCROW BID DOCUMENTS

A. General

1. The two apparent low BIDDERs shall submit, within 72 hours 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.

B. Ownership

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

2. The DISTRICT stipulates and expressly acknowledges that the Escrow Bid Documents, as defined herein, constitute trade secrets. This acknowledgement is based on the DISTRICT'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. DISTRICT 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. DISTRICT further acknowledges that the Escrow Bid Documents and the information contained therein are made available to DISTRICT only because such action is an express prerequisite to award of the contract. DISTRICT 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. DISTRICT agrees to safeguard the Escrow Bid Documents, and all information contained herein, against disclosure to the fullest extent permitted by law.

C. Purpose

1. 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 the CONTRACTOR'S anticipated methods of construction or to assess the CONTRACTOR'S qualifications for performing the WORK.

D. Format and Contents

1. It is required that the Escrow Bid Documents clearly itemize the estimated costs of performing all WORK associated with each Bid item contained in the Bid form. Bid items should be separated into sub-items as required to present a complete and detailed cost estimate and allow a detailed cost review. The Escrow Bid Documents shall include all quantity takeoffs, crew, equipment, calculations of rates of production and progress, copies of quotations from Subcontractors and Suppliers and memoranda, narratives, consultant's reports, add/deduct sheets, and all other information used by the BIDDER to arrive at the prices contained in the Bid. Estimate costs should be broken down into the BIDDER'S usual estimate categories such as direct labor, equipment operation, equipment ownership, expendable materials, permanent materials, and subcontract costs as appropriate. Plant equipment and indirect costs should be detailed in the BIDDER'S usual format. The CONTRACTOR'S allocation of plant and equipment, indirect costs, contingencies, markup and other items to each Bid item shall be included.

2. All costs shall be identified. For Bid items amounting to less than $10,000, estimated unit costs are acceptable without a detailed cost estimate, provided that labor, equipment, materials, and subcontracts, as applicable, are included and provided that indirect costs, contingencies, and markup, as applicable, are allocated.

3. Bid documents provided by the DISTRICT should not be included in the Escrow Bid Documents unless needed to comply with the requirements of this specification.

4. BIDDERS shall submit Escrow Bid Documents in their usual cost estimating format, to the extent said format provides the required

information. It is not the intention of this specification to cause the BIDDER extra work during the preparation of the Bid, but to ensure that the content of the Escrow Bid Documents will be adequate to enable their complete understanding and proper interpretation for their intended use. The Escrow Bid Documents shall be in the language (e.g., English) of the Specifications.

5. The documentary information included in the Escrow Bid Documents shall include any softcopy (electronic) or hardcopy form of recorded communication or representation, including letters, words, drawings, diagrams, pictures, sounds, numbers or other symbols, or combinations thereof, and any record thereby created, regardless of the manner in which the record has been stored, including, but not limited to, electronic files, handwriting, typewriting, keyboarding, printing, photostatting, photographing, photocopying, transmitting by electronic mail or facsimile, electronic transmissions, and every other means of recording information.

E. Submittal

1. The Escrow Bid Documents shall be submitted by the two lowest BIDDERS in a sealed container within 72 hours after the time of receipt of Bids. The container shall be clearly marked on the outside with the BIDDER'S name, date of submittal, Project name and the word "Escrow Bid Documents."

2. The Escrow Bid Documents shall be accompanied with the Bid Documentation Certification, signed by an individual authorized by the BIDDER to execute the bidding proposal, stating that the material in the Escrow Documentation constitutes all the 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.

3. Prior to award, Escrow Bid Documents of the apparent successful BIDDER will be examined, organized and inventoried by representatives of DISTRICT and ENGINEER, together with members of the CONTRACTOR'S staff who are knowledgeable in how the Bid was prepared.

4. This examination is to ensure that the Escrow Bid Documents are authentic, legible and complete. It will not include review of, and will not constitute approval of proposed construction methods, estimating assumptions, or interpretation of Contract Documents. Examination will not alter any condition(s) or term(s) of the Contract Documents.

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

6. 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.

7. 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 the DISTRICT to reject the Bid.

8. Escrow Bid Documents submitted by unsuccessful BIDDERS will be returned unopened, unless opened as provided above, following award of the contract.

F. Storage

1. The Escrow Bid Documents will be placed in escrow, for the life of the contract, at an independent location determined by the DISTRICT. The cost of storage will be paid by the DISTRICT.

G. Examination

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

2. Examination of the Escrow Bid Documents is subject to the following conditions:

   a. As trade secrets, the Escrow Bid Documents are proprietary and confidential as described in Section B, "Ownership".

   b. The DISTRICT and the CONTRACTOR shall each designate, in writing to the other party and a minimum of ten (10) Days prior to examination, representatives who are authorized to examine the Escrow Bid Documents. With the consent of both the DISTRICT and CONTRACTOR, members of the Disputes Review Board (as applicable) may examine the Escrow Bid Documents if required to assist in the settlement of a dispute. 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 representative of both the DISTRICT and CONTRACTOR.

H. Final Disposition

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

I. Other BIDDERS

1. If for any reason the contract is not awarded to either of the initial two apparent low BIDDERS, then the next apparent low BIDDER shall submit to the DISTRICT within 72 hours of receipt of written notification by DISTRICT, the Escrow Bid Documents described herein, and said documents shall be governed by the procedures set forth herein.

2.8 INDEPENDENCE OF CONTRACTOR

A. It is understood and agreed that CONTRACTOR is at all times an independent contractor and that no relationship of employer-employee exists between the parties hereto. CONTRACTOR will not be entitled to any benefits payable to employees of DISTRICT, including but not limited to overtime, retirement benefits, worker's compensation benefits, injury leave, or other leave benefits. DISTRICT is not required to make any tax or benefit deductions from the compensation payable to CONTRACTOR under the provisions of this Agreement. As an independent contractor, CONTRACTOR hereby holds DISTRICT harmless from any and all claims that may be made against DISTRICT based upon any contention by any third party that an employer-employee relationship exists by reason of the Agreement.

B. If, in the performance of this Agreement, any third persons are employed by CONTRACTOR such persons will be entirely and exclusively under the direction, supervision and control of CONTRACTOR. All terms of employment, including hours, wages, working conditions, discipline, hiring and discharging or any other terms of employment or requirements of law, will be determined by CONTRACTOR. DISTRICT will have no right or authority over such persons or the terms of such employment, except as provided in this Agreement.

ARTICLE 3 - INTENT AND USE OF CONTRACT DOCUMENTS

3.1 INTENT

A. The Contract Documents comprise the entire Agreement between the DISTRICT and the CONTRACTOR concerning the WORK. The Contract Documents are complementary; what is called for by one is as binding as if called for by all. The Contract Documents will be construed in accordance with the law of the place of the WORK.

<u>INTENT OF WORK TO BE FUNCTIONALLY COMPLETE</u>

B. The Contract Documents describe the WORK to be constructed in accordance with the Contract Documents. When words or phrases which have a well-known technical or construction industry or trade meaning are used to describe work, materials, or equipment such words or phrases shall be interpreted in accordance with that meaning unless a definition has been provided in Article 1 of the General Conditions. Reference to standard Specifications, manuals, or codes of any technical society, organization, or

association, or to the Laws or Regulations of any governmental authority, whether such reference be specific or by implication, shall mean the latest standard specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids, except as may be otherwise specifically stated. However, no provision of any referenced standard specification, manual, or code shall be effective to change the duties and responsibilities of the CONTRACTOR set forth in the Contract Documents.

DISCOVERY OF PROBLEMS WITH CONTRACT DOCUMENTS

C. If CONTRACTOR ever discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents or between the Contract Documents and any provision of any such Law or Regulation applicable to the performance of the WORK or of any such standard, specification, manual, or code, including any instructions or specifications of any Supplier referred to in Paragraph 6.5, CONTRACTOR shall report it to ENGINEER in writing at once, and CONTRACTOR shall not proceed with the WORK affected thereby (except in an emergency as authorized by Paragraph 6.12) until a Clarification, Field Order, or Change Order to the Contract Documents has been reissued.

NECESSARY UTILITIES

D. If Utilities to equipment/fixtures are not shown but are necessary to operate the equipment/fixtures, the Utilities service installation is considered to be part of the WORK. The implied WORK will conform to the appropriate sections of the technical specifications.

3.2 ORDER OF PRECEDENCE OF CONTRACT DOCUMENTS

A. In the event of a conflict between one Contract Document and any of the other Contract Documents, the provisions in the document highest in precedence shall be controlling. The order of precedence of the Contract Documents is as follows:

1. Permits from other agencies.
2. Change orders, Field Orders, issued pursuant to and in accordance with the Agreement.
3. Agreement (Section 00500)
4. Bid Documents (Sections 00400 – 00456)
5. Bidding Requirements (Section 00020 – 00100)
6. Supplementary General Conditions (Section 00800)
7. General Conditions (Section 00700)
8. General Requirements (Division 1)
9. Technical Specifications (Division 2 – 16)
10. Drawings
11. Standard Details
12. Reports

B. With reference to the Drawings the order of precedence is as follows:

1. Figures govern over scaled dimensions
2. Detail drawings govern over general drawings
3. Addenda/Change Order drawings govern over Contract Drawings
4. Contract Drawings govern over Standard Details

3.3 AMENDING AND SUPPLEMENTING CONTRACT DOCUMENTS

A. Pursuant to the Request for Change Order procedure (Article 10), the Contract Documents may be amended to provide for additions, deletions, and revisions in the WORK or to modify the terms and conditions thereof.

B. The requirements of the Contract Documents may be clarified or supplemented by one or more of the following documents:

1. A Field Order;
2. ENGINEER'S written approval of a Shop Drawing or sample; (subject to the provisions contained in these General Conditions);
3. ENGINEER'S Clarification; or
4. ENGINEER'S written response to a Request for Information (RFI)

C. Any material changes to the Contract Documents must be made in writing and signed by the DISTRICT. No oral statement by any person shall change or modify the Contract Documents. All changes to the Contract Documents shall be made in accordance with its provisions. In addition to any material changes to the WORK, any changes in Contract Price and/or Contract Time shall be considered material changes to the Contract Documents.

3.4 REUSE OF DOCUMENTS

A. Neither the CONTRACTOR, nor any Subcontractor or Supplier, nor any other person or organization performing any of the WORK under a contract with the DISTRICT shall have or acquire any title to or ownership rights in any of the Drawings, Technical Specifications, or other documents used on the WORK, and they shall not reuse any of them on the extensions of the Project or any other project without written consent.

3.5 PARTIAL INVALIDITY

A. If any provision(s) of this Agreement is inconsistent with the provisions of any binding statute, regulation, or other applicable law which the parties are not free to waive or modify by this Agreement (hereafter "binding law), the following rules of interpretation shall apply. First, if the provision(s) of this Agreement can reasonably be interpreted in a manner consistent with said binding law, that interpretation shall prevail. Second, if the provision(s) of this Agreement cannot reasonably be interpreted in a manner consistent with said binding law because of the numerical or other quantitative requirements of said law, said numerical or quantitative requirements shall be substituted for the inconsistent provision(s) of this Agreement in a manner which would most

closely match the inconsistent provision(s) being substituted. For provision(s) of this Agreement inconsistent with binding law which do not fall within either of the above two categories, the inconsistent provisions shall be severed from this Agreement, and the remaining provisions shall be given full force and effect, and interpreted in a manner consistent with applicable law which would most closely match the inconsistent provision(s) being severed.

B. If any provision of this Agreement is held by a court of competent jurisdiction to be invalid, void, or unenforceable, the remaining provisions shall nevertheless continue in full force without being impaired or invalidated in any way.

3.6 WAIVER OF RIGHTS

A. No actions or failure to act by DISTRICT or ENGINEER shall constitute a waiver of any right or duty afforded any of them under the Contract Documents, nor shall any such action or failure to act constitute an approval of or acquiescence in any breach thereunder.

ARTICLE 4 - SITE OF THE WORK

4.1 AVAILABILITY OF LANDS

A. The DISTRICT will furnish, as indicated in the Contract Documents, the lands upon which the WORK is to be performed, rights-of-way and easements for access thereto, and such other lands which are designated for the use of the CONTRACTOR. Easements for permanent structures or permanent changes in existing facilities will be obtained and paid for by the DISTRICT, unless otherwise provided in the Contract Documents. Nothing contained in the Contract Documents shall be interpreted as giving the CONTRACTOR exclusive occupancy of the lands or rights-of-way provided.

B. The CONTRACTOR shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment; provided, that the CONTRACTOR shall not enter upon nor use any property not designated in the Contract Documents until a written temporary construction easement agreement has been executed by the CONTRACTOR and the property owner, and a copy of said easement furnished to the ENGINEER prior to said use; and, neither the DISTRICT nor the ENGINEER will be liable for any claims or damages resulting from the CONTRACTOR'S unauthorized trespass or use of any such properties. The CONTRACTOR shall provide the DISTRICT with a signed release from the property owner confirming that the lands have been satisfactorily restored upon completion of construction.

C. In order to assure compliance with environmental mitigation requirements, any additional lands proposed for the CONTRACTOR'S use relative to this Agreement shall be reviewed and approved by the ENGINEER prior to their use.

4.2 REPORTS OF PHYSICAL CONDITIONS

A. Subsurface Explorations. Reference is made to the Supplementary General Conditions for identification of those reports of explorations and tests of subsurface conditions (hereafter, collectively "Subsurface Reports") that have been utilized by the DESIGNER in the preparation of the Contract Documents. The CONTRACTOR may rely upon the accuracy of the technical data contained in such Subsurface Reports. However, the interpretation of such technical data, including any interpolation or extrapolation thereof, together with nontechnical data, interpretations, and opinions contained in such Subsurface Reports, including the completeness of such reports is the responsibility of the CONTRACTOR. The CONTRACTOR may rely upon the accuracy of the DESIGNER'S interpretation of baseline geotechnical conditions presented in the Geotechnical Baseline Report (GBR) (if included). However, any interpolation or extrapolation of any technical data, nontechnical data, or interpretations contained in the GBR, including the completeness of the GBR, is the responsibility of the CONTRACTOR.

B. Existing Structures. Reference is made to the Supplementary General Conditions for identification of those Drawings of physical conditions in or relating to existing surface and subsurface structures (except Underground Utilities referred to in Paragraph 4.3 herein) which are at or contiguous to the site that have been utilized in the preparation of the Contract Documents. The CONTRACTOR may rely upon the accuracy of the technical data contained in such Drawings, except for such physical dimensions that can be field verified, however, nontechnical data, interpretations, and opinions contained in such Drawings are not to be relied on by the CONTRACTOR. The CONTRACTOR shall also be responsible for any interpretation, interpolation, or extrapolation that it makes of any information shown in such Drawings.

4.3 PHYSICAL CONDITIONS - UNDERGROUND UTILITIES

A. Indicated. The information and data indicated in the Contract Documents with respect to existing underground Utilities at or contiguous to the site are based on information assembled by the DESIGNER. The CONTRACTOR shall review and field verify all such information and data, including locating all underground Utilities indicated in the Contract Documents, and coordinate the WORK with the owners of such underground Utilities during construction, for the safety and protection thereof, and repair any damage thereto resulting from the WORK, the cost of which will be considered as having been included in the Contract Price.

B. Not Indicated. If an underground Utility main, trunkline or service line is uncovered or revealed at or contiguous to the site which was not indicated in the Contract Documents and which the CONTRACTOR could not reasonably have been expected to be aware of, the CONTRACTOR shall identify the owner of such underground Utility and give written notice thereof to that owner and shall notify the ENGINEER in accordance with the General

Requirements. The CONTRACTOR'S failure to give notice of such underground Utilities within one business day of their discovery shall constitute a waiver of all Requests for Change Orders or claims in connection therewith, whether direct or consequential in nature.

The CONTRACTOR also shall not be entitled to any adjustment in the Contract Price or Time(s) and shall be deemed to have waived its right to such a Request for Change Order or claim if:

1. The CONTRACTOR knew of the existence of such underground Utilities at the time the CONTRACTOR signed the Agreement after being awarded the contract; or

2. The existence of such underground Utility could reasonably have been discovered or revealed as a result of any examination, investigation, of the site and contiguous areas suggested or required by the Bid documents; or

3. The CONTRACTOR failed to give the written notice within the time and as required by Paragraph 4.3.

4.4 DIFFERING SITE CONDITIONS

A. The CONTRACTOR shall promptly notify the ENGINEER, in writing, of the following conditions, hereinafter called “differing site conditions”, upon their discovery (but in no event later than one business day) and before they are further disturbed:

1. Material that the CONTRACTOR believes may be material that is hazardous waste, as defined in Section 25117 of the Health and Safety Code, that is required to be removed to a class I, class II, or class III disposal site in accordance with provisions of existing law.

2. Work effort, construction requirements, or subsurface or latent physical conditions at the site of the WORK differing materially from those presented in the Geotechnical Baseline Report (if included for this contract) as discussed in Paragraph 4.2;

3. Subsurface or latent physical conditions at the site of the WORK differing materially from those indicated by information about the site made available to CONTRACTOR and other BIDDER’S prior to the deadline for submitting Bids, including, but not limited to information described or delineated in the Contract Documents including those reports discussed in Paragraph 4.2; and

4. Unknown physical conditions at the site of the WORK of an unusual nature, different materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents including those reports and documents discussed in Paragraph 4.2.

B. The ENGINEER shall promptly investigate such conditions, determine whether such conditions do classify as differing site conditions or if there is a necessity of obtaining additional explorations or tests with respect thereto, and advise the DISTRICT, in writing, of the ENGINEER'S findings and conclusions. CONTRACTOR shall not further disturb such conditions or perform any affected WORK until written instructions have been provided by the ENGINEER (except in an emergency as required by Paragraph 6.12).

C. If the DISTRICT concludes that such newly discovered conditions classify as differing site conditions and require a change in the Contract Documents or cause a decrease or increase in the CONTRACTOR'S time required for or cost of performance of any part of the WORK, a Change Order will be issued under the procedures described in Article 10. Said Change Order may allow a change in the Contract Documents to reflect the difference, or a decrease or increase in the Contract Price, or an extension or shortening of the Contract Time(s), or any combination thereof, to the extent that they are attributable to any such difference.

D. In the event that a dispute arises between the DISTRICT and the CONTRACTOR whether such conditions do classify as differing site conditions or cause a decrease or increase in the CONTRACTOR'S cost of, or time required for, performance of any part of the WORK, the CONTRACTOR shall not be excused from the Contract Time(s) set forth under this Agreement, but shall proceed with all WORK to be performed under the Agreement. The CONTRACTOR shall retain any and all rights provided under Articles 10 and 17 for resolving any such dispute.

<u>DISALLOWANCE OF ENTITLEMENT</u>

E. The CONTRACTOR'S failure to give notice of differing site conditions within one business day of their discovery or before they are further disturbed shall constitute a waiver of all Requests for Change Orders and claims in connection therewith, whether direct of consequential in nature.

The CONTRACTOR shall also not be entitled to any adjustment in the Contract Price or Time(s) and shall be deemed to have waived his right to such a Request for Change Order or claim if:

1. The CONTRACTOR knew of the existence of such conditions at the time the CONTRACTOR signed the Agreement after being awarded the contract; or

2. The existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, of the site and contiguous areas suggested or required by the Bid documents; or

3. The CONTRACTOR failed to give the written notice within the time and as required by Paragraph 4.4.

4.5 HAZARDOUS MATERIALS

A. As between the DISTRICT and the CONTRACTOR only, DISTRICT shall be responsible for any Asbestos, PCBs, Petroleum, Radioactive Material, or Hazardous Waste (hereafter, collectively “Hazardous Materials”) uncovered or revealed at the site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the WORK. DISTRICT will not be responsible for any such Hazardous Materials brought to the site by CONTRACTOR, Subcontractor, Supplier, anyone for whom CONTRACTOR is responsible, or any other third parties.

B. If any Hazardous Materials may present a substantial danger to persons or property exposed thereto in connection with WORK at the site, CONTRACTOR shall immediately stop all WORK in connection with such hazardous condition and any area affected thereby and notify DISTRICT and ENGINEER (and thereafter confirm in writing). DISTRICT will promptly consult with ENGINEER concerning the necessity for DISTRICT to retain a qualified expert to evaluate such hazardous condition or take corrective action, if any. CONTRACTOR shall not be required to resume WORK in connection with such hazardous condition or in any such affected area until after DISTRICT has delivered to CONTRACTOR special written notice. Such written notice will specify that such condition and any affected area is or has been rendered safe for the resumption of WORK or specify any special conditions under which such WORK may be resumed safely. If DISTRICT and CONTRACTOR cannot agree as to entitlement to or the amount or extent of adjustment, if any, in Contract Price or Contract Time(s) as a result of such WORK stoppage or such special conditions under which WORK is agreed by CONTRACTOR to be resumed, the CONTRACTOR shall retain any and all rights provided under Articles 10 and 17 for resolving any such dispute.

C. If, after receipt of such special written notice, CONTRACTOR does not agree to resume such WORK based on a reasonable belief it is unsafe, or does not agree to resume such WORK under special conditions, then DISTRICT may order such portion of the WORK that is in connection with such hazardous condition or in such affected area to be deleted from the WORK. If DISTRICT and CONTRACTOR cannot agree as to entitlement to or the amount or extent of an adjustment, if any, in Contract Price or Contract Time(s) as a result of deleting such portion of the WORK then the CONTRACTOR shall retain any and all rights provided under Articles 10 and 17 for resolving any such dispute. DISTRICT may have such deleted portion of the WORK performed by DISTRICT'S own forces or others in accordance with Article 7.

D. DISTRICT will indemnify and hold harmless CONTRACTOR and its officers, directors, employees, agents, other consultants, and Subcontractors of each and any of them from and against all claims, costs, losses, and damages directly arising from the CONTRACTOR’S compliance with the DISTRICT’S special written notice described above; provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease or death, or

to injury to or destruction of tangible property (other than the WORK itself), and nothing in this Paragraph shall obligate DISTRICT to indemnify any person or entity from and against the consequences of that person's or entity's own willful misconduct, negligence, or noncompliance with any applicable Laws or Regulations.

E. The provisions of this Paragraph 4.5 supercede any inconsistent provisions of Paragraph 4.3 with respect to any Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material uncovered or revealed at the site.

F. See Supplemental General Conditions (at SGC-4.5) for Hazardous Materials at the Site of the WORK, and supplemental conditions related thereto.

G. Notwithstanding any of the foregoing language of this Paragraph 4.5, in the event of an emergency, the CONTRACTOR'S conduct shall also be governed by Paragraph 6.12.

4.6 REFERENCE POINTS

A. DISTRICT shall provide engineering surveys to establish reference points for construction which in ENGINEER'S judgment are necessary to enable CONTRACTOR to proceed with the WORK. CONTRACTOR shall be responsible for laying out the WORK, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of DISTRICT. CONTRACTOR shall report to ENGINEER whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

ARTICLE 5 - BONDS AND INSURANCE

5.1 BONDS

A. The CONTRACTOR shall furnish a satisfactory Performance Bond in the amount of 100 percent of the Contract Price and a satisfactory Payment Bond in the amount of 100 percent of the Contract Price as security for the faithful performance and payment of all the CONTRACTOR'S obligations under the Contract Documents. These Bonds shall remain in effect at least until one year after the date of Final Completion, unless a longer effective period is provided by Law or Regulation or by the Contract Documents. The CONTRACTOR shall also furnish such other Bonds as are required by the Supplementary General Conditions. All Bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such Sureties as are named in the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Audit Staff, Bureau of Government Financial Operations, U.S. Treasury Department. All Bonds

signed by an agent must be accompanied by a certified copy of such agent's authority to act.

B. If the Surety on any Bond furnished by the CONTRACTOR is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the WORK is located, the CONTRACTOR shall within 7 calendar Days thereafter substitute another Bond and Surety, which must be acceptable to the DISTRICT.

C. All Bonds required by the Contract Documents to be purchased and maintained by CONTRACTOR shall be obtained from Surety companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue Bonds for the limits so required. Such Surety companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary General Conditions.

5.2 INSURANCE

A. CONTRACTOR shall maintain at all times beginning with inception of their Agreement and thereafter if required to return to the Project for any reason, policies of insurance, written by an insurance company with an A.M. Best's rating of A-,VII or higher, with the following minimum limits and including the following specified coverage requirements:

1. Worker's Compensation Insurance including Occupational Disease Insurance meeting all statutory requirements of the State of California and containing Employers' Liability insurance in an amount of at least $1,000,000. CONTRACTOR shall provide a waiver of subrogation in favor of DISTRICT at CONTRACTOR'S expense. CONTRACTOR is responsible to carry "Marine Coverages" if required by federal and/or state laws.

2. Business Auto Liability on an occurrence basis covering all owned, non-owned, and hired vehicles for limits of liability of at least $1,000,000. CONTRACTOR shall cause this policy to be endorsed so that DISTRICT, ENGINEER, DESIGNER, and any others required in the contract documents shall be named as "additional insureds" under the policy. If CONTRACTOR at any time transports hazardous materials, CONTRACTOR shall carry appropriate auto pollution coverage.

3. Comprehensive General Liability insurance on an occurrence basis, providing coverage for a combined single limit for bodily injury, personal injury, including its employees, and property damage, of at least $15,000,000 for each occurrence and $15,000,000 General Aggregate. Umbrella/Excess Insurance may be used to satisfy these limits. This policy must provide premises-operations, elevators, independent contractors, broad form property damage, hostile fire pollution, contractual liability, and products & completed operations coverage. Explosion, collapse, and underground exclusions must be deleted.

CONTRACTOR shall cause this policy to be endorsed, effective as of the Effective Date of the Agreement by the insurance company providing coverage to include the following items:

a. DISTRICT, ENGINEER, DESIGNER, County and any others required in the Contract Documents shall be named as "additional insureds" under the policy per ISO form CG2010-1185 or acceptable equivalent.

   In the event of a loss or claim of an additional insured where the absence of the requested form would serve to deny coverage, it is understood and agreed that the contractual liability coverage requirements of this Paragraph (5.2) shall be triggered and shall require immediate defense and indemnity as set forth in Paragraph 6.15 of Section 00700.

b. This insurance shall be considered primary insurance and any other insurance carried by the additional insureds will be excess and shall not contribute to any losses arising out of CONTRACTOR'S work.

c. A 30-day advance notice of cancellation to all additional insureds.

d. If CONTRACTOR'S liability policies do not contain the standard ISO separation of insureds provision, or a substantially similar clause, they shall be endorsed to provide cross-liability coverage.

e. A waiver of subrogation in favor of the DISTRICT shall be endorsed to the policy.

4. Umbrella/Excess Insurance may be used to satisfy the required limits of insurance. Coverage shall apply to all the same risks as the underlying insurance policies listed above. All requirements listed in Paragraph 5.2.A.3, above, shall apply to this insurance.

B. DISTRICT reserves the right to require higher limits for specific exposures.

C. Subcontractors performing grading, earthwork and/or underground Utility activities shall not have risks relating to subsidence excluded from coverage under their general liability and umbrella/excess policies.

D. The insurance coverages and limits required in this Paragraph (5.2) shall not limit the extent of CONTRACTOR'S responsibilities and liabilities specified within the Contract Documents or by law. DISTRICT makes no representation that the coverage and limits specified in this Paragraph (5.2) will necessarily be adequate to protect CONTRACTOR and such coverage and limits shall not be deemed as a limitation on CONTRACTOR'S liability under the indemnities granted to DISTRICT in the Contract Documents.

E. If CONTRACTOR employs Subcontractors in the performance of its WORK, CONTRACTOR agrees to obtain equivalent insurance provisions from its Subcontractors as required under this Agreement. At CONTRACTOR'S sole

discretion, CONTRACTOR may allow its Subcontractors to provide a limit of insurance for General Liability Insurance that is less than the amount required in Paragraph 5.2.A.3. However, in no event shall the Subcontractor provide a limit of insurance less than $1,000,000 for each occurrence and $2,000,000 general aggregate.

All other requirements as outlined in this Paragraph (5.2) remain unchanged. Contractor shall provide a copy of the Subcontractors appropriate insurance documentation to DISTRICT.

F. The words “endeavor to” and “but failure to mail such notice” on a certificate of insurance shall impose no obligation or liability of any kind upon DISTRICT, its agents or representatives and shall be deleted from the certificate form’s cancellation provision. Failure of DISTRICT to demand such certificate or other evidence of full compliance with these insurance requirements or failure of DISTRICT to identify a deficiency in the form that is provided shall not be construed as a waiver of CONTRACTOR or Subcontractor’s obligation to maintain such insurance.

G. CONTRACTOR or Subcontractor’s failure to maintain the insurance coverage required pursuant to this provision shall be deemed a CONTRACTOR default pursuant to Paragraph 15.2 of the Agreement. In such event, DISTRICT may terminate the Agreement and obtain damages from CONTRACTOR resulting from said default. Alternatively, DISTRICT may purchase such required insurance coverage and without further notice to CONTRACTOR, DISTRICT may deduct from sums due to CONTRACTOR any premium costs advanced by DISTRICT for such insurance.

H. CONTRACTOR shall provide certified copies of all insurance policies, including all endorsements required in this Paragraph (5.2) within 10 days of DISTRICT written request for same.

I. Other Insurance – CONTRACTOR shall consider on its own, and purchase if it deems necessary, insurance coverage for any risks beyond the minimum insurance requirements outlined in this provision.

J. Professional Liability Insurance (Errors & Omissions)
In the event any contract specifications requires a CONTRACTOR of any tier, including any professional service provider, to perform professional services, such as but not limited to, architectural, engineering, construction management, surveying, design, etc., a certificate of insurance must be provided to the DISTRICT prior to commencing work evidencing such primary coverage with a limit of not less than $ 2,000,000. Any material change in limits, coverage or loss of aggregate limit due to outstanding claims must be reported to the DISTRICT within 30 Days of any such event.

K. Aviation Insurance
In the event any fixed or rotary aircraft are used in connection with this Agreement and/or in the execution of the work, a minimum of $5,000,000 of aviation liability insurance must be maintained with the following

requirements: the DISTRICT must be named as an "additional insured" and a waiver of hull damage must be provided in favor of the DISTRICT. Also, if any aircraft is to be used to perform lifts at the project site, a "slung cargo" endorsement must be included to cover the full replacement value of any equipment or material being lifted. All such lifts must be coordinated with the DISTRICT for approval prior to lift execution.

L. Environmental and Asbestos Abatement Coverage
If this Agreement involves the removal of asbestos, the removal/replacement of underground tanks or use of toxic chemicals and substances, the CONTRACTOR shall be required to provide adequate coverage, not less than $5,000,000 per claim basis, for such exposures subject to requirements and approval of the DISTRICT.

M. Conditions of Understanding and Other Insurance
The amount and types of insurance coverage required herein shall not be construed to be a limitation of the liability on the part of the CONTRACTOR. Any type of insurance, or any greater limits of liability, than described above, which the CONTRACTOR requires for their own protection or on account of statute, shall be the CONTRACTORS own responsibility and at its own expense. The carrying of the insurance described shall in no way be interpreted as relieving the CONTRACTOR of any responsibility of liability under this Agreement.

N. Certificates of Insurance evidencing complete compliance with all of the provisions specified in this Paragraph (5.2) effective as of the Effective Date of this Agreement shall be submitted by CONTRACTOR to DISTRICT prior to commencing any WORK. Receipt and acceptance of all proper Certificate(s) of Insurance is a prerequisite to the Notice to Proceed. The CONTRACTOR shall file certificates of such insurance with the DISTRICT, which shall be subject to the DISTRICTS approval for adequacy of protection, including the satisfactory character of any Insurer. If requested by the DISTRICT, a certified copy of the actual policy(s) with appropriate endorsement(s) and other documents shall be provided to the DISTRICT.

O. Failure to Comply - In the event of failure of the CONTRACTOR to furnish and maintain said insurance and to furnish satisfactory evidence thereof, the DISTRICT shall have the right to take out and maintain same coverage for all parties on behalf of the CONTRACTOR who also agrees to furnish all necessary information thereof and to pay the cost thereof to the DISTRICT immediately upon presentation of a premium invoice.

P. Builder's Risk Insurance
The DISTRICT shall obtain and maintain in force during the term of this Agreement, a Builder's Risk Insurance policy or policies which shall insure against all risks of physical loss and/or damage (subject to normal policy exclusions), to all buildings, structures, materials and real property to be incorporated into and forming part of the Project, whether or not such buildings, structures, materials or real property will have been supplied or made available to CONTRACTOR or Subcontractors by DISTRICT.

The Builder's Risk policy shall be endorsed to add CONTRACTOR and all Subcontractors as additional named insureds, as their interests may appear and to waive the carrier's right of recovery under subrogation against CONTRACTOR and all Subcontractors whose interests are insured under such policy.

Unless required otherwise by DISTRICT, claims under the Builder's Risk insurance provided are subject to a deductible amount of ten thousand dollars ($10,000) per occurrence. If claim results from any construction activity, the CONTRACTOR herein shall pay the deductible amount. The DISTRICT shall pay the deductible for damage caused by acts of God. All Builders' Risk losses will be adjusted with and payable to the DISTRICT or their designee for the benefit of all parties as their interest may appear.

The DISTRICT shall not be responsible for loss or damage to or obtaining and/or maintaining in force insurance on temporary structures, construction equipment, tools or personal effects, owned by or rented to or in the care, custody and control of CONTRACTOR or any Subcontractor.

In the event of loss or damage to the Project not covered by the Builder's Risk policy, the cost of the repair and/or replacement of such loss or damage shall be the responsibility of the DISTRICT. However, the foregoing shall not include elements not yet installed in the Project.

ARTICLE 6 - CONTRACTOR'S RESPONSIBILITIES

6.1 SUPERVISION AND SUPERINTENDENCE

A. The CONTRACTOR'S performance under the Contract Documnents includes the obligations to supervise, inspect, direct and complete the WORK competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the WORK in accordance with the Contract Documents. The CONTRACTOR shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction and safety precautions and programs incidental thereto. The CONTRACTOR shall be responsible for assuring that the completed WORK complies accurately with the Contract Documents.

B. The CONTRACTOR shall designate in writing and keep on the WORK site at all times during its progress a technically qualified, English-speaking Project Manager, who is an employee of the CONTRACTOR and who shall not be replaced without written notice to the DISTRICT and the ENGINEER. The Project Manager will be the CONTRACTOR'S representative at the site and shall have authority to act on behalf of the CONTRACTOR. All communications given to the Project Manager shall be as binding as if given to the CONTRACTOR. The CONTRACTOR shall issue all its communications to the DISTRICT through the ENGINEER.

C. The CONTRACTOR'S Project Manager (or authorized designee) shall be present at the site of the WORK at all times while work is in progress and shall be available by phone for emergencies 24 hours per Day, 7 Days per week. Failure to observe this requirement shall be considered suspension of the WORK by the CONTRACTOR until such time as such Project Manager is again present at the site.

REMOVAL OF PROJECT MANAGER

D. Upon written notice, the DISTRICT may require replacement and removal from the WORK of the CONTRACTOR'S Project Manager, if the WORK is not progressing in a competent, efficient or safe manner. In such event, the CONTRACTOR shall submit a replacement Project Manager subject to approval by the DISTRICT within 30 Days, at no increase in Contract Price or Contract Time. Repeated safety violations on the job site will be sufficient grounds for directing such replacement.

6.2 LABOR, MATERIALS, AND EQUIPMENT

A. The CONTRACTOR shall provide competent, suitably qualified personnel to survey and lay out the WORK and perform construction as required by the Contract Documents. The CONTRACTOR shall at all times maintain good discipline and order at the site. Except in connection with the safety or protection of persons or the WORK or property at the site or adjacent thereto and except as otherwise indicated in the Contract Documents, all working hours at the site shall be limited as defined in the General Requirements The CONTRACTOR will not permit overtime work or the performance of work on Sunday, or any federally observed holiday without the DISTRICT'S written consent. The CONTRACTOR shall apply for this consent through the ENGINEER in writing a minimum of 24 hours in advance.

The CONTRACTOR shall only use competent, skillful workers to do the WORK, and whenever any person shall appear to be incompetent or to act in a disorderly or improper manner, such person shall be removed from the WORK. A person hired directly or indirectly by the CONTRACTOR who repeatedly performs WORK not in conformance with the Contract Documents shall be removed from all WORK.

No convict labor shall be directly employed by the CONTRACTOR or any Subcontractor in the performance of any WORK done under this Agreement.

Prior to acceptance of any materials on-site, CONTRACTOR shall provide a signed Certificate of Compliance verifying that said materials meet the requirements of the Contract Documents. Certificate shall note material being delivered, quantity, specification section reference, manufacturer, and date of delivery.

B. Except as otherwise provided in this Paragraph, the CONTRACTOR shall receive no additional compensation for overtime work, i.e., work in excess of 8 hours in any one calendar Day or 40 hours in any one calendar week, even

though such overtime work may be required under emergency conditions and may be ordered by the ENGINEER in writing. Additional compensation will be paid the CONTRACTOR for overtime work only in the event extra work is ordered by the ENGINEER and the Change Order specifically authorizes the use of overtime work and then only to such extent as overtime wages are regularly being paid by the CONTRACTOR for overtime work of a similar nature in the same locality.

Certain WORK involving connections and cut-in operations to existing lines may require night work by the CONTRACTOR. The CONTRACTOR may also be required to prosecute the WORK at night if, at any time, the ENGINEER deems it necessary for the progress of the WORK, or if emergencies arise. The CONTRACTOR shall promptly comply with any night work requirements made in writing by the ENGINEER. The CONTRACTOR will also be permitted to work at night if he shall satisfy the ENGINEER of the need therefor, in order to maintain the required progress or protect the WORK from the elements. When required, ordered, or permitted to work at night, the CONTRACTOR shall provide sufficient and satisfactory lighting and other facilities therefor. For night work, if any be performed, the CONTRACTOR shall receive no extra payment, but compensation shall be considered as having been included in the price stipulated for the WORK.

C. All increased costs of inspection and testing performed during overtime work by the CONTRACTOR which is allowed solely for the convenience of the CONTRACTOR shall be borne by the CONTRACTOR. The DISTRICT has the authority to deduct the cost of all such inspection and testing from any partial payments otherwise due to the CONTRACTOR.

D. Unless otherwise specified in the Contract Documents, the CONTRACTOR shall furnish and assume full responsibility for all materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, lubricants, power, light, heat, telephone, water, sanitary facilities, and all other facilities, consumables, and incidentals necessary for the furnishing, performance, testing, start-up, and completion of the WORK.

E. All materials and equipment to be incorporated into the WORK shall be of good quality and new, except as otherwise provided in the Contract Documents. All warranties and guarantees specifically called for by the Specifications shall expressly run to the benefit of the DISTRICT. If required by the ENGINEER, the CONTRACTOR shall furnish satisfactory evidence (including reports of required tests) as to the kind and quality of materials and equipment. All materials and equipment shall be applied, installed, connected, erected, used, cleaned, and conditioned in accordance with the instructions of the applicable Supplier except as otherwise provided in the Contract Documents; but no provisions of any such instructions will be effective to assign to the ENGINEER, or any of the ENGINEER consultants, agents, or employees, any duty or authority to supervise or direct the furnishing or performance of the WORK or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.9C.

F. The CONTRACTOR shall conform to the requirements of San Luis Obispo County Code Chapter 8.12, Solid Waste Management, as specified in Section 02055, “Mandatory Recycling Requirements.

G. The CONTRACTOR shall at all times utilize work forces, plant, materials, equipment, and tools sufficient to prosecute the WORK at not less than the progress rates fixed under the terms of the Agreement and to complete WORK or any separable portion thereof within the time limits therein fixed. If the CONTRACTOR fails to utilize work forces, plant, materials, equipment, and tools to maintain required progress, he may, after such failure, be required to increase his progress at any point or points or to modify his plans and procedures in such manner and to such extent as necessary to satisfy and maintain the required progress. Any such increase or modification shall be at no cost to the DISTRICT.

6.3 SCHEDULE

A. The Contract Time establishes the period and duration in which the WORK shall be performed. Any schedule that shows completion ahead of the Contract Time shall include additional supporting data to explain the basis of the shorter time for performance. DISTRICT may (1) notify CONTRACTOR that the Contract Time is being adjusted by Change Order to reflect the shorter schedule duration or (2) elect not to adjust the Contract Time and allow the use by all parties of the increased schedule flexibility that the shorter schedule represents. In any case, DISTRICT shall not be responsible for any costs to CONTRACTOR, actual or anticipated, resulting from delay of any cause that prevents completion of any part or all of the WORK unless it prevents CONTRACTOR from meeting the interim, Substantial Completion or Final Completion time set forth in the Agreement; nor shall DISTRICT be obligated to incur any additional costs for administration or inspection of accelerated work.

6.4 SUBSTITUTES OR "OR EQUAL" ITEMS

A. The CONTRACTOR shall submit proposed substitutes or "or equal" items in accordance with the provisions of the General Requirements.

6.5 CONCERNING SUBCONTRACTORS, SUPPLIERS, AND OTHERS

A. The CONTRACTOR shall be responsible to the DISTRICT and the ENGINEER for the acts and omissions of its Subcontractors, Suppliers, and their employees to the same extent as CONTRACTOR is responsible for the acts and omissions of its own employees. Nothing contained in this Paragraph shall create any contractual relationship between any Subcontractor and the DISTRICT nor relieve the CONTRACTOR of any liability or obligation under the Contract Documents. The CONTRACTOR shall include these General Conditions and the Supplementary General Conditions as a part of all its subcontract agreements.

B. CONTRACTOR shall be solely responsible for scheduling and coordinating the WORK of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the WORK under a direct or indirect contract with CONTRACTOR.

C. CONTRACTOR shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the WORK to communicate with ENGINEER through CONTRACTOR.

D. All WORK performed for CONTRACTOR by a Subcontractor or Supplier will be pursuant to an appropriate agreement between CONTRACTOR and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of DISTRICT and ENGINEER. Whenever any such agreement is with a Subcontractor or Supplier who is listed as an additional insured on the property insurance provided in Paragraph 5.2, the agreement between the CONTRACTOR and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against DISTRICT, CONTRACTOR, and ENGINEER, and all other individuals or entities identified in the Supplementary General Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the WORK. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, CONTRACTOR will obtain the same.

6.6 PERMITS

A. Unless otherwise provided in the Supplementary General Conditions or the General Requirements, the CONTRACTOR shall obtain and pay for all construction permits and licenses from the agencies having jurisdiction, including the furnishing of insurance and Bonds if required by such agencies. Compliance with such requirements under this Agreement shall not be made the basis for any requests or claims for additional compensation. The DISTRICT will assist the CONTRACTOR, when necessary, in obtaining such permits and licenses. The CONTRACTOR shall pay all governmental charges and inspection fees necessary for the prosecution of the WORK. The CONTRACTOR shall pay all charges of utility owners for inspection or connections to the WORK.

B. The CONTRACTOR shall obtain and pay for all construction permits and licenses except those obtained by the DISTRICT, and where specified, pay for the costs of inspection for the permits obtained by the DISTRICT as listed in Section 01060, “Permit Requirements”.

6.7 PATENT FEES AND ROYALTIES

A. With respect to any invention, design, process, product, writing, trademark, or device which is the subject of patent rights or copyrights held by others, the CONTRACTOR shall pay all license fees and royalties and assume all costs incident to the use thereof in the performance of any WORK. The CONTRACTOR shall indemnify, defend, and hold harmless the DISTRICT, the ENGINEER, the DESIGNER, their consultants, and the officers, directors, employees and agents of each and any of them from and against all claims, damages, losses, and expenses (including but not limited to, fees of engineers, experts, consultants, attorneys and other professionals, and court costs, including costs of appeal) relating in any way to any alleged infringement of patent rights or copyrights relating to any invention, design, process, product, writing, trademark, or device not specified in the Contract Documents used in the performance of any WORK, regardless of whether the Contract Documents disclose that the use of the particular invention, design, process, product, writing, trademark, or device is subject to patent rights or copyrights.

6.8 LAWS AND REGULATIONS

A. The CONTRACTOR shall observe and comply with all federal, state, and local laws, ordinances, codes, orders, and regulations which in any manner affect those engaged or employed on the WORK, the materials used in the WORK, or the conduct of the WORK. If any discrepancy or inconsistency should be discovered in this Agreement in relation to any such law, ordinance, code, order, or regulation, the CONTRACTOR shall report the same in writing to the ENGINEER.

B. The CONTRACTOR shall indemnify, defend, and hold harmless the DISTRICT, the ENGINEER, the DESIGNER, their Consultants, Subconsultants, and their officers, directors, employees and agents of each and any of them against all claims, damages, losses and expenses (including, but not limited to, fees of engineers, experts, consultants, attorneys and other professionals, and court costs, including costs of appeal) arising directly or indirectly from or based on the violation of any law, ordinance, regulation, order, or decree, whether by the CONTRACTOR, Subcontractors, Suppliers, or their employees, or agents.

C. Any particular law or regulation specified or referred to elsewhere in the Contract Documents shall not in any way limit the obligation of the CONTRACTOR to comply with all other provisions of federal, state, and local Laws and Regulations.

6.9 TAXES

A. The CONTRACTOR shall pay all tariffs, sales, consumer, use, and other similar taxes required to be paid by the CONTRACTOR in accordance with the Laws and Regulations of the place of the Project and all other applicable

state and federal laws which are applicable during the performance of the WORK.

6.10 USE OF PREMISES

A. The CONTRACTOR shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Project site, the land and areas identified in and permitted by the Contract Documents, and the other land and areas permitted by Laws and Regulations, rights-of-way, permits, and easements.

B. The CONTRACTOR shall assume full responsibility for any damage to any land or property, including the WORK site, relating in any way to the performance of the WORK. Should any claim be made against the DISTRICT by any owner or occupant of any such land or property relating to the performance of the WORK, the CONTRACTOR shall promptly attempt to settle the claim by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding. The CONTRACTOR shall, to the fullest extent permitted by law, indemnify, defend, and hold harmless the DISTRICT, the ENGINEER, the DESIGNER, their consultants, Subcontractors, and the officers, directors, employees and agents of each and any of them from and against all claims, damages, losses, and expenses (including, but not limited to, fees of engineers, experts, consultants, attorneys and other professionals, and court costs, including costs of appeal) arising directly or indirectly from any damage to any land or property relating to performance of the WORK.

C. The CONTRACTOR shall be responsible for maintaining good security at all locations where WORK is performed under this Agreement and to that end shall utilize such watchmen or other persons as may be required. Unauthorized persons shall be excluded from the site of WORK. The Contractor shall not sell, nor shall permit or suffer the introduction or use of intoxicating liquors, narcotics, or other unlawful or controlled substances upon the WORK embraced in these Specifications or upon any of the grounds occupied or controlled by him in connection with such WORK.

<u>WORK BY OTHERS</u>

D. CONTRACTOR shall be responsible for ascertaining the nature and extent of any simultaneous, collateral and essential work by others as described in the General Requirements and shall include in its Bid all costs involved as a result of coordinating its WORK with others.

6.11 SAFETY AND PROTECTION

<u>SAFETY PLAN</u>

A. The CONTRACTOR shall submit a written safety plan to the ENGINEER for review and acceptance by ENGINEER prior to commencement of any WORK on site. The CONTRACTOR shall be solely responsible for implementing the safety plan and for initiating, maintaining, and supervising all safety

precautions and programs in connection with the WORK. The CONTRACTOR shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

1. All persons performing the WORK and other persons and organizations who may be affected thereby;

2. All the WORK and materials and equipment to be incorporated therein, whether in storage on or off the site; and

3. Other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, and Utilities not designated for removal, relocation, or replacement in the course of construction.

B. The CONTRACTOR shall comply with all applicable Laws and Regulations (whether referred to herein or not) for the safety of persons or property and protect them from damage, injury, or loss and shall erect and maintain all necessary safeguards for such safety and protection. The CONTRACTOR shall notify owners of adjacent property and Utilities when prosecution of the WORK may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.

C. The CONTRACTOR shall designate a qualified and experienced safety representative at the site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and program. The safety representative shall report directly to the Project Manager. The CONTRACTOR'S safety representative shall be certified by the Board of Certified Safety Professionals as a Certified Safety Professional or certified by California Division of Occupational Safety and Health (DOSH) as a Safety Representative who is qualified to recognize hazardous conditions and is certified by the DOSH as defined in Subchapter 20 Tunnel Safety Orders.

HAZARD COMMUNICATION PROGRAMS

D. Materials that contain hazardous substances or mixtures may be required on the WORK. A Material Safety Data Sheet shall be made available on site by the CONTRACTOR for every hazardous product used.

E. Material usage shall be accomplished with strict adherence to OSHA safety requirements and all manufacturer's warnings and application instructions listed on the Material Safety Data Sheet and on the product container label.

F. The CONTRACTOR shall be responsible for coordinating any exchange of Material Safety Data Sheets or other hazard communication information required to be made available to or exchanged between or among employers at the site in accordance with Laws or Regulations.

G. The CONTRACTOR shall immediately notify the ENGINEER if it considers a specified product or its intended usage to be unsafe. This notification must be given to the ENGINEER prior to the product being ordered for purchase, or if ordered by some other party, prior to the product being incorporated in the WORK.

TRENCH SHORING PLAN

H. The CONTRACTOR shall submit to the ENGINEER a detailed plan showing the design of shoring, bracing, sloping, or other provisions to be made for worker protection from the hazard of caving ground during the excavation of such trench or trenches before undertaking any such activities, and shall not commence any such activities before said plan is accepted by the ENGINEER. Notwithstanding said acceptance, said plan is the sole responsibility of the CONTRACTOR under this Agreement. No acceptance, comment or any other action taken by ENGINEER or DISTRICT regarding said plan shall either lessen the CONTRACTOR'S sole responsibility, or impute any responsibility upon ENGINEER or DISTRICT, for said plan. CONTRACTOR shall be solely responsible for any injury or damage arising from said plan, or arising from any acts or omissions of the CONTRACTOR relating to said plan. Nothing in this Paragraph shall be construed to impose any liability upon DISTRICT or ENGINEER, or either of their employees, for any claims of any kind which may arise in connection with said plan or any act or omission of CONTRACTOR regarding said plan.

ELECTRIC SHOCK HAZARDS

I. Any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines shall be operated so that a clearance of 10 feet is maintained. If the voltage is higher than 50kV, the clearance shall be increased 4 inches for every 10kV over that voltage. However, under any of the following conditions, the clearance may be reduced:

    1. If the vehicle is in transit with its structure lowered, the clearance may be reduced to 4 feet. If the voltage is higher than 50kV, the clearance shall be increased 4 inches for every 10 kV over that voltage.

    2. If insulating barriers are installed to prevent contact with the lines, and if the barriers are rated for the voltage of the line being guarded and are not a part of or an attachment to the vehicle or its raised structure, the clearance may be reduced to a distance within the designed working dimensions of the insulating barrier.

    3. If the equipment is an aerial lift insulated for the voltage involved, and if the work is performed by a qualified person, the clearance (between the uninsulated portion of the aerial lift and the power line) may be reduced to the distance given the table below.

VOLTAGE RANGE (Phase to Phase)	MINIMUM APPROACH DISTANCE
300V and less	Avoid Contact
Over 300V, not over 750V	1'-0"
Over 750V, not over 2kV	1'-6"
Over 2kV, not over 15kV	2'-0"
Over 15kV, not over 37kV	3'-0"
Over 37kV, not over 87.5kV	3'-6"
Over 87.5kV, not over 121kV	4'-0"
Over 121kV, not over 140kV	4'-6"

J. Employees standing on the ground may not contact the vehicle or mechanical equipment or any of its attachments, unless:

1. The employee is using protective equipment rated for the voltage; or

2. The equipment is located so that no uninsulated part of its structure (that portion of the structure that provides a conductive path to employees on the ground) can come closer to the line than permitted in this Paragraph.

K. If any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines is intentionally grounded, employees working on the ground near the point of grounding may not stand at the grounding location whenever there is a possibility of overhead line contact. Additional precautions, such as the use of barricades or insulation, shall be taken to protect employees from hazardous ground potentials, depending on earth resistivity and fault currents, which can develop within the first few feet or more outward from the grounding point.

6.12 EMERGENCIES

A. In emergencies affecting the safety or protection of persons or the WORK or property at the site or adjacent thereto, CONTRACTOR, without special instruction or authorization from DISTRICT or ENGINEER, is obligated to immediately act to prevent threatened damage, injury, or loss. CONTRACTOR shall give ENGINEER prompt written notice if CONTRACTOR believes that any significant changes in the WORK or variations from the Contract Documents have been caused thereby. If ENGINEER determines that a change in the Contract Documents is required because of the action taken by CONTRACTOR in response to such an emergency, a Change Order will be issued to document the consequences of such action.

6.13 SUBMITTALS

A. All submittals required by the Contract Documents shall be submitted to the ENGINEER in accordance with the General Requirements. Before

submitting each Shop Drawing or sample, CONTRACTOR shall have determined and verified:

1. All field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers and similar information with respect thereto;

2. The suitability of all materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the WORK;

3. All information relative to CONTRACTOR'S responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto; and

4. Shall also have reviewed and coordinated each Shop Drawing or sample with other Shop Drawings and samples and with the requirements of the WORK and the Contract Documents. Each submittal shall bear a stamp or specific written certification that CONTRACTOR has satisfied CONTRACTOR'S obligations under the Contract Documents with respect to CONTRACTOR'S review and approval of that submittal.

B. With each submittal, CONTRACTOR shall give ENGINEER specific written notice of any variations, that the Shop Drawing or sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop Drawings or sample submittals; and, in addition, by a specific notation made on each Shop Drawing or sample submitted to ENGINEER for review and approval of each such variation.

C. ENGINEER will provide timely review of submittals in accordance with the schedule of submittals acceptable to ENGINEER. ENGINEER'S review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the WORK, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. ENGINEER'S review will be in accordance with the General Requirements.

6.14 CONTINUING THE WORK

A. The CONTRACTOR shall carry on the WORK and adhere to the progress schedule during all disputes or disagreements with the DISTRICT. No WORK shall be delayed or postponed pending resolution of any disputes or disagreements, except as the CONTRACTOR and the DISTRICT may otherwise agree in a separate writing which specifically addresses the details of the dispute or disagreement at issue.

6.15 INDEMNIFICATION

A. Indemnification of DISTRICT. CONTRACTOR shall to the fullest extent permitted by law, defend, indemnify and hold harmless the DISTRICT, and its

officers, agents and employees, from all claims, demands, damages, costs, expenses, judgments, attorney fees, liabilities or other losses (hereafter [for purposes of this Paragraph 6.15 only] collectively "claims"), that arise out of, are made in connection with, or relate in any way to any act or omission of CONTRACTOR relating to this Agreement or the performance of any duty, obligation, or work hereunder. The preceding sentence shall be effective and shall extend to all such claims in their entirety, even when such claims or losses arise from the joint, concurring or contributory negligence of the DISTRICT, its officers, agents, and employees, or any other persons or entities. However, the DISTRICT shall be responsible for the amount of a judgment rendered against the DISTRICT to the extent such judgment is based upon a specific finding of active negligence on the part of the DISTRICT, subject to the DISTRICT's rights under applicable law for contribution, indemnification and other remedies.

1. The above paragraph applies to any and all such claims, regardless of the nature of the claim or theory of recovery, and regardless of whether the claim arises before, during or after commencement or completion of this Agreement. As used herein, the term "CONTRACTOR" shall include the CONTRACTOR, and/or its agents, employees, Suppliers, Subcontractors, or other independent contractors hired, by, or directly responsible to, CONTRACTOR.

2. DISTRICT shall notify CONTRACTOR about the existence of any claim to which the CONTRACTOR'S indemnification obligations would apply and shall give CONTRACTOR a reasonable opportunity to defend the same at the expense of CONTRACTOR. If CONTRACTOR shall, within a reasonable time after Notice, fail to defend any such claim, demand, liability or other matter, DISTRICT shall have the right, but not the obligation, to undertake the defense of, and to compromise or settle (exercising reasonable business judgment) the claim or other matter on behalf, for the account, and at the risk and cost, of CONTRACTOR. The CONTRACTOR'S duty to defend includes the duty of providing a separate legal defense for the DISTRICT if the DISTRICT determines that joint representation is not in the best interest of the DISTRICT.

3. It is the intent of the parties to provide the DISTRICT the fullest indemnification, defense, and "hold harmless" rights allowed under the law. If any word(s) contained herein are deemed by a court to be in contravention of applicable law, said word(s) shall be severed from this contract and the remaining language shall be given full force and effect. Nothing contained in the foregoing indemnity provisions shall be construed to require CONTRACTOR to indemnify DISTRICT against any responsibility or liability in contravention of Civil Code 2782.

4. The CONTRACTOR shall be solely responsible for performing the WORK under this Agreement. All activities arising out of or relating to the performance of the WORK shall be at the risk of the CONTRACTOR. The DISTRICT's or ENGINEER's review, inspection, clarification, feedback, direction, approval and/or acceptance regarding any materials,

equipment, personnel, procedures, methods, techniques, schedules, sequences, plans, or any other means used by CONTRACTOR to perform the WORK shall not relieve the CONTRACTOR of its sole responsibility for its work. Under no circumstances shall any act or omission of the DISTRICT or ENGINEER relating to any review, inspection, clarification, feedback, direction, approval and/or acceptance regarding any materials, equipment, personnel, procedures, methods, techniques, schedules, sequences, plans, or any other means used by CONTRACTOR to perform the WORK constitute active negligence on the part of the DISTRICT. Under no circumstances shall any act or omission of the DISTRICT or ENGINEER relating to any review, inspection, clarification, direction, approval and/or acceptance regarding any WORK constitute active negligence on the part of the DISTRICT.

B. Indemnification of County. Each and every term and provision of Paragraph 6.15.A. above (including all subparagraphs thereunder) is hereby incorporated herein by reference, as though fully set forth herein, with the word "DISTRICT" being replaced with "County of San Luis Obispo," so that CONTRACTOR shall defend, indemnify, and hold harmless the County pursuant to said terms and conditions as so amended.

C. Indemnification of ENGINEER**.** CONTRACTOR shall defend, indemnify and hold harmless the ENGINEER, and its officers and employees, from all claims, demands, damages, costs, expenses, judgments, attorney fees, liabilities or other losses (hereafter [for purposes of this Paragraph 6.15 only] collectively "claims"), that arise out of, are made in connection with, or relate in any way to any act or omission of CONTRACTOR relating to this Agreement or the performance of any duty, obligation, or work hereunder. The foregoing sentence excludes any claims arising out of any act or omission of the ENGINEER.

D. Indemnification of DESIGNER**.** CONTRACTOR shall defend, indemnify and hold harmless the DESIGNER, and its officers and employees, from all claims, demands, damages, costs, expenses, judgments, attorney fees, liabilities or other losses (hereafter [for purposes of this Paragraph 6.15 only] collectively "claims"), that arise out of, are made in connection with, or relate in any way to any act or omission of CONTRACTOR relating to this Agreement or the performance of any duty, obligation, or work hereunder. The foregoing sentence excludes any claims arising out of any act or omission of the DESIGNER.

E. General Provisions.

1. This Paragraph 6.15 applies to all claims, regardless of the nature of the claim or theory of recovery, and regardless of whether the claim arises before, during or after commencement or completion of this Agreement. The types of claims covered by this Paragraph 6.15 include, but are not be limited to, the following:

a. Claims resulting directly or indirectly from the negligence or carelessness of the CONTRACTOR, Subcontractors and Suppliers, or their employees, or agents in the performance of the WORK, or in guarding or maintaining the same, or from any improper materials, implements, or appliances used in its construction, or by or on account of any act or omission of the CONTRACTOR, Subcontractors and Suppliers, or their employees, or agents;

b. Claims arising directly or indirectly from bodily injury, occupational sickness or disease, or death of the CONTRACTOR'S Subcontractor's, or Supplier's own employees engaged in the WORK resulting in actions brought by or on behalf of such employees against the DISTRICT, County of San Luis Obispo, the ENGINEER, and/or the DESIGNER .

c. Claims arising directly or indirectly from or based on the violation of any law, ordinance, regulation, order, or decree, whether by the CONTRACTOR, Subcontractors, Suppliers, or their employees, or agents;

d. Claims arising directly or indirectly from the use or manufacture by the CONTRACTOR, Subcontractors, Suppliers, or their employees, or agents in the performance of this Contract Agreement of any copyrighted or uncopyrighted composition, secret process, patented or unpatented invention, article, or appliance, unless otherwise specifically stipulated in this Agreement;

e. Claims arising directly or indirectly from the breach of any warranties, whether express or implied, made to the DISTRICT or any other parties by the CONTRACTOR, Subcontractors, Suppliers, or their employees, or agents;

f. Claims arising directly or indirectly from the willful misconduct of the CONTRACTOR, Subcontractors, Suppliers, or their employees, or agents; and

g. Claims arising directly or indirectly from any breach of the obligations assumed herein by the CONTRACTOR.

2. The CONTRACTOR's obligations under this Paragraph 6.15 shall not be limited in any way by any limitation of the amount or type of damages, compensation, or benefits payable by or for the CONTRACTOR or any such Subcontractor or other person or organization under workers' compensation acts, disability benefit acts, or other employee benefit acts.

3. As used herein, the term "CONTRACTOR" shall include the CONTRACTOR, and/or its agents, employees, Suppliers, Subcontractors, or other independent contractors hired, by, or directly responsible to, CONTRACTOR.

6.16 CONTRACTOR'S DAILY REPORTS

A. The CONTRACTOR shall complete a daily report indicating location worked, total manpower hours for each construction trade, major equipment engaged in the WORK and note periods of time when said equipment is out of service, each Subcontractor's manpower and equipment, weather conditions, materials delivered, work performed and progress achieved, potential circumstances that could lead to a delay, Request for Change Order, claim, and other related information involved in the performance of the WORK. The daily report shall be completed on forms furnished by the ENGINEER, and shall be submitted to the ENGINEER at the conclusion of each work day. The report shall comment on the daily progress and status of the WORK within each major component of the WORK. These components will be decided by the ENGINEER.

6.17 PAYROLL RECORD OF WAGES PAID

A. The CONTRACTOR and each Subcontractor shall keep an accurate payroll record, showing the name, address, social security number, work classification, straight time and overtime hours worked each Day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed by him in connection with the WORK.

B. The payroll records shall be certified and shall be available for inspection at all reasonable hours at the principal office of the CONTRACTOR upon the basis set forth in Section 1776 of the Labor Code, and the CONTRACTOR shall comply fully with all of the provisions thereof and of any rules adopted pursuant thereto.

C. In the event of noncompliance with the requirements of such section after 10 Days written notice specifying in what respects compliance is required, the CONTRACTOR shall forfeit as a penalty to the DISTRICT, $25.00 for each calendar Day, or portion thereof, for each worker, until strict compliance is effectuated. Upon the request of the Division of Apprenticeship Standards or the Division of Labor Standards Enforcement, such penalties shall be withheld from progress payments then due.

6.18 CONTRACTOR'S GENERAL WARRANTY AND GUARANTEE

A. CONTRACTOR warrants and guarantees to DISTRICT that all WORK will be in accordance with the Contract Documents and will not be defective. ENGINEER and DISTRICT shall be entitled to rely on this representation of CONTRACTOR'S warranty and guarantee.

B. CONTRACTOR'S obligation to perform and complete the WORK in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of WORK that is not in accordance with the Contract Documents or a release of CONTRACTOR'S obligation to perform the WORK in accordance with the Contract Documents:

1. Observations by ENGINEER;

2. Recommendation by ENGINEER or payment by DISTRICT of any progress or final payment;

3. The issuance of a Certificate of Substantial Completion by ENGINEER or any payment related thereto by DISTRICT;

4. Use or occupancy of the WORK or any part thereof by DISTRICT;

5. Any review and approval of a Shop Drawing or sample submittal or the issuance of a notice of acceptability by ENGINEER;

6. Any inspection, test, or approval by others; or

7. Any correction of Defective Work by DISTRICT.

6.19 ACTS OF GOD

A. The CONTRACTOR shall not be responsible for the cost of repairing or restoring damaged portions of the WORK determined by the ENGINEER to have been proximately caused by an act of God in excess of 5 percent of the Contract Price, provided that the WORK damaged was built in accordance with the Contract Documents, including the applicable construction standards related thereto. The CONTRACTOR shall obtain insurance to indemnify the DISTRICT for any damage to the WORK caused by an act of God if the premium of said insurance coverage is called for as a separate bid item in the bidding schedule for the WORK. For purposes of this Paragraph, the term “acts of God” shall include only the following occurrences or conditions and effects: earthquakes in excess of a magnitude of 3.5 on the Richter Scale, and tidal waves.

ARTICLE 7 - OTHER WORK

7.1 RELATED WORK AT SITE

A. The DISTRICT may perform other work related to the Project at the site by the DISTRICT'S own forces, have other work performed by utility owners, or let other direct contracts therefore which may contain General Conditions similar to these. If the fact that such other work to be performed was not noted in the Contract Documents, written notice thereof will be given to the CONTRACTOR prior to starting any such other work.

B. The CONTRACTOR shall afford each other contractor who is a party to such a direct contract and each utility owner (or the DISTRICT, if the DISTRICT is performing the additional work with the DISTRICT’S employees) proper and safe access to the site and a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such work. CONTRACTOR shall properly connect and coordinate the WORK with said work of others. The CONTRACTOR shall do all cutting, fitting, and patching of the WORK that may be required to make its several parts come together

properly and integrate with such other work. The CONTRACTOR shall not endanger any work of others by cutting, excavating, or otherwise altering their work and will only cut or alter their work with the written consent of the ENGINEER and the others whose work will be affected.

C. If the proper execution or results of any part of the CONTRACTOR'S WORK depends upon the work of any such other CONTRACTOR or utility owner (or DISTRICT), the CONTRACTOR shall promptly inspect and report to the ENGINEER in writing within 2 days any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for such proper execution and results. The CONTRACTOR'S failure to promptly report such delays, defects, or deficiencies will constitute an acceptance of the other work as fit and proper for integration with the CONTRACTOR'S WORK except for latent or nonapparent defects and deficiencies in the other work.

ARTICLE 8 - DISTRICT'S RESPONSIBILITIES

8.1 COMMUNICATIONS

A. All communications from the DISTRICT to the CONTRACTOR will be through either the ENGINEER or the DISTRICT.

8.2 PAYMENTS

A. The DISTRICT will make payments to the CONTRACTOR as provided in Paragraphs 14.5 and 14.8.

8.3 LANDS, EASEMENTS, AND SURVEYS

A. The DISTRICT'S duties with respect of providing lands and easements and providing engineering surveys to establish reference points are set forth in Paragraphs 4.1 and 4.6. The DISTRICT will identify and make available to the CONTRACTOR copies of reports of physical conditions at the site and in existing structures which have been utilized in preparing the Contract Documents as set forth in Paragraph 4.2.

8.4 CHANGE ORDERS

A. The DISTRICT will execute Change Orders when appropriate pursuant to Article 10.

8.5 INSPECTIONS AND TESTS

A. The DISTRICT'S role in inspections and tests is set forth in Paragraph 13.3.

ARTICLE 9 - ENGINEER'S STATUS DURING CONSTRUCTION

9.1 DISTRICT'S REPRESENTATIVE

A. The ENGINEER will be the DISTRICT'S representative during the construction period. The duties and responsibilities and the limitations of authority of the ENGINEER as the DISTRICT'S representative during construction are set forth in the Contract Documents.

9.2 VISITS TO SITE

A. The ENGINEER will be on-site full time during construction. The DESIGNER will make visits to the site during construction. The DESIGNER will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the WORK. The DESIGNER will not, during such visits or as a result of such observations of the CONTRACTOR'S work in progress, supervise, direct, coordinate, or have control over the CONTRACTOR'S work.

9.3 PROJECT REPRESENTATION

A. The ENGINEER will furnish on-site representatives for contract administration and coordination of activities among the DISTRICT, CONTRACTOR, DESIGNER, and other parties.

9.4 CLARIFICATIONS AND INTERPRETATIONS

A. The ENGINEER will issue, with reasonable promptness, such written Clarifications or interpretations of the requirements of the Contract Documents as the ENGINEER may determine necessary, which shall be consistent with or reasonably inferable from the overall intent of the Contract Documents.

B. ENGINEER will respond to a CONTRACTOR'S Request for Information with reasonable promptness, and no later than 21 days after the ENGINEER'S receipt of request.

9.5 AUTHORIZED VARIATIONS IN WORK

A. The ENGINEER may authorize variations in the WORK from the requirements of the Contract Documents. These may be accomplished by a Field Order or other written directive and will require the CONTRACTOR to perform the WORK involved in a manner that minimizes the impact to the WORK and the Contract Time(s). If the CONTRACTOR believes that a Field Order or other written directive justifies an increase in the Contract Price or an extension of the Contract Time(s), the CONTRACTOR may make a Request for Change Order as provided in Article 10.

9.6 REJECTING DEFECTIVE WORK

A. The ENGINEER will have authority to reject WORK which the ENGINEER believes to be defective and will also have authority to require special inspection or testing of the WORK as provided in Paragraph 13.3F, whether or not the WORK is fabricated, installed, or completed.

9.7 CONTRACTORS SUBMITTALS, CHANGE ORDERS, AND PAYMENTS

A. The ENGINEER will receive, process, monitor and return all CONTRACTOR submittals.

B. The ENGINEER'S responsibilities for Change Orders are set forth in Article 10.

C. The ENGINEER'S responsibilities for Applications for Payment are set forth in Article 14.

9.8 DECISIONS ON DISPUTES

A. Any inquiries, disputes, and other matters relating to the acceptability of the WORK and interpretation of the requirements of the Contract Documents pertaining to the performance of the WORK shall be initially determined by the ENGINEER. Any disputes in respect to changes in the Contract Price or Contract Time(s) shall be resolved in accordance with the requirements set forth in Articles 10 and 17.

B. A Disputes Review Board (see Section 00800A) will be established to assist in the resolution of disputes in connection with, or arising out of, performance of the WORK of this Agreement, if so specified in the Supplementary General Conditions.

9.9 LIMITATION ON ENGINEER’S RESPONSIBILITIES

A. Neither the ENGINEER'S authority to act under this Article 9 or other provisions of the Contract Documents, nor any decision made by the ENGINEER in good faith either to exercise or not exercise such authority, shall give rise to any duty or responsibility of the ENGINEER to the CONTRACTOR, any Subcontractor, any Supplier, any Surety for any of them, or any other person or organization performing any of the WORK.

B. Whenever in the Contract Documents the terms "as ordered," "as directed," "as required," "as allowed," "as reviewed," "as approved," or terms of like effect or import are used, or the adjectives "reasonable," "suitable," "acceptable," "proper," or "satisfactory," or adjectives, verbs, or nouns of like effect or import are used to describe a requirement, direction, review, decision or judgment of the ENGINEER as to the WORK, it is intended that such requirement, direction, review, decision or judgment will be solely to evaluate the WORK for compliance with the requirements of the Contract Documents, and conformance with the design concept of the completed

Project as a functioning whole as indicated by the Contract Documents, unless there is a specific statement indicating otherwise. The use of any such term or adjective shall not be effective to assign to the ENGINEER any duty or authority to supervise or direct the performance of the WORK or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.9.C.

C. The ENGINEER will not supervise, direct, control, or have authority over or be responsible for the CONTRACTOR'S means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of the CONTRACTOR to comply with Laws and Regulations applicable to the performance of the WORK. The ENGINEER will not be responsible for the CONTRACTOR'S failure to perform the WORK in accordance with the Contract Documents. The ENGINEER will not be responsible for the acts or omissions of the CONTRACTOR nor of any Subcontractor, SUPPLIER, or any other person or organization performing any of the WORK.

ARTICLE 10 - CHANGES IN THE WORK

10.1 GENERAL

A. Without invalidating the Agreement and without notice to any Surety, the DISTRICT may at any time or from time to time, order additions, deletions, or revisions in the WORK; these will be authorized by a written Field Order and/or a Change Order. Upon receipt of any such document, CONTRACTOR shall promptly proceed with the WORK involved with the Contract Documents. (except as otherwise specifically provided in said document).

Changes in the plans and Specifications, requested in writing by the CONTRACTOR, which do not materially affect the WORK and which are not detrimental to the WORK or to the interests of DISTRICT, may be granted to facilitate the WORK, when approved in writing by the ENGINEER. If the method will result in a cost savings, an appropriate deductive change may be required under the provisions of Paragraph 11.7. Nothing herein shall be construed as granting a right to the CONTRACTOR to demand acceptance of such changes.

B. Any written Field Order, response to Request for Information, or other directive, direction, instruction, interpretation, Clarification, or determination (hereinafter referred to as “Direction” for the purpose of this Article 10), provided by the DISTRICT or ENGINEER is not considered a Change Order, or a change to the Agreement, and shall not constitute, in and of itself, entitlement to an adjustment in Contract Price and/or Contract Time(s).

C. To the extent the CONTRACTOR believes it is entitled to any additional money or time for any reason the CONTRACTOR shall submit a Request for Change Order to the ENGINEER as more fully described in Paragraph 10.3, “CONTRACTOR’S Request for Change Order”. Notwithstanding any other

provisions in the Contract Documents relating to any additional time or money which the CONTRACTOR may be entitled to upon the occurrence of any Direction, or other event, or any other circumstance, the CONTRACTOR must comply with the provisions of Paragraph 10.3 to avoid a waiver of any such entitlement to any additional time or money.

UNAUTHORIZED CHANGES IN THE WORK

D. The CONTRACTOR shall not be entitled to an increase in the Contract Price nor an extension of the Contract Time(s) with respect to any work performed that is not required by the Contract Documents as amended, modified, supplemented by Change Order.

E. Any additional work resulting from any changes which are not authorized by a Change Order, including changes initiated or requested by CONTRACTOR which are accepted by the ENGINEER, shall be performed at the CONTRACTOR'S sole expense.

NOTIFICATION TO SURETY

F. If notice of any change is required by the provisions of any Bond to be given to a Surety, the giving of any such notice shall be the CONTRACTOR'S responsibility, and the amount of each applicable Bond shall be adjusted accordingly.

10.2 ALLOWABLE QUANTITY VARIATIONS

A. In the event of an increase or decrease in Bid item quantity of a unit price cost item, the total amount of WORK actually done or materials or equipment furnished will be paid for according to the unit price established for such WORK under the Contract Documents, wherever such unit price has been established; provided, that an adjustment in the Contract Price may be made for changes which result in an increase or decrease in excess of 25 percent of the estimated quantity of any unit price Bid item of the WORK.

B. In the event a part of the WORK is to be entirely eliminated and no lump sum or unit price is named in the Contract Documents to cover such eliminated WORK, the price of the eliminated WORK shall be agreed upon in writing by the DISTRICT and the CONTRACTOR. If the DISTRICT and the CONTRACTOR fail to agree upon the price of the eliminated WORK, said price shall be determined in accordance with the provisions of Article 11.

10.3 CONTRACTOR'S REQUEST FOR CHANGE ORDER

A. If the CONTRACTOR believes any of the following events entitles the CONTRACTOR or its Subcontractors or Suppliers to additional money or time, the CONTRACTOR must file a Request for Change Order with the requirements set forth herein.

1. Written Field Order;

2. Response to a Request for Information;

3. Clarification;

4. Comments on a submittal;

5. Differing site condition;

6. Underground Utilities;

7. Suspension of the WORK;

8. Delay, inconvenience, disruption of schedule, loss of efficiency or productivity;

9. DISTRICT caused stand-by;

10. Conflicts, ambiguities, inconsistencies, and/or problems arising from the Contract Documents; and

11. Any other reason for which the CONTRACTOR believes it is entitled to additional money or time.

B. The CONTRACTOR shall not be entitled to any change in the Contract Price and/or Contract Time under the following conditions or events:

1. They were foreseeable at the time the CONTRACTOR submitted its Bid; and

2. They were caused by the acts of the CONTRACTOR, Subcontractor and/or Supplier, including but not limited to the choice of means, methods, techniques, sequences, or procedures for WORK, failure to provide labor, materials or equipment in a timely manner, and failure to take reasonable steps to mitigate delays, disruptions, or conditions encountered.

IMMEDIATE NOTICE OF EVENTS IMPACTING WORK

C. CONTRACTOR shall immediately, not less than one business day, notify ENGINEER in writing of any Direction or other event that CONTRACTOR considers grounds for any additional time or money beyond those provided by the Contract Time(s) and Contract Price. Said notice shall contain a brief description of said Direction or event, including the names of the persons involved and the date, location and time at which it occurred, and a statement that the CONTRACTOR believes said Direction or event entitles CONTRACTOR to additional time or money. Failure to immediately provide such notice to ENGINEER shall constitute a waiver of the CONTRACTOR'S right to receive additional time or money for work performed, costs incurred,

or delays or time incurred, from the time of such event up until the ENGINEER'S receipt of such notice.

NOTICE OF INTENT TO SUBMIT A REQUEST FOR CHANGE ORDER

D. The CONTRACTOR shall promptly provide the ENGINEER with written notice that the CONTRACTOR intends to submit a Request for Change Order no later than five (5) Days, unless a shorter period is specified elsewhere in the Contract Documents, after the Direction and/or the event giving rise to the CONTRACTOR'S request for an adjustment in Contract Time(s) or Contract Price.

E. The CONTRACTOR shall include the following information in the notice of intent to Request a Change Order:

1. The date, circumstances, and source of the Direction or the event giving rise to the CONTRACTOR'S request;

2. Reasonable order of magnitude estimate of the change to the Contract Price;

3. Reasonable order of magnitude estimate of the time impact to the Contract Time; and

4. Contractual provisions and substantive basis to support the request.

REQUEST FOR CHANGE ORDER

F. Unless the ENGINEER issues written notice authorizing the CONTRACTOR additional time to submit the Request for Change Order, the CONTRACTOR shall provide, in writing, a detailed Request for Change Order to the ENGINEER no later than thirty-five (35) Days after the Direction and/or the event giving rise to the CONTRACTOR'S request for an adjustment in Contract Time(s) or Contract Price.

G. The Request for Change Order shall include:

1. Specific dollar amount requested covering all associated costs calculated in accordance with Article 11 and any other applicable provisions of the Contract Documents.

2. Specific request for time extension (number of Days) calculated in accordance with Article 12 and any other applicable provisions of the Contract Documents.

3. A copy of the written notice of intent, including all attachments; and

4. All documentation supporting the Request for Change Order, including but not limited to all cost records, schedule analysis, and any other

documents referenced in Paragraph 16.3 that are relevant to CONTRACTOR'S Request for Change Order.

H. The Request for Change Order shall be made in good faith, and the amount requested accurately reflect the adjustments in Contract Price or Contract Time for which the CONTRACTOR believes it is entitled to, and covers all direct, supplemental, indirect, consequential, serial and cumulative costs and delays to which the CONTRACTOR believes it is entitled to. CONTRACTOR'S justification for entitlement shall be clear and complete citing specific Contract Document references and reasons on which their entitlement is based.

DISTRICT'S RESPONSE TO REQUEST FOR CHANGE ORDER

I. The ENGINEER will make a written determination with respect to the CONTRACTOR'S Request for Change Order within thirty (30) Days of receipt of said request, unless additional information is required by the ENGINEER.

1. The ENGINEER may request additional information and specify a time period for receipt of the information. The CONTRACTOR shall comply with the ENGINEER'S request for information.

2. The ENGINEER will make a written determination within thirty (30) Days of receipt of CONTRACTOR'S additional information.

J. If the ENGINEER does not make a written Request for Information or a determination regarding the Request for Change Order within the applicable thirty (30) Day time period, the Request for Change Order is deemed denied.

EXECUTION OF CHANGE ORDERS

K. The methods to be used to execute a Change Order pursuant to these General Conditions are limited to the following:

1. Bilateral Change Method. The ENGINEER may direct the CONTRACTOR to proceed with a change in WORK as a result of mutual acceptance of a lump sum price negotiated on the basis of the CONTRACTOR'S itemized estimate of the anticipated cost of the work involved, including the CONTRACTOR'S allowable overhead and profit as stated in these General Conditions.

2. Unilateral Change Method. The ENGINEER may direct the CONTRACTOR to proceed with a change in WORK with payment to be made on the basis of the ENGINEER'S determination of the allowed cost and/or time for the work involved, including the CONTRACTOR'S allowable overhead and profit as stated in these General Conditions.

DENIAL OF REQUEST FOR CHANGE ORDER

L. If the CONTRACTOR disagrees with ENGINEER'S denial of a Request for Change Order, CONTRACTROR'S sole remedy shall be to make a claim, pursuant to the claim process described in Article 17.

CONTRACTOR'S OBLIGATION TO CONTINUE WORK

M. Pending resolution of the CONTRACTOR'S Request for Change Order, the CONTRACTOR shall continue to perform all WORK including, at written request of the ENGINEER, that work associated with the pending Request for Change Order. The CONTRACTOR shall maintain its progress with the WORK.

N. The ENGINEER may monitor the CONTRACTOR'S cost for verification of any requested increase of time or money. Such monitoring and verification of costs shall not signify agreement with the merit of the request.

WAIVER

O. Failure to follow the provisions set forth in this Paragraph 10.3 shall constitute a waiver of the CONTRACTOR'S right to receive any additional time or money as a result of any alleged Direction and/or event giving rise to the CONTRACTOR'S Request for Change Order. Notwithstanding any other provisions in the Contract Documents relating to any additional time or money which the CONTRACTOR may be entitled to upon the occurrence of any Direction, or other event, or any other circumstance, the CONTRACTOR must comply with the provisions of Paragraph 10.3 to avoid a waiver of any such entitlement to any additional time or money.

10.4 DISTRICT'S REQUEST FOR CHANGE PROPOSAL

A. The DISTRICT may request a written Change Proposal from the CONTRACTOR for a change in the WORK. CONTRACTOR shall submit its written Change Proposal within the time specified in the DISTRICT'S request. The Change Proposal shall represent the CONTRACTOR'S offer to perform the requested work, and the pricing set forth within the proposal shall represent full, complete, and final compensation for the proposed change and any impacts to any other WORK, including any adjustments in the Contract Time.

B. If the DISTRICT accepts the Change Proposal as submitted by the CONTRACTOR or as negotiated by the parties, the DISTRICT shall notify the CONTRACTOR in writing of its decision and will issue a written Change Order for the change in WORK.

ARTICLE 11 - CHANGE OF CONTRACT PRICE

11.1 GENERAL

A. The Contract Price constitutes the total compensation payable to the CONTRACTOR for performing the WORK. All duties, responsibilities, and obligations assigned to or undertaken by the CONTRACTOR to complete the WORK shall be at its expense without change in the Contract Price.

B. The Contract Price may only be changed by a Change Order.

C. The value of any work covered by a Change Order for an increase or decrease in the Contract Price shall be determined in one of the following ways:

1. By application of unit prices to the quantities of the items involved for portions of the work covered by unit prices contained in the Contract Documents;

2. By mutual acceptance of a lump sum, which may include an allowance for overhead and profit; or

3. On the basis of the cost of work (determined as provided in Paragraphs 11.3) plus a CONTRACTOR'S fee for overhead and profit (determined as provided in Paragraph 11.4).

11.2 COSTS RELATING TO WEATHER

A. Normal seasonal weather conditions, including the County wet season (October 15th through April 15th) and normal high or low ambient temperatures shall be considered in the planning and scheduling of the WORK influenced by such weather conditions to ensure the completion of the WORK within the Contract Time. No additional compensation or time extensions will be granted for the CONTRACTOR'S failure to take into account such weather conditions for the location of the WORK and for the period of time in which the WORK is to be accomplished.

CONTRACTOR shall add a critical activity to the schedule to reflect the occurrence of normal seasonal weather condition Day(s) which influence completion of the WORK, as specified in Section 01310, "Construction Scheduling."

B. The cost and time impacts of Inclement Weather are addressed in Paragraph 12.2.

11.3 COST OF WORK (BASED ON TIME AND MATERIALS)

A. General: The term "cost of work" means the sum of all costs necessarily incurred and paid by the CONTRACTOR for labor, materials, and equipment in the proper performance of extra work. Except as otherwise may be agreed

to in writing by the DISTRICT, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall include only the following items and shall not include any of the costs itemized in Paragraph 11.5. Provided, however, that the "cost of work" shall in no event exceed the actual costs incurred by CONTRACTOR in the performance of extra work.

B. Labor: The costs of labor will be the actual cost for wages prevailing for each craft or type of workers performing the extra work at the time the extra work is done, plus the employer labor surcharge associated with said wages (with said surcharge consisting of payroll taxes, workers compensation insurance, health and welfare, pension, vacation, apprenticeship funds, and other direct employer costs resulting from Federal, State or local laws, as well as assessments or benefits required by lawful collective bargaining agreements). Labor costs for equipment operators and helpers will be paid only when such costs are not included in the invoice for equipment rental. The labor costs for foremen shall be proportioned to all of their assigned work and only that applicable to extra work shall be paid. Nondirect labor costs including superintendence shall be considered part of the markup set out in Paragraph 11.4.

C. Materials: The cost of materials reported shall be at invoice or lowest current price at which materials are locally available and delivered to the job in the quantities involved (whichever is lower), plus the cost of freight, delivery and storage, subject to the following:

1. All trade discounts and rebates shall accrue to the DISTRICT, and the CONTRACTOR shall make provisions so that they may be obtained;

2. For materials secured by other than a direct purchase, the cost shall be deemed to be the price paid to the actual supplier as determined by the ENGINEER. Markup except for actual costs incurred in the handling of such materials will not be allowed;

3. Payment for materials from sources owned wholly or in part by the purchaser shall not exceed the price paid by the purchaser for similar materials from said sources on extra work items or the current wholesale price for such materials delivered to the WORK site, whichever price is lower; and

4. If in the opinion of the ENGINEER the cost of material is excessive, or the CONTRACTOR does not furnish satisfactory evidence of the cost of such material, then the cost shall be deemed to be the lowest current wholesale price as determined by the ENGINEER for the quantity concerned delivered to the WORK site less trade discount.

5. The DISTRICT reserves the right to furnish materials for the extra work and no Request for Change Order or claim will be allowed by the CONTRACTOR for costs and profit on such materials.

D. Equipment: The CONTRACTOR will be paid for the use of equipment at the rental rate listed for such equipment specified in the Supplementary General Conditions (SGC-11.3, Section 00800). Such rental rate will be used to compute payments for equipment whether the equipment is under the CONTRACTOR'S control through direct ownership, leasing, renting, or another method of acquisition. The rental rate to be applied for use of each item of equipment will be the rate resulting in the least total cost to the DISTRICT for the total period of use. If it is deemed necessary by the CONTRACTOR to use equipment not listed in the publication specified in the Supplementary General Conditions, an equitable rental rate for the equipment will be established by the ENGINEER. The CONTRACTOR may furnish cost data which might assist the ENGINEER in the establishment of the rental rate. Payment for equipment shall be subject to the following:

1. All equipment shall, in the opinion of the ENGINEER, be in good working condition and suitable for the purpose for which the equipment is to be used;

2. Unless otherwise specified, manufacturer's ratings and manufacturer approved modifications shall be used to classify equipment for the determination of applicable rental rates. Equipment which has no direct power unit shall be powered by a unit of at least the minimum rating recommended by the manufacturer;

3. Rental time will not be allowed while equipment is inoperative due to breakdowns.

E. Equipment on the WORK Site: The rental time to be paid for equipment on the WORK site will be the time the equipment is in productive operation on the extra work being performed and, in addition, will include the time required to move the equipment to the location of the extra work and return it to the original location (or to another location requiring no more time than that required to return it to its original location); except, that moving time will not be paid if the equipment is used on other than the extra work, even though located at the site of the extra work. Loading and transporting costs will be allowed, in lieu of moving time, when the equipment is moved by means other than its own power, except that no payment will be made for loading and transporting costs when the equipment is used at the site of the extra work on other than the extra work. The rental time of equipment on the WORK site will be computed subject to the following:

1. When hourly rates are listed, any part of an hour less than 30 minutes of operation will be considered to be half-hour of operation, and any part of an hour in excess of 30 minutes will be considered one hour of operation;

2. When daily rates are listed, any part of a Day less than 4 hours operation will be considered to be half-day of operation;

3. Payment for the equipment will be made in accordance with the provisions in Paragraph 11.3.D, herein;

4. Payment for the cost of labor and subsistence or travel allowance will be made at the rates paid by the CONTRACTOR to other workers operating similar equipment already on the WORK site, or in the absence of such labor, established by collective bargaining agreements for the type of workmen and location of the extra work, whether or not the operator is actually covered by such an agreement. A labor surcharge will be added to the cost of labor described herein in accordance with the provisions of Paragraph 11.3.B, herein, which surcharge shall constitute full compensation for payments imposed by state and federal laws and all other payments made to or on behalf of workers other than actual wages; and

5. To the direct cost of equipment rental and labor, computed as provided herein, will be added the allowances for equipment rental and labor as provided in Paragraph 11.4, herein.

F. Special Services: Special work or services are defined as that work characterized by extraordinary complexity, sophistication, innovation, or a combination of the foregoing attributes which are unique to the construction industry. The ENGINEER in making estimates for payment for special services may consider the following:

1. When the ENGINEER and the CONTRACTOR, determine that a special service or work is required which cannot be performed by the forces of the CONTRACTOR or those of any of its Subcontractors, the special service or work may be performed by an entity especially skilled in the work to be performed. After validation of invoices and determination of market values by the ENGINEER, invoices for special services or work based upon the current fair market value thereof may be accepted without complete itemization of labor, material, and equipment rental costs;

2. When the CONTRACTOR is required to perform WORK necessitating special fabrication or machining process in a fabrication or a machine shop facility away from the job site, the charges for that portion of the WORK performed at the off-site facility may, by agreement, be accepted as a special service and accordingly, the invoices for the work may be accepted without detailed itemization; and

3. All invoices for special services will be adjusted by deducting all trade discounts. In lieu of the allowances for overhead and profit specified in Paragraph 11.4, herein, an allowance of 15 percent will be added to invoices for special services.

G. Sureties: All work performed hereunder shall be subject to all of the provisions of the Contract Documents and the CONTRACTOR'S Sureties shall be bound with reference thereto as under the original Agreement. Copies of all amendments to Surety Bonds or supplemental Surety Bonds shall be submitted to the DISTRICT for review prior to the performance of any work hereunder.

11.4 CONTRACTOR'S OVERHEAD AND PROFIT

A. Extra work ordered on the basis of time and materials will be paid for at the incurred cost of work as determined by the ENGINEER pursuant to Paragraph 11.3, plus only those allowances for overhead and profit expressly allowed in this Paragraph. The allowance for overhead and profit will include full compensation for superintendence, Bond and insurance premiums, taxes, field office expense, extended overhead, home office overhead, and all other items of expense or cost not included in the cost of labor, materials, or equipment provided for under Paragraph 11.3. The allowance for overhead and profit shall be made in accordance with the following schedule:

Actual Overhead and Profit Allowance

Labor	20 percent
Materials	15 percent
Equipment.....	15 percent

1. The allowance for overhead and profit shall be added to the net direct costs of Change Orders. The net direct costs shall be the sum of the added direct costs and the deducted direct costs associated with a Change Order.

2. For any change which results in a net decrease in cost less than $100,000, the amount to be deducted from the Contract Price shall be the net decrease in cost plus five (5) percent of such net decrease. (If a change results in a net decrease in cost of $10,000, the amount to be deducted from the Contract Price shall be $10,500.)

3. For any change which results in a net decrease in cost of $100,000 or more, the amount to be deducted from the Contract Price shall be the net decrease in cost plus twelve (12) percent of such net decrease. (If a change results in a net decrease in cost of $100,000, the amount to be deducted from the Contract Price shall be $112,000.)

B. To the sum of the costs and markups provided for in this Article, 2 percent will be added as compensation for Bonds and insurance.

C. It is understood that labor, materials, and equipment may be furnished by the CONTRACTOR or by the Subcontractor on behalf of the CONTRACTOR. When all or any part of the extra work is performed by a Subcontractor, the allowances specified herein will be applied to the labor, materials, and equipment costs of only that Subcontractor performing the extra work, to which the CONTRACTOR may add 5 percent of that Subcontractor's net direct costs for the extra work. This 5 percent increase constitutes the CONTRACTOR full allowance for overhead and profit on any extra work performed by a Subcontractor. Regardless of the number of hierarchical tiers of Subcontractors, the 5 percent increase above the Subcontractor's net direct costs may be applied one time only.

11.5 EXCLUDED COSTS

A. The term "cost of the work" shall not include any of the following:

1. Payroll costs and other compensation of CONTRACTOR'S officers, executives, principals (of partnership and sole proprietorships) general managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expediters, timekeepers, clerks, and other personnel employed by CONTRACTOR whether at the site or in CONTRACTOR'S principal or a branch office for general administration of the WORK and not specifically covered by Paragraph 11.3.F all of which are to be considered administrative costs covered by the CONTRACTOR'S allowance for overhead and profit;

2. All office expenses of CONTRACTOR (other than CONTRACTOR'S office at the site);

3. Individual pieces of equipment or tools having a replacement value of $500 or less, whether or not consumed by use;

4. Any part of CONTRACTOR'S capital expenses, including interest on CONTRACTOR'S capital employed for the WORK and charges against CONTRACTOR for delinquent payments;

5. Cost of premiums for all Bonds and for all insurance whether or not CONTRACTOR is required by the Contract Documents to purchase and maintain the same (except for the cost of premiums covered by Paragraph 11.4 above);

6. Costs due to the negligence of CONTRACTOR, any Subcontractor, or anyone directly or indirectly hired by any of them or for whose acts any of them may be liable, including but not limited to, the correction of Defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property;

7. Other overhead or general expense costs of any kind, and the cost of any item not specifically and expressly included in Paragraph 11.4;

8. Costs associated with the preparation of Request for Change Orders (whether or not ultimately authorized), cost estimates, or the preparation or filing of claims;

9. Expenses of the CONTRACTOR associated with anticipated lost profits or lost revenues, lost income or earnings, lost interest on earnings or unpaid retention.

10. Costs of special consultants or attorneys, whether or not in the direct employ of the CONTRACTOR, employed for services specifically related to the resolution of a claim, dispute, or other matter relating to the acceptability of the WORK.

11.6 CONTRACTOR'S EXTRA WORK REPORT

A. In order to be paid for extra work, the CONTRACTOR must submit a daily extra work report on the form furnished by the ENGINEER. The form must be completely filled out based on the provisions of Paragraphs 11.3 through 11.5 and signed by the CONTRACTOR and ENGINEER at the end of each work day. Failure to complete the form and obtain appropriate signatures by the next working Day after the extra work of the previous Day was completed will result in CONTRACTOR'S forfeiture of any rights to be paid for extra work under this Agreement.

11.7 VALUE ENGINEERING INCENTIVE

A. This Paragraph applies to any cost reduction proposal (hereinafter referred to as a Value Engineering Change Proposal or VECP) that the CONTRACTOR initiates and develops for the purpose of refining the Agreement to increase cost effectiveness or significantly improve the quality of the end result. The DISTRICT will consider VECPs that would result in net savings to the DISTRICT by providing either: (a) a decrease in the construction cost of the Agreement; or (b) a reduction in cost of ownership (hereinafter referred to as collateral costs) of the WORK provided by this Agreement. VECPs must result in savings without impairing essential functions and characteristics such as safety, service, life, reliability, economy of operation, ease of maintenance, aesthetics and necessary standard design features. However, nothing herein prohibits the CONTRACTOR from submitting VECPs when the required functions and characteristics can be combined, reduced or eliminated because they are nonessential or excessive. The DISTRICT will not recognize the CONTRACTOR'S correction of drawing errors, that result in a cost reduction, as a VECP.

B. The DISTRICT encourages the CONTRACTOR to include the VECP provisions in contracts with Subcontractors and Suppliers and to encourage submission of VECPs from Subcontractors and Suppliers. However, it is not mandatory to submit VECPs to the DISTRICT or to accept or transmit Subcontractor- or Supplier-proposed VECPs to the DISTRICT.

C. Submittal Requirements. As a minimum, submit the following information with each VECP:

1. A description of the difference between the existing Agreement requirement and the proposed change, and the comparative advantages and disadvantages.

2. Separate detailed cost estimates for both the existing Agreement requirement and the proposed change. Break down the cost estimates by contract item numbers indicating quantity increases or decreases and deleted pay items. Identify additional proposed work not covered by contract items, by using current DISTRICT pay item numbers. In preparing the estimates, include overhead, profit, and Bond. The

DISTRICT will not allow any separate pay item(s) for the cost of overhead, profit, and Bond.

3. An itemization of the changes, deletions or additions to drawing details, drawing sheets, design standards and Specifications that are required to implement the VECP if the DISTRICT adopts it. Provide preliminary plan drawings sufficient to describe the proposed changes.

4. An estimate of the effects the VECP would have on collateral costs to the DISTRICT.

5. Engineering or other analysis in sufficient detail to identify and describe specific features of the Agreement that must be changed if the DISTRICT accepts the VECP with a proposal as to how these changes can be accomplished and an assessment of their effect on other Nacimiento Water Project elements. The DISTRICT may require that engineering analyses be performed by a prequalified consultant in the applicable class of work. Support all design changes that result from the VECP with prints of drawings and computations signed and sealed by the Specialty ENGINEER.

6. State the time by which the DISTRICT must approve the VECP to obtain the total estimated cost reduction during the remainder of the contract, noting any effect on the contract completion time or delivery schedule.

D. VECP Review. Submit two copies of each VECP to the ENGINEER. The DISTRICT will process VECPs expeditiously; however, the DISTRICT is not liable for any delay in acting upon a VECP submitted. The CONTRACTOR may withdraw, in whole or in part, a VECP not accepted by the DISTRICT within the period specified in the VECP. The DISTRICT is not liable for any VECP development cost in the case where the DISTRICT rejects or the CONTRACTOR withdraws a VECP.

The ENGINEER is the sole judge of the acceptability of a VECP and of the estimated net savings in construction and collateral costs from the adoption of all or any part of such proposal. In determining the estimated net savings, the DISTRICT reserves the right to disregard the contract Bid prices if, in the judgment of the ENGINEER, such prices do not represent a fair measure of the value of work to be performed or to be deleted.

Prior to approval, the ENGINEER may modify a VECP, with the concurrence of the CONTRACTOR, to make it acceptable. If any modification increases or decreases the net savings resulting from the VECP, the DISTRICT will determine the CONTRACTOR'S fair share upon the basis of the VECP as modified and upon the final quantities. The DISTRICT will compute the net savings by subtracting the revised total cost of all Bid items affected by the VECP from the total cost of the same Bid items as represented in the original Agreement. Prior to approval of the VECP that initiates the supplemental agreement, provide acceptable contract-quality plan sheets revised to show all details consistent with the VECP design.

E. The DISTRICT will not pay for the CONTRACTOR'S VECP development and implementation costs. If the VECP is adopted, the CONTRACTOR'S share of the net savings as defined hereinafter represents full compensation to the CONTRACTOR for the VECP. The DISTRICT will not include its costs to process and implement a VECP in the estimate. However, the DISTRICT reserves the right, where it deems such action appropriate, to require the CONTRACTOR to pay the DISTRICT'S cost of investigating and implementing a VECP as a condition of considering such proposal. When the DISTRICT imposes such a condition, the CONTRACTOR shall accept this condition in writing, authorizing the DISTRICT to deduct amounts payable to the DISTRICT from any monies due or that may become due to the CONTRACTOR under the Agreement.

F. To determine any collateral cost savings, prepare separate estimates for collateral costs of both the existing contract requirement and the proposed change. Provide estimates that consist of an itemized breakdown of all costs and the basis for the data used in the estimate. Cost benefits to the DISTRICT include, but are not limited to, reduced costs of operation, maintenance or repair, and extended useful service life. Increased collateral costs include the converse of such factors. Compute collateral costs as follows:

1. Calculate costs over a 20-year period on a uniform basis for each estimate.

2. If the difference in the estimates as approved by the DISTRICT indicates a savings, divide the resultant amount by 20 to arrive at the average annual net collateral savings. The DISTRICT will share the average annual net collateral savings as stipulated below.

G. Sharing Arrangements: If the DISTRICT approves a VECP, the CONTRACTOR may be entitled to share in both construction savings and collateral savings to the full extent provided for. The CONTRACTOR shall receive the percentage specified below of the net reduction in the construction cost of the contract due to an approved VECP:

Accrued Net Savings	CONTRACTOR's Share %	DISTRICT's Share %
Less than $25,000	100	0
$25,000 to $50,000	75	25
Over $50,000	50	50

The DISTRICT will not consider an approved change that is identical or similar to a previously submitted VECP or an idea previously used by the DISTRICT as an innovative idea.

When collateral savings occur, the DISTRICT will provide the CONTRACTOR with 20% of the average annual net collateral savings.

H. DISTRICT'S Future Rights to a VECP: In the event of acceptance of a VECP, the CONTRACTOR hereby grants to the DISTRICT all rights to use, duplicate or disclose, in whole or in part, in any manner and for any purpose whatsoever, and to have or to permit others to do so, royalty free and without fee, other costs or surcharge, data reasonably necessary to fully utilize such proposal on this and any other DISTRICT contract.

ARTICLE 12 - CHANGE OF CONTRACT TIMES

12.1 GENERAL

A. The Contract Time(s) may only be changed by a Change Order. An increase in Contract Time(s) does not mean that the CONTRACTOR is due an increase in Contract Price. Only compensable time extensions will result in an increase in Contract Price.

B. All time limits stated in the Contract Documents are of the essence of the Agreement.

CRITERIA FOR DETERMINING ADJUSTMENTS IN CONTRACT TIME

C. Use of Float and Critical Path. Float is for the benefit of the Project and jointly owned by the DISTRICT and CONTRACTOR and is a resource available to meet contract Milestones and the Substantial and Final Completion dates.

D. Non-Compliance with CPM Schedule Requirements. The CONTRACTOR'S failure, neglect, or refusal to comply with the requirements of Paragraph 10.3, or any portion thereof, shall bar CONTRACTOR's request for costs or Contract Time extensions. Such failure, neglect, or refusal prejudices the DISTRICT'S and the ENGINEER'S ability to recognize and mitigate delay, and such failure, neglect, or refusal prevent the timely analysis of requests for extensions of Contract Time, and whether such extension may be warranted. The CONTRACTOR hereby waives all rights to additional costs or time extensions due to delays or accelerations that result from or occur during periods of time for which CONTRACTOR fails, neglects, or refuses to fully comply with the requirements of Paragraph 10.3.

E. Contractor Required Analysis. An extension in Contract Time will not be granted unless the CONTRACTOR can demonstrate through an analysis of the Critical Path Method Progress Schedule ("Critical Path") provided with a revised CPM Construction Schedule, as required in the General Requirements, that the increases in the time to perform or complete the WORK, or specified part of the WORK, beyond the corresponding Contract Time(s) arise from unforeseeable causes beyond the control and without the fault or negligence of both the CONTRACTOR and his subcontractors, suppliers or other persons or organizations, and that such causes in fact lead to performance or completion of the WORK, or specified part in question, beyond the corresponding Contract Time, despite the CONTRACTOR'S reasonable and diligent actions to guard against those effects.

F. When CONTRACTOR is prevented from completing any part of the WORK within the Contract Time(s) due to delay beyond the control of CONTRACTOR, the Contract Time(s) will be extended in an amount equal to the time lost on the Critical Path of the Project due to such delay, if a Request for Change Order is made therefore. Delays beyond the control of CONTRACTOR may include fires, floods, epidemics, Inclement Weather conditions, or earthquakes. Delays attributable to and within the control of Subcontractor or Supplier shall be deemed to be delays within the control of the CONTRACTOR.

G. When CONTRACTOR is prevented from completing any part of the WORK within the Contract Time(s) due to delay beyond the control of both DISTRICT and CONTRACTOR, an extension of the Contract Time(s) in an amount equal to the time lost on the Critical Path of the Project due to such delay shall be CONTRACTOR'S sole and exclusive remedy for such delay. In no event will DISTRICT be liable to CONTRACTOR, any Subcontractor, any Supplier, any other person or organization, or to any Surety for or employee or agent of any of them, for damages arising out or resulting from the following:

1. Delays caused by or within the control of CONTRACTOR; or

2. Delays beyond the control of both parties: may include fires, floods, epidemics, Inclement Weather conditions, earthquakes, or acts or neglect by utility owners or other contractors performing other work as contemplated by Article 7.

H. Delays attributable to and within the control of Subcontractor or Supplier shall be deemed to be delays within the control of CONTRACTOR. No time extension will be allowed for such delays.

I. Any delays caused by the DISTRICT will be non-compensable when there are concurrent delays by the CONTRACTOR. Should the CONTRACTOR make a Request for Change Order or claim for additional compensation when there are concurrent delays by the CONTRACTOR, the additional management, engineering, environmental, inspection, administrative, legal, and clerical costs required to respond to such a non-meritorious Request for Change Order or claim shall be borne solely by the CONTRACTOR.

J. Any delays caused by the DISTRICT will be non-compensable to the extent that there are offsetting actions by the DISTRICT or contract changes which result in time savings to the CONTRACTOR.

<u>DISTRICT'S RIGHT TO GRANT TIME EXTENSION</u>

K. The DISTRICT may elect, at its sole discretion, to grant an extension in Contract Time, without the CONTRACTOR'S request, because of delays or other factors.

12.2 EXTENSIONS OF CONTRACT TIMES FOR DELAY DUE TO WEATHER

A. Contract Time(s) may be extended by the ENGINEER because of delays in the completion of the WORK due to Inclement Weather, provided that the CONTRACTOR shall, within 10 Days of the beginning of any such delay, notify the ENGINEER in writing of the cause of delay and request an extension of Contract Time(s). The ENGINEER will ascertain the facts and the extent of the delay and extend the Contract Time(s) when, in its judgment, the findings of the fact justify such an extension.

ARTICLE 13 - INSPECTIONS AND TESTS; CORRECTION, REMOVAL, OR ACCEPTANCE OF DEFECTIVE WORK

13.1 NOTICE OF DEFECTS

A. Prompt notice of defects known to the DISTRICT or ENGINEER will be given to the CONTRACTOR. All Defective Work, whether or not in place, may be rejected, corrected, or accepted as provided in this Article 13. Defective Work may be rejected even if approved by prior inspection.

13.2 ACCESS TO WORK

A. DISTRICT, ENGINEER, DESIGNER, their Consultants, Subconsultants, other representatives and personnel of DISTRICT, independent testing laboratories and governmental agencies with jurisdictional interests will have access to the WORK at reasonable times for their observation, inspecting, and testing. CONTRACTOR shall provide them proper and safe conditions for such access and advise them of CONTRACTOR'S site safety procedures and programs so that they may comply therewith as applicable.

13.3 INSPECTIONS AND TESTS

A. The CONTRACTOR shall give the ENGINEER not less than 24 hours notice of readiness of the WORK for all required inspections, tests, or approvals, and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.

B. If Laws or Regulations of any public body having jurisdiction other than the DISTRICT require any WORK to specifically be inspected, tested, or approved, the CONTRACTOR shall pay all costs in connection therewith. The CONTRACTOR shall also be responsible for and shall pay all costs in connection with any inspection or testing required in connection with the DISTRICT'S or the ENGINEER'S acceptance of a Supplier of materials or equipment proposed as a substitution or "or equal" to be incorporated in the WORK, or of materials or equipment submitted for review prior to the CONTRACTOR'S purchase thereof for incorporation in the WORK. The cost of all inspections, tests, and approvals in addition to the above which are required by the Contract Documents will be paid by the DISTRICT (unless otherwise specified).

C. The ENGINEER will make, or have made, such inspections and tests as the ENGINEER deems necessary to see that the WORK is being accomplished in accordance with the requirements of the Contract Documents. Unless otherwise specified in the Supplementary General Conditions, the cost of such inspection and testing will be borne by the DISTRICT. In the event such inspections or tests reveal non-compliance with the requirements of the Contract Documents, the CONTRACTOR shall bear the cost of corrective measures deemed necessary by the ENGINEER, as well as the cost of subsequent reinspection and retesting. Neither observations by the ENGINEER nor inspections, tests, or approvals by ENGINEER or others shall relieve the CONTRACTOR from the CONTRACTOR'S obligation to perform the WORK in accordance with the Contract Documents.

D. All inspections, tests, or approvals other than those required by Laws or Regulations of any public body having jurisdiction shall be performed by organizations acceptable to the ENGINEER, DISTRICT and the CONTRACTOR.

E. The CONTRACTOR is responsible for providing safe and easy access to all WORK requiring inspection, testing, or approval by the ENGINEER or others (e.g. electric utility provider). If safe and easy access to such WORK is impeded without the written concurrence of the ENGINEER, CONTRACTOR shall remove and remedy any such impedements, at the request of the ENGINEER. Such removal and remedy shall be at the CONTRACTOR'S expense unless the CONTRACTOR has given the ENGINEER not less than 24 hours notice of the CONTRACTOR'S intention to cover or otherwise impede access to WORK requiring inspection, testing or approval by the ENGINEER, and the ENGINEER has not responded within 24 hours of receiving such notice.

F. If the ENGINEER considers it necessary or advisable for the ENGINEER or others to inspect or test any WORK not requiring inspection, testing, or approval, in accordance with Paragraph 9.6, and safe and easy access to such WORK is impeded, the CONTRACTOR shall remove and remedy any such impedements and provide safe and easy access to that portion of the WORK in question, furnishing all necessary labor, material, and equipment. If it is found that such WORK is defective, the CONTRACTOR shall bear all direct, indirect, and consequential costs and damages of providing such safe and easy access, inspection, and testing and of satisfactory reconstruction, including but not limited to, fees and charges of engineers, consultants, attorneys, and other professionals. However, if such WORK is not found to be defective, the CONTRACTOR will be allowed an increase in the Contract Price or an extension of the Contract Time, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, and reconstruction, provided the CONTRACTOR complies with the Request for Change Order procedures in Article 10.

13.4 DISTRICT MAY STOP THE WORK

A. If the WORK is defective, or the CONTRACTOR fails to perform WORK in such a way that the completed WORK will conform to the Contract Documents, or the WORK poses imminent injury to persons or damage to property, the DISTRICT may order the CONTRACTOR to stop the WORK, or any portion thereof, until the cause for such order has been eliminated. This right of the DISTRICT to stop the WORK shall not give rise to any duty on the part of the DISTRICT to exercise this right for the benefit of the CONTRACTOR or any other party.

13.5 CORRECTION OR REMOVAL OF DEFECTIVE WORK

A. If required by the ENGINEER, the CONTRACTOR shall promptly either correct all Defective Work, whether or not fabricated, installed, or completed, or, if the WORK has been rejected by the ENGINEER, remove it from the site and replace it with non-Defective Work. The CONTRACTOR shall bear all direct, indirect, and consequential costs and damages of such correction or removal, including but not limited to fees and charges of ENGINEERS, consultants, attorneys, and other professionals made necessary thereby.

13.6 ONE YEAR CORRECTION PERIOD

A. If within one year after the date of Final Completion (or such longer period of time as may be prescribed by Laws or Regulations, any applicable special guarantee required by the Contract Documents, or by any other specific provision of the Contract Documents), any WORK is found to be defective, the CONTRACTOR shall promptly, without cost to the DISTRICT, correct such Defective Work in accordance with DISTRICT'S written notification thereof. If DISTRICT notifies CONTRACTOR in writing that the Defective Work has been rejected by the DISTRICT, CONTRACTOR shall promptly remove it from the site and replace it with non-Defective Work. CONTRACTOR shall also satisfactorily correct or remove and replace any damage to other work of others resulting from any correction, removal and/or replacement of the Defective Work. If the CONTRACTOR does not promptly comply with such notification, or in an emergency where delay would cause serious risk of loss or damage, the DISTRICT may have the Defective Work corrected, or the rejected WORK removed and replaced, and all direct, indirect, and consequential costs and damages of such correction, removal and/or replacement, including but not limited to fees and charges of engineers, consultants, attorneys, and other professionals will be paid by the CONTRACTOR.

B. Where Defective Work (and damage to other work resulting therefrom) has been corrected, removed, or replaced under this Paragraph 13.6, the correction period hereunder with respect to such WORK will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

13.7 ACCEPTANCE OF DEFECTIVE WORK

A. If, instead of requiring correction or removal and replacement of Defective Work, the DISTRICT prefers to accept the Defective Work, the DISTRICT may do so. The CONTRACTOR shall bear all direct, indirect, and consequential costs attributable to the DISTRICT'S evaluation of and determination to accept such Defective Work. If any such acceptance occurs prior to final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the WORK, and the DISTRICT shall be entitled to an appropriate decrease in the Contract Price.

DISTRICT MAY CORRECT DEFECTIVE WORK

B. If the CONTRACTOR should neglect to prosecute the WORK properly or fail to perform any provision of the Agreement, the DISTRICT, after five (5) working Days written notice to the CONTRACTOR, may, without prejudice to any other remedy the DISTRICT may have, take action to alleviate such deficiencies and deduct the cost thereof from the payment then or thereafter due the CONTRACTOR.

C. In exercising the rights and remedies under this Paragraph 13.7.B, DISTRICT shall proceed expeditiously. In connection with such corrective or remedial action, DISTRICT may exclude CONTRACTOR from all or part of the Site, take possession of all or part of the WORK and suspend CONTRACTOR'S services related thereto, take possession of CONTRACTOR'S tools, appliances, construction equipment and machinery at the Site, and incorporate in the WORK all materials and equipment stored at the Site or for which DISTRICT has paid CONTRACTOR but which are stored elsewhere. CONTRACTOR shall allow DISTRICT, DISTRICT'S representatives, agents and employees, DISTRICT'S other contractors, and ENGINEER and ENGINEER'S consultants access to the Site to enable DISTRICT to exercise the rights and remedies under this Paragraph 13.7.B.

D. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by DISTRICT in exercising the rights and remedies under this Paragraph 13.7.B will be charged against CONTRACTOR, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the WORK; and DISTRICT shall be entitled to an appropriate decrease in the Contract Price.

E. CONTRACTOR shall not be allowed an extension of the Contract Time(s) because of any delay in the performance of the WORK attributable to the exercise by DISTRICT of DISTRICT'S rights and remedies under this Paragraph 13.7.B.

ARTICLE 14 - PAYMENTS TO CONTRACTOR AND COMPLETION

14.1 SCHEDULE OF VALUES (LUMP SUM PRICE BREAKDOWN)

A. The schedule of values or lump sum price breakdown established as provided in the General Requirements shall serve as the basis for progress payments and shall be incorporated into a form of Application for Payment acceptable to the ENGINEER.

14.2 UNIT PRICE BID FORM

A. Progress payments on account of unit price work will be based on the number of units completed.

14.3 APPLICATION FOR PROGRESS PAYMENT

A. On the first business day of the month unless otherwise prescribed by law, the CONTRACTOR shall submit to the ENGINEER for review, the Application for Payment filled out and signed by the CONTRACTOR covering the WORK completed as of the date of the Application for Payment and accompanied by the following:

1. Schedule of values reflecting current status;

2. Project schedule and current schedule updates;

3. Affidavits signed by all Subcontractors performing the WORK to date, stating that each of them has been paid, less earned retainage, as their interests appeared in the last preceding Application for Payment.

All payment requests by CONTRACTOR shall be made through an Application for Payment. Inclusion of the required documentation is a condition precedent to payment. The CONTRACTOR is not entitled to payment for any WORK unless the Application for Payment includes all required documentation.

In no event shall any payments be made in excess of the maximum percentages set forth in Public Contract Code section 9203.

B. The Application for Payment shall correlate with the amount requested in the schedule of values and with the state of completion of the WORK, as measured by the current project schedule. The following items shall be identified as a subtotal in the Application for Payment:

1. The amount of the CONTRACTOR'S total earnings for all WORK completed to date;

2. Plus the value of materials stored at the site, as specified in Paragraph 14.3.D; and

3. Less a deductive adjustment for the materials installed to date which have been previously paid for as materials stored at the site in prior Applications for Payment, in accordance with the provisions of Paragraph 14.3.D.

The CONTRACTOR'S Application for Payment shall be reviewed and processed by the ENGINEER in accordance with Paragraph 14.5 subject to the review and recommendation of any other withholdings, if applicable, and retainage as set forth below.

RETAINAGE

C. Unless otherwise prescribed by law, the DISTRICT shall retain a portion of the amount otherwise due to the CONTRACTOR, as follows:

1. Retention of 10 percent of each approved progress payment until the WORK is 50 percent complete; then the DISTRICT may, at its option, thereafter discontinue retainage (or reduce the percentage of retainage) for payment requests subsequently submitted.

2. In the event retention is ever reduced below the 10 percent level, the DISTRICT may, at its option, reinstate up to 10 percent retention of the total of the WORK done.

3. In no event shall the amount of retainage be less than the minimum amounts or retainage referenced in Public Contract Code section 9203.

PAYMENT FOR MATERIALS ON HAND

D. The value of materials and equipment procured by the CONTRACTOR and stored at the Site shall be an amount equal to the specified percent of the value of such materials as specified below. Said amount shall be based upon the value of all acceptable materials and equipment not incorporated in the WORK but delivered and suitably stored at the Site or at another location within the County of San Luis Obispo, California, agreed to in writing; provided, each such individual item has a value of more than $5,000 and will become a permanent part of the WORK. Unless otherwise prescribed by law, the value of materials and equipment procured by the CONTRACTOR and stored at the Site shall be 80 percent of the value of such materials. An individual item means a single item and does not include a package, box, crate or other container or stockpile containing several articles adding up to a value of more than $5,000. Materials of like kind in large quantities and related appurtenant components that will be incorporated in the WORK will be eligible for payment, if considered eligible by the ENGINEER, even though a single item of said material has a value of less than $5,000.

The Application for Payment shall also be accompanied by the following documentation in a form satisfactory to the DISTRICT: a bill of sale, invoice, or other documentation warranting that the CONTRACTOR has received the materials and equipment free and clear of all liens, charges, security

interests, and encumbrances (which are hereinafter in these General Conditions referred to as "Liens") and evidence that the materials and equipment are covered by appropriate property insurance and other arrangements to protect the DISTRICT'S interest therein.

Payment will not be made until Shop Drawing submittals have been submitted and approved.

OTHER PAYMENT WITHHOLDINGS

E. The Application for Payment and the payment thereof, or both, may at any time, be withheld or reduced if, in the opinion of the ENGINEER, the CONTRACTOR is not performing the WORK in accordance with the Agreement in a material respect, diligently and efficiently endeavoring to comply with intent of the Agreement, or if the CONTRACTOR shall fail to pay his labor and material bills as they become due. In determining whether the CONTRACTOR'S failure to perform in accordance with the Agreement is material, the ENGINEER will give consideration, among other factors, to whether the CONTRACTOR'S failure to perform endangers the public health, safety, and welfare, and whether the WORK is being performed in accordance with the accepted construction schedule.

The DISTRICT may keep monies which would otherwise be payable at any time hereunder, and apply the same, or so much as may be necessary therefore, to the payment of expenses, losses, or damages, as determined by the ENGINEER, incurred by the DISTRICT for which the CONTRACTOR is liable under the Agreement including but not limited to:

1. Failure of the CONTRACTOR to submit or obtain acceptance of a progress schedule, schedule of values, and any updated schedules;

2. Defective or non-conforming WORK;

3. Costs incurred by the DISTRICT to correct, repair or replace Defective or nonconforming WORK, or to complete the WORK;

4. A reasonable doubt that the WORK can be completed for the balance then unpaid;

5. A reasonable concern by the DISTRICT that the materials, equipment or component parts are not in proper operating condition;

6. Assessment of Liquidated Damages;

7. Failure to perform in accordance with the Agreement;

8. A reasonable concern that cost or liability that may occur to the DISTRICT as the result of the CONTRACTOR'S, Subcontractor's or Supplier's improper acts, omissions, fault, or negligence will cause

DISTRICT to incur cost, expense or liability (even if DISTRICT is indemnified for such cost, expense or liability under Paragraph 6.15);

9. Deduction in contract WORK;

10. Failure of CONTRACTOR to repair damaged materials, equipment, property, or WORK;

11. Failure of the CONTRACTOR to provide or obtain review of submittals;

12. Failure to pay Subcontractors or Suppliers;

13. Failure to keep record documents up to date;

14. Failure to comply with all applicable federal, state, and local laws, statutes, regulations, codes, licenses, easements, and permits;

15. Failure to obtain and maintain applicable permits, insurance, and bonds;

16. Failure to provide Statement of Intent to Pay Prevailing Wage and/or Affidavits of Wages Paid; and

17. Failure to comply with the contract safety requirements.

14.4 CONTRACTOR'S WARRANTY OF TITLE

A. The CONTRACTOR agrees, warrants and guarantees that title to all WORK, materials, and equipment covered by an Application for Payment, whether incorporated in the WORK or not, will pass to the DISTRICT free and clear of all liens no later than the time of payment.

14.5 REVIEW OF APPLICATIONS FOR PROGRESS PAYMENT

A. The ENGINEER shall review each Application for Payment as soon as practicable after receipt for the purpose of determining whether the request for payment is proper and shall deliver the appropriate written documents to the CONTRACTOR and/or DISTRICT as soon as practicable, but no later than seven (7) Days after receipt of such request, in accordance with the following provisions:

1. If any Application for Payment is determined to be proper, the ENGINEER shall deliver a written recommendation of payment, along with the Application for Payment, to the DISTRICT and shall deliver a copy of such written recommendation to the CONTRACTOR.

2. If any Application for Payment is determined to be not proper, the ENGINEER shall return such Application for Payment to the CONTRACTOR, accompanied by a document setting forth in writing the reasons why the request for payment is not proper. In such case, nothing will be delivered to the DISTRICT.

3. If the ENGINEER determines only a portion of any Application for Payment to be proper, ENGINEER shall present a written recommendation of partial payment to the DISTRICT which identifies said proper portion of the Application for Payment and shall deliver a document to the CONTRACTOR setting forth in writing the reasons why the remaining portion of the Application for Payment was determined to be not proper.

Subject to the provisions of Paragraph 14.5.B. and other applicable provisions of this Agreement, progress payments by DISTRICT to CONTRACTOR will be due within thirty (30) Days of ENGINEER's receipt of an undisputed and properly submitted request for payment.

B. The DISTRICT may refuse to make payment of the full amount recommended by the ENGINEER because claims have been made against the DISTRICT on account of the CONTRACTOR'S performance of the WORK, or Liens have been filed in connection with the WORK or there are other items entitling the DISTRICT to a credit against the amount recommended. The DISTRICT will give the CONTRACTOR (with a copy to the ENGINEER) written notice stating the reason for such action as soon as practicable after the DISTRICT'S receives from the ENGINEER a written recommendation regarding the Application for Payment.

C. A payment request shall be considered properly executed if funds are available for payment of the payment requested, and payment is not delayed due to an audit inquiry by the financial officer of the local agency. If the DISTRICT fails to make any progress payment within thirty (30) days after ENGINEER'S receipt of an undisputed and properly submitted Application for Payment from the CONTRACTOR, the DISTRICT shall pay interest to the CONTRACTOR on the undisputed principal amount at the legal rate set forth in subdivision (a) of Section 685.010 of the Code of Civil Procedure (which is currently 10 percent per annum). The number of days available to DISTRICT to make a payment without incurring interest pursuant to this Paragraph shall be reduced by the number of days by which the seven-day return requirement set forth in Paragraph 14.5.A. is exceeded. Said reduction of said thirty (30) day period shall be CONTRACTOR's sole remedy for any failure by ENGINEER or DISTRICT to comply with said seven-day return requirement. For purposes of this Paragraph 14.5, A "progress payment" includes all payments due CONTRACTOR, except that portion of the final payment designated by this Agreement as retention earnings.

14.6 PARTIAL UTILIZATION

A. The DISTRICT shall have the right to utilize or place into service any item of equipment or other usable portion of the WORK prior to completion of the WORK. Whenever the DISTRICT plans to exercise said right, the CONTRACTOR will be notified in writing by the DISTRICT, identifying the specific portion or portions of the WORK to be so utilized or otherwise placed into service.

B. It shall be understood by the CONTRACTOR that until such written notification is issued, all responsibility for care and maintenance of all of the WORK shall be borne by the CONTRACTOR. Upon issuance of said written notice of Partial Utilization, the DISTRICT will accept responsibility for the protection and maintenance of all such items or portions of the WORK described in the written notice.

C. The CONTRACTOR shall retain full responsibility for satisfactory completion of the WORK, regardless of whether a portion thereof has been partially utilized by the DISTRICT, and the CONTRACTOR'S one year correction period shall commence only after the date specified in Paragraph 13.6, “One Year Correction Period.”

14.7 SUBSTANTIAL COMPLETION

A. When the CONTRACTOR considers the WORK ready for its intended use the CONTRACTOR shall notify the DISTRICT and the ENGINEER in writing that the WORK is substantially complete. Substantially complete means that the facilities are finished to the point of completion that is set forth in the Supplementary General Conditions. The CONTRACTOR shall attach to this request a list of all WORK items that remain to be completed and a request that the ENGINEER prepare a Certificate of Substantial Completion.

Within a reasonable time thereafter, the DISTRICT, the CONTRACTOR, and the ENGINEER shall make an inspection of the WORK to determine the status of completion. If the ENGINEER does not consider the WORK substantially complete, or that the list of remaining WORK items is not comprehensive, the ENGINEER will notify the CONTRACTOR in writing giving the reasons therefore. If the ENGINEER considers the WORK substantially complete, the ENGINEER will prepare and deliver to the DISTRICT the Certificate of Substantial Completion signed by the ENGINEER and CONTRACTOR, which shall fix the date of Substantial Completion.

14.8 FINAL APPLICATION FOR PAYMENT

A. After the CONTRACTOR has completed all of the remaining WORK items and delivered all schedules, guarantees, Bonds, certificates of inspection, marked-up record documents (as provided in the General Requirements), and other documents, all as required by the Contract Documents, and after the ENGINEER has indicated that the WORK is acceptable, the CONTRACTOR may make application for final payment following the procedure for progress payments. The final Application for Payment shall be accompanied by all documentation called for in the Contract Documents, together with complete and legally effective releases or waivers (satisfactory to the DISTRICT) of all liens arising out of or filed in connection with the WORK.

14.9 FINAL PAYMENT AND ACCEPTANCE

A. After the ENGINEER is satisfied that the WORK has been completed and the CONTRACTOR'S other obligations under the Contract Documents have been fulfilled, based on the ENGINEER'S observation of the WORK during construction, final inspection, and review of the final Application for Payment and accompanying documentation, the ENGINEER shall prepare and deliver to the DISTRICT a recommendation for final payment. Accompanying the recommendation for final payment, a Notice of Completion form, executed by the CONTRACTOR and the ENGINEER, shall be delivered to the DISTRICT to be processed by the DISTRICT'S governing body.

B. After acceptance of the WORK by the DISTRICT'S governing body, the DISTRICT will make final payment to the CONTRACTOR of the amount remaining after deducting all prior payments and all other payment witholdings to be kept or retained under the provisions of the Contract Documents. In addition to other payment withholdings, the DISTRICT shall withhold two times the value of outstanding items of punch list WORK not completed by the CONTRACTOR prior to the ENGINEER and CONTRACTOR execution of the Notice of Completion. Said value shall be determined by the DISTRICT, and said determination shall be binding upon the CONTRACTOR so long as the sum of said value and the amounts retained pursuant to Paragraph 14.3 do not exceed 10 percent of the total Contract Price under the Agreement.

Final payment for the WORK performed under this Agreement shall not be made until the lapse of thirty-five (35) Days after the Notice of Completion of said WORK has been recorded and no payment shall be construed to be an acceptance of any Defective Work or improper materials.

14.10 RELEASE OF RETAINAGE AND OTHER DEDUCTIONS

A. Within 60 days after the date of completion of the WORK, the retention withheld by the DISTRICT shall be released. In the event of a dispute between the DISTRICT and the CONTRACTOR, the DISTRICT may withhold from the final payment an amount not to exceed 150 percent of the disputed amount. For purposes of this Paragraph, "completion" means any of the following":

1. The occupation, beneficial use, and enjoyment of the WORK, excluding any operation only for testing, startup, or commissioning, by the DISTRICT, or its representative, accompanied by cessation of labor on the WORK.

2. The acceptance by the DISTRICT, or its representative, of the WORK.

3. After the Commencement Date, a cessation of labor on the WORK for a continuous period of 100 days or more, due to factors beyond the control of the CONTRACTOR.

4. After the Commencement Date, a cessation of labor on the WORK for a continuous period of 30 Days or more, if the DISTRICT files for record a Notice of Completion.

B. In the event that retention payments are not made within the time periods required by this Paragraph, the DISTRICT withholding the unpaid amounts shall be subject to a charge of 2 percent per month on the improperly withheld amount, in lieu of any interest otherwise due.

14.11 CONTRACTOR'S CONTINUING OBLIGATION

A. The CONTRACTOR'S obligation to perform and complete the WORK within the time limits specified in the Agreement and in accordance with the Contract Documents shall be absolute. Neither recommendation of any progress or final payment by the ENGINEER, nor the issuance of a Notice of Completion, nor any payment by the DISTRICT to the CONTRACTOR under the Contract Documents, nor any use or occupancy of the WORK or any part thereof by the DISTRICT, nor any act of acceptance by the DISTRICT nor any failure to do so, nor any review of a Shop Drawing or sample submittal, will constitute an acceptance of WORK not in accordance with the Contract Documents or a release of the CONTRACTOR'S obligation to perform the WORK in accordance with the Contract Documents. Neither the DISTRICT nor the ENGINEER shall be precluded or estopped by any of the foregoing actions from showing the true and correct amount and character of the WORK done and materials furnished by the CONTRACTOR or any part thereof, if they do not in fact conform to the Specifications; and the DISTRICT shall not be precluded or estopped from demanding and recovering from the CONTRACTOR such damages as the DISTRICT may sustain by reason of the CONTRACTOR'S failure to comply with the Specifications.

14.12 FINAL PAYMENT TERMINATES LIABILITY OF DISTRICT

A. Final payment is defined as the last progress payment made to the CONTRACTOR for earned funds, less retainage as applicable, less deductions listed in Paragraph 14.9.B herein. The acceptance by the CONTRACTOR of the final payment referred to in Paragraph 14.9 herein, shall be a release of the DISTRICT and its agents from all claims of liability to the CONTRACTOR for anything done or furnished for, or relating to, the WORK or for any act or neglect of the DISTRICT or of any person relating to or affecting the WORK, except demands against the DISTRICT for the remainder, if any, of the amounts kept or retained under the provisions of Paragraph 14.9 herein; and excepting pending, unresolved claims filed prior to the date of the Notice of Completion.

14.13 CLAYTON ACT AND CARTWRIGHT ACT

A. Section 7103.5 of the Public Contract Code specifies that in entering into a public works contract or a subcontract to supply goods, services or materials pursuant to a public works contract, the contractor or subcontractor offers and agrees to assign to the awarding body all rights, title, and interest in and to all

causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Sec. 15) or under the Cartwright Act (Chapter 2 commencing with Sec. 16700) of Part 2 of Division 7 of the Business Profession Code, arising from purchase of goods, services or materials pursuant to the contract or subcontract. Pursuant to Public Contract Code Section 7103.5 the CONTRACTOR and all of its Subcontractors hereby offer and agree to assign to the DISTRICT all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Sec. 15) or under the Cartwright Act (Chapter 2 commencing with Sec. 16700) of Part 2 of Division 7 of the Business Profession Code, arising from purchase of goods, services or materials pursuant to this Agreement. This assignment shall become effective when the DISTRICT tenders final payment to the CONTRACTOR without further acknowledgement by the parties.

14.14 RELEASE OF CLAIMS UPON PAYMENT OF UNDISPUTED AMOUNTS

A. The DISTRICT reserves the right to condition the payment of undisputed amounts upon the CONTRACTOR furnishing the DISTRICT with a release of all claims against the DISTRICT arising from the Contract Documents relating to those amounts. The release shall be in a form satisfactory to the DISTRICT. Disputed contract claims in stated amounts may be specifically excluded by CONTRACTOR from the operation of the release. This Paragraph applies to both progress payments and final payment.

ARTICLE 15 - SUSPENSION OF WORK AND TERMINATION

15.1 TEMPORARY SUSPENSION OF WORK BY DISTRICT

A. The DISTRICT, acting through the ENGINEER, may suspend the WORK or any portion thereof for a period of not more than 90 Days by notice in writing to the CONTRACTOR. Suspension of WORK may be for any of the following reasons:

1. Weather conditions or other conditions which are unfavorable for the prosecution of the WORK;

2. Failure of the CONTRACTOR to carry out orders given or to perform any provisions of the Agreement; and

3. The convenience and benefit of the DISTRICT.

B. The suspension of WORK shall be effective upon receipt by the CONTRACTOR of the written order suspending the WORK and shall be terminated upon receipt by the CONTRACTOR of the written order terminating the suspension. If the CONTRACTOR makes an approved Request for Change Order in accordance with Article 10, the CONTRACTOR may be allowed an increase in the Contract Price or an extension of the Contract Time(s), or both, directly attributable to any suspension as specified below:

1. If under authority of Paragraph 15.1.A(1) or 15.1.A(3), above, the DISTRICT orders a suspension of all or a portion of the WORK which is the Critical Path, the CONTRACTOR shall be allowed an extension of the Contract Time(s) for the working Days on which the suspension is in effect. If a portion of WORK so suspended is not the Critical Path at the time of such suspension, but subsequently does become the Critical Path, the CONTRACTOR shall be allowed an extension or the Contract Time(s) for the working Days on which the suspension is in effect, after the date on which such portion of the WORK becomes the Critical Path.

2. If a suspension of WORK is ordered by the DISTRICT under authority of Paragraph 15.1.A(2), above, the CONTRACTOR shall not be allowed an extension of Contract Time(s) for the working Days on which the suspension is in effect for the portion of WORK so suspended.

15.2 TERMINATION OF AGREEMENT BY DISTRICT (CONTRACTOR DEFAULT)

A. In the event of default by the CONTRACTOR, the DISTRICT may give 10 Days written notice to the CONTRACTOR of DISTRICT'S intent to terminate the Agreement and provide the CONTRACTOR an opportunity to remedy the conditions constituting the default. It will be considered a default by the CONTRACTOR whenever CONTRACTOR shall:

1. Declare bankruptcy, become insolvent, or assign its assets for the benefit of its creditors;

2. Fail to provide materials or workmanship meeting the requirements of the Contract Documents;

3. Disregard or violate provisions of the Contract Documents or ENGINEER'S instructions;

4. Fail to prosecute the WORK according to the accepted progress schedule; or

5. Fail to provide a qualified superintendent, competent workmen, or materials or equipment meeting the requirements of the Contract Documents;or

6. Fail to provide a consistently safe work place and follow the CONTRACTORS approved safety plan.

B. If the CONTRACTOR fails to remedy the conditions constituting default within the time allowed, the DISTRICT may then issue the Notice of Termination.

C. In the event the Agreement is terminated in accordance with the above provisions of Paragraph 15.2, the DISTRICT may take possession of the WORK and may complete the WORK by whatever method or means the DISTRICT may select. The cost of completing the WORK will be deducted from the balance which would have been due the CONTRACTOR had the

Agreement not been terminated and the WORK completed in accordance with the Contract Documents. If such cost exceeds the balance which would have been due, the CONTRACTOR shall pay the excess amount to the DISTRICT. If such cost is less than the balance which would have been due, the CONTRACTOR shall have no claim to the difference.

15.3 TERMINATION OF AGREEMENT BY DISTRICT (FOR CONVENIENCE)

A. If the DISTRICT determines it is impossible, impractical, inconvenient, or against the DISTRICT'S interests to complete the WORK, the DISTRICT may, without cause and without prejudice to any other right or remedy of the DISTRICT, terminate the Agreement at any time by providing CONTRACTOR a written Notice of Termination. In such a case, the CONTRACTOR shall have no Request for Change Orders or claims against the DISTRICT except for (i) the value of WORK performed up to the date the Agreement is terminated and (ii) the cost of materials and equipment on hand, in transit, or on definite commitment, as of the date the Agreement is terminated, which would be needed in the WORK and which meet the requirements of the Contract Documents.

B. The value of WORK performed and the cost of materials and equipment delivered to the site, as mentioned above, will be determined by the ENGINEER in accordance with the procedure prescribed for the making of the final Application for Payment under Paragraphs 14.8 and 14.9.

C. If a Notice of Termination issued by DISTRICT under the provision of Paragraph 15.2 is found by a court (or other tribunal having jurisdiction) to be in violation of said provisions, said Notice of Termination shall be deemed to be a Notice of Termination issued under the provisions of Paragraph 15.3, and all of the provisions of this Article relating to a Notice of Termination issued under Paragraph 15.3 shall apply.

15.4 CONTRACTOR'S RESPONSIBILITIES UPON TERMINATION

A. After receipt of Notice of Termination, and except as directed by the ENGINEER, the CONTRACTOR shall, regardless of any delay in determining or adjusting any amounts due under this termination for convenience clause, immediately proceed with the following obligations:

1. Stop WORK as specified in the Notice of Termination.

2. Complete any WORK specified in the Notice of Termination in a least cost/shortest time manner while still maintaining the quality and safety called for under the Contract Documents.

3. Leave the property upon which the CONTRACTOR was working and upon which the facility (or facilities) forming the basis of the Contract Documents is situated in a safe and sanitary manner such that it does not pose any threat to the public health or safety of the public (including the occupants of any adjoining properties).

4. Terminate all subcontracts to the extent that they relate the portions of the WORK terminated.

5. Place no further subcontracts or orders, except as necessary to complete any WORK specified in the Notice of Termination.

15.5 SUSPENSION, TERMINATION, OR CHANGES IN WORK DUE TO LITIGATION

A. If all WORK is suspended, delayed, or interrupted by an order of a court of competent jurisdiction, such suspension, delay or interruption will be considered to be for the convenience and benefit of the DISTRICT under the provisions of Paragraph 15.1, except where the order is determined by the ENGINEER to have resulted from a failure or refusal of the CONTRACTOR to comply with this Agreement or any statute, rule, regulation, or decision directly applicable to performance of the WORK in effect at the time of contract award, in which case the suspension, delay or interruption will be considered to be a suspension for failure of the CONTRACTOR to carry orders under the provisions of Paragraph 15.1.

B. If pursuant to court order, the DISTRICT is temporarily or permanently prohibited from requiring the CONTRACTOR to perform any portion of the WORK, the ENGINEER may eliminate the enjoined WORK pursuant to Paragraph 10.1.

ARTICLE 16 - MISCELLANEOUS

16.1 GIVING NOTICE

A. Whenever the CONTRACTOR, ENGINEER or DISTRICT are required to notify the other, or otherwise provide notice, under the provisions of the Contract Documents, such notification or notice shall be in writing. Such writing, and any other writing or document required to be submitted by the CONTRACTOR, ENGINEER or DISTRICT under the provisions of the Contract Documents, shall be deemed submitted when made under one of the following delivery methods:

1. Depositing in the U.S. mail (or other method of commercial express mail), which notice shall be effective on the date of receipt;

2. Delivery to the parties' representative or at the CONTRACTOR'S home office or field office, which notice shall be effective on the date of delivery;

3. Facsimile to the parties' representative or CONTRACTOR'S home office or field office, which notice shall be effective upon receipt; or

4. Electronic means as permitted by the General Requirements.

B. The address given in the CONTRACTOR'S Bid is hereby designated as the place to which all notices, letters and other communications to the CONTRACTOR may be mailed or delivered.

16.2 TITLE TO MATERIALS FOUND ON THE WORK

A. The DISTRICT reserves the right to retain title to all soils, stone, sand, gravel, and other materials developed and obtained from excavations and other operations connected with the WORK. Unless otherwise specified in the Contract Documents, neither the CONTRACTOR nor any Subcontractor shall have any right, title, or interest in or to any such materials. The CONTRACTOR will be permitted to use in the WORK, without charge, any such materials which meet the requirements of the Contract Documents.

16.3 RIGHT TO AUDIT

A. If the CONTRACTOR submits a Request for Change Order or claim to the DISTRICT, the DISTRICT shall have the right, as a condition to considering the Request for Change Order or claim, and as a basis for evaluation of the Request for Change Order or claim, and until the Request for Change Order or claim has been settled, to audit the CONTRACTOR'S books to the extent they are relevant. This right shall include the right to examine books, records, documents, schedules, calendars, and other evidence and accounting procedures and practices, sufficient to discover and verify matters relating to the claim, including scheduling matters and all direct and indirect costs of whatever nature believed to have been incurred or anticipated to be incurred and for which the Request for Change Order or claim has been submitted. The right to audit shall include the right to inspect the CONTRACTOR'S plans, or such parts thereof, as may be or have been engaged in the performance of the WORK. The CONTRACTOR further agrees that the right to audit encompasses all subcontracts and is binding upon Subcontractors. The rights to examine and inspect herein provided for shall be exercisable through such representatives as the DISTRICT deems desirable during the CONTRACTOR'S normal business hours at the office of the CONTRACTOR. The CONTRACTOR shall make available to the DISTRICT for auditing, all relevant accounting and scheduling records and documents, and other financial data, and upon request, shall submit true copies of requested records to the DISTRICT.

B. This Agreement shall be subject to the examination and audit of the State Auditor and/or the DISTRICT for a period of three years after final payment under this Agreement. CONTRACTOR and each Subcontractor shall retain, preserve and maintain all records (including electronic and computer records) and documentation relating to this Agreement for a minimum period of three years from the date of final payment under this Agreement.

16.4 APPLICABLE LAW

A. Legal action to enforce this Agreement, or interpret any portion hereof, shall be brought in a court of the State of California.

ARTICLE 17 - CLAIMS PROCEDURE

17.1 CLAIMS PREREQUISITE

A. As a prerequisite to the CONTRACTOR'S right to submit a claim under this article, the Contractor must first comply with, and exhaust the Request for Change Order process provided in Article 10.

17.2 SUBMITTAL OF CLAIMS

A. In order to preserve its right to pursue a remedy to a disputed matter, the CONTRACTOR shall submit to the ENGINEER a notice of potential claim no later than 7 Days after conclusion of the Request for Change Order process provided in Article 10. The conclusion of the Request for Change Order process includes the receipt of either an ENGINEER'S notice of denied Request for Change Order or a disputed unilateral Change Order. CONTRACTOR shall file a written claim no later than 10 Days after submission of the notice of potential claim or the date the final payment is due under the contract, whichever is earlier.

B. The notice of potential claim shall set forth the CONTRACTOR'S factual or legal contentions upon which its objections to the ENGINEER'S demand or decision are based; contain a description of the impacts to the CONTRACTOR'S operations affected by the decision; and outline the general nature and extent of costs or delays involved.

C. The claim shall set forth clearly and in detail each item of additional compensation or time adjustment claimed, the reasons for each item claimed, references to applicable provisions of the Contract Documents, and all other pertinent factual data necessary to evaluate the claim. The claim shall include copies of supporting documents necessary to substantiate the claim. Supporting data is subject to audit in accordance with the General Conditions. The CONTRACTOR shall certify under penalty of perjury that the information contained in the claim is true, that the supporting data is accurate and complete, and that the amount requested accurately reflects the contract adjustment for which DISTRICT is responsible.

D. The CONTRACTOR shall submit substantiation of actual costs when the WORK performed under protest is completed. Failure to submit substantiation will be sufficient cause to deny the claim.

E. Orders or decisions of the ENGINEER that are protested by the CONTRACTOR shall be final and conclusive on the CONTRACTOR if the CONTRACTOR fails to submit a notice of potential claim and a claim in the manners and within the times stated above, and such failure shall constitute a waiver of the right to receive additional compensation or time extension for WORK performed under protest.

17.3 RESPONSE TO CLAIMS

A. The ENGINEER may request in writing, within 30 Days of receipt of the claim, additional documentation supporting the claim or relating to defenses to the claim DISTRICT may have against the CONTRACTOR. If additional information is thereafter required, it shall be requested and provided pursuant to this Paragraph upon mutual agreement of the ENGINEER and the CONTRACTOR.

B. For claims of less than $50,000, the ENGINEER will respond in writing within 45 Days of receipt of the claim, or within 15 Days after receipt of the further documentation or within a period of time no greater than that taken by the CONTRACTOR in producing the additional information, whichever is greater.

C. For claims of over $50,000, the ENGINEER will respond in writing within 60 Days of receipt of the claim, or within 30 Days after receipt of the further documentation, or within a period of time no greater than that taken by the CONTRACTOR in producing the additional information or requested documentation, whichever is greater.

17.4 MEET AND CONFER

A. If the CONTRACTOR disputes the ENGINEER'S response, or the ENGINEER fails to respond within the time prescribed, the CONTRACTOR may notify the ENGINEER, in writing, either within 15 Days of receipt of the ENGINEER'S response or within 15 Days of the ENGINEER'S failure to respond within the time prescribed, respectively, and demand an informal conference to meet and confer for settlement of the issues in dispute.

   Upon a demand, the ENGINEER will schedule a meet and confer conference within 30 Days for settlement of the dispute.

B. Following the meet and confer conference, if the claim or any portion remains in dispute, the CONTRACTOR may file a claim pursuant to the Tort Claims Act of the Government Code. For purposes of those provisions, the period of time within which a claim must be filed shall not include the time the CONTRACTOR submits a written notice of potential claim through the time the claim is denied as a result of the meet and confer process.

C. Claims less than $375,000. If the matter remains in dispute, this Paragraph applies to the filing of a civil action for a claim of less than $375,000.

   1. Within 30 to 60 Days after the filing or responsive pleadings, the court shall submit the matter to nonbinding mediation unless waived by mutual stipulation of both parties. The mediation process shall provide for the selection within 15 Days by both parties of a disinterested third person as mediator, shall begin within 30 Days of the submittal, and shall be concluded within 15 Days from the start of the mediation unless a time requirement is extended by the court or by stipulation of both parties. If

the parties fail to select a mediator within a 15-Day period, any party may petition the court to appoint the mediator.

2. If the matter remains in dispute, the case shall be submitted to judicial arbitration pursuant to § 1141.10 et seq. of the California Code of Civil Procedure. The Civil Discovery Act of 1986 shall apply to any proceeding brought under this Paragraph.

3. Arbitrators appointed shall be experienced in construction law, and, upon stipulation of the parties, mediators and arbitrators shall be paid necessary and reasonable hourly rates of pay not to exceed their customary rate, and such fees and expenses shall be paid equally by the parties, except in the case of arbitration where the arbitrator, for good cause, determines a different division. In no event shall these fees or expenses be paid by state or County funds.

4. Any party who after receiving an arbitration award requests a trial de novo but does not obtain a more favorable judgment shall, in addition to payment of costs and fees provided under § 1141.10 et seq. of the California Code of Civil Procedure, pay the attorney's fees of the other party arising out of trial de novo.

5. The court may, upon request by any party, order any witnesses to participate in the mediation or arbitration process.

6. In any suit filed under this Paragraph, DISTRICT will pay interest at the legal rate on any arbitration award or judgment. The interest will begin to accrue on the date the suit is filed in a court of law.

D. Claims over $375,000. Unless otherwise mutually agreed upon by both parties, the procedures detailed in Paragraph 17.4.C above shall not apply to claims over $375,000 and the CONTRACTOR may file a civil action against DISTRICT in accordance with applicable law and the terms of this Agreement.

E. Payment on undisputed portion of claims. DISTRICT will pay undisputed portions of claims, except as otherwise provided in the Agreement.

17.5 FALSE CLAIMS

A. Pursuant to Government Code § 12650 et seq., a person who commits any of the following acts shall be liable to DISTRICT for 3 times the amount of damages that DISTRICT sustains because of the act; and for a civil penalty in an amount up to $10,000 for any false claim presented by the CONTRACTOR; and for the costs of a civil action brought to recover any of the penalties or damages.

1. Knowingly presents or causes to be presented to an officer or employee of DISTRICT a false claim for payment or approval.

2. Knowingly makes, uses, or causes to be made or used a false record or statement to get a false claim paid or approved by DISTRICT.

3. Conspires to defraud DISRICT by getting a false claim allowed or paid by DISTRICT.

4. Knowingly makes, uses, or causes to be made or used a false record or statement to conceal, avoid, or decrease an obligation to pay or transmit money or property to DISTRICT.

5. Is a beneficiary of an inadvertent submission of a false claim to DISTRICT, subsequently discovers the falsity of the claim, and fails to disclose the false claim to DISTRICT within a reasonable time after discovery of the false claim.

6. Any other act described in Government Code § 12651(a).

<< End of Section 00700 >>

SECTION 00800 – SUPPLEMENTARY GENERAL CONDITIONS

GENERAL

These Supplementary General Conditions make additions, deletions, or revisions to the General Conditions as indicated herein. All provisions which are not so added, deleted, or revised remain in full force and effect. Terms used in these Supplementary General Conditions which are defined in the General Conditions have the meanings assigned to them in the General Conditions.

SGC-2.2 COPIES OF DOCUMENTS

Add the following to Paragraph 2.2.A:

DESIGNER will prepare conformed Contract Documents by incorporating Addenda items into the Bid documents. The DISTRICT will furnish to the CONTRACTOR five (5) copies of the conformed Contract Documents, consisting of ½-size drawing sets and Specifications, together with three (3) sets of full-sized Drawings. Additional quantities of the Contract Documents will be furnished at reproduction cost.

SGC-4.2 REPORTS OF PHYSICAL CONDITIONS

Add the following to Paragraph 4.2.A:

In the preparation of the Contract Documents, the DESIGNER has relied upon the following data report of explorations and tests of subsurface conditions at the site of the WORK, and the CONTRACTOR may rely upon the accuracy of the technical data contained in such report(s). These reports are part of the Contract Documents and are attached hereto as Appendix E-1:

1. Geotechnical Data Report, Nacimiento Water Project – Pipelines, San Luis Obispo County, California; prepared by Geomatrix Consultants, Inc; March 2007.

The following interpretative report of explorations and tests of subsurface conditions at the site of the WORK is available for review as part of the reference materials. This report is not a part of the Contract Documents. The interpretation of technical data, including any interpolation or extrapolation thereof, together with non-technical data, interpretations, and opinions contained in such reports or the completeness thereof is the responsibility of the CONTRACTOR.

1. Geotechnical Interpretative Report, Nacimiento Water Project – Pipelines, San Luis Obispo County, California; prepared by Geomatrix Consultants, Inc; March 2007.

SGC-4.5 HAZARDOUS MATERIALS

Add the following to Paragraph 4.5.A:

Hazardous materials, contaminated soils and/or contaminated groundwater known to be present at the site of WORK include the following sites:

The Phase I Environmental Site Assessment Report, Lake Nacimiento Water Project, San Luis Obispo, California, prepared by Kleinfelder, Inc. dated October 11, 2005 is included as part of the reference materials in Appendix F.

18781 El Camino Real, Santa Margarita. Historical releases of petroleum hydrocarbons associated with leaks from the Conoco-Phillips fuel pump station and fuel pipeline delivery system through Santa Margarita have been documented. The NWP Pipeline alignment passes through areas where significant contamination has been documented, which include the following:

- Sta 2060+00 to Sta 2080+00 along El Camino Real in front of the fuel pump station. The Kleinfelder report states that petroleum hydrocarbon contamination, mostly crude oil, is present in the soil and groundwater at Site 1. The highest TEPH concentrations (as high as 48,000mg/Kg) in soil are encountered within the top 15 feet. TEPH has been detected in groundwater at concentrations as high as 8,400 µg/L.

- Sta 2256+00 to Sta 2277+00 along the west side of Highway 101, between the intersection with Highway 58 and Tassajara Creek Road. The Kleinfelder report states that petroleum hydrocarbon contamination, mostly crude oil, is present in the soil and groundwater at Sites 6, 16 and 19. The highest TEPH concentrations in soil at Sites 6, 16 and 19 are 18,000 mg/Kg, 760 mg/Kg, and 17,000 mg/Kg, respectively. The highest TEPH concentration in groundwater at Site 19 is 120,000 µg/L, and floating product was present in at least one location.

Site assessment report(s) prepared for Conoco-Phillips documenting conditions at the site west of Highway 101 described above are included in the reference materials in Appendix F. These reports document the additional assessment activities performed along a segment of the former (Unocal) and existing ConocoPhillips Santa Margarita Pipeline easement in Santa Margarita, California. ConocoPhillips' Santa Margarita Pipeline easement, which extends a distance of approximately 3.4 miles between the Santa Margarita Pump Station and Tassajara Creek Road, contains two, 8-inch diameter pipelines. Sampling in 1994 and subsequent investigations conducted in 1995, 1999, and 2000 are documented in reports prepared by Earth Systems Consultants (1994), England & Associates (1996 and 1999), and England Geosystem, Inc. (2001). The

assessment activities documented in the reports focus on further characterization of Site Nos. 6 and 19, both of which are located on the Spanish Oaks Ranch in the southern part of the Santa Margarita Pipeline easement.

CONTRACTOR shall segregate the excavated material from the trench, bore pits and trenchless construction from all other trench, bore pit and trenchless construction spoil in the areas described above, and shall segregate any groundwater collected from the trench bore pit and trenchless construction excavation. The DISTRICT will retain a state-certified laboratory to collect and analyze a sample of the segregated soil and groundwater on a 24-hour turnaround time from the time that excavation of the entire volume of soil and collection of groundwater is completed. The results will be made available to the CONTRACTOR within one Day of their receipt by the DISTRICT. The results shall be used by the CONTRACTOR for characterization of the segregated soil and groundwater for TPH and its constituents. A copy of the laboratory test results will be forwarded to the San Luis Obispo County Department of Health Services by the ENGINEER. All other characterization requirements for the segregated soil and groundwater shall be the responsibility of the CONTRACTOR.

Pending analytical results, segregated soil from the locations noted above may be temporarily stockpiled at a location determined by the CONTRACTOR that meets all Federal, State, and local requirements covering the activity, and segregated groundwater shall be stored in tanks. It is believed, based on existing information, that the soil and groundwater can be handled as a non-TSCA regulated waste. Stockpiled soil from the areas shall be underlain by a layer of visqueen and covered with visqueen held down in a manner that protects the stockpile from rain and wind. If the stockpile is located in an area accessible by the public, a temporary chain-link fence shall be erected around the stockpile and tanks to prohibit access by the public.

When analytical results are received, CONTRACTOR shall remove the material and groundwater that is determined to be contaminated from the site and transport and dispose of it at a landfill facility licensed to accept such material for disposal. The cost of handling and disposing of the contaminated material and groundwater, if any, will be paid for on a negotiated lump sum or unit price basis using the allowances specified in Bid Items No. 10 and 11 in Section 01025, “Measurement and Payment.”

Hazardous materials, contaminated soils and/or contaminated groundwater which may be present at the site of WORK include the following:

Agricultural Land Use. As noted in Article 7.1 of the Kleinfelder report, agricultural land has historically been associated with the use of pesticides and herbicides. Residual concentrations of these products in soil can pose human health or material disposal issues. The pipeline

alignment traverses certain agricultural areas that include row crops and orchards. CONTRACTOR shall collect samples from a representative number of agricultural parcels in advance of construction of the pipeline, in order to assess the potential impacts of agricultural land use on construction of the pipeline.

If the analytical results indicate levels of contamination that exceed threshold levels for normal disposal of excavated material, consult with ENGINEER and DISTRICT.

Railroads. As noted in Article 7.5 of the Kleinfelder report, areas traversed by railroad tracks may be contaminated with PCP and other chemicals historically used in the treatment of railroad ties, as well as other chemicals contained in solutions sprayed on tracks for weed control, such as PCBs, lead, arsenic, herbicides and petroleum hydrocarbons. Residual chemicals are typically found primarily in close proximity to the railroad tracks.

In addition, pipelines carrying petroleum products are typically located within railroad rights-of-way and if these pipes have leaked, the ground surrounding the pipelines may have become contaminated over time.

Therefore, for work adjacent to and across railroad rights-of-way, CONTRACTOR shall collect soil and groundwater samples from the excavations, in order to assess the potential impact on construction. If the CONTRACTOR believes that contamination is present, notify the ENGINEER and DISTRICT immediately. The DISTRICT will retain a state-certified laboratory to collect and analyze a sample of the segregated soil and groundwater on a 24-hour turnaround time from the time that excavation of the entire volume of soil and collection of groundwater is completed. The results will be made available to the CONTRACTOR within one Day of their receipt by the DISTRICT. The results shall be used by the CONTRACTOR for characterization of the segregated soil and groundwater. A copy of the laboratory test results will be forwarded to the San Luis Obispo County Department of Health Services by the ENGINEER. All other characterization requirements for the segregated soil and groundwater shall be the responsibility of the CONTRACTOR.

The segregated soil from the excavations shall be temporarily stockpiled at a location determined by the CONTRACTOR that meets all Federal, State, and local requirements covering the activity, and segregated groundwater shall be stored in tanks. Stockpiled soil from the areas shall be underlain by a layer of visqueen and covered with visqueen held down in a manner that protects the stockpile from rain and wind. If the stockpile is located in an area accessible by the public, a temporary chain-link fence shall be erected around the stockpile and tanks to prohibit access by the public.

When analytical results are received, CONTRACTOR shall remove the material and groundwater that is determined to be contaminated from the site and transport and dispose of it at a landfill facility licensed to accept such material for disposal. The cost of handling and disposing of the contaminated material and groundwater, if any, will be paid for on a negotiated lump sum or unit price basis using the allowances specified in Bid Items No. 10 and 11 in Section 01025, "Measurement and Payment."

Serpentinitic Rock and Asbestos-Containing Materials. As noted in the Geotechnical Interpretative Report, areas of the Project cross geologic formations composed of serpentinite / serpentinitic rock. Serpentinite is known to contain chrysotile, a fibrous material commonly known as asbestos, a potentially hazardous material. Serpentinite can also contain soluble heavy metals including nickel and chromium. Disposal of asbestos-containing materials is regulated by the State. More information can be found at:

http://www.arb.ca.gov/cap/handbooks/asbestosnoafinal.pdf

A link to landfill information in region 3 of the RWQCB is:

http://www.waterboards.ca.gov/cwphome/land/docs/wal r3.xls

See also the requirements specified in Section 02200, Paragraph 1-6, "Construction and Excavation Operations in Serpentinitic Rock."

If the CONTRACTOR believes that asbestos-containing materials are present in the excavation, notify the ENGINEER and DISTRICT immediately. The DISTRICT will retain a state-certified laboratory to collect and analyze a sample of the segregated material on a 24-hour turnaround time. The results shall be used by the CONTRACTOR for characterization of the material. A copy of the laboratory test results will be forwarded to the San Luis Obispo County Department of Health Services by the ENGINEER.

The asbestos-containing material from the excavations shall be temporarily stockpiled at a location determined by the CONTRACTOR that meets all Federal, State, and local requirements covering the activity. Stockpiled material from the areas shall be underlain by a layer of visqueen and covered with visqueen held down in a manner that protects the stockpile from rain and wind. If the stockpile is located in an area accessible by the public, a temporary chain-link fence shall be erected around the stockpile and tanks to prohibit access by the public.

Asbestos-containing material shall be removed from the site and transported and disposed of at a landfill facility licensed to accept such material for disposal. The cost of handling and disposing of the asbestos-containing material, if any, will be paid for on a negotiated lump sum or unit price basis using the allowances specified in Bid Item No. 10 in Section 01025, "Measurement and Payment.".

SGC-6.2 LABOR, MATERIALS, AND EQUIPMENT

Add the following to Paragraph 6.2.C:

The hourly rates for DISTRICT'S or ENGINEER'S inspectors during CONTRACTOR'S overtime work are as follows:

Job Classification	Hourly Rate
Civil/Structural Inspector	$121.00
Mechanical Inspector	$134.00
Electrical and I&C Inspector	$148.00
Pipeline Inspector	$121.00
Marine Inspector	$121.00
Shaft/Tunnel Inspector	$121.00
HDD Inspector	$134.00
Auger Bore Inspector	$121.00

SGC-11.3 COST OF WORK (BASED ON TIME AND MATERIALS)

Add the following to Paragraph 11.3.D of the General Conditions:

The CONTRACTOR will be paid for the use of equipment at actual rental invoice rates, or at the rental rates listed for such equipment specified in the current edition of the Caltrans Rental Rate Book; Equipment Rental Rate, Division of Construction, whichever is lower.

SGC-14.7 SUBSTANTIAL COMPLETION

In Paragraph 14.7.A of the General Conditions, add the following:

> Substantial Completion means that the WORK associated with installation of the pipelines, turnout, fiber optic system and all appurtenances is completed; the corrosion monitoring system is installed and tested; the pipeline and appurtenances have been tested and accepted in accordance with the requirements specified in Section 02704, "Pipeline Pressure and Leakage Testing;" the pipeline is cleaned subsequent to testing and made ready to be placed into operation by the DISTRICT; the turnout facility and fiber optic system have been tested and accepted in accordance with Section 01650, "Startup and Testing;" and all site restoration required and specified shall have been performed to the satisfaction of the ENGINEER and DISTRICT.

<< End of Section 00800 >>

ATTACHMENT 00800A

STANDARD FORMS

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COUNTY OF SAN LUIS OBISPO
Department of Public Works

ESTIMATE NO. 1
WORK PERFORMED THROUGH ENTER DATE
TODAY'S DATE 06/25/07

BID OPENING 08/02/07
R.E. NAME:
XXX-XXXX (office)

PROJECT RECORD - ESTIMATE

Nobody Construction Company
PO Box 1234
San Luis Obispo CA 93403-1234

TYPE: **APPLICATION FOR PAYMENT**
**Electronic Version will be provided for CONTRACTOR awarded Contract

Federal Contract No. N/A
State Contract No. N/A
County Contract No. 300187.08.05

		ORIGINAL AUTH. AMT	REVISED AUTH. AMT	
PROJECT STATUS:				**FOR OFFICE USE ONLY**
CONTRACTOR'S BID AMOUNT		ENTER	ENTER	
SUPPL.WORK & CONTINGENCIES		ENTER	$0.00	
CONSTRUCTION ALLOTMENT		$0.00	$0.00	
COUNTY FURNISHED MAT'L. & EXPENSE (CFM&E)		$0.00	$0.00	
TOTAL ALLOTMENT		$0.00	$0.00	
ALLOTMENT CHANGES:		CFM&E ALLOTMENT	TOTAL ALLOTMENT	
	PREVIOUS	$0.00	$0.00	
	THIS MONTH	$0.00	$0.00	
	TO DATE	$0.00	$0.00	
FOR OFFICE USE ONLY	CONTRACTOR'S BID AMOUNT		$0.00	**FOR OFFICE USE ONLY**
	APPROVED CONTRACT CHANGE ORDERS	$0.00		
	EXTRA WORK	$0.00		
	ADJ.OF COMP.	$0.00		
	ITEM CHANGES	$0.00		
	ITEM BALANCES	$0.00		
	FINAL AND QUANTITY	R35*		
	SYSTEM GENERATED	$0.00		
	EXTRA WORK/ADJ.OF COMP. BALANCES	$0.00		
	FINAL	R39*		
FOR OFFICE USE ONLY	SYSTEM GENERATED	$0.00		**FOR OFFICE USE ONLY**
	AUTHORIZED FINAL COST OF WORK		$0.00	
	AUTHORIZED CONTINGENCY BALANCE		$0.00	
	ANTICIPATED CHANGES	$0.00		
	CONTRACT ITEMS	$0.00		
	C.C.O.	$0.00		
	UNDISTRIBUTED	$0.00		
	ESTIMATED FINAL COST		$0.00	
	ESTIMATED FINAL CONTINGENCY BALANCE		$0.00	
FOR OFFICE USE ONLY	PERCENT TIME ELAPSED	#DIV/0!		**FOR OFFICE USE ONLY**
	PERCENT COMPLETE	#DIV/0!		
	THEORETICAL PERCENT (HC-247)	#DIV/0!		

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COUNTY OF SAN LUIS OBISPO
Department of Public Works

ESTIMATE NO. 1
WORK PERFORMED THROUGH ENTER DATE
TODAY'S DATE 06/25/07

BID OPENING 08/02/07
R.E. NAME:
XXX-XXXX (office)

PROJECT RECORD - ESTIMATE

Nobody Construction Company
PO Box 1234
San Luis Obispo CA 93403-1234

TYPE: **APPLICATION FOR PAYMENT**
**Electronic Version will be provided for CONTRACTOR awarded Contract

Federal Contract No. N/A
State Contract No. N/A
County Contract No. 300187.08.05

DESCRIPTION	AUTHORIZED AMOUNT	THIS ESTIMATE $ AMOUNT		TOTAL ESTIMATE $ AMOUNT
ORIGINAL CONTRACT AMOUNT	$0.00			
APPROVED CONTRACT ITEM CHANGES	$0.00			
EXTRA WORK	$0.00			
ADJUSTMENT OF COMPENSATION	$0.00			
TOTAL AUTHORIZED CONTRACT AMOUNT	$0.00			
SUBTOTAL CONTRACT ITEMS		$0.00		$0.00
PLUS: ADJUSTMENT OF COMPENSATION		$0.00		$0.00
PLUS: EXTRA WORK		$0.00		$0.00
TOTAL WORK COMPLETED		**$0.00**		**$0.00**
PLUS: MATERIALS ON HAND				$0.00
LESS: DEDUCTIONS				$0.00
LESS: RETENTION			1)	$0.00
TOTAL PAYMENT TO CONTRACTOR				$0.00
LESS: AMOUNT OF PREVIOUS PAYMENTS				$0.00
NET PAYMENT THIS ESTIMATE				**$0.00**

RETENTIONS: 1)UP TO 50% COMPLETION, 10% OF TOTAL WORK COMPLETED
2)AFTER 50% COMPLETION, IF SATIFACTORY, 5% OF TOTAL WORK COMPLETED
3)UNSATIFACTORY PROGRESS, 10% OF TOTAL WORK COMPLETED

ITEMS FOR WHICH CONTRACT PRICE EXCEEDS MAXIMUM VALUE: NONE

DATE CONTRACTOR RECEIVED NOTICE TO PROCEED	ENTER	WORKING DAYS TO DATE	0	WORK COMPLETED THIS ESTIMATE	$0.00
CONTRACTOR BEGAN WORK	ENTER	WEATHER NON-WORKING DAYS	0	TOTAL WORK COMPLETED TO DATE	$0.00
CONTRACT DAYS	ENTER	CHANGE ORDER DAYS	0	PERCENT COMPLETED	#DIV/0!
ESTIMATED DATE OF COMPLETION	ENTER	OTHER ALLOWABLE DAYS	0	PERCENT TIME ELAPSED	#DIV/0!

RESIDENT ENGINEER	DATE	CHECKED BY	DATE	CONSTRUCTION ENGINEER	DATE	DEPUTY DIRECTOR - ENGINEERING SERVICES	DATE
ENTER R.E.NAME		ACCOUNTING		DAVE O'HALLORAN		GLEN L. PRIDDY	

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COUNTY OF SAN LUIS OBISPO
Department of Public Works

ESTIMATE NO. 1
WORK PERFORMED THROUGH ENTER DATE
TODAY'S DATE 06/25/07

BID OPENING 08/02/07
R.E. NAME:
XXX-XXXX (office)

P R O J E C T R E C O R D - E S T I M A T E

Nobody Construction Company
PO Box 1234
San Luis Obispo CA 93403-1234

TYPE: **APPLICATION FOR PAYMENT**
**Electronic Version will be provided for CONTRACTOR awarded Contract

Federal Contract No. N/A
State Contract No. N/A
County Contract No. 300187.08.05

CHANGE ORDER LISTING

A U T H O R I Z E D A M O U N T S

CCO	DESCRIPTION	APPROVAL DATE	ITEM INCR	ITEM DECR	ADJ. OF COMP	EXTRA WORK	**NET CHANGE**	TIME EXTENSION
							$0.00	
	CONTRACT TOTALS		**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**0**

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COUNTY OF SAN LUIS OBISPO
Department of Public Works

ESTIMATE NO. 1
WORK PERFORMED THROUGH ENTER DATE
TODAY'S DATE 06/25/07

BID OPENING 08/02/07
R.E. NAME:
XXX-XXXX (office)

P R O J E C T R E C O R D - E S T I M A T E

Nobody Construction Company
PO Box 1234
San Luis Obispo CA 93403-1234

TYPE: **APPLICATION FOR PAYMENT**
**Electronic Version will be provided for CONTRACTOR awarded Contract

Federal Contract No. N/A
State Contract No. N/A
County Contract No. 300187.08.05

S C H E D U L E A - ADJUSTMENT OF COMPENSATION

CHANGE ORDER NO.	METHOD OF PAYMENT	THIS ESTIMATE AMOUNT	TOTAL ESTIMATE AMOUNT
THERE ARE NO PAYMENTS THIS ESTIMATE		$0.00	$0.00

METHOD OF PAYMENT:
ACUP - ADJUSTMENT OF COMPENSATION AT UNIT PRICE
ACLS - ADJUSTMENT OF COMPENSATION AT LUMP SUM

TOTALS	$0.00	$0.00

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COUNTY OF SAN LUIS OBISPO
Department of Public Works

ESTIMATE NO. 1
WORK PERFORMED THROUGH ENTER DATE
TODAY'S DATE 06/25/07

BID OPENING 08/02/07
R.E. NAME:
XXX-XXXX (office)

P R O J E C T R E C O R D - E S T I M A T E

Nobody Construction Company
PO Box 1234
San Luis Obispo CA 93403-1234

TYPE: **APPLICATION FOR PAYMENT**
**Electronic Version will be provided for CONTRACTOR awarded Contract

Federal Contract No. N/A
State Contract No. N/A
County Contract No. 300187.08.05

SCHEDULE B - EXTRA WORK

	CHANGE ORDER NO.	METHOD OF PAYMENT	THIS ESTIMATE AMOUNT	TOTAL ESTIMATE AMOUNT
THERE ARE NO PAYMENTS THIS ESTIMATE			$0.00	$0.00

METHOD OF PAYMENT:
EWFA - EXTRA WORK AT FORCE ACCOUNT
EWAP - EXTRA WORK AT AGREED UNIT PRICE
EWLS - EXTRA WORK AT AGREED LUMP SUM

TOTALS	$0.00	$0.00

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COUNTY OF SAN LUIS OBISPO
Department of Public Works

ESTIMATE NO. 1
WORK PERFORMED THROUGH ENTER DATE
TODAY'S DATE 06/25/07

BID OPENING 08/02/07
R.E. NAME:
XXX-XXXX (office)

P R O J E C T R E C O R D - E S T I M A T E

Nobody Construction Company
PO Box 1234
San Luis Obispo CA 93403-1234

TYPE: **APPLICATION FOR PAYMENT**
**Electronic Version will be provided for CONTRACTOR awarded Contract

Federal Contract No. N/A
State Contract No. N/A
County Contract No. 300187.08.05

		THIS ESTIMATE AMOUNT	TOTAL ESTIMATE AMOUNT
S C H E D U L E C - MATERIALS ON HAND			
CHANGE ORDER NO.	DESCRIPTION		
NO MATERIALS ON HAND PAYMENT THIS ESTIMATE		$0.00	$0.00
	TOTAL MATERIALS ON HAND PAYMENT	$0.00	$0.00
S C H E D U L E D - DEDUCTIONS			
TYPE OF DEDUCTION	DESCRIPTION		
THERE ARE NO DEDUCTIONS THIS ESTIMATE		$0.00	$0.00
	TOTAL DEDUCTIONS	$0.00	$0.00

TYPE OF DEDUCTION:
ADM - ADMINISTRATIVE
LCV - LABOR COMPLIANCE VIOLATION

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COUNTY OF SAN LUIS OBISPO
Department of Public Works

ESTIMATE NO. 1
WORK PERFORMED THROUGH ENTER DATE
TODAY'S DATE 06/25/07

BID OPENING 08/02/07
R.E. NAME:
XXX-XXXX (office)

P R O J E C T R E C O R D - E S T I M A T E

Nobody Construction Company
PO Box 1234
San Luis Obispo CA 93403-1234

TYPE: **APPLICATION FOR PAYMENT**
**Electronic Version will be provided for CONTRACTOR awarded Contract

Federal Contract No. N/A
State Contract No. N/A
County Contract No. 300187.08.05

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COUNTY OF SAN LUIS OBISPO
Department of Public Works

ESTIMATE NO. 1
WORK PERFORMED THROUGH ENTER DATE
TODAY'S DATE 06/25/07

BID OPENING 08/02/07
R.E. NAME:
XXX-XXXX (office)

PROJECT RECORD - ESTIMATE

Nobody Construction Company
PO Box 1234
San Luis Obispo CA 93403-1234

TYPE: **APPLICATION FOR PAYMENT**
**Electronic Version will be provided for CONTRACTOR awarded Contract

Federal Contract No. N/A
State Contract No. N/A
County Contract No. 300187.08.05

ITEM NO	DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE	ORIGINAL AUTH. AMT	THIS ESTIMATE QUANTITY	$ AMOUNT	TOTAL ESTIMATE QUANTITY	$ AMOUNT
1		XX	0.00	$0.00	$0.00	0.00	$0.00	0.00	$0.00
2		XX	0.00	$0.00	$0.00	0.00	$0.00	0.00	$0.00
3		XX	0.00	$0.00	$0.00	0.00	$0.00	0.00	$0.00
4		XX	0.00	$0.00	$0.00	0.00	$0.00	0.00	$0.00
5		XX	0.00	$0.00	$0.00	0.00	$0.00	0.00	$0.00
6		XX	0.00	$0.00	$0.00	0.00	$0.00	0.00	$0.00
7		XX	0.00	$0.00	$0.00	0.00	$0.00	0.00	$0.00
8		XX	0.00	$0.00	$0.00	0.00	$0.00	0.00	$0.00
9		XX	0.00	$0.00	$0.00	0.00	$0.00	0.00	$0.00
10		XX	0.00	$0.00	$0.00	0.00	$0.00	0.00	$0.00
11		XX	0.00	$0.00	$0.00	0.00	$0.00	0.00	$0.00
12		XX	0.00	$0.00	$0.00	0.00	$0.00	0.00	$0.00
13		XX	0.00	$0.00	$0.00	0.00	$0.00	0.00	$0.00
14		XX	0.00	$0.00	$0.00	0.00	$0.00	0.00	$0.00
15		XX	0.00	$0.00	$0.00	0.00	$0.00	0.00	$0.00
16		XX	0.00	$0.00	$0.00	0.00	$0.00	0.00	$0.00
17		XX	0.00	$0.00	$0.00	0.00	$0.00	0.00	$0.00
18		XX	0.00	$0.00	$0.00	0.00	$0.00	0.00	$0.00
19		XX	0.00	$0.00	$0.00	0.00	$0.00	0.00	$0.00
20		XX	0.00	$0.00	$0.00	0.00	$0.00	0.00	$0.00
21		XX	0.00	$0.00	$0.00	0.00	$0.00	0.00	$0.00
22		XX	0.00	$0.00	$0.00	0.00	$0.00	0.00	$0.00
			TOTALS		**$0.00**		**$0.00**		**$0.00**

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COUNTY OF SAN LUIS OBISPO
Engineering Department

ESTIMATE NO. 1
WORK PERFORMED THROUGH ENTER DATE
TODAY'S DATE 06/25/07

BID OPENING 08/02/07
R.E. NAME:
XXX-XXXX (office)

PROJECT RECORD - ESTIMATE

Nobody Construction Company
PO Box 1234
San Luis Obispo CA 93403-1234

TYPE: **APPLICATION FOR PAYMENT**
**Electronic Version will be provided for CONTRACTOR awarded Contract

Federal Contract No. N/A
State Contract No. N/A
County Contract No. 300187.08.05

DESCRIPTION	AUTHORIZED AMOUNT	THIS ESTIMATE $ AMOUNT	TOTAL ESTIMATE $ AMOUNT
ORIGINAL CONTRACT AMOUNT	$0.00		
APPROVED CONTRACT ITEM CHANGES	$0.00		
CONTRACT ITEM FINAL BALANCES	$0.00		
TOTAL EXTRA WORK EXPENDED	$0.00		
TOTAL ADJUSTMENT OF COMPENSATION	$0.00		
TOTAL AUTHORIZED CONTRACT AMOUNT	$0.00		
SUBTOTAL CONTRACT ITEMS		$0.00	$0.00
PLUS: ADJUSTMENT OF COMPENSATION		$0.00	$0.00
PLUS: EXTRA WORK		$0.00	$0.00
TOTAL WORK COMPLETED		**$0.00**	**$0.00**
PLUS: MATERIALS ON HAND			$0.00
LESS: DEDUCTIONS			$0.00
LESS: RETENTION			$0.00
TOTAL PAYMENT TO CONTRACTOR			$0.00
LESS: AMOUNT OF PREVIOUS PAYMENTS			$0.00
NET PAYMENT THIS ESTIMATE			**$0.00**

RETENTIONS:
1)UP TO 50% COMPLETION, 10% OF TOTAL WORK COMPLETED
2)AFTER 50% COMPLETION, IF SATIFACTORY, 5% OF TOTAL WORK COMPLETED
3)UNSATIFACTORY PROGRESS, 10% OF TOTAL WORK COMPLETED

ITEMS FOR WHICH CONTRACT PRICE EXCEEDS MAXIMUM VALUE: NONE

DATE CONTRACTOR RECEIVED					
NOTICE TO PROCEED	ENTER	WORKING DAYS TO DATE	0	WORK COMPLETED THIS ESTIMATE	$0.00
CONTRACTOR BEGAN WORK	ENTER	WEATHER NON-WORKING DAYS	0	TOTAL WORK COMPLETED TO DATE	$0.00
CONTRACT DAYS	ENTER	CHANGE ORDER DAYS	0	PERCENT COMPLETED	#DIV/0!
ESTIMATED DATE OF COMPLETION	ENTER	OTHER ALLOWABLE DAYS	0	PERCENT TIME ELAPSED	#DIV/0!

RESIDENT ENGINEER DATE CHECKED BY DATE CONSTRUCTION ENGINEER DATE DEPUTY DIRECTOR - ENGINEERING SERVICES DATE

ENTER R.E.NAME ACCOUNTING DAVE O'HALLORAN GLEN L. PRIDDY

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DIVISION 1
GENERAL REQUIREMENTS

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Section 01010

SUMMARY OF WORK

1. GENERAL

The WORK to be performed under this Contract shall consist of furnishing all plant, tools, equipment, materials, supplies, and manufactured articles and furnishing all labor, transportation, and services, including fuel, power, water, and essential communications, and performing all WORK, or other operations required for the fulfillment of the Contract in strict accordance with the Contract Documents. The WORK shall be complete, and all WORK, materials, and services not expressly indicated or called for in the Contract Documents which may be necessary for the complete and proper construction of the WORK in good faith shall be provided by the CONTRACTOR as though originally so indicated, at no increase in cost to the DISTRICT.

2. WORK COVERED BY CONTRACT DOCUMENTS

The WORK defined by the Contract Documents includes furnishing all labor, materials, equipment, services, permits, temporary controls and construction facilities, and all general conditions, general requirements and incidentals required to complete the WORK in its entirety as described in the Contract Documents. The WORK includes, but is not necessarily limited to, the following:

- Unit G Pipeline from Rocky Canyon Pump Station Discharge to Route 58/Maria Avenue, including site clearing and preparation; pipe manufacture / fabrication and pipe deliveries; trenching, pipeline installation, and backfilling; connecting to existing facilities, sheeting, shoring and bracing; creek crossings; railroad crossings, river crossing, road and highway crossings and trenchless construction; linings and coatings; specials and appurtenances; corrosion monitoring; off-site disposal of excavated materials; imported backfill materials; pavement restoration; traffic and pedestrian control; temporary access; locating, potholing, and protecting of existing utilities; and pipeline pressure and leakage testing.
- Unit G1 Pipeline from Route 58/Maria Avenue to Cuesta Tunnel Tank Inlet, including site clearing and preparation; pipe manufacture / fabrication and pipe deliveries; trenching, pipeline installation, and backfilling; connecting to existing facilities, sheeting, shoring and bracing; creek crossings; railroad, road and highway crossings and trenchless construction; linings and coatings; specials and appurtenances; corrosion monitoring; off-site disposal of excavated materials; imported backfill materials; pavement restoration; traffic

and pedestrian control; temporary access; locating, potholing, and protecting of existing utilities; and pipeline pressure and leakage testing.

- Unit H1 Pipeline from Cuesta Tunnel to San Luis Obispo Turnout, including site clearing and preparation; pipe manufacture / fabrication and pipe deliveries; trenching, pipeline installation, and backfilling; connecting to existing facilities, sheeting, shoring and bracing; creek crossings; railroad and road crossings and trenchless construction; linings and coatings; specials and appurtenances; corrosion monitoring; off-site disposal of excavated materials; imported backfill materials; pavement restoration; traffic and pedestrian control; temporary access; locating, potholing, and protecting of existing utilities; and pipeline pressure and leakage testing.
- Unit T11 – City of San Luis Obispo Turnout, including connection to main pipeline, site clearing and preparation; pipe manufacture / fabrication and pipe deliveries; trenching, pipeline installation, and backfilling; sheeting, shoring and bracing; bridge crossing; linings and coatings; specials and appurtenances; corrosion monitoring; off-site disposal of excavated materials; imported backfill materials; temporary access; locating, potholing, and protecting of existing utilities; pipeline pressure and leakage testing; and turnout facility construction including sitework, vault construction, flow meter, isolation valves, flow control valves, and electrical and instrumentation and control systems.
- Installation, splicing and testing of fiber optic conduit and pullboxes and fiber optic cable.
- Protection of existing utilities and coordination with local utility owners including, but not limited to, the County of San Luis Obispo, City of San Luis Obispo, Pacific Gas & Electric Company, Southern California Gas Company, AT&T/SBC, Charter Communications and Conoco-Phillips.
- Obtaining permits and complying with permit conditions.
- Complying with environmental mitigation and CEQA requirements.
- Tree protection.
- Abiding by the conditions of permanent and temporary easements.
- Coordination with other DISTRICT contractors including Contracts 300187.08.02 and 300187.08.04.
- Coordination with work by others.
- Hazardous materials removal and disposal.
- Site restoration.

3. WORK SEQUENCE AND CONSTRAINTS

3.1 CONTRACTOR'S Responsibility to Coordinate and Plan the WORK

It is the CONTRACTOR'S responsibility to coordinate and plan the construction activities such that the required construction sequencing and each time constraint is incorporated into the overall performance of the Work. Work shall be scheduled, sequenced, and performed in a manner which minimizes disruption to the operation and maintenance of the owner's facilities.

The CONTRACTOR shall incorporate the required construction sequencing, planned plant outages, and specified time constraints in the CPM Construction Schedule required under Section 01310, "Construction Scheduling." The CPM Construction Schedule shall include the CONTRACTOR'S activities necessary to satisfy all sequencing and time constraints included and referenced in the Contract Documents.

3.2 Contract Time(s)

The Contract Time(s) shall be as specified in Section 00500, "Agreement."

3.3 Construction Sequencing and Time Constraints

The construction sequencing and time constraints are specified in Section 01311, "Construction and Schedule Constraints."

4. WORK BY OTHERS.

4.1 DISTRICT Construction Contract 300187.08.02 – NWP Facilities

DISTRICT is performing the construction of the NWP Facilities under Contract 300187.08.02. Construction at the Rocky Canyon Pump Station and Cuesta Tunnel Tank will occur in parallel with the work of this contract. During pipeline construction, the NWP Facilities contractor will have use of certain areas of the site for materials storage, laydown, and access.

CONTRACTOR is required to coordinate and share use of the designated areas with the DISTRICT contractor. Details of shared use of the site(s) shall be discussed at the pre-construction conference.

The NWP Facilities contractor will install and test the control and communications panels at the SLO Turnout facility as shown on the Drawings. CONTRACTOR shall coordinate its schedule and panel mounting requirements with the work to be performed by the NWP Facilities contractor.

4.2 DISTRICT Construction Contract 300187.08.04 – Pipeline Central

DISTRICT is performing the construction of the Pipeline Central under Contract 300187.08.04. Construction of the Pipeline Central segment ends at the northern end of work under this contract, and will occur in parallel with the work of this contract.

CONTRACTOR is required to coordinate the sequencing of its construction activities with those of the Pipeline Central contractor.

5. AGENCY COORDINATION

For permitting requirements, refer to Section 01060, “Permit Requirements.”

For environmental mitigation requirements, refer to Section 01061, “Environmental Mitigation Requirements.”

6. UTILITY COORDINATION

As specified in Article 4.3 of the General Conditions, CONTRACTOR is responsible to coordinate the location of all utilities, either known or unknown, with the respective utility owner. CONTRACTOR shall provide adequate notification to all utility owners in advance of commencing construction operations.

Refer to Section 01530, “Protection of Existing Facilities,” for additional requirements.

7. LAND FOR CONSTRUCTION PURPOSES.

As specified in Article 4.1 of the General Conditions, the DISTRICT will furnish the lands upon which the WORK is to be performed, rights-of-way and easements for access thereto, and such other lands which are designated for the use of the CONTRACTOR. Easements for permanent structures or permanent changes in existing facilities will be obtained and paid for by the DISTRICT, unless otherwise provided in the Contract Documents. Nothing contained in the Contract Documents shall be interpreted as giving the CONTRACTOR exclusive occupancy of the lands or rights-of-way provided.

For the requirements associated with the boundaries and CONTRACTOR’S use of easements made available by DISTRICT for the Project, refer to Section 01040, “Easement and Right-of-Way Requirements.”

CONTRACTOR shall make its own arrangements for the use of any other areas that are not part of the areas designated for CONTRACTOR’S use.

8. CONNECTIONS TO EXISTING FACILITIES. Unless otherwise specified or indicated, CONTRACTOR shall make all necessary connections to existing facilities, including structures, drain lines, and utilities such as water, sewer, gas, telephone, and electric. In each case, CONTRACTOR shall receive permission from the DISTRICT or the owning utility prior to undertaking connections. CONTRACTOR shall protect facilities against deleterious substances and damage.

Connections to existing facilities which are in service shall be thoroughly planned in advance, and all required equipment, materials, and labor shall be on hand at the time of undertaking the connections. Work shall proceed continuously (around the clock) if necessary to complete connections in the minimum time. Operation of valves or other appurtenances on existing utilities, when required, shall be by or under the direct supervision of the owning utility.

9. UNFAVORABLE CONSTRUCTION CONDITIONS. During unfavorable weather, wet ground, or other unsuitable construction conditions, CONTRACTOR shall confine its operations to work which will not be affected adversely by such conditions. No portion of the WORK shall be constructed under conditions which would affect adversely the quality or efficiency thereof, unless special means or precautions are taken by CONTRACTOR to perform the WORK in a proper and satisfactory manner.

10. DEFINITIONS APPLICABLE TO TECHNICAL SPECIFICATIONS

The following words shall have the defined meaning in the Technical Portions of the WORK:

Furnish - means to supply and deliver to the site, to unload and unpack ready for assembly, installation, testing, and startup.

Indicated - is a word used to direct the CONTRACTOR to information contained on the Drawings or in the Specifications. Terms such as "shown," "noted," "scheduled," and "specified" also may be used to assist in locating information but no limitation of location is implied or intended.

Install - defines operations at the site including assembly, erection, placing, anchoring, applying, shaping to dimension, finishing, curing, protecting, and cleaning, ready for the DISTRICT'S use.

Installer - a person or firm engaged by the CONTRACTOR or its Subcontractor or any subcontractor for the performance of installation, erection, or application work at the site. Installers must be expert in the operations they are engaged to perform.

Provide - is defined as furnish and install, test, adjust, program, and demonstrate proper operation if required by the specification, ready for the intended use.

11. CLEANING UP: CONTRACTOR shall keep the premises free at all times from accumulations of waste materials and rubbish. CONTRACTOR shall provide adequate trash receptacles about the Site and shall promptly empty the containers when filled. Construction materials, such as concrete forms and scaffolding, shall be neatly stacked by CONTRACTOR when not in use. CONTRACTOR shall promptly remove splattered concrete, asphalt, oil, paint, corrosive liquids, and cleaning solutions from surfaces to prevent marring or other damage. Volatile wastes shall be properly stored in covered metal containers and removed daily.

Wastes shall not be buried or burned on the Site or disposed of into storm drains, sanitary sewers, streams, or waterways. All wastes shall be removed from the Site and disposed of in a manner complying with local ordinances and antipollution laws.

Adequate cleanup will be a condition for recommendation of progress payment applications.

End of Section

Section 01011

ALTERNATIVE PIPELINE BID

1. GENERAL

CONTRACTOR shall complete the pricing for Alternatives A through C as shown in the Bid Form for the Alternative Pipeline Bid. If the Contract is awarded by the DISTRICT on the basis of one or more of the alternatives given in the Alternative Pipeline Bid, the pipeline design and installation requirements shall be revised from that shown for the Base Bid as specified herein.

1-1. Pipeline Diameter and Pipe Pressure Class. The pipe material shall meet the size and pressure requirements defined in the following tables:

Welded Steel Pipe Specification Section 15062					
Unit	Bid Alternative	Beginning Station	Ending Station	Pipe Size (inches)	Pipe Class
G	A	1785+50±	1914+25	24	250
G	B	1914+25	1918+57	24	250 River Crossing
G	A	1918+57	2016+00	24	250
G	A	2016+00	2151+57±	24	200
G1	C	2150+00	2187+00	24	200
G1	C	2187+00	2308+08±	24	150

Ductile Iron Pipe Specification Section 15061					
Unit	Bid Alternative	Beginning Station	Ending Station	Pipe Size (inches)	Pipe Class
G	A	1785+50±	1914+25	24	250
G	B	1914+25	1918+57	24	250 River Crossing
G	A	1918+57	2016+00	24	250
G	A	2016+00	2151+57±	24	200
G1	C	2150+00	2308+08±	24	200

1-2. Restrained Joints. The lengths of pipeline requiring restrained joints as shown on the Drawings shall be unchanged as a basis for establishing the Alternative Pipeline Bid. If all or portions of the Project are awarded on the basis of the Alternative Pipeline Bid, the lengths of restrained joints will be recalculated, and a change order will be negotiated if the total length is materially different from the Base Bid condition.

1-3. Air Valve Design. The pressure classes for air valves shall be unchanged.

1-4. Casing Sizes. Increase the diameter of casings by 6-inches.

1-5. Pipeline Profile. Install the pipeline to maintain a minimum cover depth of 42 inches at any location, and minimum clearances when crossing existing utilities as shown on the Drawings.

End of Section

Section 01025

MEASUREMENT AND PAYMENT

1. SCOPE. Methods and procedures for measurement and payment for items of Work under this Contract shall be in accordance with the requirements specified in Article 14 of the General Conditions, "Payments to Contractor and Completion," and as specified herein.

2. GENERAL. Payment for the various items of the Bid Form, as further specified herein, shall include all compensation to be received by the CONTRACTOR for furnishing all tools, equipment, supplies, and manufactured articles, and for all labor, operations, and incidentals appurtenant to the items of work being described, as necessary to complete the various items of the WORK all in accordance with the requirements of the Contract Documents, including all appurtenances thereto, and including all costs of permits and cost of compliance with environmental protection and mitigation requirements and permits and with the regulations of public agencies having jurisdiction, including Safety and Health Requirements of the California Division of Industrial Safety and the Occupational Safety and Health Administration of the U.S. Department of Labor (OSHA). No separate payment will be made for any item that is not specifically set forth in the Bid Form, and all costs therefor shall be included in the prices named in the Bid Form for the various appurtenant items of work.

No separate payment will be made for any of the requirements of the General Conditions, the Supplementary General Conditions, nor for any of the work specified in the Division 1 Sections of the Specifications.

Payment includes full compensation for furnishing all required labor, materials, products, tools, equipment, plant, transportation, services, incidentals; application or installation of each item of the Work, and all other costs of whatsoever nature for the items of Work complete and in place according to the Contract Documents. Payment for each Bid item shall include overhead and profit.

Neither the payment of any estimate nor of any retained percentage shall relieve the CONTRACTOR of any obligation to make good any defective work or material.

3. ESTIMATED QUANTITIES. The estimated quantities given in the Bid Form for items bid on a unit price basis are approximate and are given only for a basis for comparison of bids. DISTRICT does not expressly, nor by implication, warrant that the actual amount of work will correspond to the estimated quantities. The DISTRICT reserves the right to increase or decrease the amount

of work performed under unit price Bid Items, or to omit such work altogether. No adjustments to the Contract unit prices will be made, nor will any claim for loss of anticipated profit be allowed on account of any such increase, decrease, or omission except as provided for in Paragraph 10.2 of Section 00700, "General Conditions." Payment for unit price Bid Items will be made at the Contract unit prices stated in the CONTRACTOR'S Bid measured in accordance with the specified methods of measurement as stated in this Section.

4. UNIT PRICE ITEMS. The quantity of work to be paid for under any item for which a unit price is fixed in the Description of Bid Items shall be the actual amount of units of work satisfactorily completed in accordance with the Contract Documents, and as directed by the DISTRICT. No payment will be made for work done outside of the prescribed or ordered limits.

CONTRACTOR shall take all measurements and compute all payment quantities. The ENGINEER will verify and approve measurements and quantities. Measurements and computations will be made by methods approved by the ENGINEER for the class of work measured.

CONTRACTOR shall measure all work to be paid for at a contract price per unit of measurement in accordance with United States Standard Measures except as otherwise specified.

Material paid for by weight shall be weighed on sealed scales certified by and regularly inspected by the applicable California State Weights and Measures Department.

Where pipeline construction is specified to be measured by length, the lengths shall be based on the pipeline stationing which is the horizontal projection of the pipeline layout.

When material is to be measured and paid for on a volume basis and it is impractical to determine the volume by the specified method of measurement, or when requested by CONTRACTOR in writing and approved by the ENGINEER in writing, the material will be weighed in accordance with the requirements specified for weight measurement. Such weights will be converted to volume measurement for payment purposes. Factors for conversion from weight measurement to volume measurement will be determined by ENGINEER and shall be agreed to by CONTRACTOR before such method of measurement of pay quantities will be adopted.

When metering devices are required in the Specifications or are used to measure the quantity of liquids used in the Work, the metering devices shall be inspected, tested, and certified by the applicable California State Weights and Measures Department within the past year.

Full compensation for all expense involved in conforming to the requirements for measuring and weighing materials shall be considered as included in the unit prices paid for the materials being measured or weighed and no additional compensation will be allowed therefor.

5. SCHEDULE OF VALUES. CONTRACTOR shall prepare a schedule of the estimated values of each of the various major parts of the project and the total of all parts that shall equal the Contract Price. Said schedule shall be on AIA Form G703 or similar form and shall be subject to DISTRICT'S approval. The ENGINEER will use the Schedule of Values for verifying the amount of each progress payment.

CONTRACTOR shall submit the Schedule of Values to the ENGINEER per Section 01300, "Submittals." Provide a breakdown of the contract price consistent with the itemized cost-loaded CPM Construction specified in Section 01310, "Construction Scheduling" and in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the project manual table of contents. Provide several line items for principal subcontract amounts, where appropriate.

Provide a separate line item in the Schedule of Values for each part of the WORK where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at CONTRACTOR'S option.

There is no separate progress payment made for preparation of submittals, unless otherwise specified for specific submittals.

6. DESCRIPTION OF BID ITEMS.

6.1 General

Bid Items 1 through 14 are presented to indicate major categories of the WORK for purposes of comparative bid analyses. Bid Item 2 is presented to comply with the California Labor Code relating to the price for sheeting, shoring, and bracing of excavations. Bid items are not intended to be exclusive descriptions of work categories and the CONTRACTOR shall determine and include in its pricing all

materials, labor, and equipment necessary to complete each Bid Item as shown and specified.

6.2 Bid Item No. 1 - Mobilization

Bid Item No. 1 is a lump sum bid item, with a stipulated amount of $360,000, that includes obtaining all permits, insurance, bonds and other documents; moving all equipment onto the site and setting up field offices; making utility connections and furnishing and erecting temporary construction facilities; submitting the complete shop drawing schedule and receiving the ENGINEER'S acceptance; completion and approval of a Storm Water Pollution Prevention Plan (SWPPP); and submittal and approval of a finalized CPM Construction Schedule and Schedule of Values per Section 01310, "Construction Scheduling," all as required for the proper performance and completion of the WORK.

The CONTRACTOR'S attention is directed to the condition that no payment for mobilization, or any part thereof, will be approved for payment nor paid for under the Contract until all mobilization items listed above are completed as specified.

6.3 Bid Item No. 2 - Sheeting, Shoring and Bracing

Bid Item No. 2 is a lump sum bid item that includes additional cost for providing all sheeting, shoring and bracing in connection with the WORK including but not limited to that required by Sections 6700-6708 of the California Labor Code, as follows:

- Bid Item No. 2a - Sheeting, Shoring and Bracing for Unit G Pipeline
- Bid Item No. 2b - Sheeting, Shoring and Bracing for Unit G1 Pipeline
- Bid Item No. 2c - Sheeting, Shoring and Bracing for Unit H1 Pipeline
- Bid Item No. 2d - Sheeting, Shoring and Bracing for Unit T11

6.4 Bid Item No. 3 – Environmental Mitigation Costs

Bid Item No. 3 is a lump sum bid item that includes all work required for complying with the environmental mitigation requirements specified in Section 01061, "Environmental Mitigation," for the construction of the Project specified under Bid Items 4 through 14.

6.5 Bid Item No. 4 – Installation of Fiber Optic Conduit and Cable System

Bid Item No. 4 is a lump sum bid item that includes all work associated with furnishing, installing, splicing and testing the fiber optic conduit and cable network as shown on the Drawings:

- Bid Item No. 4a – Work associated with Units G, G1 and H1
- Bid Item No. 4b – Work associated with Unit T11

6.6 Bid Item No. 5 – Pipeline Unit G (18-Inch)

Bid Item No. 5 is a unit price bid item, measured in feet, that includes all work required for the furnishing, installing and testing of the 18-Inch Pipeline Unit G, as shown on the Drawings and as specified, including but not limited to, all General Conditions, Supplementary General Conditions, and General Requirements; designing, detailing, fabricating, delivering and installing welded steel or ductile iron pipe together with fittings, specials, flanges, pipe supports and appurtenances, protective linings and coatings, and shop testing; coordination; trenching and backfilling; trenchless crossings; corrosion monitoring; traffic control; pavement restoration; site restoration; making connections as shown; and hydrostatic pressure and leakage testing.

6.7 Bid Item No. 6 – Salinas River Crossing - South (24-Inch)

Bid Item No. 6 is a lump sum bid item that includes all work required for the furnishing, installing and testing of the 18-Inch Salinas River Crossing South performed by auger bore construction methods as shown on the Drawings and as specified in Section 02313.

6.8 Bid Item No. 7 – Pipeline Unit G1 (18-Inch)

Bid Item No. 7 is a unit price bid item, measured in feet, that includes all work required for the furnishing, installing and testing of the 18-Inch Pipeline Unit G1, as shown on the Drawings and as specified, including but not limited to, all General Conditions, Supplementary General Conditions, and General Requirements; designing, detailing, fabricating, delivering and installing welded steel or ductile iron pipe together with fittings, specials, flanges, pipe supports and appurtenances, protective linings and coatings, and shop testing; coordination; trenching and backfilling; trenchless crossings; corrosion monitoring; traffic control; pavement restoration; site restoration; making connections as shown; and hydrostatic pressure and leakage testing.

6.9 Bid Item No. 8 – Pipeline Unit H1 (12-Inch)

Bid Item No. 8 is a unit price bid item, measured in feet, that includes all work required for the furnishing, installing and testing of the 12-Inch Pipeline Unit H1, as shown on the Drawings and as specified, including but not limited to, all General Conditions, Supplementary General Conditions, and General Requirements; designing, detailing, fabricating, delivering and installing welded steel or ductile iron pipe together with fittings, specials, flanges, pipe supports and appurtenances, protective linings and coatings, and shop testing;

coordination; trenching and backfilling; trenchless crossings; corrosion monitoring; traffic control; pavement restoration; site restoration; making connections as shown; and hydrostatic pressure and leakage testing.

6.10 Bid Item No. 9 – San Luis Obispo Turnout T11

Bid Item No. 9 is a lump sum bid item that includes all work required for the construction of the San Luis Obispo Turnout, Unit T11, as shown on the Drawings and as specified, including but not limited to, all General Conditions, Supplementary General Conditions, and General Requirements; coordination; construction of the turnout pipeline; construction of general, civil, architectural, and structural work; and furnishing, installing and testing all mechanical, electrical and instrumentation and control systems.

6.11 Bid Item No. 10 – Allowance - Contaminated Soils

Bid Item No. 10 is a lump sum bid item that provides an allowance as part of the Contract Price to pay for the work associated with identifying, removing, stockpiling, testing and disposing of contaminated spoils as specified in Supplementary General Conditions SGC-4.5. The allowance will be utilized upon approval by the ENGINEER for CONTRACTOR to perform the required work at an agreed-upon price.

6.12 Bid Item No. 11 – Allowance - Contaminated Groundwater

Bid Item No. 11 is a lump sum bid item that provides an allowance as part of the Contract Price to pay for the work associated with identifying, removing, holding, testing and disposing of contaminated groundwater as specified in Supplementary General Conditions SGC-4.5. The allowance will be utilized upon approval by the ENGINEER for CONTRACTOR to perform the required work at an agreed-upon price.

6.13 Bid Item No. 12 - Allowance - Change in Pipe Alignment or Profile Due to Utility Conflict

Bid Item No. 12 is a lump sum bid item that provides an allowance as part of the Contract Price to pay for the work associated with making field adjustments of the pipeline alignment or profile as a result of a conflict found with an existing utility not shown on the Drawings. The allowance will be utilized upon approval by the ENGINEER for CONTRACTOR to perform the required work at an agreed-upon price.

6.14 Bid Item No. 13 - Subgrade Stabilization in Soft, Unstable Soils.

Bid Item No. 13 is a unit price bid item, measured by foot of length of trench, for the installation of crushed rock contained within a geotextile fabric envelope for reinforcing soft unstable subgrades to the limits determined in the field by ENGINEER based on the actual conditions encountered.

6.15 Bid Item No. 14 – All Other Work

Bid Item No. 14 is a lump sum bid item that includes all other WORK required by the Contract Documents for Pipeline South except as otherwise paid for under the other Bid Items.

End of Section

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Section 01040

EASEMENT AND RIGHT-OF-WAY REQUIREMENTS

1. GENERAL

Approvals and agreements from various agencies, public and private, and from property owners, are required for the use of lands necessary for the execution of the WORK under this Contract.

As specified in Article 4.1 of the General Conditions, the DISTRICT will furnish, as indicated in the Contract Documents, the lands upon which the WORK is to be performed, rights-of-way and easements for access thereto, and such other lands which are designated for the use of the CONTRACTOR.

The CONTRACTOR shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment; provided, that the CONTRACTOR shall not enter upon nor use any property not under the control of the DISTRICT until a written temporary construction easement agreement has been executed by the CONTRACTOR and the property owner, and a copy of said easement furnished to the ENGINEER prior to said use; and, neither the DISTRICT nor the ENGINEER will be liable for any claims or damages resulting from the CONTRACTOR'S unauthorized trespass or use of any such properties. The CONTRACTOR shall provide the DISTRICT with a signed release from the property owner confirming that the lands have been satisfactorily restored upon completion of construction.

In order to assure compliance with environmental mitigation requirements, any additional lands proposed for the CONTRACTOR'S use relative to this Contract shall be reviewed and approved by the affected property owner, the DISTRICT, ENGINEER, and Environmental Monitor prior to their use.

The intent of this section is to provide BIDDERS with an abstract of the requirements of easement agreements that have been entered into by the DISTRICT. A summary of the permit requirements, environmental mitigation requirements, and regulatory approvals required for the WORK are described in other sections.

Copies of the applicable plats, legal descriptions and area calculations for permanent and temporary easements are attached hereto in Appendix B and are a part of the Contract Documents.

Actual or probable conditions of certain easements are provided in the Summary of Easement Requirements to promote the BIDDER'S awareness of the

conditions and requirements of the issuing authority, public or private. In case of conflict between these summaries and the actual easements and approvals, the conditions set forth in the easements and approvals take precedence over the summaries given in Summary of Easement Requirements.

In case of conflict between the easements/approvals and the Drawings and Specifications, the more stringent requirement shall take precedence.

2. SITE ACCESS, WORK AREA LIMITS AND NOTIFICATION REQUIREMENTS.

Work area limits are designated on the Drawings. Note that in certain areas of the alignment, CONTRACTOR'S working area is narrower than the width of easements obtained by the DISTRICT, due to environmental reasons.

2.1 Easement Deeds – General Requirements.

The following general requirements apply to all Work performed on private or public properties for which temporary and/or permanent easements were obtained by the DISTRICT:

- Unless otherwise specified, the easement deeds require the DISTRICT to provide each property owner with a 30-day advance notification prior to commencing construction activities on each parcel. As a result, CONTRACTOR shall provide the ENGINEER with a 60-day advance notification prior to commencing construction activities on each parcel.
- Vehicle traffic shall be restricted to established public roads and designated access roads within the work area. The DISTRICT may approve CONTRACTOR'S use of existing private roadways outside the DISTRICT'S easements and right-of-ways, where the DISTRICT has such rights. In order to assure compliance with environmental mitigation requirements, any use of private roadways or land shall be reviewed and approved in advance by the affected property owner, the DISTRICT, ENGINEER, and Environmental Monitor.
- No hazardous or toxic materials shall be stored within the Permanent Easement Area.
- CONTRACTOR shall keep open access roads and private driveways for property owner's use during the construction activities. The CONTRACTOR shall be responsible for repairing any damages to any lanes, drives, rights-of- way, and roadways within the real property caused by CONTRACTOR'S use thereof.

- Upon completion of construction, the permanent and temporary construction easement areas shall be restored to the condition that existed prior to construction, subject to the further restoration requirements specified in the Contract Documents. Restoration of disturbed areas at each parcel shall be restored within the number of Days tabulated below from the time of completion of pipeline construction. After the initial restoration is performed, any follow-up construction to install appurtenances that causes disturbance to surface features shall include follow-up restoration as well.

Owner Name	Allowable Time Period for Restoration	Comments
All	60 Days	

3. CONTRACTOR'S STORAGE AREA FOR HAZARDOUS MATERIALS

The CONTRACTOR shall construct and use a separate storage area for hazardous materials used in constructing the WORK. The CONTRACTOR shall clearly mark these areas in the field.

For the purpose of this paragraph, hazardous materials to be stored in the separate area are all products labeled with any of the following terms: Warning, Caution, Poisonous, Toxic, Flammable, Corrosive, Reactive, or Explosive. In addition, whether or not so labeled, the following materials shall be stored in the separate area: diesel fuel, gasoline, new and used motor oil, hydraulic fluid, cement, paints and paint thinners, two-part epoxy coatings, sealants, asphaltic products, glues, solvents, wood preservatives, sand blast materials, and spill absorbent.

The CONTRACTOR shall develop and submit to the ENGINEER a plan for storing and disposing of the materials above. The CONTRACTOR shall prepare a Hazardous Material Spill Response Plan in accordance with Section 01061, "Environmental Mitigation." This plan shall be reviewed by the Environmental Monitor for adequacy and for implementation.

The CONTRACTOR shall obtain and submit to the ENGINEER a single EPA number for wastes generated at the site.

The separate storage area shall meet all the requirements of all authorities having jurisdiction over the storage of hazardous materials. Such authorities are: Cal-OSHA, AQMD, California Department of Fish and Game, Regional Water Quality Control Board, and County of San Luis Obispo Environmental Health

Services.

All hazardous materials which are delivered in containers shall be stored in original containers until use. Hazardous materials which are delivered in bulk shall be stored in containers which meet the requirements of authorities having jurisdiction.

4. SUMMARY OF EASEMENT REQUIREMENTS. Refer to property owner requirements in Appendix B.

5. STATUS OF EASEMENT ACQUISITION. The status of DISTRICT acquisition of permanent and temporary easements as of the date of opening of Bids is provided below for CONTRACTOR'S information and construction scheduling purposes.

Easement Status	**Property Owners & Assessor's Parcel Numbers (APN)**	
Easement Agreements signed by property owner and Board of Supervisors action is completed.	**Rossi** 071-091-036 **Santa Margarita Ranch** 069-073-001 070-094-001 **Lopez** 070-071-024	**Crabtree** 070-061-036 070-061-037 **Ryan** 070-061-038 **Land Conservancy of San Luis Obispo** 073-321-003
Easement Agreements signed by property owner and pending Board of Supervisors action.	**Glick** 073-261-006 073-261-008 073-261-009 073-261-010	
Easement Agreements Pending.	**Atascadero Mutual Water Company** 034-434-001 Easement Deed execution in process. **United States of America** 070-061-022 070-094-002 Easement Deed execution in process. **State of California** 070-061-039 070-501-010 Easement Deed execution in process.	**Cal Poly (State of California)** 073-291-002 Easement Deed execution in process. **City of San Luis Obispo** 073-271-002 073-291-003 Easement Deed execution in process.

Easement Status	Property Owners & Assessor's Parcel Numbers (APN)	
Right of Possession pending completion of eminent domain proceedings. Right of Possession estimated to be completed by December 31, 2007	**Davis** 034-401-020 **Davis** 034-401-015 034-401-016 034-401-017	**Taft** 034-432-014 **Hendrix** 070-093-001 070-093-003 070-093-004

6. ACCESS THROUGH CALIFORNIA MEN'S COLONY AND CAMP SAN LUIS. Access to pipeline construction areas in Unit H1 is available through Camp San Luis and the California Men's Colony. The point of coordination for site access via CMC is:

John Kellerman, CMC
(805) 547-7974
(805) 547-7548 FAX

Access to the site though this area may be affected by bridge restrictions across Chorro Creek. CMC installed a 1-lane Bailey bridge at this location whose load bearing capabilities should be adequate, but it is narrow.

For contractors working on CMC property or near the perimeter fence, denim (blue, gray, or black) is not permitted. No firearms, tobacco, or drugs of any nature are permitted to be brought on the property. However, for contractors and inspectors passing through CMC gates on their way to the NWP job site, provided that persons stay in their vehicles and don't approach the perimeter fence, no special attire is required.

CONTRACTOR shall coordinate with the ENGINEER at the Pre-Construction Conference and with CWC in advance of mobilization onto the site.

End of Section

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Section 01050

FIELD ENGINEERING

1. LOCATION AND DATUM. Reference points and elevation datum for the Project are based on the Primary Control Survey Report prepared by Cannon Associates, July 2005, and Addendum 1, January 2006, both of which are attached hereto as Appendix A and are a part of the Contract Documents. The locations of survey control points and mapping information are shown on the "Primary Survey Control Drawing."

2. LINES AND GRADES. The CONTRACTOR shall lay out all work, including structures and pipelines, and shall be responsible for any errors resulting therefrom. In all questions arising as to proper location of lines and grades, the ENGINEER'S decision will be final.

As part of the bid price for the construction of the improvements, the CONTRACTOR shall provide and be responsible for the layout of all Work on this project. The CONTRACTOR shall provide all necessary surveys, field staking, and positioning for the construction of all components at the proper alignment, elevations, grades, and positions, as indicated on the Drawings and as required for the proper operation and function of the facilities. The CONTRACTOR shall stake the work limits. Work shall be performed by a licensed Land Surveyor registered in the State of California.

The CONTRACTOR'S layout shall be based on existing structures (where applicable), survey control, and benchmarks established by the DISTRICT.

The CONTRACTOR shall supply such labor as required, at no extra charge, to aid and assist the ENGINEER in checking location and grades of the WORK as set by the CONTRACTOR, if required by the ENGINEER. This shall include moving materials and equipment located between monuments and the construction work.

3. ESTABLISHING PROPERTY AND EASEMENT LINES. Work within the project site area requires that the CONTRACTOR determine the locations of easements, public rights-of-way and property lines so that all WORK is performed within the construction limits shown on the Drawings, and within the County's right-of-way. As a result, CONTRACTOR shall survey and field stake all permanent and temporary easements, private owner and DISTRICT property lines, and applicable right-of-way lines in order to demonstrate its compliance with the foregoing requirement. Work shall be performed by a licensed Land Surveyor registered in the State of California. Field stakes shall illustrate corners of areas and be spaced at 100 foot intervals along straight boundaries (approx.).

4. SURVEY DATA. All field books, notes, and other data developed by CONTRACTOR in performing surveys required as part of the WORK shall be available to ENGINEER for examination throughout the construction period. All such data shall be submitted to ENGINEER with the other documentation required for final acceptance of the Work.

5. LAYOUT DATA. CONTRACTOR shall keep neat and legible notes of measurements and calculations made in connection with the layout of the WORK. Copies of such data shall be furnished to the ENGINEER for use in checking CONTRACTOR'S layout as provided in the project requirements section. All such data considered of value to the DISTRICT shall be transmitted to the ENGINEER by CONTRACTOR with other records upon completion of the Work.

All connections to existing facilities shall be installed based on the actual elevations of existing facilities and structures to which connections are made.

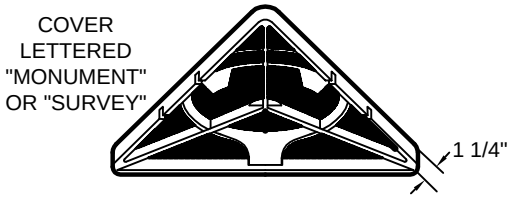
6. SETTING NEW SURVEY MONUMENTS. CONTRACTOR shall install new Standard Street Monument in accordance with San Luis Obispo County Department of Public Works Standard Construction Drawings details M-1 (for Paved Roads) and M-1a (for Gravel Roads) as follows:

- Install one monument directly over the pipeline at each property line.
- Install one monument directly over the pipeline at the centerline of each road crossed.
- Install one monument directly over the pipeline at each pipeline turnout.
- Install one monument directly over the pipeline at each end of each casing in which the pipeline is installed.

7. RESTORING SURVEY MONUMENTS. Any existing survey monuments that may be disturbed or destroyed during construction shall be referenced by a licensed land surveyor, and shall be reset as required by the County Standard Details.

End of Section

Revisions					
Description	Approved	Date	Description	Approved	Date



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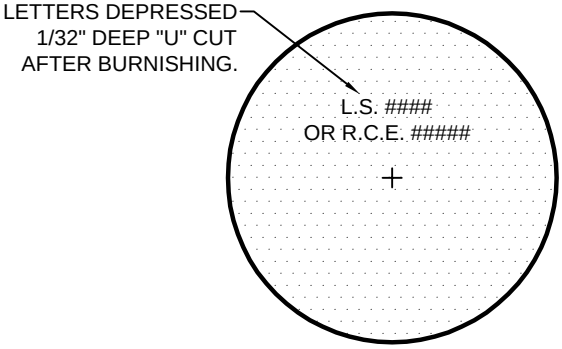
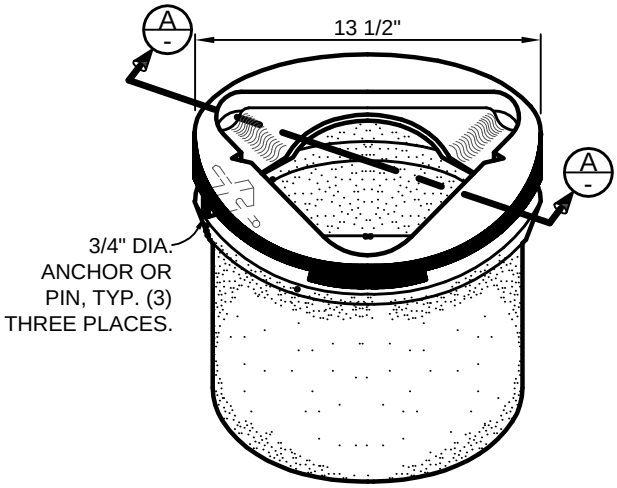


CAP PLAN



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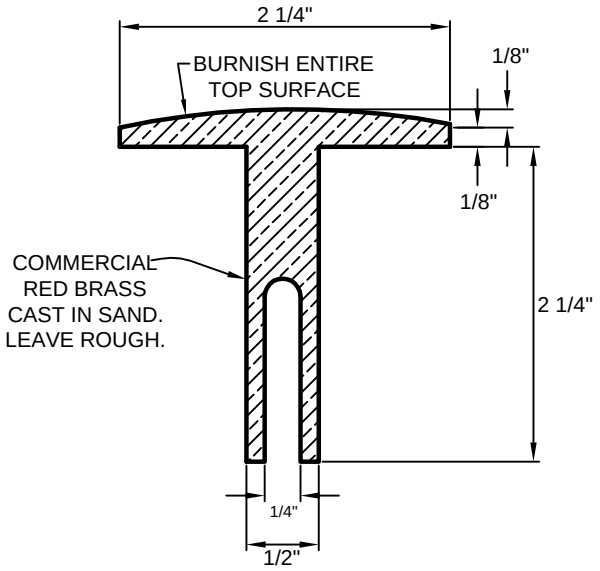

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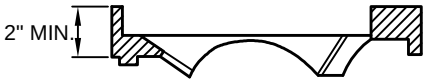
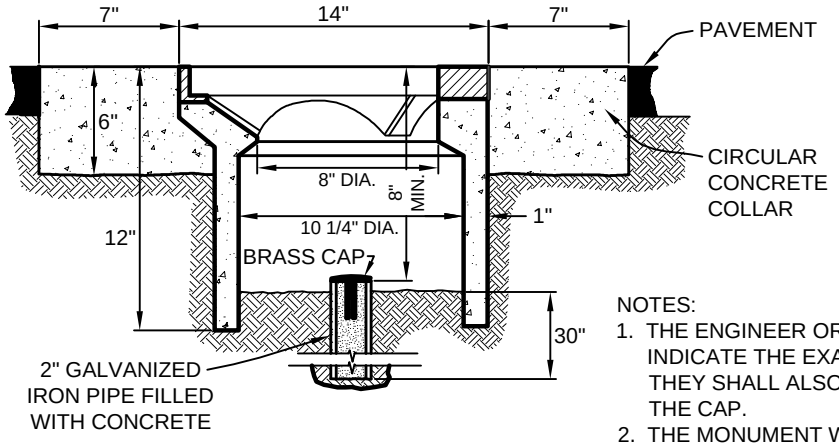


RISER RING



SECTION A-A

NOTES:
1. THE ENGINEER OR SURVEYOR SETTING THE MONUMENT SHALL INDICATE THE EXACT POINT BY MARKING A CROSS ON THE CAP. THEY SHALL ALSO STAMP THEIR LICENSE TYPE AND NUMBER ON THE CAP.
2. THE MONUMENT WELL SHALL BE BROOKS PRODUCTS No. 4TT, OR DEPARTMENT APPROVED EQUAL.
3. BRASS CAPS ARE AVAILABLE FOR PURCHASE FROM THE COUNTY PUBLIC WORKS DEPARTMENT.

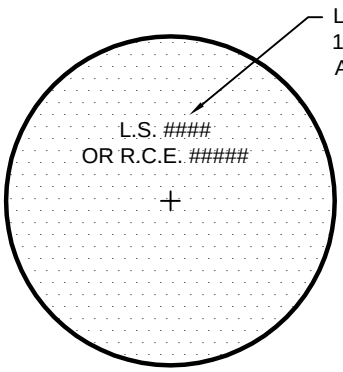
SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

STANDARD STREET MONUMENT

FOR PAVED ROADS

Scale:	Issued:
NTS	Aug. 2006
Drawing No:	M-1
Sheet No:	1 OF 1

Revisions					
Description	Approved	Date	Description	Approved	Date



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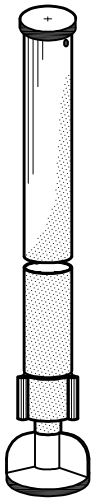

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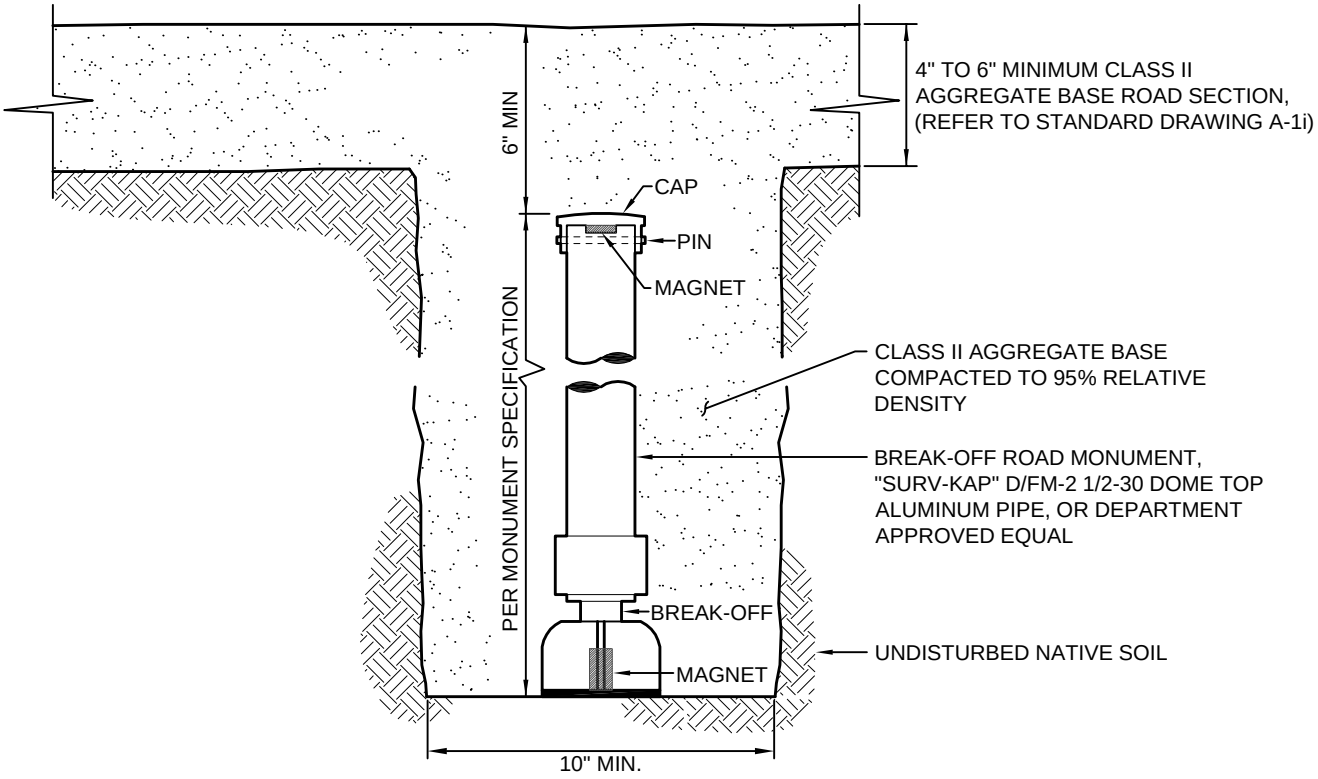

NOTES:

1. BREAK-OFF MONUMENTS ARE DESIGNED TO BREAK OFF AT A PRE-DETERMINED POINT, LEAVING A PORTION OF THE BASE CONTAINING THE MAGNET FOR RELOCATING THE ORIGINAL SURVEY POINT.
2. BREAK-OFF MONUMENTS MAY BE SPECIFIED TO MONUMENT CENTERLINE OF COUNTY RURAL GRAVEL ROADS, (REFER TO STANDARD DRAWING A-1i).
3. NOT FOR USE IN PAVED ROADS (REFER TO STANDARD DRAWING M-1).

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

STANDARD STREET MONUMENT

FOR GRAVEL ROADS

Scale:	Issued:
NTS	Aug. 2006

Drawing No: M-1a

Sheet No: 1 OF 1

Section 01060

PERMIT REQUIREMENTS

1. GENERAL

Permits, approvals and agreements from various agencies, public and private, and from property owners, are required for execution of the WORK under this Contract. For purposes of this section, “permits” is defined to include all of the permit approvals and agreements referenced.

Sometimes these permits require fees to be paid by the CONTRACTOR and sometimes these permits impose construction conditions. Some of these permits have been obtained by the DISTRICT, and some shall have to be obtained by the CONTRACTOR as specified. The CONTRACTOR shall include in its overall bid the cost of obtaining any necessary permits and the preparation of any plans required by these permits not obtained by the DISTRICT, including application fees and any other costs; and the cost of complying with all of the conditions set by all of the required permits. For permits that the DISTRICT obtains, the DISTRICT will directly pay the permitting agencies and companies for application fees, permit renewal fees, and inspection fees, unless otherwise specified herein.

Easement requirements and environmental mitigation requirements are covered in other sections.

The intent of this section is to provide BIDDERS with an abstract of the requirements of permits and approvals required for the WORK under this Contract and indicate which of these permits and approvals have been obtained. Copies of the applicable permits or permit requirements that are available are provided to the CONTRACTOR in Appendix C.

Actual or probable conditions of required permits and approvals are provided in the Summary of Permits and Approvals to promote the CONTRACTOR’S awareness of the conditions and requirements of the issuing authority, public or private. In case of conflict between these summaries and the actual permits and approvals, the conditions set forth in the permits and approvals take precedence over the summaries given in Summary of Permits and Approvals.

Information provided in this section does not relieve the CONTRACTOR of responsibility to determine and verify the extent of the permits and approvals required to complete the Work under this Contract, or the CONTRACTOR of its responsibility to obtain other permits and approvals which are the responsibility of the CONTRACTOR and not included in this Section. The CONTRACTOR’S

attention is directed to additional requirements specified in the General Conditions.

In case of conflict between the permits/approvals and the plans/specifications, the more stringent requirement shall take precedence.

1.1 INDEX OF PERMITS AND APPROVALS. The following permits are included herein:

Paragraph	Description
1.2.1	State of California, Department of Transportation (Caltrans), Encroachment Permit Nos.: ▪ 0506-NTN-0679 Highway 101/North of Tassajara Creek Road ▪ 0506-NUK-0688, Highway 58 South of Yerba Buena Avenue
1.2.2	Union Pacific Railroad, Pipeline License Agreement and Wireline License Agreements with Contractor Right of Entry Agreements as follows: ▪ Station 1953+40 - Folder No. 2413-06, Pipeline Crossing, (Atascadero) and Folder No. 2429-40, Fiber Optic Crossing ▪ Station 2394+88 – Folder No. 2413-07, Pipeline Crossing, (San Luis Obispo) and Folder No. 2429-41, Fiber Optic Crossing ▪ Station 2507+48 - Folder No. 2413-08, Consent Letter Pipeline, (Stenner Creek) and Folder No. 2429-42, Consent Letter Fiber Optic
1.2.3	San Luis Obispo County, Department of Public Works, Encroachment Permit
1.2.4	State of California, Department of Industrial Relations, Division of Occupational Safety and Health, Mining and Tunnel Unit, Underground Classification
1.2.5	State of California State Water Resources Control Board (SWRCB) authorization to discharge under the State Water Resources Control Board General Construction Storm Water Permit
1.2.6	Regional Water Quality Control Board, 401 Water Quality Certification, Number 34006WQ19

1.2.7 State of California, Department of Fish & Game, Streambed Alteration Agreement(s)

- SAA 1600-2006-0246-3
- SAA 1600-2006-0247-3

1.2.8 U.S Army Corps of Engineers, Section 404 Nationwide Permit

1.2.9 State of California Department of Industrial Relations Occupational Safety and Health Administration (Cal/OSHA) – Construction Activities Permit

1.2.10 Procedures for Crossing Conoco Phillips Petroleum Pipelines

1.2 SUMMARY OF PERMITS AND APPROVALS.

1.2.1 State of California, Department of Transportation (Caltrans), Encroachment Permits:

a. Encroachment Permit No. 0506-NTN-0679, Highway 101

The DISTRICT has applied for and obtained an Encroachment Permit for the trenchless crossing of Highway 101 north of Tassajara Creek Road. A copy of the permit is included in Appendix C. CONTRACTOR shall comply with all requirements and general and special provisions. CONTRACTOR'S attention is directed to the notification and scheduling requirements. All work is subject to inspection by Caltrans. CONTRACTOR shall set and monitor the survey grid as specified, at CONTRACTOR'S expense.

CONTRACTOR is required to apply for and obtain an Encroachment Permit prior to starting work. CONTRACTOR'S Encroachment Permit application shall state that it is a "Double Permit for Permit Number 0506-NTN-0679." CONTRACTOR shall include a deposit of $656.00 with the permit application to compensate the State for inspection time.

CONTRACTOR is responsible for providing a stormwater Water Pollution Control Plan / Storm Water Pollution Prevention Plan (WPCP/SWPPP) document using the Caltrans template with the permit application.

b. Encroachment Permit No. 0506-NUK-0688, Highway 58

The DISTRICT has applied for and obtained an Encroachment Permit for the longitudinal encroachment and trenchless crossing of Highway 58 south of Yerba Buena Avenue. A copy of the permit is included in Appendix C. CONTRACTOR shall comply with all requirements and general and special provisions. CONTRACTOR'S attention is directed to the notification and scheduling requirements. All work is subject to inspection by Caltrans. CONTRACTOR shall set and monitor the survey grid as specified, at CONTRACTOR'S expense.

CONTRACTOR is required to apply for and obtain an Encroachment Permit prior to starting work. CONTRACTOR'S Encroachment Permit application shall state that it is a "Double Permit for Permit Number 0506-NUK-0688." CONTRACTOR shall include a deposit of $820.00 with the permit application to compensate the State for inspection time.

CONTRACTOR is responsible for providing a stormwater Water Pollution Control Plan / Storm Water Pollution Prevention Plan (WPCP/SWPPP) document using the Caltrans template with the permit application.

The following requirements also apply to work along Highway 58:

- Coordination with Others - Caltrans District 5 has a streetscape improvement project scheduled for construction from January 2008 until January 2009 along Highway 58 in the Santa Margarita area.

- Open Trench Construction Compaction along Highway 58 – use controlled density fill and submit a Quality Control Plan to Caltrans to assure compliance with backfill and compaction requirements.

- Trenching and Backfilling - Comply with CAL OSHA side slope standards for trenching. Sheeting and shoring shall comply with CAL OSHA regulations. Where trench is within three (3) feet of roadway's existing edge of pavement, the shoulder structural section shall be replaced to the edge of pavement.

- Bore and Jack Construction - CONTRACTOR shall not bore in advance of the leading edge of the casing and pressure grouting shall be performed to fill all voids around the casing.

- Steel Casing - Steel casing shall extend 5-feet (minimum) beyond the edge of pavement.

1.2.2 Union Pacific Railroad, Pipeline License Agreements, Contractor Right of Entry Agreements, Wireline Crossing License Agreements

a. Station 1953+40 - Folder No. 2413-06, Pipeline Crossing (Atascadero) and Folder No. 2429-40, Fiber Optic Crossing

The DISTRICT has applied for and obtained a Pipeline License Agreement and Contractor Right of Entry Agreement, and a Wireline Crossing License Agreement and Contractor Right of Entry Agreement for the trenchless crossing of the UPRR tracks located at UPRR Milepost (MP) 228.7 near Atascadero. Copies of the Agreements are included in Appendix C. CONTRACTOR shall comply with all requirements and general and special provisions. CONTRACTOR'S attention is directed to the notification and scheduling requirements. All work is subject to inspection by UPRR.

CONTRACTOR shall complete the Contractor Right of Entry Agreements for the Pipeline and Wireline Crossings and submit two copies of each Agreement, along with two checks; one in the amount of $500 (for the Pipeline) and the other for $500 (for the Wireline/Fiber Optic) and the required insurance certificates to Joan Preble, Union Pacific Railroad, 1400 Douglas Street, Stop 1690, Omaha, NB 68179-1690. CONTRACTOR shall reference the Folder No. 2413-06 (for the Pipeline) and Folder No. 2429-40 (for the Wireline) on the respective checks and communications.

CONTRACTOR shall be responsible to obtain the specified insurance coverage, including Commercial General Liability (CGL) policy (under Term 21 A) to cover $2,500,000 each occurrence and an aggregate limit of at least $5,000,000.

The CONTRACTOR is responsible to pay $1,000 to participate in Licensor's Blanket Policy for the Railroad Protective Liability Insurance (under Term 21 D).

b. Station 2394+88 - Folder No. 2413-07, Pipeline Crossing (San Luis Obispo) and Folder No. 2429-41, Fiber Optic Crossing

The DISTRICT has applied for and obtained a Pipeline License Agreement and Contractor Right of Entry Agreement, and a Wireline Crossing License Agreement and Contractor Right of Entry Agreement for the trenchless crossing of the UPRR tracks located at UPRR Milepost (MP) 240.9 near San Luis Obispo. Copies of the Agreements are included in Appendix C. CONTRACTOR shall comply with all requirements and general and special provisions. CONTRACTOR'S

attention is directed to the notification and scheduling requirements. All work is subject to inspection by UPRR.

CONTRACTOR shall complete the Contractor Right of Entry Agreements for the Pipeline and Wireline Crossings and submit two copies of each Agreement, along with two checks; one in the amount of $500 (for the Pipeline) and the other for $500 (for the Wireline/Fiber Optic) and the required insurance certificates to Joan Preble, Union Pacific Railroad, 1400 Douglas Street, Stop 1690, Omaha, NB 68179-1690. CONTRACTOR shall reference the Folder No. 2413-07 (for the Pipeline) and Folder No. 2429-41 (for the Wireline) on the respective checks and communications.

CONTRACTOR shall be responsible to obtain the specified insurance coverage, including Commercial General Liability (CGL) policy (under Term 21 A) to cover $2,500,000 each occurrence and an aggregate limit of at least $5,000,000.

The CONTRACTOR is responsible to pay $1,000 to participate in Licensor's Blanket Policy for the Railroad Protective Liability Insurance (under Term 21 D).

c. Station 2507+48 - Folder No. 2413-08, Consent Letter Pipeline (Stenner Creek) and Folder No. 2429-42, Consent Letter Fiber Optic

The DISTRICT has applied for and obtained two Consent Letters: one for the Pipeline (Folder No. 2413-08) and the other for the Fiber Optic Line (Folder No. 2429-42) open trench construction crossing of the UPRR tracks located at Pipeline Station 2507+48, UPRR Milepost (MP) 244.95 within Stenner Creek Road. Copies of the letters are included in Appendix C. CONTRACTOR shall comply with all requirements and general and special provisions. CONTRACTOR'S attention is directed to the notification and scheduling requirements. All work is subject to inspection by UPRR.

CONTRACTOR shall notify the UPRR Manager Track Maintenance office as shown in the letters 10 days in advance of any construction work on, along or across the Railroad's right of way and/or tracks. CONTRACTOR shall keep a copy of the Consent Letters available on site to be shown on request to any Railroad employee or official.

1.2.3 San Luis Obispo County, Department of Public Works, Encroachment Permit

The DISTRICT has applied for and obtained a Blanket Encroachment Permit for project construction located within the San Luis Obispo County

public right-of-way. A copy of the permit is included in Appendix C. The CONTRACTOR will be required to obtain an encroachment permit and submit a damage bond to Public Works. An individual permit shall be issued for each road in the project. The permits are $318.00 at this time. The price may go up at the beginning of the fiscal year. The amount of the damage bond may vary, but will be a minimum of $10,000.

CONTRACTOR shall comply with all requirements and general and special provisions. CONTRACTOR'S attention is directed to the notification and scheduling requirements. All work is subject to inspection by the County. CONTRACTOR'S attention is also directed to the traffic control and public convenience and safety requirements specified in the County encroachment permit. The permit also addresses requirements for trenching, trench backfill, and pavement restoration.

As noted on the Drawings, CONTRACTOR shall modify traffic signal operation in accordance with the County encroachment permit requirements prior to beginning work in areas with traffic signals. At completion of pipeline installation in these areas, CONTRACTOR shall replace & restore damaged traffic loops and re-program traffic signal operation to pre-construction conditions.

The County Encroachment Permit will include the following requirements:

1. Paved roads, where the pipe alignment is in the center of the road, shall be repaved with a minimum of a 2% crown or match existing if greater.
2. In reference to County Standard R-4, the second cut shall be adjusted so that there are no seams in the wheel track.
3. All gravel roads shall be resurfaced with an aggregate pulled from a Public Works approved pit. Class II aggregate shall not be allowed.
4. All excavations performed in the shoulder shall be resurfaced with an aggregate pulled from an approved pit, graded and compacted a minimum of 6" thick.
5. During the course of construction, any culvert or other drainage structure that is damaged shall be replaced at the direction of Public Works. For CONTRACTOR'S information regarding the estimated condition of existing culverts, refer to the report entitled "Culvert Conditions – Nacimiento Water Project Pipeline Alignment, May 11, 2007," which is included in Appendix F for reference.
6. El Pomar shall have one lane open at all times, and two lanes open at the close of the working day, per traffic control plan.

7. Rocky Canyon Road may be closed if the terrain will not allow one travel lane to remain open. Trenching in the closed area shall be limited to 150' open at a time. Only one heading shall be allowed when the road is closed. Residents shall be allowed access to their driveways. Closure will be permitted from April to October.
8. All plates in the traveled way shall be pinned and have a 12" cold mix taper. All plates shall have a non-skid surface.
9. Temporary repairs shall not exceed 3,000 feet in length before permanent repairs are installed.

1.2.4 State of California, Department of Industrial Relations, Division of Occupational Safety and Health, Mining and Tunnel Unit, Underground Classification

DISTRICT has applied for and obtained Underground Classifications for the bore and jack crossings on the Project. Copies of the permits are included in Appendix C. CONTRACTOR shall comply with all provisions. CONTRACTOR shall notify the Mining and Tunneling Unit to schedule a mandated Pre-Job Conference with the Division prior to commencing any activity associated with construction of the crossings.

Each of the crossings has been classified as “Potentially Gassy with Special Conditions.” The special conditions are listed in each document.

1.2.5 State Water Resources Control Board (SWRCB) – General Construction Storm Water Permit.

The DISTRICT has filed, with the State Water Resources Control Board, a Notice of Intent (NOI) to comply with the terms of the National Pollutant Discharge Elimination System (NPDES) General Permit to discharge storm water associated with Construction Activities for the Project. In compliance with the General Permit, the CONTRACTOR shall prepare a Storm Water Pollution Prevention Plan (SWPPP) that identifies storm water pollution prevention control measures to be implemented, obtain approval from the RWQCB for the dewatering measures contained therein, and once approved, retain it at the construction site, maintain and update it and make it available upon request to representatives of the RWQCB.

A copy of pertinent information relating to this requirement is included in Appendix C. A copy of the SWRCB’s fact sheet is included in Appendix C for CONTRACTOR’S use as a reference. The CONTRACTOR is responsible for obtaining the NPDES requirements for construction waste discharge from the Regional Board at http://www.swrcb.ca.gov/stormwtr/docs/finalconstpermit.pdf.

In addition, the DISTRICT has prepared a Draft Conceptual SWPPP for CONTRACTOR to reference as a guide in preparing its project–specific SWPPP. The Draft Conceptual SWPPP is available from the DISTRICT as a .pdf file upon request.

The General Permit and SWPPP are applicable to construction activities which occur near the site, within rights-of-way, easements, or limits of construction areas as shown on the Drawings. The SWPPP shall include, but not be limited to, requirements for erosion control, dewatering, sediment control, and site-specific storm water pollution prevention control measures. At a minimum, the CONTRACTOR shall include erosion control measures, dewatering discharge plan and locations, control measures to minimize, to the maximum extent possible, sediment and pollutants from construction activities from contacting storm water runoff, soil stabilization practices, wind erosion control practices, waste disposal practices, and location of access, loading, and unloading areas. The SWPPP shall define the CONTRACTOR'S control measures.

In addition, the State of California Regional Water Quality Control Board, Central Coast Region (RWQCB) regulates discharges of water from site excavations and trench dewatering operations into storm drains and creeks. In accordance with the RWQCB requirements, the CONTRACTOR shall include provisions within the Storm Water Pollution Prevention Plan (SWPPP) that describes the Best Management Practices (BMPs) that the CONTRACTOR shall employ when discharging dewatering effluent. The CONTRACTOR shall also submit the SWPPP to the RWQCB and obtain approval of Contractor's proposed dewatering procedures prior to any dewatering discharge. The CONTRACTOR shall discharge dewatering water into retention basins or other holding facilities to maximize reinfiltration and to settle most of the solids prior to discharge to storm drains and creeks. If retention basins are to be constructed outside of the right-of-way or limits of construction, the CONTRACTOR shall obtain the rights to utilize such proposed location of the retention basins and other facilities, along with written approval by the property owners, for approval by the DISTRICT. Additional requirements are as follows:

- The CONTRACTOR shall prepare, submit, comply with, revise and amend the SWPPP for the duration of the Contract in accordance with the regulations of and orders by the SWRCB, RWQCB and Caltrans (for areas within the State's right of way). Such revisions or amendments shall be submitted to the ENGINEER and completed at no additional cost to the DISTRICT.

- The CONTRACTOR'S SWPPP shall be submitted to the ENGINEER during the mobilization phase as specified in Bid Item No. 1 in Section 01025, "Measurement and Payment." The CONTRACTOR'S SWPPP may be reviewed by the ENGINEER for completeness in accordance with the regulations of the SWRCB. The DISTRICT or ENGINEER will not be responsible for reviewing the accuracy of assumptions, data, information used, and procedures contained in the CONTRACTOR'S amendment to the SWPPP or the adequacy thereof. Nothing in this section shall be construed to impose liability on DISTRICT or ENGINEER or any of its officers, agents, representatives, or employees for the completeness of, or any inaccuracies contained in, the CONTRACTOR'S SWPPP.

- The CONTRACTOR shall monitor and inspect the storm water pollution control facilities specified in the SWPPP and report the operation condition of each facility at the time of inspection. Storm water pollution control facilities shall be inspected by the CONTRACTOR once every working day during the wet weather period and on the calendar day before each forecasted storm event and on the calendar day following each storm event. The CONTRACTOR shall also monitor and inspect sediment basins with less than design capacity due to sediment accumulation, and shall remove accumulated sediment three (3) days in advance of any forecasted storm event. The CONTRACTOR shall submit logs showing the results of the inspections required herein to the ENGINEER during the month in which the inspections occur.

- The CONTRACTOR shall immediately repair or replace any storm water pollution control facilities that are not operating properly or are not providing adequate treatment to assure non-degradation of any receiving waters. The CONTRACTOR shall notify the ENGINEER and the RWQCB of any pollutant discharge or violations of these specifications within eighteen (18) hours of the occurrence.

The CONTRACTOR'S attention is also directed to the following requirements:

- The CONTRACTOR shall clean and maintain the construction sites free from excess construction materials, spoils, and dust daily during construction operations. The CONTRACTOR shall also prevent spillage of soil on haul routes and immediately remove any spilled materials. Near creeks or drainage ways the CONTRACTOR will be required to keep all equipment and materials out of the drainage path during construction.

- Excavated material not acceptable for use as backfill shall be removed and disposed of off-site at an approved location by the CONTRACTOR.

- Water used for hydrostatic testing may be discharged provided that the water has been tested and determined to meet water quality requirements in accordance with the RWQCB, the SWPPP, the General Permit, and in accordance with NPDES. Chlorinated water to be discharged shall be neutralized by chemical treatment and disposed of in accordance with the specified requirements.

- The CONTRACTOR shall use sediment barriers near rivers, creeks, and drainage swales to prevent sediment, construction materials, or fluid spills from construction equipment from entering the rivers, creeks, drainage swales, or drainage canals. If the pollutants or sediments from the construction site enter the rivers, creeks, drainage swales, or drainage canals, the pollutants and sediments shall be removed immediately and the CONTRACTOR shall report such occurrence in accordance with the permits.

- Mechanical and electrical equipment, pipe, valves, and embankment materials may be loaded, unloaded, and stored at the site with enclosures or flow barriers which shall be erected by the CONTRACTOR. The barriers shall surround the temporary storage areas to prevent storm water flows from entering the areas, and to control sediments and other pollutants discharge in storm water flows from leaving the temporary storage areas.

- If storm water flows enter the temporary storage areas and contacts construction materials, the ENGINEER shall determine if the storm water has become contaminated or may be allowed to be discharged to the storm drains or steam channels. For the purposes of this paragraph, contamination is defined as any degradation of the storm water quality due to contact with construction materials including but not limited to excavated materials and petroleum products. If the storm water flows have become contaminated due to contact with the construction materials, the CONTRACTOR shall provide for disposal of the storm water flows at no additional costs to the DISTRICT in a manner acceptable to the DISTRICT and the RWQCB.

- If spills occur in the temporary storage areas or at the site, the CONTRACTOR shall immediately notify the ENGINEER and, at the CONTRACTOR'S expense, contain and clean up the spill to prevent spilled material from entering storm drains, creeks, stream channels, drainage canals, or groundwater, or from being absorbed by the underlying pavement or soil.

- The CONTRACTOR shall immediately clean up spills of fuel, hydraulic fluid, or oil from construction equipment or vehicles, including spills on the construction site, and at the CONTRACTOR'S yard. The CONTRACTOR shall include containment areas for these materials, and provide for disposal of these materials, their containers, and pavement or soil that may be contaminated with fuel, hydraulic fluid, or oil in accordance with all applicable laws and regulations.

- Backfill material stored at the construction site shall be protected from storm water flows and wind erosion with solid barriers. If a potential for erosion due to storm water or wind exists, covers shall be provided. The purpose of these barriers and covers shall be to prevent the backfill material from flowing into water courses.

- Water from equipment washing shall not be discharged to creeks, drainage swales, or drainage canals or allowed to percolate into the ground. The CONTRACTOR shall not sweep, grade, or flush surplus materials, rubbish or debris into creeks, drainage swales, or drainage canals.

- Fueling, maintenance, and parking of vehicles and vehicle maintenance equipment are prohibited within 0.20 mile of any river, creek, drainage canal, drainage swale, or stream.

1.2.6 Regional Water Quality Control Board, 401 Water Quality Certification, Number 34006WQ19

The DISTRICT applied for and obtained a Clean Water Act, Section 401 Technically Conditioned Water Quality Certification for the pipeline crossing and related work at Lake Nacimiento, Nacimiento River, Dry Creek, San Marcos Creek, Salinas River, Santa Margarita Creek, Stenner Creek and un-named ephemeral drainages 309.00 Some Hydrologic Unit. A copy of the certification is included in Appendix C. CONTRACTOR shall comply with all requirements and general and special provisions. CONTRACTOR'S attention is directed to the notification and scheduling requirements, and pollution prevention measures. Compliance will be monitored by the RWQCB.

1.2.7 State of California, Department of Fish & Game, Streambed Alteration Agreement(s) Nos. 1600-2006-0246-3 and 1600-2006-0247-3

The DISTRICT has applied for and obtained several Section 1602 Lake and Streambed Alteration Agreements for construction of the pipeline and related work under this contract. Copies of the permits are included in Appendix C. CONTRACTOR shall comply with all requirements and terms and conditions.

CONTRACTOR'S attention is directed to Terms and Conditions, Article 1, addressing scheduling constraints, and Article 2, requiring that all groundwater discharged during drilling shall be maintained onsite and not be allowed to enter the respective waterway. Compliance will be monitored by the DISTRICT and CDFG.

1.2.8 U.S. Army Corps of Engineers, Section 404 Nationwide Permit

The DISTRICT has applied for and obtained a Section 404 Nationwide Permit for the Project. A copy of the permit is included in Appendix C. CONTRACTOR shall comply with all requirements and terms and conditions.

In particular, the permit requires that the CONTRACTOR perform mitigation as specified in the MMCP (November 2006, latest version). The requirements for the MMCP are specified in Section 01061, "Environmental Mitigation Requirements."

1.2.9 State of California Department of Industrial Relations Occupational Safety and Health Administration (Cal/OSHA) – Construction Activities Permit

The CONTRACTOR shall obtain a Construction Activity Permit from Cal/OSHA for excavations and pipeline trenches greater than five (5) feet deep into which construction personnel will enter. A sample permit application form is included in Appendix C. To obtain the permit, the CONTRACTOR shall schedule and attend a safety permit conference with the nearest Cal/OSHA District office. At the conference, the CONTRACTOR shall provide enough project details that Cal/OSHA can make a determination that the work will be performed safely. For more information, refer to http://www.dir.ca.gov/dosh/Permits.html

The CONTRACTOR shall provide the following to Cal/OSHA, with a copy to ENGINEER:

- Permit Application Form
- Activity Notification Form
- Copy of CONTRACTOR'S IIP Program
- Copy of CONTRACTOR'S Code of Safe Practices

1.2.10 Procedures for Crossing Conoco Phillips Petroleum Pipelines

Appendix C includes written procedures provided by Conoco Phillips in connection with an encroachment of its right-of-way. CONTRACTOR shall comply with all requirements and terms and conditions. In particular, the procedures specified in MPR-2702, "Foreign Pipeline and Utility

Crossings," require that the CONTRACTOR perform certain activities in advance of and during pipeline construction, including but not limited to, the following:

- Inspect the crossing site(s) with a representative of Conoco Phillips in order to determine and/or confirm the exact location of the proposed crossing, the depth of Conoco Phillips petroleum pipeline(s), the depth of the NWP Pipeline being installed, and the material of which the NWP Pipeline is constructed.
- Review the Pipeline / Utility Crossing Restrictions that are provided on the back of Form 15040 with the Conoco Phillips representative.
- Locate the petroleum pipelines and verify their depths, and temporarily mark the petroleum pipeline(s) at the crossing site.
- For crossing work performed by bore and jack construction, proceed as shown on the Drawings and as specified in Section 02313. Determine the distance between the NWP Pipeline (i.e., steel casing with carrier pipe) and petroleum pipeline(s) to verify that the minimum allowable clearance exists between the two; make adjustment if needed to achieve minimum clearances required.
- For crossing work performed by open cut construction, if shown, ensure that the locations and paths of the petroleum pipeline(s) remain adequately marked throughout the excavation process and that the excavating equipment operator is able to see the alignment of the petroleum pipeline(s) at all times; re-mark the pipeline(s) as necessary. Exercise extreme care when initially uncovering the petroleum pipeline(s) and monitor the depth of the pipelines utilizing a probe or other alternative means; keep the excavating equipment operator advised of the depth of the pipeline(s). Cease mechanical excavation once the earth has been removed to within five (5) feet of the pipeline(s), and manually remove the earth above and below the pipeline(s) using shovels. Repeat the process of mechanical and manual excavation untiI the desired length of the pipeline(s) is exposed. Measure the distance between the NWP Pipeline and petroleum pipeline(s) to verify that the minimum allowable clearance exists between the two; make adjustment if needed to achieve clearances required. Inspect the excavation and provide temporary pipeline support for the exposed pipeline(s). After pipeline placement, backfill the area carefully to achieve full support of the existing pipelines.

End of Section

Section 01061

ENVIRONMENTAL MITIGATION REQUIREMENTS

1. GENERAL

This Section 01061 identifies environmental mitigation measures to be performed by the CONTRACTOR for compliance with the DISTRICT'S project Mitigation, Monitoring, and Compensation Plan (MMCP) including plans prepared as part of that MMCP. A copy of the MMCP prepared for the DISTRICT by Environmental Science Associates, November 2006, is included in Appendix D.

The MMCP describes mitigation and monitoring actions for direct and indirect impacts to jurisdictional waters and biological resources from the Project. Project activities will result in disturbance to verified jurisdictional waters of the U.S. and the State of California, and biological resources, which must be considered by the U.S. Army Corps of Engineers (Corps) under Section 404 of the Clean Water Act (CWA) and Section 7 of the federal Endangered Species Act (ESA). Other jurisdictional entities include the Central Coast Regional Water Quality Control Board (CCRWQCB) under Section 401 of the CWA, California Department of Fish and Game (CDFG) under Section 1600 of California Fish and Game Code for a Lake and Streambed Alteration Agreement (SAA), and the U.S. Fish and Wildlife Service (USFWS), also under Section 7 of the federal ESA. The MMCP includes measures to restore disturbed wetland areas in accordance with authorizations received by the resource agencies. Additionally, it includes other measures to protect non-wetland resources and describes a monitoring program to ensure that all Project environmental commitments are met, and a compensation program to offset permanent losses to endangered species habitat.

Compliance with environmental mitigation requirements resulting from CEQA/NEPA documentation, permits, agreements and approvals provided by various agencies, public and private, is required for execution of the WORK under this Contract. The CONTRACTOR shall include in its overall bid the cost of complying with all environmental mitigation requirements.

The CONTRACTOR shall be responsible for conducting all operations in such a way as to minimize environmental impacts and comply with all laws, regulations, permits, plans, and agreements applicable to the WORK.

Easement requirements and permit requirements are covered in other sections.

The intent of this section is to provide BIDDERS with a general description of the environmental mitigation requirements for the WORK under this Contract; copies of the applicable permits or mitigation requirements are provided to the CONTRACTOR in Appendix C and D.

Actual or probable conditions of required permits and mitigation measures are provided in the Summary of Permits and Mitigation Requirements to promote the CONTRACTOR'S awareness of the conditions and requirements of the issuing authority, public or private. In case of conflict between these summaries and the actual permits and approvals, the conditions set forth in the permits and approvals take precedence over the summaries given in Summary of Permits and Mitigation Requirements.

Information provided in this section does not relieve the CONTRACTOR of responsibility to determine and verify the extent of the permits and approvals required to complete the Work under this Contract, or the CONTRACTOR of its responsibility to obtain other permits and approvals which are the responsibility of the CONTRACTOR and not included in this Section. The CONTRACTOR'S attention is directed to additional requirements specified in the General Conditions.

In case of conflict between the permits/approvals and the Drawings and Specifications, the more stringent requirement shall take precedence.

The DISTRICT will provide and pay for the services of the Environmental Monitors, who shall function as facilitators and record-keepers. They shall also have the authority, if so delegated by the DISTRICT, to halt construction operations for non-compliance with the requirements specified herein. Environmental Monitors are responsible for instructing the CONTRACTOR'S work crews about compliance with biological mitigation measures. Environmental Monitors will also participate in the administration of the environmental education sessions to construction personnel.

In addition, the CONTRACTOR shall provide an experienced Environmental Manager/Coordinator (EMC). The Environmental Manager/Coordinator shall oversee all aspects of the CONTRACTOR'S monitoring program, which need to be implemented by persons working in the field. The EMC shall interact directly with the Environmental Monitors to stop or modify the conduct of the Project when such actions are recommended by the Environmental Monitors and approved by the DISTRICT. The DISTRICT may delegate to the Environmental Monitors the authority to stop construction on an emergency basis without such coordination.

The DISTRICT will pay for the cost of any environmental / biological / archaeological pre-construction surveys that are specified in the Contract

Documents, which will be performed by representatives of the DISTRICT and/or Environmental Monitor.

The DISTRICT, working through its Environmental Monitors, may require that the CONTRACTOR remove construction personnel that cause flagrant and/or repeated (for example, more than once in a week or four times in any 4-week period) violations of the mitigation requirements. The DISTRICT will monitor CONTRACTOR compliance with the environmental mitigation specifications and record compliance, or non-compliance on Environmental Quality Control Report forms. Copies of these forms will be given to the CONTRACTOR on a regular basis as appropriate for the work being performed. For serious non-compliance incidents, the DISTRICT shall give immediate notification (within 24 hours) of the incident to the CONTRACTOR. The DISTRICT may require remedial actions of the CONTACTOR including, but not limited to, additional education of CONTACTOR personnel (see subsection 1.3 below).

Many of the environmental mitigation measures for the WORK are based on conditions attached to environmental permits and agreements obtained by the DISTRICT. Violation of these conditions can result in monetary fines, requirements for restoration of or compensation for damage, or stoppage of work. The CONTRACTOR shall be responsible to confine activity within the pipeline construction and staging areas (hereinafter call the ROW) as shown on the Drawings, access roads or easements, and established facility sites. Approval shall be obtained from the DISTRICT before any work can be conducted outside these designated areas. The CONTRACTOR shall be held fully responsible for any damage, resulting from CONTRACTOR operations, to natural vegetation, wildlife, cultural resources, and any other environmental resources located either (a) outside the work areas permitted in the Contract Documents or (b) inside the work areas but clearly marked by the DISTRICT to indicate that avoidance of that resource is required (referred to as Exclusion Areas). Exclusion areas are not to be disturbed and are not part of the ROW. The CONTRACTOR shall assume full responsibility for all costs associated with restoration, revegetation, and monitoring to endure successful restoration and for all other measures necessary to repair or compensate for any such damage incurred. Damages for unallowed disturbances to natural vegetation, wildlife, or cultural resources shall be determined based on the DISTRICT'S actual costs to mitigate and administer such mitigation. Administration costs will be approximately 25 percent of mitigation cost.

Private landowners may request the CONTRACTOR to perform maintenance work as compensation for additional work and/or equipment storage areas beyond the DISTRICT'S Right-of-Way. Such work may require federal, state, or local permits and could have environmental impacts that the CONTRACTOR may be responsible for. No work shall be permitted outside the designated

project boundaries without approval of the DISTRICT and all appropriate regulatory agencies. This includes disposal of excess spoils material.

The CONTRACTOR shall not sell the wood from trees cut or pruned during construction. Limbs cut from trees shall not be further cut into pieces less than 10 feet in length nor shall small branches be removed from the limbs unless otherwise directed by the DISTRICT. The cut wood shall be stored within the edge of the ROW with minimal stacking to provide wildlife habitat or to be used for revegetation as protection for oak seedlings.

2. MITIGATION MONITORING PLAN

The Environmental Mitigation Plan Drawings reference Mitigation Measures that shall be performed by the CONTRACTOR as a part of the WORK. The various Mitigation Measures referenced on the Environmental Mitigation Plan Drawings are detailed in the project Mitigation Monitoring Plan (MMP). A copy of the MMP is included in Appendix D.

The Mitigation Measure references listed in the Environmental Mitigation Plan Drawings refer to specific and detailed requirements contained in the MMP. The Mitigation Measures and corresponding requirements are listed by the following categories and corresponding mitigation measure reference:

Mitigation Measure Category	**Mitigation Measure Reference**
Hydrology and Water Quality	WQ- #
Geology, Seismicity, and Soils	GS- #
Drainage, Erosion, and Sedimentation	DE- #
Air Quality	AQ- #
Noise	N- #
Hazards and Hazardous Materials	HM- #
Biology Resources	BR- #
Cultural and Paleontology Resources	CR- #
Utilities and Public Services	UP- #
Transportation/Circulation	T- #
Visual and Aesthetic Resources	VR- #
Agricultural Resources	AG- #
Recreational Resources	REC- #

The CONTRACTOR is responsible to familiarize itself with the mitigation measures listed in the MMP and is responsible to conduct the WORK in conformance with the MMP requirements.

The CONTRACTOR shall be aware that some environmental mitigations result in construction windows (periods during which construction is permitted), restricted start-up of work pending removal of sensitive animals, move-arounds, and other actions. Construction windows are shown on the Environmental Mitigation Plan Drawings. The beginning and end dates for these windows are dependent on factors such as rainfall and bird nesting that can vary from year to year. Thus, the dates for commencement of construction windows may be adjusted by the DISTRICT according to specific conditions at the time of construction and could allow for larger windows. In no event will the construction window be shorter than shown on the Environmental Mitigation Plan Drawings. If the actual conditions permit longer construction windows than those indicated on the Environmental Mitigation Plan Drawings, the additional days during which the CONTRACTOR is able to work shall serve to offset any days on the critical path lost due to differing site conditions, unforeseeable environmental constraints, DISTRICT-caused delays, or other compensable delays.

The CONTRACTOR shall be aware that some environmental mitigations detailed in the MMP are applicable to all of the WORK but have not been noted on the Environmental Mitigation Plan Drawings. The CONTRACTOR shall be aware that the environmental mitigations listed in the table below apply to all of the WORK and apply to all Environmental Mitigation Plan Drawings. The descriptions of the environmental mitigations in the table below are shortened versions of the Mitigation Measures detailed in the MMP. The CONTRACTOR is responsible to conduct the WORK in conformance with the MMP requirements as detailed in Appendix D.

Mitigation Measure Reference	**Description of Environmental Mitigation**
WQ-1	Refueling locations are limited to areas along the construction corridor that have been approved by the Environmental Monitor.
DE-1	Construction activities shall conform to requirements stated in the Erosion Control Plan.
DE-2	Construction activities shall conform to requirements for diverting stream flows.
DE-4	Implement emergency construction site securing procedures as applicable.

Mitigation Measure Reference	Description of Environmental Mitigation
DE-5	Equipment access and construction within drainages should be conducted from the banks rather than within the drainage.
DE-6	Materials or spoils shall not be stored within the channel or overbanks.
DE-7	Obtain weather updates daily or more frequently if inclement conditions are threatening.
DE-8	Erosion and sedimentation impacts shall be mitigated by employing standard erosion control procedures as detailed in the MMP and the Erosion Control Plan.
DE-9	Stream-bed construction activity shall conform to the requirements detailed in the MMP.
DE-11	Store excavated soil and stockpiles of imported fill outside of channels as detailed in the MMP.
DE-19	Areas disturbed during construction should be revegetated as soon as practical, prior to the beginning of the rainy season.
AQ-1	Implement SLOAPCD standard dust reduction measures as detailed in the MMP.
AQ-2	Implement construction activity management plan as detailed in the MMP.
AQ-3	Implement NOX & ROC reduction measures to the maximum extent feasible as detailed in the MMP.
AQ-4	Best Available Control Technology shall be used to mitigate combustion emissions from heavy-duty construction equipment in accordance with the MMP.
N-2	Construction activities shall be limited to 7am to 7pm weekdays and 8am and 5pm on Saturdays except as otherwise detailed in the MMP.
N-4	Maintain proper mufflers on all internal combustion and vehicle engines to reduce noise to the maximum extent feasible.
HM-3	In event of an accidental release of hazardous materials (including fuel spills), the mitigations and actions detailed in the Hazardous Materials Contingency Plan shall be followed.
BR-4	Within sensitive resource zones, construction equipment work shall be conducted in accordance with the MMP.

Mitigation Measure Reference	Description of Environmental Mitigation
CR-11	Cease construction and notify the project archaeologist if unknown archaeological resources are discovered.
UP-1	Use non-potable water sources (maximally as feasible) for dust mitigation and other non-drinking purposes.
T-13	Restore all roads disturbed by construction activities as detailed in the MMP.

3. SUBMITTALS

The MMP contains numerous environmental work plans (WQ-1, GS-3, DE-1, AQ-4, HM-2, T-2, AG-2 and others) that are to be submitted by the CONTRACTOR. The CONTRACTOR shall submit the plans required by the MMP within 30 days of award of contract. All of the required plans must be approved by the DISTRICT and appropriate regulatory agencies prior to the beginning of any construction activity.

Each plan shall describe the methods proposed for compliance with the environmental mitigations as well as alternative methods, where feasible. Required components of the plans, as appropriate, shall included by not be limited to:

1. Schedule for implementing plan
2. Types of equipment to be used
3. Installation and maintenance methods
4. Decommissioning (for temporary measures)
5. Enforcement/verification methods (for self monitoring)
6. Format and schedule for reporting to the DISTRICT
7. Problem solving methods
8. Feasibility studies
9. Individuals responsible for coordination and implementation of plan

4. CONTRACTOR ENVIRONMENTAL EDUCATION

As indicated above, the CONTRACTOR shall provide an experienced Environmental Manager/Coordinator (EMC). The EMC shall ensure that all workers requiring environmental education are identified to the DISTRICT and

scheduled for environmental education and that a facility for such education is provided by the CONTRACTOR at an approved location near the WORK. The EMC shall participate in education meetings, identify workers that need escort, and provide contractor information that needs to be presented at these meetings, including, but not limited to, environmental mitigation measures, fire suppression, hazardous materials, safety requirements, etc. All construction personnel working on the site shall attend an Environmental Education Program course provided by the DISTRICT to become familiar with the sensitive environmental resources and regulations for their protection. The education program will take approximately 2 hours and must be completed within 5 days of reporting to the job site. Persons taking the education course shall sign a statement verifying that they have read and understand to project environmental requirements and that shall follow the procedures. Hardhat decals shall be issued to each person completing the course and shall be worn at all times on the site. The DISTRICT shall keep a log of all persons completing the course. The DISTRICT may elect to conduct additional mandatory education and tailgate sessions for CONTRACTOR'S workers as necessary.

All CONTRACTOR management personnel shall attend a one-day or less education meeting with key DISTRICT management personnel and environmental staff. The purpose of the meeting will be to provide additional education and coordinate implementation of project environmental mitigation measures with the CONTRACTOR'S staff.

The cost for educating CONTRACTOR'S workers as described above shall be included in the Bid Price, excluding the cost of DISTRICT'S and ENGINEER'S staff time which will be paid for by the DISTRICT.

5. ACCESS

Persons entering sensitive resource areas infrequently or for brief periods, such as to deliver materials or supplies, shall be advised of environmental requirements and be escorted during their visit by someone who has completed the environmental education program described in Section 1.3. The escort shall be responsible for the actions of the visitor and for the consequences of any violations of environmental requirements or permits.

Project-related vehicle traffic, construction activities, and equipment storage shall be restricted to established roads (as approved by the DISTRICT), project access roads, the construction ROW, and staging areas for material and equipment storage and vehicle parking. No other access routes shall be used witout prior approval of the DISTRICT.

Project staging areas shown on the drawings will be marked with flagging by the DISTRICT and shall be fenced (using orange plastic construction fencing or other materials as approved by DISTRICT) and maintained by the CONTRACTOR.

6. DUST CONTROL

The CONTRACTOR shall comply with the requirements of Mitigation Measure AQ-1 as detailed in the MMP.

7. EROSION CONTROL

The CONTRACTOR shall comply with the requirements of all Mitigation Measures detailed in Mitigation Measure Category “Drainage, Erosion, and Sedimentation” in the MMP.

8. TOPSOIL SALVAGE AND HANDLING

The CONTACTOR’S attention is directed to Mitigation Measures AG-4, AG-7, BR-6, BR-11, BR-12, BR-13, BR-14, BR-15, and others detailed in the MMP.

The CONTRACTOR shall remove, store, and replace topsoil from all graded or excavated areas that support or could support vegetation. The CONTRACTOR shall submit shop drawings to the DISTRICT showing the methods for trenching and soil handling within 30 days of contract award. Both plan and cross section diagrams showing equipment work areas, stock piles, and pipe and equipment laydown shall be included in the shop drawings. Submittals shall include shop drawings for each area where construction methods, including topsoil handling, change. For example, construction methods may differ for locations where the construction corridor is in a grassland area or an agricultural area, is on steep hillside areas, has a constrained road right-of-way, or contains a creek/drainage crossing. The type of construction method shall be submitted for each portion of the WORK. Applicable station numbers for each method shall be provided on the shop drawings.

Salvaged topsoil shall always be segregated and stored separately in such a manner that the topsoil is not damaged or mixed with subsoil. All spoil must be stored within the limits of the ROW unless otherwise approved by the DISTRICT. Topsoil storage areas shall be protected from loss through wind and/or erosion, especially during the rainy season.

All areas shall be restored to within 4 inches of the original contours except where specified otherwise on the Drawings or where directed otherwise by the DISTRICT. Excess backfill material from below the topsoil layer shall not be spread over any areas of existing topsoil in the ROW. This material shall be placed within the area where the topsoil has been removed and then covered

with the topsoil, or it can be disposed of off site in accordance with all local regulations and by approval of the DISTRICT to minimize environmental damage.

Topsoil shall not be compacted during or after placement over the trench and any graded areas, except where necessary to prevent erosion.

Project topsoil salvage and handling methods shall be as follows by area:

1. In areas that are identified on the Drawings as disturbed and/or are covered with pavement or gravel, no special topsoil handling is required.
2. In all other grassland including other categories that have some vegetation present, the available topsoil up to 18 inches of soil, or as otherwise directed by the DISTRICT, shall be excavated first and saved separately from the remainder of the excavated materials. In some areas, the topsoil layer may be less than 18 inches thick. When bedrock is present within this layer, only the soil above bedrock needs to be saved. The topsoil shall be replaced on top of the trench fill after compaction so that a layer the same thickness as that removed covers the fill and the grade is approximately the same as before construction. Compaction of topsoil shall be to the minimum level that will prevent wind or water erosion. This is particularly important on slopes of greater than 10 percent. Any over-compacted areas shall be loosened with a harrow.

9. MATERIAL AND EQUIPMENT STORAGE

All open construction pipes, culverts, of similar structures stored in stockpile areas or in the ROW shall be inspected for sensitive animals (such as badger, kit fox, etc.) before the pipe is buried, capped, or otherwise used or moved, except as directed by the DISTRICT. All in-place pipeline segments shall be capped daily until buried to prevent entry of animals.

10. PETS, CAMPING, FIREARMS, AND USE OF AREA

No camping shall be allowed on the ROW at any construction site. Only authorized off site, established camping areas may used by construction personnel.

No construction personnel pets shall be allowed on the ROW, staging areas, access roads, or any other construction sites.

Possession of firearms shall be prohibited in the ROW or any construction site. This includes firearms displayed in gun racks.

Construction workers and other project personnel, equipment, materials, spoil, and all activities shall stay within the ROW or facility site. Exceptions that will not cause environmental impacts may be granted only after permission by the property owner and only after approval by the DISTRICT.

11. TRASH CONTROL

All food waste shall be placed in closed containers and disposed of at an authorized disposal site as necessary to avoid attracting animals. The ROW and other construction areas shall be policed daily by the CONTACTOR, and any garbage shall be collected and removed by the end of the day.

The CONTRACTOR shall keep the ROW and other areas used by the CONTRACTOR in a neat and clean condition, and free from any accumulation of rubbish. The CONTACTOR shall dispose of all rubbish and waste materials of any nature (including cigarette butts) occurring at the construction site, and shall establish regular intervals of collection and disposal of such materials and waste. The CONTRACTOR shall also keep its haul roads free from dirt, rubbish, and unnecessary obstruction resulting from its operations. Disposal of all rubbish and surplus materials shall be off the construction site in accordance with local codes and ordinances governing locations and methods of disposal, and in conformance with all applicable safety laws.

12. HAZARDOUS MATERIALS

The CONTRACTOR shall comply with the requirements of all Mitigation Measures detailed in Mitigation Measure Category “Hazards and Hazardous Materials” in the MMP.

13. FIRE CONTROL

The CONTRACTOR shall prepare a Fire Protection Plan that meets San Luis Obispo County Fire Department (CFD) requirements and is approved, in writing, by CFD. This plan shall then be submitted to the DISTRICT for approval. The plan shall address the items discussed in the MMP and the MMCP. The CONTRACTOR shall be responsible for implementing the approved plan. The plan shall also include a list of CONTRACTOR contacts and local fire protection agency contacts including radio calls, frequency, and emergency phone numbers.

The CONTRACTOR must acquire permits for welding, grinding, cutting, and brazing from the San Luis Obispo County Fire Department. Compliance with the requirements of the permits is mandatory.

14. COLLECTION AND HARASSMENT OF SPECIES

The CONTRACTOR'S attention is directed to the federal Endangered Species Act (16 USC 1531, as amended), the California Endangered Species Act (California Fish and Game Code 2050-2098, as amended), and the California Native Plant Protection Act (California Fish and Game Code 1900-1913, as amended) , which provide protection of threatened, endangered, and rare species of plants and animals. The CONTRACTOR shall comply with these and any other applicable federal and state laws that provide protection to plants and animals and shall comply with all provisions of the MMP and the MMCP.

The CONTRACTOR shall not intentionally "take" (meaning harm, harass, pursue, hunt, shoot, wound, trap, kill, capture, or collect) any species that are listed as threatened, endangered, or special status (list to be provided by DISTRICT). Protection extends to animals, dead or alive, and all their body parts. The exceptions are those incidentally taken during normal clearing of the ROW in conformance with the above acts and all permits or agreements obtained for this project under these acts. In addition, the CONTRACTOR shall not intentionally "take" any other species of plant or wildlife at or around the construction site. This includes all snakes, lizards, frogs, turtles, birds, and mammals.

In the event that any threatened or endangered species, or other special status wildlife, are found in or near the project where they could be affected by construction activities, the CONTRACTOR shall notify the DISTICT and proceed with construction only after the DISTRICT has removed these species (or taken other appropriate protective measures). The CONTRACTOR must immediately report to the DISTRICT any accidental "takings," as defined above, of these animals or plants. The protocol for dealing with the listed and candidate species has been established in documents available from the DISTRICT.

15. OAK TREE PROTECTION

In reference to BR-10, subparagraph f), for purposes of CONTRACTOR'S activities, "construction area" shall mean the permanent easement (P/E) or public right-of-way (R/W) as shown on the Drawings. The temporary easement (T/E) boundary shown on the Drawings provides expanded space outside the P/E or R/W that the CONTRACTOR can use to support the construction activities, but tree removal within the area between the P/E and T/E or the R/W and T/E is not allowed unless indicated on the Drawings. The pipeline alignment shown on the Drawings and within the R/W has been routed so that no trees within the R/W would need to be removed. The following shall apply to oak tree protection.

15.1 Submittal. The CONTRACTOR'S plan, in report format, that includes an inventory of trees, condition of the trees, and recommended specific tree removal and specific tree pruning and trimming for all trees greater than 4-inches in

diameter within the P/E, T/E and R/W, shall be prepared and submitted to the ENGINEER in accordance with Section 01300 prior to the construction activities. The plan shall be prepared cooperatively by the CONTRACTOR and a California licensed and certified arborist. The credentials of the arborist shall be submitted to the ENGINEER for approval prior to the preparation of the report. The plan shall detail the following:

- Temporary tree protection fencing details.
- Ribbon and placard details identifying trees for removal.
- Tree branch and root pruning and trimming methods.
- Report all species of trees within the P/E, T/E, and R/W along the alignment that are 4-inches and larger in diameter at breast height.
- Report the condition of the tree.
- Identify the specific trees considered to be removed and those that are pruned or trimmed and how and where they will be pruned and trimmed.

15.2 Pruning, Trimming, and Cutting of Branches and Roots. If the drip line of the tree falls inside or near the P/E or R/W and the tree trunk is either outside the P/E or R/W, or is inside the P/E or R/W and significantly away from the trenching activities and does not pose a safety problem with construction, then the tree shall not be removed. The CONTRACTOR shall erect and maintain temporary fencing at the drip line of the tree within the P/E, T/E, and that part of the R/W not in the public travel way, and protect it in-place. Temporary fencing shall be removed by the CONTRACTOR at the conclusion of construction activities for each reach of the WORK and during the site restoration activities.

The tree branches within the P/E that are potentially exposed to significant damage, by the construction activities and/or are a safety problem with the trench and pipeline construction activities, can be trimmed away by a California licensed and certified arborist. The CONTRACTOR'S submitted plan shall detail the pruning and trimming plan for each tree.

Care shall be exercised by the CONTRACTOR to prevent undue damage to the root system of the tree. The CONTRACTOR shall seek the advice and assistance of the California licensed and certified arborist in excavation near and through the root zone of the tree to protect the roots from damage.

15.3 Tree Removal. No trees within the public R/W shall be removed. If the CONTRACTOR deems this requirement as posing a safety concern to the performance of that specific element of WORK at or near a specific tree, he may submit written notice to the ENGINEER at least thirty (30) Days in advance of needing to pass the specific tree with his proposal to remove the tree including

efforts to mitigate or altering the WORK in this specific area to avoid tree removal.

If the tree trunk falls inside of the P/E, and if the tree trunk is in-line with or extremely near the pipeline trench and the tree trunk is deemed too close for safe excavation of the trench, then the tree shall be cleared to make way for the trench construction activity. All trees that shall be removed shall be clearly marked with ribbon and placards to make it extremely simple and easy to identify in the field any trees subject to be removed. The CONTRACTOR shall provide in the submitted plan any all trees, including non-oak trees, which he believes shall be completely removed.

15.4 Tree Protection. The CONTRACTOR shall erect temporary fencing at the drip lines of all trees, including non-oak trees, within the boundaries of the P/E, T/E, and/or R/W, with the exception of those trees within the P/E that are determined to be removed in order to safely perform the WORK.

15.5 Tree Removal Penalty. The goal of this Project is to minimize the number of all oak tree species that are removed. The requirements specified herein are specific to accomplish these goals. Any tree, including non-oak trees, removed by the CONTRACTOR that has not been previously approved by the ENGINEER shall be assessed a penalty of $1000 per diameter inch. For example, if a tree having a basal diameter of 60-inches was specified to remain but instead was removed by the CONTRACTOR, then a penalty of $60,000 would be assessed on the CONTRACTOR'S next payment application.

15.6 NWP Tree Report. The surveyed trunk locations for oak trees with trunk size 12" and larger are summarized in Appendix F.

16. RIPARIAN HABITAT PROTECTION

The CONTRACTOR shall comply with the requirements of Mitigation Measures BR-17, BR-18, BR-19, BR-20, and others as detailed in the MMP.

17. COLLECTION OF CULTURAL ARTIFACTS

The CONTRACTOR shall comply with the requirements of all Mitigation Measures detailed in Mitigation Measure Category "Cultural and Paleontology Resources" in the MMP.

18. RARE PLANTS

The Rare Plant Survey Report, October 2006, details the results of rare plant surveys conducted April through June of 2005 by ESA botanists. The survey covered the 45-mile long route for the NWP pipeline. The route includes portions

of Camp Roberts and a portion of the Stenner Creek watershed, a botanically diverse area near the City of San Luis Obispo.

Avoidance measures stipulated by the MMP shall be implemented and include, but are not limited to, the use of existing roads to the extent feasible, the depiction of sensitive plant populations on construction maps, field flagging of sensitive plant populations, and worker education on the resources to be avoided.

Where avoidance may not always be feasible, such as in the overland portions of the pipeline in Camp Roberts as well as portions of the upper Stenner Creek watershed, the mitigation measures stipulated in the MMP shall be implemented in order to minimize impacts to the rare plant populations documented in the report. These measures include, but are not limited to, preparation of a mitigation plan for salvage, propagation, and reintroduction of rare species into appropriate habitat, the narrowing of the construction corridor in order to avoid or minimize impacts, and stockpiling of topsoil during construction with post-construction replacement in situ.

19. VEGETATION REPLACEMENT/RESTORATION PLAN

The Vegetation Replacement/Restoration Plan, November 2006, identifies protection measures to minimize the area of permanent removal of rare plants consistent with Mitigation Measures BR-3, BR-4, and BR-5, and BR-11 through BR-15. The Plan provides for establishing an on-site protection zone consisting of the occupied habitat as determined and marked during the pre-construction survey, and a buffer area. The buffer area is intended to prevent impacts to plants at the outer margin of the population. The buffer area shall be a maximum of 25-feet wide, measured from the outer margin of occupied habitat; the buffer area width can be reduced in locations where Project activities are unlikely to occur within the vicinity of occupied habitat. The protection zone boundary shall be marked in the field with temporary fencing or another material that is durable, clearly visible to construction personnel and the Environmental Monitor, and will not adversely affect livestock or wildlife. Any marking material used shall be approved by the landowner, as appropriate. Temporary fencing shall be installed by construction personnel with the assistance of the Environmental Monitor.

20. CLEANUP

The CONTRACTOR shall clean up the ROW and all temporary use areas (staging areas and access roads) promptly after construction is complete. This includes removal of stakes, lath, flagging, barrels, cans, drums, temporary fencing, accidental spills, hazardous materials, contaminated soils, and any other trash, debris, refuse, or wastes generated by of during construction activities.

The CONTRACTOR shall remove all temporary erosion control and water diversion structures that are no longer needed.

21. INDEX OF MITIGATION REQUIREMENTS AND PERMIT CONDITIONS.

Based on the information contained in the MMP and the MMCP, the mitigation requirements and permit conditions listed above are included herein. Note that other regulatory permit requirements (e.g. due to CA Fish & Game Streambed Alteration Agreement) are covered in Section 01060.

End of Section

Section 01090

REFERENCE STANDARDS

1. GENERAL. Whenever in these specifications references are made to published specifications, codes, standards, or other requirements, it shall be understood that wherever no date is specified, only the latest specifications, standards, or requirements of the respective issuing agencies, which have been published as of the date that the work is advertised for bids, shall apply including all addenda, modifications, amendments, or other lawful changes thereto; except to the extent that said standards or requirements may be in conflict with applicable laws, ordinances, or governing codes. No requirements set forth herein or shown on the Drawings shall be waived because of any provision of, or omission from, said standards or requirements.

2. SPECIALISTS, ASSIGNMENTS: In certain instances, specification text requires (or implies) that specific work is to be assigned to specialists or expert entities, who must be engaged for the performance of that work. Such assignments shall be recognized as special requirements over which the CONTRACTOR has no choice or option. These requirements shall not be interpreted so as to conflict with the enforcement of building codes and similar regulations governing the WORK; also they are not intended to interfere with local union jurisdiction settlements and similar conventions. Such assignments are intended to establish which party or entity involved in a specific unit of work is recognized as "expert" for the indicated construction processes or operations. Nevertheless, the final responsibility for fulfillment of the entire set of contract requirements remains with the CONTRACTOR.

3. REFERENCE SPECIFICATIONS, CODES, AND STANDARDS. References herein to "Building Code" or "Uniform Building Code" shall mean Uniform Building Code of the International Conference of Building Officials (ICBO). Similarly, references to "Mechanical Code" or "Uniform Mechanical Code," "Plumbing Code" or "Uniform Plumbing Code," "Fire Code" or "Uniform Fire Code," shall mean Uniform Mechanical Code, Uniform Plumbing Code and Uniform Fire Code of the ICBO. "Electric Code" or "National Electric Code (NEC)" shall mean the National Electric Code of the National Fire Protection Association (NFPA). References here to ‘Caltrans Tests” shall mean the Standard Specifications and tests of Caltrans, Department of Transportation.

In case of conflict between codes, reference standards, drawings and the other Contract Documents, the most stringent requirements shall govern. All conflicts shall be brought to the attention of the ENGINEER for clarification and directions

prior to ordering or providing any materials or furnishing labor. The CONTRACTOR shall bid for the most stringent requirements.

The CONTRACTOR shall construct the WORK specified herein in accordance with the requirements of the Contract Documents and the referenced portions of those referenced codes, standards, and specifications listed herein.

3.01 Applicable Standard Specifications:

References in the Contract Documents to SSPWC shall mean the Standard Specifications for Public Works Construction, 1991 Edition.

References in the Contract Documents to “Caltrans Specifications”, “State Specifications”, “State Standards”, etc. shall mean the May 2006 edition of the California Department of Transportation Standard Plans and Specifications.

References herein to "OSHA Regulations for Construction" shall mean **Title 29, Part 1926, Construction Safety and Health Regulations,** Code of Federal Regulations (OSHA), including all changes and amendments thereto.

Applicable Safety Standards**:** References herein to "Cal-OSHA" shall mean **State of California, Department of Industrial Relations, Construction Safety Orders,** as amended to date, and all changes and amendments thereto.

4. REGULATIONS RELATED TO HAZARDOUS MATERIALS. The CONTRACTOR is responsible that all work included in the Contract Documents, regardless if shown or not, shall comply with all EPA, OSHA, Cal-OSHA, RCRA, NFPA, and any other Federal, State, and Local Regulations governing the storage and conveyance of hazardous materials, including petroleum products.

Where no specific regulations exist, all chemical, hazardous, and petroleum product piping and storage in underground locations must be installed with double containment piping and tanks, or in separate concrete trenches and vaults, or with an approved lining which cannot be penetrated by the chemicals, unless waived in writing by the DISTRICT.

End of Section

Section 01200

PROJECT MEETINGS

1. PRE-CONSTRUCTION CONFERENCE

The pre-construction conference will be scheduled by the DISTRICT in accordance with Article 2.5 of the General Conditions. Attendees shall include the DISTRICT, CONTRACTOR, ENGINEER, DESIGNER, and other interested parties as requested by the DISTRICT.

The agenda for the meeting will include discussion of, but is not necessarily limited to, the following items:

- Introductions.
- Designation of responsible personnel.
- Communication among parties.
- Progress meeting schedule.
- Project schedule.
- CONTRACTOR'S CPM Construction Schedule.
- Qualifications of the CPM Scheduler as specified in Section 01310, "Construction Scheduling."
- Critical work sequence, including installation sequencing.
- Inspection of the WORK.
- Coordination with other contractors.
- Review of special project requirements, including use of lands and easements.
- Review of regulatory permitting requirements.
- Environmental education program per Section 01061, "Environmental Mitigation Requirements."
- Procedures for changes in work.
- Procedures for payments.
- Submission of shop drawings, product data and samples.
- Use of site, office and storage areas, security, and housekeeping.
- Delivery, storage and handling.
- Maintaining record documents.

- Operation and maintenance manuals.
- Startup and testing.

2. TEAM BUILDING

The DISTRICT intends to encourage team building with the CONTRACTOR and its subcontractors. The team building will be structured to draw on the strengths of each organization to identify and achieve reciprocal goals. The objectives are effective and efficient contract performance, intended to achieve completion within budget, on schedule, and in accordance with the Contract Documents.

To implement the team building initiative, it is anticipated that within 60 days of the Notice to Proceed, a full-day team building workshop (facilitated by a third party) will be conducted, to be attended by the DISTRICT, CONTRACTOR, key Subcontractors and Suppliers, DESIGNER and ENGINEER.

As part of the team building workshop, it is expected that a charter will be developed and agreed to between the CONTRACTOR and the DISTRICT. This charter will outline communication goals to foster close, amicable working relations, performance objectives for all parties, and steps to be followed in resolution of disputes including use of the disputes resolution board (DRB), if applicable. The charter will be signed by the workshop participants. Execution of the charter will not waive any of the rights of the parties specified in the Contract Documents or in law.

Team building will be bilateral in makeup and will be totally voluntary. The DISTRICT will pay for the cost of the facilitator, and the CONTRACTOR shall pay for the cost of the meeting room and lunch. Costs associated with personnel attending the meeting shall be borne by each party.

3. PROGRESS MEETINGS

Following the pre-construction conference, the CONTRACTOR shall prepare an agenda and conduct weekly progress meetings during the construction period. Meeting minutes will be taken by the ENGINEER with copies distributed to the DISTRICT, CONTRACTOR AND DESIGNER; to facilitate the preparation of meeting minutes, the meeting will be voice recorded.

The DISTRICT, CONTRACTOR, ENGINEER, Resident Project Representative and DESIGNER shall each be represented at these meetings. .

In general, the agenda may include the following items:

- Review minutes of previous meeting.

- Safety issues.
- Review of work progress, three week Look-Ahead Schedule, and updates of CPM Construction Schedule.
- Identification of problems which impede planned progress, corrective measures to regain projected schedules, and effect of proposed changes on progress schedule and coordination.
- Field observations, problems, and decisions.
- Review of submittals schedule and status of submittals.
- Review of off-site fabrication and delivery schedules.
- Maintenance of quality and work standards.
- Other business relating to Work.

4. CONFERENCES

At any time during progress of the Work, the DISTRICT, ENGINEER or Resident Project Representative shall have the authority to require the CONTRACTOR to attend a job-site conference. Any notice of such conference shall be duly observed and complied with by the CONTRACTOR.

5. OTHER MEETINGS

CONTRACTOR shall attend other meetings as may be specified in other sections of the General Requirements and Technical Specifications.

End of Section

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Section 01300

SUBMITTALS

1. GENERAL.

Where the CONTRACTOR is required by these Specifications to make submittals, they shall be made as specified herein.

For the convenience of the ENGINEER, DESIGNER and CONTRACTOR, CONTRACTOR'S submittals for the Project shall be made through transmission of electronic files by email (or on CD for files exceeding 10 MB), unless hard copies are otherwise specified in the Contract Documents.

1.01. Electronic Files and Signatures. Electronic files shall be scanned in or converted to (.pdf) file format using Adobe Acrobat Version 7.0 or higher. AutoCad 2004 (or higher) drawing files shall also be in (.pdf) file format. When specifically requested by the DESIGNER, AutoCad 2004 (or higher) files shall be made available to the DESIGNER in (.dwg) file format, transmitted on CD.

Each submittal shall be converted to a PDF document (PDF file) and provided to ENGINEER for review. Drawings or other graphics converted to .PDF format shall be incorporated into the single PDF document. Pages that must be viewed in landscape format shall be rotated to the appropriate position for easy reading on screen.

The ENGINEER, DESIGNER and the CONTRACTOR will make use of certificates for electronic signatures to process all submittals and RFIs. The electronic signatures and their certificates will be developed using the Adobe Acrobat Digital Signature plug-ins. Only designated CONTRACTOR personnel will be able to sign the submittal transmittal sheet and the RFIs form.

1.02. Preliminary Schedules. Refer to General Conditions Article 2.4.

1.03. Initial Acceptance of Submittals. Refer to General Conditions Article 2.6.

1.04. Hard Copy Submittals. Where hard copies of submittals are specified, the number of copies of submittals shall be as follows:

▪ Shop Drawings and Product Data	Five (5) sets of copies
▪ Samples	Two (2) each
▪ O&M Manuals	As specified in Section 01730
▪ Cost Breakdown/Schedule of Values	Four (4) copies

- CPM Construction Schedule & Updates — Four (4) copies
- Laboratory Test Results — Two (2) copies

1.05. Project Forms – The ENGINEER has developed the necessary electronic submittal transmittal form and the RFIs form for use by both the CONTRACTOR and the DESIGNER. The CONTRACTOR shall use these forms to generate new submittals and RFIs. The time for review and response of these submittals will commence on the business day following the posting of the document(s).

2. SHOP DRAWINGS AND ENGINEERING DATA.

2.01. General. Shop Drawings and engineering data (submittals) covering all equipment and all fabricated components and building materials which will become a permanent part of the WORK under this Contract shall be submitted to ENGINEER for review. Submittals shall verify compliance with the Contract Documents, and shall include drawings and descriptive information in sufficient detail to show the kind, size, arrangement, and the operation of component materials and devices; the external connections, anchorages, and supports required; the performance characteristics; and dimensions needed for installation and correlation with other materials and equipment. When an item consists of components from several sources, CONTRACTOR'S initial submittal shall be complete including all components.

All submittals, regardless of origin, shall be stamped with the approval of CONTRACTOR and identified with the name and number of this Contract, CONTRACTOR'S name, and references to applicable specification paragraphs and Contract Drawings. Each submittal shall indicate the intended use of the item in the WORK. When catalog pages are submitted, applicable items shall be clearly identified and inapplicable data crossed out. The current revision, issue number, and date shall be indicated on all drawings and other descriptive data.

CONTRACTOR shall be solely responsible for the completeness of each submittal. CONTRACTOR'S stamp of approval is a representation to ENGINEER and DESIGNER that CONTRACTOR accepts sole responsibility for determining and verifying all quantities, dimensions, field construction criteria, materials, catalog numbers, and similar data, and that CONTRACTOR has reviewed and coordinated each submittal with the requirements of the WORK and the Contract Documents.

All deviations from the Contract Documents shall be identified as deviations on each submittal and shall be tabulated in CONTRACTOR'S letter of transmittal. Such submittals shall, as pertinent to the deviation, indicate essential details of all changes proposed by CONTRACTOR (including modifications to other

facilities that may be a result of the deviation) and all required piping and wiring diagrams.

ENGINEER will not accept submittals from anyone but CONTRACTOR. Submittals shall be consecutively numbered in direct sequence of submittal and without division by subcontracts or trades.

2.02. Review of Submittals by DESIGNER and ENGINEER. CONTRACTOR'S submittals will be reviewed to determine if the equipment and materials proposed by the CONTRACTOR are in general conformity with the requirements of the Contract Documents. The review is not intended to be a complete check of quantities, dimensions, fabrication details, materials, etc. indicated on the shop drawings, and does not extend to the CONTRACTOR'S means and methods. DESIGNER'S and ENGINEER'S review shall not relieve CONTRACTOR of sole responsibility for errors, omissions, or deviations in the drawings and data, nor of CONTRACTOR'S sole responsibility for compliance with the Contract Documents.

The submittal review period shall be 21 consecutive calendar days and shall commence on the first calendar day following receipt of the submittal or resubmittal in ENGINEER'S office.

ENGINEER will return submittal review comments to CONTRACTOR via electronic files.

a. No Exceptions Noted (NEN): The ENGINEER'S review found no deviations from the Contract Documents.

b. Exceptions Noted (EN): The ENGINEER'S review found no major deviations from the Contract Documents; only minor discrepancies or deficiencies are noted. Corrected copies are not required; however, when the item for which the submittal was prepared is furnished, it shall be in compliance with the ENGINEER'S comments. If the CONTRACTOR, Supplier, or manufacturer takes exception to any comments, they shall submit corrected or supplemental data to further explain the reasons for any deviations from the Contract Documents.

c. Returned for Correction (RFC): The ENGINEER'S review revealed major discrepancies or deficiencies, so that corrected data shall be submitted to determine compliance with the Contract Documents.

d. Record Copy (RC): This status is assigned for submittal data which the ENGINEER determines to be general or supplemental to information being reviewed, such as test reports, manufacturer's or supplier's letters included with submittal data, unmarked catalog data, etc.

e. Not Acceptable (NA): In the ENGINEER'S opinion, the item submitted for review does not meet the requirements of the Contract Documents. Submittals from a new source shall be submitted.

f. Returned Without Review (RWOR): This status is assigned to items such as design calculations or items pertaining to the CONTRACTOR'S means and methods of construction.

g. Not Applicable (N/Appl.): This status is assigned to items that do not apply to the project or the submitted specification section.

When the drawings and data are returned marked "NOT ACCEPTABLE" or "RETURNED FOR CORRECTION", the corrections shall be made as noted thereon and as instructed by ENGINEER and five corrected copies resubmitted. Facsimile (fax) copies will not be acceptable. When the drawings and data are returned marked "EXCEPTIONS NOTED", "NO EXCEPTIONS NOTED", or "RECORD COPY", no additional copies need be furnished unless specifically requested by ENGINEER.

2.03. Resubmittal of Drawings and Data. CONTRACTOR shall accept full responsibility for the completeness of each resubmittal. CONTRACTOR shall verify that all corrected data and additional information previously requested by DESIGNER and ENGINEER are provided on the resubmittal.

When corrected copies are resubmitted, CONTRACTOR shall direct specific attention to all revisions in writing and shall list separately any revisions made other than those called for by DESIGNER and ENGINEER on previous submittals. Requirements specified for initial submittals shall also apply to resubmittals. Resubmittals shall bear the number of the first submittal followed by a letter (A, B, etc.).

If more than one resubmittal is required because of failure of CONTRACTOR to provide all previously requested corrected data or additional information, CONTRACTOR shall reimburse DISTRICT for the charges of DESIGNER and ENGINEER for review of the additional resubmittals. This does not include initial submittal data such as shop tests and field tests that are submitted after initial submittal.

When resubmittals are needed, resubmittals shall be made within 30 days of the date on the letter returning the material to be modified or corrected, unless within 14 days CONTRACTOR submits an acceptable request for an extension of time, listing the reasons why the resubmittal cannot be completed within the stipulated time.

The need for more than one resubmittal, or any other delay in obtaining DESIGNER'S and ENGINEER'S review of submittals, will not entitle CONTRACTOR to extension of the Contract Times unless delay of the WORK is the direct result of a change in the WORK authorized by a Change Order or failure of ENGINEER to review and return any submittal to CONTRACTOR within the specified review period.

2.04. Color Selection. CONTRACTOR shall submit samples of colors and finishes for all accepted products before ENGINEER will coordinate the selection of colors and finishes with DISTRICT. ENGINEER will prepare a schedule of finishes that include the colors and finishes selected for both manufactured products and for surfaces to be field painted or finished and will furnish this schedule to CONTRACTOR within 60 days after the date of acceptance of the last color or finish sample.

End of Section

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Section 01310

CONSTRUCTION SCHEDULING

1. GENERAL. The scheduling of the WORK under the Contract shall be performed by the CONTRACTOR in accordance with the requirements of this Section. The development of the schedule, the cost loading of the schedule, monthly payment requisitions and project status reporting requirements of the Contract shall employ computerized Critical Path Method (CPM) scheduling. The cost-loaded CPM schedule and all reports shall be prepared using the latest version of Primavera Project Planner P3 software (or equivalent; e.g., Primavera 5.0 or SureTrak Project Manager). Where submittals are required hereunder, the CONTRACTOR shall submit four copies of each submittal item.

In addition to the scheduling aspect, the CPM Construction Schedule shall be cost-loaded and used in conjunction with the schedule of values / applications for payment, and to develop a cash drawdown schedule that presents an estimate of expected billings over time.

CONTRACTOR hereby agrees that in the process of preparing its baseline schedule and monthly updates, it will consult with all key Subcontractors and suppliers to assure concurrence with the feasibility and achievability of CONTRACTOR'S planned start dates, sequencing, durations, and completion dates.

Startup Schedules provided in accordance with Section 01650, Startup and Testing, shall be prepared and certified as accurate and in full conformance with the Contract Documents by the CONTRACTOR'S Startup Manager. Startup Schedules shall be prepared and submitted in full conformance with this section and shall be considered part of Schedule Updates at the time they are required to be submitted, as indicated.

All schedules shall be structured using the systems and related breakdown provided for the Schedule of Values developed for the WORK in accordance with Article 14 of the General Conditions.

2. QUALIFICATIONS. The CONTRACTOR shall employ the services of a qualified Scheduler with not less than five (5) years of experience that can demonstrate competence in the use of CPM scheduling through the submission of a fully compliant CPM Construction Schedule with the initial CPM submission. In the event the CONTRACTOR fails to so demonstrate competence in the CPM scheduling, the CONTRACTOR shall nominate another qualified Scheduler until accepted by the ENGINEER.

The CONTRACTOR shall submit to the DISTRICT a statement of computerized CPM capability at the Pre-Construction Conference as specified in Section 01200, “Project Meetings,” and shall verify that either the CONTRACTOR has in-house capability qualified to use CPM technique and the specified software, or that the CONTRACTOR will employ a CPM consultant so qualified. In either event the statement shall identify the individual who will perform the CPM scheduling. Capability shall be verified by description of construction projects on which the individual has successfully applied computerized CPM, as described more fully in Paragraph 2.01 below.

The Scheduler shall have verifiable training and credentials in preparing and maintaining a computerized CPM Construction Schedule using Primavera software as specified herein.

2.01. Required Experience. Performed CPM scheduling on at least 2 completed construction projects of value at least 75 percent as large as this project and having at least 75 percent as many schedule items as this project. Scheduling of both projects shall have been done using Primavera software or the equivalent to that specified for this Project. The following Scheduler experience information shall be submitted:

- Descriptions of at least 2 projects of the value and complexity above.
- Copy of a cost-loaded CPM schedule from one of the previous projects.
- Names and telephone numbers of facility owner representative, design engineer, and construction manager for each project.

3. CPM STANDARDS.

3.01. Definitions:

CPM, as required by this Section, shall comply with the standards outlined in the Associated General Contractors’ publication, “Construction Planning and Scheduling, Second Edition,” unless specifically changed by this Section.

CPM Construction Schedule: The CONTRACTOR’S CPM Construction Schedule shall include a graphic time scaled logic network, computerized tabular reports and cost loading as described below. To be acceptable, the schedule must demonstrate the following:

- A logical succession of work from start to finish. This logical succession, when accepted, is the CONTRACTOR’S work plan. The individual activities are to be designated as early start/early finish solely to accommodate the Primavera software.

- Clear definition of each activity including a cost loading. The assigned dollar value (cost loading) of each activity shall cumulatively equal the contract price.

- Proper interfacing of related activities including submittals, major material and equipment deliveries, procurement, required permits and other constraints such as equipment or manpower/crew availability. Submittal dates must include review periods and permit schedules must include agency review and issue dates. The narrative shall explain the rationale for all constraints, lags, and unusual relationships.

- Agreement with the interim milestones, schedule coordination requirements, and completion dates indicated in the Contract Documents.

CPM Graphic Logic Network. The CPM graphic logic network or diagram shall be in the form of a time-scaled diagram of the customary precedence diagram and may be divided into a number of separate pages with suitable notation relating the interface points among the pages. Individual pages shall not exceed 34-inch by 44-inch. Notation on each activity line shall include activity descriptions, total float, start/finish dates, and durations as a minimum.

All construction activities and procurement shall be indicated in a time-scaled format, and a calendar shall be shown on all sheets along the entire sheet length. Each activity shall be plotted so the beginning and completion dates of said activity can be determined graphically by comparison with the calendar scale. A legend shall be included clearly distinguishing between critical and non-critical path activities and progress to date.

Duration: The duration indicated for each activity shall be in units of whole working days and shall represent the single best time considering the scope of the WORK and resources planned for the activity including time for holidays and inclement weather. The calendar for the network shall be in calendar days. Except for certain non-labor activities, such as curing concrete or delivering materials, activity durations shall not exceed 14 days, be less than one day, nor exceed $50,000 in value unless otherwise accepted by the ENGINEER.

Content: All schedule activities shall be grouped and coded according to the systems defined in the CONTRACTOR'S Schedule of Values. Within each system, schedule items shall have a one-to-one relationship to the breakdown of activities provided by the CONTRACTOR for each system included in the Schedule of Values. Administrative submittals and related activities that are shown on the schedule, but are otherwise not related to a specific system, may be exempted from this requirement at the ENGINEER'S sole discretion.

Computerized Tabular Reports: Reports shall include the following for each activity depicted in the schedule.

- Activity ID
- Activity Description
- Duration (original and remaining)
- Early Start Date
- Early Finish Date
- Late Start Date
- Late Finish Date
- Total Float
- Percent Complete
- Activity Cost
- Actual Start Date
- Actual Finish Date
- Preceding and Succeeding Event Numbers
- Activity Constraints

Project Information: Each report shall be prefaced with the following summary data.

- Project Name
- CONTRACTOR
- Type of Tabulation (Initial or Updated)
- Project Duration
- Project Scheduled Completion Date
- Projected Completion Date
- Data Date / Run Date

Acceptance: ENGINEER will review schedule submittals. If, in the opinion of ENGINEER, the schedule (1) does not accurately reflect CONTRACTOR'S actual or anticipated progress or work plan or, (2) cannot be used to effectively evaluate CONTRACTOR'S progress or, (3) is not in compliance with this article and other parts of the Contract Documents, it will be returned to CONTRACTOR for corrections or clarification. CONTRACTOR shall make the necessary corrections and resubmit or shall respond in detail to ENGINEER'S comments and request that the submittal be accepted without modification. Failure by CONTRACTOR to provide corrections or clarifications to schedule submittals as directed by ENGINEER shall constitute reason to withhold approval of any Progress Payment Request.

ENGINEER'S review of schedule submittals shall not relieve CONTRACTOR from responsibility for any variation from the requirements of the Contract Documents unless CONTRACTOR has, in writing, called ENGINEER'S attention to each such variation at the time of submission and ENGINEER has given written approval of each such variation; nor shall any approval by ENGINEER relieve CONTRACTOR from responsibility for compliance with any provision of the Contract Documents, except as specifically approved with respect to such variation.

4. INITIAL CPM CONSTRUCTION SCHEDULE SUBMITTAL.

The CONTRACTOR shall submit the following in accordance with General Conditions Article 2.4.C:

- A CPM timescaled logic network, computer generated using Primavera Project Planner software.
- Computerized Tabular Reports in the following formats:
    1. Activity sort by activity ID, organized by facility or area.
    2. Activity sort by early start, organized by facility or area.
    3. Activity sort by float, organized by facility or area.
- Predecessor/successor listing.
- Activity code dictionary.
- Basis of schedule narrative describing the logic and reasoning of the schedule.
- Breakdown of specific cost amount for each component of multi-component activities in the CPM Schedule in spreadsheet format (using Microsoft Excel) showing component unit quantities as well as costs. Such breakdown, when accepted by the ENGINEER, shall constitute the Schedule of Values for the Project per Section 01025, "Measurement and Payment."
- A Cash Drawdown Schedule, based upon the cost-loaded CPM Schedule, that presents an estimate of expected monthly billings over the length of the contract.
- A CD-ROM disk copy of entire schedule in P3 format and spreadsheet.
- A Look-Ahead Schedule for the weekly progress meetings in a format approved by the ENGINEER.

ENGINEER will review the schedule submittals within 15 days and state acceptance or rejection of the proposed CPM Construction Schedule.

Within 15 days after receipt of the ENGINEER'S review comments, the CONTRACTOR shall revise and resubmit the CPM Construction Schedule as required. The revised CPM Construction Schedule will be reviewed and accepted or rejected by ENGINEER within 10 days after receipt. If a schedule submittal is not acceptable to the ENGINEER, the schedule shall be revised and resubmitted as many times as is necessary until the schedule is acceptable.

A conference will be held to finalize the initial submittals as specified in Article 2.6 of the General Conditions.

Submit a CPM Construction Schedule update, as required below, every month along with the Application for Payment.

5. CHANGE OF CONTRACT TIMES. If a change of Contract Times is made pursuant to Article 12 of the General Conditions, the approved change shall be reflected in the next schedule update by the CONTRACTOR as an integrated fragment for the changed work item(s).

6. SCHEDULE UPDATES. The CPM Construction Schedule shall be updated to reflect the as-built conditions of the WORK and to accurately forecast the status of incomplete activities. Progress reports shall be given at each weekly progress meeting, stating actual percent earned versus percent planned. CPM Construction Schedule and Cash Drawdown Schedule updates shall be submitted to the ENGINEER with each payment request (but no less frequent than monthly). Updates shall include approved changes in the WORK and shall accurately depict the current status and sequence of all activities, including identification of critical path activities.

The updated CPM Construction Schedule shall be submitted in the form, sequence, and number of copies requested for the initial schedule.

The ENGINEER will review each monthly CPM Construction Schedule update and provide the CONTRACTOR comments within seven (7) days of the submittal. The CONTRACTOR shall revise and resubmit the schedule within five (5) days of receipt of comments from the ENGINEER. The ENGINEER will review the re-submittal within five (5) days and provide comments if the schedule update is still unacceptable. The CONTRACTOR shall revise and resubmit the schedule within five (5) days of receipt of comments from the ENGINEER.

7. PROGRESS MEETINGS AND LOOK-AHEAD SCHEDULES. For the weekly progress meetings, the CONTRACTOR shall submit a Look-Ahead Schedule. This schedule will cover three weeks: the immediate past week, the current week, and the forthcoming week. This schedule will include all activities which

are complete, started, are incomplete or underway, or scheduled to be worked during this three-week time frame. This schedule shall list all activities from the accepted CPM Construction Schedule which are complete, are scheduled for WORK during the period, are currently planned to be worked, even if out of sequence, and WORK which is unfinished but scheduled to be finished. Actual start and completion dates shall be provided for the WORK that has been completed the prior week; forecast early start and early finish dates shall be provided for the WORK that is in-process or upcoming.

Each activity noted above shall be identified by activity number corresponding to the accepted CPM Construction Schedule and detailed description of the activity.

The Look-Ahead Schedule shall be delivered to the ENGINEER twenty-four (24) hours prior to the weekly progress meeting.

The Look-Ahead Schedule shall be in a bar-chart format approved by the ENGINEER. Critical path activities shall be identified.

Tabular reports for approximate manpower and equipment resources shall be provided for and with each Look-Ahead Schedule.

8. CPM CONSTRUCTION SCHEDULE REVISIONS. The DISTRICT or ENGINEER may direct and, if so directed, the CONTRACTOR shall propose, revisions to the CPM Construction Schedule upon occurrence of any of the following instances:

- The actual physical progress of the WORK falls more than five percent (5%) behind the accepted CPM Construction Schedule, as demonstrated by comparison to the accepted monthly CPM Construction Schedule updates or as determined by the ENGINEER if a current accepted CPM Construction Schedule does not exist.

- The DISTRICT considers milestone or completion dates to be in jeopardy because of “activities behind schedule”. “Activities behind schedule” are all activities that have not or cannot be started or completed by the dates shown in the CPM Construction Schedule, regardless of the existence of positive float on the activity.

- A Change Order has been issued that changes, adds, or deletes scheduled activities or affects the time for completion of scheduled activities.

When the instances requiring revision to the CPM Construction Schedule occur, the CONTRACTOR shall submit the proposed revised CPM Construction Schedule within ten (10) days after receiving direction from the ENGINEER to provide such Schedule. No additional payment will be made to the CONTRACTOR for preparation and submittal of proposed revised CPM

Construction Schedules. However, if the ENGINEER accepts the proposed revised CPM Construction Schedule, it shall replace and supersede all previous CPM Construction Schedules and substitute for the next monthly CPM Construction Schedule update that would otherwise be required.

Revisions to the CPM Construction Schedule shall comply with all of the same requirements applicable to the original schedule.

9. SCHEDULE RECOVERY. If a revised CPM Construction Schedule accepted by the ENGINEER requires the CONTRACTOR to employ additional manpower, equipment, hours of work or work shifts, or to accelerate procurement of materials or equipment, or any combination thereof, as schedule recovery measures to meet Contract milestones, the CONTRACTOR shall implement such schedule recovery measures without additional charge to the DISTRICT.

10. TIME IMPACT ANALYSIS REQUIREMENT. When delays are experienced by the CONTRACTOR and a time extension is requested, the CONTRACTOR shall submit to the ENGINEER, within fifteen (15) days of the delay, a written Time Impact Analysis illustrating the influence of all changes or all delays on the current Project completion date. The time impact analysis shall be constructed on an As-Built Schedule Analysis approach. The As-Built Schedule that is created will incorporate all actual start and finish dates, actual durations of activities, and actual sequences of construction (referred to as the As-Built Logic) current as of the time the Time Impact Analysis is performed. This Time Impact Analysis shall incorporate all delays (including DISTRICT, CONTRACTOR and third party delays without exception) in the time frame that they actually occurred with actual logic ties. The As-Built Schedule data shall be obtained from the most recent approved monthly schedule update. The As-Built Schedule shall be created as an early start schedule with the actual start and finish dates coinciding with the early start and finish dates from the most recent approved monthly schedule update. The As-Built Schedule shall show the original activity durations equal to the actual duration and the actual logic driving all activities. This As-Built Schedule will be validated by the ENGINEER. All requests for time extension shall be based upon an analysis of this As-Built Schedule. The critical path will be established and all DISTRICT-caused delays on the critical path will be identified. The time extension will be based solely upon the cumulative duration of all DISTRICT and third party caused delays which are on the critical path. Any time extensions to the project's Interim Milestone Dates, if any, shall be non-compensable time extensions only.

Each Time Impact Analysis shall demonstrate the estimated time impact based on the events of delay, the status of construction at that point in time, and the event time computation of all activities affected by the change or delay. The event times used in the analysis shall be those included in the latest approved

update of the project schedule, in effect at the time the change or delay was encountered.

11. EARLY COMPLETION SCHEDULES. Refer to General Conditions Article 6.3, “Schedule.”

12. BASIS OF SCHEDULE NARRATIVES. CONTRACTOR shall furnish a basis of schedule narrative to the ENGINEER with each Application for Payment. If the WORK falls behind schedule, submit additional narrative at such intervals as the ENGINEER may request.

Each narrative shall include a summary of progress for the month, description of any current and anticipated delaying factors, a variance analysis for varying activities, impacts on the construction schedule, and proposed corrective actions. Any WORK reported complete, but which is not readily apparent to the ENGINEER, must be substantiated with satisfactory evidence.

Each narrative shall include a list of the activities completed during the preceding month and a list of the activities started during the month but not yet completed. Each narrative shall clearly identify critical path activities and non-critical path activities.

13. FLOAT. Total Float is the number of days by which a part of the WORK in the CPM Construction Schedule may be delayed from its early start and finish dates without necessarily extending the Contract Times. The difference in time between the Project’s scheduled early completion date, as submitted, and the required Contract completion date shall be considered as float, slack time, or contingency. Float, slack time, or contingency within the schedule, and total float within the overall schedule, is not for the exclusive use of either the DISTRICT or the CONTRACTOR, but is jointly owned by both parties and is a resource available to and shared by both parties as needed to meet Contract milestones and the Contract completion date.

The CONTRACTOR shall not sequester shared float through such strategies as extending activity duration estimates to consume available float, using preferential logic, using extensive crew/resource sequencing, etc. Since float time within the schedule is jointly owned, no time extensions will be granted nor delay damages paid until a delay occurs which extends the work beyond each Milestone completion date. Since float time within the construction schedule is jointly owned, it is acknowledged that DISTRICT-caused delays on the project may be offset by DISTRICT-caused time savings (i.e. critical path submittals returned in less time than allowed by the Contract, approval of substitution requests which result in a savings of time to the CONTRACTOR, etc.). In such an event, the CONTRACTOR shall not be entitled to receive a time extension or delay damages until all DISTRICT-caused time savings are exceeded and the Contract completion date is also exceeded.

14. WEATHER CONDITIONS. Seasonal weather conditions shall be considered in the planning and scheduling of work influenced by high or low ambient temperatures or precipitation to ensure the completion of the WORK within the Contract Time. No time extensions will be granted for the CONTRACTOR'S failure to take into account such weather conditions for the location of the WORK and for the period of time in which the WORK is to be accomplished; refer to General Conditions Article 12.2.

CONTRACTOR shall add a critical activity to the schedule to reflect the occurrence of the weather day(s).

End of Section

Section 01311

CONSTRUCTION AND SCHEDULE CONSTRAINTS

1. GENERAL

1.1 Contractor's Responsibility to Coordinate and Plan the Work

It is the CONTRACTOR'S responsibility to coordinate and plan the construction activities such that the required construction sequencing and each time constraint is incorporated into the overall performance of the WORK.

Work shall be scheduled, sequenced, and performed in a manner which will achieve the completion milestones and Contract Times specified. In addition, the CONTRACTOR'S construction sequencing and time constraints shall minimize impact to other DISTRICT construction contracts and to the operation of any existing facilities owned and operated by the participant water agencies.

The CONTRACTOR shall incorporate the required construction sequencing and specified time constraints in the CPM Construction Schedule required under Section 01310, "Construction Scheduling." The CPM Construction Schedule shall include the CONTRACTOR'S activities necessary to satisfy all sequencing and time constraints included and referenced in the Contract Documents.

1.2 Completion Milestones

The completion milestones and Contract Times shall be as specified in Section 00500, "Agreement," and as defined in the General Conditions and Supplementary General Conditions.

2. WORK SEQUENCE AND CONSTRAINTS

2.1 Construction Sequencing and Time Constraints

CONTRACTOR shall comply with the following time constraints. The following requirements shall be incorporated into CONTRACTOR'S CPM Construction Schedule. The following items do not list all of the construction sequencing and time constraints that need to be addressed, but only the major and/or critical items.

- Time constraints specified as part of any easement agreements included in Section 01040, "Easement and Right-of-Way Requirements."

- Time constraints specified in the permits included in Section 01060, "Permit Requirements."

- Time constraints specified in the environmental permits and mitigation measures included in Section 01061, “Environmental Mitigation Requirements.”

- Time constraints specified in Section 01500, “Construction Facilities and Temporary Controls.”

- Time constraints associated with interfaces between DISTRICT contracts.

- Pipeline Construction. Prior to commencing pipeline construction, CONTRACTOR shall perform, and the ENGINEER shall approve, the “pipeline installation demonstration test section” as specified in Section 02202, “Trenching and Backfilling.” After approval of the test section, construction of the pipeline shall proceed as follows: After the first one (1) mile reach of pipeline has been constructed for any segment, CONTRACTOR shall perform the pipeline pressure and leakage testing for that reach in accordance with the requirements specified in Section 02704. After the satisfactory completion and acceptance of the pressure and leakage testing for the first one mile of pipe installed, CONTRACTOR may proceed with the remaining pipeline construction.

  In connection with the above requirement, if the pipeline appurtenances are not installed at the time of the initial pressure and leakage test, then CONTRACTOR shall re-perform the pressure and leakage testing for this reach after the appurtenances have been installed.

2.3 Working Hours. Construction activities shall be limited to 7:00 a.m. and 7:00 p.m. on weekdays and between 8:00 a.m. and 5:00 p.m. on Saturdays except when other work hours are approved or directed by the ENGINEER. CONTRACTOR shall comply with the work hour restrictions in the Environmental Plans & Mitigation Monitoring Plan mitigation measures (Section 01061) including, but not limited to, Mitigation Measures N-2, T-1 and T-3.

Work on Sundays or holidays is not permitted, unless CONTRACTOR requests otherwise from the DISTRICT in writing at least 48 hours in advance and DISTRICT approves at its sole discretion. In the case of work by the CONTRACTOR after normal working hours, CONTRACTOR shall be responsible for any additional inspection costs incurred by the DISTRICT. Such costs may be withheld from any succeeding monthly progress payment.

3. CONNECTION TO EXISTING FACILITIES.

Unless otherwise specified or indicated, CONTRACTOR shall make all necessary connections to existing facilities, including structures, drain lines, and utilities such as water, sewer, gas, telephone, and electric. In each case, CONTRACTOR shall receive permission from the DISTRICT or the owning utility

prior to undertaking connections and shall follow all requirements of the DISTRICT, owning utility, and this sequencing specification including any time constraints specified herein. CONTRACTOR shall protect facilities against deleterious substances and damage at all times.

End of Section

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Section 01320

WEB-BASED PROJECT MANAGEMENT SYSTEM

1. GENERAL. The DISTRICT intends to utilize a web-based project management system on the Internet for administering the construction contracts and for collaboration and communication of all Contract related work. The requirements of this Section are applicable across all Sections of the Contract Documents unless otherwise indicated. It is the CONTRACTOR'S responsibility to utilize the web-based system provided by the DISTRICT for all contract communication and submittal requirements.

1.2 SUBMITTALS. Comply with the requirements specified in Section 01300, "Submittals."

Within 10 days of NTP, submit the names of CONTRACTOR'S users' information for the web-based project management system, with periodic updates, to include:

- Name, title and company affiliation.
- Address, phone number, cellular phone number, email address and fax number.
- Specific job related functions.
- Level of authority to access the electronic management system.

Within 10 days of NTP, submit names of key individuals who will administer and train the CONTRACTOR'S staff in the web-based project management system.

1.3 PROJECT COMMUNICATIONS. All written documents and written communications required by the Contract Documents, unless otherwise excepted, including, but not limited to, correspondence, reports, notices, submittals, transmittals, Shop Drawings, RFIs, Clarifications, Field Orders, Request for Change Order, Change Proposals, Applications for Payment, Change Orders, claims, meeting agendas, meeting minutes, substitutions, VE Change Proposals, test reports, monitoring reports, and punch lists will be submitted through the DISTRICT'S web-based management system.

The following Contract Documents are exceptions to the requirements of this section and shall be communicated as paper documents as prescribed in Giving Notice in the General Conditions:

- Notice of Award
- Notice to Proceed

- Notice of Termination
- Certification of Substantial Completion
- Notice of Completion

Notice for Contract Documents transmitted through the web-based project management system is the time and date when the document is sent to the other party as recorded in the web-based project management system.

This Section shall not relieve the CONTRACTOR of its obligations to provide the DISTRICT with Record Drawings in the physical form specified in the Contract Documents.

1.4 USE REQUIREMENTS. The use of the web-based project management system is intended to expedite and improve collaboration and written contract communication and to accurately record the flow of Contract documentation.

The CONTRACTOR is required to obtain and maintain computers with access to the Internet to use the web-based project management system. No special hardware or software is required.

The CONTRACTOR is encouraged, as appropriate, to invite major Subcontractors and key vendors to utilize the web-based management system to improve communications and coordination within the CONTRACTOR'S team.

The CONTRACTOR is required to comply with applicable laws and regulations regarding electronic transmission of documents requiring professional engineering stamps or signatures, including provision of hard copies of such documents as appropriate.

Project communications and Contract Documents that require the signature of authorized persons will utilize either :

- An approved digital signature in accordance with California law;
- An approved "image" of the official signature affixed to the document. Provide the DISTRICT with the original signed hard copy/paper document.
- An electronic copy or electronic image of a fully executed document containing the required signatures.

1.5 DOWNTIME. In the event that the Internet or the web-based project management system is temporarily unavailable, continue with project communications using other electronic means (email) or hard copies.

Maintain records of the project communications during the downtime and upload the records when the system is operational.

Notify the ENGINEER by telephone or email when the web-based project management system is not functional.

1.6 DISTRICT RESPONSIBILITIES. The DISTRICT will provide user access to the web-based project management system and manage the permission levels for all users of the system for the duration of the Contract. The DISTRICT will provide policies and procedures for use of the system.

The DISTRICT will provide introductory training in the use of the web-based system to the CONTRACTOR'S identified key staff who will be responsible to manage and administer the CONTRACTOR'S use of the system.

End of Section

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Section 01380

CONSTRUCTION VIDEO

1. CONSTRUCTION VIDEO. CONTRACTOR shall be responsible for the production of construction videos as provided herein. The ENGINEER shall designate the subject of each video.

A video of the entire site, or pertinent features thereof, shall be taken before the commencement of Work and promptly submitted to the ENGINEER. The video shall be a minimum of twenty (20) minutes. The same views that are captured in the initial video shall be re-videoed upon completion of all construction activities and submitted with CONTRACTOR'S Application for Final Payment.

A brief 5 minute video showing work progress shall be made each month throughout the progress of the WORK at such times as requested by the ENGINEER, and submitted with CONTRACTOR'S Application for Payment.

All video shall be taken with a late model digital camcorder using mini DV tape or recorded directly onto DVD.

At completion of construction, CONTRACTOR shall compile all video taken during construction onto one or more DVDs, which shall be marked with the name and number of the Contract, name of CONTRACTOR, and dates taken.

The ENGINEER will transmit the digital files to the DISTRICT.

End of Section

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Section 01400

QUALITY CONTROL

1. TESTING SERVICES. Testing services shall be provided by CONTRACTOR in accordance with the requirements specified in Article 13.3 of the General Conditions, “Inspections and Tests,” and as specified herein. All tests to determine compliance with the Contract Documents shall be performed by an independent testing laboratory hired by CONTRACTOR and acceptable to ENGINEER. The testing laboratory shall be staffed with experienced technicians, properly equipped and fully qualified to perform the tests in accordance with the specified standards.

1.01. CONTRACTOR’S Independent Testing Laboratory.

Prior to the start of work, CONTRACTOR shall submit the following information for its independent testing laboratory in accordance with Section 01300, “Submittals”:

- Name, address and phone number of independent testing laboratory, and names of registered engineers and certified technicians assigned to the work.

Qualifications and duties of CONTRACTOR’S independent testing laboratory shall be as follows:

- Laboratory shall be authorized to operate in the State of California.
- Testing equipment shall be calibrated and qualified, at intervals of not more than 3 years, in accordance with the procedures of the applicable national authority as evidence of competence to perform the required tests.
- Cooperate with ENGINEER, Resident Project Representative and CONTRACTOR.
- Provide qualified personnel.
- Perform specified inspections, sampling and testing of materials, equipment and methods of construction.
- Comply with specified standards.
- Ascertain compliance of workmanship, materials and mixes with requirements of Contract Documents.
- Promptly notify the Resident Project Representative and CONTRACTOR of observed irregularities or deficiencies of work or products.

1.02. Testing Services Provided by CONTRACTOR. All tests or materials furnished by the CONTRACTOR shall be made in accordance with the commonly recognized standards of national technical organizations, and such special methods and tests as prescribed in the Specifications.

Unless otherwise specified, CONTRACTOR shall provide all testing services in connection with the following:

- Earthwork materials testing, and laboratory soil compaction testing.
- Concrete materials and design mixtures.
- Asphaltic concrete materials testing, design mixtures, laboratory compaction testing.
- Pipeline hydrostatic and leakage testing.
- Other tests that are specified in the Technical Specifications.
- All other tests and engineering data required for ENGINEER'S review of materials and equipment proposed to be used in the Work.

CONTRACTOR shall obtain ENGINEER'S acceptance of the testing firm before having services performed, and shall pay all costs for these testing services.

1.03. Testing Services Provided by ENGINEER. Testing services provided by ENGINEER are for the sole benefit of the DISTRICT; however, test results will be available to CONTRACTOR. Testing necessary to satisfy CONTRACTOR'S internal quality control procedures plus demonstrate contract compliance shall be the sole responsibility of CONTRACTOR.

Unless otherwise specified, ENGINEER may test the following materials and equipment:

- Concrete compression tests, field verification of slump, air content and temperature.
- Asphaltic concrete in-place compaction testing.
- Moisture content and in-place field density (soils compaction) tests on trench subgrade, pipe embedment and trench backfill materials, embankment fills, and backfill materials.
- Other materials and equipment at the discretion of ENGINEER.

Testing specified to be by ENGINEER, including sampling, will be performed by the Resident Project Representative or the ENGINEER’S testing laboratory personnel, in the general manner indicated in the Specifications. The CONTRACTOR shall notify the ENGINEER 24 hours prior to when the work is

ready to be tested, and the Resident Project Representative will determine the exact time, location, and number of tests, including samples.

Arrangements for delivery of samples and test specimens to the ENGINEER'S testing laboratory will be made by ENGINEER. The ENGINEER'S testing laboratory will perform all laboratory tests within a reasonable time consistent with the specified standards and will furnish a written report of each test.

CONTRACTOR shall furnish all sample materials and cooperate in the testing activities, including sampling. CONTRACTOR shall interrupt the Work when necessary to allow testing, including sampling, to be performed. CONTRACTOR shall have no Claim for an increase in Contract Price or Contract Times due to such interruption. When testing activities, including sampling, are performed in the field by the Resident Project Representative or the ENGINEER'S testing laboratory personnel, CONTRACTOR shall furnish personnel and facilities to assist in the activities.

CONTRACTOR'S responsibility to compensate ENGINEER for the cost of any retesting shall be as specified in Article 13.3 of the General Conditions.

1.04. Test Reports. The CONTRACTOR'S independent testing laboratory shall promptly submit the written report of each test and inspection as specified for submittals in Section 01300. Each report shall include the following information as applicable:

- Date issued.
- Project title and number.
- Testing laboratory name, address and telephone number.
- Name and signature of responsible laboratory person.
- Identification of product and specification section.
- Location of sample or test in the Project.
- Date and time of sampling or inspection and date of test.
- Record of temperature and weather conditions.
- Type of inspection or test.
- Results of tests and statement of compliance with or deviation from requirements of the Contract Documents.
- Interpretation of test results, when required by Specifications.

2. OFFSITE INSPECTION AND TESTING.

2.01. ENGINEER'S Factory or Plant Inspection. When the Specifications require ENGINEER'S inspection of materials or equipment during the production,

manufacturing, or fabricating process, or before shipment, such services will be performed by the Resident Project Representative, ENGINEER or an independent testing firm or inspection organization acceptable to ENGINEER.

All tests of equipment and/or manufactured or fabricated products that are specified to be performed in the shop or factory may be witnessed by the ENGINEER at its option. Where witnessing of factory tests or plant inspections is performed, the ENGINEER'S representative(s) will inspect the equipment and manufactured products, inspect and check the testing equipment being used, observe calibration of test equipment, and observe the testing.

The CONTRACTOR shall give the ENGINEER a minimum of four (4) weeks advance notification prior to performing factory tests that are specified to be conducted, and four (4) weeks advance notification prior to the date that manufactured products will be ready to receive shop inspection, as applicable.

The ENGINEER'S representative(s) shall have free entry at all times to the manufacturer's facilities while tests and inspections are being conducted. Adequate facilities shall be furnished free of charge to allow the ENGINEER to perform its factory and plant inspections. Retain on file and make available to the ENGINEER'S representative(s), upon request, copies of all specified reports, test results, and quality control documentation relating to the Work.

2.02. Factory and Mill Test Reports. The CONTRACTOR shall furnish the ENGINEER certified copies of all required factory and mill test reports to verify material quality and composition. Any materials shipped to the CONTRACTOR from a factory or mill prior to having satisfactorily passed such testing and inspection shall not be incorporated in the work, unless the ENGINEER has notified the CONTRACTOR in writing that such testing and inspection will not be required. The cost of performing all factory and mill tests shall be paid by the CONTRACTOR unless otherwise required by the Contract Documents.

End of Section

Section 01500

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

1. OFFICES AT SITE OF WORK. During the performance of this Contract, CONTRACTOR shall maintain a suitable office at or near the Project site which shall be the headquarters of its representative authorized to receive drawings, instructions, or other communication or articles. Any communication given to the said representative or delivered at CONTRACTOR'S office at the project site area in the representative's absence shall be deemed to have been delivered to CONTRACTOR.

Copies of the Drawings, Specifications, and other Contract Documents shall be kept at CONTRACTOR'S office at the site and available for use at all times.

1.01. ENGINEER'S Office at the Site of Work. Provide a field trailer with utilities and furnishings for ENGINEER'S Resident Project Representative; refer to Attachment A to this Section for specific requirements.

2. WATER. Water in reasonable amounts required for and in connection with the WORK to be performed shall be obtained and paid for by CONTRACTOR as specified below. CONTRACTOR shall furnish necessary pumps, pipe, hose, nozzles, and tools and shall perform all necessary labor for making connections. CONTRACTOR shall make arrangements with the DISTRICT as to the amount of water required and the time when the water will be needed. Unnecessary waste of water will not be tolerated. Special hydrant wrenches shall be used for opening and closing fire hydrants. In no case shall pipe wrenches be used for this purpose.

- For work at the Cuesta Tunnel Tank site. CONTRACTOR will be permitted to obtain raw water from the DISTRICT at its Santa Margarita Booster Pump Station (Salinas Reservoir supply). This water is at no cost if reasonably used and not wasted. Raw water may not be suitable for all construction purposes. CONTRACTOR shall meter the water used and report the total volume on a monthly basis.

- If CONTRACTOR desires to use the Salinas Reservoir raw water for the system commissioning as specified in Section 01650, CONTRACTOR shall make all arrangements to obtain and convey the water from the DISTRICT'S supply to the pipeline, including all temporary pipelines, valves and pumps for conveyance.

Alternatively, CONTRACTOR may be permitted to receive Salinas Reservoir raw water from the DISTRICT by constructing a temporary piping interconnection between the Salinas pipeline and Cuesta Tunnel Tank.

- CONTRACTOR shall make its own arrangements to obtain all other water supplies needed for construction and testing purposes.

3. ELECTRICAL POWER. All electrical power for heating, lighting, and operation of CONTRACTOR'S equipment in connection with the WORK to be performed under this Contract shall be provided by CONTRACTOR.

- Make arrangements with PG&E to obtain temporary power at locations mutually agreed-upon.

- When construction is completed, all temporary electrical power facilities shall be removed.

CONTRACTOR at its own expense shall make authorized connections to the existing power sources and shall extend temporary service lines to the required areas. Temporary wiring shall conform to Article 305 of the NEC.

CONTRACTOR shall at all times provide adequately against waste and needless use of power. Electrical power shall be used only in such quantities as will not interfere with DISTRICT'S requirements, and care shall be taken not to overload the existing facilities. CONTRACTOR shall provide any additional or temporary electrical power or power of other voltages it may require for prosecution of the WORK.

4. TELEPHONE SERVICE. CONTRACTOR shall make all necessary arrangements and pay all installation charges for telephone lines for the field offices at the site, and shall provide all telephone instruments.

- DSL service may not be available from the telephone company in certain reaches along the pipeline alignment.
- Cellular telephone coverage in certain reaches along the pipeline alignment can be poor or non-existent at times. CONTRACTOR should also consider use of radio communications on-site because of this.

5. SANITARY FACILITIES. CONTRACTOR shall furnish temporary sanitary facilities at the site, as provided herein, for the needs of all construction workers and others performing work or furnishing services on the Project.

Sanitary facilities shall be of reasonable capacity, properly maintained throughout the construction period, and obscured from public view to the greatest practical

extent. If toilets of the chemically treated type are used, at least one toilet shall be furnished for each 20 persons. CONTRACTOR shall enforce the use of such sanitary facilities by all personnel at the site.

6. FENCES AND GATES. Except as may otherwise be designated for demolition, all existing fences affected by the WORK shall be maintained by CONTRACTOR until completion of the WORK. Fences which interfere with construction operations shall not be relocated or dismantled until written permission is obtained from the owner of the fence, and the period the fence may be left relocated or dismantled has been agreed upon. Gates shall be kept closed and locked at all times when not in use. On completion of the WORK, CONTRACTOR shall restore all fences and gates to their original location and pre-construction condition.

7. DAMAGE TO EXISTING PROPERTY. CONTRACTOR will be held responsible for any damage to existing structures, work, materials, or equipment because of its operations and shall repair or replace any damaged structures, work, materials, or equipment to the satisfaction of, and at no additional cost to, DISTRICT.

CONTRACTOR shall protect all existing structures and property from damage and shall provide bracing, shoring, or other work necessary for such protection.

CONTRACTOR shall be responsible for all damage to streets, roads, curbs, sidewalks, highways, shoulders, ditches, embankments, culverts, bridges, or other public or private property, which may be caused by transporting equipment, materials, or workers to or from the Work. CONTRACTOR shall make satisfactory and acceptable arrangements with the agency having jurisdiction over the damaged property concerning its repair or replacement.

8. TRAFFIC AND ROADWAY CONTROLS. CONTRACTOR shall minimize damage to roadways including haul routes. The CONTRACTOR shall be responsible for repairing damage to the roadways caused by construction activities or, as determined by the agency having jurisdiction over the roadway, for reimbursing the agency having jurisdiction on the roadways for damage caused by construction operations. The CONTRACTOR shall be responsible for damage directly attributable to its and its Subcontractor's activities and shall be responsible for repairs to return the roadways to the pre-project condition. The ENGINEER will periodically monitor the roadway condition and will notify the CONTRACTOR of damages and repairs that need to be implemented. All repairs shall be performed at the CONTRACTOR'S expense.

Construction may cause increased traffic from transporting construction materials to the project site area and traffic delays caused by construction at or adjacent to

a roadway. CONTRACTOR shall plan the transportation of materials and crews to limit traffic during peak hours. The DISTRICT may direct the CONTRACTOR to rearrange transportation to and from the project site area to minimize increased traffic. If transportation does need to be rearranged, such rearrangement will be at the CONTRACTOR'S expense. The CONTRACTOR shall perform construction activities at roadways and at access road entrances and exits to the public roadways in such a manner to eliminate substantial traffic delays and traffic delays or detours that would last more than one week at any location. The DISTRICT will notify the CONTRACTOR in the event that traffic delays have or are anticipated to exceed an acceptable level or duration. In such cases, the CONTRACTOR shall, at the CONTRACTOR'S expense, rearrange the work activities to reduce the delays caused by the performance of the WORK.

9. TREE AND PLANT PROTECTION. All trees and other vegetation which must be removed to perform the Work shall be removed and disposed of by CONTRACTOR; however, no trees or cultured plants shall be unnecessarily removed unless their removal is indicated on the Drawings. All trees and plants not removed shall be protected against injury from construction operations; refer to Section 01061, "Environmental Mitigation Requirements," for additional information.

CONTRACTOR shall take extra measures to protect trees specified or designated to be protected, such as temporary fencing, erecting barricades, trimming to prevent damage from construction equipment, and installing pipe and other Work by means of hand excavation or tunneling methods. Such trees shall not be endangered by stockpiling excavated material or storing equipment against their trunks.

All trimming, repair, and replacement of trees and plants shall be performed by qualified nurserymen or horticulturists.

10. SECURITY. CONTRACTOR shall be responsible for protection of the site and all WORK, and of its materials and equipment, against vandals and other unauthorized persons.

No claim shall be made against DISTRICT by reason of any act of an employee or trespasser, and CONTRACTOR shall make good all damage to DISTRICT'S property resulting from CONTRACTOR'S failure to provide security measures as specified.

Security measures shall be at least equal to those usually provided by DISTRICT to protect DISTRICT'S existing facilities during normal operation, but shall also include additional measures such as temporary perimeter security fencing,

barricades, lighting, and other measures as required to protect the Site. The construction site and access road shall be fenced in with standard chain link security fencing topped with a triple barbed wire outrigger. Fencing shall be temporary and shall be removed once the project is completed.

10.01. Security Measures Submittal. In accordance with the requirements specified in Section 01300, CONTRACTOR shall submit a written plan defining security and security procedures.

10.02. CONTRACTOR Access to Santa Margarita Booster Pump Station Site. The existing SMBPS access gate is kept closed and access to the site is granted by contacting DISTRICT plant staff from the gate location. During construction, CONTRACTOR shall implement and maintain a secure site access program for its employees, laborers, Subcontractors, and site deliveries. The site access program shall include the following:

- Submit to the DISTRICT a list of all personnel that are on site each day. The list shall be kept up to date and the current listing shall be maintained on site and be available to the DISTRICT, ENGINEER, and Resident Project Representative at all times.

- Establish and maintain an identification and record system (Visitor's Log) for all who access the project site. All personnel entering the site will be required to have a visible photo ID badge; badge shall be visible at all times while on site. Submit record information to the ENGINEER at the end of each day.

- Establish and maintain a system to identify and record all material and equipment brought onto and removed from the project site.

- Insure that all powered operated equipment left on site over night and during off-hours are secured to prevent their use in damaging existing facilities.

11. ACCESS ROADS. CONTRACTOR shall establish and maintain temporary access roads to various parts of the project area as required to complete the Project. Such roads shall be available for the use of all others performing work or furnishing services in connection with the Project.

12. PARKING. CONTRACTOR shall provide and maintain suitable parking areas for the use of all workers and others performing work or furnishing services in connection with the Project, as required to avoid any need for parking personal vehicles where they may interfere with public traffic, DISTRICT'S operations, or construction activities.

13. NOISE CONTROL. Refer to Section 01061, "Environmental Mitigation Requirements," for specific requirements. CONTRACTOR shall take reasonable

measures to avoid unnecessary noise. Such measures shall be appropriate for the normal ambient sound levels in the area during working hours. All construction machinery and vehicles shall be equipped with practical sound-muffling devices, and operated in a manner to cause the least noise consistent with efficient performance of the Work.

During construction activities on or adjacent to occupied buildings, and when appropriate, CONTRACTOR shall erect screens or barriers effective in reducing noise in the building and shall conduct its operations to avoid unnecessary noise which might interfere with the activities of building occupants.

14. DUST CONTROL. Refer to Section 01061, "Environmental Mitigation Requirements," for specific requirements. CONTRACTOR shall take reasonable measures to prevent unnecessary dust.

15. TEMPORARY DRAINAGE PROVISIONS. Refer to the SWPPP requirements in Section 01060, "Permits," and Section 01061, "Environmental Mitigation Requirements," for specific requirements. CONTRACTOR shall provide for the drainage of storm water and such water as may be applied or discharged within the project site area in CONTRACTOR'S performance of the WORK. Drainage facilities shall be adequate to prevent damage to the WORK, the project site area, and adjacent property.

16. EROSION CONTROL. Refer to the SWPPP requirements in Section 01060, "Permits," and Section 01061, "Environmental Mitigation Requirements," for specific requirements. CONTRACTOR shall prevent erosion of soil on the project site area and adjacent property resulting from its construction activities. Effective measures shall be initiated prior to the commencement of clearing, grading, excavation, or other operation that will disturb the natural protection.

Work shall be scheduled to expose areas subject to erosion for the shortest possible time, and natural vegetation shall be preserved to the greatest extent practicable. Temporary storage and construction buildings shall be located, and construction traffic routed, to minimize erosion. Temporary fast-growing vegetation or other suitable ground cover shall be provided as necessary to control runoff.

17. POLLUTION CONTROL. Refer to Section 01061, "Environmental Mitigation Requirements," for specific requirements. CONTRACTOR shall prevent the pollution of drains and watercourses by sanitary wastes, sediment, debris, and other substances resulting from construction activities. No sanitary wastes shall be permitted to enter any drain or watercourse other than sanitary sewers. No sediment, debris, or other substance shall be permitted to enter sanitary sewers,

and reasonable measures shall be taken to prevent such materials from entering any drain or watercourse.

18. TRAFFIC CONTROL. Traffic control requirements shall be as shown on the Drawings, and as specified in any encroachment permits obtained for the Project as specified in Section 01060, “Permits.”

19. PROJECT SIGN. The CONTRACTOR shall coordinate with the ENGINEER to install Project Signs as shown in Attachment B to Section 01500. The CONTRACTOR shall anticipate that the Project Sign will need to be modified or replaced at least twice during the construction period as Project information (e.g., names of Supervisors or Commissioners) changes.

End of Section

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Attachment A to Section 01500

ENGINEER'S FIELD OFFICE

PART 1 - GENERAL

1.01 SUMMARY

A. The CONTRACTOR shall provide and maintain, for the exclusive use of the ENGINEER'S on site representatives, one separate field office or office space within CONTRACTOR'S operation of approximately 680 square feet, with a configuration to accommodate the following approximate spaces: two private offices (12'x14' and 10'x12'), conference room (12'x16'), open space (10'x10'), and combination Men/Women rest room facility compliant w/ ADA.

B. The ENGINEER'S office shall be installed and fully functional within 30 days after the Notice to Proceed.

C. The CONTRACTOR shall provide all necessary utilities, security system, and janitorial services as specified.

D. Unless released earlier by the ENGINEER in writing, the field office shall be maintained in full operation at the site until the Certificate of Completion has been executed. The CONTRACTOR shall remove the field office within 14 days after release, and shall restore the site.

1.02 SUBMITTALS

A. Comply with requirements of Section 01300, "Submittals."

B. Provide a dimensioned layout including structural and architectural features inside and outside.

1.03 PARKING

A. Provide 3 parking spaces for the ENGINEER staff adjacent to the field office trailer.

1.04 FIELD OFFICE TELEPHONE AND DSL SERVICE

A. The CONTRACTOR shall provide a minimum of 2 incoming data quality telephone lines to the ENGINEER'S field office. Radio telephone service is not acceptable. Provide all conduit, wire, trenching, and appurtenances necessary for telephone service. The CONTRACTOR shall pay all costs and fees to establish telephone service, and shall pay all basic and long distance monthly telephone service charges.

The telephone system shall include the following features:

- Two telephone instruments capable of meeting the requirements specified.
- Individual line to each instrument with individual voice mail.
- Capability to forward any line to a central phone station in the office.
- Capability to transfer calls to another line.
- One dedicated fax line.
- One dedicated line for high speed internet modems.

DSL Service: Provide high speed internet service (DSL, cable modem, etc) for up to 4 computer work stations. Pay for monthly service charges for the duration of the contract. DSL or other internet service shall include router, firewall, and all other necessary hardware and software. If DSL is unavailable, then alternative high speed internet services such as cable or satellite are acceptable equals.

1.05 POWER

A. Provide electrical power service to the field office. Coordinate voltage and phase requirements, and provide necessary transformers, metering, panels, circuit breakers, wire, conduit, trenching, power poles, and appurtenances necessary to install electrical service. Pay all costs and fees to establish electrical service, and pay all monthly service charges.

B. Electrical system: All fixtures, outlets, and wiring of UL approved devices; all circuits protected by circuit breakers; fuses not acceptable; incoming service provided with circuit breaker; 110-volt, 20-amp duplex convenience outlets at every 6 feet along each wall surface; GFCI outlets in bath area; separate circuit for copy machine.

C. Lighting system: Fluorescent type providing 100-foot candles at desk height; minimum 2-foot by 4-foot fixtures.

1.06 WATER

A. Provide potable water service to the field office including one 20-gallon quick recovery hot water heater. Provide all piping, trenching, meters, pressure regulators, and appurtenances necessary to install water service. Pay all costs and fees to establish water service, and pay all monthly service charges.

1.07 SANITATION

A. Provide sanitary sewer connections from the trailer. Provide all piping, trenching, and appurtenances necessary to connect the trailer to the sanitary

sewer. Pay all costs and fees to establish sewer service, and pay all monthly service charges.

1.08 ENVIRONMENTAL CONTROL

A. Thermostatically controlled air conditioning and heating unit capable of automatically maintaining an interior temperature of 72 degrees F during all seasons in each room.

B. Security alarm system consisting of motion detectors, door alarms, audible horn, and remote alarm indication. Any alarm shall be monitored at a central location, and a uniformed security service shall respond to the alarm.

C. At exterior door, provide a boot wash consisting of a boot brush, hose bib, 10 feet of garden hose with spray nozzle, and gravel drain area.

1.09 MAINTENANCE

A. Provide necessary maintenance to keep the field office trailer, utility services, and appurtenance in good operating condition. Pay all costs and fees for maintenance services. Include the following minimum elements:

- Daily services (5 days/week):
  - Sweep and vacuum floors, and floor mats. Use sweeping dust abatement compound to control dust while sweeping. Empty trash cans, and remove other clearly marked trash.
  - Clean restroom, toilet bowl, sink, floors, counters, and other appurtenances.
  - Replace all restroom supplies including hand soap, toilet paper, seat covers, and sanitary bags.
  - Dust all surfaces that are cleared of paper.
  - Clean food preparation area, including counters and sinks.
- Twice/week services:
  - Mop floors.
- Weekly services:
  - Sweep and clean outside entry areas.
- Quarterly services:
  - Strip and wax floors.
  - Wash all windows inside and out.

1.10 ENGINEER'S OFFICE FURNITURE AND EQUIPMENT

A. The CONTRACTOR shall provide and maintain the following field office trailer furnishings for the duration of the Contract as follows:

- 2 standard steel office desks 30" x 60", with six drawers and formica tops.
- 3 folding tables 29"x 30" x 48" with formica top.
- 3 stacking metal chairs with cushioned vinyl pads.
- 2 office chairs, standard arm rest type, adjustable, swivel, tilt-back with casters.
- 2 bookshelves with 5 shelves each, 36" x 12" x 72" high.
- 4 metal legal size filing cabinets, four drawers each, with suspension racks installed in each drawer.
- 1 supply cabinet 72"h X 36"w X 24"d with shelves, lock and keys.
- Provide & install one plan rack, wall mounted 42" wide w/ 36 individual plan holders each.
- Provide & install combination tack/ white board 36"x48" one in each office.
- Provide and install one (1) digital COPIER (Toshiba e-Studio 35, Konica 7035 or equal.) with the following features and accessories:
    - 100 Sheet RADF, lift-top, document feeder;
    - Finisher with collation and one position stapling;
    - Three paper trays integral with the equipment including 8- ½ x 11, 8-1/2 x 14 and 11x17;
    - Additional 550 sheet paper feed pedestal or drawer;
    - 32 MB Image Memory, 20 GB hard disk drive;
    - 35 PPM Digital Imaging, 600 x 600 dpi;
    - Zoom, Reduction and enlargement from 25% to 400%;
- Embedded Print Controller with minimum 166 Mhz processor and 10/100 BaseT Network Interface Card;
- Connect to jobsite LAN and configure as a printer option for all workstations.
- Two (2) spare toner cartridges. Replace as necessary for duration of the contract.
- Provide, install, configure & maintain one HP Scanjet 8250 digital scanner or equal, with Hi-Speed USB interface.
- Provide and install HP fax 1220 Fax machine or equal with the following features and accessories:

- 150 sheet paper tray;
- 4 mb of memory with 270 pages of out of paper reception;
- 100 number auto-dial;
- Two (2) spare toner cartridges. Replace as necessary for duration of the contract.

- 3 wastebaskets.
- 1 first aid kit.
- 1 Type ABC 10-pound fire extinguisher.
- 1 small refrigerator.
- 1 microwave oven.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 INSTALLATION

A. Comply with local, state, and national codes.

B. Provide 3-foot minimum cover for sewer and water service. Insulate and cover with a waterproof jacket all exposed piping.

C. Obtain and pay for all permits required to deliver and install the ENGINEER'S office. Arrange and pay for all inspections required by the permitting authorities.

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Attachment B to Section 01500

PROJECT SIGN

Layout of Project Sign:

NACIMIENTO WATER PROJECT

Construction of the PIPELINE - SOUTH

A Project of the
San Luis Obispo County Flood Control
and Water Conservation District

District's Board of Supervisors
Harry Ovitt, Supervisor District No. 1
Bruce Gibson, Supervisor District No. 2
Jerry Lenthall, Supervisor District No. 3
K. H. "Katcho" Achadjian, Supervisor District No. 4
James R. Patterson, Supervisor District No. 5

District's Nacimiento Project Manager: John R. Hollenbeck, P.E.
General Information: (805) 781-5252

Project Participants and Nacimiento Water Commissioners
City of Paso Robles, Frank Mecham
Templeton Community Services District, David Brooks
Atascadero Mutual Water Company, Robert "Grigger" Jones
City of San Luis Obispo, Dave Romero
County Services Area 10A, Harry Ovitt

General Contractor: <Firm Name later>
General Information: <Contractor provided number>
24-hour Emergency Number: <Contractor provided number>
Construction Commencement Date: <enter Commencement Date>

Construction Manager: Jacobs Engineering, Inc.
General Information: (805) 781-2452

Designer: Black & Veatch Corporation and Boyle Engineering

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Section 01530

PROTECTION OF EXISTING FACILITIES

1. GENERAL

CONTRACTOR shall locate, protect, shore, brace, support, and maintain all underground pipes, utilities, conduits, cables, drains, and other underground construction uncovered or otherwise affected by its construction operations. All pavement, surfacing, driveways, curbs, walks, buildings, utility poles, guy wires, fences, and other surface structures affected by construction operations, together with all sod and shrubs in yards, parkways, and medians, shall be restored to their original condition, whether within or outside the construction easements. All replacements shall be made with new materials of the same size, type, and quality as that removed.

CONTRACTOR shall be responsible for all damage to streets, roads, highways, shoulders, ditches, embankments, culverts, bridges, curbs, sidewalks, signs, and other public or private property, regardless of location or character, which may be caused by transporting equipment, materials, or workers to or from the WORK or any part or site thereof, whether by CONTRACTOR or its Subcontractors. CONTRACTOR shall make satisfactory and acceptable arrangements with the owner of, or the agency or authority having jurisdiction over, the damaged property concerning its repair or replacement or payment of costs incurred in connection with the damage.

All fire hydrants and water control valves shall be kept free from obstruction and available for use at all times.

2. NOT USED.

3. LOCATING EXISTING UTILITIES DURING CONSTRUCTION

Pursuant to Government Code Section 4216 - 4216.9, the CONTRACTOR shall notify the appropriate regional notification center of all excavations as required under Government Code Sections 4216 - 4216.9. The CONTRACTOR shall contact Underground Service Alert at 1-800-642-2444 for the location of subsurface installations. CONTRACTOR shall furnish to the ENGINEER written documentation of its contact(s) with Underground Service Alert (and any other regional notification center within five (5) days after such contact(s).

It shall be the CONTRACTOR'S responsibility to determine the exact location and depth of all utilities, including service connections, which have been marked by the respective owners, and which CONTRACTOR believes may affect or be

affected by CONTRACTOR'S operations. CONTRACTOR shall field locate by potholing or other acceptable non-destructive method, and expose, all underground utilities not less than 1,500 feet in advance of pipeline construction operations, and report to the ENGINEER any potential conflicts so that they may be resolved in a timely manner.

4. NOTIFYING UTILITY OWNERS

Prior to any excavation in the vicinity of any existing underground facilities, including all water, sewer, storm drain, gas, petroleum products, or other pipelines; all buried electric power, communications, or television cables; all traffic signal and street lighting facilities; and all roadway and state highway rights-of-way, the CONTRACTOR shall notify the respective authorities representing the owners or agencies responsible for such facilities not less than 3 days nor more than 7 days prior to excavation so that a representative of said owners or agencies can be present during such work if they so desire.

The CONTRACTOR shall not perform any work that would affect any oil, gas, sewer, or water pipeline; any telephone, telegraph, fiber optic, or electric transmission line; any fence; or any other structure, nor shall the CONTRACTOR enter upon the rights-of-way involved until notified by the ENGINEER that the DISTRICT has secured authority therefor from the proper party. After authority has been obtained, the CONTRACTOR shall give said party due notice of its intention to begin work, if required by said party, and shall remove, shore, support or otherwise protect such pipeline, transmission line, ditch, fence, or structure or replace the same.

5. PROTECTING EXISTING UTILITIES AND IMPROVEMENTS

5.01. General: The CONTRACTOR shall protect all Underground Utilities and other improvements which may be impaired during construction operations. The CONTRACTOR shall protect all overhead power and communication wires and cables encountered along the line of the WORK. The CONTRACTOR shall take all possible precautions for the protection of unforeseen utility lines to provide for uninterrupted service and to provide such special protection as may be necessary.

5.02. Utilities to be Moved: In case it shall be necessary to move the property of any public utility or franchise holder, such utility company or franchise holder will, upon request of the CONTRACTOR, be notified by the DISTRICT to move such property within a specified reasonable time. When utility lines that are to be removed are encountered within the area of operations, the CONTRACTOR shall notify the ENGINEER a sufficient time in advance for the necessary measures to be taken to prevent interruption of service.

Where the proper completion of the WORK requires the temporary or permanent removal and/or relocation of an existing utility or other improvement which is indicated, the CONTRACTOR shall remove and, without unnecessary delay, temporarily replace or relocate such utility or improvement in a manner satisfactory to the ENGINEER and the owner of the facility. In all cases of such temporary removal or relocation, restoration to former location shall be accomplished by the CONTRACTOR in a manner that will restore or replace the utility or improvement as nearly as possible to its former locations and to as good or better condition than found prior to removal.

5.03. DISTRICT'S Right of Access: The right is reserved to the DISTRICT and to the owners of public utilities and franchises to enter at any time upon any public street, alley, right-of-way, or easement for the purpose of making changes in their property made necessary by the WORK of this Contract.

5.04. Underground Utilities Indicated: Existing utility lines that are indicated in the Contract Documents or the locations of which are otherwise made known to the CONTRACTOR prior to excavation, and all utility lines that are constructed during excavation operations shall be protected from damage during excavation and backfilling and, if damaged, shall be immediately repaired or replaced by the CONTRACTOR.

5.05. Underground Utilities Not Indicated: In the event the CONTRACTOR discovers any underground Utility facilities not identified in the Contract Documents, the CONTRACTOR shall immediately notify the ENGINEER in writing. The CONTRACTOR'S failure to give said Notice within one business day of its discovery of said underground facilities shall constitute a waiver of all claims in connection therewith, whether direct or consequential in nature.

In the event an existing underground main or trunkline of a Utility is not identified or indicated in the Contract Documents, and the location of said Utility facility is not otherwise made known to the CONTRACTOR prior to excavation, and the CONTRACTOR has timely notified ENGINEER of its discovery of said Utility facility, all compensable costs of CONTRACTOR of locating, protecting, removing, or relocating such Utility facilities, and all compensable costs of repairing damage not due to failure of the CONTRACTOR to exercise reasonable care, and all compensable costs for equipment at the Work Site which was interrupted or idled by removal or relocation of such utility facilities, and which was necessarily idled during such removal/relocation work, will be paid for as extra work in accordance with the provisions of Articles 10, 11, and 12, Section 00700, "General Conditions," so long as said costs are reasonable and compensable under said Articles.

In the event an existing underground main or trunkline of the Utility is not identified or indicated in the Contract Documents, and the location of said Utility

facility is not otherwise made known to the CONTRACTOR prior to excavation, the CONTRACTOR shall not be assessed liquidated damages for delay in completing any Work, when such delay was caused by the failure of the DISTRICT or the owner of the Utility to provide for removal or relocation of such Utility facilities. The foregoing provisions of this paragraph do not apply to any existing service laterals, appurtenances, or other Utility facilities whenever the presence of such facilities at the Work Site can be inferred from the presence of other visible facilities, such as buildings, meter and junction boxes, on or adjacent to the Work Site, or whenever the presence of such facilities could reasonably have been discovered by CONTRACTOR as a result of an examination or investigation of the Site and its contiguous areas.

5.06. Approval of Repairs: All repairs to a damaged utility or improvement are subject to inspection and approval by an authorized representative of the utility or improvement owner before being concealed by backfill or other work.

5.07. Maintaining in Service: All oil and gasoline pipelines, power, and telephone or the communication cable ducts, gas and water mains, irrigation lines, sewer lines, storm drain lines, poles, and overhead power and communication wires and cables encountered along the line of the WORK shall remain continuously in service during all the operations under the Contract, unless other arrangements satisfactory to the ENGINEER are made with the owner of said pipelines, duct, main, irrigation line, sewer, storm drain, pole, or wire or cable. The CONTRACTOR shall be responsible for and shall repair all damage due to its operations, and the provisions of this Section shall not be abated even in the event such damage occurs after backfilling or is not discovered until after completion of the backfilling.

5.08. Thrust Blocks on Waterlines. The CONTRACTOR'S attention is called to thrust blocks which may or may not be delineated in the Drawings, for waterlines throughout the Project 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 City of Paso Robles, by Atascadero Mutual Water Company, or by others. CONTRACTOR shall protect thrust blocks in-place or shore to resist the thrust by a means approved by the owner of the water line, and reconstruct. If the thrust blocks are exposed or rendered to be ineffective in the opinion of the ENGINEER, reconstruct them to bear against firm unexcavated or backfill material. 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: a.) Sand-cement slurry (94 pounds of cement per cubic yard). or b.) The native material compacted to a relative compaction of 95%. Then excavate the backfill material for construction of the thrust block.

End of Section

Section 01600

PRODUCTS, MATERIALS, EQUIPMENT AND SUBSTITUTIONS

1. GENERAL

The word "Products," as used herein, is defined to include purchased items for incorporation into the WORK, regardless of whether specifically purchased for the project or taken from CONTRACTOR'S stock of previously purchased products. The word "Materials," is defined as products which must be substantially cut, shaped, worked, mixed, finished, refined, or otherwise fabricated, processed, installed, or applied to form units of work. The word "Equipment" is defined as products with operational parts, regardless of whether motorized or manually operated, and particularly including products with service connections (wiring, piping, and other like items). Definitions in this paragraph are not intended to negate the meaning of other terms used in the Contract Documents, including "specialties," "systems," "structure," "finishes," "accessories," "furnishings," special construction," and similar terms, which are self-explanatory and have recognized meanings in the construction industry.

Neither "Products" nor "Materials" nor "Equipment" includes machinery and equipment used for preparation, fabrication, conveying and erection of the WORK.

2. QUALITY ASSURANCE.

2.01. Source Limitations: To the greatest extent possible for each unit of work, the CONTRACTOR shall provide products, materials, and equipment of a singular generic kind from a single source.

2.02. Compatibility of Options: Where more than one choice is available as options for CONTRACTOR'S selection of a product, material, or equipment, the CONTRACTOR shall select an option which is compatible with other products, materials, or equipment. Compatibility is a basic general requirement of product, material and equipment selections.

3. DELIVERY AND STORAGE.

The CONTRACTOR shall deliver and store the WORK in accordance with manufacturer's written recommendations and by methods and means which will prevent damage, deterioration, and loss including theft. Delivery schedules shall be controlled to minimize long-term storage of products at site and overcrowding of construction spaces. In particular, the CONTRACTOR shall ensure coordination to ensure minimum holding or storage times for flammable, hazardous, easily damaged, or sensitive materials to deterioration, theft, and other sources of loss.

Contractor shall, either directly or through contractual arrangements with others, accept responsibility for the safe handling and protection of the equipment and materials furnished under this Contract before and after receipt at the port of entry. Acceptance of the equipment shall be made after it is installed, tested, placed in operation and found to comply with all of the specified requirements.

3.01 Preparation For Shipment. All equipment shall be suitably packaged to facilitate handling and to protect against damage during transit and storage. All equipment shall be boxed, crated, or otherwise completely enclosed and protected during shipment, handling, and storage. All equipment shall be protected from exposure to the elements and shall be kept dry at all times.

Painted and coated surfaces shall be protected against impact, abrasion, discoloration, and other damage. Painted and coated surfaces which are damaged prior to acceptance of equipment shall be repainted to the satisfaction of the ENGINEER.

Grease and lubricating oil shall be applied to all bearings and similar items.

Before shipping, each item of equipment shall be tagged or marked as identified in the delivery schedule or on the Shop Drawings. Complete packing lists and bills of material shall be included with each shipment. Instructions for servicing equipment while in long-term storage shall accompany each item of equipment. Notification of enclosed instructions shall be indicated on the exterior of each package.

3.02. Shipping and Handling. CONTRACTOR shall be responsible for obtaining all transportation permits for any over-sized equipment.

Products shall be transported by methods to avoid damage and shall be delivered in undamaged condition in manufacturer's unopened containers and packaging.

Upon delivery of materials and equipment to the jobsite, the CONTRACTOR shall off-load and inspect the items. All items shall be checked for damage and for shortages against packing lists immediately on delivery to the site. Damage and shortages shall be remedied with the minimum of delay. The CONTRACTOR shall have a representative on the jobsite to inspect the materials and equipment along with the Resident Project Representative.

All items found after delivery inspection to be unacceptable due to being incomplete, damaged, or not in conformance with the accepted shop drawings shall be replaced, at the expense of the CONTRACTOR, prior to incorporation into the WORK.

Following delivery and inspection, all equipment and materials shall immediately be stored and protected until installed in the WORK.

3.03. Storage. Products shall be stored in accordance with manufacturer's written instructions and with seals and labels intact and legible. Sensitive products shall be stored in weather-tight climate controlled enclosures and temperature and humidity ranges shall be maintained within tolerances required by manufacturer's recommendations

For exterior storage of fabricated products, products shall be placed on sloped supports above ground. Products subject to deterioration shall be covered with impervious sheet covering and ventilation shall be provided to avoid condensation.

Loose granular materials shall be stored on solid flat surfaces in a well-drained area and shall be prevented from mixing with foreign matter.

Storage shall be arranged to provide access for inspection. The CONTRACTOR shall periodically inspect to assure products are undamaged and are maintained under required conditions.

Stacked items shall be suitably protected from damage by spacers or load distributing supports that are safely arranged. No metalwork (miscellaneous steel shapes and reinforcing steel) shall be stored directly on the ground. Masonry products shall be handled and stored in a manner to hold breakage, chipping, cracking, and spalling to a minimum. Cement, lime, and similar products shall be stored off the ground on pallets and shall be covered and kept completely dry at all times. Pipe, fittings, and valves may be stored out of doors, but must be placed on wooden blocking. PVC pipe, geomembranes, plastic liner, and other plastic materials shall be stored off the ground on pallets and protected from direct sunlight.

Pumps, motors, electrical equipment, and all equipment with antifriction or sleeve bearings shall be stored in weathertight structures maintained at a temperature above 60°F. Electrical equipment, controls, and insulation shall be protected against moisture and water damage. All space heaters furnished in equipment shall be connected and operated continuously.

Equipment having moving parts, such as gears, bearings, and seals, shall be stored fully lubricated with oil, grease, etc., unless otherwise instructed by the manufacturer. Manufacturer's storage instructions shall be carefully followed by CONTRACTOR.

When required by the equipment manufacturer, moving parts shall be rotated a minimum of twice a month to ensure proper lubrication and to avoid metal to metal "welding".

When required by the equipment manufacturer, lubricants shall be changed upon completion of installation and as frequently as required thereafter during the period between installation and acceptance. New lubricants shall be put into the equipment by CONTRACTOR at the time of acceptance.

Equipment and materials shall not show any pitting, rust, decay, or other deleterious effects of storage when installed in the WORK.

In addition to the protection specified for prolonged storage, the packaging of spare units and spare parts shall be for export packing and shall be suitable for long-term storage in a damp location. Each spare item shall be packed separately and shall be completely identified with a typed label on the outside of the container. A bill of lading shall be provided for each container.

Stored products shall be periodically inspected on a scheduled basis. The CONTRACTOR shall maintain a log of inspections and shall make the log available on request. Products shall be serviced on a regularly scheduled basis, and a log of services shall be maintained and submitted as a record document prior to acceptance by the DISTRICT in accordance with the Contract Documents.

4. PROPOSED SUBSTITUTES OR "OR-EQUAL" ITEMS. Whenever materials or equipment are indicated in the Contract Documents by using the name of a proprietary item or the name of a particular supplier, the naming of the item is intended to establish the type, function, and quality required. If the name is followed by the words "or equal" indicating that a substitution is permitted, materials or equipment of other suppliers may be accepted if sufficient information is submitted by the CONTRACTOR to allow the ENGINEER to determine that the material or equipment proposed is equivalent or equal to that named.

4.01. Requirements:

a. The burden of proof as to the type, function, and quality of any such substitute product, material or equipment shall be upon the CONTRACTOR.

b. The ENGINEER will be the sole judge as to the type, function, and quality of any such substitute and the ENGINEER'S decision shall be final.

c. The ENGINEER may require the CONTRACTOR to furnish at the CONTRACTOR’S expense additional data about the proposed substitute, or sample of same.

d. The DISTRICT may require the CONTRACTOR to furnish at the CONTRACTOR'S expense a special performance guarantee or other surety with respect to any substitute.

e. Acceptance by the ENGINEER of a substitute item proposed by the CONTRACTOR shall not relieve the CONTRACTOR of the responsibility for full compliance with the Contract Documents and for adequacy of the substitute.

f. The CONTRACTOR shall be responsible for resultant changes including design and construction changes and all additional costs resulting from the changes which the accepted substitution requires in the CONTRACTOR'S work, the work of its Subcontractors and of other contractors, and shall effect such changes without cost to the DISTRICT.

4.02. Review Procedure: The procedure for review by the ENGINEER will include the following:

a. If the CONTRACTOR wishes to provide a substitute item, the CONTRACTOR shall make written application to the ENGINEER on the "Substitution Request Form."

b. Unless otherwise provided by law or authorized in writing by the ENGINEER, the "Substitution Request Form(s)" shall be submitted within the 35-day period after the effective date of the Agreement.

c. Wherever a proposed substitute item has not been submitted within said 35-day period, or wherever the submission of a proposed substitute material or equipment has been judged to be unacceptable by the ENGINEER, the CONTRACTOR shall provide the material or equipment indicated in the Contract Documents.

d. The CONTRACTOR shall certify that the proposed substitute will perform adequately the functions and achieve the results called for by the general design, and be similar and of equal substance to that indicated, and be suited to the same use as that specified.

e. The ENGINEER will evaluate each proposed substitute within a reasonable period of time.

f. As applicable, no shop drawing submittals shall be made for a substitute item nor shall any substitute item be ordered, installed, or utilized without the ENGINEER'S prior written acceptance of the CONTRACTOR'S "Substitution Request Form."

g. The ENGINEER will record the time required by the ENGINEER in evaluating substitutions proposed by the CONTRACTOR and in making changes by the CONTRACTOR in the Contract Documents occasioned thereby. Whether or not the ENGINEER accepts a proposed substitute, the CONTRACTOR shall reimburse the DISTRICT for the charges of the ENGINEER for evaluating each proposed substitute.

4.03. Application: The CONTRACTOR'S application using the "Substitution Request Forms" shall contain the following statements and information which shall be considered by the ENGINEER in evaluating the proposed substitution:

a. The evaluation and acceptance of the proposed substitute will not prejudice the CONTRACTOR'S achievement of Substantial Completion on time.

b. Whether or not acceptance of the substitute for use in the WORK will require a change in any of the Contract Documents to adopt the design to the proposed substitute.

c. Whether or not incorporation or use of the substitute in connection with the WORK is subject to payment of any license fee or royalty.

d. All variations of the proposed substitute from the items originally specified will be identified.

e. Available maintenance, repair, and replacement service will be indicated. The manufacturer shall have a local service agency (within 50 miles of the site) which maintains properly trained personnel and adequate spare parts and is able to respond and complete repairs within 24 hours.

f. Itemized estimate of all costs that will result directly or indirectly from acceptance of such substitute, including cost of redesign and claims of other contractors affected by the resulting change.

End of Section

Section 01605

GENERAL EQUIPMENT REQUIREMENTS

1. SCOPE. All equipment and appurtenances furnished and installed under this Contract (including but not limited to process, electrical, and mechanical equipment, ducts, piping, and electrical conduits) shall conform to the general requirements set forth in this Section and Section 05550, “Anchorage in Concrete and Masonry,” except as otherwise specified in other sections.

2. COORDINATION. CONTRACTOR shall coordinate all details of the equipment with other related parts of the WORK, including verification that all structures, piping, wiring, and equipment components are compatible. CONTRACTOR shall be responsible for all structural and other alterations in the WORK required to accommodate equipment differing in dimensions or other characteristics from that contemplated in the Contract Drawings or Specifications.

3. EQUIPMENT MANUFACTURER'S EXPERIENCE. Unless such longer periods of time are otherwise specified in the individual Technical Specifications, a manufacturer shall have furnished equipment of the type and size specified which has been in successful operation for not less than the past five (5) years.

4. WORKMANSHIP AND MATERIALS. CONTRACTOR shall guarantee all equipment against faulty or inadequate design, improper assembly or erection, defective workmanship or materials, and leakage, breakage, or other failure. Materials shall be suitable for service conditions.

All equipment shall be designed, fabricated, and assembled in accordance with recognized and acceptable engineering and shop practice. Individual parts shall be manufactured to standard sizes and thicknesses so that repair parts, furnished at any time, can be installed in the field. Like parts of duplicate units shall be interchangeable. Equipment shall not have been in service at any time prior to delivery, except as required by tests.

Except where otherwise specified, structural and miscellaneous fabricated steel used in equipment manufacture shall conform to AISC standards. All structural members shall be designed for shock or vibratory loads. Unless otherwise specified, all steel which will be submerged, all or in part, during normal operation of the equipment, shall be at least ¼ inch thick.

5. SEISMIC DESIGN AND ANCHORAGE OF EQUIPMENT AND OTHER APPURTENANT FACILITIES.

5.01. General. The CONTRACTOR shall recognize that the applicable seismic zone is Zone 4 as presented in the 2001 California Building Code (CBC). All equipment or assemblies within these Specifications or on the Drawings shall be designed and anchored to resist seismic forces appropriate for Seismic Zone 4. Unless the seismic coefficient is specifically listed, the greater force — as determined by the base shear equation — shall be used.

Unless otherwise specified, all pieces of electrical, mechanical, and instrumentation equipment and appurtenant assemblies which are separately mounted or anchored shall be so designed and installed in conformance to all requirements of the 2001 CBC, Chapter 16 and other appropriate sections, and as amended herein or in the Technical Specifications. Anchoring systems shall be designed to simultaneously withstand seismic lateral force (F_P) acting horizontally and two-thirds of the lateral force (0.67 F_P) acting vertically. This requirement applies, but is not limited, to such items as electrical and instrumentation panels, tanks, pumps, piping, pipe and conduit supports and hangers, motors, and other similar equipment. The quantity F_P shall be determined in accordance with Section 1632 of the 2001 CBC.

As a minimum, the effects of vertical ground motion should be evaluated together with the effects of horizontal ground motion for the load case: $F_e = (F_h^2 + F_v^2)^{1/2}$

Seismic loading criteria for the Project shall be used as shown below.

I_p	=	1.50
Z	=	Refer to Attachment
N_a	=	Refer to Attachment
N_v	=	Refer to Attachment
C_a	=	Refer to Attachment
C_v	=	Refer to Attachment

Notwithstanding the foregoing, where the effect of neglecting Fv is more conservative, the effect of vertical seismic forces shall be neglected.

Equipment shall include internal components that are attached to and supported by the equipment housing. All components shall be locked down or otherwise connected to prevent internal hammering and shall be restrained against falling. The attachment of components within the equipment housing, the equipment

housing itself, and the housing anchorage to the supporting building structure shall be able to resist the seismic forces specified for this project.

Attachments of components within equipment housings shall be a positive connection, such as bolts, lock down devices, and hold-down bars or braces which will not come loose due to vibration or ground shaking. Data on the device or devices to be used shall be submitted for review.

The design of the entire anchoring system, and the furnishing of any part of the anchoring system which must be integral with the equipment or assembly, shall be the responsibility of the manufacturer or Supplier. The CONTRACTOR, working closely with the manufacturer or Supplier, shall be responsible for furnishing or installing any anchors or restraints, which are independent of the equipment or facilities. Examples, but not limited to those noted, are anchor bolts, restraining curbs, walls, or angles and similar items.

Welded, bolted, or other intermittent connections such as inserts for anchorage shall not be allowed the one-third increase in allowable stress.

Anchor bolts in concrete or masonry shall be embedded not less than 12 bolt diameters for cast-in-place and expansion anchors, nor less than 15 diameters for adhesive anchors. Cast-in-place anchor bolts shall have heavy bolt heads embedded in the concrete. Expansion and adhesive anchor bolts shall have ICBO/ICC Evaluation Report Numbers. Adhesive anchors shall not be used in side mount or overhead applications or in areas with heat potential above 120 degrees Fahrenheit. Edge distance and spacing shall be considered in the design and shown on the erection drawings. On its erection drawings and installation instructions, CONTRACTOR shall note that “Special Inspections shall be performed for the installation of all anchor bolts”.

5.02. Special Detailing Requirements. In addition to all of the applicable detailing requirements of the CBC, the following shall apply:

Anchorage to concrete structures for seismic force resistance shall be accomplished by cast-in-place anchors wherever practical. Cast-in-place anchors shall be designed in accordance with the strength design provisions of CBC Section 1923. Design of anchors shall, whenever practical, be designed to be controlled by yielding of the steel anchor as opposed to shear cone failure of the concrete. Strength of drilled-in anchors, either adhesive or expansion type, shall not exceed the ICBO/ICC certified permissible values without the one-third increase in capacities.

5.03. Piping. All duct work, piping, and conduits shall be provided with seismic restraints in accordance with the Seismic Restraint Manual: Guidelines for

Mechanical Systems, Latest Edition, as published by the Sheet Metal and Air Conditioning Contractors National Association (SMACNA) Inc. with appropriate Seismic Hazard Level (SHL) and in accordance with the 2001 CBC. Where size of pipe or duct is smaller than listed in SMACNA, use member sizes and connections as indicated for the smallest listed size. Where piping material is aluminum, copper, or plastic, the supports shall be adjusted proportionally to the modulus of elasticity of steel over the modulus of elasticity for the material used.

5.04. Calculations. Where specified in the individual sections of the Technical Specifications, calculations for equipment anchorage, structural systems analysis, and load data, stamped and signed by a registered California Civil or Structural Engineer, shall be prepared and submitted for review and acceptance in accordance with Section 01300, "Submittals." As a minimum, submittal shall include the items on the Seismic Submittal Review Checklist, and the checklist shall also be submitted as part of the submittal.

6. LUBRICATION. Equipment shall be adequately lubricated by systems which require attention no more frequently than weekly during continuous operation. Lubrication systems shall not require attention during startup or shutdown and shall not waste lubricants.

Lubricants of the types recommended by the equipment manufacturer shall be provided in sufficient quantities to fill all lubricant reservoirs and to replace all consumption during testing, startup, and operation prior to acceptance of equipment by ENGINEER. Unless otherwise specified or permitted, the use of synthetic lubricants will not be acceptable.

Lubrication facilities shall be convenient and accessible. Oil drains and fill openings shall be easily accessible from the normal operating area or platform. Drains shall allow for convenient collection of waste oil in containers from the normal operating area or platform without removing the unit from its normal installed position.

7. ELEVATION. The elevation of the site(s) of the WORK are shown on the Drawings. All equipment furnished shall be designed to meet stipulated conditions and to operate satisfactorily at the specified elevation(s).

8. ELECTRIC MOTORS. Unless otherwise specified, motors furnished with equipment shall meet the requirements specified in specific equipment sections.

9. NOT USED.

10. NOT USED.

11. ANCHOR BOLTS. Equipment suppliers shall furnish suitable anchor bolts for each item of equipment. Anchor bolts, together with templates or setting drawings, shall be delivered sufficiently early to permit setting the anchor bolts when the structural concrete is placed. Anchor bolts shall comply with the requirements specified in Section 05550, “Anchorage in Concrete and Masonry,” and, unless otherwise specified or shown, shall be at least ¾ inch in diameter.

Unless otherwise indicated or specified, anchor bolts for items of equipment mounted on baseplates shall be long enough to permit 1-1/2 inches of grout beneath the baseplate and to provide adequate anchorage into structural concrete.

12. EQUIPMENT BASES. Unless otherwise indicated or specified, all equipment shall be installed on concrete bases at least 6 inches high. Cast iron or welded steel base plates shall be provided for pumps, compressors, and other equipment. Each unit and its drive assembly shall be supported on a single base plate of neat design. Base plates shall have pads for anchoring all components, and adequate grout holes. Base plates for pumps shall have a means for collecting leakage and a threaded drain connection. Base plates shall be anchored to the concrete base with suitable anchor bolts and the space beneath filled with grout as specified in Section 03600, “Grout.”

13. SPARE PARTS, MAINTENANCE MATERIALS AND SPECIAL TOOLS AND ACCESSORIES. CONTRACTOR shall furnish and deliver spare parts for the equipment as specified in the various equipment sections. Each spare part shall be fully identified as to the manufacturer, part number, purpose, and associated item of equipment. The CONTRACTOR shall inventory such parts and deliver the inventory, in writing, to the DISTRICT where requested. All safety-related items shall be delivered prior to testing.

Equipment requiring periodic repair and adjustment shall be furnished complete with all special tools, instruments and accessories required for proper maintenance. Equipment requiring special devices for lifting or handling shall be furnished complete with those devices.

14. SHOP PAINTING. All iron and steel surfaces of the equipment shall be protected with suitable protective coatings applied in the shop. Surfaces of the equipment that will be inaccessible after assembly shall be protected for the life of the equipment. Coatings shall be suitable for the environment where the equipment is installed. Exposed surfaces shall be finished, thoroughly cleaned, and filled as necessary to provide a smooth, uniform base for painting. Electric

motors, speed reducers, starters, and other self-contained or enclosed components shall be shop primed or finished with an oil-resistant enamel or universal type primer suitable for top coating in the field with a universal primer and aliphatic polyurethane system.

Surfaces to be coated after installation shall be prepared for painting as recommended by the paint manufacturer for the intended service, and then shop painted with one or more coats of a universal primer.

Machined, polished, and nonferrous surfaces which are not to be painted shall be coated with rust-preventive compound as recommended by the equipment manufacturer.

15. SHIPPING, HANDLING AND STORAGE. Equipment shall be prepared for shipment, handled and stored onsite as specified in Section 01600, “Products, Materials, Equipment and Substitutions.”

16. INSTALLATION AND OPERATION. Installation, testing and startup and initial operation shall be as specified in respective equipment sections in the Technical Specifications and Section 01650, “Startup and Testing.”

End of Section

TABLE 3

CALIFORNIA BUILDING CODE (2001) SEISMIC DESIGN PARAMETERS FOR PIPELINE ALIGNMENT

Nacimiento Water Project
San Luis Obispo County, California

Point	Location	Fault	Distance to Fault (km)	Z	Na	Nv	Soil Profile	Ca	Cv
1	0.5 miles east of intake structure	Rinconada	2.3	0.40	1.27	1.56	Sc	0.51	0.87
2	1.5 miles east of intake structure	Rinconada	<2.0	0.40	1.3	1.6	Sc	0.52	0.90
3	Camp Roberts, Boy Scout Road, 2.5 miles east of intake structure	Rinconada	<2.0	0.40	1.3	1.6	Sc	0.52	0.90
4	Camp Roberts, Boy Scout Road, 3.5 miles east of intake structure	Rinconada	<2.0	0.40	1.3	1.6	Sc	0.52	0.90
5	Camp Roberts, near the intersection of Boy Scout Road and West Perimeter Road	Rinconada	<2.0	0.40	1.3	1.6	Sc	0.52	0.90
6	Camp Roberts, West Perimeter Road, about 0.6 miles south of its intersection with Boy Scout Road	Rinconada	<2.0	0.40	1.3	1.6	Sc	0.52	0.90
7	Camp Roberts, West Perimeter Road, about 1.6 miles south of its intersection with Boy Scout Road	Rinconada	<2.0	0.40	1.3	1.6	Sc	0.52	0.90
8	Camp Roberts, West Perimeter Road, about 2.6 miles south of its intersection with Boy Scout Road	Rinconada	<2.0	0.40	1.3	1.6	Sc	0.52	0.90
9	Camp Roberts, West Perimeter Road, about 0.4 miles NW of its intersection with Generals Road	Rinconada	<2.0	0.40	1.3	1.6	Sc	0.52	0.90
10	Camp Roberts, Generals Road, about 0.7 miles south of its intersectoin with West Perimeter Road	Rinconada	<2.0	0.40	1.3	1.6	Sc	0.52	0.90
11	Mahoney Road, about 0.5 miles west of Texas Road	Rinconada	3.2	0.40	1.18	1.44	Sc	0.47	0.81

TABLE 3

CALIFORNIA BUILDING CODE (2001) SEISMIC DESIGN PARAMETERS FOR PIPELINE ALIGNMENT

Nacimiento Water Project
San Luis Obispo County, California

Point	Location	Fault	Distance to Fault (km)	Z	Na	Nv	Soil Profile	Ca	Cv
12	Private property, about 0.5 miles east of the intersection of Mahoney Road and Texas Road	Rinconada	4.7	0.40	1.03	1.24	Sc	0.41	0.69
13	Wellsona Road, about 0.2 miles south of its intersection with San Marcos Road	Rinconada	5.2	0.40	1	1.19	Sc	0.40	0.67
14	Wellsona Road, about 800 feet west of Highway 101	Rinconada	5.7	0.40	1	1.17	Sd	0.44	0.75
15	Monterey Road, about 0.2 miles north of its intersection with Exline Road	Rinconada	5.6	0.40	1	1.18	Sd	0.44	0.75
16	Monterey Road, about 0.3 miles north of its intersection with Highway 101	Rinconada	5	0.40	1	1.2	Sd	0.44	0.77
17	North River Road , about 1.2 miles north of its intersectoin with Creston Road	Rinconada	4	0.40	1.1	1.33	Sd	0.48	0.85
18	North River Road, about 800 feet north of its intersection with Creston Road	Rinconada	3.8	0.40	1.12	1.36	Sc	0.45	0.76
19	South River Road, about 0.8 miles south of its intersection with Creston Road	Rinconada	2.9	0.40	1.21	1.48	Sc	0.48	0.83
20	South River Road, about 800 feet north of its intersection with Niblick Road	Rinconada	2.3	0.40	1.27	1.56	Sc	0.51	0.87
21	South River Road, about 0.8 miles south of its intersection with Niblick Road	Rinconada	<2.0	0.40	1.3	1.6	Sc	0.52	0.90

TABLE 3

CALIFORNIA BUILDING CODE (2001) SEISMIC DESIGN PARAMETERS FOR PIPELINE ALIGNMENT

Nacimiento Water Project
San Luis Obispo County, California

Point	Location	Fault	Distance to Fault (km)	Z	Na	Nv	Soil Profile	Ca	Cv
22	Santa Ysabel Ranch	Rinconada	<2.0	0.40	1.3	1.6	Sd	0.57	1.02
23	Salinas River crossing, about 0.5 miles north of Vaquero Drive	Rinconada	<2.0	0.40	1.3	1.6	Sd	0.57	1.02
24	Vaquero Road, about 0.5 miles west of Concho Way	Rinconada	<2.0	0.40	1.3	1.6	Sd	0.57	1.02
25	El Pomar Road, about 0.5 miles SW of its intersection with Vaquero Road	Rinconada	<2.0	0.40	1.3	1.6	Sd	0.57	1.02
26	Templeton Road, about 600 feet SE of its intersection with Moss Lane	Rinconada	3.3	0.40	1.17	1.43	Sc	0.47	0.80
27	Templeton Road, about 1.2 miles SE of its intersection with Moss Lane	Rinconada	2.7	0.40	1.23	1.51	Sd	0.54	0.96
28	Templeton Road, about 2.2 miles SE of its intersection with Moss Lane	Rinconada	<2.0	0.40	1.3	1.6	Sd	0.57	1.02
29	Private property, north of the Gottfried property	Rinconada	<2.0	0.40	1.3	1.6	Sd	0.57	1.02
30	Intersection of Templeton Road and Rocky Canyon Road	Rinconada	<2.0	0.40	1.3	1.6	Sd	0.57	1.02
31	Rocky Canyon Road, about 800 feet north of its northern intersection with Adobe Canyon Road	Rinconada	<2.0	0.40	1.3	1.6	Sd	0.57	1.02
32	Rocky Canyon Road, about 0.4 miles south of its southern intersection with Adobe Canyon Road	Rinconada	<2.0	0.40	1.3	1.6	Sc	0.52	0.90
33	Rocky Canyon Road, about 0.6 miles north of its intersection with Halcon Road	Rinconada	<2.0	0.40	1.3	1.6	Sd	0.57	1.02

TABLE 3

CALIFORNIA BUILDING CODE (2001) SEISMIC DESIGN PARAMETERS FOR PIPELINE ALIGNMENT

Nacimiento Water Project
San Luis Obispo County, California

Point	Location	Fault	Distance to Fault (km)	Z	Na	Nv	Soil Profile	Ca	Cv
34	Private property, east side of Salinas River, about 0.4 miles SE of the intersection of Rocky Canyon Road and Halcon Road	Rinconada	<2.0	0.40	1.3	1.6	Sd	0.57	1.02
35	Private property, east side of Salinas River, about 0.3 miles east and 0.2 miles north of the intersection of Santa Clara Road and Sandoval Road	Rinconada	<2.0	0.40	1.3	1.6	Sd	0.57	1.02
36	Private property, near the intersection of Santa Margarita Creek/Trout Creel and UPRR	Rinconada	<2.0	0.40	1.3	1.6	Sd	0.57	1.02
37	El Camino Real, about 600 feet north of its intersection with Pine Avenue	Rinconada	<2.0	0.40	1.3	1.6	Se	0.47	1.54
38	El Camino Real, about 0.4 miles south of its intersection with Linden Avenue	Rinconada	2.7	0.40	1.23	1.51	Sc	0.49	0.84
39	El Camino Real, about 400 feet west of its intersection with Estrada Calf Canyon Highway (Highway 58)	Rinconada	3.3	0.40	1.17	1.43	Sd	0.51	0.91
40	El Camino Real, about 0.2 miles east of its intersection with Wilhelmina Avenue	Rinconada	4.9	0.40	1.01	1.21	Sc	0.40	0.68
41	Frontage Road to Santa Margarita Booster Station, about 0.5 miles SW of its intersection with Highway 58	Rinconada	6.4	0.40	1	1.14	Sc	0.40	0.64
42	Undeveloped property, unpaved roadway, about 0.4 miles north of the Cuesta Tank site	Rinconada	7.5	0.40	1	1.1	Sc	0.40	0.62

TABLE 3

CALIFORNIA BUILDING CODE (2001) SEISMIC DESIGN PARAMETERS FOR PIPELINE ALIGNMENT

Nacimiento Water Project
San Luis Obispo County, California

Point	Location	Fault	Distance to Fault (km)	Z	Na	Nv	Soil Profile	Ca	Cv
43	Undeveloped property, SW of the Cuesta Tank site, about 0.2 miles NE of TV Tower Road	Rinconada	8.4	0.40	1	1.06	Sc	0.40	0.60
44	Undeveloped property, north of UPRR, about 1.1 miles NE of the north end of Stenner Creek Road	Rinconada	9.8	0.40	1	1.01	Sc	0.40	0.56
45	Undeveloped property, about 800 feet NE of the north end of Stenner Creek Road	Rinconada	11.4	0.40	1	1	Sc	0.40	0.56
46	Stenner Creek Road, about 0.2 miles NE of its intersection with UPRR	Rinconada	12.8	0.40	1	1	Sb	0.40	0.40

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SEISMIC SUBMITTAL REVIEW CHECKLIST
NACIMIENTO WATER PROJECT
Contract No. 300187.08.05 – Pipeline South

Submittal No. _____ **Dated:** _____
Spec. Section _____ **Review Date:** _____
Subject: _____ **Reviewer:** _____
Equipment Item: _____ **Supplier:** _____
Manufacturer: _____

	Included	N/A	Comments for N/A
SEISMIC CALCULATIONS			
Sketch of equipment or facility			
Dimensions needed for anchorage design (Anchorage includes the supporting legs, skirts, frames, etc., as well as the attachment of the equipment to the supporting structure)			
Weight(s)			
Location of center of gravity(ies)			
Restate design criteria			
Loads			
Definition of structural systems			
Free body diagrams for each component			
Check combined stress condition per code when element is subject to multiple stresses simultaneously			
State materials used and properties			
State special materials and finishes (SS, galv., high str., etc.)			
Show AB pattern, bolt sizes, material, finish, embedment, projection, spacing, edge distance, special reinforcement, special instruction requirements, latest issue ICBO/ICC ER			
Calculate hydrodynamic sloshing forces			
Sliding factor of safety (1.5 min. or comply with applicable code and/or governing standards)			
Overturning moment factor of safety (1.5 min. or comply with applicable code and/or governing standards)			
Combined stresses for legs, shells, beam struts, anchor bolts			
Apply loads in critical direction			
Design for discontinuities, openings, and restraints			
Design of anchor brackets			
State loads to the supporting structure			
Calculate drift where displacement affects process performance			
Base plates			
Catalog data			
ASTM data or reference			
Latest ICBO/ICC ER			
QC			
Engineering Seal			

Note: **N/A** denotes “not applicable."

SEISMIC SUBMITTAL REVIEW CHECKLIST
NACIMIENTO WATER PROJECT
Contract No. 300187.08.05 – Pipeline South

Submittal No. _____ **Dated:** _____
Spec. Section _____ **Review Date:** _____
Subject: _____ **Reviewer:** _____
Equipment Item: _____ **Supplier:** _____
Manufacturer: _____

	Included	N/A	Comments for N/A
DRAWINGS			
Project name/location/date/spec number			
Drawing numbers			
Engineering Seal			
Consistent with calculations (Information on drawings same as the intended design stated in calculations)			
Information for shop fabrication			
Information for field installation			
Material call out			
Connection details for seismic load path			
Special inspection requirements stated			
Anchor bolt size, embedment, projection, minimum spacing, edge distance, and bolt layout			
Reinforcing requirements			
QC			

SEAL

ENGINEER-OF-RECORD

Name: _____

Section 01620

MANUFACTURER'S FIELD SERVICES

1. GENERAL

The CONTRACTOR shall provide the services of the manufacturers' representatives during equipment installation, facilities testing and startup, and training of DISTRICT personnel. Where manufacturer's services are specified, the CONTRACTOR shall furnish a qualified representative of the manufacturer to provide these services.

For purposes of furnishing manufacturer's services, the following definitions shall apply:

- Manufacturer's Representatives: Employee of CONTRACTOR and/or manufacturer who is factory trained and knowledgeable in technical aspects of their products and systems.

- Person-Day or Instructor-Day: One person for eight (8) hours straight time, exclusive of Saturdays, Sundays or holidays; does not include travel time.

2. SUBMITTALS

CONTRACTOR shall submit the following items as specified in Section 01300, "Submittals":

- Qualifications and experience records of proposed manufacturers' representatives who will assist installation and testing of equipment and conduct training sessions.
- After installation, manufacturer's representative shall submit to the ENGINEER a written report certifying that the equipment is installed properly, in accordance with the manufacturer's installation instructions.
- After testing and startup, submit to the ENGINEER a written report certifying that the equipment has been properly installed and lubricated; is in accurate alignment; is free from any undue stress imposed by connecting piping or anchor bolts; and has been operated under full load conditions and that it operated satisfactorily.
- Manufacturer's Representative Service Reports.

3. SCHEDULING OF MANUFACTURER'S FIELD SERVICES

An experienced, competent, and authorized representative of the manufacturer of each item of equipment for which field services are indicated in the individual sections of the Technical Specifications, shall visit the site of the Work and inspect, check, adjust if necessary, and approve the equipment installation. In each case, the manufacturer's representative shall be present when the equipment is being tested and placed in operation. The manufacturer's representative shall revisit the jobsite as often as necessary until all trouble is corrected and the equipment installation and operation are satisfactory in the opinion of the ENGINEER.

The scheduling of all visits to the site by the manufacturer's field services representative shall be determined by the CONTRACTOR and approved by the ENGINEER.

Manufacturers' representatives shall resolve assembly or installation problems attributable to, or associated with, their products and equipment.

During the testing specified in Section 01650, "Startup and Testing," furnish manufacturers' representative(s) to assist, as applicable for the type of equipment, and to perform initial equipment and system adjustments and calibrations.

4. MANUFACTURER'S REPRESENTATIVE SERVICE REPORT

The manufacturer's representative shall complete and submit the attached form entitled "Manufacturer's Representative Service Report" for each site visit.

5. TRAINING OF DISTRICT'S PERSONNEL

Refer to Section 01735, "Training."

End of Section

MANUFACTURER'S REPRESENTATIVE SERVICE REPORT

NACIMIENTO WATER PROJECT
Pipeline South
Project No. 300187.08.05

File No. _____
Date: _____

- This form should be completed and returned by the manufacturer's representative prior to leaving the site.
- The representative is expected to follow the instructions to manufacturers' service representatives (Page 2) during the site visit.

Manufacturer: _____ MRSR No. _____

Supplier: _____ Contract/P.O. No. _____

Manufacturer's Representative: _____
Company

Equipment/Material: _____

Work performed and tests made on equipment:

Factory errors corrected:

Field errors corrected:

The above equipment ☐ is ☐ is not ready to be placed in operation.
Remarks:

Arrival onsite _____ Date _____ Time AM ☐ PM ☐ Departure from Site _____ Date _____ Time AM ☐ PM ☐

Actual total duration onsite was _____ hours for period covered by this report.

Manufacturer's Representative: _____ Signature _____ Date

Address: _____ _____ Phone No.

Report Received By: _____ Signature _____ Date

Distribution: _____ _____ _____

INSTRUCTIONS TO MANUFACTURER'S SERVICE REPRESENTATIVES

NACIMIENTO WATER PROJECT
Pipeline South
Project No. 300187.08.05

File No. _____
Date: _____

MRSR No. _____

The following summarizes the jobsite requirements for manufacturer's representatives (herein designated the representative) providing service and/or startup assistance for the above named project.

1. The acknowledgment of these instructions creates no contractual obligation nor changes, modifies, or adds any obligation to the purchase contract conditions for either party.

2. The buyer's contact shall coordinate the representative's onsite visit and work. The service representative's buyer contact will be: _____.
   Name and Company

3. The representative will be furnished construction and/or testing assistance unless noted otherwise in the purchase contract. The buyer's contact will administer the initiation of this assistance. The representative shall immediately advise the buyer's contact of any problems regarding the furnished assistance.

4. The representative will be instructed as to the priority of the work by the buyer's contact. Any changes in priority due to material shortages, equipment malfunctions, or otherwise will be coordinated through the buyer's contact.

5. The representative shall advise the buyer's contact and the Owner of steps in erection, inspection, startup, dismantling, or repairs of the product and provide additional service as required to aid construction personnel during installation of the equipment.

6. The representative shall immediately follow up any manufacturer's material shortages or defective material replacements and advise the buyer's contact of their status so that possible effects on the schedule can be evaluated. Every effort shall be made to expedite replacement material.

7. The representative shall advise the buyer's contact of any manufacturing errors affecting the equipment and initiate field correction as required. Representative time spent correcting manufacturing errors shall be to the account of the manufacturer.

8. The representative shall complete and submit to the buyer's contact a Service Report on a daily basis or other interval as agreed to with the buyer's contact. This report shall be used to document the requirements outlined above.

9. The representative shall provide written certification that the equipment has been inspected and adjusted and that it is ready for service. The Service Report can be used for this purpose.

10. The representative shall comply with all safety, security, and work rules applicable to the project during the period onsite.

11. ☐ The representative shall attend (if box checked) the specific coordination meeting held on a regular basis with individual erection contractors for the purpose of discussing procedures and progress. This meeting is held in the Site Construction Office Building on _____.
    Day and Time

Manufacturer's Representative
Acknowledgment: _____ _____
Signature Date

Acknowledgment:
Received By: _____ _____
Signature Date

Section 01650

STARTUP AND TESTING

1. GENERAL. This Section covers requirements and procedures for field checking and testing of equipment and systems.

CONTRACTOR is responsible for planning, scheduling, coordinating and performing the testing of the Project.

CONTRACTOR shall furnish the services of the various manufacturers' field representatives to assist CONTRACTOR during installation and testing.

2. DEFINITIONS.

2.01. System**.** A system means the overall process, or a portion thereof, that performs a specific function.

2.02. Testing shall comprise:

- Pre-startup tests which are defined as those checks and tests necessary to determine that equipment, systems and subsystems have been properly manufactured and installed, function properly as specified and are in a condition to permit safe startup of the Project.

- Startup tests which are defined as those checks and tests necessary to determine that all features and equipment systems and subsystems have been properly designed, manufactured, installed and adjusted, function properly as specified and are capable of operating simultaneously in such condition that the project is capable of continuous operation at all capacities throughout its operating range.

3. SUBMITTALS. CONTRACTOR shall submit the following information for specific equipment where specified in individual sections and in this section, in accordance with Section 01300, "Submittals:"

- Manufacturer's certification of proper installation of all equipment.

- Detailed testing plan with schedule for each equipment item and system. Submit schedules showing testing work not less than 90 days in advance of first scheduled tests. Schedules shall list each piece of equipment or component to be tested, as specified in this Section or by the various sections of the Technical Specifications. Schedules shall include sequence and duration for all pre-startup testing.

- Operation and maintenance instruction manual for each equipment item and system to be tested.

- Submit the following in accordance with Section 01300, “Submittals.”

  a. Organization chart for conducting pre-startup testing, and experience information (list of projects and owner contact information) for Startup Manager.

  b. Instrumentation list with calibration methods and calibration dates.

  c. Clearance, Red Tag and equipment release procedures including authorization assignments.

  d. Acceptance criteria required to release equipment and systems for startup.

  e. Field calibration report.

- Submit test reports in conformance with requirements specified herein.

  a. Submit preliminary copies of test data in field report form within two days after completion of each test.

  b. Submit five bound copies of field test reports of checkout and testing of all equipment.

4. MATERIALS AND EQUIPMENT – GENERAL. Provide all lubricating oil, hydraulic oil, grease, packing, and insulating and lubricating fluids and filters required to clean, blow out, flush, and initially charge equipment and systems.

5. TESTING AND STARTUP RESPONSIBILITIES.

5.01. CONTRACTOR’S Responsibilities.

- CONTRACTOR shall provide a Startup Manager, who shall be experienced in all aspects of startup and testing or as may be supplemented by similarly experienced assistants. The Startup Manager shall prepare the detailed testing plan, shall provide technical instruction for the pre-startup testing, and shall coordinate directly with the DISTRICT’S operators.

- The CONTRACTOR shall submit information to demonstrate that their Startup Manager is qualified. The qualifications for the Startup Manager shall be submitted at the Preconstruction Conference, and will be reviewed by the DISTRICT and ENGINEER. Once accepted, the CONTRACTOR shall not change the Startup Manager throughout the full period of performance of the

WORK without the express written permission of the DISTRICT or ENGINEER.

- The Startup Manager shall conduct weekly coordination meetings during startup and testing activities.

- CONTRACTOR shall furnish labor and materials, tools, instruments, and services for checking, testing, and startup specified for each equipment item, except as specified. This includes such services as manufacturers' representatives, Subcontractors, electricians, instrumentation technicians, and pipefitters.

- Startup Submittal Review Workshop. CONTRACTOR shall schedule and conduct a one (1) day submittal review workshop with the DISTRICT, ENGINEER and DESIGNER to receive submittal review comments to the CONTRACTOR'S detailed startup and testing plan submittal.

- CONTRACTOR shall prepare a detailed testing schedule and incorporate testing and startup activities in the CPM Construction Schedule for the work.

- CONTRACTOR shall develop a standard testing log to be used as a record of testing of each equipment item and system. This log shall:

    - Be subject to approval of the ENGINEER;

    - Include equipment name;

    - Have provisions for recording dates of completion for checking, inspection by manufacturer, verification of instrumentation and controls, and completion of tests; and

    - Provide space for problems remaining with equipment and for signature of ENGINEER and manufacturer's representatives indicating acceptance.

- CONTRACTOR shall obtain and furnish qualified manufacturer's and System Supplier's representative(s) to assist testing of each equipment type and system.

- CONTRACTOR shall notify the ENGINEER and DISTRICT and all respective equipment manufacturers at least 21 days prior to the date when equipment or a specific system is scheduled to be initially started.

5.02. ENGINEER'S Responsibilities:

- ENGINEER will coordinate directly with the CONTRACTOR'S Startup Manager.

- ENGINEER will attend weekly startup and testing coordination meetings.

5.03. DISTRICT'S Responsibilities:

- DISTRICT will attend weekly startup and testing coordination meetings.

6. PRE-STARTUP TESTS AND CHECKS.

6.01 Cleaning and Checking. Prior to testing of all equipment, CONTRACTOR shall:

- Inspect and clean equipment, devices, and connected piping so they are free of foreign material.
- Lubricate equipment in accordance with manufacturer's instructions.
- Turn rotating equipment by hand and check motor-driven equipment for correct rotation.
- Open and close valves by hand and operate other devices to check for binding, interference, or improper functioning.
- Check power supply to electric-powered equipment for correct voltage.
- Check for proper equipment alignment.
- Obtain manufacturer's certification of proper installation.

6.02 Ready-To-Test Determination: All equipment shall be determined ready-to-test by the DISTRICT based on the following:

- Notification in writing by the CONTRACTOR of equipment and system readiness for testing.
- Submittal and approval of detailed startup and testing plan.
- Receipt of approved O&M Manuals.
- Cleanliness of equipment, devices, and connected work.
- Adequate completion of work adjacent to, or interfacing with, equipment to be tested.
- Availability and acceptability of manufacturers' representatives to assist testing of respective equipment, and satisfactory fulfillment of other specified manufacturers' responsibilities.

6.03 Pre-Startup Testing (General): CONTRACTOR shall perform pre-startup tests and make adjustments as needed. Pre-startup tests shall include, but not be limited to, the following:

- Check for correct operation and perform calibration tests of position, pressure, level, flow, speed, temperature and all other monitoring instruments.

- Perform pre-startup testing and conduct operating tests for all mechanical equipment, systems and accessories specified in Divisions 13, 15 and 16 technical specification sections. Inspect, adjust and operate the equipment and systems:

  (1) Test valves using manual controls. Repeat operation and adjust as necessary until proper timing is obtained. Place valvesin their normal position.

  (2) Check and operate pipeline accessories such as air valves, drain lines and pump-outs.

- Inspect and verify proper anchorage and grounding of equipment.

- Perform leak tests of pipe, fittings, gaskets and seals.

- Perform tests of alarms, signals, and fail-safe or system shutdown controls.

- Perform insulation resistance and point-to-point circuit continuity tests.

- Perform trip checks of all cable, wire and electrical equipment to verify the proper functions of all trip and control circuits.

- Perform all pre-startup tests specified in sections of the Technical Specifications.

- Perform tests required by manufacturer's catalogs or specifications.

- Additional tests required by manufacturer's modifications to meet specified requirements, or tests required due to failures of CONTRACTOR-furnished equipment, shall be at the CONTRACTOR'S expense with no additional cost to DISTRICT.

6.04 Not Used.

6.05 Pre-Startup Testing (Electrical): CONTRACTOR shall perform pre-startup tests and make adjustments to all electrical equipment and materials as specified. Prior to initial energizing, perform the following preliminary tests and submit to the ENGINEER documentation that the tests have been done as

specified. These tests shall be done when the equipment is de-energized. Test reports shall be submitted as specified herein. The following tests shall be performed:

- Test the system ground per Division 16 then terminate the ground.
- Perform any tests required by PG&E prior to acceptance of the installation.
- Perform pre-startup testing for all electrical equipment, systems and subsystems in accordance with NETA Electrical Acceptance Tests, including tests indicated as optional.

A label shall be attached to all devices to indicate that pre-startup testing has been performed and completed, indicating the date that tests were completed, and initialed by the person conducting the tests.

When the above procedures are complete, startup may proceed.

7.0 STARTUP AND NWP COMMISSIONING

Startup and commissioning of the NWP will be performed by the NWP Facilities contractor under Contract No. 300187.08.02.

CONTRACTOR shall provide a representative onsite during startup testing and commissioning of the Project to assist with any problems that may arise from operation of the pipeline and appurtenances that are furnished and installed under this contract.

When testing or operation of the Project demonstrates that the pipeline or pipeline appurtenances furnished and installed under this contract do not meet the specified requirements, CONTRACTOR shall investigate the cause and correct any deficiencies uncovered as part of the warranty work specified under General Conditions Articles 6.18 and 13.6.

End of Section

Section 01700

CONTRACT CLOSEOUT

1. GENERAL. Refer to Article 14.8 of the General Conditions, “Final Application for Payment,” for additional requirements.

2. RECORD DRAWINGS AND SPECIFICATIONS. Refer to Section 01720, “Project Record Documents.”

3. OPERATION AND MAINTENANCE MANUALS. Refer to Section 01730, Operation and Maintenance Manuals.”

4. CLOSEOUT SCHEDULE AND PROCEDURES. The requirements preparatory to Final Inspection shall be:

- CONTRACTOR shall request the ENGINEER to perform a preliminary inspection for the purpose of determining the state of completion of the Project. The CONTRACTOR shall notify the ENGINEER at least seven (7) days in advance of the time the CONTRACTOR would like the inspection to be performed. Prior to the ENGINEER performing such inspection, the CONTRACTOR shall provide the ENGINEER with the CONTRACTOR’S punchlist, listing the CONTRACTOR’S observed contract deficiencies. If the punchlist is adequate in the opinion of the ENGINEER, and does not contain an excessive number of items or items of uncompleted work, the ENGINEER will perform the pre-final inspection and prepare a final punchlist of work to be performed, corrected, or completed before the Project is accepted. All work on the final punchlist shall be completed by the CONTRACTOR prior to Final Inspection.
- All temporary facilities shall be removed from the site, except as may be required for the performance of work expected to appear on the punchlist.
- The site and all applicable appurtenances and improvements shall be completely cleaned to the satisfaction of the ENGINEER.

After all requirements preparatory to the Final Inspection have been completed as specified in this section, the CONTRACTOR shall request the ENGINEER to perform the Final Inspection. Notice shall be given at least seven (7) days in advance of the time the Final Inspection is to be performed.

5. CLEANUP. The area within the limits of the Project and all ground occupied by the CONTRACTOR in connection with the work shall be left in neat and presentable condition. The CONTRACTOR shall remove all rubbish, surplus materials, discarded materials, falsework, temporary structures, equipment and debris.

The CONTRACTOR shall not remove warning, regulatory, and guide signs without approval of the ENGINEER.

The CONTRACTOR shall clean out all open culverts, ditches, drains, inlets, catch basins, manholes and valve chambers, within the limits of the Project, of dirt and debris of any kind which is the result of the CONTRACTOR'S operations including storm water runoff.

6. FINAL CLEANUP. Before Final Inspection of the WORK, CONTRACTOR shall promptly remove from the vicinity of the completed work and adjacent property and streets, all rubbish, unused materials, concrete forms, construction equipment, and temporary structures and facilities used during construction. All parts of the WORK shall be left in a neat and presentable condition.

Final acceptance of the WORK by the DISTRICT will be withheld until the CONTRACTOR has satisfactorily complied with the foregoing requirements for final cleanup of the project site.

7. FINAL SUBMITTALS. The CONTRACTOR, prior to requesting final payment, shall obtain and submit the following items to the ENGINEER for transmittal to the DISTRICT:

- One complete set of full-size marked-up record drawings.
- "Release of Liens" from all Subcontractors, materialmen, fabricators, Suppliers, and labor suppliers.
- Final "As-Constructed" project CPM Construction Schedule per Section 01310, "Construction Scheduling."
- All remaining original field survey notes and drawings per Section 01050, "Field Engineering."
- Recycling Plan Disposal Report, as specified in Section 02055, "Mandatory Recycling Requirements."
- All keys to permanent gates and locks.
- All remaining O&M Manuals.
- All manufacturers' guarantees and warranties.
- All mill certifications and test data.
- Maintenance stock items, spare parts, and special tools.
- Final completed punchlist.
- Final project pay estimate.

End of Section

Section 01720

PROJECT RECORD DOCUMENTS

1. GENERAL. Refer to Article 14.8 of the General Conditions, “Final Application for Payment,” for additional requirements.

2. OPERATION AND MAINTENANCE MANUALS. Refer to Section 01730.

3. RECORD DRAWINGS AND SPECIFICATIONS. The CONTRACTOR shall keep at the project site a copy of the drawings and specifications, including addenda and change orders, to which the ENGINEER AND DISTRICT shall have access at all times.

The CONTRACTOR shall maintain one (1) set of specifications and full size prints and mark thereon any deviation from plan dimensions, elevations, or orientations, and all changes from addenda, change orders, and clarifications. The CONTRACTOR shall submit the record drawings in good condition to the ENGINEER upon completion of the WORK as a condition of acceptance of the WORK. Marked prints shall be updated at least weekly and shall be available to the ENGINEER and DISTRICT for review. The DISTRICT may withhold partial payments, if it does not find the record drawings to be satisfactory.

End of Section

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Section 01730

OPERATION AND MAINTENANCE MANUALS

1. GENERAL. Operation and maintenance information shall be supplied for all equipment. Operation and maintenance manuals shall include the following:

a. Equipment function, normal operating characteristics, and limiting conditions.

b. Assembly, installation, alignment, adjustment, and checking instructions.

c. Operating instructions for startup, routine and normal operation, regulation and control, shutdown, and emergency conditions.

d. Lubrication and maintenance instructions.

e. Guide to troubleshooting.

f. Parts lists and predicted life of parts subject to wear.

g. Outline, cross section, and assembly drawings; engineering data; and wiring diagrams.

h. Test data and performance curves, where applicable.

i. List of vendors for service and replacement parts purchase.

The operation and maintenance manuals shall be in addition to any instructions or parts lists packed with or attached to the equipment when delivered, or which may be required by CONTRACTOR.

Three (3) preliminary copies of operation and maintenance manuals shall be submitted to the ENGINEER within sixty (60) calendar days from the date of shipment of each type of equipment. Preliminary copies shall be in hardcopy format.

After review by ENGINEER, four (4) final hardcopies and four (4) electronic copies of operation and maintenance manuals shall be delivered to ENGINEER not later than 30 days prior to placing the equipment in operation.

Shipment of equipment will not be considered complete until all required manuals and data have been received.

1.01. Hardcopy Operation and Maintenance Manuals. Hardcopies for preliminary and final manuals shall be temporarily bound in heavy paper covers bearing suitable identification. All manuals and other data shall be printed on heavy, first quality 8-1/2 x 11 inch paper, with standard three-hole punching. Drawings and diagrams shall be reduced to 8-1/2 x 11 inches or 11 x 17 inches. Where reduction is not practicable, larger drawings shall be folded separately and placed in envelopes, which are bound into the manuals. Each envelope shall be suitably identified on the outside. Each volume containing data for three or more items of equipment shall include a table of contents and index tabs. The final hardcopy of each manual shall be prepared and delivered in substantial, permanent, three-ring or three-post binders with a table of contents and suitable index tabs.

1.02. Electronic Operation and Maintenance Manuals. Each electronic copy shall be delivered on a unique CD-ROM in Adobe Acrobat's Portable Document Format (PDF). The PDF file(s) shall be fully indexed using the Table of Contents, searchable with thumbnails generated.

File names shall use the "eight dot three" convention (XXXXX_YY.pdf), where X is the five digit number corresponding to the specification section, and YY is a two digit number set in sequential order when there are more than one PDF document (more than one O&M manual) per specification section. The initial filename for the OEM submittal will be provided with the request for final O&M manuals.

Scanned images must be at a readable resolution. For most documents, they should be scanned at 300 dots per inch (dpi). Optical Character Recognition (OCR) capture must be performed on these images. OCR settings shall be performed with the "original image with hidden text" option in Adobe Acrobat Exchange.

One PDF document (PDF file) shall be created for each equipment service manual. The entire manual shall be converted to a single .PDF file via scanning or other method of conversion. Drawings or other graphics shall also be converted to .PDF format and included into the single PDF document. Pages that must be viewed in landscape format shall be rotated to the appropriate position for easy reading on screen.

The PDF documents shall have a bookmark created in the navigation frame for each major entry ("Section" or "Chapter") in the Table of Contents. Thumbnails shall be generated for each page or graphic in the PDF file.

The opening view for each PDF document shall be as follows:

Initial View: Bookmarks and Page

Magnification: Fit In Window

The file shall open to the cover page of the manual, with bookmarks to the left, and the first bookmark shall be linked to the Table of Contents.

1.03. Labeling. As a minimum, the following information shall be included on all final O&M manual materials, including CD-ROM disks, jewel cases, and hardcopy manuals:

Manufacturer's name.

Equipment name and/or O&M title spelled out in complete words.

Example: "Operations and Maintenance Manual"

"Vertical Diffusion Vane Pumps"

Specification Section Number. Example: "Section 11140"

Project Name. "Nacimiento Water Project"

City Contract Number. "Specification No. 30187.08.xx"

File Name and Date. Example: "11140_01.pdf", "06-30-09"

End of Section

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Section 01735

TRAINING

1. GENERAL. The CONTRACTOR shall provide the services of the manufacturer's field services representatives to instruct the DISTRICT'S operations and maintenance personnel in the operation, disassembly, and assembly of major equipment items, start-up, shutdown, safety concerns, troubleshooting, installation, alignment, and recommended corrective and preventive maintenance procedures for all equipment.

The ENGINEER will coordinate the time for the training to be accomplished through the CONTRACTOR. The training will be accomplished at a time approved by the ENGINEER, near completion of the project, but prior to Substantial Completion. Manufacturers shall provide a combination of classroom and field training. CONTRACTOR shall be responsible for planning, supervising, and conducting the training, in coordination with the ENGINEER, DESIGNER and manufacturers' representatives. The training shall be planned such that it follows a logical sequence that generally includes the following components:

- Mechanical systems – Overview of system operation by DESIGNER, training by CONTRACTOR and manufacturers' representatives.
- Electrical Systems - Overview of system operation by DESIGNER, training by CONTRACTOR and manufacturers' representatives.
- Instrumentation and Controls - Overview of system operation by DESIGNER, training by CONTRACTOR and manufacturers' representatives.

The DISTRICT considers training performed by the manufacturers' representatives a critical element of this project. Failure to submit the required information on schedule or to provide satisfactory training, in the opinion of the DISTRICT, may result in progress payment retainage of 10 percent of the amount due the CONTRACTOR for the respective equipment until satisfactory lead time and training is provided. The DISTRICT will have the right to videotape all training sessions, or may designate separate sessions or portions thereof for the sole purpose of videotaping.

CONTRACTOR shall provide training for the equipment and systems specified in the table below.

Spec Section	**Equipment or System**	**Time Required**
13562, 13563	Flow Instruments; Pressure and Level Instruments	½ day
15107	Sleeve Valves	½ day

Spec Section	Equipment or System	Time Required
16640	Corrosion Monitoring	1 day

A personnel training day as indicated in the above table shall mean one full eight-hour period of instruction at the DISTRICT'S facility. Travel and set-up time for manufacturers' training representatives shall be in addition to the personnel training days indicated. Personnel training days shall be in addition to manufacturer's field services required as indicated in the various sections of the Technical Specifications.

2. TRAINING REQUIREMENTS

2.01. Instruction Schedule. CONTRACTOR shall provide to ENGINEER a tentative training schedule and contact person 60 days prior to commencement of any training. Manufacturer shall submit for approval a proposed lesson plan for the instruction 30 days prior to commencement of scheduled training. Manufacturer shall submit for approval credentials of its designated instructor. Credentials shall include a brief resume and specific details of the instructor's experience with training on maintenance and operation of the equipment provided.

2.02. Instruction Lesson Plan. Manufacturer's proposed lesson plan shall include the elements presented in the outline specified herein. Specific components and procedures shall be identified in the proposed lesson plan. Manufacturer's proposed lesson plan shall detail specific instruction topics. Training aids to be utilized in the instruction shall be referenced and attached where applicable to the proposed lesson plan. "Hands-on" demonstrations planned for the instruction shall be described in the lesson plan. The manufacturer shall indicate the estimated duration of each segment of the training lesson plan.

Outline of Instruction Lesson Plan:

- Equipment operation:
  - Describe equipment's operating (process) function.
  - Describe equipment's fundamental operating principals and dynamics.
  - Identify equipment's mechanical, electrical, and electronic components and features.
  - Identify all support equipment associated with the operation of subject equipment (i.e., valve actuators, motors).
- Detailed component description:

- Identify and describe in detail each component's function.
- Where applicable, group related components into subsystems. Describe subsystem functions and their interaction with other subsystems.
- Identify and describe in detail equipment safeties and control interlocks.

- Equipment preventive maintenance:
  - Describe preventive maintenance inspection procedures required to:
    - Perform an inspection of the equipment in operation.
    - Spot potential trouble symptoms (anticipate breakdowns).
    - Forecast maintenance requirements (predictive maintenance).
  - Define the recommended preventive maintenance intervals for each component.
  - Provide lubricant and replacement part recommendations and limitations.
  - Describe appropriate cleaning practices and recommended intervals.
- Equipment troubleshooting:
  - Define recommended systematic troubleshooting procedures.
  - Provide component-specific troubleshooting checklists.
  - Describe applicable equipment testing and diagnostic procedures to facilitate troubleshooting.
- Equipment corrective maintenance:
  - Describe recommended equipment preparation requirements.
  - Identify and describe the use of any special tools required for maintenance of the equipment.
  - Describe component removal/installation and disassembly/assembly procedures.
  - Perform at least two "hands-on" demonstrations of common corrective maintenance repairs.
  - Describe recommended measuring instruments and procedures and provide instruction on interpreting alignment measurements, as appropriate.
  - Define recommended torquing, mounting, calibration, and/or alignment procedures and settings, as appropriate.
  - Describe recommended procedures to check/test equipment following a corrective repair.

2.03. Training Aids. The manufacturers' instructors shall incorporate training aids as appropriate to assist in the instruction. At a minimum, the training aids

shall include text and figure handouts. The manufacturer shall provide the DISTRICT one complete set of all slides, transparencies, diagrams, and other written material used for training purposes. Other appropriate training aids are:

- Audio-visual aids (e.g. films, slides, videotapes, overhead transparencies, posters, blueprints, diagrams, catalog sheets).
- Equipment cutaways and samples (e.g. spare parts, damaged equipment).
- Tools (e.g. repair tools, customized tools, measuring, and calibrating instruments).

The manufacturer's instructor shall utilize descriptive class handouts during the instruction. Photocopied class handouts shall be good quality reproductions. Class handouts should accompany the instruction with frequent reference made to them. Customized handouts developed especially for the instruction are encouraged. Handouts planned for the instruction shall be attached with the manufacturer's proposed lesson plan.

2.04. Hands-On Demonstrations. The manufacturer’s instructor shall present at least two "hands-on" demonstrations of common corrective maintenance repairs so that key operations and maintenance personnel have the opportunity to witness the demonstration. The manufacturer shall provide the tools and equipment to conduct the demonstrations. Requests for supplemental assistance and facilities should be submitted with the manufacturer's proposed lesson plan. The proposed "hands-on" demonstrations should be described in the manufacturer's proposed lesson plan. In any hands-on training situation where DISTRICT'S operations or maintenance personnel participate in disassembly or assembly of equipment components, the manufacturer shall be responsible for such disassembly or assembly and shall provide written certification of proper equipment operation to the ENGINEER.

2.05. Manufacturer's Services. Training for each equipment item in these specifications shall be in accordance with this section unless otherwise specified. All training will be performed during the operating staff's normal business hours or at other times requested or approved by the DISTRICT. In addition to the above criteria, each equipment specification may request minimum times and material for training. These shall include, but not be limited to, installation assistance; startup, checkout, and testing; pre-startup training; and post-startup training. The time specified for these activities shall be in addition to time required for fulfilling the instruction requirements as specified above.

End of Section

TECHNICAL SPECIFICATIONS

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DIVISION 2
SITE WORK

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Section 02050

DEMOLITION

PART 1 - GENERAL

1-1. SCOPE. This section covers the demolition, removal, and subsequent disposal of existing structures and materials, and modifications to existing facilities as indicated on the Drawings, as specified, or as required to complete the WORK.

Requirements for clearing and grubbing are specified in Section 02100, “Clearing and Grubbing.” Specific property owner requirements relating to the temporary relocation and/or protection of existing structures and facilities are specified in Section 01040, “Easement and Right-of-Way Requirements.” Requirements for recycling are specified in Section 02055, “Mandatory Recycling Requirements.”

1-2. GENERAL. All existing facilities which are not involved in construction must continue in use during the work. Demolition and salvage work shall be performed with an absolute minimal level of interference to existing facilities designated to remain.

The CONTRACTOR shall have carefully and thoroughly inspected all existing structures and facilities, and shall have taken into account, in the preparation of its bid, how such conditions will affect the WORK required by the Drawings and Specifications. Failure to do so will in no way relieve the CONTRACTOR of the responsibility for furnishing all labor, materials, and equipment required.

The CONTRACTOR shall assume full responsibility for any and all damage, resulting from the WORK, to any existing structures and facilities which are to remain in place. CONTRACTOR shall take any necessary video of existing structures and facilities to verify existing conditions per Section 01380, “Construction Video,” and shall file a report with the ENGINEER listing any existing damaged structures and facilities before the work is started.

1-3. SUBMITTALS. Prepare and submit the following items in accordance with the requirements specified in Section 01300, “Submittals.”

- CONTRACTOR’S proposed approach and methods for performing demolition of specified items.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION

3-1. DEMOLITION. All demolition and removal work shall be carried out in a manner which will prevent damage to existing structures and facilities.

Unless otherwise specified, blasting will not be permitted. Demolition work shall be performed in accordance with all applicable laws and ordinances.

Existing structures and facilities which are indicated or specified to be removed shall not be disconnected or removed until such time as the item is scheduled to be removed in the construction schedule and such removal is accepted by the ENGINEER. Acceptance of the construction schedule does not constitute acceptance for removal of existing structures and facilities; such acceptance will be granted by the ENGINEER for each item.

Certain items of demolition are indicated by the Drawings and Specifications; however, the demolition work shall not be confined to those items, but shall include all such work required to complete the Project.

The general area in which the demolition work is to be performed shall be left clean and free of debris.

All open ends of buried piping that are to be abandoned shall be plugged.

3-1.01. Removal and Repair of Existing Structures. Existing structures, including concrete equipment pads, shall be removed in a careful manner so that adjacent structures, piping, or facilities to be left in place are not cracked or otherwise damaged. Where equipment pads are removed and not replaced the floors shall be repaired and leveled with epoxy grout or otherwise repaired as acceptable to the ENGINEER.

Temporary supports shall be used where and as required for support of existing structures, piping, or facilities until the new installation or construction is completed. Holes and damage resulting from removal operations shall be filled, reconstructed, repaired, and finished to match and conform to adjacent surfaces and construction as determined by the ENGINEER.

Existing concrete and materials to be removed shall be cut into fragments of a size suitable for removal and shall be disposed of offsite by the CONTRACTOR in an appropriate permitted site.

3-1.02. Not Used.

3-1.03. Piping and Equipment Demolition. All piping and equipment that are designated to be removed and associated with the structure to be demolished

shall be removed and shall become the property of CONTRACTOR. All such items shall be promptly removed from the jobsite.

Removed and salvaged equipment or facilities shall include removal and salvage of all accessories, piping, wiring, supports, associated electrical starters and devices, baseplates and frames, and all other appurtenances, unless otherwise directed.

3-1.04. Sitework Demolition. Sitework demolition shall include:

- Removal of reinforced concrete and non-reinforced concrete pavements, curb, and slab on grade within the limits of the site as indicated on the Drawings.

- Removal of existing fencing where indicated on the Drawings.

- Removal of asphaltic concrete pavement within the limit of the work site as indicated on the Drawings.

- Removal of trees and shrubs as indicated on the Drawings to be removed and as required to complete the WORK; refer to Section 02100, “Clearing and Grubbing,” for requirements.

- Removal or abandon in place any existing yard piping as indicated on the Drawings. Where pipes are designated to be abandoned in place, they shall be filled with lean concrete.

- Termination of all electrical wiring to equipment being abandoned and removed.

3-1.05. Demolition Schedule. All structures and facilities to be demolished are as indicated on the Drawings, as specified, or as required for completion of the Project.

3-2. SALVAGE. Not Used.

3-3. CLEAN UP. All areas of demolition shall be left clean and free of debris.

3-4. DISPOSAL. All materials and debris resulting from the removal and demolition work shall become the property of the CONTRACTOR and shall be removed from the site to the CONTRACTOR'S place of disposal at his expense. Credit for the salvage value, if any, of such removed materials shall have been reflected in the CONTRACTOR'S Bid Price.

End of Section

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Section 02055

MANDATORY RECYCLING REQUIREMENTS

PART 1 – GENERAL

1-1. SCOPE. This section covers the CONTRACTOR'S mandatory responsibilities for recycling construction and demolition debris.

1-2. GENERAL.

A. County Ordinance. In compliance with the requirements of the San Luis Obispo County Code Title 8, "Health and Sanitation", Chapter 8.12, "Solid Waste Management", the CONTRACTOR shall be required to divert at least fifty (50) percent by weight of all construction and demolition debris resulting from the WORK.

B. Mandatory Quantity. The goal of the Nacimiento Project is to recycle a minimum of 50 percent of the construction and demolition debris. To accomplish this goal, the mandatory quantity of 50 percent of all construction and demolition debris shall be diverted by weight for recycling for this Project.

C. Materials. Construction and demolition debris shall include used or discarded materials removed from premises during construction or renovation of a structure resulting from construction, repair, or demolition operations on any pavement or structure.

1-3. SUBMITTALS. In accordance with the requirements specified in Section 01300, "Submittals," the CONTRACTOR shall complete and submit the following items to the ENGINEER and the Solid Waste Coordinator, identified in Exhibit 02055-A:

A. Recycling Plan. A Recycling Plan shall be submitted on a Recycling Plan form approved by the County prior to receiving a Notice to Proceed. The Project shall not proceed unless the Recycling Plan has first been approved by the Solid Waste Coordinator. The Recycling Plan shall indicate all of the following:

1. The Project owner, Project location, and CONTRACTOR'S name;

2. The estimated volume or weight of Project construction and demolition debris, by materials type, to be generated;

3. The maximum volume or weight of such materials that can feasibly be diverted via reuse or recycling;

4. The vendor or facility that the CONTRACTOR proposes to use to collect or receive that material; and

5. The estimated volume or weight of construction and demolition debris that will be landfilled.

B. Recycling Plan Disposal Report. A Recycling Plan Disposal Report and documentation showing that the recycling requirement has been met shall be submitted. County's Solid Waste Coordinator shall review and provide a determination of compliance described below prior to receiving a Notice of Completion. The disposal report documentation shall include all of the following:

1. All receipts from the vendor or facility which collected or received each material showing the actual weight or volume of that material;

2. A copy of the previously approved Recycling Plan for the Project with a completed disposal report section showing the actual volume or weight of each material diverted and landfilled;

3. Any additional information the CONTRACTOR believes is relevant to determining its efforts to comply in good faith with San Luis Obispo County Code 8.12.

1-4. RECYCLING PLAN PROCESSING. If the Solid Waste Coordinator determines that the recycling plan does not provide all of the information set forth in "Submittals", stated above, or fails to indicate at least the mandatory quantity specified above by weight of all construction and demolition debris generated by the Project will be used or recycled, the Solid Waste Coordinator will either:

1. Return the Recycling Plan to the CONTRACTOR marked "Denied," including a statement of reasons, and so notify the DISTRICT; or

2. Return the Recycling Plan to the CONTRACTOR marked "Further Explanation Required."

If the Solid Waste Coordinator determines that all the diversion requirements have been met, the official will return the Recycling Plan marked "Approved" to the CONTRACTOR and notify DISTRICT of such approval.

1-5. DETERMINATION OF COMPLIANCE. The Solid Waste Coordinator will review the Recycling Plan Disposal Report documentation and determine whether the CONTRACTOR has complied with diversion requirements as follows:

1. Full Compliance. If the Solid Waste Coordinator determines that the CONTRACTOR has fully complied with the documentation and diversion requirements applicable to the Project, the Solid Waste Coordinator will approve the Recycling Plan's Disposal Report and inform the DISTRICT and the CONTRACTOR of such approval.

2. Substantial Compliance. If the Solid Waste Coordinator determines that the diversion requirements have not been achieved, the Solid Waste Coordinator will determine whether the CONTRACTOR has made a good faith effort and is in substantial compliance with the diversion requirements. Such a decision will be based on the availability of markets for the construction and demolition debris to be landfilled, the size of the Project, and the documented efforts of the CONTRACTOR to divert construction and demolition debris. If the Project is determined to be in substantial compliance, the Solid Waste Coordinator will approve the Recycling Plan Disposal Report and inform the DISTRICT and CONTRACTOR of such approval.

3. Non-Compliance. If the Solid Waste Coordinator determines that CONTRACTOR is not in substantial compliance with the diversion requirements or if the CONTRACTOR fails to submit the documentation required in "Submittals," stated above, then the CONTRACTOR shall be assessed a penalty as specified in "Civil Penalties," below, prior to the Project receiving final approval or a Notice of Completion.

4. Non-Compliance - Falsification of Records. If the Solid Waste Coordinator finds that the CONTRACTOR submits false or misleading data and fails to meet the requirements in violation to San Luis Obispo County Code 8.12, "Solid Waste Management," the CONTRACTOR shall be subject to double the penalties specified in "Civil Penalties," below.

1-6. CIVIL PENALTIES. If the Solid Waste Coordinator, or on appeal, the Public Works Director, determines that an CONTRACTOR is in non-compliance, as described in "Determination of Compliance," stated above, the CONTRACTOR shall pay a civil penalty within thirty (30) days of the finding of non-compliance in the amount calculated as two (2) percent of the total Project valuation or contract award amount. The civil penalty shall be payable to the County of San Luis Obispo and sent to the Public Works Director. Interest shall accrue on any penalty at the legal rate of interest from the date of imposition by the Solid Waste Coordinator.

The CONTRACTOR shall be responsible for any civil penalty arising from the Project's failure to comply with the provisions of San Luis Obispo County Code 8.12. The County Counsel office is hereby authorized to bring a civil action in any court of competent jurisdiction to recover such civil penalties. In any action to enforce such provisions, the County shall be entitled to recover its attorney fees and costs from the CONTRACTOR who is determined by a court of competent jurisdiction to have violated the requirements of San Luis Obispo County Code 8.12.

PART 2 – PRODUCTS – Not used

PART 3 – EXECUTION

3-1. CALCULATING VOLUME AND WEIGHT OF DEBRIS. In estimating the volume or weight of materials identified in the Recycling Plan, the CONTRACTOR shall use the standardized conversion rates established by the Public Works Director for this purpose and revised from time to time.

3-2. WEIGHING OF WASTES. CONTRACTOR shall make reasonable efforts to ensure that all construction and demolition debris diverted or landfilled are measured and recorded using the most accurate method of measurement available. To the extent practical, all construction and demolition debris shall be measured by weight on scales. Such scales shall be in compliance with all regulatory requirements for accuracy and maintenance. A volumetric measurement shall be used for construction and demolition debris for which weighing is not practical due to small size or other considerations. For conversion of volumetric measurements to weight, the CONTRACTOR shall use the standardized conversion rates approved by the Public Works Director for this purpose and amended from time to time.

3-3. VENDORS AND FACILITIES. Local vendors and facilities for construction and demolition debris recycling are provided in the table below.

San Luis Obispo County Recycling Guide			Asphalt/Concrete	Brick/Tile/Porcelain	Cardboard	Carpet/Foam	Plastic	Scrap Materials	Wood & Pallets	Yard Trimmings
RECYCLING COMPANIES THAT ACCEPT CONSTRUCTION & DEMOLITION MATERIALS										
A-1 Metals & Salvage	238-3545	Paso Robles						X		
Bedford Enterprises, Inc.	922-4977	Santa Maria			X			X		
Burke Construction	543-8568	San Luis Obispo	X	X						
Camp Roberts - Contact Nick Dougal	(805) 365-5083	Bradley	X							
Gator Crushing & Recycling	995-1097	Nipomo	X	X						
Heilman Salvage & Metals	466-4893	Atascadero						X		
Navajo Rock & Gravel	238-0955	Paso Robles	X	X						
Negranti Construction	995-3357	Cayucos	X	X						
Paso Robles Recycling	238-4678	Paso Robles			X		X			
Rossi Transportation	434-2884	Templeton								X
Troesh Recycling	928-3764	Nipomo	X	X						
Viborg Sand & Gravel, Inc.	238-4368	Paso Robles	X	X		X				
ROLL-OFF COMPANIES										
API Roll-Off Services	928-8689	Santa Maria	X	X	X			X	X	X
Coastal Roll-Off	543-0473	San Luis Obispo	X	X	X			X	X	X
Mid-State Recycling	466-3636	Atascadero	X	X	X			X	X	X
Mid-State Solid Waste	434-9112	Templeton	X	X	X			X	X	X
Paso Robles Roll-Off	238-2385	Paso Robles	X	X	X			X	X	X
R & R Roll-Off LLC	528-8440	Nipomo	X	X	X			X	X	X
San Miguel Roll-Off	239-1266	San Miguel	X	X	X			X	X	X
LANDFILLS & TRANSFER STATION										
Chicago Grande Landfill	466-2985	Atascadero	X	X	X			X	X	X
Cold Canyon Landfill	549-8332	San Luis Obispo	X	X	X			X	X	X
Paso Robles Landfill	238-2028	Paso Robles	X	X	X			X	X	X
Santa Maria Transfer Station	922-9255	Nipomo	X	X	X			X	X	X

End of Section

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County Project Number: _____

County Project Title _____

Contract Number:_____ County Contact: _____

Simplified Recycling Plan

For San Luis Obispo County Contracts

WASTE MANAGEMENT

You need to review the ***Requirements for Managing Project Waste*** information on the back of this form and then check the box that fits this project. You must check one of the boxes and submit the form prior to issuance of a Notice to Proceed. Note: IWMA means Integrated Waste Management Authority

Are you planning to

- ❑ A) use an IWMA-certified construction and demolition waste recycling facility? or
- ❑ B) use other recycling and disposal facilities?

If B is checked, you must fill out Sections 1 & 2 of a Detailed Recycling Plan form and have it approved prior to the Notice to Proceed. A list of certified facilities is on the back of this form.

LEGAL DECLARATION

I, the owner of record of this company, or authorized agent, have accurately completed this form and declare that all statements herein are true. I acknowledge the responsibility for recycling this project's waste and the penalty for non-compliance. I agree to comply with the requirements of the County Construction & Demolition Debris Recycling Ordinance.

Owner/Agent signature _____

Date _____

Prior to a Notice to Proceed, this form must be signed and faxed to 805-788-2345, or mailed to

Solid Waste Coordinator, Public Works Department
County Government Center, Room 207
San Luis Obispo CA 93408

Please allow 5 working days for receipt and approval prior to Notice to Proceed.

TO EXPEDITE THE PROCESSING OF YOUR RECYCLING PLAN, DO **NOT** SEND IT TO THE GENERAL SERVICES DEPARTMENT -- PLEASE SEND OR FAX IT TO PUBLIC WORKS AT THE ABOVE NUMBER / ADDRESS

Requirements for Managing Project Waste

County law requires each construction, demolition or remodel project to recycle at least **50%** of the waste made by the project if the project is greater than $50,000 in value or larger than 999 square feet. Prior to the County issuing a Notice to Proceed, the law requires you to submit a Recycling Plan for the management of waste generated during the project.

Your choices are:

A) using an Integrated Waste Management Authority (IWMA)-certified construction and demolition waste recycling facility; or,

B) using other recycling and disposal facilities.

Your choice means:

A) use an IWMA-certified construction and demolition waste recycling facility. Check this if all of the construction and demolition (C&D) waste is going to any of the following IWMA-certified facilities.

C&D Recycling Facility at Cold Canyon Landfill	805-549-8332
C&D Recycling Facility at Chicago Grade Landfill	805-466-2985
North SLO County Recycling	805-434-0043
API (roll-off/debris box company)	805-928-8689
R&R (a roll-off/debris box company)	805-929-8000
Recycling Facility at the Paso Robles Landfill	805-238-2028
Santa Maria Transfer Station	805-922-9255
Bedford Enterprises/SMART	805-922-4977

By using any of the above certified recycling facilities for all of your C&D waste and submitting your receipts, you have met the requirement to recycle 50% of your waste. You can either hire a hauling company or haul your C&D waste yourself to one of these facilities.

B) use other recycling and disposal facilities. Check this if your C&D waste is NOT going to any of the C&D recycling facilities listed above. If you choose this option, before the Notice to Proceed can be issued you need to fill out a Detailed Recycling Plan form that shows how you will recycle 50% of your C&D waste. The form is available from the Public Works Department (805-781-5252).

Receipts. With both Option A or Option B, at the end of the project you must submit all the original receipts from any recycling and/or disposal facility that received waste from the project. (Be sure that receipts from Cold Canyon Landfill, Chicago Grade Landfill, Paso Robles Landfill and the Santa Maria Transfer Station indicate that you used the C&D recycling area.) Your receipts must be submitted and approved **before you can receive the Notice of Completion**. If you select Option B, before you receive the Notice of Completion you also need to fill out another part of the Detailed Recycling Plan that shows you recycled the required amount of project waste.

Waste includes anything discarded from the site, such as wood scraps, cardboard, drywall, flashing, tools, paint or other finishing products, concrete, asphalt, plastic bags, remnants of insulation, etc.

Failure to achieve the recycling goal could result in delays in receiving the **Notice of Completion** and result in a penalty equal to 2% of the project's value. Penalties must be paid before receiving the Notice of Completion.

DETAILED RECYCLING PLAN & DISPOSAL REPORT

SECTION 1. To be completed for all projects that are 1,000 square feet or larger or at least $50,000 in value that do not use a certified recycling facility. This form must be approved before a Notice to Proceed can be issued. Call the Public Works Department at 781-5252 for a list of certified facilities.

Project #	Contractor name
Contract #	Contractor representative
Site Address	Contractor Phone
Project Title	
Recycling Facility	Resident Engineer Name

SECTION 2. Recycling Plan – to be completed by all County Contractors prior to the Notice to Proceed being issued unless an IWMA-certified facility is used for recycling and disposal.

SECTION 3. Disposal Report –To be completed before a Notice of Completion is issued. The Disposal Report must be done for all finished projects not using an IWMA-certified recycling facility. Fill in quantities below and **attach all original disposal & recycling receipts** and send them to the County Public Works Department.

Materials	**Before Construction** (Estimated Tons)		**After Construction** (Actual Tons)				**All disposal & recycling receipts must be submitted to County Public Works Department**
			Tons Disposed in Landfill	Recycling			
	To Landfill	To Recycling		On-Site Reuse	Off-Site Recycling	Total Recycled	
Land Clearing							Tons Generated
Inerts (Concrete, A/C, etc.)							
Drywall							
Metals							
Lumber							Sum of Diverted Materials
Cardboard							
Mixed Recyclables							
Trash							Percent of Materials Diverted, Actual Diversion
Totals							
Estimated % Diversion							

Official Use Only	
Plan Approved	
Project Exempt	
Plan Denied	
Information Required	
Date	
Reviewed/Approved By	

Notice of Completion will be delayed if Section 3 is not completed and if receipts are not submitted to Public Works

Questions? Call 781-5252 for questions about certified recycling facilities.

Official Use Only	
Balance	
Disposal Report Approved	
Disposal Report Denied	
Information Required	
Date	
Reviewed/Approved By	

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Construction Material Recyclers and Facilities

This is for informational purposes only and is not a recommendation or endorsement by the County of San Luis Obispo, nor should this list be considered complete. Fees apply. Call for locations, currently accepted materials, and fee information.

Atascadero

C&D Recycling Facility - Chicago Grade Landfill *****
(805) 466- 2985
Open M-Sat 7:30am-3pm; Sun 9-3pm. Sorting facility may be closed intermittently, call for more information.
Accepts appliances, scrap metal, clean concrete, asphalt, roofing tile, brick, wood & green waste. **(IWMA - Certified)**

Heilman Salvage
(805) 466-4893
Open W-Sat. 9am-5pm
Accepts auto parts, plastic, and scrap metals.

Cayucos

Negranti Construction
(805) 995-3357
Open M-F 8am-4pm
Accepts asphalt, brick, tile/porcelain, concrete.

Nipomo

Gator Crushing & Recycling
(805) 995-1097
Open M-F 8am-4pm
Accepts asphalt, brick, tile/porcelain and concrete.

Santa Maria Transfer Station *
(805) 922-9255
(IWMA Certified)

RoXsand
(805) 357-2288
Open M-F 7am-4pm
Recycles concrete, asphalt, concrete block

Paso Robles

A-1 Metals and Salvage
(805) 238-3545
Open M-F 8am-5pm; Sat. 8am-2pm
Accepts appliances, auto parts, and scrap metal.

Paso Robles Recycling
(805) 238-4678
Open T-Sat. 9am-4:45 pm
Accepts cardboard and some metals.

Viborg Sand & Gravel
(805) 238-4368
Open M-F 7am-4:30pm, Sat 8am-Noon
Accepts concrete, asphalt, roofing tile and bricks.

*** IWMA-Certified means the Integrated Waste Management Authority has certified that the facility recycles 50% of the waste it receives.**

(over)

Paso Robles Landfill
(805) 238-2028
Open M-Sat - 8am-3pm
Accepts appliance, scrap metal, clean concrete, asphalt, roofing tile, brick, wood and green waste. **(IWMA-Certified)**

San Luis Obispo
C&D Recycling Facility at Cold Canyon Landfill *****
(805) 549-8332
Open M-Sun. 8am-3pm
Accepts appliances, asphalt, auto batteries, brick, tile/porcelain, cardboard, plastic, rebar, scrap metals, ceramic toilets (no metal), wood pallets, and yard trimmings. **(IWMA - Certified)**

Pacific Coast Lumber
(805) 543-5533
Open M-F 8am-5pm; Sat. 9am-1pm
Accepts wood and trees.

R. Burke Corporation
(805) 543-8568
Open M-F 8am-4pm
Accepts porcelain toilets, broken concrete, asphalt, rock, and brick.

Victor Kemp/Desottto South
(805) 541-0450
Open M-F 7:30am-4:20pm
Accepts carpet padding.

Templeton
Granite Construction
(805) 434-2376
Accepts concrete and asphalt.

North SLO County Recycling *****
(805) 434-0043
Open M-F 7am-4pm, Sat 7-1pm
Accepts mixed construction debris including concrete and asphalt, brick, tile/porcelain, ceramic toilets, drywall, scrap metals, appliances, cardboard, green waste (yard trimmings) lumber, plywood and wooden pallets. **(IWMA - Certified)**

Rossi Transportation
(805) 434-2884
Open M-F 8am-5pm
Accepts yard trimmings 2”-3” diameter, 6’length max; no stumps, palms, or yuccas.

Out of County

Santa Maria
Bedford Enterprises/SMART *
(805) 922-4977
Open M-F 8:30am-4:30pm; Sat. varies
Accepts construction debris.

*** IWMA-Certified means the Integrated Waste Management Authority has certified that the facility recycles 50% of the waste it receives.**

(over)

Section 02100

CLEARING AND GRUBBING

PART 1 - GENERAL

1-1. SCOPE. This section covers clearing and grubbing and shall include the necessary preparation of the site; removal and disposal of all debris; excavation; handling, storage, transportation, and disposal of all excavated material.

Requirements for demolition of existing structures and facilities are addressed in Section 02050, “Demolition.”

Requirements for protecting certain trees that are located inside of the work limits are specified in Section 01061, “Environmental Mitigation Requirements.”

1-2. GENERAL. With reference to the terms and conditions of the construction standards for excavations set forth in OSHA "Safety and Health Regulations for Construction", Chapter XVII of Title 29, CFR, Part 1926, CONTRACTOR shall employ a competent person and, when necessary based on the regulations, a registered professional engineer licensed in the State of California, to act upon all pertinent matters of the work of this section. All work shall be done in strict compliance with these Specifications and to the satisfaction of the ENGINEER.

1-3. SUBMITTALS. Submit the following items in accordance with the requirements specified in Section 01300, “Submittals.”

- Drawings showing the proposed clearing and grubbing limits.

PART 2 - PRODUCTS

2-1. CLEARING. Clearing shall consist of the cutting of trees and stumps so that the final top elevation of remaining stumps shall not be more than 12 inches above the original ground surface in each case and the satisfactory disposal of such trees, the cutting and removal of all brush, shrubs, debris and all vegetation to approximately flush with the ground surface and the disposal of such cuttings, debris, etc., as specified herein. Mowing will be considered adequate for the cutting of light vegetation.

Unless otherwise shown or specified, clear only those trees that interfere with the work. Trees specified in Section 01061 to be protected shall be protected in-place.

Shrubs, structures, and other existing features indicated on the Drawings to be protected in place shall be adequately protected during clearing and grubbing operations.

2-2. GRUBBING. Grubbing shall mean the removal and disposal of all stumps and roots larger than 2 inches in diameter including matted roots whether 2 inches or larger or not, to a minimum depth of 12 inches below the natural surrounding ground surface in each case.

PART 3 - EXECUTION

3-1. CLEARING AND GRUBBING. Except as otherwise specified or shown to be protected, trees, shrubs, vegetation, grasses, etc. within the limits of the WORK shall be sufficiently cleared and disposed of to allow construction of the work. 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, rubbish, and fencing.

Protect structures and piping above and belowground, trees, shrubs, and vegetative growth and fencing which are not designated for removal.

Prior to trenching operations in paved areas, neatly cut pavement and curbs and gutters beyond the limits of excavation.

3-2. STRIPPING. Remove and stockpile organic sod (topsoil) – refer to Section 01061, “Environmental Mitigation Requirements.” Reuse topsoil as shown and specified.

Remove and dispose of grass and grass roots, and other objectionable material remaining after clearing from the areas designated to be stripped.

3-3. MOWING AND RAKING. All previously cultivated land area shall be cleared by mowing. All vegetation shall be mowed as close as possible to the ground surface, raked into windrows, and thoroughly disposed of. Final mowing, raking and disposal shall not be completed prior to completion of all other phases of the clearing and grubbing work.

3-4. DISPOSAL. All logs, trees, stumps, roots, brush, tree trimmings and other materials resulting from clearing and grubbing operations shall become the property of the CONTRACTOR and shall be entirely removed from the site and disposed of at such location(s) as determined by the CONTRACTOR and approved by the ENGINEER. Do not burn combustible materials. Disposal shall be such that upon completion, the area shall be entirely void of all stumps, trimmings, brush, vegetation, debris, etc. Burning will not be allowed.

3-5. DISPOSAL OF EXISTING STRUCTURES, FOUNDATIONS, FENCES, ETC. Any existing fencing, including fence posts, shall be removed by the CONTRACTOR if shown or as specified. All fence wire and fence posts which in the opinion of the ENGINEER have some salvage value shall be removed in a careful manner and stored at such locations as directed by the ENGINEER. All wire salvaged shall be rolled as required to provide ease of handling and all posts salvaged shall be stacked neatly as directed. All fence wire and posts not having salvage value shall become the property of the CONTRACTOR and shall be disposed of by and at the expense of the CONTRACTOR.

All structures, foundations, or debris of any kind which project above ground shall be removed and disposed of away from the site or at such locations as may be designated by the ENGINEER by and at the expense of the CONTRACTOR. Any excavation made by such removal shall be backfilled to the level of the surrounding ground in a manner acceptable to the ENGINEER.

No pre-arranged disposal site or related permits have been determined or secured by the DISTRICT.

3-6. CONDITION ON COMPLETION. Before the work is considered complete, any regrowth of vegetation or tree shoots, which have grown after initial cutting, shall be cut and removed as hereinbefore specified. All tree shoots shall be cut off level with the surrounding stumps. All regrowth of vegetation shall be mowed and raked. The finished work shall leave a completely cleared and grubbed site as specified.

3-7. PRESERVATION OF TREES, SHRUBS, AND OTHER PLANT MATERIAL. CONTRACTOR shall save and protect from damage plant materials (trees, shrubbery, and plants) beyond the limits of clearing and grubbing from damage resulting from the WORK. No filling, excavating, trenching, or stockpiling of materials will be permitted within the drip line of these plant materials. The drip line is defined as a circle drawn by extending a line vertically to the ground from the outermost branches of a plant or group of plants. To prevent soil compaction within the drip line area, no equipment will be permitted within this area.

When trees are close together, restrict entry to area within drip line by fencing. In areas where no fence is erected, protect the trunks of trees 2 inches or greater in diameter by encircling the trunk entirely with boards held securely by 12-gauge wire and staples. This protection shall extend from ground level to a height of 6 feet.

Cut and remove tree branches where necessary for construction. Remove branches other than those required for a balanced appearance of any tree. Except for oak trees, treat cuts with a tree sealant.

End of Section

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Section 02140

DEWATERING

PART 1 – GENERAL

1-1. SCOPE. This section covers dewatering of excavations and construction areas to achieve proper completion of all WORK performed under this Contract.

Dewatering of trenches and other excavations shall be considered as incidental to the construction of the WORK and all costs thereof shall be included in the Contract Prices in the Bid Schedule.

1-2. GENERAL REQUIREMENTS. All permanent improvements shall be constructed in areas free from water. The CONTRACTOR shall construct and maintain all permanent or temporary slopes, dikes, levees, drainage ditches, and sumps necessary for removal of water from work areas. The CONTRACTOR shall design, furnish, install, maintain, and operate all necessary pumping and other dewatering equipment required for dewatering the various work areas and for maintaining the foundation and other work areas free from water from any and all sources whatsoever. Dewatering shall be accomplished by methods that will ensure a dry excavation and preserve the final lines and grades of the bottoms of excavations. Said methods may include deep wells, well points, or other methods suitable for the accomplishment of the work.

The CONTRACTOR'S discharge of water from dewatering operations is governed by a National Pollutant Discharge Elimination System (NPDES) permit issued to the DISTRICT by the Regional Water Quality Control Board for the Project. Refer to Section 01060, "Permit Requirements," for additional requirements.

The dewatering shall be accomplished in a manner that will prevent loss of fines from the foundation, will maintain stability of all excavated slopes and bottoms of excavations, and will permit all construction operations to be performed in dry, stable conditions. Dewatering of excavations shall be performed to the extent required to permit placement of compacted fill materials in the dry and to prevent sloughing of the excavation side slopes. The CONTRACTOR shall lower the groundwater level a minimum of three (3) feet below foundation grade prior to foundation preparation and placement of structural foundations. During the placement and compaction of fill or bedding materials, the water level at every point within the limits of fills being placed shall be maintained a minimum of three (3) feet below fill placement level.

The infiltration of groundwater into excavations will be affected by the soil type and depth of the excavation below the static water level. Particular attention will be required when excavating pipeline trenches through wet or saturated soil deposits and

rock. Prevent groundwater inflows into trench excavations. Field conditions shall be carefully assessed before trenches and excavations are made so that appropriate measures can be taken to prevent sloughing and caving, running ground, and excessive ground movement during construction.

Reference is made to the reports of physical conditions and subsurface explorations specified in Article 4.2.A of the General Conditions.

1-3. SUBMITTALS. Submit the following in accordance with the requirements specified in Section 01300, "Submittals."

- Dewatering Plan. Prior to commencement of excavation, the CONTRACTOR shall submit and receive acceptance of a detailed plan for dewatering of excavations including, but not limited to, the following:

  1. Anticipated dewatering flow rates and a means for monitoring actual flow rates during construction.
  2. Description of CONTRACTOR'S equipment and systems proposed for use in dewatering excavations.
  3. Description of methods for the disposal of water from construction dewatering into nearby drainages, the storm drain system, or offsite.
  4. Construction schedule.
  5. The dewatering plan shall be coordinated with and conform to the requirements specified in the Storm Water Pollution Prevention Plan (SWPPP) and other permits.

  The dewatering plan shall be prepared by a licensed hydrogeologist and submitted for the ENGINEER'S review and acceptance prior to dewatering.

  The CONTRACTOR may be required to demonstrate the system(s) proposed will satisfy the requirements specified herein and to verify that adequate equipment, personnel, and materials are provided to dewater the excavations at all locations and times.

- Except as otherwise specified in Section 01060, "Permit Requirements," CONTRACTOR shall be responsible for obtaining all dewatering permits, including permits required to discharge water into nearby sanitary sewer facilities, if any.

- CONTRACTOR shall provide a plan for abandoning all wells and groundwater monitoring wells (piezometers) at the completion of construction work, including those installed by the CONTRACTOR, and those installed by the DISTRICT as part of the geotechnical field investigations, unless otherwise directed by the DISTRICT.

- A plan for treating, stabilizing, and disposing of chemically affected groundwater shall also be provided.

1-4. QUALITY CONTROL. All dewatering operations shall be the responsibility of the CONTRACTOR and shall be adequate to assure the integrity of the finished project and controlled in such a manner as to avoid all objectionable settlement and subsidence.

CONTRACTOR shall establish reference points where critical structures or facilities exist immediately adjacent to areas of proposed dewatering. Reference points shall be observed at frequent intervals to detect any settlement that may develop. The responsibility for conducting the dewatering operation in a manner which will protect adjacent structures and facilities rests solely with the CONTRACTOR. The cost of repairing any damage to adjacent structures and restoration of facilities shall be the responsibility of the CONTRACTOR.

The CONTRACTOR shall monitor and record all dewatering pump rates and volumes. Dewatering equipment shall be equipped with meters and totalizers or similar equipment, acceptable to the ENGINEER, to adequately measure the instantaneous and total flow from the equipment. Initial dewatering volumes and averaged rates shall be recorded at least once every 6 hours until the pumping has reached a uniform flow. Subsequent pumping volumes and averaged rates shall be recorded at least twice a day, once at the beginning of the work shift and once at the end of the work shift. A certified record of all pumping rates and volumes shall be provided to the ENGINEER on a weekly basis.

1-5. EQUIPMENT. Dewatering, where required, may include the use of well points, sump pumps, temporary pipelines for water disposal, rock or gravel placement, ditches, drainage trenches, and other means.

Standby pumping equipment shall be maintained on the job site. A minimum of one standby unit (a minimum of one for each ten in the event well points are used) shall be available for immediate installation should any well unit fail. The design and installation of well points or deep wells shall be suitable for the accomplishment of the WORK. Drawings indicating the proposed dewatering system shall be submitted to the ENGINEER for review.

1-6. NOISE MITIGATION. Referring to the requirements specified in Section 01061, “Environmental Mitigation Measures,” dewatering equipment shall not cause noise nuisance. Noise levels shall, at a minimum, comply with the requirements of local jurisdictions or permitting agencies and the approved Mitigation Monitoring Program.

1-7. DISPOSAL OF CONTAMINATED GROUNDWATER. Refer to the Supplementary General Conditions for specific requirements.

PART 2 – PRODUCTS - Not used

PART 3 - EXECUTION

3-1. DEWATERING. Dewatering for structures and pipelines shall commence when groundwater is first encountered, and shall be continuous until such times as water can be allowed to rise in accordance with the provisions of this Section or other requirements.

CONTRACTOR'S dewatering operations shall at all times be conducted in such a manner as to preserve the undisturbed bearing capacity of the subgrade soils at proposed bottom of excavation. Each excavation shall be kept dry during subgrade preparation and continually thereafter until the structure to be built, or the pipe to be installed therein, is completed to the extent that no damage from hydrostatic pressure, flotation, or other cause will result.

If foundation soils are disturbed or loosened by the upward seepage of water or an uncontrolled flow of water, the affected areas shall be excavated and replaced with imported fill material specified by the ENGINEER at no additional cost to the DISTRICT.

Surface water should be directed away from open excavations, and water should not be allowed to accumulate in the bottoms of excavations.

Excavations that will be left open for an extended period (i.e., more than a couple of days) likely will require more elaborate dewatering measures.

The CONTRACTOR shall maintain the water level three(3) feet below the bottom of the excavation in all work areas where groundwater occurs during construction, backfilling and until acceptance of the WORK.

Flotation of pipelines and structures shall be prevented by the CONTRACTOR by maintaining a positive and continuous removal of water. The CONTRACTOR shall be fully responsible and liable for all damages which may result from failure to adequately keep excavations dewatered.

Except for shutdowns for maintenance of dewatering equipment, no interruption in the approved dewatering procedures will be permitted during excavation and construction operations. Full time surveillance (24 hours a day) and maintenance of the equipment shall be provided by the CONTRACTOR to avoid breakdowns.

3-2.CONTROL OF WATER DURING SHAFT CONSTRUCTION. In connection with shaft construction for the bore and jack operations covered in Section 02313, “Bore and Jack Construction,” and other deep excavations requiring excavation supports systems, CONTRACTOR shall construct, install, operate and maintain, and remove upon completion, a suitable dewatering system capable of meeting the performance requirements specified herein for subsurface conditions encountered.

Selection of appropriate materials, equipment, and means and methods for controlling ground water and surface water shall be made by CONTRACTOR based on the conditions encountered. Methods selected shall be compatible with the methods selected for shaft excavation and excavation support.

CONTRACTOR shall conduct additional subsurface investigations as necessary to identify ground water conditions and to provide parameters for design, installation, and operation of ground water control systems.

Install a ground water control system compatible with requirements of Federal Regulations 29 CFR Part 1926 to produce the following results:

- Develop a substantially dry and stable subgrade for subsequent construction operations.

- Preclude damage to adjacent properties, buildings, structures, utilities, installed facilities, and other work.

- Maintain stability of sides and bottom of excavations.

Provide drainage of seepage water and surface water, as well as water from any other source entering the shaft excavation, by sump pumping or other methods selected by CONTRACTOR.

Provide ditches, berms, pumps and other methods necessary to divert and drain surface water from excavation and other work areas.

Install ground water control and drainage systems so as not to interfere with utilities, construction operations, or adjacent properties.

Assume sole responsibility for ground water control systems and for any loss or damage resulting from partial or complete failure of protective measures and any settlement or resultant damage caused by the ground water control operations. Modify ground water control systems or operations if they cause or threaten to cause damage to new construction, existing site improvements, or adjacent property. Repair damage caused by ground water control systems or resulting from failure of the system to protect property as required.

Comply with permit requirements.

Provide equipment and instrumentation installed at the proper locations and depths to provide meaningful observations of the conditions affecting the excavation and adjacent structures, including piezometers and monitoring wells, and devices such as flow meters for observing and recording flow rates.

3-3. SITE DRAINAGE. At all times, site grading shall promote drainage. Surface runoff shall be diverted from excavations. Water entering the excavation from surface runoff shall be collected in shallow ditches around the perimeter of the excavation, drained to sumps, and be pumped or drained by gravity from the excavation to maintain a bottom free from standing water.

3-4. WELL AND WELL POINTS. If well points or wells are used, they shall be adequately spaced to provide the necessary dewatering. They shall be packed with sand and/or other porous medium to prevent pumping of fine sands or silts from the subsurface. A continual check by the CONTRACTOR shall be maintained to ensure that the subsurface soil is not being removed by the dewatering operation.

CONTRACTOR shall abandon / destroy all wells and groundwater monitoring wells when no longer needed, or at the completion of construction work, unless otherwise directed by the DISTRICT.

During the geologic and geotechnical study for the NWP, groundwater monitoring wells (i.e., piezometers) were installed at key locations along the pipeline alignment. The CONTRACTOR may use the piezometers to monitor groundwater levels prior to, and/or during, construction. When the piezometers are no longer needed, the CONTRACTOR shall destroy the piezometers that were installed along (or near) the pipeline alignment prior to the acceptance of the Work. A listing of piezometers and typical details of construction are included in the Geotechnical Data Report.

CONTRACTOR shall comply with all applicable laws and regulations of the County of San Luis Obispo and the State of California pertaining to well construction, destruction, repair or modification. CONTRACTOR shall obtain all required permits, coordinate all inspections, submit all documentation, and pay all fees relating to the destruction of the NWP piezometers. Well destruction permit applications may be obtained from the County of San Luis Obispo, Public Health Department, Environmental Health Services, 2156 Sierra Way, P.O. Box 1489, San Luis Obispo, CA 93406-1489. Additional permits will be required from the State of California, Department of Transportation (Caltrans) for the destruction of piezometers within Caltrans right-of-way.

3-5. DISPOSAL OF WATER. CONTRACTOR shall dispose of water in a suitable manner without damage to adjacent property and in conformance with permit conditions. No water shall be drained into work built or under construction without prior consent of the ENGINEER. Water shall be filtered using an approved method to remove sand and fine-sized soil particles before disposal into any drainage system. The dewatering system shall not allow migration and pumping of soil fines with the discharge water.

3-6. TERMINATION OF DEWATERING. The release of groundwater to its static level shall be performed in such a manner as to maintain the undisturbed state of the natural foundation soils, prevent disturbance of compacted backfill and prevent flotation or movement of structures, and pipelines.

End of Section

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Section 02200

EARTHWORK

PART 1 - GENERAL

1-1. SCOPE. This section covers general earthwork requirements including site and structure excavations; handling, storing, transporting, and disposing of all excess excavated material; excavation support and protection; preparation and stabilization of foundation surfaces and subgrades; earthwork materials; construction of fills and embankments; surfacing and grading; and other appurtenant work.

Related work requirements specified elsewhere include: site preparation, clearing and grubbing – addressed in Section 02100, “Clearing and Grubbing;” dewatering - addressed in Section 02140, “Dewatering;” and trench excavation, pipe backfill, and trench backfill – addressed in Section 02202 – “Trenching and Backfilling.”

1-2. GENERAL. With reference to the terms and conditions of the construction standards for excavations set forth in OSHA "Safety and Health Regulations for Construction", Chapter XVII of Title 29, CFR, Part 1926, CONTRACTOR shall employ a competent person and, when necessary based on the regulations, a registered professional engineer, to act upon all pertinent matters of the work of this section.

Backfilling during inclement weather shall not be performed except by permission of the ENGINEER. No backfill or materials shall be placed on wet or saturated surfaces, nor shall wet or saturated materials be placed in any backfill.

1-3. SUBMITTALS. Submit the following in accordance with the requirements specified in Section 01300, “Submittals.”

- Detailed information and test results regarding all earthwork materials required for use on the project. Testing shall be performed by CONTRACTOR’S certified testing laboratory. Submit lab testing results, which shall include:

  Materials tests indicating type of each material and composition, source, gradation, Atterberg limits, classification, durability, and hardness. Two initial gradation tests for each material and one additional gradation test shall be made for each additional 500 tons of material delivered to or used on the site.

Laboratory soil compaction testing for each material type.

- Submit Certificates of Compliance for imported materials. The certificates shall name the sources of materials, test results, and other special requirements. The CONTRACTOR shall not change sources during the job unless another certificate is prepared, submitted, and approved.

- Submit a 12-inch square sample of geotextile fabric, manufacturer's descriptive product data, and installation instructions.

- Submit a detailed plan showing the design and installation of all excavation support systems.

- Submit complete mix design and laboratory test results for controlled density fill.

- Submit Asbestos Dust Mitigation Plan.

1-4. LABORATORY TESTS. As specified in Section 01400, "Quality Control," all tests required for preliminary review of materials shall be made by an acceptable certified testing laboratory at the expense of the CONTRACTOR. Required materials tests by CONTRACTOR are specified in this section.

1-5. LABORATORY COMPACTION TEST METHODS. The following standard testing methods shall be used in determining maximum dry densities for earthwork materials used as follows:

For free-draining earthwork materials that may contain up to 10 percent, by weight, of soil particles passing a No. 200 sieve: ASTM D4253.

For earthwork materials that contain 10 percent or more, by weight, soil particles passing a No. 200 sieve: ASTM D1557.

As used for the work of this project, “percent compaction,” “percent relative compaction” or “percent maximum density” shall be taken as follows:

For materials subject to the requirements of ASTM D4253, percent compaction or percent relative compaction refers to the ratio of field-measured in-place dry density of the material to its maximum index density determined in the laboratory using ASTM D4253.

For materials subject to the requirements of ASTM D1557, percent maximum density refers to the ratio of field-measured in-place dry density of the material to the dry density at optimum moisture content (maximum density) determined in the laboratory using ASTM D1557.

1-6. CONSTRUCTION AND EXCAVATION OPERATIONS IN SERPENTINITIC ROCK

An Asbestos Dust Mitigation Plan shall be prepared for all construction and grading operations where serpentinitic rock may encountered. The Plan shall be submitted to and approved by the San Luis Obispo County Air Pollution Control District (APCD) [3433 Roberto Court, San Luis Obispo, CA 93401-7126, APCO – Larry Allen, Phone: 805-781-4AIR or 805-781-5912; Fax: 805-781-1002].

Submit APCD-approved Plan to ENGINEER. The provisions of the Plan shall be implemented at the beginning of construction, and shall be maintained throughout construction. At minimum, the Plan shall include:

- Construction vehicle speed at the work site shall be limited to fifteen (15) miles per hour.
- Prior to any ground disturbance, sufficient water shall be applied to the area to be disturbed to prevent visible emissions from crossing any property line, and shall be kept adequately wetted to prevent visible emissions throughout excavation.
- Storage piles shall be kept adequately wetted, treated with a chemical dust suppressant, or covered when material is not being added to or removed from the pile.
- Equipment shall be washed down before moving from the property onto a paved public road.
- Visible track-out on a paved public road shall be cleaned using wet sweeping or a HEPA filter-equipped vacuum device within twenty-four (24) hours.

PART 2 - PRODUCTS

2-1. MATERIALS.

2-1.01. Geotextile Fabric. Woven geotextile fabric used for trench subgrade stabilization shall be Mirafi "600X", Amoco Fabrics and Fibers Co. "Amoco 2006", TNS Advanced Technologies "W300", or approved equal.

2-1.02. Vapor Barrier. Vapor barrier beneath concrete slabs or slab base course material shall be polyethylene film, Product Standard PS17, 10 mil minimum thickness.

2-1.03. Crushed Rock. Crushed rock for building pads, subsurface drains, drainage trenches and other uses as shown on the Drawings shall be an imported material that consists of durable rock and gravel that is free from

slaking or decomposition under the action of alternate wetting and drying, and free of hazardous or deleterious materials/substances. Crushed rock shall meet the following gradation requirements:

Sieve Size	Percent Passing by Weight
1 inch	100
3/4 inch	90 – 100
No. 4	0 – 10
No. 200	0 – 2

Crushed rock shall have a durability index of not less than 40 as determined by California Test Method 229 and a sand equivalent value of not less than 75 as determined by ASTM Test Method D2419.

2-1.04. Pea Gravel. Pea gravel shall be washed, free-flowing, and free of hazardous or deleterious materials/substances. Pea gravel shall meet the following gradation requirements:

Sieve Size	Percent Passing by Weight
1/2 inch	90 – 100
3/8 inch	40 – 70
No. 4	0 – 15
No. 8	0 – 5

2-1.05. Blown Sand. Except as otherwise specified in the permit requirements, sand used for air-blown applications (such as for the annular space between the carrier pipe and the steel casing in bore and jack construction), shall be clean and sized such that 100 percent passes a Standard No. 30 sieve.

2-1.06. Permeable Material. Permeable material for use as a free-draining base beneath slabs and foundations, wall drains, subsurface trench and blanket drains, and other uses as shown on the Drawings shall be crushed rock or gravel and sand that is free from dust, clay, trash and hazardous or deleterious materials/substances; hard, durable, nonfriable; and shall be graded in accordance with Class 2 Permeable Material, as specified in California Department of Transportation (Caltrans) Standard Specifications (July 2002), Section 68. Material shall have a durability index of not less than 40, as determined by California Test Method 229, and a sand equivalent value of not less than 75, as determined by ASTM Test Method D2419.

Only crushed rock with angular particles shall be used when the perimeter of the permeable material is not confined or otherwise subject to ravelling, such as on a slope.

2-1.07. Aggregate Base and Subbase. Aggregate base and subbase for building pads, roads, and structure backfill shall conform to the requirements of Caltrans Standard Specifications (July 2002) Section 26, Class 2 Aggregate Base (3/4 inch maximum aggregate) or Section 25, Class 2 Aggregate Subbase (with at least 15 percent of subbase passing No. 200 sieve). Recycled materials shall not be used.

2-1.08. Controlled Density Fill. Fills at certain locations shall be controlled density fill (CDF), where shown on the Drawings, also known as controlled low strength material (CLSM) or "Slurry Cement Backfill" in Section 19 of the Caltrans Standard Specifications (July 2002).

Comply with the Caltrans gradation of CDF aggregate:

Sieve Size	Percent Passing by Weight
1-1/2 inch	100
1 inch	80 – 100
3/4 inch	60 – 100
3/8 inch	50 – 100
No. 4	40 – 80
No. 100	10 – 40

In addition to the Caltrans requirements, the CDF aggregate shall be free from roots and organic matter, clay balls, and other hazardous or deleterious materials/substances, and no more than 15 percent of the aggregate shall pass through the No. 200 sieve.

The 28-day compressive strength of the CDF shall be no less than 50 psi and no more than 110 psi.

2-1.09. Rip Rap. Rip rap for drainage outfalls and other uses as shown on the Drawings shall conform to the requirements for No.1 Backing of the Caltrans Standard Specifications (July 2002), Section 72 as follows:

Rock Mass (lbs)	Percent Larger
200	0-5%
75	50-100%
25	90-100%

The amount of material smaller than the smallest rock mass listed above shall not exceed the percentage limit listed on a mass basis. Compliance with the percentage limit shall be determined by the ratio of the number of individual pieces larger than the specified rock mass compared to the total number of individual pieces larger than the smallest rock mass.

Rock may be imported, or obtained from rock excavation being performed under this WORK. Rock shall be of such shape as to form a stable protection structure of the required section. Rounded boulders or cobbles shall not be used on prepared ground surfaces having slopes steeper than 2:1 (horizontal : vertical). Angular shapes may be used on any planned slope. Flat or needle shapes will not be accepted unless the thickness of the individual pieces is greater than 0.33 times the length.

2-1.10. Native Materials. To the maximum extent available, use of native materials obtained from site, structure and trench excavations will be allowed for the construction of fills, embankments, and structure backfill (structure backfill is defined as the material placed around and outside of structures) provided the material is demonstrated by CONTRACTOR to be "suitable." Use of native materials for trench backfill is addressed in Section 02202, "Trenching and Backfilling."

"Suitable" materials are those which can be placed and compacted to meet the specified requirements. The CONTRACTOR will have difficulty compacting native fill material obtained from site, structure and trench excavations if it is not of uniform consistency and at a moisture content near optimum. Mixing, blending and moisture conditioning will be necessary to create a material that can be placed and adequately compacted.

CONTRACTOR shall demonstrate the suitability of using native materials from site, structure and trench excavations for compacted fills by performing the laboratory soil compaction testing for each material type as specified under "Submittals."

Additional material to make up any deficiencies in suitable materials shall be provided from CONTRACTOR'S off-site source. No borrow pits shall be opened on the site.

Whatever the source, material placed in site fills, embankments, and as structure backfill shall have the following properties or characteristics:

- Less than 30 percent of the material shall be retained on the ¾-inch sieve.

- No less than 15 percent of the material shall pass the No. 200 sieve.

- All material placed as backfill shall be free from rocks and stones greater than 4-inches in size, unbroken clods of soil greater than 1-inch in size, brush, stumps, logs, roots, debris, and other organic, hazardous and deleterious materials/substances.

- Materials can be placed and compacted to meet the specified requirements and will not cause damage to any elements of the Work.

2-1.11. 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.

2-2. MATERIAL TESTING.

2-2.01. Preliminary Review of Materials. As specified in Section 01400, "Quality Control," all tests required for materials shall be made by an acceptable independent testing laboratory at the expense of CONTRACTOR. Two initial gradation tests shall be made for each type of general fill, designated fill, backfill, or other material, and one additional gradation test shall be made for each additional 500 tons of each material delivered to or used on the site. In addition, one set of initial Atterberg Limits test shall be made for each fill material containing more than 20 percent by weight passing the No. 200 sieve, and one additional Atterberg Limits test shall be made for each additional 500 tons of each material delivered to or used on the site.

All material testing on CDF shall be made by an independent testing laboratory at the expense of CONTRACTOR.

2-2.02. Field Testing At Expense of DISTRICT As specified in Section 01400, all in-place field density and moisture content tests will be made by an independent testing laboratory at the expense of the DISTRICT. CONTRACTOR shall provide access to the materials and work area and shall assist the laboratory as needed in obtaining representative samples.

2-2.03. Required Field Tests. For planning purposes the following guidelines shall be used for frequency of field tests. Additional tests may be performed as necessary for job conditions.

a. Moisture content and in-place density tests of structure foundation subgrades, one every 500 square feet of foundation area.

b. Moisture content and in-place density tests of pipe zone and trench zone backfill materials, every 1,000 feet.

c. Moisture content and in-place density tests of embankment fills, every 1,000 cubic yards placed.

d. One in-place field density and moisture test for every 200 cubic yards of structure backfill.

e. One in-place density and moisture test whenever there is a suspicion of a change in material uniformity, the quality of moisture control or effectiveness of compaction.

f. Testing of CDF: Compressive strength test cylinders for every 200 cubic yards of CDF placed, tested in accordance with ASTM C39 at 7 days and 28 days.

PART 3 - EXECUTION

3-1. SITE PREPARATION. Refer to the requirements specified in Section 02100, “Clearing and Grubbing.”

3-2. EXCAVATION.

3-2.01. General. Excavations shall provide adequate working space and clearances for the work to be performed therein and for installation and removal of concrete forms. In no case shall excavation faces be undercut for extended footings.

Subgrade surfaces shall be clean and free of loose material of any kind, and free of standing water, when concrete is placed thereon.

Except where exterior surfaces are specified to be damp-proofed, monolithic concrete manholes and other concrete structures or parts thereof, which do not have footings that extend beyond the outside face of exterior walls, may be placed directly against excavation faces without the use of outer forms, provided that such faces are stable and also provided that a layer of polyethylene film is placed between the earth and the concrete.

3-2.02. Classification of Excavated Materials. No classification of excavated materials for facilities construction will be made for payment purposes. Excavation work shall include the removal and subsequent handling of all materials excavated or otherwise removed in performance of the work, regardless of the type, character, composition, or condition thereof.

3-2.03. Preservation of Trees. No trees shall be removed outside excavated or filled areas, unless their removal is authorized by the ENGINEER. Trees left standing shall be adequately protected from permanent damage by construction operations.

3-2.04. Unauthorized Excavation. Except where otherwise authorized, indicated, or specified, all materials excavated below the bottom of concrete walls, footings, slabs on grade, and foundations shall be replaced with concrete or lean concrete at the expense of CONTRACTOR. If structural concrete replacement is chosen, it shall be with concrete placed at the same time and monolithic with the concrete foundation.

3-2.05. Blasting. Blasting or other use of explosives for excavation will not be permitted.

3-2.06. Dewatering. As specified in Section 02140, “Dewatering,” dewatering measures shall be used and dewatering equipment shall be provided to control, remove, and dispose of all surface water and groundwater entering onto cuts and into excavations, trenches, or other parts of the work.

3-2.07. Excavation Support. Except where banks are cut back on a stable slope, excavations for structures and trenches shall be supported in accordance with the requirements specified in 29CFR1926, Subpart P – Excavations, Cal/OSHA requirements, and the General Conditions, to prevent caving, sliding and settlement.

Excavation support systems shall be designed by a professional Civil or Structural Engineer who is retained by the CONTRACTOR and is registered in the State of California. In all areas, excavation support systems shall be designed to support earth pressures, unrelieved hydrostatic pressures, utility loads, equipment, applicable traffic loads, and other surcharge loads in such manner as will allow safe construction and will prevent damage to adjacent structures (including existing pipelines and utilities) and injury to workers and the public. Design support system to maintain the stability of the excavation against sliding or bottom heave. In addition, the installation of excavation support systems shall not cause a disruption to public convenience or access.

Excavation support systems shall be furnished and installed as necessary to limit the extent of excavations for deeper structures and to protect adjacent structures and facilities from damage due to excavation and subsequent construction. CONTRACTOR shall assume complete responsibility for, and install adequate protection systems for prevention of damage to existing facilities.

CONTRACTOR shall maintain excavation support systems as necessary to support the sides of excavations and to prevent detrimental settlement and lateral movement of existing facilities, adjacent property, and completed work.

Excavation support systems may be removed coincident with backfilling operations when the strength of the facility under construction is sufficient to carry external loads. Excavation support systems shall not be pulled after backfilling. Where the excavation support system is left in place, it shall not be braced against the structure, but shall be supported in a manner which will preclude concentrated loads or horizontal thrusts on the structure. Cross braces installed may be removed after structure backfill placement and compaction has been completed. Excavation support systems shall be removed unless otherwise permitted by the ENGINEER. The excavation support system shall not be removed, if in the opinion of the ENGINEER, removal of the support system will cause settlement or damage to the facility it is protecting. If left in place, the support system shall be cut off 12 inches below finished grade. The design of the support system shall be such as to permit complete removal while maintaining safety and stability at all times.

3-2.08. Foundation Subgrade Stabilization. Subgrades for concrete structure foundations shall be firm, dense, and thoroughly compacted and consolidated; shall be free from mud, muck, and standing water; and shall be sufficiently stable to remain firm and intact under the feet of the workers.

All surface vegetation, sod, and organic topsoil shall be removed beneath and within structure foundations.

Subgrades for concrete structures which are otherwise solid, but which become unstable or mucky on top due to construction operations, shall be reinforced with crushed rock contained within a geotextile fabric envelope as shown on the Drawings. The finished elevation of stabilized subgrades shall be at or below the subgrade elevations indicated on the Drawings.

3-2.09. Roadway Excavation. Excavation for the roadways, drives, and parking areas shall conform to the lines, grades, cross sections, and dimensions indicated on the Drawings and shall include the excavation of all unsuitable material from the subgrade. Rock encountered during excavation shall remain undisturbed. After shaping to line, grade, and cross section, the subgrade shall be compacted to a depth of at least 6 inches to 95% of the maximum density at a

moisture content between optimum and 3% over optimum. This operation shall include any reshaping and wetting or drying required to obtain proper compaction. All soft or otherwise unsuitable material shall be removed and replaced with suitable material.

3-3. FILLS AND EMBANKMENTS. All fills and embankments shall be constructed to the lines and grades indicated on the Drawings.

Backfilling and construction of fills and embankments during inclement weather shall not be performed except by permission of the ENGINEER. No backfill, fill, or embankment materials shall be installed on frozen or wet unstable surfaces, nor shall frozen or saturated wet materials be placed in any backfill, fill, or embankment.

3-3.01. Subgrade Preparation. After preparation of the fill or embankment site, the subgrades that expose soil shall be scarified, moisture conditioned and compacted to a depth of at least 6 inches to 90% of the maximum density at a moisture content between optimum and 3% over optimum.

Unless otherwise directed by ENGINEER, the subgrade shall be proof-rolled by a rubber-tired roller, a loaded dump truck, or other suitable rubber-tired equipment acceptable to ENGINEER. A minimum of four passes of the proof-rolling equipment shall be provided such that the last two passes are made perpendicular to the first two passes.

All soft, yielding, or otherwise unsuitable material shall be removed and replaced with compacted fill.

Rock exposed in subgrades of fill shall be cleaned of loose rock and earth. Loosened blocks of rock shall be removed by prying. Holes left by the removal of such blocks shall be filled with CDF.

3-3.02. Protection of Excavated Surfaces and Subgrades. To mitigate adverse affects caused by potentially expansive soil and bedrock, all exposed excavation surfaces shall be protected from erosion, air or water slaking, and changes in moisture content that could cause expansion, shrinkage, and/or degradation of the exposed surface/subgrade. Building pads and fills and embankments shall be placed as quickly as possible after exposed surfaces are prepared. Depending on the size of the excavation, it may be necessary to excavate in sections to minimize the period that the surface is exposed to the elements. Before fill or the building pad is placed, the exposed surface shall be clean of loose material and debris and fee of standing water.

All excavations shall be kept free of standing water during the construction period. Groundwater, rainfall, surface runoff, or construction water shall not be

allowed to pond on exposed or unprotected surfaces. If left unprotected, soil and bedrock surfaces will likely degrade quickly. In addition, the properties of these earth materials can change under the action of heavy earthmoving equipment and wetting and drying caused by the elements. If any subgrade becomes disturbed as a result of exposure to the elements or CONTRACTOR'S operations, the subgrade shall be restored to meet all of the requirements of these specifications at no additional cost to the DISTRICT.

3-3.03. Placement and Compaction of Fills and Embankments. All fill and embankment materials shall be placed in approximately horizontal layers not to exceed 8 inches in uncompacted thickness. Material deposited in piles or windrows by excavating and hauling equipment shall be spread and leveled before compaction.

Each layer of material shall have moisture content between optimum and 3 percent over optimum for satisfactory compaction. The material in each layer shall be wetted or dried as required and thoroughly mixed to ensure uniform moisture content and adequate compaction. Each layer shall be thoroughly compacted to not less than 92 percent of maximum density in accordance with ASTM D1557. If the material fails to meet the density specified, compaction methods shall be altered. The changes in compaction methods shall include, but not be limited to, changes in compaction equipment, reduction in uncompacted lift thickness, increase in number of passes, and better moisture control.

When new fill is to be placed and compacted against existing slopes, the new fill shall be placed on a horizontal surface. For new fill slopes less than 5 feet high, a near horizontal surface that is a minimum of 8 feet wide shall be cut into the existing slope. The surface shall be gently sloped back into the hillside at a gradient of no less than 2 percent. Base keys shall be constructed at the toes of all fill slopes greater than 5 feet high. The keys shall be cut into the underlying undisturbed bedrock or a minimum of 12 feet wide and 3 feet deep, or as shown on the Drawings. Keys shall be sloped back toward the fill slope at a gradient of no less than 2 percent.

As the new fill is placed and compacted, the existing slope shall be benched horizontally so that the new fill will be incorporated into the slope. To provide a firm foundation free of loose or disturbed material, a minimum of 2 feet normal to the existing slope face shall be removed and re-compacted while the new fill is brought up in layers. Existing fill or native material cut in this manner shall be re-compacted along with the new fill material. All permanent fill slopes shall be overbuilt by at least 1 foot and then cut to final grade to provide adequate compaction.

Wherever a trench is to pass through a fill or embankment, the fill or embankment material shall be placed and compacted to an elevation not less than 12 inches above the top of pipe elevation before the trench is excavated.

3-3.04. Permeable Material. Permeable material shall be placed on suitably prepared subgrades in uncompacted lift thickness of 6 inches or less and compacted by vibration. Permeable material shall be compacted to not less than 90 percent compaction as determined by ASTM D4253 using plate or roller type vibratory compaction equipment.

Where permeable material is to be covered with concrete, the top surface shall be graded to the required subgrade elevation. The completed fill shall be covered by a vapor barrier.

Permeable material used behind retaining and other structural walls shall have a thickness of not less than 12 inches. During backfilling, permeable material shall be placed against the wall at least 12 inches higher than the adjacent backfill to prevent contamination and shall be continuous with any foundation drain system. A 2-foot-thick cap of relatively impervious fill shall be placed over the permeable material at the top of the backfill to prevent infiltration of surface runoff.

3-3.05. Structure Backfill. Backfill materials shown to be suitable shall be deposited in layers not to exceed 8 inches in uncompacted thickness and shall be compacted to between 90 and 92 percent maximum density. The moisture content shall be adjusted to the optimum or as much as 3 percent over the optimum moisture content. Compaction of structure backfill shall be performed in such a manner that damage to the structure is prevented. The weight of compaction equipment used within 8 feet of the walls and for the top 8 feet of backfill shall be limited to one ton. Compaction of structure backfill by inundation with water will not be permitted.

No backfill shall be deposited or compacted in water.

Particular care shall be taken to compact structure backfill which will be beneath pipes, drives, roads, parking areas, walks, curbs, gutters, or other surface construction or structures. In addition, wherever a trench is to pass through structure backfill, the structure backfill shall be placed and compacted to an elevation not less than 12 inches above the top of pipe elevation before the trench is excavated. Compacted areas, in each case, shall be adequate to support the item to be constructed or placed thereon.

3-3.06. Crushed Rock, Sand and Pea Gravel. Crushed rock, sand and pea gravel shall be placed in uncompacted lift thickness of 8 inches or less and compacted with a minimum of four passes (round trips) of a self-propelled or

walk-behind type vibrating roller. The roller shall be operated in the vibrating mode and in accordance with the manufacturer's instructions.

3-3.07. Aggregate Base or Subbase Beneath Slabs or Roads. Aggregate base shall be placed in uncompacted lift thicknesses of 8 inches or less. Aggregate base material placed for roads or beneath structures shall be compacted to no less than 95 percent of maximum density. The moisture content of the material shall be within -1 percent and +3 percent of optimum.

3-3.08. Controlled Density Fill. CDF shall not be placed on frozen ground. Batching, mixing, and placing of CDF may be started when weather conditions are favorable and when the temperature is at least 34°F and rising. At time of placement of CDF the temperature shall be at least 40°F. Mixing and placing shall stop when the temperature is 38°F and falling. Each filling stage shall be as continuous an operation as is practicable.

CDF shall be discharged from the mixer by an acceptable procedure into the area to be filled.

When CDF is placed as backfill against structures, the fill shall be placed in lifts of 2 to 3 feet and the next lift shall not be placed until the previous lift has taken initial set and at least 16 hours have elapsed from the end of placement. Lift thickness shall be reduced as necessary to prevent floatation of the structure.

When CDF is placed over culverts or pipelines, they shall be anchored to prevent flotation during the placement of CDF. Unless otherwise required, CDF shall be placed to one foot below subgrade elevation if the subgrade elevation is not more than 5 feet over the top of the culvert or pipe. If the subgrade is more than 5 feet over the top of the culvert or pipe fill, CDF shall be placed to an elevation 2 feet over the top of the culvert or pipe, and the remainder shall be backfilled with soil designated by ENGINEER.

3-4. PLACEMENT OF RIP RAP. A footing trench shall be excavated along the toe of the slope as indicated on the Drawings. The larger rocks shall be placed in the footing trench. Rocks shall be placed with their longitudinal axis normal to the embankment face and arranged so that each rock above the foundation course has a 3-point bearing on the underlying rocks. Bearing on smaller rocks which may be used for chinking voids will not be acceptable. Placing of rocks by dumping will not be permitted. Local surface irregularities of the slope protection shall not vary from the planned slope by more than 12 inches measured at right angles to the slope.

3-5. FINAL GRADING. All areas which are to be graded shall be brought to grade at the indicated elevations, slopes, and contours. All cuts, fills, embankments, and other areas which have been disturbed or damaged by

construction operations shall be surfaced with topsoil to a depth of at least 4 inches. Topsoil shall be of a quality at least equal to the existing topsoil in adjacent areas, free from hazardous and deleterious materials/substances, trash, stones, and debris, and well suited to support plant growth.

Use of graders or other power equipment will be permitted for final grading and dressing of slopes, provided the result is uniform and equivalent to manual methods. All surfaces shall be graded to secure effective drainage. Unless otherwise indicated, a slope of at least 1 percent shall be provided.

Final grades and surfaces shall be smooth, even, and free from clods and stones, weeds, brush, and other debris.

3-6. DISPOSAL OF EXCESS EXCAVATED MATERIALS.

The DISTRICT has pre-arranged for the CONTRACTOR'S use of the following site(s) for disposal of excess excavated earthwork materials / soils; CONTRACTOR shall make its own arrangements for use of other disposal sites:

- County of San Luis Obispo, North River Road Quarry, APN # 020-311-006 located on North River Road between and behind 4036 (Maduena) and 3955 (Hopkins).

In areas of the project that are neither paved nor landscaped, excess excavated materials may be disposed of onsite by spreading the material across the permanent easement width or right-of-way width, as applicable. The material shall be spread evenly, graded, and the exposed surfaces restored to the pre-construction condition as specified in Section 02950, "Site Restoration."

All excess material disposed of onsite shall be free from large rocks and stones greater than 3-inches in size, brush, stumps, logs, roots, debris, and other organic, hazardous and deleterious materials/substances.

Except as specified above, all other excess excavated materials shall be disposed of away from the site. Excess excavated materials shall not be placed in riparian habitat and drainage ways.

Broken concrete and other debris resulting from pavement or sidewalk removal, excavated rock, debris encountered in excavation work, and other similar waste materials shall be recycled as specified in Section 02055, or otherwise disposed of away from the site.

3-7. SITE RESTORATION. Refer to Section 02950, "Site Restoration."

3-8. SETTLEMENT. CONTRACTOR shall be responsible for all settlement of backfill, fills, and embankments which may occur within the correction period stipulated in Article 13.6 of the General Conditions.

CONTRACTOR shall make, or cause to be made, all repairs or replacements made necessary by settlement within 30 days after notice from ENGINEER or DISTRICT.

End of Section

Section 02202

TRENCHING AND BACKFILLING

PART 1 - GENERAL

1-1. SCOPE. This section covers earthwork requirements for pipeline, utility and conduit installation including trench excavation; handling, storing, transporting, and disposing of all excess excavated material; excavation support and trench protection; preparation and stabilization of subgrades; pipe and conduit bedding; placing and compacting pipe zone and trench zone backfill materials; surfacing and grading; and other appurtenant work.

Related work requirements specified elsewhere include: site preparation, clearing and grubbing – addressed in Section 02100, “Clearing and Grubbing;” dewatering - addressed in Section 02140, “Dewatering;” and general earthwork - – addressed in Section 02200 – “Earthwork.”

1-1. Work in City, County and State Rights-of-Way. Trenching and backfilling requirements for pipeline construction in City streets, County roads, and State highways may also be specified as part of the various permits included in Section 01060, “Permit Requirements,” such as the encroachment permits issued by City, County and State agencies. Where such permits include trenching and backfilling requirements, CONTRACTOR shall comply with those requirements which shall govern. Refer to Section 01060 for specific requirements.

1-2. GENERAL. With reference to the terms and conditions of the construction standards for excavations set forth in OSHA "Safety and Health Regulations for Construction", Chapter XVII of Title 29, CFR, Part 1926, CONTRACTOR shall employ a competent person and, when necessary based on the regulations, a registered professional engineer, to act upon all pertinent matters of the work of this section.

1-3. SUBMITTALS. Submit the following in accordance with the requirements specified in Section 01300, “Submittals.”

- Detailed information and test results regarding all earthwork materials required for use on the project. Testing shall be performed by CONTRACTOR’S certified testing laboratory. Submit lab testing results, which shall include:

  Materials tests indicating type of each material and composition, source, gradation, Atterberg limits, classification, durability, and hardness. Two

initial gradation tests for each material and one additional gradation test shall be made for each additional 500 tons of material delivered to the site.

Laboratory soil compaction testing for each material type.

- Submit Certificates of Compliance for imported materials. The certificates shall name the sources of materials, test results, and other special requirements. The CONTRACTOR shall not change sources during the job unless another certificate is prepared, submitted, and approved.

- Submit a 12-inch square sample of geotextile fabric, manufacturer's descriptive product data, and installation instructions.

- Submit a detailed plan showing the design and installation of all excavation support systems.

- Submit complete mix design and test results for controlled density fill.

- Submit proposed procedures for placement and compaction of pipeline bedding, pipe zone backfill and trench zone backfill materials. Proposed procedures shall be confirmed by constructing “pipeline installation demonstration test sections” as specified herein. Submit results of demonstration test sections.

1-4. BASIS FOR PAYMENT. No additional payment above the Contract Price will be made for trench sheeting left in place.

1-5. LABORATORY TESTS. As specified in Section 01400, "Quality Control," all tests required for preliminary review of materials shall be made by an acceptable certified testing laboratory at the expense of the CONTRACTOR. Required materials tests by CONTRACTOR are specified in this section.

1-6. LABORATORY COMPACTION TEST METHODS. The following standard testing methods shall be used in determining maximum dry densities for earthwork materials used as follows:

For free-draining earthwork materials that may contain up to 10 percent, by weight, of soil particles passing a No. 200 sieve: ASTM D4253.

For earthwork materials that contain 10 percent or more, by weight, soil particles passing a No. 200 sieve: ASTM D1557.

As used for the work of this project, “percent compaction,” “percent relative compaction” or “percent maximum density” shall be taken as follows:

For materials subject to the requirements of ASTM D4253, percent compaction or percent relative compaction refers to the ratio of field-measured in-place dry density of the material to its maximum index density determined in the laboratory using ASTM D4253.

For materials subject to the requirements of ASTM D1557, percent maximum density refers to the ratio of field-measured in-place dry density of the material to the dry density at optimum moisture content (maximum density) determined in the laboratory using ASTM D1557.

1-7. PIPELINE INSTALLATION DEMONSTRATION TEST SECTIONS. CONTRACTOR shall construct pipeline installation demonstration test sections to validate his proposed procedures for placing and compacting pipe bedding, pipe zone backfill and trench zone backfill materials. The demonstration test section shall be approximately eighty (80) feet long and constructed in the field in the presence of the DISTRICT and ENGINEER as part of the submittals review process. As a minimum, the demonstration test section shall confirm that the CONTRACTOR'S proposed means and methods will produce an acceptable pipeline installation, for each type of ground condition expected along the alignment, meeting the specified requirements for the following:

- Proposed trench widths for each pipe diameter for each type of backfill material proposed.
- Placement of proposed pipe bedding material.
- Placement and compaction of each proposed pipe zone material.
- Placement and compaction of each proposed trench zone material.
- Saturating and jetting operations for compaction of bedding and/or pipe embedment materials, if proposed.
- Procedures for re-use of native materials obtained from trench excavation, if any.
- Dewatering procedures, if any.
- Procedures for anchoring and/or bracing pipe against movement if using controlled density fill as a backfill material.

The CONTRACTOR will not be allowed to use saturating and jetting operations for compacting pipe bedding and/or pipe embedment materials unless:

- The CONTRACTOR'S means, methods and techniques effectively control, collect, and remove the water used for saturating and jetting.

- The CONTRACTOR demonstrates that the means, methods and techniques that it intends to use will fill all voids and will achieve the desired degree of compaction.

- The water for saturating and jetting will not cause trench wall instability and/or softening of the trench bottom.

- The CONTRACTOR'S means, methods and techniques prevent the pipe from floating or moving during backfill consolidation.

- The CONTRACTOR'S means, methods and techniques produce a quality installation and do not cause damage or distress to completed work or adjacent properties.

Should ground conditions change from those used in the pipeline installation demonstration test sections, as work progresses along the pipeline alignment, CONTRACTOR'S means, methods and techniques shall be re-evaluated if the required degree of compaction is not being achieved or if requested by the ENGINEER.

During the construction of the demonstration test section(s), the ENGINEER will observe the CONTRACTOR'S operations, and perform in-place soil density testing to confirm that compaction requirements are being met. The CONTRACTOR shall remove sections of the demonstration test section pipe, as directed by the ENGINEER, to permit the inspection and testing of the pipe bedding materials. In addition, in the case of steel pipe, after completion of the demonstration test section the ENGINEER will perform deflection testing as specified in Section 15062.

The CONTRACTOR shall notify the ENGINEER at least 48 hours prior to commencing construction of the demonstration test section(s) and shall provide no less than 5 days in the construction schedule after the demonstration test section(s) has been constructed for field and laboratory testing by the ENGINEER. If the CONTRACTOR fails to meet the requirements of these specifications, the CONTRACTOR shall vary its means, methods, and techniques until the requirements of these specifications are consistently achieved. The CONTRACTOR shall not proceed with pipeline construction until the ENGINEER concludes that the requirements of these specifications are being consistently achieved.

PART 2 - PRODUCTS

2-1. MATERIALS.

2-1.01. Geotextile Fabric. Woven geotextile fabric used for trench subgrade stabilization shall be Mirafi "600X", Amoco Fabrics and Fibers Co. "Amoco 2006", TNS Advanced Technologies "W300", or approved equal.

2-1.02. Sand. Sand shall be free from clay or organic material, and shall be of such size that 90 percent to 100 percent will pass a No. 4 sieve and not more than 5 percent will pass a No. 200 sieve.

2-1.03. Aggregate Base. Aggregate base shall be in accordance with the requirements specified for Class 2 Aggregate Base, Section 26 of the Caltrans Standard Specifications.

2-1.04. Controlled Density Fill (CDF) and Crushed Rock. Refer to the requirements specified in Section 02200, "Earthwork."

During the progress of the work, no change shall be made in the batch proportions of the ingredients without the acceptance of the ENGINEER.

2-1.05. Native Materials. To the maximum extent available, use of native materials obtained from trench excavations for trench backfill will be allowed provided the material is demonstrated by CONTRACTOR to be "suitable." Fill derived from trench excavations will not be a suitable material for pipe bedding or pipe zone backfill.

The CONTRACTOR is hereby cautioned that the native soils along the NWP Pipeline alignment are very heterogeneous and are often clayey/fine-grained. If the native soils are not thoroughly mixed and do not have a moisture content that is close to the optimum for compaction, the CONTRACTOR should anticipate that the native soils will be difficult to use (e.g., to place and compact) as fill and trench backfill. Soft rock also may be used for fill and backfill. However, if not properly processed (e.g., thoroughly crushed, mixed, and moisture-conditioned), soft rock excavated from trenches also will be difficult to use for fill and trench backfill.

"Suitable" materials are those which can be placed and compacted to meet the specified requirements. The CONTRACTOR shall anticipate that most, if not all, of the soil excavated from trenches will require thorough mixing and moisture conditioning for it to be suitable for fill and backfill. In general, most, if not all, of the rock excavated from the trenches will require screening and/or processing to render it suitable for fill and backfill. When excavated, much of the native, generally clayey soils and soft rock will come out of the trenches in large chunks and blocks that must be broken up, mixed, and blended before it is suitable for fill and backfill. Hard rock will require crushing, screening, and other processing to be rendered suitable for fill and backfill. Processed hard rock may also require blending with fine-grained earth (clay, silt, and sand) to create suitable fill and backfill that will be dense and "tight" (have low permeability) when compacted. Soil excavated from below groundwater level will be wet/saturated. Before these soils will be suitable for fill and backfill, their moisture content must be greatly reduced.

CONTRACTOR shall demonstrate the suitability of using native materials from site excavations for compacted fill and backfill by performing the pipeline installation test sections described in Paragraph 1.7 above, and laboratory soil compaction testing on the native materials that will be used for fill and backfill, as specified under “Submittals.”

Additional material to make up any deficiencies in suitable materials shall be provided from CONTRACTOR’S off-site source. No borrow pits shall be opened on the site.

Whatever the source, material used for fill and trench backfill shall also have the following properties or characteristics:

- Less than 30 percent of the material shall be retained on the ¾-inch sieve.
- No less than 15 percent of the material shall pass the No. 200 sieve.
- All material placed in trenches as backfill shall be free from rocks and stones greater than 3-inches in size, unbroken clods of soil greater than 1-inch in size, brush, stumps, logs, roots, debris, and other organic, hazardous and deleterious materials/substances.
- Materials can be placed and compacted to meet the specified requirements and will not cause damage to any elements of the Work.

2-1.06. 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.

2-2. MATERIAL TESTING. Refer to Section 02200, “Earthwork,” Paragraph 2-2, “Material Testing,” for material test requirements to be performed by an acceptable independent testing laboratory at the expense of CONTRACTOR.

2-2.01. Field Testing At Expense of DISTRICT As specified in Section 01400, all in-place field density and moisture content tests will be made by an independent testing laboratory at the expense of the DISTRICT. CONTRACTOR shall provide access to the materials and work area and shall assist the laboratory as needed in obtaining representative samples.

2-2.02. Required Field Tests. For planning purposes the following guidelines shall be used for frequency of field tests associated with the pipeline installation. Additional tests may be performed as necessary for job conditions.

a. Moisture content and in-place density tests of trench subgrade, every 1,000 feet.

b. Moisture content and in-place density tests of pipe zone and trench zone backfill materials, 2 lifts per location, every 1,000 feet.

c. One in-place density and moisture test whenever there is a suspicion of a change in material uniformity, the quality of moisture control or effectiveness of compaction.

d. Testing of CDF: Compressive strength test cylinders for every 200 cubic yards of CDF placed, tested in accordance with ASTM C39 at 7 days and 28 days.

PART 3 - EXECUTION

3-1. CLEARING. All clearing shall be performed as necessary for access, stringing of pipeline materials, and construction of the pipeline and appurtenant structures as specified in Section 02100, “Clearing and Grubbing.”

3-2. TRENCH EXCAVATION. Trench excavations shall provide adequate working space and clearances for the work to be performed therein and for the placement and compaction of pipe bedding, pipe zone, and trench zone materials. In no case shall excavation faces be undercut for extended footings.

Subgrade surfaces shall be clean and free of loose material of any kind, and free of standing water, when concrete is placed thereon.

3-2.01. Classification of Excavated Materials. No classification of excavated materials for pipeline construction will be made for payment purposes. Excavation and trenching work shall include the removal and subsequent handling of all materials excavated or otherwise removed in performance of the work, regardless of the type, character, composition, or condition thereof.

3-2.02. Preservation of Trees. No trees shall be removed outside excavated or filled areas, unless their removal is authorized by the ENGINEER. Trees left standing shall be protected from permanent damage by construction operations.

3-2.03. Blasting. Blasting or other use of explosives for excavation will not be permitted.

3-2.04. Dewatering. As specified in Section 02140, “Dewatering,” dewatering measures shall be used and dewatering equipment shall be provided to control, remove, and dispose of all surface water and groundwater entering onto cuts and

into excavations, trenches, or other parts of the WORK. Dewater subgrade to a minimum of three (3) feet below bottom of excavation and trench. Remove water during period when concrete is being placed, when pipe is being laid, and during placing of backfill.

3-2.05. Excavation Support. Except where banks are cut back on a stable slope, excavations for pipeline, utility and conduit trenches, and for jacking and receiving shafts/pits for pipejacking operations, shall be supported in accordance with the requirements specified in 29CFR1926, Subpart P – Excavations, Cal/OSHA requirements, and the General Conditions, to prevent caving, sliding and settlement.

Excavation support systems shall be designed by a professional Civil or Structural Engineer who is retained by the CONTRACTOR and is registered in the State of California. In all areas, excavation support systems shall be designed to support earth pressures, unrelieved hydrostatic pressures, utility loads, equipment, applicable traffic loads, and other surcharge loads in such manner as will allow safe construction and will prevent damage to adjacent structures (including existing pipelines and utilities) and injury to workers and the public. Design support system to maintain the stability of the excavation against sliding or bottom heave. In addition, the installation of excavation support systems shall not cause a disruption to public convenience or access.

Excavation support systems shall be furnished and installed as necessary to limit the extent of excavations and trenches for deeper structures and pipelines and to protect adjacent structures and facilities from damage due to excavation and subsequent construction. CONTRACTOR shall assume complete responsibility for, and install adequate protection systems for prevention of damage to existing facilities.

CONTRACTOR shall maintain excavation support systems as necessary to support the sides of excavations and to prevent detrimental settlement and lateral movement of existing facilities, adjacent property, and completed work.

Trench support systems may be removed if the pipe strength is sufficient to carry trench loads based on trench width to the back of the support system. Trench support systems shall not be pulled after backfilling. Where the trench support system is left in place, it shall not be braced against the pipe, but shall be supported in a manner which will preclude concentrated loads or horizontal thrusts on the pipe. Cross braces installed above the pipe may be removed after pipe zone backfill placement and compaction has been completed. Trench support systems shall be removed unless otherwise permitted by the ENGINEER. The trench support system shall not be removed, if in the opinion of the ENGINEER, removal of the support system will cause settlement or damage to the facility it is protecting. If left in place, the support system shall be cut off 12

inches below finished grade. The design of the support system shall be such as to permit complete removal while maintaining safety and stability at all times.

3-2.06. Trench Subgrade Stabilization. Subgrades for pipe and conduit trench bottoms shall be firm, dense, and thoroughly compacted and consolidated; shall be free from mud, muck and standing water; and shall be sufficiently stable to remain firm and intact under the feet of the workers.

After the required excavation has been completed, the ENGINEER will inspect the exposed subgrade to determine the need for any additional excavation. Additional excavation shall be performed in all areas within the influence of the pipeline where unacceptable materials exist at the exposed subgrade. Overexcavation shall include removal of all such unacceptable material extending to the entire width of the trench to the depth required.

Subgrades which are otherwise solid, but which become unstable or mucky on top due to construction operations, shall be reinforced with crushed rock contained within a geotextile fabric envelope as shown on the Drawings. The finished elevation of stabilized subgrades shall be at or below the subgrade elevations required for the pipeline installation elevations indicated on the Drawings.

3-2.07. Allowable Length of Open Trench No more trench shall be opened in advance of pipe laying than is necessary to expedite the work. One block or 500 feet, whichever is the shorter, shall be the maximum length of open trench on any line under construction, except along the toe of an existing cut slope the maximum length of open trench shall be 80 feet.

Except where trenchless construction is indicated on the Drawings, is specified, or is permitted by the ENGINEER, all trench excavation shall be open cut from the surface.

3-2.08. Alignment, Grade, and Minimum Cover. The alignment and grade or elevation of each pipeline shall be fixed and determined from offset stakes. Vertical and horizontal alignment of pipes, and the maximum joint deflection used in connection therewith, shall be in conformity with the requirements specified in the pipe material sections in Divisions 2 and 15.

Where pipe grades or elevations are not definitely fixed by the Drawings, trenches shall be excavated to a depth sufficient to provide a minimum depth of backfill cover over the top of the pipe of 42 inches. Greater pipe cover depths may be necessary on vertical curves or to provide adequate clearance beneath existing pipes, conduits, drains, drainage structures, or other obstructions encountered at normal pipe grades. Measurement of pipe cover depth shall be made vertically from the outside top of pipe to finished ground or pavement

surface elevation, except where future surface elevations are indicated on the Drawings.

3-2.09. Minimum Trench Widths. Trench widths in the pipe zone shall be as shown on the Drawings. If no widths are shown, the minimum width shall be 18 inches greater than the pipe outside diameter. Specified minimum sidewall clearances are not minimum average clearances but are minimum clear distances required from the pipe wall to the inside of the trench excavation support system.

IF controlled density fill or consolidation of backfill by saturating or jetting is approved by the ENGINEER and used by the CONTRACTOR, the minimum trench width can be reduced from that shown on the Drawings to equal the pipe outside diameter plus 18-inches.

The minimum trench width used for pipeline installation shall be appropriate for the type of pipe bedding and pipe zone backfill material used, as well as the method of compaction selected by the CONTRACTOR and approved by the ENGINEER and DISTRICT based on the results of the Pipeline Installation Demonstration Test Section specified in Paragraph 1-7.

Trench width at the top of the trench is not limited except where needed to protect adjacent structures and facilities from damage due to excavation and subsequent construction.

Excavating trench banks on slopes to reduce earth load to prevent sliding and caving shall be used only in areas where the increased trench width will not interfere with surface features or encroach on easement or right-of-way limits.

3-2.10. Mechanical Excavation. The use of mechanical equipment will not be permitted in locations where its operation would cause damage to trees, buildings, culverts, or other existing property, utilities, or structures above or below ground. In all such locations, hand-excavating methods shall be used.

Mechanical equipment used for trench excavation shall be of a type, design, and construction, and shall be so operated, that the rough trench excavation bottom elevation can be controlled, and that trench alignment is such that pipe, when accurately laid to specified alignment, will be centered in the trench with adequate sidewall clearance. Undercutting the trench sidewall to obtain sidewall clearance will not be permitted.

In locations where maximum trench widths are required for designated rigid conduits, mechanical equipment shall be operated so that uniform trench widths and vertical sidewalls are obtained at least from an elevation 12 inches above the top of the installed pipe to the bottom of the trench.

When installation of the pipeline is along (or on) the slope of an existing roadway embankment, cutting away existing embankment fill to create a level working surface will not be allowed. A small amount of fill may be used for this purpose, subject to review and approval by the ENGINEER. After the pipeline is installed and backfilled, the leveling fill shall be completely removed and the original embankment slope restored.

In the case of overexcavation of the trench width or depth, whether intended or accidental, CONTRACTOR shall replace the overexcavated areas with the material that is specified or shown for “pipe bedding”.

3-2.11. Cutting Concrete Surface Construction. Cuts in concrete pavement and concrete base pavements shall be no larger than necessary to provide adequate working space for proper installation of pipe and appurtenances. Cutting shall be started with a concrete saw in a manner which will provide a clean groove at least 1-1/2 inches deep along each side of the trench and along the perimeter of cuts for structures.

Concrete pavement and concrete base pavement over trenches excavated for pipelines shall be removed so that a shoulder not less than 6 inches in width at any point is left between the cut edge of the pavement and the top edge of the trench. Trench width at the bottom shall not be greater than at the top and no undercutting will be permitted. Pavement cuts shall be made to and between straight or accurately marked curved lines, which, unless otherwise required, shall be parallel to the center line of the trench.

Pavement removal for connections to existing lines or structures shall not exceed the extent necessary for the installation.

Where the trench parallels the length of concrete walks, and the trench location is all or partially under the walk, the entire walk shall be removed and replaced. Where the trench crosses drives, walks, curbs, or other surface construction, the surface construction shall be removed and subsequently replaced between existing joints or between saw cuts as specified for pavement.

3-2.12. Excavation for Pipe Joints. Except where otherwise required, pipe trenches shall be excavated below the underside of the pipe to provide adequate clearance for tools and methods used for installing pipe at field joints. No part of any pipe bell or coupling shall be in contact with the trench bottom or trench walls when the pipe is jointed.

3-3. EXCAVATION SUPPORT SYSTEMS FOR TRENCHLESS PIPE INSTALLATION OPERATIONS. CONTRACTOR shall install launching and receiving shaft/pit excavation support systems in accordance with its excavation

support submittals. If settlement or deflections of supports indicate that the support system requires modification to prevent excessive movements, redesign and resubmit revised excavation support system design and calculations to the ENGINEER at no additional cost to the DISTRICT. Should deflections become excessive and jeopardize worker safety and/or the structural integrity of the system or adjacent systems, CONTRACTOR shall stop the excavation and trenchless pipe installation work until corrective measures have been taken by CONTRACTOR.

CONTRACTOR shall not begin to remove excavation support until it can be removed without damage to existing facilities, completed work, or adjacent property. Removal of the support system shall be performed in a manner that will not disturb or harm adjacent construction or facilities and only after backfill has been fully compacted. Any voids left by the support system or voids created by the removal of the support system shall be filled to provide soil support between initial and intermediate backfill zone and the native soil. All voids created by the removal of the support system shall be immediately filled with CDF, lean concrete, or cement grout by CONTRACTOR.

3-4. PIPE BEDDING and PIPE ZONE BACKFILL. Materials for pipe bedding and pipe zone backfill and requirements for compaction shall be as follows:

- For **cement mortar-coated steel pipe**, pipe bedding and pipe zone backfill materials shall be sand, aggregate base, or controlled density fill (CDF).

- For **polyethylene wrapped ductile iron pipe**, pipe bedding and pipe zone backfill materials shall be sand or controlled density fill.

3-4.01. Placement and Compaction. Pipe bedding material shall be spread and the surface graded to provide a uniform and continuous support beneath the pipe at all points between bell holes or pipe joints. It will be permissible to slightly disturb the finished subgrade surface by withdrawal of pipe slings or other lifting tackle.

After each pipe has been graded, aligned, and placed in final position on the bedding material, and shoved home, sufficient pipe zone backfill material shall be deposited and compacted under and around each side of the pipe and back of the bell or end thereof by shovel slicing or other suitable methods to hold the pipe in proper position and alignment during subsequent pipe jointing and backfill operations.

Backfill material shall be deposited and compacted uniformly and simultaneously on each side of the pipe to prevent lateral displacement.

Pipe zone backfill material shall be compacted to the top of the pipe in all areas. Each lift of pipe zone backfill material shall be compacted with mechanical equipment during placement to ensure that all spaces beneath the pipe are filled. Material shall be placed in maximum lift thicknesses of 6 inches, and each lift of material shall be compacted using a vibratory plate compactor.

Alternatively, settlement or consolidation of pipe bedding and/or pipe zone backfill material using water saturation or jetting methods may be permitted along certain reaches of the pipeline alignment using acceptable means, methods and techniques if proposed by CONTRACTOR and accepted by the ENGINEER and DISTRICT as specified in Paragraph 1-7.

When CDF is used for pipe bedding and pipe zone backfill, the pipe(s) shall be anchored to prevent flotation and movement during the placement of CDF.

Compaction requirements for pipe bedding and pipe zone backfill materials shall be as specified herein:

- For free-draining earthwork materials that may contain up to 10 percent, by weight, of soil particles passing a No. 200 sieve per ASTM D4253, the material shall be placed and compacted to 90 percent relative compaction.

3-4.02. Special Construction Requirements.

Pipeline Reaches Characterized by High Groundwater. Where indicated on the Drawings, migration of soil into the pipe zone backfill material shall be prevented by installing geotextile fabric on the trench surfaces so that it completely surrounds the backfill material. Joints shall be lapped 12 inches.

Groundwater Barriers. Where indicated on the Drawings, continuity of pipe and trench zone backfill material shall be interrupted by low permeability groundwater barriers (trench dams).

Concrete Encasement on Steep Slopes. Where indicated on the Drawings or as specified herein, along pipeline reaches that are situated on steep slopes, the pipeline shall be installed in a trench cut into the soil or rock and then encased in concrete that is placed in a stair-step fashion. If possible, the concrete encasement shall be placed neat against the excavated soil or rock to avoid forming. To mitigate erosion, the concrete encasement shall extend beyond the top and bottom of the slope. After the encased pipe is installed, the exposed concrete face shall be either concealed with riprap that is placed on the slope or shall be sculpted of shotcrete to match existing grades.

Concrete Encasement on Steep Slopes.	
Station From	Station To
2374+20	2377+00
2380+00	2383+20
2386+50	2388+65
2404+00	2404+30
2405+60	2406+50

Subgrade Stabilization in Soft, Unstable Soils. Subgrades for pipe and conduit trench bottoms where trench excavation is performed in soft, unstable soils shall be reinforced with crushed rock contained within a geotextile fabric envelope as shown on the Drawings. The finished elevation of stabilized subgrades shall be at or below the subgrade elevations required for the pipeline installation elevations indicated on the Drawings.

3-5. TRENCH ZONE BACKFILL. Materials for trench zone backfill and requirements for compaction shall be as follows:

- Unless otherwise specified or shown, trench zone backfill materials shall be sand, aggregate base, controlled density fill, or suitable native material derived from trench excavations and processed for re-use as specified herein.

- Note: the type of backfill material allowed to be used and compaction requirements in the trench zone may be dictated by specific requirements set forth in permits obtained by the DISTRICT or CONTRACTOR; refer to Section 01060, “Permit Requirements,” for more information.

Compacted backfill will be required for the full depth of the trench above the pipe zone. Except as otherwise shown on the Drawings, minimum compaction requirements shall be as specified below:

Location	Compaction Requirements
County Right-of-Way (ROW)	See Section 01060
City of Paso Robles ROW	See Section 01060
Open Farmland, maximum longitudinal slope 4%; maximum cross-slope 8%	Minimum 88%
All other locations	Minimum 90%

In paved areas, the upper portion of the trench shall be constructed as shown on the Drawings and as specified in the permit requirements for pavement restoration.

In un-paved areas, the upper portion of the trench shall be constructed to conform to the pre-construction condition. Requirements for replacement of topsoil are specified in Section 01061, "Environmental Mitigation Requirements." Requirements for seeding and site restoration are specified in Section 02950, "Site Restoration."

3-6. DRAINAGE MAINTENANCE. Trenches across roadways, driveways, walks, or other traffic ways adjacent to drainage ditches or watercourses shall not be backfilled prior to completion of backfilling the trench on the upstream side of the traffic way, to prevent impounding water after the pipe has been laid. Maintain bridges and other temporary structures required to maintain traffic across such unfilled trenches. Backfilling shall be performed so that water will not accumulate in unfilled or partially filled trenches. All material deposited in roadway ditches or other watercourses crossed by the line of trench shall be removed immediately after backfilling is completed, and the original section, grades, and contours of ditches or watercourses shall be restored. Surface drainage shall not be obstructed longer than necessary.

3-7. PROTECTION OF TRENCH BACKFILL IN DRAINAGE COURSES. Where trenches are constructed in ditches or other watercourses, backfill shall be protected from surface erosion. Where the grade of the ditch exceeds 1 percent, or as otherwise required, ditch checks shall be installed. Unless otherwise indicated on the Drawings, ditch checks shall be concrete. Ditch checks shall extend at least 2 feet below the original ditch or watercourse bottom for the full bottom width and at least 18 inches into the side slopes, and shall be at least 12 inches thick.

3-8. FINAL GRADING. All areas which are to be graded shall be brought to grade at the indicated elevations, slopes, and contours. All cuts, fills, embankments, and other areas which have been disturbed or damaged by construction operations shall be surfaced with topsoil to a depth of at least 4 inches. Topsoil shall be of a quality at least equal to the existing topsoil in adjacent areas, free from hazardous and deleterious materials/substances, trash, stones, and debris, and well suited to support plant growth.

Use of graders or other power equipment will be permitted for final grading and dressing of slopes, provided the result is uniform and equivalent to manual methods. All surfaces shall be graded to secure effective drainage. Unless otherwise indicated, a slope of at least 1 percent shall be provided.

Final grades and surfaces shall be smooth, even, and free from clods and stones, weeds, brush, and other debris.

3-9. DISPOSAL OF EXCESS EXCAVATED MATERIALS.

The DISTRICT has pre-arranged for the CONTRACTOR'S use of the following site(s) for disposal of excess excavated earthwork materials / soils; CONTRACTOR shall make its own arrangements for use of other disposal sites:

- County of San Luis Obispo, North River Road Quarry, APN # 020-311-006 located on North River Road between and behind 4036 (Maduena) and 3955 (Hopkins).

In areas of the project that are neither paved nor landscaped, excess excavated materials may be disposed of onsite by spreading the material across the permanent easement width or right-of-way width, as applicable. The material shall be spread evenly, graded, and the exposed surfaces restored to the pre-construction condition as specified in Section 02950, "Site Restoration."

All excess material disposed of onsite shall be free from large rocks and stones greater than 3-inches in size, brush, stumps, logs, roots, debris, and other organic, hazardous and deleterious materials/substances.

Except as specified above, all other excess excavated materials shall be disposed of away from the site. Excess excavated materials shall not be placed in riparian habitat and drainage ways.

Broken concrete and other debris resulting from pavement or sidewalk removal, excavated rock, debris encountered in excavation work, and other similar waste materials shall be recycled as specified in Section 02055, or otherwise disposed of away from the site.

3-10. SITE RESTORATION. Refer to Section 02950, "Site Restoration."

3-11. SETTLEMENT. CONTRACTOR shall be responsible for all settlement of backfill, fills, and embankments which may occur within the correction period stipulated in Article 13.6 of the General Conditions.

CONTRACTOR shall make, or cause to be made, all repairs or replacements made necessary by settlement within 30 days after notice from ENGINEER or DISTRICT.

End of Section

Section 02313

BORE AND JACK CONSTRUCTION

PART 1 - GENERAL

1-1. DESCRIPTION. This section covers construction of trenchless crossings, including, but not limited to, furnishing casing pipe; installation by bore and jack construction; jacking and receiving pit construction; all necessary sheeting, shoring, and protection work; dewatering as necessary; protection of adjacent property; and other appurtenant work.

Requirements for earthwork are specified in Section 02200, "Earthwork." Welded steel pipe for casings and carrier pipes are specified in Section 15062, "Steel Pipe." Corrosion monitoring of the casing pipe is specified in Section 16640, "Corrosion Monitoring."

1-2. GENERAL. Compliance with all the Rules and Regulations of the California Occupational Safety and Health Act (CAL OSHA), Public Law 91-596, the "Williams' Steiger Occupational Safety and Health Act of 1970", is required on this project.

CONTRACTOR, or its subcontractor who will perform this work, shall have not less than seven (7) years' experience in trenchless construction and installation of welded steel pipe casings on projects having similar conditions to this project. CONTRACTOR shall furnish a statement of qualifications and experience to the ENGINEER demonstrating satisfactory qualifications and experience.

The CONTRACTOR shall be responsible for maintaining the specified line and grade, and for preventing settlement of overlying pavement, or other damage due to the bore and jack operations, as determined by the ENGINEER.

1-3. SUBMITTALS. CONTRACTOR shall submit the following in accordance with Section 01300, "Submittals":

- CONTRACTOR'S or Subcontractor's statement of qualifications and experience in trenchless construction.
- Crossing Plan for all crossings including existing Utility Potholing information.
- Detailed locations and sizes of all boring or jacking and receiving pits.
- Casing installation schedules, which shall include schedules of excavation, pipeline installation, and backfill operations.

- Material list including diameter, thickness, and class of steel casing; method of fabrication; and detail of field joints.

- A description and details of the equipment, accessories, and means and methods proposed for installing the pipe casing.

- A description of proposed procedures and methods for installing and encasing the carrier pipe inside of the casing pipe.

- Product data for casing insulators and end closure.

- For grouting of the casing pipe, submit design of grout mix; certificates of compliance for cement, aggregates, and admixtures (if used); and technical data showing proposed grouting equipment, methods and procedures. Maintain and submit a log of all holes grouted, amount of grout used, and pressures and rate of pumping for each grouting operation.

Prior to beginning any trench or structure excavation 5 feet deep or over, CONTRACTOR shall submit a detailed plan showing the design of all shoring, bracing, sloping of the sides of excavation, or other provisions for worker protection against the hazard of caving ground during the excavation of such trenches or structure excavation. The CONTRACTOR'S attention is directed to the provisions for "Shoring and Bracing Drawings" in Section 6705 of the California Labor Code. If such plan varies from the shoring system standards established in the Construction Safety Orders of the State of California, such alternative systems plans shall be prepared by a Civil or Structural Engineer licensed in the State of California.

1-4. QUALITY ASSURANCE. The CONTRACTOR shall give the ENGINEER a minimum of ten (10) days advance notice of the start of excavation or boring operations.

All work shall be performed in the presence of the ENGINEER and other public agency representatives as required by the contract.

1-4.01. Welding Requirements: All welding procedures used to fabricate steel casings shall be prequalified under the provisions of ANSI/AWS D1.1. Welding procedures shall be required for, but not necessarily limited to, longitudinal and girth or special welds for pipe cylinders, casing joint welds, reinforcing plates and grout coupling connections.

All welding shall be done by certified welders, welding operators, and tackers who have had adequate experience in the type of materials to be used. Welders shall be qualified under the provisions of ANSI/AWS D1.1 by an independent local, approved testing agency not more than 6 months prior to commencing work on the casing or pipeline. Machines and electrodes similar to those used in

the work shall be used in qualification tests. The CONTRACTOR shall furnish all material and bear the expense of qualifying welders.

1-5. SAFETY. As specified in Section 01060, “Permit Requirements,” the DISTRICT has obtained from the State Department of Industrial Relations, Division of Occupational Safety and Health, Mining and Tunneling Unit, an "underground classification" of "Potentially Gassy" for this project. It shall be the CONTRACTOR'S responsibility to see that the work is performed in conformance with the State requirements for this classification. It shall also be the CONTRACTOR'S responsibility to conduct the required safety meeting with representatives from the Mining and Tunneling Unit prior to beginning construction of each tunnel.

1-6. PERMITS. As specified in Section 01060, “Permit Requirements,” as a convenience for CONTRACTOR, the DISTRICT has obtained or has applied to obtain in its name, in advance, various permits and agreements that are required for the trenchless crossing construction. CONTRACTOR shall comply with all of the general and special provisions, special conditions, and special requirements that are specified in the permits and agreements obtained or to be obtained by the DISTRICT. The cost of repair of any damage to existing facilities shall be borne by CONTRACTOR. All permits and agreements shall be permanently posted on the job site.

PART 2 – PRODUCTS

2-1. GENERAL. Casings shall be welded steel pipe of the diameter shown on the Drawings. The CONTRACTOR shall be fully responsible for the sufficiency of the casing provided and may select a greater diameter or thickness for the method of work, loading characteristics, site conditions, or possible interferences at no additional cost to the DISTRICT.

Annular spaces between the carrier pipes and the casing shall be filled with sand as required by the permitting agencies.

2-2. MATERIALS.

2-2.01. Casing Pipe. Smooth-wall casing pipe shall be of welded steel construction, shall be of new material with a minimum yield point of 36,000 psi, and shall meet the requirements of the railroad or highway authority having jurisdiction. The casing pipe shall be cleaned and coated both inside and outside with 16 mils of coal tar epoxy, Carboline Bitumastic 300; or approved equal. Refer to Section 15062, "Steel Pipe," for additional requirements.

The steel casing pipe minimum diameter and wall thickness shall be as shown on the Drawings. It shall be the CONTRACTOR'S responsibility for selecting a

casing at or greater than the minimum size specified, so that the jacking can be done with sufficient accuracy to allow installation of the carrier pipes to the grade shown on the Contract Documents. All increased costs resulting from the CONTRACTOR'S use of steel casing pipe with a larger diameter or thickness than the minimum specified shall be borne solely by the CONTRACTOR.

Casing section joints shall be butt-welded, lap welded or welded using butt straps in the field. Joints in the lower one-half of the cross-section shall be ground smooth to allow the casing insulators to slide freely.

2-2.02. Grout: Grout shall consist of one part Portland cement, three parts sand and the minimum amount of water necessary to obtain the desired consistency and all grout mixtures shall contain 2 percent of bentonite by weight of the cement. Portland cement, water and sand shall conform to the applicable requirements of specification Section 03300, **"**Cast-in-Place Concrete," except that sand to be used shall be of such fineness that 100 percent will pass a Standard No. 8 sieve and at least 45 percent, by weight, will pass a Standard No. 40 sieve. Bentonite shall be a commercial-processed powdered bentonite, Wyoming type, such as Imacco-gel, Black Hills, or equal.

2-2.03. Grout Connections: The CONTRACTOR shall provide 2-inch grout connections with steel plugs on the interior of the steel casing pipe, located at a maximum of four (4) feet on center alternating at 30 degrees from plumb each side of the vertical centerline, and at the invert of the casing as shown. Longitudinal spacing between the grout connections may be decreased to provide more frequent grouting, but in no case shall the spacing shown or specified be exceeded.

2-2.04. Wood Skids. Wood skids shall not be used.

2-2.05. Casing Insulators. Plastic coated or stainless steel casing (pipeline) insulators shall be provided where indicated on the Drawings. Casing insulators shall be as manufactured by Pipeline Seal and Insulator, Inc. or PowerSeal Pipeline Products Corporation. Casing insulators shall be designed to be sufficiently sturdy to carry the weight of the pipe and stresses during installation as recommended by the manufacturer. Refer to Section 16640, “Corrosion Monitoring” for additional requirements.

2-2.06. End Closure. Standard pull-on type end seals, sized to fit the carrier pipe / casing configuration, may be used as end closures; refer to Section 16640 for additional requirements. As an alternate, nominal 12 inch masonry brick for end closures may be used.

PART 3 - EXECUTION

3-1. INSTALLATION OF STEEL PIPE CASING. Casing shall be installed by jacking and/or boring methods, or a combination of both, without the use of water or air, at the locations and grades shown on the Contract Documents and subject to the approval of the ENGINEER. Unless otherwise specified, the methods and equipment used in installing the casing pipe shall be selected by CONTRACTOR, subject to the review and concurrence of the ENGINEER. Such concurrence, however, shall not relieve the CONTRACTOR of the responsibility for performing a satisfactory installation meeting all specified requirements, including the following:

- The diameter of the excavated hole shall be not more than 1 inch greater than the outside diameter of the casing pipe.
- Sluicing or jetting with water will not be allowed as a method of excavation.
- CONTRACTOR shall remove excavated material from the casing as excavation progresses.
- The casing pipe shall be installed in a manner that will prevent loss of ground, ground deformation, and any damage to the existing facilities, including the roadway and railroad.
- If loss of ground should occur at any time during the casing installation, CONTRACTOR shall backfill the voids immediately with soil cement. Soil cement shall consist of a slightly moistened mix of 1 part cement to 5 parts granular material; thoroughly mix the soil cement and pack into all voids.
- The joints of sections of casing pipe to be installed shall be welded with a continuous full penetration butt weld for the entire circumference.
- The casing installation shall be performed true to line and grade, such that the carrier pipe can be installed as shown on the line layout diagrams; but in no case shall the casing installation deviate from the required alignment and profile by more than 6 inches. CONTRACTOR shall continuously monitor the horizontal and vertical alignment of the casing during installation to assure conformance to required line and grade. Any adjustments that are made to the carrier pipe horizontal and vertical alignment as a result of the casing installation shall be made only with the DISTRICT'S acceptance and at no additional cost to the DISTRICT.

3-1.01. Jacking Head. A steel jacking head shall be fitted to the lead section of the casing in such a manner that it extends around the entire outer surface of the steel casing and projects at least 18 inches beyond the driving end of the casing.

The jacking head shall not protrude more than 0.5 inches outside of the outer casing surface. The head shall be securely anchored to prevent any wobble or alignment variation during the boring or jacking operations. To minimize voids outside the casing, excavation shall be carried out entirely within the jacking head and not in advance of the head. Excavated materials shall be removed from the casing as the boring or jacking operation progresses and no accumulation of excavated materials within the casing shall be permitted.

3-1.02. Jacking Pit. The excavations for the boring or jacking operations shall be adequately shored and dewatered to safeguard existing substructures and surface improvements and to ensure against ground movement in the vicinity of the jack supports. Heavy guide timber, structural steel, or concrete cradles of sufficient length shall be provided to assure accurate control of boring or jacking alignment. The CONTRACTOR shall provide adequate space within the excavation to permit the insertion of the lengths of casing to be bored or jacked. Timbers and structural steel sections shall be anchored to ensure action of the jacks in line with the axis of the casing. A bearing block, consisting of a timber or structural steel framework, shall be constructed between the jacks and the end of the casing to provide uniform end bearing over the perimeter of the casing and distribute the jacking pressure evenly.

No portion of the jacking pit(s) shall be located within highway or railroad right-of-way.

Any interfering utilities shown on the Contract Drawings within jacking pits shall be relocated at the CONTRACTOR'S expense.

3-1.03. Control of Alignment and Grade. Allowable grade deviations in horizontal and vertical alignments shall be no greater than 0.2 feet per 100 feet in any direction over the length of the jacking or boring to a maximum deviation of 0.5 feet. The steel casing shall be installed so as not to restrict the installation of the carrier pipe to plan line and grade. Stricter tolerances than the above may be shown on the Contract Documents.

If required by the ENGINEER, the augers shall be removed from the casing, for every 100 feet of casing length, to check for correct line and grade. Corrections shall be made as required to keep the casing within the required horizontal and vertical tolerances. The grade and alignment shall be checked by optical surveying or laser equipment. In all cases, casing length shall be equal to auger length.

The CONTRACTOR shall control the application of the jacking pressure and excavation of materials ahead of the casing as it advances to prevent the casing from becoming earthbound or deviating from the required line and grade.

The CONTRACTOR shall restrict the excavation of the materials to the least clearance necessary to prevent binding in order to avoid loss of ground and consequent settlement or possible damage to overlying structures.

3-1.04. Potholing Existing Utilities. All existing utilities approached or crossed within 60-inches of the proposed casing alignment shall be potholed by the CONTRACTOR prior to the start of the installation of the casing.

3-2. INSTALLATION OF CARRIER PIPE. CONTRACTOR shall install the carrier pipes inside of the casing with casing insulators positioned as shown. The casing shall be filled with sand and the carrier pipe shall be fully encased such a manner that avoids movement of the pipe during sand placement. Seal the ends of the casing with casing seal or masonry.

If the CONTRACTOR is not ready to place the carrier pipe in the casing at the time of completion of bore and jack operations, the ends of the casing shall be bulkheaded and the jacking and receiving pits shall be plated over.

3-2.01. Joints. All joints of the carrier pipes within the casing shall be as shown on the Drawings.

3-2.02. Application of Mortar Lining and Coating to Joints. Application of mortar to the interior and exterior joints shall be performed as shown on the Drawings. No exterior or interior joints of the carrier pipe shall have mortar grout applied over a seam until the seam has cooled.

3-3. GROUTING. Immediately after completion of the boring or jacking operations, the CONTRACTOR shall inject grout through the grout connections in such a manner as to completely fill all voids outside the casing pipe resulting from the boring or jacking operations. Grout pressure, 4 psi maximum at the grout fitting, shall be controlled so as to avoid deformation of the steel casing and avoid movement of the surrounding ground. After completion of the grouting operations, the CONTRACTOR shall close the grout connections with cast-iron threaded plugs.

Grouting equipment and material shall be on the jobsite before the jacking operations have been completed so that grouting around the exterior of the casing can begin immediately after the jacking operations have been completed.

3-3.01. Grouting Equipment. Equipment used for mixing and injecting contact grout shall be designed for grouting service. Equipment shall be maintained in condition, capable of satisfactorily mixing and agitating the grout, and forcing it into the grout holes in a continuous flow at the required pressures. Hoses shall be used that are capable of developing the required pressure at the grout hole connection. A means of rapid flushing with clear water at each pump shall be provided to remove partially set grout during periods of sustained pumping to

prevent plugging. Mixer shall have an accurate meter for measuring the amount of mixing water added in the grout. Not less than two pressure gages shall be provided, one at the grout pump and one on the manifold hookup at the collar of the hole being grouted. Suitable stop valves shall be provided at each grout hole to retain grout until the grout has set. The grouting equipment shall be provided with means to accurately measure the amount of grout injected.

3-3.02. Mixing and Injection of Grout. Maximum pressure for grout injection at steel casing shall be 4 psi. Grout shall be injected continuously until completed. Grout pumps shall be operated and controlled so that the grout is delivered uniformly and steadily, progressively from pipe-to-pipe. Grouting will be considered completed when no more grout of the required mix and consistency can be forced in under the maximum pressure.

When the steel casing grouting is complete, CONTRACTOR shall clean the threads of both the grout holes and the plugs, coat the plug threads with mineral oil, and replace the plugs in the hole for their full length, screwed tight.

3-4. CLOSING OF PITS. After jacking equipment and excavated materials from boring or jacking operations have been removed from the jacking and receiving pits, the CONTRACTOR shall backfill the bottom of the jacking pit with well-compacted sand or controlled density fill to provide support for the pipe foundation.

Bore pits shall be backfilled with controlled density fill from the top of pipe bedding to 12” above the top of pipe.

The CONTRACTOR shall place and compact all backfill materials 12” above the top of pipe in accordance with Specification Section 02202, "Trenching and Backfilling."

End of Section

Section 02465

CAST-IN-DRILLED HOLE FOUNDATION PILES

PART 1 - GENERAL

1-1. SCOPE. This section covers construction and testing of cast-in-drilled hole foundation piles.

1-2. GENERAL. Unless specifically indicated otherwise in the Contract Documents, all concrete work, including steel reinforcing, shall be in accordance with the best standard practices as set forth in the ACI Building Code, Manuals and Recommended Practices.

Requirements for cast-in-place concrete are specified in Section 03300. Earthwork requirements are specified in Section 02200.

1-3. SUBMITTALS. Submit the following items in accordance with Section 01300, "Submittals."

Submit reinforcing steel placement drawings and bar lists.

Submit record of experience showing that the CONTRACTOR has been engaged in the successful installation of drilled foundation piles of comparable size and magnitude to those specified for this Project for at least three years immediately preceding this Project. Submit at least 30 days prior to construction of the drilled piles or at such time as otherwise specified.

Submit manufacturer’s catalog data for proposed alignment devices and bolsters.

Submit detailed records in a reviewed form, for each pile, showing shaft diameter, depths of holes, top and bottom elevations, bearing strata description, casing description, water conditions, concrete strength, concrete volume, rock elevations, dates of drilling and concrete placement, and other pertinent information.

Submit the following as specified in Section 03300:

(1) Certified test reports.

(2) Certificates of Compliance.

(3) Mix designs and CONTRACTOR'S independent testing laboratory test results.

(4) Batch tickets.

(5) Concrete cylinder test reports, and reports on concrete testing for slump, air content and temperature.

Submit Samples of concrete materials requested by the ENGINEER.

Submit procedures for hot and cold weather concreting when such conditions are anticipated.

1-4. QUALITY CONTROL. The ENGINEER will make inspections during drilling, taking of concrete test specimens, placing of reinforcement steel, and construction of the piles and of each drilled pile excavation. Do not place concrete until the excavation and placement of reinforcement steel have been inspected by the ENGINEER. Furnish all necessary equipment required for proper inspection of drilled pile excavations. Inspections performed by the ENGINEER shall not relieve the CONTRACTOR of the responsibility for performing its own inspections necessary to ensure the drilled pile work is performed in compliance with these specifications.

PART 2 - PRODUCTS

2-1. PILE DRILLING EQUIPMENT. Pile drilling equipment shall have the minimum torque capacity and downward force capacity for the site conditions to be encountered.

2-2. CONCRETE WORK. Concrete work shall be performed in accordance with the requirements specified in Section 03300, as modified herein:

- Coarse Aggregate: Maximum size of coarse aggregate shall be 1 inch.
- Compressive Strength: Minimum concrete compressive strength shall be 3,500 psi at 28 days.
- Water Cement Ratio: 0.48 maximum.
- Slump: 5 to 8 inches.

2-3. REINFORCEMENT CAGE ALIGNMENT. Provide prefabricated devices wired to the reinforcing cages to maintain alignment in the excavation. Provide minimum 3-inch clearance to the earth sides. Wire ties shall be galvanized and sized by the manufacturer for the device used for this purpose.

2-4. REINFORCEMENT CAGE BOLSTERS. Reinforcement cage bolsters shall be a fabricated concrete support with integral wire ties. The bolsters shall be nominal 4-inch diameter by 3 inches high, with two 9-gauge galvanized wires for attachment to the bottom of the reinforcing cage. Provide a minimum of four

bolsters per cage, spaced to support reinforcement steel cage free of foundation material.

PART 3 - EXECUTION

3-1. SEQUENCE OF WORK

Excavate drilled piles or groups of drilled piles so that reinforcing steel and concrete placement is a continuous operation performed the same day that the excavation is completed. Do not leave excavations open overnight. Place concrete within three hours after completing excavation.

3-2. EXCAVATION

Excavate drilled piles to depths and dimensions shown. Clean bottoms of drilled piles of loose or soft material and level. Dispose of excavated material in accordance with Section 02200.

Protect the soils and earth walls surrounding the drilled shafts against cave-ins, displacement of the surrounding earth, and retention of groundwater by means of temporary steel casings, if necessary.

Continuously remove water that flows into the excavations. Remove water from the excavation bottom prior to concrete placement. In the event of a severe water condition that makes it impossible or impractical to dewater the excavation, place concrete using underwater tremie after water movement has stabilized.

Each drilled pier excavation will be inspected and shall be accepted by the ENGINEER prior to placing concrete. Keep a record of all inspections, with related construction changes. Provide personnel and equipment to support inspection and testing procedures.

3-3. INSTALLING CASINGS

Temporary steel casings shall have outside diameters not less than the indicated shaft sizes and shall be a minimum of 1/4 inch thick. Do not remove if the structural integrity of the drilled pile will be impaired, as determined by the ENGINEER.

Withdraw temporary steel casings, as the concrete is being placed, maintaining sufficient head of concrete within the casing to prevent extraneous material from falling in from the sides and mixing with the concrete. Casings may be jerked upward a maximum of 4 inches to break the bottom seal, but thereafter remove with a smooth, continuous motion.

Thoroughly clean and oil the inside of steel casings before reuse.

The temporary casing shall be in place from the drilled pile top to the ground surface until the concrete has set if the elevation of the top of the drilled pile is below the adjacent ground surface.

The outside diameter of permanent steel casing shall be the same as the nominal shaft diameter. Wall thickness of permanent casings shall be a minimum of 1/4 inch.

3-4. WELDING

Detail and field welding shall be in accordance with AWS D1.1. Qualification of welding procedures, welders, and welding operators shall be in accordance with AWS D1.1, Section 5. Records of test results of welding procedures not prequalified and copies of records for each qualified welding operator, containing records on positions of welding and types of electrode qualifications, shall be available for examination by the ENGINEER.

3-5. INSTALLATION OF ALIGNMENT DEVICES AND BOLSTERS

Install alignment devices and bolsters on the cages in the quantities required to provide alignment and support of each cage in the shaft. Secure tie wires to prevent displacement during placement of cage in shaft. Insert the cages securely in the drilled shafts, in position and alignment as shown, prior to concrete placement.

3-6. REINFORCING STEEL

After a hole has been inspected and accepted, install the reinforcing steel and place the concrete within one hour.

The required reinforcing steel cage for the drilled pile shall be completely assembled and placed as a unit for the full length of the drilled pile immediately prior to concrete placement. The cages shall be straight and shall conform to the dimensions shown in the Drawings. Steel shall be free of rust, mud, or any deleterious materials that would hinder bonding of concrete and steel.

Support the reinforcing steel cage from the top by a ground surface frame, crane, or other positive means during the concrete placement to achieve the clearances shown in the drawings. Setting the cage on the bottom of the hole or suspending the cage by hand will not be permitted. The support system shall be concentric to prevent racking and displacement of the cage.

If concrete placement does not immediately follow the cage placement, the ENGINEER may order the steel to be removed from the excavation so that the

integrity of the excavation, including the presence of loose material in the bottom of the hole, and the surface condition of the reinforcing steel may be determined by inspection.

3-7. PLACING CONCRETE

Verify depth of drilled pile excavation, remove water, and verify tolerances of position and pile alignment before placing concrete.

Continuously place concrete by methods that ensure against segregation and completely fill the shaft. Place concrete by pumping or drop chutes in dry holes and by tremie or pumping in wet holes. Keep the discharge a minimum of 3 feet below the fresh concrete surface during placement. Drilling of piles or driving of casings shall not be permitted within 20 feet of concrete placed within the last three days.

Bring concrete to a true level surface inside the shaft. Prior to placing additional concrete, clean surfaces of laitance and slush with one-to-one portland cement grout. The grout shall have a water-cement ratio not exceeding that of the concrete.

Vibrate concrete for full height of drilled pile.

3-8. TOLERANCES

Cross-sections of shafts shall not be less than design dimensions.

Install piles with top location deviating a maximum of 3 inches from centerline locations.

Install piles plumb within a maximum deviation of 1-1/2 inches for the top 10 feet and within l/2 inch for each 10 feet of additional depth.

Correct any pile out of center or plumb beyond the tolerance specified to comply with the tolerances; the CONTRACTOR shall bear any cost of correction.

3-9. PROTECTION

Protect around the top of the excavation to prevent debris from being dislodged into the excavation and concrete.

End of Section

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Section 02512

ASPHALTIC CONCRETE PAVEMENT

PART 1 - GENERAL

1-1. SCOPE. This section covers the furnishing of labor, materials, and equipment for the construction of asphaltic concrete paving for trench restoration, roadways, driveways, and parking areas as indicated on the Drawings for the various types shown.

Subgrade preparation and aggregate base course materials shall be as specified in Section 02200, "Earthwork."

Asphaltic concrete paving shall be constructed to the limits indicated on the Drawings. Where no limits are shown, re-pave all trench excavations in paved areas.

For work in the public right-of-way, the placement of asphaltic concrete pavement shall be in accordance with the requirements and minimum dimensions specified in the encroachment permit that applies to the work site. Refer to Section 01060, “Permit Requirements,” for additional information. Copies of specific paving requirements that apply to this Project are attached to the end of this Section, including:

- Table 02512-1, “Existing Asphaltic Concrete Pavement Structure Thicknesses.
- County of San Luis Obispo; refer to attached County Standard Construction Drawing No. R-4, R-4A, and U-4.

1-2. GENERAL.

1-2.01. Governing Standards. Except as otherwise specified or shown, materials, equipment details, and construction methods shall comply with the State of California, Department of Transportation (Caltrans), Standard Specifications for Construction of Local Streets and Roads, May 2006. In all cases, the reference to payment in the Standard Specification is not applicable.

1-3. QUALITY CONTROL. Testing services for materials and design mixtures shall be as indicated in Section 01400, "Quality Control."

1-4. DELIVERY AND HANDLING.

1-4.01. Delivery. Asphalt aggregate mixtures shall be transported from mixing site to jobsite in trucks having tight, clean compartments that have been coated lightly with lime-water mixture to prevent sticking. Delivery tickets for all materials delivered to the site shall be submitted to ENGINEER at the end of each day during the progress of the work.

1-4.02. Handling. Equipment and facilities for mixing, heating, transporting, spreading, compacting, and all other operations shall be in accordance with applicable requirements of the governing standards and be acceptable to the ENGINEER.

1-5. WEATHER LIMITATIONS. Weather limitations, including minimum temperatures, under which asphalt pavements may be constructed shall be as specified herein. No materials shall be placed when the underlying surface is muddy or has water thereon.

Bituminous prime shall be applied only when the ambient temperature in the shade is above 50 degrees F and when the temperature has not been below 35 degrees F for 12 hours immediately prior to application.

Application of asphalt aggregate surface course shall not be done when the atmospheric temperature is below 40 degrees F.

1-6. SUBMITTALS. All submittals of samples and data shall be in accordance with the procedures of the applicable ASTM standard, Caltrans specifications, and as set forth in Section 01300, "Submittals."

CONTRACTOR shall submit laboratory test reports for the following materials:

Aggregates, course and fine from each material source and each grading.

Asphalt cement for each penetration grade.

Uncompacted asphalt concrete mix.

Compacted asphaltic concrete mix.

Density and stability analysis of mix.

Plant sampling and testing of asphalt concrete mixers for quality control during paving operations.

Asphalt plant inspection.

PART 2 - PRODUCTS

2-1. MATERIALS. Except as otherwise required by the City or County under the encroachment permit specifications, materials for asphaltic concrete paving shall conform to the following requirements:

Aggregate Base	As specified in Section 02200, "Earthwork."
Asphaltic Concrete	Caltrans Section 39.
Aggregate	Caltrans Section 39-2.02, Type B, 1/2-inch maximum size, medium grading.
Asphalt Binder	Caltrans Section 92, paving asphalt Grade AR 4000.
Prime Coat	Caltrans Section 93, Grade SC-70.
Paint Binder (Tack Coat)	Caltrans Section 94, liquid emulsion Grade SS-1.
Bituminous Seal	Caltrans Section 37-1 for "Fog Seal."

2-2. DESIGN MIXES. A design mix for the bituminous base course and for the surface course, based upon the aggregates to be furnished, shall be determined by an independent testing laboratory at the expense of CONTRACTOR and shall be submitted to ENGINEER for review.

The design mixes, upon acceptance by ENGINEER, shall be the basis for the mixes to be used in asphaltic concrete pavement construction. The proposed design mix data submitted for review shall include the following:

Marshall stability, all mixtures

Number of compaction blows

Flow, all mixtures

Percent air voids: (laboratory specimen)

- Base
- Surface

Percent voids in the following mineral aggregate:

- 3/4 inch max size
- 5/8 inch max size
- 3/8 inch max size

PART 3 - EXECUTION

3-1. INSPECTION. Preparation of the subgrade as specified in Section 02200 shall be completed for the full width of the roads, drives, and parking areas prior to the placement of any base materials.

3-2. PREPARATION.

3-2.01. Field Preparation. Ditches and drains along the subgrade shall be maintained as required for effective drainage. Whenever ruts of 2 inches or more in depth are formed, the subgrade shall be brought to grade, reshaped, and recompacted. Storage or stockpiling of materials on the subgrade will not be permitted.

All foreign and loose material from subbase surface shall be removed immediately before application of paving by use of power brooms, blowers, and hand brooming as required.

3-2.02. Frame Adjustments. The CONTRACTOR shall check the alignment and elevation of frames for subsurface structures, including both existing and new frames.

Frames shall be set to elevation with a ring of compacted asphalt concrete base prior to paving operation. Asphalt concrete mixture shall be placed up to 1 inch below top of frame, sloped to grade, and compacted with hand tamper.

Cover of frame shall be set to grade, flush with surface of adjacent pavement. If permanent covers are not available, provide temporary covers over openings until completion of rolling operations.

3-3. APPLICATION. For work in areas covered by specific requirements included in the encroachment permits referenced herein, the procedures described in the encroachment permits and attached hereto shall be followed:

For work in areas not covered by specific requirements included in the encroachment permits referenced herein, the procedures described below shall be followed:

3-3.01. Aggregate Base Course. After the subgrade has been accepted by the ENGINEER, a 6-inch-thick aggregate base course shall be placed and compacted to no less than 95 percent of maximum dry density. The moisture content shall be within -1 percent and +3 percent of optimum. Recompacted aggregate base course shall also be as specified.

3-3.02. Prime Coat. After placing or recompacting the aggregate base course, a prime coat shall be applied to the subgrade in accordance with Caltrans Section 93. Rate of application shall be in accordance with the standard but not less than 0.20 and 0.25 gallon per square yard as required to fill all voids and interstices, and to uniformly coat the subgrade surface.

3-3.03. Paint Binder. The vertical surfaces of concrete gutters and other fixed structures against which asphaltic surfacing is to be placed, and the edge of all courses at transverse and longitudinal joints shall be given a uniform coating of cut-back or emulsified asphalt before placing the adjoining mixture. The tack coat shall be applied by methods which will ensure a uniform coating and in no case shall the application be excessive.

3-3.04. Surface Course. The surface course mixture shall be hauled to the site of paving and placed as soon as possible after mixing.

The surface course shall be constructed in two equal layers to provide a total compacted thickness of 3 inches.

The placement of the surface course shall be completed over the full width of the section under construction on each day's run. Materials shall be placed by finishing machines having automatic screed controls and traveling string lines and/or other sensing devices riding on the curb and previously placed pavement.

Adjacent to curbs, gutters, and other structures, the surface shall be finished uniformly high so that when compacted, it will be slightly above the edge of the curb and flush structure.

3-3.05. Bituminous Seal. Asphaltic concrete surfaces shall receive a fog seal in conformance with Caltrans S.S. Section 37-1. The application rate of fog seal coat (asphaltic emulsion and added water) shall be such that the original emulsion will be spread at a rate of 0.10 gallon per square yard.

All asphaltic concrete surfaces at the site shall be given a fog seal coating. Resurfaced pavement over pipe trenchlines shall extend over the limits indicated on the drawings. Where not indicated on the Drawings, fog seal shall be applied over the entire surface of new pavement and shall overlap 12 inches on both sides of the trenchline over existing pavement.

3-3.06. Construction Joints. Construction joints shall be made in such a manner as to ensure a neat junction, thorough compaction, and bond throughout.

A transverse joint extending over the full width of the strip being laid and at right angles to its centerline shall be constructed at the end of each day's work and at any other times when the operations of placing the mixture are suspended for a period of time which will permit the mixture to chill. The forward end of a freshly laid strip shall be thoroughly compacted by rolling before the mixture has become chilled. When work is resumed, the end shall be cut vertically for the full depth of the layer.

Longitudinal joints between strips shall be parallel to the centerline of the roadbed. The longitudinal joints between strips shall be not less than 6 inches distant transversely from like joints in the previously placed course or layer. When the wearing course is constructed in an even number of strips, one longitudinal joint shall be on the centerline of the roadbed; and when constructed in an odd number of strips, the centerline of one strip shall be on the centerline of the roadbed.

3-4. REPAIR OF DEFECTS. CONTRACTOR shall remove and replace defective areas by cutting to the full depth of the course. Cuts shall be made perpendicular and parallel to the direction of traffic with edges vertical.

A tack coat of emulsified asphalt shall be applied to all exposed surfaces. The area shall be filled with fresh hot asphaltic concrete mix in lifts of the same depths as the adjacent area, then compacted by rolling to specified surface density and smoothness.

3-5. CLEANING. After completion of paving operation, all areas shall be cleaned of excess spilled asphalt materials to the satisfaction of ENGINEER.

3-6. PROTECTION. In addition to the requirements for protection stipulated in the governing standards, CONTRACTOR shall protect all adjacent concrete and masonry so that no damage will occur as the result of subsequent construction operations. All damage or discoloration shall be repaired to the satisfaction of ENGINEER before final acceptance by DISTRICT.

Special care shall be taken to prevent bituminous materials from spraying or splashing. Adjacent construction shall be protected by covering with suitable fabric or paper.

End of Section

TABLE 02512-1

EXISTING ASPHALTIC CONCRETE PAVEMENT THICKNESS

ROADWAY*	CONTRACT	NOMINAL PIPELINE STATIONS	A.C. TOTAL THICKNESS (INCHES)	AGGGREGATE BASE TOTAL THICKNESS (INCHES)
North River Road (Paso Robles)	300187.08.03	985 – 1050	5	18
South River Road (Paso Robles)	300187.08.03	1071 – 1149	5	18
South River Road	300187.08.03	1149 – 1171	5	18
Santa Ysabel Road	300187.08.03 300187.08.04	1167 – 1185	3	18
Vaquero Drive	300187.08.04	1278 – 1312	3	12
El Pomar Drive	300187.08.04	1312 – 1389	6	18
Templeton Road	300187.08.04	1389 – 1514 1556 – 1626	6	12
Rocky Canyon Road	300187.08.04	1630 – 1682	6	12
Rocky Canyon Road	300187.08.04 300187.08.05	1682 – 1835	3	12
Sandoval Road	300187.08.05	1954 – 1980	4	12
County Road to Santa Margarita Booster Pump Station	300187.08.05	2200 - 2245	4	18
All Other Locations (Minimum)	All	N/A	3	6

***** Roadways are under County of San Luis Obispo jurisdiction unless otherwise noted.

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LOCAL AGENCY REQUIREMENTS

COUNTY OF SAN LUIS OBISPO

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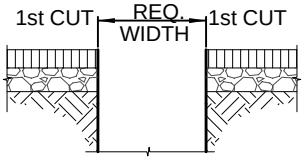
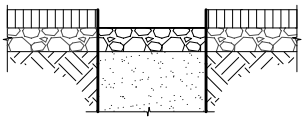
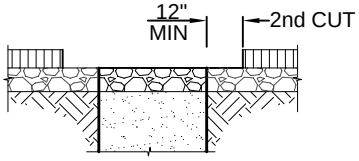
Revisions					
Description	Approved	Date	Description	Approved	Date



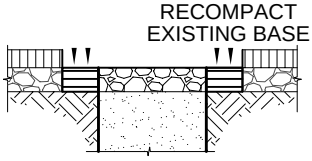
STEP 1: SAWCUT PER TO CONSTRUCT TRENCH PER U-4. SAWCUT SHALL FOLLOW ALIGNMENT OF STRUCTURE.



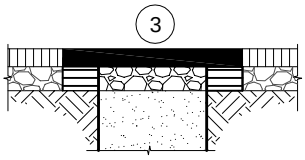
STEP 2: BACKFILL & COMPACT NEW TRENCH TO TOP OF EXIST BASE SECTION PER U-4.



STEP 3: SAWCUT PER NOTE 1 TO REMOVE AN ADDITIONAL 12" MIN OF ASPHALT SURFACE.

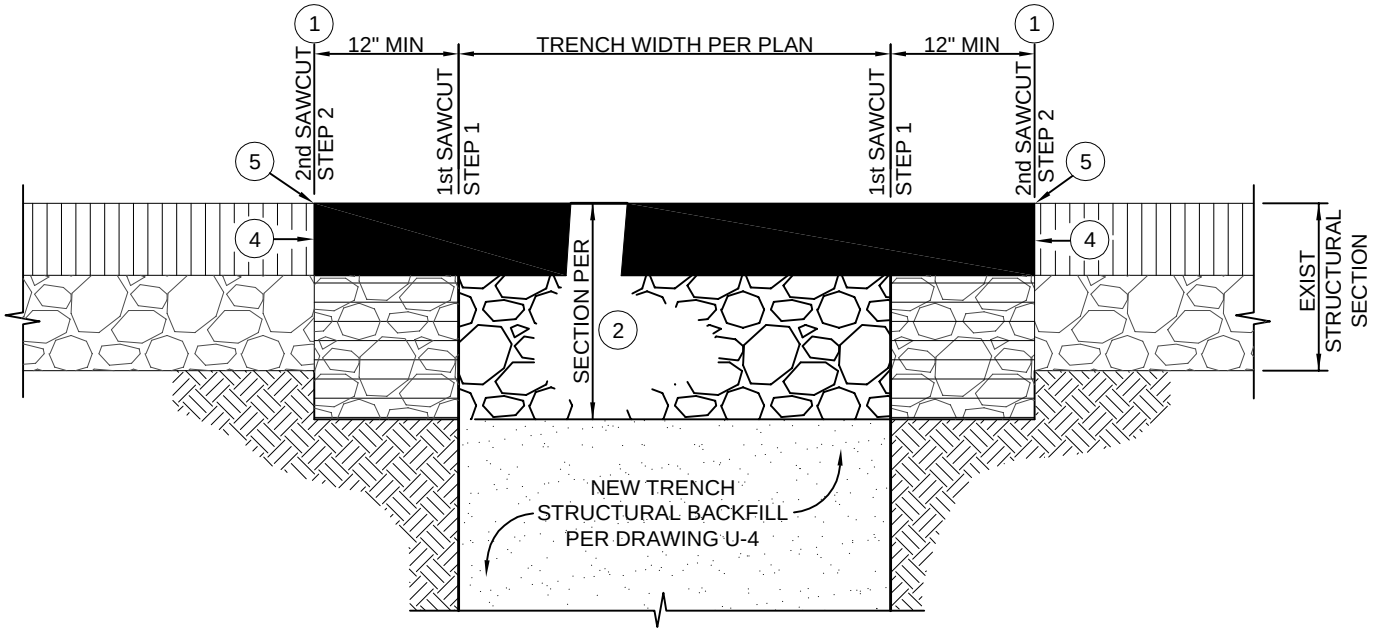


STEP 4: RECOMPACT EXISTING BASE SECTION TO 95% RELATIVE COMPACTION.



STEP 5: PAVE ROADWAY PER DEPARTMENT APPROVED SECTION.

PAVEMENT REPAIR PROCEDURE



SECTION VIEW

NOTES:

1. SAWCUT TO REMOVE DAMAGED OR FAILED PAVEMENT SECTION ADJACENT TO THE EDGE OF TRENCH AS NECESSARY TO PROVIDE A CLEAN JOIN LINE. ALL SAWCUTS SHALL BE PERPENDICULAR OR PARALLEL TO CENTERLINE, OUTSIDE THE NORMAL VEHICLE TIRE PATH WITHIN A TRAVEL LANE, AND SHALL NOT BE ALLOWED WITHIN DESIGNATED BICYCLE LANES. CUT EDGES SHALL BE VERTICAL WITH SQUARE CORNERS AND SHALL BE STRAIGHT AND NEAT IN APPEARANCE. ALL SAWCUTS SHALL BE TO MINIMUM SHOWN OR TO COMPETENT PAVEMENT SECTION.
2. THE STRUCTURAL ROAD REPAIR SECTION SHALL MATCH THE EXISTING STRUCTURAL SECTION THICKNESS OR AS REQUIRED BY THE DEPARTMENT. TYPICAL ROAD WIDENING SECTION SHALL BE:
   - ASPHALT CONCRETE PER THE DESIGN STANDARDS TO 95% RELATIVE COMPACTION, OVER
   - CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER
   - TRENCH SECTION PER DRAWING U-4 (STRUCTURAL BACKFILL TO 95% MIN RELATIVE COMPACTION)
3. NEW PAVEMENT SHALL BE PLACED IN LIFTS NOT EXCEEDING 3-INCHES (COMPACTED). WHERE EXISTING PAVEMENT IS 3.5-INCHES THICK OR GREATER SEE STANDARD DRAWING R-4a FOR TRENCH REPAIR REQUIREMENTS.
4. A TACK COAT SHALL BE APPLIED TO ALL HORIZONTAL AND VERTICAL CONFORM SURFACES PRIOR TO PAVING.
5. AFTER PAVING, APPLY "CRAFCO SUPERFLEX" TO ALL SURFACE SEAMS PER MANUFACTURER'S RECOMMENDATIONS.
6. THE DEPARTMENT SHALL PROVIDE ADDITIONAL REQUIREMENTS WHEN TRENCHING IN EXISTING ROADS HAVING CONCRETE STRUCTURAL SECTIONS.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

TRENCH REPAIR

EXISTING AC PAVEMENT LESS THAN 3.5" THICK

Scale:	Issued:
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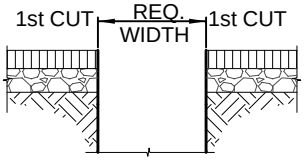
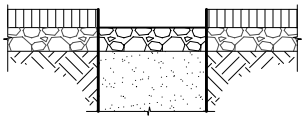
Drawing No: R-4

Sheet No: 1 OF 1

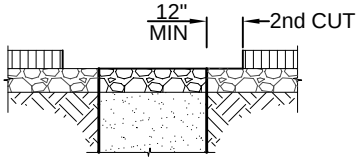
Revisions					
Description	Approved	Date	Description	Approved	Date



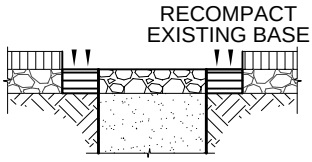
STEP 1: SAWCUT PER TO CONSTRUCT TRENCH PER U-4. SAWCUT SHALL FOLLOW ALIGNMENT OF STRUCTURE



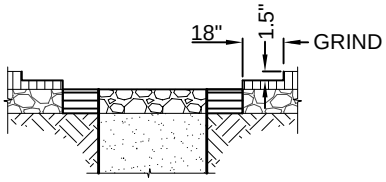
STEP 2: BACKFILL & COMPACT NEW TRENCH TO TOP OF EXIST BASE SECTION PER U-4



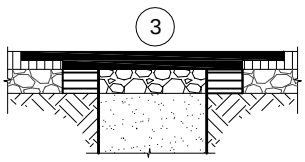
STEP 3: SAWCUT PER NOTE 1 TO REMOVE AN ADDITIONAL 12" MIN OF ASPHALT SURFACE



STEP 4: RECOMPACT EXISTING BASE SECTION TO 95% RELATIVE COMPACTION.

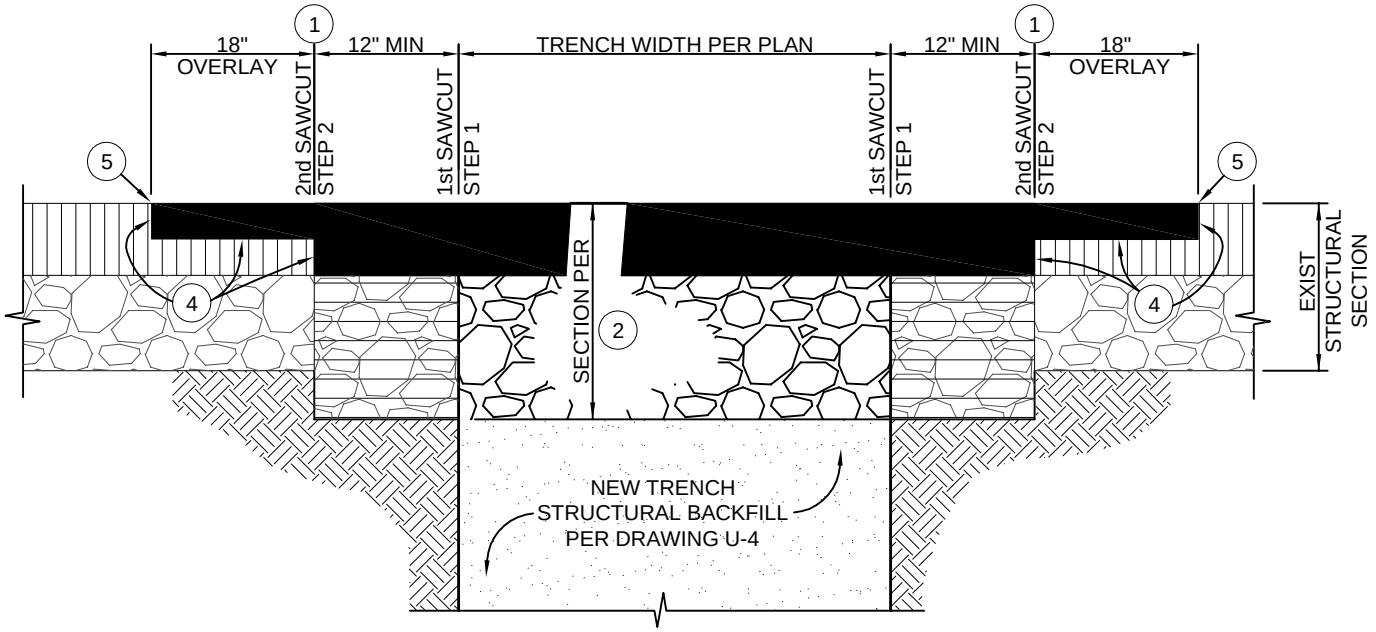


STEP 5: WHEN EXISTING AC IS **P**3.5" THICK, GRIND 18" WIDE x 1.5" DEEP OF OFF EXISTING ASPHALT SURFACE.



STEP 6: PAVE ROADWAY TO MATCH EXISTING SECTION OR AS REQUIRED BY THE DEPARTMENT.

PAVEMENT REPAIR PROCEDURE



SECTION VIEW

NOTES:

1. SAWCUT TO REMOVE DAMAGED OR FAILED PAVEMENT SECTION ADJACENT TO THE EDGE OF TRENCH AS NECESSARY TO PROVIDE A CLEAN JOIN LINE. ALL SAWCUTS SHALL BE PERPENDICULAR OR PARALLEL TO CENTERLINE, OUTSIDE THE NORMAL VEHICLE TIRE PATH WITHIN A TRAVEL LANE, AND SHALL NOT BE ALLOWED WITHIN DESIGNATED BICYCLE LANES. CUT EDGES SHALL BE VERTICAL WITH SQUARE CORNERS AND SHALL BE STRAIGHT AND NEAT IN APPEARANCE. ALL SAWCUTS SHALL BE TO MINIMUM SHOWN OR TO COMPETENT PAVEMENT SECTION.
2. THE STRUCTURAL ROAD REPAIR SECTION SHALL MATCH THE EXISTING STRUCTURAL SECTION THICKNESS OR AS REQUIRED BY THE DEPARTMENT. TYPICAL ROAD WIDENING SECTION SHALL BE:
   - ASPHALT CONCRETE PER THE DESIGN STANDARDS TO 95% RELATIVE COMPACTION, OVER
   - CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER
   - TRENCH SECTION PER DRAWING U-4 (STRUCTURAL BACKFILL TO 95% MIN RELATIVE COMPACTION)
3. NEW PAVEMENT SHALL BE PLACED IN LIFTS NOT EXCEEDING 3-INCHES (COMPACTED), WITH A MINIMUM LIFT NOT LESS THAN 1.5-INCHES.
4. A TACK COAT SHALL BE APPLIED TO ALL HORIZONTAL AND VERTICAL CONFORM SURFACES PRIOR TO PAVING.
5. AFTER PAVING, APPLY "CRAFCO SUPERFLEX" TO ALL SURFACE SEAMS PER MANUFACTURER'S RECOMMENDATIONS.
6. THE DEPARTMENT SHALL PROVIDE ADDITIONAL REQUIREMENTS WHEN TRENCHING IN EXISTING ROADS HAVING CONCRETE STRUCTURAL SECTIONS.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

TRENCH REPAIR

EXISTING AC PAVEMENT 3.5" THICK OR GREATER

Scale:	Issued:
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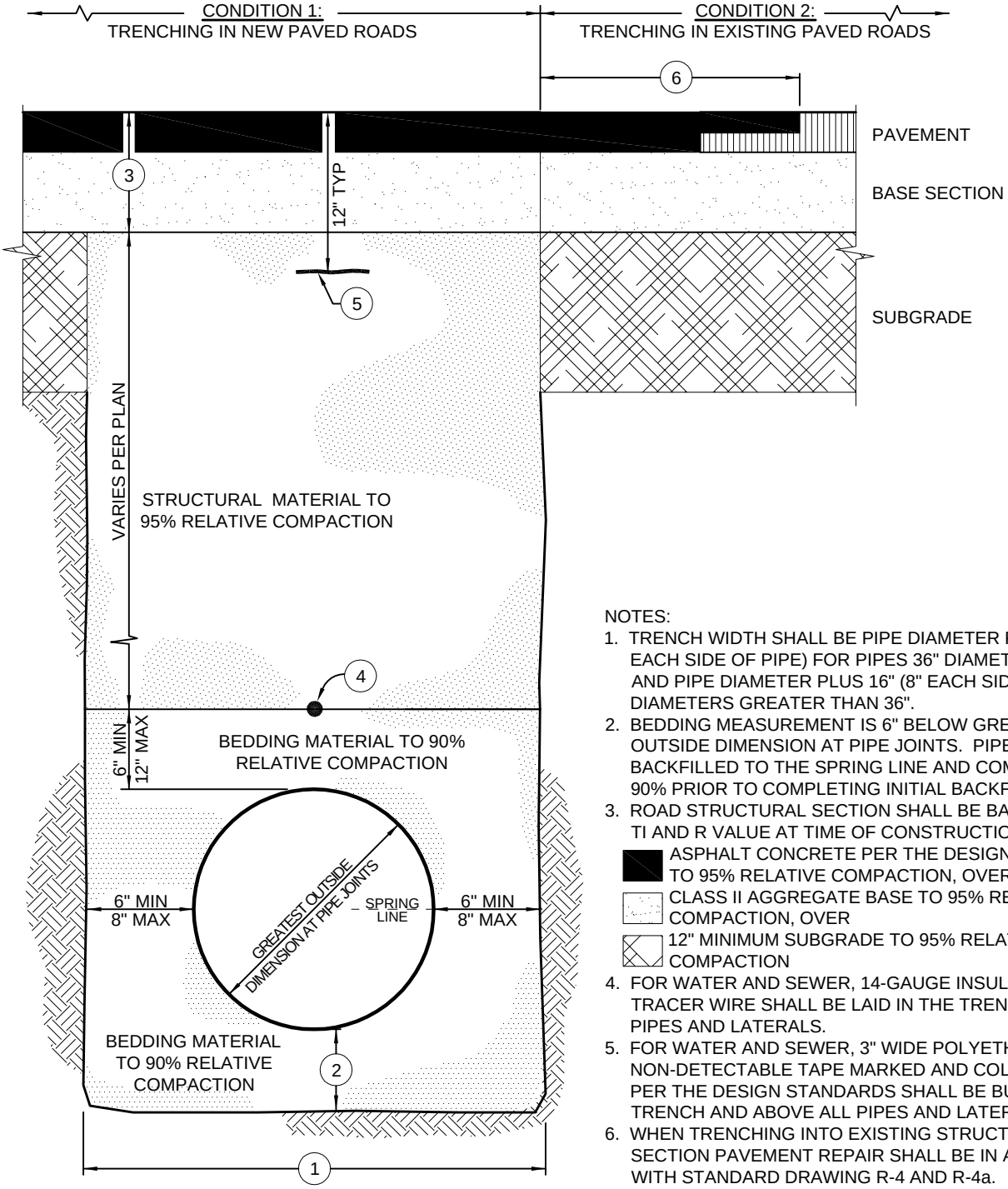
Drawing No: R-4a

Sheet No: 1 OF 1

Revisions					
Description	Approved	Date	Description	Approved	Date



NOTES:

1. TRENCH WIDTH SHALL BE PIPE DIAMETER PLUS 12" (6" EACH SIDE OF PIPE) FOR PIPES 36" DIAMETER OR LESS, AND PIPE DIAMETER PLUS 16" (8" EACH SIDE) FOR PIPE DIAMETERS GREATER THAN 36".
2. BEDDING MEASUREMENT IS 6" BELOW GREATEST OUTSIDE DIMENSION AT PIPE JOINTS. PIPE SHALL BE BACKFILLED TO THE SPRING LINE AND COMPACTED TO 90% PRIOR TO COMPLETING INITIAL BACKFILL.
3. ROAD STRUCTURAL SECTION SHALL BE BASED ON THE TI AND R VALUE AT TIME OF CONSTRUCTION:
   - ASPHALT CONCRETE PER THE DESIGN STANDARDS TO 95% RELATIVE COMPACTION, OVER
   - CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER
   - 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION
4. FOR WATER AND SEWER, 14-GAUGE INSULATED COPPER TRACER WIRE SHALL BE LAID IN THE TRENCH ABOVE ALL PIPES AND LATERALS.
5. FOR WATER AND SEWER, 3" WIDE POLYETHYLENE NON-DETECTABLE TAPE MARKED AND COLOR CODED PER THE DESIGN STANDARDS SHALL BE BURIED IN THE TRENCH AND ABOVE ALL PIPES AND LATERALS.
6. WHEN TRENCHING INTO EXISTING STRUCTURAL SECTION PAVEMENT REPAIR SHALL BE IN ACCORDANCE WITH STANDARD DRAWING R-4 AND R-4a.
7. REFER TO STANDARD DRAWINGS U-3 TO U-3b FOR ADDITIONAL REQUIREMENTS FOR WATER AND SEWER TRENCHES.
8. THE DEPARTMENT SHALL REQUIRE ADDITIONAL WORK WHEN TRENCHING INTO EXISTING ROADS HAVING CONCRETE STRUCTURAL SECTIONS.

BEDDING MATERIAL

SIEVE SIZES	PERCENT PASSING
1"	100%
No. 4	80% - 100%
No. 200	0% - 15%

STRUCTURAL MATERIAL

SIEVE SIZES	PERCENT PASSING
3"	100%
No. 4	35% - 100%
No. 30	20% - 100%

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

TRENCH DETAIL

EXISTING AND NEW PAVED ROADS

Scale:	Issued:
NTS	Aug. 2006

Drawing No: U-4

Sheet No: 1 OF 1

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Section 02704

PIPELINE PRESSURE AND LEAKAGE TESTING

PART 1 - GENERAL

1-1. SCOPE. This section covers field hydrostatic pressure and leakage testing of piping. The term "piping" shall be used in this section to refer to piping systems, pipelines, or sections thereof.

1-2. GENERAL. Testing of pipeline shall be completed prior to final cleaning.

Pipeline testing shall be conducted by individual reaches, with each reach not to exceed one (1) mile in length. Testing sequence and test durations shall be clearly identified in CONTRACTOR'S CPM Construction Schedule per Section 01310.

Additional specific construction schedule and time constraints may apply to this work; refer to Section 01311, "Construction and Schedule Constraints," for more information.

CONTRACTOR shall notify federal, state, and local regulatory agencies to determine if any special procedures or permits are required for disposal of water used for pressure and leakage testing and to identify acceptable locations for disposal of the water. All requirements and costs associated with notifications and obtaining any discharge permit or approvals shall be responsibility of CONTRACTOR.

ENGINEER will be present during testing and shall be notified of the time and place of testing at least 7 days prior to commencement of the work. All work shall be performed to the satisfaction of ENGINEER.

1-2.01. Testing Schedule and Procedure. A testing schedule and test procedure shall be submitted to ENGINEER for review and acceptance not less than 21 days prior to commencement of testing. The schedule shall indicate the proposed time and sequence of testing of the piping. The testing procedure shall establish the limits of the piping to be tested, the positions of all valves during testing, the locations of temporary bulkheads, and all procedures to be followed in performing the testing. Submit test bulkhead locations and design calculations, pipe attachment details, and methods to prevent excessive pipe wall stresses.

Select locations of test bulkheads within reaches of restrained pipe. If test bulkheads are located in unrestrained (rubber gasketed) joint areas, provide

additional length of restrained joints to prevent movement of pipe during hydrostatic testing.

1-2.02. Special Testing Requirements. Special testing requirements shall be as follows:

1. Existing valves used to maintain test pressure during leakage testing may leak. CONTRACTOR shall take appropriate steps to obtain valid test results.

2. Unless otherwise acceptable to ENGINEER, the general sequence of work for each pipeline, or valved or bulkheaded section thereof, shall be as follows:

    (a) Initial flushing and cleaning of pipeline.

    (b) Filling pipeline.

    (c) Hydrostatic pressure and leakage testing.

    (d) Transfer test water to next test segment.

    (e) Final cleaning and flushing.

3. Unless otherwise acceptable, temporary bulkheads shall be provided during testing so that the test pressures are not applied to existing or new valves, or to existing water lines, or to any portion of water lines installed under this Contract that have already been put into service.

4. A temporary pressure gauge shall be installed at each end of the limits of the pipeline to be tested. Scale of each gauge shall indicate approximately double the pressure at the location of the gauge.

5. The tests shall be conducted before connections are made to existing water lines, or to any portion of water lines installed under this Contract that have already been put into service.

6. Unless otherwise acceptable, upon completion of testing, connections made to existing water lines or to any portion that has been put into service of new water lines installed under this Contract shall be visually inspected for leakage after placing the water line into service and before backfilling the connection.

7. 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.

1-2.03. Water. Water for testing will be furnished by the DISTRICT as specified in Section 01500, "Construction Facilities and Temporary Controls." CONTRACTOR shall develop a plan to re-use test water transferred from adjacent reaches of pipeline already tested.

1-2.04. Test Pressures. Test pressures, in pounds per square inch gauge, shall be the difference between the test Hydraulic Grade Line (HGL) and the centerline pipe elevation multiplied by 0.433. Test each pipeline segment as specified below.

Refer to Drawing G601, "Condensed Hydraulic Profile" and the Drawings.

- For Units G and G1 – the CONTRACTOR shall determine the length of pipeline to be tested based on the following criteria: the static test HGL is no less than either the HGL defined for the "Steady State Ultimate" or the "Steady State – Bypass Mode" as shown on Drawing G601. The maximum static test HGL elevation within the test length shall be no more than 55 ft above the controlling HGL shown on Drawing G601.

- For Units H1 – the test HGL shall be Elev. 1381 ft. throughout.

PART 2 - PRODUCTS

2-1. TEST EQUIPMENT. All necessary connections between the piping to be tested and the water source, together with pumping equipment, water meter, pressure gauges, and all other equipment, materials, and facilities required to perform the specified tests, shall be provided. All required flanges, valves, bulkheads, bracing, blocking, and other sectionalizing devices shall also be provided. All temporary sectionalizing devices shall be removed upon completion of testing. Vents shall be provided in test bulkheads where necessary to expel air from the piping to be tested.

Test pressures shall be applied by means of a force pump sized to produce and maintain the required pressure without interruption during the test.

Water meters and pressure gauges shall be accurately calibrated and shall be subject to review and acceptance by ENGINEER.

Permanent gauge connections shall be installed at each location where test gauges are connected to the piping during the required tests. Drilling and tapping of pipe walls will not be permitted. Upon completion of testing, each gauge connection shall be fitted with a removable plug or cap acceptable to ENGINEER.

PART 3 - EXECUTION

3-1. FILLING AND VENTING. Before filling the piping with water, care shall be taken to ensure that all air release valves and other venting devices are properly installed and in the open position. Hand-operated vent valves shall not be closed until an uninterrupted stream of water is flowing from each valve. Maximum rate of initial pipeline filling for hydrostatic testing shall not cause water velocity in pipeline to exceed 1 fps. Filling may be facilitated by removing automatic air valves and releasing air manually.

The CONTRACTOR shall fill the pipeline with water and allow it to stand a minimum of 24 hours under slight pressure to permit the pipe to absorb what water it will and to allow the escape of any trapped air. The rate of filling the piping with water must not exceed the venting capacity of the installed air vent valves and devices.

The release of the air can be accomplished by opening air release valves and service line cocks at the high points of the system. The valve controlling the admission of water into the section of pipe to be tested should be opened wide before closing the air release valves and service cocks. After the system has been filled with water and all air expelled, all the valves controlling the section to be tested shall be closed.

3-2. BLOCKING AND BACKFILLING. Piping shall be adequately blocked, anchored, and supported before the test pressure is applied. Where any section of the piping contains concrete thrust blocks or encasement, do not make the pressure test until at least 10 days after the concrete has been placed.

3-3. PRESSURE TESTING. After the piping to be tested has been filled with water and left to stand for 24 hours, the test pressure shall be applied and maintained without interruption within plus or minus 5 percent of test pressure for 2 hours plus any additional time required for the ENGINEER to examine all piping being tested and for CONTRACTOR to locate any defective joints and pipe materials.

3-4. PIPELINE LEAKAGE TESTING. Following completion of pressure testing and acceptance by the ENGINEER, the piping shall be subjected to a leakage test. The duration of the leakage test shall be 4 hours plus the additional time required for the ENGINEER to make an accurate determination of leakage.

3-4.01. Leakage Test Pressure. The hydrostatic pressure maintained during the leakage test shall be at least 75 percent, but not more than 100 percent, of the pressure specified for pressure testing of the piping and shall be maintained

within plus or minus 5 psi during the entire time that leakage measurements are being performed.

3-4.02. Leakage Measurement. Measurement of leakage shall not be attempted until all trapped air has been vented and a constant test pressure has been established. After the pressure has stabilized, piping leakage shall be measured with a suitable water meter installed in the pressure piping on the discharge side of the force pump.

3-4.03. Allowable Leakage. The allowable piping leakage for pipe with rubber gasket joints shall be one half (1/2) the maximum value as allowed in AWWA Standard C600. The allowable piping leakage for pipe with welded joints shall be zero. All joints in piping shall be watertight and free from leaks, visible or not, during the leakage test. Locate and repair leaking joints and other defective work to the extent necessary and re-perform the leakage test.

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

3-4.04. Appurtenances. All connections of appurtenances to the main pipeline will be inspected by the ENGINEER during the leakage test and shall be found to be watertight and free from visible leaks.

3-4.05. Repairs. Testing shall include corrections, repairs, and retesting until the piping passes the specified tests. The CONTRACTOR shall locate and repair leaking joints and other defective work to the extent necessary and retest the pipeline. Each leak that is discovered shall be repaired by and at the expense of the CONTRACTOR.

3-4.06. Bulkhead and Test Facility Removal. After a satisfactory test, transfer the test water to the next reach of pipe designated to be tested, remove test bulkheads and other test facilities, and restore the pipe coatings.

3-5. FINAL FILLING. After the completion and acceptance of all pipeline pressure and leakage testing, and final cleaning and flushing, CONTRACTOR shall refill the pipeline and appurtenances with fresh water as specified in Paragraph 3-1, and shall leave the pipeline filled at the completion of the Work.

End of Section

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Section 02720

MANHOLES AND STORM DRAIN STRUCTURES

PART 1 - GENERAL

1-1. SCOPE. This section covers standard manholes, storm drain catch basins, and drop inlets to be furnished and installed as indicated and detailed on the Drawings, complete with all fittings, specials, jointing materials, and other necessary appurtenances.

Related work requirements specified elsewhere include general earthwork – addressed in Section 02200, "Earthwork," and trench excavation, pipe backfill, and trench backfill – addressed in Section 02202 – "Trenching and Backfilling."

1-2. GENERAL.

1-2.01. Governing Standards. Storm drain catch basins, drop inlets, and manhole structures shall be constructed in accordance with the ACI 318, as indicated on the Drawings, and as modified by these specifications.

1-3. SUBMITTALS. Submit shop drawings and product data for all precast concrete structures, together with complete data covering all materials proposed for use, in accordance with Section 01300, "Submittals." The drawings and data shall include, but shall not be limited to, the following:

Shop drawings showing precast concrete structure geometry, details of joints, details of fittings and specials, and reinforcing.

Product data for materials and products.

Design calculations sealed and signed by a civil or structural engineer registered in California.

Manufacturer's recommendations for shipping and handling, and installation instructions.

Test reports.

1-4. DELIVERY AND HANDLING.

1-4.01. Delivery. Precast concrete structures shall not be delivered to the site until representative concrete control cylinders have attained a strength of at least 80 percent of the specified minimum 28-day strength.

1-4.02. Handling. Precast concrete sections shall be handled carefully and shall not be bumped or dropped. Hooks shall not be permitted to come in contact with joint surfaces. Precast sections may be provided with lifting notches on the inside faces of walls to facilitate handling. Lifting notches shall be not more than 3 inches deep; holes extending through the wall will not be acceptable.

1-5. BASIS OF DESIGN. The precast concrete structures shall conform to the design requirements of ASTM C890, AASHTO Standard Specifications for Highway Bridges, ACI 318.

In addition, the precast concrete structures shall be designed to resist the pavement, soil weight and at-rest lateral earth pressure, H2O loading, and hydrostatic uplift and lateral forces, including seismic loading, per the geotechnical report without leaking or becoming buoyant with a water elevation at 6 feet below grade.

The precast concrete structure manufacturer shall design the foundation to resist all applicable loads. The Contractor shall construct the foundation as required by the manufacturer.

Concrete cover requirements shall be the following with no minus tolerance:

Interior surfaces, minimum, inches	1-1/2
Exterior surfaces, minimum, inches	1-1/2

PART 2 - PRODUCTS

2-1. MATERIALS.

Concrete	Materials, handling, forms, finishing, curing, and other work as specified in Section 03300, “Cast-in-Place Concrete.”
Non-shrinking Grout	As specified in Section 03600, “Grout.”
Mastic	Ram-Nek Flexible Plastic Gasket and Primer by K.T. Snyder Company; or equal.

Medium Consistency Coal Tar	Carboline "Kop-Coat Bitumastic Super-Service Black," Tnemec "46-465 Heavy Duty HB Tnemecol," or approved equal.
Asphalt Varnish	Fed Spec TT-V-51.

2-2. MANUFACTURE. If precast concrete base sections are used, part of the concrete invert fill may be furnished with the precast unit; however, a rough surface shall be provided to improve bond with the final invert fill. At least the top 2 inches of the concrete invert fill shall be installed in the field.

2-3. MANHOLE STEPS. Manhole steps shall be as shown on the Drawings.

2-4. MANHOLE FRAMES AND COVERS. Manhole frames and covers shall be cast iron of size and shape detailed on the Drawings. Castings shall be tough, close-grained gray iron, sound, smooth, clean, free from blisters, blowholes, shrinkage, cold shuts, and all defects, and shall conform to ASTM A 48, Class 35B. Plane or grind bearing surfaces to ensure flat, true surfaces. Cover shall be true and seat within ring at all points.

2-5. DROP INLET FRAME AND GRATE. Drop inlet frames and grate shall be as indicated on the Drawings.

2-6. STORM DRAIN CATCH BASIN COVER. Storm drain catch basin cover shall be provided and installed where indicated on the Drawings and as specified herein. The covers shall be of aluminum construction, with mill finish. All surfaces of aluminum which will be in contact with concrete or mortar when installed shall be given a heavy coat of coal tar paint, Kop-Coat "Bitumastic Super Service Black", Tnemec "46-449 Heavy Duty Black", or equal. All paint shall be dry and hard when the coated parts are shipped, assembled, or installed.

The sizes of the covers shall be as indicated on the Drawings. The ¼-inch thick diamond pattern aluminum plate shall be designed to withstand an H-20 wheel loading. Covers shall be provided recessed hex bolts. The orientation of access doors shall be as indicated on the Drawings.

2-7. EXCAVATION AND BACKFILL. Excavation and backfill shall conform to applicable portions of Section 02200, “Earthwork.” Backfill around manholes shall be granular fill material as specified in Section 02200.

PART 3 - EXECUTION

3-1. INSPECTION. Precast concrete sections shall be inspected when delivered and all cracked or otherwise visibly defective units rejected.

3-2. CONSTRUCTION.

3-2.01. Bases. If cast-in-place concrete bases are used, concrete shall be placed on undisturbed earth in accordance with applicable requirements of the concrete section.

If precast concrete (developed) bases are used, the subgrade materials shall be excavated to undisturbed earth and to a uniform elevation that will permit at least 4 inches of granular embedment material, as specified in Section 02200, to be installed and compacted. The surface of the granular material shall be carefully graded and the base section accurately set so that connecting pipes will be on proper line and grade. The elevation of the granular material shall be adjusted as required until proper grade and alignment of the base section has been attained.

No wedging or blocking under precast concrete bases will be permitted.

In no case shall the invert section through a catch basin be greater than that of the outgoing pipe. The shape of the invert shall conform exactly to the lower half of the pipe it connects. Side branches shall be connected with as large radius of curve as practicable. All inverts shall be troweled to a smooth clean surface.

3-2.02. Riser Sections. Lifting notches in catch basin walls shall be filled with non-shrinking grout.

3-2.03. Connecting Piping. The space between connecting pipes and the wall of precast sections shall be completely filled with non-shrinking grout.

3-2.04. Concrete-Lined Swale. The combined aggregate for Class B portland cement concrete shall conform to the grading limits for the 1-inch maximum size specified in S.S. Section 90-3.04, "Combined Aggregate Gradings".

The edges of the lined swale shall be straight and uniform, and the completed lining shall conform to the dimensions and shape shown on the Drawings. The edges shall be below ground level on any uphill sides.

When the swale is constructed by the slip-form method, concrete shall not be allowed to intrude into the drain field connecting to weep holes.

Weakened plane joints shall conform to the details shown on the Drawings and shall be constructed at 10-foot intervals.

3-2.05. Miscellaneous Construction. Concrete curbs and/or curb and gutters, sidewalks, curb ramps, valley gutters, and driveways and other miscellaneous concrete work shall conform to the provisions in Section 73, "Concrete Curbs and Sidewalks," of the Caltrans Standard Specifications and the Contract Documents.

Conforms with existing concrete shall be sawcut. After sawcutting, concrete shall be cleaned. The concrete may be cleaned by abrasive blast cleaning or other methods approved by the DISTRICT.

When constructing new curb and/or curb and gutter, sidewalk, or driveway adjacent to existing curb, sidewalk, or driveway, the CONTRACTOR shall dowel the existing concrete to the new concrete with No. 10 reinforcing bars. Two No. 10 bars shall be used to dowel new curb and/or curb and gutter to existing curb and/or curb and gutter, otherwise No. 10 bars shall be spaced at 1.2 m maximum intervals in doweling new and existing concrete. Embedment shall be 0.130 m minimum into both the new and existing concrete.

If the CONTRACTOR elects to use the curing compound method for curing concrete, the curing compound shall be curing (6) as specified in Section 90-7.01B, "Curing Compound Method," of the Caltrans Standard Specifications.

The curing compound shall be applied in a manner that will provide a complete coating of all exposed faces of the concrete surface.

Driveways, curb ramps, and sidewalks that are contiguous with curb will be measured from a point 150 mm behind the face of the curb to the back edge of the driveway conform, ramp, or sidewalk.

3-3. PAINTING. If castings arrive on the job without a foundry coating, one coat of coal tar paint shall be applied. Before painting, all castings shall be thoroughly cleaned and properly supported. All loose rust shall be removed by wire brushing. Castings shall not be handled until the paint is dry and hard.

3-4. CONNECTIONS AT MANHOLE. Provide joints in pipe 2 to 4 feet from manhole walls. Lay pipes entering manholes on compacted bedding material. Refer to Section 02200 for definition and placement of bedding and backfill.

3-5. MANHOLE EXTENSIONS. Install extensions and concrete top block in conformance with the details shown on the Drawings, and to height determined by DISTRICT. Lay grade rings with sides plumb and tops level. Extensions shall be water tight; place sections using mastic in joints.

3-6. MANHOLE FRAMES AND COVERS. Install frames and covers on top of manholes to positively prevent all infiltration of surface or groundwater into manholes. Frames shall be set as shown in the Drawings. Set frames so tops of covers are flush with surface of adjoining pavement or ground surface, unless otherwise shown or directed.

3-7. DROP INLET FRAME AND GRATE. Install frames and grates so tops of frames and grates are flush with concrete surface.

3-8. STORM DRAIN CATCH BASIN COVER. Install covers on top of structures to positively prevent all infiltration of surface or groundwater into structures. Set covers so tops of covers are flush with surface of adjoining pavement or ground surface, unless otherwise shown or directed.

End of Section

Section 02832

FENCING AND GATES

PART 1 - GENERAL

1-1. SCOPE. This section covers permanent fencing and gates. Permanent fencing shall be provided as indicated on the Drawings. Requirements for temporary fencing and gates are specified in Section 01500, "Construction Facilities and Temporary Controls."

1-2. GENERAL. Standard fencing and gates for the Project shall be provided as indicated in the Standard Details at the locations shown on the Drawings. In addition, special fencing installations shall be provided at specific locations to match existing fencing or as required by specific property owner. A summary of the special fencing installations is tabulated below:

Facility Location	**Fence Location**	**Type of Fence and Details**	**Type of Gate and Details**
Typical	Across Alignment	5-wire barbed wire fence	One 10'-0" wide metal frame farm gate, per Std. Detail C030.

1-3. SUBMITTALS. Complete detail drawings and specifications for each fence type, gate type, and all accessories shall be submitted in accordance with the requirements specified in Section 01300, "Submittals."

1-4. DELIVERY, STORAGE, AND HANDLING. Shipping, handling and storage shall be in accordance with Section 01600.

PART 2 - PRODUCTS

2-1. FENCE TYPES.

2-1.01. Chain Link Fencing. Standard chain link fencing shall consist of aluminum coated steel fabric with a top rail, bottom tension wire, and three strands of barbed wire mounted on 45 degree extension arms. The fabric height shall be 6 feet. The upper strand of barbed wire shall be approximately the specified distance out from the fence and the same distance above the top of the fabric. Posts shall be set in earth as indicated on the Standard Drawings.

2-1.02. White Vinyl Fencing. Vinyl Fencing shall consist of posts and rails made of rigid Poly Vinyl Chloride. Posts shall be provided at a spacing of not more than 8' between centers. The fence shall be of three rail system with a total height of 4.5'. All the accessories required for complete gate installation shall be included in the scope of supply.

2-2. MATERIALS.

2-2.01. Standard Steel Fencing. All steel or malleable iron parts and accessories for fencing and gates shall be aluminum coated after fabrication.

Fabric	9 gage thick, 2 inch mesh, aluminum coated per ASTM A491.
Fabric Finish	Knuckled both edges for fabric widths of 60 inches or less. Knuckled one edge and twisted one edge for fabric widths of 72 inches or more.
Posts	Steel pipe, ASTM F1043, Group IC, with ASTM F1043, Type B or D interior and Type B exterior protective coating.
Line Posts	2-3/8 inch OD pipe, 3.12 lb/ft.
Terminal Posts	2-7/8 inch OD pipe, 4.64 lb/ft.
Gate Posts	
For gate or leaf wider than 6 feet	4 inch OD pipe, 6.56 lb/ft.
For gate or leaf wider than 13 feet	6-5/8 inch OD pipe,18.97 lb/ft.
Top Rails	1-5/8 inch OD pipe, 1.40 lb/ft.
Rail Couplings	Sleeve type, 6 inches long, ASTM F626.
Post Tops (with barbed wire)	Pressed steel, malleable iron with pressed steel extension arm, or one-piece aluminum casting, ASTM F626.

Barbed Wire	Each strand shall consist of two 12.5 gage steel wires with four-point barbs; aluminum coated per ASTM A585, Type I.
Stretcher Bars	Steel, ASTM F626, 3/16 by 3/4 inch, or equivalent area.
Fabric Ties	Aluminum bands or wire, ASTM F626.
Gate Frames	Steel tubing, 1-7/8 inch OD, 2.28 lb/ft.
Tension Wire	ASTM A824, aluminum coated coil spring wire, 7 gage.
Handrail-Setting Cement	Minwax "Super Por-Rok Cement" or Master Builders "Set 45".

2-2.02. Vinyl Fencing. The posts and rails of the fencing shall be made of Poly Vinyl Chloride (PVC) formulated to resist impact and for Ultra Violet (UV) stabilization. Extruded products shall meet or exceed the requirements of ASTM D 1784. Posts shall be supported on concrete foundation of at least 3' deep.

2-2.03. Padlocks. Padlocks will be furnished by the DISTRICT.

2-3. STANDARD GATE. The standard gate shall be swing type, hinged to swing 90 degrees from closed to open, complete with frames, latches, stops, keepers, hinges, braces, padlocks, three strands of barbed wire, and fabric. Gate leaves shall have intermediate members and diagonal truss rods where necessary for rigid construction and shall be free from sag or twist. When adjacent fence is topped with barbed wire, gate shall be fitted with vertical extension arms or shall have frame end members extended to carry barbed wire. Joints between frame members shall be made by welding or by means of heavy fittings, and shall be rigid and watertight. Gate fabric shall be same as fence fabric and shall be attached to frame ends by stretcher bars, bolt hooks, or other mechanical means.

Hinges shall be of heavy pattern, with large bearing surfaces, and shall not twist or turn under the action of the gate. Latches shall be plunger bar type, full gate height, and arranged to engage the gate stop. Latches shall be arranged for padlocking, with the padlock accessible from both sides of the gate. Stops shall consist of a roadway plate with anchor set in concrete and arranged to engage the plunger. Keepers shall consist of mechanical devices for securing and supporting the free end of the gate when in the fully open position.

2-4. FARM GATE. Construct a 5'-0" x 10'-0" galvanized steel tubular gate where the pipeline crosses property lines that protected by existing 5-strand barbed wire fences, and at other locations specified or shown. Gate shall be fabricated from 2-inch steel tubes, 19 ga. minimum. Hinges shall be heavy pattern, with large bearing surfaces, and shall not twist or turn under the action of the gate. Product: Tractor Supply No. 3603035; or equal. Construct a double brace or corner assembly on each side of the gate(s).

PART 3 - EXECUTION

3-1. STANDARD FENCE INSTALLATION.

3-1.01. Chain Link Fence. The installed fence shall conform to the alignment and finished grade indicated. All posts shall be plumb. Unless otherwise indicated on the Drawings, posts shall be spaced approximately 10 feet apart. Where necessary, the fence grade shall be adjusted to fit the ground contour by slipping the fence fabric links. Ground surface irregularities shall be graded to maintain not more than 2 inch clearance below the bottom of the fence fabric.

Where posts are set in earth, concrete foundations 36 inches deep shall be provided. If bedrock is encountered, post excavation shall be continued to the 36-inch depth or 18 inches into the rock, whichever is less. Concrete foundations shall be circular in horizontal section, not less than 10 inches in diameter for line posts, and with a diameter not less than the post OD plus 9 inches for terminal and gate posts, except that foundations in bedrock shall be at least 6 inches larger than the outside dimension of the post. Foundations shall extend above the ground surface and shall be crowned approximately 1 inch. Concrete for foundations shall conform to the requirements specified in Section 03300, except that the 28-day compressive strength shall be minimum of 1500 psi. Each foundation shall be cured for at least 72 hours before further work is done on the post.

Top rails and bottom tension wires shall be installed before the fabric. Top rails shall be furnished in at least 18-foot lengths and shall be securely connected to gate and terminal posts. Tension wires shall be installed approximately 6 inches above grade and shall be attached to each post and securely anchored at terminal and gate posts. A terminal post shall be provided at each change in slope.

Fabric shall be attached to the top rail and bottom tension wire at 24-inch centers, and to the line posts at 15-inch centers. Barbed wire shall be fastened to each extension arm by internal clips or external fabric ties. Stretcher bars shall be provided at each gate post and terminal post. Each stretcher bar shall

be threaded through the fabric and anchored to the post at 15-inch centers by positive mechanical means.

When necessary, each gate post and terminal post shall be braced by a horizontal pipe brace and an adjustable truss extending to an adjacent line post. Corner posts shall be braced in both directions.

Fabric shall be stretched taut and anchored so that a pull of 150 pounds at the middle of a panel will not lift the bottom of the fabric more than 6 inches.

Gate shall be installed so it cannot be removed without disassembly of the hardware. Hardware attachment bolts shall be peened so that removal will be difficult.

3-1.02. Vinyl Fence. Manufacturer's installation recommendations shall be followed in the installation of vinyl fences. The spacing between posts shall be a maximum of 8' between centers. Posts shall be installed in concrete foundations meeting the requirements specified under 3-1.01 above. Spacing between the rails shall be adjusted equally to get a total height as specified. The fence shall follow the contour as shown in the Drawings

End of Section

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Section 02950

SITE RESTORATION

PART 1 - GENERAL

1-1. SCOPE. This section covers the requirements for restoring grass-covered areas and stabilizing soils damaged by construction regardless of location, using hydroseeding methods, including seedbed preparation, fertilizing, planting, mulching, and maintenance. The CONTRACTOR shall provide all materials, labor, and equipment to complete all hydroseeding work in accordance with the drawings and specifications and to the complete satisfaction of DISTRICT and ENGINEER.

All areas disturbed by construction, unless cultivated or otherwise covered by structures, pavement, aggregate surfacing, or other surface treatment, shall be restored by seeding with the applicable seed mixture specified, as directed by the ENGINEER.

Seed mixes are approximate for bidding purposes. Consult with ENGINEER to confirm seed mixes prior to start of construction.

1-2. PERSONNEL AND EQUIPMENT. The CONTRACTOR shall employ only experienced personnel who are familiar with, and regularly engaged in, the type of work required; shall provide adequate supervision by a qualified supervisor at all times when construction is in progress; and shall have access to equipment of proper size and capacity to perform the work as specified and within the limits disturbed by construction.

1-3. GUARANTEE AND ACCEPTANCE. Seeded areas shall be uniform in density, reasonably free of weeds, diseases, or other visible imperfections; and at least 2 inches tall and growing for acceptance.

1-4. SUBMITTALS. Submit the following items in accordance with the requirements specified in Section 01300, “Submittals.”

- List of materials and proposed procedures for performing hydroseeding work.

PART 2 – PRODUCTS

2-1. MATERIALS.

2-1.01. Soils for Repairs. The soil used in any repair work shall be of a quality at

least equal to that which exists in areas adjacent to the area to be repaired. Soil to be used shall be free from tree roots, clay balls, stones, rock and gravel that were used for pipe embedment, trench backfill, aggregate surfacing, and other materials that would hinder grading, planting, and maintenance operations. The soil shall also be free from noxious weed seeds and toxic substances.

2-1.02. Seed. For erosion control, hydroseeding shall be provided at all sites. The plant species listed in the Table below are appropriate for revegetation of areas disturbed by grading and construction.

GERMINATION PERIOD AND MINIMUM SPROUTABLE SEED		
Seed Species (Botanical Name / Common Name)	Percent Purity	Percent Germination
Bromus hordeaceus / Blando Brome	95	85
Eriogonum parvifolium / Cliff Buckwheat	30	60
Eschscholzia californica / California Poppy	98	75
Lasthenia glabrata / Goldfields	90	85
Lotus scoparius / Deerweed	90	60
Mimulus aurantiacus / Monkeyflower	5	70
Muhlenbergia rigens / Deergrass	80	70
Nassella pulchra / Purple Needlegrass	70	60
Trifolium fragiferum / Strawberry Clover	98	85
Vulpia myuros var. hirsute / Zorro Fescue	90	80

PART 3 - EXECUTION

3-1. DELIVERY, STORAGE, AND HANDLING. Packaged materials shall be delivered in containers showing weight, analysis, and name of manufacturer. Materials shall be protected from deterioration during delivery and while they are stored at the site.

3-2. TIME AND CONDITIONS. Hydroseeding work shall progress as rapidly as portions of the site become available, working within seasonal limitations.

3-3. HYDROSEEDING APPLICATION. Seed shall be applied by the hydroseeding method. Seed shall be applied at the following rates for the mixtures stipulated below.

Pipeline Unit G

Seed, (Botanical Name / Common Name)	Pounds Seed per acre
Bromus hordeaceus / Blando Brome	10
Eschscholzia californica / California Poppy	3
Lotus scoparius / Deerweed	6
Nassella pulchra / Purple Needlegrass	6
Trifolium fragiferum / Strawberry Clover	5
Vulpia myuros var. hirsute / Zorro Fescue	10

Pipeline Unit G1 / H1

Seed, (Botanical Name / Common Name)	Pounds Seed per acre
Bromus hordeaceus / Blando Brome	20
Eriogonum parvifolium / Cliff Buckwheat	3
Eschscholzia californica / California Poppy	4
Lasthenia glabrata / Goldfields	8
Lotus scoparius / Deerweed	3
Mimulus aurantiacus / Monkeyflower	3

3-4. MAINTENANCE. All seeded areas shall be maintained by the CONTRACTOR until acceptance of the WORK, and shall include reseeding and repair of erosion damage caused during the One Year Correction Period specified in Article 13.6 of the General Conditions.

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DIVISION 3
CONCRETE

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Section 03300

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1-1. SCOPE. This section covers all cast-in-place concrete, including reinforcing steel, forms, finishing, curing, and appurtenant work. Unless otherwise specified, all concrete shall be air-entrained.

1-2. GENERAL. All cast-in-place concrete shall be accurately formed and properly placed and finished as indicated on the Drawings and as specified herein.

Unless specifically indicated otherwise in the Contract Documents, all concrete work, including steel reinforcing, shall be in accordance with the best standard practices as set forth in the ACI Building Code, Manuals and Recommended Practices.

1-3. SUBMITTALS. Submit the following items in accordance with Section 01300, "Submittals."

Submit data describing the equipment to be used for proportioning, mixing, and transporting concrete. In the case of ready-mixed concrete, certification that the ready-mix plant complies with the requirements of ASTM C94 will be acceptable.

Submit reinforcing steel placement drawings and bar lists.

Submit the following as specified elsewhere in this section:

(1) Certified test reports.
(2) Certificates of Compliance.
(3) Mix designs and CONTRACTOR'S independent testing laboratory test results.
(4) Batch tickets.
(5) Concrete cylinder test reports, and reports on concrete testing for slump, air content and temperature.

Submit Samples of concrete materials requested by the ENGINEER.

Submit Product Data and manufacturer's installation instructions for curing materials, bonding materials, repair materials, non-shrink grout, sealers and hardeners.

Submit procedures for hot and cold weather concreting when such conditions are anticipated.

1-4. STORAGE AND HANDLING. Cement shall be stored in suitable moisture-proof enclosures. Cement that has become caked or lumpy shall not be used.

Aggregates shall be stored so that segregation and the inclusion of foreign materials are prevented. The bottom 6 inches of aggregate piles in contact with the ground shall not be used.

Reinforcing steel shall be carefully handled and shall be stored on supports which prevent the steel from touching the ground until inclusion in the WORK.

PART 2 - PRODUCTS

2-1. LIMITING REQUIREMENTS. Unless otherwise specified, concrete shall be controlled within the following limiting requirements.

2-1.01. Cement Content. The quantity of portland cement in the concrete shall be not less than that indicated in the following table:

Quantity of Cement (lb/yd^3)				
Concrete Slump	Coarse Aggregate Size from No. 4 Sieve to			
	3/8"	1/2"	3/4"	1"
2 inches	601	573	545	517
3 inches	629	592	564	536
4 inches	639	611	583	555

2-1.02. Ratio of Fine to Total Aggregates. The ratio of fine to total aggregates based on solid volumes (not weights) shall be:

Coarse Aggregate Size	Minimum Ratio	Maximum Ratio
3/8 inch	0.45	0.60
1/2 inch	0.40	0.55
3/4 inch	0.35	0.50
1 inch	0.30	0.46

2-1.03. Maximum Water-Cement Ratio. The maximum water-cement ratio shall be 0.45 on a weight basis, or, if fly ash is used, the combined mass of cement plus fly ash shall be used to determine the water-cementitious materials ratio.

2-1.04. Fly Ash Content. At the option of the CONTRACTOR, fly ash may be substituted for up to 15 percent of the portland cement, on the basis of 1.5 pounds of fly ash added for each pound of cement reduction.

2-1.05. Coarse Aggregate. The maximum nominal coarse aggregate size shall be 1 inch.

2-1.06. Slump. Concrete slump shall be kept as low as possible consistent with proper handling and thorough compaction. Unless otherwise authorized by the ENGINEER, slump shall not exceed 4 inches.

2-1.07. Total Air Content. The total volumetric air content of concrete after placement shall be 6 percent ±1 percent.

2-1.08. Admixtures. The admixture content, batching method, and time of introduction to the mix shall be in accordance with the manufacturer's recommendations. A water-reducing admixture and an air-entraining admixture shall be included in all concrete. No calcium chloride or admixture containing chloride from sources other than impurities in admixture ingredients will be acceptable. Admixtures classified as Class 1 or Class 2 in ACI 212R or containing any lignosulfonic acids ("lignins") or their salts will not be acceptable.

2-1.09. Strength. The minimum acceptable compressive strengths, as determined by ASTM C39, shall be:

Age	Minimum Compressive Strength
7 days	3,000 psi
28 days	4,000 psi

2-1.10. Concrete for Other Uses. Concrete for fence posts, manholes, pads, thrust blocking, and other uses as shown on the Drawings or Standard Details shall conform to the limiting requirements specified herein, except that the cement factor and total water content may be adjusted to provide the minimum compressive strength as shown. Concrete shall have a slump of not less than 2 inches nor more than 4 inches when placed.

2-2. MATERIALS.

Cement	ASTM C150, Type II only, low alkali.
Fly Ash	ASTM C618, Class F, except loss on ignition shall not exceed 4 percent.
Fine Aggregate	Clean natural sand, ASTM C33. Artificial or manufactured sand will not be acceptable.
Coarse Aggregate	Crushed rock, washed gravel, or other inert granular material conforming to ASTM C33, except that clay and shale particles shall not exceed 1 percent.
Water	Clean and free from deleterious substances.
Admixtures	
Water-Reducing	ASTM C494, Type A or D.
Air-Entraining	ASTM C260.
Superplasticizing	ASTM C494, Type F or G.
Reinforcing Steel	
Bars	ASTM A615, Grade 60, deformed.
Welded Wire Fabric	ASTM A185 or A497.
Bar Supports	CRSI Class 1, plastic protected; or Class 2, stainless steel protected.

Mechanical Splice	Classified Type 2 per ACI 318-02 or per UBC-97. Dayton/Richmond “Dowel Bar Splicer” or “Coupler Splice” system, Bar-Lock “Coupler Systems” or Barsplice Products, or approved equal.

Forms

Plywood	Product Standard PS1, waterproof, resin-bonded, exterior type, Douglas fir.
Lumber	Straight, uniform width and thickness, and free from knots, offsets, holes, dents, and other surface defects.
Form Coating	Nonstaining and nontoxic after 30 days, VOC-compliant; Burke "Form Release (WB)", L&M Chemical "E Z Strip", Nox-Crete "Form Coating", Symons "Thrift Kote E," or approved equal.
Pre-Cure Finishing Aid	Burke "Finishing Aid Concentrate", Euclid "Eucbar", L&M Chemical "E-Con", Master Builders "Confilm", Sika "Sikafilm," or approved equal.
Polyethylene Film	Product Standard PS17, 6 mils or thicker.
Membrane Curing Compound	ASTM C1315, Type 1, Class A, water based, VOC-compliant acrylic, maximum VOC 2.9 lb/gal, minimum 30 percent solids, non-yellowing, unit moisture loss 0.40 kg/m^2 maximum; Euclid "Super Aqua Cure VOX", L&M Chemical "Dress & Seal WB30", Symons "Cure & Seal 31%E," or approved equal.

2-3. PRELIMINARY REVIEW. The source and quality of concrete materials and the concrete proportions proposed for the work shall be submitted to the

ENGINEER for review at least 30 days before concrete is proposed to be delivered to the site.

2-4. FORMS. Forms shall be designed to produce hardened concrete having the shape, lines, and dimensions indicated on the Drawings. Forms shall be substantial and sufficiently tight to prevent leakage of mortar and shall be maintained in proper position and accurate alignment.

Forms for pavement, curbs, or gutters shall be supported on thoroughly compacted earth. The top face of pavement forms shall not vary from a true plane more than 1/4 inch in 10 feet.

Forms shall be thoroughly cleaned and oiled before concrete is placed.

Where concrete is placed against gravel or crushed rock which does not contain at least 25 percent material passing a No. 4 sieve, such surfaces shall be covered with polyethylene film to protect the concrete from loss of water. Joints in the film shall be lapped at least 4 inches.

2-4.01. Form Ties. Form ties shall be of the removable end, permanently embedded body type, and shall have sufficient strength and rigidity to support and maintain the form in proper position and alignment without the use of auxiliary spreaders.

2-4.02. Edges and Corners. Chamfer strips shall be placed in forms to bevel all salient edges and corners, except the top edges of walls and slabs which are to be tooled and edges which are to be buried. Unless otherwise noted, bevels shall be 3/4 inch wide.

2-4.03. Form Removal. Forms shall not be removed or disturbed until the concrete has attained sufficient strength to safely support all dead, live, and construction loads. Care shall be taken in form removal to avoid surface gouging, corner or edge breakage, and other damage to the concrete.

2-5. REINFORCEMENT. Reinforcement shall be accurately formed and positioned and shall be maintained in proper position while the concrete is being placed and compacted. Unless otherwise indicated on the Drawings, the details of fabrication shall conform to ACI 315 and 318. In case of conflict, ACI 318 shall govern. Reinforcement shall be free from dirt, loose rust, scale, and contaminants. Mechanical connections shall be used only as indicated on the Drawings.

2-6. BATCHING AND MIXING. Concrete shall conform to ASTM C94 and shall be furnished by an acceptable ready-mixed concrete supplier.

2-6.01. Consistency. The consistency of concrete shall be suitable for the placement conditions. Aggregates shall float uniformly throughout the mass, and the concrete shall flow sluggishly when vibrated or spaded. The slump shall be kept uniform.

2-6.02. Delivery Tickets. A delivery ticket shall be prepared for each load of ready-mixed concrete and a copy of the ticket shall be handed to the ENGINEER by the truck operator at the time of delivery. Tickets shall indicate the name and location of the concrete supplier, the project name, the mix identification, the quantity of concrete delivered, the quantity of each material in the batch, the outdoor temperature in the shade, the time at which the cement was added, and the numerical sequence of the delivery. Concrete not discharged from the truck within one and one-half (1-1/2) hours of the addition of water shall be rejected and not discharged at the site.

PART 3 - EXECUTION

3-1. PLACEMENT. The CONTRACTOR shall inform the ENGINEER at least 24 hours in advance of the times and places at which he intends to place concrete.

Methods of conveying concrete to the point of final deposit and of placing shall prevent segregation or loss of ingredients. During and immediately after placement, concrete shall be thoroughly compacted and worked around all reinforcement and embedments and into the corners of the forms. Concrete shall be compacted by immersion-type vibrators, vibrating screeds, or other suitable mechanical compaction equipment. The use of "jitterbug" tampers to compact concrete flatwork will not be permitted.

3-2. FINISHING. Recesses from form ties shall be filled flush with mortar. Fins and other surface projections shall be removed from all formed surfaces, except exterior surfaces that will be in contact with earth backfill.

Unless otherwise specified, unformed surfaces shall be screeded and given an initial float finish as soon as the concrete has stiffened sufficiently for proper working. Any piece of coarse aggregate which is disturbed by the float or which causes a surface irregularity shall be removed and replaced with mortar. Initial floating shall produce a surface of uniform texture and appearance, with no unnecessary working of the surface.

Initial floating shall be followed by a second floating at the time of initial set. The second floating shall produce a finish of uniform texture and color and the completed finish for unformed surfaces.

3-2.01. Application of Pre-Cure Finishing Aid. Concrete flatwork subject to rapid evaporation due to hot weather, drying winds, and sunlight shall be protected with a pre-cure finishing aid. The finishing aid shall form a monomolecular film on the surface of fresh, plastic concrete to retard evaporation.

Immediately following screeding, pre-cure finishing aid shall be sprayed over the entire surface of fresh, plastic concrete flatwork at a rate of not less than 200 square feet per gallon, in accordance with the manufacturer's recommendations. The spray equipment shall have sufficient capacity to continuously spray finishing aid at approximately 40 psi with a suitable nozzle as recommended by the manufacturer.

The sprayable solution shall be prepared as recommended by the manufacturer.

Under severe drying conditions, additional applications of finishing aid may be required following each floating or troweling, except the last finishing operation.

The surface of pavements shall not vary more than 1/8 inch under a 10 foot straightedge placed parallel to the center line.

3-3. CURING. Concrete shall be protected from loss of moisture by water saturation or by membrane curing for at least 7 days after placement; however, when concrete is also being protected from low temperatures, the period of curing by saturation shall be 1 day less than the duration of the low temperature protection.

Water saturation of concrete surfaces shall begin as soon as possible after initial set. Unformed surfaces shall be covered with polyethylene film, tarpaulins, or sand to retain the water. Water shall be applied as often as necessary to keep the concrete saturated for the entire curing period. Acceptable methods of water curing are described in ACI 308.

Membrane curing compound may be used instead of water curing on concrete which will not be covered later with mortar or additional concrete. Membrane curing compound shall be sprayed at a coverage rate of not more than 300 square feet per gallon. Unformed surfaces shall be covered with curing compound within 30 minutes after final finishing. If forms are removed before the end of the specified curing period, curing compound shall be immediately applied to the formed surfaces. Curing compound shall be suitably protected against abrasion during the curing period.

Concrete shall be protected against freezing for at least 8 days after placement.

3-4. REPAIRING DEFECTIVE CONCRETE. Defects in concrete surfaces shall be repaired to the satisfaction of the ENGINEER. All concrete which is

honeycombed or otherwise defective shall be cut out and removed to sound concrete, with edges cut square to avoid feathering.

Concrete repair work shall conform to Article 5.3.7 of ACI 301 and shall be performed in a manner that will not interfere with thorough curing of surrounding concrete. Repair work shall be adequately cured.

3-5. FIELD CONTROL TESTING. In accordance with the following requirements, the ENGINEER will perform the field verification of slump, air content, and temperature of concrete delivered to the site. Concrete strength test cylinders will be taken by the ENGINEER and tested by the ENGINEER'S independent testing laboratory. The CONTRACTOR shall provide all facilities and the services of one or more employees as necessary to assist with the field control testing.

The frequency specified herein for each field control test is approximate and subject to change as required by the ENGINEER.

3-5.01. Air Content. An air content test shall be made on concrete from each batch of concrete from which concrete compression test cylinders are made. The CONTRACTOR shall provide all equipment and supplies necessary for the testing. Air content shall be determined in accordance with ASTM C231.

3-5.02. Slump. A slump test shall be made on concrete from each batch of concrete from which concrete compression test cylinders are made. Slump shall be determined in accordance with ASTM C143.

3-5.03. Test Cylinders. Compression test specimens shall be made, cured, stored, and delivered to the laboratory in accordance with ASTM C31 and C39.

One set of concrete test cylinders shall be cast for each concrete pour. A set of test cylinders shall consist of six cylinders, two to be broken and to have compressive strengths averaged at 7 days, two to be broken and to have compressive strengths averaged at 28 days, and two spare. All concrete required for testing shall be furnished by, and at the expense of, the CONTRACTOR.

The cured cylinders will be tested by an independent testing laboratory at the expense of the ENGINEER.

End of Section

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Section 03315

CORROSION-INHIBITING CONCRETE ADMIXTURE

PART 1 - GENERAL

1-1. SUMMARY

This section specifies a calcium nitrite-based corrosion inhibitor to be used as an admixture to cement mortar for the protection of steel pipe as specified in Section 15062, “Steel Pipe.”

1-2. SUBMITTALS. Submit the following items in accordance with Section 01300, "Submittals."

- Submit manufacturer’s product data, installation instructions, and recommendations for each material.
- Submit the concrete corrosion inhibitor supplier experience statement.

1-3. QUALITY ASSURANCE

Manufacturer: Concrete admixtures shall be manufactured by a firm with a minimum of five (5) years experience in the production of corrosion inhibitors for concrete. Manufacturers proposed for use but not named in these specifications shall submit evidence of ability to meet all requirements specified, and include a list of projects of similar design and complexity completed more than five years ago.

Materials: For each type of material required for the work of this Section, provide primary materials, which are the products of one manufacturer.

PART 2 - PRODUCTS

2-1. MATERIALS

Corrosion Inhibitor Admixture shall be Calcium Nitrite by Weight of Solution: 30% plus or minus 2 percent. Product: DCI or DCI-S concrete admixtures by Grace Construction Products; or equal.

PART 3 - EXECUTION

3-1. EXAMINATION. Examine conditions of substrates and other conditions under which work is to be performed and notify ENGINEER, in writing, of circumstances detrimental to the proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3-2. USE. Follow manufacturer's written recommendations for application of this product in cement mortar. Refer to Section 15062, "Steel Pipe," for application rate.

End of Section

Section 03600

GROUT

PART 1 - GENERAL

1-1. SCOPE. This section covers uses of grout as indicated on the Drawings. Unless otherwise specified, all grouting shall be done with non-shrinking grout.

1-2. SUBMITTALS. Submit product data for all grout materials proposed for use in accordance with Section 01300, "Submittals."

PART 2 - PRODUCTS

2-1. MATERIALS.

Non-shrinking Grout	L&M "Crystex", Master Builders "Masterflow 713 Grout" or "Set Grout", Sauereisen Cements "F-100 Level Fill Grout", Sonneborn "Sonogrout 10K", Hilti "OG 200PC", or Five Star Products "Five Star Grout".
Epoxy Grout for Reinforcing Bars, Threaded Rod Anchors and Anchor Bolts	
Adhesive	Moisture-insensitive.
For Horizontal Surfaces	ChemRex, "Concresive Liquid LPL", or Sika "Sikadur 35, Hi-Mod LV".
For Vertical Surfaces	Sika "Sikadur 31, Hi-Mod Gel", or equal.
Aggregate	As recommended by the epoxy grout manufacturer.
Water	Clean and free from deleterious substances.
Reinforcing Bars	ASTM A615, Grade 60, deformed.

PART 3 - EXECUTION

3-1. NON-SHRINKING GROUT. Non-shrinking grout shall be furnished factory premixed so that only water is added at the jobsite. Grout shall be mixed in a mechanical mixer in accordance with the manufacturer's instructions.

3-1.01. Preparation. The concrete foundation to receive non-shrinking grout shall be saturated with water for at least 12 hours preceding grouting unless additional time is required by the grout manufacturer.

3-1.02. Placement. Grout shall be placed in strict accordance with the directions of the manufacturer so that all spaces and cavities are completely filled, without voids. Forms shall be provided where grout cannot be confined.

3-1.03. Edge Finishing. In all locations where the edge of the grout will be exposed to view, the grout shall be finished smooth after it has reached its initial set.

3-1.04. Curing. Non-shrinking grout shall be protected against rapid loss of moisture by covering with wet cloths or polyethylene sheets. After edge finishing is completed, the grout shall be wet cured for at least 3 days and then an acceptable membrane curing compound shall be applied.

3-2. EPOXY GROUT. Epoxy grout shall consist of a two-component liquid epoxy adhesive of viscosity appropriate to the location and application, and an inert aggregate filler component, if recommended by the adhesive manufacturer. Components shall be packaged separately at the factory and shall be mixed immediately before use. Proportioning and mixing of the components shall be done in accordance with the manufacturer's recommendations.

3-2.01. Preparation. Where indicated on the Drawings, anchor bolts, threaded rod anchors, and reinforcing bars shall be epoxy grouted in holes drilled into hardened concrete. Diameters of holes shall be as follows:

Item	Diameter of Hole
Reinforcing Bars and Threaded Rod Anchors	1/8 inch larger than the outside diameter of the bar or the rod
Headed Anchor Bolts	Bolt diameter plus 2 inches

The embedment depth for epoxy grouted anchor bolts, threaded rod anchors, and reinforcing bars shall be at least 15 bolt, rod, or bar diameters, unless otherwise indicated on the Drawings.

Holes shall be prepared for grouting as recommended by the grout manufacturer.

3-2.02. Installation. Anchor bolts, threaded rod anchors, and reinforcing bars shall be clean, dry, and free of grease and other foreign matter when installed. The bolts, rods, and bars shall be set and positioned and the epoxy grout shall be placed and finished in accordance with the recommendations of the grout manufacturer. Care shall be taken to ensure that all spaces and cavities are filled with epoxy grout, without voids.

During assembly of all threaded stainless steel components, anti-seize thread lubricant shall be liberally applied to the threaded portion not embedded in concrete.

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DIVISION 5
METALS

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Section 05520

HANDRAILING, GUARDRAILING, AND LADDERS

PART 1 - GENERAL

1-1. SCOPE. This section covers the fabrication and installation of handrailing, guardrailing, and ladders fabricated from metal or fiberglass shapes. Metal stairs, concrete and masonry anchorage systems, and structural and miscellaneous metal are covered in other sections.

1-2. GENERAL. Fabricated items which are indicated on the Drawings but not mentioned specifically herein shall be fabricated in accordance with the applicable requirements of this section.

1-3. SUBMITTALS. Complete data, detailed drawings, and setting or erection drawings covering all materials shall be submitted in accordance with the requirements specified in Section 01300, "Submittals." Each separate piece shall be marked.
Data shall be submitted to certify that all railings and ladders meet all applicable requirements of the codes as required and the project specifications and drawings. ENGINEER may request copies of all supporting calculations.

1-3.01. Samples. Samples shall be submitted to indicate finishes. Samples of each type of fitting required to complete the installation shall also be submitted.

1-3.02. Colors. Where color selections are required, color charts shall be submitted showing the full range of available colors. Procedures for selecting colors shall be as indicated in Section 01300.

1-4. DELIVERY, STORAGE, AND HANDLING. Materials shall be handled, transported, and delivered in a manner which will prevent bends, dents, coating damage, or corrosion. Damaged materials shall be promptly replaced. Materials shall be stored on blocking so that no material touches the ground and water cannot collect thereon. The material shall be protected against bending under its own weight or superimposed loads.

PART 2 - PRODUCTS

2-1. GENERAL. Handrailing and guardrailing products of like materials shall be from a single supplier and the installed systems shall have a uniform appearance throughout the project. Ladders may be from another supplier. Unless indicated

otherwise on the Drawings, ladders in proximity with guardrailing shall be of the same material, style, and finish as the guardrailing.

Railing shall be furnished in the configurations indicated on the Drawings. For metal railing systems, at CONTRACTOR'S option, handrailing and guardrailing shall be either shop fabricated welded systems or prefabricated nonwelded systems designed for field assembly. Either system shall meet the requirements specified herein. Handrailing and guardrailing systems shall be a product of a company normally engaged in the manufacture of pipe railings and as required. Welded railing systems shall be fabricated from pipe and accessories by metal fabricators experienced in designing and fabricating welded guardrailing.

Metal ladders shall be designed and shop fabricated by a company normally engaged in the manufacturer of ladders and as required. All ladders shall meet the requirements specified herein.

Acceptable rail manufacturers (for metal) shall be Moultrie “Wesrail;” Universal “Uni-Rail;” Thompson “TUF Rail System;” Julius Blum & Company “Connectorail;” or equal.

Acceptable rail manufacturers (for fiberglass) shall be Fibergrate “FRP Safety Handrails and Systems;” Strongwell Company; “Safrail;” or equal.

CONTRACTOR shall demonstrate that railing systems from alternative suppliers satisfy the requirements of this specification and the Drawings.

2-2. PERFORMANCE AND DESIGN REQUIREMENTS.

2-2.01. Railing System Design Criteria. All railing systems shall be designed and fabricated in compliance with the most stringent requirements of the applicable local building code, OSHA 29 CFR Part 1926 Subpart R, and all other pertinent OSHA regulations and local safety regulations. Handrails for handicapped accessible areas, if required, shall comply with the requirements of the local building code, ANSI 117.1 Uniform Federal Accessibility Standards, and the accessibility standards of the Americans with Disabilities Act. In case of conflicting requirements the more stringent requirements shall be applicable.

At a minimum, guardrailings shall be designed to withstand a uniform horizontal load of 50 lbs per foot with a simultaneous vertical load of 100 lbs per foot applied to the top rail. Handrailing and stair railing shall be designed to withstand a uniform horizontal load of 50 lbs per foot applied to the top rail. In addition, guardrailing, handrailing, and stair railing shall be designed to withstand a concentrated load of 200 lbs applied in any direction, at any point on the railing system. The 200 lb concentrated load need not be applied simultaneously with the 50 lbs per foot uniform horizontal load.

2-2.02. Handrails. Aluminum handrailings shall be fabricated from 1-1/2 inch ID pipe. Fiberglass handrailing shall be fabricated from 1-3/4 inch fiberglass reinforced pultruded square tube.

2-2.03. Guardrails. Aluminum guardrailings shall be fabricated from 1-1/2 inch ID pipe. Fiberglass guardrailing shall be fabricated from 1-3/4 inch fiberglass reinforced pultruded square tube.

2-2.04. Kickplate. Kickplates shall be 4 inches high and shall be fabricated from similar materials as the railing. Kickplates shall clear the walking surface by 1/4 inch.

2-2.05. Fasteners. All fasteners used for connections with prefabricated aluminum railings shall be stainless steel. Pipe rails shall be fastened to fittings with through bolts or flush set screws. Glued or pop riveted connections are not permitted. Fastener details shall be indicated on the submittal drawings.

Epoxy bonded connections shall be utilized for connecting fiberglass railings in accordance with the manufacturer's standard details. Fasteners used for alignment or for connection to dissimilar materials shall be stainless steel. Fastener details shall be indicated on the submittal drawings.

2-2.06. Connections. All angles, offsets, or other changes in alignment in welded pipe railings shall be made with railing ells and welded connectors as specified. Field joints shall be made with a splice-lock connector which shall provide a firm, permanent connection. The connector shall mechanically draw the railing sections together to form tight, hairline joint.

All fittings and connections in prefabricated and fiberglass railing systems shall be as specified and as recommended by the railing manufacturer.

2-2.07. Guarding of Openings. Openings in railing shall be guarded by self-closing gates in accordance with OSHA 1910.23. Safety chains shall not be used unless required or specifically indicated on the Drawings.

2-2.08. Configuration. All guardrailing and handrailing shall conform to the configurations and arrangements shown on the Drawings. Removable handrail sections shall be so designed that each section has at least two, but not more than three posts. Maximum spacing for posts shall be 5 feet for aluminum and fiberglass railings.

Guardrailing in outdoor locations shall have slip joints at least every 60 feet and at all concrete expansion joints to permit expansion and contraction. The gap at each slip joint shall be not less than 1/4 inch.

2-2.09. Mounting to Structure. Handrailing and guardrailing shall be mounted to structures as indicated on the Drawings. If mounting details are not indicated, guardrail posts shall be surface mounted with base flanges or side mount brackets secured to concrete by stainless steel anchor bolts set in adhesive or epoxy grout. In lieu of details, handrail shall be mounted with stainless steel anchor bolts set in adhesive or epoxy grout. Bolt sizes and pattern shall be as needed for the mounting device.

2-2.10. Ladders. Ladders shall be designed to meet the requirements of CalOSHA and ANSI-A14.3. Ladders with climbing heights greater than 20 feet shall be provided with cages or fall prevention devices as indicated on the Drawings. Rest platforms shall be provided to limit straight climbs to maximum 30 feet .

Ladders exiting through hatchways shall be furnished with extending ladder safety posts.

Ladders shall be mounted to structures as indicated on the Drawings. If mounting details are not indicated, bracket connection bolts shall be stainless steel bolted to structural steel or set in concrete or masonry with adhesive or epoxy grout.

2-3. MATERIALS.

Aluminum Systems

Pipe	Aluminum ASTM B429, Alloy 6061-T6, Schedule 40.
Shapes and Plates	Aluminum ASTM B308, Alloy 6061-T6 for Shapes. ASTM B209, Alloy 6061-T6 for Plates.
Fittings, Welded	Angles, offsets, tees, ells, crosses, caps for aluminum, ASTM B429, Alloy 6063-T6, Schedule 40.
Fittings, Non-welded	Manufacturer's standard component fittings, extruded sections, ASTM B221, Alloy 6063-T5 or T6.
Assembly Bolts, Nuts, Washers, and Fasteners	Stainless steel.

Fiberglass Systems	
Tube	Fiberglass reinforced pultruded square tube, UV protected.
Kickplate	Fiberglass reinforced pultruded corrugated plate, UV protected.
Fittings & Hardware	Manufacturer standard component fittings, AISI Type 316 stainless steel.
Steel Pipe Sleeves	
Outer Sleeves	Black steel pipe, Schedule 40. Hot-dip galvanized after fabrication.
Removable Post Inner Sleeves	PVC tube, Schedule 40.
Plastic Pipe Sleeves	PVC tube, Schedule 40.
Post Setting Cement	Minwax "Super Por-Rok Cement" or Master Builders Set Products Division "Set 45".
Ladder Fall Prevention Devices	Cal OHSA approved fall prevention device with harness.
Anchor Bolts to Prime Painted Steel	ASTM High Strength bolts, nuts, and washers in accordance with Section 05990, “Structural and Miscellaneous Metals.”
Anchor Bolts to Masonry	Stainless steel adhesive anchors in accordance with Section 05550, “Anchorage in Concrete and Masonry.”
Shop Coatings	
Universal Primer	Ameron "Amercoat 385 Epoxy", Carboline "Carboguard 888 Primer", or Tnemec "Series N27 S.T. Typoxy."
Red Oxide Primer	SSPC 15, Type 1, or Fed Spec TT-P-636.

Epoxy Enamel	Gray; Ameron "Amerlock 400 High-Solids Epoxy Coating", Carboline "Carbogaurd 891", or Tnemec "Series N140 Pota-Pox Plus".
Asphalt Varnish	Fed Spec TT-C-494.
Anodic Finish	AA-M10C22A41, clear unless otherwise required.
Galvanizing	ASTM A123, A153, A385.

Where galvanized bolts are indicated on the Drawings or specified, the use of zinc-plated bolts will not be acceptable.

2-4. FABRICATION. Unless otherwise indicated on the Drawings, all railings provided under this section shall be of the same type and design. Aluminum railings or fiberglass railings shall be provided as indicated or designated on the drawings.

2-4.01. Metal Railings. Metal railings shall be smooth, with all projecting joints and sharp corners ground smooth. Welded joints shall be flush type. Members shall be neatly coped and continuously welded or mechanically connected at all junctions. Top rails shall run continuously over posts. All rails and posts shall be in the same plane and shall not be offset. All welding shall be done neatly and substantially by a process (e.g., TIG or MIG) producing a smooth weld. All weld spatter and burrs shall be removed, and all welds shall be thoroughly brushed with a stainless steel power wire brush.

2-4.02. Guarding of Openings. Openings in railing shall be guarded by self-closing gates with lock, unless safety chain is specifically required or indicated on the drawings. Self-closing gates shall be fabricated of the same materials with the same finish as the guardrailing. The closure device shall be manufacturer's standard. Self-closing gates shall be as manufactured by FabEnCo, Inc., PS Doors, Protect-O-Gate, or approved equal.

At locations specifically indicated on the Drawings, a safety chain fabricated of 1/4 inch stainless steel shall be provided across openings in the railing. The chain shall be fastened to one railing post by a stainless steel eyebolt, and shall engage a similar eyebolt on the opposite post by means of a 2-1/2 inch heavy-duty, stainless steel harness snap. The chain length shall be as needed by the width of the opening.

2-4.03. Sleeves. When indicated on the Drawings, sleeves for fixed handrail posts shall be fabricated from Schedule 40 PVC pipe or from Schedule 40 black

steel pipe hot-dip galvanized after fabrication. Sleeves shall provide at least 1/4 inch clearance all around each post and shall be 5 inches long unless otherwise indicated on the Drawings.

When indicated on the Drawings, sleeves for removable posts shall have an outer and inner sleeve. The outer sleeve shall be fabricated from Schedule 40 black steel pipe and shall be hot-dip galvanized after fabrication. The inner sleeve shall be Schedule 40 PVC pipe.

2-4.04. Ladders. Ladders, safety cages or climbing devices, and rest platforms shall be provided as indicated on the Drawings. Ladders shall be fabricated of material as indicated on the Drawings with general configurations as indicated on the drawings. All necessary brackets, bolts, and anchors shall be provided for installing the ladders.

2-5. COATING.

2-5.01. Aluminum. All surfaces of aluminum which will be in contact with concrete, mortar, or dissimilar metals shall be given a coat of epoxy enamel.

All aluminum railings shall be provided with a clear anodic finish.

PART 3 - EXECUTION

3-1. GENERAL. Handrailing, guardrailing, and ladders shall be erected and installed in conformity with dimensions, and arrangements specified or indicated on the Drawings. All members and parts, as erected, shall be free of winds, warps, local deformations, and unauthorized bends.

Before assembly, surfaces to be in contact with each other shall be thoroughly cleaned. All parts shall be assembled accurately as indicated on the drawings. Light drifting will be permitted to draw parts together, but drifting to match unfair holes will not be permitted. Any enlargement of holes necessary to make connections in the field shall be done only with the approval of ENGINEER by reaming with twist drills. Enlarging holes by burning will not be permitted.

All materials shall be erected in compliance with OSHA 29 CFR Part 1926, Subpart R, and in compliance with all other applicable OSHA and local safety regulations.

3-2. INSTALLATION. When railings and ladders are assembled, all posts shall be plumb and longitudinal members shall be parallel with each other and with the floor surface or slope of stairs. In any section or run of railing, the center lines of all members shall be in true alignment, positioned in the same vertical plane. All

posts in fixed handrail sections and all ladders shall be rigidly attached to the supporting structure.

3-2.01. Attachment to Concrete. Posts shall be attached to concrete structures as indicated on the Drawings. If sleeves are indicated, they shall be rigidly supported in accurate alignment in the forms and shall be positioned vertically so that the top of each sleeve is approximately 1/2 inch below the finished concrete surface. The position of all sleeves shall be carefully measured before railings are fabricated. When the railing is set, the posts shall be wedged in accurate alignment, and the annular space between the posts and sleeves shall be filled with handrail-setting cement to the top of the steel sleeve. Filling of the remaining space with sealant, as indicated on the Drawings, is covered in Section 07900, "Caulking."

Base flanges and side-mount brackets shall be installed with minimal disturbance to the reinforcing steel. Bolts shall be stainless steel set in adhesive or epoxy grout as indicated in Section 05550, "Anchorage in Concrete and Masonry."

Ladders and appurtenances shall be installed as indicated on the Drawings. Firm, secure anchorage shall be provided to the supporting structure. Ladder rails intersecting guardrailing shall be configured to provide an aesthetically pleasing transition, although ladder rails need not be physically attached to the guardrailing. There shall be no gaps between ladder rails and adjacent guardrailing that would allow passage of a sphere greater than 4 inches in diameter. Railing gaps at ladders shall be protected by self-closing gates, unless safety chains are required or specifically indicated on the Drawings.

3-2.02. Attachment to Steel or Aluminum. Where attached to steel or aluminum shapes, as indicated, attachments shall be made with flanges or with other special attachments or anchorages as detailed on the Drawings.

3-2.03. Removable Attachments. For the removable guardrail sections in embedded sleeves, inner sleeves shall be set in outer sleeves in the same manner as specified herein for the setting of fixed posts. Particular care shall be taken to ensure that the inner sleeves are accurately spaced and plumbed, so that the handrail sections, when set in position, will stand in proper alignment and will be removable without binding.

Removable guardrail sections with base flanges or side mount brackets shall be secured in the bases with removable screws.

3-2.04. Wall Mounted Handrailing. Suitable wall brackets shall be provided where shown or specified. Wall brackets shall be securely anchored to walls with stainless steel bolts set in adhesive or epoxy grout as indicated in Section 05550.

Expansion anchors shall not be used unless specifically indicated on the Drawings.

3-2.05. Expansion Control. Guardrails in outdoor locations shall have slip joints at least every 60 feet and at all concrete expansion joints to permit expansion and contraction. The gap at each slip joint shall be not less than 1/4 inch.

3-2.06. Connections. Welding connectors and splice locks shall be installed in accordance with the manufacturer's recommendations. Other methods of making connections and changes in alignment will be considered, provided complete information covering the proposed method is submitted to ENGINEER for review.

3-2.07. Alignment. After installation, railings and ladders shall be checked for final alignment, using a tightly drawn wire for reference. The maximum misalignment tolerance for railings shall be 1/8 inch in 12 feet. Bent, deformed, or otherwise damaged installations shall be replaced.

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Section 05530

GRATING

PART 1 - GENERAL

1-1. SCOPE. This section covers the fabrication and installation of metal and fiberglass grating.

Fabricated items which are indicated on the Drawings but not mentioned specifically herein shall be fabricated in accordance with the applicable requirements of this section.

1-2. SUBMITTALS. Detailed fabrication and erection drawings covering the grating shall be submitted in accordance with the requirements specified in Section 01300, “Submittals.”. Drawings shall indicate locations of grating supports, profiles, thicknesses, lengths, markings of panels, and fastening methods.

1-3. DELIVERY, STORAGE, AND HANDLING. Materials shall be handled, transported, and delivered in a manner which will prevent bends, dents, scratches, or damage of any kind. Damaged materials shall be promptly replaced. Materials shall be stored off the ground.

PART 2 - PRODUCTS

2-1. PERFORMANCE AND DESIGN REQUIREMENTS.

2-1.01. Design Criteria. Except as modified herein, the manufacture and fabrication of metal grating shall comply with recommendations in the "Metal Bar Grating Manual" of the National Association of Architectural Metal Manufacturers (NAAMM).

- Minimum Design Load: 100 psf live load.
- Maximum Deflection: 1/240 of span.
- No single piece of grating shall weight more than 80 pounds.

2-1.02 Aluminum Grating. Aluminum grating shall be the pressure locked type, with cross bars deformed or swaged to prevent turning. Bearing bars shall be at least 3/16 inch thick flat stock or equivalent I-bars, with center-to-center spacing of 1-3/16 inches. Grating shall be a mill finish. Cross bar center-to-center

spacing shall be 4 inches maximum. Grating depth shall be as indicated on the Drawings. All bars shall be completely banded.

2-1.03. Fiberglass Grating. Fiberglass grating trench covers shall be fiberglass reinforced, pultruded type unless indicated on the drawings to be molded type. All fabrications shall have a UV barrier coating. Grating depth shall be as indicated on the Drawings. Walking surfaces of pultruded grating shall have a cast-in grit finish. Walking surface of molded grating shall have a concave or cast-in-grit finish. All bars shall be completely banded.

2-2. MATERIALS.

Aluminum Grating	NAAMM MBG 531, ASTM B221, 6063-T6 or 6061-T6 alloy, pressure or swage locked, mill finish.
Fiberglass Grating	ASTM E-84, D635
Molded Type	IKG Borden "Corgrate Molded SM", Fibergrate Corporation molded grating, Strongwell "Duragrate", Seasafe "Gator-Grate".
Pultruded Type	IKG Borden "Corgrate FI" (flush top), Fibergrate "Safe-T-Span", Strongwell "Duradek", Seasafe "Gator-Deck".
Grating Fasteners	Manufacturer standard fasteners
Clips, Bolts, Nuts, Washers	AISI Type 316 stainless steel.
Welded Threaded Steel Studs	ASTM A108 fully threaded studs automatically welded with compatible nuts and washers; TRW Nelson Type CFL or acceptable equal.
Stepped Locking Fasteners	Non-penetrating, non-welded mechanical fasteners, with stainless steel clips and bolts, galvanized cast iron body; Lindaptor “Grate-Fast” or Grating Specialty Co. “G-Clip”.
Fiberglass Grating Support Legs	Adjustable fiberglass legs specifically designed to support elevated molded fiberglass grating; Fibergrate Corporation “Grating Legs” or Strongwall Corporation “Elevated Floor System”.

Fiberglass Curb Angle	Fiberglass trim angle with integral concrete anchorage; Fibergrate Corporation trim angle.

2-3. FABRICATION. Grating panels shall be arranged so that openings are centered on a joint between panels. Toeplates extending the full depth of the grating and 4 inches above the top shall be provided around openings and on the open sides of stairway landings, overhead platforms, overhead walkways, and other locations indicated on the Drawings. Bands and toeplates shall be 3/16 inch thick minimum. Toeplates shall be welded to each bearing bar as applicable or mechanically attached to the handrail posts. Bands shall be welded to the first, the last, and every fourth intermediate bar. Cross bars shall be cut off flush with the outside face of side bars.

All angular, circular, re-entrant, and other cuts in aluminum and fiberglass grating shall be sawed or sheared. All fiberglass grating which requires cutting shall have the affected surfaces sealed with catalyzed resin sealant of equal or superior corrosion resistance to the grating. Any protective coating damaged by sawing or cutting shall be fully restored.

Angular, circular, and re-entrant cuts in steel grating may be made by flame cutting. All other cuts in steel grating shall be sawed or sheared. Cuts shall be clean and smooth, without fins, beads, or other projections.

Grating shall be fabricated in panels that can be easily handled by plant personnel. Unless otherwise indicated on the Drawings, the weight of individual panels shall not exceed 80 lbs. Panels shall be within ±3/16 inch of authorized length and ±1/8 inch of authorized width, and shall have a maximum difference in length of opposite diagonals of 1/4 inch. The spacing of bearing bars shall be within 1/32 inch of authorized spacing. Cross bars and edge bars of adjacent panels shall align. After installation, there shall be not more than 1/4 inch clearance between panels. All bearing bars shall be parallel. Bands and toeplates shall align within 1/8 inch tolerance, vertical and horizontal.

Steel frames anchored to or cast in concrete to support grating shall be stainless steel or hot-dip galvanized after fabrication. Fiberglass curb angles, if required, shall be as specified. The anchorage of fiberglass curb angles shall consist of intermittant embedded shapes or interlocking deformations on the back side of the angle. Embedment details utilizing a continuous shape which would interfere with the placement of concrete beneath the angle shall not be permitted.

2-4. SHOP COATING.

2-4.01. Aluminum. All surfaces of aluminum which will be in contact with concrete, mortar, or dissimilar metals shall be given a coat of epoxy enamel on the contact surfaces.

2-4.02. Fiberglass. All fiberglass grating shall be coated with a UV barrier. Field cut edges shall be sealed with catalyzed resin sealant of equal or superior corrosion resistance to the grating or as specified by the manufacturer. Sufficient quantities of edge repair coating shall be supplied with the grating.

PART 3 - EXECUTION

3-1. GENERAL. All materials shall be erected in compliance with OSHA 29 CFR Subpart R, and in compliance with all other applicable OSHA and local safety regulations.

All grating shall lie flat, with no tendency to rock when installed. Poorly fitting or damaged grating shall be rejected. Grating openings may be field cut with the approval of ENGINEER, provided that no more than four adjacent bearing bars are cut. If the grating is cut or modified in the field, affected surfaces shall be repaired or sealed to assure restoration of the corrosion resistance of the grating. Field cut openings must be spaced so that there are at least as many continuous bars between each opening as there are cut bars at the opening.

3-2. ATTACHMENTS TO SUPPORTING STRUCTURE. Grating shall be attached to the supporting structure in accordance with the grating manufacturer's recommendations and submittals. All grating supported on steel, aluminum, or fiberglass structures shall be attached. Single span grating over flumes, manholes, pits, or other openings in concrete floors may rest unattached in recesses constructed for that purpose. To preclude excessive accumulation of tolerances, an extra-long panel shall be provided for each unanchored grating cover that exceeds 20 feet in length. The panel shall be cut to the required dimension after the remainder of the grating panels have been installed.

3-2.01. Prime Painted Steel Supports. Unless otherwise specified or indicated on the Drawings, clip or flange block fasteners or stepped locking fasteners shall be used to attach grating to prime painted steel supports. Clip fasteners shall be secured to the supporting steel with through bolts in drilled holes. Through bolts shall be stainless or galvanized steel. Fusion welded threaded studs may be utilized if the primer is removed before welding or if a suitable weldable primer is used. Welded studs shall be cleaned and prime painted to match the support steel prior to finish painting.

3-2.02. Galvanized Steel Supports. Stepped locking fasteners shall be used to attach grating to galvanized steel supports. The galvanized coating shall not be damaged.

3-2.03. Stainless Steel, Aluminum, and Fiberglass Supports. Clip or flange block fasteners or stepped locking fasteners shall be used to attach grating to stainless steel, aluminum, or fiberglass supports. Fasteners shall be secured to the supporting structure with stainless steel through bolts in drilled holes. Welded fasteners shall not be used.

3-3. FINISH TOUCHUP. After erection, all grating and trench covers shall be cleaned. Damaged coatings shall be touched up in accordance with the grating manufacturer's recommendations to fully restore the corrosion resistance provided to the underlying metal. Cut ends of fiberglass grating pieces shall be sealed with catalyzed resin sealant of equal or superior corrosion resistance to the grating itself or repaired in accordance with the manufacturer's recommendations to assure full undamaged performance. Any protective coating damaged shall be fully restored after erection is complete.

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Section 05550

ANCHORAGE IN CONCRETE AND MASONRY

PART 1 - GENERAL

1-1. SCOPE. This section covers the procurement and installation of anchors in concrete and masonry for structural applications, equipment anchorage, and supports. It includes cast-in-place anchor bolts, adhesive anchors, expansion anchors, and epoxy grouted anchor bolts and reinforcing steel to be installed in concrete and masonry.

1-2. GENERAL. Unless otherwise specified or indicated on the Drawings all anchors and anchor bolts shall be cast-in-place anchor bolts with forged heads or embedded nuts and washers. J-bolts are not allowed. Unless otherwise indicated, bolts in concrete shall have a diameter of at least 3/4 inch, and bolts in grouted masonry shall have a diameter of at least 1/2 inch. All expansion anchors shall be at least 1/2 inch in diameter.

Unless otherwise indicated on the Drawings, anchors and anchor bolts used in the following locations and applications shall be of the indicated materials. Other anchors and anchor bolts shall be as indicated on the Drawings.

Cast-In-Place Anchor Bolts.

Submerged locations	Stainless steel.
Locations subject to splashing	Stainless steel.
Buried locations	Stainless steel.
Anchorage of structural steel columns	Galvanized steel.
Other exterior locations	Galvanized steel.
Other interior locations	Carbon steel.

Threaded Rod and Expansion Anchors.

Submerged locations	Stainless steel.
Locations subject to splashing	Stainless steel.
Buried locations	Stainless steel.

Anchorage of structural steel columns	Stainless steel.
Other exterior locations	Stainless steel.
Other interior locations	Carbon steel.

Adhesive anchors and expansion anchors may be used instead of cast-in-place anchors where specifically indicated or permitted on the drawings or with the specific acceptance by ENGINEER.

1-3. SUBMITTALS. Letters of certification indicating the manufacturer and types of adhesive anchors, expansion anchors, and epoxy grouts to be supplied shall be submitted in accordance with the requirements specified in Section 01300, “Submittals.” All anchorage products and systems used shall have a current product report on file with the International Code Council (ICC).

1-4. DELIVERY, STORAGE, AND HANDLING. Materials shall be handled, transported, and delivered in a manner which will prevent damage or corrosion. Damaged materials shall be promptly replaced. Materials shall be shipped and stored in original manufacturer's packaging.

PART 2 - PRODUCTS

2-1. MATERIALS. Materials shall be as indicated below.

Expansion Anchors	Hilti "Kwik-Bolt II"; ITW Ramset/Red Head "Trubolt Wedge Anchor"; Powers Fasteners "Power-Stud Anchor".
Reinforcing Bars	ASTM A615, Grade 60, deformed.
Reinforcing Bars, weldable	ASTM A706, Grade 60, deformed.
Anchor Bolts and Nuts.	
Carbon steel	ASTM A307 or ASTM A36, with compatible nuts.
Stainless steel	Bolts, ASTM F593, Alloy Group 1 or 2; nuts, ASTM F594, Alloy Group 1 or 2.
Galvanized steel	Carbon steel bolts and nuts; hot-dip galvanized, ASTM A153 and A385.

Flat Washers	ANSI B18.22.1; of the same material as anchor bolts and nuts.
Threaded Rod Anchors and Nuts.	
Carbon steel	ASTM A36, with compatible nuts.
Stainless steel	Rods, ASTM F593, Alloy Group 1 or 2; nuts, ASTM F594, Alloy Group 1 or 2.
Galvanized steel	Carbon steel rods and nuts; hot-dip galvanized, ASTM A153 and A385.
Adhesive Anchors for Concrete and Grout Filled Masonry.	
Threaded Rods and Nuts	As specified for Threaded Rod Anchors and Nuts and as recommended by the adhesive manufacturer.
Adhesive	Hilti "HIT HY 150", “HIT-ICE”, “HIT RE 500”, or “HVA” Systems; ITW Ramset/Redhead "Epcon Ceramic 6" System; or Powers Fasteners "Power Fast Epoxy Injection Gel" System.
Epoxy Grout for Reinforcing Bars, Threaded Rod Anchors, and Anchor Bolts.	
Adhesive.	
For Floors and Horizontal Surfaces	Sika "Sikadur 35, Hi-Mod LV"; ChemRex "Concresive Liquid LPL"; Sika "Sikadur 32 Hi-Mod".
For Vertical Surfaces and Overhead Applications	Sika "Sikadur 31 Hi-Mod Gel".
Aggregate	As recommended by the epoxy grout manufacturer.
Water	Clean and free from deleterious substances.

Adhesive Anchors for Hollow Masonry System.

Threaded Rod Anchors and Nuts	As specified for Threaded Rod Anchors and Nuts and as recommended by the adhesive manufacturer.
Adhesive	Hilti "HIT HY 20" System; ITW Ramset/Redhead "Epcon Ceramic 6" System; or Powers Fasteners "Power Fast Epoxy Injection Gel" System.
Screen Tubes	As recommended by the manufacturer.

2-2. ANCHORS.

2-2.01. Cast-in-Place Anchor Bolts. Cast-in-place anchor bolts shall be delivered in time to permit setting before the structural concrete is placed. Anchor bolts shall be provided with sufficient threads to permit a nut to be installed on the concrete side of the concrete form or the supporting template. Two nuts, a jam nut, and a washer shall be furnished for cast-in-place anchor bolts indicated on the drawings to have locknuts; two nuts and a washer shall be furnished for cast-in-place anchor bolts without locknuts.

2-2.02. Adhesive and Expansion Anchors. When adhesive or expansion anchors are indicated on the Drawings, only acceptable systems shall be used. Acceptable systems shall include only those systems and products specified or specifically indicated by product name on the drawings. Alternative anchoring systems may be used only when specifically accepted by ENGINEER. An acceptable adhesive anchor system may be used as an alternative in locations where epoxy grouted anchor bolts and epoxy grouted threaded rod anchors are specified or indicated.

Threaded rod anchors in adhesive anchor systems shall be furnished with a sufficient length to provide an embedment depth of at least 15 rod diameters and free of coatings that would weaken the bond with the adhesive. Unless otherwise required, single nut and washer shall be furnished for threaded rod anchors, adhesive anchors and expansion anchors. Anchor bolts and threaded rod anchors that are to be epoxy grouted shall be clean and free of coatings that would weaken the bond with the epoxy.

Adhesive anchors in hollow masonry shall utilize screen tubes as recommended by the manufacturer.

2-2.03. Epoxy Grouted Anchor Bolts and Reinforcing. Epoxy grout for installing reinforcing steel dowels and anchor bolts not indicated to be adhesive anchors shall consist of a two-component liquid epoxy adhesive of viscosity appropriate to the location and application, and an inert aggregate filler component, if recommended by the adhesive manufacturer. Components shall be packaged separately at the factory and mixed immediately before use.

Anchor bolts and reinforcing steel shall be as indicated on the Drawings.

PART 3 - EXECUTION

3-1. GENERAL. Anchor bolts shall be installed at the locations indicated on the Drawings.

Anti-seize thread lubricant shall be liberally applied to projecting, threaded portions of stainless steel anchors immediately before final installation and tightening of the nuts.

3-2. CAST-IN-PLACE ANCHORS AND ANCHOR BOLTS. Cast-in-place anchors and anchor bolts shall be carefully positioned with templates and secured in the forms prior to placing concrete. CONTRACTOR shall verify that anchorage devices are positioned in accordance with the design drawings and with applicable equipment submittal drawings. Anchors and bolts shall be positioned sufficiently in advance of the concrete placement so that an on-site representative of ENGINEER or DISTRICT will have sufficient time to inspect the bolts prior to placing concrete. If Special Inspection of the anchor bolts is indicated or required by the local building code, anchorage shall be placed in sufficient time and with sufficient notification so that such inspection can take place without delaying progress of the work.

Threads, bolts, and nuts spattered with concrete during placement shall be cleaned prior to final installation of the bolts and nuts.

3-3. EPOXY GROUT. Epoxy grout components shall be packaged separately at the factory and shall be mixed immediately before use. Proportioning and mixing of the components shall be done in accordance with the manufacturer's recommendations.

An acceptable adhesive anchoring system may be used where epoxy grouted threaded rod anchors are indicated on the Drawings.

3-3.01. Preparation. Where indicated on the Drawings, anchor bolts, threaded rod anchors, and reinforcing bars shall be epoxy grouted in holes drilled into hardened concrete. Diameters of holes shall be as follows:

Item	Diameter of Hole
Reinforcing Bars and Threaded Rod Anchors	1/8 inch larger than the outside diameter of the bar or the rod.
Headed Anchor Bolts	Bolt diameter plus 2 inches and sufficient to clear the bolt head.

The embedment depth for epoxy grouted anchor bolts, threaded rod anchors, and reinforcing bars shall be at least 15 bolt, rod, or bar diameters, unless otherwise indicated on the drawings.

Holes shall be prepared for grouting as recommended by the epoxy grout manufacturer.

3-3.02. Installation. Anchor bolts, threaded rod anchors, and reinforcing bars shall be clean, dry, and free of grease and other foreign matter when installed. The bolts, rods, and bars shall be set and positioned and the epoxy grout shall be placed and finished in accordance with the recommendations of the grout manufacturer. Care shall be taken to ensure that all spaces and cavities are filled with epoxy grout, without voids. Temperature of substrate and epoxy grout during installation and curing shall not exceed manufacturer's recommendations.

3-4. ADHESIVE ANCHORS. When adhesive anchors are indicated on the drawings, only an acceptable system shall be used. Alternative anchoring systems may be used only when acceptable to ENGINEER. An acceptable adhesive anchor system may be used as an alternative in locations where epoxy grouted anchor bolts and threaded rod anchors are specified or indicated. The embedment depth for adhesive anchors shall be at least 15 rod diameters unless a greater depth is indicated on the Drawings.

Adhesive for adhesive anchors shall be statically mixed in the field during application. All proportioning and mixing of the components shall be in accordance with the manufacturer's recommendations.

Anchors shall be installed in holes drilled into hardened concrete or grout filled masonry. Diameter of holes shall be 1/16 inch larger than the outside diameter of the rod unless recommended otherwise by the anchor system manufacturer. Holes shall be prepared for insertion of the anchors by removing all dust and debris using procedures recommended by the adhesive manufacturer.

Adhesive anchors and holes shall be clean, dry, and free of grease and other foreign matter at the time of installation. The adhesive shall be placed, the rods

shall be set and positioned, and the adhesive shall be finished, all in accordance with the recommendations of the material manufacturer. Care shall be taken to ensure that all spaces and cavities are filled with adhesive, without voids, and remain filled with adhesive until completion of the curing period. Adhesive shall be cured in accordance with the recommendations of the adhesive manufacturer.

3-5. EXPANSION ANCHORS. When expansion anchors are indicated on the Drawings, only an acceptable expansion anchor shall be used. Alternative anchoring systems may be used only when acceptable to ENGINEER. Expansion anchors shall be installed in accordance with the drawings and ICC report, but in no case shall the depth of the hole be less than eight bolt diameters. The minimum distance between the center of any expansion anchor and an edge or exterior corner of concrete shall be at least six times the diameter of the bolt. Unless otherwise indicated on the Drawings, the minimum distance between the centers of expansion anchors shall be at least 12 times the diameter of the bolt.

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Section 05990

STRUCTURAL AND MISCELLANEOUS METALS

PART 1 - GENERAL

1-1. SCOPE. This section covers the fabrication and erection of structural and miscellaneous metal items not covered in other sections.

Except as otherwise specified or indicated on the Drawings, all work shall conform to the applicable provisions of the AISC "Manual of Steel Construction - Allowable Stress Design", Parts 1, 2, 3, and 4, the AISC "Specification for Structural Steel Buildings" and the Aluminum Association "Specifications for Aluminum Structures".

Special inspection during the fabrication and erection of structural steel, if specified or required by the local building code, is addressed in Section 01400, “Quality Control.”

1-2. SUBMITTALS. Complete data, fabrication drawings, and setting or erection drawings covering all structural and miscellaneous metal items shall be submitted in accordance with the requirements specified in Section 01300, “Submittals.”

All bolted connections and welds shall be properly identified on the shop drawings. Welding procedures, welding procedure qualification records and welder qualifications shall be submitted.

Submittals for high strength bolts, tension control bolts and load indicator washers shall include statements from the bolt and washer manufacturers certifying satisfactory compliance with the governing standards and the specified tests.

1-3. DELIVERY, STORAGE, AND HANDLING. Materials shall be handled, transported, and delivered in a manner which will prevent bends, dents, significant coating damage, or corrosion. Damaged materials shall be promptly replaced. Structural and miscellaneous metal work shall be stored on blocking so that no metal touches the ground and water cannot collect thereon. The material shall be protected against bending under its own weight or superimposed loads.

Bolting materials shall be stored indoors. Weld rod shall be stored in accordance with the supplier’s instructions and AWS D1.1.

1-4. PLANT CERTIFICATION All fabricating plants providing structural steel shall be category Sbd certified in accordance with the AISC Quality Certification Program.

PART 2 - PRODUCTS

2-1. GENERAL. All structural steel shall be detailed and fabricated to facilitate compliance with OSHA 29 CFR Part 1926 subpart R and all other pertinent OSHA and local safety regulations.

All field connection materials shall be furnished.

2-2. MATERIALS.

Steel

Shapes (W, WT)	ASTM A992
Shapes (S, M, HP, C)	ASTM A36 or ASTM A572 Grade 50.
Other Shapes (angles)	ASTM A36
Plates and Bars	ASTM A36.
Sheets	ASTM A1008 CS Type B or A1011 CS Type B.
Pipe	ASTM A53, Type E or S, Grade B; ASTM A500, Grade B or C; or ASTM A501.
Square and Rectangular Structural Tubing	ASTM A500, Grade B or C.
Checkered Plate	ASTM A786, carbon steel, skid resistant pattern as standard with the manufacturer; Inland “4-way Floor Plate” or U.S. Steel “Multigrip Floor Plate”.

Bolts and Nuts

Bolts, High Strength	ASTM A325, Type 1; tested in accordance with Article 9.2 thereof.

Bolts, Tension Control Type (Twist off)	ASTM F1852. Equivalent to ASTM A325
Bolts, unfinished	ASTM A307.
Nuts, Heavy-Hex	ASTM A563, grade and finish compatible with bolts.
Nuts, Self-Locking	Prevailing torque type; IFI-100, Grade A.
Washers	
Flat, Hardened	ASTM F436, Type 1.
Lock	ANSI/ASME B18.21.1, helical spring type.
Beveled	ASTM F436.
Load Indicator	ASTM F959, compressible-washer-type direct tension indicator; type compatible with bolts tested in accordance with Article 10.2 of ASTM F959.
Anchor Rods (hooked, or threaded and nutted)	ASTM F1554, Grade 55, with weldability supplement S1
Threaded Rods	ASTM A36
Forged Steel Clevises and Turnbuckles	AISI C-1035
Forged Steel Eyebolts and Eyenuts	AISI C-1030, ANSI B 18.15 Type 2 shoulder pattern unless otherwise required
Forged Steel Sleeve Nuts	AISI C-1018, Grade 2
Stainless Steel	
Shapes	ASTM A276, Type 316L.
Plates	ASTM A240, Type 316L.

Pipe	ASTM A312, Grade TP316L
Tube	ASTM A269, Grade TP316L
Checkered Plate	ASTM A793, stainless steel, raised pattern A
Bolts	ASTM F593, Alloy Group 1 or 2
Nuts	ASTM F594, Alloy Group 1 or 2
Washers	
Flat	ANSI/ASME B18.22.1, Type 316.
Lock	ANSI/ASME B18.21.1, helical spring type, Type 316.
Cast Iron	ASTM A48, Class 35B or better.
Aluminum	
Sheet and Plate	ASTM B209, Alloy 6061-T6.
Rolled Sections	ASTM B308, Alloy 6061-T6. All members shall be Aluminum Association standard shapes.
Rod and Bar (Rolled or Drawn)	ASTM B211, Alloy 6061-T6 or 2017-T4.
Extrusions	ASTM B221, Alloy 6063-T5 or T6.
Pipe	ASTM B429, Alloy 6061-T6.
Rivets	ASTM B316, Alloy 6061-T6.
Bolts, Aluminum	ASTM F468, Alloy 2024-T4.
Nuts, Aluminum	ASTM F467, Alloy 6061-T6.
Washers, Aluminum	
Flat	ANSI/ASME B18.22.1, Type 6061 T-6.

Lock	ANSI/ASME B18.21.1, helical spring type, Type 6061-T6.
Castings	ASTM B26 or B85.
Checkered Plate	ASTM B632, Type 6061-T6.
Brass or Bronze	
Plate and Strip	ASTM B36.
Casting	ASTM B61 or B584
Bolts and Nuts	IFI-104, Grade 462 or 464.
Washers	
Flat	ANSI/ASME B18.22.1
Lock	ANSI/ASME B18.21.1, helical spring type.
Silicon Bronze	
Sheet and Plate	ASTM B96, American Brass "Everdur 1010".
Castings	ASTM B584, American Brass "Everdur 1000".
Bolts and Nuts	IFI-104, Grade 655.
Washers	
Flat	ANSI B18.22.1.
Lock	ANSI/ASME B18.21.1, helical spring type.
Weld Metal (Steel Connections)	ANSI/AWS D1.1, Table 3.1, filler metal with minimum 70 ksi tensile strength unless otherwise required.

Welded Headed Studs, Concrete Anchors, and Shear Connectors	ASTM A108 with a minimum 50,000 psi yield strength and minimum 60,000 psi tensile strength. TRW/Nelson or equal.
Deformed Bar Anchors (DBA)	ASTM A496 with a minimum 70,000 psi yield strength and minimum 80,000 psi tensile strength. TRW/Nelson division or equal.
Rails	
Crane	ASTM A1.
Railroad	ASTM A1.
Bird Screen	2 mesh, brass or copper wire cloth, min wire dia 0.063 inch.
Body Solder	Flux-core wire, ASTM B32, Alloy Grade 20B.
Shop Coatings	
Universal Primer	As indicated in Section 09940, “Protective Coatings.”
Epoxy Enamel	As indicated in Section 09940, “Protective Coatings.”
Galvanizing	ASTM A123, A153, A385.

2-3. FABRICATIONS. The following fabrications shall be constructed as indicated on the Drawings and as specified herein.

2-3.01. Stairs. Stairs shall be fabricated to the dimensions, arrangements and sizes indicated on the Drawings. Stairs shall be true to line and slope, shall be rigidly supported, and shall be braced and tightened to prevent movement. All treads shall be level and in perfect alignment and spacing. Handrails shall be in alignment and rigidly connected.

After installation, stairs shall be rigid and shall not sway noticeably or deflect under foot traffic. If necessary to prevent noticeable movement, additional supports or bracing shall be provided.

2-3.01.01. Stair Design. Stairs shall be designed by the stair supplier in general accordance with details indicated on the Drawings. The design shall comply with all applicable provisions of the local building code, ANSI A117.1, and OSHA as applicable. If requested by the ENGINEER, calculations shall be submitted to confirm compliance with the above.

The completed fabrications shall support a uniform live load of 100 lbs per square foot and a concentrated load of 300 lbs applied at the center of the span. Individual treads and platforms shall be designed to support a uniform live load of 100 lbs per square foot or a 300 lb concentrated live load applied on an area of 4 square inches. Vertical deflections under full live load shall be limited to span/240. Stairs and landings shall be braced or otherwise designed to avoid noticeable sideways.

The stair design and details shall be coordinated with the handrailing and guardrailing supplied. Stair members shall be adequate to accept loads from the rail posts based upon the following minimum railing design criteria.

200 lbs applied at any point and in any direction on the top of each rail post.

50 lbs per lineal foot applied in any direction on the handrail.

50 lbs per lineal foot applied horizontally at the required guardrail height simultaneously with 100 plf applied vertically downward at the top of the guardrail.

Connections to the supporting structure shall be adequate to transfer all loadings with a factor of safety of at least 3.0 times service load. The number and type of connections shall comply, at a minimum, with the design drawings. All necessary brackets, bolts, and anchors shall be provided.

2-3.01.02. Nosings. All stair treads shall have non-skid nosings, either fabricated integrally with the tread or attached with stainless steel bolts and self-locking nuts.

2-3.01.03. Grating Stairs. Treads shall be fabricated from grating material in accordance with Section 05530, “Grating.”

2-4. SHOP COATING. All structural and miscellaneous metal items shall be shop coated as specified herein. The requirements for field painting are covered in Section 09940, “Protective Coatings.”

2-4.01. Cleaning. Surfaces shall be dry and of proper temperature when coated, and shall be free of grease, oil, dirt, dust, grit, rust, loose mill scale, weld flux,

slag, weld spatter, and other objectionable substances. Articles to be galvanized shall be pickled before galvanizing. All other ferrous metal surfaces shall be cleaned by solvent, high-speed power wire brushing or by blasting to the extent recommended by the paint manufacturer and as required in Section 09940.

2-4.02. Edge Grinding. Sharp projections of cut or sheared edges of ferrous metals which will be submerged in operation, except for items specified to be hot-dip galvanized, shall be ground to a radius as needed to ensure satisfactory paint adherence and as required in Section 09940.

2-4.03. Prime Painted Steel. Unless otherwise specified or indicated on the Drawings, all ungalvanized structural and miscellaneous steel shall be given a universal prime coat in the shop after fabrication. The dry film thickness of the universal primer shall be at least 5 mils. Steel surfaces shall be prime-coated as soon as practicable after cleaning. Steel shall not be moved or handled until the shop coat is dry and hard.

2-4.04. Galvanizing. Steel materials required to be galvanized are indicated on the Drawings. All galvanizing shall be done by the hot-dip process after fabrication. An approved zinc-rich paint shall be used to touch up minor coating damage. Materials with significant coating damage shall be regalvanized or replaced.

Where galvanized bolts are indicated on the Drawings or specified, the use of zinc-plated bolts will not be acceptable.

2-4.05. Stainless Steel. Unless otherwise specified, all items fabricated from stainless steel shall be thoroughly cleaned and degreased after fabrication. Pickling or a light blast cleaning shall produce a modest etch and remove all embedded iron and heat tint. Surfaces shall be subjected to a 24-hour water test or a ferroxyl test to detect the presence of residual embedded iron and shall be retreated as needed to remove all traces of iron contamination. Surfaces shall be adequately protected during shipping and handling to prevent contact with iron or steel objects or surfaces.

2-4.06. Aluminum. All surfaces of aluminum which will be in contact with concrete, mortar, or dissimilar metals shall be given a coat of epoxy enamel.

2-4.07. Castings. Shop coating of miscellaneous iron castings will not be required.

2-4.08. Other Surfaces. Painting of zinc coated steel or bronze surfaces will not be required.

PART 3 - EXECUTION

3-1. STRUCTURAL STEEL ERECTION. Structural steel shall be erected so that individual pieces are plumb, level, and aligned within a tolerance of 1:500. The elevations of the top of floor and roof members shall be within 1/16 inch of the elevations indicated on the Drawings. The faces of girts and other supporting members for rigid wall panels shall be in vertical planes within a maximum variation of 1/8 inch.

All members and parts, as erected, shall be free of warps, local deformations, and unauthorized bends. All parts shall be assembled accurately as indicated on the fabrication drawings. Light drifting will be permitted to draw parts together, but drifting to match unfair holes will not be permitted. Any enlargement of holes necessary to make connections in the field shall be done by reaming with twist drills and only with the approval of ENGINEER. Enlarging holes by burning will not be permitted.

Baseplates shall be set level in exact position and grouted in place.

All materials shall be erected in compliance with OSHA 29 CFR, Part 1926, Subpart R, and with all other applicable OSHA and local safety regulations.

3-1.01. Inspection and Testing. Special inspections, if indicated on the Drawings or specified, shall be performed for field fabrication and erection of structural and miscellaneous metals, and for all structural steel field connections. The erector shall provide access as needed to facilitate all inspections and shall provide timely notification during erection when inspection milestones are approaching.

3-2. STRUCTURAL STEEL CONNECTIONS. Unless otherwise indicated on the Drawings, bolted connections for structural steel, as defined in the AISC manual, shall be made with ASTM A325 high strength bolts conforming to the "Specification for Structural Joints Using ASTM A325 or A490 Bolts" as approved by the Research Council on Structural Connections. The method of installation, pretensioning procedures, bolting equipment and tools shall likewise conform to the above referenced standard.

Except as otherwise indicated on the Drawings or specified herein, bolted connections shall be bearing type with threads included in the shear plane. Slip critical connections shall be used in diagonal bracing connections, where slip critical connections are indicated on the Drawings, and where oversize holes or slotted holes parallel to the direction of the load are used.

Bolts in all structural steel connections, both bearing and slip critical, shall be fully pretensioned in accordance with the AISC standards unless specifically noted otherwise on the Drawings. The turn-of-the-nut method or load-indicator

washers shall be used to verify pretensioning of bolts in bearing type connections. When using turn-of-the-nut method the bolt, nut, and material shall be match marked. A wax lumber marker or paint shall be used to clearly mark the assembly. The calibrated wrench method of pretensioning bolts will not be permitted.

Load indicator washers shall be used to verify pretensioning of bolts in slip critical connections. Load indicator washers shall be installed in accordance with the manufacturer's recommendations, as supplemented herein. To facilitate proper tightening of fastener assemblies with load indicator washers, a hardened flat washer shall be installed under the turned element (bolt head or nut) and between the turned element and the load indicator washer protrusions, in all cases. Whenever possible, the load indicator washer shall be installed on the head end of the bolt. If the bolt head will not be visible for inspection of the indicator washer after installation, or if the bolt head must be turned to tighten the assembly, the load indicator washer may be installed on the nut end of the bolt.

Tightening of each connection assembly shall progress systematically from the most rigid part of the joint toward the free edges until all have been sufficiently rotated or the load indicator washers on all bolts have been closed to the average gap stipulated by the load indicator washer manufacturer.

If approved by the ENGINEER, patented tension control type (twist-off) bolts may be used in bolted connections. Bolts shall be of equivalent size and strength to the indicated high strength bolts, and shall be installed in strict accordance with the manufacturer's instructions.

Bolt holes shall have a diameter nominally 1/16 inch larger than the nominal bolt diameter. Bolt holes for one ply of vertical diagonal bracing connections may be oversized to a diameter nominally 3/16 inch larger than the nominal bolt diameter. If oversized holes are provided in an outer ply, a hardened flat washer shall be installed over each hole during bolting. Load indicator washers shall not be substituted for hardened flat washers required for oversized holes.

Contact surfaces of slip critical connections shall not be shop coated. Contact surfaces of bearing type connections may be shop coated. When assembled, all joint surfaces, including those adjacent to the bolt heads, nuts, or washers, shall be free of loose mill scale, dirt, burrs, oil, and other foreign material that would prevent solid seating of the parts.

Beveled washers shall be used when the bearing faces of bolted parts have a slope of 1:20 or greater with respect to a plane perpendicular to the bolt axis. Bolt length shall be increased as needed to accommodate the beveled washers.

Bolts, nuts, and washers shall be galvanized when connected materials are galvanized or where indicated on the Drawings.

3-3. MISCELLANEOUS STEEL CONNECTIONS. Connections for miscellaneous steel fabrications not included in the AISC definition of structural steel may be made with unfinished bolts unless indicated otherwise on the Drawings. Unless otherwise indicated on the Drawings all unfinished bolts shall be snug tight.

3-4. STRUCTURAL AND MISCELLANEOUS STEEL WELDING. Welding and related operations shall conform to applicable provisions of the Structural Welding Code - Steel, AWS D1.1, of the American Welding Society. All welding shall be performed in accordance with written procedures, using only those joint details which have prequalified status when performed in accordance with AWS D1.1. All welding shall be performed by welders qualified in accordance with the American Welding Society for steel welding and American Society for Mechanical Engineers Section IX for stainless steel welding.

All welds shall be visually inspected in accordance with AWS procedures.

Welds not dimensioned on the Drawings shall be sized to develop the full strength of the least strength component of the connection.

Where structural or miscellaneous steel connections are welded, all butt and miter welds shall be continuous and, where exposed to view, shall be ground smooth. Intermittent welds shall have an effective length of at least 2 inches and shall be spaced not more than 6 inches apart.

Surfaces to be welded and surfaces within 2 inches of a weld shall be free from loose or thick scale, slag, rust, moisture, grease, paint and other foreign materials that would prevent proper welding or release objectionable fumes.

Only shielded metal arc, gas metal arc, flux cored arc, submerged arc, and gas tungsten arc welding are permitted. For flux cored arc welding, only E70xx one (1) or five (5) wire electrodes with supplemental gas shielding shall be permitted. Use of electroslag or electrogas welding processes or the short-circuiting transfer mode of the gas metal arc process will not be acceptable.

Field welded connections shall not be substituted for field bolted connections indicated on the Drawings.

Deformed bar anchors, headed studs, concrete anchors and shear connectors shall be welded with an automatic stud welding gun per the manufacturer’s recommendation. Hand welding will not be acceptable.

3-5. STRUCTURAL AND MISCELLANEOUS ALUMINUM. Unless otherwise noted, all work shall conform to applicable provisions of the Aluminum Association "Standard for Aluminum Structures".

3-5.01. Connections. Connections not specifically detailed on the Drawings shall develop the full strength of the least strength member of the connections. Bolted connections shall be all-bolted bearing type, equipped with a helical spring lock washer under the stationary element (bolt head or nut) and a flat washer under the turned element. All bolts shall be fully tightened. Bolts and nuts for structural aluminum connections shall be stainless steel. Bolts and nuts for nonstructural miscellaneous aluminum assemblies shall be stainless steel or aluminum. A sufficient number of bolts shall be provided in each connection to develop the shear strength of the member.

Welded connections shall be made in accordance with the American Welding Society D1.2, Structural Welding Code - Aluminum. All welding shall be performed by welders qualified in accordance with American Welding Society. Welds shall be free of porosity, cracks, holes, and flux. Welded connections shall not be substituted for bolted connections without prior approval of ENGINEER.

3-5.02. Erection. Structural aluminum shall be erected so that individual pieces are plumb, level, and aligned within a tolerance of 1:500. The elevation of horizontal members shall be within 1/16 inch of the elevation indicated on the Drawings.

Baseplates shall be set level in exact position and grouted in place.

3-6. REPAIR AND CLEANING. Abraded and scarred areas and connections on painted surfaces exposed to view shall be repaired with the same kind of paint and with a minimum dry film thickness equal to that previously applied to the steel.

Abraded and scarred areas on galvanized surfaces shall be repaired with cold galvanizing compound in accordance with ASTM A780 with a minimum dry film thickness of 8 mils.

Wet storage stains on stainless and galvanized steel shall be removed after installation.

Abraded and scarred areas on fusion-bonded epoxy-coated surfaces shall be repaired with patching compound in accordance with the manufacturer's written instructions and specifications with a minimum dry film thickness of 10 mils.

End of Section

DIVISION 7
THERMAL AND MOISTURE PROTECTION

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Section 07700

ROOF SPECIALTIES AND ACCESSORIES

PART 1 - GENERAL

1-1. SCOPE. This Section covers roof hatches and miscellaneous roof accessories.

1-2. GENERAL. Roof accessories shall be provided and installed at the locations indicated on the Drawings. Fasteners as required for mounting the accessories shall be provided.

1-3. SUBMITTALS. Submit the following in accordance with the requirements specified in Section 01300, "Submittals:"

- Submit complete specifications, detailed drawings, and setting and erection drawings covering roof accessories.
- Submit roof hatch manufacturer's warranty.

PART 2 - PRODUCTS

2-1. ROOF HATCHES. Roof hatches shown on the Drawings shall be as follows:

The "Access Hatch," also called out as "Floor Hatch," shall be BILCO Type J Steel manufactured by The BILCO Company; or equal. Hatch shall have single leaf cover constructed of 1/4" steel diamond pattern plate and reinforced for a 300 PSF live load. Dimensions shall be as shown on the Drawings.

The "Equipment Hatch", also called out as "Double Door Floor Hatch," shall be BILCO Type JD Steel manufactured by The BILCO Company; or equal. Hatch shall have double leaf cover constructed of 1/4" steel diamond pattern plate and reinforced for a 300 PSF live load. Dimensions shall be as shown on the Drawings.

Each hatch shall have a channel frame of 1/4" steel with full anchor flange around the perimeter. Hinges shall be designed for horizontal installation and shall be through bolted to the cover with tamperproof Type 316 stainless steel lock bolts and shall be through bolted to the frame with Type 316 stainless steel bolts and locknuts.

Each hatch shall have a 1-1/2” drain coupling in the channel frame that is connected to a 1-1/2” PVC pipe to daylight at the edge of the structure.

Provide hatches with compression spring operators enclosed in telescopic tubes to provide, smooth, easy, and controlled cover operation throughout the entire arc of opening and to act as a check in retarding downward motion of the cover when closing. The upper tube shall be the outer tube to prevent accumulation of moisture, grit, and debris inside the lower tube assembly. The lower tube shall interlock with a flanged support shoe fastened to a formed 1/4” gusset support plate.

Provide a removable exterior turn/lift handle with a spring loaded ball detent to open the cover and the latch release shall be protected by a flush, gasketed, removable screw plug. All hardware shall be Type 316 stainless steel. Provide an exterior hasp for DISTRICT padlock.

Manufacturer shall guarantee against defects in material and workmanship for a period of 5 years.

Hatches shall be shop-primed and field painted after installation with System A6 as specified in Section 09940, “Protective Coatings.”

PART 3 – EXECUTION

3-1. INSTALLATION. All products provided under this Section shall be installed in accordance with the manufacturers' instructions. Unless otherwise noted, all anchors shall be non-corrosive. Install drain pipe in roof slab that is connected to drain coupling on hatch.

3-2. TESTING. CONTRACTOR shall test for proper operation after installation.

End of Section

Section 07900

CAULKING

PART 1 - GENERAL

1-1. SCOPE. This section covers caulking and sealing.

1-2. GENERAL. The terms "caulking" and "sealing", as used on the Drawings and in these Specifications, are synonymous. Both terms indicate the materials specified herein. Oil-base caulking shall not be used on this Project.

1-3. APPROVALS. All caulking shall meet the requirements of the standards specified herein. All caulking and sealing to be used in contact with potable water shall meet the requirements of ANSI/NSF Standard 61.

1-4. SUBMITTALS. Submit the following in accordance with the requirements specified in Section 01300, “Submittals:”

- Specifications and data covering the materials proposed for use, together with samples or color cards showing the manufacturer's full line of sealant colors.

PART 2 - PRODUCTS

2-1. MATERIALS.

Thiokol Sealants (polysulfides)	Fed Spec TT-S-00227E, Class A or ASTM 920 Type M; polysulfide rubber, two component.
Nonsag	
Submerged Service, Non potable water	Pecora "Synthacalk GC-2+" Sonneborn “Sonolastic Polysulfide Sealant”
Nonsubmerged Service	Pecora " Synthacalk GC-2+" Sonneborn "Sonolastic Polysulfide Sealant" Polymeric Systems “PSI-350”

Self-Leveling, Nonsubmerged	A.C. Horn "Hornflex Traffic Grade" Polymeric Systems “PSI-350”
Urethane Sealants (Polyurethanes)	Fed Spec TT-S-00227E, Class A, Type 2 and ASTM C920, Type M, Grade NS; two component.
Nonsag	
Submerged Service	
Potable Water	Polymeric Systems “RC-270”, Sika “Sikaflex-2cNS
Nonpotable Water	Pecora "Dynatred" Polymeric Systems “RC-270".
Nonsubmerged Service	Bostik "Chem-Calk 500" Tremco "Vulkem 227" Pecora "Dynatrol II" Tremco "DYmeric 240" Sika “Sikaflex-2cNS”
Self-Leveling, Nonsubmerged	Bostik "Chem-Calk 550" Tremco "Vulkem 245" Pecora "Urexpan NR-200" Polymeric Systems “ RC-2SL" Tremco "THC-900"
Acrylic Sealant	Fed Spec TT-S-230; ASTM C834 Bostik “Chem-Calk 600” Pecora “ AC20” Tremco “Mono 555”
Silicone Sealant	Silicone rubber, neutral color; Dow Corning "Mildew-Resistant silicone 786", General Electric "Silicone Sanitary 1702 Sealant".
Primer	As recommended by the sealant manufacturer.

Backup Material	Polyethylene or polyurethane foam as recommended by the sealant manufacturer; Dow "Ethafoam SB" or Plateau "Denver Foam".
Bondbreaker Tape	Adhesive-backed polyethylene tape as recommended by the sealant manufacturer.

2-2. COLORS. Colors of sealants shall be as selected by ENGINEER from the manufacturer's standard line of colors. Different colors may be required for different locations.

2-3. LOCATIONS TO BE CAULKED.

2-3.01. With Thiokol or Urethane Sealant (Nonsag) - Submerged Service.

All joints requiring caulking in submerged locations.

2-3.02. With Thiokol or Urethane Sealant (Nonsag) - Nonsubmerged Service.

Entire perimeter of frames for exterior metal doors.

Entire perimeter of metal louvers.

Entire perimeter of metal dampers and metal shutters.

Control joints in masonry walls.

Joints in cast stone units.

Around service sinks.

Joints between masonry and cast-in-place concrete, where indicated on the Drawings.

Other locations where caulking is indicated on the Drawings, specified in other sections, or required for weatherproofing.

2-3.03. With Thiokol or Urethane Sealant (Self-Leveling).

Horizontal joints in walks or drives.

Horizontal joints in traffic-bearing decks and slabs.

Annular space around handrail posts set in sleeves**.**

2-3.04. With Acrylic Sealant.

Watertight joints in sheet metal work.

PART 3 - EXECUTION

3-1. JOINT PREPARATION. All surfaces to receive sealant shall be clean, dry, and free from dust, grease, oil, or wax. Concrete surfaces which have been contaminated by form oil, paint, or other foreign matter which would impair the bond of the sealant to the substrate shall be cleaned by sandblasting. All surfaces shall be wiped with a clean cloth saturated with xylol or other suitable solvent, and shall be primed before the sealant is applied.

Unless otherwise recommended by the sealant manufacturer and permitted by the ENGINEER, the depth of sealant in a joint shall be equal to the width of the joint, but not more than 1/2 inch. Backup material shall be provided as necessary to control the depth of sealant and shall be of suitable size so that, when compressed 25 to 50 percent, the space will be filled. Backup material shall be rolled or pressed into place in accordance with the manufacturer's installation instructions, avoiding puncturing and lengthwise stretching. If depth of the joint does not permit use of backup material, bondbreaker tape shall be placed at the bottom of the joint to prevent three-sided adhesion.

3-2. SEALING. Sealing work shall be done before any field painting work is started. The air temperature and the temperature of the sealed surfaces shall be above 50°F when sealing work is performed.

Upon completion of the sealing work, each sealed joint shall have a smooth, even, tooled finish, flush with the edges of the sealing recess, and all adjacent surfaces shall be clean. Sealant shall not lap onto adjacent surfaces. Any sealant so applied as to prevent the painting of adjacent surfaces to a clean line, or with an excess of material outside the joint and feathered onto surfaces, shall be removed and the joint resealed.

End of Section

DIVISION 9
FINISHES

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Section 09940

PROTECTIVE COATINGS

PART 1 - GENERAL

1-1. SCOPE. This section covers field-applied protective coatings, including surface preparation, protection of surfaces, inspection, and other appurtenant work for equipment and surfaces designated in the schedules to be coated with heavy duty maintenance coatings. Regardless of the number of coats previously applied, at least two field coats in addition to any shop coats or field prime coats shall be applied to all surfaces, unless otherwise specified.

Architectural painting, water repellant for masonry, and steel tank coatings are covered in other sections.

1-2. GENERAL. Cleaning, surface preparation, coating application, and thickness shall be as specified herein and shall meet or exceed the coating manufacturer's recommendations. When the manufacturer's minimum recommendations exceed the specified requirements, CONTRACTOR shall comply with the manufacturer's minimum recommendations. When equivalent products are acceptable to ENGINEER, CONTRACTOR shall comply with this specification and the coating manufacturer's recommendations.

1-2.01. Governing Standards. All cleaning, surface preparation, coating application, thickness, testing, and coating materials (where available) shall be in accordance with the referenced standards of the following American Water Works Association (AWWA), American National Standard Institute (ANSI), NACE International (NACE), SSPC: The Society for Protective Coating (SSPC), NSF International (NSF), and ASTM requirements.

1-2.02. Delivery and Storage. All coating products shall be received and stored in accordance with the coating manufacturer's recommendations.

1-3. SUBMITTALS. Submit the following in accordance with the requirements specified in Section 01300, “Submittals:”

- Submit color cards for all coatings proposed for use, together with complete descriptive specifications and the completed Coating System Data Sheets, to ENGINEER for review and color selection. Requests for review submitted directly to ENGINEER by coating suppliers will not be considered.

- For proposed products in contact with raw or treated water, CONTRACTOR shall submit certifications that the proposed systems are in compliance with ANSI/NSF 61.

- CONTRACTOR shall submit a Coating System Data Sheet for each separately identified surface in the Coating Schedule that will be used on the contract, using the appropriate Coating System Data Sheet forms (Figures 1-09940 and 2-09940) at the end of this section. Each field coating system shall be acceptable to the coating material manufacturer. Each Coating System Data Sheet shall include application temperature requirements including recoat window requirements for the ambient conditions at the site, including elevated temperatures up to 130°F. Temperature requirements shall be specified by the coating manufacturer.

Each proposed coating system shall be assigned a unique number with a prefix letter based on the following:

Prefix	Surfaces	Figure
A	Iron and steel	2
C	Concrete and concrete block	1
E	Equipment - submerged non-submerged	1 2
F	Nonferrous metal	1
G	Galvanized	1
H	High temperature	1
P	PVC and FRP	1

Each coating system that will be applied entirely in the field shall be assigned only a prefix letter and no suffix letter. When appropriate under the indicated conditions, the following suffix shall be added to the coating system numbers:

-F Each shop-applied coating system that includes a finish coat applied in the field.

A separate Coating System Data Sheet shall be developed and submitted for each variation or change in a coating system or surface to be coated.

The manufacturer's standard colors will be acceptable for all coatings.

1-4. QUALITY ASSURANCE.

1-4.01. Coating System Data Sheet Certifications. The coating applicator and coating manufacturer shall review and approve in writing the coating manufacturer's written recommendations for the coating system and the intended service. Any variations from the specifications or the coating manufacturers published recommendations shall be submitted in writing and approved by the coating manufacturer. The coating manufacturer shall observe the surface preparation, mixing, and application of the protective coating systems and submit a written report of what has been observed and any additional recommendations.

PART 2 - PRODUCTS

2-1. ACCEPTABLE MANUFACTURERS.

2-1.01. Alternative Manufacturers. In addition to the coatings listed herein, equivalent coatings of the following manufacturers will also be acceptable:

ICI Devoe
Rust-Oleum
Plasite
PPG
Sigma

2-1.02. Equivalent Coatings. Whenever a coating is specified by the name of a proprietary product or of a particular manufacturer or vendor, the specified coating shall be understood as establishing the type and quality of coating desired. Other manufacturers' coatings will be accepted, provided that sufficient information is submitted to enable ENGINEER to determine that the proposed coatings are equivalent to those named. Information on proposed coatings shall be submitted for review in accordance with Section 01300, “Submittals.” Requests for review of equivalency will be accepted only from CONTRACTOR, and will be considered only after the contract has been awarded.

2-2. MATERIALS. All coatings shall be delivered to the job in original unopened containers with labels intact. Coatings shall be stored indoors and shall be protected against freezing. No adulterant, unauthorized thinner, or other material not included in the coating formulation shall be added to the coating for any purpose.

All coatings shall conform to the air quality regulations applicable to San Luis Obispo County. Coating materials that cannot be guaranteed by the

manufacturer to conform, whether or not specified by product designation, shall not be used.

The coatings specified have been selected on the basis of the manufacturer's statement that the VOC content of the product is 2.8 lbs per gallon or less, unless otherwise indicated herein; however, it shall be the CONTRACTOR'S responsibility to use only coating materials that are in compliance with the requirements of all regulatory agencies. Local regulations may require some coatings to have a lower VOC content than specified herein. The coatings specified may meet the VOC limits in the unthinned (as shipped) condition, but may exceed the limits if thinned according to the manufacturer's recommendations. Under these conditions, the coatings shall not be thinned beyond the 2.8 lbs per gallon limit, and if the product cannot be thinned to suit the application method or temperature requirements, another manufacturer's coating shall be used, subject to acceptance by ENGINEER.

CONTRACTOR shall be responsible for ensuring the compatibility of field coatings with each other or with the coatings on shop coated or previously coated surfaces. Coatings used in successive field coats shall be produced by the same manufacturer. Coatings used in the first field coat over shop coated or previously coated surfaces shall cause no wrinkling, lifting, or other damage to underlying coats.

All coatings used on surfaces that will be in contact with raw or treated water shall be certified as being in compliance with ANSI/NSF 61. Coatings that cannot be so certified, whether or not specified by manufacturer and by product designation, shall not be used.

2-2.01. Primers.

Universal Primer	Ameron "Amercoat 385 Epoxy", Carboline "Carboguard 888 Primer", Tnemec "Series 27 F.C. Typoxy", or Sherwin-Williams "Macropoxy 646".
Epoxy Concrete Block Filler	Ameron "Amerlock 400BF Epoxy Block Filler", Plasite "9029 Filler", Tnemec "Series 54-660", or Sherwin-Williams "Kem Cati-Coat HS".

Epoxy Concrete Filler and Surfacer	Tnemec "Series 63-1500", Ameron NuKlad 114A.

2-2.02. Intermediate and Finish Coatings.

Epoxy Enamel (NSF certified systems)

Ferrous Metal Surfaces, and Concrete Surfaces in Contact with Raw or Treated Water	Ameron "Amerlock 400 High-Solids Epoxy Coating", Carboline "Carboguard 891", Tnemec "Series N140 Pota-Pox Plus", or Sherwin-Williams "Macropoxy 646"; immersion service.

Epoxy Enamel

Concrete Floors	Ameron "Amercoat 385 Epoxy", Carboline "Carboguard 890", Tnemec "Series N69 Hi-Build Epoxoline II", or Sherwin-Williams "Armorseal 1000HS"; nonskid.
Ferrous Metal Surfaces, and Masonry or Concrete Surfaces Other Than Floors	Ameron "Amercoat 385 Epoxy", Carboline "Carboguard 890", Tnemec "Series N69 Hi-Build Epoxoline II", or Sherwin-Williams "Macropoxy 646".
Aliphatic Polyurethane	Ameron "Amercoat 450HS", Carboline "Carbothane 134HG", Tnemec "Series 1074 Endura-Shield II", or Sherwin-Williams "Acrolon 218HS".
Medium Consistency Coal Tar	Carboline "Bitumastic 50" or Tnemec "46-465 H.B. Tnemecol".

PART 3 - EXECUTION

3-1. SURFACE PREPARATION. All surfaces to be coated shall be clean and dry and shall meet the recommendations of the coating manufacturer for surface preparation. Freshly coated surfaces shall be protected from dust and other contaminants. Oil and grease shall be completely removed by use of solvents or detergents before mechanical cleaning is started. The gloss of previously coated surfaces shall be dulled if necessary for proper adhesion of topcoats.

Surfaces shall be free of cracks, pits, projections, or other imperfections that would interfere with the formation of a smooth, unbroken coating film, except for concrete block construction where a rough surface is an inherent characteristic.

When applying touchup coating or repairing previously coated surfaces, the surfaces to be coated shall be cleaned as recommended by the coating manufacturer and the edges shall be sanded or wire brushed to provide a feathered or otherwise smoothed so that they will not be noticeable after they are coated. All coatings made brittle or otherwise damaged by heat of welding shall be completely removed.

3-1.01. Galvanized Surfaces. Galvanized surfaces shall be prepared for coating in conformity with the instructions of the manufacturer of the epoxy enamel. Any chemical treatment of galvanized surfaces shall be followed by thorough rinsing with clean water.

3-1.02. Ferrous Metal Surfaces. Ungalvanized ferrous metal surfaces shall be prepared for coating by cleaning using one or more of the following methods as specified: solvents (SSPC-SP1); blasting (SSPC-SP5, -SP6, -SP7, or -SP10); power tools (SSPC-SP3 or -SP11); or hand tools (SSPC-SP2). Oil and grease shall be completely removed in accordance with SSPC-SP1 before beginning any other cleaning method. Surfaces of welds shall be scraped and ground as necessary to remove all slag and weld spatter. Tools which produce excessive roughness shall not be used.

All components of equipment that can be properly prepared and coated after installation shall be installed prior to surface preparation. Components of equipment that will be inaccessible after installation shall have the surfaces prepared and coated prior to installation. Motors, drive trains, and bearings shall be protected during surface preparation in accordance with the equipment manufacturer's recommendations.

All cut or sheared edges shall be ground smooth to a 1/8 inch minimum radius for all material 1/4 inch thickness and larger. For material thickness less than 1/4

inch all cut or sheared edges shall be ground smooth to a radius equal to 1/2 the material thickness. Grinding of rolled edges on standard shapes with a minimum radius of the 1/16 inch will not be required.

All ferrous metal surfaces shall have all welds ground smooth and free of all defects in accordance with NACE Standard RPO178, Appendix C, Designation C and sharp edges ground smooth, if not previously prepared in the shop. Instead of blending of the weld with the base metal as required by the NACE standard, it will be acceptable to furnish a welded joint that has a smooth transition of the weld to the base metal. All welds shall be ground smooth to ensure satisfactory paint adhesion.

The cleaning methods and surface profiles specified herein are minimums, and if the requirements printed in the coating manufacturer's data sheets exceed the limits specified, the value printed on the data sheets shall become the minimum requirement.

3-1.02.01. Ferrous Metal Surfaces - Nonimmersion Service. Ferrous metal surfaces, including fabricated equipment, in nonimmersion service shall be cleaned to the degree recommended by the coating manufacturer for surfaces to be coated with epoxy enamel, except galvanized surfaces. Blast cleaning to at least SSPC-SP6 shall be used where recommended by the coating manufacturer, and may be used elsewhere at the option of CONTRACTOR, provided that no dust is permitted to settle on adjacent wet coating. Surface profile shall be as recommended by coating manufacturer, but not less than 2 mils.

3-1.02.02. Ferrous Metal Surfaces - Immersion Service. Surface preparation of ferrous metal surfaces in immersion service shall consist of blast cleaning to at least SSPC-SP10 and the first application of coating shall be performed on the same day. If more surface area is prepared than can be coated in one day, the uncoated area shall be blast cleaned again to the satisfaction of ENGINEER. Surface profile shall be as recommended by coating manufacturer, but not less than 3.5 mils.

3-1.03. Concrete Surfaces. All concrete surfaces shall be free of objectionable substances and shall meet the coating manufacturer's recommendations for surface preparation. Any other surface preparation recommended by the coating material manufacturer shall be brought to ENGINEER'S attention and may be incorporated into the work if acceptable to ENGINEER.

All concrete surfaces shall be dry when coated and free from dirt, dust, sand, mud, oil, grease, and other objectionable substances. Oil and grease shall be completely removed by use of solvents or detergents before mechanical cleaning is started.

New concrete shall have cured for at least 4 weeks before coating is applied as recommended by the material manufacturer. Concrete surfaces shall be tested for capillary moisture in accordance with ASTM D4263. There shall be no capillary moisture when coatings are applied on concrete.

All surfaces to be coated shall be cleaned in accordance with ASTM D4258 and abraded in accordance with ASTM D4259. Surface profile shall be at least 25 percent of the dry film thickness specified for the coating system. Prior to application of the coating, the surfaces shall be thoroughly washed or cleaned by air blasting to remove all dust and residue. Spalled areas, voids, and cracks shall be repaired in accordance with Section 03300 and as acceptable to the ENGINEER. Fins and other surface projections shall be removed to provide a flush surface before application of coating.

Except where epoxy enamel is applied as dampproofing, the concrete surfaces, including those with bug holes less than 1 inch in any dimension, shall be prepared when required and as recommended by the manufacturer, using an epoxy concrete filler and surfacer.

3-1.04. Concrete Block Surfaces. Voids and openings in concrete block surfaces shall be pointed. All exposed exterior surfaces and surfaces to be coated with epoxy enamel, including the joints, shall be filled so that a continuous unbroken coating film is obtained.

3-1.05. Copper Tubing. All flux residue shall be removed from joints in copper tubing. Immediately before coating is started, tubing shall be wiped with a clean rag soaked in xylol.

3-1.06. Hardware. Hardware items such as bolts, screws, washers, springs, and grease fittings need not be cleaned prior to coating if there is no evidence of dirt, corrosion, or foreign material.

3-1.07. Aluminum. When a coating system is required, remove all oil or deleterious substance with neutral detergent or emulsion cleaner or blast lightly with fine abrasive.

3-2. MIXING AND THINNING. Coating shall be thoroughly mixed each time any is withdrawn from the container. Coating containers shall be kept tightly closed except while coating is being withdrawn.

Coating shall be factory mixed to proper consistency and viscosity for hot weather application without thinning. Thinning will be permitted only as necessary to obtain recommended coverage at lower application temperatures. In no case shall the wet film thickness of applied coating be reduced, by addition

of coating thinner or otherwise, below the thickness recommended by the coating manufacturer. Thinning shall be done in compliance with all applicable air quality regulations.

3-3. APPLICATION. Coating shall be applied in a neat manner that will produce an even film of uniform and proper thickness, with finished surfaces free of runs, sags, ridges, laps, and brush marks. Each coat shall be thoroughly dry and hard before the next coat is applied. In no case shall coating be applied at a rate of coverage greater than the maximum rate recommended by the coating manufacturer.

Coating failures will not be accepted and shall be entirely removed down to the substrate and the surface recoated. Failures include but are not limited to sags, checking, cracking, teardrops, fat edges, fisheyes, or delamination.

3-3.01. Priming. Edges, corners, crevices, welds, and bolts shall be given a brush coat (stripe coat) of primer before application of the primer coat. The stripe coat shall be applied by a brush and worked in both directions. Special attention shall be given to filling all crevices with coating.

Abraded and otherwise damaged portions of shop-applied coating shall be cleaned and recoated as recommended by the manufacturer of the finish coating. Welded seams and other uncoated surfaces, heads and nuts of field-installed bolts, and surfaces where coating has been damaged by heat shall be given a brush coat of the specified primer. Before the specified spot or touchup coating of metal surfaces, edges, corners, crevices, welds, and bolts in the area of the spot or touchup coating shall be given a brush coat of primer. This patch, spot, or touchup coating shall be completed, and the paint film shall be dry and hard, before additional coating is applied.

3-3.02. Epoxy Enamel. When used, epoxy enamel shall be applied in accordance with the coating manufacturer's recommendations, including temperature limitations and protection from sunlight until topcoated.

When concrete is to be coated, coatings shall not be applied to concrete surfaces in direct sunlight or when the temperature of the concrete is rising. Preferably the coating shall be applied when the temperature of the concrete is dropping.

When applying high build epoxy coatings with a roller or brush and where a dry film thickness of at least 4-6 mils per coat is required, two or more coats shall be applied to achieve the recommended dry film thickness equal to a spray applied coating.

3-3.03. Film Thickness. The total coating film thickness including intermediate coats and finish coat, shall be not less than the following:

Type of Coating	Minimum Dry Film Thickness
Medium consistency coal tar	20 mils.
Epoxy enamel	
Floors	5 mils.
Surfaces with first coat of epoxy enamel and final coat of aliphatic polyurethane	7 mils (5 mils DFT for epoxy plus 2 mils DFT for aliphatic polyurethane).
Surfaces with first and second coat of epoxy enamel and final coat of aliphatic polyurethane	12 mils (10 mils DFT for epoxy plus 2 mils DFT for aliphatic polyurethane).
Other surfaces (two coats)	10 mils.
Immersion service (three coats)	15 mils.
Other surfaces (one coat)	5 mils.
Other surfaces (two coats)	10 mils.

3-3.04. Weather Conditions. Coatings shall not be applied, except under shelter, during wet, damp, or foggy weather, or when windblown dust, dirt, debris, or insects will collect on freshly applied coating.

Coatings shall not be applied at temperatures lower than the minimum temperature recommended by the coating manufacturer, or to metal surfaces such as tanks or pipe containing cold water, regardless of the air temperature, when metal conditions are likely to cause condensation. When necessary for proper application, a temporary enclosure shall be erected and kept heated until the coating has fully cured.

Coatings shall not be applied at temperatures higher than the maximum temperature recommended by the coating manufacturer. Where coatings are applied during periods of elevated ambient temperatures, CONTRACTOR and the coatings manufacturer shall be jointly responsible to ensure that proper application is performed including adherence to all re-coat window requirements. Precautions shall be taken to reduce the temperature of the surface application, especially for metal, at elevated temperatures above 100°F including shading application area from direct sunlight, applying coating in the evening or at night, and ventilating the area to reduce the humidity and temperature,

3-4. REPAIRING FACTORY FINISHED SURFACES. Factory finished surfaces damaged prior to acceptance by ENGINEER shall be spot primed and recoated with materials equivalent to the original coatings. If, in the opinion of ENGINEER, spot repair of the damaged area is not satisfactory, the entire surface or item shall be recoated.

3-5. PROTECTION OF SURFACES. Throughout the work CONTRACTOR shall use drop cloths, masking tape, and other suitable measures to protect adjacent surfaces. CONTRACTOR shall be responsible for correcting and repairing any damage resulting from its or its subcontractor's operations. Coatings spilled or spattered on adjacent surfaces which are not being coated at the time shall be immediately removed. Exposed concrete or masonry not specified to be coated which is damaged by coatings shall be either removed and rebuilt or, where authorized by ENGINEER, coated with two coats of masonry coating.

3-6. FIELD QUALITY CONTROL. The following inspection and testing shall be performed by a certified coatings inspector paid for by the CONTRACTOR: visual inspection, surface profile, and wet and dry film thickness. All inspection and testing will be witnessed by ENGINEER.

3-6.01. Surface Profile Testing. The surface profile for ferrous metal surfaces shall be measured for compliance with the specified minimum profile. The surface profile for concrete shall comply with SSPC 13/NACE 6 Table 1 for severe service.

3-6.02. Visual Inspection. The surface of the protective coatings shall be visually inspected.

3.6.03. Film Thickness. Coating film thickness shall be verified by measuring the film thickness of each coat as it is applied and the dry film thickness of the entire system. Wet film thickness shall be measured with a gauge that will measure the wet film thickness within an accuracy of ±0.5 mil. Dry film thickness shall be measured in accordance with SSPC-PA 2.

3-7. FIELD PRIMING SCHEDULE. In general, steel and cast iron surfaces of equipment are specified to be shop primed. Any such surfaces which have not been shop primed shall be field primed. Damaged or failed shop coatings which have been determined unsuitable by ENGINEER shall be removed and the surfaces shall be field coated, including prime coat (if any).
Galvanized, aluminum, stainless steel, and insulated surfaces shall be field primed. Primers used for field priming, unless otherwise required for repair of shop primers, shall be:

Surface To Be Primed	Material
Equipment, surfaces to be coated with	
Aliphatic polyurethane	Universal primer.
Epoxy enamel	Same as finish coats.
Steel and cast iron, surfaces to be coated with	
Epoxy enamel	Same as finish coats.
Aluminum	Epoxy enamel.
Galvanized	Epoxy enamel.
Copper	Epoxy enamel.
Stainless steel	Epoxy enamel.
Plastic surfaces, including PVC and FRP	Same as finish coats.
Insulated piping	As recommended by manufacturer of finish coats.
Concrete, surfaces to be coated with epoxy enamel	
For dampproofing	Epoxy enamel.
For all other surfaces	Epoxy concrete filler and surfacer.
Concrete block exposed in exterior locations	Epoxy concrete block filler.
Concrete block to be coated with epoxy enamel	Epoxy concrete block filler.

Unless otherwise recommended by the coating manufacturer or specified herein, priming will not be required on concrete, or concrete block, nor on metal surfaces specified to be coated with epoxy enamel coatings. Concrete surfaces to be coated with epoxy enamel shall be filled with epoxy concrete filler and surfaced

so that a continuous film is obtained, except where concrete is dampproofed with epoxy enamel.

3-8. FINISH COATING SYSTEMS. The following schedule lists coatings systems and coating system designations.

No.	Finish Coating Systems	Coating System Designation						
		A	C	E	F	G	H	P
1.	Epoxy enamel – One coat	x			x	x		
2.	Epoxy enamel – Two coats	x	x	x	x	x		x
3.	Epoxy enamel / NSF – Two coats	x	x	x				
4.	Epoxy enamel – Three coats	x	x	x				
5.	Epoxy enamel / NSF – Three coats	x	x	x				
6.	Epoxy enamel – First coat Aliphatic polyurethane – Finish coat	x	x	x	x	x		x
7.	Epoxy enamel – First and second coat Aliphatic polyurethane – Finish coat			x	x	x		
8.	Universal primer – First coat Aliphatic polyurethane – Finish coat	x		x				
9.	Medium consistency coal tar – Two coats	x	x	x				
10.	Coal tar epoxy – One coat	x		x				
11.	Vinyl ester – Two coats			x				

3-8.01. Surfaces to be Finish Coated. Unless otherwise specified, the following surfaces shall be finish coated:

Surfaces	Finish Coating System
Structural and miscellaneous steel exposed to view or to the elements in exterior locations; non-galvanized	A6
Structural and miscellaneous steel exposed to view inside buildings. (Galvanized surfaces are not to be coated unless as required	A2
Metal curbs for skylights and power roof ventilators.	A1
Heating and air conditioning units, convector covers, electrical equipment cabinets, and similar Items and equipment (unless factory finished) exposed to view	E8
Cast iron and steel piping inside buildings, including valves, fittings, flanges, bolts, supports, and accessories, and galvanized surfaces after proper priming	A2
Cast iron and steel piping above grade exposed to the elements and to view outdoors, including valves, fittings, flanges, bolts, supports, and accessories, and galvanized surfaces after proper priming	A6
Copper pipe and tubing, including fittings and valves.	F1
Copper pipe and tubing, including fittings and valves exposed to view in exterior locations	F6
All metal surfaces, unless otherwise specified, which will be submerged or buried, all or in part, including valves, but excluding piping laid in the ground	E3
Miscellaneous castings, including manhole rings and covers, and manhole steps. (One coat, if not shop coated.)	E3
Cast iron and steel piping in manholes, wetwells, and similar locations, including valves, fittings, flanges, bolts, supports, and accessories.	E5
All metal harness anchorage for buried piping.	A9
Aluminum and galvanized ductwork indoors.	F1 or G1
Aluminum and galvanized ductwork exposed to elements outdoors.	F6 or G6

3-8.02. Surfaces Not To Be Coated. Unless otherwise specified, the following surfaces shall be left uncoated:

Exposed aluminum, except ductwork.

Polished or finished stainless steel. Unfinished stainless steel, except flashings and counter flashings, shall be coated.

Nickel or chromium.

Galvanized surfaces, except piping, conduit, ductwork, and other items specifically noted.

Rubber and plastics, except as specified.

Exterior concrete.

Surfaces specified to be factory finished.

3-8.03. Shop Finishing. All other surfaces where blast cleaning cannot be or is not recommended to be performed in the field or where otherwise specified shall be shop finished. Shop finishing shall be in accordance with the coating schedule and the manufacturer's recommendations.

3-8.04. Field Coating. Surfaces not indicated to be shop finished and surfaces where blast cleaning can be performed in the field shall be field coated. Field coating shall be in accordance with the field priming schedule, the coating schedule, and the manufacturer's recommendations.

3-9. PIPING IDENTIFICATION SCHEDULE. Exposed piping and piping in accessible chases shall be identified with lettering or tags designating the service of each piping system, shall be marked with flow directional arrows, and shall be color coded as required.

3-9.01. Location. Lettering and flow direction arrows shall be provided on pipe near the equipment served, adjacent to valves, on both sides of wall and floor penetrations, at each branch or tee, and at least every 50 feet in straight runs of pipe. If, in the opinion of ENGINEER, this requirement will result in an excessive number of labels or arrows, the number required shall be reduced as directed.

3-9.02. Metal Tags. Where the outside diameter of pipe or pipe covering is 5/8 inch or smaller, aluminum or stainless steel tags shall be provided instead of lettering. Tags shall be stamped as specified and shall be fastened to the pipe with suitable chains. Pipe identified with tags shall be color coded as specified.

3-9.03. Lettering. Lettering shall be painted or stenciled on piping or shall be applied as snap-on markers. Snap-on markers shall be plastic sleeves, Brady "Bradysnap-On B-915" or Seton "Setmark". Letter size shall be as follows:

Outside Diameter of Pipe or Covering	Minimum Height of Letters
5/8 inch and smaller	Metal tags -1/4 inch
3/4 to 4 inches	3/4 inch
5 inches and larger	2 inches

3-9.04. Color Coding and Lettering. Electrical conduit shall be coated to match adjacent ceiling or wall surfaces as directed by ENGINEER. Vent lines shall be coated to match surfaces they adjoin.

In addition, valve handwheels and levers shall be painted red.

Numerals at least 2 inches high shall be painted on or adjacent to all accessible valves, pumps, flowmeters, and other items of equipment which are identified on the Drawings or in the specifications by number.

End of Section

SURFACE DESCRIPTION	SYSTEM NO. -

SURFACE PREPARATION DESCRIPTION

- ☐ Solvent SSPC-SP1
- ☐ Ferrous Metal Nonimmersion SSPC-SP6
- ☐ Ferrous Metal Immersion
  - ☐ SSPC-SP10
  - ☐ SSPC-SP-5
- ☐ Other

COATING	DFT mils	MANUFACTURER AND PRODUCT
First Coat (Primer)		
Second Coat		
Third Coat		
Total System		Not less than minimum thickness specified.

Notes: (Attached if needed.)

Project: **San Luis Obispo Nacimiento Water Project**		
Coatings Manufacturer:		Initials _____
Painting Applicator:		Initials _____
BLACK & VEATCH	**Coating System Data Sheet**	**Fig 1-09940**

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SURFACE DESCRIPTION	SYSTEM NO. - -F

SURFACE PREPARATION DESCRIPTION
☐ Solvent SSPC-SP1 ☐ Other:

COATING	DFT mils	MANUFACTURER AND PRODUCT
Shop (Primer)		(Identify Product/Type)
Touchup		
Intermediate Coat		
Finish Coat		
Total System		Not less than minimum thickness specified.

Notes: (Attached if needed.)

Project: **San Luis Obispo Nacimiento Water Project**		
Coatings Manufacturer:		Initials _____
Painting Applicator:		Initials _____
BLACK & VEATCH	**Coating System Data Sheet**	**Fig 2-09940**

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Section 09945

EXTERIOR COATING FOR EXPOSED DUCTILE IRON PIPE

PART 1 - GENERAL

1-1. SCOPE. This section includes materials, application, and testing of an amine cured ceramic pigment epoxy formulated for use as an external coating for ductile iron pipe and fittings in exposed service, and as an acrylic gloss enamel topcoat.

Related work specified elsewhere includes Section 09940, “Protective Coatings,” and Section 15061, Ductile Iron Pipe.”

1-2. SUBMITTALS. CONTRACTOR shall submit the following items in accordance with the requirements specified in Section 01300, “Submittals.”

- Submit manufacturer's data sheets showing the following information:
  1. Percent solids by volume.
  2. Recommended surface preparation.
  3. Recommended thinners.
  4. Application instructions including recommended equipment and temperature limitations.
  5. Curing requirements and instructions.
- Provide submittal identifying the type and gradation of abrasives used for surface preparation.

PART 2 - PRODUCTS

2-1. GENERAL.

The coating shall be high solids, solvent free, fast curing two-component epoxy formulated especially to coat the exterior of ductile iron pipe for aggressive atmospheres. Product: Ceramawrap Epoxy or equal.

Topcoat shall be a single component, water borne, chemical and corrosion resistant, acrylic gloss enamel. Topcoat shall not contain lead or chromates and shall conform to ANSI/AWWA D102-03. Product: Aquanaut© Acrylic Gloss Enamel by Induron or equal. Color: Forest Green (Induron color 5256).

2-2. COATING THICKNESS. Coating thicknesses shall be as follows:

- Apply coating to pipe exterior to a total thickness of 25 mils.
- Apply Acrylic Gloss Enamel topcoat to a total thickness of 1.5 mils.

2-3. COATING PROPERTIES. Coating properties shall be as follows:

TEST	RESULTS
20% Sulfuric Acid Immersion	After 1 year 8 months exposure; no effect when rated using ASTM D-714.
25% Sodium Hydroxide Immersion	After 1 year 8 months exposure; no effect when rated using ASTM D-714.
5% Sodium Chloride Solution (Salt Water) Immersion Unscribed panel	After 1 year 8 months exposure; no effect when rated using ASTM D-714.
5% Sodium Chloride Solution (Salt Water) Immersion Panel Scribed to Metal	After 1 year 8 months exposure; none to very slight underfilm corrosion at the scribe; no effect when rated using ASTM D-714.
Distilled Water Immersion	After 1 year 8 months; no effect when rated using ASTM D-714.
Salt Fog (5% Sodium Chloride Solution Mist at 95°F) Scribed Panel	After 1 year 8 months exposure; none to very slight underfilm corrosion at the scribe; no effect when rated using ASTM D-714.
Impact Resistance for Pipe Line Coatings ASTM G-14	Passed - 140 in./lbs.
Standard Test Method for Resistance to Cathodic Disbondment by the attached Cell Method ASTM G-95	No coating surface irregularities, (No blistering or hydrolysis) 7.1mm average disbondment after 30 days
Standard Test Method for Permeability ASTM D-1653	0.00 Metric Perms

2-4. TOPCOAT PROPERTIES. Topcoat properties shall be as follows:

TEST	**RESULTS**
Adhesion to Steel ASTM D 3359-87 Method B 5B	Rating (No Adhesion Loss)
Adhesion (5 yr.) to old Alkyd	Elcometer Adhesion > 400 psi Old Alkyd Fails, No Loss of Adhesion
Impact Resistance ASTM D 2794-84	130 in./lbs.
Direct Mandrel Flex ASTM D 522-88 Method A	1/4" Diameter Bend No Cracking
Chemical Resistance Spot Testing 300 Hours Exposure	Distilled Water No Effect 5% Salt Water No Effect 10% Sodium Hydroxide No Effect 50% Sodium Hydroxide No Effect Propylene Glycol No Effect Motor Oil No Effect
Salt Spray Resistance ASTM B 117	500 Hours No Undercut at Scribe No Blistering or Corrosion on Face of Panel
Salt Spray Resistance ASTM B 117	500 Hours <1/16" Undercut at (1.5 mils Finish Only) Scribe. No Blistering or Corrosion
QUV Exposure Color Change Continuous UV 1,000 Hours	<1.0 McAdam Unit PANEL: Cold Rolled Steel

2-5. ABRASIVES FOR SURFACE PREPARATION. Abrasives used for preparation of iron surfaces shall be one of the following:

- 16 to 30 or 16 to 40 mesh silica sand or mineral grit.
- 20 to 40 mesh garnet.
- Crushed iron slag, 100% retained on No. 80 mesh.
- SAE Grade G-40 or G-50 iron or steel grit.

PART 3 - EXECUTION

3-1. SURFACE PREPARATION.

Pipe Condition - All pipes shall be delivered to the coating applicator bare. Because removal of old coatings may not be possible, the intent of this specification is that the entire exterior of the ductile iron pipe or fitting shall not have been coated with any substance prior to the application of the specified coating material.

Surface Preparation - The entire surface to be coated shall be abrasive blasted. The intent of this specification is that 100% of the surface be struck by the blast media so that all loose oxides and rust are removed.

3-2. COATING OF PIPE. After surface preparation and within 8 hours of surface preparation, the entire exterior surface up to the gasket grove with the exception of the spigot end, shall receive an average of 25 mils, 20 mils minimum, of epoxy. If any rusting is apparent prior to coating the surface, the entire area must be re-blasted as specified.

3-2.01. Coating of the Pipe Ends – Gasketed Joints

Due to the tolerances involved, the spigot end from the gasket area to the end of the spigot shall be coated with 6 mils average, 10 mils maximum of Epoxy. Care should be taken that the epoxy is smooth without excess buildup on the spigot end.

3-2.02. Testing of Coating

The film thickness of the coating shall be checked using a magnetic film thickness gauge. Measurements shall be taken per SSPC PA2 Section 5.1.

The coated areas of the pipe from the socket edge area of the spigot back to the bell face shall be tested for pinholes using a 2000-volt pinhole detection test. Any pinholes found shall be repaired prior to shipment.

3-3. THICKNESS MEASUREMENT AT PLACE OF MANUFACTURE

Test coatings per NACE RP01-88 with a high-voltage holiday detector set at the voltage per NACE RP01-88, Table 1. If the number of holidays or pinholes is fewer than one per 25 square feet of coating surface for internal coatings and one per 10 square feet for external coatings, repair the holidays and pinholes by applying the coating manufacturer's recommended polyurethane patching compound to each holiday or pinhole and retest. If the number of pinholes and holidays exceeds the above criteria, remove the entire coating and recoat the

item or pipe at the place of manufacture. Recoating will be permitted if the material has cured less than the manufacturer's recommended cure time.

Measure the coating thickness on each pipe section using a coating thickness gauge calibrated at least once per eight-hour shift. 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 gauge readings for each spot measurement of either the substrate or the paint. Move the probe a distance of 1 to 3 inches for each new gauge reading. Discard any unusually high or low gauge reading that cannot be repeated consistently. Take the average (mean) of the three gauge 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% of the specified thickness. One of three readings that are averaged to produce each spot measurement may under run by a greater amount. If a section of the pipe, item, or piece of equipment does not meet these criteria, remove the entire coating and recoat the entire item or piece of equipment.

3-3.01. Acceptance Criteria. Thickness determinations shall be conducted using a Type 1 or 2 thickness gauge as described in SSPC PA2 specification. Thickness determinations shall meet the following requirements:

- No individual reading shall be below 75% of specified minimum.
- Individual spot readings (consisting of three point measurements within 3 inches of each other) shall have an average not less than 80% of minimum.
- The average of all spot readings shall be equal to or greater than the minimum thickness specified.

3-3.02. Repair of Improperly Coated Surfaces at Place of Manufacture. If the item has an insufficient film thickness and the coating material curing time has not been exceeded, clean and topcoat the surface with the specified polyurethane repair coating to obtain the specified coverage. Sandblast or power-sand visible areas of chipped, peeled, or abraded coating, feathering the edges. Then re-coat in accordance with the specifications. Work shall be free of runs, bridges, shiners, laps, or other imperfections.

3-4. IN-PLANT INSPECTION AND TESTING BY DISTRICT'S REPRESENTATIVE

A DISTRICT representative may inspect pipe, fittings, and coating, and other material during fabrication at the mill, production plant, or shop. The DISTRICT representative shall be allowed complete and unlimited access to all parts of the work and shall be furnished with such information and assistance by the

CONTRACTOR and/or manufacturer as is required to make a complete and detailed inspection. The CONTRACTOR shall notify the ENGINEER at least seven (7) days prior to beginning of material production and application.

The DISTRICT may conduct tests to determine the integrity of the coating. Pipe and fittings shall be available onsite and accessible at least three (3) days before installation to allow time for the DISTRICT'S tests. If the test results indicate any manufacturing defect, the material shall be repaired or replaced at no extra cost to the DISTRICT. The DISTRICT'S representative will make a determination on whether to repair or reject defective or damaged pipe or fitting.

3-5. MANUFACTURER TESTING AND CERTIFICATION. Every section of pipe and fitting shall be delivered with certified test results of that individual pipe section or fitting. If a pipe or fitting is not accompanied by such certifications or does not meet the tests as described above, the pipe or fitting will be rejected.

3-6. FIELD REPAIR AND TOUCH UP.

Any areas where damage has occurred due to handling shall be repaired using the same epoxy prior to installation as the original coating. Apply at a film thickness of 20-25 mils dry.

Apply product only if the substrate temperature and ambient air temperature is above 45°F and is expected not to drop below 45° for at least two hours after application. The substrate temperature shall be 5°F above the dew point for a period of at least two hours after application to avoid condensation occurring on wet paint. Do not apply epoxy over wet or frozen surfaces. Overcoat with the same material as specified above.

3-7. ON-SITE STORAGE.

All pipes shall be handled with belt slings and padded forks to avoid damage. All shipping timbers and straps should be padded when shipping pipe.

The maximum delivery, storage, and installation time allowed for pipes and fitting is 120 days from the date they were lined to the date they are installed. Any pipe not meeting this requirement will be rejected.

End of Section

DIVISION 13
SPECIAL CONSTRUCTION

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Section 13210

PREFABRICATED METAL BRIDGES

PART 1 - GENERAL

1-1. SCOPE. This section includes materials and installation of fully engineered clear span prefabricated metal bridges.

Related work specified elsewhere includes:

- Section 02200 – “Earthwork”
- Section 03300 – “Cast In-Place Concrete”
- Section 05550 – “Anchorage in Concrete and Masonry”
- Section 05990 – “Structural and Miscellaneous Metals”
- Section 09940 – “Protective Coatings”
- Section 09945 – “Exterior Coating for Ductile Iron Pipe”

1-2. SUBMITTALS. Submit the following items in accordance with Section 01300, "Submittals."

- Submit manufacturer's catalog data describing the bridge construction and components. Submit design and erection drawings; shop painting and finishing specifications; instruction manuals; and other data shall describe the design, materials, sizes, layouts, construction details, fasteners, and erection.

- For metal bridge design, submit engineering design calculations for structural components, bracing, equipment supports, and anchor bolts. A civil or structural engineer registered in the state of California shall sign design calculations. For computer programmed designs, submit the stress values utilized in the analysis and a certificate, signed by a civil or structural engineer registered in the state of California, stating the design criteria and procedures used and attesting to the adequacy and accuracy of design.

- Submit certificate that the design meets the applicable local and regional building codes.

- Submit erection drawings and diagrams. Submit bridge support reactions. Show base anchor details and anchor bolt sizes. Show girder and/or truss bracing.

- Submit color charts of the colors available if not specifically identified in this specification.

- Manufacturer's Schematic Drawings and Diagrams: Shop drawings shall be unique drawings, prepared to illustrate the specific portion of the work to be done. Manufacturer's standard forms requiring only filling in of blank spaces shall not be acceptable unless all non-applicable information is deleted and such standard forms are modified to reflect exact requirements and conditions unique to the project. All relative design information such as member sizes, reactions, and general notes shall be clearly specified in the drawings. Shop drawings shall be accurately prepared by skilled draftsmen shall be complete in every respect. Drawings shall have cross-referenced details and sheet numbers. All drawings shall be signed and sealed by a registered professional engineer, registered in the state of California.

1-3. GUARANTEE. Bridges shall be guaranteed against detrimental weathering or structural defects caused by ordinary wear and tear by the elements for a period of five (5) years. Such guarantee is in addition to the guarantee required in the General Conditions and shall start upon final acceptance of the Work by the DISTRICT.

PART 2 - PRODUCTS

2-1. MANUFACTURERS. Prefabricated metal bridges shall be manufactured by Continental Bridge, Alexandria, Minnesota, or equal.

2-2. DESIGN CRITERIA

The bike path bridge shall be of the size and shape shown, complete with all accessories. Determine anchor bolt layouts before placing concrete footings, walls, or slabs to support the bridge.

The design of the bridge and components shall be in accordance with American Association of State Highway and Transportation Officials (AASHTO) with interims and revisions by Caltrans.

2-2.01. Span and Width.

- Bridge shall be 115 feet 4 inch (straight-line dimension) from begin bridge to end bridge with a clear span truss of 112 feet 3 inches.

- Bridge inside width shall be 6 feet 0 inches between the truss girders.

2-2.02 Geometry:

- Half through (pony truss) utilizing an "H" section design where the floor system is raised above the truss bottom chord.

- Height: Top of top chord shall be 6 feet 0 inch above the deck surface.

- One diagonal per panel. Chords, diagonals, verticals, and stringers shall be of tube steel. Floor beams shall be wide flange material that bolts in place in the field.

2-2.03. Camber: Bridge camber at center of bridge span shall be for dead load camber only.

- ASTM A500 Grade C cold-formed welded square and rectangular tubing (Fy = 50,000 psi), ASTM A588, ASTM A242, ASTM A572, ASTM A606 (Fy = 50,000 psi), ASTM A36 (Fy = 36,000 psi) plate and structural steel shapes ASTM A992. Splice plates shall be ASTM A588.

- Field splices shall be fully bolted with ASTM A 325 Type 3 high strength bolts in accordance with "Specifications for Structural Joints Using ASTM A 325 or A 490 Bolts."

- Decking: Bridge shall be provided with a galvanized steel grating walkway. Walkway shall have toe plates or channels on each side of the decking.

2-2.04. Design Loads: Design all bridges for the dead load, specified live load, and the combinations of these loads as set forth in the AASHTO publication. Reduction of loads due to tributary loaded area is permitted. Include the following loads in addition to the dead load:

- Live load, wind load, and seismic loads as required by the Caltrans modified AASHTO.

- Weights of all pipe, pipe supports, and equipment supported by the structure. Design for two 18” ductile iron pipes, one to be installed in the future, assuming 100 lb/ft. dead load each, and water weight 110 lb/ft. each.

- Uniform Live Load: Main supporting members (girders, trusses, and arches) shall be designed for a pedestrian live load of 85 psf of bridge walkway area. Secondary Members: Bridge decks and supporting floor systems, including secondary stringers, floor beams, and their connections to main supporting members shall be designed for a live load of 85 psf, with no reduction allowed. Water in pipe: 62.4 lbs/cu. ft.

- Vehicle Loads: None.

- Wind Load: The bridge(s) shall be designed for a wind load of 35 psf on the full vertical projected area of the bridge as if enclosed. The wind load shall be applied horizontally at right angles to the longitudinal axis of the structure. The effect of forces tending to overturn structures shall be calculated assuming that the wind direction is at right angles to the longitudinal axis of the structure. In addition, an upward force shall be applied at the windward quarter point of the transverse superstructure width. This force shall be 20 psf of deck.

- Top Chord Railing Loads: The top chord, truss verticals, and floor beams shall be designed for lateral wind loads (per paragraph 8.c) and for any loads required to provide top chord stability; however, in no case shall the load be less than 50 pounds per lineal foot or a 200-pound point load, whichever produces greater stresses, applied in any direction at any point along the top chord.

- Seismic Loads: In accordance with Section 01605.

2-2.05. Load Combinations. Load combinations shall be per Caltrans load combinations.

2-2.06. Design Limitations.

- Deflection: The vertical deflection of the main trusses due to service pedestrian live load shall not exceed 1/500 of the span. The deflection of the floor system members (floor beams and stringers) due to service pedestrian live load shall not exceed 1/360 of their respective spans. The horizontal deflection of the structure due to lateral wind loads shall not exceed 1/500 of the span under a 35-psf wind load.

- Minimum Thickness of Metal: The minimum thickness of all structural steel members shall be 1/4 inch nominal and be in accordance with the AISC Manual of Steel Constructions' "Standard Mill Practice Guidelines." For ASTM A500 and ASTM A 847 tubing, the section properties used for design shall be per the Steel Tube Institute of North America's Hollow Structural Sections "Dimensions and Section Properties."

2-2.07. Governing Design Codes/References.

- Structural Steel Allowable Stresses: Allowable design stresses shall be in accordance with AASHTO "Standard Specifications for Highway Bridges" latest edition with Caltrans interim specifications.

- Welded Tubular Connections: All welded tubular connections shall be checked, when within applicable limits, for the liming failure modes outlined in the ANSI/AWS D1.1 Structural Welding Code or in accordance with the

"Design Guide for Hollow Structural Section Connections" as published by the Canadian Institute of Steel Construction (CISC). When outside the "validity range" defined in these design guidelines, all applicable limit states or failure modes shall be checked.

- Top Chord Stability. The top chord of a half-through truss shall be considered as a column with elastic lateral supports at the panel points. The critical buckling force of the column, so determined, shall exceed the maximum force from dead load and live load (uniform or vehicular) in any panel of the top chord by not less than 50% for parallel chord truss bridges or 100% for tied arch bridges. The design approach to prevent top chord buckling shall be as outlined by E. C. Holt's research work in conjunction with the Column Research Council on the stability of the top chord of a half-through truss.

  In addition, for the dead load plus live load combination, the spring constant "C" furnished by the transverse "U-frames" shall not be less than "C" required as defined by:

$$C\,\text{required} = \frac{1.46P_c}{L}$$

  where P_c is the maximum top chord compression due to dead load plus the live load times the appropriate safety factor (1.5 for parallel chord truss bridges or 2.0 for tied arch truss bridges) and L is the length in inches of one truss panel or bay.

  For uniformly loaded bridges, the vertical truss members, the floor beams, and their connections (transverse frames) in half-through truss spans shall be proportioned to resist a lateral force of not less than 1/100k times the top chord compressive load, but not less than 0.004 times that top chord load, applied at the top chord panel points of each truss.

  For bridges with live loads, the lateral force applied at the top chord elevation for design of the transverse frames shall not be less than 1% of the top chord compression due to dead load plus any live loading.

  The bending forces in the transverse frames, as determined above, act in conjunction with all forces produced by the actual bridge loads as determined by an appropriate analysis which assumes that the floor beams are "fixed" to the trusses at each end.

  The effects of three-dimensional loading (including "U-frame" requirements) shall be considered in the design of the structure. The "U-frame" forces in

half-through spans shall be added to the forces derived from a three-dimensional analysis of the bridge.

- Design structural steel members in accordance with the "Manual of Steel Construction: Allowable Stress Design" as adopted by the American Institute of Steel Construction (AISC), latest edition. Design structural cold-formed steel framing members in accordance with AISI publication, "Specification for the Design of Cold-Formed Steel Structural Members."

- Welded tubular structural design shall be in accordance with the Structural Welding Code (ANSI/AWS D1.1), Chapter 10, "Tubular Structures."

2-3. BRACING. Provide erection bracing and layout. Base size of bracing upon a wind load as specified herein. Provide flange bracing.

2-4. ASSEMBLY. The size of the prefabricated components and the field connections required for erection shall permit efficient assembly and disassembly. The maximum size of any shop-assembled component of the bridge shall permit transportation from factory to site by commercial carrier. Clearly and legibly mark each and every piece and part of the assembly to correspond with previously prepared erection drawings, diagrams, and/or instruction manuals.

2-5. FINISHING. All structural steel, after fabrication, shall be blast cleaned in accordance with SSPC SP-10 commercial blast cleaning, latest edition.

2-6. PAINTING OF CHORDS, BEAMS, COLUMNS, BRACING, AND STRUTS. Coat per Section 09940, System No. A6. Color of finish coat shall be selected by the DISTRICT.

2-7. BEARING PADS. Fabric-reinforced bearing pads shall conform to the requirements set forth in Section 51-1.12H of the Standard Specifications, State of California, Department of Transportation.

PART 3 - EXECUTION

3-1. STORAGE AND PROTECTION. Deliver, store, handle, and erect prefabricated components, sheets, panels, and other manufactured items such that they will not be damaged or deformed. Stock materials stored on the site before erection on platforms or pallets and cover with tarpaulins or other weatherproof covering. Store metal sheets, panels, or frames so that water accumulated during transit or storage will drain off. Do not store components in contact with materials that may cause staining. Upon arrival on the jobsite, remove moisture on sheets and panels, restack, and protect until used.

3-2. FABRICATION. Workmanship, fabrication, and shop connections shall be in accordance with AASHTO specifications. Welding operators shall be properly accredited, experienced operators, each of whom shall submit satisfactory evidence of experience and skill in welding structural steel with the kind of welding to be used in the work and who has demonstrated the ability to make uniform good welds of the type required.

3-3. DELIVERY AND ERECTION. Delivery of the bridge shall be made to a location nearest the site that is accessible to over-the-road trucks. The bridge manufacturer shall coordinate with the CONTRACTOR in advance of the expected time of arrival at the site.

The manufacturer or his representative shall instruct the CONTRACTOR or his representative in the proper lifting procedure for the unloading and erection of the bridge. Care shall be taken to prevent damage to the finish of the bridge.

Erect in accordance with the manufacturer's erection instructions and drawings and the requirements herein. Insulate incompatible dissimilar materials that are in contact by means of gaskets or insulating compounds. Keep exposed surfaces clean and free from sealant, metal cuttings, and other foreign materials.

Accurately set anchor bolts by template while the concrete is in a plastic state. Provide uniform bearing under base plates and sill members using a non-shrink grouting mortar.

Accurately space members to assure proper fitting of covering. As erection progresses, securely fasten the work and brace to resist vertical loads and horizontal wind or earthquake loads.

3-4. FIELD PAINTING. Touch up factory-coated finish surfaces with the bridge manufacturer's touch-up paint for the particular finish coat used.

Touch up the prime coat per Section 09940 before applying the finish coat. Apply finish coat before installing side-wall panels.

End of Section

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Section 13540

FIBER OPTIC CABLES, HARDWARE, AND ACCESSORIES

PART 1 - GENERAL

1-1. SCOPE. This section covers the furnishing and installation of fiber optic cable systems to provide communications for the Computer Control System as indicated on the Drawings.

All work shall be performed in accordance with the Drawings, Specifications and County of San Luis Obispo Standard for Data and Voice Cabling, a copy of which is included for reference in Appendix F.

1-2. SUBMITTALS. Submittals shall be made in accordance with the requirements of Section 01300, “Submittals”.

1-2.01. Drawings and Data. All material and equipment documentation shall be submitted for review. Each sheet of descriptive literature submitted shall be clearly marked to identify the material or equipment.

Submitted product data shall include:

a. Cut sheets and catalog literature for proposed fiber optic cable, and fiber optic cable accessories (pigtails, connectors, etc.)

b. Manufacturer specifications and data that clearly shows that the fiber optic cable meets all requirements specified herein.

c. Sample of the proposed cable.

d. Physical dimension drawings of all fiber optic accessories.

e. Proposed fiber identification sequence and labeling.

f. Provide off-line maintenance aids and on-line diagnostics to check the performance of the communication links and interfaces of devices on the data highway.

g. Provide a Recommended Spare Parts List (RSPL).

h. Provide a list of recommended special tools for fiber installation testing or maintenance.

i. Point-to-point fiber diagrams showing all fibers, all patch panels, and where each fiber is terminated.

1-2.02. Operations and Maintenance Manuals. Operation and Maintenance Manuals shall have the following items included in addition to those items specified in other sections:

a. Description of all components.

b. Methods of connection.

c. Connection diagram.

d. OTDR trace plots for all fibers.

1-3 SHIPMENT, PROTECTION, AND STORAGE. Equipment provided under this section shall be shipped, protected, and stored in accordance with the requirements of Section 01600.

1-4. QUALIFICATIONS. CONTRACTOR shall subcontract the work specified herein to a qualified Telecommunications Subcontractor. The Telecommunications Subcontractor may design data and voice cabling and subcontract the installation to another subcontractor or perform both design and installation. In either case, all contractors must meet the qualifications for any portion of the work they perform.

Qualifications for Telecommunications Subcontractors that perform design work:

- Any person who designs any data or voice cabling for this project shall be a BICSI RCDD (Registered Communication Distribution Designer) and a full-time employee of the Telecommunications Subcontractor.

- Two (2) copies of RCDD certification(s) shall be submitted during the pre-construction meeting.

- Any person who designs any data or voice cabling for this project shall be thoroughly familiar with the cabling methods set forth in the latest release of the BICSI TDMMs (Telecommunications Distribution Methods Manuals).

- The Telecommunications Subcontractor shall submit two (2) copies of documentation of at least five (5) years experience in design of structured cable systems during the pre-construction meeting.

- The Telecommunications Subcontractor shall submit two (2) copies of a written list of completed projects equivalent in size and complexity to this project, with a reference name, title, company, address, and telephone number for each during the pre-construction meeting.

Qualifications for Telecommunications Subcontractors that perform installation work:

- The Telecommunications contractor shall have at least one person acting as project manager/engineer for this project who is both a BICSI RCDD (Registered Communication Distribution Designer) and a full-time employee of the Telecommunications Subcontractor. Two (2) copies of RCDD certification(s) shall be submitted during the pre-construction meeting.

- The Telecommunications Subcontractor shall be thoroughly familiar with the cabling methods set forth in the latest release of the BICSI TDMMs (Telecommunications Distribution Methods Manuals) and unless otherwise specified, shall supervise the installation in accordance with the recommendations and practices outlined in the latest release of the BICSI TDMMs.

- The Telecommunications Subcontractor shall be an approved Ortronics Certified Installer at a Plus tier (CIP, CIP-Gold, CIP-Platinum, and multisitelnational contractors) or Berk-Tek Certified OASIS Integrator. The Telecommunications Subcontractor is responsible for workmanship and installation practices in accordance with the Ortronics CIICIP Program and Berk-Tek OASIS Program.

- The Telecommunications Subcontractor shall submit during the pre-construction meeting two (2) copies of documentation of at least five (5) years experience in installation and maintenance of structured cable systems.

- The Telecommunications Subcontractor shall submit during the pre-construction meeting two (2) copies of a written list of completed projects equivalent in size and complexity to this project, with a reference name, title, company, address, and telephone number for each.

- During the pre-construction-meeting, the Telecommunications Subcontractor shall submit two (2) copies of a written list of qualified technicians assigned to this project, including relevant manufacturers' training programs and years of related experience completed by each. At least 20 percent of the optical fiber installation and termination crew must be certified by Berk-Tek and Ortronics or other approved organizations in Optical Fiber installation and termination practices.

PART 2 - PRODUCTS

2-1. GENERAL. All fiber optic cable and fiber optic hardware and accessories shall be designed, assembled and connected in accordance with the requirements of these specifications and the Drawings. All fiber optic cable used shall be single-mode.

2-2. SINGLE MODE FIBER OPTIC CABLE. The fiber optic cable shall meet all of the requirements of the following paragraphs.

a. The fiber optic cable shall meet the following requirements of the National Electrical Code (NEC) Section 770.

b. Riser Applications – Applicable Flame Test UL 1666.

c. Finished cables shall conform to the applicable performance requirements of Table 8-6 and 8-7 in the Insulated Cable Engineers Association, Inc. (ICEA) Standard for Fiber Optic Premises Distribution Cable (ICEA S-83-596).

d. Every fiber in the cable shall be usable and meet required specifications.

e. All optical fibers shall be sufficiently free of surface imperfections and inclusions to meet the optical, mechanical, and environmental requirements of this specification.

f. Each optical fiber shall consist of a doped silica core surrounded by a concentric glass cladding. The fiber shall be a matched clad design.

g. All optical fibers shall be proof tested by the fiber manufacturer at a minimum load of 100 kpsi.

h. All optical fibers shall be 100 percent attenuation tested. The attenuation shall be measured at 850 nm, and 1300 nm for multimode fibers. The attenuation shall be measured at 1310 nm and 1550 nm for single-mode fibers. The manufacturer shall store these values for a minimum of 5 years. These values shall be available upon request.

i. The optical fibers shall be of SMF-28e classification, or otherwise be compliant with ITU-T G.652-C and G.652-D.

j. The dispersion unshifted single-mode fiber utilized in the cable specified herein shall conform to the specifications herein.

k. Cladding Diameter: 125.0 + 1.0 μm.

l. Core-to-Cladding Offset: < 0.8 μm.

m. Cladding Non-Circuladty: < 1.0%.

n. Coating Diameter: 245 ± 10 μm.

o. Colored Fiber Diameter: nominal 900 μm.

p. Attenuation Uniformity: No point discontinuity greater than 0. 1 0 dB at either 1310 nm or 1550 nm.

q. Attenuation at the Water Peak: The attenuation at 1383 ± 3 nm shall not exceed 2.1 dB/km.

r. Cutoff Wavelength: The cabled fiber cutoff wavelength(λccf,) shall be < 1260 nm.

s. Mode-Field Diameter: 9.30±0.50 μm at 1310 nm 10.50 ± 1.00 micrometers at 1550 nm.

t. Zero Dispersion Wavelength (λo): 1301.5 nm < λo < 1321.5 nm.

u. Zero Dispersion Slope (So): < 0.092 ps/(nm^2 *km).

v. Fiber Polarization Mode Dispersion (PMD): < 0.5 ps/(sq. km)

The storage temperature range for the cable on the original shipping reel shall be –40°C to +70°C. The operating temperature range shall be –40°C to +70°C. Testing shall be in accordance with FOTP-3.

Every fiber in the cable shall meet the following requirements:

a. The attenuation specification shall be a maximum attenuation for each fiber at 23 ± 5°C.

b. The attenuation of the cabled fiber shall be uniformly distributed throughout its length such that there are no discontinuities greater than 0.2 dB at 850 nm/1300 nm (multimode) in any one kilometer length of fiber.

c. Required Fiber Grade: Maximum Fiber Attenuation at 850 nm shall be 3.5 dB/km. Maximum Fiber Attenuation at 1310 nm shall be 0.35 dB/km for single mode fibers. Maximum Fiber Attenuation at 1550 nm shall be 0.25 dB/km.

Fiber optic cable shall meet the following construction requirements:

a. Optical fibers shall be placed inside a loose buffer tube. The nominal outer diameter of the buffer tube shall be 3.0 mm.

b. The cable shall contain 96 fibers. Each buffer tube shall contain up to 12 fibers.

c. The fibers shall not adhere to the inside of the buffer tube.

d. Each fiber shall be distinguishable from others by means of color coding in accordance with TIA/EIA-598-A, “Optical Fiber Cable Color Coding.”

e. The fibers shall be colored with ultraviolet (UV) curable inks.

f. Buffer tubes containing fibers shall also be color coded with distinct and recognizable colors in accordance with TIA/EIA-598-A, “Optical Fiber Cable Color Coding.”

g. In buffer tubes containing multiple fibers, the colors shall be stable during temperature cycling and not subject to fading or smearing onto each other. Colors shall not cause fibers to stick together.

h. The buffer tubes shall be resistant to kinking.

i. The cable jacket color shall be black.

j. Fibers may be included in the cable core to lend symmetry to the cable cross-section where needed. Fibers shall be placed so that they do not interrupt the consecutive positions of the buffer tubes. In dual layer cables, any fillers shall be placed in the inner layer. Fillers shall be nominally 3.0 nm in outer diameter.

k. The jacket shall be continuous, free from pinholes, splits, blisters, or other imperfections. The jacket shall have a consistent, uniform thickness; jackets extruded under high pressure are not acceptable. The jacket shall be smooth, as consistent with the best commercial practice. The jacket shall provide the cable with a tough, flexible, protective coating, able to withstand the stresses expected in normal installation and service.

l. The outer cable jacket shall be marked with the manufacturer's name or UL file number, date of manufacture, fiber type, flame rating, UL symbol, and sequential length markings every two feet (e.g. "62.5/125 MICRON – TYPE OFNR – (UL) 00001 Feet"). The print color shall be white.

m. The cable shall be all-dielectric, containing no metallic armoring or other metallic elements.

n. The outside diameter of the cable shall not exceed 0.75 inches.

o. Flammability – All cables shall comply with the requirements of the 1996 NEC Article 770. All cables shall pass UL 1666.

Fiber Optic Cable shall be OFS ADSS, Corning ADSS, or equal.

Note: The 12-strand fiber optic cable for installation at the Cuesta Tunnel shall meet all of the requirements specified for the fiber optic cable above, with the following optical fibers cable parameters specified by Central Coast Water Authority:

Cuesta Tunnel 12-Strand

OPTICAL FIBERS CABLE PARAMETERS

Parameters	
Fiber Type	SM Step index
Core Diameter	8.5 um ±5 um
Cladding Diameter	125 um ±2 um
Core/Clad Concentricity Error	≤1 um
Coating Diameter	250 um ±15 um
Attenuation: @ 1,300 nm @ 1,550 nm	 ≤0.4 db/km ≤0.3 db/km
Proof Test	50,000 psi
Chromatic Dispersion: Zero Dispersion Wavelength (Wo)	 Wo = 1301.5 to 1321.5 nm
Zero Dispersion Slope (So)	≤0.092 ps/nm²-km
Buffer Type	Loose tube, gel filled
Number of Fibers/ Buffer	6
Total Number of Fibers in Cable	12
Cable Member Strength	Dielectric
Cable Fill	Water blocking gel
Cut-Off Wavelength	1,140 to 1,330 nm
Mode Field Diameter	9.5 ±0.5 um @ 1,300 nm

The SM optical fiber is also operable at the 1,550 nm wavelength, with a minimum bending radius of 2 inches.

2-3. FIBER OPTIC PATCH PANELS. The fiber optic patch panels shall be used to provide SC-type connectors for jumpers which will connect the individual fibers to other fibers or equipment. The fiber optic patch panels shall meet the following requirements:

a. The patch panel shall be mountable in a 19” rack.

b. The patch panel shall contain 72 pre-terminated SC-type connectors.

c. The patch panel must be configured with color-coded, 2-meter pigtails for all 72 terminations.

The patch panel shall be ADC FL2000 series, Corning Evolant RCS series, or equal.

2-4. FIBER OPTIC SPLICE DRAWERS. The fiber optic splice drawers shall house fusion splices to splice the incoming fiber to the outgoing fiber or to the pigtails which terminate in the patch panel. The fiber optic splice drawers shall meet the following requirements:

a. The splice drawer must be mountable in a 19” rack.

b. The splice drawer must be configured to hold a minimum of 96 fusion splices.

c. Each tray within the splice drawer shall hold no more than 24 individual splices in shrink-wrap splice sleeves.

The splice drawers shall be ADC FL2000 series, Corning Evolant RCS series, or equal.

2-5. FIBER OPTIC JUMPER CABLES (PATCH CORDS). Fiber optic jumper cables shall be furnished and installed for equipment interfacing and between termination cabinets. The jumpers shall meet the following requirements:

a. The jumpers shall be 62.5/125 microns for operation at 1300 nm to match the application. They shall be tight-buffered and be protected by Kevlar-type strength material. The manufacturer of these cables shall be the same as that for fiber optic cable specified herein.

b. The jumpers shall be supplied with SC connectors on each end. They shall be long enough to run from the specific termination cabinet to the Fiber Optic Modules or other data highway equipment.

c. The jumpers shall meet or exceed FOTP standards for single-mode fiber optic patch cords.

Fiber optic patch cords shall be ADC FP series, Corning Ultra Series, or equal.

PART 3 - EXECUTION

3-1. INSTALLATION. The CONTRACTOR shall be responsible for the coordination of the installation of all cable furnished hereunder. The CONTRACTOR shall be responsible for the termination of all cable furnished hereunder.

3-1.01. Cable Damage. If the cable becomes damaged during installation, the CONTRACTOR shall stop work and notify the ENGINEER immediately. The DISTRICT and ENGINEER will decide whether to replace the entire reel of cable or to install a splice at the damaged section. If the DISTRICT decides to replace the entire reel of cable, the CONTRACTOR shall begin the installation at the last designated splice point. The damaged cable between these points shall be removed, coiled, tagged, and given to the DISTRICT. Installation of new cable to replace damaged cable shall not be a basis of extra payment or contract time. In addition to installation of the new cable, the CONTRACTOR shall reimburse the DISTRICT for the entire cost of the replacement reel of cable. This cost will be withheld from the Contract Price. If the DISTRICT decides to install a splice at the damaged point, and the cable is damaged a second time, the entire reel of damaged cable (and all subsequent damaged reels) shall be replaced with new reels at the CONTRACTOR'S expense.

3-1.02. Fiber Optic Cable Installation. The cable manufacturer shall provide installation procedures and technical support concerning the items contained in this specification. Fiber optic cable installation shall meet the following requirements:

a. All fiber optic cable shall be installed, terminated, and tested by the Telecommunications Subcontractor as specified above.

b. In pulling the cable, strain-release, or other tension limiting devices shall be used to limit the pull tension to less than 600 lbs.

c. Minimum bend radius restrictions shall be satisfied both during and after cable installation.

d. Horizontal, unsupported cable runs shall be supported at continuous distances of 5 feet or less.

e. All conduit and cabinet entrances shall be sealed with RTV or other re-enterable sealant material to prevent ingress of water, dust or other foreign materials.

f. Cable routing within occupied office areas shall conform to Federal, State, and local electrical and fire codes.

g. Any non-terminating (field) splices shall be documented as to the physical location and cable meter mark (prior to stripping). Field splices shall be OTDR-tested and documented prior to final cable acceptance testing.

h. Fiber optic cables shall be installed in accordance with NECA 301-2004, Installing And Testing Fiber Optic Cables.

i. Except as otherwise shown on the Drawings for required spare cable lengths at designated locations, a minimum of 100’ of cable shall be coiled in each pullbox during cable installation. Pullboxes at the end of a cable reel (requiring a splice closure) shall have 100’ coiled from EACH reel. Do not exceed the minimum bend radius in any coiled cable in the pullbox.

3-2. FIBER OPTIC CABLE TESTING. CONTRACTOR is responsible for the splicing and testing of the full lengths of fiber cable and associated hardware that are included in this Contract. Splices made between DISTRICT contracts and final testing of the entire NWP fiber optic network will be performed by the NWP Facilities contractor under Contract 300187.08.02.
Fiber optic cable testing shall be as specified below. All testing shall be witnessed by the ENGINEER in accordance with Section 01400, "Quality Control," and Section 01650, “Startup and Testing.” A test plan shall be submitted prior to the proposed test dates. The test plan and procedures shall be mutually agreed to prior to conducting the tests.

Each optical fiber of each fiber optic cable shall be tested after installation and termination. For each fiber, an OTDR (Optical Time Domain Reflectometer) trace soft/hardcopy is required, provide copy to the DISTRICT. This end-to-end trace shall be performed from BOTH ends of the fiber. Also for each fiber, an end-to-end power attenuation (insertion loss) test shall be performed. The attenuation test shall use a stabilized optical source and an optical power meter calibrated to the appropriate operating wavelength (1300 nm).

For each installed fiber, the power attenuation shall not exceed the following, tested from connector to connector at the respective patch panels:

(0.0035)L + (0.25)N + 3.0 dB
Where L = The length of the fiber optic cable in meters and
N = the number of splices in the fiber.

Any fiber optic cables containing one or more fibers not meeting this performance will not be accepted by the DISTRICT, and shall be repaired or replaced at no additional cost.

Each fiber optic jumper cable shall be tested and must exhibit an end-to-end attenuation of less than 2.0 dB at 1300 nm. Any jumper exceeding this level shall be replaced at no additional cost.

All fiber cable testing shall be documented on pre-approved test forms. Three (3) copies of all documentation (including OTDR traces) shall be submitted to the ENGINEER upon successful completion of the testing.

3-3. FIBER OPTIC NETWORK STARTUP AND TESTING. CONTRACTOR shall provide a representative of the Telecommunications Subcontractor to be onsite during the NWP Commissioning and fiber optic network testing. The representative shall support all testing and troubleshooting specified in Section 01650 to ensure proper fiber system installation for the portion of the network that is installed under this Contract.

End of Section

Section 13541

FIBER OPTIC CONDUIT SYSTEM COMPONENTS

PART 1 - GENERAL

1-1. SCOPE. This section covers the furnishing and installation of a fiber optic conduit system along the pipeline alignment as indicated on the Drawings.

1-2. SUBMITTALS. Complete product details, specifications, and data covering the materials used shall be submitted in accordance with Section 01300, "Submittals."

PART 2 - PRODUCTS

2-1. GENERAL. All fiber optic conduit system hardware and accessories shall be designed, assembled and connected in accordance with the requirements of these specifications and the Drawings.

2-2. CONDUIT. Except as specified for the HDD construction, the conduit used shall be factory-lubricated, low-friction, HDPE conduit. The conduit shall be capable of being coiled on reels in continuous lengths, transported, stored outdoors, and subsequently uncoiled for installation, without affecting its properties or performance. The conduit placed shall meet all of the requirements of the following paragraphs.

All conduit used shall be of high-density polyethylene (HDPE) construction.

The conduit thickness shall be SDR-11.

The conduit shall be of smooth wall construction.

The conduit shall have an outer diameter (O.D.) of 1.25”.

The conduit shall be manufactured in accordance with standards established by the Plastic Pipe Institute for fiber optic conduits.

All conduit shall be free from corrosion, restrictions, sharp edges, and debris.

All conduit shall be delivered on reels of a minimum length of 5,000 feet per reel.

All conduit shall be equipped from the factory with a pre-lubricated, non-abrasive mule tape with footage markings.

The coefficient of friction (COE) on the internal conduit walls shall not exceed 0.15 when pulling cable.

The conduit shall be Blue Diamond HDPE, Carlon HDPE, or any equal meeting all requirements and specifications.

Fiber optic conduit for the HDD construction shall be welded steel as shown on the Drawings and as specified in Section 02312. Fiber optic conduit for steel pipe casing "trenchless" crossings, and for other locations as shown on the Drawings, shall be galvanized rigid steel conduit.

2-3. CONDUIT SPLICE COUPLINGS. Splice couplings are used to join two conduit ends where necessary. The use of splice couplings, although necessary, should be minimized by optimizing conduit usage between pullbox locations. Splice couplings must meet the following requirements:

All splice couplings used shall be of high-density polyethylene (HDPE) construction.

All splice couplings shall be of a technology not requiring special tools to install.

All splice couplings must form a watertight, airtight seal with a breaking force greater than 250 lbs.

The conduit splice couplings shall be Blue Diamond HDPE, Carlon HDPE, or any equal meeting all requirements and specifications.

2-4. MULE TAPE. All HDPE conduit used must be equipped from the supplier with pre-installed mule tape meeting the following requirements:

All mule tape shall be of woven polyester fabrication.

All mule tape pre-installed into the conduit shall be pre-lubricated and non-abrasive.

All mule tape shall have sequential footage markings.

All mule tape shall have a minimum pull strength of 1,250 lbs.

All mule tape shall extend past the conduit ends and be secured back to the exterior of the conduit.

Mule tape manufacturer shall be same as conduit manufacturer per this specification.

2-4. CONDUIT END CAPS. Conduit end caps shall be used to cover the open conduit at every termination point. Conduit end caps shall be composed of HDPE and shall be appropriately-sized to properly and securely fit over the terminated ends of 1-1/4" smooth-wall HDPE conduits.

The conduit splice couplings shall be Blue Diamond HDPE, Carlon HDPE, or any equal meeting all requirements and specifications

2-5. PULLBOXES. Pullboxes shall consist of a molded body of high-density polyethylene construction and lids shall be of polymer concrete construction. All pullboxes shall meet the following requirements:

The pullbox body dimensions shall be 24" width, 36" length, and 24" depth.

All pullboxes shall be constructed of HDPE meeting ASTM D-756, ASTM D-570, ASTM D-822, and ASTM D-543.

All pullbox lids shall be attachable to the body by a minimum of (4) corner bolts.

Alll pullbox lids shall be of single-piece, polymer concrete construction and be traffic-rated at 20,000 lbs.

Pullboxes shall be Pencell Series PEM-2436, Highline PHA243636H, or equal.

2-6. BURIED WARNING TAPE. The conduit system shall contain (2) layers of buried warning tape. The warning tape used shall meet the following requirements:

The buried warning tape shall be orange in color.

The buried warning tape shall be imprinted with the following:"CAUTION: BURIED FIBER OPTIC CABLE BELOW".

The buried warning tape shall be a minimum of 3" wide, and 4 mils thick.

The buried warning tape shall be of stretch-type, be color-durable, and chemically resistant.

Buried Warning Tape shall be HellermanTyton UT3-OF, Monarch MWTDFO, or equal.

2-7. CABLE WRAP MARKERS. Cable markers shall be placed on each fiber optic cable in each pullbox. The cable markers shall meet the following requirements:

The cable markers shall be orange in color.

The cable markers shall be a minimum of 4” in width and be sized to fit a fiber optic cable between 0.40” and 1.0” outer diameter.

The cable markers shall be non-adhesive and constructed of pre-coiled plastic.

The cable markers shall be imprinted with the following: “FIBER OPTIC CABLE”.

Cable wrap markers shall be Preformed Fiberlign Fiber Optic Cable Marker, Almetek WAM-33, or equal.

2-8. CABLE WARNING POSTS. The cable marker warning posts shall be used to alert excavators that there is a buried cable in the area and they must call for a locate prior to excavating. These posts also enable service personnel to quickly locate cable routes whenever necessary. Cable marker posts shall meet the following criteria:

The cable warning posts shall be orange in color.

The cable warning posts shall be a minimum of 3-1/2” wide, and of tubular or triangular shape.

The cable warning posts shall be of sufficient length to allow for a minimum of 4 feet above grade when installed.

The cable warning posts shall be equipped to handle a customized 2-7/8” W x 6” customized warning decal.

The cable warning posts shall be of flexible construction and able to withstand a minimum of (5) vehicle impacts at 45 MPH.

The cable warning posts shall be UV-stable, and must not significantly fade, or become brittle when exposed to UV light for a minimum of 10 years.

Cable Warning Posts shall be William Frick & Company’s 360 Post Marker, Arris PolyDome, or equal.

2-9. LOCATABLE 'TRACER' WIRE. Tracer wire shall be installed in the conduit system for locate purposes. The tracer wire shall be at least 12-gauge, solid copper.

Tracer Wire shall be Coleman Cable Model 54492-12, Copperhead Cable Model 1230-HS-2500, or equal.

PART 3 - EXECUTION

3-1. INSTALLATION. The CONTRACTOR shall be responsible for the coordination of the installation of all conduit system products furnished hereunder.

3-1.01. CONDUIT INSTALLATION. The installation of all conduits shall meet the following requirements:

All conduit shall be installed and tested by the CONTRACTOR or his subcontractor as specified above.

All conduits shall be installed at a minimum depth of 30 inches, placed in the open trench as shown on the Drawings. Attain maximum possible horizontal separation between the pipe and the conduits.

All conduits shall be swept or bent at the maximum practical radius to achieve the routing shown on the Drawings at all times. Conduit bend radius shall never be less than 24" in any scenario. This applies to horizontal and vertical conduit sweeps or bends for routing purposes and pullbox entry.

All conduits shall use sweeps to elevate the buried conduits to the final grade within the pullbox. The sweeps shall be terminated within the pullbox to allow for easy installation and removal of conduit plugs.

All conduit and cabinet entrances shall be sealed with RTV or other re-enterable sealant material to prevent ingress of water, dust or other foreign materials.

All conduit runs shall have a limited number of bends between pullboxes. The preferred limit is 90 degrees wherever practical. At no place in the conduit system shall there be more than 270 degrees of bends between pullboxes.

Splice couplings shall be used to join conduit at bored crossing

locations and at a minimum of locations along the general trenched pipeline. Additional pullboxes shall not be substituted for splices. Follow the manufacturer's instructions for the installation of splice couplings.

Conduit plugs shall be installed in all conduit ends as soon as the conduit is installed. Conduit shall be plugged at all termination points such as pullboxes and building/cabinet entry points.

All trenches shall be backfilled continuously during conduit installation, and no conduit shall be left exposed below grade level at the end of a shift.

3-1.02. PULL BOX INSTALLATION. The manufacturer shall provide installation procedures and technical support concerning the items contained in this specification. Pull box installation shall meet the following requirements:

Contractor shall refer to the Drawings at each pullbox location to determine if the box is to be installed with the lid flush-to-grade, or if the pullbox in any specific location is to be installed below grade.

Place 6" of crushed rock evenly across the bottom of the selected pullbox location as a box bedding.

Place the lid on the pullbox prior to backfilling.

Backfill in 12" increments and compact.

All conduits shall be capped after installation into the pullbox.

3-1.03. TRACER WIRE INSTALLATION. A conductive copper wire shall be installed for locate purposes. The tracer wire installation shall meet the following requirements:

The tracer wire shall be installed along the entirety of the conduit system.

The tracer wire may be installed in the same conduit concurrent with the fiber optic cable or it may be installed in the spare conduit.

The tracer wire shall not be cut and spliced between pullboxes or any other termination locations.

3-1.04. MANDREL TESTING. Once installed, the conduit shall be mandrel tested to assure that the conduit system is intact. Mandrel Testing shall meet the following requirements:

The mandrel to be pulled must be sized no less than at 80% of the inner diameter of the conduit.

The mandrel or pull rope used must have a load capacity not to exceed 2,240 lbs of force.

The mandrel must be pulled completely both directions through each span of conduit between pullboxes.

Any section failing to pass the mandrel shall be exposed, removed, and replaced with a new section of conduit meeting the original conduit specifications. Once installed, the new section shall be mandrel tested to ensure a clean conduit path.

End of Section

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Section 13560

INSTRUMENTATION – GENERAL REQUIREMENTS

PART 1 - GENERAL

1-1. SCOPE. This section covers the furnishing of all instrumentation equipment required for the Project as indicated on the Drawings and this section.

Principal components of the instrumentation systems shall be as indicated on the P&ID drawings; on the Instrument Device Schedule attached to this Section 13560, and as specified herein and in related Division 13 sections.

1-2. GENERAL. CONTRACTOR shall select the equipment furnished under this section for its superior quality and the intended performance. CONTRACTOR shall install all equipment in accordance with the manufacturer's instructions. Equipment and materials used shall be subject to review and shall comply with the following requirements.

1-2.01. General Equipment Requirements. Section 01605, "General Equipment Requirements" shall apply to all equipment provided under this section.

1-2.02. Drawings. Supplementing this section, the drawings indicate locations and arrangement of instruments and enclosures, provide mounting details, and may show device schedules and other information regarding the connection and interaction with other equipment.

1-2.03. Corrosive Fluids. All parts, which are exposed to corrosive conditions shall be made from corrosion resistant materials. CONTRACTOR shall submit certification that the instrument manufacturer approves the selection of materials of primary elements that are in contact with the specified process fluid to be inert to the effects of the process fluid.

1-2.04. Elevation and Temperature. All instruments shall be designed to operate within a range of elevation of 1000 to 3000 ft above sea level and temperature of 15^{o} F – 120^{o} F outdoors and 20^{o} F to 120^{o} F indoors.

1-2.05. Power and Instrument Signals. Unless otherwise indicated, electric power supply to the instrumentation equipment will be unregulated 120 volts ac. Unless otherwise indicated, all transmitted electronic analog instrument signals shall be 4-20 mA dc and shall be linear with the measured variable.

1-2.06. Appurtenances. Signal converters, signal boosters, amplifiers, special power supplies, special cable, special grounding, and isolation devices shall be furnished as needed for proper performance of the equipment.

1-2.07. Interchangeability and Appearance. To the extent possible, instruments used for similar types of functions and services shall be of the same brand and model line. Similar components of different instruments shall be the products of the same manufacturer to facilitate maintenance and stocking of repair parts. Whenever possible, identical units shall be furnished.

1-2.08. Programming Devices. A programming or system-configuring device shall be provided for systems that contain any equipment that requires such a device for routine calibration, maintenance, and troubleshooting. The programming device shall be complete, newly purchased for this project, and shall be in like-new condition when turned over to ENGINEER at completion of startup. One pressure transmitter calibrator programming device shall be provided.

1-2.09. Device Tag Numbering System. All devices shall be provided with permanent identification tags. The tag numbers shall agree with the equipment drawings and shall be as close as practical to the tag numbers used on the Drawings and device schedules. All field-mounted transmitters and devices shall have stamped stainless steel identification tags. Panel, subpanel, and rack-mounted devices shall have laminated phenolic identification tags securely fastened to the device. Hand-lettered or tape labels will not be acceptable.

1-3. SPARE PARTS. Spare parts shall be provided as specified in the respective instrumentation sections.

PART 2 – PRODUCTS

2-1. INDIVIDUAL DEVICE SPECIFICATIONS. Individual instruments and related devices shall be provided as specified in one or more of the following sections.

13562 "Flow Instruments"

13563 "Pressure and Level Instruments"

PART 3 - EXECUTION

3-1. INSTRUMENTATION INSTALLATION REQUIREMENTS. Instruments shall be installed and calibrated in accordance with the following requirements.

3-1.01. Mounting of Field Instruments. Instruments shall be mounted so that they can be easily read and serviced and so that all appurtenant devices can be easily operated. Installation details for some instruments are indicated on the Drawings.

3-1.02. Field Calibration. After each instrument has been installed, the manufacturer's field service representative shall calibrate each instrument and shall provide a written calibration report for each instrument, indicating the results and final settings. The adjustments of calibrated instruments shall be sealed or marked, insofar as possible, to discourage tampering. Instrument calibration shall be done before checkout of the system operation. A typical instrument calibration report is attached to the end of this section.

3-2. FIELD INSPECTIONS AND TESTS.

3-2.01. Manufacturer's Installation Check. After installation and field calibration, the manufacturer's field services representative shall inspect and approve the installations as specified in Section 01620.

3-2.02. Pre-Startup Test and Checks. Perform pre-startup tests and checks in accordance with the requirements specified in Section 01650, "Startup and Testing." Testing shall not begin until installation checks by the equipment manufacturer have been completed.

3-3. INSTRUMENTATION STARTUP AND TESTING. CONTRACTOR shall provide a manufacturer's field services representative to be onsite during the NWP Commissioning and turnout testing. The representative shall support all testing and troubleshooting specified in Section 01650 to ensure proper instrumentation system installation for turnout construction performed under this Contract.

3-4. TRAINING OF DISTRICT PERSONNEL. Refer to Section 01735, "Training."

End of Section

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INSTRUMENT NAME & SERVICE:		
BRAND & MODEL NO.:		
TAG OR LOOP NO.:		
INPUT/OUTPUT RANGE:		
INPUT	ACTUAL OUTPUT	DESIRED OUTPUT
PROPORTIONAL BAND:		
RESET:		
POSITION OF SWITCHES, JUMPERS, ETC.		
COMMENTS:		
DATE OF CALIBRATION: CALIBRATED BY:		
Black & Veatch	INSTRUMENT CALIBRATION REPORT	Figure 1-13560

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Instrument Device Schedule
Nacimiento Water Project

City of San Luis Obispo Turnout

NOTE: ALL EQUIPMENT AND DEVICE NUMBERS SHALL HAVE A **"T11"** PREFIX FOR CITY OF SAN LUIS OBISPO TURNOUT.

Item	System Code	Tag	Loop	Service Description	Device Type	Size	Output Type	Output Range	Power	Install Detail	P&I Drawing	Spec	Furnished
1		PIT	1200	TURNOUT INLET PRESSURE INDICATING TRANSMITTER	PRESSURE TRANSMITTER	N/A	4-20mA	0-1000 FEET HEAD, 0-450 PSI	2-WIRE		T11-I601	13563	
2		FIT	1201	FLOW TO SAN LUIS OBISPO	FLOW INDICATING TRANSMITTER	N/A	4-20mA	0-8 MGD	4-WIRE		T11-I601	13562	
3		FE	1201	FLOW TO SAN LUIS OBISPO	MAGNETIC FLOW METER		mV	0-8 MGD	N/A		T11-I601	13562	
4		PIT	1203	TURNOUT OUTLET PRESSURE INDICATING TRANSMITTER	PRESSURE TRANSMITTER	N/A	4-20mA	0-50 FEET HEAD, 0-25 PSI	2-WIRE		T11-I601	13563	
5		ZS	1206	PANEL INTRUSION SWITCH	POSITION SWITCH	N/A	CONTACT	NA	DRY CONTACT		T11-I601	Div 16	
		ZS	1207	VAULT INTRUSION SWITCH	POSITION SWITCH	N/A	CONTACT	NA	DRY CONTACT		T11-I601	Div 16	
6		ZS	1208	PANEL INTRUSION SWITCH	POSITION SWITCH	N/A	CONTACT	NA	DRY CONTACT		T11-I601	Div 16	

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Section 13562

FLOW INSTRUMENTS

PART 1 - GENERAL

1-1. SCOPE. This section covers the furnishing, installing and testing of flow instruments and accessories as shown on the Drawings.

Equipment and services provided under this section shall be subject to the General Instrumentation Requirements specified in Section 13560, "Instrumentation – General Requirements". Supplementing Section 13560, "Instrumentation – General Requirements", instrument data, special requirements, and options are indicated on the Drawings or the Instrument Device Schedule.

1-2. GENERAL. Equipment provided under this section shall be manufactured and assembled in full conformity with the drawings, specifications, engineering data, instructions, and recommendations of the device manufacturer, unless exceptions are noted by ENGINEER.

Instruments shall be furnished with all necessary parts and accessories indicated on the Drawings, specified, or otherwise required for a complete, properly operating installation and shall be the latest standard products of a manufacturer regularly engaged in the production of instrumentation.

1-2.01. General Equipment Requirements. The requirements specified in Section 01605, "General Equipment Requirements," shall apply to the equipment furnished under this Section.

1-3. DESIGN CRITERIA. Each device shall be a pre-assembled, packaged unit. Upon delivery to the work site, each device or system shall be ready for installation with only minor piping and electrical connections required by CONTRACTOR.

Primary elements shall derive any required power from the transmitter, unless otherwise indicated.

The instruments shall be installed to measure, monitor, or display the specified process at the ranges and service conditions indicated on the Drawings. The instruments shall be installed at the locations indicated on the Drawings.

Where possible, each instrument shall be factory calibrated to the calibration ranges indicated on the Drawings. Transmitters or similar measurement instruments shall be calibrated using National Institute of Standards and Testing (NIST) approved bench calibration procedures, when such procedures exist for the instrument type.

For "smart" devices, calibration data shall be stored digitally in each device, including the instrument tag designation indicated on the Drawings.

1-4. SUBMITTALS. CONTRACTOR shall submit complete shop drawings, details, specifications, installation instructions and wiring diagrams covering the instruments and their accessories in accordance with the requirements specified in Section 01300, “Submittals.”

1-5. DELIVERY, STORAGE, AND HANDLING. Shipping, handling and storage shall be in accordance with the requirements specified in Section 01600.

1-6. MANUFACTURER’S FIELD SERVICES. Provide the services of the manufacturer’s field services representative during installation and testing as specified in Section 01620.

1-7. OPERATION AND MAINTENANCE DATA AND MANUALS. Submit O&M Manuals in accordance with the requirements specified in Section 01730.

1-8. EXTENDED WARRANTY. After final acceptance, the magnetic flowmeter shall be warranted to be completely operational under all conditions for a correction period of two (2) years. Repairs or replacements that are required during the correction period, whether equipment or materials, shall be performed at no cost to and to the satisfaction of the DISTRICT.

PART 2 - PRODUCTS

2-1. GENERAL. The following paragraphs provide minimum device requirements. The Drawings or Instrument Device Schedule shall be used to determine any additional instrument options, requirements, or service conditions.

2-1.01. Interconnecting Cable. For instruments where the primary element and transmitter are physically separated, interconnecting cable from the element to the transmitter shall be provided. The cable shall be the type approved by the instrument manufacturer for the intended purpose of interfacing the element to the transmitter. Length of cable shall be a minimum of twenty (20) feet or as indicated in the Drawings.

2-1.02. Programming Device. For instruments that require a dedicated programming device for calibration, maintenance, or troubleshooting, programming devices shall be provided. The programming devices shall include appropriate operation manuals and shall be included in the training requirements. For systems that allow the programming device functions to be implemented in software, running on a laptop computer, the software shall be provided instead of the programming device.

2-1.03. Configuration Software/Serial Interface. Devices indicated as requiring a serial interface shall be provided with all accessories required to properly communicate over the serial link. As a minimum, an appropriate cable shall be provided to allow the transmitter serial interface to be connected to a personal computer. One licensed copy of the diagnostic/interface software shall be provided for each DISTRICT facility. Software shall be capable of running under Microsoft's Windows 98, Windows Me, Windows 2000, Windows NT 4.0, and Windows XP operating systems. If the software furnished performs the same functions as the programming device specified elsewhere, then the programming device shall not be furnished.

2-2. FLOW INSTRUMENTATION.

2-2.01. Magnetic Flowmeters, Signal Converters, and Accessories.

2-2.01.01. Magnetic Flowmeter. The magnetic flowmeter shall be a completely obstructionless, in-line flowmeter with no constrictions in the flow of fluid through the meter. The meter shall consist of a metallic tube with flanged ends and with grounding rings. Flange diameter and bolt drilling pattern shall comply with ANSI/ASME B16.5 for line sizes from one-half inch to 24 inches or AWWA C207 for line sizes larger than 24 inches. Flange class ratings and meter maximum pressure ratings shall be compatible with the adjoining piping. Flangeless wafer insert style meters may be used for pipe sizes up to 6 inches, where compatible with adjacent piping flanges. Electrode and liner materials shall be fully compatible with the process fluid as approved by the ENGINEER and shall comply with the requirements specified in the instrument device schedules. Each meter shall be factory calibrated, at a facility, which is traceable to NIST or other standard acceptable to ENGINEER, and a copy of the calibration, report shall be submitted as part of the operation and maintenance manual submittal.

The meter shall be capable of standing empty for extended periods of time without damage to any components.

When submersible design is required, the meter housing shall withstand submergence in 30 feet of water for 48 hours without damage.

When required, the meter shall be suitable for use in a Class I, Division 2, hazardous area.

Meters shall be as manufactured by Foxboro, Krohne, ABB, Endress + Hauser, or Rosemount.

2-2.01.02. Magnetic Flowmeter Signal Converters. Separately mounted, microprocessor-based signal converters shall be provided for the magnetic flowmeters. The signal converters shall include output damping, self-testing, built-in calibration capability, and an "empty pipe zero" contact input. The overall accuracy of the magnetic flowmeter transmitter and signal converter shall be ±0.5 percent of actual flow rate for full-scale settings of 3 to 30 fps. The meter manufacturer shall furnish the signal cable between the converter and the magnetic flowmeter. The signal converter shall be housed in a corrosion-resistant, weatherproof NEMA Type 4X housing and shall be suitable for operation over an ambient temperature range of -30 to +140°F [-34 to +60°C], and relative humidity of 10 to 100 percent. The converter shall have an analog output of 4-20 mA dc. When required, the converter shall also have a pulse output designed to operate a remote seven-digit totalizer and scaled so that the totalizer will operate for 60 days at 100 percent flow without repeating. Scaling factors shall be field adjustable and shall be selected to provide a totalizer multiplier of a power of 10. Transmitters tagged on the drawings or specified to be of the indicating type shall contain a local indicator with a minimum four digit LCD type display, scaled to read in engineering units of flow.

Magnetic flowmeter systems shall provide zero flow stability by means of automatic zero adjustment of a DC excited metering circuit. Converters shall be capable of bi-directional flow measurement. Signal converters shall be of the same brand as the magnetic flowmeters.

The signal converter shall have a non-reset seven-digit, or a manually reset six-digit, totalizer on the face of the enclosure.

The signal converter shall be of the "smart" type that can be diagnosed and recalibrated with the use of a hand-held communicator/calibrator device. One device shall be furnished for all converters provided by a single manufacturer.

PART 3 - EXECUTION

3-1. INSTALLATION, CALIBRATION AND TESTING. Refer to requirements specified In Section 13560, “Instrumentation – General Requirements.”

End of Section

Section 13563

PRESSURE AND LEVEL INSTRUMENTS

PART 1 - GENERAL

1-1. SCOPE. This section covers the furnishing, installing and testing of all pressure and level instruments and accessories required for the Project as indicated on the Drawings.

Equipment and services provided under this section shall be subject to the General Instrumentation Requirements specified in Section 13560, “Instrumentation – General Requirements”. Supplementing Section 13560, “Instrumentation – General Requirements”, instrument data, special requirements, and options are indicated on the Drawings or the Instrument Device Schedule.

When multiple pressure and level instruments of a particular type are specified in this section, and each requires different selectable features, the required features are described on the Drawings or in the Instrument Device Schedule.

1-2. DESIGN CRITERIA. Each device shall be a pre-assembled, packaged unit. Upon delivery to the work site, each device or system shall be ready for installation with only minor piping and electrical connections required by CONTRACTOR.

Primary elements shall derive any required power from the transmitter, unless otherwise indicated.

The instruments shall be installed to measure, monitor, or display the specified process at the ranges and service conditions indicated on the Drawings or as indicated in the Instrument Device Schedule. The instruments shall be installed at the locations indicated on the Drawings or in the Instrument Device Schedule.

Where possible, each instrument shall be factory calibrated to the calibration ranges indicated in the Drawings or in the Instrument Device Schedule. Transmitters or similar measurement instruments shall be calibrated using National Institute of Standards and Technology (NIST) approved bench calibration procedures, when such procedures exist for the instrument type. For "smart" devices, calibration data shall be stored digitally in each device, including the instrument tag designation indicated on the Drawings and/or Instrument Device Schedule.

1-4. SUBMITTALS. CONTRACTOR shall submit complete shop drawings, details, specifications, installation instructions and wiring diagrams covering the instruments and their accessories in accordance with the requirements specified in Section 01300, “Submittals.”

1-5. DELIVERY, STORAGE, AND HANDLING. Shipping, handling and storage shall be in accordance with the requirements specified in Section 01600.

1-6. MANUFACTURER’S FIELD SERVICES. Provide the services of the manufacturer’s field services representative during installation and testing as specified in Section 01620.

1-7. OPERATION AND MAINTENANCE DATA AND MANUALS. Submit O&M Manuals in accordance with the requirements specified in Section 01730.

PART 2 - PRODUCTS

2-1. GENERAL. The following paragraphs provide minimum device requirements. The Drawings or Instrument Device Schedule shall be used to determine any additional instrument options, requirements, or service conditions.

2-1.01. Interconnecting Cable. For systems where the primary element and transmitter are physically separated, interconnecting cable from the element to the transmitter shall be provided. The cable shall be the type approved by the instrument manufacturer for the intended purpose of interfacing the element to the transmitter. Length of cable shall be a minimum of twenty (20) feet or as otherwise determined by the CONTRACTOR to match the locations indicated in the Drawings or Instrument Device Schedule.

2-1.02. Programming Device. For instruments that require a dedicated programming device for calibration, maintenance, or troubleshooting, programming devices shall be provided as specified in Section 13560.

The programming devices shall include appropriate operation manuals and shall be included in the training requirements. For systems that allow the programming device functions to be implemented in software, running on a laptop computer, the software shall be provided instead of the programming device.

2-1.03. Configuration Software/Serial Interface. Devices indicated as requiring a serial interface shall be provided with all accessories required to properly communicate over the serial link. As a minimum, an appropriate cable shall be provided to allow the transmitter serial interface to be connected to a personal

computer. One licensed copy of the diagnostic/interface software shall be provided for each DISTRICT facility. Software shall be capable of running under Microsoft's Windows 2000, Windows 98/Me, Windows NT 4.0, and Windows XP operating system. If the software furnished performs the same functions as the programming device, specified elsewhere, then the programming device shall not be furnished.

2-2. PRESSURE AND LEVEL INSTRUMENTATION.

2-2.01. "Smart" Pressure and Pressure Sensing Level Transmitters. Transmitters shall have "smart" electronic circuitry and shall be of the two-wire type. Process fluid shall be isolated from the sensing elements by AISI Type 316 stainless steel, Hastelloy-C, ceramic, or cobalt-chromium-nickel alloy diaphragms, and the transducer may use a silicone oil fluid fill. Transmitters shall have self-diagnostics and electronically adjustable span, zero, and damping. Transmitters shall be enclosed in a NEMA Type 4X housing and shall be suitable for operation at temperatures from 0° to 180°F [-17° to +82°C], and relative humidity of 5 to 100 percent. All parts shall be cadmium-plated carbon steel, stainless steel, or other corrosion-resistant materials. Transmitters shall have over-range protection to maximum line pressure. Accuracy of the transmitter shall be 0.10 percent of span, and transmitter output shall be 4-20 mA dc without the need for external load adjustment. Transmitters shall not be damaged by reverse polarity. Transmitters shall have an elevated or suppressed zero if required by the application. For calibrated spans of less than 8 psig [gauge] a differential pressure type transmitter with side vents shall be utilized. Transmitters shall be provided with brackets for wall and pipe-stand mounting.

Transmitters shall be factory calibrated to the required range and provided with the manufacturer's standard hand-held communications/calibration device. One device shall be furnished for all transmitters provided by a single manufacturer.

Transmitters tagged on the drawings or specified to be indicating type shall be furnished with LCD type digital indicators.

Transmitters shall be Foxboro "Model IGP10-D", Endress & Hauser "Cerabar S", or "Deltabar S Series", ABB Model 264GS, or Rosemount Model 3051C.

2-2.02. Flange-Mounted "Smart" Pressure Sensing Level Transmitters. Level transmitters shall be of the differential pressure sensing type that connects to the process by a 3-inch, ANSI/ASME B16.5, Class 150, flat faced, carbon steel mounting flange. Each transmitter shall have a 1/2-inch NPT low-pressure connection for the process or atmospheric reference. The transmitter shall have a process flushing port connection on the process side of the mounting flange. The transmitter shall have "smart" electronic circuitry and be of the two-wire type. Process fluid shall be isolated from the sensing elements by AISI Type 316

stainless steel, Hastelloy-C, ceramic, or cobalt-chromium-nickel alloy diaphragms, and the transducer may use a silicone oil fluid fill. Transmitters shall have self-diagnostics and electronically adjustable span, zero, and damping. Transmitters shall be enclosed in a NEMA Type4X housing and shall be suitable for operation at temperatures from 0° to 180°F [-17° to +82°C] and a relative humidity of 5 to 100 percent. All parts shall be cadmium-plated carbon steel, stainless steel, or other corrosion-resistant materials. Transmitters shall have over-range protection to a maximum line pressure. Accuracy of the transmitter shall be 0.20 percent of span and the transmitter output shall be 4-20 mA dc without the need for external load adjustment. Transmitters shall not be damaged by reverse polarity. Transmitters shall have an elevated or suppressed zero if required by the application.

Transmitters shall be factory calibrated to the required range and provided with the manufacturer's standard hand-held communications/calibration device. One device shall be furnished for all transmitters provided by a single manufacturer.

Transmitters tagged on the drawings or specified to be the indicating type shall be furnished with LCD type digital indicators.

ABB Model 264DH, or Rosemount Model 1151LT.

2-2.03. Fixed-Mount Float Type Level Switches. Switches shall be of the floating ball type, with a nominal 5-1/2 inch diameter, coated stainless steel float ball that contains a sealed switch assembly. The float shall be supported with a flexible synthetic rubber hinge fastened to an adjustable mounting bracket. The hinge shall also act as a housing for the lead wires from the alarm switch. The lead wire shall be a waterproof cable of such length that no splice or junction box is required in the wet well. Stainless steel mounting accessories shall be furnished. The switch contacts shall be single-pole-double-throw rated 4-amp [A] at 250 V ac. Switches shall be U.S. Filter Control Systems "9G" or Contegra “FS96”.

2-2.04. Adjustable Deadband Float Type Level Switch. Level switches shall consist of a non-mercury type switch element encapsulated in a nominal 5 inch diameter PVC float housing. The switch contact shall be single-pole, double-throw, rated 10 amp [A] at 120 V ac. The float shall be supported from a flexible three-conductor 18 AWG cable that also acts as the float hinge. The cable shall be suitable for fixed mount or weighted suspension type installation as indicated on the drawings or in the Instrument Device Schedule. All necessary mounting hardware shall be provided. The hinge-cable length shall be field adjustable in a manner that allows the deadband to be adjusted between 9 inches and 3 feet. The switch shall be Magnetrol "Series T10" float switch.

2-2.05. Electrode/Conductance Relay Level Switch. Electrodes shall be rigid AISI Type 316 stainless steel solid rod type with a PVC outer sheath, or flexible wire suspension type with shielded stainless steel electrode tips, PVC spacers shall be provided at 4-foot intervals of electrode length. Electrode holders shall be 4-inch ANSI Class 125 flange type, or corrosion-resistant bracket or wall-mounted type.

Electrode relays shall be dual-coil or solid-state relay type with single-pole, double-throw output contacts rated not less than 5 amperes at 120 V ac. The relay primary power shall be 120 V ac, 60 Hz, single phase. Intrinsically safe solid-state relays shall be utilized whenever the electrodes are located in a hazardous area.

Relays shall be housed in a NEMA Type 4 enclosure. Electrodes and conductance relays shall be manufactured by B/W Controls or Warrick Controls.

2-2.06. Flange-Mounted Displacement Float Type Level Switches. Level switches shall be of the displacer float type, with the floats suspended by a stainless steel cable from a 4-inch, ANSI/ASMEB16.5, Class 150, flat faced, carbon steel mounting flange. A corrosion-resistant mounting flange shall be provided. The switch housing shall be weatherproof.. Displacer floats shall be stainless steel or ceramic. Combination high-low alarm switches shall have two independent single-pole, double-throw switch mechanisms. Where indicated in the Instrument Device Schedule, switches shall have adjustable deadband by means of additional floats. Switch repeatability and adjustment resolution shall be less than 1/4 inch of level. Switches shall be manufactured by Magnetrol International.

2-2.07. Pressure Switches. Pressure switches shall be diaphragm actuated type switches. Switches shall be field adjustable type, with trip point repeatability better than 1 percent of actual pressure. Switches shall have over-range protection to maximum process line pressure. Switches mounted inside panels shall have NEMA Type1 housings. All other switches shall have weatherproof housings. Switches shall be differential type where indicated in the Instrument Device Schedule. Switch wetted parts shall be compatible with the process fluid. Where the process is not defined, all wetted parts shall be Teflon-coated or viton and the connection port shall be stainless steel.

Panel-mounted and surface-mounted switches shall be provided with 1/4 inch NPT connections. All stem-mounted switches shall be provided with 1/2 inch NPT connections.

All pressure switches shall be ranged in psi and all vacuum switches in inches of water. Unless otherwise indicated, switches shall have a fixed deadband and

shall be auto-reset type. As a minimum, switches shall be SPDT, rated 10 amp [A] at 120 V ac.

Unless otherwise indicated, each switch shall be provided with a threaded end, ball-type shutoff valve. Shutoff valve materials shall be compatible with the process fluid. Where the process is not specified, valves shall have AISI Type 316 stainless steel wetted parts and Teflon seals. Multi-port valves shall have all unused ports plugged.

Switches shall be installed at the locations indicated on the Drawings, with installation conforming to the installation details. All switches, snubbers, and diaphragm seals shall be installed in the vertical, upright position. Thread sealer, suitable for use with the associated process, shall be used in the assembly of threaded connections. All connections shall be free from leaks. Lines shall be purged of trapped air at switch locations prior to installation of the switch or diaphragm seal.

Switches shall be manufactured by Ashcroft, Barksdale, NeoDyn, Mercoid Controls, or S.O.R.

2-2.08. Submersible Pressure Sensing Level Transmitters. The level transmitter system shall consist of a submersible pressure sensor/transmitter unit that is suitable for direct submersion into the liquid being measured. Sensor size shall not exceed 1-1/4 inch diameter by 9-inch length. The sensor shall be a solid-state variable capacitance or diffused silicon semiconductor type that shall provide an output signal directly proportional to the sensed pressure over a factory-calibrated range. The sensor assembly shall have a stainless steel or titanium housing and shall be supported by a polyethylene or urethane jacketed cable with a minimum 200 lb test strength. The sensor cable shall be of sufficient length, 700 feet minimum, so that no splice or connector is required in the wet or inaccessible area, and the vent tube termination point is located in an area protected from dirt and moisture.

The transmitter shall have a two-wire type 4-20 mA dc current output that is proportional to level. The output shall have surge protection, and shall not be damaged by reverse polarity. The transmitter shall be suitable for an operating temperature range of 0° to +50°C. Accuracy of the level transmitter shall be ±0.25 percent "best straight line", with an overall combined accuracy of ±1 percent over the entire operating temperature/pressure range.

Submersible pressure sensing level transmitters shall be Ametek Controls PMT Division "Model 575", Endress & Hauser Waterpilot or Deltapilot Series, or Druck "Model PTX-1830".

2-2.09. Pressure Gauges. Pressure gauges shall be of the indicating dial type, with C-type phosphor bronze Bourdon tube; stainless steel rotary geared movement; phenolic or polypropylene open front turret case; adjustable pointer; stainless steel, phenolic, or polypropylene ring; and acrylic plastic or shatterproof glass window.

Gauge dial shall be 4-1/2 inch size, with white background and black markings. The units of measurement shall be indicated on the dial face. Subdivisions of the scale shall conform to the requirements of the governing standard. Pointer travel shall be not less than 200 degrees or more than 270 degrees of arc.

Panel-mounted and surface-mounted gauges shall be provided with 1/4 inch NPT connections. All stem-mounted gauges shall be provided with 1/2 inch NPT connections. Where indicated in the Drawings or on the Instrument Device Schedule, stem mounted gauges shall have an adjustable viewing angle to allow the gauge to be positioned for optimum viewing.

All pressure gauges shall measure in psi and all vacuum gauges in inches of water. All gauges shall have a suitable range to give mid-scale readings under normal conditions. Gauge accuracy shall be 0.5 percent of scale range.

Each gauge shall be provided with a threaded end, ball-type gauge valve. Gauge valve materials shall be compatible with the measured process. Where the process is not defined, gauge valves shall have AISI Type 316 stainless steel wetted parts and Teflon seals. Multi-port gauge valves shall have all unused ports plugged.

Gauges shall be installed at the locations indicated on the Drawings, with installation conforming to the installation details. All gauges, snubbers, and diaphragm seals shall be installed in the vertical, upright position. Thread sealer, suitable for use with the associated process, shall be used in the assembly of threaded connections. All connections shall be free from leaks. Lines shall be purged of trapped air at gauge locations prior to installation of the gauge or diaphragm seal.

Each gauge shall be provided with all required mounting hardware to securely mount the unit according to the mounting requirements indicated in the Drawings or the Instrument Device Schedule.

Unless otherwise indicated, mounting and installation hardware shall be Type 316L stainless steel.

Pressure gauges shall be Ashcroft "1279 Duragauge", or equal.

PART 3 - EXECUTION

3-1. INSTALLATION, CALIBRATION AND TESTING. Refer to requirements specified In Section 13560, “Instrumentation – General Requirements.”

End of Section

DIVISION 15
MECHANICAL

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Section 15010

VALVE INSTALLATION

PART 1 - GENERAL

1-1. SCOPE. This Section covers the installation of new valves and actuators.

Cleaning, pressure and leakage testing, insulation, and pipe supports are covered in other sections.

1-2. GENERAL. Equipment installed under this Section shall be erected and placed in proper operating condition in full conformity with the drawings, specifications, engineering data, instructions, and recommendations of the equipment manufacturer, unless exceptions are noted by ENGINEER.

1-2.01. Coordination. When manufacturer's field services are provided by the equipment manufacturer, CONTRACTOR shall coordinate the services with the equipment manufacturer.

Flanged connections to valves including the bolts, nuts, and gaskets are covered in the appropriate pipe specification section.

1-3. DELIVERY, STORAGE, AND HANDLING. Shipping, handling and storage shall be in accordance with the requirements specified in Section 01600.

PART 2 - PRODUCTS

2-1. PRECAST VALVE BOX. G4 Traffic Valve Box 10" ID x 12" high, precast concrete by Christy Concrete Products, Inc.; Brooks; or equal. Valve box shall be high density reinforced concrete box with cast iron triangular top for heavy traffic areas. Furnish and install valve boxes with heavy-duty plastic pipe extensions as shown on the Drawings.

PART 3 - EXECUTION

3-1. INSPECTION. All valves and accessories shall be inspected for damage and cleanliness before being installed. Any material damaged or contaminated in handling on the job shall not be used unless it is repaired and re-cleaned to the original requirements by CONTRACTOR. Such material shall be segregated from the clean material and shall be inspected and approved by ENGINEER before its use.

3-2. INSTALLATION.

3-2.01. General. Valves shall be installed with sufficient clearance for proper operation of any external mechanisms, and with sufficient clearance to dismantle the valve for in-place maintenance. Installation shall be in accordance with the valve manufacturer's recommendations.

Unless otherwise indicated on the Drawings or specified herein, all valves installed in horizontal runs of pipe having centerline elevations 4 feet 6 inches or less above the finish floor shall be installed with their operating stems vertical. Valves installed in horizontal runs of piping having centerline elevations between 4 feet 6 inches and 6 feet 9 inches above the finish floor shall be installed with their operating stems horizontal. If adjacent piping prohibits this, the stems and operating handwheel shall be installed above the valve horizontal centerline as close to horizontal as possible. Valves installed in vertical runs of pipe shall have their operating stems oriented to facilitate the most practicable operation, as reviewed by ENGINEER.

3-2.02. Butterfly Valves. Butterfly valves shall be installed with the shaft horizontal unless otherwise necessary for proper operation or as acceptable to ENGINEER.

Whenever an actuator must be removed to permit installation of a valve, the actuator shall be promptly reinstalled and shall be inspected and readjusted by a representative of the valve manufacturer.

3-2.03. Check Valves. Install valves oriented for the correct flow direction.

3-2.04. Eccentric Plug Valves. Eccentric plug valves shall be installed with the shaft horizontal and the plug in the upper half of the valve body. Valves in drains and residual lines shall be installed with the seat on the upstream end.

3-2.05. Resilient Seated Gate Valves. Valves shall be handled and installed in accordance with the recommendations set forth in the Appendix to ANSI/AWWA C509 and with the recommendations of the manufacturer.

3-2.06. Air Release and Combination Air Valves. The exhaust from each valve shall be piped to a suitable point acceptable to ENGINEER. Air release valve exhaust piping leading to a trapped floor drain shall terminate at least 6 inches above the floor.

3-2.07. Valve Boxes. Valve boxes shall be set plumb. Each valve box shall be placed directly over the valve it serves. The top of the box shall be provided with a concrete collar set flush with the finished grade. After each valve box is placed

in proper position, earth fill shall be placed and thoroughly tamped around the box, or concrete placed as shown on the Drawings.

3-3. VALVE ACTUATORS. Valve actuators and accessories shall be installed in accordance with the equipment manufacturer's recommendations.

3-4. FIELD QUALITY CONTROL.

3-4.01. Startup and Testing. After installation, perform cleaning and checking and pre-startup testing as specified in Section 01650, “Startup and Testing.”

3-4.02. Pressure and Leakage Testing. All valves shall be tested for leakage in conjunction with the related connected piping system as specified in Section 02704, “Pipeline Pressure and Leakage Testing.” Valves shall be open during pressure tests; do not test against closed valves.

All valves shall be free from leaks. Each leak that is discovered within the correction period stipulated in the General Conditions shall be repaired by and at the expense of CONTRACTOR. This requirement applies whether pressure testing is required or not.

End of Section

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Section 15020

MISCELLANEOUS PIPING AND ACCESSORIES INSTALLATION

PART 1 - GENERAL

1-1. SCOPE. This section covers the installation of miscellaneous piping, miscellaneous steel, miscellaneous plastic, cast iron soil pipe, copper tubing, and accessories as indicated on the Drawings and as required. CONTRACTOR shall furnish all necessary jointing materials, coatings, and accessories that are specified herein.

Pipe supports and anchors shall be furnished by CONTRACTOR and are covered in the pipe supports sections. Pipe trenching and backfilling requirements are covered in Section 02200, “Earthwork.”

1-2. GENERAL.

1-2.01. Coordination. Materials installed under this section shall be installed in full conformity with the drawings, specifications, engineering data, instructions, and recommendations of the manufacturer, unless exceptions are noted by ENGINEER.

1-3. SUBMITTALS.

1-3.01. Drawings and Data. CONTRACTOR shall submit complete specifications, data, and catalog cuts or drawings in accordance with the requirements specified in Section 01300, “Submittals.”

1-3.02. Welder Certification. Prior to the start of the work, CONTRACTOR shall submit a list of the welders he proposes using and the type of welding for which each has been qualified. Copy of certification and identification stamp shall be submitted for each welder. Qualification tests may be waived if evidence of prior qualification is deemed suitable by ENGINEER.

1-4. QUALITY ASSURANCE.

1-4.01. Welding and Brazing Qualifications. All welding and brazing procedures and operators shall be qualified by an independent testing laboratory in accordance with the applicable provisions of Section IX of the ASME Code. All procedure and operator qualifications shall be in written form and subject to ENGINEER'S review. Accurate records of operator and procedure qualifications shall be maintained by CONTRACTOR and made available to ENGINEER upon request.

1-4.02. Tolerances. These tolerances apply to in-line items and connections for other lines.

The general dimension, such as face-to-face, face or end-to-end, face- or end-to center, and center-to-center shall be 1/8 inch.

The inclination of flange face from true in any direction shall not exceed 3/64 inch per foot.

Rotation of flange bolt holes shall not exceed 1/16 inch.

1-5. DELIVERY, STORAGE, AND HANDLING. Shipping, handling and storage shall be in accordance with the requirements specified in Section 01600.

Plastic pipe, tubing, and fittings shall be stored between 40°F and 90°F.

1-5.01. Coated Pipe. Handling methods and equipment used shall prevent damage to the protective coating and shall include the use of end hooks, padded calipers, and nylon or similar fabric slings with spreader bars. Bare cables, chains, or metal bars shall not be used. Coated pipe shall be stored off the ground on wide, padded skids.

PART 2 - PRODUCTS

2-1. SERVICE CONDITIONS. Pipe, tubing, and fittings covered herein shall be installed in the services indicated in the various pipe sections.

2-2. MATERIALS.

Solder	Solid wire, ASTM B32, ANSI/NSF 61 certified, Alloy Grade Sb5, (95-5).
Soldering Flux	Paste type, ASTM B813.
Brazing Filler Metal	AWS A5.8, BCuP-5; Engelhard "Silvaloy 15", Goldsmith "GB-15", or Handy & Harman "Sil-Fos".
Brazing Flux	Paste type, Fed Spec O-F-499, Type B.

Insulating Fittings	
Threaded	Dielectric steel pipe nipple, ASTM A53, Schedule 40, polypropylene lined, zinc plated; Perfection Corp. "Clearflow Fittings".
Flanged	Epco "Dielectric Flange Unions" or Central Plastics "Insulating Flange Unions".
Pipe Insulation	See Section 15250, Mechanical Insulation
Pipe Sleeve Sealant	Polysulfide or urethane, as specified in the Section 07900, Caulking
Anti-Seize Thread Lubricant	Jet-Lube "Nikal", John Crane "Thred Gard Nickel", Never-Seez "Pure Nickel Special", or Permatex "Nickel Anti-Seize".
Teflon Thread Sealer	Paste type; Hercules "Real-tuff", John Crane "JC-30", or Permatex "Thread Sealant with Teflon".
Teflon Thread Tape	Hercules "Tape Dope" or John Crane "Thred-Tape".
Solvent Cement	
PVC Systems	ASTM D2564.
Primer, PVC Systems	ASTM F656.
Protective Coatings	
Tape Wrap	ANSI/AWWA C209, except single ply tape thickness shall not be less than 30 mils; Protecto Wrap "200" or Tapecoat "CT".
Primer	As recommended by the tape manufacturer.

Coal Tar Coating	Medium consistency; Carboline "Bitumastic Super Service Black" or Tnemec "46-465 H.B. Tnemecol".

PART 3 - EXECUTION

3-1. INSPECTION. All piping components shall be inspected for damage and cleanliness before being installed. Any material damaged or contaminated in handling on the job shall not be used unless it is repaired and recleaned to the original requirements by CONTRACTOR. Such material shall be segregated from the clean material and shall be inspected and approved by ENGINEER before its use.

3-2. PREPARATION.

3-2.01. Field Measurement. Pipe shall be cut to measurements taken at the site, not from the Drawings. All necessary provisions shall be made in laying out piping to allow for expansion and contraction. Piping shall not obstruct openings or passageways. Pipes shall be held free of contact with building construction to avoid transmission of noise resulting from expansion.

3-3. INSTALLATION.

3-3.01. General. All instruments and specialty items shall be installed according to the manufacturer's instructions and with sufficient clearance and access for ease of operation and maintenance.

Flat faced wrenches and vises shall be used for copper tubing systems. Pipe wrenches and vises with toothed jaws will damage copper materials and shall not be used. Bends in soft temper tubing shall be shaped with bending tools.

3-3.02. Pipe Sleeves. Piping passing through concrete or masonry shall be installed through sleeves that have been installed before the concrete is placed or when masonry is laid. Unless otherwise indicated on the Drawings, where pipe sleeves pass through floors, pipe sleeves shall project not less than 1 inch nor more than 2 inches above the floor surface, with the projections uniform within each area. In the case of insulated pipes, the insulation shall extend through pipe sleeves. Where the Drawings indicate future installation of pipe, sleeves fitted with suitable plastic caps or plugs shall be provided.

Holes drilled with a suitable rotary drill will be considered instead of sleeves for piping which passes through interior walls and through floors with a special finish.

Unless otherwise indicated on the Drawings, all pipes passing through walls or slabs which have one side in contact with earth or exposed to the weather shall be sealed watertight with special rubber-gasketed sleeve and joint assemblies, or with sleeves and modular rubber sealing elements.

3-3.03. Pipe Joints. Pipe joints shall be carefully and neatly made in accordance with the indicated requirements.

3-3.03.01. Threaded. Pipe threads shall conform to ANSI/ASME B1.20.1, NPT, and shall be fully and cleanly cut with sharp dies. Not more than three threads at each pipe connection shall remain exposed after installation. Ends of pipe shall be reamed after threading and before assembly to remove all burrs.

Threaded joints in plastic piping shall be made up with teflon thread tape applied to all male threads. At the option of CONTRACTOR, threaded joints in other piping may be made up with teflon thread tape, thread sealer, or a suitable joint compound.

3-3.03.02. Compression. Ends of tubing shall be cut square and all burrs shall be removed. The tubing end shall be fully inserted into the compression fitting and the nut shall be tightened not less than 1-1/4 turns and not more than 1-1/2 turns past fingertight, or as recommended by the fitting manufacturer, to produce a leaktight, torque-free connection.

3-3.03.03. Flared. Ends of annealed copper tubing shall be cut square, and all burrs shall be removed prior to flaring. Ends shall be uniformly flared without scratches or grooves. Fittings shall be tightened as needed to produce leaktight connections.

3-3.03.04. Soldered and Brazed. Where solder fittings are specified for lines smaller than 2 inches, joints may be soldered or brazed at the option of CONTRACTOR. Joints in 2 inch and larger copper tubing shall be brazed. Joints in copper chlorine tubing and refrigerant piping shall be brazed; solder will not be acceptable. Brazing alloy shall contain no tin.

Surfaces to be joined shall be thoroughly cleaned with flint paper and coated with a thin film of flux. At each joint, tubing shall enter to the full depth of the fitting socket.

Care shall be taken to avoid overheating the metal or flux. Each joint shall be uniformly heated to the extent that filler metal will melt on contact. While the joint is still hot, surplus filler metal and flux shall be removed with a rag or brush.

3-3.03.05. Solvent Welded. Solvent welded connections shall only be used for PVC pipe. All joint preparation, cutting, and jointing procedures shall comply with

the pipe manufacturer's recommendations and ASTM D2855. Pipe ends shall be beveled or chamfered to the dimensions recommended by the manufacturer. Newly assembled joints shall be suitably blocked or restrained to prevent movement during the setting time recommended by the manufacturer. Pressure testing of solvent welded piping systems shall not be performed until the applicable curing time, as set forth in Table X2.1 of ASTM D2855, has elapsed.

3-3.03.06. Flanged. Flange bolts shall be tightened sufficiently to slightly compress the gasket and effect a seal, but shall not be torqued less than the minimum value required by the gasket manufacturer. Flange bolts shall not be so tight as to fracture or distort the flanges. A plain washer shall be installed under the head and nut of bolts connecting plastic pipe flanges. Anti-seize thread lubricant shall be applied to the threaded portion of all stainless steel bolts during assembly.

Flange bolt holes shall be oriented as follows, unless otherwise indicated on the spool drawings:

Vertical flange face:	Bolt holes to straddle the vertical centerlines.
Horizontal flange face:	Bolt holes to straddle plant north-south centerlines.

Pipe sealants, thread compounds, or other coatings shall not be applied to flange gaskets unless recommended by the gasket manufacturer for the specified service and approved by ENGINEER.

Welds at orifice flanges shall have internal surfaces ground smooth to the pipe wall.

Slip-on flanges shall be welded inside and outside. There shall be a distance of approximately 1/16 to 1/8 inch between the edge of the fillet weld and the face of the flange. The seal weld shall be applied so that the flange face shall be free of weld spatter and does not require refacing.

Flat-faced flanges shall be used when mating to Class 125 flanges. Full-face gaskets shall be used with flat-faced flanges and ring gaskets shall be used with raised faced flanges.

Weld neck flanges shall be used with butt-weld fittings. The bore of weld neck flanges shall match the pipe wall thickness.

3-3.03.07. Welded. Welding shall conform to the specifications and recommendations contained in the "Code for Pressure Piping", ANSI B31.1.

Weld cross-sections shall be equal to or greater than the pipe wall thickness. Welds shall be smooth and continuous and shall have interior projections no greater than 1/16 inch. Backing strips or rings shall not be used except with specific prior review by ENGINEER as to use, material, and design. Root gap inserts that are completely melted and consumed in the weld bead are acceptable only when reviewed in advance by ENGINEER.

Welding shall be made by the shielded metal arc process.

3-3.03.8. Grooved Couplings. Grooves for grooved couplings shall be cut with a specially designed grooving tool. Grooves cut in steel pipe shall conform to flexible grooving dimensions, as set forth in AWWA C606, and shall be clean and sharp without burrs or check marks.

3-3.03.9. Push-on. Gasket installation and other jointing procedures shall be in accordance with the recommendations of the manufacturer. Each spigot end shall be suitably beveled to facilitate assembly. All joint surfaces shall be lubricated with a heavy vegetable soap solution immediately before the joint is completed. Lubricant shall be suitable for use in potable water, shall be stored in closed containers, and shall be kept clean.

3-3.03.10. Rubber-Gasketed. Rubber-gasketed joints for hub and spigot type cast iron soil pipe shall have plain spigot ends, without beads. Cut ends of all pipe shall be cut square, beveled, and all burrs shall be removed. Spigot ends shall be coated with a lubricant recommended by the gasket manufacturer and fully seated in the gasket. Clamps for hubless cast iron soil pipe shall be installed in accordance with the manufacturer's recommendations.

3-3.04. Pipe. Pipe shall be installed as specified, as indicated on the Drawings, or, in the absence of detail piping arrangement, in a manner acceptable to ENGINEER.

Piping shall be installed without springing or forcing the pipe in a manner which would induce stresses in the pipe, valves, or connecting equipment.

Piping shall be supported in conformance with the pipe supports section.

Water and air supply piping shall be provided with a shutoff valve and union at each fixture or unit of equipment, whether or not indicated on the Drawings, to permit isolation and disconnection of each item without disturbing the remainder of the system. Air supply piping shall be provided with sectionalizing valves and valved air inlet connections as needed for isolation of portions of the system for periodic testing.

A union shall be provided within 2 feet of each threaded-end valve unless there are other connections which will permit easy removal of the valve. Unions shall also be provided in piping adjacent to devices or equipment which may require removal in the future and where required by the Drawings or the specifications.

All air piping shall be graded to points of drainage collection where drip legs and drain valves shall be provided. Air piping shall be sized for the service conditions, with the indicated minimum sizes:

Service	Minimum Size
Air supply	1/2 inch OD
Buried piping	3/4 inch

Water supply piping within structures shall be arranged, and facilities provided, for complete drainage. All piping serving metering equipment shall be uniformly graded so that air traps are eliminated and complete venting is provided.

Stuffing box leakage from water sealed pumps shall be piped to the nearest point of drainage collection.

Taps for pressure gauge connections on the suction and discharge of pumping units shall be provided with a nipple and a ball type shutoff valve.

Drilling and tapping of pipe walls for installation of pressure gauges or switches will not be permitted.

In all water piping, insulating fittings shall be provided to prevent contact of dissimilar metals, including but not limited to, contact of copper, brass, or bronze pipe, tubing, fittings, valves, or appurtenances, or stainless steel pipe, tubing, fittings, valves, or appurtenances with iron or steel pipe, fittings, valves, or appurtenances. Insulating fittings shall also be provided to prevent contact of copper, brass, or bronze pipe, tubing, fittings, valves or appurtenances with stainless steel pipe, tubing, fittings, valves, or appurtenances.

Buried PVC piping shall be "snaked" in the trench and shall be kept as cool as possible during installation. PVC pipe shall be kept shaded and shall be covered with backfill immediately after installation.

Piping adjacent to flow sensors shall be installed in accordance with the requirements of the manufacturer of the flow sensor and commonly accepted design practices of the appropriate straight pipe runs both upstream and downstream.

Drains required for operation are shown on the Drawings. However, vents at all high points and drains at all low points in the piping that are required for complete draining for pressure test may not be shown on these drawings. CONTRACTOR shall add such items as found to be necessary during detail piping design and/or piping installation.

3-3.05. Reducers. Eccentric reducers shall be installed flat on the bottom for steam, condensate return and digester gas services.

3-3.06. Valves. Prior to soldering or brazing valves, teflon and elastomer seats and seals shall be removed to prevent damage.

Isolation valves provided with equipment and instruments shall be located in a manner which will allow ease of access and removal of the items to be isolated.

3-4. PIPING ASSEMBLY.

3-4.01. General. CONTRACTOR shall only use labor that has been qualified by training and experience to capably perform the specified activities required to accomplish the work in a satisfactory manner.

If there is a conflict between the mechanical drawings and piping and instrumentation drawings (P&IDs), the P&IDs shall take precedence. Any deviations from the Specifications or piping locations shown on the drawings require prior review and approval by ENGINEER.

3-5. PROTECTIVE COATING. Standard weight black steel pipe in buried locations will have exterior surfaces protected with a shop applied plastic coating.

Extra strong black steel pipe in buried locations shall have exterior surfaces protected with shop applied tape wrap.

The exterior surfaces of all fittings, couplings, specials, and other portions of buried piping not protected with plastic coating shall be tape-wrapped in the field. All surfaces to be tape-wrapped shall be thoroughly cleaned and primed in accordance with the tape manufacturer's recommendations immediately before wrapping. The tape shall be applied by two-ply (half-lap) wrapping or as needed to provide a total installed tape thickness of at least 60 mils. Joints in plastic-coated pipe shall be cleaned, primed, and tape-wrapped after installation.

Joints in galvanized steel piping in underground locations shall be field painted with two coats of coal tar coating.

3-5.01. Inspection. All shop-applied plastic coatings and tape wrap on pipe or fittings shall be inspected for holidays and other defects after receipt of the pipe or fitting on the job and immediately before installation. All field-applied tape wrap on pipe, joints, fittings, and valves shall be inspected for holidays and other defects following completion of wrapping. Inspection of plastic coatings after installation of the pipe or fitting in the trench shall be made where, in the opinion of ENGINEER, the coating may have been damaged during installation. Holidays and defects disclosed by inspection shall be repaired in accordance with the recommendations of the coating or tape wrap manufacturer, as applicable.

The inspection shall be made using an electrical holiday detector. The detector and inspection procedures shall conform to the requirements of Section 4.4 of ANSI/AWWA C209.

3-6. PRESSURE AND LEAKAGE TESTING. All specified tests shall be made by and at the expense of CONTRACTOR in the presence, and to the satisfaction of ENGINEER. Each piping system shall be tested for at least 1 hour with no loss of pressure. Piping shall be tested at the indicated pressures:

Service	Test Pressure	Test Medium
Water supply	1-1/2 times working pressure but not less than 120 psi	Water
Other piping	1-1/2 times working pressure but not less than 50 psi	Suitable fluid or gas; for distilled water piping, distilled water or filtered oil-free compressed air may be used

Leakage may be determined by loss-of-pressure, soap solution, chemical indicator, or other positive and accurate method acceptable to ENGINEER. All fixtures, devices, or accessories which are to be connected to the lines and which would be damaged if subjected to the specified test pressure shall be disconnected and the ends of the branch lines plugged or capped as needed during the testing.

Unless otherwise required by the applicable codes, drainage and venting systems shall be water or air tested, as required. For water testing, the drainage and venting system shall be filled with water to the level of the highest vent stack. For air testing, the system shall be charged with air to a minimum pressure of 5 psig. Openings shall be plugged as necessary for either type of test. To be

considered free of leaks, the system shall hold the water or air for 30 minutes without any drop in the water level or air pressure.

All necessary testing equipment and materials, including tools, appliances and devices, shall be furnished and all tests shall be made by and at the expense of CONTRACTOR and at the time directed by ENGINEER.

All joints in piping shall be tight and free of leaks. All joints which are found to leak, by observation or during any specified test, shall be repaired, and the tests repeated.

3-7. CLEANING. The interior of all pipe, valves, and fittings shall be smooth, clean, and free of blisters, loose mill scale, sand, dirt, and other foreign matter when installed. Before being placed in service, the interior of all lines shall be thoroughly cleaned, to the satisfaction of ENGINEER.

3-8. ACCEPTANCE. ENGINEER reserves the right to have any section of the piping system which he suspects may be faulty cut out of the system by CONTRACTOR for inspection and testing. Should the joint prove to be sound, ENGINEER will reimburse CONTRACTOR on a time-and-material basis as specified in the Contract. Should the joint prove to be faulty, the destructive test will continue joint by joint in all directions until sound joints are found. Costs for replacement of faulty work and/or materials shall be the responsibility of CONTRACTOR.

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Section 15060

MISCELLANEOUS PIPING AND PIPE ACCESSORIES

PART 1 - GENERAL

1-1. SCOPE. This Section covers the furnishing of miscellaneous piping and pipe accessories for the following services. Miscellaneous piping shall be furnished complete with all fittings, flanges, unions, and other accessories specified herein.

Material Classification BR-1

Gauge piping for raw water systems.

1-2. SUBMITTALS.

1-2.01. Drawings and Data. CONTRACTOR shall submit complete specifications, data, and catalog cuts or drawings in accordance with the requirements specified in Section 01300, “Submittals.” Items requiring submittals shall include, but shall not be limited to, the following:

Chemical resistant waste pipe and fittings.

Hose and hose couplings.

Name of Manufacturer

Type and model

Construction materials, thickness, and finishes,

Pressure and temperature ratings

1-3. DELIVERY, STORAGE, AND HANDLING. Shipping, handling and storage shall be in accordance with the requirements specified in Section 01600. All materials shall be stored in a sheltered location above the ground, separated by type, and shall be supported to prevent sagging or bending.

PART 2 - PRODUCTS

2-1. MATERIALS.

2-1.01. Pipe Materials. Miscellaneous piping materials shall be as indicated.

Material Classification	BR-1
Regular Weight Brass Pipe	
Pipe	ASTM B43, red brass, seamless, regular weight.
Fittings	ANSI/ASME B16.15.
Material Classification	HS-1
Hose With Insert Type Couplings	
Hose	ID not smaller than nominal size. Boston "Crosslinked Polyethylene Hose" or Gates "Renegade", "Mustang 45 HW" or "Stallion" acid-chemical hose. To be selected for resistance to the service medium.
Couplings	Rigid PVC or other material suitable for service conditions, with band type stainless steel clamps.
Material Classification	HS-2
Hose With Quick Disconnect Couplings	
Hose	ID not smaller than nominal size. Boston "Crosslinked Polyethylene Hose" or Gates "Renegade", "Mustang 45 HW" or "Stallion" acid-chemical hose. To be selected for resistance to the service medium.

Couplings	OPW "Quick Coupler" or PT Coupling "Quick Connect/Disconnect Coupling"; polypropylene or other material suitable for service conditions.

2-1.02. Accessories. Accessories for the miscellaneous piping systems shall be as indicated.

Unions For Brass pipe	Fed Spec A-A-59617.

PART 3 - EXECUTION

3-1. INSTALLATION. Materials furnished under this Section shall be installed in accordance with Section 15020.

End of Section

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Section 15061

DUCTILE IRON PIPE

PART 1 – GENERAL

1-1. SCOPE. This section covers the furnishing and installation of ductile iron pipe. Ductile iron pipe is indicated on the Drawings as "DIP." Ductile iron pipe shall be furnished complete with all fittings, jointing materials, pipe hangers and supports, anchors, blocking, encasement, and appurtenances.

Piping furnished hereunder shall be complete with all joint gaskets, bolts, and nuts required for installation of any valves and equipment furnished under this Contract.

Pipe hangers and supports, pressure and leakage testing, cleaning, and corrosion monitoring are covered in other sections. Pipe trenching, embedment, and backfill are covered in Section 02202, "Trenching and Backfilling."

1-1.01. Pipe Manufacturer's Experience and Field Services. All ductile iron pipe, fittings, and specials shall be fabricated, lined, and coated by the pipe manufacturer. Minimum required experience qualifications shall include manufacture of a pipeline at least 10 miles in length, of a diameter equal to or larger than the pipe to be provided, with joints, lining, and coating suitable for the same or a higher pressure rating, which has performed satisfactorily for the past 5 years. The pipe manufacturer shall have ISO 9001:2000 registration.

The pipe manufacturer shall provide the services of an experienced, competent, and authorized field service representative who is acceptable to the ENGINEER to perform all pipe manufacturers' field services specified herein. The service representative shall have at least 5 years of practical knowledge and experience in installing ductile iron pipe with joints, lining, and coating of the pipe. A resume of the proposed field service representative which meets the specified minimum required experience qualifications shall be submitted for review.

1-1.02. Emergency Repair Manual. Submit an emergency repair manual prepared and furnished by the pipe manufacturer. The manual shall include procedures for handling emergency repairs; a list of recommended stock replacement pipe sections, closures, and other parts needed for emergency repairs; names and emergency telephone numbers of pipe manufacturer's engineering staff and factory-trained field service representatives who can be contacted during an emergency; and installation instructions for the materials and methods used in making repairs.

1-2. SUBMITTALS. CONTRACTOR shall submit complete specifications, data, and catalog cuts or drawings in accordance with the requirements specified in Section 01300, “Submittals.” Drawings, details, specifications, and installation schedules covering all ductile iron pipe and accessories shall be submitted. The Drawings and data shall include, but shall not be limited to, the following:

Certification by manufacturer for each item furnished in accordance with the ANSI/AWWA Standards.

Certification of gaskets, certifying that gasket material is suitable for services intended.

Certification of proof-of-design tests for joints.

Certification of proof-of-design tests for welded-on outlets.

Laying schedule complete with an explanation of all abbreviations used in the schedule. Lay schedules that indicate the type of pipe, fitting, or special, and the location and the direction of each of these components in the completed line shall be provided. In addition, the lay schedule shall include: the pipe stationing at all changes in grade or horizontal alignment; all elements of curves and bends, both in horizontal and vertical alignment; and the limits of each reach of restrained joints or concrete encasement.

Two samples of the polyethylene encasement, each sample clearly identified as required by the Governing Standards and test results from an independent third party laboratory of the requirements specified in ANSI/AWWA C105/A21.5.

Product data for all manufactured products, such as mechanical couplings and flanged coupling adapters.

Certification of joint design shall be provided in accordance with ANSI/AWWA C111/A21.11

Certification of suitability of Class 350 pipe and restrained joint system at operating heads in excess of 800 feet elevation.

Submittal data shall clearly indicate the country of origin of pipe, fittings, flanges, restraining devices, and accessories. Certified copies of physical and chemical test results as outlined in ANSI/AWWA C151 shall be submitted for the materials to be provided.

Obtain and submit a written statement from the gasket material manufacturer certifying that the gasket materials are compatible with the joints specified herein

and are recommended for the specified field test pressures and service conditions.

1-3. DELIVERY, STORAGE, AND HANDLING. Shipping, handling and storage shall be in accordance with the requirements specified in Section 01600, and the manufacturer's recommendations.

Pipe, fittings, and accessories shall be handled in a manner that will ensure installation in sound, undamaged condition. Equipment, tools, and methods used in handling and installing pipe and fittings shall not damage the pipe and fittings. Hooks inserted in ends of pipe shall have broad, well-padded contact surfaces. Unpadded hooks, wire brushes or other abrasive tools shall not be permitted to come into contact with polyethylene lining if such lining is specified.

Pipe and fittings in which the lining has been damaged shall be replaced. With the concurrence of the ENGINEER, small and readily accessible damaged areas may be repaired.

Repair any damage to pipe coatings before the pipe is installed.

1-4. BASIS OF DESIGN. Refer to Drawing G601, "Condensed Hydraulic Profile" and the Drawings. There are three (3) Hydraulic Grade Lines (HGLs) shown in the profile based on the "Ultimate," "Phase 1," and "Bypass Mode" flow rates. In addition, refer to the pipeline pressure test requirements specified in Section 02704. The DIP pressure classes are based on the following:

Unit	**HGL Basis for Pipe Pressure Class**
G	Ultimate
G1	Ultimate
H1	Pressure Test HGL Elev. 1379
T11	Pressure Test HGL Elev. 1379

PART 2 – PRODUCTS

2-1. PIPE CLASS. The class of ductile iron pipe shall be as indicated in the Drawings. The specified class includes service allowance and casting allowance.

Pipe wall thickness for grooved and threaded end pipe shall comply with the following minimum thickness:

Pipe Size (Inches)	Minimum Class Threaded Ends (1)	Grooved Ends (2)
4-16	53	53
18 – 24	53	55
30 – 36	53	56

(1) Complies with ANSI/AWWA C115/A21.15 for minimum pipe wall thickness for threaded flanges.

(2) Complies with ANSI/AWWA C606 for grooved and shouldered joint ductile iron pipe.

2-2. MATERIALS.

Pipe — Ductile iron, ANSI/AWWA C151/A21.51, Table 1 or Table 3.

Gaskets – All Joint Types — Synthetic rubber in accordance with AWWA C111; natural rubber will not be acceptable. Gaskets shall be furnished by the pipe manufacturer.

Fittings — ANSI/AWWA C110/A21.10 or ANSI/AWWA C153/A21.53, minimum working pressure rating as follows, unless indicated otherwise on the Drawings.

Fitting Size in.	Material	Type	Min. Working Pressure Rating, psi
4 to 24	DI	Mechanical and Push-on joints	350
30 to 36	DI	Mechanical and Push-on joints	350
4 to 12	DI	Flanged joints	350
14 to 36	DI	Flanged joints	250

All fittings shall be ductile iron and suitable for a factory test pressure of 1.5 times rated working pressure without leakage or damage.

Coordinate flange OD and bolt hole size and spacing with the flange of the valve or item to which the ductile iron pipe flange is to be connected.

Push-on Joints	ANSI/AWWA C111/A21.11.
Restrained Push-on Joints, gaskets with stainless steel gripping segments, (4 inch through 12 inch)	Tyton "Field Lok 350 Gasket", or American "Fast Grip".
Restrained Push-on Joints, locking wedge type (4 inch through 20 inch)	EBAA Iron "Megalug" Series 1700; or equal.
Restrained Push-on Joints, positive locking segments and/or rings, as required (4 inch through 36 inch)	American "Flex-Ring," or "Lok-Ring"; Clow "Super-Lock"; U.S. Pipe "TR Flex"; or Griffin "Snap-Lok." Field-adaptable devices that are an integral part of the pipe manufacturer's proprietary push-on restrained joint system will be acceptable for field closures and stationing adjustments. American Field FlexRing and USP Gripper Ring or equal.
Flanged Joints	ANSI/AWWA C115/A21.15.
Flanges	Flanges shall be individually fitted and machine tightened in the shop. Pipe shall extend completely through threaded-on flanges. The pipe end and flange face shall be finish machined in a single operation. Flange faces shall be flat and perpendicular to the pipe centerline. Flanges shall be back-faced parallel to the face of flange.

Class 250	Ductile iron, flat faced, solid back with ANSI/ASME B16.1, Class 250 diameter and drilling to match Class 250 flanged valves.
All Others	Ductile iron, flat faced, solid back ANSI/AWWA C115/A21.15.
Flanges	All flanges shall be suitable for test pressure of 1.5 times rated pressure without leakage or damage.
Bolts	ASTM A307, chamfered or rounded ends projecting 1/4 to 1/2 inch beyond outer face of nut.
Nuts	ASTM A307, hexagonal, ANSI/ASME B18.2.2, heavy semi finished pattern.
Gaskets	ASTM D1330, Grade I rubber, full-face type, 1/8 inch thick. Gaskets shall be furnished by the pipe manufacturer.
Insulated Flanges	
Flanges	As specified herein, except bolt holes shall be enlarged as needed to accept bolt-insulating sleeves.
Insulation Kits	As specified in Section 16640, "Corrosion Monitoring."
Threaded Connections	ANSI/ASME B1.20.1, NPT; with boss or tapping saddle wherever wall thickness minus the foundry tolerance at the tapped connection is less than that required for 4-thread engagement as set forth in Table A.1, Appendix A, of ANSI/AWWA C151/A21.51.

Mechanical Couplings

Couplings	In accordance with ANSI/AWWA C606; Victaulic Depend-O-Lok, FxF Type 2; or equal. Couplings furnished shall have rated pressures exceeding the design and test pressures shown on the Drawings.
Grooved Couplings	AWWA C606.

Flanged Coupling Adapters

Restrained (4 inch through 12 inch)	Smith-Blair "Type 912" or Romac "Style FCA501", with anchor studs.
Restrained (14 inch through 84 inch - Dismantling Joint)	Romac "DJ400" or Viking Johnson.
Unrestrained (14 inch and larger)	Smith-Blair "Type 913" or Romac "Style FC400", 14 inches and larger.
Tapping Saddles	Ductile iron, with steel straps and rubber sealing gasket, minimum 350 psi pressure rating.

Shop Lining and Coating

Cement Mortar Lining with or without Seal Coat	ANSI/AWWA C104/A21.4.
Universal Primer	Manufacturer’s standard.
Asphaltic Coating	AWWA C151 for buried pipe. For pipe that is exposed, refer to Section 09945.
Polyethylene Encasement	Seamless, ANSI/AWWA C105/A21.5; LLDPE - 8 mil.
Mechanical Joints	ANSI/AWWA C110/A21.10 and C110/A21.11

Restrained Mechanical Joints	EBAA Iron “Megalug” Series 1100; or equal.

2-3. SHOP COATING AND LINING. The interior of all pipe and fittings shall be cement mortar lined, except sleeves, caps, plugs, and blind flanges.

The exterior surfaces of all pipe and fittings that will be buried, or installed in vaults and not exposed to view, shall be coated with asphaltic coating. Flange faces shall be coated with a suitable rust-preventive compound.

Ductile iron pipe that is aboveground and exposed to view shall be shop-primed and field painted as specified in Section 09945, “Exterior Coating for Exposed Ductile Iron Pipe.”

2-4. WELDED-ON OUTLETS

2-4.01. Outlet Size and Parent Pipe Size: Welded-on outlets shall be limited to branch outlets having a nominal diameter not greater than indicated in the Table below. Welded-on outlets shall be fabricated by the pipe manufacturer at the same facility where the pipe is produced. The pipe manufacturer shall have a minimum of five years experience in the fabrication and testing of outlets of similar size and configuration.

Main Line Nominal Diameter Versus Maximum Nominal Branch Outlet Diameter				
Main Line Nominal Dia.	Branch Outlet Nominal Dia.		Main Line Nominal Dia.	Branch Outlet Nominal Dia.
10”	6”		30”	20”
12”	8”		36”	24”
14”	8”		42”	30”
16”	10”		48”	30”
18”	12”		54”	*30”
20”	14”		60”	*30”
24”	16”		64”	*30”

2-4.02. Outlet Joint Types. The joints on welded-on branch outlets shall meet the requirements of AWWA C111 or AWWA C115.

2-4.03. Design. The pipe wall thickness and weld reinforcement design for welded-on outlet fabrications shall be based on either Section 13 of AWWA Manual M11 for welded outlets on steel pipe or Section VIII of the ASME Unfired Pressure Vessel Code. Reinforcing welds shall be placed using Ni-Rod FC 55-0 cored wire, Stoody Castweld Ni 55-0 cored wire, or Ni-Rod 55-0 electrodes manufactured by INCO Alloys or equal. Carbon steel electrodes are not acceptable. Submit test results indicating typical mechanical properties of the utilized weld material (an all-weld sample), as well as mechanical properties from transverse tensile and impact specimens machined from butt-weld joined ductile iron pipe coupons to show the suitability or equivalence of the electrodes used.

Parent pipe and branch outlet candidate pipe shall be centrifugally cast ductile iron pipe designed in accordance with AWWA C150 and manufactured in accordance with AWWA C151. Minimum classes for parent and outlet pipe shall be: for sizes 4" – 54", Special Thickness Class 53.

All welded-on outlets 6" – 30" shall be rated for a working pressure of 250 psi. Welded-on outlets 36" and larger shall be rated for 200 psi at a minimum safety factor of 2.5 based on proof of design hydrostatic test results. Submit proof test data confirming the design, hydrostatic test results, and safety factors.

Prior to the application of any coating or lining in the outlet area, all weldments for branch outlets shall be subjected to an air pressure test of at least 15 psi. Leakage shall be detected by applying an appropriate foaming solution to the entire exterior surface of the weldment and adjoining pipe edges or by immersing the entire area in a vessel of water and visually inspecting the weld surface for the presence of air bubbles. Any weldment that shows any signs of leakage shall be repaired and retested in accordance with the manufacturer's submitted written procedures.

2-4.04. Quality Assurance. Submit a fully documented welding quality assurance system and maintain resident quality assurance records based on ANSI/AWS D11.2, the Guide for Welding Iron Castings. Submit welding procedure specification (WPS), procedure qualification (PQR), and welder performance qualification test (WPQR) records as well as appropriate air-test logs documenting air-leakage tests on all welded-on outlet pipes furnished to the project.

PART 3 – EXECUTION

3-1. DELIVERY, STORAGE, AND HANDLING. Refer to Paragraph 1-3.

3-2. INSPECTION. Pipe and fittings shall be carefully examined for cracks and other defects immediately before installation; spigot ends shall be examined with particular care. All defective pipe and fittings shall be removed from the site. Tests for preliminary acceptance of materials as requested in the Submittals paragraph shall be made at the expense of the CONTRACTOR.

The ENGINEER may obtain samples from the material supplied in the field and have test conducted by an independent third-party laboratory, at the ENGINEER'S expense, of the requirements specified in ANSI/AWWA C105/A21.5.

3-3. PREPARATION. The interior of all pipe and fittings shall be thoroughly cleaned of all foreign matter prior to installation. Before jointing, all joint contact surfaces shall be wire brushed if necessary, wiped clean, and kept clean until jointing is completed.

Precautions shall be taken to prevent foreign material from entering the pipe during installation. Debris, tools, clothing, or other objects shall not be placed in or allowed to enter the pipe.

3-4. CUTTING PIPE. Cutting shall be done in a neat manner, without damage to the pipe or the lining. Cuts shall be smooth, straight, and at right angles to the pipe axis. After cutting, the ends of the pipe shall be dressed with a file or a power grinder to remove all roughness and sharp edges. The cut ends of push-on joint pipe shall be suitably beveled.

All field cutting of existing gray cast iron pipe shall be done with mechanical pipe cutters, except where the use of mechanical cutters would be difficult or impracticable.

Ends of ductile iron pipe shall be cut with a portable guillotine saw, abrasive wheel, saw, milling cutter, or oxyacetylene torch. The use of hydraulic squeeze type cutters will not be acceptable. Field-cut holes for saddles shall be cut with mechanical cutters; oxyacetylene cutting will not be acceptable.

3-5. PIPE INSTALLATION.

3-5.01. General. All trenching, embedment, and backfilling of buried piping shall conform to the requirements specified in Section 02200, "Earthwork"; Section 02202, "Trenching and Backfilling"; and the details indicated on the Drawings.

Pipe embedment and backfilling shall closely follow the installation and jointing of DIP in the trench to prevent flotation of the pipe by water and longitudinal movement caused by thermal expansion or contraction of the pipe.

3-5.02. Pipe Alignment and Grade. The horizontal and vertical alignment of pipelines shown on the Drawings establishes the basis of pipeline design. CONTRACTOR'S actual trenching activities and pipe laying operations, as performed in the field, subject to review and approval by the ENGINEER (resident inspector) and DISTRICT, may be permitted to vary from the horizontal and vertical alignments shown to achieve pipe manufacture and installation economies, generally as specified below. In all cases, the CONTRACTOR shall maintain an adequate supply of pipe and fittings at the job site in order to allow such adjustments without affecting the pipe laying operations.

3-5.02.01. Adjusting the Pipe Grade (Vertical Profile). In general, except where making connections to other facilities or as specifically shown, the pipeline shall be installed with a typical minimum earth cover of 42 inches. Field survey the pipeline alignment and ground surface 1,500 feet or more in advance of pipe laying operations. Where the actual ground surface varies from that shown, CONTRACTOR shall adjust the pipe profile up or down during pipe laying to achieve 42 inches minimum cover over the top of the pipe.

As specified in Section 01530, "Protection of Existing Facilities, CONTRACTOR shall locate certain existing utilities in advance of preparing pipe laying drawings to account for any differences between actual conditions and that shown. In addition, as specified in Section 01530, CONTRACTOR shall field locate and expose all underground utilities not less than 1500 feet in advance of pipe laying operations. Where there is a potential conflict between the pipeline and existing utility, adjust the pipe profile up or down to meet the minimum clearance requirements shown on the Drawings.

Adjusting the pipe profile in the field as described above shall be performed through daily consultation with the ENGINEER (resident inspector), who has the authority approve such modifications in a timely manner.

3-5.02.02. Criteria For Making Pipe Profile Adjustments. In general, pipe placement shall proceed in the uphill direction with the bell end of the pipe located on the uphill end. Pipelines or runs intended to be straight shall be laid straight except as approved in the field by ENGINEER. Deflections from a straight line or grade shall not exceed the values stipulated in Table 3 or Table 4 of AWWA C600, or 75 percent of the pipe manufacturer's published allowable joint deflections, unless specially designed bells and spigots are provided.

Avoid localized high points in the pipe that might allow air to collect in pipelines unless an air release valve is indicated on the Drawings at that location, or

unless the CONTRACTOR installs an air release valve assembly at no additional cost to the DISTRICT.

Minimize localized low points to the maximum extent feasible.

3-5.02.03. Adjusting the Horizontal Alignment. The points of intersection (P.I.'s) and curve data shown on the Drawings define the horizontal alignment for design and permanent easement purposes. CONTRACTOR'S line layout may depart slightly from the defined alignment if such departure produces manufacturing or installation economies in the use of standard fittings or other savings. CONTRACTOR shall propose adjusting the alignment in the pipeline submittals for review and approval by the ENGINEER and DISTRICT.

In addition, pipeline horizontal alignment revisions may be made in the field when needed to avoid a utility or other conflict subject to review and approval by the ENGINEER (resident inspector) and DISTRICT.

3-6. LAYING PIPE. Buried pipe shall be protected from lateral displacement by placing the specified pipe zone backfill material. Under no circumstances shall pipe be laid in water, and no pipe shall be laid under unsuitable weather or trench conditions. Whenever pipe laying is stopped, the open end of the pipe shall be sealed with a child and vermin-proof plug, which will also prevent trench water from entering the pipe.

3-7. FIELD JOINTS. Joints shall be push-on type, and restrained where indicated on the Drawings. Bond all buried joints as described in Section 16640.

Certification of joint design shall be provided in accordance with ANSI/AWWA C111/A21.11, Section 4.5, Performance Requirements, as modified herein. The joint test pressure shall be not less than 2 times the working pressure or 1-1/2 times the test pressure of the pipeline, whichever is higher. The same certification and testing shall also be provided for restrained joints. For restrained joints, the piping shall not be blocked to prevent separation and the joint shall not leak or show evidence of failure. It is not necessary that such tests be made on pipe manufactured specifically for this project. Certified reports covering tests made on other pipe of the same size and design as specified herein and manufactured from materials of equivalent type and quality may be accepted as adequate proof of design.

Restrained joints shall be extended after they are assembled to minimize further take-up. Field closure pieces shall be located at least one joint away from the bends beyond the length over which joints are to be restrained.

3-8. MECHANICAL JOINTS. Mechanical joints shall be carefully assembled in accordance with the manufacturer’s recommendations. If effective sealing is not

obtained, the joint shall be disassembled, thoroughly cleaned, and reassembled. Bolts shall be uniformly tightened to the torque values listed in Appendix A of ANSI/AWWA C111/A21.11. Over-tightening of bolts to compensate for poor installation practice will not be acceptable.

The holes in mechanical joints with tie rods shall be carefully aligned to permit installation of the tie rods. In flange and mechanical joint pieces, holes in the mechanical joint bells and the flanges shall straddle the top (or side for vertical piping) centerline. The top (or side) centerline shall be marked on each flange and mechanical joint piece at the foundry.

3-9. PUSH-ON JOINTS. The pipe manufacturer's instructions and recommendations for proper jointing procedures shall be followed. All joint surfaces shall be lubricated with heavy vegetable soap solution immediately before the joint is completed. Lubricant shall be suitable for use in potable water, shall be stored in closed containers, and shall be kept clean. Each spigot end shall be suitably beveled to facilitate assembly. Pipe ends for restrained joint pipe shall be prepared in accordance with the pipe manufacturer's recommendations.

3-10. FLANGED JOINTS. 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.

When bolting flanged joints, care shall be taken to avoid restraint on the opposite end of the pipe or fitting which would prevent uniform gasket compression or would cause unnecessary stress in the flanges. One end of the flanged pipe shall be free to move in any direction while the flange bolts are being tightened. Bolts shall be tightened gradually and at a uniform rate, to ensure uniform compression of the gasket.

3-11. FLANGED COUPLING ADAPTERS. Flanged coupling adapters shall be installed in accordance with the coupling manufacturer's recommendations. After the pipe is in place and bolted tight, the proper locations of holes for the anchor studs shall be determined and the pipe shall be field-drilled. Holes for anchor studs shall be drilled completely through the pipe wall. Hole diameter shall be not more than 1/8 inch larger than the diameter of the stud projection.

The inner surfaces of couplings shall be prepared for coating in accordance with instructions of the coating manufacturer and shall then be coated with liquid epoxy in accordance with ANSI/AWWA C210. The remaining surfaces, except flange mating surfaces, shall be cleaned and shop primed with universal primer.

3-12. MECHANICAL COUPLINGS. Mechanical couplings shall be carefully installed in accordance with the manufacturer's recommendations. A space of at least 1/4 inch, but not more than 1 inch, shall be left between the pipe ends. Pipe and coupling surfaces in contact with gaskets shall be clean and free from dirt and other foreign matter during assembly. All assembly bolts shall be uniformly tightened so that the coupling is free from leaks, and all parts of the coupling are square and symmetrical with the pipe. Following installation of the coupling, damaged areas of shop coatings on the pipe and coupling shall be repaired to the satisfaction of the ENGINEER.

The interior surfaces of the middle rings shall be prepared for coating in accordance with instructions of the coating manufacturer and shall then be coated with liquid epoxy in accordance with ANSI/AWWA C210. The remaining components shall be cleaned and shop primed with universal primer.

3-13. GROOVED-END JOINTS. Grooved couplings with rigid type grooving shall be installed in accordance with the coupling manufacturer's recommendations. Completed joints shall be rigid and shall allow no angular deflection or longitudinal movement. Except for closure pieces, field grooving of pipe will not be acceptable.

Special care shall be taken when connecting piping to pumping equipment to avoid transmitting pipe stresses to the pump flanges. Piping shall be permanently supported to obtain accurate matching with abutting pump flanges before bolts are installed in the flanges.

3-14. POLYETHYLENE ENCASEMENT. All buried ductile iron pipe, including all straight pipe, bends, tees, adapters, closure pieces, and other fittings or specials, and all valves, shall be provided with at least one wrap of polyethylene encasement. Locations where ductile iron pipe shall be double wrapped with polyethylene encasement are indicated on the Drawings or as specified in Section 16640.

Polyethylene tube protection shall be installed in accordance with ANSI/AWWA C105/A21.5, as modified herein. Preparation of the pipe shall include, but shall not be limited to, removal of lumps of clay, mud, cinders, etc., prior to installation.

1. Apply a single wrapping except where double wrapping is shown on the Drawings.
2. 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.

3. Wrap bell-spigot interfaces, restrained joint components, and other irregular surfaces with wax tape or moldable sealant prior to placing polyethylene encasement.
4. 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.
5. 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.
6. Where ductile iron pipe is also embedded or encased in concrete, the polyethylene tube shall be installed over the pipe for 5 feet either side of each end of the concrete encasement.

The terms "polyethylene tube protection" and "polyethylene encasement" are interchangeable and shall have the same meaning in these Contract Documents.

3.15. OUTLETS. Where a 12-inch or smaller branch outlet is indicated and the diameter of the parent pipe is at least twice the diameter of the branch, use either a tee or a factory welded-on boss. For all others use a tee meeting ANSI/AWWA C110/A21.10 or ANSI/AWWA C153/A21.53.

3.16. REDUCERS. Reducers shall be eccentric as indicated on the Drawings. Reducers of eccentric pattern shall be installed with the straight side on top, so that no air traps are formed.

3-17. CONNECTIONS WITH EXISTING PIPING. Connections between new work and existing piping shall be made using fittings suitable for the conditions encountered. Each connection with an existing pipe shall be made at a time and under conditions which will least interfere with service to customers, and as authorized by the DISTRICT. Facilities shall be provided for proper dewatering and for disposal of all water removed from dewatered lines and excavations without damage to adjacent property.

Special care shall be taken to prevent contamination when dewatering, cutting into, and making connections with existing piping. Trench water, mud, or other contaminating substances shall not be permitted to enter the lines. The interior of all pipe, fittings, and valves installed in such connections shall be thoroughly cleaned and then all potable water pipe, fittings, and valves shall be swabbed with, or dipped in, a 200-mg/L chlorine solution.

3-18. INSULATED FLANGED JOINTS. Insulated flanged joints shall be installed where indicated on the Drawings; refer to Section 16640, "Corrosion Monitoring," for specification requirements.

3-19. CONCRETE ENCASEMENT. Concrete encasement shall be installed where indicated on the Drawings. A pipe joint shall be provided within 12 inches of each end of the concrete encasement. Concrete and reinforcing steel shall be as specified in Section 03300. All pipe to be encased shall be suitably supported and blocked in proper position, and shall be anchored to prevent flotation.

3-20. PRESSURE AND LEAKAGE TESTS. Pipe and fittings shall be subjected to a pressure test and a leakage test performed in accordance with Section 02704, "Pipeline Pressure and Leakage Testing." CONTRACTOR shall provide all necessary pumping equipment; piping connections between the piping and the nearest available source of test water; pressure gauges; and other equipment, materials, and facilities necessary for the tests. All pipe, fittings, valves, pipe joints, and other materials that are found to be defective shall be removed and replaced with new and acceptable materials, and the affected portion of the piping shall be retested by and at the expense of CONTRACTOR.

All joints shall be watertight and free from visible leaks. Any visible leak which is discovered within the guarantee period stipulated in General Conditions 13.6, “One Year Correction Period,” shall be repaired by and at the expense of CONTRACTOR.

3-21. CLEANING. The interior of all pipe and fittings shall be kept clean of any foreign matter until the work has been accepted.

End of Section

Section 15062

STEEL PIPE

PART 1 - GENERAL

1-1. SCOPE. This section covers designing, detailing, fabricating, delivering and installing welded steel pipe, 6 inches in diameter and larger, together with fittings, specials, manholes, flanges, pipe supports and appurtenances, protective linings and coatings, hydrostatic shop testing, and nondestructive examination of shop welds for specials in accordance with AWWA C200 as modified herein.

Welded steel pipe is indicated on the Drawings as “WSP.”

Steel pipe smaller than 6 inches in diameter, miscellaneous small piping, pipe supports, corrosion monitoring, hydrostatic field pressure leakage tests, and cleaning are covered in other sections.

Pipe trenching, bedding, and backfill are covered in Section 02200, "Earthwork," and Section 02202, "Trenching and Backfilling."

Steel piping shall be furnished and installed complete with all fittings, specials, jointing materials, appurtenances, and accessories indicated on the Drawings or otherwise required for proper installation and functioning of the piping.

1-1.01. Pipe Manufacturer’s Qualifications. All manufacturing of the pipe, including fabrication of steel cylinders, application of protective linings and coatings, and fabrication of fittings, specials, or appurtenances shall be performed by one manufacturing company with a minimum of ten (10) years experience manufacturing pipe of the type and size specified and shall hold either SPFA quality certification or ISO 9001:2000 certification. Pipe lining and coating, whether factory applied or field applied, is an element of the completed pipe. Only pipe manufacturers who provide completed lined and coated pipe shall furnish pipe for this Project. In addition, supervisors of coating operations shall have at least two years of continuous recent experience in the application of the specified coating systems for steel pipe.

1-2. GOVERNING STANDARDS. Except as modified or supplemented herein, all steel pipe, fittings, and specials shall conform to the applicable requirements of the following standards:

ANSI/AWWA Standards	Title
C200	Steel Water Pipe 6 In. and Larger
C205	Cement-Mortar Protective Lining and Coating for Steel Water Pipe – 4 inch and Larger - Shop Applied
C206	Field Welding of Steel Water Pipe
C207	Steel Pipe Flanges for Waterworks Service – Sizes 4 In. through 144 In.
C208	Dimensions for Fabricated Steel Water Pipe Fittings
C219	Bolted, Sleeve-Type Couplings For Plain-End Pipe
C602	Cement-Mortar Lining of Water Pipelines in Place - 4 In. and Larger
C606	Grooved And Shouldered Joints
ANSI Standard	
B18.2.1	Square and Hex Bolts and Screws
ANSI/ASME Standards	
B1.1	Unified Inch Screw Threads
B18.2.2	Square and Hex Nuts
B36.10	Welded and Seamless Wrought Steel Pipe

1-3. SUBMITTALS. CONTRACTOR shall submit the following items in accordance with the requirements specified in Section 01300, “Submittals.”

Submit Shop Drawings, tabulated layout schedule and line layout diagrams for review before fabrication, showing the layout and details of the pipeline and all specials required as shown on the Drawings. The line layout diagrams shall be suitable for use in distributing material along the pipeline alignment and for laying the pipe. Diagrams shall show stations; laying lengths; sequence and direction of placement; invert elevations and grades; the degree of bevel and/or pull required; piece marks; steel pipe plate thickness; the location of steel pipe specials and fabricated bends; closure sections; insulating joints; nozzles and

manholes. The numbers indicated on the Drawings shall correspond with those painted on the pipe. Additional information shown shall include, but not be limited to, the following:

Pipe inside diameter after lining.

ASTM class or grade of steel.

Yield strength and design stress of steel.

Total coating thickness.

Thickness of mortar lining.

Joint details.

Coating materials (shop and field applied).

Test bulkheads.

Weld details.

Submit pipe manufacturer's qualifications.

Submit welding procedure specifications (WPS), procedure qualification records (PQR), and welder, welding operator and tack welder qualification test records for all shop and field welding in accordance with AWS D1.1, Section 5.

Submit certified copies of shop testing and inspection reports.

Submit Certificates of Compliance, obtained from the pipe fabricator, stating that all pipe, specials, flanges, coatings, and linings have been manufactured and tested in accordance with these Specifications. Certificates shall be submitted for the testing or manufacturing regardless of whether it was witnessed by the ENGINEER or not.

Submit Certificates of Compliance for items referenced to ASTM standards including, but not limited to, the following:

Steel plate for fabricated or mill pipe.
Steel weld fittings.
Gaskets.
Bolts, nuts and washers.
Submit Product Data and manufacturer's installation instructions for pipe coating products.

Submit pipe manufacturer's shipping and handling instructions.

Submit a certified copy of mill test reports for each heat number of the steel used in the fabrication of the pipe. Mill test reports shall show the type of steel and the physical and chemical properties for each heat number of steel used in fabrication of the pipe.

Submit drawings of all steel pipe hangers, supports, anchorage, embeds, and all other information regarding installation of steel pipe. Submit design and details of pipe support and hold-down system to be used during concrete encasement of steel pipe.

Submit product data, material lists and shop drawings for manufactured products including, but not limited to, the following:

Mechanical couplings and shouldered couplings
Flanged coupling adapters
Coating products
Pipe sleeves

Submit a written statement from the gasket material manufacturer certifying that the gasket materials are compatible with the stab and flanged joints specified herein and are suitable for the specified field test pressures and for use with chlorinated and chloraminated potable water.

Submit proposed field weld test procedures and test results.

Submit results of survey control for pipe layout; refer to Paragraph 3-5.03.02 of this Section.

1-4. FABRICATION, WELDING AND WELD INSPECTION REQUIREMENTS.

1-4.01. General. Design of details not otherwise shown, fabrication, assembly, inspection and testing of steel pipe shall be in accordance with AWWA C200. Where provisions of AWWA conflict with the provisions of the Specifications, the latter shall govern.

Field welding shall be performed in accordance with AWWA C206. Where provisions of AWWA conflict with the provisions of the Specifications, the latter shall govern.

1-4.02. Shop and Field Welding. Use only welders, welding operators, tack welders, equipment, and welding procedures qualified in accordance with the standards specified herein.

Identify by name all qualified personnel.

As Work progresses, the ENGINEER may require additional test specimens and no welder whose work is at any time found unsatisfactory shall remain employed on the Work regardless of the quality of his earlier test welds. Each hand weld specimen shall be plainly marked with the welder's identifying symbol.

1-4.03. Welder's qualifications. Each welder shall be qualified in accordance with AWS D1.1 and as defined in ANSI/AWWA C200. All qualifications shall be in accordance with all-position pipe tests as defined in Section 5 of AWS D1.1. Any welder shall be retested and requalified when the welder's work creates a reasonable doubt as to proficiency. Test, when required, shall be conducted at no additional expense to the DISTRICT.

Submit qualification test records of the welders.

1-4.04. Examination of Shop Welds. Requirements for shop hydrostatic testing are specified in Paragraph 2-12.03 of this Section.

Welding inspectors shall be qualified and currently certified as Certified Welding Inspectors (CWI) in accordance with AWS Standard for Qualification and Certification of Welding Inspectors (QCI). Only individuals so qualified shall be authorized to perform fabrication inspection and testing. Welding inspectors shall verify that fabrication welding is performed in accordance with the requirements of the Specifications.

Personnel performing radiographic tests shall be qualified and certified according to the requirements of SNT-TC-1A.

Perform nondestructive examination of all shop welds used to fabricate specials. Nondestructive examination of the shop welds listed below shall be performed in accordance with AWWA C200 and as specified.

All welds at special sections shall be examined using radiographic testing methods. In addition, welded collar plates used for nozzle and manhole attachments shall be air leakage tested.

All shop welds not meeting the specified requirements shall be repaired and retested until the specified requirements are met, at no additional cost to the DISTRICT.

1-4.05. Examination of Field Welds. Refer to Paragraph 3-11.01 of this Section.

1-5. STORAGE AND HANDLING. Pipe, fittings, specials, and appurtenances shall at all times be handled and stored in a manner that will ensure installation in sound, undamaged condition.

1-6. BASIS OF DESIGN. Refer to Drawing G601, “Condensed Hydraulic Profile” and the Drawings. There are three (3) Hydraulic Grade Lines (HGLs) shown in the profile based on the “Ultimate,” “Phase 1,” and “Bypass Mode” flow rates. In addition, refer to the pipeline pressure test requirements specified in Section 02704. The welded steel pipe pressure classes are based on the following:

Unit	HGL Basis for Pipe Pressure Class	Notes
G	Ultimate	
G1	Ultimate	
H1	Pressure Test HGL Elev. 1379	
T11	Pressure Test HGL Elev. 1379	

If the pressure in any segment of the pipeline during the hydrostatic test exceeds the design pressure class by more than 25 psi or 55 ft. elevation, then increase the design pressure class for those pipe reaches affected.

PART 2 - PRODUCTS

2-1. PIPE FABRICATION. Steel pipe shall be fabricated in accordance with AWWA C200. Steel pipe may be either fabricated pipe or mill type. In either case, all items shall be fabricated to the sizes, dimensions, and shapes indicated on the Drawings and as specified herein; Drawings indicate the nominal diameter.

The specified size of fabricated pipe, fittings, and specials shall be the nominal diameter stated on the Drawings measured to the finished lining of the pipe.

The nominal diameter shall be the finished inside diameter to the cement mortar lining.

Except for seamless mill-type pipe, all piping shall be made from steel plates rolled into cylinders or sections thereof with the longitudinal seams butt-welded, or shall be spirally formed and butt-welded. There shall be not more than two longitudinal seams. Girth seams shall be butt-welded and shall be spaced not closer than 10 feet apart except in specials and fittings.

Steel pipe and special sections shall be lined and coated as specified herein.

All steel shall be fully killed and made to a fine austenitic grain size practice.

2-1.01. Steel Coil and Plate for Fabricated Pipe. Pipe, fittings and specials shall be fabricated from steel sheet coil or steel plate in accordance with any one of the following: ASTM A1011 Grade 36 or 40; or ASTM A1018 Grade 36 or 40.

2-1.02. Minimum Pipe Wall Thickness. Welded steel pipe shall have the minimum pipe dimensions based on the "Class" of pipe shown on the Drawings as follows:

Pipe Class	Finished ID (in.)	Minimum Cylinder ID (in.)	Minimum Cylinder Thickness (in.)
150	36	37.0	0.188
200	36	37.0	0.234
250	36	37.0	0.284
300	36	37.0	0.344
350	36	37.0	0.406
150	30	30.75	0.154
200	30	30.75	0.190
250	30	30.75	0.240
300	30	30.75	0.297
350	30	30.75	0.344
150	24	24.75	0.125
200	24	24.75	0.156
250	24	24.75	0.190
300	24	24.75	0.229
350	24	24.75	0.267
150	18	18.63	12 ga.
200	18	18.63	11 ga.
250	18	18.63	0.144
300	18	18.63	0.173
350	18	18.63	0.203
150	12	12.63	15 ga.
200	12	12.63	13 ga.

Pipe Class	Finished ID (in.)	Minimum Cylinder ID (in.)	Minimum Cylinder Thickness (in.)
250	12	12.63	12 ga.
300	12	12.63	11 ga.
350	12	12.63	0.136
400	12	12.63	0.156
450	12	12.63	0.177

2-1.03. Dimensions of Fittings and Specials. The dimensions of steel pipe fittings shall be in accordance with AWWA C208 unless otherwise indicated on the Drawings and as specified herein.

Except as modified herein, special sections shall conform to applicable sections of AWWA C200 and shall be fabricated as shown on the Drawings. Specials shall be fabricated from pipe that meets the requirements of this Section and has been previously hydrotested. Steel plate used for the fabrication of specials shall conform to the material specification for fabricated steel pipe or mill pipe.

2-1.04. Pipe Lengths. The length of straight pipe sections shall not exceed that which can be hydrostatically tested in the manufacturer's shop.

2-1.05. Changes in Alignment. In general, changes in horizontal and vertical alignment shall be made by asymmetrical joint assembly, beveled pipe, fabricated bends, or a combination of the above methods, as shown on the Drawings, as recommended by the pipe fabricator, and as reviewed and concurred by the ENGINEER.

2-1.06. Long Radius Curves. The laying of steel pipe on curved alignments by means of unsymmetrical closure of the spigot end into the bell end ("deflected joints") will be permitted in accordance with the manufacturer's recommendations and the concurrence of the ENGINEER. Long radius curves shall be achieved with either "deflected joints" (0-1.49 degrees) or with beveled bells at the joint (1.50-4.00 degrees). For mitered elbows, provide the number of pieces and wall thickness "t" as tabulated below:

Class A (degrees)	Class B (degrees)	No. of Pieces
0 to 30	0 to 22.5	2
31 to 60	22.5 to 45	3
61 to 90	45 to 67.5	4
67.5 to 90		5

Pipe Nominal Diameter (inches)	Design Internal Pressure (psi)		
	125 or Less	More Than 125 but Less or equal to 200	More Than 200 but Less or equal to Pmax
20 and less	Class A (t=0.0.188 in.)	Class A (t=0.250 in.)	Class A (Pmax=450 psi) (t=0.375 in.)
More than 20 but less or equal to 30	Class A (t=0.250 in.)	Class A (t=0.375 in.)	Class B (Pmax=350 psi) (t=0.438 in.)
More than 30	Class A (t=0.250 in.)	Class B (t=0.375 in.)	Class B (Pmax=350 psi) (t=0.500 in.)

If elbow radius R < 2.5 D, calculate the minimum thickness of elbows by the following formula:

$$t = \frac{PD}{2f} \times \frac{R - (D/6)}{R - (D/2)}$$

where:

t = Required elbow thickness (inches)

P = Design pressure (psi)

f = 16,500 psi

D = Outside diameter of elbow (inches)

R = Radius of elbow (inches)

2-1.07. Design of Reinforcement for Fittings and Specials. The pipe manufacturer shall design and detail all fabricated bends, fittings, branch connections, reducers, and special sections, which shall be reinforced, or the pipe wall thickness shall be increased, so that the combined stresses due to internal pressure (circumferential and longitudinal) and bending will not exceed 67 percent of the yield strength of the pipe material. Design shall be in accordance with AWWA M11, except as specified herein.

Select the type of reinforcement for fittings with outlets from the following table:

$$R = \frac{\text{ID outlet}}{\text{ID main run x sinB}}$$

where B = Angle between the longitudinal axis of the main run and the branch

R	**Type of Reinforcement**
Maximum of 0.5	Collar
Maximum of 0.7	Wrapper Plate
No limit	Crotch Plate

Whether or not indicated on the Drawings, reinforcements or additional wall thickness shall be provided as required to ensure that the combined stresses do not exceed the specified maximum. Unless otherwise indicated or specified, the internal pressure shall be the specified field test pressure for the piping adjacent to the item in question, and the dead load shall be equal to the pipe full of water.

For collar reinforcement, select an effective shoulder width "W" of a collar from the inside surface of the steel outlet to the outside edge of the collar, measured on the surface of the cylinder of the main run, such
that:

$$W = \quad (1/3 \text{ to } 1/2) \times \frac{\text{ID outlet}}{\sin B}$$

For a wrapper plate, use the above collar formula except that the wrapper is of thickness "T," its total width is (2W + ID outlet/sinB), and it extends entirely around the main pipe diameter portion of the steel fitting.

Base crotch plate design on Swanson, H.S. et al., Design of Wye Branches for Steel Pipes, summarized in AWWA Manual M11 (Fourth edition), Chapter 13.

Wall thickness of reducing sections shall be not less than the thicknesses required for the larger ends.

Hand holes may be provided at CONTRACTOR'S option for convenience.

2-1.08. Markings. Clearly stencil on the inside of each pipe section, fitting, and special:

Service.

Wall thickness.

Minimum yield strength of the pipe material.

T (for field top) of the pipe for specials and pieces other than straight pipe.

Outside diameter, inches.

Name of manufacturer.

Date of manufacture.

Piece number correlating pipe to tabulated layout schedule and line layout diagrams.

Amount of bevel on beveled pipe.

2-2. MATERIALS.

Stab Joints	Bell-and-spigot, with rubber gasket as sole element depended upon for water tightness.
Rubber Gaskets	Continuous O-ring; ANSI/AWWA C200, Section 4.13, except basic polymer shall be synthetic rubber. Natural rubber will not be acceptable. Gaskets shall be furnished by the pipe manufacturer.

Flanged Joints

Flanges	ANSI/AWWA C207, steel ring slip-on type, except where otherwise indicated on the Drawings..
Dimensions and Drilling	ANSI/AWWA C207, or as indicated on the Drawings.
Blind Flanges	ANSI/AWWA C207, unless otherwise indicated on the Drawings or specified; pressure ratings shall be the same as for flanges.
Gaskets	ANSI/AWWA C207, 1/8” thick, full face type. Gaskets for potable water service shall be certified as suitable for the test pressures specified, and for chlorinated and chloraminated potable water; a certificate of gasket suitability shall be submitted.
Insulated Flanges	
Flanges	As specified herein, except bolt holes shall be enlarged as needed to accept bolt insulating sleeves.
Insulation Kits	As specified in Section 16640, "Corrosion Monitoring."
Flange Bolting	
Material	ANSI/AWWA C207, galvanized.
Type	Bolt and nut; bolt-stud and two nuts permitted for 1 inch and larger.
Bolts and Bolt-Studs	
Length	Such that ends project 1/4 to 1/2 inch beyond surface of nuts.
Ends	Chamfered or rounded.
Threading	ANSI/ASME B1.1, coarse thread series, Class 2A fit. Bolt-studs may be threaded full length.

Bolt Head Dimensions	ANSI B18.2.1; regular pattern for square, heavy pattern for hexagonal.
Nuts	Hexagonal.
Dimensions	ANSI/ASME B18.2.2, heavy, semi-finished pattern.
Threading	ANSI/ASME B1.1, coarse thread series, Class 2B fit.
Washers	ASTM F436, galvanized
Mechanical Couplings	
General Requirements	Mechanical couplings shall be furnished in accordance with AWWA C219, with rated pressure that exceeds the field test pressure shown on the Drawings. Couplings shall feature carbon steel end rings and fasteners, elastomeric ring gaskets suitable for chlorinated water service, and shop-applied coating conforming to AWWA C213.
Insulating Type	Baker "Series 216", Dresser "Style 39", Smith-Blair "416"; without pipe stop; or equal.
Reducing Type	Baker "Series 220", Dresser "Style 62", Smith-Blair "413" and "415"; without pipe stop; or equal.
All Other Types	Baker "Series 200", Dresser "Style 38", Smith-Blair "411 Flexible Coupling"; without pipe stop; or equal.
Restrained Joints	Welded lap type unless indicated otherwise on the Drawings or as specified.
Lugs or Collars	ASTM A283, Grade B or C; or ASTM A36.
Tie Bolts	ASTM A193, Grade B7.
Threading	ANSI/ASME B1.1, Class 2A fit, coarse thread series for 7/8 inch and smaller, and 8-thread series for 1 inch larger.
Ends	Chamfered or rounded.

Nuts	Hexagonal, ASTM A194, Grade 2H or better.
Threading	As specified for tie bolts, except Class 2B fit.
Dimensions	ANSI/ASME B18.2.2, heavy, semi finished pattern.
Flat Washers	Hardened steel, ASTM A325.
Flanged Coupling Adapters	Dresser "Style 128", Smith-Blair "913"; or equal. Coupling adapters shall have an adequate rated pressure and be furnished with anchor studs of sufficient size and number to withstand the field test pressures shown on the Drawings.
Small Branch Connections	
Pipe Nipples	Seamless black steel pipe, ASTM A53, Schedule 40.
Welding Fittings	
Threaded Outlets	Bonney "Thredolets", Porter "W-S Teelets", or Vogt "Weld Couplets".
Welded Outlets	Bonney "Weldolets", Porter "W-S Teelets", or Vogt "Weld Couplets".
Coatings and Linings	
Rust-Inhibitive Primer	Universal type; Ameron "Amercoat 180 Synthetic Resin Coating", Carboline "Kop-Coat 340 Gold Primer", or equal.
Rust-Preventive Compound	Houghton "Rust Veto 344", or equal.
Coal Tar Enamel	ANSI/AWWA C203.
Wax Tape Wrap	AWWA C217-95, Synthetic fiber felt saturated with microcrystalline wax, plasticizers, and corrosion inhibitors. No. 1 wax tape as manufactured by TRENTON Corporation of Ann Arbor, Michigan, or approved equal. Primer coat of "Temcoat" manufactured by TRENTON Corporation; or approved equal. "Rock Shield" type material, "Guard Wrap" as manufactured by TRENTON Corporation; or approved equal.

Cement Mortar	ANSI/AWWA C205 and C602. Add corrosion inhibitor as specified herein.
Cement	ASTM C150, Type II, low alkali.
Sand	ANSI/AWWA C205, Section 4.2.3, except sand for field-applied lining shall pass a No. 16 sieve.
Water	Water shall be free of organic materials and other impurities that might reduce the strength, durability or other quality of the cement mortar. Water shall have a pH of 7.0 to 9.0, a maximum chloride concentration of 500 mg/L (per Caltrans test method 422), and a maximum sulfate concentration of 500 mg/L (per Caltrans test method 417).
Epoxy Bonding Agent	ASTM C881, Type II, moisture insensitive and suitable for service conditions.
Latex Admixture	Euclid "Euco Flex-Con" or Sika "SikaLatex".
Medium Consistency Coal Tar	Carboline "Bitumastic Super Service Black" or Tnemec "46-465 H.B. Tnemecol".
Wall Penetration Seal	Thunderline Corporation "Link-Seal", insulating type with modular rubber sealing elements, nonmetallic pressure plates, and galvanized bolts and nuts.
Anchor Bolts	ASTM A307.

2-3. JOINTS. Pipe ends shall be suitable for the field joints shown on the Drawings and specified herein.

2-3.01. Joints for Pipe 24 Inches and Smaller. Joints shall be bell and rolled groove spigot with rubber gasket, except joints for 24-inch Class 250 and above shall be bell and welded-on Carnegie spigot for rubber gasket joints or lap joint for welding. Where restrained joints are required on the Drawings, provide bell and rolled groove spigot prepared for field butt-welding, lap joint for field welding, or pipe ends prepared for field fit-up of butt straps.

2-3.02. Joints for Pipe Larger Than 24 Inches. Joints shall be bell and welded-on Carnegie spigot, for rubber gasket joints or expanded bell lap joint for field welding. Alternatively, joints for pipe larger than 24 inches and less than 300 psi shall be bell and rolled groove spigot with rubber gasket. Where restrained joints are required on the Drawings, provide expanded bell lap joints for field welding.

Provide pipe ends for field fit-up of butt straps for closure joints.

2-3.03. Pipe Ends For Fitting with Flanges. Ends to be fitted with slip-on flanges shall be prepared to accommodate the flanges in accordance with the governing standards. Pipe ends shall have the longitudinal or spiral welds of the pipe cylinder ground to plate surface for a distance sufficient to receive the flange. The flange after welding shall be perpendicular to the axis of the pipe, free of warp with faces smooth and true.

2-3.04. Pipe Ends For Mechanical Couplings. Ends to be joined by mechanical couplings shall be plain end type in accordance with the governing standard. In addition, pipe seam welds on ends to be joined by mechanical couplings shall be ground flush to permit slipping the coupling in at least one direction to clear the pipe joint.

2-3.05. Pipe Ends For Shouldered Couplings. Ends to be joined by shouldered couplings shall be of the type conforming to the governing standard and as recommended by the coupling manufacturer for the size and wall thickness of the pipe, fitting, or special being coupled, and for the maximum test or working pressure to which the couplings will be subjected.

2-3.06. Pipe Ends For Flanged Coupling Adapters. Ends to be fitted with flanged coupling adapters shall be plain end type in accordance with the governing standard for mechanical couplings. Welds shall be ground flush to permit installation of the coupling, and holes shall be field drilled at the proper location for anchor studs.

2-3.07. Pipe Ends For Connection to Dissimilar Pipe Materials. Steel pipe connections to buried or submerged concrete pipe or cast iron or ductile iron pipe shall be made with insulated flanges.

2-4. NOT USED.

2-5. SMALL BRANCH CONNECTIONS. Branch connections 2-1/2 inches and smaller shall be made with welding fittings with threaded outlets. Where the exact outlet size desired is in doubt, but is known to be less than 1 inch, a 1 inch outlet shall be provided and reducing bushings used as required.

Except as otherwise shown, branch connections sized 3 through 12 inches shall be made with pipe nipples or with welding fittings with welded outlets. Pipe nipples and welding fittings shall be welded to the pipe shell and reinforced as required to meet design and testing requirements.

Small branch connections shall be so located that they will not interfere with joints, supports, or other details, and shall be provided with caps or plugs to protect the threads during shipping and handling.

2-6. ACCESS MANWAYS. Access manways shall be provided in the locations indicated on the Drawings. Each access manway shall consist of a reinforced, flanged outlet with a gasketed, bolted-on blind flange cover with corp stop and two handles fabricated from 3/8-inch diameter steel rod.

An access manway marker post shall be furnished and installed adjacent to each buried access manhole as indicated on the Drawings.

2-7. DRAINS AND VENTS. In interior locations, drains and vents shall be provided at the locations and in the sizes indicated on the Drawings. Pipe used for drain and vent piping shall be ASTM A53, Schedule 40, black steel pipe. Drain valves shall be hose valves. Vent valves shall be resilient seat globe valves. Drain and vent valves shall comply with the requirements specified in Division 15.

2-8. FLANGED JOINTS. Flange faces shall be normal to the pipe axis. Angular deflection (layback) of the flange faces shall not exceed the allowable set forth in Section 4.3 of ANSI/AWWA C207. All flanges shall be refaced after welding to the pipe, if necessary, to prevent distortion of connecting valve bodies from excessive flange bolt tightening and to prevent leakage at the joint.

Pipe lengths and dimensions and drillings of flanges shall be coordinated with the lengths and flanges for valves and other equipment to be installed in the piping. All mating flanges shall have the same diameter and drilling and shall be suitable for the pressures to which they will be subjected.

Flanges shall be of the slip-on type, except that welding-neck or slip-on flanges welded to short lengths of pipe may be used where installation of flanges in the field is permitted or required.

2-9. MECHANICAL COUPLINGS. The middle ring of each mechanical coupling shall have a thickness at least equal to the wall thickness shown on the Drawings for the pipe on which the coupling is to be used. The length of each middle ring shall be not less than 10 inches for 36 inch and larger pipe and not less than 7 inches for pipe smaller than 36 inches.

The interior and exterior surfaces of the middle rings of all mechanical couplings shall be coated with a fusion bonded epoxy powder coating meeting the requirements of AWWA C213, that is proposed by the manufacturer and accepted by the ENGINEER. Couplings shall be furnished with low alloy steel bolts, nuts and washers.

2-10. NOT USED.

2-11. PROTECTIVE COATINGS AND LININGS. All steel pipe, fittings, specials, wall fittings, and accessories shall be lined, coated, primed and painted, or wrapped as specified herein.

2-11.01. Type of Coating and Lining. Surface preparation shall be in accordance with the coating or lining manufacturer's instructions. Types of protective coating and lining shall be as follows:

Pipe Exterior Surfaces Underground, Including those Encased in Concrete	Cement mortar, ANSI/AWWA C205, except as modified herein.
Pipe Interior Surfaces	Cement mortar - shop applied, ANSI/AWWA C205. The governing standards shall be as modified herein.
Pipe Exterior Surfaces in Interior Locations, where shown	Shop-applied rust-inhibitive primer with field painting. Field painting is covered in Section 09940, "Protective Coatings."

2-11.01.01. Shop-Applied Cement Mortar Lining. Cement mortar lining shall be shop applied. Except as modified herein, shop-applied mortar linings shall comply with ANSI/AWWA C205.

Minimum Thickness of Cement-Mortar Lining. The minimum lining thickness shall be as shown in Table 1 of AWWA C205.

Specials. Wire fabric reinforcement shall be used in the lining of fittings and specials in accordance with Section 4.4.5 of ANSI/AWWA C205.

Holdbacks at Joints. An uncoated holdback shall be left at each pipe end as shown on the Drawings to permit assembly and welding of the pipe joints.

2-11.01.02. Shop-Applied Cement Mortar Coating. Cement mortar coating shall be shop applied. Except as modified herein, shop-applied mortar coatings shall comply with ANSI/AWWA C205.

Minimum Thickness of Cement-Mortar Coating. The minimum coating thickness for pipe 24-inch diameter and larger shall be 1-inch. The minimum coating thickness for pipe less than 24-inch diameter shall be ¾-inch.

Holdbacks at Joints. An uncoated holdback shall be left at each pipe end as shown on the Drawings to permit assembly and welding of the pipe joints.

Storage/Handling. The pipe coating shall be protected from damage during transportation and installation of the pipe, and any damaged portions of the coating shall be restored to a condition equal to that specified herein for the original work. Belt slings, placed so as to prevent deformation, shall be used for handling lined and coated pipe sections. In no event shall pipe be transported from the coating yard until after the exterior mortar coating has attained an age of 7 days.

Corrosion Inhibitor. Refer to Section 03315, "Corrosion-Inhibiting Concrete Admixture"

Add minimum dose of 2 gal/cu. yd corrosion inhibitor to the coating to all pipe in the following locations:

From Station	Drawing	To Station	Drawing
382+00	A1P-C130	595+00	CP-C146
1071+08.11	C1P-C189	1098+00	C1P-C191
1184+00	C1P-C201	1198+00	C1P-C202
1327+00	DP-C213	1382+00	DP-C217

2-11.01.03. Other. Except as otherwise shown on the Drawings or modified herein, other pipe surfaces at joints shall be coated as follows:

At Couplings	Shop coating as specified for each type of coupling. Field coating as specified for ends of sections.
Ends of Pipe Sections	Liquid epoxy.
Machined Surfaces & Flange Faces	Rust-preventive compound.

2-12. SHOP INSPECTION AND TESTING. All materials and work shall be inspected and tested by the pipe manufacturer in accordance with ANSI/AWWA C200. All costs in connection with such inspection and testing shall be borne by the CONTRACTOR.

Copies of all test reports shall be submitted in accordance with Section 01300.

The DISTRICT reserves the right to sample and test any pipe after delivery and to reject all pipe represented by any sample which fails to comply with the specified requirements.

2-12.01. DISTRICT'S Inspection at the Shop. The DISTRICT will inspect all work materials. Additional weld test specimens shall be furnished to the DISTRICT'S inspector for testing by an independent testing laboratory whenever, in the judgment of the DISTRICT'S inspector, a satisfactory weld is not being made. Test specimens shall also be furnished when the DISTRICT'S inspector desires. The entire cost of obtaining, inspecting, and testing of such additional specimen plates, welds, or materials will be borne by the DISTRICT. If any specimen is found not to conform to the specified requirements, the materials represented by the specimen will be rejected. The expense of all subsequent tests due to failure of original specimens to comply with the specifications shall be the responsibility of the CONTRACTOR.

In addition to making or witnessing all specified tests and submitting any required reports to the ENGINEER and the DISTRICT, the DISTRICT'S inspector will submit written reports to the CONTRACTOR concerning all materials rejected, noting the reason for each rejection.

Inspection by the DISTRICT'S inspector, or failure to provide inspections, shall not relieve the CONTRACTOR of his responsibility to provide materials and to perform the work in accordance with the Contract Documents.

2-12.02. Shop Hydrostatic Testing. A shop hydrostatic test shall be performed on each length of steel pipe in accordance with AWWA C200, and as specified herein. The test pressure shall be maintained for a period of sufficient length to allow thorough examination of the pipe section for defects. The test period shall be extended if requested by the DISTRICT to complete visual inspection.

Defects in welds shall be repaired and all repaired sections shall be retested hydrostatically. To make repairs, the pipe shall be removed from the testing machine and areas requiring repair shall be thoroughly dried before the required repair welding is performed.

Test pressure shall be as specified in Section 5.2 of AWWA C200.

2-12.03 Shop Weld Inspections. Refer to Paragraph 1-4.04 of this Section.

2-12.04. Shop Joint Fit-up Tests. The first one hundred (100) bell and rolled groove spigot with rubber gasket joints of each pipe diameter shall be tested for fit-up in the shop. The fit-up shall meet the code-specified requirements,

otherwise the pipe pieces shall be replaced with pieces meeting the requirements. Thereafter, the ENGINEER may require shop fit-up tests for up to another 10% of joints during pipe manufacture on an as-requested, random basis. Pipe manufacturer is responsible for quality monitoring. If quality problems are experienced in the shop, CONTRACTOR and pipe fabricator shall correct the quality problems prior to shipment of pipe to the field. If field leakage problems are experienced after installation of the first one mile of pipe, as specified in Section 01311, then the CONTRACTOR and pipe manufacturer shall review its shop fabrication procedures and correct any quality problems attributed to the leakage problems before making further pipe shipments to the field.

PART 3 - EXECUTION

3-1. GENERAL. Notify the ENGINEER not less than 24 hours in advance of the time of unloading or installation of pipe and appurtenances so that arrangements of inspection of the unloading or installation of the pipe and appurtenances may be made.

3-2. CARE AND HANDLING OF PIPE. Pipe bracing for shipping and handling (shipping struts):

After completion of linings and coatings, wood struts placed at right angles to each other shall be installed at each end of the pipe, and at intermediate points if necessary. The shipping struts shall be of a size sufficient to securely brace the pipe during shipping, and handling at the site. Struts shall be installed in a manner that will prevent damage to the lining, and shall have caps conforming to the curvature of the lining.

For steel pipe 30 inches and larger, the struts shall be left in place until the bedding, backfilling, and compaction are completed satisfactorily; see Pipe Stulling, Par. 3-5.03.01.

Waterproof covers on ends of pipe shall remain in place and intact during storage of the pipe at the site of the Work; any covers which are damaged shall be repaired.

All pipe and appurtenances shall be handled in accordance with the manufacturer's recommendations and instructions and as specified herein; in case of conflict, the more stringent requirements shall apply. At least two pipe slings, equally spaced along the pipe barrel, shall be used in the handling of pipe sections 20 feet or greater in length. Care shall be exercised to prevent damage to the pipe and coating system. Steel pipe shall only be handled with wide canvas or rubber covered slings. Bare cables, chain hooks, or metal bars shall not be allowed to come in contact with the coatings.

3-3. UNFIT OR REJECTED PIPE. All material will be inspected for defects and conformance to the Contract requirements prior to lowering into the trench. CONTRACTOR shall repair or replace any pipe section or appurtenance that has been damaged during loading, transporting, unloading, or as a result of faulty support during transport or storage.

Any pipe or appurtenance, installed or not, determined by the ENGINEER to not meet the requirements of the Contract Documents or otherwise found unfit shall be rejected, removed from the job site, and replaced by the CONTRACTOR without additional cost to the DISTRICT.

Excessive coating or lining damage, as determined by the DISTRICT, shall be a cause for rejection of the pipe or appurtenance as unfit.

3-4. PROTECTION AND CLEANING. The interior of all pipe and fittings shall be thoroughly cleaned of all foreign matter before being installed and shall be kept clean until the work has been accepted. Pipe shall not be damaged by the equipment and methods used for installation. The pipe shall be maintained in a clean condition during laying, jointing, bedding and backfilling operations.

3-5. PIPELINE INSTALLATION.

3-5.01. General. All trenching, embedment, and backfilling of buried piping shall conform to the requirements specified in Section 02200, "Earthwork"; Section 02202, "Trenching and Backfilling"; and the details indicated on the Drawings.

Whenever pipe laying is stopped, the open end of the line shall be sealed with a watertight plug. All water in the trench shall be removed prior to removing the plug.

Pipe embedment and backfilling shall closely follow the installation and jointing of steel pipe in the trench to prevent flotation of the pipe by water and longitudinal movement caused by thermal expansion or contraction of the pipe. Not more than 160 feet of restrained joint pipe shall ever be exposed ahead of the backfilling in any section of trench. The backfill adjacent to field joints may be temporarily omitted to provide adequate space for field coating the joints.

3-5.02. Pipe Alignment and Grade. The horizontal and vertical alignment of pipelines shown on the Drawings establishes the basis of pipeline design. CONTRACTOR'S actual trenching activities and pipe laying operations, as performed in the field, subject to review and approval by the ENGINEER (resident inspector) and DISTRICT, may be permitted to vary from the horizontal and vertical alignments shown to achieve pipe fabrication and installation economies, generally as specified below. In all cases, the CONTRACTOR shall

maintain an adequate supply of pipe and fittings at the job site in order to allow such adjustments without affecting the pipe laying operations.

3-5.02.01. Adjusting the Pipe Grade (Vertical Profile). In general, except where making connections to other facilities or as specifically shown, the pipeline shall be installed with a typical minimum earth cover of 42 inches. Field survey the pipeline alignment and ground surface 1,500 feet or more in advance of pipe laying operations. Where the actual ground surface varies from that shown, CONTRACTOR shall adjust the pipe profile up or down during pipe laying to achieve 42 inches minimum cover over the top of the pipe.

As specified in Section 01530, “Protection of Existing Facilities, CONTRACTOR shall locate certain existing utilities in advance of preparing pipe laying drawings to account for any differences between actual conditions and that shown. In addition, as specified in Section 01530, CONTRACTOR shall field locate and expose all underground utilities not less than 500 feet in advance of pipe laying operations. Where there is a potential conflict between the pipeline and existing utility, adjust the pipe profile up or down to meet the minimum clearance requirements shown on the Drawings.

Adjusting the pipe profile in the field as described above shall be performed through daily consultation with the ENGINEER (resident inspector), who has the authority approve such modifications in a timely manner.

3-5.02.02. Criteria For Making Pipe Profile Adjustments. In general, pipe placement shall proceed in the uphill direction with the bell end of the pipe located on the uphill end. Pipelines or runs intended to be straight shall be laid straight except as approved in the field by ENGINEER. Maximum joint openings and deflections of bell and spigot joints shall be as specified herein.

Avoid localized high points in the pipe which might allow air to collect in pipelines unless an air release valve is indicated on the Drawings at that location, or unless the CONTRACTOR installs an air release valve assembly at no additional cost to the DISTRICT.

Minimize localized low points to the extent feasible.

3-5.02.03. Adjusting the Horizontal Alignment. The points of intersection (P.I.'s) and curve data shown on the Drawings define the horizontal alignment for design and permanent easement purposes. CONTRACTOR'S line layout may depart slightly from the defined alignment if such departure produces fabricating or installation economies in the use of standard fittings or other savings. Adjusting the alignment shall be proposed by CONTRACTOR in the pipeline submittals for review and approval by the ENGINEER and DISTRICT.

In addition, pipeline horizontal alignment revisions may be made in the field when needed to avoid a utility or other conflict subject to review and approval by the ENGINEER (resident inspector) and DISTRICT.

3-5.03.01. Pipe Stulling. Internal pipe stulls designed to meet installation requirements shall be installed in each pipe section 30-inch dia. and greater, before the pipe is placed in the trench. Installation stulls shall be of a size sufficient to securely brace the pipe during bedding and backfilling operations and shall have continuous head and sill timbers placed parallel to the longitudinal axis of the pipe, contoured to the pipe inside diameter. Stulls shall be installed in a manner that will prevent damage to the lining. Stulls shall be placed every 10 feet along the length of the pipe.

Pipe which deviates from a true circle by more than one percent (1%) shall be laid with its larger diameter vertical, or shall be re-rounded by using the installation stulls to correct the vertical diameter where permitted by the ENGINEER.

Stulls shall not be removed until after completion of all trench backfilling. Final inspection, repair, and checking of the interior lining shall be performed after the stulls have been removed.

3-5.03.02. Survey Control of Pipe Layout. Survey the horizontal and vertical alignment of the pipe in place as the pipe installation progresses and record information on the record drawing set. At least one horizontal alignment and elevation reading shall be taken for each 40 feet of pipe. Results shall be submitted to the ENGINEER with the record drawing set.

3-5.04. Pipeline Field Joints. Pipeline field joints shall be made as shown on the Drawings.

3-5.04.01. Assembling Rubber Ring (Stab) Joints. Clean the ends of the pipe to be joined of foreign material. Immediately prior to lowering each section of pipe into the trench, apply a nontoxic water-soluble vegetable soap solution to the inside of the bell of the pipe in the trench and to the rubber gasket and spigot groove of the pipe to be installed. Stretch the rubber gasket into the groove of the spigot end of the pipe to be inserted and distribute it uniformly around the circumference.

Without tilting the pipe to be installed, enter its spigot into the bell of the pipe in the trench. Use come-a-longs or pipe jacks to drive spigot end home horizontally. Maintain joint recess recommended by pipe manufacturer for made-up joint. Where deflections at joints are required for curved alignment, do not exceed the pipe manufacturer's recommended maximum joint opening on one side or the criteria specified herein, whichever is more stringent.

Install metallic jumper bond or bars across all rubber-gasket joints that are not welded after assembly.

3-5.04.02. Welded Joints. Provide welded joints where restrained joints are shown on the Drawings.

Where interior joint welds are shown on the Drawings, backfill to one (1) foot over the pipe except at the joints. Complete the interior weld prior to filling the outside joint recess with cement mortar. In lieu of exterior welded joints, the interior may be welded where the pipe diameter is 30 inches or greater.

If joint rings are rusted or pitted where weld metal is to be deposited, clean them by wire brushing or sand blasting.

Preheat the joints to be welded where required in accordance with Table 1 of AWWA C206. Do not heat the concrete coating or lining adjacent to the joint rings.

To apply a fillet weld to the exterior joint of rubber-gasket joints, caulk the recess between the bell and spigot with a rod and weld two or more passes. Complete each pass around the entire circumference of the pipe before commencing the next pass. Use the electrodes recommended by the pipe fabricator. Do not deposit more than 1/8 inch of throat thickness per pass.

Complete each pass around the entire circumference of the pipe before commencing the next pass. Use the electrodes recommended by the pipe fabricator. Do not deposit more than 1/8 inch of throat thickness per pass.

Clean each layer of deposited weld metal prior to depositing the next layer of weld metal, including the final pass, by a power-driven wire brush.

Provide closure lap joints at intervals of approximately 500 feet either by lengthening the bell to provide 3 inches of longitudinal adjustment beyond the normal lap-joint requirements or by using a butt strap. Set the special closure lap joints so that the pipe will be stabbed deeper than the normal closed position to such an extent that upon cooling and contraction of the pipe, the final closure-joint weld may be made at the approximate normal closed position. Weld all joints either side of the closure joints. Weld the closure joints during the coolest hour of the 24-hour day. When possible, the closure-joint welds shall be made when the steel temperature is approximately equal to the lowest operating temperature.

3-5.04.03. Butt-Strap Welded Joints. Field trimming of pipe when approved by the ENGINEER shall be normal to the axis of the pipe only. Employ pipeline

butt-straps to unite sections of pipeline laid from opposite directions and to adjust the field length of the pipeline to meet structures, other pipelines, and points established by design stations. Butt-straps shall include at least two hand-hole assemblies to facilitate cement mortar lining.

Center the shaped steel butt straps over the ends of the pipe sections they are to join. Weld the butt straps to the outside of the pipes with complete circumferential fillet welds equal in size to the thinnest part being joined.

Cement-mortar line butt-straps to a mortar thickness at least equal to the adjoining standard pipe sections. Clean the steel with wire brushes and apply a cement and water wash coat prior to applying the cement mortar. Where more than a 4-inch joint strip of mortar is required, place welded wire mesh reinforcement in 2-inch by 4-inch pattern of No. 13 gauge over the exposed steel. Install the mesh so that the wires on the 2-inch spacing run circumferentially around the pipe. Crimp the wires on the 4-inch spacing to support the mesh 3/8 inch from the metal pipe surface. Steel-trowel finish the interior mortar to match adjoining mortar-lined pipe sections.

Coat the exterior of closure assemblies with mortar, or pour a concrete encasement, to cover all steel by at least 1-1/2 inches. Protect exterior mortar to retard drying while curing.

3-5.04.03. Flanged Joints. Care shall be taken in bolting flanged joints to avoid restraint on the opposite end of the piece, which would prevent pressure from being evenly and uniformly applied upon the gasket. The pipe or fitting must be free to move in any direction during installation of bolts. Bolts shall be gradually tightened in a crisscross pattern, to ensure a uniform rate of gasket compression around the entire flange.

3-5.04.04. Insulated Flanged Joints. Insulated flanged joints shall be installed where indicated on the Drawings or as specified in Section 16640, "Corrosion Monitoring."

3-5.04.05. Joints Using Mechanical Couplings. All pipe to be connected with mechanical couplings shall be fabricated so that the space between pipe ends within the couplings at time of initial installation will not exceed the amount recommended by the coupling manufacturer, or as shown in Table 5 of AWWA C219, subject to the concurrence of the ENGINEER.

3-6. PROTECTIVE COATINGS AND LININGS.

3-6.01. Field Coating and Repair. Entry into the pipeline for application of interior linings to unlined ends shall be from open ends or through access manways, except as otherwise permitted by the ENGINEER.

Field joints and repair of shop-applied exterior coatings and interior linings shall conform to the following:

For Field-Welded and Rubber Gasket Joints

Cement Mortar Lining	Hold back lining from the joint as shown on the Drawings. Make field joints in accordance with Section 4.7.2 of ANSI/AWWA C205, as modified herein. The addition of lime or pozzolan will not be permitted
Cement Mortar Coating	Hold back coating from the joint as shown on the Drawings. Make field joints with cement mortar (grout) in accordance with Section 4.7.3 of ANSI/AWWA C205, except that the maximum alkali content shall be limited to 0.60 percent when experience indicates that the aggregate sources are reactive to alkalis. The soluble chloride ion (CL-) content of the cement-mortar mix shall not exceed 0.06 percent, expressed as a percentage of cement weight.. Apply a layer of welded wire fabric around the pipe and tack-welded to the pipe exterior where the gap between segments of shop-applied coating exceeds 4 inches. Use impermeable bands or diapers to retain the grout without leakage. Where a corrosion inhibitor is required for the shop-applied coating, add the same inhibitor to the grout.

For Flanged Joints

Buried Pipe	Extend cement mortar lining to ends of pipe. Apply AWWA C217 wax tape wrap to all remaining exposed flange, bolt and nut surfaces.

Pipe Exposed Inside Vaults	Extend cement mortar lining to ends of pipe. Shop prime and field paint all remaining exposed exterior pipe, flange, bolt and nut surfaces. Field painting is specified in Section 09940, "Protective Coatings."
For Mechanically Coupled Joints	
Cement Mortar Coating	Hold back coating from joints; paint exposed surfaces with 2.5 mil dry film thickness of Type B primer in accordance with ANSI/AWWA C203. Lining shall extend to end of pipe. Field coat exterior surfaces with 20 mil dry film thickness of medium consistency coal tar. Repair of lining at joints not required.

3-6.02. Completion of Interior Cement Mortar Joints

3-6.02.01. For Pipes 24 Inches in Diameter and Smaller. Insert a tight-fitting swab or squeegee in the joint end of the installed pipe to be joined. When ready to insert the spigot for rubber-gasket pipe, and ready to place the bell over the spigot for lap-joints to be welded after assembly, coat the face of the cement-mortar lining at the bell with a sufficient amount of stiff cement and water mortar to fill the space between adjacent mortar linings of the two pipes to be joined. Immediately after joining the pipes, draw the swab or squeegee through the pipe to remove all excess mortar and expel it from the open pipe end. Do not weld the joint until sufficient time has elapsed to allow complete cure of the cement mortar lining at the joint.

3-6.02.02. For Pipes Greater than 24 Inches in Diameter. Weld the exterior of the joint if required, cement coat the joint, and backfill the trench before applying interior lining at field-welded joints.

Working inside the pipe, the exposed steel shall be thoroughly cleaned and all grease shall be removed. The patched area shall be given an initial floating with a wood float, followed by a steel trowel finish. Remove excess mortar and other construction debris from the pipe interior.

Defective or damaged shop-applied cement mortar linings shall be removed, the surfaces cleaned, and the lining repaired per Section 4.4.6 of ANSI/AWWA C205, and as specified above for making field joints.

3-7. WALL SLEEVES. Unless otherwise noted, wall sleeves and wall penetration seals of the type indicated on the Drawings and as specified shall be provided where steel pipe passes through concrete or masonry walls. Where harness lugs are attached to wall sleeves, the sleeves shall be carefully aligned to permit installation of the tie rods.

3-8. PIPE SUPPORTS AND HANGERS, ENCASEMENT, ANCHORAGE, BLOCKING AND SUPPORTS. Pipe anchors, blocking, hangers, and supports shall be fabricated in accordance with Section 15140, "Pipe Supports," and the details indicated on the Drawings, and shall be furnished and installed complete with all concrete bases, anchor bolts and nuts, plates, rods, and other accessories required for proper support of the piping. All piping shall be rigidly supported and anchored so that there is no movement or visible sagging between supports. Where the details must be modified to fit the piping and structures, all such modifications shall be subject to acceptance by the ENGINEER. Unless otherwise permitted, lugs for lateral or longitudinal anchorage shall be shop welded to the pipe.

Pipe that is shown being concrete-encased shall be erected, supported and held rigidly in position during encasement by an anchoring system that is designed and installed by the CONTRACTOR. The anchoring system shall include all supports and other accessories required for proper support and tiedown of the pipe. Concrete encasement shall be provided as indicated on the Drawings, and as specified in Section 03300, "Cast-In-Place Concrete." All pipe to be encased shall be suitably supported and blocked in proper position, and shall be anchored to prevent flotation or movement during concrete placement.

Concrete reaction anchorage, blocking, and supports shall be provided as indicated on the Drawings. Concrete and reinforcing steel for anchorages, blocking, and supports shall conform to the requirements specified in Section 03300, "Cast-In-Place Concrete."

3-9. CONNECTIONS WITH EXISTING PIPING. Connections between new work and existing piping shall be made with suitable fittings. Each connection with an existing pipe shall be made at a time and under conditions which will least interfere with service to customers, and as authorized by the DISTRICT.

Facilities shall be provided for dewatering and for disposal of the water removed from the dewatered lines and excavations without damage to adjacent property.

Special care shall be taken to prevent contamination when dewatering, cutting into, and making connections with potable water piping. Trench water, mud, or other contaminating substances shall not be permitted to enter the lines. The interior of all pipe, fittings, and valves installed in such connections shall be

thoroughly cleaned and then swabbed with or dipped in a 200 mg/L chlorine solution.

3-10. PROVISIONS FOR CORROSION MONITORING. Provisions shall be made for corrosion monitoring of underground steel pipelines as specified in Section 16640, "Corrosion Monitoring."

3-11. FIELD TESTS AND INSPECTIONS.

3-11.01. Inspection of Field Welds. Perform testing of field welds as follows:

All bell and spigot lap welds and butt strap connections shall be tested by using a soap solution test by smearing soap solution onto the weld and applying air in the annular gap. Bubbling of the soap layer will be indicative of a defective spot that shall be corrected. Field lap welds may be inspected by magnetic particle or dye penetration methods.

The ENGINEER will perform visual inspections of all field welds, and any other appropriate nondestructive examination that may be needed, in order to determine compliance with the field welding requirements. Field weld test specimens shall be furnished to the ENGINEER for testing whenever, in the judgment of the ENGINEER, a satisfactory weld is not being made. Test specimens shall also be furnished when the ENGINEER desires. All costs for this testing will be paid by the DISTRICT. Field welds will be randomly inspected and tested by an independent testing laboratory as directed by ENGINEER. Inform ENGINEER before welded joints are to be backfilled so that he joint may be inspected. CONTRACTOR shall assume all costs of exposing joints that were backfilled before inspection.

All defective welds shall be repaired and retested at no additional cost to the DISTRICT until they meet the specified requirements.

3-11.02. Testing of Dielectrically Insulated Joints. Refer to Section 16640, "Corrosion Monitoring."

3-11.03. Testing of CP Test Stations. Refer to Section 16640, "Corrosion Monitoring."

3-11.04. Pipeline Deflection Test. After CONTRACTOR has removed the installation bracing and stulls, and after completion of backfilling but before acceptance of the Work, all pipe 24 inches and larger in diameter shall be tested for excessive deflection by measuring the actual inside vertical diameter. Deflection measurements will be made by the ENGINEER. Deflection shall not exceed the following:

Pipe	Max. Allowable Deflection (inch)
24 Inch Pipe	0.48
30 Inch Pipe	0.60
36 Inch Pipe	0.72

Perform corrective measures at no additional cost to the DISTRICT if the deflection of any pipe section exceeds the limits specified.

In the event the measured deflection exceeds the maximum allowable specified above, correct the deflection by removing the backfill from the respective pipe section and also for one-quarter length of both adjoining pipe sections down to at least the pipe bottom and then performing the backfill and compaction procedures in accordance with Section 02202, "Trenching and Backfilling," to finished grade.

Stulls may be used to help re-round the pipe, provided that such stulls will not damage the pipe lining. Mechanical or pneumatic re-rounders will not be permitted.

3-11.05. Pipeline Field Hydrostatic and Leakage Test. After installation, steel piping shall be hydrostatically tested for defective workmanship and materials as specified in Section 02704, "Pipeline Pressure and Leakage Testing."

End of Section

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Section 15065

MISCELLANEOUS STEEL PIPE, TUBING, AND ACCESSORIES

PART 1 - GENERAL

1-1. SCOPE. This section covers the furnishing of miscellaneous steel pipe, tubing and accessories that are less than 6 inches in diameter for the services as required Pipe and tubing shall be furnished complete with all fittings, flanges, unions, and other accessories specified herein.

Steel pipe for water conveyance are covered in Section 15062, “Steel Pipe.”

1-2. GENERAL.

1-2.01. General Equipment Requirements. The requirements specified in Section 01605, “General Equipment Requirements,” shall apply to the materials furnished under this Section.

1-3. SUBMITTALS. CONTRACTOR shall submit the following items in accordance with the requirements specified in Section 01300, “Submittals.” Items requiring submittals shall include, but not be limited to, the following:

Expansion joints.

Flange gaskets, including verification that gasket materials are suitable for service.

Plastic lined steel pipe and fittings.

Grooved and mechanical couplings.

Insulating (dielectric) couplings, threaded and flanged.

Name of manufacturer.

Type and model.

Construction materials, thickness, and finishes.

Pressure and temperature rating.

CONTRACTOR shall obtain and submit a written statement from the gasket material manufacturer certifying that the gasket materials are compatible with the joints specified herein and are recommended for the specified field test pressures and service conditions.

1-4. DELIVERY, STORAGE, AND HANDLING. Shipping, handling and storage shall be in accordance with the requirements specified in Section 01600.

1-4.01. Coated Pipe. Handling methods and equipment used shall prevent damage to the protective coating and shall include the use of end hooks, padded calipers, and nylon or similar fabric slings with spreader bars. Bare cables, chains, or metal bars shall not be used. Coated pipe shall be stored off the ground on wide, padded skids. Plastic coated pipe shall be covered or otherwise protected from exposure to sunlight.

PART 2 - PRODUCTS

2-1. MATERIALS.

2-1.01. Pipe Materials. Miscellaneous steel pipe materials shall be as indicated.

Material Classification	CSG-2
Standard Weight Galvanized Steel With Threaded Malleable Iron Fittings	
Pipe	ASTM A53, Type E, standard weight, Grade A or B; or ASTM A106, of equivalent thickness.
Fittings	Threaded type, ANSI/ASME B16.3, or Fed Spec WW-P-521, Type II.

2-1.02. Accessory Materials. Accessory materials for the miscellaneous steel pipe and tubing systems shall be as indicated.

Unions (Malleable Iron)	Fed Spec WW-U-53l, Class 2; Type B (galvanized) for galvanized pipe or Type A (black) for ungalvanized pipe.

PART 3 - EXECUTION

3-1. INSTALLATION. Materials furnished under this section shall be installed in accordance with Section 15020.

End of Section

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Section 15067

MISCELLANEOUS PLASTIC PIPE, TUBING, AND ACCESSORIES

PART 1 - GENERAL

1-1. SCOPE. This section covers the furnishing of miscellaneous plastic pipe, tubing, and accessories for the following services.

Material Classification PVC-2

Sampling Lines

Sleeves for copper piping

Sump Pump discharge in buried location

Material Classification PVC-4

Chemical resistant waste and vent piping

Pipe and tubing shall be furnished complete with all fittings, flanges, unions, jointing materials and other necessary appurtenances.

1-2. GENERAL.

1-2.01. General Equipment Requirements. The requirements specified in Section 01605, “General Equipment Requirements,” shall apply to the materials furnished under this Section.

1-3. SUBMITTALS. CONTRACTOR shall submit the following items in accordance with the requirements specified in Section 01300, “Submittals.” Items requiring submittals shall include, but not be limited to, the following:

Chemical resistant waste pipe and fittings.

Expansion joints.

Flange gaskets.

Gas pipe and fittings.

Pipe sleeves.

PVC pipe and fittings.

Name of manufacturer.

Type and model.

Construction materials, thickness, and finishes.

Pressure and temperature rating.

1-4. DELIVERY, STORAGE, AND HANDLING. Shipping, handling and storage shall be in accordance with the requirements specified in Section 01600. All materials shall be stored in a sheltered location above the ground, separated by type, and shall be supported to prevent sagging or bending.

Pipe, tubing, and fittings shall be stored between 40°F and 90°F [4°C and 32°C].

PART 2 - PRODUCTS

2-1. MATERIALS.

2-1.01. Pipe Materials. Miscellaneous plastic pipe materials shall be as indicated.

Material Classification	PVC-1
Schedule 40 PVC Pipe With Solvent Welded Joints	
Pipe	ASTM D1785, Cell Classification 12454, bearing NSF seal.
Fittings	ASTM D2466, Cell Classification 12454, bearing NSF seal.
Material Classification	PVC-2
Schedule 80 PVC Pipe With Solvent Welded Joints	
Pipe	ASTM D1785, Cell Classification 12454, bearing NSF seal.
Fittings	ASTM D2467, Cell Classification 12454, bearing NSF seal.

	Flanges or unions shall be provided where needed to facilitate disassembly of equipment or valves. Flanges or unions shall be joined to the pipe by a solvent weld. When acceptable to ENGINEER, threaded joints may be used instead of solvent welded joints in exposed interior locations for the purpose of facilitating assembly. The use of threaded joints in this system shall be held to a minimum.
Material Classification	PVC-4
PVC DWV Pipe (Single Wall) With Solvent Welded Joints	
Pipe	ASTM D1785, cell classification 12454, bearing NSF seal.
Fittings	ASTM D2665 and ASTM D3311, cell classification 12454, bearing NSF seal.
Material Classification	PVC-6
PVC Underdrain Pipe and Fittings	
Pipe	ASTM F758, solid or perforated wall, as required, Cell Classification 12454 or 12364, Type PS 46, with solvent welded or elastomeric gasket joints, as required.
Fittings	ASTM D3034, Cell Classification 12454, wall thickness SDR 35, with solvent welded or elastomeric gasket joints, as required.
Material Classification	RPT-1
Reinforced Plastic Tubing	Wire reinforced PVC hose; Cobon Plastics Corp. "Cobovin Type S" or NewAge Industries Inc. "Vardex".

2-1.02. Accessory Materials. Accessory materials for the miscellaneous plastic pipe systems shall be as indicated.

Material Classification	PVC-1 through PVC-7
Flanges	Diameter and drilling shall conform to ANSI/ASME B16.5, Class 150. Schedule 80 for DWV systems.
Flange Bolts and Nuts	ASTM A307, Grade B, length such that, after installation, the bolts will project 1/8 to 3/8 inch beyond outer face of the nut. Stainless steel for DWV and chemical feed systems, galvanized steel for all other systems.
Flat Washers	ANSI B18.22.1, plain. Stainless steel for DWV and chemical feed systems, galvanized steel for all other systems.
Flange Gaskets	Full face, 1/8 inch thick, chemical-resistant elastomeric material suitable for the specified service.
Expansion Joints	Edlon "Thermo-molded TFE" or Resistoflex "Style R6905" molded expansion joint.

PART 3 - EXECUTION

3-1. INSTALLATION. Materials furnished under this Section shall be installed in accordance with Section 15020.

End of Section

Section 15070

COPPER TUBING AND ACCESSORIES

PART 1 - GENERAL

1-1. SCOPE. This section covers the furnishing of copper tubing and accessories. Copper tubing shall be furnished complete with all fittings, flanges, unions, and other accessories specified herein.

1-2. SUBMITTALS. CONTRACTOR shall submit the following items in accordance with the requirements specified in Section 01300, “Submittals.”

Complete specifications, data, and catalog cuts or drawings shall be submitted for all piping, fittings, gaskets, sleeves, and accessories, and shall include the following data:

Name of Manufacturer

Type and model

Construction materials, thickness, and finishes

Pressure and temperature ratings

CONTRACTOR shall obtain and submit a written statement from the gasket material manufacturer certifying that the gasket materials are compatible with the joints specified herein and are recommended for the specified field test pressures and service conditions.

1-3. DELIVERY, STORAGE, AND HANDLING. Shipping, handling and storage shall be in accordance with the requirements specified in Section 01600.

PART 2 - PRODUCTS

2-1. MATERIALS. Copper tubing materials and service shall be as specified herein.

2-1.01. Material Classification CU-1.

CU-1 – Water Tubing with Flared Fittings Buried Raw water supply, 2 inch and smaller. Differential pressure lines from flow elements to transmitters. All instrument tubing not otherwise specified.	Tubing	Soft annealed copper tubing, ASTM B88, Type K.
	Fittings	Flared, material to match tubing. Fittings shall conform to ANSI/ASME B16.26.

2-1.02. Material Classification CU-2. Not used.

2-1.03. Material Classification CU-3.

CU-3 – Water Tubing with Solder and Brazed Joints Raw water supply, 3 inch and smaller. Differential pressure lines for flow transmitters.	Tubing	Hard drawn copper tubing, ASTM B88, Type L.
	Fittings	Solder joint (smaller than 2 inch), Brazed joint (2 inch and larger), material to match tubing. Fittings shall conform to ANSI B16.18, or ANSI/ASME B16.22.
	Flanges	Where required for connection to equipment, valves, and accessories, ANSI B16.24, cast bronze, brazed joint.

2-1.04. Material Classification CU-4.

CU-4 – Air Tubing with Solder and Brazed Joints Buried or submerged compressed air supply piping.	Tubing	Soft annealed copper tubing, ASTM B88, Type K.
	Fittings	Solder joint (smaller than 2 inch), Brazed joint (any size), material to match tubing. Fittings shall conform to ANSI B16.18, or ANSI/ASME B16.22.

2-1.05. Accessory Materials. Accessory materials for the copper tubing systems shall be as indicated.

Flange Bolts and Nuts	ASTM A307, Grade B, length such that, after installation, the bolts will project 1/8 to 3/8 inch beyond outer face of the nut.
Flange Gaskets	ASTM D1330, Grade I, red rubber, ring type, 1/8 inch thick.
Expansion Joints	Tempflex "Model HB Expansion Compensators" with copper tube ends.
Insulating Fittings	
Threaded	Dielectric steel pipe nipple, ASTM A53, Schedule 40, poly-propylene lined, zinc plated; Perfection Corp. "Clearflow Fittings".
Flanged	Epco "Dielectric Flange Unions" or Central Plastics "Insulating Flange Unions".

PART 3 - EXECUTION

3-1. INSTALLATION. Materials furnished under this section shall be installed in accordance with the Miscellaneous Piping and Accessories Installation section.

End of Section

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Section 15091

MISCELLANEOUS BALL VALVES

PART 1 - GENERAL

1-1. SCOPE. This section covers the furnishing of manually operated or remote activated two position (open-close) ball valves as specified herein.

Miscellaneous ball valves shall be provided where AWWA type ball valves are not required.

Piping, pipe supports, insulation, and accessories that are not an integral part of the valves or are not specified herein are covered in other sections.

1-2. GENERAL.

1-2.01. General Equipment Requirements. The requirements specified in Section 01605, “General Equipment Requirements,” shall apply to the equipment furnished under this Section. If the requirements in this section are different from those in the General Equipment Stipulations, the requirements in the section shall take precedence.

1-2.02. Permanent Number Plates. All miscellaneous ball valves, except buried or submerged valves, that have been assigned a number on the Drawings, shall be provided with a permanent number plate. The location of number plates and the method of fastening shall be acceptable to ENGINEER. Numerals shall be at least 1 inch high and shall be black baked enamel on anodized aluminum plate.

1-3. SUBMITTALS. CONTRACTOR shall submit the following items in accordance with the requirements specified in Section 01300, “Submittals.” Items requiring submittals shall include, but not be limited to, the following:

Complete drawings, details, and specifications covering the valves and their appurtenances. Included in the submittal shall be drawings by the valve manufacturer to indicate the position of the valve actuator and valve shaft.

1-4. DELIVERY, STORAGE, AND HANDLING. Shipping, handling and storage shall be in accordance with the requirements specified in Section 01600.

PART 2 - PRODUCTS

2-1. CONSTRUCTION. Ball valves shown on the Drawings, but not specified herein, shall be selected to match piping material they are installed in.

2-1.01. Valves Type VB-1.

VB-1 Instrument air, heating water, chilled water, and condenser water systems with copper pipe, ball valves indicated on the plumbing drawings for water service in metallic piping systems. 2 inch and smaller	Rating Code Type Body/Bonnet Trim Seat Ball Stem Thrust Washer Stem Seal End Connection Temp. Limitations Valve Operator Manufacturers	500 psi nonshock cold WOG MSS SP-110 In-line, two piece, end entry, full port ASTM B584–C84400 bronze Reinforced Teflon Brass, or chrome plated brass Brass or bronze Reinforced Teflon Teflon or Viton Threaded End -20 to 400°F [-29 to 204°C] Lever Conbraco Industries "Apollo 77-100 Series"; Powell "Fig 4210T"

2-1.02. Valves Type VB-3.

VB-3 Process air service 2 inch and smaller	Rating Code Type Body/Bonnet Trim Seat Ball Stem Thrust Washer Stem Seal	800 psi nonshock cold WOG MSS SP-110 In-line, two piece, end entry, regular port ASTM A351-CF8M, stainless steel Reinforced Teflon ASTM A276-316, stainless steel ASTM A276-316, stainless steel Reinforced Teflon Teflon or Viton

	End Connection	Threaded End
	Temp. Limitations	-20 to 400°F [-29 to 204°C]
	Valve Operator	Lever
	Manufacturers	Conbraco Industries "Apollo 76-100 Series"; Neles-Jamesbury "Series 4000"

2-1.03. Valves Type VB-10.

VB-10	Rating	150 psig nonshock cold WOG
Service as specified in Miscellaneous Plastic Pipe, Tubing, and Accessories section	Type	In-line, true union, full port (Schedule 80)
	Body/Bonnet	PVC or CPVC to match piping system
	Trim	
	Seat	Teflon
	Ball	PVC or CPVC to match piping system
4 inch and smaller	Stem	PVC or CPVC to match piping system
	Thrust Washer	Teflon
Socket	Stem Seal	Viton O-ring
	Body Seals	Viton O-rings
	End Connection	Socket
	Temp. Limitations	0 to 140°F [-18 to 60°C]
	Valve Operator	Lever
	Manufacturers	Hayward Plastic Products "True Union Ball Valve"; Nibco "Chemtrol TU Series Tru-Bloc Ball Valve"; Spears Manufacturing Co "True Union 2000 Standard Series 3600 Ball Valve"

2-1.04. Valves Type VB-11.

VB-11 Service as specified in Miscellaneous Plastic Pipe, Tubing, and Accessories section 4 inch and smaller Flanged	Rating	150 psig nonshock cold WOG
	Type	In-line, true union, full port (Schedule 80)
	Body/Bonnet	PVC or CPVC to match piping system
	Trim	
	Seat	Teflon
	Ball	PVC or CPVC to match piping system
	Stem	PVC or CPVC to match piping system
	Thrust Washer	Teflon
	Stem Seal	Viton O-ring
	Body Seals	Viton O-rings
	End Connection	Flanged, ASME B16.5, Class 150, raised face
	Temp. Limitations	0 to 140°F [-18 to 60°C]
	Valve Operator	Lever
	Manufacturers	Hayward Plastic Products "True Union Ball Valve"; Nibco "Chemtrol TU Series Tru-Bloc Ball Valve"; Spears Manufacturing Co. "True Union 2000 Standard Series 3600 Ball Valve"

2-1.05. Length Tolerance. Unless otherwise specified, the actual length of valves shall be within plus or minus 1/16 inch of the specified or theoretical length.

2-1.06. Shop Coatings. All ferrous metal surfaces of valves and accessories, both interior and exterior, shall be shop coated for corrosion protection. The valve manufacturer's standard coating will be acceptable, provided it is functionally equivalent to the specified coating.

Coating Materials

Asphalt Varnish Fed Spec TT-C-494.

Coal Tar Epoxy	High-build coal tar epoxy; Ameron "Amercoat 78HB Coal Tar Epoxy", Carboline "Bitumastic 300 M", Tnemec "46H-413 Hi-Build Tneme-Tar", or Sherwin-Williams "Hi-Mil Sher-Tar Epoxy".
Epoxy Enamel (for liquid service)	Ameron "Amerlock 400 High-Solids Epoxy Coating", Carboline "Carboguard 891", or Tnemec "Series N140 Pota-Pox Plus".
Rust-Preventive Compound	As recommended by the manufacturer.

Surfaces To Be Coated

Unfinished Surfaces	
Interior Surfaces	
Liquid Service	Epoxy Enamel.
Exterior Surfaces of Valves To Be Buried, Submerged, or Installed in Manholes or Valve Vaults	Asphalt varnish or coal tar epoxy.
Exterior Surfaces of all other valves	Universal primer.

2-2. VALVE ACTUATORS. Ball valves, except those which are equipped with power actuators or are designed for automatic operation, shall be provided with manual actuators. Unless otherwise specified or indicated on the Drawings, each manual actuator shall be equipped with a lever operator. Ball valves with center lines more than 7’-6” above the floor shall be provided with chain levers.

Valves indicated to be electric motor operated on the Drawings shall have reversible electric motor operators designed for 120 volt ac, single phase operation. Actuators shall include integral thermal overload protection and a declutchable manual override. Actuators shall be equipped with motor operation limit switches and two additional single-pole, double-throw limit switches for auxiliary open and closed indication. An internal heater and thermostat shall be provided in each actuator housing to prevent condensation. Actuators in Class I, Division 1 and Division 2, Group D hazardous areas indicated on the drawings shall have NEMA Type 7 housings. Actuators in other areas shall have NEMA Type 4X housings.

2-3. ACCESSORIES. If the drawings indicate the need for extension stems, stem guides; position indicator; floor boxes; valve boxes; or operating stands, refer to Section 15180, "Valve Actuators."

PART 3 - EXECUTION

3-1. INSTALLATION. Materials furnished under this section shall be installed in accordance with Section 15010, "Valve Installation."

End of Section

Section 15093

CHECK VALVES

PART 1 - GENERAL

1-1. SCOPE. This Section covers requirements for the check valves.

Piping, pipe supports, insulation, and accessories that are not an integral part of the valves or are not specified herein are covered in other sections.

1-2. GENERAL.

1-2.01. General Equipment Requirements. The requirements specified in Section 01605, "General Equipment Requirements," shall apply to the equipment furnished under this Section.

1-2.02. Number Plates. Each valve covered by this Section shall be provided with a number plate mounted on or adjacent to the valve in a manner acceptable to the ENGINEER. Number plates shall be aluminum with engraved letters at least 3/4 inch high. Letters shall be painted black after fabrication.

1-3. SUBMITTALS. CONTRACTOR shall submit complete drawings, details, and specifications covering the valves and their appurtenances in accordance with the requirements specified in Section 01300, "Submittals." Submittal drawings shall clearly indicate the country of origin of all cast gray iron and ductile iron valve components.

1-4. DELIVERY, STORAGE, AND HANDLING. Shipping, handling and storage shall be in accordance with the requirements specified in Section 01600.

PART 2 - PRODUCTS

2-1. CONSTRUCTION.

2-1.01. Check Valve Details. Details of check valves to be furnished under this Section are provided below.

Type	Dual disc wafer
Body	Carbon Steel, ASTM A216WCB or equal

Trim	
Seat Ring	Buna N
Disc	ASTM B148 Alloy 952 or aluminum bronze
Springs/Hinge Pins/Stops	AISI Type 316 stainless steel
Bearings	Teflon
End Connection	Double flanged, refer Valve Schedule for details.
Temp. Limitations	-20 to 225°F
Manufacturers	Crane “Duo-Chek II ”, Valve and Primer or equal

2-1.02. Length Tolerance. Unless otherwise specified, the actual length of valves shall be within plus or minus 1/16 inch of the specified or theoretical length.

2-1.03. Shop Coatings. All ferrous metal surfaces of valves and accessories, both interior and exterior, shall be shop coated for corrosion protection. The valve manufacturer’s standard coating will be acceptable, provided it is functionally equivalent to the specified coating.

Coating Materials

Asphalt Varnish	Fed Spec TT-C-494.
Epoxy Enamel (for liquid service)	Ameron "Amerlock 400 High-Solids Epoxy Coating", Carboline "Carboguard 891", or Tnemec "Series N140 Pota-Pox Plus".
Rust-Preventive Compound	As recommended by the manufacturer.

PART 3 - EXECUTION

3-1. INSTALLATION. Materials furnished under this Section shall be installed in accordance with Section 15010.

End of Section

Section 15101

AWWA BUTTERFLY VALVES

PART 1 - GENERAL

1-1. SCOPE. This section covers furnishing AWWA butterfly valves for cold water service as shown on the Drawings and as specified herein. AWWA butterfly valves shall be furnished complete with actuators and accessories. Actuators are specified in Section 15180, “Valve Actuators.”

1-2. GENERAL. Equipment provided under this section shall be fabricated and assembled in full conformity with the drawings, specifications, engineering data, instructions, and recommendations of the equipment manufacturer, unless exceptions are noted by ENGINEER.

Valves shall be furnished with all necessary parts and accessories indicated on the Drawings, specified, or otherwise required for a complete, properly operating installation and shall be the latest standard products of a manufacturer regularly engaged in the production of valves.

1-2.01. General Equipment Requirements. The requirements specified in Section 01605, “General Equipment Requirements,” shall apply to the equipment furnished under this Section. If requirements in this specification differ from those in the General Equipment Requirements, the requirements specified herein shall take precedence.

1-2.02. Governing Standard. Except as modified or supplemented herein, all butterfly valves and manual actuators shall conform to the applicable requirements of ANSI/AWWA C504.

1-2.03. Marking. Supplementing the requirements of Section 6.1 of the governing standard, the country of origin of all castings and an identifying serial number shall be stamped on a corrosion-resistant plate attached to the valve body.

1-2.04. Temporary Number Plates. Each butterfly valve shall be tagged or marked in the factory with the identifying number shown on the Drawings.

1-2.05. Permanent Number Plates. All AWWA butterfly valves, except buried or submerged valves, that have been assigned a number on the Drawings, shall be provided with a permanent number plate. The location of number plates and the method of fastening shall be acceptable to ENGINEER. Numerals shall be at least 1 inch high and shall be black baked enamel on anodized aluminum plate.

1-3. SUBMITTALS. CONTRACTOR shall submit complete shop drawings, details, and specifications covering the valves, actuators, and their appurtenances in accordance with the requirements specified in Section 01300, "Submittals."

Included in the submittal shall be drawings by the valve manufacturer to indicate the position of the valve actuator and valve shaft.

Drawings shall include separate wiring diagrams for each electrically operated or controlled valve and the electrical control equipment. Each drawing shall be identified with the valve number or name.

Certified copies of test results as required by Section 5 of ANSI/AWWA C504, with an affidavit of compliance as indicated in Section 6.3 of C504, shall be submitted to ENGINEER before the valves are shipped.

Provide C_v values for each size valve.

1-4. DELIVERY, STORAGE, AND HANDLING. Shipping, handling and storage shall be in accordance with the requirements specified in Section 01600.

1-5. MANUFACTURER'S FIELD SERVICES. Provide the services of the manufacturer's field services representative during installation and testing as specified in Section 01620.

1-6. OPERATION AND MAINTENANCE DATA AND MANUALS. Submit O&M Manuals in accordance with the requirements specified in Section 01730.

PART 2 - PRODUCTS

2-1. ACCEPTABLE PRODUCTS. Butterfly valves shall be limited to the manufacturers listed below. Sizes and styles for the manufacturers shall be as indicated, without exception:

Manufacturer	Acceptable Sizes and Styles
DeZurik	BAW
Pratt (Mueller)	Ground Hog

2-2. MATERIALS. Except as modified or supplemented herein, materials used in the manufacture of butterfly valves shall conform to the requirements of ANSI/AWWA C504 and C540.

Acceptable shop coatings are listed in the following table.

Coal Tar Epoxy	High-build coal tar epoxy; Ameron "Amercoat 78HB Coal Tar Epoxy", Carboline "Bitumastic 300 M", Tnemec "46H-413 Hi-Build Tneme-Tar", or Sherwin-Williams "Hi-Mil Sher-Tar Epoxy".
Epoxy Enamel	
For Raw or Treated Water Service in potable water facilities (NSF certified)	Ameron “Amercoat 400 High Solids Epoxy”, Carboline “Carboguard 891”, or Tnemec “Series N140 Pota-Pox Plus”, immersion service.
Rust-Preventive Compound	As recommended by manufacturer.

2-3. VALVE CONSTRUCTION.

2-3.01. Valve Bodies. Valves shall be short-body type unless otherwise specified or shown.

The use of a stop or lug cast integrally with or mechanically secured to the body for the purpose of limiting disc travel by means of direct contact or interference with the valve disc (in either the open or closed position) will not be acceptable.

2-3.02. Flanges. Flanges shall be finished to true plane surfaces within a tolerance limit of 0.005 inch. The finished face shall be normal to the longitudinal valve axis within a maximum angular variation tolerance of 0.002 inch per foot (0.017 percent) of flange diameter.

2-3.03. Mechanical Joint Ends. Mechanical joint ends shall be either mechanical joint or push-on ends conforming to ANSI/AWWA C111/A21.11.

2-3.04. Valve Shafts. Valve shafts shall be fabricated of AISI Type 304 or 316 stainless steel. The use of shafts having a hexagonal cross section will not be acceptable.

The connection between shaft and disc shall be in accordance with ANSI/AWWA C504. The connection between the shaft and the disc shall be mechanically secured by means of solid, smooth sided, stainless steel or monel taper pins or dowel pins. Each taper pin or dowel pin shall extend through or shall wedge against the side of the shaft and shall be mechanically secured in place. The use of set screws, knurled or fluted dowel pins, expansion pins, roll pins, tension pins,

spring pins, or other devices instead of the pins specified herein will not be acceptable.

2-3.05. Valve Seats. Acceptable seating surfaces mating with rubber are AISI Type 304 or 316 stainless steel, monel, or plasma-applied nickel-chrome overlay for all valves; bronze for 20 inch and smaller valves; and alloy cast iron for 20 inch and smaller manually operated valves.

Seats shall be located on the valve body. Valve seat configurations which rely on the mating pipe flange to hold the seat in position in the valve body will not be acceptable.

2-3.06. Shaft Seals. Shaft seals shall be of the chevron type.

2-3.07. Thrust Bearings. Each valve shall be provided with one or more thrust bearings in accordance with the governing standard. Thrust bearings which are directly exposed to line liquid and which consist of a metal bearing surface in rubbing contact with an opposing metal bearing surface will not be acceptable.

2-4. VALVE ACTUATORS. Requirements for valve actuators shall be as specified in Section 15180, “Valve Actuators.” Valve actuators shall be provided, installed, and adjusted by the valve manufacturer. Actuator mounting arrangements shall facilitate operation and maintenance and shall be determined by the valve manufacturer unless indicated otherwise on the Drawings or directed by the ENGINEER.

All 8 inch and larger valves shall have geared actuators.

If valves with an AWWA class designation higher than specified are furnished, actuator torque capabilities shall be increased accordingly and be acceptable to ENGINEER.

When valves are to be buried or submerged, the actuator and accessories shall be sealed to prevent the entrance of water. The design water depth shall be not less than 20 feet .

2-4.01. Actuator Sizing. The valve manufacturer shall size the actuator in accordance with AWWA C504, the operating conditions and the valve manufacturer's requirements.

Unless otherwise indicated or specified, actuator torque requirements shall be based on a maximum differential pressure across the valve equal to the valve class and a maximum velocity through the valve of 16 feet per second.

Valves with operating stands shall have actuator torques increased by 25 percent. Actuator torques determined by the above requirements shall be increased by any safety factors required by AWWA C504, paragraphs 4.5.8.6.1 and 4.5.8.7 or indicated or specified herein.

2-5. SHOP PAINTING. All interior and exterior ferrous metal surfaces, except finished surfaces, bearing surfaces, and stainless steel components, of valves and accessories shall be shop painted for corrosion protection. The valve manufacturer's standard coating will be acceptable, provided it is functionally equivalent to the specified coating and is compatible with the specified field painting. Epoxy enamel coatings shall be ANSI/NSF 61 certified.

Surfaces shall be painted as follows:

Unfinished Surfaces	
Interior Surfaces	Epoxy enamel.
Exterior Surfaces of Valves To Be Buried	Coal tar epoxy.
Exterior Surfaces of Valves To Be Submerged, or Installed in Manholes or Valve Vaults	Epoxy enamel.
Exterior Surfaces of All Other Valves	Universal primer.
Polished or Machined Surfaces	
Flange Faces	Rust-preventive compound.
Other Surfaces	Epoxy enamel.

Interior coatings shall comply with AWWA C550 and shall be free of holidays. The total dry film thickness of shop-applied coatings shall be not less than:

Type of Coating	Minimum Dry Film Thickness
Coal Tar Epoxy	15 mils
Epoxy Enamel	10 mils
Universal Primer	3 mils

2-6. ACCESSORIES. Requirements for extension stems and stem guides, position indicators, floor boxes, operating stands, torque tubes, valve boxes, and extension bonnets shall be as shown and as specified in Section 15180.

2-7. SHOP TESTS. Perform shop tests in accordance with AWWA C504, Section 5.2. All valves shall be driptight at rated design pressure.

PART 3 - EXECUTION

3-1. INSTALLATION. Valves shall be installed in accordance with the requirements specified in Section 15010.

3-2. FIELD INSPECTIONS AND TESTS.

3-2.01. Manufacturer's Installation Check. After installation, the manufacturer's field services representative shall inspect and approve the installations as specified in Section 01620.

3-2.02. Pre-Startup Test and Checks. Perform pre-startup tests and checks in accordance with the requirements specified in Section 01650, "Startup and Testing." Testing shall not begin until installation checks by the equipment manufacturer have been completed.

3-2.03. Startup and Testing. Startup and testing requirements shall be as specified in Section 01650.

End of Section

Section 15103

BALL VALVES

PART 1 - GENERAL

1-1. SCOPE. This section covers furnishing 6 inch and larger ball valves as required by the WORK and as shown on the Drawings. Ball valves shall be furnished complete with actuators and accessories as specified herein. Actuators are specified in Section 15180, “Valve Actuators.”

1-2. GENERAL. Equipment provided under this section shall be fabricated and assembled in full conformity with the drawings, specifications, engineering data, instructions, and recommendation of the equipment manufacturer, unless exceptions are noted by ENGINEER.

Valves shall be furnished with all necessary parts and accessories indicated on the Drawings, specified, otherwise required for a complete, properly operating installation and shall be the latest standard products of a manufacturer regularly engaged in the production of valves.

1-2.01. General Equipment Requirements. The requirements specified in Section 01605, “General Equipment Requirements,” shall apply to the equipment furnished under this Section. If requirements in this specification differ from those in the General Equipment Requirements, the requirements specified herein shall take precedence.

1-2.02. Governing Standard. Except as modified or supplemented herein, all ball valves up to an operating pressure of 300 psig shall conform to the requirements of ANSI/AWWA C507. Ball valves with operating pressures exceeding 300 psig shall conform to the requirements of API 608 and ASME/ANSI B16.34. All the actuators shall meet the requirements of Section 15180 and shall be suitable for the operating pressures specified.

All valves to be provided under this Section shall be full bore type, unless indicated otherwise or approved by the ENGINEER.

1-2.03. Coordination. All equipment provided under this section shall be furnished by or through a single manufacturer who shall be responsible for the design, coordination, and satisfactory performance of all components over the full operating range.

1-2.04. Temporary Number Plates. Each ball valve shall be tagged or marked in the factory with the identifying number shown on the Drawings.

1-2.05. Permanent Number Plates. All ball valves, except buried or submerged valves, that have been assigned a number on the Drawings, shall be provided with a permanent number plate. The location of number plates and the method of fastening shall be acceptable to ENGINEER. Numerals shall be at least 1 inch high and shall be black baked enamel on anodized aluminum plate

1-3. SUBMITTALS. CONTRACTOR shall submit complete drawings, details, and specifications covering the valves and their appurtenances in accordance with the requirements specified in Section 01300, “Submittals.”

Drawings shall include separate wiring diagrams for each electrically operated or controlled valve and the electrical control equipment. Each drawing shall be identified with the valve number or name as specified in this Section.

Certified copies of reports covering proof-of-design testing of valves as set forth in the governing standards or as approved by the ENGINEER, with an affidavit of compliance, shall be submitted to ENGINEER before the valves are shipped.

PART 2 - PRODUCTS

2-1. MATERIALS. Except as modified or supplemented herein, materials used in the manufacture of ball valves shall conform to ANSI/AWWA C507 or API 6D as applicable. Materials for major components shall be as below:

Body	Carbon Steel
Ball	Stainless Steel equivalent to Grade 316 or better
Valve Stem	Stainless Steel equivalent to Grade 316 or better

Acceptable shop coatings are listed as follows:

Coal Tar Epoxy	High-build coal tar epoxy; Ameron "Amercoat 78HB Coal Tar Epoxy", Carboline "Bitumastic 300 M", Tnemec "46H-413 Hi-Build Tneme-Tar", or Sherwin-Williams "Hi-Mil Sher-Tar Epoxy".
Epoxy (NSF certified systems.)	Ameron "Amerlock 400 High-Solids Epoxy Coating"; Carboline "Carboguard 891", or Tnemec "Series N140 Pota-Pox plus"; immersion service.

Rust-Preventive Compound	As recommended by manufacturer.

2-2. VALVE CONSTRUCTION.

2-2.01. Valve Body. Each valve body shall be provided with flanged ends suitable for the design pressure. Flanges shall be flat faced and finished to true plane surfaces within a tolerance of 0.005 inch. Each flange face shall be perpendicular to the longitudinal axis of the valve, within a maximum angular variation tolerance of 0.002 inch per foot of flange diameter. Flange faces shall have concentric or spiral serrated finish.

Actual length of valves shall be within plus or minus 1/16 inch of the theoretical length.

2-2.02. Ball. Each ball shall be designed so that there will be flow between the ball and body when the ball is in a throttled position and so that substantially all flow is through the ball when in the fully open position.

2-2.03. Seats. The seats type shall be resilient.

The seats shall be provided on both the ball and the valve body. The resilient seat shall be located on the ball or on the valve body, and the rigid seat shall be located opposite the resilient seat. Each valve shall be equipped with seats on both ends. Seats shall be securely anchored in place.

Contact pressure between seats shall not exceed 1,000 psi at an unbalanced head equal to the specified working pressure.

2-2.04. Operating Mechanism. Unless otherwise specified, the basic operating mechanism for each valve shall be of the traveling-nut type and shall consist of (1) a traveling crosshead which will move transversely to the valve shaft, (2) a threaded lead screw engaging corresponding threads in the crosshead, which will move the crosshead when turned by the valve drive unit for manual or electric motor operated valves, and a piston rod with the crosshead directly attached thereto for cylinder operated valves, and (3) a rotator lever, linked to the crosshead, which will impart a rotary motion to the valve shaft.

2-3. VALVE ACTUATORS. Requirements for valve actuators shall be as specified in Section 15180, “Valve Actuators.”

2-4. SHOP PAINTING. All interior and exterior ferrous metal surfaces of valves and accessories shall be shop painted for corrosion protection. The valve manufacturer's standard coating will be acceptable, provided it is functionally

equivalent to the specified coating and is compatible with the specified field painting.

Surfaces shall be painted as follows:

Unfinished Surfaces	
Interior Surfaces	Epoxy.
Exterior Surfaces of Valves To Be Installed in Manholes or Valve Vaults	Coal tar epoxy.
Exterior Surfaces of All Other Valves	Universal primer.
Polished or Machined Surfaces	Rust-preventive compound.

Interior epoxy coatings shall comply with AWWA C550 or the other governing standards and shall be free of holidays. The total dry film thickness of shop-applied coatings shall be not less than:

Type of Coating	Minimum Dry Film Thickness
Coal Tar Epoxy	15 mils
Epoxy	10 mils
Universal Primer	3 mils

2-5. ACCESSORIES. Requirements for extension stems and stem guides; position indicators; floor boxes; and operating stands shall be as shown on the Drawings and as specified in Section 15180.

2-6. PROOF-OF-DESIGN TESTING. Except as modified or supplemented herein, ball valves shall be subject to proof-of-design testing in accordance with governing standards. Upon completion of the cycle test, seat leakage of resilient-seated valves shall be droptight.

PART 3 - EXECUTION

3-1. INSTALLATION. Valves shall be installed in accordance with the requirements specified in Section 15010.

3-2. FIELD INSPECTIONS AND TESTS.

3-2.01. Manufacturer's Installation Check. After installation, the manufacturer's field services representative shall inspect and approve the installations as specified in Section 01620.

3-2.02. Pre-Startup Test and Checks. Perform pre-startup tests and checks in accordance with the requirements specified in Section 01650, "Startup and Testing." Testing shall not begin until installation checks by the equipment manufacturer have been completed.

3-2.03. Startup and Testing. Startup and testing requirements shall be as specified in Section 01650.

End of Section

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Section 15104

RESILIENT-SEATED GATE VALVES

PART 1 - GENERAL

1-1. SCOPE. This section covers furnishing resilient-seated non-rising stem AWWA gate valves for water service. Resilient-seated gate valves shall be furnished complete with hand wheel or wrench nut actuators and accessories as specified herein and as specified in Section 15180, where applicable.

1-2. GENERAL. Equipment provided under this Section shall be fabricated and assembled in full conformity with the drawings, specifications, engineering data, instructions, and recommendations of the equipment manufacturer, unless exceptions are noted by ENGINEER.

Valves shall be furnished with all necessary parts and accessories indicated on the Drawings, specified, or otherwise required for a complete, properly operating installation and shall be the latest standard products of a manufacturer regularly engaged in the production of valves.

1-2.01. General Equipment Requirements. The requirements specified in Section 01605, “General Equipment Requirements,” shall apply to the equipment furnished under this Section.

1-2.02. Governing Standard. Except as modified or supplemented herein, all resilient-seated gate valves shall conform to the applicable requirements of ANSI/AWWA C509 up to a pressure rating of 150 psig or 200 psig depending on the valve size as covered by AWWA C509. Valves beyond these pressure ratings shall be designed and manufactured to other relevant ASME Standards like ASME B16.10 for face to face dimension, ASME B16.5 for flanges and API600 for other requirements.

1-2.03. Marking. Supplementing the requirements of Section 6.1 of the governing standard, the name of the country where the valve body was manufactured shall be cast on the exterior of the body. The name of the country where the gate was manufactured shall be molded into the resilient seat material.

1-2.04. Temporary Number Plates. Each resilient-seated gate valve shall be tagged or marked in the factory with the identifying number shown on the Drawings.

1-3. SUBMITTALS. CONTRACTOR shall submit complete shop drawings, details, and specifications covering the valves, actuators, and their

appurtenances in accordance with the requirements specified in Section 01300, “Submittals.”

Certified copies of physical and chemical test results shall be submitted for the materials of construction of valve components.

All valves shall be tested in accordance with Section 5 of the governing standard. Certified copies of the results of all tests, together with an affidavit of compliance as indicated in Section 6.3 of the governing standard, shall be submitted to ENGINEER before the valves are shipped.

PART 2 - PRODUCTS

2-1. MATERIALS. Except as modified or supplemented herein, materials used in the manufacture of resilient-seated gate valves shall conform to the requirements of ANSI/AWWA C509. For valves with pressure rating greater than 150 psig, the body shall be made of cast steel to ASTM A216 WCB.

2-1.01. Bronze Components. All bronze valve components in contact with liquid shall contain less than 15 percent zinc. All aluminum bronze components in contact with liquid shall be heat treated in accordance with Section 4.4.2 of ANSI/AWWA C504 to inhibit dealuminization.

2-1.02. Gaskets. Gaskets shall be free of asbestos and corrosive ingredients.

2-1.03. Shop Coatings.

Epoxy	Manufacturer’s standard fusion-bonded or liquid epoxy.
Rust-Preventive Compound	As recommended by manufacturer.

2-2. VALVE CONSTRUCTION.

2-2.01. Ends. Flanged ends shall be provided. Except as modified or supplemented herein, the ends shall conform to the applicable requirements of the governing standard.

Flanges shall be finished to true plane surfaces within a tolerance limit of 0.005 inch. The finished face shall be normal to the longitudinal valve axis within a maximum angular variation tolerance of 0.001 inch per inch of flange diameter.

2-2.02. Stem Seals. O-ring stem seals shall be provided.

2-2.03. Rotation. The direction of rotation of the wrench nut to open the valve shall be to the left (counterclockwise).

2-2.04. Shop Coating. All interior and exterior ferrous metal surfaces of valves and accessories shall be shop coated for corrosion protection. Except as specified below, the valve manufacturer's standard coating will be acceptable, provided it is functionally equivalent to the specified coating and is compatible with the specified field coating.

Surfaces shall be coated as follows:

Interior surfaces (potable water)	Epoxy (NSF certified).
Exterior surfaces	Epoxy.
Polished or machined surfaces	Rust-preventive compound.

The protective epoxy coating on the interior surfaces of each valve shall be applied in three coats, with a minimum total dry film thickness of 13 mils. Alternatively, the manufacturer's standard coating may be used and the interior surfaces of each valve shall be subjected to a nondestructive holiday test in accordance with ASTM G62, Method A, and shall be electrically void-free.

2-3. VALVE ACTUATORS AND ACCESSORIES. Requirements for valve actuators and accessories shall be as specified in Section 15180.

2-4. VALVE SELECTION CRITERIA. Valves shall be selected by CONTRACTOR based on size and operating conditions specified:

2-4.01. Valve Size. Valves shall be provided in the sizes noted on the Drawings.

2-4.02. Valve Pressure Rating. Valve pressure ratings shall meet or exceed the field hydrostatic test pressure requirement that is specified for various reaches of the main pipeline in Section 02704, "Pipe Pressure and Leakage Testing."

2-4.03. Valve Arrangement / Installation. Valves shall be consistent with the installation requirements shown on the Standard Details.

PART 3 - EXECUTION

3-1. INSTALLATION. Valves shall be installed in accordance with the requirements specified in Section 15010.

3-2. FIELD INSPECTIONS AND TESTS.

3-2.01. Manufacturer's Installation Check. After installation, the manufacturer's field services representative shall inspect and approve the installations as specified in Section 01620.

3-2.02. Pre-Startup Test and Checks. Perform pre-startup tests and checks in accordance with the requirements specified in Section 01650, "Startup and Testing." Testing shall not begin until installation checks by the equipment manufacturer have been completed.

End of Section

Section 15107

SLEEVE VALVES

PART 1 - GENERAL

1-1. SCOPE. This section covers the furnishing, installing and testing of a horizontal in-line "Y"-pattern sleeve type flow control valve assembly complete and operable including electric motor operator, and an orifice type fixed sleeve valve, both with appurtenances and accessories for DISTRICT Turnout T11 as shown on the Drawings and as specified herein.

Piping, pipe supports, insulation, and accessories which are not an integral part of the valves or are not specified herein are covered in other sections.

1-2. GENERAL.

1-2.01. General Equipment Requirements. The requirements specified in Section 01605, “General Equipment Requirements,” shall apply to the equipment furnished under this Section.

1-2.02. Number Plates. Each valve covered by this section which has been assigned a number on the Drawings shall be provided with a number plate mounted on or adjacent to the valve in a manner acceptable to ENGINEER. Number plates shall be aluminum with engraved letters at least 3/4 inch high. Letters shall be painted black after fabrication.

1-3. SUBMITTALS. CONTRACTOR shall submit complete fabrication and assembly drawings, together with manufacturer and model number, detailed specifications, unit dimensions, performance curves showing flow capacity versus pressure drop, shop test reports, and data covering materials, parts, devices, and accessories forming a part of the equipment furnished in accordance with the requirements specified in Section 01300, “Submittals.” With the layout drawings, the CONTRACTOR shall submit:

- Certified operating data from the manufacturer, showing a minimum of three (3) successful operations of similar valves, over a period of ten (10) years, including reference names and phone numbers.

- Layout drawings shall be drawings of the valve showing all dimensions, tolerances and materials.

- Calculations shall be supplied showing actuator sizing and design stresses in the major valve components or as requested by the ENGINEER. All calculations shall be stamped by a mechanical Professional Engineer.

- Test reports on an eight (8) inch valve, minimum, verifying cavitation resistance and operation at heads up to 450 feet and flow velocities up to 25 feet/second.

1-4. DELIVERY, STORAGE, AND HANDLING. Shipping, handling and storage shall be in accordance with the requirements specified in Section 01600.

1-5. MANUFACTURER'S FIELD SERVICES. Provide the services of the manufacturer's field services representative during installation and testing as specified in Section 01620.

1-6. OPERATION AND MAINTENANCE DATA AND MANUALS. Submit O&M Manuals in accordance with the requirements specified in Section 01730.

1-7. EXTENDED WARRANTY. After final acceptance, the sleeve valves shall be warranted to be completely operational under all conditions for a correction period of two (2) years. Repairs or replacements that are required during the correction period, whether equipment or materials, shall be performed at no cost to and to the satisfaction of the DISTRICT.

PART 2 – PRODUCTS

2-1. PERFORMANCE AND DESIGN REQUIREMENTS. Sleeve valves shall be designed to meet the service requirements as indicated herein.

The flow control sleeve valve for Turnout T11 shall be designed for remote control and shall be electric motor operated. The motor will be controlled by electrical signals from the DISTRICT'S PLC which is monitoring the Turnout discharge flowrate and adjusting valve position to maintain the selected flow setpoint. The valve opening/closing time shall be designed for 3 minutes from fully closed to fully open.

2-1.01. Flow Control Sleeve Valve. The flow control sleeve valve shall be Polyjet "Model 305 Y-Pattern In-Line"" or equal.

Performance and Design Requirements (*)	
Turnout Location	San Luis Obispo T11
Valve Tag	T11-V-1002
Number of Valves	1
Valve size, inches	8
Maximum flow rate, gpm	4000
Inlet Pressure at maximum flow rate, psi	180
Outlet Pressure at maximum flow rate, psi	30
Minimum flow rate, gpm	2000
Inlet Pressure at minimum flow rate, psi	333
Outlet Pressure at minimum flow rate, psi	28
Pressure for Actuator sizing and valve body rating, psi	450

(*) – the specified performance parameters are to be achieved by means of one 305 Model and one 816 Model installed in series.

The valve shall be designed and guaranteed to operate for at least five years throughout its range without cavitation damage, excessive noise or vibration, for the conditions specified herein. Material stresses shall not exceed 1/5 of the ultimate or 1/3 of the yield strength of the material. The valve trims shall have either equal percentage or linear characteristic so that they will open preferably between 20% to 80% corresponding to the maximum and minimum conditions specified above. CONTRACTOR shall include valve characteristics with the operating points marked on the valve % stroke vs Cv plots, as part of submittals for the approval of the ENGINEER.

"Y" pattern sleeve valve assembly shall consist of a flanged ductile iron or cast steel body and a sliding cylindrical sleeve which has tapered control nozzles. The sliding sleeve shall be provided with a seal at the upper end and a seat seal at the downstream end. The stainless steel seat seal ring shall be bolted to the body of the main valve, and shall be removable from the top when the valve is installed in the pipeline without removing the valve from the line. The valve shall be operated by means of a rising stem. The stem shall be connected to a stainless steel threaded stem for a multi-turn electric actuator as specified in Section 15180, “Valve Actuators.”

All interior surfaces which come in contact with water shall be fabricated of stainless steel, bronze, stellite, epoxy coated ductile iron, or epoxy coated carbon steel. All moving metal parts shall be dissimilar metals to prevent galling. The seat ring shall be of stainless steel with stellite facing to resist wear and wire drawing. It shall be attached to the body with cap screws for ease of maintenance. The seating surface of the seat ring shall be machined with a 32

micro-inch finish or better. The seat seal shall be a rubber compound ring type seal and shall be held in place with a type stainless steel seal holder. All studs, bolts, washers, and nuts in contact with water shall be Type 304 stainless steel.

2-2.02. Fixed Sleeve Valve. The orifice type fixed sleeve valve shall be Polyjet "Model 816;" or equal. Orifice plates are not acceptable as substitutes. Fixed sleeve valve assembly shall consist of a flanged cylinder and end cap. The orifice shall be fabricated from 304 stainless steel and shall contain the control nozzles. Each tapered nozzle shall be machined to have a co-efficient of discharge of at least 0.94 for increased capacity and shall be designed for cavitation free performance. The valve shall be 8" in diameter and suitable for installation in a 12" pipe. The valve shall have a body pressure rating of ANSI 300#.

2-3. SHOP PAINTING. All ferrous metal surfaces of valves and accessories, both interior and exterior, shall be shop painted for corrosion protection in accordance with the following list. The valve manufacturer's standard coating will be acceptable, provided it is functionally equivalent to the specified coating and is compatible with the field painting specified in Section 09940, "Protective Coatings."

Interior Surfaces	
Epoxy Enamel	Ameron "Amerlock 400 High-Solids Epoxy Coating", Carboline "Carboguard 891", or Tnemec "Series N140 Pota-Pox Plus"; immersion service.
Exterior Surfaces	Universal primer.

2-4. SHOP TESTING. The sleeve valves shall be shop tested prior to shipment in accordance with the following:

- Hydrostatic test to 1.5 times valve pressure rating.
- Leakage rate of less than 2.0 oz. per inch of valve diameter per hour tested at valve pressure rating.
- Functional test of five (5) complete cycles of operation with the valve actuator settings in place (limit switches, torque switches, etc.).

Submit certified shop test reports which shall include appropriate information such as handwheel rotation direction, valve stroke length, stroke calibration data, operating times and visual inspection notes.

PART 3 – EXECUTION

3-1. INSTALLATION. Materials furnished under this Section shall be installed in accordance with Section 15010 and as shown on the Drawings.

The fixed sleeve valve shall be installed with the orifice section extending into the inlet pipe. Conventional gaskets shall be used on both sides of the flange to prevent leakage.

3-2. FIELD INSPECTIONS AND TESTS.

3-2.01. Manufacturer's Installation Check. After installation, the manufacturer's field services representative shall inspect and approve the installations as specified in Section 01620.

3-2.02. Pre-Startup Test and Checks. Perform pre-startup tests and checks in accordance with the requirements specified in Section 01650, "Startup and Testing." Testing shall not begin until installation checks by the equipment manufacturer have been completed.

3-3. NWP COMMISSIONING AND STARTUP AND TESTING. Startup and commissioning of the NWP will be performed by the NWP Facilities contractor under Contract No. 300187.08.02. CONTRACTOR shall provide a representative of the valve manufacturer onsite during startup testing and commissioning of the Project to assist with any problems that may arise from operation of the sleeve valves, valve controllers, and appurtenances that are furnished and installed under this contract.

Valves will be field tested to the specified operating pressures. The pressure drop across the valves will be recorded to insure that no pipeline debris has been lodged in the valve.

Any excessive noise or vibration shall be resolved by the CONTRACTOR and valve manufacturer at no additional cost to the DISTRICT. The noise shall not exceed 90 dba at a distance of three (3) feet from the valve.

When testing or operation of the Project demonstrates that the valves or valve appurtenances furnished and installed under this contract do not meet the specified requirements, CONTRACTOR shall investigate the cause and correct any deficiencies uncovered as part of the warranty work specified under General Conditions Articles 6.18 and 13.6.

3-4. FIELD PAINTING. Perform field painting as specified in Section 09940.

End of Section

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Section 15108

COMBINATION AIR VALVES

PART 1 - GENERAL

1-1. SCOPE. This section covers furnishing of Combination Air Valves as shown on the Drawings and specified herein.

Valves labeled on the Drawings as “AR/AV” shall mean combination air valves in the sizes and pressure ratings specified herein.

Valves labeled on the Drawings as “AR/AV Slow Closing” shall mean combination air valves with a surge check feature in the sizes and pressure ratings specified herein.

The valve inlets and outlets shall be threaded or flanged based on manufacturer’s standard products in the sizes required. Flanges shall conform to ANSI/ASME B16.1, with appropriate pressure rating commensurate with the operating conditions.

Miscellaneous ball valves are covered in Section 15091.

1-2. GENERAL. Equipment provided under this section shall be fabricated and assembled in full conformity with drawings, specifications, engineering data, instructions, and recommendations of the equipment manufacturer, unless exceptions are noted by ENGINEER.

Valves shall be furnished with all necessary parts and accessories indicated on the Drawings, specified, or otherwise required for a complete, properly operating installation and shall be the latest standard products of a manufacturer regularly engaged in the production of these types of valves. Furnish combination valves except where shown otherwise on the Drawings.

1-2.01. General Equipment Requirements. The requirements specified in Section 01605, “General Equipment Requirements,” shall apply to the equipment furnished under this Section.

1-2.02. Governing Standard. Except as modified or supplemented herein, all valves furnished under this section shall conform to the applicable requirements of AWWA C512, if the valves are within a working pressure of 300 psig. For valves with operating pressures higher than 300 psig, the valves shall meet the requirements of Paragraph 2-1 herein.

1-3. SUBMITTALS. CONTRACTOR shall submit complete assembly drawings, together with detailed specifications and data, covering materials used and accessories forming a part of the valves furnished, in accordance with the requirements specified in Section 01300, “Submittals.”

In addition to the above, CONTRACTOR shall create and submit an “air valve schedule” for all air valves to be furnished and/or installed under this Contract. The air valve schedule shall list the valves, pipeline station, size, hydrostatic test pressure requirement and valve pressure rating.

1-4. DELIVERY, STORAGE, AND HANDLING. Shipping, handling and storage shall be in accordance with the requirements specified in Section 01600.

1-5. MANUFACTURER’S FIELD SERVICES. Provide the services of the manufacturer’s field services representative during installation and testing as specified in Section 01620.

1-6. OPERATION AND MAINTENANCE DATA AND MANUALS. Submit O&M Manuals in accordance with the requirements specified in Section 01730.

PART 2 - PRODUCTS

2-1. ACCEPTABLE PRODUCTS. Valve design shall comply with AWWA C512, except as modified herein. Combination air valves shall be of the integral type with a valve assembly which functions as both an air and vacuum valve and an air release valve.

2-2. VALVE SELECTION CRITERIA. Valves shall be selected by CONTRACTOR based on size and operating conditions specified:

2-2.01. Valve Size. Valves shall be provided in the sizes listed below, except furnish 6” slow-closing combination air valves where noted on the Drawings.

- Furnish 3-in. nominal size combination air valves for main pipeline sizes 30-in. and 36-in.
- Furnish 2-in. nominal size combination air valves for main pipeline sizes 24-in. and 18-in.
- Furnish 1-in. nominal size combination air valves for pipeline sizes 12-in. and smaller, except where working pressure exceeds 300 psi as specified herein.

2-2.02. Valve Pressure Rating. Valve pressure ratings shall meet or exceed the field hydrostatic test pressure requirement that is specified for various reaches of the main pipeline in Section 02704, “Pipe Pressure and Leakage Testing.”

2-2.03. Valve Arrangement / Installation. Valves shall be consistent with the installation requirements shown on the Standard Details.

2-3. COMBINATION AIR VALVES "AR/AV". Combination air valves shall be furnished as shown in the following table. Class 150 valves shall have a maximum working pressure of at least 150 psi. Class 300 valves shall have a maximum working pressure of at least 300 psi. For valves on lines with test pressures greater than 300 psig, use Class 500 valves having a maximum working pressure of at least 500 psi.

Valve Pressure Rating		APCO	Crispin-Multiplex	Val-Matic	Vent-O-Mat
Class 150	1"	143C	C Series	201C	RBX 2521
	2"	145C		202C	RBX 2521 or 2531
	3"	147C		203C	RBX 1631
Class 300	1"	143C	C Series	201C	RBX 2521
	2"	145C		202C	RBX 2521
	3"	147C		203C	RBX 2531
Class 500	1"	Note 1	Note 1	Note 1	RBX 4021
	2"				RBX 4021
	3"				RBX 4031

Note 1: Where pressures are greater than 300 psig, the valve(s) shall be ANSI Class flanged inlet connection and shall have a steel or ductile iron body, top, and inlet flange.

2-4. COMBINATION AIR VALVES "AR/AV SLOW CLOSING". Slow-closing combination air valves for water service shall consist of an air and vacuum valve with an air release integral to it. The air and vacuum valve shall incorporate a perforated water diffuser or surge check valve in the inlet to prevent water column from slamming the valve shut. Connect the attached air release valve to the air and vacuum valve with standard weight steel piping (ASME B36.10) and an isolation gate or ball valve.

Valve Pressure Rating	APCO	Crispin-Multiplex	Val-Matic	Vent-O-Mat
Class 150	Series 1700	AL/SC/PL Series	1200 Series/ 100 Series/ 38	Note 3

Class 300	Series 1700	AL/SC/PL Series	1200 Series/ 100 Series/ 38	Note 3
Class 500	Note 2	Note 1	Note 1	Notes 1 & 3

Note 2: Consult with valve manufacturer.

Note 3: As specified above for combination air valve plus surge check valve APCO Series 600; or equal.

2-2. MATERIALS. Except as modified or supplemented herein, materials of construction shall comply with the governing standard. The use of stressed thermoplastic components will not be acceptable.

Valve Trim	Bronze or austenitic stainless steel.
Float	Austenitic stainless steel.
Shop Coatings	
Epoxy Enamel	Ameron "Amerlock 400 High-Solids Epoxy Coating", Carboline "Carboguard 891", or Tnemec "Series N140 Pota-Pox Plus."
Rust-Preventive Compound	As recommended by manufacturer.

2-3. SHOP PAINTING. All interior and exterior ferrous metal surfaces, except stainless steel components, shall be shop painted for corrosion protection. The valve manufacturer's standard coating will be acceptable, provided it is functionally equivalent to the specified coating and is compatible with the specified field coating. Field painting is covered in the protective coatings section.

Surfaces shall be painted as indicated:

Interior Surfaces	Epoxy enamel.
Exterior Surfaces	Universal primer.
Polished or Machined Surfaces	Rust-preventive compound.

Interior epoxy coatings shall comply with AWWA C550 and shall be free of holidays. The total dry film thickness of shop-applied coatings shall be not less than:

Type of Coating	Minimum Dry Film Thickness
Epoxy	10 mils
Universal Primer	3 mils

PART 3 - EXECUTION

3-1. INSTALLATION. Valves shall be installed in accordance with the requirements specified in Section 15010.

3-2. FIELD INSPECTIONS AND TESTS.

3-2.01. Manufacturer's Installation Check. After installation, the manufacturer's field services representative shall inspect and approve the installations as specified in Section 01620.

3-2.02. Field Pressure and Leakage Testing. Combination air valves will be subjected to the field hydrostatic pressure and leakage tests specified in Section 02704.

3-2.03. Pre-Startup Test and Checks. Perform pre-startup tests and checks in accordance with the requirements specified in Section 01650, "Startup and Testing." Testing shall not begin until installation checks by the equipment manufacturer have been completed.

3-2.04. Startup and Testing. Startup and testing requirements shall be as specified in Section 01650. During initial system commissioning, inspect each air valve installed to verify proper operation.

End of Section

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Section 15110

HIGH PERFORMANCE BUTTERFLY VALVES

PART 1 - GENERAL

1-1. SCOPE. This section covers furnishing High Performance (HP) Butterfly Valves for applications as shown on the Drawings.

The HP butterfly valves shall be furnished complete with actuators and accessories as specified herein and as specified in Section 15180, “Valve Actuators.”

1-2. GENERAL. Equipment provided under this section shall be fabricated and assembled in full conformity with drawings, specifications, engineering data, instructions, and recommendations of the equipment manufacturer, unless exceptions are noted by ENGINEER.

HP butterfly valves shall be furnished with all necessary parts and accessories indicated on the Drawings, specified, or otherwise required for a complete, properly operating installation and shall be the latest standard products of a manufacturer regularly engaged in the production of valves.

1-2.01. General Equipment Requirements. The requirements specified in Section 01605, “General Equipment Requirements,” shall apply to the equipment furnished under this Section. If requirements in this specification differ from those in the General Equipment Requirements, the requirements specified herein shall take precedence.

1-2.02. Governing Standard. Except as modified or supplemented herein, all HP butterfly valves shall conform to the applicable requirements of MSS-SP-68. The actuators, where specified shall be as detailed in Section 15180, “Valve Actuators.”

1-2.03. Marking. Supplementing the requirements of the governing standard, the country of origin of all castings and an identifying serial number shall be stamped on a corrosion-resistant plate attached to the valve body.

1-2.04. Temporary Number Plates. Each HP butterfly valve shall be tagged or marked in the factory with the identifying number shown on the Drawings.

1-2.05. Permanent Number Plates. All HP butterfly valves, except buried or submerged valves, that have been assigned a number on the Drawings, shall be provided with a permanent number plate. The location of number plates and the method of fastening shall be acceptable to ENGINEER. Numerals shall be at least 1 inch high and shall be black baked enamel on anodized aluminum plate.

1-3. SUBMITTALS. CONTRACTOR shall submit shop drawings, details, and specifications covering the valves, actuators, and their appurtenances in accordance with the requirements specified in Section 01300, "Submittals."

Included in the submittal shall be drawings by the valve manufacturer to indicate the position of the valve actuator and valve shaft. Submittal drawings shall clearly indicate the country of origin of all cast gray iron and ductile iron valve components.

Drawings shall include separate wiring diagrams for each electrically operated or controlled valve and the electrical control equipment. Each drawing shall be identified with the valve number or name as specified in this Section.

Certified copies of test results as required by the governing standard, with an affidavit of compliance, shall be submitted to the ENGINEER before the valves are shipped.

Provide C_v values for each size valve.

1-4. DELIVERY, STORAGE, AND HANDLING. Shipping, handling and storage shall be in accordance with the requirements specified in Section 01600.

1-5. MANUFACTURER'S FIELD SERVICES. Provide the services of the manufacturer's field services representative during installation and testing as specified in Section 01620.

1-6. OPERATION AND MAINTENANCE DATA AND MANUALS. Submit O&M Manuals in accordance with the requirements specified in Section 01730.

PART 2 - PRODUCTS

2-1. ACCEPTABLE PRODUCTS. HP butterfly valves shall be limited to the manufacturers listed below.

Manufacturers and Model

SPX DeZurik BHP High Performance Butterfly Valves

Pratt Series 400 High Performance Butterfly Valves

2-2. MATERIALS. Except as modified or supplemented herein, materials used in the manufacture of HP butterfly valves shall conform to the requirements of the governing standard.

Acceptable shop coatings are listed in the following table.

Coal Tar Epoxy	High-build coal tar epoxy; Ameron "Amercoat 78HB Coal Tar Epoxy", Carboline "Bitumastic 300 M", Tnemec "46H-413 Hi-Build Tneme-Tar", or Sherwin-Williams "Hi-Mil Sher-Tar Epoxy".
Epoxy Enamel	
For Raw or Treated Water Service in potable water facilities (NSF certified)	Ameron “Amercoat 400 High Solids Epoxy”, Carboline “Carboguard 891”, or Tnemec “Series N140 Pota-Pox Plus”, immersion service.
Rust-Preventive Compound	As recommended by manufacturer.

2-3. VALVE CONSTRUCTION.

2-3.01. Valve Bodies. Valve bodies shall be carbon steel lugged type designed for dead-end service unless otherwise specified. Pressure rating shall be ANSI Class 300.

The use of a stop or lug cast integrally with or mechanically secured to the body for the purpose of limiting disc travel by means of direct contact or interference with the valve disc (in either the open or closed position) will not be acceptable.

2-3.02. Flanges. Flanges shall be finished to true plane surfaces within a tolerance limit of 0.005 inch. The finished face shall be normal to the longitudinal valve axis within a maximum angular variation tolerance of 0.002 inch per foot (0.017 percent) of flange diameter.

2-3.03. Valve Shafts. Valve shafts shall be one piece and fabricated of AISI Type 316 stainless steel. The use of shafts having a hexagonal cross section will not be acceptable.

The connection between shaft and disc shall be as per the governing standard. The connection between the shaft and the disc shall be mechanically secured by means of solid, smooth sided, stainless steel or monel taper pins or dowel pins. Each taper pin or dowel pin shall extend through or shall wedge against the side of the shaft and shall be mechanically secured in place. The use of set screws, knurled or fluted dowel pins, expansion pins, roll pins, tension pins, spring pins, or other devices instead of the pins specified herein will not be acceptable.

2-3.04. Valve Seats. Valve seats shall be PTFE, retained in the body and replaceable without removing the disc or stem. Valve seat configurations which rely on the mating pipe flange to hold the seat in position in the valve body will not be acceptable.

2-3.05. Shaft Seals. Shaft seals shall be the manufacturer's standard.

2-3.06. Thrust Bearings. Thrust bearings shall be the manufacturer's standard.

2-4. VALVE ACTUATORS. Requirements for valve actuators shall be as specified herein and as specified in Section 15180. Valve actuators shall be provided, installed, and adjusted by the valve manufacturer. Actuator mounting arrangements shall facilitate operation and maintenance and shall be determined by the valve manufacturer unless indicated otherwise on the Drawings or directed by the ENGINEER.

All 6 inch and larger valves shall have geared actuators, unless otherwise specified.

When valves are to be buried or submerged, the actuator and accessories shall be sealed to prevent the entrance of water. The design water depth shall be not less than 20 feet.

2-4.01. Actuator Sizing. The valve manufacturer shall size the actuator in accordance with the governing standard, the operating conditions and the valve manufacturer's requirements.

Unless otherwise indicated or specified, actuator torque requirements shall be based on a maximum differential pressure across the valve equal to the valve class and a maximum velocity through the valve of 20 feet per second.

Valves with operating stands shall have actuator torques increased by 25 percent. Actuator torques determined by the above requirements shall be increased by any safety factors required by the governing standards or indicated or specified herein.

2-5. SHOP PAINTING. All interior and exterior ferrous metal surfaces, except finished surfaces, bearing surfaces, and stainless steel components, of valves and accessories shall be shop painted for corrosion protection. The valve manufacturer's standard coating will be acceptable, provided it is functionally equivalent to the specified coating and is compatible with the specified field painting. Epoxy enamel coatings shall be ANSI/NSF 61 certified.

Surfaces shall be painted as follows:

Unfinished Surfaces	
Interior Surfaces	Epoxy enamel.
Exterior Surfaces of Valves To Be Buried	Coal tar epoxy.
Exterior Surfaces of Valves To Be Submerged, or Installed in Manholes or Valve Vaults	Epoxy enamel.
Exterior Surfaces of All Other Valves	Universal primer.
Polished or Machined Surfaces	
Flange Faces	Rust-preventive compound.
Other Surfaces	Epoxy enamel.

Interior coatings shall be free of holidays. The total dry film thickness of shop-applied coatings shall be not less than:

Type of Coating	Minimum Dry Film Thickness
Coal Tar Epoxy	15 mils
Epoxy Enamel	10 mils
Universal Primer	3 mils

2-6. ACCESSORIES. Requirements for extension stems and stem guides, position indicators, floor boxes, operating stands, torque tubes, valve boxes, and extension bonnets shall be as shown on the Drawings and as specified in Section 15180.

2-7. SHOP TESTS. Perform shop tests in accordance with the governing standard. All valves shall be driptight at rated design pressure.

PART 3 - EXECUTION

3-1. INSTALLATION. Valves shall be installed in accordance with Section 15010.

3-2. FIELD INSPECTIONS AND TESTS.

3-2.01. Manufacturer's Installation Check. After installation, the manufacturer's field services representative shall inspect and approve the installations as specified in Section 01620.

3-2.02. Pre-Startup Test and Checks. Perform pre-startup tests and checks in accordance with the requirements specified in Section 01650, "Startup and Testing." Testing shall not begin until installation checks by the equipment manufacturer have been completed.

3-2.03. Startup and Testing. Startup and testing requirements shall be as specified in Section 01650.

End of Section

Section 15140

PIPE SUPPORTS

PART 1 - GENERAL

1-1. SCOPE. This section covers the furnishing and installation of pipe hangers, brackets, and supports. Pipe supports shall be furnished complete with all necessary inserts, bolts, nuts, rods, washers, and other accessories. This section also covers the spacing of expansion joints in piping systems. Expansion joint products and materials are covered in the respective piping sections.

Concrete and fabricated steel supports shall be as indicated on the Drawings, as specified in other sections or, in the absence of such requirements, as permitted by ENGINEER.

1-2. GENERAL. In certain locations, pipe supports, anchors, and expansion joints have been indicated on the drawings, but no attempt has been made to indicate every pipe support, anchor, and expansion joint. It shall be CONTRACTOR'S responsibility to provide a complete system of pipe supports, to provide expansion joints, and to anchor all piping, in accordance with the requirements specified herein. Additional pipe supports may be required adjacent to expansion joints, couplings, or valves.

All piping shall be rigidly supported and anchored so that there is no movement or visible sagging between supports.

Pipe supports and expansion joints are not required in buried piping, but concrete blocking or other suitable anchorage shall be provided as indicated on the drawings or specified in other sections.

Piping support system components shall comply with specified piping code requirements.

1-2.01. Abbreviations. Reference to standards and organizations in this section shall be as indicated by the following designations.

AISI	American Iron and Steel Institute
ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials

MSS Manufacturers Standardization Society of Valve and Fitting Industry

1-2.02. General Equipment Requirements. The requirements specified in Section 01605, “General Equipment Requirements,” shall apply to the equipment furnished under this Section.

1-3. SUBMITTALS. CONTRACTOR shall submit complete data and catalog cuts or drawings covering fabricated pipe supports, fabricated inserts, and stainless steel, galvanized, and copper and plastic coated pipe supports in accordance with the requirements specified in Section 01300, “Submittals.” Data shall include a listing of the intended use and general location of each item submitted.

PART 2 - PRODUCTS

2-1. MATERIALS. Unless otherwise indicated, all pipe supports shall comply with ANSI/MSS SP-58 and MSS SP-69. Materials of construction for fabricated steel supports are covered in Section 05990, “Structural and Miscellaneous Metals.” All pipe support materials shall be packaged as necessary to ensure delivery in satisfactory condition.

Unless otherwise specified or indicated on the Drawings, pipe supports shall be fabricated of manufacturer's standard materials and provided with manufacturer's standard finish.

Design loads for inserts, brackets, clamps, and other support items shall not exceed the manufacturer's recommended loads.

Pipe supports shall be manufactured for the sizes and types of pipe to which they are applied. Strap hangers will not be acceptable. Threaded rods shall have sufficient threading to permit the maximum adjustment available in the support item. Continuously threaded rod is not acceptable for hanger rods over 12 inches in length.

Unless otherwise acceptable to ENGINEER, the use of supports which rely on stressed thermoplastic components to support the pipe will not be acceptable.

Contact between dissimilar metals, including contact between stainless steel and carbon steel, shall be prevented. Supports for brass or copper pipe or tubing shall be copper plated. Portions of pipe supports which come into contact with other metals that are dissimilar shall be rubber or vinyl coated.

Pipe support types and application shall comply with Table 1.

PART 3 - EXECUTION

3-1. APPLICATION. Concrete inserts or anchor bolts shall be used to support piping from new cast-in-place concrete. Expansion anchors shall be used to fasten supports to existing concrete and masonry.

Anchorage shall be provided to resist thrust due to temperature changes, changes in diameter or direction, or dead-ending. Anchors shall be located as specified to force expansion and contraction movement to occur at expansion joints, loops, or elbows, and as needed to prevent excessive bending stresses and opening of mechanical couplings. Anchorage for temperature changes shall be centered between elbows and mechanical joints used as expansion joints. Anchorage for bellows type expansion joints may be located adjacent to the joint.

When expansion joints are required, pipe guides shall be provided adjacent to bellows type expansion joints. Guides will not be required where mechanical couplings are permitted as expansion joints. Guides shall be located on both sides of expansion joints, except where anchors are adjacent to the joint. Unless otherwise indicated on the drawings, one guide shall be within four pipe diameters from the joint and a second guide within 14 pipe diameters from the first guide. Pipe supports shall allow adequate movement; pipe guides shall not be used for support. Pipe guides shall be provided at locations as recommended by the manufacturer.

3-2. TYPES OF SUPPORTS. The specific products for pipe supports shall be as indicated in Table 1 for the specified type and size of support.

TABLE 1 - TYPES OF SUPPORTS

Description and Service		Type	
		MSS SP 69 (Note 1)	Other
Hangers			
	2-1/2 inch and smaller pipe		
	J-style	5	B-Line "B3690", Anvil "67", or Unistrut "J Hanger".
	Clevis	1	B-Line "B3104" or Anvil "65".
	3 Through 10 inch pipe		
	Clevis	1	B-Line "B3100" or Anvil "260" for steel pipe; B-Line "B3102" or Anvil "590" for cast iron pipe.

TABLE 1 - TYPES OF SUPPORTS		
Description and Service	Type	
	MSS SP 69 (Note 1)	Other
12 inch pipe		
Clevis or saddle	1	See drawings.
14 inch and larger pipe		
Saddle	--	See drawings.
Concrete Inserts, Steel		
12 inch and smaller pipe	18	Channel 12 ga, galv, 1-5/8 by 1-3/8 inches, min. 8 inches long, anchor lugs on 4 inch centers, at least three lugs, end caps, and filler strip.
14 inch and larger pipe, fabricated insert, except as noted	--	See drawings.
Beam Clamps, Malleable Iron or Steel, 12 inch and smaller pipe	21	B-Line "3050" and "3055" or Anvil "133" and "134".
	28, 29	Anvil "292".
	30	B-Line "3054" or Anvil "228".
Side Beam Bracket	34	B-Line "B3062" or Anvil "202".
Wall Supports and Frames, Steel, 12 inch and smaller pipe (Note 2)		
Brackets	32	B-Line "B3066" or Anvil "195".
	33	B-Line "B3067" or Anvil "199".
Prefabricated channels	--	12 ga, galv, 1-5/8 inches, with suitable brackets and pipe clamps.
Offset pipe clamp, 1-1/2 inch and smaller pipe	--	Galv, 1-1/4 by 3/16 inch steel, with 3/8 inch bolts.
Offset pipe clamp, 2 to 3-1/2 inch pipe	--	Galv, 1-1/4 by 1/4 inch steel, with 3/8 inch bolts.
Floor Supports, Steel or Cast Iron		
6 inch and smaller pipe	37 (with base)	B-Line "B3090" or Anvil "259".

TABLE 1 - TYPES OF SUPPORTS			
Description and Service		Type	
		MSS SP 69 (Note 1)	Other
	8 through 24 inch pipe	38	B-Line "B3093" or Anvil "264".
Pipe Alignment Guides		--	B-Line "B3281" through "B3287" or Anvil "255".
Turnbuckles Steel		13	B-Line "B3202" or Anvil "230".
Hanger Rods, Carbon Steel, Threaded Both Ends, 3/8 inch minimum size		--	B-Line "B3205" or Anvil "140".
Weldless Eye Nut, steel		17	B-Line "B3200" or Anvil "290".
Insulation Protection Saddle		39	B-Line "B3160 Series" or Anvil "160 Series".
Insulation Protection Shield		40	B-Line "B3151" or Anvil "167".

Table 1 Notes:

1. MSS SP-69 supports and hangers are illustrated on Figure 1-15140.

2. Pipe clamps or other devices which rely on the application of a clamping force to the supported pipe in order to maintain the clamp position or location in a prefabricated channel or track will not be acceptable for use with nonmetallic pipe or tubing.

3-3. SUPPORT SPACINGS. Pipe supports and expansion joints shall be spaced in accordance with Table 2.

TABLE 2 - MAXIMUM PIPE SUPPORT SPACINGS AT STANDARD TEMPERATURES AND SERVICES				
Type of Pipe	Pipe Support Max Spacing	Max Run Without Expansion Joint, Loop, or Bend (Note 1)	Expansion Joint Max Spacing (Note 2)	Type of Expansion Joints
	feet	Feet	feet	
Cast or Ductile iron	15	80	80	Note 4
Steel				

TABLE 2 - MAXIMUM PIPE SUPPORT SPACINGS AT STANDARD TEMPERATURES AND SERVICES					
Type of Pipe		Pipe Support Max Spacing	Max Run Without Expansion Joint, Loop, or Bend (Note 1)	Expansion Joint Max Spacing (Note 2)	Type of Expansion Joints
		feet	Feet	feet	
	1-1/4 inch and smaller	7	30	100	Note 3
	1-1/2 to 4 inch	10	30	100	Note 3
	Over 4 inch	15	80	80	Note 4
Copper					
	1 inch and smaller	5	--	--	Note 5
	Over 1 inch	7	50	100	Note 3
Cast iron soil pipe		10	--	--	Notes 5, 6

Table 2 Notes:

1. Unless otherwise acceptable to ENGINEER, an expansion joint shall be provided in each straight run of pipe having an overall length between loops or bends exceeding the maximum run specified herein.

2. Unless otherwise acceptable to ENGINEER, the spacing between expansion joints in any straight pipe run shall not exceed the maximum spacing specified herein.

3. Expansion joint fittings are specified in the respective piping procurement sections.

4. Expansion joints shall be mechanical couplings.

5. No expansion joints are required.

6. Supports for 5 and 10 foot long pipe sections shall be located within 18 inches of each joint. Supports shall be positioned to maintain the piping alignment and to prevent the piping from sagging.

3-4. INSTALLATION.

3-4.01. General. All piping shall be supported in a manner which will prevent undue stress on any valve, fitting, or piece of equipment. In addition, pipe supports shall be provided at changes in direction or elevation, adjacent to flexible couplings, and where otherwise shown. Pipe supports and hangers shall not be installed in equipment access areas.

Where horizontal piping is arranged with two or more parallel lines, trapeze hangers may be used in lieu of individual hangers. Trapeze assembly shall consist of structure attachments as previously specified with rod size dependent upon total weight supported. Spacing of assemblies shall be determined by the minimum pipe size included in the group supported. Trapeze horizontal assemblies shall be structural angle or channel section of sufficient size to prevent measurable sag between rods. All lines shall be attached to the horizontal with intermediate pipe guides and U-bolts or one-hole clamps. Pre-engineered support equipment may be used when selected and installed in accordance with the manufacturer's recommendations.

No copper pipe shall contact a pipe support or hanger of dissimilar metal. Hangers and supports for copper pipe shall be copper-plated, plastic coated, or copper pipe shall be galvanically isolated using Neoprene strips or other material as approved.

No piping shall be supported from the pipe above.

Horizontal piping hanger support rods shall attach to steel beams with center-loading I-clamps, or welded beam clips. Hanger support rods shall attach to concrete slabs or beams with inserts.

Anchorage shall be provided to resist both lateral and longitudinal seismic forces. Seismic forces shall be calculated assuming the pipes are full.

3-4.02. Inserts. Reference building structural concrete drawings for concrete inserts. When not provided as part of the building concrete structure, provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.

Where concrete slabs form finished ceilings, provide inserts flush with the slab surface.

Where inserts are omitted, drill through concrete slab from below and provide thru-bolt with recessed square steel plate and nut recessed into and grouted flush with slab. X-ray locate existing reinforcing rods before drilling.

3-4.03. Pipe Hangers and Supports. Hanger rod sizing for copper pipe shall be same as for steel pipe. Install hangers to provide a minimum 1/2 inch space between finished covering and adjacent work.

A hanger shall be placed with 18 inches of each horizontal elbow, and on both sides of all piping accessories and valves weighing 20 pounds or more.

Hangers shall have 1-1/2 inches minimum vertical adjustment.

Support horizontal cast iron, ductile iron and no-hub piping systems adjacent to each joint.

Support vertical piping at every floor using riser clamps.

Support riser piping independently of connected horizontal piping.

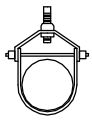
Hanger and hanger components shall be sized specifically for the pipe size it is to be used on.

3-5. PLACEMENT. Unless closer spacing is indicated on the Drawings, the maximum spacing for pipe supports and expansion joints shall be as indicated in Table 2.

Rubber hose and flexible tubing shall be provided with continuous angle or channel support.

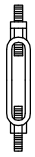
Unless otherwise indicated on the drawings or acceptable to ENGINEER, piping shall be supported approximately 1-1/2 inches out from the face of walls and at least 3 inches below ceilings.

End of Section

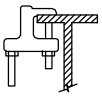


ADJ. STEEL CLEVIS
TYPE-1

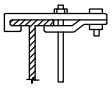
ADJ. STEEL
BAND HGR
TYPE-7



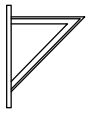
STEEL TURNBUCKLE
TYPE-13



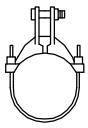
TOP BEAM
C-CLAMP
TYPE-19



TOP I-BEAM CLAMP
TYPE-25

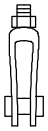


LIGHT WELDED
STEEL BRACKET
TYPE-31

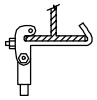


ALLOY STEEL
PIPE CLAMP
TYPE-2

EXTENSION PIPE ON
RISER CLAMP
TYPE-8



STEEL CLEVIS
TYPE-14

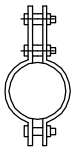


SIDE I-BEAM ON
CHANNEL CLAMP
TYPE-20

CLIP
TYPE-26

MEDIUM WELDED
STEEL BRACKET
TYPE-32

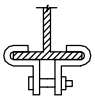
HEAVY WELDED
STEEL BRACKET
TYPE-33



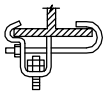
CARBON OR ALLOY
STEEL DOUBLE BOLT
PIPE CLAMP
TYPE-3

ADJUSTABLE
BAND HGR
TYPE-9

SWIVEL
TURNBUCKLE
TYPE-15

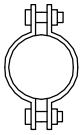


CENTER I-BEAM
TYPE-21

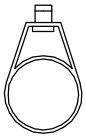


SIDE I-BEAM CLAMP
TYPE-27

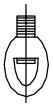
SIDE BEAM BRACKET
TYPE-34



STEEL PIPE CLAMP
TYPE-4

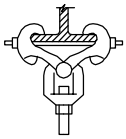


ADJ. SWIVEL RING
BAND TYPE
TYPE-10

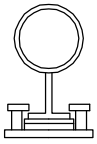


MALLEABLE
IRON SOCKET
TYPE-16

WELDED
ATTATCHMENT
TYPE-22
AS SHOWN OR
INVERTED LESS BOLT

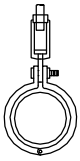


STEEL I-BEAM CLAMP
W/ EYE NUT
TYPE-28



PIPE SLIDE &
SLIDE PLATE
TYPE-35

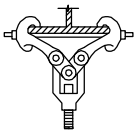
PIPE HANGER
TYPE-5



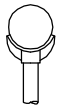
SPLIT PIPE W/WO
TURMBUCKLE ADJ.
TYPE-11

STEEL WELDLESS
EYE NUT
TYPE-17

C-CLAMP
TYPE-23

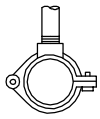


STEEL W.F. CLAMP
W/ EYE NUT
TYPE-29

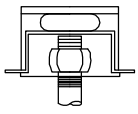


PIPE SADDLE
SUPPORT
TYPE-36

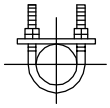
ADJ. SWIVEL PIPE RING
SPLIT RING TYPE OR
SOLID RING TYPE
TYPE-6



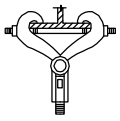
EXTENSION SPLIT
PIPE CLAMP
HINGED OR TWO BOLT
TYPE-12



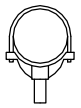
STEEL OR MALLEABLE
CONCRETE INSERT
TYPE-18



U-BOLT
TYPE-24



MALLEABLE BEAM CLAMP
W/EXTENSION PIECE
TYPE-30

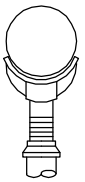


PIPE STANCHION
SADDLE
TYPE-37

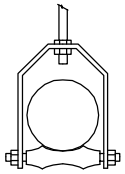
HANGERS AND SUPPORTS

Black & Veatch

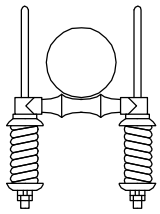
FIG 1-15140(A)



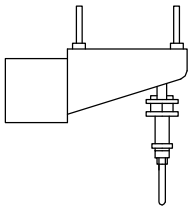
ADJUSTABLE PIPE
SADDLE SUPPORT
TYPE-38



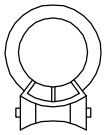
ADJUSTABLE ROLLER
HANGER W/WO SWIVEL
TYPE-43



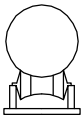
SPRING CUSHION ROLL
TYPE 49



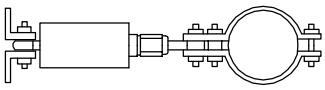
CONSTANT SUPPORT
HORIZONTAL TYPE
TYPE-54



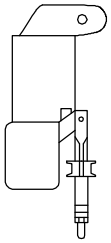
STEEL PIPE COVER
PROTECTION SADDLE
TYPE 39



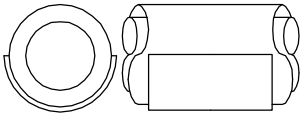
PIPE ROLL
COMPLETE
TYPE 44



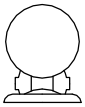
SPRING SWAY BRACE
TYPE 60



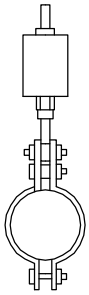
CONSTANT SUPPORT
VERTICAL TYPE
TYPE-65



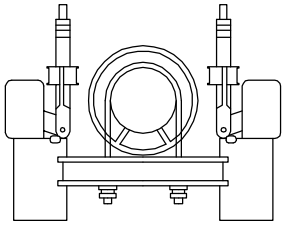
PROTECTION SHIELD
TYPE-41



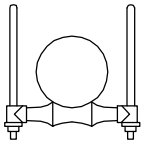
PIPE ROLL & PLATE
TYPE-45



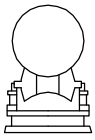
VARIABLE SPRING
HANGER
TYPE-61



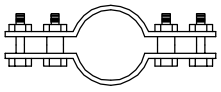
CONSTANT SUPPORT
TRAPEZE TYPE
TYPE-64



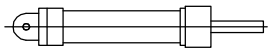
SINGLE PIPE ROLL
TYPE-41



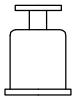
ADJUSTABLE PIPE ROLL & BASE
TYPE-46



CARBON OR ALLOY STEEL
RISER CLAMP
TYPE-42



RESTRAINT CONTROL
DEVICE
TYPE-47



VARIABLE SPRING
BASE SUPPORT
TYPE-62

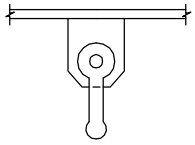
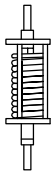
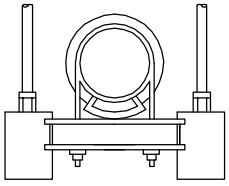


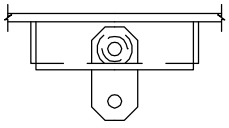
PLATE LUG
TYPE-67



SPRING CUSHION
TYPE-48



VARIABLE SPRING
TRAPEZE HANGER
TYPE-53



HORIZONTAL TRAVELER
TYPE-58

HANGERS AND SUPPORTS

Black & Veatch

FIG 1-15140(B)

Section 15180

VALVE ACTUATORS

PART 1 - GENERAL

1-1. SCOPE. This section covers furnishing manual actuators and accessories as specified herein.

1-2. GENERAL. Equipment provided under this section shall be fabricated and assembled in full conformity with the drawings, specifications, engineering data, instructions, and recommendations of the equipment manufacturer, unless exceptions are noted by ENGINEER.

Actuators shall be furnished with all necessary parts and accessories indicated on the drawings, specified, or otherwise required for a complete, properly operating installation and shall be the latest standard products of a manufacturer regularly engaged in the production of actuators.

1-2.01. General Equipment Requirements. The requirements specified in Section 01605, “General Equipment Requirements,” shall apply to the equipment furnished under this Section.

1-2.02. Governing Standards. Except as modified or supplemented herein, all manual actuators for butterfly, ball and eccentric plug valves shall conform to the applicable requirements of ANSI/AWWA C504.

1-2.03. Marking. Each actuator shall be marked with the manufacturer's name, model number, and the country of origin. An identifying serial number shall be stamped on a corrosion-resistant plate attached to the actuator.

1-2.04. Temporary Number Plates. Each actuator shall be factory tagged or marked to identify the actuator and the applicable valve by number or service as shown on the Drawings.

1-3. SUBMITTALS. CONTRACTOR shall submit complete drawings, details, and specifications covering the actuators and their appurtenances in accordance with the requirements specified in Section 01300, “Submittals.” Submittal drawings shall clearly indicate the country of origin of each actuator and its components.

Certified copies of physical and chemical test results shall be submitted for the materials of construction for the actuator components.

The drawings shall include separate wiring diagrams for each electrically operated or controlled actuator and the electrical control equipment. Each actuator drawing shall be identified with the respective valve number or name.

For electric actuators, certified copies of reports covering proof-of-design testing of the actuators as set forth in Section 5 of ANSI/AWWA C540, together with an affidavit of compliance as indicated in Section 6.3 of ANSI/AWWA C540, shall be submitted to ENGINEER before the actuators are shipped.

1-4. DELIVERY, STORAGE, AND HANDLING. Shipping, handling and storage shall be in accordance with the requirements specified in Section 01600.

1-5. MANUFACTURER'S FIELD SERVICES. Provide the services of the manufacturer's field services representative during installation and testing as specified in Section 01620.

1-6. OPERATION AND MAINTENANCE DATA AND MANUALS. Submit O&M Manuals in accordance with the requirements specified in Section 01730.

PART 2 - PRODUCTS

2-1. PERFORMANCE AND DESIGN REQUIREMENTS.

2-1.01. General. Actuators and appurtenances shall be designed for the conditions and requirements as indicated in the respective valve sections.

Liberal factors of safety shall be used throughout the design, especially in the design of parts subject to intermittent or alternating stresses. In general, working stresses shall not exceed one-third of the yield point or one-fifth of the ultimate strength of each material.

2-1.02. Valve Actuators. Each actuator shall be designed to open or close the valve under all operating conditions. Actuators shall be designed for the maximum pressure differential across the valve and maximum velocities through the valve where indicated in the respective valve schedules.

Valve actuators shall be provided and adjusted by the valve manufacturer. Actuator mounting arrangements and positions shall facilitate operation and maintenance and shall be determined by the valve manufacturer unless indicated otherwise on the Drawings or directed by ENGINEER.

When valves are to be buried, submerged, or installed in vaults, the actuators and accessories shall be sealed to prevent the entrance of water. The design

water depth shall be as indicated in the respective valve schedules but not less than 20 feet.

2-2. MATERIALS. Except as modified or supplemented herein, materials used in the manufacture of actuators shall conform to the requirements of ANSI/AWWA C504 and C540.

2-3. VALVE MANUAL ACTUATORS.

2-3.01. General. Manual actuators shall be provided by the valve manufacturer.

Unless otherwise indicated or specified, each geared manual actuator shall be equipped with an operating handwheel.

The direction of rotation of the wheel, wrench nut, or lever to open the valve shall be to the left (counterclockwise). Each valve body or actuator shall have cast thereon the word "Open" and an arrow indicating the direction to open.

The housing of traveling-nut type actuators shall be fitted with a removable cover which shall permit inspection and maintenance of the operating mechanism without removing the actuator from the valve. Travel limiting devices shall be provided inside the actuator for the open and closed positions. Travel limiting stop nuts or collars installed on the reach rod of traveling-nut type operating mechanisms shall be field adjustable and shall be locked in position by means of a removable roll pin, cotter pin, or other positive locking device. The use of stop nuts or adjustable shaft collars which rely on clamping force or setscrews to prevent rotation of the nut or collar on the reach rod will not be acceptable.

Each actuator shall be designed so that shaft seal leakage cannot enter the actuator housing.

Actuators shall produce the required torque with a maximum pull of 80 lbs on the lever, handwheel, or chain. Actuator components shall withstand, without damage, a pull of 200 lbs on the handwheel or chainwheel or an input of 300 foot-lbs on the operating nut.

2-3.02. Handwheels. Handwheel diameters shall be at least 8 inches but not more than 24 inches.

2-3.03. Levers. Levers shall be capable of being locked in at least five intermediate positions between fully open and fully closed. In any building or structure containing lever operated valves, at least two operating levers shall be provided for each size and type of lever operated valve.

2-3.04. Wrench Nuts. Unless otherwise specified in the valve schedules or on the Drawings, wrench nuts shall be provided on all buried valves and on all valves that are to be operated through floor boxes. Unless otherwise directed by ENGINEER, all wrench nuts shall comply with Section 3.15 of AWWA C500. At least two operating keys shall be furnished for operation of the wrench nut operated valves.

2-4. ACTUATOR ACCESSORIES.

2-4.01. Position Indicators. Unless otherwise specified, each valve actuator shall be provided with a position indicator to display the position of the plug or disc relative to the body seat opening.

For quarter turn plug, ball, or cone type valves installed in interior locations, the indicating pointer shall be mounted on the outer end of the valve operating shaft extension and shall operate over an indicating scale on the operating mechanism cover. Where the shaft passes through the cover, a suitable stuffing box or other seal shall be provided to prevent the entrance of water.

Each actuator for butterfly valves, except where located in manholes, buried, or submerged, shall have a valve disc position indicator mounted on the end of the valve shaft. A disc position indicator shall also be provided on each operating stand or the actuator mounted thereon.

Each buried valve actuator shall be equipped with a position indicator. Position indicators shall be Indico "Model 179 Valve Position Indicators" manufactured by the Mills Engineering Company, Needham Heights, Massachusetts, or "Diviner" ground level position indicator manufactured by the Henry Pratt Company, Aurora, Illinois. Each indicator assembly shall be designed for installation on the extension stem connected to the operating stem of the buried actuator mechanism and shall be mounted in the top section of the valve box beneath the valve box cover. Each indicator shall be equipped with a wrench nut. Internal gearing shall be sealed and protected from the elements.

2-4.02. Valve Boxes. Each valve buried to a depth of 4 feet or less shall be provided with a slide type valve box. Valve boxes shall be cast iron, extension sleeve type, suitable for the depth of cover indicated on the Drawings. Only one extension will be allowed with each slide type valve box. Valve boxes shall be at least 5 inches in inside diameter, shall be at least 3/16 inch thick, and shall be provided with suitable cast iron bases and covers.

Each buried valve shall be provided with a precast valve box consisting of a concrete valve box, cast iron cover and extension pipe sections; refer to the Standard Details and Section 15010, “Valve Installation.” Valve covers shall be shop coated and field painted.

Valve boxes which are to be provided with position indicators shall have top sections and covers designed for proper installation of the position indicator and accessories.

2-5. SHOP PAINTING. All ferrous metal surfaces, except bearing and finished surfaces and stainless steel components of valve actuators and accessories, shall be shop painted for corrosion protection. The valve manufacturer's standard coating will be acceptable, provided it is functionally equivalent to the specified coating and is compatible with the specified field painting.

The following surfaces shall be painted:

Polished or Machined Surfaces	Rust-preventive compound.
Other Surfaces	Epoxy enamel.
Actuators and Accessories	Universal primer.

2-6. STANDARD ELECTRIC ACTUATORS.

2-6.01. General. Standard electric actuators shall be provided by the valve manufacturer as specified herein.

Standard electric actuators for 12 inch and smaller butterfly valves and eccentric plug valves shall be quarter-turn type and shall be EIM Series Q, Limitorque, Rotork or equal.

All other standard electric actuators shall be multiturn type and shall be EIM Series 2000; Limitorque Model LY; Rotork AQ; or equal.

Standard electric actuators produced by other manufacturers are not acceptable.

Each standard electric actuator shall be furnished complete with a motor, gearing, handwheel, limit switches and torque sensors, lubricants, heating elements, wiring, and terminals. Each actuator shall be constructed as a self-contained unit with a cast iron or aluminum alloy housing and shall be integrally assembled on the applicable valve or gate by the valve or gate manufacturer.

Actuators shall be designed to cycle the valve from the fully open to the fully closed position or the reverse in approximately 180 seconds.

Actuator motors may be mounted horizontally adjacent to or vertically above the reduction gearing. All gearing shall be oil lubricated.

2-6.02. Motors. Motors shall be totally enclosed, high torque design made expressly for valve actuator service, capable of operating the valve under full differential pressure for two complete strokes or one complete cycle of travel without overheating. Motors shall be designed in accordance with NEMA standards and shall operate successfully at any voltage within 10 percent above or below rated voltage. Motor bearings shall be permanently lubricated.

2-6.03. Power Gearing. Power gearing shall consist of hardened steel spur or helical gears and alloy bronze or hardened steel worm gear, all suitably lubricated, designed for 100 percent overload, and effectively sealed against entrance of foreign matter. Steel gears shall be hardened to at least 350 Brinell. Planetary or cycloidal gearing or aluminum, mild steel, or nonmetallic gears will not be acceptable. Gearing shall be designed to be self-locking so that actuation of a torque switch by a torque overload condition will not allow the actuator to restart until the torque overload has been eliminated. If a secondary gear box is required, it shall be designed to withstand the locked rotor torque of the actuator.

2-6.04. Handwheel Mechanism. The handwheel shall not rotate during motor operation. During handwheel operation the motor shall not affect the actuator operation. The actuator shall be responsive to electrical power and control at all times and, when under electrical control, shall instantly disengage the handwheel. The handwheel shall rotate counterclockwise to open the valve. An arrow indicating the opening direction and the word "Open" shall be cast on the handwheel. The force required to operate the handwheel shall not exceed 40 lbs. The handwheel shall have a padlockable declutch lever.

2-6.05. Torque Sensing. Torque and thrust loads in both closing and opening directions shall be limited by a torque sensing device. Each torque sensing device shall be provided with an adjustment setting indicator. The adjustment shall permit a variation of approximately 40 percent in torque setting. Switches shall have a rating of not less than 6 amperes at 120 volts ac and 0.5 ampere at 115 volts dc.

2-6.06. Limit Switches. Each standard electric actuator shall be designed to be readily field adaptable for four limit switch assemblies. Each switch assembly shall consist of at least three separate limit switches, shall be operated by the driving mechanism, and shall be independently adjustable to trip at any point at and between the fully open and fully closed valve positions. All switches shall have an inductive contact rating of not less than 6 amperes at 120 volts ac, 3 amperes at 240 volts ac, 1.5 amperes at 480 volts ac, and 0.5 ampere at 115 volts dc.

Each quarter-turn actuator shall be provided with end-of-travel limit switches in addition to four spdt switches, each independently adjustable at any point of valve travel.

2-6.07. Position Transmitter. When indicated, actuators shall be provided with an electronic type position transmitter. The transmitter output shall be an isolated 4-20 mA dc capable of driving an external load of 0 to 500 ohms. Accuracy of the transmitted signal shall be ±2 percent of span. Repeatability and hysteresis shall be within 1 percent. The transmitter shall transmit to a remote position indicator.

A position transmitter is required on the actuator for sleeve valve T11-V-1002 (Section 15108).

2-6.08. Heating Elements. Space heating elements shall be provided to prevent condensation in the motor and limit switch housing. Heating elements shall be rated 120 volts ac. Heaters shall be continuously energized.

2-6.09. Terminal Facilities. Terminal facilities for connection to motor leads, switches, position transmitter, and heating elements shall be provided in readily accessible terminal compartments. Each terminal compartment shall have at least two openings for external electrical conduits, one sized at least 3/4 inch and the other at least 1-1/4 inches. Each terminal compartment shall be large enough to allow easy routing and termination of fifteen 12 AWG conductors.

2-6.10. Controller. Each valve shall be furnished with a reversing controller located inside the actuator enclosure and shall have controller devices. The controller shall be equipped with:

a. A motor overload protective device in each phase or solid state motor protection.

b. A space heater element, rated 120 volts ac, sized to be continuously energized for prevention of condensation within the controller enclosure.

c. A fused control power circuit taken from one power lead on the load side of the breaker and line side of the reversing starter to ground. If power supply is greater than 120 volts ac, a control power transformer with fused secondary, with volt-ampere capacity suitable for starter control plus continuous service to space heater elements in motor housing, limit switch compartment, and controller enclosure.

d. A terminal block with connectors for all external controls. All leads from the actuator motor and limit switch assembly shall be routed to terminal connections in the controller for external connections to all other control devices.

e. Auxiliary control contacts as indicated in the electrical schematics.

Reversing controllers shall be both mechanically and electrically interlocked and shall be provided with the necessary direct-operated auxiliary contacts for required interlocking and control.

Valve controllers shall be expressly selected for long life and reliable, low maintenance service under rugged service conditions.

2-6.11. Control Module. Sleeve valve T11-V-1002 shall be designed for modulating service and shall be provided with a control module for position modulating type service. The control module shall be mounted within the valve actuator limit switch housing. The module shall accept a standard 4-20 mA dc analog input signal with a load impedance of not greater than 400 ohms. The control module shall contain adjustments for span, zero, gain, and deadband.

The actuator shall have a slide-wire type position feedback potentiometer which provides a position feedback signal to the control module.

2-6.11.01. Control Performance. For any operating torque within the specified range of the valve actuator, the valve and actuator shall perform within these specified limits:

Linearity	Linearity of actual valve position as compared to demand signal shall be within ±4 percent of span over the entire operating range.
Repeatability	For any repeated demand signal to the valve actuator, the actual valve position shall be repeated.
Deadband	Deadband of the valve actuator shall be adjustable from 1 to 10 percent of span.

Hysteresis	For any repeated demand signal to the valve actuator, from either an increasing or a decreasing direction, the actual valve position shall be repeated within 1 degree of valve shaft rotation."

PART 3 - EXECUTION

3-1. INSTALLATION. Actuators shall be installed on the valves in accordance with Section 15010.

3-2. FIELD INSPECTIONS AND TESTS.

3-2.01. Manufacturer's Installation Check. After installation, the manufacturer's field services representative shall inspect and approve the installations as specified in Section 01620.

3-2.02. Pre-Startup Test and Checks. Perform pre-startup tests and checks in accordance with the requirements specified in Section 01650, "Startup and Testing." Testing shall not begin until installation checks by the equipment manufacturer have been completed.

3-2.03. Startup and Testing. Startup and testing requirements shall be as specified in Section 01650.

End of Section

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Section 15250

MECHANICAL INSULATION

PART 1 - GENERAL

1-1. SCOPE. This Section covers the furnishing and installation of insulation, jackets, and accessories for the following mechanical systems:

Piping

Building insulation materials are specified in other sections. Insulation for mechanical equipment which is to be applied at the factory prior to shipment is specified in the individual equipment sections.

1-2. GENERAL. Materials furnished and installed under this Section shall be in full conformity with the drawings, specifications, engineering data, instructions, and recommendations of the equipment manufacturer unless exceptions are noted by ENGINEER.

1-2.01. Coordination. CONTRACTOR shall be responsible for coordinating the installation of insulation with the installation of the items or systems to be insulated. Each item or system shall be tested and accepted by ENGINEER before installation of the insulation materials.

CONTRACTOR shall verify that each component of the insulation systems is compatible with all other parts of the system; that all insulation materials are appropriate for the intended applications; and that all necessary devices and accessories have been provided.

All insulation of the same class shall be the product of a single manufacturer; however, all the insulation types need not be the products of one manufacturer.

1-2.02. General Equipment Requirements. The requirements specified in Section 01605, “General Equipment Requirements,” shall apply to the equipment furnished under this Section.

1-2.03. Governing Standards. Except as modified or supplemented herein, all work covered by this Section shall be performed in accordance with all applicable municipal codes and ordinances, laws, and regulations. In case of a conflict between this Section and any state law or local ordinance, the latter shall govern.

All work shall comply with UL, NFPA, and ASTM safety requirements.

1-2.04. Metal Thickness. Metal thickness and gages specified herein are minimum requirements. Gages refer to US Standard gage.

1-2.05. Surface Burning Characteristics. Insulation, jackets, tapes, and adhesives to be used indoors shall have a composite flame spread rating not to exceed 25 and a composite smoke developed rating of 50 when tested by UL 723, NFPA 255, or ASTM E84. All testing shall be done on materials of the same densities and installed thicknesses as the materials being installed. Insulation materials which have been treated with a flame retardant additive to meet the required flame spread and smoke developed ratings are not acceptable.

1-2.06. Painting and Identification. Field painting and identification shall be as specified in Section 09940, “Protective Coatings.”

1-3. SUBMITTALS. CONTRACTOR shall submit a complete list of materials and catalog cuts, together with detailed specifications, materials performance data, and installation instructions for all parts, devices, and accessories furnished in accordance with the requirements specified in Section 01300, “Submittals.” Information shall include certified test results to show compliance with UL, NFPA, and ASTM safety requirements.

1-4. QUALITY ASSURANCE.

1-4.01. Manufacturer Experience. A manufacturer shall have furnished material of the type specified which has been in successful operation for not less than the past 5 years.

1-5. DELIVERY, STORAGE, AND HANDLING. Shipping, handling and storage shall be in accordance with the requirements specified in Section 01600.

PART 2 - PRODUCTS

2-1. MATERIALS.

2-1.01. Pipe Insulation.

2-1.01.01. Type PFC1 Insulation. Type PFC1 flexible cellular elastomeric pipe insulation shall be Armacell "AP/Armaflex" or Nomaco K-Flex "Insul-Tube 180" for unslit insulation and Armacell “AP/Armaflex SS” or Nomaco K-Flex “Insul-Lock II” for factory pre-slit insulation. Flexible cellular polyolefin foam insulation shall be IMCOA "Imcolock" or" Imcoshield".

Type PFC1 pipe insulation shall be one-piece, molded elastomeric or polyolefin foam insulation suitable for a temperature range of -40°F to 210°F [-40°C to 99°C], and shall have a maximum thermal conductivity (k) of 0.28 Btu in/hr ft^2 °F at 75°F. The insulation shall be suitable for exposure to weather and direct sunlight or, where not indicated to be jacketed, shall be given two coats of an ultraviolet-resistant finish recommended by the manufacturer. The insulation shall conform to ASTM C534.

2-2. ACCESSORIES.

2-2.01. PVC Insulation Jackets. PVC insulation jackets for piping systems shall be furnished and installed as specified herein and indicated on the Drawings.

All fittings in piping systems insulated with mineral fiber shall be jacketed with a polyvinyl chloride (PVC) jacketing material. Piping systems where indicated to have PVC jackets shall be jacketed with the same PVC jacketing material. Jackets for fittings shall be one piece, factory molded to the contour of the fitting. The PVC jacket and fitting covers shall have a minimum thickness of 0.020 inches when installed indoors and 0.030 inches when installed outdoors. PVC jacketing shall be Johns Manville "Zeston 2000 Series".

2-2.02. Aluminum Insulation Jackets. Aluminum insulation jackets for insulated piping systems shall be furnished and installed as required and indicated on the drawings.

Fittings in insulated piping systems and equipment where indicated in the insulation schedule shall be provided with aluminum jackets of the same aluminum jacketing material as the piping systems. The aluminum jacket shall be Alclad 3004 complying with ASTM B209. The jacket shall have a 0.024 inch nominal thickness, with an embossed finish. A factory-applied asphalt and kraft paper vapor barrier or polyethylene film and kraft paper vapor barrier shall extend the full width of the jacket.

PART 3 - EXECUTION

3-1. INSTALLATION.

3-1.01. General. CONTRACTOR shall install all insulation materials as specified herein for the piping systems, and ductwork, and equipment that are not factory insulated. Insulation materials shall be installed in accordance with the manufacturer's written instructions and recommendations. Surfaces to be insulated shall be cleaned and dried. All work shall be performed within the temperature ranges recommended by the insulation product manufacturer.

Insulation shall be kept clean and dry and shall remain in the factory container until it is installed. Packages or factory containers shall bear the manufacturer's stamp or label with the name of the manufacturer and description of materials.

Seams of exposed insulation and jackets shall be in the least visible location.

3-1.02. Piping Insulation.

3-1.02.01. Type PFC1 Insulation. Pipe insulation shall be installed to cover all pipe, fittings, and appurtenances with all seams and joints sealed by a factory or field applied adhesive. Insulation at fittings and appurtenances shall be carefully formed and fitted. Insulation at elbows shall be mitered using segments of pipe insulation.

3-1.03. PVC Jacketing. PVC jacketing for piping systems shall be installed as specified herein and indicated on the Drawings. End joints and longitudinal seams on piping systems conveying fluids at lower than ambient temperatures shall be vapor-sealed, and covered with vapor-barrier tape to ensure a continuous vapor seal. Fittings shall be insulated with glass fiber material.

3-1.04. Aluminum Jacketing. Aluminum jacketing for piping systems shall be installed as specified herein and indicated on the Drawings. Jacketing shall be held in place with stainless steel securing bands uniformly spaced at not more than 18 inches to produce tight joints without "bulging". The jacket shall overlap at least 2 inches at longitudinal and circumferential joints. Joints shall be overlapped and sealed with caulk to prevent moisture penetration, and longitudinal joints shall be placed to shed water. Exposed ends of pipe insulation shall be provided with covers constructed of the same material as the jacketing.

Elbows shall be jacketed with spirally wrapped aluminum strips or individual mitered segments or gores cut to fit the insulation.

3-2. INSULATION SCHEDULE.

INSULATION SCHEDULE				
Service	Size Inches	Mechanical Insulation		Notes
		Type	Thickness Inches	
PIPING - INDOOR (CONCEALED OR EXPOSED)				
Raw Water	Up to 3	PFC1	3/4	(3)
	4 & larger	PFC1	1	(3)
Refrigerant Suction	Up to 1	PFC1	3/4	(2)
	1-1/4 & larger	PFC1	1	(2)
Storm Drain	All	PFC1	3/4	(3), (4)
PIPING - OUTDOOR (EXPOSED)				
Refrigerant Suction	All	PFC1	1	(1)

Mechanical Insulation Types: FC - Flexible Cellular
MF - Mineral Fiber

Notes:

(1) Aluminum jacket.

(2) PVC jackets shall be provided on exposed portions of insulated piping located less than 8 feet above finished floor. On all other portions of the insulated piping system PVC jackets shall be provided only for fittings.

(3) Insulation shall be provided for portions of the piping system which pass through space above finished ceilings or is exposed above equipment, electrical panels, or cabinets.

(4) The underside of all roof drains shall be insulated to a 1 foot radius from the center of the drain. All roof drain piping within 4 feet of the drain shall be insulated.

Unless otherwise indicated in the insulation schedule, all mechanical piping, ductwork, equipment, and accessories with an operating temperature in excess of 140°F [60°C] and below 60°F [15°C] shall be insulated.

End of Section

DIVISION 16
ELECTRICAL

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Section 16050

ELECTRICAL

PART 1 - GENERAL

1-1. SCOPE. This section covers the general requirements for furnishing and installing electrical equipment, systems and materials for the work under this contract. Requirements for the fiber optic system are specified in Sections 13540 and 13541.

1-2. GENERAL. Electrical apparatus on all equipment shall be installed complete and placed in readiness for proper operation.

Electrical materials furnished and installed under this section shall be fabricated, assembled, erected, and placed in proper operating condition in full conformity with the drawings, specifications, engineering data, instructions, and recommendations of the equipment manufacturer, unless exceptions are noted by ENGINEER. All equipment shall be designed and installed to resist the seismic forces specified in Section 01605.

1-2.01. General Equipment Requirements. The requirements specified in Section 01605, “General Equipment Requirements,” shall apply to the equipment furnished under this Section. If requirements in this specification differ from those in the General Equipment Requirements, the requirements specified herein shall take precedence.

1-2.02. Coordination. Electrical work shall conform to the construction schedule and the progress of other trades.

1-2.03. Anchor Bolts and Expansion Anchors. All anchor bolts, nuts, washers, and expansion anchors shall comply with Section 05550, “Anchorage in Concrete and Masonry,” except smaller than 3/4 inch will be permitted to match NEMA standard size bolt holes on motors and electrical equipment.

1-2.04. Drawings. Supplementing this section, the Drawings indicate locations of equipment and enclosures and provide one-line and schematic diagrams regarding the connection and interaction with other equipment.

1-3. CODES AND PERMITS. All work shall be performed and materials shall be furnished in accordance with the NEC - National Electrical Code, the NESC - National Electrical Safety Code, and the following standards where applicable:

ANSI American National Standards Institute.

ASTM	American Society for Testing and Materials.
AWG	American Wire Gauge.
Fed Spec	Federal Specification.
ICEA	Insulated Cable Engineers Association.
IEEE	Institute of Electrical and Electronics Engineers.
IESNA	Illuminating Engineering Society of North America.
NEIS	National Electrical Installation Standards
NEMA	National Electrical Manufacturers Association.
NFPA	National Fire Protection Association.
UL	Underwriters' Laboratories.

Equipment covered by this section shall be listed by UL, or by a nationally recognized third party testing laboratory. All costs associated with obtaining the listing shall be the responsibility of CONTRACTOR. If no third-party testing laboratory provides the required listing, an independent test shall be performed at CONTRACTOR'S expense. Before the test is conducted, CONTRACTOR shall submit a copy of the testing procedure to be used.

1-4. IDENTIFICATION.

1-4.01. Conduit. Conduits in manholes, handholes, building entrance pull boxes, junction boxes, and equipment shall be provided with identification tags. Identification tags shall be 19 gage stainless steel, with 1/2 inch stamped letters and numbers as indicated on the Drawings. Identification tags shall be attached to conduits with nylon tie wraps and shall be positioned to be readily visible.

1-4.02. Cable. Except for lighting and receptacle circuits, each individual wire in power, control, indication, and instrumentation circuits shall be provided with identification markers at the point of termination.

The wire markers shall be of the heat-shrinkable tube type, with custom typed identification numbers.

The wire numbers shall be as indicated on the equipment manufacturer's drawings.

The wire markers shall be positioned to be readily visible for inspection.

Power wires shall be color coded with electrical tape or colored wire jacket; white-N, black, and red for 120/240 volt, 3-wire; and gray-N, brown, orange and yellow for 480/277 volt, 4-wire circuits.

1-4.03. Motor Starters. Motor starters shall be provided with nameplates identifying the related equipment. Pilot controls and indicating lights shall have engraved or etched legends ("start", "stop", etc.) as indicated on the Drawings. Nameplates shall be laminated black-over-white plastic, with 1/8 inch engraved letters, and shall be securely fastened to the motor starters.

1-4.04. Control Stations. Control stations shall be provided with nameplates identifying the related equipment. Pilot controls and indicating lights shall have engraved or etched legends ("start", "stop", etc.) as indicated on the Drawings. Nameplates shall be laminated black-over-white plastic, with 1/8 inch engraved letters, and shall be securely fastened to the control stations.

1-4.05. Circuit Breakers. Circuit breakers shall be provided with nameplates identifying related equipment. Nameplates shall be laminated black-over-white plastic, with 1/8 inch engraved letters, and shall be securely fastened to the circuit breakers.

1-4.06. Disconnect Switches. All switches shall have front cover-mounted permanent nameplates that include switch type, manufacturer's name and catalog number, and horsepower [kW] rating. An additional nameplate, engraved or etched, laminated black-over-white plastic, with 1/8 inch letters, shall be provided to identify the associated equipment. Both nameplates shall be securely fastened to the enclosure.

1-5. SUBMITTALS. Complete assembly, foundation, and installation drawings, together with complete engineering data covering the materials used, parts, devices, and accessories forming a part of the WORK, shall be submitted in accordance with the requirements specified in Section 01300, “Submittals.”

1-5.01. Submittal Identification. Information covering all materials and equipment shall be submitted for review. Each sheet of descriptive literature submitted shall be clearly marked to identify the material or equipment as follows:

a. Lamp fixture descriptive sheets shall show the fixture schedule letter, number, or symbol for which the sheet applies.

b. Equipment and materials descriptive literature and drawings shall show the specification paragraph for which the equipment applies.

c. Sheets or drawings covering more than the item being considered shall have all inapplicable information crossed out.

d. A suitable notation shall identify equipment and materials descriptive literature not readily cross-referenced with the Drawings or specifications.

e. Schematics and connection diagrams for all electrical equipment shall be submitted for review. A manufacturer's standard connection diagram or schematic showing more than one scheme of connection will not be accepted, unless it is clearly marked to show the intended connections.

f. Transient voltage surge suppressor submittals shall include drawings (including unit dimensions, weights, component and connection locations, mounting provisions, and wiring diagrams), all testing documentation as specified herein, equipment manuals that detail the installation, operation and maintenance instructions for the specified unit(s), manufacturer's descriptive bulletins and product sheets, and warranty.

1-5.02. Additional Submittals. In addition, CONTRACTOR shall submit the following items:

Within 90 days after the Notice to Proceed, CONTRACTOR shall furnish a submittal for all types of cable and conduit to be provided. The submittal shall include the cable manufacturer and type, and sufficient data to indicate that the cable and conduit meet the specified requirements.

In addition to the complete specifications and descriptive literature, a sample of the largest size of each type of cable shall be submitted for review before installation. Each sample shall include legible and complete surface printing of the cable identification.

Underground cable pulling procedures.

Results of electrical field testing, including cable insulation tests and grounding system testing.

1-6. PROTECTION AND STORAGE. During construction, the insulation on all electrical equipment insulation shall be protected against absorption of moisture, and metallic components shall be protected against corrosion by strip heaters, lamps, or other suitable means. This protection shall be provided immediately upon receipt of the equipment and shall be maintained continuously.

PART 2 - PRODUCTS

2-1. POWER SERVICE ENTRANCE. CONTRACTOR shall consult the local electric utility PG&E regarding their service installation requirements, and shall furnish the service equipment in compliance with these requirements.

Power service equipment shall include the following.

- Meter board, meter socket and test cabinet.
- Metering transformer cabinet.
- Disconnect means, grounding materials, and riser conduits and service entrance fittings required by the utility and for compliance with codes and regulations.

For underground services, the following shall be furnished as applicable.

- Trenching and backfill
- Ducts

A weatherhead shall be provided on each service riser conduit as required.

2-2. TELEPHONE SERVICE ENTRANCE. Not Used.

2-3. CABLE. All cables of each type (such as lighting cable or 600 volt power cable) shall be from the same manufacturer.

All types of cable shall conform to the Cable Data Figures at the end of this section and/ or as described herein.

2-3.01. Lighting Cable. Lighting cable (Figure 1-16050 THHN-THWN) shall be provided only in lighting and receptacle circuits operating at 277 volts or less. Lighting and receptacle circuits, 8 AWG or larger, shall be as specified for 600 volt (Figure 2-16050 XHHW power cable.

2-3.02. 600 Volt Power Cable. Cable in power, control, indication, and alarm circuits operating at 600 volts or less, except where lighting, multiconductor control, and instrument cables are permitted, shall be Figure 2-16050 XHHW-2 power cable.

2-3.03. Instrument Cable. Cable for electronic circuits to instrumentation, metering, and other signaling and control equipment shall be two- or three-conductor instrument cable twisted for magnetic noise rejection and protected from electrostatic noise by a total coverage shield. Types of instrument cables shall be (Figure 4-16050 single pair) and (Figure 5-16050 single triad.)

2.3.04. Multiconductor Control Cable. Not used.

2-3.05. Medium Voltage Power Cable. Cable for circuits rated higher than 600 volts but not above 5,000 volts, and for wet or dry locations in conduit and open air, shall be (Figure 9-16050 8 kV EPR) power cable.

Cable for the 21 kV circuits shall be suitable for installing in underground ducts. It shall have the following characteristics: rated 25 kV with 345 mils of EPR insulation, 133 % insulation level, single conductor copper, 5 mil copper shield, PVC jacket, 90 degree C continuous operating temperature. Okonite Co. Okoguard-Okoseal Type MV-90 or approved equal.

2-3.06. Tray Cable. Not used.

2-3.07. Metal Clad Lighting Cable. Metal clad lighting cable (Figure 14-16050 Metal Clad THHN) shall be provided only in lighting and receptacle circuits operating at 277 volts or less, concealed in interior partition walls and above suspended ceilings of finished office and administration areas.

2-4. CONDUIT. Conduit and raceways shall be as described in the following paragraphs:

2-4.01. Rigid Steel Conduit. Rigid steel conduit shall be heavy wall, hot-dip galvanized, shall conform to ANSI C80.1, and shall be manufactured in accordance with UL 6.

2-4.02. Intermediate Metal Conduit (IMC). Not used.

2-4.03. Liquidtight Flexible Metal Conduit. Liquidtight flexible metal conduit shall be hot-dip galvanized steel, shall be covered with a moistureproof polyvinyl chloride jacket, and shall be UL labeled.

2-4.04. Utility (PVC) Duct. Not used.

2-4.05. Rigid Nonmetallic (PVC) Conduit. PVC conduit shall be heavy wall, Schedule 40, UL labeled for aboveground and underground uses, and shall conform to NEMA TC-2 and UL 651.

2-4.06. PVC-Coated Rigid Steel Conduit. The conduit shall be rigid steel. Before the PVC coating is applied, the hot-dip galvanized surfaces shall be coated with a primer to obtain a bond between the steel substrate and the coating. The PVC coating shall be bonded to the primed outer surface of the conduit. The bond on conduit and fittings shall be stronger than the tensile strength of the PVC coating. The thickness of the PVC coating shall be at least 40 mils.

A chemically cured two-part urethane coating, at a nominal 2 mil thickness, shall be applied to the interior of all conduit and fittings. The coating shall be sufficiently flexible to permit field bending the conduit without cracking or flaking of the coating.

Every female conduit opening shall have a PVC sleeve extending one conduit diameter or 2 inches, whichever is less, beyond the opening. The inside diameter of the sleeve shall be the same as the outside diameter of the conduit before coating. The wall thickness of the sleeve shall be at least 40 mils.

All fittings, condulets, mounting hardware, and accessories shall be PVC-coated. All hollow conduit fittings shall be coated with the interior urethane coating described above. The screw heads on condulets shall be encapsulated by the manufacturer with a corrosion-resistant material.

PVC coated rigid steel conduit shall be manufactured by Ocal, Perma-Cote, or Robroy.

2-4.07. Fiber Optic Conduit. Refer to Section 13541.

2-5. WIRING DEVICES, BOXES, AND FITTINGS. Concealed conduit systems shall have flush-mounted switches and convenience outlets. Exposed conduit systems shall have surface-mounted switches and convenience outlets.

2-5.01. Conduit Boxes and Fittings.

a. Galvanized or cadmium plated, threaded, malleable iron boxes and fittings shall be manufactured by Crouse-Hinds, Appleton, or O Z Gedney. In applications utilizing aluminum conduit systems, aluminum boxes and fittings manufactured by Crouse-Hinds, Appleton, or O Z Gedney shall be installed.

b. Rigid PVC device boxes and fittings shall be manufactured by Carlon or Cantex.

c. Sheet steel device boxes shall be manufactured by Appleton, Raco, or Steel City.

d. PVC coated device boxes shall be manufactured by Ocal, Perma-Cote, or Robroy Industries.

e. Hub arrangements on threaded fittings shall be the most appropriate for the conduit arrangement to avoid unnecessary bends and fittings.

2-5.02. Device Plates.

a. Galvanized or cadmium-plated device plates shall be used on surface mounted outlet boxes where weatherproof plates are not required.

b. Device plates on flush mounted outlet boxes where weatherproof plates are not required shall be AISI Type 302 stainless steel, Eagle "93nnn series", Hubbell "S series", or Leviton "840nn-40 series"; nylon or polycarbonate, Eagle "513nV series", Hubbell "Pn series", or Leviton "807nn-I series".

c. Device plate mounting hardware shall be countersunk and finished to match the plate.

d. Device plates for switches outdoors or indicated as weatherproof shall have provisions for padlocking switches "On" and "Off", and shall be Appleton "FSK-1VS", Crouse-Hinds "DS185" or O Z Gedney "FS-1-WSCA".

e. Device plates for receptacles indicated as weatherproof shall be Appleton "FSK-WRD", Crouse-Hinds "WLRD1", or O Z Gedney "FS-1-WDCA.

f. Flush-mounted, weatherproof plates shall be provided with adapter plates, Appleton "FSK-SBA" or Crouse-Hinds "FS031".

g. Device plates for ground fault interrupter receptacles indicated to be weatherproof shall be Appleton "FSK-WGFI", Eagle "966", or O Z Gedney "FS-1-GFCA".

h. Receptacle covers outdoors or otherwise indicated to be weatherproof while in-use shall be die cast aluminum and shall include a padlock eye. Covers for standard convenience outlets shall be Hubbell “WP8M” or Thomas and Betts Red Dot “CKMDV”. Covers for ground fault interrupter receptacles shall be Hubbell “WP26M” or Thomas and Betts Red Dot “CKMGV”.

i. Engraved device plates, where required, shall be manufactured by Leviton, or equal.

j. Device plates on PVC conduit fittings shall be Carlon "E98 Series" or Cantex "513300 Series".

2-5.03. Wall Switches.

a. Switches on ac lighting panel load circuits through 277 volts shall be 20 amperes, 120/277 volts, Eagle "2221V" through "2224V", Hubbell "HBL 1221I" through "HBL 1224I", or Leviton "1221-2I" through "1224-2I".

b. Switches for pulse control of lighting contactors shall be 20 amperes, 120/277 volts, momentary, double-throw, center "Off", Eagle "2220V", Hubbell "1557I" or Leviton "1257-I".

c. Switches on ac lighting panel load circuits through 277 volts in Class I, Division 1 and Division 2, Group D hazardous areas indicated on the Drawings shall be 20 ampere, 120/277 volts. Hazardous area switches shall be factory sealed tumbler switches, Appleton “EDS” or Killark “FXS”.

2-5.04. Receptacles.

a. Standard convenience outlets shall be duplex, three-wire, grounding, 20 amperes, 125 volts, Eagle "5362V", Hubbell "5362I" or Leviton "5362-I" for 120 volt circuits, and 250 volts, Eagle "5462V", Hubbell "5462I" or Leviton "5462-I" for 240 volt circuits.

b. Ground fault circuit interrupter receptacles shall be duplex, 20 amperes, 125 volts, Eagle "GF8300V", Hubbell "GF5362I" or Leviton "8899-I".

c. Welding receptacles shall be 30 amperes, 600 volts, 3 phase, with grounding conductors connected through a fourth pole, Appleton "ACRE3034-100", Crouse-Hinds "AR348" plus "ARRC33" and "AR30" or Leviton " 430MI5W". One matching plug, Appleton "ACP3034BC", Crouse-Hinds "APJ3485" or Leviton "430P5W" with appropriate woven grip and plug cap, shall be furnished for the cable size directed by ENGINEER.

d. Welding receptacles shall be 60 amperes, 240 volts, 3 phase, with grounding conductors connected through a fourth pole, Appleton "ACRE6035-150", Crouse-Hinds "AREA6485" or Leviton "460MI9W". One matching plug, Appleton "ACP6034BC", Crouse-Hinds "APJ6485" or Leviton "460P9W" with appropriate woven grip and plug cap, shall be furnished for the cable size directed by ENGINEER.

e. Receptacles in Class I, Division 1 and Division 2, Group D hazardous areas indicated on the Drawings shall be three-wire, grounding, 20 amperes, 125 volts. Hazardous area receptacles shall be factory sealed, with an integral switch that is only activated when an approved matching plug is fully inserted and rotated into the engaged position. Hazardous area receptacles shall be Appleton “ENR”, Crouse-Hinds “ENR”, or Killark “UGR”.

2-5.05. Special Outlets. Clock outlets shall be Eagle "93632", Hubbell "5235" or Leviton "5261-CH".

2-5.06 Telephone Station Jacks. Station jacks shall be modular four-wire type and conform to FCC Part 68.

2-6. JUNCTION BOXES, PULL BOXES, AND WIRING GUTTERS. Indoor boxes (larger than switch, receptacle, or fixture type) and gutters shall be constructed of sheet steel, shall be galvanized after fabrication, and shall be rigidly supported by hot-dip galvanized hardware and framing materials, including nuts and bolts.

Indoor boxes and gutters in corrosive areas indicated on the Drawings and outdoor boxes and gutters shall be NEMA Type 4X, ABS or stainless steel and shall be rigidly supported by PVC-coated or stainless steel framing materials. Mounting hardware, which includes nuts, bolts, and anchors, shall be stainless steel. All damaged coatings shall be repaired according to the manufacturer's instructions.

Bolt-on junction box covers 3 feet square or larger, or heavier than 25 lbs, shall have rigid handles. Covers larger than 3 by 4 feet shall be split.

Where indicated on the Drawings, junction and pull boxes with a removable side opposite the underground conduits shall be provided over building ends of underground conduit banks. Boxes shall be sized in accordance with the National Electrical Code, including space for full size continuations of all underground conduits not originally continued. Conduit arrangement shall leave maximum space for future conduits.

2-7. LIGHTING FIXTURES. Lighting fixtures shall be furnished as described in the fixture schedule and as indicated on the Drawings. Lighting fixtures shall be furnished complete with lamps. Pendant fixtures shall have swivel type box covers and threaded conduit pendants unless otherwise specified.

2-7.01. Electronic Ballasts. Electronic ballasts furnished with fluorescent type lighting fixtures shall be CBM certified as meeting requirements of ANSI C82.11 with a THD level of not more than 20 percent.

2-8. LIGHTING PANELS. Each lighting panel shall be a dead-front, 120/240 volt, single phase or 120/208 volt, three phase panelboard with circuit breakers, in accordance with the Drawings and the following:

2-8.01. Cabinet. The panel shall have a flush-mounted or surface-mounted enclosure with a NEMA designation appropriate for the location where it will be installed. The enclosure shall have a hinged trim (cover). Breaker operating handles shall be accessible through a latched, lockable, door. At the completion

of the contract, a neatly printed or typed directory listing the panel and circuit identities shall be mounted inside the door.

2-8.02. Circuit Breakers. Circuit breakers shall be thermal-magnetic, bolt-in, individually front replaceable, and shall indicate "On", "Off", and "Tripped". Breakers indicated as multiple-pole shall be common trip. Breakers shall have interrupting ratings not less than 22,000 amperes. Handle clips to prevent casual operation of breakers shall be provided for 10 percent (at least two) of the breakers and applied to the circuits directed. Breakers and provisions for future breakers shall be provided in the quantities, number of poles, and ampere ratings indicated on the Drawings.

2-8.03. Buses. The panel shall have main and neutral buses insulated from the cabinet, and a ground bus. Buses shall be copper, with ampere ratings and main lugs or breaker as indicated. The ground bus shall be similar to a neutral bus and shall have a good ground connection to the cabinet, a removable bond to the neutral bus, clamp type lugs for the ground cable in each supply conduit, and connections for a ground cable in each load conduit.

2-9. POWER PANELS. Unless otherwise specified, each power panel, without a neutral, shall be dead-front, 3 phase panelboard with circuit breakers, in accordance with the Drawings and the following:

2-9.01. Cabinet. The panel shall have a flush-mounted or surface-mounted enclosure with a NEMA designation appropriate for the location where it will be installed. The enclosure shall have a door with latch and lock. At the completion of the contract, a neatly printed or typed directory listing the panel and circuit identities shall be mounted inside the door.

2-9.02. Circuit Breakers. Circuit breakers shall be thermal-magnetic, bolt-in, individually front replaceable, and shall indicate "On", "Off", and "Tripped". Breakers indicated as multiple-pole shall be common trip type. Breakers up to 240 volts shall have interrupting ratings not less than 65,000 amperes. Breakers for 277 volts shall have interrupting ratings not less than 65,000 amperes. Breakers for 480 volts shall be rated 600 volts, with interrupting ratings not less than 65,000 amperes at 480 volts. Handle clips to prevent casual operation of breakers shall be provided for 10 percent (at least two) of the breakers and applied to the circuits directed.

2-9.03. Buses. The panel shall have 3 phase buses and a ground bus. Buses shall be copper, with ampere and voltage ratings and main lugs or breakers as indicated. The ground bus shall have a good ground connection to the cabinet, clamp type lugs for the ground cable in each supply conduit, and connections for a ground cable in each load conduit.

2-10. TRANSIENT VOLTAGE SURGE SUPPRESSION.

2-10.01. Scope. Transient voltage surge suppression (TVSS) devices shall be provided as specified herein and as indicated on the Drawings. Each unit shall be designed for parallel connection to the wiring system and shall utilize non-linear voltage-dependent metal oxide varistors (MOV) in parallel.

TVSS devices shall be furnished and installed for the electrical equipment indicated on the Drawings and as specified herein. All new lighting and power panels shall be furnished with integral TVSS devices.

All TVSS devices shall be rated for high exposure class of equipment.

2-10.02. Standards. The specified unit shall be designed, manufactured, tested and installed in compliance with the following standards:

ANSI/IEEE C62.41 and C62.45;

ANSI/IEEE C62.1 and C62.11;

National Electrical Manufacturers Association (NEMA LS1 Guidelines);

National Fire Protection Association (NFPA 20, 70 [NEC], 75, and 78);

Underwriters Laboratories UL 1449 Second Edition and 1283

The unit shall be UL 1449 Second Edition Listed as a Transient Voltage Surge Suppressor and UL 1283 Listed as an Electromagnetic Interference (EMI) Filter.

2-10.03. Environmental Requirements.

a. Operating Temperature: -40°F to +140°F [-40°C to +60°C].

b. Relative Humidity: Reliable operation with 5 percent to 95 percent non-condensing.

2-10.04. Electrical Requirements.

a. Unit Operating Voltage. The nominal unit operating voltage and configuration shall be as indicated on the Drawings.

b. Maximum Continuous Operating Voltage (MCOV). The TVSS device shall be designed to withstand a MCOV of not less than 115 percent of nominal RMS voltage.

c. Operating Frequency. Operating frequency range shall be 47 to 63 Hertz.

d. Protection Modes. All protected modes are defined per NEMA LS-1, Paragraph 2.2.7. Following IEEE Standard 1100, section 9.11.2 recommendations, Four-wire configured systems shall provide, Line-to-Neutral (L-N), Line-to-Ground (L-G), and Neutral-to-Ground (N-G), and Line-to-Line (L-L) protection. Three-wire configured systems shall provide Line-to-Line (L-L) protection and Line-to-Ground (L-G) protection.

e. Rated Single Pulse Surge Current Capacity. The rated single pulse surge current capacity, in amps, for each mode of protection of the unit shall be as required and shall be no less than listed in the following table.

	L-N	L-G	N-G	L-L
High Exposure Level	120 kA	120 kA	120 kA	120 kA
Medium-High Exposure Level	100 kA	100 kA	100 kA	100 kA
Medium Exposure Level	80 kA	80 kA	80 kA	80 kA
Low Exposure Level	60 kA	60 kA	40 kA	60 kA

f. UL 1449 Second Edition Suppression Voltage Rating (SVR). The maximum SVR per mode for the device (inclusive of disconnect) shall be as required and shall not exceed the following:

Voltage	L-N	L-G	N-G	L-L
120/240 1-phase	500 V	500 V	500 V	800 V
120/208 3-phase	500 V	500 V	500 V	800 V
240 V 3W		800 V		800 V
240 V 4W	800 V	800 V	500 V	1500 V
480 V 3W		1500 V		1800 V
480 V 4W	900 V	1000 V	1500 V	1800 V

g. Noise Attenuation. EMI noise rejection or attenuation values shall be measured in accordance with test and evaluation procedures outlined in NEMA LS-1. The unit shall be capable of a minimum -40 dB attenuation at 100kHz when tested per the 50 ohm insertion loss method as defined by MIL-STD-220A.

h. Minimum Repetitive Surge Current Capacity. The minimum number of repetitive surges per mode as a result of testing a 20 kV, 10kA ANSI/IEEE C62.41 Category C3 surge current with less than a 10 percent degradation of clamping voltage shall be as follows:

For integral and external installation and power panels: 5,000.

For lighting panels: 3,500.

i. Overcurrent Protection. At high and medium-high exposure levels, the TVSS device shall incorporate internal fusing capable of interrupting, at minimum, up to 200 kA symmetrical fault current with 600 volts ac applied.

At medium and low exposure levels, the TVSS device shall incorporate internal fusing capable of interrupting, at minimum, up to 65kA symmetrical fault current with 600 volts ac applied.

The device shall be capable of allowing passage of the rated maximum surge current for every mode without fuse operation.

j. Unit Status Indicators. The unit shall include long-life, externally visible phase indicators that monitor the on-line status of the unit.

2-10.05. Testing Documentation. Contractor shall submit documentation of third party testing from a nationally recognized testing laboratory (NRTL) for the following:

a. Single Pulse Surge Current Capacity Testing. Verify that the suppressor components can survive the published surge current rating for each mode and for each phase using the ANSI/IEEE C62.41, 8 x 20 microsecond current wave.

b. Minimum Repetitive Surge Current Capacity Testing. Confirm the minimum number of repetitive surges per mode the device can protect against with less than a 10 percent degradation of clamping voltage as a result of testing a 20 kV, 10kA ANSI/IEEE C62.41 Category C3 surge current.

c. UL 1449 Second Edition Testing. Provide verification that the TVSS device complies with these ratings.

d. Overcurrent Protection Testing.

Verify that the total surge current can be passed through the fuse with no charring, flames, or projection of materials. Testing of the fuse only will not be acceptable for this requirement. Testing shall indicate the lowest possible surge that can disrupt the fusing.

Confirm that the fuse can withstand the rated fault current. Testing shall be conducted in both high and low impedance fault conditions and shall confirm no charring, flaming, or projection of materials.

e. Let-through Voltage Testing. Supply an oscilloscope graph for each of the following wave forms tested in accordance with ANSI/IEEE C62.45:

ANSI/IEEE Category C3 combination wave (20 kV, 10kA, 8 x 20 microsecond impulse).

ANSI/IEEE Category C1 combination wave (6 kV, 3kA, 8 x 20 microsecond impulse).

ANSI/IEEE Category B3 ringwave (6 kV, 500 A, 100 kHz).

f. EMI Testing. Provide spectrum analysis based on MIL-STD 220A test procedures between 50 kHz and 200 kHz.

2-10.06. Warranty. The manufacturer shall provide a minimum five year (5) limited warranty from date of shipment against failure when installed in compliance with applicable national/local electrical codes and the manufacturer's installation, operation and maintenance instructions.

2-10.07. Installation. The TVSS devices shall be installed according to the manufacturer's recommendations. If possible for the integral units, provide direct bus connections.

2-10.08. Acceptable Manufacturers. Integral TVSS devices shall be manufactured by Cutler-Hammer, General Electric, or Square D. External TVSS devices shall be manufactured by Cutler-Hammer, General Electric, Square D, Control Concepts, or Current Technology. The products of other manufacturers will not be acceptable.

2-11. PHOTOELECTRIC CONTROLS. Photoelectric controls shall be weatherproof, swivel adjustable, with built-in time delay to prevent accidental turnoff by momentary brightness. The photocell shall be rated 1800 VA, 120 volts ac, and shall be field adjustable from 1 ft/c turn-on to 15 ft/c turn-off.

PART 3 - EXECUTION

3-1. INSTALLATION. All material, equipment, and components specified herein shall be installed in compliance with NECA 1000 – NEIS Specification System.

3-2. POWER AND SERVICE ENTRANCE INSTALLATION. CONTRACTOR shall consult with PG&E regarding their service installation requirements, and shall install the service equipment in compliance with these requirements.

Contact information for the electric utility is as follows:

Name of electric utility PG&E

Electric utility contact person and telephone number	J.T. Hass 805-546-5234

CONTRACTOR shall coordinate details and timing of service entrance installations with the utility.

3-3. TELEPHONE SERVICE ENTRANCE INSTALLATION. CONTRACTOR shall consult the local telephone utility regarding their service installation requirements, and shall install the service equipment in compliance with these requirements.

Contact information for the local telephone utility is as follows:

Name of telephone utility	AT&T (SBC/PacBell)
Telephone utility contact person and telephone number	Lon Maisonneuve 559-454-4406 lonm@att.com

CONTRACTOR shall coordinate details and timing of service entrance installations with the utility. CONTRACTOR shall complete and submit service applications to the telephone utility as necessary.

3-4. CABLE INSTALLATION.

3-4.01. General. Except as otherwise specified or indicated on the Drawings, cable shall be installed according to the following procedures, taking care to protect the cable and to avoid kinking the conductors, cutting or puncturing the jacket, contamination by oil or grease, or any other damage.

a. Stranded conductor cable shall be terminated by lugs or pressure type connectors. Wrapping stranded cables around screw type terminals is not acceptable.

b. Stranded conductor cable shall be spliced by crimp type connectors. Twist-on wire connectors may be used for splicing solid cable and for terminations at lighting fixtures.

c. Splices may be made only at readily accessible locations.

d. Cable terminations and splices shall be made as recommended by the cable manufacturer for the particular cable and service conditions. All shielded cable stress cone terminations shall be IEEE Class 1 molded rubber type. Shielded cable splices shall be tape or molded rubber type as required. Shielded cable splices and stress cone terminations shall be made by qualified splicers. Materials shall be by 3M Company, Plymouth/Bishop, or Raychem Electric Power Products.

e. Cable shall not be pulled tight against bushings nor pressed heavily against enclosures.

f. Cable-pulling lubricant shall be compatible with all cable jackets; shall not contain wax, grease, or silicone; and shall be Polywater "Type J".

g. Cables operating at more than 2000 volts shall be fireproofed in all cable vaults, manholes, and handholes. Fireproofing shall be applied with a half-lapped layer of 3M "Scotch 77 Arc-Proofing Tape", anchored at each end with a double wrap of 3M "Scotch 69 Glass Cloth Tape" or with equivalent tape by Anixter or Plymouth/Bishop.

h. Where necessary to prevent heavy loading on cable connections, in vertical risers, the cable shall be supported by Kellems, or equal, woven grips.

i. Spare cable ends shall be taped, coiled, and identified.

j. Cables shall not be bent to a radius less than the minimum recommended by the manufacturer. For cables rated higher than 600 volts, the minimum radius shall be 8 diameters for nonshielded cable and 12 diameters for shielded cable.

k. All cables in one conduit, over 1 foot long, or with any bends, shall be pulled in or out simultaneously.

l. Circuits to supply electric power and control to equipment and devices are indicated on the one-line diagrams. Conductors in designated numbers and sizes shall be installed in conduit of designated size. Circuits shall not be combined to reduce conduit requirements unless acceptable to ENGINEER.

3-4.02. Underground Cable Pulling Procedure. Care shall be taken to prevent excessive physical stresses that would cause mechanical damage to cables during pulling. Before pulling cables into the underground duct system, the CONTRACTOR shall submit a pulling procedure for all of the fiber optic cables. The procedure shall include the following information:

a. Point of cable entrance into the duct system.

b. Point of cable exit from the duct system.

c. Type of cable grip to be used.

d. Type of pulling device to be used.

e. Method of continuously monitoring cable tension during pulling.

f. Identification of manholes through which cable will be pulled or where splices will be made.

g. Size and type of cable sheave assemblies to be used.

3-4.03. Cable Insulation Test. Conductors with insulation rated 5,000 volts and higher shall be given a field DC insulation test.

The ampacity of direct current testing equipment shall be at least 2,500 microamperes.

Final test voltages and the duration of the test shall be as indicated on the Cable Data Sheets attached to this Section. Cable insulation testing shall be recorded on the Cable Test Data Form attached to this Section - Figure 15-16050.

Test procedures shall conform to ICEA S-93-639 (NEMA WC 74), 5-46 kV Shielded Power Cable For Use In The Transmission & Distribution of Electric Energy, and the applicable qualification testing standards of AEIC CS-8.

The cable insulation tests shall be performed by experienced personnel specializing in electrical cable testing. Triplicate copies of test data for each cable shall be submitted to ENGINEER. A Cable Test Data Form is included in this section.

3-5. CONDUIT INSTALLATION. CONTRACTOR shall be responsible for routing all conduits. This shall include all conduits indicated on the one-lines, riser diagrams, and home-runs shown on the plan drawings. Conduits shall be routed as defined in these specifications. Where conduit routing is shown on the Drawings, it shall be considered a general guideline and shall be field verified to avoid interferences.

Except as otherwise specified or indicated on the Drawings, conduit installation and identification shall be completed according to the following procedures.

3-5.01. Installation of Interior and Exposed Exterior Conduit. This section covers the installation of conduit inside structures, above and below grade, and in exposed outdoor locations. In general, conduit inside structures shall be concealed. Large conduit and conduit stubs may be exposed unless otherwise

specified or indicated on the Drawings. No conduit shall be exposed in water chambers unless so indicated on the Drawings.

Unless otherwise indicated on the Drawings, CONTRACTOR shall be responsible for routing the conduit to meet the following installation requirements:

a. Conduit installed in all exposed indoor locations, except corrosive areas indicated on the Drawings, and in floor slabs, walls, and ceilings of hazardous (classified) locations, shall be rigid steel. Exposed conduit shall be rigidly supported by hot-dip galvanized hardware and framing materials, including nuts and bolts.

b. Conduit installed in floor slabs and walls in non-hazardous locations shall be rigid Schedule 40 PVC.

c. Conduit installed in all exposed outdoor locations shall be PVC-coated rigid steel, rigidly supported by PVC-coated framing materials. Mounting hardware, which includes nuts, bolts, and anchors, shall be stainless steel. All damaged coatings shall be repaired according to the manufacturer's instructions.

d. Final connections to dry type transformers, to motors without flexible cords, and to other equipment with rotating or moving parts shall be liquidtight flexible metal conduit with watertight connectors installed without sharp bends and in the minimum lengths required for the application, but not longer than 6 feet unless otherwise acceptable to ENGINEER.

e. Terminations and connections of rigid steel and intermediate metal conduit shall be taper threaded. Conduits shall be reamed free of burrs and shall be terminated with conduit bushings.

f. Exposed conduit shall be installed either parallel or perpendicular to structural members and surfaces.

g. Two or more conduits in the same general routing shall be parallel, with symmetrical bends.

h. Conduits shall be at least 6 inches from high temperature piping, ducts, and flues.

i. Conduit installed in corrosive chemical feed and storage areas as indicated by Area Type on the Drawings shall be rigid Schedule 40 PVC.

j. Rigid Schedule 40 PVC conduit shall have supports and provisions for expansion as required by NEC Article 352.

k. Metallic conduit connections to sheet metal enclosures shall be securely fastened by locknuts inside and outside.

l. Rigid Schedule 40 PVC conduit shall be secured to sheet metal device boxes using a male terminal adapter with a locknut inside or by using a box adapter inserted through the knockout and cemented into a coupling.

m. Conduits in walls or slabs, which have reinforcement in both faces, shall be installed between the reinforcing steel. In slabs with only a single layer of reinforcing steel, conduits shall be placed under the reinforcement. Conduits larger than 1/3 of the slab thickness shall be concrete encased under the slab.

n. Conduits that cross structural joints where structural movement is allowed shall be fitted with concretetight and watertight expansion/deflection couplings, suitable for use with metallic conduits and rigid Schedule 40 PVC conduits. The couplings shall be Appleton Type DF, Crouse-Hinds Type XD, or O-Z Type DX.

o. Conduit shall be clear of structural openings and indicated future openings.

p. Conduits through roofs or metal walls shall be flashed and sealed watertight.

q. Conduit installed through any openings cut into non-fire rated concrete or masonry structure elements shall be neatly grouted. Conduit penetrations of fire rated structure elements shall be sealed in a manner that maintains the fire rating as indicated on the Architectural Drawings.

r. Conduits shall be capped during construction to prevent entrance of dirt, trash, and water.

s. Exposed conduit stubs for future use shall be terminated with galvanized pipe caps.

t. Concealed conduit for future use shall be terminated in equipment or fitted with couplings plugged flush with structural surfaces.

u. Where the Drawings indicate future duplication of equipment wired hereunder, concealed portions of conduits for future equipment shall be provided.

v. Horizontal conduit shall be installed to allow at least 7 feet of headroom, except along structures, piping, and equipment or in other areas where headroom cannot be maintained.

w. Conduit shall not be routed across the surface of a floor, roof, or walkway unless approved by ENGINEER.

x. PVC-coated rigid steel conduit shall be threaded and installed as recommended by the conduit manufacturer's installation procedure using appropriate tools.

y. All conduits that enter enclosures shall be terminated with acceptable fittings that will not affect the NEMA rating of the enclosure.

z. Nonmetallic conduit, which turns out of concrete slabs or walls, shall be connected to a 90 degree elbow of PVC-coated rigid steel conduit before it emerges.

ab. Power conductors to and from adjustable frequency drives shall be installed in steel conduit.

3-5.02. Underground Conduit Installation. All excavation, backfilling, and concrete work shall conform to the respective sections of these specifications. Underground conduit shall conform to the following requirements:

a. All underground conduits shall be concrete encased unless indicated otherwise on the Drawings. Concrete encasement within 15 feet of building entrances, under and within 5 feet of roadways, and within 10 feet of indicated future excavations shall be reinforced as detailed on the Drawings.

b. Concrete encased conduit shall be Schedule 40 PVC. Conduits shall have end bells where terminated at walls. All joints shall be solvent welded in accordance with the recommendations of the manufacturer.

c. Concrete encasement on exposed outdoor conduit risers shall continue to 6 inches above grade, with top crowned and edges chamfered.

d. Conduit and concrete encasement installed underground for future extension shall be terminated flush at the bulkhead with a coupling and a screw plug. The termination of the duct bank shall be reinforced with bars 100 diameters long that shall be terminated 2 inches from the bulkhead. Matching splice bars shall be 50 bar diameters long. Each longitudinal bar shall be provided with a Lenton "Form Saver" coupler and plate or a Dayton "Superior DBR" coupler at the bulkhead. The coupler shall be threaded to accept a dowel of like diameter in the future. Threads shall be protected with screw-in plastic caps. A 1-3/4 by 3/4 inch deep horizontal shear key shall be formed in the concrete encasement above and below the embedded conduits. After concrete placement, conduit and bar connector ends shall

be cleaned and coated with two coats of thixotropic coal tar.

e. Underground conduits indicated not to be concrete encased shall be rigid Schedule 40 PVC or HDPE as indicated on the Drawings. The HDPE conduit is only to be used for the fiber optic cable along the pipeline.

f. Underground conduit bend radius shall be at least 2 feet at vertical risers and at least 3 feet elsewhere.

g. Underground conduits and conduit banks shall have at least 2 feet of earth cover, except where indicated otherwise.

h. Underground conduit banks through building walls shall be cast in place, or concreted into boxouts, with water stops on all sides of the boxout. Water stops are specified in the cast-in-place concrete section.

i. Underground nonmetallic conduits, which turn out of concrete or earth in outdoor locations, shall be connected to 90 degree elbows of PVC-coated rigid steel conduit before they emerge.

j. Conduits not encased in concrete and passing through walls, which have one side in contact with earth, shall be sealed watertight with special rubber-gasketed sleeve and joint assemblies or with sleeves and modular rubber sealing elements.

k. Underground conduits shall be sloped to drain from buildings to manholes.

l. Each 5 kV or higher voltage cable, each 250 kcmil or larger cable, and each conduit group of smaller cables shall be supported from manhole walls by Kindorf "D-990" or Unistrut "P-3259" inserts, with Kindorf "F-721-24" or Unistrut "P-2544" brackets and Unistrut "P1753" or "P1754" fiberglass reinforced polyester cable saddles.

m. Telephone cables shall not be installed in raceways, conduits, boxes, manholes, or handholes containing other types of circuits.

n. Intercommunication and instrument cables shall be separated the maximum possible distance from all power wiring in pull-boxes, manholes, and handholes.

3-5.03. Sealing of Conduits. After cable has been installed and connected, conduit ends shall be sealed by forcing nonhardening sealing compound into the conduits to a depth at least equal to the conduit diameter. This method shall be used for sealing all conduits at handholes, manholes, and building entrance junction boxes, and for 1 inch and larger conduit connections to equipment.

Conduits entering chlorine feed and storage rooms shall be sealed in a junction box or conduit body adjacent to the point of entrance.

Conduits entering hazardous (classified) areas and submersible or explosion proof enclosures shall have Appleton "Type ESU" or Crouse-Hinds "EYS" sealing fittings with sealing compound.

3-5.04. Reuse of Existing Conduits. Existing conduits shall not be reused.

3-6. WIRING DEVICES, BOXES, AND FITTINGS INSTALLATION. Metallic and nonmetallic conduit boxes and fittings shall be installed in the following locations:

3-6.01. Conduit Boxes and Fittings.

a. Galvanized or cadmium plated, threaded, malleable iron boxes and fittings shall be installed in concrete walls, ceilings, and floors; in the outdoor faces of masonry walls; and in all locations where weatherproof device covers are required. These boxes and fittings shall also be installed in exposed rigid steel and intermediate metal conduit systems.

b. Galvanized or cadmium plated sheet steel boxes shall be installed in the indoor faces of masonry walls, in interior partition walls, and in joist supported ceilings.

c. Rigid PVC device boxes shall be installed in exposed nonmetallic conduit systems.

d. PVC coated boxes and fittings shall be installed in PVC coated conduit systems.

e. Telephone conduit shall be provided with separate junction boxes and pull fittings.

3-6.02. Device Plates. Oversized plates shall be installed where standard-sized plates do not fully cover the wall opening.

3-6.03. Wall Switches.

a. Wall switches shall be mounted 3'-6" above floor or grade.

b. After circuits are energized, all wall switches shall be tested for proper operation.

3-6.04. Receptacles.

a. Convenience outlets shall be 18 inches above the floor unless otherwise required.

b. Convenience outlets outdoors and in garages; in basements, shops, storerooms, and rooms where equipment may be hosed down; shall be 4 feet above floor or grade.

c. Welding receptacles shall be surface-mounted 4 feet above the floor.

d. After circuits are energized, each receptacle shall be tested for correct polarity and each GFCI receptacle shall be tested for proper operation.

e. Conduit and wire for convenience outlet installation is not shown on the Drawings and shall be sized, furnished, and installed by CONTRACTOR. Conductors shall be minimum 12 AWG and conduit shall be minimum 3/4 inch for convenience outlet installation.

3-6.05. Special Outlets.

a. Wall thermostats shall be 4'-6" above the floor unless otherwise required. Thermostats on exterior walls shall be suitably insulated from wall temperature.

b. Telephone outlets shall be 18 inches above the floor unless otherwise required. Telephone outlets outdoors and in garages; in basements, shops, storerooms, and rooms where equipment may be hosed down; shall be 4 feet above floor or grade.

c. Clock outlets shall be located 7 feet above the floor.

d. Horns and strobe lights for audio/visual alarms shall be mounted a minimum of 8 feet above finished floor and shall be positioned to provide maximum penetration of the surrounding area.

3-7. EQUIPMENT INSTALLATION. Except as otherwise specified or indicated on the Drawings, the following procedures shall be used in performing electrical work.

3-7.01. Setting of Equipment. All equipment, boxes, and gutters shall be installed level and plumb. Boxes, equipment enclosures, metal raceways, and similar items mounted on water- or earth-bearing walls shall be separated from the wall by at least 1/4 inch thick corrosion-resistant spacers. Where boxes, enclosures, and raceways are installed at locations where walls are not suitable or available for mounting, concrete equipment pads, framing material, and associated hardware shall be provided.

3-7.02. Sealing of Equipment. All outdoor substation, switchgear, motor control center, and similar equipment shall be permanently sealed at the base, and all openings into equipment shall be screened or sealed with concrete grout to keep out rodents and insects the size of wasps and mud daubers. Small cracks and openings shall be sealed from inside with silicone sealant, Dow-Corning "795" or General Electric "SCS1200".

3-7.02. Other. Refer to Section 16100, “Electrical Equipment Installation,” for additional requirements.

3-8. GROUNDING.

3-8.01. General. The electrical system and equipment shall be grounded in compliance with the National Electrical Code and the following requirements:

a. All ground conductors shall be at least 12 AWG soft drawn copper cable or bar, bare or green-insulated in accordance with the National Electrical Code.

b. Ground cable splices and joints, ground rod connections, and equipment bonding connections shall meet the requirements of IEEE 837, and shall be exothermic weld connections or irreversible high-compression connections, Cadweld "Exothermic" or Burndy "Hyground". Mechanical connectors will not be acceptable. Cable connections to bus bars shall be made with high-compression two-hole lugs.

c. Ground cable through exterior building walls shall enter within 3 feet below finished grade and shall be provided with a water stop. Unless otherwise indicated, installation of the water stop shall include filling the space between the strands with solder and soldering a 12 inch copper disc over the cable.

d. Ground cable near the base of a structure shall be installed in earth and as far from the structure as the excavation permits, but not closer than 24 inches. The tops of ground rods and ground cable interconnecting ground rods shall be buried a minimum of 30 inches below grade, or below the frost line, whichever is deeper.

e. All powered equipment, including lighting fixtures and receptacles, shall be grounded by a copper ground conductor in addition to the conduit connection.

f. Ground connections to equipment and ground buses shall be made with copper or high conductivity copper alloy ground lugs or clamps. Connections to enclosures not provided with ground buses or ground terminals shall be made with irreversible high-compression type lugs inserted under permanent assembly bolts or under new bolts drilled and inserted through enclosures, other than explosion proof enclosures, or by grounding locknuts or bushings. Ground cable connections to anchor bolts; against gaskets, paint, or varnish; or on bolts holding removable access covers will not be acceptable.

g. The grounding system shall be bonded to a flange on interior station piping exposed above the slab, on either a suction or discharge pipe, with a copper bar or strap. The flange shall be drilled and tapped to provide a bolted connection.

h. Ground conductors shall be routed as directly as possible, avoiding unnecessary bends. Ground conductor installations for equipment ground connections to the grounding system shall have turns with minimum bend radii of 12 inches.

i. Ground rods not described elsewhere shall be a minimum of 3/4 inch in diameter by 10 feet long, with a copper jacket bonded to a steel core.

j. Test wells and covers for non-traffic areas shall be molded high density polyethylene. Test wells for traffic areas shall be precast concrete construction rated for traffic duty with concrete or cast iron covers.

3-8.02. Grounding System Resistance. The grounding system design depicted on the Drawings is the minimum design required for each building or structure. Each system shall comply with the maximum resistance of 5 ohms. CONTRACTOR shall confirm the system grounding resistance with the results of the testing specified herein. Systems exceeding the maximum resistance specified shall be supplemented with additional grounding provisions and retested until the maximum specified resistance is achieved.

3-8.03. Grounding System Testing. The grounding system of each new building or structure and each existing building or structure indicated below, shall be tested to determine the resistance to earth. Testing shall be performed by an independent electrical or grounding system testing organization. Testing shall be completed after not less than three full days without precipitation and without any other moistening or chemical treatment of the soil.

Existing Building(s) or Structure(s) to be tested	SLO Turnout

3-8.03.01. New Grounding Systems. Grounding systems of each new building or structure shall be tested for resistance to earth utilizing the three-point fall of potential test as defined by IEEE 81. Testing shall be completed prior to installation of the electrical distribution equipment to ensure the grounding system is isolated from the utility grounding system and the systems of other structures. The current source probe for the test shall be placed in soil at a distance of 5 to 10 times the distance of the widest measurement across the grounding system ring or grid to ensure adequate measurements outside of the grounding system's sphere of influence. Test probe measurements shall be taken at a distance of one foot from the grounding system reference connection and at each 10 percent increment from the grounding system reference connection to the current source probe location. Test results shall be documented on a graphical plot with resistance in ohms on the vertical axis and distance in feet on the horizontal axis. The results shall clearly indicate a system resistance plateau which confirms a valid test procedure.

3-8.03.02. Grounding System Test Report. A report certified by the testing organization shall be prepared and submitted in accordance with Section 01300. The final report shall include complete testing results for each building or structure, graphical representation of the test point results for the three-point fall of potential method, and complete observations of all site weather conditions and other environmental conditions that may affect the test results. Final acceptance of the results reported shall be subject to the review and approval of ENGINEER.

3-9. LIGHTING FIXTURE INSTALLATION. The Drawings indicate the general locations and arrangements of the lighting fixtures. Fixtures in rows shall be aligned both vertically and horizontally unless otherwise specified. Fixtures shall be clear of pipes, mechanical equipment, structural openings, indicated future equipment and structural openings, and other obstructions.

Conduit and wire for lighting fixture installation is not shown on the Drawings and shall be sized, furnished and installed by CONTRACTOR. Circuits to emergency lighting units, exit signs, and fixtures indicated to be night lights shall not be switched. Circuits to fluorescent lighting fixtures indicated to have emergency battery packs shall include an additional un-switched hot conductor. Conductors shall be minimum 12 AWG and conduit shall be minimum 3/4 inch for lighting fixture installation.

End of Section

STANDARD SPECIFICATIONS

REFERENCE:	UL 83, ICEA S-95-658 (NEMA WC70).
CONDUCTOR:	Solid, uncoated copper. Maximum operating temperature 90°C dry, 75°C wet.
INSULATION:	Polyvinyl chloride, UL 83, Type THHN and THWN, ICEA S-95-658.
SHIELD:	None.
JACKET:	Conductor: Nylon, 4 mils (100 µm) minimum thickness, UL 83.
FACTORY TESTS:	Cable shall meet the requirements of UL 83 for Type THHN and THWN.

Cable Details

Size		Number of Strands	Conductor Insulation Thickness*		Maximum Outside Diameter	
AWG or kcmil	mm^2		in.	µm	in.	mm
12	4.0	1	0.015	380	0.17	4.32
10	6.0	1	0.020	510	0.20	5.08

*The average thickness shall be not less than that indicated above. The minimum thickness shall not be less than 90 percent of the values indicated above.

A durable marking shall be provided on the surface of the cable at intervals not exceeding 24 inches (600 mm). Marking shall include manufacturer's name, THWN or THHN, conductor size, and 600 volt.

600 Volt, Single Conductor Lighting Cable (600-1-PVC-THHN-THWN)

BLACK & VEATCH	Cable Data	Figure 1-16050

STANDARD SPECIFICATIONS

REFERENCE: ICEA S-95-658 (NEMA WC 70).

CONDUCTOR: Concentric-lay, uncoated copper; strand Class B. Wet/dry maximum operating temperature 90°C.

INSULATION: Cross-linked thermosetting polyethylene, ICEA S-95-658, Paragraph 3.6.

SHIELD: None.

JACKET: None.

FACTORY TESTS: Cable shall meet the requirements of ICEA S-95-658.

Cable Details

Size		Number of Strands	Conductor Insulation Thickness*		Maximum Outside Diameter	
AWG or kcmil	mm^2		in.	μm	in.	mm
14	2.5	7	0.030	760	0.17	4.32
12	4.0	7	0.030	760	0.19	4.83
10	6.0	7	0.030	760	0.21	5.33
8	10.0	7	0.045	1140	0.27	6.86
6	16.0	7	0.045	1140	0.31	7.87
4	25.0	7	0.045	1140	0.36	9.14
2	35.0	7	0.045	1140	0.42	10.67
1	40.0	19	0.055	1400	0.48	12.19
1/0	50.0	19	0.055	1400	0.52	13.21
2/0	70.0	19	0.055	1400	0.57	14.48
4/0	95.0	19	0.055	1400	0.68	17.27
250	120.0	37	0.065	1650	0.75	19.05
350	185.0	37	0.065	1650	0.85	21.59
500	300.0	37	0.065	1650	0.98	24.89
750	400.0	61	0.080	2030	1.22	31.00
1,000	500.0	61	0.080	2030	1.37	34.80

*The average thickness shall be not less than that indicated above. The minimum thickness shall be not less than 90 percent of the values indicated above.

A durable marking shall be provided on the surface of the cable at intervals not exceeding 24 inches (600 mm). Marking shall include manufacturer's name, XLP, XHHW-2, conductor size, and voltage class.

600 Volt, Single Conductor Lighting/Power Cable (600-1-XLP-NONE-XHHW-2)

BLACK & VEATCH	Cable Data	Figure 2-16050

STANDARD SPECIFICATIONS

REFERENCE: UL 83, ICEA S-95-658 (NEMA WC 70).

CONDUCTOR: Stranded, uncoated copper. Maximum operating temperature 90°C dry, 75°C wet.

INSULATION: Polyvinyl chloride, UL 83, Type THHN and THWN, ICEA S-95-658.

SHIELD: None.

JACKET: Conductor: Nylon, 4 mils (100 μm) minimum thickness, UL 83.

FACTORY TESTS: Cable shall meet the requirements of UL 83 for Type THHN and THWN.

Cable Details

Size		Number of Strands	Conductor Insulation Thickness*		Maximum Outside Diameter	
AWG or kcmil	mm^2		in.	μm	in.	mm
14	2.5	19	0.015	381	0.12	3.05
12	4.0	19	0.015	381	0.14	3.56
10	6.0	19	0.020	508	0.17	4.32
8	10.0	19	0.030	762	0.23	5.84
6	16.0	19	0.030	762	0.26	6.60
4	25.0	19	0.040	1016	0.33	8.38
2	35.0	19	0.040	1016	0.39	9.91
1	40.0	19	0.050	1270	0.44	11.18
1/0	50.0	19	0.050	1270	0.50	12.70
2/0	70.0	19	0.050	1270	0.54	13.72
4/0	95.0	19	0.050	1270	0.66	16.76
250	120.0	37	0.060	1520	0.72	18.29
350	185.0	37	0.060	1520	0.83	21.08
500	300.0	37	0.060	1520	0.96	24.38
750	400.0	61	0.070	1780	1.17	29.72
1,000	500.0	61	0.070	1780	1.32	33.53

*The average thickness shall be not less than that indicated above. The minimum thickness shall be not less than 90 percent of the values indicated above.

A durable marking shall be provided on the surface of the cable at intervals not exceeding 24 inches (600 mm). Marking shall include manufacturer's name, THWN or THHN, conductor size, and 600 volt.

600 Volt, Single Conductor Power Cable (600-1-PVC-THHN-THWN)

BLACK & VEATCH	Cable Data	Figure 3-16050

STANDARD SPECIFICATIONS

REFERENCE: UL 62, UL 1277.

CONDUCTOR: 16 AWG (1.5 mm^2), 7-strand, concentric-lay, uncoated copper. Maximum operating temperature 90°C dry, 75°C wet.

INSULATION: Polyvinyl chloride, not less than 15 mils (380 μm) average thickness; 13 mils (330 μm) minimum thickness, UL 62, Type TFN.

LAY: Twisted pair with 1-1/2 inch to 2-1/2 inch (38.10 mm - 63.5 mm) lay.

SHIELD: Cable assembly, combination aluminum-polyester tape and 7-strand, 20 AWG (0.5 mm^2) minimum size, tinned copper drain wire, shield applied to achieve 100 percent cover over insulated conductors.

JACKET: Conductor: Nylon, 4 mils (100 μm) minimum thickness, UL 62.

Cable assembly: Black, flame-retardant polyvinyl chloride, UL 1277, applied over tape-wrapped cable core.

CONDUCTOR IDENTIFICATION: One conductor black, one conductor white.

FACTORY TESTS: Insulated conductors shall meet the requirements of UL 62 for Type TFN. Assembly jacket shall meet the requirements of UL 1277. Cable shall meet the vertical-tray flame test requirements of UL 1277.

Cable Details

	Assembly Jacket Thickness*		**Maximum Outside Diameter**	
	in.	**μm**	**in.**	**mm**
Single Pair	0.045	1140	0.34	8.64

*The average thickness shall be not less than that indicated above. The minimum thickness shall be not less than 80 percent of the value indicated above.

A durable marking shall be provided on the surface of the cable at intervals not exceeding 24 inches (600 mm). Marking shall include manufacturer's name, Type TC, Type TFN, conductor size, single pair, and voltage class.

600 Volt, Single Pair, Shielded Instrument Cable (600-SINGLE-PAIR-SH-INSTR)

BLACK & VEATCH	Cable Data	Figure 4-16050

STANDARD SPECIFICATIONS

REFERENCE: UL 62, UL 1277.

CONDUCTOR: 16 AWG (1.5 mm^2), 7-strand, concentric-lay, uncoated copper. Maximum operating temperature 90°C dry, 75°C wet.

INSULATION: Polyvinyl chloride, not less than 15 mils (380 µm) average thickness; 13 mils (330 µm) minimum thickness, UL 62, Type TFN.

LAY: Twisted pair with 1-1/2 inch to 2-1/2 inch (38.10 mm - 63.5 mm) lay.

SHIELD: Cable assembly, combination aluminum-polyester tape and 7-strand, 20 AWG (0.5 mm^2) minimum size, tinned copper drain wire, shield applied to achieve 100 percent cover over insulated conductors.

JACKET: Conductor: Nylon, 4 mils (100 µm) minimum thickness, UL 62.
Cable assembly: Black, flame-retardant polyvinyl chloride, UL 1277, applied over tape-wrapped cable core.

CONDUCTOR IDENTIFICATION: One conductor black, one conductor white, one conductor red.

FACTORY TESTS: Insulated conductors shall meet the requirements of UL 62 for Type TFN. Assembly jacket shall meet the requirements of UL 1277. Cable shall meet the vertical-tray flame test requirements of UL 1277.

Cable Details

	Assembly Jacket Thickness*		**Maximum Outside Diameter**	
	in.	**µm**	**in.**	**mm**
Single Triad	0.045	1140	0.35	8.87

*The average thickness shall be not less than that indicated above. The minimum thickness shall be not less than 80 percent of the value indicated above.

A durable marking shall be provided on the surface of the cable at intervals not exceeding 24 inches (600 mm). Marking shall include manufacturer's name, Type TC, Type TFN, conductor size, single triad, and voltage class.

600 Volt, Single Triad, Shielded Instrument Cable (600-SINGLE-TRIAD-SH-INSTR)

BLACK & VEATCH	**Cable Data**	**Figure 5-16050**

STANDARD SPECIFICATIONS

REFERENCE: UL 62, UL 1277.

CONDUCTOR: 18 AWG (0.75 mm^2), 7-strand, concentric-lay, uncoated copper. Maximum operating temperature 90°C dry, 75°C wet.

INSULATION: Polyvinyl chloride, not less than 15 mils (380 μm) average thickness; 13 mils (330 μm) minimum thickness, UL 62, Type TFN.

LAY: Twisted pairs or triads with 1-1/2 inch to 2-1/2 inch (38.10 - 63.5 mm) lay.

SHIELD: Each pair or triad and cable assembly: Combination aluminum-polyester tape and 7-strand, 20 AWG (0.5 mm^2) minimum size, tinned copper drain wire, shield applied to achieve 100 percent cover over insulated conductors. Shield tape on pair and/or triad assemblies shall be applied in such a way as to give total shield isolation from all other pairs' or triads' shields.

JACKET: Conductor: Nylon, 4 mils (100 μm) minimum thickness, UL 62.

Cable Assembly: Black, 90°C, flame-retardant polyvinyl chloride, UL 1277, Table 10.17, applied over tape-wrapped cable core.

CONDUCTOR IDENTIFICATION:

Pair: One conductor black, one conductor white.

Triad: One conductor black, one conductor white, one conductor red.

PAIR Identification: Each pair and/or triad numbered.

FACTORY TESTS: Insulated conductors shall meet the requirements of UL 62 for Type TFN. Assembly jacket shall meet the requirements of UL 1277. Cable shall meet the vertical-tray flame test requirements of UL 1277.

Cable Details

	Assembly Jacket Thickness*		**Maximum Outside Diameter**	
	in.	**μm**	**in.**	**mm**
Number of Pairs				
4	0.045	1140	0.554	14.07
8	0.060	1520	0.749	19.02
12	0.060	1520	0.896	22.76
24	0.060	1520	1.256	31.90
Number of Triads				
4	0.060	1520	0.648	16.46
8	0.060	1520	0.823	20.99
12	0.080	2030	1.030	26.16
24	0.080	2030	1.393	35.38

*The average thickness shall be not less than that indicated above. The minimum thickness shall be not less than 80 percent of the values indicated above.

A durable marking shall be provided on the surface of the cable at intervals not exceeding 24 inches (600 mm). Markingshall include manufacturer's name, Type TC, Type TFN, conductor size, number of pairs or triads, and voltage class.

600 Volt, Multiple Pair and/or Triad, Shielded Instrument Cable
(600-MULTI-PAIRS-TRIADS-SH-INSTR)

BLACK & VEATCH	**Cable Data**	**Figure 6-16050**

STANDARD SPECIFICATIONS

REFERENCE: UL 83, UL 1277, ICEA S-58-679.

CONDUCTOR: 14 AWG (2.5 mm^2), 7 or 19 strands, concentric-lay, uncoated copper. Maximum operating temperature 90°C dry, 75°C wet.

INSULATION: Polyvinyl chloride, not less than 15 mils (380 μm) average thickness; 13 mils (330 μm) minimum thickness, UL 83, Type THHN and THWN.

SHIELD: None.

JACKET: Conductor: Nylon, 4 mils (100 μm) minimum thickness, UL 83.

Cable assembly: Black, flame-retardant polyvinyl chloride, UL 1277, applied over tape-wrapped cable core.

CONDUCTOR IDENTIFICATION: ICEA S-58-679, Method 1, Table 2 or ICEA S-58-679, Method 3, Table 2. White or green conductors shall not be provided.

FACTORY TESTS: Insulated conductors shall meet the requirements of UL 83 for Type THHN-THWN. Assembly jacket shall meet the requirements of UL 1277. Cable shall meet the flame test requirements of UL 1277 for Type TC power and control tray cable.

Cable Details

Number of Conductors	Assembly Jacket Thickness*		Maximum Outside Diameter	
	in.	μm	in.	mm
2	0.045	1140	0.38	9.65
3	0.045	1140	0.39	9.91
4	0.045	1140	0.44	11.18
5	0.045	1140	0.46	11.68
7	0.045	1140	0.49	12.45
9	0.045	1140	0.61	15.49
12	0.060	1520	0.66	16.76
19	0.060	1520	0.77	19.56
24	0.060	1520	0.93	23.62
30	0.080	2030	0.98	24.89
37	0.080	2030	1.05	26.67

*The average thickness shall be not less than that indicated above. The minimum thickness shall be not less than 80 percent of the values indicated above.

A durable marking shall be provided on the surface of the cable at intervals not exceeding 24 inches (600 mm). Marking shall include manufacturer's name, Type TC, Type THWN or THHN, conductor size, number of conductors, and voltage class.

600 Volt, Multiconductor 14 AWG (2.5 mm^2) Control Cable (600-MULTI-THHN-THWN)

BLACK & VEATCH	Cable Data	Figure 7-16050

STANDARD SPECIFICATIONS

REFERENCE: UL 83, UL 1277, ICEA S-58-679.

CONDUCTOR: 12 AWG (4 mm^2), 7 or 19 strands, concentric-lay, uncoated copper. Maximum operating temperature 90°C dry, 75°C wet.

INSULATION: Polyvinyl chloride, not less than 15 mils (380 μm) average thickness; 13 mils (330 μm) minimum thickness, UL 83, Type THHN and THWN.

SHIELD: None.

JACKET: Conductor: Nylon, 4 mils (100 μm) minimum thickness, UL 83.

Cable assembly: Black, flame-retardant polyvinyl chloride, UL 1277, applied over tape-wrapped cable core.

CONDUCTOR IDENTIFICATION: ICEA S-58-679, Method 1, Table 2 or ICEA S-58-679, Method 3, Table 2. White or green conductors shall not be provided.

FACTORY TESTS: Insulated conductors shall meet the requirements of UL 83 for Type THHN-THWN. Assembly jacket shall meet the requirements of UL 1277. Cable shall meet the flame test requirements of UL 1277 for Type TC power and control tray cable.

Cable Details

Number of Conductors	Assembly Jacket Thickness*		Maximum Outside Diameter	
	in.	μm	in.	mm
2	0.045	1140	0.46	11.68
3	0.045	1140	0.49	12.45
4	0.045	1140	0.56	14.22
5	0.045	1140	0.60	15.24
7	0.045	1140	0.66	16.76
9	0.060	1520	0.77	19.56
12	0.060	1520	0.91	23.11
19	0.060	1520	1.05	26.67
24	0.060	1520	1.22	30.99
30	0.080	2030	1.29	32.77
37	0.080	2030	1.40	35.56

*The average thickness shall be not less than that indicated above. The minimum thickness shall be not less than 80 percent of the values indicated above.

A durable marking shall be provided on the surface of the cable at intervals not exceeding 24 inches (600 mm). Marking shall include manufacturer's name, Type TC, Type THWN or THHN, conductor size, number of conductors, and voltage class.

600 Volt, Multiconductor 12 AWG (4 mm^2) Control Cable (600-MULTI-THHN-THWN)

BLACK & VEATCH	Cable Data	Figure 8-16050

STANDARD SPECIFICATIONS

REFERENCE:	ICEA S-93-639 (NEMA WC 74), AEIC CS-8, ICEA P-45-482.
CONDUCTOR:	Concentric-lay, uncoated or coated copper, strand Class B. Normal maximum operating temperature 90°C.
CONDUCTOR SHIELD:	Extruded semiconducting thermosetting material, ICEA S-93-639, Section 3.
INSULATION:	Ethylene-propylene rubber, ICEA S-93-639, Section 4, not less than 115 mils (2920 μm) average thickness; 103.5 mils (2630 μm) minimum thickness.
INSULATION SHIELD:	Extruded semiconducting thermosetting material, and nonembedded coated copper tape or coated copper wires, ICEA S-93-639, Section 5. Extruded material shall be tested in accordance with ICEA S-93-639 and AEIC CS-8. Shield area shall be not less than that of one helically applied 5 mil (130 μm) copper tape with a 10 percent overlap when calculated according to Formula 3 in ICEA P-45-482.
JACKET:	Black polyvinyl chloride, ICEA S-93-639, Paragraph 7.1.9.
FACTORY TEST:	Cable shall meet the requirements of ICEA S-93-639 and AEIC No. CS-8.

Cable Details

Size		**Number of Strands**	***Jacket Thickness**		**Maximum Outside Diameter**	
AWG or kcmil	**mm²**		**in.**	**μm**	**in.**	**mm**
6	16	7	0.060	1520	0.74	18.8
4	25	7	0.060	1520	0.78	19.81
2	35	7	0.060	1520	0.84	21.34
1	40	19	0.060	1520	0.88	22.35
1/0	50	19	0.060	1520	0.92	23.37
2/0	70	19	0.080	2030	1.01	25.65
4/0	95	19	0.080	2030	1.12	28.45
250	120	37	0.080	2030	1.18	29.97
350	185	37	0.080	2030	1.29	32.77
500	300	37	0.080	2030	1.45	36.88
750	400	61	0.080	2030	1.65	41.91
1000	500	61	0.080	2030	1.81	45.97

*The average thickness shall be not less than that indicated above. The minimum thickness shall be not less than 80 percent of the values indicated above.

The conductor shield, insulation, and insulation shield shall be applied in a triple extrusion process with all three components being cured at the same time.

The color of the insulation shall be in contrast to the color of the semiconducting paint. The semiconducting paint shall be readily removable for terminating.

A durable marking shall be provided on the surface of the cable at intervals not exceeding 24 inches (600 mm). Marking shall include manufacturer's name, insulating material, conductor size, and voltage class.

Voltage Test After Installation: DC Test Voltage - 36 kV
Duration of Test - 15 Minutes

8000 Volt, Single Conductor Power Cable
100 Percent Insulation Level (8000-1-EPR-PVC-SH)

BLACK & VEATCH	**Cable Data**	**Figure 9-16050**

STANDARD SPECIFICATIONS

REFERENCE: ICEA S-93-639 (NEMA WC 74), AEIC CS-8, ICEA P-45-482.

CONDUCTOR: Concentric-lay, uncoated or coated copper, strand Class B. Normal maximum operating temperature 90°C.

CONDUCTOR SHIELD: Extruded semiconducting thermosetting material, ICEA S-93-639, Section 3.

INSULATION: Ethylene-propylene rubber, ICEA S-93-639, Section 4, not less than 220 mils (5590 μm) average thickness; 198 mils (5030 μm) minimum thickness.

SHIELD: Extruded semiconducting thermosetting material, and nonembedded coated copper tape or coated copper wires, ICEA S-93-639, Section 5. Extruded material shall be tested in accordance with ICEA S-93-639 and AEIC CS-8. Shield area shall be not less than that of one helically applied 5 mil (130 μm) copper tape with a 10 percent overlap when calculated according to Formula 3 in ICEA P-45-482.

JACKET: Black polyvinyl chloride, ICEA S-93-639, Paragraph 7.1.9.

FACTORY TEST: Cable shall meet the requirements of ICEA S-93-639 and AEIC CS-8.

Cable Details

Size		Number of Strands	*Jacket Thickness		Maximum Outside Diameter	
AWG or kcmil	mm^2		in.	μm	in.	mm
2	35	19	0.080	2030	1.14	28.96
1	40	19	0.080	2030	1.17	29.72
1/0	50	19	0.080	2030	1.21	30.73
2/0	70	19	0.080	2030	1.25	31.75
4/0	95	19	0.080	2030	1.30	33.02
250	120	37	0.080	2030	1.43	36.32
350	185	37	0.080	2030	1.53	38.86
500	300	37	0.080	2030	1.66	42.16
750	400	61	0.110	2790	1.95	49.53
1000	500	61	0.110	2790	2.19	55.63

*The average thickness shall be not less than that indicated above. The minimum thickness shall be not less than 80 percent of the values indicated above.

The conductor shield, insulation, and insulation shield shall be applied in a triple extrusion process with all three components being cured at the same time.

The color of the insulation shall be in contrast to the color of the semiconducting paint. The semiconducting paint shall be readily removable for terminating.

A durable marking shall be provided on the surface of the cable at intervals not exceeding 24 inches (600 mm). Marking shall include manufacturer's name, insulating material, conductor size, and voltage class.

Voltage Test After Installation: DC Test Voltage - 53 kV
Duration of Test - 15 Minutes

15,000 Volt, Single Conductor Power Cable
133 Percent Insulation Level (15-1-EPR-PVC-SH)

BLACK & VEATCH	Cable Data	Figure 10-16050

STANDARD SPECIFICATIONS

REFERENCE: ICEA S-95-658 (NEMA WC 70).

CONDUCTOR: Concentric lay, uncoated copper; strand Class B. Normal maximum operating temperature 90°C.

INSULATION: Cross-linked thermosetting polyethylene, ICEA S-95-658, Paragraph 3.6.

SHIELD: None.

JACKET: Cable assembly; black, flame-retardant polyvinyl chloride, UL1277, applied over tape-wrapped cable core.

FACTORY TEST: Cable shall meet the requirements of ICEA S-95-658, UL1277 and IEEE Standard 383 ribbon burner flame test.

Cable Details

Size		Number of Strands	*Conductor Insulation Thickness		**Assembly Jacket Thickness		Maximum Outside Diameter	
AWG or kcmil	mm^2		in.	mm	in.	μm	in.	mm
12	4	7	0.030	0.76	0.045	1140	0.46	11.68
10	6	7	0.030	0.76	0.045	1140	0.51	12.95
8	10	7	0.045	1.14	0.060	1520	0.68	17.27
6	16	7	0.045	1.14	0.060	1520	0.76	19.30
4	25	7	0.045	1.14	0.060	1520	0.91	23.11
2	35	7	0.045	1.14	0.060	1520	1.03	26.16
1	40	19	0.055	1.40	0.080	2030	1.16	29.46
1/0	50	19	0.055	1.40	0.080	2030	1.26	32.00
2/0	70	19	0.055	1.40	0.080	2030	1.36	34.54
4/0	95	19	0.055	1.40	0.080	2030	1.60	40.64

*The average thickness shall be not less than indicated above. The minimum thickness shall be not less than 90 percent of the values indicated above.

**The average thickness shall be not less than indicated above. The minimum thickness shall be not less than 80 percent of the values indicated above.

A durable marking shall be provided on the surface of the cable at intervals not exceeding 24 inches (600 mm). Marking shall include manufacturer's name, XLP, XHHW, Type TC, conductor size, and voltage class.

600 Volt, 3 Conductor With Ground Power Tray Cable (600-3-XLP-PVC-TC)

BLACK & VEATCH	Cable Data	Figure 11-16050

STANDARD SPECIFICATIONS

REFERENCE: ICEA S-95-658 (NEMA WC 70).

CONDUCTOR: Concentric-lay, uncoated copper; strand Class B. Wet/dry maximum operating temperature 90°C.

INSULATION: Cross-linked thermosetting polyethylene, ICEA S-95-658, Paragraph 3.6.

SHIELD: None.

JACKET: None.

FACTORY TESTS: Cable shall meet the requirements of ICEA S-95-658, UL and IEEE Standard 383 ribbon burner flame tests.

Cable Details

Size		Number of Strands	Conductor Insulation Thickness*		Maximum Outside Diameter	
AWG or kcmil	mm^2		in.	μm	in.	mm
250	120	37	0.065	1650	0.72	18.29
350	185	37	0.065	1650	0.83	21.08
500	240	37	0.065	1650	0.95	24.13
750	400	61	0.080	2030	1.17	29.72
1000	500	61	0.080	2030	1.35	34.29

*The average thickness shall be not less than indicated above. The minimum thickness shall be not less than 90 percent of the values indicated above.

A durable marking shall be provided on the surface of the cable at intervals not exceeding 24 inches (600 mm). Marking shall include manufacturer's name, VW-1, XHHW-2, Type TC, conductor size, and voltage class.

600 Volt, Single Conductor Power Tray Cable
(600-1-VW-1-NONE-XHHW-2-TC)

BLACK & VEATCH	Cable Data	Figure 12-16050

STANDARD SPECIFICATIONS

REFERENCE: ICEA S-95-658 (NEMA WC 70).

CONDUCTOR: Concentric-lay, uncoated copper; strand Class B. Normal maximum operating temperature 90°C.

INSULATION: Cross-linked thermosetting polyethylene, ICEA S-95-658, Paragraph 3.6.

SHIELD: None.

JACKET: None.

FACTORY TESTS: Cable shall meet the requirements of ICEA S-95-658.

Cable Details

Size		**Number of Strands**	**Conductor Insulation Thickness***		**Maximum Outside Diameter**	
AWG or kcmil	**mm^2**		**in.**	**μm**	**in.**	**mm**
14	2.5	7	0.045	1140	0.19	4.83
12	4.0	7	0.045	1140	0.22	5.59
10	6.0	7	0.045	1140	0.24	6.10
8	10.0	7	0.060	1520	0.31	7.87
6	16.0	7	0.060	1520	0.35	8.89
4	25.0	7	0.060	1520	0.39	9.91
2	35.0	7	0.060	1520	0.46	11.68
1	40.0	19	0.080	2030	0.54	13.72
1/0	50.0	19	0.080	2030	0.59	14.99
2/0	70.0	19	0.080	2030	0.63	16.00
4/0	95.0	19	0.080	2030	0.74	18.80
250	120.0	37	0.095	2410	0.82	20.83
350	185.0	37	0.095	2410	0.91	23.11
500	300.0	37	0.095	2410	1.04	26.42
750	400.0	61	0.110	2790	1.28	32.51
1,000	500.0	61	0.110	2790	1.44	36.58

*The average thickness shall be not less than that indicated above. The minimum thickness shall be not less than 80 percent of the values indicated above.

A durable marking shall be provided on the surface of the cable at intervals not exceeding 24 inches (600 mm). Marking shall include manufacturer's name, XLP, RHH or RHW or USE, conductor size, and voltage class.

600 Volt, Single Conductor Power Cable (600-1-XLP-NONE-RHH-RHW-USE)

BLACK & VEATCH	Cable Data	Figure 13-16050

STANDARD SPECIFICATIONS

REFERENCE: Type MC, UL 83 and 1569.

CONDUCTOR: Solid, uncoated copper. Maximum operating temperature 90°C dry.

INSULATION: Polyvinyl chloride, UL 83, Type THHN.

GROUND: Copper conductor sized per NEC with green THHN insulation.

JACKET: Conductor: Nylon.

ARMOR: Galvanized interlocked steel.

FACTORY TESTS: Conductors shall meet the requirements of UL 83 for Type THHN. Assembly shall meet the requirements of UL 1569 for Type MC.

Cable Details

Size					**Nominal Outside Diameter**	
AWG or kcmil	**mm²**	**Number of Conductors**	**Ground Size (AWG)**	**Number of strands per conductor**	**in.**	**mm**
12	4.0	2	12	1	0.492	12.50
12	4.0	3	12	1	0.531	13.49
12	4.0	4	12	1	0.579	14.71
10	6.0	2	10	1	0.562	14.27
10	6.0	3	10	1	0.610	15.49
10	6.0	4	10	1	0.641	16.28

600 Volt, Type MC Metal Clad Lighting Cable (Metal Clad THHN)

BLACK & VEATCH	Cable Data	Figure 14-16050

Project and Location _____ Project No. _____

Circuit Designation _____ Date _____

DC TEST DATA

Time in Minutes After 100% Test Voltage Is Applied	Current, μA		
	Phase A	Phase B	Phase C
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
kV dc after 1 min Decay			

DC Test Voltage _____

Cable Installation: New ____ Used ___ Years____

Cable: Size _____ Length: _____

Oper. kV _____ Grounded _____ Ungrounded _____

Rated Cable Voltage _____

Insulation Wall _____
(Type & Thickness)

Conductor Jacket Wall _____
Type & Thickness)

Shield _____
(Type)

Cable Manufacturer _____

Temperature _____ Humidity_____

Type of Termination _____

Type of Splice & Location_____
_____

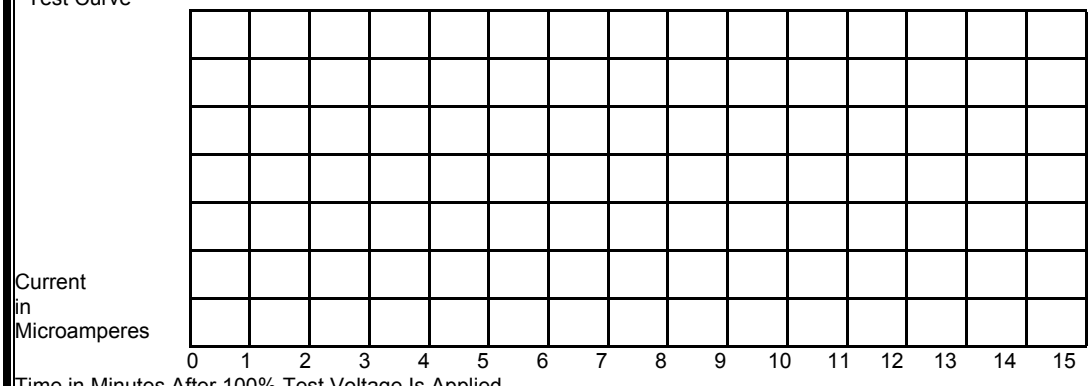
Remarks_____

100 Microamperes (μA) = 0.1 Milliampere

APPLICATION OF TEST VOLTAGE

The initially applied direct-current voltage shall be not greater than 3.0 times the rated alternating-current voltage. The rate of increase from the initially applied voltage to the specified test voltage shall be not over 100 percent in 10 seconds nor less than 100 percent in 60 seconds. The duration of the direct-current voltage test shall be 15 minutes for shielded cables and 5 minutes for nonshielded cables.

Test Curve



NOTES:
1. Plot results of tests on all three phases on this graph.
2. Assign and indicate values for each division on the microamperes scale as required for the circuit being tested.

Cable Test Data Form

BLACK & VEATCH	Cable Data	Figure 15-16050

ATTACHMENT A - CIRCUIT LIST DESCRIPTION

BLACK & VEATCH
PROJECT 137522

NACIMIENTO WATER PROJECT
SPEC 05 – Pipeline South

CIRCUIT NO.	FROM EQUIPMENT	TO EQUIPMENT	------ CABLE DATA ------ CB	CND	SIZE	TYPE	---------- ROUTING ----------
SWGR1-1C	SWGR-1	XFMR-3	3	1	4/0	1	SWGR1-1C

FROM
INDICATES THE EQUIPMENT OR DEVICE AT WHICH THE SUBJECT CIRCUIT ORIGINATES

TO
INDICATES THE EQUIPMENT OR DEVICE AT WHICH THE SUBJECT CIRCUIT TERMINATES

CIRCUIT SEQUENCE NUMBER

CIRCUIT NUMBER PREFIX – INDICATES SOURCE PIECE OF EQUIPMENT FOR THE CIRCUIT.

ROUTING
INDICATES THE RACEWAYS IN WHICH THE CIRCUIT IS TO BE ROUTED. RACEWAY NUMBERS ARE IN THE ORDER OF THE ROUTING STARTING AT THE "FROM" EQUIPMENT. ROUTING DOES NOT NECESSARILY SPECIFY THE DIRECTION TO BE USED FOR CABLE PULLING.

CABLE TYPE
REFER TO CORRESPONDING FIGURE NUMBER IN SECTION 16050 AND CABLE TYPE LEGEND BELOW.

SIZE
SIZE OF INDIVIDUAL CONDUCTORS. NUMBER INDICATED IS NOMINAL AREA OF CONDUCTOR IN AWG OR KCMIL.

CONDUCTOR
INDICATES THE NUMBER OF CONDUCTORS IN AN OVERALL CABLE ASSEMBLY.

NUMBER
INDICATES THE NUMBER OF OVERALL CABLE ASSEMBLIES TO BE INSTALLED.

CABLE TYPE LEGEND

3	600 VOLT, SINGLE CONDUCTOR POWER CABLE (SEE SECTION 16050, FIGURE 3)
4	600V, SINGLE PAIR, SHIELDED INSTRUMENT CABLE (SEE SECTION 16050, FIGURE 4)
5	600 VOLT, SINGLE TRIAD, SHIELDED INSTRUMENT CABLE (SEE SECTION 16050, FIGURE 5)
9	8000 VOLT, SINGLE CONDUCTOR POWER CABLE (SEE SECTION 16050, FIGURE 9)
G	GROUND CABLE
K	25000 VOLT, SINGLE CONDUCTOR POWER CABLE (SEE SECTION 16050)
M	MANUFACTURER SUPPLIED CABLE
T	TELEPHONE CABLE (SEE SECTION 16050)
F	FIBER OPTIC CABLE (SEE SECTION 13540)

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Section 16640

CORROSION MONITORING

PART 1- GENERAL

1-1. DESCRIPTION. This Section includes the procurement, installation, and testing of a corrosion monitoring system for the exterior surfaces of an underground pipeline.

1-2. REFERENCE SPECIFICATIONS, CODES AND STANDARDS.

National Association of Corrosion Engineers (NACE International).

RP0169	Control of External Corrosion on Underground or Submerged Metallic Piping Systems
RP0286	Electrical Insulation of Cathodically Protected Pipelines
RP0375	Field-Applied Underground Wax Coating Systems for Underground Pipelines: Application, Performance, and Quality Control
RP0200	Steel-Cased Pipeline Practices
TM0497	Measurement Techniques Related to Criteria for Cathodic Protection on Underground or Submerged Metallic Piping Systems

National Fire Protection Association (NFPA).

70	National Electric Code

Underwriters Laboratories, Inc. (UL).

83	Thermoplastic-Insulated Wires and Cables
486	Wire Connectors and Soldering Lugs for Use with Copper Conductors
514	Outlet Boxes and Fittings

1-3. GENERAL REQUIREMENTS. The corrosion monitoring system shown on the Drawings is considered diagrammatic and should not be scaled for exact

location of corrosion monitoring facilities, except where dimensions are given. Field conditions, including interference with other utilities, architectural, mechanical and structural features shall determine exact locations. Where applicable, materials and equipment shall bear evidence of U.L. approval. Conform to the requirements of all applicable federal, state and local laws, codes and regulations.

1-4. SUBMITTALS. CONTRACTOR shall submit the following items in accordance with the requirements specified in Section 01300, “Submittals.”

- Manufacturer’s information for each item listed below shall be provided. Include sufficient information to show that the materials meet the requirements provided herein, including references to specific sections and details shown on the Drawings.

  Connectors.

  Exothermic Weld Materials.

  Weld Coating.

  Test Stations.

  Test Boxes.

  Pipe Flange Insulating Kits.

  Pipe Lead & Bond Wire.

  Coating for Buried Insulated Pipe Flanges.

  Brass Identification Tags.

  Concrete.

  Plastic Warning Tape.

  Underground Reference Electrodes.

  Casing Insulators.

  Casing Seals.

- Qualifications of the NACE certified Corrosion Technician, materials, installation method, testing methods and testing equipment.

- Certification by the professional Corrosion Engineer or the NACE certified Corrosion Specialist stating that the criteria in these Specifications are met.

1-5. QUALITY ASSURANCE. The installation shall conform to the National Electrical Code, applicable local codes, and the Recommended Practice of NACE International.

Provide all materials, equipment, labor and supervision necessary for the completion of the installation and testing. Employ a corrosion construction supervisor, with experience in the installation of at least five similar type systems, to supervise the corrosion monitoring system installation. The corrosion construction supervisor shall be under the direct supervision of a licensed professional Corrosion Engineer, a NACE certified Cathodic Protection Specialist, or a NACE certified Corrosion Specialist. The corrosion construction supervisor shall instruct the CONTRACTOR on site during the initial installation and shall revisit the site as required.

Maintain record drawings for the corrosion monitoring system continuously throughout installation of the corrosion monitoring system. Record drawings shall properly identify all items of equipment and material and shall show exact locations with dimensional ties to existing structures or survey monuments for all test boxes, insulated pipe flanges, and buried wires.

PART 2- MATERIALS

2.-1. GENERAL. Provide corrosion monitoring system materials and equipment that are new, undamaged, and in the original packaging marked with the manufacturer's name or trademark. The materials and equipment shall be of the manufacturer's latest standard design and shall be fully compatible to provide a complete and functional corrosion monitoring system.

2-2. COMPRESSION RING-TONGUE TERMINALS. Compression ring tongue terminals for terminating lead wires in test stations shall be single hole, uninsulated, compression type terminal lugs made of copper, bronze, or nickel-plated brass. Compression ring tongue terminal part numbers shall be as indicated in the table below:

Wire Size	Stud Size	Ring-Tongue Terminal Part No.	Manufacturer
14 AWG	1/4 inch	YAV12-G3	Burndy Corporation
12 AWG or 10 AWG	1/4 inch	YAV10-T3	Burndy Corporation
8 AWG	1/4 inch	YAV8C-L1	Burndy Corporation

2-3. EXOTHERMIC WELD MATERIALS. Make the electrical connection of lead wire and joint bonds to metallic structures by exothermic weld or by brazing.

Exothermic weld material shall be a mixture of copper oxide and aluminum, packaged by size in plastic tubes. The materials shall be non-explosive and not subject to spontaneous ignition.

Material of different manufacturers shall not be mixed.

Connections shall be made in accordance with UL 486.

Connectors and accessories shall be Erico Products, Inc., or equal.

2-4. WELD COATING. Thermite weld caps shall be Royston Handy Cap 2 or equal.

2-5. TEST STATIONS. Test stations shall be used as a test lead terminal to read:

Underground structure-to-soil potentials.

The isolation integrity of the insulation flanges and joints.

The integrity of insulation between all types of underground metallic structures, such as between a carrier and its casing.

Stray currents on all types of underground structures.

Pipeline currents.

Test stations shall not rust, corrode, shatter, or peel.

Test stations shall have dimensional and electrical stability from -20°F to 175°F and be stable under ultraviolet exposure.

Test stations shall be environmentally safe, resist attack from alkaline, acid, or organic compounds commonly found in soil and salt, herbicides, pesticides, and fertilizers.

Each test station shall include a micarta or cross-laminated phenolic insulating panel with a minimum thickness of 3/16 inch. The insulating panel shall contain terminal connectors to accommodate the number of wires shown on the Drawings. Test Stations shall be Cott, Big Fink; or equal.

2-6. TEST BOXES. Boxes for corrosion monitoring test stations shall be mounted flush with the ground and designed to withstand H-20 traffic loads. Boxes shall be 10-3/8" inches I.D. and 12 inches deep, with a bolt down cast iron cover. Covers for test stations shall have the words "CM TEST" cast or welded thereon. Letters shall be raised, 2 inches tall, 1/4 inch thick, and 1/4 inch in height. Test boxes shall be Christy Concrete Products Model G5; or equal.

2-7. UNDERGROUND COPPER SULFATE REFERENCE ELECTRODES. Underground reference electrodes shall be of the saturated, gelled, copper-copper sulfate type, packaged in a special backfill and complete with 75 feet of 14 AWG stranded copper lead wire with high molecular weight polyethylene insulation. Underground reference electrodes shall have a 30 year minimum design life. Underground reference electrodes shall be Model UL-CUG, as manufactured by Electrochemical Devices, Inc., Albion, Rhode Island; or acceptable equal.

2-8. PIPE FLANGE INSULATING KITS. Pipe flange insulating kit materials shall be of the type designated by the manufacturer as suitable for appropriate service at the operating temperatures and pressures specified on the Drawings.

Flange insulating kits shall consist of a one piece full-face, insulating gasket, an insulating sleeve for each bolt, two insulating washers for each bolt, and a steel washer between each insulating washer and nut.

2-8.01. Insulating Gasket. Insulating gasket retainers shall be full-face, Type E, NEMA G-l0 epoxy glass retainers with a nitrile (Buna-N) rectangular cross section 0-ring sealing. Minimum total thickness shall not be less than 1/8-inch. Dielectric strength shall be not less than 550 volts per mil, and compressive strength of not less than 50,000 psi. Use PSI Linebacker, or equal.

2-8.02. Insulating Sleeves. Provide full length, one piece, insulating flange bolt sleeves for the appropriate bolt size. Insulating sleeves shall be NEMA G-10 epoxy glass. Dielectric strength shall be not less than 400 volts per mil.

2-8.03. Insulating Washers. Insulating washers shall be NEMA G-10 epoxy glass with a minimum thickness of 1/8-inch. Dielectric strength shall not be less than 550 volts per mil, and compressive strength of not less than 50,000 psi.

Provide cadmium plated steel flange bolt washers for placement over the insulating washers with a minimum thickness of 1/8 inch.

2-9. PIPE LEAD AND BOND WIRE. Use stranded copper wire with insulation rated at 600 volts. Wires with cut or damaged insulation are not acceptable, and replacement of the entire lead will be required. Wires shall be sufficient length to

extend from the point of installation on the pipeline to the appropriate corrosion monitoring test box without splices.

2-9.01. Pipe Test Lead and Pipe Joint Bonding Wires. The pipe test lead wires and pipe joint bonding wires shall be No. 8 AWG unless indicated otherwise on the Drawings and shall have a 7/64-inch thick HMWPE insulation specifically designed for cathodic protection service and suitable for direct burial in corrosive soil, conforming to ASTM D1248, Type I, Grade J3, Class C, Category 5 (HMWPE Type CP). Each pipe test lead wire shall have at least 24 inches of slack in the test box.

2-10. COATING FOR BURIED INSULATED PIPE FLANGES. The wax-tape coating shall conform to the requirements of AWWA C217, and shall consist of three parts: surface primer, wax-tape and outer covering.

The primer shall be a blend of petrolatum, plasticizer and corrosion inhibitors having a paste like consistency such as Trenton Wax-Tape Primer, or equal.

The wax-tape shall be a plastic-fiber felt tape, 50 to 70 mils thick, and saturated with a blend of petrolatum, plasticizer, and corrosion inhibitors that is easily formed over irregular surfaces such as Trenton #1 wax-tape, or equal.

The outer covering shall be a plastic wrapper consisting of three each 50 gauge, clear polyvinylidene chloride, high cling membranes wound together as a single sheet such as Trenton Poly-Ply, or equal.

2-11. BRASS IDENTIFICATION TAGS. All leads shall be identified with 1-inch diameter by 1/16-inch brass tags. Tags shall be securely attached to the test leads with nylon wire tie straps. All tags shall be die stamped. Identification shall be as indicated on the Drawings.

2-12. PLASTIC WARNING TAPE. Plastic warning tape for horizontal runs of buried leads in cable trenches shall be a minimum of 4 mils thick and 6 inches wide, inert yellow plastic film designed for prolonged use underground. The tape shall have the words, “CAUTION CATHODIC PROTECTION CABLE BELOW,” or similar, clearly visible in repeating patterns along its entire length.

2-13. GLASS-REINFORCED CASING INSULATORS. Casing insulators, which electrically isolate the carrier pipe from the casing pipe, shall be coated steel bands with 2 inch wide glass reinforced plastic runners. Casing insulator inner liners shall be of PVC. Casing insulator construction, sizes, and Model numbers shall be as required for the carrier and casing pipe sizes indicated in the table below:

Carrier Pipe Outside Diameter	Steel Band Width	Quantity of Runners	PSI Casing Insulator Model No.
20-36 inches	12 inches	2 top, 4 bottom	C12G-2

Glass-reinforced casing insulators shall be as manufactured by PSI Industries, Houston, Texas; or equal.

2-14. CASING END SEALS. Casing end seals for single carrier pipes shall be flexible to allow for longitudinal movement of the carrier pipe due to expansion or contraction and shall be of material suitable for the application. The casing seals shall be supplied with Type 304 stainless steel bands, clamps, and sealers, as applicable, for connecting to the pipes. Casing seal types shall be selected from the following table according to the application:

Relationship Between Carrier Pipe and Casing Pipe	Casing End Seal Type
Concentric	1,5,6,10,11,12,17
Eccentric	2,5,7,13,16
Carrier Pipe Welded Prior to Casing Seal Installation	3,5,8,14

Casing end seal type numbers are defined by catalog model number and manufacturer, as follows:

Type	Catalog Model Number or Type	Manufacturer
1	Model DU	ITN Corporation, Houston, Texas
2	Model KG	ITN Corporation, Houston, Texas
3	Model KO	ITN Corporation, Houston, Texas
5	Raychem CASEAL heat shrinkable sleeve	Tyco Adhesives, Corrosion Protection Group, Chula Vista, California
6	Multiflex	Maloney Pipeline Products Company, Houston, Texas
7	Pull-on	Maloney Pipeline Products Company, Houston, Texas
8	Zip-on	Maloney Pipeline Products Company, Houston, Texas
10	Innerlynx	Advance Products & Systems, Lafayette, Louisiana
11	Link-Seal	Thunderline, Corporation
12	Model S	Pipeline Seal & Insulator, Inc., Houston, Texas

Type	Catalog Model Number or Type	Manufacturer
13	Model C	Pipeline Seal & Insulator, Inc., Houston, Texas
14	Model W	Pipeline Seal & Insulator, Inc., Houston, Texas
16	U-Seal	T. D. Williamson, Inc., Tulsa, Oklahoma
17	Z-Seal	T. D. Williamson, Inc., Tulsa, Oklahoma

PART 3 - EXECUTION

3-1. TEST WIRE CONNECTIONS. Make connections to ensure continued operation of the system under all weather conditions.

Make connections to the structure with the exothermic weld process ("Cadweld" or equal). This process shall consist of a mixture of granulated copper oxide and aluminum together with a powdered magnesium starting charge, the whole being manufactured so that the charge, when poured into a suitable carbon mold, may be ignited by a spark gun to initiate a chemical reaction that will deposit molten copper welding metal at the point of the connection. Make exothermic welds in accordance with the manufacturer's procedures.

Prepare the pipe surface by removing a four-inch square "window" from the coating. File and wire brush the pipe surface until a bright metal finish is obtained.

Where two or more wires are welded to the metallic structure, the minimum spacing between exothermic welds shall be 6 inches.

The lead wire end to be welded shall be stripped so that a copper sleeve of suitable size can be fitted over the bare section.

After the weld is performed, test the bond by hammering the molten deposit with a 2-pound hammer. If the weld comes loose, or is not completely connected, perform a second weld. Prepare a second bare surface at least 6 inches from the site of the failed weld. The wire conductor shall be restripped and covered with a new copper sleeve.

Make the test wire connections during the pipe laying process or as required during the system installation.

Install the cables with sufficient slack so that the cable insulation and conductors will not be damaged due to ground or structure movement.

3-2. CORROSION MONITORING TEST STATIONS. Install flush mounted test stations directly over the pipeline to which they are connected. In the case where the pipeline is in a paved street, install the test boxes in areas away from traffic hazards, such as in medians, shoulders, or behind curbs or as directed by the ENGINEER.

Install test stations at the locations shown on the Drawings. Weld the wires to the pipelines at the nearest pipe joint to the station indicated. The wire shall be direct buried and terminated in the test box with a minimum of 24 inches of slack in each wire.

3-2.01. Dual-Sided Utility Markers. Use dual-sided utility markers to mark the location of corrosion monitoring stations. Attach DISTRICT contact information; request information from ENGINEER.

Utility Markers: Carsonite CIB-380 or equal; with Carsonite Pl-144 and ETS-238 decals, or equal.

3-3. EXOTHERMAL WELDS. After the exothermal weld has been performed and the connection tested for strength, thoroughly coat the cleaned surface with a coating repair recommended by the coating manufacturer, and allow to dry to a non-glossy appearance.

For welds on ductile iron pipe, valves, and pipe special fittings, cover the connection with a thermite weld cap. Where unable to use a weld cap, cover the exposed metal surfaces with a 1/8-inch thick dielectric sealant, or wax tape. Work the sealant or tape so that there are no voids or spaces between the sealant or tape and the pipe surface. Push the lead wire back down onto the pipe so that the elastomer compound is in firm contact with the pipe over the entire welded area.

For welds on steel pipe, place a cement mortar coat of equal material and thickness over the weld.

3-4. LEAD WIRE TERMINATIONS IN TEST STATIONS. Applicable termination details for each test station are indicated on the Drawings.

Connections at field test stations shall be made with single hole, uninsulated, compression type terminal lugs made of corrosion-resistant copper, bronze, or nickel-plated brass. Compression ring tongue terminals shall be as specified herein.

A calibrated crimping tool designed to crimp the connector shall be used for all compression connections. The connector shall not release from the conductor when pulled or twisted.

Solid conductors shall additionally be soldered in the terminal lug before terminating the lug in the field test station.

Attach a brass identification tag as specified herein to each lead wire in each field test station. Each pipe lead wire shall be identified as indicated on the Drawings.

Firmly tighten the lid after the installation of the test box to prevent tampering.

3-5. INSTALLATION OF FLANGE INSULATING KIT MATERIALS. Install the pipe flange insulating kits at the locations shown on the Drawings and in accordance with the manufacturer's recommendations. Install the insulating flanges in accordance with the NACE recommended practice RP0286, "Electrical Insulation of Cathodically Protected Pipelines." The effectiveness of the insulating flanges shall be tested by the Corrosion Engineer in accordance with RP0286, Section 7, "Field Testing and Maintenance." Particular attention shall be paid to properly aligning the flanges prior to inserting the insulating sleeves around flange bolts. Prevent moisture, soil or other foreign matter from contacting any portion of the insulating joint prior to or during installation. If moisture, soil or other foreign matter contacts any portion of the insulating joint, disassemble the entire joint, clean with a suitable solvent and - dry prior to reassembling. Follow the manufacturer's recommendations regarding the torque pattern of the bolts and the amount of torque to be used when installing the flange insulating kit. Do not use conductive grease on the flange bolts or any other flange components.

3-6. PIPE JOINT BONDING WIRES. During installation of the pipe, electrically bond across pipe joints which are not circumferentially welded. Install bond wires across buried or submerged metallic in-line valves, couplings, bolted flanges, and fittings, except for insulated pipe flanges. Install bond wires at minimum length. A minimum of two bond wires are required for each joint. Joint bonding details are shown on the Drawings.

3-7. FIELD APPLIED COATING. Field coat bare fittings and connections to the pipe with wax tape.

3-8. COATING OF BURIED INSULATED PIPE FLANGES. Coat buried insulated pipe flanges with an external wax-tape coating in accordance with AWWA C217. Do not apply the wax-tape coating until the insulated pipe flanges have been tested and approved by the ENGINEER. The wax-tape coating shall consist of a surface primer, wax-tape and an outer covering. The wax tape

coating system shall extend over the adjacent pipe coating by a minimum 12-inches or 18-inches away from the flange surface, whichever is greater.

The surfaces to receive the wax tape coating shall be clean and free of all dirt, grease, and other foreign material. Apply the primer by gloved hand or brush onto all exposed steel surfaces. Apply the wax tape immediately after the primer application. Cut strips of wax tape and apply them by gloved hand around all bolts, nuts, and other irregular shapes so that there are no voids or spaces under the tape. Apply a sufficient amount of tape to completely encapsulate all exposed steel surfaces with a minimum wax tape thickness of 140-mils. Apply by hand two layers of polyvinylidene chloride, high cling membrane sheet over the wax tape coating by tightly wrapping it around the pipe such that it adheres and conforms to the wax tape. Secure the plastic wrap to the pipe with adhesive tape.

3-9. UNDERGROUND REFERENCE ELECTRODES. Underground reference electrodes shall be stored and maintained in a dry environment, above freezing temperatures, until activation and installation. Underground reference electrodes shall be activated by complete immersion in clean, fresh water for approximately 8 to 12 hours prior to installation.

Except as indicated otherwise on the Drawings or these Specifications, the packaged underground reference electrode shall be installed horizontally below the frost line, in permanently moist soil, with a minimum of 6 inches of clean earthfill between the electrode package and any surrounding rock.

After burial of the packaged reference electrode, but before backfilling or covering the excavation, a minimum of 10 gallons of water shall be poured over and around the electrode package. After the surrounding soil and underground reference electrode package is thoroughly saturated with water, place a mild steel stake or rod in firm contact with the soil, several feet from the reference electrode package. Connect the negative test lead of a digital dc voltmeter to the reference electrode lead wire. Firmly connect the voltmeter positive test lead to the mild steel stake or rod. Measure and record the dc voltage on the voltmeter. For copper-copper sulfate type underground reference electrodes, a stable negative reading between -0.4 and -0.8 volts should be obtained with the lead wires connected as described above for the installation to be acceptable.

3-10. CASING INSULATORS. Casing insulators shall be installed in accordance with the manufacturer's instructions. Special care shall be taken to ensure that all components are correctly assembled and evenly tightened, and that no pipe coating damage occurs during the tightening of the insulators or during carrier pipe insertion. The spacing of the insulators must ensure that the carrier pipe is adequately supported throughout its length, particularly at the ends, to offset settling and possible electrical shorting. The end insulators shall

be within 6 inches of the end of the casing pipe. There shall be no inadvertent metallic contact between the casing or pipe sleeve and the carrier pipe. Electrical isolation between the carrier pipe and sleeve or casing shall be tested.

3-11. TESTING. Verify, by testing, that the entire system is functioning properly, and that the criteria for acceptance are met. Perform all testing in the presence of the ENGINEER.

Retain a NACE certified Corrosion Technician to perform the testing. Perform tests under the supervision of a licensed professional Corrosion Engineer or a NACE certified Corrosion Specialist.

Furnish test results including all pertinent readings, dates, times, and locations to the ENGINEER.

3-11.01. Insulated Pipe Flange Tests. Test each insulated pipe flange under the supervision of a licensed professional Corrosion Engineer or a NACE certified Corrosion Specialist for electrical isolation of the two mating flanges. If the insulated pipe flange will be buried, this inspection shall be done before the wax tape coating is applied. The insulated pipe flanges shall be installed in accordance with the NACE recommended practice RP0286, “Electrical Insulation of Cathodically Protected Pipelines.” The effectiveness of the insulated pipe flanges shall be tested in accordance with RP0286, Section 7, “Field Testing and Maintenance.” Replace or repair any insulated pipe flange that is not electrically effective.

3-11.02. Testing of Completed Welds. Pipe lead wire connections will be inspected by the ENGINEER prior to backfilling. Verify the soundness of the exothermic welds. Strike the weld nugget with a 2-pound hammer while steadily pulling on the wire. Note that the wire near the weld shall not be unnecessarily cold-worked during installation or testing. Remove and reweld any welds that break loose or show signs of separating, as determined by the ENGINEER.

3-11.03. Wire Identification. The ENGINEER shall be given the opportunity (two days notice) to verify that buried pipe lead wires are properly identified with die-stamped brass tags prior to backfilling the wires and the welded wire-to-pipe connections.

3-11.04. Pipe Lead Wire Integrity Tests. After the pipe is buried, the pipe lead wire trenches are backfilled, and the test boxes are installed, the ENGINEER will test each set of pipe lead wires for electrical continuity to the pipe. If more than twice the theoretical resistance of the pipe lead wire lengths is measured, replace the pipe lead wires.

3-11.05. Casing Isolation Tests. Tests to verify effective electrical isolation of the carrier pipe from the casing shall be performed in accordance with NACE RP0200. If these tests indicate that the carrier pipe is not isolated from the casing, repairs to correct this defect shall be made as determined by the ENGINEER.

3-11.06. Pipe-to-Soil Potential Record. After the pipeline has been installed a minimum of 90 days, all test stations installed, and all insulated flanges and casing insulators have tested satisfactory, a pipe-to-soil potential measurement survey shall be taken and recorded at measurement intervals of 10 feet directly over the pipeline. The interval of the measurement shall be shortened to 3 feet when anodic conditions are indicated or other unusual conditions occur. The pipe-to-soil potential at each test station with a terminated underground reference electrode shall be measured and recorded. This pipe-to-soil potential record shall be dated and submitted to the DISTRICT and the ENGINEER within 15 days of the survey.

3-11.07. Final Inspection. Notify the ENGINEER when the corrosion monitoring system is completely installed. Within four weeks the system will be inspected and tested by the ENGINEER. The CONTRACTOR shall replace or repair any deficiencies in materials and installation that are revealed by these tests.

End of Section

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