THE CITY OF

PLEASANTON

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

GENERAL PROVISIONS, NOTICE TO BIDDERS, SPECIAL PROVISIONS, PROPOSAL AND CONTRACT FOR

Near-Term Water Improvements
Project No. 24171 & 24173

PROJECT IS COMPRISED OF TWO BID SETS

TURNOUT #4 BOOSTER PUMP STATION AND DISCHARGE PIPELINE (F-1 LINE), CIP 24171 BY WOODARD & CURRAN

SUNOL PIPELINE IMPROVEMENTS, 20-INCH WATER MAIN (F-7 LINE), CIP 24173 BY MARK THOMAS

Bid Opening Date – February 22, 2024

2:00 p.m.

To be used in conjunction with the City Standard Specifications and Details dated November 2016, the State Standard Specifications and Plans dated 2015 and all updates at the time of bid, and the Labor Surcharge and Equipment Rental Rates in effect on the date the work is accomplished.

APPROVED

Adam Nelkie
City Engineer
No. 78830
Expires: 9/30/2023

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NOTICE TO BIDDERS

Proposals Sought; Time for Receipt

Sealed Bid Proposals will be received by the City Clerk's Office of the City of Pleasanton, Civic Center, in-person at 123 Main Street (or by mail to P.O. Box 520), Pleasanton, CA 94566, until 2:00 p.m., **February 22, 2024**, for work as described in the Plans and Specifications entitled:

Near-Term Water Improvements
Project No. 24171 & 24173

At the above-mentioned time, date and address, the Bid Proposals will be publicly opened and read.

Please review the City website and/or bidnetdirect.com for addendum(s) prior to submission.

Scope of Work and Project Location

The work is as described below:

For Project No. 24171 Stoneridge (F-1) Line and Turnout No. 4:

The work shall consist of, but is not limited to, providing and installing 3,500 linear feet of 24-inch fusible polyvinyl chloride potable water main by open trench; 50 linear feet of 24-inch, 120 linear feet of 18-inch, and 200 linear feet of 16-inch HDSS Class 350 ductile iron potable water main by open trench; 40 linear feet of fusible pipe in steel casing by jack and bore; connection to city's existing 12-inch and 16-inch potable mains. All improvements are to be restrained, externally kicked, and cathodically protected. Work also includes, but is not limited to, site preparation for installation of prepacked booster station (prepackaged station by others); construction of new turnout; remobilization to install prepacked station including electrical tie-ins; connection to new potable main and Zone 7's existing 20-inch line; coordination with booster station supplier for testing and acceptance of system; disinfection, flushing, testing and acceptance of new water mains; abandonment and removal of pipe; and street, landscape, and hardscape restoration.

For Project No. 24173 Sunol Pipeline Improvements (F-7 Line):

The work shall consist of, but is not limited to, providing and installing 4,500 linear feet of 20-inch HDSS Class 350 potable water main by open trench; 30 linear feet of 20-inch ductile iron pipe in steel casing by jack and bore; connection to city's existing 12-inch, 20-inch, and 24-inch potable mains. All improvements are to be restrained, externally kicked, and bonded. Work also includes, but is not limited to, disinfection, flushing,

testing and acceptance of new water main; and street, landscape, and hardscape restoration.

The Engineer's cost estimate for Project No. 24171 is $5.1 million.

The Engineer's cost estimate for Project No. 24173 is $4.4 million.

Copies of Plans and Specifications

In order to be an eligible bidder, plans, specifications and all bid proposal and contract documents must adhere to the latest version of all bid documents as amended through any addendums. Plans may be purchased from the Engineering Division of the City of Pleasanton, Civic Center, 200 Old Bernal Avenue, at a cost of **$35 per set** plus shipping. Plans will be electronically available on the City's website and bidnetdirect.com at no charge. The City requires all parties interested in this bid opportunity to email the City and request to be added to the plan holder list. Any addenda will be sent electronically to those on the plan holder list prior to the bid opening date. To request plans or to be added to the plan holder list, please email:_

bcarlson@cityofpleasantonca.gov and kroberts@cityofpleasantonca.gov

Bid Security and Contract Bonds

Each Bid Proposal shall be accompanied by either cash, a cashier's check or a certified check, amounting to not less than ten percent of the bid, payable to the order of the City of Pleasanton or by a bond for that amount and payable in the form contained in this bid package. The successful Bidder will be required to furnish performance and payment bonds, each in an amount not less than one hundred percent (100%) of the contract price, and a maintenance bond not less than ten percent (10%) of the contract price.

Bid Forms

The Contractor is responsible for reviewing the City of Pleasanton's City Bids website (and/or bidnetdirect.com) to ensure they have the latest addendums and utilize all updated documents issued through addendum. Bidders must complete bid proposal and submit it in its entirety. Failure to do so will cause the bid to be deemed nonresponsive.

City of Pleasanton's City Bids Website:
http://www.cityofpleasantonca.gov/business/bids.asp

Bids Received After Deadline

Bids received after the time established for receiving bids will not be considered. Except as provided in Section "Instruction to Bidders," no Bidder may withdraw a bid after the time established for receiving bids or before the award and execution of the contract, unless the award is delayed for a period of ninety (90) calendar days after the date of the City's opening of bids.

Rejection of Bids

The City reserves the right to reject any or all bids and to determine which bid is, in the City's judgment, the lowest responsive and responsible bid of a Bidder or group of Bidders. The City also reserves the right to waive any inconsequential omissions or discrepancies in any bid and to delete certain items listed in the bid as set forth therein. Costs for developing, submitting, and presenting bids are the sole responsibility of the Bidder and claims for reimbursement will not be accepted by the City.

Contractor's License Classification

As provided in California Business & Professions Code Section 7028.15, the City has determined that at the time of bid, the Contractor shall possess a valid **Class A General Engineering** Contractor license. The Contractor's failure to possess the specified license shall render the Bid as non-responsive and shall act to bar award of the contract to any Bidder not possessing said license at the time of bid, unless exempted by federal or state law.

Contractor's Department of Industrial Relations Registration

Bidder and its Subcontractors must be registered and qualified to perform public work pursuant to section 1725.5 of the Labor Code, subject to limited legal exceptions under Labor Code section 1771.1.

This Contract will be subject to compliance monitoring and enforcement by the California Department of Industrial Relations, pursuant to Labor Code section 1771.4.

Substitution of Securities in Lieu of Retention

At the successful Contractor's option, securities may be substituted for the required retention, in accordance with provisions of Section 22300 of California Public Contract Code.

Prevailing Wage

In accordance with California Labor Code Sections 1770 et seq., the Contractor shall pay general prevailing rate of per diem wages to all workers employed under this contract.

Labor Nondiscrimination

The awarded Contractor shall comply with the requirements of the State of California's Standard Specification Code Section 7-1.01A(4) "Labor Nondiscrimination" under this contract.

Questions

Questions should be directed to the project engineer either in-person at 200 Old Bernal Avenue, Pleasanton, California, by mail at P.O. Box 520, Pleasanton, California 94566-0802, by phone at (925) 931-5650, or by email at bcarlson@cityofpleasantonca.gov. Questions will only be answered by reference to particular sections of these bid documents. If interpretation is deemed necessary, then the question shall be addressed in writing and a clarification shall be given to all prospective Bidders through addenda. To allow time for issuance of addenda, questions shall only be accepted prior to seven (7) calendar days before the bid opening date.

CITY OF PLEASANTON

Date: January 3, 2024

By: _____
Jocelyn Kwong, City Clerk

BID PROPOSAL

Near-Term Water Improvements
Project No. 24171 & 24173

DATE: _____

Proposal of _____ (hereinafter called "Bidder") a _____ organized and existing under the laws of the State _____, doing business as _____, to the City of Pleasanton, City Clerk, 123 Main Street, Pleasanton, California (hereinafter called "City").

Ladies and Gentlemen:

The Bidder, in compliance with the invitation for bids for the **NEAR-TERM WATER IMPROVEMENTS, PROJECT NO. 24171 & 24173,** City of Pleasanton, having examined the Plans and Specifications and related documents and the premises of the proposed work, and being familiar with all of the conditions surrounding the construction of the proposed project including the availability of materials and supplies, declares that this proposal is made without collusion with any other person, firm or corporation and agrees to construct the project in accordance with the contract documents, within the time set forth therein, and at the prices stated below. These prices are to cover all expenses incurred in performing the work required under the Contract Documents, of which this Bid Proposal is a part.

Work Completion

For Project No. 24171:
Bidder shall complete all work designated as Phase 1 by June 30, 2024.
Bidder shall complete all work designated as Phase 2 within one-hundred-and-ten (110) working days after the start of work.
Bidder will be given separate "Notice to Proceed" to start Phase 3 dependent on prepacked booster station fabrication and shall commence work within fifteen (15) calendar days of notification. Notification is expected to be given between February and May, 2025.
Bidder shall complete all work designated as Phase 3 within sixty (60) working days after start of Phase 3 work.

For Project No. 24173:
Bidder shall complete all work within one-hundred-and-seventy (170) working days after the start of work.

Liquidated Damages
For Project No. 24171:
Bidder shall pay as liquidated damages in the sum of **$2,000** per calendar day should the successful bidder fail to complete the work designated as Phase 1 by June 30, 2024.

Bidder shall pay as liquidated damages in the sum of **$4,500** per calendar day should the successful bidder fail to complete the work designated as Phase 2 within one hundred ten (110) working days.
Bidder shall pay as liquidated damages in the sum of **$2,000** per calendar day should the successful bidder fail to complete the work designated as Phase 3 within sixty (60) working days.

For Project No. 24173:
Bidder shall pay as liquidated damages in the sum of **$4,500** per calendar day should the successful bidder fail to complete the work within one hundred seventy (170) working days.

Liquidated damages will accrue separately and are additive for failure to complete the work or phases of work within the above time limits.

Bidder acknowledges receipt of the following addendum:

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

Bidder to perform all of the work described in the Contract Documents for the total bid amount entered.

Bid Table on Next Page

Project No. 24171

Item No.	Quantity (Approximate)	Unit of Measure	Item Description	Unit Price	Total
1	1	LS	Mobilization		
2	1	LS	Traffic Control		
3	1	LS	Site Demolition, Finished Site Work and Grading		
4	1	LS	Trench Shoring		
5	1	LS	Zone 7 Connection		
6	1	EA	Turnout 9' x 13' Precast Concrete Vault with Access Hatch		
7	1	EA	8" Sch 40 PVC Vent Pipe and Fittings with 2' Cover		
8	1	EA	12" Diameter x 36" High Armorcast Standpipe Vent with 24 Vent Slots, Model P6002712, or equal		
9	1	LS	Concrete Slab for Package Pump Station – Size and Reinforcement per Foundation Plan		
10	1	LS	Fluoride Improvements (New 500-gallon Fluoride Chemical Tank and Fittings, Containment Curb Modifications, New Fluoride Vault, and Removal of Old Equipment)		
11	2	EA	14" FLG x PE DI Spool		
12	1	EA	14” FLG x FLG Gate Valve		
13	2	EA	Rosemount Model 8712E Pressure Transmitter with 125/150 FLG Drilling		
14	1	EA	14" FLG x FLG Rosemount Flow Meter, Model 8705		
15	1	EA	14" Dezurik VPB V-Port Ball Valve with ANSI 150 Flanges, Rotork Electric Motor, and Operator IQTM2000 Modulating 480 Vac Main Voltage		
16	1	EA	14" FLG x FLG DI Spool		
17	1	EA	Water Sampling Tap		
18	1	EA	14" Dismantling Joint, Romac Model DJ400 or Equal with Tie Rods		
19	1	EA	14" Combination Pressure Reducing Check Valve, Cla-Val Model 94-01		
20	3,200	LF	24" C900 DR18 (Class 235) FPVC Discharge Piping		

Item No.	Quantity (Approximate)	Unit of Measure	Item Description	Unit Price	Total
21			Not Used		
22	210	LF	18" DIP, Class 350		
23	200	LF	16" DIP, Class 350		
24	35	LF	24” DIP, Class 350		
25	1	EA	6” Gate Valve, FLG x MJ		
26	2	EA	12" Gate Valve, FLG x FLG		
27	2	EA	12” Gate Valve, FLG x RMJ		
28	2	EA	16" Gate Valve, FLG x MJ		
29	2	EA	16" Gate Valve, FLG x RMJ		
30	4	EA	18" Gate Valve, FLG x RMJ		
31	1	EA	Install City Furnished 24" Gate Valve, FLG x RMJ		
32	1	EA	24” x 16” DIP Reducer, FLG x MJ		
33	1	EA	12” x 6” DIP Reducer		
34	1	EA	16" x 14" FLG x FLG DI Concentric Reducer with MJ Restraint for DIP, EBAA Iron Series 1100 or Equal		
35	1	EA	18" x 14" FLG x FLG DI Concentric Reducer with MJ Restraint for DIP, EBAA Iron Series 1100 or Equal		
36	2	EA	24" x 12" FLG x FLG DIP Reducer		
37	1	EA	24" x 16" DIP Reducer FLG x FLG		
38	1	EA	24" x 18" DIP Reducer FLG x FLG		
39	4	EA	16" Res Solid Sleeve		
40	3	EA	12" Transition Coupling		
41	1	EA	12” MJ DI 45° Elbow with MJ Restraint for DIP, EBAA Iron Series 1100 or Equal		
42	1	EA	16” 45° Elbow, FLG x FLG		
43	1	EA	18" MJ DI 45° Elbow with MJ Restraint for DIP, EBAA Iron Series 1100 or Equal		
44	1	EA	18" MJ DI 90° Elbow with MJ Restraint for DIP, EBAA Iron Series 1100 or Equal		
45	2	EA	18" DI 45° Elbow RMJ		
46	1	EA	18" FLG x MJ DI 45° Elbow with MJ Restraint for DIP, EBAA Iron Series 1100 or Equal		
47	3	EA	24" DI 45° Elbow FLG		

Item No.	Quantity (Approximate)	Unit of Measure	Item Description	Unit Price	Total
48	4	EA	24" DI 11.25° Elbow RMJ		
49	1	EA	18” x 12” Tee FLG		
50	2	EA	16” Tee FLG x FLG x RMJ		
51	1	EA	16" x 16" x 12" Tee with Blind Flange		
52	1	EA	24" Tee FLG		
53	1	EA	24” x 12” MJ x FLG Tee		
54	1	EA	24" DIP Cross		
55	1	EA	18" x 16” DIP Cross		
56	1	EA	18" x 12” DIP Cross		
57	1	EA	12" FL x PE 5' Spool		
58	1	EA	12" FLG x PE Spool with Transition CPLG		
59	1	EA	16” FCA ACP OD		
60	4	EA	16” Solid Sleeve RMJ		
61	3	EA	16” FLG x PE DI Spool		
62	2	EA	12’ DI Spool 5’		
63	1	EA	16” DI Spool 8’		
64	1	EA	16” DI Spool 3’		
65	4	EA	16” FLG x MJ Adapter		
66	3	EA	18” DIP Spools – var. lengths		
67	1	EA	18” FLG x PE Spool – 2’		
68	1	EA	24” FLG x MJ Adapter		
69	5	EA	2" Combination Air Valve Assembly		
70	1	EA	Fire Hydrant Assembly per City Std. No 307		
71	3	EA	Pipe Supports		
72	1	LS	Jack and Bore Crossing (including 24" FPVC installed, 42” Steel Casing, and Jacking and Receiving Shafts pipe and fittings)		
73			Not used		
74	1	LS	Striping/Markings		
75	1	LS	Water Main Abandonment		
76	1	LS	Remove Pipe		
77	1	LS	BMPs/Storm Water Pollution Control Plan		
78	12	EA	Cathodic Test Stations		
79	41	EA	30# or 18# Anode Bags		
80	1	LS	Flushing Station (Gooseneck and Inlet Box)		
81	1	LS	Install Package Booster Pump Station Furnished by Supplier		

Item No.	Quantity (Approximate)	Unit of Measure	Item Description	Unit Price	Total
82	1000	LF	24” FPVC Vertical Depth Adjustments (0FT to 2FT)		
83	100	LF	24” FPVC Vertical Depth Adjustments (2FT to 4FT)		
84	10	LF	24” FPVC Vertical Depth Adjustments (4FT to 6FT)		
85	10	LF	24” FPVC Vertical Depth Adjustments (6FT to 8FT)		
86	100	LF	18” DIP Vertical Depth Adjustments (0FT to 2FT)		
87	50	LF	18” DIP Vertical Depth Adjustments (2FT to 4FT)		
88	10	LF	18” DIP Vertical Depth Adjustments (4FT to 6FT)		
89	10	LF	18” DIP Vertical Depth Adjustments (6FT to 8FT)		
90	75	LF	16” DIP Vertical Depth Adjustments (0FT to 2FT)		
91	10	LF	16” DIP Vertical Depth Adjustments (2FT to 4FT)		
92	10	LF	16” DIP Vertical Depth Adjustments (4FT to 6FT)		
93	10	LF	16” DIP Vertical Depth Adjustments (6FT to 8FT)		
94	1	LS	Electrical System		
95	250	LF	PG&E Conduit from transformer to PG&E Tie-In. two 3” conduit and one pull box		

Project No. 24173

Item No.	Quantity (Approximate)	Unit of Measure	Item Description	Unit Price	Total
1	1	LS	MOBILIZATION		
2	4468	LF	20-inch DIP (HDSS)		
3	68	LF	12-inch DIP (HDSS)		
4	1	LS	Sta 10+00.00 TIE-IN		
5	1	LS	Sta 15+34.15 60" CMP SD CROSSING		
6	1	LS	Sta 30+00.00 BORE AND JACK CASING AND CARRIER PIPE		
7	1	LS	Sta 50+76.23 FLUSHING CONNECTION		
8	1	LS	Sta 54+67.86 TIE-IN		
9	2	EA	12" GATE VALVE		
10	5	EA	20" GATE VALVE		

Item No.	Quantity (Approximate)	Unit of Measure	Item Description	Unit Price	Total
11	2	EA	20" DIP 22.5° FITTING		
12	4	EA	20" DIP 11.25° FITTING		
13	2	EA	20" X 8" DIP TEE FITTING		
14	3	EA	COMBINATION AIR VALVE		
15	4	EA	CP TEST STATION		
16	300	LF	VERTICAL DEPTH ADJUSTMENTS (0FT TO 2FT)		
17	100	LF	VERTICAL DEPTH ADJUSTMENTS (2FT TO 4FT)		
18	10	LF	VERTICAL DEPTH ADJUSTMENTS (4FT TO 6FT)		
19	10	LF	VERTICAL DEPTH ADJUSTMENTS (6FT TO 8FT)		
20	1	LS	STRIPING/MARKINGS		
21	1	LS	TRAFFIC CONTROL PLAN		
22	1	LS	BMP's/STORM WATER POLLUTION CONTROL PLAN		
23	1	LS	TRENCH SHORING		
			TOTAL	**$**	

Note: The Bidder acknowledges that the total amount set forth above is for the entire project as represented by the Contract Documents regardless of itemization. Basis of bid comparison will be the Total Bid Amount.

Attached is a bid guaranty bond duly completed by a guaranty company authorized to carry on business in the State of California in the amount of at least ten percent (10%) of the total amount of the bid, or alternately, there is attached a certified or cashier's check payable to the City in the amount of at least ten percent (10%) of the total amount of the bid.

If this Bid Proposal is accepted, bidder agrees to sign the contract and to furnish the performance bond, labor and materials bond, maintenance bond, and the required evidences of insurance within ten (10) working days after receiving written notice of the award of the contract. If bidder fails to contract as provided herein or fails to provide the bonds and/or evidence of insurance, the City may at its option, determine the acceptance thereof shall be null and void, and the forfeiture of such security accompanying this Bid Proposal shall operate and the same shall be the property of the City of Pleasanton.

This Bid Proposal shall be good and may not be modified, withdrawn or canceled for a period of ninety (90) calendar days after the date of the City's opening of bids.

Bidder hereby certifies that the licensing information hereinafter stated is true and correct. Bidder further agrees, if the bid is accepted and a contract for performance of the work is entered into with the City, to so plan work and to prosecute it with such diligence that the work shall be completed within the time stipulated in the agreement. Under the penalty of perjury bidder affirms that, to the best of bidder's knowledge, the representations made in this bid are true.

Bidders are required by law to be licensed and regulated by the contractors' State License Board. Any questions concerning a contractor may be referred to the Registrar, Contractors' State License Board.

It is a misdemeanor for any person to submit a bid to a public agency in order to engage in the business or act in the capacity of a contractor within this state without having a license therefor, except for specific cases outlined in Business and Professions Code, Section 7028.15.

_____	_____
Name of Bidder	Contractor's License Number
_____	_____
Signature of Bidder	Expiration Date
_____	_____
Print Name	Address of Bidder
_____	_____
Title of Signatory	
_____	(____)_____
State of Incorporation	Telephone Number
_____	_____
DIR Registration Number	Contractor’s Email Address

BID BOND FORM

Note: Bidders must use this form if a bid bond is to be used as bidder's security. This form is not necessary if cash, cashier's check made payable to the City, or certified check made payable to the City, accompanies the bid.

We, the undersigned, _____ ("Principal"), and _____ a corporation organized and existing under and by virtue of the laws of the State of _____ and authorized to do business in the State of California as a surety, ("Surety"), acknowledge ourselves jointly and severally bound to the CITY OF PLEASANTON for ten percent (10%) of the total bid amount.

Contractor's Bid $_____
10% Bid Bond $_____

The above amount to be paid to the CITY OF PLEASANTON as follows: If Principal's bid for the work required for the project, described below,

NEAR-TERM WATER IMPROVEMENTS
PROJECT NO. 24171 & 24173

shall be accepted and the proposed contract awarded to Principal, and if Principal shall fail to execute the contract within the time specified in the Award and Execution of Contract section of this Contract Document, and to furnish the required faithful performance and labor and material bonds; otherwise, the obligation shall be void. Bid errors shall not constitute a defense to forfeiture.

If the City of Pleasanton brings suit upon this bond and judgment is recovered, Surety shall pay all costs incurred by the CITY OF PLEASANTON in bringing such suit, including reasonable attorney's fees.

IN WITNESS WHEREOF, we hereunto set our hands and seals this ___ day of _____, 20__.

_____
Principal

_____
By:

_____
Surety:

_____
By:

(Notarization of Surety's signature required)

(corporate seal)

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CERTIFICATION OF BIDDER'S

EXPERIENCE AND QUALIFICATIONS

The undersigned Bidder certifies that the Bidder is, at the time of the bidding, and shall be, throughout the period of the contract, licensed by the State of California to do the type of work required under the terms of the contract documents. Bidder further certifies that the Bidder is skilled and regularly engaged in the general class and type of work called for in the contract documents.

The Bidder represents that the Bidder is competent, knowledgeable and has special skills in the nature, extent and inherent conditions of the work to be performed. Bidder further acknowledges that there are certain peculiar and inherent conditions existent in the construction of the particular facilities which may create, during the construction program, unusual or peculiar unsafe conditions hazardous to persons and property. Bidder expressly acknowledges that the Bidder is aware of such peculiar risks and has the skill and experience to foresee and to adopt protective measures to adequately and safely perform the construction work with respect to such hazards.

Bidder has been engaged in the contracting business, under the present business name, for _____ years. Experience in work of a similar nature to that called for in the contract documents extends over a period of _____ years.

BIDDER'S CONTRACT EXPERIENCE

The Bidder shall list below three projects completed in the last seven (7) years of similar size and complexity that indicate the Bidder's experience as a Contractor.

1.

Project	Amount
Owner	Contact
Telephone	Completion Date

2.

Project	Amount
Owner	Contact
Telephone	Completion Date

3.

Project	Amount
Owner	Contact
Telephone	Completion Date

Name of Bidder _____

Signed this _____ day of _____, 20_____.

BIDDER'S Labor Classifications

The Bidder shall list below the anticipated labor classifications completed by Bidder. List Subcontractor's classifications under List of Subcontractors.

☐ ASBESTOS	☐ BOILERMAKER	☐ BRICKLAYERS	☐ CARPENTERS
☐ CARPET/LINOLEUM	☐ CEMENT MASONS	☐ DRYWALL FINISHER	☐ DRYWALL/LATHERS
☐ ELECTRICIANS	☐ ELEVATOR MECHANIC	☐ GLAZIERS	☐ IRON WORKERS
☐ LABORERS	☐ MILLWRIGHTS	☐ OPERATING ENG	☐ PAINTERS
☐ PILE DRIVERS	☐ PIPE TRADES	☐ PLASTERERS	☐ ROOFERS
☐ SHEET METAL	☐ SOUND/COMM	☐ SURVEYORS	☐ TEAMSTER
☐ TILE WORKERS	☐ _____	☐ _____	☐ _____

B. BIDDER'S FINANCIAL RESPONSIBILITY

Reference is hereby made to the following banks and surety companies as to the financial responsibility and general reliability of the Bidder:

1. Name of Bank _____

   Address _____

2. Name of Bank _____

   Address _____

3. Surety Company _____

   Address _____

4. Surety Company _____

   Address _____

C. LIST OF SUBCONTRACTORS

In conformance with Section 2.1 – 1.10 of the Caltrans Standard Specifications and § 4100 of California Public Contract Code, the Bidder shall provide the following information for each Subcontractor to whom the Bidder proposes to subcontract portions

of the work in an amount in excess of one-half of one percent of the total Bid Proposal OR $10,000, whichever is greater.

1. Name of Subcontractor _____

   Contractor License Number _____

   Address _____ Phone No. _____

   Individual, Partnership or Corporation _____

   Dollar Value of work to be Performed _____

   Work to be Performed _____

   Labor Classification/s _____

   DIR Registration # _____

   CSLB# _____ Email _____

2. Name of Subcontractor _____

   Contractor License Number _____

   Address _____ Phone No. _____

   Individual, Partnership or Corporation _____

   Dollar Value of work to be Performed _____

   Work to be Performed _____

   Labor Classification/s _____

   DIR Registration # _____

   CSLB# _____ Email _____

3. Name of Subcontractor _____

   Contractor License Number _____

   Address _____ Phone No. _____

   Individual, Partnership or Corporation _____

   Dollar Value of work to be Performed _____

Work to be Performed _____

Labor Classification/s _____

DIR Registration # _____

CSLB# _____ Email _____

4. Name of Subcontractor _____

Contractor License Number _____

Address _____ Phone No. _____

Individual, Partnership or Corporation _____

Dollar Value of work to be Performed _____

Work to be Performed _____

Labor Classification/s _____

DIR Registration # _____

CSLB# _____ Email _____

5. Name of Subcontractor _____

Contractor License Number _____

Address _____ Phone No. _____

Individual, Partnership or Corporation _____

Dollar Value of work to be Performed _____

Work to be Performed _____

Labor Classification/s _____

DIR Registration # _____

CSLB# _____ Email _____

6. Name of Subcontractor _____

Contractor License Number _____

Address _____ Phone No. _____

Individual, Partnership or Corporation _____

Dollar Value of work to be Performed _____

Work to be Performed _____

Labor Classification/s _____

DIR Registration # _____

CSLB# _____ Email _____

Signature of Bidder: _____

INSTRUCTIONS TO BIDDERS

General

The City of Pleasanton, hereinafter referred to as "City," will receive at the City Clerk's Office of the City of Pleasanton, Civic Center, 123 Main Street, Pleasanton, California, until the hour and day specified in the "Notice to Bidders," sealed Bid Proposals for furnishing materials, equipment and/or labor for performing the work described in these Contract Documents. All Bid Proposals shall be submitted in accordance with the provisions of the "Proposal Requirements and Conditions" set forth under Section 2 of the Standard Specifications of the State of California, except as modified herein.

Plan Holder List

The City requires all Bidders to be on the project's plan holder list prior to submitting the Bid Proposal. Please see Notice to Bidders for instructions on how to request to be added to the plan holder list.

Bid Proposal Form

All Bid Proposals shall be submitted on the Bid Proposal forms which are bound herein. All Bid Proposal forms shall be filled in completely in ink with all signature blocks signed by the Bidder. The completed Bid Proposal forms shall remain bound with the Contract Documents provided and shall be sealed in an envelope addressed to the City of Pleasanton, California and clearly labeled with identifying project name and number, and bid opening date.

Delivery of Bid Proposal

The Bid Proposal shall be delivered by the time and to the place set forth in the "Notice to Bidders." It is the Bidder's sole responsibility to see that his or her Bid Proposal is received in proper time. Any proposal received after the time fixed for opening of bids shall be returned to the Bidder unopened.

Opening of Bid Proposals

The Bid Proposals shall be publicly opened and read at the time and place fixed in the "Notice to Bidders."

Modifications and Alternative Proposals

Each Bidder represents that his or her Bid Proposal is based upon the materials and equipment described in the Contract Documents. Unauthorized conditions, limitations or provisions attached to a Bid Proposal will render it non-responsive and may cause its rejection. The completed Bid Proposal forms shall be without interlineations, alterations or erasures. Alternative Bid Proposals will not be considered unless written request has been submitted to the Engineer for approval at least seven (7) calendar days prior to the

date for receipt of Bids. The request shall include the name of substitute material or equipment drawings, cut sheets, performance and test dates and any other data or information necessary for complete evaluation. If the Engineer approves any proposed substitution, such approval shall be set forth in an Addendum. Oral, telegraphic, or telephonic Bid Proposals or modifications will not be considered.

Contractor's Department of Industrial Relations Registration

A bid will not be accepted nor any contract entered into without proof that the bidder and its subcontractors are registered with the California Department of Industrial Relations to perform public work pursuant to Labor Code Section 1725.5, subject to limited legal exceptions.

Discrepancies in Bid Proposals

In the event there is more than one bid item on a Bid Proposal form, the Bidder shall furnish a price for all items and failure to do so will render the Bid Proposal non-responsive and may cause its rejection. In the event there are unit price bid items on a Bid Proposal form and the "amount" indicated for a unit price bid item does not equal the product of the unit price and quantity, the unit price shall govern and the amount will be corrected accordingly. In the event there is more than one bid item on the Bid Proposal form and the total indicated on the Bid Proposal form does not agree with the sum of the amounts bid on the individual items, the price bid on the individual items shall govern and the total on the proposal will be corrected accordingly.

Bid Security

Each Bid Proposal shall be accompanied by cash, a cashier's check or a certified check, amounting to ten percent (10%) of the Bid, payable to the order of the City of Pleasanton or by a bond for that amount and so payable in the form contained in this bid package. The amount so posted shall be forfeited to the City if the successful bidder does not, within ten (10) working days not including Saturday, Sunday and legal holidays after date of postage of mailed written notice that the contract has been awarded, enter into a contract with the City for the work.

After the contract is duly entered into by the successful bidder, the amount of the deposit will be returned to the Bidder. All certified checks, cashier's checks, and cash deposits of the unsuccessful bidders will be returned to the bidders within two (2) weeks after the contract is entered into by the successful bidder.

Miscellaneous

For requirements on Bidder's examination of site, withdrawal of proposals, and disqualification of bidders, refer to Section 2 of the Standard Specifications of the State of California.

AWARD AND EXECUTION OF CONTRACT

General

Award and execution of Contract shall be in accordance with "Award and Execution of Contract" set forth under Section 3 of the Standard Specifications of the State of California except as modified herein.

Award of Contract

The City reserves the right to reject for any reason any or all Bid Proposals.

No Bidder shall modify, withdraw or cancel a Bid Proposal or any part thereof for ninety (90) calendar days after the time designated for the opening of Bids in the "Notice to Bidders." Within this time period of ninety (90) days and if the City so chooses, the Contract shall be awarded to the lowest responsible Bidder.

In accordance with the provisions of California Business & Professions Code Section 7028.5, the City has determined that at the time that a bid is submitted, the bidder shall possess a valid **Class A General Engineering** Contractor license. Failure to possess the specified license shall render the bid as non-responsive and shall act to bar award of the Contract to any Bidder not possessing said license at the time of bid.

Execution of Contract

Within ten (10) working days, not including Saturday, Sundays and legal holidays, after date of postage of mailed notice of award to the lowest responsible Bidder, the following documents shall be submitted to the City.

- Executed contract
- Contract bonds as required by the forms contained herein including:

  ◊ Faithful Performance Bond for 100% of contract price
  ◊ Labor and Material Bond for 100% of contract price
  ◊ Maintenance Bond for 10% of contract price

- Certificates of insurance
- Evidence of a current business license to conduct business in the City of Pleasanton

Failure to submit the above shall be just cause for forfeiture of the Bid Proposal security.

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CONTRACT

NEAR-TERM WATER IMPROVEMENTS
PROJECT NO. 24171 & 24173

THIS CONTRACT is made and entered into this _____ day of _____, 20__ by and between _____, ("Contractor"), whose address is _____, and telephone number is _____ and the CITY OF PLEASANTON, a municipal corporation ("City").

W I T N E S S E T H:

WHEREAS, the City has awarded to the Contractor a contract for **NEAR-TERM WATER IMPROVEMENTS, PROJECT NO. 24171 & 24173**

NOW, THEREFORE, in consideration of the mutual promises set forth herein, the parties agree as follows:

1. Work to be Performed. The work will generally consist of:

For Project No. 24171 Stoneridge (F-1) Line and Turnout No. 4:

The work shall consist of, but is not limited to, providing and installing 3,500 linear feet of 24-inch fusible polyvinyl chloride potable water main by open trench; 50 linear feet of 24-inch, 120 linear feet of 18-inch, and 200 linear feet of 16-inch HDSS Class 350 ductile iron potable water main by open trench; 40 linear feet of fusible pipe in steel casing by jack and bore; connection to city's existing 12-inch and 16-inch potable mains. All improvements are to be restrained, externally kicked, and cathodically protected. Work also includes, but is not limited to, site preparation for installation of prepacked booster station (prepackaged station by others); construction of new turnout; remobilization to install prepacked station including electrical tie-ins; connection to new potable main and Zone 7's existing 20-inch line; coordination with booster station supplier for testing and acceptance of system; disinfection, flushing, testing and acceptance of new water mains; abandonment and removal of pipe; and street, landscape, and hardscape restoration.

For Project No. 24173 Sunol Pipeline Improvements (F-7 Line):

The work shall consist of, but is not limited to, providing and installing 4,500 linear feet of 20-inch HDSS Class 350 potable water main by open trench; 30 linear feet of 20-inch ductile iron pipe in steel casing by jack and bore; connection to city's existing 12-inch, 20-inch, and 24-inch potable mains. All improvements are to be restrained, externally kicked, and bonded. Work also includes, but is not limited to, disinfection, flushing, testing and acceptance of new water main; and street, landscape, and hardscape restoration.

Said work is more particularly shown in the following documents which are on file with the Public Works Department, Engineering Division of the City and are incorporated herein by this reference:

A. Approved Plans and Specifications entitled the **NEAR-TERM WATER IMPROVEMENTS, PROJECT NO. 24171 & 24173**and addenda thereto, if any.

B. Contract Change Orders approved by the City Engineer, done in accordance with the Standard Specifications.

C. The elements of the proposal submitted to the City by the Contractor, which the City has accepted.

2. Compensation. The City shall pay the Contractor for work actually performed at the unit prices set out in the Contractor's proposal to the City as set forth in Exhibit A of this agreement and incorporated herein. The quantities of work stated therein are estimates only; actual quantities will be measured for payment in accordance with the specifications.

3. Method of Payment.

A. Progress Payments. As of the twentieth day of each month, the Contractor may submit for review a request for progress payment, listing the amount and value of work actually performed during the preceding month, or part thereof. Upon the City Engineer's review and approval, including adjustments if any, City shall make a progress payment to the Contractor.

B. 5% Retention. Five percent (5%) of the amount due shall be retained by the City as retention. The City shall retain five percent (5%) of the contract amount for thirty-five (35) days after the Notice of Completion for the work is recorded. The Contractor may elect to receive 100 percent of payments due under the contract documents from time to time, without retention from any portion of the payment by the City, by depositing securities of equivalent value with the City in accordance with the provisions of Section 22300 of the California Public Contract Code. Such securities, if deposited by the Contractor, shall be valued by the City, whose decision on valuation of the securities shall be final. Securities eligible for investment under this provision shall be limited to those listed in Section 16430 of the California Government Code.

C. Time of Payment. Requests submitted promptly as of the 20th day of each month will be paid by the 10th day of the following month.

4. Incorporation of Contract Documents. This Contract expressly incorporates all terms and conditions contained in the Contract Documents. In the event there is any conflict between this Contract and the Contract Documents, this Contract shall control.

5. Indemnification. Contractor shall indemnify, save and hold harmless from and defend the City, members of the City Council and their agents, servants and employees, against any and all claims, costs, demands, causes of action, suits, losses, expense or other detriment or liability arising from or out of acts or omissions of Contractor, its agents, sub-contractors, officials or employees, in connection with the execution of the work covered by this Contract or any amendments thereto.

6. Certification re: Workers' Compensation. In accordance with Section 1861 of the California Labor Code, each contractor to whom a public works contract is awarded shall sign and file with the awarding body the following certification prior to performing the work of the contract: "I am aware of the provisions of Section 3700 of the Labor Code which require every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that code, and I will comply with such provisions before commencing the performance of the work of this contract."

7. Department of Industrial Relations: Pursuant to Labor Code section 1771.1, the Bidder and its Subcontractors must be registered and qualified to perform public work pursuant to section 1725.5 of the Labor Code, subject to limited legal exceptions.

8. Independent Contractor. The Contractor is an independent contractor retained by the City to perform the work described herein. All personnel employed by the Contractor, including subcontractors, and personnel of said subcontractors, are not and shall not be employees of the City.

9. Warranty Against Defects. The Contractor hereby warrants all work done under this contract against all defects in materials and workmanship for a period of 12 months following City's acceptance of said work. If any defects occur within said 12 months, the Contractor shall be solely responsible for the correction of those defects.

10. Counterparts and Electronic Signatures. This contract may be executed in multiple counterparts, each of which shall be an original and all of which together shall constitute one agreement. Counterparts may be delivered via facsimile, electronic mail (including pdf or any electronic signature complying with U.S. federal E-Sign Act of 2000 (15 U.S. Code §7001 et seq.), California Uniform Electronic Transactions Act (Cal. Civil Code §1633.1 et seq.), or other applicable law) or other transmission method, and any counterpart so delivered shall be

deemed to have been duly and validly delivered and be valid and effective for all purposes.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement the date and year first above written.

CONTRACTOR:

By: _____
Its Authorized Agent

By: _____
Its Authorized Agent
(Second signature required if a corporation)

CITY OF PLEASANTON:

By: _____
Gerry Beaudin, City Manager

ATTEST:

_____
Jocelyn Kwong, City Clerk

APPROVED AS TO FORM:

_____
Daniel G. Sodergren, City Attorney

Bond No. _____

CONTRACTOR'S BOND FOR FAITHFUL PERFORMANCE

KNOW ALL PERSONS BY THESE PRESENTS:

Whereas, The City Council of the City of Pleasanton, State of California, and _____ ("Principal") have entered into an agreement whereby Principal agrees to install and complete certain designated public improvements, which said agreement, dated _____, 20__, and identified as **NEAR-TERM WATER IMPROVEMENTS, PROJECT NO. 24171 & 24173**, is hereby referred to and made a part hereof; and

Whereas, Said Principal is required under the terms of said agreement to furnish a bond for the faithful performance of said agreement.

Now, therefore, we, Principal and _____ ("Surety"), are held and firmly bound unto the City of Pleasanton, in the penal sum of _____ dollars ($_____) lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, successors, executors and administrators, jointly and severally, firmly by these presents.

The condition of this obligation is such that if the above bounded Principal, Principal's heirs, executors, administrators, successors or assigns, shall in all things stand to and abide by, and well and truly keep and perform the covenants, conditions and provisions in the said agreement and any alteration thereof made as therein provided, on Principal's part, to be kept and performed at the time and in the manner therein specified, and in all respects according to their true intent and meaning, and shall indemnify and save harmless City of Pleasanton, 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 and effect.

As a part of the obligation secured hereby and in addition to the face amount specified therefor, there shall be included costs and reasonable expenses and fees, including reasonable attorney's fees, incurred by City of Pleasanton in successfully enforcing such obligation, all to be taxed as costs and included in any judgment rendered.

Surety hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the agreement or to the work to be performed thereunder or the specifications accompanying the same shall in anywise affect its obligations on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the agreement or to the work or to the specifications.

In witness whereof, this instrument has been duly executed by the Principal(s) and Surety above named, on _____, 20____..

Contractor Surety

By: _____ By:_____

By: _____ By:_____

Date Signed: _____ _____

Surety Address

_____

_____

_____

Surety's Phone No.

(attach acknowledgments)

LABOR AND MATERIAL BOND

Whereas, the City Council of the City of Pleasanton, State of California, and _____ ("Principal") have entered into an agreement whereby Principal agrees to install and complete certain designated public improvements, which agreement, dated _____, 20__, and identified as **NEAR-TERM WATER IMPROVEMENTS, PROJECT NO. 24171 & 24173**, is hereby referred to and made a part hereof; and

Whereas, Under the terms of the agreement, Principal is required before entering upon the performance of the work, to file a good and sufficient payment bond with the City of Pleasanton to secure the claims to which reference is made in Title 3 (commencing with Section 9000) of Part 6 of Division 4 of the Civil Code.

Now, therefore, Principal and the undersigned as corporate surety, are held firmly bound unto the City of Pleasanton and all contractors, subcontractors, laborers, material suppliers, and other persons employed in the performance of the agreement and referred to in Title 3 (commencing with Section9000) of Part 6 of Division 4 of the Civil Code in the sum of _____ dollars ($_____), for materials furnished or labor thereon of any kind, or for amounts due under the Unemployment Insurance Act with respect to this work or labor, that the surety will pay the same in an amount not exceeding the amount hereinabove set forth, and also in case suit is brought upon this bond, will pay, in addition to the face amount thereof, costs and reasonable expenses and fees, including reasonable attorney's fees, incurred by City of Pleasanton in successfully enforcing this obligation, to be awarded and fixed by the court, and to be taxed as costs and to be included in the judgment therein rendered.

It is hereby expressly stipulated and agreed that this bond shall inure to the benefit of any and all persons, companies, and corporations entitled to file claims under Title3 (commencing with Section 9000) of Part 6 of Division 4 of the Civil Code, so as to give a right of action to them 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 and effect.

The surety hereby stipulates and agrees that no change, extension of time, alteration, or addition to the terms of the agreement 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 witness whereof, this instrument has been duly executed by Principal and surety above named, on _____, 20____.

Principal	Surety
By: _____	By: _____

(Signature of Principal and Surety must be notarized)

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Bond No. _____

CONTRACTOR'S BOND FOR ONE YEAR MAINTENANCE

NEAR-TERM WATER IMPROVEMENTS
PROJECT NO. 24171 & 24173

KNOW ALL PERSONS BY THESE PRESENTS:

WHEREAS, the City of Pleasanton has awarded and _____ ("Contractor") is about to execute a Contract for the above-referenced Project ("Contract") and the terms thereof, which are incorporated herein by reference, require the furnishing of a bond with said Contract providing for maintenance for a period of one (1) year from the date of acceptance by the City Council of said contract by the Contractor.

NOW, THEREFORE, WE, Contractor and _____ ("Surety"), are held firmly bound unto the City of Pleasanton, as Agency in the penal sum of:
_____ DOLLARS, ($_____), lawful money of the United States of America, said sum being ten percent (10%) of the estimated amount payable by Agency under the terms of the contract, for payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that if the above bounden _____, Principal(s), within a period of one (1) year after the completion and acceptance of the project fulfills the provisions of the Contract and complies with any necessary repairs or replacement of faulty materials to the **NEAR-TERM WATER IMPROVEMENTS, PROJECT NO. 24171 & 24173** and related facilities, then the above obligation shall be void; otherwise to remain in full force and effect.

No cancellation or termination of this bond by Surety shall be effective unless thirty (30) days prior written notice thereof has been delivered to the City Engineer, provided that no cancellation or termination shall affect any liability incurred or accrued hereunder prior to the expiration of said thirty (30) day period or any work performed under any Contract issued by the City.

This bond is executed in accordance with the rules, regulations, standards, specifications and policies of the City of Pleasanton.

Bond No. _____

IN WITNESS WHEREOF, the Principal(s) and Surety have caused these presents to be executed, and corporate names and seals to be hereunto attached by proper officers hereunto duly authorized, the day and year first herein-above written.

Contractor

By:

By:

_____
Date Signed

Surety

By: _____

By: _____

Surety Address:

_____

_____

Surety Phone No. ( ) _____

(attach acknowledgments)

GENERAL PROVISIONS

Unless otherwise stated in these Contract Documents or deemed inapplicable by the Engineer, the General Provisions of the State of California Standard Specifications are hereby incorporated with the following General Provisions.

SECTION 1. DEFINITIONS AND TERMS

As used in these Contract Documents unless the context otherwise requires, the following terms have the meanings indicated:

Addenda: Are written or graphic instruments, clarifications or corrections, issued prior to the execution of the contract, which modify or interpret the Contract Documents.

Bidder: Any individual, partnership or corporation submitting a Bid Proposal for the work described in the Contract Documents.

Bidding Documents: Includes the Notice to Bidders, the Bid Proposal, Bid Bond, Contractor's Information Forms including the Contractor's past experience, financial responsibility and Subcontractors, and Instructions to Bidders.

City: The City of Pleasanton.

City Standard Specifications and Standard Details: Means the November 2016 edition of the City's Standard Specifications and Standard Details.

Contractor: Any individual, partnership or corporation that has entered into a Contract with the City to perform the work described in the Contract Documents.

Contract Documents: Includes the Bidding Documents, the Award and Execution of Contract Requirements, the Contract, the Labor and Material Bond, the Performance Bond, the Maintenance Bond, the City General Provisions, the Special Provisions, Project Plans, the City of Pleasanton Standard Specifications, and Standard Details, the State Standard Specifications and Plans, all Addenda issued by the City and all Change Orders executed by the City.

Engineer: The City Engineer of the City of Pleasanton, acting either directly or through properly authorized agents, such agents acting within the scope of the particular duties entrusted to them.

General Provisions: Those Specifications that apply to all projects unless specifically modified by Special Provisions.

Project Plans: Drawings specifically prepared for a particular project.

Special Provisions: Specifications specifically prepared for a particular project.

State Standard Specifications and Standard Plans: Means the May 2015 edition of the Standard Specifications and Standard Plans of the State of California, Department of Transportation. Any reference therein to the State of California or a State agency, office or officer shall be interpreted to refer to the City or its corresponding agency, office or officer acting under this contract.

Subcontractor: Any individual, partnership or corporation that has contracted with the Contractor to provide labor, equipment and/or materials described in the Contract Documents which is an amount in excess of one-half of one (1) percent of the Contractor's total Bid.

Work: Material, equipment and labor to be provided to City by the Contractor as defined by the Contract Documents.

SECTION 2. SCOPE OF WORK

The Work presented in these Contract Documents shall be done in accordance with: 1) the Special Provisions and Project Plans, 2) the City Standard Specifications and Standard Details and 3) the State Standard Specifications and Standard Plans. In case of conflicting portions, the above order of precedence shall prevail. In case of conflict between the specifications and drawings, the specifications shall prevail.

SECTION 3. CONTROL OF WORK AND MATERIALS

3-01. Protection of Workers in Trench Excavations: As required by Section 6705 of the California Labor Code and in addition thereto, whenever work under the Contract involves the excavation of any trench or trenches 5 feet or more in depth, the Contractor shall submit for acceptance by the City or by a registered civil or structural engineer, employed by the City, to whom authority to accept has been delegated, in advance of excavation, a detailed plan showing the design of shoring, bracing, sloping, or other provisions to be made for worker protection from the hazard of caving ground during the excavation, of such trench or trenches. If such plan varies from the shoring system standards established by the Construction Safety Orders of the Division of Industrial Safety, the plan shall be prepared by a registered civil or structural engineer employed by the Contractor, and all costs therefore shall be included in the price named in the Contract for completion of the Work as set forth in the Contract Documents. Nothing in this Section shall be construed to impose tort liability on the City, the Engineer, nor any of their officers, agents, representatives, or employees.

3-02. Substitution of Materials; Assignment of Certain Rights: In accordance with the provisions of Section 3400 of the California Public Contract Code, a Contractor shall be provided a period of not less than 35 days after award of the contract for submission of data substantiating a request for a substitution of "an equal" item.

In accordance with Section 4552 of the Government Code, the Bidder shall conform to the following requirements: In submitting a bid to a public purchasing body, the Bidder offers and agrees that if the bid is accepted, it will assign to the purchasing body all

rights, title and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Sec. 15) or under the Cartwright Act [Chapter 2 (commencing with Section 16700) of Part 2 of Division 7 of the Business and Professions Code], arising from purchase of goods, materials, or services by the bidder for sale to the purchasing body pursuant to the bid. Such assignment shall be made and become effective at the time the purchasing body tenders final payment to the Bidder.

SECTION 4. LEGAL RELATIONS AND RESPONSIBILITY

4-01. Travel and Subsistence Payments:

(a) As required by Section 1773.1 of the California Labor Code the Contractor shall pay travel and subsistence payments to each worker needed to execute the Work, as such travel and subsistence payments are defined in the applicable collective bargaining agreements filed in accordance with this Section.

(b) To establish such travel and subsistence payments, the representative of any craft, classification, or type of worker needed to execute the contracts shall file with the Department of Industrial Relations fully executed copies of collective bargaining agreements for the particular craft, classification or type of work involved. Such agreements shall be filed within 10 days after their execution and thereafter shall establish such travel and subsistence payments whenever filed 30 days prior to the call for bids.

4-02. State Wage Determination:

(a) As required by Sections 1770 et seq., of the California Labor Code, the Contractor shall pay not less than the prevailing rate of per diem wages as determined by the Director of the California Department of Industrial Relations. Copies of such prevailing rate of per diem wages are on file at the City's Engineering Counter, which copies shall be made available to any interested party on request. The Contractor shall post a copy of such determination at each job site.

(b) As provided in Section 1775 of the California Labor Code, the Contractor shall, as a penalty to the City, forfeit $50.00 for each calendar day, or portion thereof, for each worker paid less than the prevailing rates as determined by the City Engineer for such work or craft in which such worker is employed for any public work done under the contract by it or by any subcontractor under it.

4-03. Payroll Records; Retention; Inspection; Compliance Penalties; Rules and Regulations

(a) As required under the provisions of Section 1776 of the California Labor Code, each Contractor and 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 or her in connection with the public work.

(b) The payroll records enumerated in Paragraph 4-03(a), herein, shall be certified and shall be available for inspection at all reasonable hours at the principal office of the Contractor on the following basis:

1. A certified copy of an employee's payroll record shall be made available for inspection or furnished to the employee or his or her authorized representative on request.

2. A certified copy of all payroll records enumerated in Paragraph 4-03(a), herein, shall be made available for inspection or furnished upon request to a representative of the body awarding the contract, the Division of Labor Standards Enforcement, and the Division of Apprenticeship Standards of the Department of Industrial Relations.

3. A certified copy of all payroll records enumerated in Paragraph 4-03(a), herein, shall be made available upon request by the public for inspection or copies thereof made; provided, however, that a request by the public shall be made through either the body awarding the contract, the Division of Apprenticeship Standards, or the Division of labor Standards Enforcement. If the requested payroll records have not been provided pursuant to subparagraph 4-03(b2), herein, the requesting party shall pay the costs of preparation by the Contractor, subcontractors, and the entity through which the request was made. The public shall not be given access to the records at the principal offices of the Contractor.

(c) Each Contractor shall file a certified copy of the records, enumerated in Paragraph 4-03(a) with the entity that requested the records within 10 days after receipt of a written request.

(d) Any copy of records made available for inspection and copies furnished upon request to the public or any public agency by the awarding body, the Division of Apprenticeship Standards, or the Division of Labor Standards Enforcement, shall be marked or obliterated in such a manner as to prevent disclosure of an individual's name, address, and social security number. The name and address of

the Contractor awarded the contract or performing the contract shall not be marked or obliterated.

(e) The Contractor shall inform the body awarding the contract of the location of the records enumerated under Paragraph 4-03(a) including the street address, city and county, and shall, within five (5) working days, provide a notice of change of location and address.

(f) In the event of noncompliance with the requirements of this Article, the Contractor shall have ten (10) days in which to comply subsequent to receipt of written notice specifying in what respects the Contractor must comply with this Article. Should noncompliance still be evident after the 10-day period, the Contractor shall, as a penalty to the state or political subdivision on whose behalf the Contract is made or awarded, forfeit $25.00 dollars 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, these penalties shall be withheld from progress payments then due. Responsibility for compliance with these Paragraphs 4-03(a) through 4-03(f) lies with the Contractor.

(g) In conformance with State Bill 854 all contractors and subcontractors must furnish electronic certified payroll records directly to the Labor Commissioner (aka Division of Labor Standards Enforcement) as of projects awarded on or after April 1, 2015 unless exempted by federal or state law.

4-04. Apprentices: Attention is directed to Sections 1777.5 and 1777.6 and 1777.7 of the California Labor Code and Title 8, California Administrative Code Section 200 et seq. To insure compliance and complete understanding of the law regarding apprentices, and specifically the required ratio thereunder, the Contractor (and subcontractors) should, where some question exists, contact the Division of Apprenticeship Standards prior to commencement of the work. Responsibility for compliance with this Section 4.04 lies with the Contractor. The City policy is to encourage the employment and training of apprentices on its construction contracts as may be permitted under local apprenticeship standards.

4-05. Working Hours. The Contractor shall comply with all applicable provisions of Section 1810 to 1815, inclusive, of the California Labor Code relating to working hours. The Contractor shall, as a penalty of the City, forfeit $25.00 for each worker employed in the execution of the contract by the Contractor or by any Subcontractor for each calendar day during which such worker is required or permitted to work more than eight (8) hours in any one calendar day and 40 hours in any one calendar week, unless such worker receives compensation for all hours worked in excess of eight (8) hours at not less than 1-1/2 times the basic rate of pay.

4-06. Workers' Compensation:

(a) In accordance with the provisions of Section 1860 of the California Labor Code, the Contractor's attention is directed to the requirement that in accordance with the provisions of Section 3700 of the California Labor Code, every contractor will be required to secure the payment of compensation of his or her employees.

(b) In accordance with the provisions of Section 1861 of the California Labor Code, each Contractor to whom a public works contract is awarded shall sign and file with the awarding body the following certification prior to performing the work of the contract: "I am aware of the provisions of Section 3700 of the Labor Code which require every employer to be insured against liability for worker's compensation or to undertake self-insurance in accordance with the provisions of that code, and I will comply with such provisions before commencing the performance of the work of this contract."

4-07. Prime Contractor Job Site Postings. Pursuant to Labor Code Section 1771.4, Contractor is required to post all job site notices prescribed by law or regulation. The contractor shall comply with all applicable provisions of section 16451 (d) of California Labor Code relating to the posting of job site notices prescribed by regulation.

4-08. Insurance Requirements for Contractors: BIDDER'S ATTENTION IS DIRECTED TO THE INSURANCE REQUIREMENTS BELOW. IT IS HIGHLY RECOMMENDED THAT BIDDERS CONFER WITH THEIR RESPECTIVE INSURANCE CARRIERS OR BROKERS TO DETERMINE IN ADVANCE OF BID SUBMISSION THE AVAILABILITY OF INSURANCE CERTIFICATES AND ENDORSEMENTS AS PRESCRIBED AND PROVIDED HEREIN. IF AN APPARENT LOW BIDDER FAILS TO COMPLY STRICTLY WITH THE INSURANCE REQUIREMENTS, THAT BIDDER MAY BE DISQUALIFIED FROM AWARD OF THE CONTRACT.

Contractor shall procure and maintain for the duration of this contract, including one year maintenance period, contract insurance against claims for injuries to persons or damages to property which may arise from or in connection with the performance of the work hereunder by the Contractor, the Contractor's agents, representatives, employees or subcontractors. The cost of such insurance shall be included in the Contractor's bid.

(a) Minimum Scope of Insurance

Coverage shall be at least as broad as:

1. Insurance Services Office form number CG 00 01 (ED. 1/96) covering Commercial General Liability and name the City as additional insured.

2. Insurance Services Office form number CA 00 01 (Ed. 12/93) covering Automobile Liability, Code 1 "any auto."

3. Workers' Compensation insurance as required by the Labor Code of the State of California and Employers Liability insurance, and an endorsement for waiver of subrogation.

(b) Minimum Limits of Insurance

Contractor shall maintain limits no less than:

1. General Liability: $2,000,000 per occurrence for bodily injury, personal injury and property damage. If Commercial General Liability Insurance or other form with a general aggregate limit is used, either the general aggregate limit shall apply separately to this project/location or the general aggregate limit shall be twice the required occurrence limit.

2. Automobile Liability: $2,000,000 per accident for bodily injury and property damage.

3. Workers' Compensation and Employers Liability: Workers' compensation limits as required by the Labor Code of the State of California and Employers Liability limits of $2,000,000 per accident.

(c) Deductibles and Self-Insured Retentions

Any deductibles or self-insured retentions must be declared to and approved by the City. At the option of the City, either: the insurer shall reduce or eliminate such deductibles or self-insured retentions as respects the City, its officers, officials, employees and volunteers; or the Contractor shall procure a bond guaranteeing payment of losses and related investigations, claim administration and defense expenses.

(d) Other Insurance Provisions

The policies are to contain, or be endorsed to contain, the following provisions:

1. General Liability and Automobile Liability Coverages

   a. The City and Zone 7, its officers, officials, employees and volunteers are to be covered as additional insureds as respects: liability arising out of activities performed by or on behalf of the Contractor; products and completed operations of the Contractor; premises owned, occupied or used by the Contractor; or automobiles owned, leased, hired or borrowed by the Contractor. The coverage shall contain no special limitations on the scope of protection afforded to the City, its officers, officials, employees or volunteers.

   b. The Contractor's insurance coverage shall be primary insurance as respects the City, its officers, officials, employees and volunteers.

Any insurance or self-insurance maintained by the City, its officers, officials, employees or volunteers shall be excess of the Contractor's insurance and shall not contribute with it.

c. The specific coverage obligations set forth in this Section 4-07 are minimums only, and the Contractor shall have the obligation to provide the minimum coverages stated in these Specifications or such greater or broader coverage, if available in the Contractor's policies.

d. Any failure to comply with reporting provisions of the policies shall not affect coverage provided to the City, its officers, officials, employees or volunteers.

e. The Contractor's insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.

2. Workers' Compensation and Employers Liability Coverage

The insurer shall agree to waive all rights of subrogation against the City, its officers, officials, employees and volunteers for losses arising from work performed by the Contractor for the Agency.

3. All Coverages

Each insurance policy required by this clause shall be endorsed to state that coverage shall not be suspended, voided, canceled by either party, reduced in coverage or in limits except after thirty (30) days' prior written notice by certified mail, return receipt requested, has been given to the City.

(e) Acceptability of Insurers

Insurance is to be placed with insurers with a Best's rating of no less than A:VII.

(f) Verification of Coverage

The Contractor shall furnish the City with certificates of insurance and with original endorsements effecting coverage required by this clause. The certificates and endorsements for each insurance policy are to be signed by a person authorized by that insurer to bind coverage on its behalf. The certificates and endorsements may be on forms provided by the City. Where by statute, the City's workers' compensation-related forms cannot be used, equivalent forms approved by the Insurance Commissioner are to be substituted. All certificates and endorsements are to be received and approved by the City before work commences. The City reserves the right to require insurance policies, at any time.

(g) Subcontractors

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

4-09. Department of Industrial Relations: **This Contract** will be subject to compliance monitoring and enforcement by the California Department of Industrial Relations, pursuant to Labor Code section 1771.4 Attention is directed to Section 1725.5 of the California Labor Code. To insure compliance and complete understanding of the law regarding contractor registration the Contractor (and subcontractors) should, where some question exists, contact the Department of Industrial Relations prior to submission of bid. Responsibility for compliance with this Section lies with the Contractor and Sub contractors.

SECTION 5. PROSECUTION AND PROGRESS

5-01. Removal, Relocation, or Protection of Existing Utilities: In accordance with the provisions of Section 4215 of the California Government Code, the Contractor shall not be assessed liquidated damages for delay in completion of the project, when such delay was caused by the failure of the City or owner of the utility to provide for the removal or relocation of such utility facilities.

5-02. Preconstruction Conference: Following award of contract, submittal of executed contract, and approval of certificates of insurance and bonds, but before start of work, a preconstruction conference shall be held at a mutually agreed time and place. The conference shall be arranged by the City and attended by City representatives including the inspector, and the Contractor, Contractor's superintendent and major subcontractors. Contractor shall present at the conference the progress and submittal schedules, and progress payment format, and provide emergency phone numbers.

The purpose of the conference is to designate responsible personnel and establish a working relationship. Matters requiring coordination will be discussed and procedures for handling such matters established.

5-03. Beginning of Work: The Contractor shall be prepared to begin work within fifteen (15) calendar days after "Notice to Proceed". Two "Notice to Proceeds" will be issued one for the pipeline work and one for the Turnout #4 work per Phase 3 described in the specifications.

SECTION 6. MEASUREMENT AND PAYMENT

6-01. Payments: Attention is directed to Section 9-1.16, "Partial Payments," and 9-1.17, "Payment After Acceptance," of the State Standard Specifications and these City General Provisions.

As of the 20th day of each month, requests for progress payment listing amount and value of work performed during that month may be submitted for review. Upon review and approval or adjustment by the Engineer, progress payment will be made, retaining five percent (5%) of the amount due. Requests submitted promptly as of the twentieth of the month will be paid normally by the tenth of the following month.

The Bidder's attention is directed to the provisions of Section 9 of the Standard Specifications and the following modification, all of which are applicable to this Contract:

Upon receipt of written notice that the work is ready for final inspection and acceptance, the Engineer shall, within five (5) days, make such inspection, and when the Engineer finds the work acceptable under the Contract and the Contract fully performed, the Engineer will recommend to the City Council (at the next following Council meeting) that the Contract be accepted and a "Notice of Completion" be prepared and recorded. The entire balance found to be due the Contractor, including the retained percentage, shall be paid to the Contractor by the City within fifteen (15) days after the expiration of thirty (30) days following the date of recordation of the Notice of Completion.

The Contractor shall supply with each progress payment request (with the exception of the first progress payment submittal) an email, fax or letter from each subcontractor stating: (a) the date that he/she has received his/her portion of the preceding payment; and (b) if the payment received was the total amount then due. Should the payment not include the total amount invoiced due to a dispute, the subcontractor shall include the details of such dispute in his/her letter with enough information for the City to verify that the provisions of Section 7108.5 of the CA Business and Professions Code have been met.

Before the final payment is due, the Contractor shall submit evidence satisfactory to the Engineer that all payrolls, material bills, and other indebtedness connected with the work have been paid, except that in case of disputed indebtedness or liens, the Contractor may submit in lieu of evidence of payment, a surety bond satisfactory to the City guaranteeing payment of all such disputed amounts when adjudicated in cases where such payment has not already been guaranteed by surety bond.

6-02. Substitution of Securities in Lieu of Retention: Pursuant to Section 22300 of the Public Contract Code, the Contractor may substitute securities for any money held by the City to insure performance of the contract. At the request and expense of the Contractor, securities equivalent to the amount withheld shall be deposited with the City or federally-chartered banks as an escrow agent, who shall return such securities to the Contractor upon satisfactory completion of the contract. Deposit of securities with an escrow agent shall be subject to written agreement in accordance with the provisions of Section 22300. The City shall not certify that the contract has been completed until at least 35 days after filing by the City of a Notice of Completion. Securities shall be limited to those listed in

Section 16430 of the California 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 upon by the Contractor and the City.

SECTION 7. DISPUTE RESOLUTION

7-01. Claims. This Section applies to and provides the exclusive procedures for any Claim arising from or related to the Contract or performance of the Work.

(A) *Definition.* "Claim" means a separate demand by Contractor, submitted in writing by registered or certified mail with return receipt requested, for change in the Contract Time, including a time extension or relief from liquidated damages, or a change in the Contract Price, that has previously been submitted to City as a Change Order in accordance with the requirements of the Contract Documents, and which has been rejected or disputed by City, in whole or in part.

(B) *Limitations.* A Claim may only include the portion of a previously rejected demand that remains in dispute between Contractor and City. With the exception of any dispute regarding the amount of money actually paid to Contractor as Final Payment, Contractor is not entitled to submit a Claim demanding a change in the Contract Time or the Contract Price, which has not previously been submitted to City in full compliance with this Section, and subsequently rejected in whole or in part by City.

(C) *Scope of Section.* This Section is intended to provide the exclusive procedures for submission and resolution of Claims of any amount, and applies in addition to the provisions of Public Contract Code Section 9204 and Sections 20104 et seq., which are incorporated by reference herein.

(D) *No Work Delay.* Notwithstanding the submission of a Claim or any other dispute between the parties related to the Project or the Contract Documents, Contractor must perform the Work and may not delay or cease Work pending resolution of the Claim or other dispute, but must continue to diligently prosecute the performance and timely completion of the Work, including the Work pertaining to the Claim or other dispute.

7-02. Claims Submission. The following requirements apply to any Claim subject to this Section:

(A) *Substantiation.* The Claim must be submitted to City in writing, clearly identified as a "Claim" submitted pursuant to this Section 7, and must include all of the documents necessary to substantiate the Claim including the Change Order request that was rejected in whole or in part, and a copy of City's written rejection that is in dispute. The Claim must clearly identify and describe the dispute, including relevant references to applicable portions of the Contract Documents, and a chronology of relevant events. Any Claim for additional payment must include a complete, itemized breakdown of all labor, materials, taxes, insurance, and subcontract, or other costs. Substantiating documentation such as payroll records, receipts, invoices, or the like, must be submitted in support of each

claimed cost. Any Claim for an extension of time or delay costs must be substantiated with schedule analysis and narrative depicting and explaining claimed time impacts.

(B) *Claim Format.* A Claim must be submitted in the following format:

(1) General introduction, specifically identifying the submission as a "Claim" submitted under this Section 7.

(2) Relevant background information, including identification of the specific demand at issue, and the date of City's rejection of that demand.

(3) Detailed explanation of the issue(s) in dispute. For multiple issues, separately number and identify each issue and include the following for each separate issue:

(a) The background of the issue, including references to relevant provisions of the Contract Documents;

(b) A succinct statement of the matter in dispute, including Contractor's position and the basis for that position;

(c) A chronology of relevant events;

(d) The identification and attachment of all supporting documents (see subsection (A), above, on Substantiation); and

(e) Use of a separate page for each issue.

(4) Summary of issues and damages.

(5) The following certification, executed by the Contractor's authorized representative:

"The undersigned Contractor certifies under penalty of perjury that its statements and representations in this Claim are true and correct. Contractor warrants that this Claim is comprehensive and complete as to the matters in dispute, and agrees that any costs, expenses, or delay claim not included herein are deemed waived. Contractor understands that submission of a Claim which has no basis in fact or which Contractor knows to be false may violate the False Claims Act (Government Code Section 12650 et seq.)."

(C) *Submission Deadlines.*

(1) A Claim must be submitted within 15 days of the date that City notified the Contractor in writing that a request for a change in the Contract Time or Contract Price has been rejected in whole or in part.

(2) With the exception of any dispute regarding the amount of Final Payment, any Claim must be filed on or before the date of Final Payment, or will be deemed waived.

(3) A Claim disputing the amount of Final Payment must be submitted within 15 days of the effective date of Final Payment.

(4) Strict compliance with these Claim submission deadlines is necessary to ensure that any dispute may be mitigated as soon as possible, and to facilitate cost-efficient administration of the Project. *Any Claim that is not submitted within the specified deadlines will be deemed waived by the Contractor.*

7-03. City's Response. City will respond within 45 days of receipt of the Claim with a written statement identifying which portion(s) of the Claim are disputed, unless the 45-day period is extended by mutual agreement of City and the Contractor or as otherwise allowed under Public Contract Code section 9204. However, if City determines that the Claim is not adequately documented, City may first request in writing, within 30 days of receipt of the Claim, any additional documentation supporting the Claim or relating to defenses to the Claim that City may have against the Claim. If the Contractor fails to submit the additional documentation to City within 15 days of receipt of City's request, the Claim will be deemed waived.

(A) *Additional Information.* If additional information is thereafter required, it may be requested and provided upon mutual agreement of City and Contractor.

(B) *Non-Waiver.* Any failure by City to respond within the times specified above may not be construed as acceptance of the Claim in whole or in part, or as a waiver of any provision of these Contract Documents.

7-04. Meet and Confer. If the Contractor disputes City's written response, or City fails to respond within 45 days of receipt of the Claim with, the Contractor may notify City of the dispute in writing of the sent by registered or certified mail, return receipt requested, and demand an informal conference to meet and confer for settlement of the issues in dispute. If the Contractor fails to dispute City's response in writing within the specified time, the Contractor's Claim will be deemed waived.

(A) *Schedule Meet and Confer.* Upon receipt of the demand to meet and confer, City will schedule the meet and confer conference to be held within 30 days, or later if needed to ensure the mutual availability of each of the individuals that each party requires to represent its interests at the meet and confer conference.

(B) *Location for Meet and Confer.* The meet and confer conference will be scheduled at a location at or near City's principal office.

(C) *Written Statement After Meet and Confer.* Within ten working days after the meet and confer has concluded, City will issue a written statement identifying which portion(s) of the Claim remain in dispute, if any.

(D) *Submission to Mediation.* If the Claim or any portion remains in dispute following the meet and confer conference, within ten working days after the City issues the written statement identifying any portion(s) of the Claim remaining in dispute, the disputed portion(s) will be submitted for mediation, as set forth below.

7-05. Mediation and Government Code Claims.

(A) *Mediation.* Within ten working days after the City issues the written statement identifying any portion(s) of the Claim remaining in dispute following the meet and confer, City and Contractor will mutually agree to a mediator, as provided under Public Contract Code section 9204. Mediation will be scheduled to ensure the mutual availability of the selected mediator and all of the individuals that each party requires to represent its interests. The parties will share the costs of mediation equally, except costs incurred by each party for its representation by legal counsel or any other consultants.

(B) *Government Code Claims*.

(1) Timely presentment of a Government Code Claim is a condition precedent to filing any legal action based on or arising from the Contract.

(2) The time for filing a Government Code Claim will be tolled from the time the Contractor submits its written Claim until the time that Claim is denied in whole or in part at the conclusion of the meet and confer process, including any period of time used by the meet and confer process. However, if the Claim is submitted to mediation, the time for filing a Government Code Claim will be tolled until conclusion of the mediation, including any continuations, if the Claim is not fully resolved by mutual agreement of the parties during the mediation or any continuation of the mediation.

7-06. Tort Claims. This Section does not apply to tort claims and nothing in this Section is intended nor will be construed to change the time periods for filing tort-based Government Code Claims.

7-07. Arbitration. It is expressly agreed, under California Code of Civil Procedure Section 1296, that in any arbitration to resolve a dispute relating to this Contract, the arbitrator's award must be supported by law and substantial evidence.

7-08. Damages. The Contractor bears the burden of proving entitlement to and the amount of any claimed damages. The Contractor is not entitled to damages calculated on a total cost basis, but must prove actual damages. The Contractor is not entitled to recovery of any alleged home office overhead. The Eichleay Formula or similar formula may not be used for any recovery under the Contract. The Contractor is not entitled to consequential damages, including home office overhead or any form of overhead not directly incurred at the Worksite; lost profits; loss of productivity; lost opportunity to work on other projects; diminished bonding capacity; increased cost of financing for the

Project; extended capital costs; non-availability of labor, material or equipment due to delays; or any other indirect loss arising from the Contract.

7-09. Multiple Claims. In the interest of efficiency, City, acting in its sole discretion, may elect to process multiple Claims concurrently, in which case the applicable procedures above will be based on the total amount of such Claims rather than the amount of each individual Claim. Any such election will not operate to change or waive any other requirements of this Section.

7-10. Other Disputes. The procedures in this Section 7 will apply to any and all disputes or legal actions, in addition to Claims, arising from or related to this Contract, unless and only to the extent that compliance with a procedural requirement is expressly and specifically waived by City.

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ATTENTION BIDDERS:

Your bid shall represent the cost of performing all Work described in the Contract Documents including:

Special Provisions and Project Plans,
City Standard Specifications and Details,
State Standard Specifications and Plans, and
all Addenda and Change Orders.

CITY STANDARD SPECIFICATIONS AND DETAILS **(Approved November 2016)** is a separate document that is available at the City of Pleasanton Engineering Division, Civic Center 200 Old Bernal Avenue (physical location) or P.O. Box 520 (mailing address) for a non-refundable cost of $20.

Call (925) 931-5650 to request a copy of the *City Standard Specifications and Details.*
The City Standard Specifications and Details can be viewed online at the City's Web Page, http://www.cityofpleasantonca.gov/
(Select: Government, Departments, Engineering, Standard Specifications & Details)

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SPECIAL PROVISIONS, PROJECT NO. 24171

(These Special Provisions are to be used in conjunction with
the City Standard Specifications and Standard Details, and
the State Standard Specifications and Standard Plans)

All work shall be constructed in accordance with the City of Pleasanton Standard Specifications and Details dated November 2016, and as augmented by these Special Provisions. The Sections noted are those in the Standard Specifications except for the new Section(s) added. Where conflict exists between these documents and existing conditions, request clarification from the Project Engineer.

CITY OF PLEASANTON
PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION

TURNOUT #4 BOOSTER PUMP STATION AND DISCHARGE PIPELINE (F-1 LINE)

Project No. CIP-24171

SPECIAL PROVISIONS

January 2024

Prepared By:
Mirko Maher, PE
Senior Project Manager
Woodard & Curran
RCE# 64645

SECTION 1. GENERAL

1-06 Protection of Existing Facilities and Property

Add:

Prior to commencing construction activities and in the presence of the City, the Contractor shall record and document existing conditions along the project alignments and facility sites. Suitable digital photograph and videography shall be captured by the Contractor, including voiceover commentary as appropriate, and submitted for approval by the City.

The photographic and video documentation shall capture existing street striping and markings that will be replaced after final paving. The Contractor shall use the photographic and video documentation to prepare striping and marking plans for each intersection and to locate the striping between intersections prior to installing thermoplastic striping and marking material and reflectors.

The Contractor shall provide the City with a duplicate of the photographic and video documentation once complete.

Contractor may cut existing traffic loop detectors and home runs where they interfere with pipe installation. Detector loops will be replaced by others at no cost to Contractor.

1-08 Site Protection

Add:

Street shall be swept by a street sweeper capable of self-containing debris (no power brooming) at a minimum of once per day. All sidewalks shall be swept clean daily.

1-12 Storage

Add:

The City identified the following staging area for the project:

- Vacant Zone 7 land adjacent to construction site east of Johnson Drive and south of Stoneridge Drive in triangle parcel as shown on sheet PP1.

The contractor will be responsible to install any necessary access ramps/ driveway entrances and maintain pedestrian access on the sidewalk within the public right-of-way. The contactor will be responsible to replace any damaged sidewalk and curb and gutter. A City contractor is utilizing a portion of the site until August 2024, and the contractor shall maintain access to the existing contractor's trailer and relocate the access driveway as necessary.

A temporary 6’ construction fence with screening shall be installed around the entire construction staging area and laydown yard.

The contractor shall install and maintain all necessary general housekeeping and stormwater Best Management Practices (BMPS) and take extra precaution to prevent any dust from leaving the construction staging area, laydown yard and project site. In the event the City has to notify the contractor more than three times of being a “good neighbor” (i.e. dust, noise, trash, etc.) the contractor will lose use of the construction staging area and laydown yard site, and will be responsible at their cost to procure a new construction staging area site and relocate the construction laydown yard. The area shall be restored to existing condition which will include removal of all new materials.

1-16 Lines and Grades and Construction Staking

Replace with the following:

All work shall be done in accordance with the lines, grades and elevations shown on the Plans. Staking and marking shall be provided in accordance with Section 5-1.26, “Construction Surveys,” of the State Standard Specifications. Stakes and marks shall be carefully preserved by the Contractor. In case such stakes and marks are destroyed or damaged, they will be replaced at the expense of the Contractor.

The Plans were developed using a topographic survey, including utility information. The Contractor shall follow the process below to validate the horizontal and vertical alignments.

1. Call in Underground Service Alert to identify existing utilities.

2. Review Plans, mark out proposed alignment and develop pothole plan. Submit pothole plan and schedule to City.

3. Excavate potholes to verify utility and its horizontal and vertical location.

4. Using the pothole data, verify pipeline alignment and profile defined in the Plans and submit proposed modifications to the City for approval. Allow 10 working days for City review and approval.

5. Proposed modifications may include realignment space permitting.

6. Stake the pipeline alignment prior to initiating pipeline construction.

7. Contractor shall validate at least an entire block at a time.

1-18 Working Hours

Add:

Refer to Section 2 for traffic control restrictions specific to each project location that may impact the working hours which will include night time work.

Work hour restrictions also apply to receipt of material and equipment deliveries to staging areas and no equipment shall be operated within staging areas prior to 8:00 a.m.

1-20 Permits and Licenses

Replace the section entirely as follows:

Contractor shall be responsible for obtaining and paying for all necessary permits, including all required City permits. The Contractor and all subcontractors shall also be required to obtain City of Pleasanton Business Licenses. Prior to the start of any work for this project, the contractor shall apply for and obtain a "no fee" encroachment permit from the City of Pleasanton's Engineering Department.

Contractor will need to obtain an encroachment permit from Zone 7 Water Agency and follow their permit guidelines and general provisions when encroaching on their facilities. Please visit https://www.zone7water.com/post/encroachment-permits for permit application information.

1-33 Measurement and Payment

Replace the section entirely as follows:

Measurement and payment for bid items are described in this section. Full compensation for Work not appearing as a specific bid item but required by the Contract Documents shall be considered as included in the contract unit price paid for the various items of work and no additional compensation will be allowed therefore. Measurement and payment descriptions within the various sections of the City Standard Specifications, not specifically identified in these Special Provisions, for the various items of work shall not apply.

No adjustment of the unit price bid shall be made for any increase or decrease in the quantity of any bid items regardless of the reason for such increase or decrease. Bid Items 82 thru 93 are estimated quantities and will be adjusted upon final profile following potholing.

1-33A Bid Item Measurement and Payment Descriptions

Furnishing all labor, supervision, materials, tools, equipment, and incidentals for the following work shall be considered as included in the various bid items involving water main/appurtenance/turnout installation including but not limited to pipe, fittings, thrust blocks, demolition, alteration, abandonment and restoration, and no additional compensation will be made therefore.

The following work shall be considered as included in the various bid items involving water main/appurtenance installation including but not limited to new pipe, fittings, valves, combination air release valves, blow-offs, water services, cathodic protection test stations; fire hydrants, abandonment operations and no additional compensation will be made therefore:

1. Potholing and excavation at least 10 working days in advance to locate marked existing utilities along the pipe alignment; requesting utility locating, marking out and receiving approval for potholes, saw-cutting pavement, removing existing pavement, excavating and stockpiling soil material, identifying and documenting existing outer diameter of utility, locating the utility horizontally and vertically, placing and compacting backfill material, pavement restoration with temporary asphalt, all restoration; repairing damage, making modifications to or replacing existing utilities damaged by the Contractor's potholing operations.

2. Saw-cutting operation to install the water main/appurtenance and second saw-cutting operation (T-Cut) to restore asphalt concrete (AC); trench excavation; cutting and removing of tree roots 4-inches of diameter or less and rock/boulders encountered during excavation; off-hauling and disposing of all excavated material during trench excavation; dewatering and proper disposal of water if encountered; installation of the water main/appurtenances with minimum cover of 42" or as shown on the plans plus a 12" additional depth variance; import, placement and compaction of trench backfill material with specified materials; two-sack slurry between utilities; concrete thrust blocks; temporary blowoffs, disinfection, pressure testing, and flushing of water mains and appurtenances per the project plans; relocation, set up and removal of flushing materials to alternate locations; design, construction, and removal of temporary flushing basins; excavation, disposal, and backfill of all abandonments; temporary pavements; final roadway and surface restoration including asphalt concrete.

3. All coordination, including shutdown coordination with utility companies, garbage collection company, City, residents, public transit, emergency

services and other affected agencies; protection of existing facilities and improvements; pre-construction documentation (photographic/video documentation), reporting, and preservation; all required permit acquisitions; obtaining and paying for recycled water for construction including fees and meters; implementing safety equipment, materials, and measures to include but not limited to cut-back, lighted barricades, cones, caution tape, night-lights, project safety signs, daily sweeping, and trench plates to keep the jobsite safe during demolition and construction; daily general housekeeping; USA notification and removal of USA; project signs per CSD 604.

Bid Item 1 – Mobilization

Measurement: No measurement shall be made for this bid item.

Payment: The contract lump sum (LS) price paid for Mobilization shall conform to public contract code 10264 and shall include but not be limited to obtaining all permits, insurance and bonds, mobilizing labor force, mobilizing equipment onto the site, preparatory work and operations, providing necessary storage, parking, and staging areas, providing construction water supply, providing on-site sanitary facilities, and all incidentals pertaining to the project site.

Bid Item 2 – Traffic Control

Measurement: No measurement shall be made for this bid item.

Payment: The contract lump sum (LS) price paid for the Traffic Control Plan shall include all work involved in developing and implementing the traffic control plan, complete in place, including but not limited to preparing the traffic control plans and pedestrian access plans, coordinating with and providing construction notifications; haul plan; implementation of the traffic control plan including furnishing and placing barricades, warning devices, signage, flaggers, portable message boards, and other traffic control elements to control pedestrian, bicycle and vehicle traffic around and through construction areas as may be required by the Contract Documents and the encroachment permits under which the work is being performed.

Bid Item 3 –Site Demolition, Site Work and Grading

Measurement: No measurement shall be made for this bid item.

Payment: The contract lump sum (LS) price paid for Site Work and Grading of the T4 booster pump station site shall include all work involved in preparing the site for construction of concrete equipment pad(s) for electrical equipment and booster pump station and finished site surfaces as shown on the the drawings. This lump sum payment includes full compensation for tools, equipment, labor, and materials. Work includes removal and demolition of pavements; removal and replacement of concrete sidewalks, driveways and curb and gutters; removal of trees as indicated on the plans, removal of existing landscaping and capping irrigation, curbs within the

construction area; excavation and backfill (excluding structural backfill); bollards and finish grading of the construction area including asphalt pavement and striping and aggregate base surfaces.

This lump sum payment also includes finished surfacing of all concrete work per City standards including driveway aprons, sidewalks and ADA ramp, top soil and mulch, adjustment of utility boxes, valve cans and covers, manholes, grates to finished grades.

Bid Item 4 – Trench Shoring

Measurement: No measurement shall be made for this bid item.

Payment: The contract lump sum (LS) price paid for Trench Shoring shall include all work involved in implementing, installing, maintaining, protecting, and removing shoring of excavations associated with this project, complete in place, including conforming to all applicable laws and safety orders; providing a trench shoring plan prepared by a civil or structural engineer California Labor Code 6705; maintaining and submitting all required permits per California Code of Regulations 341.

Acknowledgement of the submissions for this bid item by the City or Engineer does not constitute review or approval of the designs, design assumptions or criteria, completeness of submission, applicability to areas of intended use or implementation of the plan, all of which are solely the responsibility of the Contractor.

Bid Item 5 – Zone 7 Connection

Measurement: No measurement shall be made for this bid item.

Payment: The contract lump sum (LS) price paid for the Zone 7 Connection Tie-In shall include all work involved in completing the tie-in, complete in place, including but not limited to removal/disposal of existing water main and tee and relocation of existing valves to new Zone 7 tee per sheet C-7, custom spool to replace exisitng turnout tie-in, fittings, thrust blocks to permit installation of 20” x 18” tee; new pipe; all work associated with the plan shown on Plan Sheets C-3 and C-7 details referenced; mechanical restraints, gaskets, insulating flange, repair clamps, polyethylene wrap and wrapping tape, warning tape, tracer wire; cathodic bonding, insulating flanged joints and gaskets, excavation, backfill and compaction, thrust blocks and/or cross trench kickers, blocking. This pay item include contractor coordination of all shutdown activities with Zone 7 and the City of Pleasanton to depressurizing and draining of existing watermain, dissinfection and testing of new tee and spool pieces.

Bid Items 6 through 8 – Zone 7 Turnout Vault and Vents

Measurement: Measurement for Bid Items 6 through 8 shall be measured in accordance with Sheets C-2 and C-5 of the Construction Drawings and Contract Documents.

Payment: The contract unit price (EA) price paid for Bid Item No.'s 6 through 8 shall include installation and furnishing of the Turnout #4 vault, precast concrete vault sections, lockable spring assisted access hatch with AASHTO H-20 rated reinforcement, coatings, vent piping as shown on the project plan sheets, and includes necessary excavation, subgrade preparation, backfill and compaction of backfill soils and dewatering as necessary to complete work in place.

Piping and appurtenances for the new Turnout shall be installed and furnished as described below in Bid Items 11 through 19.

Bid Item 9: Concrete Slab for Package Pump Station – Size and Reinforcement per Foundation Plan

Measurement: No measurement shall be made for this bid item.

Payment: The contract lump sum (LS) price paid for Bid Item 9 shall include all work related to the installation of concrete foundation pads for the package pump station, ac unit and electrical equipment as described on Sheet S-4 of the Contract Documents and concrete pads shown on the C and E sheets. This item includes excavating and preparation of subgrade foundation materials in accordance with special provisions and geotechnical report including the 12" aggregate base and subgrade prepartion under the pump station pad.

Bid Item 10: Fluoridation Improvements

Measurement: No measurement shall be made for this bid item.

Payment: The contract lump sum (LS) price paid for Bid Item 10 shall include all work related to necessary improvements to the Turnout #4 Fluoridation system as described on sheet C-10 of the Construction Drawings including, but not limited to, a new 500-gallon Fluroide tank, new fluoride injection vault, connection of new conduit and tubing, including new saddle and injection tap to new discharge water main located in new vault. This item also includes removal of existing circuit board and electrical equipment, disconnection and removal and replacement of existing eye wash station, resurfacing of containment area with new epoxy coating, modifications to the building containment curb to increase containment volume and installation of all necessary fittings to connect the new Fluoride tank to the the new disharge main located in new flouride vault with lockable H20 rated hatch, replacement of existing door with a Fiberglass Reinforced door and stainless steel door handle and lock, complete in place. This item also assumes the existing chemical feed pump, chemical tank level indicator shall be relocated as necessary and mounted in new location and/or protected in place.

Bid Items 11 through 19 – Turnout #4 Equipment

Measurement: Measurement for Bid Items 11 through 19 shall be measured in accordance with Sheet C-5 of the Construction Drawings.

Payment: The contract unit price (EA) paid for Bid Items 11 through 19 shall include all piping and appurtenance work involved as shown on project plan sheets for Turnout #4 with the exception of traffic control, BMPs/Storm Water Pollution Control and Trench Shoring, exavation which shall be paid for under Bid Items 2, 6, 76 and 4, respectively. The work shall include but is not limited: to piping, valving, coatings, and appurtenances as shown on C-5, including pipe supports, installing any city-furnished equipment, pipe penetrations, sump pump and piping, complete in place.

Bid Item 20 – 24" C900 Fusible PVC (FPVC) Water Pipeline

Measurement: Measurement shall be made per each horizontal lineal foot of potable FPVC water main furnished, installed by open cut methods, and tested, complete and operable in accordance with the requirements of the Contract Documents.

Payment: Contract unit price paid per linear foot (LF) for installing FPVC water main shall be made at the applicable unit price bid for Bid Item No. 20 and for the completed footage of water pipeline constructed, tested and with trench surface restored, but prior to final pavement surface. Payment under these Bid items shall be considered full compensation for the work as described in Section 26 of these Special Provisions and shall include but not be limited to furnishing, installing, flushing and testing water pipe, as specified, complete and operational, and includes excavation and backfill, tape and tracer wire and of trench materials per Details herein. Should the Engineer order a change in minimum cover from 42" to 54", additional payment will be made under Bid Items 82, 83, 84, or 85 as appropriate per detail 5 on sheet C-6.

Bid Item 21 – NOT USED

Bid Item 22 through 24 – Class 350 Ductile Iron Pipeline (18-inch, 16-inch, 24-inch)

Measurement: Measurement shall be made per each horizontal lineal foot projection of potable DIP water main furnished, installed by open cut methods, and tested, complete and operable in accordance with the requirements of the Contract Documents.

Payment: The contract unit price paid per linear foot (LF) of 16-, 18-inch, and 24-inch Class 350 HDSS DIP shall include all work involved in the installation of the water main, complete in place, including but not limited to restrained flange adapters, cathodic bonding, pipe wrap, pipe wrapping tape, warning tape, tracer wire, thrust blocks, and cross-trench kickers as well as trench excavation,backfill and compaction with trench restored but prior to asphault surfacing, testing, flushing, complete in place. Should the Engineer order a change in minimum cover from 42" to 54", additional payment will be made under Bid Items 86 through 93 as appropriate per detail 5 on sheet C-6.

Bid Items 25 through 30 – Gate Valves

Measurement: Measurement for these bid items shall be made per each water valve furnished, installed, disinfected, tested, complete and operable and in accordance with the requirements of the Contract Documents.

Payment: Contract unit price shall include installing water valves shall be made at the appropriate unit bid price named for Bid Item Nos. 25, 26, 27, 28, 29, and 30, which shall include full compensation for furnishing and installing water valve, riser, operating stem, valve box and lid, and other appurtenances required by the City's Standard Detail 314. Payment shall be full compensation for labor, materials, equipment, and other incidentals necessary to complete work.

Bid Item 31 – Install City-Furnished 24" Gate Valve

Measurement: Measurement for this bid item shall be made per each water valve installed, disinfected, tested, complete and operable and in accordance with the requirements of the Contract Documents.

Payment: The Contract unit price shall be considered full compensation for taking possession of City-furnished water valve at 3333 Busch Road; delivery; installing water valve, riser, operating stem, valve box and lid, and other appurtenances required by the City's Standard Detail 314. Payment shall be full compensation for labor, materials, equipment, and other incidentals necessary to complete work.

Bid Item 32 through 68 – Ductile Iron Fittings

Measurement: Measurement of all diameter fittings shall be made per each installed, disinfected, tested, complete and operable and in accordance with the requirements of the Contract Documents.

Payment: The unit price bid for fittings shall include all materials, labor, and incidentals necessary for the complete installation of each fitting as called for in these drawings and specifications. Fittings installed for the Contractor's convenience or negligence will not be counted for payment. Fittings shall include the cost of excavation, backfill and compaction of fittings, thrust restraints and necessary concrete thrust blocks regardless of type, spools, cathodic bonding, insulating joints where specified, mechanical joint restraints and bolting. Pay items for crosses, tees, reducers, elbows shall include excavation, backfill and compaction necessary for concrete thrust blocks and cross trench kickers, complete and in place.

Bid Item 69 – 2" Combination Air Valve

Measurement: Shall be made per each Combination Air Valve Assembly, per Detail 3, Sheet C-8 in the Contract Documents, furnished, installed, tested, complete and operable and in accordance with the requirements of the Contract Documents

Payment: The contract unit price paid for each (EA) 2" Combination Air Valve shall include all work involved in the installation of the air combination valve per modified

City Standard Detail 312, complete in place, including but not limited to the air combination valve, saddle, corporation stop, copper tubing, angle meter, fittings, valve box, box extension, concrete pad and enclosure with locks, tapping connection to potable water main; lateral line from tap to the Combination Air Valve, joint restraints, cathodic protection on all metallic components; import, placement and compaction of bedding, pipe embedment and trench backfill materials; roadway aggregate base restoration, final saw cut for T-cut, final AC pavement plug of trench T-cut, installing and maintaining temporary striping and pavement markings and delineators, temporary trench plating; restoration of concrete sidewalk, curb and curb and gutter; restoration of decorative paver crosswalks including concrete base and perimeter band and sand bedding; protective coatings on above grade metallic components; and other incidentals necessary to complete work per the Contract Documents.

Bid Item 70 – Fire Hydrant

Measurement: Measurement shall be made per new hydrant installed, complete and operable and in accordance with the requirements of the Contract Documents and City Standard Detail 307.

Payment: The contract unit price (EA) for Bid Item No. 70 shall include furnishing and installing hydrant; reducer as requried, which shall be paid for complete assembly as shown on the plans and per city detail 307 which includes 6" DIP, all excavation, backfill and compaction, piping, valves, cross trench kickers and thrust blocks, surface concrete, trench surface restoration including side walks and any landscaping complete in place.

Bid Item 71 – Pipe Supports

Measurement: Measurement for this Bid Item shall be made in accordance with the Contract Documents.

Payment: The contract unit price (EA) for Bid Item No. 71 shall include furnishing and installing pipe supports as needed in the new Turnout #4 vault and in accordance with the Contract Documents. Refer to Bid Items 6 through 8 and 11 through 19.

Bid Item 72 – 24" Jack and Bore Crossing (STA F15+75 to STA F17+30)

Measurement: No measurement shall be made for this bid item.

Payment: The contract lump sum price paid for Bid Item No. 72 shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals for doing all work involved in mobilizing, setup, preparing and submitting means and methods, contingency planning and other submittals for the installation of PVC pipe in steel casing as shown on the drawings. This item includes all excavation, backfill and compaction, dewatering, trench restoration for jacking and receiving shafts; pre-construction documentation, reporting and preservation; restoration of all areas damaged or disturbed by construction, including landscaping, fencing, concrete

sidewalk, curb, and curb and gutter, pavement, utilities and ground surfaces disturbed or damaged by jack and bore operations; all work as specified in Section 02320 –Auger Boring.

The contract lump sum includes the steel casing and all materials, fusible PVC carrier pipe, labor, cathodic protection bonding of casing to conductor wires, four 11.25 fittings and concrete thrust blocks, protection and repair of any damaged utilities, pavement or concrete surfaces, adjacent to work, sealing the ends of the casing pipe, stabilization of the carrier pipe inside the casing against movement and floatation, installation of sand to fill annular space, and all incidentals necessary for the complete installation for new watermain crossing of existing storm culvert in new steel casing.

Bid Item 73 – Not Used

Bid Item 74 – Striping/Markings

Measurement: No measurement shall be made for this bid item.

Payment: The contract lump sum (LS) price paid for thermoplastic Striping/Markings shall include all work involved in the removal and replacement of the striping and markings per applicable Caltrans Standard Details and Section 17 of the City Standard Specifications, complete in place, including but not limited to referencing existing striping / pavement markings; installing and maintaining temporary striping, pavement markings and delineators; final striping and pavement markings.

Bid Item 75 – Water Main Abandonment

Measurement: No measurement shall be made for this bid item.

Payment: The contract lump sum (LS) price paid for Water Main Abandonment shall include all work involved in abandoning the existing water main, complete in place, including but not limited to excavation, material removal/disposal, filling the water main with flowable 2-sack slurry and all restoration; plugging/capping of the existing water main.

Bid Item 76 – Remove Pipe

Measurement: No measurement shall be made for this bid item.

Payment: The contract unit price paid per lump sum (LS) of Pipe Removal shall include all work involved in the existing water pipe removal and disposal, complete in place, including but not limited to 12” ACP, 12” and 16” DI piping, concrete thrust blocks, valves and risers as shown on project plans, and portions of the Zone 7 20” Steel Water Main. This item includes excavation, backfill, and compaction per standard trench section and finished restoration.

Bid Item 77 – BMPs/Storm Water Pollution Control Plan

Measurement: No measurement shall be made for this bid item.

Payment: The contract lump sum (LS) price paid for BMPs/Storm Water Pollution Control Plan shall include all work involved in developing and implementing storm water pollution control measures, complete in place, including but not limited to: temporary fence at construction yard, preparing and implementing a SWPCP for approval by the City, clean up, all best management practices.

Bid Item 78 – Cathodic Protection Test Stations

Measurement: Measurement for Bid Item No. 78 shall be made for each cathodic protection test station as detailed in the Contract Documents.

Payment: The contract unit price paid for each (EA) Test Station shall include all work involved in installing the CP test station per Details 1, 2, & 3, Plan Sheet CP-2 and Details 1 and 2, Plan Sheet CP-3, complete in place, including but not limited to all cable to pipe connections, insulating blankets, conduits, wires, terminal board, flush-mounted test station.

Bid Item 79 – Anode Bags (18lb or 30lb)

Measurement: Measurement for Bid Item No. 78 shall be made for each 18 pound or 30 pound Anode Bag as detailed in the Contract Documents.

Payment: The contract unit price paid for each (EA) Anode Bag shall include all work involved in furnishing and installing the bags and anode cables per sheets CP-1 through CP-6 of the plans sheets complete in place.

Bid Item 80 – 12" Flushing Assembly and Station

Measurement: No measurement shall be made for this bid item.

Payment: The contract lump sum for Bid Item No. 79 shall be considered full compensation for furnishing and installing the 12" gooseneck flushing assembly as shown in the Details on Sheet C-9 and C-3 of the Contract Documents, including but not limited all fittings and piping beginning at including the 12" 90° base elbow to the gooseneck outlet, joint restraints, concrete kickers, cathodic protection on all metallic components; 12" pressure reducing and surge anticipator valve; field inlet, grating, drain pipe, concrete surfaces and block wall and pipe support, 18" storm drain line, penetration to existing manhole, new precast 4 foot by 6 foot vault, grating, import, placement and compaction of bedding, pipe embedment and trench backfill materials; roadway aggregate base restoration, final saw cut for T-cut, final AC pavement plug of trench T-cut, installing and maintaining temporary striping and pavement markings and delineators, temporary trench plating; restoration of concrete sidewalk, curb and curb and gutter; and other incidentals necessary to complete work per the Contract Documents.

Bid Item 81 – Install Package Booster Pump Station

Measurement: No measurement shall be made for this bid item.

Payment: The contract lump sum (LS) price paid for installing the package booster pump station furnished by others and shall include all work associated with off loading and installing, including crane cable of lifting 50 tons, and anchoring the booster pump station and enclosure to the concrete foundation pad, pipe connections, coating of interior pipe installed by contractor, including remobilization to the site and connection to proposed suction and discharge piping.

Bid Items 82, 86, and 90 - Vertical Depth Adjustment (0 ft to 2 ft)

The contract unit price paid per linear foot (LF) of Vertical Depth Adjustment (0 ft to 2 ft) shall include all work involved in installing the water main deeper than 54" to avoid existing utility interferences including additional shoring, excavation and backfill materials, compaction, spoil hauling and disposal, dewatering.

Payment under this Bid Item is in addition to payment made under Bid Items 20 through 24 per detail 5 on C-6. Payment occurs when the additional vertical depth required for the adjustment is 2 ft or less. Only one Vertical Depth Adjustment bid item may apply as determined necessary in the field.

Bid Items 83, 87, and 91 - Vertical Depth Adjustment (2 ft to 4 ft)

The contract unit price paid per linear foot (LF) of Vertical Depth Adjustment (2 ft to 4 ft) shall include all work involved in installing the water main deeper than deeper than 78" to avoid existing utility interferences including additional shoring, excavation and backfill materials, compaction, spoil hauling and disposal, dewatering.

Payment under this Bid Item is in addition to payment made under Bid Items 20 through 24 per detail 5 on C-6. Payment occurs when the additional vertical depth required for the adjustment is between 2 ft and 4 ft. Only one Vertical Depth Adjustment bid item may apply as determined necessary in the field.

Bid Items 84, 88, and 92 - Vertical Depth Adjustment (4 ft to 6 ft)

The contract unit price paid per linear foot (LF) of Vertical Depth Adjustment (4 ft to 6 ft) shall include all work involved in installing the water main deeper than 102" to avoid existing utility interferences including additional shoring, excavation and backfill materials, compaction, spoil hauling and disposal, dewatering.

Payment under this Bid Item is in addition to payment made under Bid Items 20 through 24 per detail 5 on C-6. Payment occurs when the additional vertical depth required for the adjustment is between 4 ft and 6 ft. Only one Vertical Depth Adjustment bid item may apply as determined necessary in the field.

Bid Items 85, 89, and 93 - Vertical Depth Adjustment (6 ft to 8 ft)

The contract unit price paid per linear foot (LF) of Vertical Depth Adjustment (6 ft to 8 ft) shall include all work involved in installing the water main deeper than 126", to avoid existing utility interferences including additional shoring, excavation and backfill materials, compaction, spoil hauling and disposal, dewatering.

Payment under this Bid Item is in addition to payment made under Bid Items 21 through 24 per detail 5 on C-6. Payment occurs when the additional vertical depth required for the adjustment is between 6 ft and 8 ft. Only one Vertical Depth Adjustment bid item may apply as determined necessary in the field.

Bid Item 94 - Electrical System

Measurement: No measurement shall be made for these bid item

Payment: The contract lump sum paid for installing site electrical improvements shall include all work associated with demolition of the existing electrical equipment, removal and reconnection of existing City RTU, protection of Zone 7 RTU in place, conduits, wires, handholes, modifications in the flouride building, turnout vault, wiring from new booster station to site, installing new grounding and conduit systems, junction box, and power system study, as detailed on sheets E-1 through E-6 of the Contract Plans and special provisions. This pay item includes all excavation for new conduits, and all necessary labor and incidentials to provide electical site improvements complete and in place for fully fuctional booster pump station.

Bid Item 95 – PG&E Conduit Two 3" with pull tape and one junction box

Measurement: Measurement sahll be made by linear feet.

Payment: The contract unit price paid per linear foot (LF) for installing two 3" conduits from the PG&E transformer on site to the PG&E tie-in as specified by PG&E. The tie-in shall be assumed to cross Stoneridge Drive (all lanes) or Hopyard Road (all lanes) installed per the lastest requirements of the PG&E Greenbook. This pay item includes all trenching and excavation and restoration, mandral testing and pull tape for new conduits and one junction/pull box, coordination with PG&E for new service, and all necessary labor and incidentials to provide completed in place electrical conduit feed for PG&E.

SECTION 2. TRAFFIC CONTROL

2-01A Public Convenience and Safety

Add:

Upon completion of each day's work, the contractor shall be responsible for leaving the work area free of hazards and shall provide all necessary temporary signs, warning devices, plating of trenches and barricades at no additional cost to the city. Access is to be provided for all adjacent residences and businesses at all times including non-

construction hours. Maintain access for pedestrian and disabled persons at all times including non-construction hours.

All trenches shall be plated every night. All plates shall be non skid, and be flush with the top of pavement. Lighted traffic control shall be used if night time closures are used. Trench plates within intersections shall be recessed if more than 48 hours.

Contractor shall allow access to driveways and parking lots at all times, unless previously coordinated with facility owner.

2-01B Construction Area Traffic Control Devices

Add:

Construction signs shall not block sidewalks or bike lanes wherever feasible.

A minimum of two (4) Changeable Message Sign (CMS) devices are required on this project. CMS is required for northern and southern limits of the project on Hopyard Road, and East and West Limits on Stoneridge Drive. CMS must be placed 500 feet away approaching the project site. The CMS shall be delivered and be in operation at least 14 days in advance of the start of work and shall be maintained in continuous operation until project completion. The contractor shall modify the message on the CMS devices to convey accurate messages. The City reserves the right to direct the contractor to relocate locations of CMS devices at no additional cost to the City.

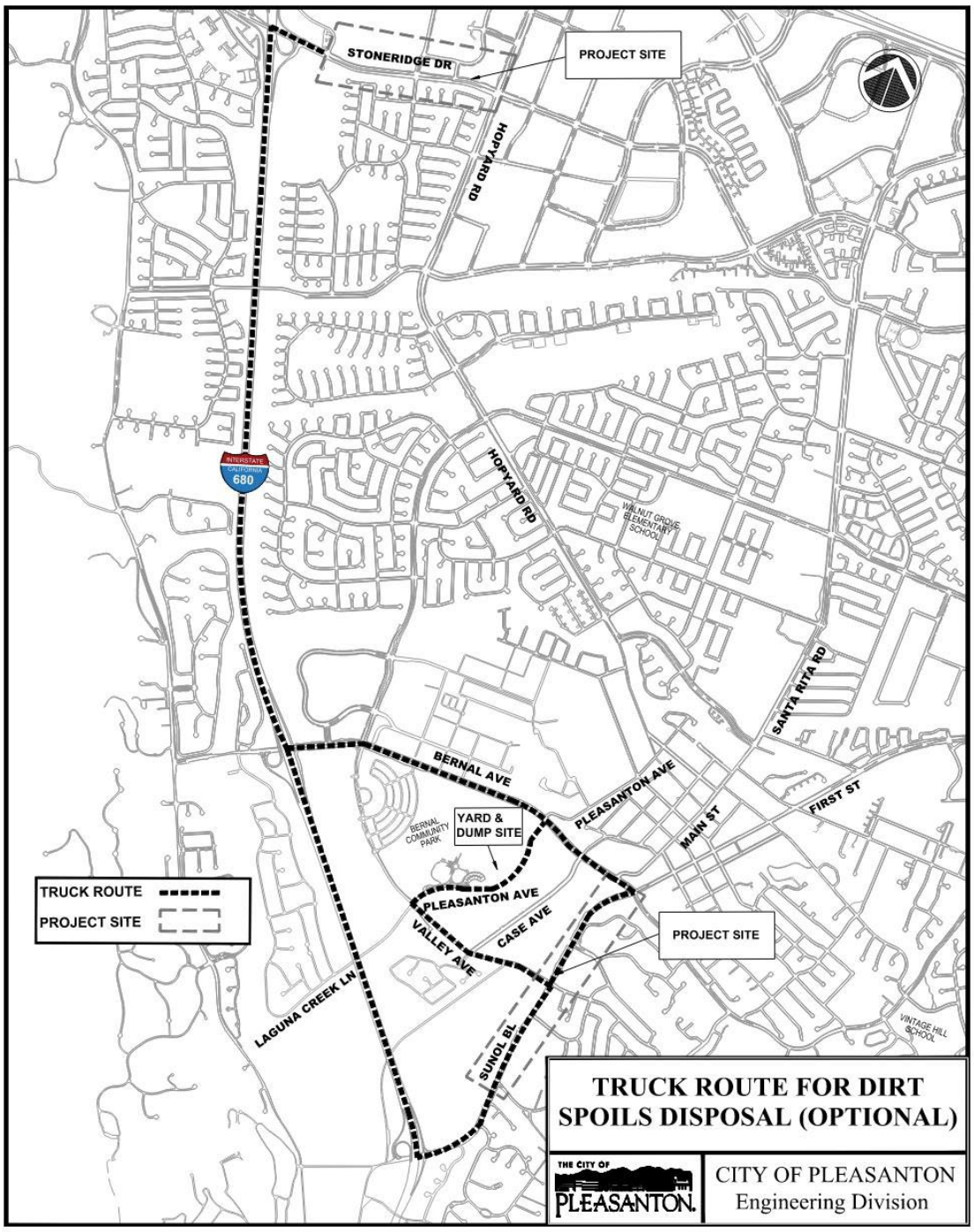
The contractor shall be responsible for maintenance of any and all traffic control devices required by the approved Traffic Control Plan. The contractor shall ensure all devices are maintained in the proper location during holidays, overnight, and on weekends.

Should it become necessary to use City forces to maintain the traffic control devices, the contractor will be billed at the overtime rate for two (2) technicians and a vehicle, with a minimum of two (2) hours per incident/call.

2-01C Haul Routes

Replace:

Haul routes are included in the Project Plans. Routes for the disposal of dirt spoils shall be as follows:



2-01D Traffic Control Plan

Add:

For all portions of the work, the Contractor shall provide a detailed site-specific traffic control plan including pedestrian, bicyclist, and disabled person's accessibility plan for review and comment by the City Traffic Engineer. No work shall commence until the traffic control plans have been reviewed and commented on by the City Traffic

Engineer. These plans shall be prepared by qualified professionals (Traffic Engineers, Civil Engineers, or by Traffic Control Specialists).

Submit site specific traffic control plans for all signalized intersections at Turnout #4. Typical traffic control plan shall be submitted for work between intersections. Typical plans shall be prepared for the various lane configurations/geometry that will be encountered throughout the project limits. Traffic control plans shall conform to the most current California MUTCD and State Standard Plan, and traffic control plan must include provisions for driveway access, pedestrians, bicyclist, and ADA requirements.

The Traffic Control Plan shall be prepared and submitted along with the pothole plan for validation of alignment and profile as described in Section 1-16, Lines and Grades and Construction Staking, as modified by these Special Provisions.

The time frame for city review and comment on the Traffic Control Plan shall be 14 calendar days for each Plan submitted.

2-01E Traffic Control Restrictions

Add:

The City reserves the right to adjust the traffic control including lane closure hours and the number of traffic lanes closed.

Contractor shall provide one (1) 10-foot lane for through traffic at all times unless otherwise approved by the Engineer.

Encroachment permits from various entities shall be obtained for the work. Refer to Section 1-20, Permits and Licenses, of these special provisions. Traffic control requirements and restrictions contained in the encroachment permits, if any, shall be accommodated in traffic control planning and execution.

Stoneridge Drive:

Contractor may close the #3 lane WB for pipe excavation/installation work 24 hours/day provided all excavations are plated and traffic control devices are rated for night use, i.e. flashing lights on barricades. Trench restoration time frames apply and portions of lane shall reopened to public traffic as work progresses. Equipment can be stored within closed lane if these requirements are met.

Jacking and receiving pits shall either be designed to be plated to accommodate HS20 loads or contractor is to install k-rail with tapers to protect excavations. Plating will be required to be installed within 2 hours of no active construction activities.

The number 2 lane may be closed daily from 10 am to 3 pm.

Submit traffic control plans per Section 2-01D.

For crossing Stoneridge Drive:

2-lanes closure WB from 8 pm to 5 am.
2-lanes closure EB from 8 pm to 5 am.
A minimum of one turn lane to remain open till 10 pm.

For work within Hopyard Road:

2-lanes closure Stoneridge WB & EB from 8 pm to 5 am.
2-lanes closure Hopyard SB & NB from 8 pm to 5 am.
A minimum of one turn lane to remain open till 10 pm.

For Stage 3 work at Turnout No. 4:

The Contractor can occupy the EB right turn lane 24 hours/day provided all excavations within the roadway are plated and traffic control devices are rated for night use, I.e. flashing lights on barricades. Submit traffic control plans per Section 2-01D.

The minimum taper length of 550 feet for each lane and 1100 feet for 2-lane closure.

Access shall remain open for businesses on Stoneridge Drive Road during their normal business hours The Contractor shall coordinate a minimum of 7 days and, again, 48 hours in advance with each business owner to arrange for their access/deliveries.

Sidewalks along Stroneridge Drive WB may be closed. Submit pedestrian handling plan for City's review and approval.

SECTION 3. CLEARING AND GRUBBING

Add new section as follows:

3-03J Temporary Fencing

Temporary 6' fences shall be furnished, constructed, and maintained around the perimeter of the on and/or off-site storage area(s) and laydown yard(s) located throughout the project and later removed as specified in these special provisions, and as directed by the Engineer. The Contractor shall cover trench excavations in the sidewalk with plywood or traffic steel plates at night as approved by the Engineer. If existing vegetation outside the limits of work is damaged, mitigation shall be performed by the Contractor, as directed by the Engineer, at no additional cost to the City.

Used materials may be used providing such used materials are good, sound, and are suitable for the purpose intended.

Temporary fence is to be supported in concrete or metal post blocks on the ground surface.

Temporary fences that are damaged from any cause during the progress of the work shall be repaired or replaced by the Contractor at their expense.

When no longer required for the work as determined by the Engineer, temporary fences shall be removed. Removed facilities shall become the property of the Contractor and shall be removed from the site of the work, except as otherwise provided in this section.

Full compensation for maintaining, removing, and disposing of temporary fences shall be considered as included in the price paid for the various contract items of work and no separate payment shall, therefore, be allowed.

SECTION 8. ASPHALT CONCRETE, LIQUID ASPHALT, AND ASPHALTIC EMULSION

8-02A.1 Type

Replace the entire sentence to:

Aggregate grading for Type A HMA and shall be produced under the State Construction Process.

8-03C Asphaltic Emulsion

Add:

A paint binder of asphaltic emulsion SS-1 tack coat shall be applied to all vertical surfaces of pavement, curbs, gutters, and construction joints in the surfacing against which additional material is to be placed and to pavement surface prior to overlay. The area to which prime coat or paint binder has been applied shall be closed to public traffic and construction traffic shall be kept off the surface as much as possible. Care shall be taken to avoid tracking of binder material onto existing pavement surfaces beyond the limit of construction. The surface shall be free of water, foreign material, or dust, when the tack coat is applied.

8-04 Measurement
Replace with:
HMA Asphalt concrete, asphalt binder, liquid asphalt and asphaltic emulsion shall not be measured items.

8-05 Payment

Replace with:
Payment for HMA asphalt concrete, asphalt binder, liquid asphalt and asphaltic emulsion shall be considered included in the various contract items of work and no separate payment shall be allowed therefore.

SECTION 11. TRENCH EXCAVATION AND BACKFILL

11-02C Upper Trench Backfill Material

Replace entire paragraph to:

Upper trench backfill material shall be recycled Class II aggregate base.

11-03A Excavation

Add:

Soil; aggregate subbase; and aggregate base spoils can be disposed of by Contractor at Pleasanton Community Park site as shown on Contract Plans. Spoils pile shall be graded and hydroseeded at the completion of the project. The Contractor shall follow the designated truck route shown on the Project Plans and shall provide any required SWPPP measures and adequate measures to prevent tracking.

Asphalt concrete and Portland cement concrete spoils from trenching and surfacing removals shall become the property of the Contractor and be disposed of outside of the City right of way.

Though ground water was not encountered at anticipated depths of excavations indicated in borings provided in the attached geotechnical report, the contractor shall be made aware that ground water depths may vary and may be encountered to 5-feet below grade. The Contractor shall dewater excavations to 2-feet below pipe invert in accordance with the Geotechnical report included Attachment B.

11-03A.2 Trench Length, Width and Depth

Add:

The Contractor shall restore the trench to the surface daily and reopen to traffic. The trench shall be paved with permanent asphalt concrete minimum every 2 weeks. The use of cutback will be limited to no more than 12 calendar days after which permanent asphalt concrete must be placed or prior to Friday of the second week, whichever comes first.

Trench plates, if used, shall have a non-skid coating and are limited to no more than 250 feet of open trench at any one location unless approved by the City. They shall be anchored to prevent shifting and wedged to minimize rattling and noise. All trench plates to remain at the end of the day during Phase I work, in pedestrian areas, or in place for more than 5 days shall be flush with the pavement surface. Plates within intersections to remain in place more than 48 hours shall be flush with pavement surface. Trench plates shall be limited on sidewalks to no more than 4 calendar days with the sidewalk being restored by Friday of each week (restored weekly), whichever comes first. For all other areas, the plates may rest above the trench contingent cut back is used around the plates to prevent tire damage.

It is the intent of the City to limit the impacts to the sidewalks. Plates/boards shall be limited to minimal size required and shall be ADA-compliant with ramps/wedges along all sides.

11-03A.3 Removal of Existing Pavement

Contractor shall anticipate existing asphalt concrete pavement thickness of 6.5" on Stoneridge and 10"-12" on Hopyard. All removed asphalt concrete and Portland cement concrete shall be become the property of the Contractor and be disposed of outside of the City right-of-way.

SECTION 14. WATER

Add:
The Contract Plans have been developed using City GIS data, including utility information and aerial imagery. Due to the lack of available utility information, all drawings included at this location shall be considered schematic in nature and all utilities may not be shown. The contractor shall be fully responsible to confirm all of the utilities' depth and horizontal placement at/or near each project site and shall contact USA Markings and shall pothole as called for in these documents and on an as-needed basis. Refer to section 23-01K Construction Sequencing and Constraints for further information.

14.02B Ductile Iron Pipe

Add:

All ductile iron pipe shall be pressure class 350, U.S. Pipe type HDSS or approved equal. All pipe shall be wrapped with polyethylene wrap in accordance with AWWA C-105. Refer to City Standard Specifications section 13-02B Epoxy-lined Ductile Iron Pipe and Fittings.

14.02B.1 Joints

Replace section with:

Buried pipe shall all have restrained push-on joints unless specified otherwise. At fittings and tie-ins, pipe shall have restrained push-on joints, restrained mechanical joints, or flanged joints as shown on the project drawings. Restrained mechanical joints may be used for closures, subject to meeting thrust restraint requirements. Flanged ends, or plain ends with restrained couplings, shall be used for piping above ground.

For restrained mechanical joints, dimensional and material requirements for pipe ends, glands, bolts, nuts and gaskets shall conform to ANSI A21.11 (AWWA C111).

For flanged joints, ends of pipe and fittings shall be provided with ductile iron flanges conforming to ANSI A21.10 and A21.15 (AWWA C110 and C115), as applicable. All flanged connections shall use gaskets capable of withstanding pressures up to 350 psi.

14.02B.2 Fittings

Add:

All fittings shall be ductile iron type. Fittings for ductile iron mechanical joints shall be restrained mechanical joints with EBAA Iron Megalug 1100 restraining gland or locking segment push on joint type, TR FLEX or equal, unless noted otherwise. Each fitting shall be wrapped with polyethylene wrap per AWWA C-105.

14.02B.2 12" Pressure Reducing and Surge Anticipator Valve

Valve shall have ductile iron valve body and cover, pressure class 300 and include main valve; needle valve; stainless steel tubing, pressure relief control; pressure reducing control; and bell reducer as manufacture by CLA-VAL or approved equal.

14-02L City Supplied Materials

See drawing C-5 for list of materials for turnout #4 the City is to provide for the contractor to install. Contractor shall pick up the materials from the Public Works corporation yard at 3333 Busch Road. The contractor shall supply all gaskets, bolts and miscellaneous materials necessary to install City furnished equipment.

14-03 Construction

Add:

Existing valves to be removed and/or to be replaced shall be assumed to be encased in non-formed concrete. The contractor shall be required to remove the surrounding concrete encasement to a minimum of two feet measured from the outside of the valve in every direction.

The contractor shall provide a plan and required fittings, piping and backflows with certifications as necessary for pressure testing, chlorination and flushing of the piping.

14-03E.2 Interruption of Service

Add:

Hours of water service shutdowns shall only be between 8:00 a.m. and 4:00 p.m., unless a different time is authorized in writing by the City Engineer.

14-03K Cutting Asbestos Cement Pipe

Handling, including cutting, removal, disposal or abandoning in place of any asbestos cement pipe shall be in conformance with Title 8 CCR 1529 – Asbestos in Construction and the responsibility of the Contractor. If handling asbestos cement pipe, Contractor shall:

1. Possess appropriate state registration and certification
2. Use employees trained in performing work inside regulated work areas for Class II Asbestos work.

3. Perform work such that air fiber concentrations do not exceed Department of Occupational Safety and Health's permissible exposure limits for asbestos outside of established regulated areas.
4. Perform all work in accordance with applicable local, state, and federal regulations.
5. Contractor shall submit evidence of proper licensure and certifications prior to performing any work associated with Asbestos Cement Pipe.

Preparing or cutting asbestos cement pipe or transite pipe shall only be performed with a snap type cutter.

Disposal of asbestos/transite pipe shall be included in the contract prices paid for the various items of work and no additional compensation shall be allowed.

14-03H.1 General

Add:

Temporary blowoffs, backflows and connections may require restrained fittings and concrete thrust blocks.

Contractor shall stage flushing operation per the Project Plans, Special Provisions, and per AWWA standards and shall discharge water into the sanitary sewer unless otherwise noted. Flushing to sanitary sewer shall provide 12" min air gap. The Contractor shall submit a plan for testing, flushing and disinfection for approval prior to commencement of work for pipeline installation.

SECTION 23. MISCELLANEOUS

Add:

23-01E Good Neighbor Letter (48 Hours Notice)

Attached and made part of these special provisions is a sample "Good Neighbor Letter" informing the public of pending construction activity. This letter is required for distribution a minimum of 48 hours before the start of construction. The contractor is required to submit a draft letter to the City for review and approval prior to the start of any work. This letter is required and is in addition to the "No parking signs" required under section "2-01E Traffic Control Restrictions." These letters are to be distributed to all entities, businesses or residents that are directly impacted when access to their property may be impeded and this distribution is not limited only to the project's limit of work.

This is not a measured item of work, no separate payment for conforming to the provisions herein.

(SAMPLE LETTER ON FOLLOWING PAGE)

(Contractor's Letterhead)

REQUIRED GOOD NEIGHBOR LETTER (48 HRS Notice)

Date:____/____/____

RE: TURNOUT 4 BOOSTER PUMP STATION AND PIPELINE IMPROVEMENTS (F 1 LINE)

CIP No. XXXXX

Dear Tenant/Occupant:

Please be advised that heavy construction activity to install a new booster pump station at turnout No. 4 and a new water main and various related appurtenances within portions of Stoneridge Drive and Hopyard Road will begin at [(Time of Day: _____) on (Day of week: _____), (Date,___/___/___)]. The project will start from XXXXX to approximately XXXXX. It is anticipated that this work will be completed by (Time of Day: _____) on (Day of week: _____), (Date,___/__/___), weather permitting.

During this time period, you may have limited or no vehicle access to your driveway while work occurs in front of your residence. Pedestrian access to all properties will be maintained during this period.

(Optional sample language depending on type of work)

- On-street parking directly in front of your residence will be limited and at times may not be available. It is suggested that you park your vehicle on adjacent streets not under construction. Typically, this work will occur between the hours of 8:00 a.m. and 5:00 p.m.

If you have questions or special access needs, please feel free to contact Mr./Ms. _____ who is our construction superintendent on this project at ____ - _____. Also, you may contact the City's Inspector (Inspector assigned to project: Mr. ___ directly at 925-931-XXXX).

Sincerely,

_____
Contractor Name

Attachment(s): None/List of affected streets

Add new sections as follows:

23-01J Potholing

Potholing locations at all utility crossings (shown in drawings, USA markings), pipe connections, etc. shall be as directed by the field Engineer in order to ascertain horizontal and vertical locations of existing underground facilities that may impact final placement of proposed facilities. During potholing operations, measurements shall be taken and recorded by the contractor in order to ascertain the dimensions, shape, material, and any special features of the existing underground facilities including the outer diameter. The potholing locations shall include but not limited to utility crossings and vaults, and all storm drain pipeline and drainage inlets crossings.

Potholing operations shall only be started after the Underground Service Alert has been contacted and all of the utilities have been marked in the field. Traffic control shall be approved by the traffic engineer and shall be properly installed and maintained throughout the duration of the potholing operations.

All potholes shall be backfilled and capped with hot mix asphalt within 48 hours.

The contractor shall be held responsible for damages to existing improvements, above ground or underground, shown or not shown on the plans, both private and public, due to contractor's operation. It is understood that the Contractor shall repair and/or replace any such damaged improvements according to the requirements of the Engineer at no additional cost to the City.

23-01K Construction Sequencing and Constraints

The Contractor must adhere to the following requirements and include in the work schedule.

A. Construction Sequencing for water main and Sitework on Stoneridge Drive and Hopyard Road:

1. Potholing shall be the first order of work and be completed before any water main installation to permit ample time to make necessary elevation / horizontal adjustments to the water main alignment. Contractor shall have Traffic Control Plan reviewed prior to pothole operation.

2. PHASE 1 Hopyard Road - Install and put in service all ductile iron pipe from City-furnished valve at F33+31.47 to tie-in at F35+10.74 and flushing assembly including connection to existing sanitary system and 12" piping from 0+00 to 1+30. Surge antciaptor valve is not required but provide necessary temporary piping to accommodate flushing and chlorination. After testing/flushing, coordinate with City to make connections to existing 16" line at F 35+10.74 and existing 12" line at F0+96.03 and 16" line at F1+04.14. Install blind flange/MJ cap on pipe within the site to future booster station pad. All work must be complete by June 30, 2024. Liquidated damages in the amount of

$2,000 per calendar day will be assessed for failure to complete the work within this time limit unless the successful Contractor is granted a time extension. Surge anticipator valve is not required to be installed until installation of new station.

3. PHASE 1 - Johnson Drive– Install 16" Tee and gate valve with blind flange at F1+00. All work must be complete by June 30, 2024. Liquidated damages in the amount of $2,000 per calendar day will be assessed for failure to complete the work within this time limit unless the successful Contractor is granted a time extension.

PHASE 2 (4 thru 8)

4. Install pipe from Johnson Drive load point at proposed cross to 24" gate valve at to F33+31.47. Test and disinfect new water main for acceptance. Provide all necessary plugs and any temporary backflow prevention necessary for testing and flushing activities, Upon passing testing, flush line to flushing assembly.

5. Construct yard piping, site preparation including new foundation for booster pump station, fluoride building improvements, construct flow control vault and yard piping connections to existing 20-inch steel mortar lined and coated pipe. Coordinate all tie in work with Zone 7 water.

6. Test, flush and disinfect all yard piping (turnout watermain and discharge piping)

7. Coordinate, deliver and install new prepackaged pump station to site. Connect to all piping from turnout 4 to new booster pump station.

8. Pressurize new watermain, test and accept new booster pump station (Startup testing to be provided by pump station suppliers).

9. PHASE 3 - Remove valve and abandon pipe as shown on Sheet PP-5. Salvage existing booster station components as noted. Remove pipe as noted and complete surface improvements at turnout.

B. The Contractor shall provide continuous access through the work zone to the public. Where two lanes for each way traffic cannot be accommodated, the Contractor shall provide flaggers to control traffic movement in each direction in accordance with MUTCD and City Standard Specifications.

C. Trench AC patch paving of T-cut shall occur within two weeks of completion of water pipeline construction, including pipe embedment zone and trench zone backfill. If the trench paving does not occur within this time limit, contractor will be required to halt pipeline work until paving operations can come into compliance. This two week requirement must be met regardless of the status or pressure testing pipeline.

D. Traffic control plans broken down for each major line segment prepared by the Contractor shall be submitted to the City allowing for 14 calendar days review for each submittal. Traffic control plans shall be approved prior to marking out preliminary pipeline alignment. Traffic control plans for the City shall also meet the requirements of the City's respective encroachment permit.

E. Contractor shall provide access to driveways at all times to extent possible. Trench plating shall be installed over trenches when active construction is not occurring in front of driveways. Contractor shall coordinate with resident/business a minimum of 5 working days prior to scheduled work in front of driveways and shall work within the agreed time frame. Advance notice signage of temporary driveway closures shall be installed 48 hours at each impacted driveway.

F. Trench restoration paving shall match or exceed the quality of pavement surface and rideability as the adjacent pavement and shall be free from: depressions (greater than ¼"), high spots/swells (greater than ¼"), dips, gouges, potholes, waves, rutting, unevenness, raveling, cracking, bleeding, and settlement.

SECTION 25 – FUSIBLE POLYVINYL CHLORIDE PIPE FOR POTABLE WATER

25-01 General

Add: See Technical Specification 02675

25-01A Description

25-01A.1 Scope

This section specifies fusible polyvinyl chloride pipe, including standards for dimensionality, testing, quality, acceptable fusion practice, safe handling, storage and installation of the pipe.

25-01A.2 Requirements

Contractor shall provide fusible polyvinyl chloride pipe conforming to all standards and procedures, and meeting all testing and material properties as described in this specification.

Contractor shall be responsible for all installation processes and procedures associated with the installation of fusible polyvinyl chloride pipe.

25-01A.3 Pipe Description

Pipe Supplier shall furnish fusible polyvinyl chloride pipe conforming to all standards and procedures, and meeting all testing and material properties as described in this specification.

Pipe shall conform to the following dimensionality and general characteristics table:

Pipe Description	Nominal Diameter (in.)	DR	Color	Pressure Class (psi)
Fusible C900®	**24**	**18**	**Blue**	**235**

25-01B Quality Assurance

25-01B.1 References

This section contains references to the following documents. They are a part of this section as specified and modified. Where a referenced document contains references to other standards, those other standards are included as references under this section as if referenced directly. In the event of a conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.

Unless otherwise specified, references to documents shall mean the documents in effect at the time of design, bid, or construction, whichever is earliest. If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued.

Where document dates are given in the following listing, references to those documents shall mean the specific document version associated with that date, regardless of whether the document has been superseded by a version with a later date, discontinued or replaced.

Reference	Title
ANSI/AWWA C110/A21.10	American National Standard for Ductile-Iron and Gray-Iron Fittings, 3-inch through 48-inch, for Water and Other Liquids
ANSI/AWWA C111/A21.11	American National Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
ANSI/AWWA C153/A21.53	AWWA Standard for Ductile-Iron Compact Fittings for Water Service
AWWA C605	Standard for Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water
AWWA C651	Standard for Disinfecting Water Mains
AWWA C900	Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 in. through 12 in. (100mm Through 300mm), for Water Distribution
AWWA C905	Standard for Polyvinyl Chloride (PVC Pressure Pipe and Fabricated Fittings, 14 in. through 48 in. (350mm Through 1200mm), for Water Distribution and Transmission
AWWA M23	AWWA Manual of Supply Practices PVC Pipe—Design and Installation, Second Edition

Reference	Title
ASTM C923	Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals
ASTM D1784	Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
ASTM D1785	Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
ASTM D2152	Test Method for Degree of Fusion of Extruded Poly(Vinyl Chloride) (PVC) Pipe and Molded Fittings by Acetone Immersion
ASTM D2241	Poly (Vinyl Chloride) (PVC) Plastic Pipe (SDR-PR)
ASTM D2665	Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings
ASTM D3034	Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
ASTM F477	Elastomeric Seals (Gaskets) for Joining Plastic Pipe
ASTM F679	Standard Specification for Poly(Vinyl Chloride) (PVC) Large Diameter Plastic Gravity Sewer Pipe and Fittings
ASTM F1057	Standard Practice for Estimating the Quality of Extruded Poly (Vinyl Chloride) (PVC) Pipe by the Heat Reversion Technique
ASTM F1417	Standard Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air
UNI-B-6	Recommended Practice for Low-Pressure Air Testing of Installed Sewer Pipe
UNI-PUB-08	Tapping Guide for PVC Pressure Pipe
NSF-14	Plastics Piping System Components and Related Materials
NSF-61	Drinking Water System Components--Health Effects
PPI TR-2	PVC Range Composition Listing of Qualified Ingredients

25-01B.2 Manufacturer Requirements

All piping shall be made from PVC compound conforming to cell classification 12454 per ASTM D1784.

25-01B.3 Fusion Technician Requirements

Fusion Technician shall be fully qualified by the pipe supplier to install fusible polyvinyl chloride pipe of the type(s) and size(s) being used. Qualification shall be current as of the actual date of fusion performance on the project.

25-01B.4 Specified Pipe Suppliers

Fusible polyvinyl chloride pipe shall be used as manufactured under the trade names Fusible C-900®, Fusible C-905®, and FPVC®, for Underground Solutions, Inc., Poway, CA, (858) 679-9551. Fusion process shall be as patented by Underground Solutions, Inc., Poway, CA, Patent No. 6,982,051. City and engineer are aware of no other supplier of fusible polyvinyl chloride pipe that is an equal to this specified pipe supplier and products.

25-01B.5 Warranty

The pipe shall be warranted for one year per the pipe supplier's standard terms.

In addition to the standard pipe warranty, the fusion services shall be warranted for one year per the fusion service provider's standard terms.

25-01B.6 Pre-Construction Submittals

The following PRODUCT DATA is required from the pipe supplier and/or fusion provider:

1. Pipe Size
2. Dimensionality
3. Pressure Class per applicable standard
4. Color
5. Recommended Minimum Bending Radius
6. Recommended Maximum Safe Pull Force
7. Fusion technician qualification indicating conformance with this specification

25-01B.7 Post-Construction Submittals

The following AS-RECORDED DATA is required from the contractor and/or fusion provider to the owner or pipe supplier upon request:

1. Approved datalogger device reports
2. Fusion joint documentation containing the following information:
    a) Pipe Size and Thickness
    b) Machine Size
    c) Fusion Technician Identification
    d) Job Identification
    e) Fusion Joint Number
    f) Fusion, Heating, and Drag Pressure Settings
    g) Heat Plate Temperature
    h) Time Stamp
    i) Heating and Cool Down Time of Fusion
    j) Ambient Temperature

25-02 Materials

25-02A Fusible Polyvinyl Chloride Pressure Pipe for Potable Water

Fusible polyvinyl chloride pipe shall conform to AWWA C900, AWWA C905, ASTM D2241 or ASTM D1785 for standard dimensions, as applicable. Testing shall be in accordance with the referenced AWWA standards for all pipe types.

Fusible polyvinyl chloride pipe shall be extruded with plain ends. The ends shall be square to the pipe and free of any bevel or chamfer. There shall be no bell or gasket of any kind incorporated into the pipe.

Fusible polyvinyl chloride pipe shall be manufactured in a standard 40’ nominal length, or custom lengths as specified.

Fusible polyvinyl chloride pipe shall be blue in color for potable water use.

Pipe shall be marked as follows:

1. Nominal pipe size

2. PVC

3. Dimension Ratio, Standard Dimension Ratio, or Schedule

4. AWWA pressure class, or standard pressure rating for non-AWWA pipe, as applicable

5. AWWA standard designation number, or pipe type for non-AWWA pipe, as applicable

6. NSF-61 mark verifying suitability for potable water service

7. Extrusion production-record code

8. Trademark or trade name

9. Cell Classification 12454 and/or PVC material code 1120 may also be included

Pipe shall be homogeneous throughout and be free of visible cracks, holes, foreign material, blisters, or other visible deleterious faults.

25-02B Fusion Joints

Unless otherwise specified, fusible polyvinyl chloride pipe lengths shall be assembled in the field with butt-fused joints. The Contractor shall follow the pipe supplier's written guidelines for this procedure. All fusion joints shall be completed as described in this specification.

25-02C Connections and Fittings for Pressure Applications

Connections and fittings shall be per Section 14-02A.1 Joints and 14-02.A.2 Fittings of the City Standard Specifications.

25-02D Sanding for Casing Applications

Sand the annular space between the fusible polyvinyl chloride pipe and the casing pipe prior to the installation of grout caps. Contractor shall submit sanding plan for review.

25-02E Pipe Pull Head

Pipe pull heads, if utilized, shall employ a positive through-bolt design assuring a smooth walled bolt against the pipe cross-section at all times.

Pipe pull heads shall be specifically designed for use with fusible polyvinyl chloride pipe, and shall be as recommended by the pipe supplier.

25-02F Pipe Rollers

Pipe rollers, if required, shall be of sufficient size to fully support the weight of the pipe during handling and pullback operations.

A sufficient quantity of rollers and spacing, per the pipe supplier's guidelines shall be used to assure adequate support and resist excessive sagging of the product pipe.

25-03 Construction

25-03A Delivery and Off-Loading

All pipe shall be bundled or packaged in such a manner as to provide adequate protection of the ends during transportation to the site. Any pipe damaged in shipment shall be replaced as directed by the owner or engineer.

Each pipe shipment should be inspected prior to unloading to see if the load has shifted or otherwise been damaged. Notify owner or engineer immediately if more than immaterial damage is found. Each pipe shipment should be checked for quantity and proper pipe size, color, and type.

Pipe should be loaded, off-loaded, and otherwise handled in accordance with AWWA M23, and all of the pipe supplier's guidelines shall be followed.

Off-loading devices such as chains, wire rope, chokers, or other pipe handling implements that may scratch, nick, cut, or gouge the pipe are strictly prohibited.

During removal and handling, be sure that the pipe does not strike anything. Significant impact could cause damage, particularly during cold weather.

If appropriate unloading equipment is not available, pipe may be unloaded by removing individual pieces. Care should be taken to ensure that pipe is not dropped or damaged. Pipe should be carefully lowered, not dropped, from trucks.

25-03B Handling and Storage

Any length of pipe showing a crack or which has received a blow that may have caused an incident fracture, even though no such fracture can be seen, shall be marked as rejected and removed at once from the work. Damaged areas, or possible areas of damage may be removed by cutting out and removing the suspected incident fracture area. Limits of the acceptable length of pipe shall be determined by the owner or engineer.

Any scratch or gouge greater than 10% of the wall thickness will be considered significant and can be rejected unless determined acceptable by the owner or engineer.

Pipe lengths should be stored and placed on level ground. Pipe should be stored at the job site in the unit packaging provided by the manufacturer. Caution should be exercised to avoid compression, damage, or deformation to the ends of the pipe. The interior of the pipe, as well as all end surfaces, should be kept free from dirt and foreign matter.

Pipe shall be handled and supported with the use of woven fiber pipe slings or approved equal. Care shall be exercised when handling the pipe to not cut, gouge, scratch or otherwise abrade the piping in any way.

If pipe is to be stored for periods of 1 year or longer, the pipe should be shaded or otherwise shielded from direct sunlight. Covering of the pipe which allows for temperature build-up is strictly prohibited. Pipe should be covered with an opaque material while permitting adequate air circulation above and around the pipe as required to prevent excess heat accumulation.

Pipe shall be stored and stacked per the pipe supplier's guidelines.

25-03C Fusion Process

25-03C.1 General

1. Fusible polyvinyl chloride pipe will be handled in a safe and non-destructive manner before, during, and after the fusion process and in accordance with this specification and pipe supplier's guidelines.

2. Fusible polyvinyl chloride pipe will be fused by qualified fusion technicians, as documented by the pipe supplier.

3. Each fusion joint shall be recorded and logged by an electronic monitoring device (data logger) connected to the fusion machine.

4. Only appropriately sized and outfitted fusion machines that have been approved by the pipe supplier shall be used for the fusion process. Fusion machines must incorporate the following elements:

    a) HEAT PLATE - Heat plates shall be in good condition with no deep gouges or scratches. Plates shall be clean and free of any debris or contamination. Heater controls shall function properly; cord and plug shall be in good condition. The appropriately sized heat plate shall be capable of maintaining a uniform and consistent heat profile and temperature for the size of pipe being fused, per the pipe supplier's guidelines.

    b) CARRIAGE – Carriage shall travel smoothly with no binding at less than 50 psi. Jaws shall be in good condition with proper inserts for the pipe size being fused. Insert pins shall be installed with no interference to carriage travel.

    c) GENERAL MACHINE - Overview of machine body shall yield no obvious defects, missing parts, or potential safety issues during fusion.

    d) DATA LOGGING DEVICE – An approved datalogging device with the current version of the pipe supplier's recommended and compatible software shall be used. Datalogging device operations and maintenance manual shall be with the unit at all times. If fusing for extended periods of time, an independent 110V power source shall be available to extend battery life.

5. Other equipment specifically required for the fusion process shall include the following:

a) Pipe rollers shall be used for support of pipe to either side of the machine

b) A weather protection canopy that allows full machine motion of the heat plate, fusion assembly and carriage shall be provided for fusion in inclement, extreme temperatures, and /or windy weather, per the pipe supplier's recommendations.

c) An infrared (IR) pyrometer for checking pipe and heat plate temperatures.

d) Fusion machine operations and maintenance manual shall be kept with the fusion machine at all times.

e) Facing blades specifically designed for cutting fusible polyvinyl chloride pipe shall be used.

25-03C.2 Joint Recording

Each fusion joint shall be recorded and logged by an electronic monitoring device (data logger) connected to the fusion machine. The fusion data logging and joint report shall be generated by software developed specifically for the butt-fusion of fusible polyvinyl chloride pipe. The software shall register and/or record the parameters required by the pipe supplier and these specifications. Data not logged by the data logger shall be logged manually and be included in the Fusion Technician's joint report.

25-03C.3 General Installation

Installation guidelines from the pipe supplier shall be followed.

The fusible polyvinyl chloride pipe shall be installed in a manner so as to have a radius exceeding 150% of the manufacturer's recommended minimum bending radius or the following, whichever is greater:

FPVC Diameter (in.)	Minimum Allowable Bending Radius (ft.)
12	275
16	363
20	450
24	538

Where fusible polyvinyl chloride pipe is installed by pulling in tension, the recommended Safe Pulling Force established by the pipe supplier shall not be exceeded.

25-03D Pipe Cleaning

Host pipe shall be cleaned in accordance with all applicable standards and guidelines. Unless otherwise specified, all interior pipe surfaces shall be cleaned per AWWA M28.

Hazardous materials shall be removed and disposed of per all applicable regulations.

All pipelines shall be cleaned with as many passes as necessary to create a uniform interior host pipe surface free of all loose material and sharp edges. Any potentially deleterious areas of the host pipe should be removed or secured in place, prior to the insertion of the fusible polyvinyl chloride pipe.

25-03E TV Inspection

The host pipe shall be inspected by TV after or during the cleaning process in accordance with these specifications.

1. TV inspection after host pipe cleaning shall indicate condition of host pipe and suitability of host pipe for fusible polyvinyl chloride pipe insertion.

2. Obstructions such as corporation taps, valves and valve bodies, and collapsed piping shall be remedied prior to insertion. Spot repairs shall be made in accordance with the drawings and these specifications.

25-03F Fusible Polyvinyl chloride Pipe Insertion and Installation

25-03F.1 Excavation and Access Pits

Access pit length shall be such that the minimum bending radius for the fusible polyvinyl chloride pipe, per the pipe supplier is maintained. Sheeting, shoring and bracing requirements shall be in accordance with these specifications and applicable jurisdictional standards.

Access pit excavations shall be performed at all points where the fusible polyvinyl chloride pipe will be inserted into the existing pipeline. When possible, access pit excavations shall coincide with host pipe lateral connection points or other appurtenance installations.

25-03F.2 Pulling Equipment

The pulling mechanism shall be properly connected to the end of the fusible polyvinyl chloride pipe via a pulling head or arrangement approved by the pipe supplier.

The maximum pulling tension on the fusible polyvinyl chloride pipe shall not exceed the pipe supplier's safe pulling force as submitted for this project.

25-03F.3 Fusible Polyvinyl Chloride Care

The fusible polyvinyl chloride pipe shall be handled with care to minimize the possibility of it being cut, kinked, gouged, or otherwise damaged. The use of cables or hooks will not be permitted.

Sections of the fusible polyvinyl chloride pipe damaged, cut, or gouged shall be repaired by cutting out the section of damaged pipe and rejoining.

25-03G Connection to Existing Piping Systems

Preparation prior to making connections into existing piping systems.

a) Approximate locations for existing piping systems are shown in the construction documents. Prior to making connections into existing piping systems, the contractor shall:

   1. Field verify the location, size, piping material, and piping system of the existing pipe
   2. Obtain the required fittings as shown in the Drawings.

b) Unless otherwise approved, new piping systems shall be completely assembled and successfully tested prior to making connections into existing pipe systems.

Piping System Connections.

Pipe connections shall be installed per applicable standards and regulations and per the connection manufacturer's guidelines and as indicated in the Contract Documents. Pipe connections to structures shall be installed per applicable standards and regulations, as well as per the connection manufacturer's guidelines.

Tapping for Potable Water Connections.

a) Tapping shall be performed using standard tapping saddles designed for use on PVC piping in accordance with AWWA C605. Tapping shall be performed only with use of tap saddles or sleeves. No direct tapping shall be permitted. Tapping shall be performed in accordance with the applicable sections for Saddle Tapping per Uni-Pub-8.

b) All connections requiring a larger diameter than that recommended by the pipe supplier for tapping shall be made using ductile iron fittings as specified in these Contract Documents.

c) Equipment used for tapping shall be made specifically for tapping PVC pipe:

1. Tapping bits shall be slotted "shell" style cutters, specifically made for PVC pipe. 'Hole saws' made for cutting wood, steel, ductile iron, or other materials are strictly prohibited.
2. Manually operated or power operated drilling machines may be used.

d) Taps may be performed while the pipeline is filled with water and under pressure ('wet' tap,) or when the pipeline is not filled with water and not under pressure ('dry' tap).

25-03H Deflection Testing

1. After completion of the backfill, the Contractor shall perform a deflection test.

2. Deflection tests should be conducted using a go/no-go mandrel. The mandrel's outside dimension shall be sized to permit no more than 7.5 percent deflection. The percent deflection shall be established from the base inside diameter of the pipe. If the internal beading of the fused joints for the pipe is not required to be removed, the mandrel shall account for this clearance as well. The mandrel shall be approved by the City prior to use. Lines that permit safe entry may allow other deflection test options, such as direct measurements.

25-03I Pressure and Leakage Testing

Testing shall conform to Section 14-03G Pressure and Leakage Testing of the City Standard Specifications.

25-03J Disinfection

Disinfection shall conform to Section 14-03H Disinfection of the City Standard Specifications.

SECTION 26. CONCRETE WALL REPAIRS

26-01 General

Furnish all labor, materials, tools and equipment required to perform partial-depth concrete wall repairs. The work of this specification shall include:

26-02 Materials

Bonding Agent:
Epoxy Bonding Agent: Conform to ASTM C881/C881M Type 5 Grade 1, Grade 2, or Grade 3.

1. FX-752 as manufactured by Simpson Strong-Tie, or approved equivalent.
2. FX-792LPL as manufactured by Simpson Strong-Tie, or approved equivalent.

Packaged Repair Material:
Polymer-Modified Cementitious Proprietary Repair Material for spall repairs at walls:

1. Packaged cementitious repair material shall have a minimum compressive strength of 3,000 psi at 1 day, 6,000 psi at 7 days, and 8,000 psi at 28 days, when tested in accordance with ASTM C109.
2. Packaged cementitious repair material shall have a minimum direct tensile bond strength of 300 psi at 28 days, when tested in accordance with IRCI 210.3/ASTM C1583.
3. For freeze-thaw resistance (300 cycles), packaged cementitious repair material shall have a minimum durability factor of 95%, when tested in accordance with ASTM C348.
4. FX-263 as manufactured by Simpson Strong-Tie, or approved equivalent.

Curing Materials for Packaged Repair Material:

1. Moisture Retention Cure with a water-based curing compound conforming to ASTM C309:
2. Antisol-250 W as manufactured by SIKA, or approved equivalent.

26-02 Construction

Protect all electrical conduits, boxes, wiring, tubes, and fixtures from damage.

26-04 Measurement

Concrete wall repair is not measured and shall be included as part of Bid Item 10 Fluoride Improvments on a lump sum basis for all the work described on the plans and specifications, including but not limited to the removal, disposal, repairing of the concrete wall, coatings, vents and all necessary work and coordination, complete in place.

26-05 Payment

Full compensation for removing, disposing, repairing the concrete wall and meeting all Cal OSHA Standards, etc., shall be considered included in the lump sum price paid item for Booster Pump Station and Turnout 4 improvements and no additional compensation shall be allowed.

27 Coating Schedule

Coatings shall be installed per section 09900 and are required as shown on the drawings and specified in the specifications.

Following shall receive a coating:

- Piping within the turn out vault except factory painted valves and flow meter.
- Contractor installed piping within the booster station
- Piping within the fluoride injection vault
- Fluoride vault walls interior special coating and exterior waterproofing
- Fluoride containment area. (including under existing tank)
- Fluoride FRP door
- Exterior piping for emergency shower and eye wash.
- Turnout vault exterior waterproofing.
- Flushing station piping and pipe support including surge anticipator valve

END OF SPECIAL PROVISIONS, PROJECT NO. 24171 SEE APPENDIX A TECHNICAL SPECIFICATIONS AND APPENDIX B GEOTECHNICAL REPORT FOR ADDITIONAL REQUIREMETS FOR CIP 24171

SPECIAL PROVISIONS, PROJECT NO. 24173

(These Special Provisions are to be used in conjunction with the City Standard Specifications and Standard Details, and the State Standard Specifications and Standard Plans, 2015 Edition)

All work shall be constructed in accordance with the City of Pleasanton Standard Specifications and Details dated November 2016, and as augmented by these Special Provisions. The Sections noted are those in the Standard Specifications except for the new Section(s) added. Where conflict exists between these documents and existing conditions, request clarification from the Project Engineer.

CITY OF PLEASANTON
PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION

Sunol Avenue 20-Inch Water Main (F-7 Line)

Project No. CIP-24173

SPECIAL PROVISIONS

January 2024

Prepared By:
Joe Streeper, PE
Project Manager
Mark Thomas
RCE# 64445

1/29/2024

SECTION 1. GENERAL

1-06 Protection of Existing Facilities and Property

Add:

Prior to commencing construction activities and in the presence of the City, the Contractor shall record and document existing conditions along the project alignments and facility sites. Suitable digital photograph and videography shall be captured by the Contractor, including voiceover commentary as appropriate, and submitted for approval by the City.

The photographic and video documentation shall capture existing street striping and markings that will be replaced after final paving. The Contractor shall use the photographic and video documentation to prepare striping and marking plans for each intersection and to locate the striping between intersections prior to installing thermoplastic striping and marking material and reflectors.

The Contractor shall provide the City with a duplicate of the photographic and video documentation once complete.

Contractor may cut existing traffic loop detectors and home runs where they interfere with pipe installation. Detector loop replacement will be by others at no cost to the Contractor.

1-08 Site Protection

Add:

Street shall be swept by a street sweeper capable of self-containing debris (no power brooming) at a minimum of once per day. All sidewalks shall be swept clean daily.

1-12 Storage

Replace with the following:

Contractor shall store materials in accordance with Section 6. "Control of Materials," of the State Standard Specifications and Section 1-25B, "Materials and Storage," of these City Standard Specifications.

The City identified the following staging areas:

- Contractor may utilize the grass area 75-feet to the north of the driveway at 5353 Sunol Boulevard as a storage area. Area shall be enclosed with a 6' temporary fencing with screening. All ingress/egress from this area shall be from Sunol Boulevard and Contractor is not to enter the parking lot area. Should contractor utilize this area, the area is to be regraded and 90/10 tall fescue sod placed prior to project completion. This area is as detailed on Sheet K-1 of the Project Plans.
- The Contractor may also use a portion of the disposal site for materials storage. See Section 2-01C.

The Contractor shall not be allowed to stockpile any waste materials on the project site beyond the day on which the waste was generated.

The contractor will be responsible to install any necessary access ramps/ driveway entrances and maintain pedestrian access on the sidewalk within the public right-of-way. The contactor will be responsible to replace any damaged sidewalk and curb and gutter. A temporary 6' construction fence with screening shall be installed around the entire construction staging area and laydown yard.

The contractor shall install and maintain all necessary general housekeeping and stormwater Best Management Practices (BMPS) and take extra precaution to prevent any dust from leaving the construction staging area, laydown yard and project site. In the event the City has to notify the contractor more than three times of being a "good neighbor" (i.e. dust, noise, trash, etc.) the contractor will lose use of the construction staging area and laydown yard site, and will be responsible at their cost to procure a new construction staging area site and relocate the construction laydown yard. The area shall be restored to existing condition which will include removal of all new materials.

1-16 Lines and Grades and Construction Staking

Replace with the following:

The City will establish the proposed pipe alignment and existing grade in the field, only. The Contractor shall be responsible for establishing any additional lines and grades,to construct the work.

All work shall be done in accordance with the lines, grades and elevations shown on the Plans. Alignment staking and marking shall be provided in accordance with Section 5-1.26, "Construction Surveys," of the State Standard Specifications. Stakes and marks shall be carefully preserved by the Contractor. In case such stakes and marks are destroyed or damaged, they will be replaced by the Engineer at the expense of the Contractor.

The Plans were developed using a topographic survey, including utility information. The Contractor shall follow the process below to validate the horizontal and vertical alignment along the pipeline alignments.

8. Call in Underground Service Alert to identify existing utilities.

9. Review Plans and proposed alignment and develop pothole plan. Submit pothole plan and schedule to City.

10. Excavate potholes to verify utility and its horizontal and vertical location.

11. Using the pothole data, verify pipeline alignment and profile defined in the Plans and submit proposed modifications to the City for approval. Allow 10 working days for City review and approval.

12. Proposed modifications may include realignment space permitting.

13. Stake the pipeline alignment prior to initiating pipeline construction.

14. Contractor shall validate at least an entire block at a time.

1-18 Working Hours

Add:

Refer to Section 2 for traffic control restrictions specific to each project location that may impact the working hours.

1-20 Permits and Licenses

Replace the section entirely as follows:

Contractor shall be responsible for obtaining and paying for all necessary permits, including all required City permits. The Contractor and all subcontractors shall also be required to obtain City of Pleasanton Business Licenses. Prior to the start of any work for this project, the contractor shall apply for and obtain a "no fee" encroachment permit from the City of Pleasanton's Department Engineering, at 200 Old Bernal, Pleasanton, CA.

1-33 Measurement and Payment

Replace the section entirely as follows:

Measurement and payment for bid items are described in this section. Full compensation for Work not appearing as a specific bid item but required by the Contract Documents shall be considered as included in the contract unit price paid for the various items of work and no additional compensation will be allowed therefore. Measurement and payment descriptions within the various sections of the City Standard Specifications, not specifically identified in these Special Provisions, for the various items of work shall not apply.

No adjustment of the unit price bid shall be made for any increase or decrease in the quantity of any bid items regardless of the reason for such increase or decrease. Bid Items 16 thru 19 are estimated quantities and will be adjusted upon final profile following potholing.

1-33A Bid Item Measurement and Payment Descriptions

Furnishing all labor, supervision, materials, tools, equipment, and incidentals for the following work shall be considered as included in the various bid items involving water main / appurtenance installation including but not limited to pipe, fittings, thrust blocks, demolition, alteration, abandonment and restoration, and no additional compensation will be made therefore.

The following work shall be considered as included in the various bid items involving water main/appurtenance installation including but not limited to new pipe, fittings, valves, combination air release valves, blow-offs, water services, cathodic protection test stations; fire hydrants, abandonment operations and no additional compensation will be made therefore:

1. Potholing and excavation at least 10 working days in advance to locate marked existing utilities along the pipe alignment; requesting utility locating, marking out and receiving approval for potholes, sawcutting pavement, removing existing pavement, excavating and stockpiling soil material, identifying and documenting existing outer diameter of utility, locating the utility horizontally and vertically, placing and compacting backfill material, pavement restoration with temporary asphalt, all restoration; repairing damage, making modifications to or replacing existing utilities damaged by the Contractor's potholing operations.

2. Saw-cutting operation to install the water main/appurtenance and second saw-cutting operation (T-Cut) to restore asphalt concrete (AC); trench excavation; cutting and removing of tree roots 4-inches of diameter or less and rock/boulders encountered during excavation; off-hauling and disposing of all excavated material during trench excavation; dewatering and proper disposal of water if encountered; installation of the water main/appurtenances with minimum cover of 42" or as shown on the plans plus a 12" additional depth

variance; import, placement and compaction of trench backfill material with specified materials; two-sack slurry between utilities; temporary blowoffs, disinfection, pressure testing, and flushing of water mains and appurtenances per the phasing plan on the project plans; relocation, set up and removal of flushing materials to alternate locations; design, construction, and removal of temporary flushing basins; excavation, disposal, and backfill of all abandonments; temporary pavements; final roadway and surface restoration including asphalt concrete.

3. All coordination, including shutdown coordination with utility companies, garbage collection company, City, residents, public transit, emergency services and other affected agencies; protection of existing facilities and improvements; pre-construction documentation (photographic/video documentation), reporting, and preservation; all required permit acquisitions; obtaining and paying for recycled water for construction including fees and meters; implementing safety equipment, materials, and measures to include but not limited to cut-back, lighted barricades, cones, caution tape, night-lights, project safety signs, daily sweeping, and trench plates to keep the jobsite safe during demolition and construction; daily general housekeeping; USA notification and removal of USA; project signs per CSD 604.

Bid Item No. 1: Mobilization

The contract lump sum (LS) price paid for Mobilization shall include full compensation for furnishing all labor, supervision, materials, tools, equipment, and incidentals and for doing all work involved in Mobilization preparatory work and operations, including but not limited to: those necessary for the movement of personnel, equipment, supplies and incidentals to the project site; for the establishment of all offices, buildings and other facilities necessary for work on the project; and for all other work and operations which must be performed or costs incurred prior to beginning work on the various contract items on the project site; acquiring and securing construction staging area and laydown yard, and installation and removal of temporary 6' perimeter fence with green screen compliant with BMPs; USA notification and removal of USA markings; surveying and staking; pipe alignment and profile verification; general housekeeping at the end of each day; as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer.

Mobilization is subject to the provisions of Section 9-1.16D, "Mobilization," of the State Specifications.

Bid Item 2 – 20-inch DIP (HDSS)

The contract unit price paid per linear foot (LF) of 20-inch DIP (HDSS) shall include all work involved in the installation of the water main to the minimum cover shown on the Contract Plans, complete in place, including but not limited to couplings/sleeves, fittings (tees, bends, reducers - vertical and horizontal as needed), gaskets, mechanical restraints (mega-lugs), restrained flange adapters, cathodic bonding, pipe wrap, pipe wrapping tape, warning tape, tracer wire, thrust blocks, and cross-trench kickers. Should the Engineer order a change in minimum cover from that shown on the Contract Plans in excess of 12 inches, additional payment will be made under Bid Items 13, 14, 15, or 16 as appropriate.

Bid Item 3 – 12-inch DIP (HDSS)

The contract unit price paid per linear foot (LF) of 12-inch DIP (HDSS) shall include all work involved in the installation of the water main to the minimum cover shown on the Contract Plans, complete in place, including but not limited to couplings/sleeves, fittings (tees, bends, reducers - vertical and horizontal as needed), gaskets, mechanical restraints (mega-lugs), restrained flange adapters, cathodic bonding, pipe wrap, pipe wrapping tape, warning tape, tracer wire, thrust blocks, and cross-trench kickers. Should the Engineer order a change in minimum cover from that shown on the Contract Plans in excess of 12 inches, additional payment will be made under Bid Items 13, 14, 15, or 16 as appropriate.

Bid Item 4 – Sta 10+00 TIE-IN

The contract lump sum (LS) price paid for Sta 10+00 Tie-In shall include all work involved in completing the tie-in, complete in place, including but not limited to removal/disposal of existing water main, fittings, thrust blocks to permit installation of new pipe; installation of up to 10 linear feet 20-inch DIP, bends, fittings, sleeves, mechanical restraints, gaskets, insulating joint, polyethylene wrap and wrapping tape, warning tape, tracer wire; cathodic bonding, thrust blocks and/or cross trench kickers, blocking.

Limits of work are between Sta 10+00 (24x20-inch TEE) and Sta 10+05 end of gate valve and includes temporary blind flange. Please refer to the project plans for what may be involved to complete tie-in.

Gate Valves are paid separately under their respective bid item.

Bid Item 5 – Sta 15+34.15 60" CMP SD CROSSING

The contract lump sum (LS) price paid for Sta 15+34.15 60" CMP SD CROSSING shall include all work involved within the limits of the pay item, including but not limited to fittings inlcuding fittings at end of pay limits, thrust blocks to permit installation of new pipe; installation of up to 120 linear feet 20-inch DIP, bends, fittings, sleeves, mechanical restraints, gaskets, polyethylene wrap and wrapping tape, warning tape, tracer wire; cathodic bonding, thrust blocks and/or cross trench kickers, blocking. This bit item also includes the removal and replacement of the 60" CMP, including cutting and replacement with new 60" CMP and 60" CMP couplings.

Limits of work are between Sta 14+84 (Begin 11.25° bend) to Sta 15+82 (End 11.25° bend).

Bid Item 6 – Sta 30+00.00 BORE AND JACK CASING AND CARRIER PIPE

The contract lump sum (LS) price paid for Sta 30+00.00 BORE AND JACK CASING AND CARRIER PIPE shall include all work involved within the limits of the pay item, including but not limited to fittings including fittings at end of pay limits, thrust blocks to permit installation of new pipe; installation of up to 160 linear feet 20-inch DIP, up to 30 linear feet of 30" steel casing pipe, boring pit, receiving pit, casing end seals, casing spacers, bends, fittings, blind flanges, sleeves, mechanical restraints, gaskets, insulating joint, polyethylene wrap and wrapping tape, warning tape, tracer wire; cathodic bonding, thrust blocks and/or cross trench kickers, blocking.

Limits of work are between Sta 29+34 (Begin 11.25° bend) to Sta 30+82 (End 11.25° bend). Please refer to detail plans on the project for the work involved and the limits of this work.

Gate Valves are paid separately under their respective bid item.

Bid Item 7 – Sta 50+76.23 FLUSHING CONNECTION

The contract lump sum (LS) price paid for Sta 50+76.23 FLUSHING CONNECTION shall include all work involved within the limits of the pay item, including but not limited to removal/disposal of existing water main, fittings, thrust blocks to permit installation of new pipe; installation of up to 70 linear feet 12-inch DIP, bends, fittings, blind flange, sleeves, mechanical restraints, Pre-cast concrete box, gaskets, polyethylene wrap and wrapping tape, warning tape, tracer wire; cathodic bonding, thrust blocks and/or cross trench kickers, blocking.

The lump sum price also includes removal of spools and 90^{o} fittings and delivery to City's Corporation Yard at 3333 Busch Road after sucessful flushing. Contractor to also furnish and install fabricated welded steel 12" flange x 6" hydrant flange adapter and hydrant at this location under this bid item.

Limits of work are between the Main line Tee (included in this bid item) and the end of the flushing connection.

Gate Valves are paid separately under their respective bid item.

Bid Item 8 – Sta 54+67.86 TIE-IN

The contract lump sum (LS) price paid for Sta 54+67.86 TIE-IN shall include all work involved in completing the tie-in, complete in place, including but not limited to removal/disposal of existing water main, fittings, thrust blocks to permit installation of new pipe; installation of up to 10 linear feet 20" DIP, bends, fittings, blind flange, sleeves, reducers, mechanical restraints, gaskets, polyethylene wrap and wrapping tape, warning tape, tracer wire; bonding, thrust blocks and/or cross trench kickers, blocking.

Limits of work are between the new gate valves and existing water mains including all new piping and fittings on the existing water mains.

Gate Valves are paid separately under their respective bid item.

Bid Items 9 - 10 – GATE VALVES

The contract unit price paid for each (EA) Gate Valve shall include all work involved in the installation of the gate valve per CSD 314, complete in place, including but not limited to the gate valve, continuous 8-inch PVC riser, valve box and lid, concrete collar, pipe wrap, coating repair to valve if damaged, cathodic bonding.

Bid Item 11 - 13 – FITTINGS

The contract unit price paid for each (EA) Fitting shall include all work involved in the installation of the fittings complete in place, including but not limited to the fitting, thrust block, pipe wrap, and cathodic bonding.

Bid Item 14 – COMBINATION AIR VALVE

The contract unit price paid for each (EA) Combination Air Valve Assembly shall include all work involved in setting the assembly per modified City Std, detail 312, complete in place, including but not limited to corporation stop; fittings; polyethylene tubing; brass nipple; ball valves; Air valve; enclosure; excavation; and roadway and hardscape restoration.

Locations of combination air valves will be determined by the Engineer.

Bid Item 15– CP TEST STATION

The contract unit price paid for each (EA) CP Test Station shall include all work involved in installing the CP Test Station per City Std details for cathodic protection system, complete in place, including but not limited to all conduits, wires, terminal board, flush-mounted test station.

Bid Item 16 – VERTICAL DEPTH ADJUSTMENT (0 ft to 2 ft)

The contract unit price paid per linear foot (LF) of Vertical Depth Adjustment (0 ft to 2 ft) shall include all work involved in installing the water main deeper than the profile depth shown plus 12-inches on drawing number CD-6, to avoid existing utility interferences including additional shoring, excavation and backfill materials, compaction, spoil hauling and disposal, dewatering.

Payment under this Bid Item is in addition to payment made under Bid Item 1. Payment occurs when the additional vertical depth required for the adjustment is 2 ft or less. Only one Vertical Depth Adjustment bid item may apply as determined necessary in the field.

Bid Item 17 – VERTICAL DEPTH ADJUSTMENT (2 ft to 4 ft)

The contract unit price paid per linear foot (LF) of Vertical Depth Adjustment (2 ft to 4 ft) shall include all work involved in installing the water main deeper than the profile depth shown plus 12-inches on drawing number CD-6, to avoid existing utility interferences including additional shoring, excavation and backfill materials, compaction, spoil hauling and disposal, dewatering.

Payment under this Bid Item is in addition to payment made under Bid Item 1. Payment occurs when the additional vertical depth required for the adjustement is between 2 ft and 4 ft. Only one Vertical Depth Adjustment bid item may apply as determined necessary in the field.

Bid Item 18 – VERTICAL DEPTH ADJUSTMENT (4 ft to 6 ft)

The contract unit price paid per linear foot (LF) of Vertical Depth Adjustment (4 ft to 6 ft) shall include all work involved in installing the water main deeper than the profile depth shown plus 12-inches on drawing number CD-6, to avoid existing utility

interferences including additional shoring, excavation and backfill materials, compaction, spoil hauling and disposal, dewatering.

Payment under this Bid Item is in addition to payment made under Bid Item 1. Payment occurs when the additional vertical depth required for the adjustement is between 4 ft and 6 ft. Only one Vertical Depth Adjustment bid item may apply as determined necessary in the field.

Bid Item 19 – VERTICAL DEPTH ADJUSTMENT (6 ft to 8 ft)

The contract unit price paid per linear foot (LF) of Vertical Depth Adjustment (6 ft to 8 ft) shall include all work involved in installing the water main deeper than the profile depth shown plus 12-inches on drawing number CD-6, to avoid existing utility interferences including additional shoring, excavation and backfill materials, compaction, spoil hauling and disposal, dewatering.

Payment under this Bid Item is in addition to payment made under Bid Item 1. Payment occurs when the additional vertical depth required for the adjustement is between 6 ft and 8 ft. Only one Vertical Depth Adjustment bid item may apply as determined necessary in the field.

Bid Item 20 – STRIPING/MARKINGS

The contract lump sum (LS) price paid for thermoplastic Striping/Markings shall include all work involved in the removal and replacement of the striping and markings per applicable Caltrans Standard Details and Section 17 of the City Standard Specifications, complete in place, including but not limited to referencing existing striping / pavement markings; installing and maintaining temporary striping, pavement markings and delineators; final striping and pavement markings.

Bid Item 21 – TRAFFIC CONTROL PLAN

The contract lump sum (LS) price paid for the Traffic Control Plan shall include all work involved in developing and implementing the traffic control plan, complete in place, including but not limited to preparing the traffic control plans and pedestrian access plans, coordinating with and providing construction notifications; haul plan; implementation of the traffic control plan including furnishing and placing barricades, warning devices, signage, flaggers, 2 portable message boards, and other traffic control elements to control pedestrian, bicycle and vehicle traffic around and through construction areas as may be required by the Contract Documents and the encroachment permits under which the work is being performed.

Bid Item 22 – BMPs/STORM WATER POLLUTION CONTROL PLAN

The contract lump sum (LS) price paid for BMPs/Storm Water Pollution Control Plan shall include all work involved in developing and implementing storm water pollution control measures, complete in place, including but not limited to temporary fence at

construction yard, preparing and implementing a SWPCP for approval by the City, clean up, all best management practices.

Bid Item 23 – TRENCH SHORING

The contract lump sum (LS) price paid for Trench Shoring shall include all work involved in implementing, installing, maintaining, protecting, and removing shoring of excavations associated with this project, complete in place, including conforming to all applicable laws and safety orders; providing a trench shoring plan prepared by a civil or structural engineer California Labor Code 6705; maintaining and submitting all required permits per California Code of Regulations 341.

Acknowledgement of the submissions for this bid item by the City or Engineer does not constitute review or approval of the designs, design assumptions or criteria, completeness of submission, applicability to areas of intended use or implementation of the plan, all of which are solely the responsibility of the Contractor.

SECTION 2. TRAFFIC CONTROL

2-01A Public Convenience and Safety

Add:

Upon completion of each day's work, the contractor shall be responsible for leaving the work area free of hazards and shall provide all necessary temporary signs, warning devices, plating of trenches and barricades at no additional cost to the city. Access is to be provided for all adjacent residences and businesses at all times including non-construction hours. Maintain access for pedestrian and disabled persons at all times including non-construction hours.

All trenches shall be plated every night. Plates shall be flush with the top of pavement. Trench plates to remain in place more than 5 days shall be recessed or more than 2 days within intersections. Lighted traffic control shall be used if night time closures are used.

Contractor shall allow access to driveways and parking lots at all times, unless previously coordinated with facility owner.

2-01B Construction Area Traffic Control Devices

Add:

Construction signs shall not block sidewalks or bike lanes wherever feasible.

A minimum of two (2) Changeable Message Sign (CMS) devices are required on this project. CMS is required for southern limits of the project on Sunol Boulevard. CMS must be placed on Sunol Boulevard northbound direction approximately 500 feet away approaching the project site, near Diamond Court. The CMS shall be delivered and be in operation at least 14 days in advance of the start of work and shall be maintained in continuous operation until project completion. The contractor shall modify the message on the CMS devices to convey accurate messages. The City reserves the right to direct the contractor to relocate locations of CMS devices at no additional cost to the City.

The contractor shall be responsible for maintenance of any and all traffic control devices required by the approved Traffic Control Plan. The contractor shall ensure all devices are maintained in the proper location during holidays, overnight, and on weekends.

Should it become necessary to use City forces to maintain the traffic control devices, the contractor will be billed at the overtime rate for two (2) technicians and a vehicle, with a minimum of two (2) hours per incident/call.

2-01C Haul Routes

Replace with the following:

Haul routes are included in the Project Plans.

Soil disposal routes are as indicated in the following insert: (ADD SIDI'S PLAN)

Truck route for disposal of soil spoils shall be as included in these Special Provisions.

2-01D Traffic Control Plan

Add:

For all portions of the work, the Contractor shall provide a detailed site specific traffic control plan including pedestrian, bicyclist, and disabled person's accessibility plan for review and comment by the City Traffic Engineer. No work shall commence until the traffic control plans have been reviewed and commented by the City Traffic Engineer. These plans shall be prepared by qualified professionals (Traffic Engineers, Civil Engineers, or by Traffic Control Specialists).

Submit site specific traffic control plans for all signalized intersections, including:

- Sycamore
- Junipero/Valley
- Mission
- Bernal

Typical traffic control plan shall be submitted for work between intersections. Typical plans shall be prepared for the various lane configurations/geometry that will be encountered throughout the project limits. Traffic control plans shall conform to the most current California MUTCD and State Standard Plan, and traffic control plan must include provisions for driveway access, pedestrians, bicyclist, and ADA requirements.

The Traffic Control Plan shall be prepared and submitted along with the pothole plan for validation of alignment and profile as described in Section 1-16, Lines and Grades and Construction Staking, as modified by these Special Provisions.

The time frame for city review and comment on the Traffic Control Plan shall be 14 calendar days for each Plan submitted.

2-01E Traffic Control Restrictions

Add:

The City reserves the right to adjust the traffic control including lane closure hours and the number of traffic lanes closed.

Contractor shall provide one (1) 10-foot lane for through traffic at all times unless otherwise approved by the Engineer.

Work requiring lane closure with 500-feet of the following intersections shall be limited to 8 pm to 6 am:

- Sunol Boulevard/Bernal Avenue intersection
- Sunol Boulevard/Valley Avenue/Junipero Street intersection

Lane closure restrictions for the remaining extent of Sunol Boulevard is as follows:

Sunol Boulevard:

- 1-lane closure NB from 5:30 am to 2 pm.
- 1-lane closure SB from Valley to Sycamore 9 am to 3 pm
- 1 land closure SB from Bernal to Valley from 5:30 am to 6:30 am & 9 am to 3 pm.
- Tapers 550' for each lane.

Encroachment permits from various entities shall be obtained for the work. Refer to Section 1-20, Permits and Licenses, of these special provisions. Traffic control requirements and restrictions contained in the encroachment permits, if any, shall be accommodated in traffic control planning and execution.

Access shall remain open for businesses on Sunol Boulevard during their normal business hours which include, but are not limited to: Kidango Bernal Center, Raley's, Pleasanton Senior Center, BMO, Ace Hardware, U-Haul, Floor Coverings International, Cemeteries, Sunol Creek Memory Care, and Thermo Fisher Scientific. The Contractor shall coordinate a minimum of 7 days and, again, 48 hours in advance with each business owner to arrange for their access/deliveries.

SECTION 3. CLEARING AND GRUBBING

Add new section as follows:

3-03J Temporary Fencing

Temporary 6' fences shall be furnished, constructed, and maintained around the perimeter of the on and/or off-site storage area(s) and laydown yard(s) located throughout the project and later removed as specified in these special provisions, and as directed by the Engineer. The Contractor shall cover trench excavations in the sidewalk with plywood or traffic steel plates at night as approved by the Engineer. If existing vegetation outside the limits of work is damaged, mitigation shall be performed by the Contractor, as directed by the Engineer, at no additional cost to the City.

Used materials may be used providing such used materials are good, sound, and are suitable for the purpose intended.

Temporary fence is to be supported in concrete or metal post blocks on the ground surface.

Temporary fences that are damaged from any cause during the progress of the work shall be repaired or replaced by the Contractor at their expense.

When no longer required for the work as determined by the Engineer, temporary fences shall be removed. Removed facilities shall become the property of the Contractor and shall be removed from the site of the work, except as otherwise provided in this section.

Full compensation for maintaining, removing, and disposing of temporary fences shall be considered as included in the price paid for the various contract items of work and no separate payment shall, therefore, be allowed.

SECTION 8. ASPHALT CONCRETE, LIQUID ASPHALT, AND ASPHALTIC EMULSION

8-02A.1 Type

Replace the entire sentence to:

Aggregate grading for Type A HMA and shall be produced under the State Construction Process.

8-03C Asphaltic Emulsion

Add:

A paint binder of asphaltic emulsion SS-1 tack coat shall be applied to all vertical surfaces of pavement, curbs, gutters, and construction joints in the surfacing against which additional material is to be placed and to pavement surface prior to overlay. The area to which prime coat or paint binder has been applied shall be closed to public traffic and construction traffic shall be kept off the surface as much as possible. Care shall be taken to avoid tracking of binder material onto existing pavement surfaces beyond the limit of construction. The surface shall be free of water, foreign material, or dust, when the tack coat is applied.

8-04 Measurement

Replace with:

HMA Asphalt concrete, asphalt binder, liquid asphalt and asphaltic emulsion shall not be measured items.

8-05 Payment

Replace with:

Payment for HMA asphalt concrete, asphalt binder, liquid asphalt and asphaltic emulsion shall be considered included in the various contract items of work and no separate payment shall be allowed therefore.

SECTION 11. TRENCH EXCAVATION AND BACKFILL

11-02C Upper Trench Backfill Material

Replace entire paragraph to:

Upper trench backfill material shall be recycled Class II aggregate base.

11-03A Excavation

Add:

Soil; aggregate subbase; and aggregate base spoils can be disposed of by Contractor at Pleasanton Community Park site as shown on Contract Plans. The Contractor shall follow the designated truck route shown on the Project Plans and shall provide any required SWPPP measures and adequate measures to prevent tracking.

Asphalt concrete and Portland cement concrete spoils from trenching and surfacing removals shall become the property of the Contractor and be disposed of outside of the City right of way.

11-03A.2 Trench Length, Width and Depth

Add:

The Contractor shall restore the trench to the surface daily and reopen to traffic. The trench shall be paved with permanent asphalt concrete minimum every 2 weeks. The use of cutback will be limited to no more than 12 calendar days after which permanent asphalt concrete must be placed or prior to Friday of the second week, whichever comes first.

Trench plates, if used, shall have a non-skid coating and are limited to no more than 250 feet of open trench at any one location unless approved by the City. They shall be anchored to prevent shifting and wedged to minimize rattling and noise. All trench plates to remain at the end of the day during Phase I work, in pedestrian areas, or in place for more than 48 hours shall be flush with the pavement surface. Trench plates shall be limited on sidewalks to no more than 4 calendar days with the sidewalk being restored by Friday of each week (restored weekly), whichever comes first. For all other areas, the plates may rest above the trench contingent cut back is used around the plates to prevent tire damage.

It is the intent of the City to limit the impacts to the sidewalks. Plates/boards shall be limited to minimal size required and shall be ADA-compliant with ramps/wedges along all sides. Sidewalks shall be open to pedestrians by 11:00 am every day.

11-03A.3 Removal of Existing Pavement

Contractor shall anticipate existing asphalt concrete pavement thickness of 6.5". All removed asphalt concrete and Portland cement concrete shall be become the property of the Contractor and be disposed of outside of the City right-of-way.

SECTION 14. WATER

14.02B Ductile Iron Pipe

Add to the end of the section:

All ductile iron pipe shall be pressure class 350, U.S. Pipe type HDSS or approved equal.

All pipe shall be wrapped with polyethylene wrap in accordance with AWWA C-105.

Joint restraint for push-on joint pipe installation is required. Restrained push-on joint pipe and fittings utilizing Ductile Iron components shall be provided.

Restrained joint pipe shall be Ductile Iron manufactured in accordance with the requirements of ANSI/AWWA C151/A21.51. Push-on joints for such pipe shall be in accordance with ANSI/AWWA C111/A21.11 "Rubber-Gasket Joints for Ductile-Iron Pipe and Fittings." Pipe thickness shall be designed in accordance with ANSI/AWWA C150/A21.50 "Thickness Design of Ductile-Iron Pressure Pipe," and shall be based on laying conditions and internal pressures as stated in the project plans and specifications.

Restrained joint fittings and the restraining components shall be manufactured of Ductile Iron per grade 70-50-05 in accordance with applicable requirements of ANSI/AWWA C110/A21.10 and/or C153/A21.53 with the exception of the manufacturer's proprietary design dimensions. Push-on joints for such fittings shall be in accordance with ANSI/AWWA C111/A21.11.

Restrained push-on joints for pipe and fittings shall utilize individual Ductile-iron locking segments that are inserted through a single slot in the bell face and be easily removed. The pressure rating of the joint shall equal the pressure rating of the pipe when deflected to its maximum joint deflection. Restrained joint pipe shall be U.S. Pipe's HDSS Pipe, or approved equal. Restraint of field cut pipe shall be provided with U.S. Pipe's HDSS Pipe field weldments or approved equal.

Cement mortar lining and seal coating for pipe and fittings, where applicable, shall be in accordance with ANSI/AWWA C104/A21.4. Asphaltic outside coating shall be in accordance with ANSI/AWWA C151/A21.51 for pipe and ANSI/AWWA C110/A21.10 or ANSI/AWWA C153/A21.53 for fittings.

14.02B.1 Joints

Replace section with:

Buried pipe shall all have restrained push-on joints unless specified otherwise. At fittings and tie-ins, pipe shall have restrained push-on joints, restrained mechanical joints, or flanged joints as shown on the project drawings. Restrained mechanical joints may be used for closures, subject to meeting thrust restraint requirements. Flanged ends, or plain ends with restrained couplings, shall be used for piping above ground.

For restrained mechanical joints, dimensional and material requirements for pipe ends, glands, bolts, nuts and gaskets shall conform to ANSI A21.11 (AWWA C111).

For flanged joints, ends of pipe and fittings shall be provided with ductile iron flanges conforming to ANSI A21.10 and A21.15 (AWWA C110 and C115), as applicable. All flanged connections shall use gaskets capable of withstanding pressures up to 350 psi.

14.02B.2 Fittings

Add:

All fittings shall be ductile iron type. Fittings for ductile iron mechanical joints shall be restrained mechanical joints with EBAA Iron Megalug 1100 restraining gland or locking segment push on joint type, TR FLEX or equal, unless noted otherwise. Each fitting shall be wrapped with polyethylene wrap per AWWA.

Where shown, provide locking segment push-on joint type, TR FLEX or equal connections to valves and fittings using compatible locking segment push-on joint fittings or flange by locking segment push-on joint connecting piece adapters.

14-03 Construction

Add:

Existing valves to be removed and/or to be replaced shall be assumed to be encased in non-formed concrete. The contractor shall be required to remove the surrounding concrete encasement to a minimum of two feet measured from the outside of the valve in every direction.

The contractor shall provide a plan and required fittings, piping and backflows with certifications as necessary for pressure testing, chlorination and flushing of the piping.

14-03E.2 Interruption of Service

Add:

Hours of water service shutdowns shall only be between 8:00 a.m. and 4:00 p.m, unless a different time is authorized in writing by the City Engineer.

14-03K Cutting Asbestos Cement Pipe

Handling, including cutting, removal, disposal or abandoning in place of any asbestos cement pipe shall be in conformance with Title 8 CCR 1529 – Asbestos in Construction and the responsibility of the Contractor. If handling asbestos cement pipe, Contractor shall:

6. Possess appropriate state registration and certification
7. Use employees trained in performing work inside regulated work areas for Class II Asbestos work.
8. Perform work such that air fiber concentrations do not exceed Department of Occupational Safety and Health's permissible exposure limits for asbestos outside of established regulated areas.
9. Perform all work in accordance with applicable local, state, and federal regulations.
10. Contractor shall submit evidence of proper licensure and certifications prior to performing any work associated with Asbestos Cement Pipe.

Preparing or cutting asbestos cement pipe or transite pipe shall only be performed with a snap type cutter.

Disposal of asbestos/transite pipe shall be included in the contract prices paid for the various items of work and no additional compensation shall be allowed.

14-03H.1 General

Add:

Temporary blowoffs, backflows and connections may require restrained fittings and concrete thrust blocks. Required temporary backflow assemblies are shown on the Project Plans.

Contractor shall stage flushing operation per the Project Plans and shall discharge water into the sanitary sewer unless otherwise noted.

SECTION 23. MISCELLANEOUS

Add:

23-01E Good Neighbor Letter (48 Hours Notice)

Attached and made part of these special provisions is a sample "Good Neighbor Letter" informing the public of pending construction activity. This letter is required for distribution a minimum of 48 hours before the start of construction. The contractor is required to submit a draft letter to the City for review and approval prior to the start of any work. This letter is required and is in addition to the "No parking signs" required under section "2-01E Traffic Control Restrictions." These letters are to be distributed to all entities, businesses or residents that are directly impacted when access to their property may be impeded and this distribution is not limited only to the project's limit of work.

This is not a measured item of work, no separate payment for conforming to the provisions herein.

(SAMPLE LETTER ON FOLLOWING PAGE)

(Contractor's Letterhead)

REQUIRED GOOD NEIGHBOR LETTER (48 HRS Notice)

Date:____/____/____

RE: SUNOL BLVD 20-INCH WATER MAIN IMPROVEMENTS (F-7 LINE)
SUNOL BOULEVARD
CIP No. 24173

Dear Tenant/Occupant:

Please be advised that heavy construction activity to install a new water main and various related appurtenances within portions of Sunol Boulevard between Bernal Avenue and Sycamore Drive will begin at [(Time of Day: _____) on (Day of week: _____), (Date,___/___/___)]. The project will start from XXXXX to approximately XXXXX. It is anticipated that this work will be completed by (Time of Day: _____) on (Day of week: _____), (Date,___/__/___), weather permitting.

During this time period, you may have limited or no vehicle access to your driveway while work occurs in front of your residence. Pedestrian access to all properties will be maintained during this period.

(Optional sample language depending on type of work)

- On-street parking directly in front of your residence will be limited and at times may not be available. It is suggested that you park your vehicle on adjacent streets not under construction. Typically, this work will occur between the hours of 8:00 a.m. and 5:00 p.m.

If you have questions or special access needs, please feel free to contact Mr./Ms. _____ who is our construction superintendent on this project at ____ - _____. Also, you may contact the City's Inspector (Inspector assigned to project: Mr. ___ directly at 925-931-XXXX).

Sincerely,

_____
Contractor Name

Attachment(s): None/List of affected streets

Add new sections as follows:

23-01J Potholing

Potholing locations at all utility crossings (shown in drawings, USA markings), pipe connections, etc. shall be as directed by the field Engineer in order to ascertain horizontal and vertical locations of existing underground facilities that may impact final placement of proposed facilities. During potholing operations, measurements shall be taken and recorded by the contractor in order to ascertain the dimensions, shape, material, and any special features of the existing underground facilities including the outer diameter. The potholing locations shall include but not limited to utility crossings and vaults, and all storm drain pipeline and drainage inlets crossings.

Potholing operations shall only be started after the Underground Service Alert has been contacted and all of the utilities have been marked in the field. Traffic control shall be approved by the traffic engineer and shall be properly installed and maintained throughout the duration of the potholing operations.

All potholes shall be backfilled and capped with hot mix asphalt within 48 hours.

The contractor shall be held responsible for damages to existing improvements, above ground or underground, shown or not shown on the plans, both private and public, due to contractor's operation. It is understood that the Contractor shall repair and/or replace any such damaged improvements according to the requirements of the Engineer at no additional cost to the City.

23-01K Construction Sequencing and Constraints

The Contractor must adhere to the following requirements and include in the work schedule.

G. PHASE 4 – Install tee and valve at Sycamore Road with blind flange. Install valves, cross, blind flanges and fittings at Bernal Avenue. Coordinate shutdowns with City. Service interruption limited to one day per location.

H. Phase 5 – Install new transmission main and flushing facilities from Sycamore Road to Bernal Avenue.

I. The Contractor shall provide continuous access through the work zone to the public. Where two lanes for each way traffic cannot be accommodated, the Contractor shall provide flaggers to control traffic movement in each direction in accordance with MUTCD and City Standard Specifications.

J. Trench AC patch paving of T-cut shall occur within two weeks of completion of water pipeline construction, including pipe embedment zone and trench zone backfill. If the trench paving does not occur within this time limit, contractor will be required to halt pipeline work until paving operations can come into

compliance. This two week requirement must be met regardless of the status or pressure testing pipeline.

K. Traffic control plans broken down for each major line segment prepared by the Contractor shall be submitted to the City allowing for 14 calendar days review for each submittal. Traffic control plans shall be approved prior to marking out preliminary pipeline alignment. Traffic control plans for the City shall also meet the requirements of the City's respective encroachment permit.

L. Contractor shall provide access to driveways at all times to extent possible. Trench plating shall be installed over trenches when active construction is not occurring in front of driveways. Contractor shall coordinate with resident/business a minimum of 5 working days prior to scheduled work in front of driveways and shall work within the agreed time frame. Advance notice signage of temporary driveway closures shall be installed 48 hours at each impacted driveway.

M. Trench restoration paving shall meet the same expectations as if it was the final paving for the project. The paving shall match or exceed the quality of pavement surface and rideability as the adjacent pavement and shall be free from: depressions (greater than ¼"), high spots/swells (greater than ¼"), dips, gouges, potholes, waves, rutting, unevenness, raveling, cracking, bleeding, and settlement.

APPENDIX A

(Technical Specifications)

CITY OF PLEASANTON
PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION

ATTACHMENT A

TURNOUT #4 BOOSTER PUMP STATION AND DISCHARGE PIPELINE (F-1 LINE)

Project No. CIP-24171

TECHNICAL SPECIFICATIONS

January 2024

Prepared By:
Mirko Maher, PE
Senior Project Manager
Woodard & Curran
RCE# 64645

CITY OF PLEASANTON
PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION

ATTACHMENT A

TURNOUT #4 BOOSTER PUMP STATION AND DISCHARGE PIPELINE (F-1 LINE)

Project No. CIP-24171

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Specifications List

SECTION 02320

JACK AND BORE

PART 1 GENERAL

1.1 DESCRIPTION

A. SCOPE

1. The work specified in this Section includes the requirements for steel casing installation using Guided Auger Boring as designated in the Contract Documents. This Section also describes carrier pipe installation within the steel casing.
2. This Section defines in general terms the work to be completed. The Contractor shall have sole responsibility for the means and methods utilized to install the casing to the line and grade shown on the Drawings and to prevent settlement, all within the tolerances specified herein and subject to review by the Engineer and Owner.

1.2 DEFINITIONS

A. Auger Boring: A trenchless technology that involves jacking a steel casing from a Launch Shaft to a Receiving Shaft. Excavation is carried out within the jacked casing using auger flights to transport the soils to the Launch Shaft. The casing is advanced using hydraulic jacks located in the Launch Shaft. Auger Boring may be Guided Auger Boring or Traditional Auger Boring.

B. Guidance System: A system which utilizes an LED target mounted behind the steerable bit of the lead Pilot Tube and a camera system to install the Pilot Tubes to a specified line and grade.

C. Guided Auger Boring: A hybrid trenchless technique which utilizes a steerable Pilot Tube to guide the jacking of a casing pipe from a Launch Shaft to a Receiving Shaft. Excavation is carried out within the jacked casing using auger flights to transport the soils to the Launch Shaft. The casing is advanced using hydraulic jacks located in the Launch Shaft.

D. Launch Shaft: An excavation from which trenchless technology equipment is advanced.

E. Obstruction: An object or feature that prevents forward movement of the Pilot Tubes or casing after all diligent efforts to advance past the object by the Contractor have failed.

F. Pilot Tubes: Steerable tubes that are jacked from a Launch Shaft to a Receiving Shaft utilizing a Guidance System to provide a pilot bore accurate in both line and grade. The lead Pilot Tube is fitted with a slant-faced bit to enable steering. Once installed, the Pilot Tubes provide a centerline for the casing installation.

G. Receiving Shaft: An excavation into which trenchless technology equipment is advanced and recovered following the installation of the casing.

H. Reamer: Used during Guided Auger Boring to link or connect the last Pilot Tube to the first casing section and transmit jacking energy from the casing to the Pilot Tubes. Also commonly referred to as a spider or pipe adapter.

I. Traditional Auger Boring: Non-guided Auger Boring.

J. Casing Pipe: Sleeve through which carrier pipe will be placed. Casing pipe shall be capable of withstanding installation, jacking, and any other construction or temporary loads in addition to permanent live and dead loads. Only steel casing pipe can be used with auger boring equipment.

K. Carrier Pipe: Potable water pipe.

L. Casing Spacer: Fabricated item for positioning a carrier pipe inside a casing pipe.

1.3 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. ASTM A36 - Standard Specification for Carbon Structural Steel

B. ASTM A139 - Standard Specification for Electric-Fusion (Arc)-Welded Steel Pipe.

C. ASTM A283 - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates

D. ASTM A570 - Standard Specification for Hot-Rolled Carbon Steel Sheet and Strip, Structural Quality

E. ASTM C150 – Standard Specification for Portland Cement.

1.4 RELATED WORK SPECIFIED ELSEWHERE

A. City of Pleasanton Standard Specifications, Section 11: Trench Excavation and Backfill

B. City of Pleasanton Standard Specifications, Section 15: Concrete Improvements

C. City of Pleasanton Standard Specifications, Section 14-03G: Pressure and Leakage Testing

1.5 QUALITY ASSURANCE

A. Qualifications

1. Contractor: The Contractor must have completed at least five guided auger boring projects in the last three years on project lengths equal to or greater than 500 linear feet. At least two of the projects must have installed a casing of a diameter greater than or equal to 24 inches. At least one of the five projects must have been completed within one year prior to bid submission.

2. Superintendent: Minimum of five guided auger boring projects in the last eight years with at least one project demonstrating experience in ground conditions with similar soil classification and groundwater conditions. At least three projects where the casing or pipe was installed with a minimum diameter of 24-inches over 150 linear feet.
3. Operator: A minimum of five years of boring experience with a minimum of five guided auger boring projects. Of the five projects:

    a. Three projects must demonstrate drive lengths of at least 150 linear feet.
    b. One project demonstrating experience in ground conditions with similar soil classification, groundwater conditions and consistency as determined by SPT N-values.

4. The surveyor responsible for line and grade control shall be a Licensed Surveyor registered in the State of California who has prior experience with similar projects.
5. Allowable Installation Tolerance: The maximum deviation at any point along the casing shall not exceed the following:

    a. Guided Auger Boring installations: One (1) inch per 400 feet from the line and/or grade shown on the Drawings.

6. Allowable Ground Surface Movement: Ground surface movement shall be controlled to the following tolerances:

    a. One half (½) inch for all roadways.
    b. One (1) inch within open space areas with no surface facilities.

7. Allowable Utility Movement: Movement of any utilities shall not exceed one (1) inch.
8. The Contractor shall immediately notify the Owner, in writing, if any problems that would cause a schedule delay or a change to the submitted process/procedure are encountered with equipment or materials.
9. The Owner shall have full access to the Launch and Receiving Shafts prior to, during, and following all Auger Boring operations. This shall include, but is not limited to, visual inspection of installed Pilot Tubes and casings, and verification of line and grade. The Contractor shall provide safe access in accordance with all safety regulations.

B. Contractor Submittals

1. All submittals shall be in accordance with the requirements given in the General Provisions. All submittals requiring structural design shall be signed by a professional civil or structural engineer registered in the State of California.
2. The submittals shall include the following:

    a. Work Plan: The Contractor shall submit a Work Plan, which includes the details of the Pilot Tube and casing installation as well as the sequence of operations that shall be utilized during all phases of construction. The work plan shall also include the following:

1) A detailed description of the equipment and procedures to be employed during Auger Boring operations. Provide manufacturer's literature describing in detail the Pilot Tube Guidance System to be used.
2) Provide calculations of the anticipated jacking force required to complete the installation and details of the method used to determine anticipated forces.
3) Certification by the Auger Boring machine manufacturer of the thrust, condition, and operational characteristics of all equipment to be used for installing the specified casing.
4) Details of the Auger Boring equipment complete with jacking capacity, diameter, Reamers, and manufacturer's literature. These details shall illustrate that the jacking force estimated to complete the bore does not exceed the available jacking capacity of the equipment, with the factor of safety specified. These details shall also include conversion factors used to convert between Auger Boring equipment operating pressure and the resulting jacking force.
5) Excavation procedures including details of auger flights, safety systems, and face support capabilities. Include details of provisions for supporting the face during Auger Boring and when Auger Boring operations are interrupted.
6) Thrust block and jacking frame design and details, including reaction transfer calculations. Jacking loads shall not be transmitted to previously installed casings.
7) Details of the pipe lubrication system and description of pipe lubricants to be used during Auger Boring, including manufacture's literature and Material Safety Data Sheets (MSDS).
8) Shop drawings for all equipment, equipment setup areas, and staging areas in addition to Launch and Receiving Shafts and casing alignment. Launch Shaft shop drawings shall include arrangement and position of main jacks, thrust ring, jacking controls, and pressure gauges.
9) A spoils removal plan, including all equipment necessary to remove the material from the jacked casing. The plan shall also include the location and sequence of disposal.
10) Dewatering procedures and groundwater control details during trenchless operations, including launch and receiving seals if used. Describe method and capabilities for controlling ground conditions at the tunnel heading and preventing loss of ground.
11) Material specifications and shop drawings of casing showing the pipe wall thickness, steel grade, and the maximum allowable axial force. A casing pipe certification of compliance shall be submitted.
12) Calculations demonstrating that the casing pipe selected has been designed to support the maximum anticipated earth loads and superimposed live loads, both static and dynamic, which may be imposed on the casing pipe. This calculation shall include the maximum allowable axial force that can be applied to the casing pipe during jacking operations with a minimum safety factor of 2.0.

13) Material specifications and shop drawings showing the configuration of the Reamer and a detail of its connection to the lead casing showing all Reamer dimensions and the overcut dimension. Drawings and connection details shall be submitted for every increase in pipe diameter.
14) Calculations demonstrating that the Reamer(s) selected has/have been designed to support the maximum anticipated installation loads that may be imposed on the Reamer(s) based on the anticipated jacking forces submitted.
15) A safety plan.

b. A detailed and legible schedule of work for each planned drive. The schedule shall include, at a minimum:

1) Mobilization
2) Site preparation
3) Pilot Tube installation (where required)
4) Casing installation including end seals
5) Installation of carrier pipe including casing spacers
6) Annular space grouting
7) De-mobilization

c. Contingency Plan: The Contractor shall submit a proposed contingency plan for potential problems that may arise during Auger Boring operations. The contingency plan shall address the observations that would indicate a problem as well as the remediation methods to address it. The plan shall include, at minimum, the following scenarios:

1) Obstruction encountered at the front of the lead Pilot Tube.
2) Obstruction encountered at the leading edge of the Reamer or casing.
3) Deviation from planned alignment outside of provided tolerances.
4) Jacking forces in excess of estimated maximums.
5) Inability to complete the Pilot Tube installation.
6) Inability to complete the casing installation.
7) Inability to control ground conditions at the tunnel heading.
8) Ground movement in excess of provided tolerances.
9) Utility strike.
10) Utility movement in excess of provided tolerances.
11) The City may consider extended work hours for construction conditions encountered for a specific boring.

d. Daily Submittals: The following information shall be recorded during Auger Boring operations and submitted to the Owner on a daily basis. Information shall be submitted within 2 hours of completion of the daily events or shift change, whichever is more frequent.
e. Log of the Auger Boring operations. At a minimum the log shall consist of the following:

1) The date, and the starting and finishing time of the work.

2) Installation progress, documenting the cumulative length of Pilot Tubes and casing installed at the end of each day.
3) Documentation of any deviance in line or grade including the elevation, station, and station offset of the casing invert if different than the design alignment.
4) Jacking forces and auger flight torque.
5) Rate of advance (daily footage per hours worked).
6) Pipe lubricant used (in gallons).
7) Any problems encountered.

f. Post-Casing Installation Submittal: Field drawings for recording as-built conditions. The drawings shall be marked with all field information and shall be properly dated.

g. No work, including the set up of traffic controls for the Launch or Receiving Shafts, shall be performed until the submittals required for this Section and all other sections related to the installation of casing and carrier pipe through the casing have been reviewed and accepted by the Owner and Engineer.

1.6 SAFETY

A. The work shall be performed in conformance with all applicable federal, state, and local safety requirements.

B. The Contractor shall submit a detailed safety plan in accordance with Cal/OSHA standards.

1.7 DESIGN CRITERIA

A. Drives indicated in the Drawings as Guided Auger Boring shall be guided with a Pilot Tube Guidance System for line and grade accuracy.

B. Drives indicated in the Drawings as Traditional Auger Boring do not require a Pilot Tube Guidance System.

C. Auger Boring equipment shall be sized to provide a minimum jacking force of 1.5 times the anticipated jacking force.

D. The reaction backstop shall be adequately sized to accommodate all anticipated jacking forces for the project. Design and construction of the thrust reaction backstop shall be the sole responsibility of the Contractor.

E. Control ground and utility movement.

F. Spoils shall be excavated in a manner that controls ground conditions at the tunnel heading and prevents loss of ground.

PART 2 MATERIALS

2.1 STEEL CASING

A. Materials: Steel casing shall be ASTM A283, Grade C, ASTM A570 Grade 30, 33, and ASTM A36 unless noted otherwise. The minimum outside diameter of the steel casing shall be 42 inches as shown on the drawings with a minimum wall thickness of 1/2-inches. Greater casing thickness and diameter may be used as convenient for the method of work and loadings involved, as suitable for the site and as limited by possible interferences, but at no additional cost to the City.

B. Have the capacity to withstand the maximum axial force anticipated with a safety factor of 2.0. The casing shall also be designed to withstand reasonably anticipated long-term soil and groundwater loads.

C. Have a minimum yield strength of 35,000 psi.

D. Have a difference in roundness between the major and the minor outside diameters not exceeding 1% of the specified nominal outside diameter, or ¼ inch, whichever is less.

E. Have an outside circumference which is within 1% of the nominal circumference, or ½ inch, whichever is less.

F. Have a minimum allowable straightness deviation in any 10-foot length of 1/8 inch.

G. Joints & Welding: Casing sections shall be joined by full circumference welding. Field welds shall be full-penetration bevel welds in accordance with the standards of quality as set forth in the specifications of the American Welding Society. All welding shall be performed by skilled welders qualified under the provisions of ANSI/AWS D1.1. Welder qualifications shall be certified by an independent local, approved testing agency not more than 6 months prior to commencing work. Prepare ends of casing for proper bevel weld by providing a 45-degree bevel on the end of one of the two casing pieces being joined.

2.2 CASING SEALS

A. The casing seals shall be of brick and mortar. Seals shall be applied after grouting the interior of the casing (between carrier pipe and casing) with cellular concrete as specified herein.

2.3 PIPE SKIDS AND BLOCKING

A. Skids and blocking shall be manufactured stainless steel casing spacers with composite runner skids.

B. Casing spacer skids and blocking shall be bolt-on style with a shell made of at least two halves. The band material shall be manufactured of a minimum 14 gauge T-304 stainless steel and 10 gauge T-304 stainless steel risers when needed. All welds are to be chemically passivated. The runners shall be at least 11inches long and shall be

manufactured of high abrasion resistant and low coefficient of friction, glass filled polymer. Fasteners and hardware for securing the spacers and runners shall be stainless steel. Casing spacers shall have a flexible EPDM liner having a minimum thickness of 0.090 inches with a hardness of Durometer "A" 85-90. The liner shall have a rating of no less than 60,000 VPM and water absorption of 1% maximum.

C. Manufacturers: Casing spacers shall be as manufactured by Advance Products & Systems, Inc., Cascade Waterworks Mfg. Co., CCI Pipeline Systems, or Pipeline Seal & Insulator, Inc.

2.4 GROUT

A. Exterior of Casing: Grout shall consist of an 8 sack sand slurry.

B. Interior of Casing (between carrier pipe and casing): Grout shall consist of cellular concrete as manufactured by Cell-Crete Corporation. The cellular concrete shall have minimum compressive strength of 100 psi.

2.5 GROUT CONNECTIONS

A. The contractor shall provide threaded steel half-couplings on the inside of the casing pipe at the locations, spacing and orientation called for in the City of Pleasanton Standard Drawings.

B. Spacing of the grout connections may be decreased to provide more frequent grouting, but in no case shall the spacings shown on the drawings be exceeded. Grout holes shall be fitted with countersunk, full face, rubber gaskets to prevent infiltration of displaced earth during the casing installation process.

2.6 EQUIPMENT

A. The Contractor shall use Auger Boring equipment specifically designed for jacking Pilot Tubes and casing through the soil materials described in the Contract Documents along the alignment of the proposed pipeline. In addition:

1. The Pilot Tubes shall be installed using a jacking frame and Guidance System sufficient to meet the installation tolerances.
2. The amount of overcut shall be limited to less than 1/2 inch larger on radius than the outside of the casing.
3. Be capable of continuously monitoring jacking forces. Develop the jacking system with a uniform distribution of jacking forces on the end of the casing.
4. Pilot tube jacking and Auger Boring equipment shall be sized according to the manufacturer's recommendations and the Contractor's knowledge of Auger Boring in soils similar to those at the Site.
5. A pipe lubrication injection system shall be used to inject lubricants around the outside of the Pilot Tubes and casing as required to decrease soil-pipe interface friction. Provide a suitable pressure gage on the lubrication supply line.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

A. The Contractor shall not begin Auger Boring until the following conditions have been met:

1. Required submittals have been made and the Engineer has reviewed and accepted them.
2. Launch and Receiving Shaft excavation has been completed and supported in accordance with these Specifications.

B. The Contractor shall give the Owner and Engineer a minimum of 3 days advance notice from the start of an excavation for boring operations.

C. All work shall be performed in the presence of the Owner.

D. The Contractor shall install casing between the limits indicated on the Drawings to the specified lines and grades. Utilize methods that include due regard for safety of workers, adjacent structures and improvements, utilities, and the public. Excavate Launch and Receiving Shafts at the locations identified on the Drawings unless proposed otherwise in the Work Plan accepted by the Engineer.

E. The Contractor shall perform all work in accordance with the requirements of Cal/OSHA. Perform gas testing by a certified tester in accordance with Cal/OSHA requirements. For installation of steel casings 30-inches in diameter and larger, the Contractor shall assume that classification by Cal/OSHA will be, "potentially gassy" and Contractor shall comply with. Cal/OSHA requirements associated with that classification.

F. The Contractor shall furnish all necessary equipment, power, water, and utilities for excavation, Pilot Tube installation, Auger Boring, lubrication mixing and pumping, removal and disposal of spoils, grouting, and other associated work consistent with the methods of construction.

G. The Contractor shall conduct all operations such that trucks and other vehicles minimize dust or noise nuisance in the streets and adjacent properties.

H. The Contractor shall promptly clean up, remove, and dispose of any spoils or spillage in accordance with the spoils removal plan.

I. The Contractor shall perform all work so as not to disturb adjacent structures, roadways, or existing utilities. Immediately repair any damage to the satisfaction of the agency or utility having jurisdiction.

3.2 LAUNCH/JACKING PIT

A. Excavation Protection: The approach trench for jacking or boring operations shall be adequately shored to safeguard existing substructures and surface improvements and to ensure against ground movement in the vicinity of the casing portal.

B. Structural Support for Jacking Equipment: Heavy guide timbers, structural steel, or concrete cradle of sufficient length shall be placed in the approach trench of the jacking pit and firmly bedded on the required line and grade to provide accurate control of jacking alignment. Adequate space shall be provided to permit the insertion of the lengths of casing to be jacked. The structure of 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 inserted 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.

3.3 INSTALLATION

A. The Contractor shall use benchmarks to maintain line and grade to establish the location of the Pilot Tube using a Guidance System for Guided Auger Boring operations.

B. The Contractor shall submit to the Owner copies of field notes used to establish line and grade. The Contractor remains fully responsible for the accuracy of the installation.

C. If the Guidance System alignment shifts or is moved off of design alignment and grade for any reason, the Contractor shall halt Pilot Tube operations and the Guidance System shall be reset by qualified surveying personnel in accordance with accepted procedures.

D. If the casing installation exceeds the specified tolerances, the Contractor is responsible for correcting the installation. Do not encroach upon the minimum annular space detailed. The City will check line and grade at intervals not exceeding 40-feet to ensure compliance with plans. All corrective work shall be performed as described in the accepted Contingency Plan at no additional cost to the City.

E. The Contractor shall use augers that appropriately sized to the casing. Augers that are more than one standard pipe diameter size smaller than the casing will not be allowed. Augers shall be recessed within the casing pipe throughout excavation, maintaining a soil plug within the casing at all times. Advancing the augers in front of the casing will not be allowed.

F. The Contractor shall jack casing into place without damaging the casing. In the event a casing section is damaged during the jacking operation, the Contractor shall repair the casing in a method accepted by the Engineer and to the satisfaction of the Owner.

G. The Contractor shall provide groundwater control as required for proper execution of the work.

H. The Contractor shall transport and dispose of all spoils properly. No stockpiling shall be permitted at the Launch Shaft sites. Only use the disposal sites identified in accepted submittals.

I. Obstruction removal for Guided Auger Boring is subject to the following requirements:

1. Notify the Owner immediately upon encountering an Obstruction.

The Contractor shall take all necessary steps to remove any Obstruction or otherwise make it possible to continue Auger Boring operations.

2. Upon written authorization by the Owner, proceed with removal of the Obstruction in accordance with the Contractor's submitted and accepted Obstruction removal plan.
3. All Obstructions less than or equal to the difference of the casing inside diameter and the Pilot Tube outside diameter are the responsibility of the Contractor, and will not be considered for additional payment.
4. Only Obstructions larger than the difference of the casing inside diameter and the Pilot Tube outside diameter that prevent forward progress will be considered for additional payment.
5. All costs associated with delay, removal, and continued Guided Auger Boring for the first two Obstructions larger than the difference of the casing inside diameter and the Pilot Tube outside diameter shall be the responsibility of the Contractor and shall be included in the base bid.
6. Additional Obstruction removal for the third and subsequent Obstructions measuring larger than the difference of the casing inside diameter and the Pilot Tube outside diameter will be paid as an extra item by change order.
7. The Contractor must produce the Obstruction and allow visual observation and measurement by the Owner for the Obstruction to be considered for additional payment.

J. In the event the Contractor encounters a problem during the Work and the situation is not covered by the Contractor's Contingency Plan, the Contractor shall propose an alternative plan for the Owner's acceptance.

K. Grouting of Exterior of Casing: Immediately after completion of the jacking operation, grout shall be injected through the grout connections of casings 24-inches in diameter and larger in such a manner as to completely fill all voids outside the casing pipe resulting from the jacking operation. Where loss of ground outside the casing is suspected, additional grout connections shall be welded to the casing. Grout pressure shall be controlled to avoid deformation of the casing and/or avoid movement of the surrounding ground. After completion of grouting, the grout connections shall be closed with extra heavy black steel threaded plugs.

L. Grouting of Interior of Casing (between carrier pipe and casing): After grouting the exterior of the casing and installing the carrier pipe, the interior of the casing shall be completely filled with grout.

3.4 INSTRUMENTATION AND MONITORING

A. All crossing utilities and all utilities located horizontally within 5 feet of the exterior of the casing shall be positively located prior to construction. Where positive location cannot be performed at the crossing location without obtaining additional permits (other than encroachment permits), positive location shall be accomplished at the nearest two locations where it can be performed without acquiring additional permits (other than encroachment permits). For utilities crossing the proposed alignment, the two locations shall be on either side of the alignment. For utilities parallel to the proposed alignment, the two locations shall be up-station and down-station of the proposed alignment.

B. Utility monitoring points shall consist of a measurement rod installed within a casing placed on the top surface of the utility being monitored. The rod shall rest firmly on the utility, and shall be centered in the annular space of the casing using centralizers.

C. Utility monitoring points shall be removed once trenchless activity beneath the active point has been complete for at least four weeks. Remove and dispose of rods and casings to a depth of at least three feet below the final ground surface. Backfill holes to be even with the surrounding surfaces.

3.5 INSTALLATION OF CARRIER PIPE

A. Insertion of Carrier Pipe: After grouting the exterior of the casing pipe, the interior shall be cleaned and the carrier pipe installed. The carrier pipe shall be installed on two (2) skids of sufficient dimension to prevent the pipe bells from touching the casing pipe and to allow for proper alignment of the carrier pipe to meet the specified grade.

B. Securement: The top of the carrier pipe shall be blocked to prevent flotation. The carrier pipe shall be secured in a manner satisfactory to the City Representative to prevent floating and subsequent change of grade.

C. Pipe Skids and Blocking: Spacers shall be installed at mid-sections if the carrier pipe segment is over ten (10) feet long. Detailed product submittals showing all dimensions shall be provided to the City Representative for approval.

D. Grade Adjustment: The carrier pipe grade shall be adjusted as required by changing the height of the casing spacer riser and / or the thickness of the runner pad skids to compensate for any grade variations of the casing pipe. Care should be taken to ensure that the carrier pipe does not come in contact with and is insulated from the casing pipe.

E. Failure to Achieve Required Grade: If the alignment of the casing pipe is such that the carrier pipe grade cannot be met, the grade of the casing pipe shall, if required by the City, be adjusted. If realignment is not deemed feasible by the City, another casing pipe meeting the required grade shall be installed. The abandoned casing pipe shall be filled with sand and the ends plugged with twelve (12) inch thick masonry plugs. Realignment or replacement work shall in no way result in additional costs to the City.

F. Testing: Before backfilling the jacking and receiving pits, the carrier pipe shall have passed an initial pressure or leakage test in accordance with City of Pleasanton Standard Specifications, Section 14-03G: Pressure and Leakage Testing.

3.6 CLOSING THE LAUNCH SHAFT AND RECEPTION SHAFT

A. Closing the Jacking Pit and Receiving Pit: After jacking equipment and muck from the tunnel have been removed from the approach trench of jacking pit, the bottom of the jacking pit shall be prepared for pipe foundation and bedding. Remove all loose and disturbed material below pipe grade to undisturbed earth.

B. Backfill: The jacking pit and receiving pit represent overwidth trench conditions. Backfill shall be in accordance with City of Pleasanton Standard Specifications, Section

11: Trench Excavation and Backfill with concrete encasement of potable water pipelines within the overwidth trench as shown on the Plans.

END OF SECTION

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SECTION 02675

FUSIBLE POLYVINYL CHLORIDE PIPE

PART 1 GENERAL

1.1 DESCRIPTION

A. SCOPE

1. This section specifies fusible polyvinylchloride pipe, including standards for dimensionality, testing, quality, acceptable fusion practice, safe handling and storage.

B. PIPE DESCRIPTION

1. Pipe supplier shall furnish fusible polyvinylchloride pipe conforming to the standards and procedures, and meeting the testing and material properties as described in this Specification.
2. Pipe shall conform to the dimensionality and general characteristics shown in the Pipe Schedule in the Drawings.

1.2 QUALITY ASSURANCE

A. References: This section contains references to other standards and industry specifications. They are a part of this section as specified and modified. Where a referenced document contains references to other standards, those other standards are included as references under this section as if referenced directly. In the event of a conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.

B. Unless otherwise specified, references to documents shall mean the documents in effect at the time of design, bid, or construction, whichever is earliest. If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued.

C. Where document dates are given in the following listing, references to those documents shall mean the specific document version associated with that date, regardless of whether the document has been superseded by a version with a later date, discontinued or replaced.

D. Manufacturer Requirements

1. Fusible PVC piping shall be made from PVC compound conforming to cell classification 12454 per ASTM D1 784.
2. Fusion Technician Requirements: Fusion Technician shall be fully qualified by the pipe supplier to install fusible polyvinylchloride pipe of the type(s) and size(s)

being used. Qualification shall be current as of the actual date of fusion performance on the project.

E. Specified Pipe Suppliers: Fusible polyvinylchloride pipe shall be used as manufactured under the trade names Fusible C-900®, Fusible C-905®, and FPVC®, for Underground Solutions, Inc., Poway, CA, (858) 679-9551. Fusion process shall be as patented by Underground Solutions, Inc., Poway, CA, Patent No. 6,982,051. City is aware of no other fusible polyvinylchloride pipe product that is an equal to this specified product.

F. Warranty:

1. The pipe shall be warranted as described in the General Provisions.
2. In addition to the standard pipe warranty, the fusion services shall be warranted for one year per the fusion service provider's standard terms.

G. Pre-Construction Submittals

1. The following product data is required from the pipe supplier and/or fusion provider:

   a. Pipe Size
   b. Dimensionality
   c. Pressure Class per applicable standard
   d. Color
   e. Recommended Minimum Bending Radius
   f. Recommended Maximum Safe Pull Force
   g. Fusion technician qualification indicating conformance with this specification

H. POST-CONSTRUCTION SUBMITTALS

1. The following as-recorded data is required from the contractor and/or fusion provider to the owner or pipe supplier upon request:

   a. Approved datalogger device reports
   b. Fusion joint documentation containing the following information:

      1) Pipe Size and Thickness
      2) Machine Size
      3) Fusion Technician Identification
      4) Job Identification
      5) Fusion Joint Number
      6) Fusion, Heating, and Drag Pressure Settings
      7) Heat Plate Temperature
      8) Time Stamp
      9) Heating and Cool Down
      10) Time of Fusion
      11) Ambient Temperature

2. Prior to pipe installation, the Contractor shall provide a summary of the joint testing results, including the range of acceptable values (acceptance criteria) as determined by the pipe supplier. The Contractor shall review test results or data

that does not meet the acceptance criteria with the City , including any measures taken by the Contractor to correct the deficiency. Instances of deficient data and results shall be addressed to the satisfaction of the City. The City may reject some or all pipe if the fusion data does not meet the manufacturer's requirements.

PART 2 PRODUCTS

2.1 FUSIBLE POLYVINYLCHLORIDE PRESSURE PIPE FOR NON-POTABLE WATER CONFORMING TO AWWA C905

A. Fusible polyvinylchloride pipe shall conform to AWWA C905 standard.

B. Fusible polyvinylchloride pipe shall be extruded with plain ends. The ends shall be square to the pipe and free of any bevel or chamfer.

C. Fusible polyvinylchloride pipe shall be manufactured in a standard 40' nominal length, or custom lengths as required for the installation.

D. Fusible polyvinylchloride pipe shall be purple in color for recycled water.

E. Pipe shall be marked as follows:

1. Nominal pipe size
2. PVC
3. Dimension Ratio, Standard Dimension Ratio, or Schedule
4. AWWA pressure class
5. AWWA standard designation number
6. Extrusion production-record code
7. Trademark or trade name
8. Cell Classification 12454 and/or PVC material code 1120 may also be included
9. For reclaim water service, the wording: "Reclaimed Water, NOT for Potable Use"

F. Pipe shall be homogeneous throughout and be free of visible cracks, holes, foreign material, blisters, or other visible deleterious faults.

2.2 FUSION JOINTS

A. Unless otherwise specified, fusible polyvinylchloride pipe lengths shall be assembled in the field with butt-fused joints. The Contractor shall follow the pipe supplier's written guidelines for this procedure. All fusion joints shall be completed as described in this specification.

2.3 CONNECTIONS AND FITTINGS FOR PRESSURE APPLICATIONS

A. Connections shall be defined in conjunction with the coupling of project piping, as well as the tie-ins to other piping systems.

B. Ductile Iron Mechanical and Flanged Fittings: Acceptable fittings for use with fusible polyvinylchloride pipe shall include standard ductile iron fittings conforming to

AWWA/ANSI C110/A21.10, or AWWA/ANSI C 153/A21.53 and AWWA/ANSI C111/A21.11.

1. Connections to fusible polyvinylchloride pipe shall be made using a restrained mechanical joint retainer glands or other approved restraint harnesses specifically designed for use on PVC pipe as specified in Special Provision 22 and restrained mechanical joint ductile iron pipe fittings.
2. Bends, tees and other ductile iron fittings shall be restrained with the use of approved joint restraint hardware other means as indicated in the construction documents.
3. Ductile iron fittings and restraint glands shall be installed per the manufacturer's guidelines.

PART 3 EXECUTION

3.1 DELIVERY AND OFF-LOADING

A. All pipe shall be bundled or packaged in such a manner as to provide adequate protection of the ends during transportation to the site. Any pipe damaged in shipment shall be replaced as directed by the Engineer.

B. Each pipe shipment should be inspected prior to unloading to see if the load has shifted or otherwise been damaged. Notify Engineer immediately if more than immaterial damage is found. Each pipe shipment should be checked for quantity and proper pipe size, color, and type.

C. Pipe should be loaded, off-loaded, and otherwise handled in accordance with AWWA M23, and all of the pipe supplier's guidelines shall be followed.

D. Off-loading devices such as chains, wire rope, chokers, or other pipe handling implements that may scratch, nick, cut, or gouge the pipe are strictly prohibited.

E. During removal and handling, be sure that the pipe does not strike anything.

F. Significant impact could cause damage, particularly during cold weather.

G. If appropriate unloading equipment is not available, pipe may be unloaded by removing individual pieces. Care should be taken to insure that pipe is not dropped or damaged. Pipe should be carefully lowered, not dropped, from trucks.

3.2 HANDLING AND STORAGE

A. Pipe showing a crack or which has received a blow that may have caused an incident fracture, even though no such fracture can be seen, shall be marked as rejected and removed at once from the work. Damaged areas, or possible areas of damage may be removed by cutting out and removing the suspected incident fracture area. Limits of the acceptable length of pipe shall be determined by the Engineer.

B. Any scratch or gouge deeper than 10% of the wall thickness will result in the pipe being rejected unless determined acceptable by the Engineer.

C. Pipe lengths should be stored and placed on level ground and stored at the job site in the unit packaging provided by the manufacturer. Caution should be exercised to avoid compression, damage, or deformation to the ends of the pipe. The interior of the pipe, as well as all end surfaces, should be kept free from dirt and foreign matter. The Contractor shall be in full compliance with the manufacturer's recommendations for storing and handling of the pipe material.

D. Pipe shall be handled and supported with the use of woven fiber pipe slings or approved equal. Care shall be exercised when handling the pipe to not cut, gouge, scratch or otherwise abrade the piping in any way.

E. PVC pipe shall be shaded or otherwise shielded from direct sunlight. Covering of the pipe which allows for temperature build-up is strictly prohibited. Pipe should be covered with an opaque material while permitting adequate air circulation above and around the pipe as required to prevent excess heat accumulation.

F. Pipe shall be stored and stacked per the pipe supplier's guidelines.

3.3 FUSION PROCESS

A. General:

1. Fusible polyvinylchloride pipe will be handled in a safe and non-destructive manner before, during, and after the fusion process and in accordance with this specification and pipe supplier's guidelines.
2. Fusible polyvinylchloride pipe will be fused by qualified fusion technicians, as documented by the pipe supplier.
3. Each fusion joint shall be recorded and logged by an electronic monitoring device (data logger) connected to the fusion machine.
4. Only appropriately sized and outfitted fusion machines that have been approved by the pipe supplier shall be used for the fusion process. Fusion machines must incorporate the following elements:

    a. Heat Plate - Heat plates shall be in good condition with no deep gouges or scratches. Plates shall be clean and free of any debris or contamination. Heater controls shall function properly; cord and plug shall be in good condition. The appropriately sized heat plate shall be capable of maintaining a uniform and consistent heat profile and temperature for the size of pipe being fused, per the pipe supplier's guidelines.
    b. Carriage – Carriage shall travel smoothly with no binding at less than 50 psi. Jaws shall be in good condition with proper inserts for the pipe size being fused. Insert pins shall be installed with no interference to carriage travel.
    c. General Machine - Overview of machine body shall yield no obvious defects, missing parts, or potential safety issues during fusion.
    d. Data Logging Device - An approved datalogging device with the current version of the pipe supplier's recommended and compatible software shall be used. Datalogging device operations and maintenance manual shall be with the unit at all times. If fusing for extended periods of time, an independent 110V power source shall be available to extend battery life.

5. Other equipment specifically required for the fusion process shall include the following:

    a. Pipe rollers shall be used for support of pipe to either side of the machine
    b. A weather protection canopy that allows full machine motion of the heat plate, fusion assembly and carriage shall be provided for fusion in inclement, extreme temperatures, and /or windy weather, per the pipe supplier's recommendations.
    c. An infrared (IR) pyrometer for checking pipe and heat plate temperatures.
    d. Fusion machine operations and maintenance manual shall be kept with the fusion machine at all times.
    e. Facing blades specifically designed for cutting fusible polyvinylchloride pipe shall be used.

B. Joint Recording: Each fusion joint shall be recorded and logged by an electronic monitoring device (data logger) connected to the fusion machine. The fusion data logging and joint report shall be generated by software developed specifically for the butt-fusion of fusible polyvinyl chloride pipe. The software shall register and/or record the parameters required by the pipe supplier and these Specifications. Data not logged by the data logger shall be logged manually and be included in the Fusion Technician's joint report.

3.4 GENERAL INSTALLATION

A. Installation guidelines from the pipe supplier shall be followed.

B. The fusible polyvinylchloride pipe shall be installed in a manner so as not to exceed the recommended bending radius.

C. Where fusible polyvinylchloride pipe is installed by pulling in tension, the recommended Safe Pulling Force established by the pipe supplier shall not be exceeded.

3.5 PREPARATION PRIOR TO MAKING CONNECTIONS INTO EXISTING PIPING SYSTEMS

A. Approximate locations for existing piping systems are shown in the construction documents. Prior to making connections into existing piping systems, the contractor shall:

1. Field verify the location, size, piping material, and piping system of the existing pipe.
2. Obtain the required fittings as shown in the Drawings.

B. Unless otherwise approved, new piping systems shall be completely assembled and successfully tested prior to making connections into existing pipe systems.

3.6 PIPE SYSTEM CONNECTIONS

A. Pipe connections shall be installed per applicable standards and regulations and per the connection manufacturer's guidelines and as indicated in the Contract Documents. Pipe connections to structures shall be installed per applicable standards and regulations, as well as per the connection manufacturer's guidelines.

3.7 TAPPING FOR NON-POTABLE WATER APPLICATIONS

A. Tapping shall be performed using standard tapping saddles designed for use on PVC piping in accordance with AWWA C605. Tapping shall be performed only with use of tap saddles or sleeves. No direct tapping shall be permitted. Tapping shall be performed in accordance with the applicable sections for Saddle Tapping per Uni-Pub-8.

B. All connections requiring a larger diameter than that recommended by the pipe supplier for tapping shall be made using ductile iron fittings as specified in these Contract Documents.

C. Equipment used for tapping shall be made specifically for tapping PVC pipe:

1. Tapping bits shall be slotted "shell" style cutters, specifically made for PVC pipe. 'Hole saws' made for cutting wood, steel, ductile iron, or other materials are strictly prohibited.
2. Manually operated or power operated drilling machines may be used.

D. Taps may be performed while the pipeline is filled with water and under pressure ('wet' tap,) or when the pipeline is not filled with water and not under pressure ('dry' tap).

3.8 TESTING

A. Testing shall comply with all applicable jurisdictional building codes, statutes, standards, regulations, and laws and shall be in accordance with Special Provision 22.

B. DEFLECTION TESTING

1. After completion of the backfill, the Contractor shall perform a deflection test.
2. Deflection tests should be conducted using a go/no-go mandrel. The mandrel's outside dimension shall be sized to permit no more than 7.5 percent deflection. The percent deflection shall be established from the base inside diameter of the pipe. If the internal beading of the fused joints for the pipe is not required to be removed, the mandrel shall account for this clearance as well. The mandrel shall be approved by the City prior to use. Lines that permit safe entry may allow other deflection test options, such as direct measurements.

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SECTION 03480

PRECAST CONCRETE UTILITY STRUCTURES

PART 1 GENERAL

1.01 SCOPE

A. The section covers the work necessary to furnish and install precast concrete items, complete and operable, as shown on the drawings and specified herein.

1.02 SUPPLIERS / MANUFACTURER'S SERVICES

A. A supplier's and/or manufacturer's representative for the products specified herein shall be present at the jobsite as required for installation assistance, inspection, and certification of the installation.

1.03 SUBMITTALS DURING CONSTRUCTION

A. General: Submittals during construction shall be made in accordance with the Contract Documents.

B. Detailed Requirements: Shop drawings shall be provided showing the design, dimensions, layout, and installation of each precast concrete structure. In addition, the submittals made per this specification section shall address the access hatch, manhole, or other entry feature that is to be cast into the top slab of precast concrete structures per the contract documents.

C. Design Calculations: Design calculations for the precast concrete structures shall be submitted and signed and sealed by a civil or structural engineer registered in the state of California.

D. Buoyancy: In addition to structural calculations to determine reinforcement requirements for specified structural loading conditions, Contractor shall also be responsible to evaluate buoyancy to determine the total weight of the empty precast concrete vault (including top slab and base slab), exclusive of soil weight on the bottom slab (if it extends beyond the vault walls) or soil friction against the vault walls, versus the buoyancy force (assume ground water to be 5.0 feet below finish surface at the pump station site). The vault wall thickness and base slab thickness shall be sized to achieve required structural strength for design loads, as well as provide a total weight that is 1.25 times the buoyant force. The cost of increased wall or base slab thickness to achieve these design goals shall be borne by Contractor without additional compensation by the District.

1.04 PRODUCT IDENTIFICATION

A. The use of a manufacturer's name and model or catalog number is for the purpose of establishing the standard of quality and general configuration desired only. Products of other manufacturers will be considered in accordance with the Contract Documents.

1.05 QUALITY ASSURANCE

A. Upon delivery to the jobsite, the Contractor shall carefully inspect each precast concrete section to ensure that it complies in all respects to these specifications and is free of defects such as cracks, spalls, malformed surfaces, incorrect dimensions, etc. Defective precast units shall be rejected and immediately removed from the jobsite.

1.06 REQUIREMENTS COVERED IN OTHER SPECIFICATION SECTIONS

Section 08300: Access Hatches

1.07 DESIGN REQUIREMENT

A. Watertightness of Manholes and Vaults: Manholes, vaults and appurtenances shall be watertight and free from infiltration. All joints shall be sealed per this specification section. Joint locations include (but are not limited to) the following: adjacent precast concrete sections/risers and grade rings; at the joint between the bottom manhole/vault riser with the manhole/vault base; and at each pipe/wall connection.

PART 2 – PRODUCTS

2.01 PRECAST CONCRETE QUALITY AND APPROVED MANUFACTURER

A. Unless otherwise noted in subsequent paragraphs: (1) the materials and mixture proportioning for precast concrete structures shall conform to that required of watertight, chemical resistant concrete as specified in ACI 350R-89; and (2) the minimum compressive strength at 28 days shall be 3500 psi.

B. Precast concrete products shall be as manufactured by Olson Precast Company or approved equal.

2.02 CONCRETE VAULTS AND MANHOLES

A. Concrete Sections: Furnish and install manholes as indicated and referenced. Pre-cast concrete sections shall conform to ASTM C478 and shall have a minimum strength of 4,500 PSI. The assembled manholes or vaults shall be capable of withstanding a continuous H-20 traffic load. Submit shop drawings and signed calculations indicating structural sizes, rebar, cement and load capabilities. Unless otherwise noted on the drawings or specified herein, manhole interiors will be lined and coated.

B. Manhole Frames and Covers: Castings for frames and covers shall conform to ASTM A48, Class 35B, and to the requirements of SSPWC latest Edition, Section 206-3. Frames and covers shall be designed for H20 loading. Before leaving the foundry, all castings shall be thoroughly cleaned and subjected to a hammer inspection, after which they shall be factory coated for corrosion protection. Manhole frames and covers shall be machined and gasketed, and shall be held in place by security bolts. Frames and covers shall be

match-marked in sets before shipping to the site. Covers shall have the word “SEWER” cast thereon. Provide concentric manhole covers for diameters 36 inches and larger.

C. Exterior Coatings:

1. The exterior surfaces of VAULTS shall be coated for waterproofing (using self-adhering membranes or sheets) with W.R. Meadows Mel-Rol or approved equal. Protection board shall be used for protection of coating during backfill of trench.

D. Interior Linings:

1. Polyurethane Linings: The interior of the FLUORIDE VAULT shall be coated with a primer and 100% solids, high build polyurethane, Sancon 200 or approved equal. The primer and coating system shall conform to SSPWC latest Edition, Section 500-2.4.6, "Primer and Lining Materials", 500-2.4.7, "Lining Application", 500-2.4.8 "Spark Test", 500-2.4.9 "Repair Methods", and 500-2.4.10 "Applicable Standards".

    a. The polyurethane lining shall be furnished with sand as required to obtain a non-slip surface where walking is feasible. Sand shall be broadcast onto the surface of this coating before it has set. The type and quantity of sand shall be as recommended by the coating manufacturer to be compatible with the coating product and to obtain the desired result.

2. All other vaults (TURNOUT AND FLUSHING STATION VAULT) shall not be lined.

2.03 JOINT SEALANT

A. General: If a precast concrete structure is constructed of multiple sections, each joint shall be sealed with a combination of Type 1 and Type 2 joint sealants.

B. Type 1 Joint Sealant: Type 1 joint sealant shall be a butyl compound complying with Federal Specification SS210A (Type 1, Rope Form) and AASHTO M198-751 (Type B).

Type 1 joint sealant shall be Ram-Nek as manufactured by K.T. Snyder Company, Inc. (Houston, Texas), ConSeal as manufactured by Concrete Sealants, Inc. (New Carlisle, Ohio), EZ-Stik as manufactured by Press-Seal Gasket Corporation (Fort Wayne, Indiana), or approved equal.

C. Type 2 Joint Sealant: Type 2 joint sealant shall be an external sealing band composed of rubber, mastic and protective film elements per the requirements of ASTM C877. When properly installed, the sealing band shall prevent leakage for external hydrostatic pressures up to 13 psi (30 feet).

Type 2 joint sealant shall be Conseal CS212 as manufactured by Conseal Sealants (New Carlisle, Ohio) or approved equal.

PART 3 – EXECUTION

3.01 INSTALLATION OF PRECAST CONCRETE SECTIONS

A. Precast concrete sections shall be stacked so that they are plumb, and shall be installed in conformance with the manufacturer's recommendations.

3.02 SEALING JOINTS

A. General: As used herein, "sealing" is defined as making a joint or wall penetration watertight so that there is no leakage, assuming the groundwater table is at ground level.

B. Sealing the Joints between Precast Concrete Sections: Contractor shall seal all joints between adjacent precast concrete sections using a combination of Type 1 and Type 2 joint sealants.

C. Sealing the Joint between the Bottom Precast Concrete Section and the Base Slab: Contractor shall seal the joint between the bottom precast concrete section and the base slab using Type I joint sealant.

3.03 SEALING WALL PENETRATIONS

A. Contractor shall use wall penetration seals as indicated on the drawings to seal all penetrations of piping or electrical conduits through precast concrete structures, unless otherwise shown.

3.04 VACUUM TESTING

A. All manholes shall be vacuum tested. Perform tests as listed below:

1. Manhole Negative Air Pressure Test (Vacuum Test). Vacuum testing shall be done in accordance with ASTM C1244, latest edition. Each manhole shall be tested immediately after assembly and prior to backfilling to pull all manhole pre-cast concrete segments together and to facilitate repair of vacuum leaks. Each manhole shall be tested a second time for final acceptance after backfill in order to assure that the backfill operation did not damage the integrity of the vacuum seal. Any manholes damaged or moved during final grading or paving shall be retested, excavated if failed, repaired if necessary, and retested until passing.

2. All lift holes shall be plugged with an approved non-shrink grout. No grout will be placed in the horizontal joints before testing. All pipes entering the manhole shall be plugged, taking care to securely brace the plugs from being drawn into the manhole.

3. If a manhole fails the initial test, necessary repairs shall be made with a non-shrink grout while the vacuum is still being drawn. Cracks longer than two-inches shall

be cause for rejection of the casting and no patching shall be allowed. The Contractor shall retest until a satisfactory test is obtained.

END OF SECTION

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SECTION 08300

ACCESS HATCHES

PART 1 - GENERAL

1.01 SCOPE

A. This section covers the work necessary to furnish and install access hatches, complete and operable, as shown on the drawings and specified herein.

1.02 STANDARDIZATION

A. Like items of equipment specified herein shall be the end products of one manufacturer in order to achieve standardization for operation, maintenance, spare parts, and manufacturer's service.

1.03 SUPPLIERS/MANUFACTURER'S SERVICES

A. A supplier's and/or manufacturer's representative for the equipment specified herein shall be present at the jobsite for a minimum of 1 man-day, travel time excluded, for installation assistance, inspection, and certification of the installation.

1.04 SUBMITTALS DURING CONSTRUCTION

A. General: Submittals during construction shall be made in in accordance with the requirements of the City Standard Specifications.

B. Detailed: Submit manufacturer's technical product data, rough-in diagrams, details, installation instructions and general product recommendations.

1.06 PRODUCT IDENTIFICATION

A. The use of a manufacturer's name and model or catalog number is for the purpose of establishing the standard of quality and general configuration desired only. Products of other manufacturers will be considered in accordance with the Contract Documents.

1.07 REQUIREMENTS COVERED IN OTHER SPECIFICATION SECTIONS

Section 03480: Precast Concrete Specialties
Section 11001: General Requirements for Equipment

1.08 DEFINITION OF GAS-TIGHT

A. Hatches installed over the valve and meter vault, wetwell, and emergency storage vault are designated to be "gas tight". The design intent is that the hatches will be manufactured with elastomeric seals as recommended by the hatch manufacturer, which

will preclude sewage gases from leaking through the hatch frame and doors when they are securely and properly closed.

PART 2 - PRODUCTS

2.01 HATCH SIZE, DESIGN LOADING CONDITION AND HINGE LOCATION

A. Hatch size and location: See Plans for hatch size, type and location.

B. Hatch Loading Condition: All hatches shown on Plans shall be AASHTO H-20 loading for direct traffic applications.

C. Hinge Location: See Plans for hinge location and direction of hatch opening. The orientation of access hatch shall be field verified and approved by District prior to installation.

2.02 DESIGN CHARACTERISTICS

A. Door leaf shall be 1/4" aluminum diamond pattern plate with sufficient reinforcement to withstand the specified loading condition. Door shall be equipped with heavy duty stainless steel hinges, stainless steel pins, compression- or torsion-spring operators for easy operation, and an automatic hold-open arm with release handle. All hardware shall be Type 316 stainless steel. Factory finish shall be mill-finish with bituminous coating applied to the exterior of the frame.

B. A recessed padlockable hasp shall be provided. Contractor shall furnish a heavy duty padlock for each hatch; keyed alike and in conformance with District's requirements.

C. All indicated hatch opening dimensions are intended to refer to the clear opening space that is available without obstruction by any part of the leafs or frame when the access hatches are fully-opened. Neither the reinforcement ribs that are welded to the underside of each leaf in order to obtain the specified loading condition nor any other component of the leaf(s) or frame shall extend into the required clear opening dimensions when the hatch doors are fully opened. The only exceptions to this clear opening requirement pertain to the compression spring or torsion spring operators. If compression spring operators are provided, it is intended that they will occupy a small area in each corner within the specified clear area when the hatch doors are fully opened. If torsion-spring operators are provided, it is intended that they not extend into the open area of the vault. If the manufacturer's standard access hatch design does not provide such clear openings, then their standard design shall be modified as required to provide the indicated clear opening dimensions, at no additional cost to District.

2.03 REQUIREMENTS FOR HATCHES THAT ARE DESIGNATED TO BE GAS TIGHT

A. The entire perimeter of each leaf in a designated gas-tight access hatch shall be sealed to preclude the escape of odorous gases from the space below. A resilient elastomeric seal as recommended by the hatch manufacturer shall be attached to the access hatch frame and doors. When each door is closed, the elastomeric seal (at all locations) shall be compressed to create a low pressure gas-tight seal. The seal and its retainer shall be an integral part of the access hatch frame and doors. Provide three-point latch, as required to achieve desired gas tight performance as described herein.

B. The hatch frame shall also be gas tight. Hatch components shall be made gas tight by welding the joint along its entire length to eliminate paths for the escape of sewage odors.

C. Hatches meeting the gas tight requirements specified herein may not be a standard product by certain manufacturers. If that is the case, manufacturer shall modify their standard product as required to meet these specifications.

2.04 MANUFACTURER

A. Hatches shall be as manufactured by U.S.F. Fabrication (Hialeah, Florida) or approved equal.

B. Gas-tight hatches shall be:

1. U.S.F. Fabrication Model WAHS (for single leaf H20-load design); or approved equal.

2. U.S.F. Fabrication Model WAHD (for double leaf H20-load design); or approved equal.

2.05 PRODUCT WARRANTY

A. Manufacturer shall guarantee hatches against defects in material or workmanship for a period of five years.

PART 3 - EXECUTION

3.01 GENERAL

A. Install all equipment in conformance with the manufacturer's recommendations and as shown or specified by these contract documents.

3.02 HATCHES

A. Hatches shall be accurately and substantially positioned prior to placing concrete, such that the covers are flush with the slab surface. The hatches shall be protected from damage resulting from concrete placement. Exposed surfaces shall be thoroughly cleaned of all concrete spillage such that a clean, uniform appearance is achieved.

B. Prior to setting frame and pouring concrete, Contractor shall confirm that the hatch and its operating mechanism do not conflict with removal of indicated equipment below, and does not impede use of the associated access ladder (should one be indicated). Should a conflict be discovered, District may authorize a change in hatch orientation or size to prevent such conflict.

3.03 PAINTING

A. All interior, ferrous hatch surfaces (including all frame surfaces) shall be painted per Section 09900 in conformance with the requirements for "Ferrous Metals, Buried, Exterior." Exterior hatch surfaces shall have the manufacturer's standard finish.

END OF SECTION

SECTION 09900

COATING SYSTEMS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope:

1. The Contractor shall furnish all labor, materials, equipment and incidentals required to provide painting specified.

2. The extent of painting work is shown on the Drawings and schedules, and as herein specified.

3. The work includes the painting and finishing of all interior and exterior items and surfaces throughout the Project except as otherwise shown or specified. Surface preparation, priming and coats of paint specified are in addition to shop priming and surface treatment specified under other sections of the work.

4. The term "paint" as used herein means all coating systems materials, which includes pretreatments, primers, emulsions, enamels, sealers and fillers, and other applied materials whether used as prime, intermediate or finish coats.

5. The Contractor shall paint all exposed surfaces whether or not colors are designated in any schedule. The term "exposed" as used herein means all items not covered with concrete, plaster, fireproofing or similar material. Ducts, conduits and other materials with corrosion resistant surfaces which are in chases, above finished ceiling, or other inaccessible areas shall not require field painting unless specified to receive painting because of location in corrosive areas. Where items or surfaces are not specifically mentioned, the Contractor shall paint these the same as adjacent similar materials or areas.

6. Structural and miscellaneous metals covered with concrete, plaster, or similar material shall only receive a primer compatible with the covering material.

7. Shop drawings and samples shall be submitted for review within 90 days from the Notice to Proceed.

B. Coordination:

1. The Contractor shall review installation procedures under other Sections and coordinate the installation of items that must be field painted in this Section.

2. The Contractor shall coordinate the painting of areas to be painted that will be inaccessible once equipment has been installed.

3. The Contractor shall provide finish coats which are compatible with the prime paints used. He shall review other Sections of these Specifications in which prime paints are to be provided to ensure compatibility of the total coating systems for the various substrates. Contractor shall be responsible for the compatibility of all shop primed and field painted items in this Contract. He shall furnish information on the characteristics of the proposed finish materials to ensure that compatible prime coats are used. Barrier coats shall be provided over incompatible primers, or primers shall be removed and reprimed as required. The Resident Engineer shall be notified in writing of anticipated problems using the coating systems as specified with substrates primed by others. Such notification shall be included with the equipment submittals.

C. Painting Not Included: The following categories of work are not included as part of the field-applied finish work, or are included in other Sections of these Specifications.

1. Shop Priming: Unless otherwise specified, shop priming of structural metal, miscellaneous metal fabrications, other metal items and such fabricated components as shop-fabricated or factory-built heating and ventilating, and electrical equipment or accessories shall conform to applicable requirements of Section 09900 but is included under the appropriate Sections of this Specification.

2. Pre-Finished Items: Unless otherwise shown or specified, painting shall not be included when factory finishing such as baked-on enamel, porcelain, polyvinylidene fluoride or other similar finish is specified for such items as, but not limited to, acoustic materials, finished mechanical and electrical equipment such as light fixtures and distribution cabinets. Contractor shall be required to touch up factory finished items with paint supplied by the item manufacturer. Contractor shall field paint damaged prefinished items as directed by the Resident Engineer. Where a factory finished coating is applied to an item which is not specified to receive a factory finish coat, acceptance of the factory finish coat shall be at the discretion of the Resident Engineer. The color shall be noted with the equipment submittals.

3. Concealed Surfaces:

   a. Unless otherwise shown or specified, painting is not required on nonmetallic wall or ceiling surfaces in concealed from view areas and generally inaccessible areas, such as furred areas, pipe spaces, and duct shafts.

   b. All piping, equipment, and other such items within these area, that do not have a galvanized or other corrosion resistant finish as specified shall be painted.

4. Concrete surfaces more than 12 inches below finish floor elevation, unless otherwise shown or specified.

5. Concrete floors covered with tile or similar products and exposed concrete floors and exterior walkways/slabs.

6. Finished Metal Surfaces: Metal surfaces of anodized aluminum, stainless steel, chromium plate, and similar finished materials will not require finish painting, unless otherwise shown or specified.

   a. Operating Parts And Labels:
      Moving parts of operating units, mechanical and electrical parts, such as valve operators, linkages, sensing devices, motor and fan shafts do not require finish painting unless otherwise specified.

   b. The Contractor shall not paint over any code-required labels, such as UL and Factory Mutual, or any equipment identification, performance rating, name, or nomenclature plates.
      All paint, coating or splatter inadvertently placed on these surfaces shall be removed.

1.02 QUALITY ASSURANCE

A. Specified products are those manufactured by Tnemec Company, Inc., North Kansas City, Missouri and are specified as the standard of quality. Local contact Denis Amyot (858) 538-9502 or (310) 637-2363.

B. Equivalent materials of other manufacturers may be substituted on approval of the District's Representative. Request for substitution shall include manufacturer's literature for each product giving name, generic type, descriptive information, performance and test data, and evidence of satisfactory past performance. No request for substitution shall be considered that would decrease film thickness and/or number of coats or offer a change in the generic type of coating specified.

C. No substitution will be considered unless request for approval has been submitted by the bidder and has been received by the Engineer at least ten days prior to the date of bids. The burden of proof of the merit of the proposed substitute is upon the proposer. The District's Representative's decision of approval or disapproval of the proposed substitution shall be final.

D. Applicator Qualifications:

   1. The name and experience record of the painting applicator shall be supplied. A list of utility or industrial installations painted, responsible officials, architects, or engineers concerned with the project and the approximate contract price shall be included.

   2. Painting applicators whose submissions indicate that they have not had the experience required to perform the Work will not be approved.

E. Job Mockup: On actual wall surfaces and other exterior and interior building components as selected by the Resident Engineer, the Contractor shall duplicate painted finishes of the selected samples. On at least 20 square feet required sheen, color, and texture shall be

obtained; finished lighting conditions shall be simulated for review of in-place work. After finishes are accepted these surfaces and components will be used for comparison in evaluation of other painting and finishing of a similar nature.

F. All paint products shall be supplied by the same manufacturer unless otherwise approved.

G. Reference Standards: Applicable provisions and recommendations of the following shall be complied with, except where otherwise shown or specified:

1. ANSI A13.1: Scheme for the Identification of Piping Systems.

2. Great Lakes: Upper Mississippi River Board of State Sanitary Engineers (Ten States Standards), Recommended Standards for Waste Treatment Works - Latest Edition, Recommended Color Scheme for Piping.

3. OSHA 1910.144: Safety Color Code for Marking Physical Hazards.

4. SSPC Volume 2, Systems and Specification, Surface Preparation Guide and Paint Application Specifications.

5. AWWA C550, Protective Interior Coatings for Valves and Hydrants.

1.03 SUBMITTALS

A. Samples: The following shall be submitted for approval:

1. Paint samples for the Resident Engineer's review of color and texture only. Compliance with all other requirements is the exclusive responsibility of the Contractor. A listing of the material and application for each coat of each finish sample shall be supplied.

a. On 12-inch by 12-inch hardboard, samples of each color and material shall be provided, with texture to simulate actual conditions. Each sample shall be resubmitted as requested until acceptable sheen, color, and texture is achieved.

B. Shop Drawings: The following shall be submitted for approval:

1. Copies of manufacturer's technical information, including paint label analysis and application instructions for each material proposed for use.

2. Each material shall be listed and cross-referenced to the specific paint and finish system and application, and shall be identified by manufacturer's catalog number and general classification.

3. Copies of manufacturer's complete color charts for each coating system.

4. Certifications from manufacturers shall be provided, verifying that the factory applied prime coats are compatible with specified finish coatings.

5. Maintenance Manual: Upon completion of the Work, copies of a detailed maintenance manual including the following information shall be furnished:
   a. Product name and number.
   b. Name, address and telephone number of manufacturer and local distributor.
   c. Detailed procedures for routine maintenance and cleaning.
   d. Detailed procedures for light repairs such as dents, scratches and staining.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery of Materials: All materials shall be delivered to the job site in original, new and unopened packages and containers bearing manufacturer's name and label, and the following information.
1. Name or title of material.
2. Manufacturer's stock number and date of manufacture.
3. Manufacturer's name.
4. Contents by volume, for major pigment and vehicle constituents.
5. Thinning instructions where recommended.
6. Application instructions.
7. Color name and number.

B. Storage of Materials:

1. Only acceptable project materials shall be stored on project site.

2. The Contractor shall store in a suitable location approved by the Resident Engineer. This area shall be kept clean and accessible.

3. Storage shall be restricted to paint materials and related equipment.

4. Health and fire regulations shall be complied with, including the Occupational Safety and Health Act of 1970.

1.05 JOB CONDITIONS

A. Existing Conditions:

1. Before painting is started in any area, it shall be broom cleaned and excessive dust shall be removed.

2. After painting operations begin in a given area, broom cleaning will not be allowed; cleaning shall then be done only with commercial vacuum cleaning equipment.

B. Environmental Requirements:

1. Enamel paints shall be applied only when the temperature of the surfaces to be painted and the surrounding air temperatures are between 65 F and 95 F, unless otherwise permitted by the paint manufacturer's printed instructions.

2. Paint shall not be applied in rain, fog, or mist; or when the relative humidity exceeds 85 percent; or to damp or wet surfaces.

3. Painting may be continued during inclement weather only if the areas and surfaces to be painted are enclosed and heated within the temperature limits specified by the paint manufacturer during application and drying periods, and there is no danger of condensation on the surfaces being painted.

4. Adequate illumination and ventilation shall be provided in all areas where painting operations are in progress.

C. Protection: Finished Work of other trades and surfaces not being painted concurrently or not to be painted shall be covered or otherwise protected.

PART 2 - PRODUCTS

A. 2.01 MATERIAL QUALITY

The best grade of the various types of coating suitable for use in waste water treatment plants, water treatment plants, pumping stations and resource recovery plants as regularly manufactured by acceptable paint material manufacturers shall be provided. Material not displaying the manufacturer's identification as a standard, best-grade product will not be acceptable.

B. Primers produced by the same manufacturer as the finish coats shall be provided. Use only thinners recommended by the paint manufacturer, and use only to recommended limits. The Resident Engineer's approval shall be obtained prior to thinning any material.

C. Paints of durable and washable quality shall be provided. Materials which will withstand normal washing as required to remove grease, oil, chemicals, etc., without showing discoloration, loss of gloss, staining, or other damage shall be used.

2.02 SUBSTITUTIONS

A. No substitutions shall be considered that decrease the film thickness, the number of coats, the surface preparation or the generic type of coating specified. Approved manufacturers must furnish the same color selection as the manufacturers specified, including accent color in all coating systems.

2.03 COLORS AND FINISHES

A. Surface treatments, and finishes are shown under "Painting Systems" below. All substrates scheduled under "Painting Systems" shall be painted whether or not shown on the Drawings, or in Schedules, unless an item is specifically scheduled as not requiring the painting system scheduled below.

B. Color Selection:

1. A maximum of 5 different colors shall be selected for the project, in addition to color coding of all piping and ducts.

2. The Resident Engineer reserves the right to select non-standard colors for all paint systems specified within the ability of the manufacturer to produce such non-standard colors. Selection of non-standard colors shall not be cause for the Contractor rejecting Resident Engineer's color selections and the Contractor shall supply such colors at no additional expense to the District.

C. The Contractor shall submit to the Resident Engineer an itemized schedule of the surfaces to be painted. After approval of submittals and prior to beginning work, Resident Engineer will note on the schedule the color to be furnished. District's selected colors shall be provided by Contractor at no additional cost to District, regardless of color or whether those colors are standard for the proposed paint product.

D. Color Coding: In general, all color coding of piping, ducts and equipment shall comply with applicable standards of ANSI A13.1 and OSHA 1910.144.

E. Piping Color Code: To be selected by the Resident Engineer.

F. Representative color shall be used when preparing samples for Resident Engineer's review. Final acceptance of colors will be from samples applied on the job.

G. Color Pigments: Pure, non-fading, applicable types to suit the substrates and service indicated.

1. Lead: Lead content shall not exceed amount permitted by federal, state and local government laws and regulations.

2. Paints specified for application on submerged concrete or metal in contact with potable water shall be approved by the NSF (Ref. NSF61).

H. All painting systems specified are based on brush application unless otherwise indicated. Other mechanical techniques shall be submitted to the Resident Engineer for approval before these application techniques may be reflected in any paint schedules submitted by the Contractor. Submit proof of acceptability, of technique proposed, by the paint manufacturer selected.

2.04 PAINTING SYSTEMS

A. Definition of Exposure:

1. Interior exposure is intended to refer to materials or equipment located inside a structure which provides protection from sunlight and weather.

2. Exterior exposure is intended to refer to materials or equipment located outside a structure, subjecting those items to sunlight and weather.

B. Ferrous Metals, Non-submerged and Non-buried:

1. Shop Surface Preparation: SSPC-SP 6 Commercial Blast as specified in Section 3.02.B, or as otherwise recommended by the paint manufacturer. If proper installation of the coating system requires a more stringent surface preparation than is specified above, comply with manufacturer's requirements at no additional cost to District.

2. Field Surface Preparation: Sandblasting of field welds and other imperfections. Resident Engineer may require all areas to be blasted at his discretion, SSPC-SP 6, commercial blast as specified in Section 3.02.B.

3. Products And Manufacturer: One of the following shall be provided:

Tnemec:

(1) Primer: Series L69 Epoxoline II -- 1 coat, 3.0 - 5.0 dry mils per coat.

(2) Intermediate: Series L69 Epoxoline II -- 1 coat, 4.0-6.0 dry mils.

(3) Finish: Series 1080 Endura Shield WB-- 1 coat, 2.0 - 3.0 dry mils.

Or Equal.

C. Ferrous Metals, Buried: Contractor shall comply with the requirements stated in Special Provisions 207-9.2.7 which requires one of the following types of coating systems:
1. 24 mils of an approved liquid epoxy coating system conforming to AWWA C210..
2. A heat-shrink tape system conforming to AWWA C216.
3. A cold-applied petrolatum wax tape system conforming to AWWA C217.

All field cuts and damages to the coating shall be repaired with 24 mils (MDFT) of an approved coal tar epoxy. All foreign matter shall be removed by wire brush or sandpaper prior to the epoxy application.

D. Stainless Steel in Wetwell

PART 3 - EXECUTION

3.01 INSPECTION

A. The Contractor and his applicator shall examine the areas and conditions under which painting work is to be performed and notify the Resident Engineer in writing of conditions detrimental to the proper and timely completion of the Work. The Contractor shall not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Resident Engineer.

B. The Contractor shall not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to the formation of a durable paint film.

3.02 SURFACE PREPARATION

A. General:

1. All preparation and cleaning procedures shall be performed as specified herein and in strict accordance with the paint manufacturer's instructions for each particular substrate and atmospheric condition.

2. All hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items in place and not to be finish painted shall be removed or provided surface applied protection prior to surface preparation and painting operations. The Contractor shall remove, if necessary, for the complete painting of the items and adjacent surfaces. Following completion of painting of each space or area, the removed items shall be reinstalled by workmen skilled in the trades involved.

3. Surfaces to be painted shall be cleaned before applying paint or surface treatments. Oil and grease shall be removed with clean cloths and cleaning solvents prior to mechanical cleaning. The cleaning and painting shall be programmed so that dust and other contaminants from the cleaning process will not fall in wet, newly painted surfaces.

4. All surfaces which were not shop painted or which were improperly shop painted, and all abraded or rusted shop painted surfaces, which are to be painted, as determined by the Resident Engineer, shall be prepared as specified below.

B. Ferrous Metals:

1. Non-submerged ferrous surfaces, including structural steel and miscellaneous metal to be shop primed, shall be cleaned of all oil, grease, dirt, mill scale and other foreign matter by commercial blast cleaning complying with SSPC-SP 6.

2. Submerged ferrous surfaces, including structural steel and miscellaneous metal to be shop primed, shall be cleaned of all oil, grease, dirt, mill scale and other foreign matter by near-white blasting complying with SSPC-SP 10.

3. Non-submerged, ferrous surfaces that have not been shop-coated shall be cleaned of all oil, grease, dirt, loose mill scale and other foreign substances by commercial blasting, complying with SSPC-SP 6.

4. Submerged ferrous surfaces that have not been shop-coated or that, in the opinion of the Resident Engineer, have been improperly shop-coated, shall be cleaned of all oil, grease, dirt, mill scale and other foreign matter by near-white blasting complying with SSPC-SP 10.

5. Bare and blasted or pickled clean metal shall be treated with metal treatment wash coat, prior to priming only if recommended by the paint manufacturer.

6. Shop applied prime coats which have been damaged or bare areas shall be touched-up with primer recommended by the coating manufacturer after commercial blasting complying with SSPC-SP 6.

C. Galvanized Surfaces:

1. The Contractor shall clean galvanized surfaces to be free of oil and surface contaminants with solvent or other methods recommended by the coating manufacturer, complying with SSPC-SP 1.

2. Submerged or intermittently submerged galvanized ferrous metal, interior and exterior, shall be cleaned of all oil, grease, dirt, mill scale and other foreign matter by a brush-off blast cleaning complying with SSPC-SP 7 with one mil profile minimum.

3.03 MATERIALS PREPARATION

A. General:

1. Painting materials shall be mixed and prepared in strict accordance with the manufacturer's directions.

2. Coating materials produced by different manufacturers shall not be mixed, unless otherwise permitted by the manufacturer's instructions.

3. Materials not in actual use shall be stored in tightly covered containers. Containers used in storage, mixing, and application of paint shall be maintained in a clean condition, free of foreign materials and residue.

4. All materials shall be stirred before application to produce a mixture of uniform density, and as required during the application of the materials. Any film which may form on the surface shall not be stirred into the material. The film shall be removed and, if necessary, the material shall be strained before using.

B. Tinting: Each undercoat shall be tinted a lighter shade to facilitate identification of each coat where multiple coats of the same material are to be applied. Undercoats shall be tinted to match the color of the finish coat, but provide sufficient difference in shade of undercoats to distinguish each separate coat. A code number shall be provided to identify material tinted by the manufacturer.

C. Mixing:

1. The Contractor shall mix only in mixing pails placed in a suitably sized non-ferrous or oxide resistant metal pan to protect concrete floor from splashes or spills which could stain exposed concrete or react with subsequent finish floor material.

2. Paint shall be mixed and applied only in containers bearing accurate product name of material being mixed or applied.

3.04 APPLICATION

A. General:

1. Paint shall be applied by brush or other mechanical application techniques such as roller, air spray, or airless spray in accordance with the manufacturer's directions and recommendations of Paint Application Specifications No. 1 in SSPC Vol. 2, where applicable, as approved by the Resident Engineer. Brushes best suited for the type of

material being applied shall be used. Where approved by the Resident Engineer, rollers of carpet, velvet back, or high pile sheep's wool shall be used, as recommended by the paint manufacturer for material and texture required.

2. The number of coats and paint film thickness required is the same regardless of the application method. Succeeding coats shall not be applied until the previous coat has completely dried.

3. Additional coats shall be applied when undercoats or other conditions show through the final coat of paint, until the paint film is of uniform finish, color and appearance. This is of particular importance regarding intense primary accent colors. The Contractor shall insure that all surfaces, including edges, corners, crevices, welds, and exposed fasteners receive a film thickness equivalent to that of flat surfaces.

4. Surfaces not exposed to view do not require color coding but require the same coating systems specified for exposed surfaces. "Exposed to view surfaces" is defined as those areas visible when permanent or built-in fixture, convector covers, covers for finned tube radiation, grilles, etc., are in place in areas scheduled to be painted.

5. The backs of access panels and removable or hinged covers shall be painted to match the exposed surfaces.

6. Exterior doors on tops, bottoms, and side edges shall be finished the same as the exterior faces.

7. Aluminum parts in contact with dissimilar materials shall be painted as specified with appropriate finish.

B. Heating, Ventilating, Air Conditioning and Electrical Work:

1. Heating, ventilating, and air conditioning items to be painted include, but are not limited to, the following:
   a. Piping, pipe hangers, and supports.
   b. Ductwork and insulation.
   c. Motors, mechanical equipment, and supports.
   d. Accessory items

2. Electrical items to be painted include, but are not limited to, the following:

   a. Conduit and fittings.

   b. Switchgear, panels, junction boxes, motor control centers, motors and accessories.

C. Minimum Coating Thickness: The Contractor shall apply each material at not less than the manufacturer's recommended spreading rate, and provide total dry film thickness as specified. Extra coats shall be applied if required to obtain specified total dry film thickness.

D. Scheduling Painting:

1. The first-coat material shall be applied to surfaces that have been cleaned, pretreated or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

2. Sufficient time between successive coating shall be allowed to permit proper drying. The Contractor shall not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and the application of another coat of paint does not cause lifting of loss of adhesion of the undercoat.

E. Prime Coats: Primed and sealed walls and ceilings shall be recoated where there is evidence of suction spots or unsealed areas in first coat, to assure a finish coat with no burn-through or other defects caused by insufficient sealing.

F. Pigmented (Opaque) Finished: The Contractor shall completely cover to provide an opaque, smooth surface of uniform finish, color, appearance, and coverage.

G. Brush Application:

1. All brush coats shall be brushed-out and worked onto the surfaces in an even film. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable. All glass and color break lines shall be neatly drawn.

2. All primer or first coats shall be brush applied, unless otherwise permitted to use mechanical applicators.

H. Mechanical Applicators:

1. Mechanical methods shall be used for paint application when permitted by governing ordinances, paint manufacturer, and approved by Resident Engineer. If permitted, it shall be limited to only those surfaces impracticable for brush applications.

2. Roller applications, if approved by the Resident Engineer, shall be limited to interior wall and ceiling finishes for second and third coats. Each roller coat shall be applied to provide the equivalent hiding as brush-applied coats.

3. Spray application shall be confined to metal framework, siding, and similar surfaces where hand brush work would be inferior and to other surfaces specifically recommended by paint manufacturer.

4. Wherever spray application is used, each coat shall be applied to provide the equivalent hiding of brush-applied coats. Do not double back with spray equipment for the purpose of building up film thickness of 2 coats in one pass.

I. Completed Work: The Contractor shall match approved samples for color, texture and coverage. Work not in compliance with specified requirements shall be removed, refinished or repainted, as required by the Resident Engineer.

3.05 FIELD QUALITY CONTROL

A. The right is reserved by the Resident Engineer to invoke the following material testing procedure at any time, and any number of times during the period of field painting:

1. Engage the service of an independent testing laboratory to sample any of the paint being used. Samples of materials delivered to the project site will be taken, identified and sealed, and certified in the presence of the Contractor.

2. The testing laboratory will perform appropriate tests for any or all of the following characteristics: Abrasion resistance, apparent reflectivity, flexibility, washability, absorption, accelerated weathering, dry opacity, accelerated yellowness, recoating, skinning, color retention, alkali resistance and quantative material analysis.

3. If the test results show that the material being used does not comply with the specified requirements, the Contractor may be directed to stop the painting Work, and remove the non-complying paint; pay for testing; repaint surfaces coated with the rejected paint; remove rejected paint from previously painted surfaces if, upon repainting with the specified paint, the two coatings are non-compatible.

B. Prior to initial coat and after completion of each successive coat of paint, the Contractor shall notify the Resident Engineer. After inspection, checking of film thickness and approval by the Resident Engineer, proceed with the succeeding coat. Contractor shall supply the Resident Engineer for his use a Gardner dry-film thickness gauge.

3.06 PROTECTION

A. Work of other trades shall be protected, whether to be painted or not, against damage by the painting and finishing work. All such work shall be left undamaged. All damage shall be corrected by cleaning, repairing or replacing, and repainting, as acceptable to the Resident Engineer.

B. "Wet Paint" signs shall be provided as required to protect newly painted finishes. All temporary protective wrapping provided for protection of this Contract shall be removed after completion of painting operations.

3.07 CLEAN-UP

A. During the progress of the Work, all discarded paint materials, rubbish, cans and rags shall be removed from the site at the end of each work day.

B. Upon completion of painting work, all paint-spattered surfaces shall be cleaned. Spattered paint shall be removed by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.

C. At the completion of work of other trades, all damaged or defaced painted surfaces shall be touched-up and restored, as determined by the Resident Engineer.

END OF SECTION

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SECTION 11001

GENERAL REQUIREMENTS FOR EQUIPMENT

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope: This section pertains to providing and testing the equipment specified or shown in the contract documents.

B. Equipment Lists: Equipment lists presented in these specifications and shown on the drawings are included for the convenience of the Resident Engineer and Contractor and are not intended to represent a rigorous and precise listing of all equipment, devices and material to be provided under this contract. The Contractor agrees to rely upon his own material and equipment takeoff lists for this purpose.

C. Manufacturer's Instructions: Install all equipment per the manufacturer's written instructions.

1.02 QUALITY ASSURANCE

A. Arrangement: The arrangement of equipment shown is based upon information available to the District at the time of design and is not intended to show exact dimensions peculiar to a specific manufacturer. The drawings are, in part, diagrammatic and some features of the illustrated equipment installation may require revision to meet actual equipment installation requirements. Structural supports, foundations, connected piping and valves shown may have to be altered to accommodate the equipment provided. No additional payment will be made for such revisions and alterations. The Contractor shall submit substantiating calculations and drawings prior to beginning the work.

B. Control Devices: Control devices, wiring, starters, and other electrical items provided with mechanical equipment shall, in general, conform to Joint Industry Council (JIC) Electrical Standards for Mass Production Equipment EMP-1-1967 and the requirements specified, including those in Division 11, Division 16, Division 17, and the particular equipment sections.

C. References: This section references the following documents. They are a part of this section as specified and modified. In case of conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.

1. AFBMA, Methods of Evaluating Load Ratings of Ball and Roller Bearings
2. ANSI B1.1, Unified Inch Square Threads
3. ANSI B2.1, Pipe Threads (Except Dupeal)
4. ANSI B16.1, Cast Iron Pipe Flanges and Flanged Fittings, Class 125

5. ANSI B18.2.1, Square and Hex Head Bolts and Screws, Including Askew Head Bolts, Hex Cap Screws, and Lag Screws

6. ANSI B18.2.2, Square and Hex Nuts

1.03 SUBMITTALS

A. General: The submittal for each individual equipment or groups of related equipment shall be in accordance with the requirements of the City Standard Specifications.

B. Required Submittal Data: The following information shall be submitted for each item of equipment. Additional data, specific to individual equipment items, are listed under individual specification sections.

1. The proposed equipment shall be identified by the call-outs listed in the specifications and on the drawings.

2. Manufacturer and manufacturer's type designation.

3. Any exceptions to these specifications along with justification for each exception.

4. Manufacturer's catalog data confirming rated capacity, horsepower, efficiency and electrical requirements.

5. Shop drawings.

6. Predicted performance curves developed for the specific application. In the case of rotating equipment, performance curves shall show speed, capacity, pressure, efficiency and power for all specified conditions.

7. Cross-sectional views of machines showing details of construction.

8. Data and calculations required to justify selection of size of components such as shafts, bearings and peripheral equipment necessary to conform to these specifications.

9. Parts lists, with materials of construction.

10. Installation requirements, showing clearances required for maintenance purposes.

11. Details of all appurtenances to be furnished with the specified item.

12. Contractor shall certify that all shop applied coatings are compatible with the approved field coating system specified in Section 09900. If a barrier coating is required, the Contractor shall so state.

13. Submit with the shop drawings complete calculations or test results, details of construction, and method of attachment for all manufactured products showing compliance with current seismic requirements. The calculations and details shall

be signed by a Professional Engineer who has demonstrated proficiency in Structural Engineering or Civil Engineering and is registered in the State of California.

1.04 PROTECTION DURING SHIPMENT

A. Each item of equipment shall be shipped to the site of the work with either the manufacturer's shop applied prime coating or a vinyl paint prime coating. The prime coating shall be applied over clean dry surfaces in accordance with the paint manufacturer's recommendations. The prime coating will serve as a base for field-applied finish coats.

B. Bearing housings shall be wrapped or otherwise sealed to prevent contamination by grit and dirt, and ventilation and other types of openings shall be taped closed.

PART 2 - PRODUCTS

2.01 FLANGES AND PIPE THREADS

A. Flanges on equipment and appurtenances provided under this section shall conform in dimensions and drilling to ANSI B16.1, Class 125 unless otherwise indicated or specified. Pipe threads shall conform in dimension and limits of size to ANSI B1.1, coarse thread series, Class 2 fit.

B. Threaded flanges shall have a standard taper pipe thread conforming to ANSI B2.1. Unless otherwise specified, flanges shall be flat faced.

C. Flange assembly bolts shall be heavy pattern, hexagonal head, Type 316 stainless steel machine bolts with heavy pattern, hot pressed, hexagonal nuts conforming to ANSI B18.2.1 and B18.2.2. Threads shall be Unified Screw Threads, Standard Coarse Thread Series, Class 2A and 2B, ANSI B1.1.

2.02 BEARINGS

A. Unless otherwise specified, equipment bearings shall be oil or grease lubricated, ball or roller type, designed to withstand the stresses of the service specified. Each bearing shall be rated in accordance with the latest revisions of AFMBA Methods of Evaluating Load Ratings of Ball and Roller Bearings for one of the following classes of B-10 rating life:

Class	Hours of Operation
M1	8,000
M2	20,000
M3	50,000
M4	100,000
M5	200,000

B. Unless otherwise specified, equipment shall have bearings rated for Class M3 life.

C. Grease lubricated bearings, except those specified to be factory sealed and lubricated, shall be fitted with easily accessible grease supply, flush, drain and relief fittings. Extension tubes shall be used when necessary. Grease supply fittings shall be standard hydraulic alemite type.

D. Oil lubricated bearings shall be equipped with either a pressure lubricating system or a separate oil reservoir type system. Each oil lubrication system shall be of sufficient size to safely absorb the heat energy normally generated in the bearing under a maximum ambient temperature of 60 degrees C and shall be equipped with a filler pipe and an external level indicator gauge.

2.03 V-BELT ASSEMBLIES

A. V-belt assemblies shall be Dodge Dyna-V belts with matching Dyna-V sheaves and Dodge Taper-lock bushings, Wood's Super V-belts with matching Sure-Grip sheaves and Wood's Sure-Grip bushings, or equal.

B. Sheaves and bushings shall be statically balanced. Additionally, sheaves and bushings which operate at a peripheral speed of more than 5500 feet per minute shall be dynamically balanced. Sheaves shall be separately mounted on their bushings by means of three pull-up grub or cap tightening screws. Bushings shall be key-seated to the drive shaft.

C. Belts shall be selected for not less than 150 percent of rated driver horsepower and, where two sheaves sizes are specified, shall be capable of operating with either set of sheaves. Belts shall be of the antistatic type where explosion-proof equipment is specified.

2.04 SEALS

A. Mechanical: Unless otherwise specified elsewhere, mechanical seals shall comply with the following:

1. Mechanical seals may be internal or external type, balanced or unbalanced type, and single or double seals except as herein specified. An internal type seal may be used where clean sealing liquid is provided, either from the pumped liquid or an external source. When the pumped liquid is corrosive, abrasive, toxic or flammable, an internal double seal shall be provided with adequate sealing liquid pressure to prevent entry of pumped liquid into the seal chamber, or an external seal may be provided. The sealing liquid shall be within the temperature limits and at the flushing rate recommended by the equipment manufacturer.

2. The seal may be balanced or not, as recommended by the equipment manufacturer. To maintain the necessary minimum or maximum pressure across the seal faces, spring pressure shall be uniformly distributed to the sealing faces by a coil spring or multiple springs. The rotating seal element shall be clamped to the shaft and provided with O-ring seal. The stationary seal element shall be sealed with O-ring or gasket material.

3. Seal faces shall be tungsten carbide to tungsten carbide except on the double seal where the seal in contact with pumped liquid shall be carbon. The O-ring gasket material shall be as recommended by the manufacturer for the liquid being pumped. Other parts shall be 316 stainless steel.

B. Stuffing Box: Each stuffing box shall be cast separately, bolted to the bearing frame, tapped to permit installation of a clean liquid seal, and shall be large and sufficiently deep to hold a minimum of five rows of packing and a bronze lantern water seal ring. If specified for use in a pump specification section, packing shall be die-molded rings of material suitable for the intended service and as recommended by the manufacturer. Sealing liquid shall be the pumped liquid unless otherwise specified. Taps for external sealing and a lantern ring shall be provided. When used, lantern rings shall be of two-piece construction and shall be provided with tapped holes to facilitate removal.

2.05 COUPLINGS

A. Unless otherwise specified in the particular equipment sections, equipment with a driver greater than 1/2 HP, and where the input shaft of a driven unit is directly connected to the output shaft of the driver, shall have its two shafts connected by a flexible coupling which can accommodate angular misalignment, parallel misalignment and end float, and which cushions shock loads and dampens torsional vibrations. The flexible member shall consist of a tire with synthetic tension members bonded together in rubber. The flexible member shall be attached to flanges by means of clamping rings and cap screws, and the flanges shall be attached to the stub shaft by means of taperlock bushings which shall give the equivalent of a shrunk-on fit. There shall be no metal-to-metal contact between the driver and the driven unit. Each coupling shall be sized and provided as recommended by the coupling manufacturer for the specific application, considering horsepower, speed of rotation, and type of service.

B. Where torque or horsepower capacities of couplings of the foregoing type is exceeded, Thomas-Rex, Falk Steel Flex, or equal, couplings will be acceptable provided they are sized in accordance with the equipment manufacturer's recommendations and sizing data are submitted. They shall be installed in conformance to the coupling manufacturer's instructions.

2.06 GUARDS

A. Exposed moving parts shall be provided with guards which meet the requirements of CAL/OSHA. Guards shall be fabricated of solid 14-gage steel. Guards shall be galvanized after fabrication and shall be designed to be readily removable to facilitate maintenance of moving parts. Reinforced holes shall be provided.

2.07 CAUTION SIGNS

A. Equipment with guarded moving parts which operates automatically or by remote control shall be identified by signs reading "CAUTION -AUTOMATIC EQUIPMENT MAY START AT ANY TIME". Signs shall be installed near guarded moving parts.

2.08 PRESSURE TAPS, TEST PLUGS AND GAUGES

A. Pressure taps shall be provided on the suction and discharge sides of pumps. Pressure test plugs and gauges shall be provided where specified. Test plugs and gauges shall be as specified in the contract documents.

2.09 NAMEPLATES

A. Nameplates shall be provided on each item of equipment and shall contain the specified equipment name or abbreviation. Equipment nameplates shall be engraved or stamped on corrosion resistant material and fastened to the equipment in an accessible location with No. 4 or larger oval head stainless steel screws or drive pins.

2.10 LIFTING EYES

A. Where specified or indicated, lifting eyes shall be provided over equipment.

2.11 LUBRICANTS

A. The Contractor shall provide for each item of mechanical equipment a supply of the lubricant required for the commissioning period. Lubricants shall be of the type recommended by the equipment manufacturer and shall be products of the District's current lubricant supplier. The Contractor shall limit the various types of lubricants by consolidating them, with the equipment manufacturer's approval, into the least number of different types. Not less than 90 days before the date shown in his construction schedule for starting, testing and adjusting equipment, the Contractor shall provide the Resident Engineer with three copies of a list showing the required lubricants, after consolidation, for each item of mechanical equipment. The list shall show estimated quantity of lubricant needed for a full year's operation, assuming the equipment will be operating continuously.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Each item of equipment provided shall be installed and tested within the tolerances recommended by the equipment manufacturer.

3.02 TESTING

A. Items of equipment specified in this division shall be tested as required in each section and in accordance with Part 1.

3.03 TESTING OF PUMPS

A. All pumps shall be operated to confirm that they will convey sewage (or water) at the specified volumes and heads. Pumps and control equipment shall be tested as a system to confirm compliance to these specifications. Pumps will only be accepted once these conditions have been met. Provide certified copies of the pump curves for each set of pumps. Also refer to requirements specified in Electrical Specifications herein.

END OF SECTION

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SECTION 11050

EQUIPMENT MOUNTING

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section includes mounts, supports, and the anchorage for all equipment, piping and accessories.

1.02 QUALITY ASSURANCE

A. Requirements Of Regulatory Agencies: All piping, equipment, supports and anchorages shall be designed by the Contractor in accordance with requirements of the Uniform Building Code (UBC) and Structural Engineering Association of California (SEAOC), latest edition, unless specified otherwise herein. All elements required to resist the calculated forces described herein shall be provided by the Contractor.

B. Calculations And Shop Drawings: Calculations and shop drawings shall be submitted for all of the work required above. All calculations must be made and signed by a civil or structural engineer currently registered in the State of California. Inasmuch as all anchorage of equipment is to be made to cast-in-place concrete elements, it is imperative that types of anchorage be coordinated with the concrete subcontractor so that anchorage may be installed at time of concrete placement. If calculations and anchorage details are not submitted prior to placing of concrete, the Contractor will become responsible for any strengthening of concrete elements because of superimposed seismic loading.

PART 2 - PRODUCTS

2.01 GENERAL

A. Equipment mountings shall be as shown. All equipment located on slabs shall be mounted on concrete pads. Where a steel base is shown or specified between the equipment and the concrete pedestal, it shall be hot-dip galvanized after fabrication.

2.02 CAST IRON BASES

A. Cast iron bases do not require galvanizing but must be painted in accordance with the requirements specified in Section 09900. All fasteners requiring connections to the base shall be terminated by nuts welded to the bottom side of the base and plugged with cork, plastic plugs or grease, or acorn nuts. In no case shall the fastener terminate only into the metal base.

2.03 CONCRETE PEDESTALS

A. Concrete pedestals shall be 2 inches larger than the steel or cast base. All conduits, piping connections, drains, etc., shall be enclosed by the concrete base. No conduits, piping connections, drains, etc., will be accepted which rise directly from the floor.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Equipment:

1. Except where a higher lateral force is required by code, each piece of equipment installed shall be anchored to resist a minimum lateral seismic force of 60 percent of the operating weight of the equipment. This force shall be considered acting at the center of gravity of the piece under consideration. No equipment shall be anchored to vertical structural elements without written approval of the Resident Engineer.

2. Nonvibrating equipment shall be anchored directly to the supporting floor system. In addition to the anchorage, all equipment shall be internally designed so that all static and moving parts are anchored to the supporting framework to resist the imposed seismic force. All forces must be transmitted to the base in order to be anchored as required.

3. Equipment, piping supports and anchorage located outside the buildings shall be designed to comply with the UBC, latest edition.

B. Piping:

1. All piping, accessories, and appurtenances, furnished with equipment shall be anchored to resist a lateral seismic force of 60 percent of its operating weight without excessive deflection. This force shall be considered acting at the center of gravity of the piece under consideration.

2. Piping with flexible connections and/or expansion joints shall be anchored such that the intended uses of these joints are maintained in the piping system.

C. Ductwork: All ductwork for heating, ventilating and air conditioning, and for mechanical equipment, shall be anchored to the roof system to resist a lateral seismic force of 60 percent of the operating weight.

END OF SECTION

SECTION 13432
FLOW MEASUREMENT DEVICES

PART 1. GENERAL

1.1 SCOPE OF WORK

A. This section covers the furnishing, installation, and services for the flow measurement instrumentation as shown on the Contract Documents.

1.2 RELATED WORK

A. As specified in Section 16001.

B. Pressure measurement devices are specified in Section 13434.

1.3 SUBMITTALS

A. As specified in Section 16001.

1.4 MAINTENANCE

A. Test equipment:

1. Provide hand-held devices, programmers, software, and cables necessary for configuration and maintenance of the instruments.

B. Spares: None

C. Accessories

1. All mounting hardware required for pipe stand, surface, or other mounting shall be provided.
2. Each instrument shall be provided with a manufacturer installed stainless steel tag identifying the instrument tag number.

PART 2. PRODUCTS

2.1 MAGNETIC FLOWMETER

A. Flow Element

1. Type:

a. Pulsed DC type.

2. Function/Performance:

a. Operating Temperature: Process liquid temperatures of –10˚ to 70˚ C and an ambient of –10˚ to 60˚ C.
b. RFI protection: RFI protection to be provided.
c. Pressure rating: Equal to piping system where meter is installed.
d. Additional: Meter shall be capable of running empty indefinitely without damage to any component.

3. Physical:

a. Metering Tube: 304 stainless steel or equivalent.
b. Flanges: ANSI 150 lb. or DIN PN 16 carbon steel, as required by the piping system, unless otherwise indicated.
c. Liner: Polyurethane unless otherwise indicated on the Drawings or in the Instrument Device Schedule.
d. Electrodes: 316 stainless steel, bullet nosed or elliptical self-cleaning type unless otherwise noted.
e. Housing: Meters below grade shall be suitable for submergence for up to 48 hours to a depth of 30 ft (9m). Meters above grade shall be NEMA 4X (IP65). Where hazardous areas are indicated on the Drawings, the equipment shall be rated for that area.
f. Finish: All external surfaces shall have a chemical and corrosion resistant finish.

4. Accessories/Documentation Required:

a. Factory calibration: All meters shall be factory calibrated. A copy of the report shall be included in the O&M manual.
b. Grounding: Meter shall be grounded in accordance with the manufacturer's recommendation. Provide ground ring, ground wires, gaskets, etc., as required. All materials shall be suitable for the liquid being measured.
c. Signal cable for installation between the flowtube and the transmitter. Length shall be as required by installation indicated on the Drawings.

5. Manufacturer shall be Rosemount Series 8700, no equal to match existing.

B. Flow Converter/Transmitter

1. Type:

a. Microprocessor based, intelligent transmitter compatible with flowtube provided.
b. The transmitter shall be mounted integrally on the flow tube, or remotely mounted on an instrument stand, wall, or control panel as shown on the Drawings.

2. Functional/Performance:

a. Accuracy (including flowtube): Plus/minus 0.5 percent of flowrate.
b. Operating Temperature: –10 to 50˚ C.
c. Output: Isolated 4-20 mA with HART protocol. Current output adjustable

over the full range of the instrument. Output shall be calibrated for readous form 0 to 4000 gpm.

d. Diagnostics: Self diagnostics with on screen display of faults.
e. Display: Digital indicator displaying flow in engineering units indicated in the Instrument Device Schedule.
f. Totalizer: A fully configurable totalizer integral to the transmitter. Totalized flow shall be displayed.
g. Empty Tube Zero: The transmitter shall include a feature that will lock the output at zero when no flow is detected. The empty tube zero feature shall be enabled automatically when the transmitter detects no flow or manually through a contact input.

h. Physical:Transmitter shall be suitable for surface or instrument stand mounting.
i. Enclosure shall be NEMA 4X (IP65).
j. 120VAC input power or as shown on the Instrument List.

3. Accessories/ Required:

a. Keypad where required for transmitter configuration.
b. If hand-held programmers, special tools, software or cables are required for configuration and setup, the contractor shall provide one set of configuration equipment, plus an additional set of configuration equipment for every five flow meters provided on this project.

4. Manufacturer shall be Rosemount Series 8712, no equal to match existing.

PART 3. EXECUTION

3.1 GENERAL

A. Install in conformance with manufacturer's requirements and as specified under Section 16001.

END OF
SECTION

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SECTION 13434

PRESSURE MEASUREMENT DEVICES

PART 1. GENERAL

1.1 SCOPE OF WORK

A. This section covers the furnishing, installation, and services for the pressure measurement instrumentation as shown on the Contract Documents.

1.2 RELATED WORK

A. As specified in Section 16001.

B. Flow measurement devices are specified in Section 13432.

1.3 SUBMITTALS

A. As specified in Section 16001.

1.4 MAINTENANCE

A. Test equipment:

1. Provide hand-held devices, programmers, software, and cables necessary for configuration and maintenance of the instruments.

B. Spares: None

C. Accessories

1. All mounting hardware required for pipe stand, surface, or other mounting shall be provided.
2. Each instrument shall be provided with a manufacturer installed stainless steel tag identifying the instrument tag number.
3. Pressure instruments shall be provided with isolation valves, bleed valves, valve manifolds, tubing, pipe manifolds, process seals, and fittings as shown on the Drawings.

PART 2. PRODUCTS

2.1 PRESSURE INDICATING TRANSMITER

A. Type:

1. Microprocessor based, intelligent type.

B. Function/Performance:

1. Range: Range of the transmitter shall be the standard range of the manufacturer closest to the pressure range to be metered. Calibrate the transmitter for operation form 00 to 200 PSIG.
2. Accuracy: 0.075 percent of span.
3. Operating Temperature: -20 to 80° C.
4. Temperature Effect: Combined temperature effects shall be less than 0.2 percent of maximum span per 28° C temperature change.Output: 4 20 mA DC linear with pressure or level, with HART protocol. Zero adjustable over the range of the instrument provided calibrated span is greater than the minimum calibrated span.
5. Stability: 0.2 percent of upper range limit for 1 year.
6. Display: Digital indicator displaying pressure or level in the engineering units indicated in the Instrument Device Schedule.
7. Diagnostics: Self diagnostics with transmitter failure driving output to above or below out of range limits.
8. Over Range Protection: Provide positive over range protection to 150% of the maximum pressure of the system being monitored by the instrument.
9. If required to meet the range or suppression/elevation requirements, a differential pressure transmitter shall be provided.

C. Physical:

1. Enclosure: NEMA 4X (IP66), explosion proof, approved for Class I, Division 1, Groups C and D (EEx d IIC T5).
2. Process Wetted Parts: Isolating diaphragm and other wetted metal parts shall be 316L stainless steel, unless otherwise indicated in the device schedule. Gaskets and O rings shall be Teflon.
3. Power Supply: 24 VDC loop power.
4. Sensor Fill Fluid: Silicone.

D. Accessories Required:

1. Provide span and zero adjustment at each transmitter and through thehandheld programming unit.
2. For each transmitter provide a 316 stainless steel 3-valve manifold and isolation valve. Manifold shall be mounted directly to the instrument. Isolation valve may be mounted directly to the instrument or separately mounted. Valve manifold and valves shall be by the instrument manufacturer, by D/A Manufacturing, Anderson Greenwood or approved equal.

E. Manufacturer(s):

1. ABB 621EG.
2. Rosemount 3051CG.
3. Foxboro IGP20
4. Approved equal.

2.2 PRESSURE GAUGE

A. Gauges shall have Type 316 stainless steel Bourdon tube pressure elements and socket or bellows, unless otherwise specified. The movement shall be constructed of stainless steel, Monel, rust-proof and corrosion resistant materials, and equipped with a recalibration mechanism capable of correcting the relationship of the Bourdon tube to the gauge movement throughout the entire range of the instrument. Accuracy shall be ½ of 2 percent of scale range.

B. Cases shall be turret pattern of high impact Phenolic or equal construction with a high impact, shatter-resistant glass. The case shall be designed for stem, surface, or flush mounting and shall be furnished with brackets or adapter rings when flush or wall mounted. All dials shall be 4 ½ inch diameter with black letters on a white background unless otherwise indicated in the schedule. Gauge fitting shall be ½- inch NPT. Unless otherwise indicated, gauges shall be selected so that normal operating pressure falls between 40 and 60 percent of full scale.

C. Provide with a ball valve between the gauge and the gauge tap for isolation purposes. All gauge tap locations shall be provided with a ½-inch female thread connection to receive the gauge. Provide reducers fittings if required to match the gauge provided.

D. Snubbers shall be provided for each gauge assembly as required.

E. Manufacturers shall be Ashcroft model 1279, US Gauge, or approved equal.

PART 3. EXECUTION

3.1 GENERAL

A. Install in conformance with manufacturer's requirements and as specified in Section 16001.

END OF
SECTION

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SECTION 15000

PIPING, GENERAL

PART 1 GENERAL

1.1 THE REQUIREMENT

A. The Contractor shall provide the piping systems indicated, complete and operable, in accordance with the Contract Documents. Unless otherwise noted in the Special Provisions, Sections 14 and 22, the provisions of this Section shall apply.

B. The Drawings define the general layout, configuration, routing, method of support, pipe size and pipe type. The Drawings are not pipe construction or fabrication drawings. The Contractor shall develop details necessary to construct mechanical piping systems, to accommodate equipment, and to provide and install spools, spacers, adapters, and connectors for a complete and functional system. Flanges and joints in addition to those shown may be required to facilitate fabrication and installation.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Without limiting the generality of other requirements of these Specifications, work specified herein shall conform to or exceed the requirements of applicable Building Codes and applicable requirements of referenced standards to the extent that the provisions of such documents are not in conflict with the requirements of this Section; provided, that for Building Codes, the latest edition of the code, as adopted as of the date of award by the authority having jurisdiction, shall apply to the Work.

1.3 CONTRACTOR SUBMITTALS

A. The Contractor shall prepare and submit information required herein in accordance with the City Standard Specifications.

B. Shop Drawings: Shop Drawings shall contain layout drawings including dimensions, details, pipe joints, fittings, specials, valves, appurtenances, anchors, guides, and material lists. Fabrication drawings shall indicate spool pieces, spacers, adapters, connectors, fittings, and supports to accommodate equipment and valves in a complete and functional system. Material lists shall describe piping and appurtenances, including bolting, to be provided under this Section.

C. Certifications:

1. Certificates, test reports, and affidavits of compliance shall be submitted.
2. Fabricator Statement: A statement from the pipe fabricator certifying that the pipes provided will be fabricated subject to a recognized quality control program. An outline of the program shall be submitted prior to the fabrication of pipe.

1.4 QUALITY ASSURANCE

A. General: To assure uniformity and compatibility of piping components in grooved-end piping systems, fittings and couplings shall be furnished by the same manufacturer. Like items of materials provided hereunder shall be the end products of one manufacturer in order to achieve standardization for appearance and manufacturer's service.

B. Inspection:

1. Pipe shall be subject to inspection at the place of manufacture. During the manufacture of the pipe, the City shall be given access to areas where manufacturing is in progress and shall be permitted to make inspections to confirm compliance with the Specifications.
2. The Contractor shall notify the City of the production schedule in sufficient time so that factory inspection can be arranged. Factory inspection will be made after the manufacturer has performed satisfactory checks, adjustments, tests, and operations. The extent of factory inspection and testing shall be as specified herein and in the applicable piping sections of these Specifications.
3. The manufacturer shall make available for the City's use such gauges or other tools required for inspection. The manufacturer shall provide the City with assistance with handling of pipe and fittings.
4. If a factory inspection is performed by the City, approval of pipe at the factory will allow the manufacturer to ship the product to the site, and does not constitute final acceptance by the City.
5. Unless otherwise specified, the City will pay for expenses incurred for factory test visits. The cost of performing the tests shall be included in the Contractor's bid.

C. Welding Requirements: Welding procedures used to fabricate pipe 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 spiral welds for pipe cylinders, reinforcing plates and ring flange welds, and plates for lug connections.

PART 2 PRODUCTS

2.1 GENERAL

A. Extent of Work: Pipes, fittings, and appurtenances shall be provided in accordance with the requirements of City Standard Specifications and the Contract Documents. The pipe material required for each application shall be in accordance with the Drawings or Pipe Schedule, if applicable. Where a pipe material type is not specifically designated on the Drawings, the Contractor may select among the options presented in the Pipe Schedule, if applicable. When a pipe material is specifically designated on the Drawings, only that material will be allowed unless approved in writing by the City.

B. Lining: Application, thickness, and curing of pipe lining shall be in accordance with the requirements of the applicable City Standard Specifications, as modified by the Special Provisions and Technical Specifications, unless otherwise indicated. The Manufacturer shall take full responsibility for the complete, final product and its application. Pipe

ends and joints of lined pipes at screwed flanges shall be epoxy-coated to assure continuous protection.

C. Protective Coating: Application, thickness, and curing of pipe coating shall be in accordance with the requirements of the applicable Sections of Division 2, unless otherwise indicated. Pipes above ground or in structures shall be field coated in accordance with Section 09900 – Painting and Coatings.

D. Pressure Rating: Piping systems shall be designed for the maximum expected pressure as defined in other piping sections, or as shown on the Drawings.

E. Welding Requirements: Welding procedures used to fabricate pipe shall be prequalified under the provisions of ANSI/AWS D1.1 - Structural Welding Code. Welding procedures shall be required for longitudinal and girth or spiral welds for pipe cylinders, spigot and bell ring attachments, reinforcing plates and ring flange welds, and plates for lug connections. Welding shall be done by skilled welders, welding operators, and tackers who have had experience in the methods and materials to be used. Unless otherwise specified in Division 2, 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 pipeline. Machines and electrodes similar to those used in the Work shall be used in qualification tests. The Contractor shall furnish material and bear the expense of qualifying welders at no increased cost to the City.

F. Care shall be exercised during fabrication to prevent the accumulation of weld rod, weld splatter, pipe cuttings and filings, gravel, cleaning rags, etc., within piping sections. Piping shall be examined to assure removal of these and other foreign objects prior to assembly. Shop cleaning may employ a conventional commercial cleaning method if it does not corrode, deform, swell, or otherwise alter the physical properties of the material being cleaned.

G. Manufacturers: Piping system components of like kind shall be the product of one manufacturer.

2.2 PIPE FLANGES

A. Steel Pipe Flanges: Unless noted otherwise, where design pressure is 150 PSI or less, steel pipe flanges shall conform to either ANSI/AWWA C207 - Steel Pipe Flanges for Waterworks Service - Sizes 4 In. through 144 In., Class D, or ANSI/ASME B16.5 - Pipe Flanges and Flanged Fittings, 150-lb class. Where the design pressure is greater than 150 psi up to a maximum of 275 psi, flanges shall conform to either ANSI/AWWA C207 Class E or Class F, or ANSI/ASME B16.5 150-lb class. However, AWWA flanges shall not be exposed to test pressures greater than 125 percent of rated capacity. For higher test pressures, the next higher rated AWWA flange or an ANSI-rated flange shall be selected. Where the design pressure is greater than 275 psi up to a maximum of 700 psi, flanges shall conform to ANSI/ASME B16.5, 300-lb class. Flanges shall have flat faces and shall be attached with bolt holes straddling the vertical axis of the pipe, unless otherwise indicated. Attachment of the flanges to the pipe shall conform to the applicable requirements of ANSI/AWWA C207. Flanges for miscellaneous small diameter steel pipe shall be in accordance with the industry standards indicated for these pipes rated for the applicable pressure rating. The

Contractor shall be responsible for ensuring that steel pipe flanges are compatible with connecting appurtenances, including but not limited to valves.

B. Steel Blind Flanges: Blind flanges shall be in accordance with ANSI/AWWA C207, or as indicated for miscellaneous small pipes. Blind flanges for pipe sizes 12 inches and over shall be provided with lifting eyes in form of welded or screwed eye bolts.

C. Flange Bolts: Refer to Paragraph "Bolts and Anchors" of this Section.

D. Steel Flange Gaskets: Gaskets for flanged joints shall be full-faced, 1/16-inch thick compressed sheets of aramid fiber base, with nitrile binder and non-stick coating, suitable for temperatures to 700 degrees F, a pH of one to eleven, and pressures to 1,000 psig. Blind flanges shall have gaskets covering the entire inside face of the blind flange and shall be cemented to the blind flange. Ring gaskets shall not be permitted, unless otherwise indicated.

1. Steel Pipe Flange Gasket Manufacturers, or Equal:

a. John Crane; Style 2160.
b. Garlock; Style 3000.

E. Flange Coating: Machined faces of metal blind flanges and pipe flanges shall be coated with a temporary rust-inhibitive coating to protect the metal until the installation is completed.

F. Ductile Iron Flanges: Ductile iron flanges shall be in accordance with the City Standard Specifications, Section 14, as modified by the Special Provisions.

2.3 INSULATING FLANGES

A. Insulating Flange Sets: Insulating flange sets shall be provided where indicated and shall meet the requirements of Section 16640 – Cathodic Protection

2.4 THREADED INSULATING CONNECTIONS

A. General: Threaded insulating bushings, unions, or couplings, as appropriate, shall be used for joining threaded pipes of dissimilar metals and for piping systems where corrosion control and cathodic protection are involved.

B. Materials: Threaded insulating connections shall be of nylon, Teflon, polycarbonate, polyethylene, or other non-conductive materials, and shall have ratings and properties to suit the service and loading conditions.

2.5 MECHANICAL JOINT RESTRAINTS FOR DUCTILE IRON PIPE (RESTRAINT GLAND)

A. Mechanical joint restraints shall be as required in the Special Provisions.

1. Restraint devices joining plain end ductile iron pipe to mechanical joint fittings or pipe shall conform to AWWA C111 or AWWA C153.

B. Where allowed, restraint devices shall consist of multiple gripping wedges incorporated into a follower gland meeting the applicable requirements of AWWA C110. Restraint body, wedges and wedge actuating component shall be cast ductile iron grade 65-42-12 in accordance with ASTM A536.

1. Pressure rating shall be 350 psi for pipe 16 inches diameter and less and 250 psi for pipe 18 inches diameter and larger with a minimum factor of safety of 2.
2. Gripping wedge and bolt quantities and sizes shall be as indicated in the manufacturer's published literature for the product.
3. Coating shall be in accordance with Section 09900 – Painting and Coatings.

2.6 SLEEVE-TYPE COUPLINGS - NOT USED

2.7 FLANGE COUPLING ADAPTERS

A. Flange adapters shall be fabricated from high strength steel. Flanges shall be supplied to AWWA C207, as well as applicable ANSI standards. Compression ends shall have wedge gasket for efficient sealing. Gasket material shall be suitable for the intended fluid service and application. Miscellaneous metal items shall be Type 316 stainless steel.

B. Pipe ends shall be properly prepared for accepting the flange adapter in accordance with manufacturer's recommendations. The outside diameter and pipe type shall be verified prior to ordering adapters. Flange adapters shall be lined and coated with fusion bonded epoxy.

C. Where cement mortar coated pipe is to be provided with sleeve type couplings, cement mortar coatings shall be held back for coupling. Pipe shall be coated with amine cured epoxy at location of coupling and cement mortar coating intersection.

D. Flange Adapters Manufacturers or Approved Equal:

1. Dresser; Style 128.
2. Smith-Blair.

2.8 DISMANTLING JOINTS

A. Dismantling joints shall be designed and manufactured to provide for fit up adjustability and assembly and disassembly of flanged piping systems. Dismantling joints shall be designed to the full pipe working class rating, with the capability of at least 3 inches of fit-up adjustment and shall be fully restrained.

B. Dismantling joints shall be flanged end couplings fabricated from high strength steel. Flanges shall conform to the provisions defined in this Section. Spool pipe, end ring and body of coupling shall be fabricated from ASTM A36 steel and cold expanded 1 percent to size.

C. Gaskets shall conform to the requirements for mechanical sleeve type couplings specified in this Section.

D. Bolts and nuts shall be stainless steel conforming to the requirements of this Section. Tie rods for restraint shall conform to the requirements of Paragraph "Bolts and Anchors" of this Section.

E. Dismantling joints shall be fusion bonded epoxy.

F. Dismantling Joint Manufacturers or Approved Equal:

1. ROMAC Industries, Style DJ400
2. Dresser; Style 131.
3. Smith-Blair, Model 972.

2.9 PIPE THREADS

A. Pipe threads shall be in accordance with ANSI/ASME B1.20.1 - Pipe Threads, General Purpose (inch), made up with Teflon tape, unless otherwise indicated.

2.10 BOLTS AND ANCHORS

A. Standard Service (Non-Corrosive Application): Unless otherwise indicated, bolts, anchor bolts, washers, and nuts shall be steel, galvanized after fabrication as indicated herein. Threads on galvanized bolts and nuts shall be formed with suitable taps and dies such that they retain their normal clearance after hot-dip galvanizing. Except as otherwise indicated, carbon steel bolts, anchor bolts and cap screws shall be in accordance with the requirements of ASTM A307, Grade B where working pressures are 175 psi or less. For higher pressures, bolt material shall conform to the requirements of ASTM A193, Grade B7.

B. Corrosive Service: Bolts, nuts, and washers in the locations listed below shall be stainless steel as indicated below.

1. Buried locations.
2. Submerged locations.
3. Locations subject to seasonal or occasional flooding.
4. Inside hydraulic structures below the top of the structure.
5. Inside buried vaults, manholes, and structures that do not drain through a gravity sewer or to a sump with a pump.
6. Chemical handling areas.
7. Inside trenches, containment walls, and curbed areas.
8. Locations indicated by the Contract Documents or designated by the City to be provided with stainless steel bolts.

C. Unless otherwise indicated, stainless steel bolts, anchor bolts, nuts, and washers shall be Type 316 stainless steel in accordance with ASTM A193, Class 2, Grade 8M or ASTM F593, Condition SH. Threads on stainless steel bolts shall be protected with an antiseize lubricant suitable for submerged stainless steel bolts, to meet government specification MIL-A-907E. Buried bolts shall be coated as shown in Cathodic Protection details (see Drawings).

1. Antiseize lubricant shall be classified as acceptable for potable water use by the NSF.

2. Antiseize lubricant shall be "Pure White" by Anti-Seize Technology, Franklin Park, IL; or equal.

D. Bolt Requirements:

1. The bolt and nut material shall be free-cutting steel.
2. The nuts shall be capable of developing the full strength of the bolts. Threads shall be Coarse Thread Series conforming to the requirements of the American Standard for Screw Threads. Bolts and cap screws shall have hexagon heads and nuts shall be Heavy Hexagon Series.
3. Bolts and nuts shall be installed with washers fabricated of material matching the base material of bolts, except that hardened washers for high strength bolts shall conform to the requirements of the AISC Specification. Lock washers shall be installed with washers where indicated and shall be fabricated of material matching the bolts.
4. The length of bolts shall be such that after joints are made up, each bolt shall extend through the entire nut, but in no case more than 1/2-inch beyond the nut.
5. All-thread studs shall be used on valve flange connections, where space restrictions preclude the use of regular bolts.

PART 3 EXECUTION

3.1 DELIVERY AND STORAGE

A. Piping materials, fittings, valves, and accessories shall be delivered in a clean and undamaged condition and stored off the ground for protection against oxidation caused by ground contact. Defective or damaged materials shall be replaced with new materials.

3.2 INSTALLATION

A. General:

1. Pipes, fittings, and appurtenances shall be installed in accordance with the requirements of the applicable City Standard Specifications, as modified by the Special Provisions.
2. Each pipe and fitting shall be carefully inspected before the exposed pipe or fitting is installed or the buried pipe or fitting is lowered into the trench. The laying of pipe shall be in finished trenches free from water or debris. The lining and protective coating shall be inspected, and damaged areas patched in the field with material similar to the original. Clean ends of pipe thoroughly. Remove foreign matter and dirt from inside of pipe and keep clean during and after laying.
3. Clean out fittings, valves, and pipe sections before installing.
4. Furnish and assemble pipe and fittings to provide accurate alignment for joints.
5. Make joints watertight.
6. Use an anti-seize compound on bolt threads. Manufacturer's instruction for application shall be followed. The anti-seize compound shall be designed to prevent rusting and seizure of bolt threads and to prevent galling of stainless steel.
7. Provide temporary plugs or bulkheads for closure of the open ends of piping whenever work is stopped.

8. Use proper implements, tools, and facilities for the safe and proper protection of the pipe. Carefully handle pipe in such a manner as to avoid physical damage to the pipe. Do not drop or dump pipe into trenches.
9. Repairs of defects that are discovered as a result of inspection or tests shall be made with new materials. Caulking of screwed joints, cracks, or holes will not be accepted. Tests shall be repeated after defects have been eliminated.
10. After completion of the work, remaining pipe cuttings, joining and wrapping materials, and other scattered debris, shall be removed from the site. The entire piping system shall be handed over in a clean and functional condition.
11. Following assembly and testing, but prior to final acceptance, pipelines shall be flushed with high velocity water or flushed with a cleaning ball. Accumulated construction debris and other foreign matter shall be removed. Flushing velocities shall be a minimum of 2.5 feet per second. Accumulated debris shall be removed through drains 2 inches and larger or by dropping spools and valves.

B. Buried Pipe: Buried pipe installation shall meet the requirements of the City Standard Specifications, as modified by the Special Provisions.

C. Exposed Pipe:

1. Where not detailed, exposed pipe shall be installed in straight runs parallel to the axes of the structures. Pipe runs shall be horizontal and vertical, except that gravity lines shall have a minimum slope of not less than 0.5 percent, unless otherwise specified.
2. No exposed piping shall be erected until all equipment to which the pipe is to be attached has been installed and it can be determined where piping and fittings shall be located to make a neat, efficient arrangement.
3. The Drawings shall be taken as diagrammatic for piping that is not shown in detail. Sizes of piping and their locations are indicated, but it is not intended to show every offset and fitting nor every structural difficulty that will be encountered during the installation of the Work.
4. The alignment of pipes shall be varied from that indicated on the Contract Documents, without extra expense to the City to avoid structural or mechanical difficulties or to avoid the work of other trades. The Contractor shall furnish such parts and pieces to provide a complete and operable system.
5. Pipe work shall be suspended and supported in such manner as to prevent sagging or overstressing of pipe and connections and, furthermore, shall be supported so that no item of the piping system will transfer load or stress to equipment.
6. Pipe and fittings shall be assembled so there will be no distortion or springing of the pipelines. Flanges, unions, flexible couplings, and other connections shall come together at the proper orientation. The fit shall not be made by springing piping, nor shall orientation alignment be corrected by taking up on flange bolts. Flange bolts, union halves, flexible connectors, etc. shall slip freely into place. If the proper fit is not obtained, the piping shall be altered to fit.
7. Piping shall be made up with unions or flanged joints to permit breaking of lines for inspection and maintenance, in addition to such joints as are definitely shown on the Drawings.

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SECTION 15200

VALVES, GENERAL

PART 1 GENERAL

1.1 THE REQUIREMENT

A. The Contractor shall provide valves, actuators, and appurtenances, complete and operable, in accordance with the Contract Documents.

B. The provisions of this Section shall apply to all valves and valve actuators except where otherwise indicated. Valves and actuators in particular locations may require a combination of units, sensors, limit switches, and controls indicated in other Sections of the Specifications.

C. Single Manufacturer: Where two or more valves of the same type are required, the valves shall be furnished by the same manufacturer. Valve and valve actuators shall be provided by the valve supplier.

1.2 CONTRACTOR SUBMITTALS

A. The Contractor shall prepare and submit information required herein in accordance with the requirements of the City Standard Specifications.

B. Shop Drawings: Shop drawings shall contain the following information:

1. Valve name, size, Cv factor, pressure rating, identification number (if any), and Specification Section number.
2. Complete information on valve actuator, including sizing calculations, manufacturer, model number, limit switches, and mounting.
3. Cavitation limits for all control valves.
4. Assembly drawings showing part nomenclature, materials, dimensions, weights, and relationships of valve handles, handwheels, position indicators, limit switches, integral control systems, needle valves, and control systems.
5. Complete wiring diagrams and control system schematics.
6. Valve Labeling: A schedule of valves to be labeled, indicating in each case the valve location and the proposed wording for the label.

C. Certifications.

1. Factory Test Data: Where indicated, signed, dated, and certified factory test data for each valve requiring certification shall be included with the shipment of the valve. The data shall also include certification of quality and test results for factory-applied coatings.
2. The Contractor shall submit for valves over 12 inches in diameter, certified, copies of the hydrostatic factory tests, showing compliance with the applicable standards of AWWA, ANSI, and ASTM.
3. Manufacturer's certification of proper installation.
4. Contractor’s certification of satisfactory field testing.

D. O & M manuals: Prior to startup, the Contractor shall furnish six copies of the Operations and Maintenance Manuals for each valve Section. The Operations and Maintenance shall include installation instructions/manuals for related equipment.

E. Spare Parts List: A Spare Parts List shall contain the required information for each valve assembly, where indicated.

1.3 QUALITY ASSURANCE

A. Valves and actuators shall be engineered and manufactured under a Manufacturer's written Quality Assurance program. The Quality Assurance program is to be in effect for at least five years, to include a written record for periodic internal and external audits to confirm compliance with such program.

1.4 MANUFACTURER'S SERVICE REPRESENTATIVE

A. As specified in each valve section, a manufacturer/supplier's representative shall be present at the job site for assistance during installation, startup and testing.

1.5 MANUFACTURER'S UNIT RESPONSIBILITY

A. Unless otherwise indicated, a single manufacturer shall be responsible for coordination of design, assembly, testing, and furnishing of each valve type; however, the Contractor shall be responsible to the City for compliance with the requirements of each valve section.

PART 2 PRODUCTS

2.1 GENERAL

A. Valves shall be new and of current manufacture. Shut-off valves 6-inches and larger shall have actuators with position indicators. Buried valves shall be provided with valve boxes and covers containing position indicators and valve extensions.

B. VALVE SCHEDULE

1. Valves shall be provided as indicated in the Drawings and as specified in the City Standard Specifications as modified by the Special Provisions.
2. Notes:

    a. Valves included and specified with package systems are not included in this schedule. Refer to the individual package system specifications.
    b. Valve schedule includes manual valves 4 Inches and above. Motorized valves are listed on the equipment list.

2.2 VALVE COMPONENTS – GENERAL MATERIAL/PRODUCT

A. General: Valve materials shall be suitable for the intended application. Materials not specified shall be high-grade standard commercial quality, free from defects and imperfections that might affect the serviceability of the product for the purpose for which it is intended. Unless otherwise specified, valve and actuator bodies shall conform to the following requirements:

1. Cast Iron: Close-grained gray cast iron, conforming to ASTM A48 - Specification for Gray Iron Castings, Class 30, or to ASTM A126 - Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
2. Ductile Iron: ASTM A536 - Specification for Ductile Iron Castings, or to ASTM A395 - Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures.
3. Steel: ASTM A216 - Specification for Steel Castings, Carbon Suitable for Fusion Welding for High-Temperature Service, or to ASTM A515 - Specification for Pressure Vessel Plates, Carbon Steel, for Intermediate- and Higher-Temperature Service.
4. Bronze: ASTM B62 - Specification for Composition Bronze or Ounce Metal Castings, and valve stems not subject to dezincification shall conform to ASTM B584 - Specification for Copper Alloy Sand Castings for General Applications.
5. Stainless Steel: Stainless steel valve and operator bodies and trim shall conform to ASTM A351 - Specification for Steel Castings, Austenitic, for High-Temperature Service, Grade CF8M, or shall be Type 316 stainless steel.

B. Bodies: Valve bodies shall be cast, forged, or welded of the materials indicated, with smooth interior passages. Wall thickness shall be uniform in agreement with applicable standards for each type of valve, without casting defects, pinholes, or other defects that could weaken the body. Welds on welded bodies shall be done by certified welders and shall be ground smooth. Valve ends shall be as indicated, and be rated for the maximum temperature and pressure to which the valve will be subjected.

C. Flanges: Unless otherwise indicated, valve flanges shall be drilled in accordance with ANSI B16.1, Class 125. For small diameter pipe, valve flanges shall be in accordance with industry standards. The Contractor is responsible for coordinating pipe and valve flanges to ensure that they are compatible.

D. Bonnets: Valve bonnets shall be clamped, screwed, or flanged to the body and shall be of the same material, temperature, and pressure rating as the body. The bonnets shall have provision for the stem seal with the necessary glands, packing nuts, or yokes.

E. Valve Stems: Valve stems shall be of the materials indicated, or, if not indicated, of the best commercial material for the specific service, with adjustable stem packing, O-rings, Chevron V-type packing, or other suitable seal. Valve stems shall be bronze conforming to ASTM B62, containing not more than 5 percent of zinc or more than 2 percent of aluminum, with a minimum tensile strength of 414 MPa (60,000 psi), a minimum yield strength of 276 MPa (40,000 psi), and an elongation of at least 10 percent in 50 mm (2 inches.) Internal Parts: Internal parts and valve trim shall be as indicated for each individual valve. Where not indicated, valve trim shall be of Type 316 stainless steel or other best suited material.

F. Valve Operators: Valve operators shall be manufactured, installed, adjusted, and tested by the valve manufacturer at the manufacturer plant. Valves shall open counter-clockwise unless otherwise shown or specified.

G. Position Indicators: Shut-off valves 14-inch and larger, shall have operators with position indicators. Where buried, these valves shall be provided with valve boxes and covers containing extensions and position indicators.

H. Valve Boxes and Covers: Valve boxes and covers shall be cast iron. Where valve boxes house position indicators, the valve box shall conform to the requirements of the position indicator manufacturer. Covers shall be imprinted as shown on the Drawings or as otherwise indicated.

I. Valves shall be furnished complete with the accessories required to provide a functional system.

J. Valve Actuators: Unless otherwise indicated, valve actuators shall be in accordance with Section 15201 – Valve and Gate Actuators for electric motor-actuated valves.

K. Valve labeling: Except when such requirement is waived by the Engineer in writing, a label shall be provided on all shut-off valves and control valves except for hose bibs. The label shall be of 1/16-inch plastic or stainless steel, minimum 2 inches by 4 inches in size and shall be permanently attached to the valve or on a wall adjacent to the valve as directed by the Engineer.

L. Valve Marking: Valve bodies shall be permanently marked in accordance with MSS SP25 - Standard Marking Systems for Valves, Fittings, Flanges, and Unions.

2.3 SPARE PARTS

A. Where indicated, the Contractor shall furnish the required spare parts suitably packaged and labeled with the valve name, location, and identification number. The Contractor shall also furnish the name, address, and telephone number of the nearest distributor for the spare parts of each valve. Spare parts are intended for use by the City, only after expiration of the guarantee period.

2.4 PROTECTIVE COATING

A. The exterior surfaces of valves and the wet interior surfaces of ferrous valves of sizes 3 inches and larger shall be coated in accordance with Section 09900 – Painting and Coatings. The valve Manufacturer shall certify in writing that the required coating has been applied and tested in the manufacturing plant prior to shipment, in accordance with these Specifications. Flange faces of valves shall not be epoxy coated.

B. Where surfaces have been shop painted but have been damaged during delivery, storage or assembly, or where shop coats have deteriorated, these surfaces shall be properly cleaned and retouched or repainted with matching paint.

PART 3 EXECUTION

3.1 DELIVERY AND STORAGE

A. The Contractor shall prepare and load valves and accessories for shipment in a manner that protects the materials and coatings from damage in transit, shall include a packing list, and shall be responsible for and make good on damage.

B. Accessories and spare parts shall be packed separately in containers plainly marked "ACCESSORIES ONLY" or "SPARE PARTS ONLY." Packing materials shall be fire retardant. A packing list, listing the contents of each container, shall be placed in a moisture proof envelope and securely fastened to the outside of the container.

3.2 INSTALLATION

A. The requirements of Section 15000 – Piping, General shall apply to this Section.

B. General: Valves, actuating units, stem extensions, valve boxes, and accessories shall be installed in accordance with the Manufacturer's written instructions and as indicated. Valves shall be firmly supported to avoid undue stresses on the pipe. Where applicable, valves shall be installed with the seat upstream.

C. Access: Valves shall be installed with access for actuation, removal, and maintenance and to avoid interference between valve actuators and structural members, handrails, or other equipment.

D. Valve Accessories: Where combinations of valves, sensors, switches, and controls are indicated, the Contractor shall properly assemble and install such items so that all systems are compatible and operating properly. The relationship between interrelated items shall be clearly noted on shop drawing submittals.

3.3 TESTING

A. General: Valve testing shall be in accordance with applicable standards of AWWA, ANSI, and ASTM.

B. Factory Testing: As a minimum, unless otherwise indicated, each valve body 4 inches and larger shall be tested hydrostatically to 1.5 times its rated 100 degrees F design water-working pressure, for a period of 5 minutes, without showing any leaks or loss of pressure. In addition, valves 4 inches and larger shall undergo a functional test to demonstrate satisfactory operation throughout its operating cycle, and a closure test at rated 100 degrees F water-working pressure for a period of 5 minutes to demonstrate tight shut-off. Stem seal leakage shall not be a cause for rejection. All valves 3 inches and smaller shall undergo the Manufacturer's standard test.

C. Performance Testing: Valves shall be tested with the piping system in accordance with Section 14 of the City Standard Specifications. Field testing will be witnessed by the Engineer. The Contractor shall provide three days advance notice of field testing.

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SECTION 15201

VALVE AND GATE ACTUATORS

PART 1 GENERAL

1.1 THE REQUIREMENT

A. The Contractor shall provide valve and gate actuators and appurtenances, complete and operable, in accordance with the Contract Documents.

B. Single Manufacturer: Where two or more valve or gate actuators of the same type required, the actuators shall be produced by the same manufacturer.

1.2 CONTRACTOR SUBMITTALS

A. The Contractor shall prepare and submit information required herein in accordance with the City Standard Specifications as modified by the Special Provisions.

B. Shop Drawings: Shop Drawings of actuators shall be submitted together with the valve and gate submittals as a complete package.

C. Certifications: Manufacturer's certificate of compliance that equipment furnished meet requirements of this specification.

D. O&M Manuals: Prior to startup, the Contractor shall furnish six copies of the Operations and Maintenance Manuals for each actuator type. The Operations and Maintenance data shall be included with applicable valve and gate data.

1.3 MANUFACTURER'S UNIT RESPONSIBILITY

A. Where applicable, the valve or gate Manufacturer shall be responsible for furnishing valve actuators. To the extent practical, actuators for the entire project shall be furnished by a single Manufacturer. The valve or gate Manufacturer shall coordinate with the Contractor to furnish actuators by the selected actuator Manufacturer. Where the single actuator Manufacturer's equipment is not compatible with a valve or gate Manufacturer's equipment, the valve Manufacturer may use an alternative actuator upon approval by the Engineer. Valve operation shall not be compromised due to valve and/or actuator compatibility. The Contractor is responsible for providing a properly operating valve system.

PART 2 PRODUCTS

2.1 GENERAL

A. The actuator shall be suitable for use on a nominal 480volt, 3 phase, 60Hz power supply and is to incorporate motor, integral reversing starter, local control facilities and terminals for remote control and indication connections housed within a self-contained, sealed enclosure. The actuator shall be Rotork model IQTM3000, no equals will be allowed.

B. As a minimum the actuator should meet the requirements set out in EN15714-2 and ISA SP96.02

C. In order to maintain the integrity of the enclosure, setting of the torque levels, position limits and configuration of the indication contacts etc. must be carried out without the removal of any actuator covers and without mains power over an Infrared or *Bluetooth*® wireless interface. Sufficient commissioning tools must be provided with the actuators and must meet the enclosure protection and certification levels of the actuator. Commissioning tools must not form an integral part of the actuator and must be removable for secure storage / authorized release. In addition, provision shall be made for the protection of configured actuator settings by a means independent of access to the commissioning tool. Provision shall be made to disable *Bluetooth*® communications or only allow a *Bluetooth*® connection initiated by an Infra-Red command for maximum security.

D. The actuator shall include a device to ensure that the motor runs with the correct rotation for the required direction of valve travel irrespective of the connection sequence of the power supply.

E. Materials: Actuator shall be current model of commercial quality materials and sized for the maximum expected torque. Materials shall be suitable for the environment in which the valve or gate is to be installed.

F. Mounting: Actuator shall be securely mounted by means of brackets or hardware designed and sized for this purpose and of ample strength. The word "open" shall be cast on each valve or actuator with an arrow indicating the direction to open in the counterclockwise direction.

2.2 ACTUATOR SIZING

A. The actuator must be sized to guarantee valve closure at the specified differential pressure and temperature. The safety margin of motor power available for seating and unseating the valve must be sufficient to ensure torque switch trip at maximum valve torque with the supply voltage 10% below nominal.

2.3 ENVIRONMENTAL

A. Actuator must be suitable for indoor and outdoor use with a standard corrosivity category, C4 medium durability as per ISO 12944. The actuator must be capable of functioning in an ambient temperature ranging from -30°C (-22°F) to +70°C (+158°F), up to 100% relative humidity.

2.4 ENCLOSURE

A. Actuators shall be O-ring sealed, watertight to IP66/IP68 20m for 10 days, NEMA 4, 6. The motor and all other internal electrical elements of the actuator must be protected from ingress of moisture and dust when the terminal cover is removed for site cabling. The terminal compartment must maintain the same ingress protection rating with the terminal cover removed. The actuator enclosure must allow for temporary site storage without the need for electrical supply connection.

2.5 MOTOR

A. The motor must be an integral part of the actuator, designed specifically for valve actuator applications. The motor shall be a low inertia, high torque design and class F insulated. Resulting in class B temperature rise with a time rating of 15 minutes at 40°C (104°F) at an average load of at least 33% of maximum valve torque. Temperature shall be limited by thermostat device embedded in the motor end windings and integrated into the actuator control. Electrical and mechanical disconnection of the motor shall be possible without draining the lubricant from the actuator gearcase. The actuator shall include a device to ensure that the motor runs with the correct rotation for the required direction of valve travel irrespective of the connection sequence of the power supply.

2.6 MOTOR PROTECTION

A. Protection must be provided for the motor as follows:

- Stall - the motor must be de-energised within 8 seconds in the event of a stall when attempting to unseat a jammed valve.
- Over temperature - thermostat will cause tripping of the motor. Auto-reset on cooling
- Single phasing - lost phase protection.
- Direction – phase rotation correction.

2.7 GEARING

A. The actuator gearing must be totally enclosed in an oil-gilled gearcase suitable for operation at any angle. Grease lubrication is not permissible. All drive gearing and components must be of metal construction and incorporate a lost-motion hammer blow feature. For rising spindle valves the output shaft shall be hollow to accept a rising stem, and incorporate thrust bearings of the ball or roller type at the base of the actuator. The design should be such as to permit the opening of the gearcase for inspection or disassembled without releasing the stem thrust or taking the valve out of service. For 90° operating type valves, drive gearing shall be self-locking to prevent the valve back-driving the actuator.

2.8 HAND OPERATION

A. A handwheel must be provided for emergency operation, engaged when the motor is declutched by a lever or similar means, the drive being restored to electrical operation automatically by starting the motor. The handwheel or selection lever must not move on restoration of motor drive. Provision shall be made for the hand/auto selection lever to be locked in both hand and auto positions. It should be possible to select hand operation while the actuator is running or start the actuator motor while the hand/auto selection lever is locked in hand without damage to the drive train.

2.9 DRIVE INTERFACE

A. The actuator shall be furnished with a drive bushing easily detachable for machining to suit the valve stem or gearbox input shaft. The drive bush shall be positioned in the base

of the actuator. Thrust bearings shall be sealed for life and the base shall be capable of withstanding five times the rated thrust of the actuator.

2.10 LOCAL CONTROLS

A. The actuator must incorporate local controls for Open, Close and Stop operation and a Local/Stop/Remote mode selector switch. Mode selection must be lockable in any one of the following three positions: local control plus local stop only, stop (no electrical operation), remote control plus local stop only. It must be possible to select maintained or non-maintained local control. The local controls shall be arranged so that the direction of valve travel can be reversed without the necessity of stopping the actuator. The local controls and display shall be rotatable through increments of 90 degrees to suit valve and actuator orientation.

2.11 TORQUE AND LIMITS

A. Torque and turns limitation to be adjustable as follows:

- Position setting range – multi-turn: 2.5 to 8,000 turns, with resolution to 7.5° of actuator output.
- Position setting range – direct drive part turn actuators: 90° +/-10°, with resolution to 0.1° of actuator output.
- Torque setting: 40% to 100% rated torque.

B. Position measurement – Absolute position measurement should be incorporated with the actuator. The technology must be capable of reliably measuring position even in the case of a single fault. The design must be simple with the minimum amount of moving parts (no more than 5). Technologies such as LEDs or potentiometers for position measurement are considered unreliable and therefore not preferred.

C. Measurement of torque for multi-turn actuators must be from direct measurement of force at the output of the actuator. Methods of determining torque-using data derived from the motor such as motor speed, current, flux etc. are only acceptable for part-turn actuators.

D. A means for automatic “torque switch bypass” to inhibit torque off during valve unseating and “latching” to prevent torque switch hammer under maintained or repeated control signals shall be provided.

2.12 REMOTE VALVE POSITION AND STATUS INDICATION

A. Four contacts must be provided which can be selected to indicate any position of the valve. Provision must be made for the selection of a normally closed or open contact form. Contacts shall maintain and update position indication during handwheel operation when all external power to the actuator is isolated. The contacts must be rated for 5mA to 5A, 120VAC, 30VDC. As an alternative to providing valve position indication, any of the four contacts shall be selectable to signal one of the following:

- Thermostat tripped, lost phase
- Motor tripped on torque in mid travel, motor stalled
- Remote selected, Local selected, Stop selected
- Actuator being operated by handwheel
- Actuator fault
- Valve opening, closing or moving

B. Provision shall be made in the design to support an additional eight contacts with the same configurable functionality.

C. A configurable monitor relay must be provided as standard, which can be used to indicate either Availability or Fault. The relay should be a spring return type with a Normally Open / Normally Closed contact pre-wired to a terminal block.

D. The Monitor relay, being energized from the control transformer will de-energize under any one or more of the following conditions:

Available Mode

- Loss of main or customer 24V DC power supply
- Actuator control selected to local or stop
- Motor thermostat tripped
- Actuator internal fault

Fault Mode

- Loss of main or customer 24V DC
- Motor thermostat tripped
- Actuator internal fault

E. Provision shall be made in the design for the addition of a contactless transmitter to give 4-20mA analog signal corresponding to valve travel and / or torque for remote indication when required. The transmitter will auto range to the set limits.

2.13 LOCAL POSITION INDICATION

A. The actuator display must include a dedicated numeric/symbol digital position indicator displaying valve position from fully open to fully close in 0.1% increments. Valve closed and open positions shall be indicated by symbols showing valve position in relation to the pipework to ensure that valve status is clearly interpreted. With mains power connected, the display must be backlit to enhance contrast at all ambient light levels and must be legible from a distance of at least 5m (16ft). A power save mode shall be available to switch off the display backlight during long periods of inactivity.

B. Red, green, and yellow LEDs corresponding to open, closed and intermediate valve positions must be included on the actuator display when power is switched on. The yellow LED should also be fully programmable for on/off, blinker and fault indication. The digital display must be maintained and updated during handwheel operation when mains power to the actuator is isolated.

C. The actuator display shall include a fully configurable dot-matrix display element with a minimum pixel resolution of 168 x 132 to display operational, alarm, configuration and graphical datalogger information. The text display shall be selectable between English and other languages such as: Spanish, German, French, and Italian. Provision shall be made to upload a different language without removal of any covers or using specialized tools not provided as standard with the actuator.

D. Datalogger graphical displays and trend graphs must be available on the local LCD for the following functions:

- Number of Starts versus Position
- Number of starts per hour
- Dwell Time
- Average temperature
- Torque versus Position

2.14 INTEGRAL STARTER AND TRANSFORMER

A. The reversing starter, control transformer and local controls must be integral to the valve actuator and suitably housed to prevent breathing and condensation. The starter shall be suitable for 60 starts per hour during normal service or 1,200 starts per hour under reduced load conditions and of rating appropriate to motor size. The controls supply transformer shall be fed from two of the incoming three phases and incorporate overload protection. It must have the necessary voltage tapping and be adequately rated to provide power for the following functions:

- 24V DC or 110V AC output for remote controls (maximum 5W/VA)
- Supply for all the internal electrical circuits
- Energizing of the contactor coil

2.15 REMOTE CONTROL FACILITIES

A. The necessary control, wiring and terminals must be contained within the actuator enclosure. Open and close external interlocks must be made available to inhibit local and remote valve opening/closing control. It must be possible to configure the interlocks to be active in remote control only. Remote control signals fed from an internal 24VDC or 120VAC supply and/or from an external supply between 20VDC and 60VDC or 40VAC and 120VAC, must be suitable for any one or more of the following methods of control:

- Open, Close, and Stop control
- Open and Close maintained or “push to run” (inching) control

- Overriding Emergency Shut-Down; to close or open valve from a normally closed or open contact
- Two-wire control; energize to close (or open), de-energize to open (or close)

B. Provision shall be made for a separate drive enable permissive einput to prevent any unwanted electrical operation.

C. It must be possible to reverse valve travel without the necessit5y of stopping the actuator or moving through an intermediate stop control position. The motor starter must be protected from excessive current surges during rapid travel reversal. The internal circuits associated with the remote control and monitoring functions are to be designed to withstand simulated lightning impulses up to 2kV.

D. Operation by distributed control system must be possible utilizing one or more of the following network systems:

- Profibus
- Modbus
- Foundation Fieldbus
- DeviceNet
- Pakscan
- HART

2.16 MONITORING FACILITIES

A. Facilities to indicate actuator availability and monitor operation shall be included.

B. Actuator text display indication of the following status/alarms:

- Closed Limit, open limit, moving open, moving closed, stopped
- Torque trip closing, torque trip opening, motor stalled
- ESD active, interlock active
- Thermostat trip, phase lost, 24V supply lost, local control failure
- Configuration error, position sensor failure, torque sensor failure
- Battery low, battery discharged, power loss inhibit

C. Integral datalogger to record and store the following data:

- Opening last / average torque against position
- Closing last / average torque against position
- Opening motor starts against position
- Closing motor starts against position
- Total open / closed operations
- Maximum recorded opening and closing torque values
- Event recorder logging operational conditions (valve, control and actuator)

E. Logged data must be accessible via non-intrusive Bluetooth communication and also visible on the actuator display. An intrinsically safe portable tool must be provided to

extract datalogger and actuator configuration files from the actuator. The portable tool must permit *Bluetooth*® connection with a PC to perform file transfer. The actuator manufacturer must supply PC software to enable extracted actuator files to be viewed and analysed.

2.17 WIRING AND TERMINATION

A. Internal wiring shall be tropical grade PVC insulated stranded cable of appropriate size for control and power. Each wire shall be clearly identified at both ends. The terminals shall be embedded in a terminal block of high tracking resistance compound.

B. The terminal compartment must be separated from the inner electrical components of the actuator by means of a watertight seal. A minimum of four threaded cable entries with provision for an additional four extra conduit entries must be available to accommodate wiring connections.

C. All wiring supplied as part of the actuator must be contained within the main enclosure for physical and environmental protection. External conduit connections between components are not acceptable. A durable terminal identification card showing a plan of terminals must be attached to the inside of the terminal box cover indicating:

- External voltage values
- Wiring diagram number
- Terminal layout
- Serial number

D. The code card must be suitable for the contractor to inscribe cable core identification alongside terminal numbers.

2.18 COMMISSIONING KIT

A. The actuator must be supplied with a start-up kit comprising installation instruction manual, electrical wiring diagram and cover seals to make good any site losses during the commissioning period. In addition, sufficient actuator commissioning tools shall be supplied to enable actuator set up and adjustment during valve/actuator testing and site installation commissioning.

2.19 PERFORMANCE AND TEST CERTIFICATE

A. The actuator must be performance tested by the manufacturer and individual test certificates are to be supplied. Test certificates must be retained by the manufacturer for the serviceable life of the product. The test certificate must include details of the equipment specification such as:

- Test date
- Manufacturing site address
- Customer
- Customer order number (where applicable)
- Actuator size
- Mounting flange
- Enclosure type
- Lubricant
- Paint coating
- Power supply
- Operating speed/time
- Drive close direction
- Gear ratio for second stage gearbox (where applicable)
- Electrical optional extras
- Catalog performance
- Serial number

B. The test equipment shall simiulate a typical valve load. The following parameters must be recorded and clearly stated on the certificate:

- Current at maximum torque setting in both directions
- Flash test statement
- Test power supply voltage
- Torque at maximum torque setting in both directions

PART 3 EXECUTION

3.1 DELIVERY AND STORAGE

A. General: Delivery and storage shall be in accordance with the Pleasanton Standard Specifications Section 14-0D: Valves.

3.2 INSTALLATION

A. Valve actuator and accessories shall be installed and tested in accordance Pleasanton Standard Specifications Section 14-0D: Valves. Actuator shall be located to be readily accessible for operation and maintenance, without obstructing walkways. Actuator shall not be mounted where shock or vibrations will impair their operation, nor shall the support systems be attached to handrails, process piping, or mechanical equipment.

END OF SECTION

SECTION 16001

ELECTRICAL - GENERAL PROVISIONS

PART 1. GENERAL

1.1 SCOPE OF WORK

A. Furnish all labor, materials and equipment required to install complete and make operational, electrical and process instrumentation systems as specified herein and as shown on the Drawings.

B. The work shall include furnishing, installing, and testing the following:

1. Conduit, wire and field connections for all control devices and electrical equipment furnished under this Contract.
2. Conduit, wiring and terminations for all field mounted instruments.
3. Install vendor furnished cables specified under this Contract.
4. Provide field instrumentation including furnishing, installation, calibration, and support commissioning efforts for the flow control station system.
5. Install flow control station control panel and antennae furnished by The City.
6. Provide trenching, pull boxes, and conduits to utility meter panel per utility's requirements.
7. Also refer to Special Provisions for additional requirements.

C. Excavation, bedding material, forms, concrete and backfill for underground raceways; forms and concrete for electrical equipment furnished as specified herein.

D. Provide assistance during testing and start-up.

1.2 RELATED WORK

A. Excavation and backfilling, including gravel or sand bedding for underground electrical work.

B. Section 13432 - Flow Measurement Devices

C. Section 13434 - Pressure Measurement Devices

1.3 SUBMITTALS

A. Submit shop drawings in accordance with the City Standard Specifications, as modified by the Special Provisions for equipment, materials and other items furnished under Division 16. Additional submittal requirements are detailed under the specific technical specifications for other equipment furnished under Division 16.

B. Shop drawings shall be submitted for the following equipment:

1. Raceways, Boxes and Fittings
2. Wires and Cables
3. Grounding Hardware
4. Flow Measurement Devices as specified in Section 13432.
5. Pressure Measurement Devices as specified in Section 13434.

C. Hardware and Shop Drawings
   1. Shop Drawings shall be submitted as detailed herein. They shall be complete; giving at least equipment Specifications, details of connections, wiring, range and dimensions.
   2. Submit detailed information for each instrument or control device, including manufacturer's descriptive literature and an ISA S20.3c data sheet for each device which shall include as a minimum:

      a. ISA tag or device identifier.
      b. Product (item) name as specified and indicated on the Contract Drawings.
      c. Manufacturer's name and complete model number.
      d. Location of the device.
      e. Input/output characteristics.
      f. Range, size, span, setpoint, deadbands, etc.
      g. Physical size with dimensions, enclosure NEMA classification and mounting details.
      h. Materials of construction of all components.

D. Check shop drawings for accuracy and contract requirements prior to submittal.

E. The Engineer's review shall be for conformance with the design concept of the project and compliance with the Specifications and Drawings. Errors and omissions on approved shop drawings shall not relieve the Contractor from the responsibility of providing materials and workmanship required by the Specifications and Drawings.

F. All dimensions shall be field verified at the job site and coordinated with the work of all other trades.

G. Material shall not be ordered or shipped until the shop drawings have been approved. No material shall be ordered or shop work started if shop drawings are marked "REJECTED" “RESUBMIT".

H. Perform seismic mounting calculations as required by the Structural Drawing GS-1.

I. Operation and Maintenance Data

   1. Submit operations and maintenance data for equipment furnished under this Division. The manuals shall be prepared specifically for this installation and shall include catalog data sheets, drawings, equipment lists, descriptions, parts lists, etc., to instruct operating and maintenance personnel unfamiliar with such equipment.

J. Submit test results as described in Part 3 herein.

1.4 REFERENCE STANDARDS

A. Electrical equipment, materials and installation shall comply with the National Electrical Code (NEC, NFPA 70) 2011 Edition, including the California Electrical Code (CEC-2013) Amendments. All references to the NEC included in the Contract Documents shall be interpreted to be referenced to this version with the California Amendments as specified. Electrical equipment, materials and installation shall also comply with the latest edition of the following codes and standards:

1. National Electrical Safety Code (NESC)
2. PG&E Electric and Gas Service Requirements (Green Book)
3. California PUC, General Order 128, Rules for Construction of Underground Electric Supply and Communication Systems
4. Occupational Safety and Health Act (OSHA)
5. National Fire Protection Association (NFPA)
6. National Electrical Manufacturers Association (NEMA)
7. Underwriters Laboratories, Inc. (UL)
8. Factory Mutual, Inc. (FM)

B. Underwriters Laboratories (UL) listing is required for all equipment and materials where such listing is offered by the Underwriters Laboratories. Safety labeling and listing by other organizations, such as ETL Testing Laboratories, may be substituted for UL labeling and listing if approved by the Engineer. Provide UL service entrance labels for all equipment required by the NEC to have such labels.

1.5 SERVICE AND METERING

A. The power company serving this project is Pacific Gas and Electric (PG&E). All power utility service work shall be coordinated by the City.

B. Provide a new service conduit with pull rope from PG&E as shown on the Drawings for the following site:

1. DSRSD/DERWA Flow Control Station – 120/240V, 1 Phase, 3 Wire, 60 Hz

C. The power company will be responsible for the following work:

1. Furnishing and installing the underground conductors as required.
2. Furnishing and installing cables to the DSRSD/DERWA Flow Control Station Control Panel, CP-1.
3. Termination of underground cables at the PG&E transformer and on the line side of the utility disconnecting means.
4. Furnishing meter and meter wiring.

D. The Contractor shall be responsible for:

1. Coordinating the details of equipment layouts and conduit routing as directed by the City.
2. Furnishing and installing an empty conduit with pull line from padmounted transformer to the meter enclosure as shown on Drawings. Provide pull boxes as required per PG&E. Conduit size, type, and trench installation details shall conform to PG&E Green Book requirements and approved by the power company.

1.6 MAINTENANCE

A. Spare Parts

1. All spare parts shall be new and unused.
2. All spare parts shall be individually packaged and labeled.
3. Provide one pint of touch up paint, in one quart containers for each type and color used for all cabinets, panels, consoles, etc, supplied under the related specification sections.
4. The spares listed above shall be packed in a manner suitable for long term storage and shall be adequately protected against corrosion, humidity and temperature.

1.7 CODES, INSPECTION AND FEES

A. Equipment, materials and installation shall comply with the requirements of the local authority having jurisdiction. Obtain all necessary permits and pay all fees required for permits and inspections.

1.8 TESTS AND SETTINGS

A. Test systems and equipment furnished under this Section and repair or replace all defective work or equipment at no additional cost to the Owner. Make adjustments to the systems and instruct the Owner's personnel in the proper operation of the systems.

B. Perform all tests and provide all meters, cable connections, instruments, equipment, and test apparatus necessary.

C. In addition to the specific testing requirements listed in the individual Sections, the following minimum tests and settings shall be performed.

1. Mechanical inspection, testing and settings of circuit breakers, control circuits and equipment for proper operation.
2. Check interlocking, control and instrument wiring for each system and/or part ofa system to prove that the system will function properly as indicated by control schematic and wiring diagrams.
3. Wire Insulation Resistance Tests: Perform insulation resistance tests on circuits with 600 volt wire insulation. Make these tests after all equipment has been connected, except that equipment which may be damaged by the test voltage shall not be connected. Test the insulation with a 500 Vdc insulation resistance tester with a scale reading not less than 100 megohms. The insulation resistance shall be 20 megohms or more. Submit results for review.
4. Inspection and Testing of Grounding System

    a. Inspect the grounding and bonding system conductors and connections for tightness and proper installation. Test all grounded cases and metal parts associated with electrical equipment for continuity of connection with the ground bus system.
    b. Use Biddle Direct Reading Earth Resistance Tester or equivalent test instrument to measure resistance to ground of the system. Perform testing in accordance with test instrument manufacturer's recommendations using the fall-of-potential method.
    c. All test equipment shall be provided under this Section and approved by the Engineer.
    d. Verify grounding of instrumentation equipment.
    e. Testing shall be performed before energizing the system.

D. Provide a test report verifying compliance with the testing requirements and submit cable test results, grounding test results, circuit breaker, and protective device settings, fuse type and rating for each piece of equipment.

1.9 INTERPRETATION OF DRAWINGS

A. The Drawings are not intended to show exact locations of conduit runs. Coordinate the conduit installation with other trades and the actual supplied equipment. Stub-up conduits as near as possible to equipment terminals.

B. Unless otherwise approved by the Engineer, conduit shown exposed shall be installed surface mounted or suspended as applicable; conduit shown concealed shall be installed in walls, floor slabs, or ceilings as applicable.

C. Except where dimensions are shown, the locations of equipment, fixtures, outlets and similar devices shown on the Drawings are approximate only. Exact locations shall be determined by the Contractor and approved by the Engineer during construction. Obtain information relevant to the placing of electrical work and in case of any interference with other work, proceed as directed by the Engineer and furnish all labor and materials necessary to complete the work in an approved manner.

D. Circuit layouts are not intended to show the number of fittings or other installation details. Furnish all labor and materials necessary to install and place in satisfactory operation all power, lighting and other electrical systems shown.

E. Redesign of electrical or mechanical work, which is required due to the Contractor's use of an alternate item, arrangement of equipment and/or layout other than specified herein, shall be done at the Contractor's expense. Redesign and detailed plans shall be submitted to the Engineer for approval. No additional compensation will be provided for changes caused by such redesign.

1.10 SIZE OF EQUIPMENT

A. The equipment shall be kept upright at all times during storage and handling. When equipment must be tilted for passage through restricted areas, brace the equipment to insure that the tilting does not impair the functional integrity of the equipment.

1.11 RECORD DRAWINGS

A. As the work progresses, legibly record all field changes on a set of projectcontract drawings, hereinafter called the "record drawings".

1.12 MATERIALS AND EQUIPMENT

A. Materials and equipment shall be new.

B. Material and equipment of the same type shall be the product of one manufacturer and shall be UL listed wherever such approved equipment and materials are available.

C. Enclosure Types: NEMA areas are indicated on the Drawings and enclosures rated for such areas shall be provided unless otherwise noted. Unless otherwise required, specifically noted otherwise on the Drawings, or specified, provide electrical enclosures rated NEMA Type 4.

1.13 SUBSTITUTION OF EQUIPMENT

A. Where a specific material or equipment is mentioned in the specifications or on the plans, it is understood and construed as meaning to indicate a standard of quality. It is not intended in any way to bar the use of any material, equipment or make of equal quality, unless specifically noted otherwise. For equipment and instruments where a manufacturer and model number is specified substitutes are not allowed except where "or equal" is indicated.

B. The Electrical Drawings have been prepared on the basis of the equipment first named in the Specifications. The Contractor shall note that the second named equipment, if given, is considered acceptable and equal equipment, but in some cases additional work or material may be required to accommodate the second named equipment into the project. The Contractor desiring to use the second named equipment or any equal equipment is responsible for all costs, including cost of any engineering, material, or installation, incurred by using other than the first named equipment.

C. Changes from the layout shown to facilitate use of that equipment shall not be a basis for additional payment; neither shall changes in electrical controls or wiring or piping caused by the use of second named, or equal, equipment be a basis for additional payment.

1.14 EQUIPMENT IDENTIFICATION

A. All electrical and instrumentation equipment provided under this Contract shall have nameplate designations as shown on the Drawings and as specified herein.

PART 2. PRODUCTS

2.1 GENERAL

A. Where two or more units of the same class of material or equipment are required, products shall be of a single manufacturer. Component parts of materials or equipment need not be products of the same manufacturer.

B. Provide materials and equipment which are the standard products of manufacturers regularly engaged in the production of such materials and equipment. The manufacturers' latest standard design that is in accordance with these Specifications shall be provided.

C. Provide materials and equipment with manufacturers' standard finish system and manufacturers' standard finish color, except where specific color is shown.

D. All electronic instrumentation shall be of the solid state type and shall utilize linear transmission signals of 4 to 20 mA dc, however, signals between instruments within the same panel or cabinet may be converted to 15 V dc.

E. Electronic equipment shall be of the manufacturer's latest design, utilizing printed circuitry and suitably coated to prevent contamination by dust, moisture and fungus. Solid state components shall be conservatively rated for their purpose, to assure optimum long term performance and dependability over ambient atmosphere fluctuations and 0 to 100 percent relative humidity. The field mounted equipment and system components shall be designed for installation in dusty, humid and slightly corrosive service conditions.

F. Electrical

1. All equipment shall be designed to operate on a 60 Hertz alternating current power source at a nominal 120 volts, plus or minus 10 percent, except where specifically noted.

G. Equipment Identification

1. All field mounted electrical equipment such as disconnects, push button stations, panelboards, etc, shall be provided with weather resistant engraved equipment identification nameplates screwed or bolted adjacent to the device. Nameplate shall identify the equipment as shown on the Drawings.

2. All control panels, panel components, and field instruments shall be supplied with suitable nameplates that identify the panel and individual devices as required.

3. Nameplates shall be a 3/32-inch thick, black and white, laminated Bakelite or Lamecoid with engraved inscriptions. The letters shall be white against a black background. Edges of the nameplates shall be beveled and smooth. Nameplates with chipped or rough edges will not be acceptable.

4. Nameplates shall be as recommended by ISA Recommended Practice RP60.6 unless otherwise noted.

2.2 RACEWAYS

A. Rigid Steel Conduit

1. Rigid steel conduit , couplings, factory elbows and fittings shall be heavy wall steel tubing with a hot-dipped galvanized finish inside and out after threading and shall comply with ANSI C 80.1 and UL/6 as manufactured by the Allied Tube and Conduit Corp.; Wheatland Tube Co.; Triangle PWC Inc. or approved equal.

B. Rigid Nonmetallic Conduit

1. PVC conduit shall be rigid polyvinyl chloride schedule 40 as manufactured by Carlon/Lamson & Sessions; Kraloy Products Co., Inc.; Highland Plastics Inc. or approved equal. Connectors, couplings, fittings and ancillary materials shall be supplied by the conduit manufacturer.

C. PVC Coated RGS Conduit and fittings

1. PVC-coated rigid steel conduit shall be hot-dipped galvanized rigid steel conduit meeting the requirements of NEMA RN 1, UL/6, and ANSI C80.1. Provide a factory installed PVC coating, 40 mils nominal thickness, and applied over and permanently bonded to the galvanized surface. Coating shall include an interior 2 mil urethane coating. All male threads on conduit, elbows, nipples and other fittings shall be protected by an application of a urethane coating; they shall be threaded and galvanized with integral plastic sleeves overlapping the plastic- coated conduit.

2. Acceptable Manufacturers:

   a. Robroy, Plasti-Bond Red
   b. Thomas and Betts, “OCAL”
   c. Perma-Cote Industries, Supreme Conduit System
   d. Equal

D. Liquid Tight Flexible Metal Conduit

1. Liquid-tight flexible metal conduit shall be UL-listed galvanized steel flexible conduit covered with an extruded ultra violet resistant PVC jacket.
2. The conduit shall be terminated with nylon bushings or with bushings with a steel or malleable iron body, an insulated throat, and O-ring seal.
3. Flexible conduits, 1.25 inches and smaller, shall contain an integral copper ground conductor.
4. Flexible conduits larger than 1.25 inches shall be bonded across their length with a bonding jumper.

E. Boxes

1. NEMA 4 terminal boxes, junction boxes, pull boxes etc, shall be Type FD, copper free cast aluminum with stainless steel. Boxes shall have continuously welded seams and mounting feet. Welds shall be ground smooth. Boxes shall be flanged and shall not have holes or knockouts. Box bodies shall not be less than 14 gauge metal and covers shall not be less than 12 gauge metal. Covers shall be gasketed and fastened with stainless steel clamps. Terminal boxes shall be furnished with hinged doors, terminal mounting straps and brackets. Terminal blocks shall be NEMA type, not less than 20A, 600V. Boxes shall be as manufactured by Appleton; Crouse-Hinds; Hoffman Engineering Co.; or approved equal.

F. Miscellaneous Fittings

1. Flexible couplings shall be type ECGJH as manufactured by the Crouse Hinds Co.; Appleton Electric Co.; Killark Electric Manufacturing Co. or approved equal.
2. Conduit hubs shall be as manufactured by Myers Electric Products, Inc. or approved equal.
3. Conduit sealing bushings shall be O.Z./Gedney, Type CSB or approved equal.
4. Grounding bushings shall be malleable iron with integral insulated throat rated for 150 degrees C, with solderless lugs as manufactured by Crouse Hinds/Cooper, Series HGLL; Appleton, Series GIB; O.Z./Gedney, Type HBLG or approved equal.
5. Conduit drains and sealers shall be O.Z./Gedney Type DBB, or approved equal.

G. Conduit Mounting Equipment

1. Provide hangers, rods, backplates, beam clamps, channel, etc, of galvanized iron or steel.
2. Furnish any and all necessary supports, brackets, conduit sleeves, racks and bracing as required. All boxes and hardware shall be galvanized zinc plated steel.

2.3 CONDUCTORS

A. Power, Status, Control, and Alarm Wire

1. Wire for power distribution equipment, lighting, receptacles, and other circuits not exceeding 600 volts to ground shall be NEC type THHN/THWN as manufactured by the Okonite Co.; Carol Cable Co. Inc. West; Pirelli Cable Corp. or approved equal.
2. Wiring for alarm and control circuits shall be No.14 AWG NEC type THHN/THWN, stranded as manufactured by the Okonite Co.; Carol Cable Co. Inc. West; Pirelli Cable Corp. or approved equal.

B. Instrumentation Wire

1. Wire for 4 20 ma shall be single pair cable:

a. Conductors: 2 #16 stranded and twisted on 2 in lay

b. Insulation: PVC with 300 volt, 105 degree C rating
c. Shield: 100 percent Mylar tape with drain wire
d. Jacket: PVC with UL and manufacturers identification
e. Max overall diameter: 0.262 in
f. Misc: UL listed for underground wet location use
g. Manufacturers: Belden #9316 or approved equal

2. Special cables required by a manufacturer to interconnect subassemblies or multiple components shall be provided with the equipment.

C. Termination and Splices (Status and Alarm Conductors)

1. Termination connectors shall be of the locking fork end (upturned leg ends) type as manufactured by Ideal Industries; 3M Co.; Panduit Corp. or approved equal.
2. Splices shall be insulated compression type connectors of the expanded vinyl insulated parallel or pigtail type as manufactured by Ideal Industries; 3M Co.; Panduit Corp. or approved equal.

D. Terminations (Instrumentation Cables)

1. Termination connectors shall be of the locking fork end (upturned leg ends) type as manufactured by Ideal Industries; 3M Co.; Panduit Corp. or approved equal.
2. Splicing of signal/instrumentation cables is not acceptable. Instrument cables shall be installed in a continuous run from source to destination. If a discontinuity is required, as approved by the Engineer, provide terminal blocks located in terminal boxes in lieu of splices.

E. Wire and Cable Markers

1. Wire and cable markers shall be "clip sleeve" as manufactured by the W.H. Brady Co.; Thomas & Betts Co.; 3M Co. or approved equal.
2. Wire and cables with diameters exceeding the capacity of the "clip sleeve" shall be marked with pre printed, self adhesive vinyl tapes as manufactured by the W.H. Brady Co.; Panduit Corp. or approved equal.
3. The identification number shall be a combination of the conduit number from the conduit schedule and the terminal numbers from the originating instrument panel, control device, MCC, etc.

2.4 UNDERGROUND SYSTEMS

A. Conduits for underground systems shall be rigid non-metallic conduits as specified herein.

B. Direct Buried Cable Warning Tape: Tape shall be 6 in wide, red polyethylene not less than 0.0035 in thick. Tape shall be W.H. Brady Co., Cat. No. 91296 or approved equal.

2.5 GROUNDING

A. Ground Rods: Ground rods shall be cone pointed copper clad Grade 40 HS steel rods

conforming to ASTM B228-02. The welded copper encased steel rod shall have a conductivity of not less than 27% of pure copper. Rods shall be not less than 3/4-inch in diameter and 10 feet long, unless otherwise indicated. Rods longer than 10 feet shall be made up of 10-foot units joined together with threaded couplings. The manufacturer's trademark shall be stamped near the top.

B. Ground Conductors: Buried conductors shall be medium-hard drawn bare copper; other conductors shall be soft drawn copper. Sizes over No. 6 AWG shall be stranded. Coat all ground connections except the exothermic welds with electrical joint compound, non-petroleum type, UL listed for copper and aluminum applications.

C. Ground Connections: Buried, encased, or otherwise inaccessible grounding connections shall be by exothermic weld. Accessible connections to equipment, connections to connections made to ground rods located in ground rod boxes, and all other locations where the connections are readily accessible to maintenance personnel after completion of construction shall be connected by the mechanical ground clamps. Lugs for attachment of cables to steel enclosures shall be of the binding post type with a 1/2-13NC stud. Each post shall accommodate cables from #4 AWG to #2/0 AWG.

D. Ground Rod Boxes: Boxes shall be a 9-inch-diameter precast concrete unit with hot-dip galvanized traffic covers. Units shall be 12-inches deep. Covers shall be embossed with the wording "Ground Rod."

E. Control Panels, Antennae, radio path surveys, and programming will be performed by The City.

2.6 POWER UTILITY METERING ENCLOSURE

A. Provide utility metering and main service disconnect as detailed on the Drawings. Furnish equipment as required by the serving utility company standards. Provide meter socket suitable for utility metering and in conformance with the requirements of the serving utility. Enclosure and configuration shall meet the utility requirements for service disconnect and meter requirements at a minimum.

B. The main breaker compartment shall be service entrance rated and provided with a hinged door of sufficient size to permit ready removal of any of the equipment in the compartment. The main breaker operating mechanism shall be mounted on an inner swing out door to allow for access without exposure to live electrical equipment.

C. Provide combined meter/main section in a single section. The enclosure shall be suitable for underground feed from the utility electric distribution system. The outer door of the enclosure shall have a padlockable handle to provide protection against unauthorized entry and shall be covered to protect against vandalism.

D. The enclosure shall include a main breaker. The main circuit breaker shall be fixed mounted, molded case thermal magnetic type, 2 pole, 80 percent rated, 240V, with 22kAIC rating. The enclosure shall be hot-dipped galvanized steel with ANSI 61 Grey Polyester power coating inside and out over phosphatized surfaces. Included interior panels are white.

E. The enclosure shall be UL 508-A listed and NEMA Type 3R rated.

F. Metering enclosure shall be as manufactured by Tesco, Model 26-100, Myer's Power Products, or as approved by the serving Utility Company.

2.7 HANDHOLE

A. Handhole shall be precast concrete, heavy duty type, designed for a class H20 wheel load and conform to ASTM C478. Precast unit shall be as manufactured by Christy; Utility Vault Company; or equal and constructed to dimensions as shown on the drawings.

B. Handhole frame and cover shall be concrete, heavy duty type for class H 20 wheel loading. Cover shall have a distinctive pattern with raised lettering showing box function: "ELECTRICAL".

PART 3. EXECUTION

3.1 GENERAL

A. Any work not installed according to the Drawings and Specifications shall be subject to change as directed by the Engineer. No extra compensation will be allowed formaking these changes.

B. Equipment that has been damaged shall be replaced or repaired by theequipment manufacturer, at the Engineer's discretion.

C. Repaint any damage to factory applied paint finish per the Section 09900.

D. Furnish all anchor bolts required to install electrical equipment in conformance with the Seismic mounting calculations specified on General Structural Drawings.

E. Where electrical equipment is located on damp or wet walls, or walls exposed to weather, "stand-off" mount the equipment approximately ½-inch from the wall. Mounting shall ensure that the rear of equipment is freely exposed to aircirculation.

F. Instrumentation and accessory equipment shall be installed in accordance with the manufacturer's instructions. The locations of equipment, transmitters, alarms and similar devices shown on the Drawings are approximate only. Exact locations shall be as approved by the Engineer during construction.

G. The shield on each process instrumentation cable shall be continuous from source to destination and be grounded as directed by the manufacturer of the instrumentation equipment. However, in no case shall more than one ground point be employed for each shield.

H. Nameplates

1. Orient nameplates to facilitate reading the device identifier from a cursory inspection. Do not mount nameplates behind or under equipment.
2. Nameplate fasteners and mounting shall be:

    a. Stainless steel wire, 0.048-inch diameter with stainless steel crimped clamps for hanging nameplates.
    b. Epoxy adhesive or stainless steel screws for cabinet mounted nameplates

3.2 INSTALLATION

A. Conduit Installation

1. No conduit smaller than ¾-in electrical trade size shall be used, nor shall any have more than the equivalent of three 90 degree bends in any one run. Seventy-five linear feet of conduit shall be considered the equivalent of one90 degree bend. Pull boxes shall be provided as required or directed.

2. No wire shall be pulled until the conduit system is complete in all details; in the case of concealed work, until all rough plastering or masonry has been completed; in the case of exposed work, until the conduit system has been completed in every detail.Conduit supports for exposed conduit runs shall be spaced at intervals of 8-ft or less, as required to obtain rigid construction and as required by the NEC.
3. Except where otherwise shown on the Drawings, or specified, all wiring shall be in rigid steel conduit.
4. PVC Schedule 40 conduit shall be used for direct burial or in or below slab applications. Provide PVC coated steel conduit risers through concrete slabs.
5. Exposed switch, receptacle and lighting outlet boxes and condulet fittings shall be cast or malleable iron.
6. Terminal boxes, junction boxes and pull boxes shall be NEMA 4.
7. Exposed single conduits shall be supported by means of one-hole pipe clamps in combination with one-screw back plates, to raise conduits from the surface. Surface mounted panel boxes, junction boxes, conduit, etc shall be supported by spacers to provide a minimum of ½-in clearance between wall and equipment.
8. Conduit terminating in NEMA 4 enclosures shall be terminated with Myers type conduit hubs. O-ring style locknuts are not acceptable.
9. Conduits containing equipment grounding conductors and terminating in sheet steel boxes shall have insulated throat grounding bushings.
10. Conduits shall be installed using threaded fittings.
11. Mandrels shall be pulled through all existing conduits which will be reused and through all new conduits 2-in. in diameter and larger prior to installing conductors.
12. 3/16-in polypropylene pull lines shall be installed in all new conduits noted as spares, designated for future equipment, or for use by telephone or power companies.
13. All conduit which may under any circumstance contain liquids such as water, condensation, liquid chemicals, etc, shall be arranged to drain away from the equipment served. If conduit drainage is not possible, conduit seals shall be used to plug the conduits.
14. Where no type or size is indicated for junction boxes, pull boxes or terminal cabinets, they shall be sized in accordance with the requirements of the NEC.
15. Miscellaneous steel for the support of fixtures, boxes, transformers, starters, contactors, panels and conduit shall be furnished and installed.
16. Steel channels, flat iron and channel iron shall be furnished and installed for the support of all electrical equipment and devices, where required, including all anchors, inserts, bolts, nuts, washers, etc for a rigid installation.
17. Where required conduit installation results in a conduit low point likely to collect condensation, provide conduit drain fittings.

B. Wire and Cable Installation

1. All wire shall be color coded or coded using electrical tape in sizes where colored insulation is not available. Where tape is used as the identification system, it shall be applied in all junction boxes, handholes and other accessible intermediate locations as well as at each termination.
2. The following coding shall be used:

System	Wire	Color
240/120 Volts 1-Phase, 3-Wire	Neutral Phase A Phase B	Whit e Black Red

3. Control Conductors: Termination on saddle-type terminals shall be wired directly with a maximum of two conductors. Termination on screw type terminals shall be made with a maximum of two spade connectors.
4. Instrumentation Signal Conductors (including graphic panel, alarm, low and high level signals): terminations same as for control conductors.
5. Except where permitted by the Engineer no splices will be allowed in handholes or other structures located below grade.
6. Splices shall not be made in push button control stations, control devices (i.e., pressure switches, flow switches, etc), conduit bodies, etc.
7. Instrumentation cables shall be installed in rigid steel raceways as specified. All circuits shall be installed as twisted pairs.
8. Terminal blocks shall be provided at all instrument cable junction, and all circuits shall be identified at such junctions.
9. Shielded instrumentation wire shall be run without splices between instruments, terminal boxes, or panels.
10. Shields shall be grounded as recommended by the instrument manufacturer and isolated at all other locations. Terminal blocks shall be provided for inter-connecting shield drain wires at all junction boxes. Where individual circuit shielding is required, each shield circuit shall be provided with its own block.

C. Underground System Installation

1. The minimum cover for raceway banks shall be 24-in unless otherwise permitted by the Engineer. Install utility warning tape above all conduit and duct lines. Install tape a maximum of 12-inches deep.
2. Conduit risers through slabs in slab-on-grade shall be PVC coated steel conduit and fittings.
3. Raceway terminations at handholes shall be with end bells for PVC conduit and insulated throat grounding bushings for steel conduit.
4. Restore paved and unpaved surfaces disturbed during the installation of duct or conduit to their original elevation and condition in accordance with the Special Provisions and Division 2.

D. Grounding Installation

1. Run grounding electrode conductors in rigid steel conduits. Bond the protecting conduits to the grounding electrode conductors at both ends.
2. Install concrete encased electrode in the building foundation and bond to grounding electrode conductor prior to pouring concrete for the foundation. Protect electrode, bond connection, and electrode conductor from damage throughout the construction process.
3. Ground connections to water pipe connections shall not be painted. If the connections are painted, dis-assemble them and re-make them with new fittings.
4. All equipment enclosures, motor and transformer frames, conduits systems, cable armor, exposed structural steel and all other equipment and materials required by the NEC to be grounded, shall be grounded and bonded in accordance with the NEC.

3.3 COMPLETION INSPECTION

A. Before request for final inspection is made, the Contractor shall submit to the Engineer, in writing, a certificate stating that the Contractor has made his own thorough inspection of the entire project and that the installation is completed and in conformance with the applicable codes, and the contract plans and specifications.

3.4 FINAL CLEAN UP

A. The Contractor shall be responsible for the removal and legal disposal of all debris and unused equipment which he introduces to the project site during the execution of the Contract.

B. The Contractor shall vacuum clean the interior of all panelboards, junction boxes and other enclosures supplied under this project containing electrical equipment to remove all dirt, metal chips, stripped insulation, etc., from the enclosure. This cleaning shall be done prior to energizing the device initially and a second time immediately prior to the final acceptance inspection.

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SECTION

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SECTION 16050

BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide labor, tools, equipment, and materials necessary to furnish and install electrical work as specified and in accordance with the Drawings and applicable reference standards listed in Article 1.03.

2. Coordinate with the local Telephone, Cable/Phone Utility and Electric Utility to provide electrical, cable, and phone services as shown on the Drawings.

3. In general, electrical Work shall include but not be limited to the following.

   a. Power outlets and equipment connections

   b. Conduit installation

   c. Control and power wiring

   d. Complete grounding system

   e. Service Entrance work

   f. Short Circuit Analysis and Coordination Study

   g. Support material and hardware for raceway and electrical equipment

   h. Branch circuit wiring

   i. Underground electrical construction, i.e. all excavation, backfill, surface restoration, concrete and rebar work manholes, handholes, conduit, and conduit spacers/supports shall be provided by the Installation Contractor.

   j. Installation, termination & labeling of all cable and signal wiring for instrumentation and process control equipment.

   k. Building wall, floor and roof penetrations for raceways

   l. Start up, acceptance testing test reports and instruction of systems operation to the Owner

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per City of Pleasanton Standard Specifications and Special Provisions.

1.03 REFERENCES

A. Reference Standards

1. Electrical equipment, materials, installation and workmanship shall comply with all state and local building codes, safety and fire law Regulations at the location of the Work and shall conform the applicable codes and standards of the organizations listed:

   a. American National Standards Institute, Inc. (ANSI)

   b. Association of Edison Illuminating Companies (AEIC)

   c. Institute of Electrical and Electronics Engineers (IEEE C2)

   d. Insulated Power Cable Engineers Association (IPCEA)

   e. National Electrical Code (NEC) with California Electrical Code (CEC) Amendments

   f. National Electrical Manufacturers Association (NEMA)

   g. National Fire Protection Association (NFPA)

   h. Occupational Safety Health Act (OSHA)

   i. Underwriters' Laboratories (UL)

2. Where the Contract requires the Work or any part of the same, to be above the standards required by applicable Laws, ordinances, rules and Regulations and other statutory provisions pertaining to the Work, such Work shall be performed and completed in accordance with the Contract requirements.

3. Should any changes in the Specifications and Drawings be necessary to conform to the requirements of any of the above mentioned codes or standards, the Contractor shall so notify the Owner’s Representative.

B. Drawings required by Governing Authorities: Prepare any detailed diagrams or Drawings which may be required by the governing authorities.

C. Permits, Certificates, Inspections, Fees and Utility Costs

1. Obtain and make payments for all permits, licenses, and certificates that are required for the associated Work.

2. Obtain certificates of approval from the responsible agencies concerned with the Work.

3. Arrange for timely inspections required for Work under this section.

4. All utility company and municipal back charges shall be the responsibility of the Contractor. Cost of electricity shall be borne by the Contractor until substantial completion.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per City of Pleasanton Standards and Special Provisions.

B. The electrical work shall be coordinated with the Work of other trades to prevent interferences and so that the progress in construction of the building will in no way be retarded.

C. Coordinate with all local utility companies and make all installations for their services in accordance with all utility company requirements.

D. Where lighting fixtures and other electrical items are shown in conflict with locations of structural members and mechanical or other equipment, furnish and install all required supports and wiring to clear the encroachment for a complete installation.

E. Any Work installed contrary to or without acceptance by the Engineer shall be subject to change as directed by the Engineer, and no extra compensation will be allowed to the Contractor for making these changes.

1.05 SUBMITTALS

A. Submit in accordance with City of Pleasanton Standards and Special Provisions.

B. Furnish manufacturer's product data, test reports, and materials certifications as required.

C. Follow the procedures specified in City of Pleasanton Standards and Special Provisions and in addition, the Contractor shall prepare and submit a complete submittal list to the Engineer. The submittal list shall include all submittal items covered in the Division 16 Specification sections.

D. Shop Drawings shall be submitted to the General Contractor who shall review and approve them prior to submittal to the Engineer for approval. Shop Drawings shall identify the specific equipment and material being supplied; the quantity being supplied; and all accessories, dimensions, descriptions, mounting and connection details, wiring diagrams, elementary control diagrams, equipment interface diagrams and any other information necessary to determine compliance with the

Plans and Specifications. Fabrication and installation shall be in accordance with the approved Shop Drawings.

E. As-built copies of all Shop Drawings shall be submitted to the Engineer.

F. Submit copies of reports, permits, and easements necessary for installation, use, and operation.

G. Submit copies of reports of tests, inspections, and meter readings as specified.

H. Closeout and maintenance material submittals: per City of Pleasanton Standards and Special Provisions.

1.06 QUALITY ASSURANCE

A. Provide in accordance with City of Pleasanton Standards and Special Provisions.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with City of Pleasanton Standards and Special Provisions.

1.08 SITE CONDITIONS

A. Existing Conditions: per City of Pleasanton Standards and Special Provisions.

1.09 WARRANTY

A. Special Warranty/Extended Correction Period

B. Compile and assemble the warranties specified in Division 16 into a separate set of vinyl covered three ring binders, tabulated and indexed for easy reference.

C. Provide complete warranty information for each item. Information to include:

1. Product or equipment list

2. Date of beginning of warranty or bond

3. Duration of warranty or bond

4. Names, addresses, and telephone numbers and procedures for filing a claim and obtaining warranty services

1.10 DRAWINGS

A. The Specifications supplement the Drawings and provide information pertaining to the methods and materials to be used in the execution of the Work. When a discrepancy occurs between the two, the stricter of the two shall govern.

B. All electrical equipment such as junction and pull boxes, panelboards, switches, controls and such other apparatus as may require maintenance and operation from time to time shall be made easily accessible and properly labeled.

C. The Contractor shall examine all Contracts and reference Drawings, and verify and properly coordinate the placement of outlets. Contractor shall also check all Drawings including mechanical Drawings and Shop Drawings for apparatus for which he must rough-in and to which he must connect.

1.11 RECORD DRAWINGS

A. Maintain a complete and separate set of prints of Drawings and Specifications at job Site for duration of the Contract. Record Work completed and all changes from original Contract. Drawings shall clearly and accurately include Work installed as a modification or as an addition to the original design.

B. At completion of Work and prior to final request for payment, submit a complete set of reproducible Record Drawings showing all systems as actually installed.

1.12 JOB CONDITIONS

A. Existing Conditions

1. Existing Utilities: Locate existing underground utilities in excavation areas. If utilities are indicated to remain, support and protect services during excavation operations.

2. Prior to all Work of this section, carefully inspect the installed Work of all other trades and verify that all such Work is complete to the point where this installation may properly commence.

3. Verify that the electrical installation may be made in complete accordance with all pertinent codes and Regulations and the original design.

B. Coordination:

1. Coordinate the installation of electrical items with the schedules for Work of other trades to prevent unnecessary delays in the total Work.

2. Coordinate with all local utility companies and make all installations for their services in accordance with all utility company requirements.

3. Any changes shall be done at the Contractor’s expense.

4. Where lighting fixtures and other electrical items are shown in conflict with locations of structural members and mechanical or other equipment, furnish and install all required supports and wiring to clear the encroachment for a complete installation.

5. Any Work installed contrary to or without acceptance by the Engineer shall be subject to change as directed by the Engineer, and no extra compensation will be allowed to the Contractor for making these changes.

C. Accuracy of Data:

1. The Drawings are diagrammatic and functional only, and are not intended to show exact circuit layouts, number of fittings, components and place in satisfactory operational power, lighting, and other electrical systems shown. Install additional circuits, components and material wherever needed to conform to the specific requirements of the equipment whether or not indicated or specified.

2. Information and components called for in the Specification but not shown on Plans or vice versa shall apply and shall be provided as though required expressly by both.

3. The locations of equipment, fixtures, outlets and similar devices shown on the Drawings are approximate only. Field measurements shall take precedence over scaled dimensions from Drawings. Exact locations shall be as accepted by Engineer during construction. Obtain in the field all information relevant to the placing of electrical work and, in case of any interference with other Work, proceed as directed by the Engineer and furnish all labor and materials necessary to complete the Work in an acceptable manner.

4. The Drawings and the Specifications are intended to comply with all pertinent codes, Regulations and standards. In the event of discrepancy, the Contractor shall immediately notify the Engineer in writing of said discrepancies and apply for an interpretation and, unless an interpretation is offered in writing by the Engineer prior to the execution of the Contract, the applicable rules and Regulations shall be complied with as a part of the Contract.

5. In case of difference between building codes, Specifications, state Laws, industry standards and the Contract Documents, the most stringent shall govern. Should the Contractor perform any Work that does not comply with the requirements of the applicable building codes, state Laws, and industry standards, he shall bear all cost arising in correcting these deficiencies.

6. Verify size and ratings of motors and other electrically operated devices supplied by others.

7. Check with Engineer before installation of Work for outlets not specified as to location or for Work that interferes with other trades.

1.13 FLASHING, CUTTING, FIREPROOFING AND WATERPROOFING

A. Flashing around all electrical items penetrating roof or exterior walls shall be the responsibility of the Installation Contractor.

B. All cutting of surfaces, including core drilling of walls and slabs, shall be done by the Installation Contractor.

C. Patching shall be done by the Installation Contractor.

D. The Installation Contractor shall fireproof, waterproof and seal all openings in slabs and walls.

1.14 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Use all means necessary to protect electrical system materials before, during and after installation and to protect the installed Work and materials of all other trades.

B. In the event of damage, immediately make all repairs and replacements necessary to the acceptance of the Engineer and at no additional cost to the Owner. If any apparatus has been subject to possible injury by water, it shall be thoroughly dried out and put through such special tests as directed by the Engineer, at the cost and expense of the Contractor, or shall be replaced by the Contractor at his own expense.

C. Protect the Work of other trades. Restore any damage caused to other trades to the condition existing prior to damage at no additional cost to the Owner.

D. Investigate each space in the building through which equipment must pass to reach its final location. If necessary, the manufacture shall be required to ship his material in sections sized to permit passing through such restricted areas in the building.

1.15 WORK PERFORMANCE

A. Electrical work shall be accomplished with all affected circuits or equipment de-energized. When an electrical outage cannot be accomplished in this manner for the required Work, the following requirements are mandatory:

1. Electricians must use full protective equipment (i.e., certified and tested insulating material to cover exposed energized electrical components, certified and tested insulated tools, etc.) while working on energized systems in accordance with NFPA 70E.

2. Electricians must wear personal protective equipment while working on energized systems in accordance with NFPA 70E.

3. Before initiating any Work, a job specific Work plan must be developed by the Contractor and the Owner. The Work plan must include procedures to

be used on and near the live electrical equipment, barriers to be installed, and safety equipment to be used and exit pathways.

4. Work on energized circuits or equipment cannot begin until prior written approval is obtained from the Owner.

1.16 DEFINITIONS

A. As used in this Specification, "provide" means "furnish and install", "furnish" means "to purchase and deliver to the Project Site complete with every necessary appurtenance and support and to store in a secure area in accordance with manufacturer's instructions", and "install" means "to unload at the delivery point at the Site or retrieve from storage, move to point of installation and perform every operation necessary to establish secure mounting and correct operation at the proper location in the Project".

B. Finished Areas: In general, areas with carpet or tile floors, lay-in or fixed ceiling tile, special architectural ceiling treatment, or tiled, plastered, or paneled walls shall be considered finished areas.

C. Interior: For the purposes of this Specification, interior is any area within the boundaries of the foundation of any building within the superstructure or other structures not classified as a building.

1.17 TEMPORARY POWER

A. The Contractor shall furnish, install, maintain, and remove the temporary electrical power and lighting systems, including lamps, and pay for all labor, materials, and equipment required therefor. All such temporary electrical work shall meet the requirements of the National Electrical Code, the local utility company, and OSHA.

B. The Contractor shall make all necessary arrangements with the local utility company as to where the temporary electric service can be obtained.

C. The Contractor shall secure and pay for all required permits and back charges for Work performed by others, and other expenses incidental to the installation of the temporary electric service.

1.18 POSTED OPERATING INSTRUCTIONS:

A. Provide for each system and principal item of equipment as specified in the technical sections for use by operation and maintenance personnel. The operating instructions shall include the following:

1. Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.

2. Start up, proper adjustment, operating, lubrication, and shutdown procedures.

3. Safety precautions.

4. The procedure in the event of equipment failure.

5. Other items of instruction as recommended by the manufacturer of each system or item of equipment.

B. Print or engrave operating instructions and frame under glass or in approved laminated plastic. Post instructions where directed. For operating instructions exposed to the weather, provide weather-resistant materials or weatherproof enclosures. Operating instructions shall not fade when exposed to sunlight and shall be secured to prevent easy removal or peeling.

1.19 MANUFACTURER'S NAMEPLATE

A. Each item of equipment shall have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

1.20 FIELD FABRICATED NAMEPLATES

A. Provide laminated plastic nameplates for each equipment enclosure, relay, switch, and device; as specified in the technical sections or as indicated on the Drawings. Each nameplate inscription shall identify the name of the equipment, function and, when applicable, the position. Nameplates shall be melamine plastic, 0.125 inch thick, black with white letters. Surface shall be matte finish. Corners shall be square. Accurately align lettering and engrave into the core. Minimum size of nameplates shall be one by 2.5 inches. Lettering shall be a minimum of 0.25 inch high normal block style. All electrical equipment shall be labeled with the following:

1. Panel Name

2. Fed from "Panel Name" & "CKT #"

3. Amps

4. Volts

5. Phase

1.21 ARC FLASH LABEL

A. Provide arc flash labels for all electrical equipment with operating voltages greater than 50 volt per NEC 110.16.

1.22 WARNING SIGNS

A. Exterior warning and caution signs shall be weather resistant, nonfading, preprinted cellulose acetate butyrate signs with 20-gauge, galvanized steel backing, with colors, legend, and size appropriate to the location.

B. Interior warning and caution signs shall be aluminum signs with preprinted baked enamel finish and punched for fasteners. Colors, legend, and size appropriate to location.

1.23 WIRE AND CABLE MARKERS

A. Underground line marking tape shall be permanent, bright colored, continuous printed, metal backed, plastic tape compounded for direct burial service not less than 6 inches wide. Printed legend indicative of general type of underground line below.

B. Wire labels for wires smaller than No. 4. shall be vinyl or vinyl cloth, self-adhesive, wraparound, wire markers with preprinted numbers and letters. Wire sizes No. 4 and larger and multi conductor cables shall be marked with one-piece, nylon locking marker ties equal to Panduit PLM Series.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Materials and equipment shall be listed by UL unless it can be demonstrated that no UL standards exist for a specific item or class of equipment.

B. All other materials, not specifically described but required for a complete and operable electrical installation, shall be new, first quality of their respective kinds, Specification grade or better, and as selected by the Contractor subject to the acceptance by the Engineer.

C. All materials and equipment furnished and installed on this Project shall meet the most stringent efficiency standards of the local utility to qualify for the maximum rebate.

2.02 INTERCHANGEABILITY

A. In all design and purchasing, interchangeability of items of equipment, subassemblies, parts, motors, starters, relays and other items is essential. All similar items shall be of the same manufacturer, type, model and dimensions.

B. For ease of maintenance and parts replacement, to the maximum extent possible, use equipment of a single manufacturer.

C. The Engineer reserves the right to reject any submittal which contains equipment from various manufacturers if suitable materials can be secured from fewer

manufacturers and to require that source of materials be unified to the maximum extent possible.

2.03 SOURCE QUALITY CONTROL

A. Provide in accordance with City of Pleasanton Standards and Special Provisions.

PART 3 – EXECUTION

3.01 COORDINATION

A. Prior to all Work of this section, carefully inspect the installed Work of all other trades and verify that all such Work is complete to the point where this installation may properly commence.

B. Field verify all locations and dimensions to ensure that the equipment will be properly located, readily accessible, and installed in accordance with all pertinent codes and Regulations, the Contract Documents, and the referenced standards.

C. The Work shall be carefully laid out in advance, and where cutting, drilling, etc., of floors, walls, ceilings, or other surfaces is necessary for the proper installation, this Work shall be carefully done, and any damage to building, piping, or equipment shall be repaired by skilled mechanics of the trades involved at no additional cost to the Owner.

D. In the event any discrepancies are discovered, immediately notify the Owner's Representative in writing. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved

3.02 INSTALLATION

A. Install all equipment and fixtures in complete accordance with the manufacturer's recommendations and all pertinent codes and Regulations.

B. Thoroughly inspect all items of equipment and any items dented, scratched, or otherwise damaged in any manner shall be replaced or repaired and painted to match original finish. All items so repaired and refinished shall be brought to the attention of the Engineer for inspection and acceptance.

C. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete or supported from or on other structural components, as they are constructed.

D. Sequence, coordinate, and integrate installations of electrical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building and equipment which must be placed in service before further construction can take place.

E. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible.

F. The final routing of raceways shall be determined by structural conditions, interferences with other trades and by terminal locations on apparatus. The Engineer reserves the right of a reasonable amount of shifting at no extra cost up until time of roughing in the Work.

G. Where circuits are shown as "home-runs" all necessary fittings and boxes shall be provided for a complete raceway installation.

H. In general, wiring and raceway systems for security alarm, fire alarm, telephone and intercommunications systems are not indicated on the Drawings but shall be furnished and installed under this section.

I. Each lighting and each receptacle circuit shall have its own neutral, dedicated to that circuit. A common neutral for more than one signal phase circuit is not allowed.

J. Surface mounted panel boxed, junction boxes, conduits, etc., shall be supported by spacers to provide a clearance between wall and equipment.

K. Upon completion of all installation, lamping, and testing, thoroughly inspect all exposed portions of the electrical installation and completely remove all exposed labels, soils, markings and foreign material.

3.03 MARKING AND LABELING

A. All panelboards, indoor transformers, cabinets, control panels and other specified equipment shall be labeled with engraved laminated plastic plates with engraved letters. Punch tapes with mastic backings are not acceptable.

B. All starters, disconnect switches and other specified equipment shall be marked with engraved laminated plastic plates and engraved letters. Where individual switches are circuit breakers in power or distribution panel boards do not have cardholders, they shall be marked with ½" high labels.

C. All empty conduits shall have labels tied to the pull string at each end of each empty conduit, marked as to identification of each end. Junction boxes with circuits provided for future use shall be labeled with appropriate circuit designation.

D. All panelboards directories shall be filled out with typewritten identification of each circuit.

3.04 WIRE AND CABLE MARKERS

A. Tag control circuit conductors at both ends and at junction box splices using wire and cable markers with identification numbers as designated on equipment wiring diagrams. Provide typed listing to identify conductors by number and use.

B. Identify spare conductors, individually, at both ends and at junction box splices with number between 1 and 999. Do not duplicate numbers.

C. Identify wire numbers on terminal block marking strips.

D. Provide permanent plastic name tag indicating load for each feeder for all junction boxes, handholes and manholes. Label all process motor wires to yard equipment in handholes and manholes.

3.05 TEST & SETTINGS

A. Provide the necessary material, equipment, labor and technical supervision to perform and complete the specified tests outlined in their respective specification sections.

B. Acceptance tests as specified are defined as those tests and inspections required to determine that the equipment involved is acceptable as delivered to the job Site, that the equipment may be energized for final operational tests and is in accordance with the Specifications.

C. Final acceptance of the equipment and/or workmanship will depend upon performance characteristics as determined by the subject tests, in addition to complete operation tests, on all electrical equipment to show that it will perform the functions for which it was designed.

D. If the test and inspection data submitted should indicate deficiencies in the operation of the electrical apparatus or in the manufacturer thereof, the Contractor shall promptly implement the necessary adjustments, corrections, modifications and/or replacements necessary to be made to meet the specified requirements.

E. Upon completion of the remedial Work, the Contractor shall repeat all of the tests on components previously found deficient on the first test or any additional test if they be required. It shall be the responsibility and obligation of the Contractor to have all remedial Work accomplished as may be required by second and/or additional tests.

F. The Contractor shall provide the overcurrent breaker settings per the Short Circuit and Coordination Study as required in Section 16453, Electrical Study and apply the arc flash hazard labels to the electrical equipment.

3.06 CLEANING

A. When Work is complete and has been tested and accepted by Owner, clean all light fixtures, equipment, and exposed surfaces that have been directly affected by this Work. Keep the premises in a neat and orderly condition and at the completion of the Work properly clean up and remove any excess materials from Site.

3.07 FIELD QUALITY CONTROL

A. Provide in accordance with City of Pleasanton Standards and Special Provisions.

3.08 CLOSEOUT ACTIVITIES

A. Provide in accordance with City of Pleasanton Standards and Special Provisions.

END OF SECTION

SECTION 16060

GROUNDING AND BONDING

PART 1 – GENERAL

1.01 SUMMARY

A. Provide grounding and bonding for electrical systems in accordance with this Section and applicable reference standards listed in Article 1.03.

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per City of Pleasanton Specifications and Special Provisions.

1.03 REFERENCES

A. Institute of Electrical and Electronic Engineers (IEEE)

1. IEEE 81 Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounded System (Part 1)

2. IEEE 141 Recommended Practice for Electric Power Distribution for Industrial Plants

3. IEEE 142 Recommended Practice for Grounding of Industrial and Commercial Power Systems

B. National Electrical Code (NEC) Article 250.

C. Underwriters Laboratories (UL)

1. UL 467 Electrical Grounding and Bonding Equipment

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, sequencing, and scheduling: per City of Pleasanton Specifications and Special Provisions.

1.05 SUBMITTALS

A. Submit in accordance with City of Pleasanton Specifications and Special Provisions.

B. Product data for grounding equipment and appurtenances.

1.06 QUALITY ASSURANCE

A. Provide in accordance with City of Pleasanton Specifications and Special Provisions.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with City of Pleasanton Specifications and Special Provisions.

1.08 SITE CONDITIONS

A. Existing conditions: per City of Pleasanton Specifications and Special Provisions.

PART 2 – PRODUCTS

2.01 GENERAL

A. Provide each electrical grounding system with assembly of materials required for complete installation including wires/cables, connectors, lugs, clamps, ground rods, bonding jumpers and accessories.

B. Provide electrical grounding conductors for grounding connections matched to power supply wiring materials and sized according to NEC.

C. Provide electrical connectors, lugs, clamps, bonding jumpers and accessories as recommended by the respective manufacturer for the particular application, unless other indicated.

D. Ground rods: solid copper clad, 3/4-inch diameter by 10 feet long.

E. Insulated conductors: green in color.

F. Ground bus: bare annealed copper bars of rectangular cross section, ¼-inch x 3-inch x length as required, with 98 percent conductivity, rigidly attached to structure.

G. Bonding strap conductor/connectors: soft copper, 0.05 inch thick and 2-inches wide, except as indicated.

H. Pressure connectors: high conductivity plated units.

I. Bolted clamps: heavy-duty units listed for application.

J. Exothermic welded connections: provided in kit form and selected for specific types, sizes, and combinations of conductors and other items to be connected.

2.02 SOURCE QUALITY CONTROL

A. Provide in accordance with City of Pleasanton Specifications and Special Provisions.

PART 3 – EXECUTION

3.01 GROUNDING & BONDING

A. Ground main service entrance ground bus or lug to neutral of incoming service, to enclosure, to building steel, to ground rods/grounding ring, to rebar in concrete footing, and to main cold water pipe. Install grounding bushings or service conduits. Use exothermic style ground connections to the ground rods and building steel.

B. Use of conduit system for ground conductor is not allowed.

C. Provide and install 600 volt insulated bonding conductors throughout the distribution system with connection to bonding (or grounding) terminal on each panel and panel board with connections to other equipment where specifically indicated and noted.

D. Bonding conductors to be continuous where possible. Where splices are required, provide compression connectors of approved pattern. Insulate connectors to equivalent thickness of conductors.

E. Provide grounding system for grounded circuit conductors of dry type transformer secondaries in accordance with NEC. Use exothermic style ground connections to building steel. Enclose grounding conductors in schedule 40 PVC conduit.

F. Provide equipment grounding conductors in all conduits containing power, control, or instrumentation conductors on the load side of the service equipment or on the load side of a separately derived system.

G. Comply with NEC Article 250 for sizes and quantities of equipment grounding conductors, except larger sizes specified. Use of metallic conduit systems for equipment grounding as recognized by the NEC are not permitted.

H. Install grounding bushings on conduits at both primary and secondary entrances to transformers. Ground transformer enclosures to bushings.

I. Install bonding jumper for flexible metal conduit unless fittings are approved for grounding or otherwise comply with NEC.

   1. Size jumper to match over-current device

   2. Green insulation

3. Connect to grounding bushing at each end

J. Ensure entire electrical system is electrically continuous and permanently and effectively grounded, including electrical equipment and motors.

K. Locate ground rods with a minimum of two rod length from each other and at least the same distance from any other grounding electrode. Connect ground conductors to ground rods by means of exothermic welds except at test wells and as otherwise indicated. Drive rods until tops are 24 inches below finished floor or final grade except as otherwise indicated.

L. Route grounding electrode conductors along the shortest and straightest paths possible without obstructing access or placing conductors where they may be subjected to strain, impact, or damage, except as indicated.

M. Ensure that grounding electrode conductor connections to interior piping, structural members, and the like are accessible for periodic inspection during the life of the structure.

3.02 BONDING FOR OTHER TRADES

A. Signal raceways, water piping, heating piping and metallic air ducts shall be bonded together and to the grounding conductor with No. 8 soft drawn bare solid conductors. Connections to pipes shall be made with cast clamps of like material as the pipes to which attached, to ducting terminated in a secure manner by best practical means, bonding across any flexible or insulated connections.

B. All bonding conductors shall be installed in a neat manner properly shaped for contour of surface involved and properly supported. At locations remote from the main service entrance panel boards, bond to the largest raceway nearby.

3.03 FIELD TESTING

A. Perform point-to-point tests to determine resistance between the main grounding system and all major electrical frames, system neutral, and derived neutral points. Perform tests using clamp-on digital ground resistance tester with 2% accuracy or better.

B. Perform ground fault protection system functional testing for distribution equipment having ground fault protection.

C. Perform ground continuity and functional tests:

1. From main switchboard to grounding electrode and/or cold water main.

2. Between each main secondary feeder switchboard ground and its termination point (distribution panels, panelboards, motor control centers,

UPS systems, electric heater disconnects, chiller starters, and other such equipment) and all feeders shown on single-line diagram.

3. Between each distribution panel to panelboards and between each panelboard to panelboard (excluding branch circuits).

4. Test each branch circuit receptacle for proper polarity and ground using a plug-in test device.

5. Ground system resistance: Perform testing according to National Electrical Testing Association (NETA) standards and procedures. Testing results to be submitted on NETA forms. Test results shall indicate recommended action for a sub-par test results. Results shall list recommended test values that should be obtained for new installation.

1. Measure ground resistance without the soil being moistened by any means other than natural precipitation or natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance. Perform tests by the three-point fall of potential method in accordance with Section 9.03 of IEEE 81. Simple moisture addition is not acceptable.

a. Ground/resistance maximum values shall be as follows.

1) Equipment rated 500 kVA and less: 10 ohms.

2) Equipment rated 500 kVA to 1000 Kva: 5 ohms.

3) Equipment rated over 1000 kVA: 3 ohms.

4) Unfenced substations and pad mounted equipment: 5 ohms.

5) Fence Grounds: 10 ohms.

D. Where ground resistances exceed specified values, and if directed, modify the grounding system to reduce resistance values.

3.04 FIELD QUALITY CONTROL

A. Provide in accordance with City of Pleasanton Specifications and Special Provisions.

3.05 STARTUP & COMMISSIONING

A. Provide in accordance with City of Pleasanton Specifications and Special Provisions.

3.06 CLOSEOUT ACTIVITIES

A. Provide in accordance with City of Pleasanton Specifications and Special Provisions.

END OF SECTION

SECTION 16120

CONDUCTORS AND CABLES

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide low-voltage electrical power conductors and cables in accordance with this Section and applicable reference standards listed in Article 1.03.

2. This section includes wires, cables, and connectors for power, lighting, signal, control, and related systems rated 600 volts and less.

B. Related Requirements

1. Section 16050 – Basic Electrical Materials and Methods

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per City of Pleasanton Specifications and Special Provisions.

1.03 REFERENCES

A. Reference Standards

1. National Fire Protection Association (NFPA)

a. NFPA 70 National Electrical Code

2. Underwriters Laboratories (UL)

a. UL 83 Thermoplastic Insulated Wires and Cables

b. UL 486A Wire Connectors and Soldering Lugs for Use with Copper Conductors

c. UL 854 Service Entrance Cable

3. National Electrical Manufacturers Association (NEMA)

a. WC 5 Thermoplastic Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy

b. WC 7 Cross-Linked Thermosetting Polyethylene Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy

c. WC 8 Ethylene Propylene Rubber Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy

4. Institute of Electrical and Electronic Engineers (IEEE)

a. Standard 82 Test Procedure for Impulse Voltage Tests on Insulated Conductors

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, sequencing, and scheduling: per City of Pleasanton Specifications and Special Provisions.

1.05 SUBMITTALS

A. Submit in accordance with City of Pleasanton Specifications and Special Provisions.

B. Product data

1. Product data for electrical wires, cables, and connectors

2. Product data for Megger insulation testing instrument

3. Report sheets for Megger testing

C. Manufacturer Reports

1. Furnish manufacturer's product data, test reports, and materials certifications as required

1.06 QUALITY ASSURANCE

A. Provide in accordance with City of Pleasanton Specifications and Special Provisions.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with City of Pleasanton Specifications and Special Provisions.

B. Deliver wire and cable properly packaged in factory fabricated type containers or wound on NEMA specified type wire and cable reels.

C. Store wire and cable in clean dry space in original containers. Protect products from weather, damaging fumes, construction debris, and traffic.

1.08 SITE CONDITIONS

A. Existing conditions: per City of Pleasanton Specifications and Special Provisions.

PART 2 – PRODUCTS

A. Instrumentation Cable

1. Okonite Company
2. Belden Company
3. Dekoron Wire and Cable Company
4. Or equal

B. Cable Terminations

1. T&B Sta-Kon
2. Burndy Insulug
3. Or equal

2.02 MATERIALS

A. General

1. Provide factory-fabricated wires of sizes, ampacity ratings, and materials for applications and services indicated. Where not indicated, provide proper wire selection as determined by Installer to comply with Project's installation requirements, NEC and NEMA standards.
2. Provide color-coding for phase identification as specified.
3. Provide factory applied nylon or polyvinyl chloride (PVC) external jackets on wires and cables for pulls in raceways over 100 feet in length, for pulls in raceways with more than three equivalent 90 degree bends, for pulls in conduits underground or under slabs on grade, and where indicated.

B. Service & Distribution Wiring

1. 98 percent conductivity copper
2. 600 volt insulation, type XHHW

3. U.L. listed for underground use in wet locations at 75 degrees C

4. Use XHHW for #4 and larger and THHN/THWN or XHHW for #6 and smaller

C. Building Wiring

1. 98 percent conductivity copper

2. 600 volt insulation, type, THWN/THHN, or XHHW

3. Stranded conductor: 14 AWG and larger

4. Minimum branch circuit: 12 AWG

5. Minimum 10 AWG for 120-volt circuits more than 100 feet long

6. Minimum 10 AWG for 277-volt circuits more than 230 feet long

7. MC Type Armored Cable shall be used only in locations that are completely concealed for interior dry locations, or in accessible dry interior locations (such as above acoustical ceilings), unless specifically indicated otherwise. Where approved by code and local authorities, metal clad cable, type MC may be used for wiring of branch circuits for lighting switches, receptacles, etc. Cable shall have full size ground wires.

D. Control Wiring

1. Control wiring for digital/discrete signal wiring, shall be 600V, minimum 14 AWG, THHN/THWN, copper stranded, unless specifically indicated otherwise.

2. Instrument cable for analog signal wiring (4-20mA DC) shall be shielded, 2-conductor, 300 volt rated, minimum 18 AWG, Belden No. 8760, Alpha Wire, or approved equal. Provide 600 volt rated cable where cable occupies the same enclosure and/or raceway with voltages greater than 300 volt as specified below

3. Single Shielded Pair Instrument Cable

a. Tinned copper, XLPE insulated stranded conductors, 18 AWG minimum, twisted pair with overall shield, stranded tinned 18 AWG copper drain wire and overall PVC jacket. Rated for 600 volts minimum and conforming to UL 1581. Cables shall be rated for tray cable (TC) use where installed within a cable tray.

4. Multi-paired Shielded Pair Instrument Cable

a. Tinned copper, XLPE insulated stranded conductors, No. 16 AWG minimum, twisted pairs with shield over each pair, stranded tinned No. 18 AWG copper drain wire, and overall PVC outer jacket. Rated for 600 volts minimum and conforming to UL 1581 or UL 13. Cables shall be rated for tray cable "TC" use where installed within a cable tray.

E. Splices

1. No. 10 and smaller with 600-volt pressure type insulated connector of wire-nut type, or equal; soldered and crimped type not allowed. Ideal type wire nut Buchanan type B-Cap and Minnesota Mining (3M) type Scotchlok.

2. No. 8 and larger with solderless lugs or solderless connectors of lock-tite or similar type properly taped with plastic insulating tape, Minnesota Mining Co. #33, or equal, then two half-lap servings of friction tape, Manson, or equal.

3. Wire connector systems for use with underground conductors shall be UL listed specifically for such use

4. Service entrance conductors shall be installed without splices. Electrical equipment feeders shall be spliced only where shown or specifically approved. Control and metering conductors shall be installed without splices.

5. All splices shall be made only by specific permission of the Engineer and then only in manholes or pull boxes and shall be sealed watertight with a heat-shrunk insulation.

6. Tighten electrical connectors and terminals in accordance with manufacturer's published torque tightening values. Where manufacture's torqueing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Standards 486A and 486B.

7. Use UL listed splice for underground wires, ducts buried, in conduit and in ducts. Connectors and splices shall be waterproof.

2.03 SOURCE QUALITY CONTROL

A. Provide in accordance with City of Pleasanton Specifications and Special Provisions.

PART 3 – EXECUTION

3.01 WIRE AND CABLE INSTALLATION

A. Install wire and cables in conduit of size and type indicated on Drawings and Specifications.

B. Install electrical cables, wires, and connectors in compliance with NEC.

C. Pull conductors simultaneously where more than one is being installed in same raceway. Use UL listed pulling compound or lubricant, where necessary.

D. Use pulling means including, fish tape, cable, rope, and basket weave wire/cable grips, which will not damage cables or raceways. Do not use rope hitches for pulling attachment to wire or cable.

E. Conceal cable in finished spaces.

F. Install exposed cable parallel and perpendicular to surfaces or exposed structural members, and follow surface contours, where possible.

G. Size conductors so voltage drop does not exceed 3 percent for branch circuits or 5 percent for feeder/branch circuit combination.

H. Provide adequate length of conductors within electrical enclosures and train the conductors to terminal points with no excess. Bundle multiple conductors, with conductors larger than 10 AWG cabled in individual circuits. Make terminations so there is no bare conductor at the terminal.

I. Provide color coded feeder and branch circuit wiring at termination and splice locations. System neutrals: designated in addition to phase conductors. Equipment grounds shall be green.

J. The number of conductors shown on Drawings is not necessarily the correct number required. As many conductors as are required in each case shall be installed. In general, grounding conductors are not scheduled.

K. In general, wiring for the following systems shall be installed in separate conduits. Do not mix categories in a single raceway.

1. 120 volt power wiring

2. 120 volt control wiring, including, digital input and output signals

3. 24 volt DC control wiring, including, digital input and output signals

4. 24 volt DC analog control wiring (4-20mA)

5. Communications wiring

6. Special & Emergency Systems

L. Conductors 600 volts and below shall be color coded in accordance with the following:

CONDUCTOR	120 / 208 COLOR	480 / 277 COLOR
Phase A	Black	Brown
Phase B	Red	Orange
Phase C	Blue	Yellow
Neutral	White	White / Gray
Equipment Grounds	Green	Green

3.02 FIELD QUALITY CONTROL

A. Provide in accordance with City of Pleasanton Specifications and Special Provisions.

B. Test each electrical circuit after permanent cables are in place with terminators installed, but before cable or wire is connected to equipment or devices to demonstrate that each circuit is free from improper grounds and short circuits.

C. Megger Test the insulation resistance between phases and from each phase to ground for each of the following feeder and motor branch circuits:

1. Secondary Service Entrance

2. Power Distribution Equipment

3. Transformers

4. Variable Frequency Drives

5. Motors

D. Megger Testing to be witnessed by Engineer. Notify Engineer at least 48 hours in advance of testing.

E. Measure insulation resistance with a digital Megger insulation testing instrument in accordance with manufacturer's recommendations. Test instruments are to be provided by the Contractor.

F. If any insulation resistance measures less than 50 megohms, the cable shall be considered faulty with cable failing the insulation test. In moist environments, bag the ends of the cable to prevent a faulty Megger test.

G. Replace cable which fails insulation tests or fails when tested under full load conditions with new cable for the full length and retest.

H. The below grade service or feeder splice shall be water immersion Megger tested in the presence of the Engineer. Each splice shall be immersed in a grounded water immersion bath for 24 continuous hours prior to and during the test. Criteria for failure shall be as described for cable above.

3.03 STARTUP & COMMISSIONING

A. Provide in accordance with City of Pleasanton Specifications and Special Provisions.

3.04 CLOSEOUT ACTIVITIES

A. Provide in accordance with City of Pleasanton Specifications and Special Provisions.

END OF SECTION

SECTION 16130

RACEWAY AND BOXES

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide the labor, tools, equipment, and materials necessary to furnish and install raceways, boxes, and supporting devices in accordance with the Plans and applicable reference standards listed in Article 1.03.

B. Types of products specified in this section include

1. Conduit, Raceways & Fittings

2. Supporting Devices

3. Boxes and Fittings

C. Related Requirements

1. Section 16050 – Basic Electrical Materials and Methods

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per City of Pleasanton Specifications and Special Provisions.

1.03 REFERENCES

A. Reference Standards

1. National Electrical Code (NEC) with California Electrical Code (CEC) Amendments.

2. National Electrical Manufacturers Association (NEMA)

3. Underwriters Laboratories (UL)

4. Occupational Safety and Health Administration (OSHA)

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, sequencing, and scheduling: per City of Pleasanton Specifications and Special Provisions.

1.05 SUBMITTALS

A. Submit in accordance with City of Pleasanton Specifications and Special Provisions.

B. Furnish manufacturer's test reports, and material certifications as required.

C. Product data for cabinets and enclosures.

D. Shop Drawings for shop fabricated (non-stock items) floor boxes and boxes, enclosures and cabinets.

E. Closeout and maintenance material submittals: per City of Pleasanton Specifications and Special Provisions.

1.06 QUALITY ASSURANCE

A. Provide in accordance with City of Pleasanton Specifications and Special Provisions.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with City of Pleasanton Specifications and Special Provisions.

1.08 SITE CONDITIONS

A. Existing conditions: per City of Pleasanton Specifications and Special Provisions.

PART 2 – PRODUCTS

2.01 CONDUIT, RACEWAYS & FITTINGS

A. Provide conduit with 3/4-inch diameter minimum, except where specifically shown smaller on Drawings.

B. Conduit, connectors, and fittings shall be approved for the installation of electrical conductors.

C. Refer to Table 3.01A for approved conduit installation guidelines.

1. Rigid Galvanized Steel Conduit

a. Rigid steel conduit (RGS), including couplings, elbows, bends, and nipples, shall conform to the requirements of UL 6 and NEMA C80.1 Steel fittings shall be galvanized by the hot-dip process.

b. Fittings for rigid steel conduit shall be threaded and shall conform to NEMA FB 1.

c. Gaskets shall be solid for fittings sized 1-1/2 inches and less. Conduit fittings with blank covers shall have gaskets except in clean, dry areas or at the lowest point of a conduit run where drainage is required.

d. Covers shall have captive screws and be accessible after the Work has been completed.

2. PVC Coated Rigid Metal Conduit

a. Rigid galvanized metal conduit coated with 40 mils thick polyvinylchloride coating.

b. Fittings, elbows, supporting devices and accessories shall include factory applied 20 mils thick polyvinylchloride coating and be manufactured by the same as that of the conduit.

c. Use tools as recommended by the manufacturer so as not to damage PVC coating. Where coating is damaged, touch-up with PVC paint in the field after installation.

3. Rigid Plastic Conduit

a. PVC Schedule 40: Conduit shall be made of polyvinyl chloride compound that shall be homogeneous plastic material free from cracks, holes or foreign inclusions. Conduit shall be rated for use with 90 degree C conductors, UL Listed. Use solvent cement to join conduits as manufactured the same as the conduit manufacturer.

4. Flexible Metallic Conduit

a. Provide UL1 flexible metallic conduit.

b. Provided liquid tight flexible metallic conduit with a protective jacket of PVC extruded over a flexible interlocked galvanized steel core to protect wiring against moisture, oil, chemicals, and corrosive fumes.

c. Provide UL 514B fittings for flexible metallic conduit, Type I box connector, electrical, Type III coupling, electrical conduit, flexible steel, or Type IV adapter, electrical conduit.

5. Wireways

a. Wireways and auxiliary gutters for use in exposed, dry locations shall be a prefabricated channel-shaped sheet metal trough with hinged or removable covers, associated fittings, and supports for

housing, and protecting electrical wires and cables in accordance with UL 870.

b. Straight sections of trough, elbows, tees, crosses, closing plates, connectors, and hanging brackets shall be constructed from sheet steel of commercial quality not less than 16-gage. Sheet metal component parts shall be cleaned, phosphatized, and coated with a corrosion-resistant gray paint.

c. Straight sections of wireways and auxiliary gutters shall be solid or have knockouts as indicated in both sides and bottom, 3 inches on center.

d. Straight sections shall not be more than 5-feet long, with covers held closed with screws.

6. Conduit Seals

a. Provide factory fabricated watertight conduit sealing bushing assemblies suitable for sealing around conduit, or tubing passing through concrete floors and walls. Provide a cast in place water stop wall sleeve with a mechanical pipe seal between the conduit and the sleeve. Construct seals with steel sleeve, malleable iron body, neoprene sealing grommets or rings, metal pressure rings, pressure clamps, and cap screws.

2.02 SUPPORTING DEVICES

A. Supports, support hardware, and fasteners shall be protected with zinc coating or with treatment of equivalent corrosion resistance using approved alternative treatment, finish, or inherent material characteristic. Products for use outdoors shall be hot dip galvanized unless material is inherently corrosion resistant.

B. Refer to Table 2.02A for approved supporting device installation guidelines.

1. Conduit Supports

a. Single run hangers: galvanized steel conduit straps or clamps, or cast metal beam clamps. Perforated straps and spring steel clips and clamps will not be permitted.

b. Group run hangers: minimum 12-gauge galvanized performed U-channel rack with conduit fittings; 25 percent spare capacity

c. Hanger rods: threaded steel, 3/8-inch diameter, or as identified on Drawings

d. Vertical run supports: minimum 12-gauge galvanized performed U-channel struts with conduit fittings

2. Equipment and Lighting Supports

a. 12-gauge galvanized performed U-channel struts with fixture and conduit fittings, as applicable, unless indicated otherwise on Drawings.

3. Corrosive Area Supports

a. Clamp hangers, pipe straps, and clamp back spacers for use with PVC-coated rigid metal conduit shall have 40 mil gray PVC exterior coating.

b. Provide nonmetallic PVC material clamp hangers, pipe straps, etc. for use with PVC nonmetallic conduit.

c. Hanger rods: 20 mil gray PVC exterior coated rod with threaded ends only 3/8-inch and 1/2-inch sizes as required.

d. Strut support: 20 mil gray PVC exterior coating strut. Standard channel, slotted channel, and back to back channel are acceptable.

e. Provide stainless steel supports and accessories in lieu of PVC coated supports when indicated in Table 2.02A below.

TABLE 2.02A – Supporting Devices

Location/Equipment	Acceptable Support Type
Electrical & Control Rooms	Galvanized Steel U-Channel
Exterior	Galvanized Steel U-Channel
Chemical Storage Rooms	PVC Coated Strut

2.03 BOXES AND FITTINGS

A. Boxes must have sufficient volume to accommodate the number of conductors entering the box in accordance with NFPA 70 and UL 514A.

B. In general, boxes that are exposed to weather, process areas, normally wet locations, and locations exposed in mechanical spaces shall be cast-metal. Boxes in all other finished areas shall be sheet metal. Boxes installed in corrosive areas, such as the chemical feed room, shall be nonmetallic.

C. Refer to Table 2.03A for approved enclosure types.

1. Sheet Metal Outlet Boxes

a. Sheet Metal Outlet Boxes: Standard type galvanized steel, minimum four-inch square or octagon by 1-1/2 inch deep.

b. Luminaire and Equipment Supporting boxes: Rated for weight of equipment supported; include 2-inch male fixture studs where required.

c. Single Wall Type: Minimum size, four-inch square by 1-1/2 inch or 2-1/8 inch deep, except as noted. Provide dry wall device covers raised 3/4 inch minimum to ensure flush finish mounting.

d. Ganged Wall Type: Minimum depth three inches except as noted, ganged as required under common plate to contain devices shown. On 277-volt circuits, ganged boxes for switches shall contain only one circuit or equip box with permanent barriers per NEC Art 404-8.

2. Cast Outlet Boxes

a. Type FS shallow and type FD deep, cast ferroalloy

b. Provide number of threaded hubs as required.

c. Use in all exterior, damp and locations exposed in mechanical spaces.

d. Provide gasketed cover and accessories by box manufacturer for complete weatherproofing. Provide correct box to accept weatherproof covers as specified.

3. Sheet Metal Pull & Junction Boxes

a. Sheet metal boxes shall be standard type galvanized steel and must conform to UL 50.

b. Box dimensions shall be minimum four inch square or octagon by 2/1/2 inch deep.

c. Sizes up to 12 by 12 by 6 inches: Provide screw-type or hinged covers.

d. Sizes greater than 12 by 12 by 6 inches: Provide hinged covers.

e. Boxes shall be sized to accommodate all incoming raceways.

4. Nonmetallic Outlet, Device, and Wiring Boxes

a. Conform to NEMA OS 2, Nonmetallic Outlet Boxes, Device Boxes, Covers, and box Supports, and UL 514C, Nonmetallic Outlet Boxes, Flush Device Boxes and Covers. Boxes shall be molded polyvinyl chloride (PVC), or fiberglass units of type, shape, size, and depth to suit location and application.

b. Boxes shall be equipped with threaded screw holes for device and cover plate mounting. Each box shall have a molded cover of matching material suitable for the application and location installed.

TABLE 2.03A – Electrical Enclosure Types

Location/Equipment	Acceptable Enclosure Type
Electrical & Control Rooms	NEMA 12G
Exterior	NEMA 4X
Chemical Room	NEMA 4X

2.04 SOURCE QUALITY CONTROL

A. Provide in accordance with City of Pleasanton Specifications and Special Provisions.

PART 3 – EXECUTION

3.01 CONDUIT

A. Uses Permitted

1. Use liquid tight flexible metal conduit for the final 24 inches of connections to motors or control items subject to movement or vibration.

2. Use RGS for all exterior aboveground installations unless otherwise noted.

3. Use PVC coated rigid steel conduit, or as scheduled below, for installation in corrosive areas, and other areas as identified on the Drawings.

4. Exposed raceways in Manufacturing Areas, Utility Rooms, Mechanical Rooms, Warehouse Areas, etc., shall be Rigid Galvanized Steel below 15 feet.

5. Use Schedule 40 PVC conduit for exterior direct buried installations. Use Schedule 40 PVC conduit for exterior concrete encased installations. The transition from underground and from concrete encasement to riser shall be PVC coated rigid steel conduit to a minimum of 12 inches above finished floor and/or finished grade elevation. All elbows shall be prefabricated

Rigid Steel to prevent wire burn through. Reference Section 16135 – Underground Ducts and Raceways for Electrical Systems for further requirements.

6. Install conduit seals for conduit penetrations of slabs on grade and exterior walls below grade and where indicated. Tighten sleeve seal screws until sealing grommets have expanded to form watertight seal. Provide seals for interior of conduits penetrating exterior or water bearing walls, consisting of gland type sealing bushings or RTV closed cell silicone foam.

7. Refer to Table 3.01A below for approved conduit types.

TABLE 3.01A – Conduit Types

Location/Equipment	Approved Conduit Type
Electrical & Control Rooms	Rigid Galvanized Steel
Exterior	Rigid Galvanized Steel
Chemical Room	PVC Coated Rigid Galvanized Steel

B. Power, lighting, control, emergency light and power, and special-service systems and all related components shall be installed in accordance with NFPA 70, and shall be enclosed in separate conduit or separate conduit systems as indicated on the Drawings and as specified herein.

C. Any run of conduit between outlet and outlet, between fitting and fitting, or between outlet and fitting shall contain no more than the equivalent of three 90-degree bends, including those bends located immediately at the outlet or fitting. Field bends shall be made in accordance with the manufacturer's recommendations, which normally require use of a one-size-larger bender than would be required for uncoated conduit. Installed conduit and fittings shall be free of dirt and trash and shall not be deformed or crushed. Empty conduit shall have a pull rope stalled.

D. Conduit shall be installed with a minimum of 3 inches of free air space separation from mechanical piping.

E. Conduit in finished areas shall be installed concealed. Conduit passing through masonry or concrete walls shall be installed in sleeves. Conduit shall be securely clamped and supported at least every 10 feet vertically and 8 feet horizontally. Galvanized pipe straps shall be fastened to structure with bolts, screws, and anchors. Wooden masonry plugs shall not be used.

F. Install exposed conduits, parallel or perpendicular to walls, ceilings, or structural members. Do not run through structural members. Avoid horizontal runs within partitions or sidewalls. Avoid ceiling inserts, lights, or ventilation ducts or outlets. Do not run conduits across pipe shafts or ventilation duct openings and keep conduits a minimum of 6 inches from parallel runs of flues, hot water pipes, or other

sources of heat. Wherever possible, install horizontal raceway runs above water and steam piping.

G. Do not run conduits exposed on exterior surface of buildings. Seal conduits penetrating exterior walls below grade, at grade floors, or below grade floors to prevent moisture migration. Seal conduit exterior with a mechanical pipe seal. Interior conduit seal shall be a gland type sealing bushing or RTV closed cell silicone foam. Ensure that conduits do not retain water against these seals.

H. Raceways penetrating fire rated walls, floors, and partitions shall be sealed with a fire rated sealant.

I. Support conduits with materials specifically made for this purpose. Do not use wire hangers. Do not attach any parts of the raceway system to ventilation ducts. Conduit supports shall be attached to the building. Support conduits on each side of bends and on a spacing not to exceed the following: 6 feet for conduits smaller than 1 1/4-inches and 8 feet for conduits 1 1/4-inches and larger. Support riser conduits at each floor level with clamp hangers. Securely anchor underground conduits to prevent movement during placement of concrete or backfill. Use precast separators and heavy gauge wire ties or other approved fasteners.

J. Conduit connections to boxes and fittings shall be supported not more than 36 inches from the connection point. Conduit bends shall be supported not more than 36 inches from each change in direction. Conduit shall be installed in neat symmetrical lines parallel to the centerlines of the building construction and the building outline. Multiple runs shall be parallel and grouped whenever possible on common supports. Exposed ends of conduit without conductors shall be sealed with watertight caps or plugs.

K. Bonding wires shall be used in flexible conduit for all circuits. Flexible conduit shall not be considered a ground conductor.

L. Liquid tight flexible metallic conduits shall be used in wet and oily locations and to complete the connection to motor-driven equipment.

M. Electrical connections to vibration-isolated equipment shall be made with flexible metallic conduit in a manner that will not impair the function of the equipment.

N. A polypropylene pull rope with a tensile strength not less than 130 pounds shall be installed in empty conduit.

O. Electrical conduit may be embedded in concrete according to the provisions of Article 6.3 of ACI 318 Building Code Requirements for Reinforced Concrete, provided the following conditions are met:

1. Outside diameter of conduit shall not exceed 1/3 of concrete thickness. Maximum conduit outside diameter shall not exceed 3 inches when embedded in slab.

2. Conduit shall not be placed closer than three diameters on center. Route conduit to minimize crossing of different conduit runs.

3. Conduit shall not be embedded in structural concrete slabs less than four inches thick.

4. A 1-1/2 inch minimum concrete cover shall be provided for conduits in structural concrete slabs.

P. Installation of Underground Conduit

1. Minimum of 3/4 inch conduit in or under concrete slab on grade.

2. Where conduits are installed in concrete slabs, on the ground, underground, or exposed to the weather, make all joints liquid tight and gas tight.

3. Bury all underground conduits, except under concrete slabs placed on fill, to a depth of at least 30 inches below finished grade unless otherwise indicated on the Drawings .

4. Slope ducts to drain away from buildings into manholes and/or handholes. Adjust final slopes to coordinate with existing Site utilities.

5. Install on undisturbed soil where possible. Concrete encase conduits as shown on Drawings. Use pit run gravel and sand, placed 8-inch lifts and compacted for backfill.

6. Reference Section 16135 – Underground Ducts and Raceways for Electrical Systems for further requirements.

Q. Installation of Rigid Metal Conduit

1. Ends of conduit shall be cut square, reamed and threaded, and joints shall be brought butt-to-butt in the couplings. Joints shall be mechanically tight. Conduit shall be protected against damage and the entrance of water or foreign material during construction.

2. Ninety-degree bends of conduit with a diameter larger than 1 inch shall be made with factory-made elbows. Conduit elbows larger than 2 1/2 inches shall be long radius. Field-made bends and offsets shall be made with an approved hickey or conduit-bending machine. Changes in directions of runs shall be made with symmetrical bends or cast-metal fittings.

3. At connections to sheet metal enclosures and boxes, a sufficient number of threads shall project through to permit the bushing to be drawn tight against the end of the conduit, after which the locknut shall be pulled up sufficiently tight to draw the bushing into firm electrical contact with the box. Conduit shall be fastened to sheet metal boxes and cabinets with two locknuts where required by NFPA 70 where insulating bushings are used, where bushings cannot be brought into firm contact with the box, and where indicated.

4. Conduit joints shall be made with tapered threads set firmly. Each length of conduit cut in the field shall be reamed before installation. Where conduit is threaded in the field, each threaded end shall consist of at least five full threads. Corrosion-inhibitive compound (cold galvanizing paint) shall be used on all conduit threads or any locations where the original hot galvanized surface has been compromised.

5. Conduit stubbed-up through concrete floors for connections to free-standing equipment except motor-control centers, cubicles, and other such items of equipment shall be provided with a minimum of a 12 inch riser above the floor slab is of sufficient thickness; if not, a floor box shall be provided and set flush with the finished floor. Conduits installed for future use shall be terminated with a coupling and plug set flush with the floor.

3.01 SUPPORTING DEVICES

A. Install supporting devices to fasten electrical components securely and permanently in accordance with NEC requirements.

B. Coordinate with the building structural system and with other electrical installations.

C. Conform to manufacturer's recommendations for selection and installation of supports.

D. Install individual and multiple (trapeze) raceway hangers and riser clamps as necessary to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assembly and for securing hanger rods and conduits.

E. Support parallel runs of horizontal raceways together on trapeze type hangers.

F. Support individual horizontal raceways by separate pipe hangers. Spring steel fasteners may be used in lieu of hangers only for 1 1/2 inch and smaller raceways serving lighting and receptacle branch circuits above suspended ceilings only. For hanger rods with spring steel fasteners, use 1/4 inch diameter or larger threaded steel. Use spring steel fasteners that are specifically designed for supporting single conduits or tubing.

G. In vertical runs, arrange support so the load produced by the weight of the raceway and the enclosed conductors is carried entirely by the conduit supports with no weight load on raceway terminals.

H. Support miscellaneous electrical components as required to produce the same structural safety factors as specified for raceway supports. Install metal channel racks for mounting cabinets, panelboards, disconnects, control enclosures, pull boxes, junction boxes, transformers, and other devices.

I. Install sleeves in concrete slabs and walls and all other fire rated floors and walls for raceways and cable installations. For sleeves through fire rated wall or floor construction, apply UL listed fire-stopping sealant in gaps between sleeves and enclosed conduits and cables.

3.02 BOXES AND FITTINGS

A. Pullboxes shall be furnished and installed where necessary in the conduit system to facilitate conductor installation. Conduit runs longer than 100 feet or with more than three right angle bends shall have a pull box installed at a convenient intermediate location.

B. Boxes and enclosures shall be securely mounted to the building structure with supporting facilities independent of the conduit entering or leaving the boxes.

C. Bonding jumpers shall be used around concentric or eccentric knockouts.

D. Installation of Outlet Boxes

1. Use nonmetallic boxes in corrosive areas such as chemical feed area and as designated on the Plans.

2. Use cast metal boxes in all other locations. Each box with associated covers and fittings shall have a NEMA rating for each location installed.

E. Installation of Pull and Junction Boxes

1. Use general-purpose boxes (NEMA 1) in finished areas with framed construction.

2. Use dust-tight and oil-tight boxes (NEMA 12) in other dry interior areas.

3. Use watertight boxes (NEMA 4X) for exterior and wet locations on outdoor structure where moisture is present.

4. Use corrosion resistant watertight boxes (NEMA 4X) for wet locations and corrosion filled areas, such as the chemical feed area, and as identified on the Drawings.

3.03 FIELD QUALITY CONTROL

A. Provide in accordance with City of Pleasanton Specifications and Special Provisions.

3.04 STARTUP & COMMISSIONING

A. Provide in accordance with City of Pleasanton Specifications and Special Provisions.

3.05 CLOSEOUT ACTIVITIES

A. Provide in accordance with City of Pleasanton Specifications and Special Provisions.

END OF SECTION

SECTION 16135

UNDERGROUND DUCTS AND RACEWAYS

PART 1 – GENERAL

1.01 SUMMARY

A. Provide underground ducts and raceways for electrical systems including necessary excavation, backfill and surface restoration in accordance with this Section and applicable reference standards listed in Article 1.03.

B. Provide underground conduit duct banks with handholes and pullboxes for power, and lighting circuits as shown on Drawings.

C. Related Requirements

1. Section 16050 Basic Materials and Methods

2. Section 16060 Grounding and Bonding

3. Section 16120 Conductors and Cables

4. Section 16130 Raceway and Boxes

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per City of Pleasanton Specifications and Special Provisions.

1.03 REFERENCES

A. Reference Standards

1. American National Standards Institute (ANSI)

a. ANSI A14.3, Safety Requirements for Fixed Ladders

2. ASTM International (ASTM)

a. ASTM A48 Standard Specification for Gray Iron Castings

b. ASTM D570 Standard Test Method for Water Absorption of Plastics

1) Section 5, 6.1, 6.5: Water Absorption

c. ASTM D635 Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position

d. ASTM D790 Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials

e. ASTM G154 Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials

3. Institute of Electrical and Electronic Engineers (IEEE)

4. Insulated Cable Engineers Association (ICEA)

5. National Electrical Code (NEC)

6. National Electrical Manufacturers Association (NEMA)

7. National Electrical Safety Code (NESC)

8. Occupational Safety and Health Administration (OSHA)

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, sequencing, and scheduling: per City of Pleasanton Specifications and Special Provisions.

B. Coordinate installation with piping and other underground systems and structures and locate clear of interferences. Coordinate manhole and handhole installation with piping, sheet piling and other underground systems and structures and locate clear of interferences.

1.05 SUBMITTALS

A. Submit in accordance with City of Pleasanton Specifications and Special Provisions.

B. Shop Drawings

1. Layouts showing the proposed routing of duct banks and the locations of handholes and areas of reinforcement

2. Profiles of duct banks showing crossings with piping and other underground systems

3. Typical cross sections

4. Installation procedures

5. Manufacturer's technical information for handholes and accessories proposed for use

6. Drawings showing interior and exterior manhole and handhole dimensions and details of openings, jointing, inserts, reinforcing, size and locations of openings, and accessory locations

7. Certificate of concrete and steel used in underground pre-cast concrete utility structures, according to ASTM C858

8. Product Data for nonmetallic conduit and manhole accessories

C. Record Drawings

1. Layouts showing the actual routing of duct banks including the dimensions and depth of the top of duct bank below grade. Record Drawings for duct banks should also include cross sections of the duct bank indicating the circuit, use, conduit size, orientation and number of conduits.

2. Locations of handholes, and areas of reinforcement

D. Closeout and maintenance material submittals: per City of Pleasanton Specifications and Special Provisions.

1.06 QUALITY ASSURANCE

A. Provide in accordance with City of Pleasanton Specifications and Special Provisions.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with City of Pleasanton Specifications and Special Provisions.

1.08 SITE CONDITIONS

A. Existing conditions: per City of Pleasanton Specifications and Special Provisions.

PART 2 – PRODUCTS

2.01 DUCT BANK CONDUIT

A. Duct: Schedule 40 conduit and fittings in accordance with Section 16130.

B. Rigid steel conduit and fittings in accordance with Section 16130.

C. Shielded instrumentation and communications cable to be installed in ferrous metal, steel conduit throughout entire run of conduit from end to end.

2.02 HANDHOLES

A. The pull/splice box underground enclosures shall be constructed of polymer concrete consisting of sand and aggregate bound together with a polymer resin. Internal reinforcement may be provided by means of steel, fiberglass, or a combination of the two. Handholes for installation in roadways shall concrete reinforced H20 traffic rated.

B. Enclosure

1. The enclosure must be manufactured with an open or closed bottom and a removable cover. The enclosures shall be green or concrete gray in color.

2. The enclosures shall be designed to be installed flush to grade with the cover fitting flush to the box.

3. The enclosures shall be suitable for installation in either direct or buried native soil, embedded in concrete, or embedded in asphalt surfacing. (A concrete collar is required for installation in asphalt).

4. The enclosures shall be of a stackable design for greater installation flexibility.

5. All covers are to be equipped with a minimum of two stainless steel lockdown mechanisms. All covers shall have a logo recessed into the cover and it shall read ELECTRIC.

6. All enclosure covers will have some type of recessed access point to allow removal of the cover with a hook. The access points will be placed in such a location to allow for the greatest amount of leverage and safety possible

7. Enclosures shall be designed and suitable for installation and use through a temperature range of minus 40 degrees C (minus 40 degrees F) to 60 degrees C (140 degrees F).

8. A certified copy of all test reports must be signed and stamped by a registered professional engineer and submitted prior to shipment of products.

C. Material Requirements

1. Permanent deflection of any surface shall not exceed 10 percent of the maximum allowable static design load deflection.

2. The covers shall be skid resistant and have a maximum coefficient of friction of 0.50 on the top surface of the cover. Coatings will not be allowed.

3. Any point on the covers must be able to withstand a 70 foot-pound impact administered with a 12-pound weight having a "C" tup (ASTM D-2444) without puncturing or splitting. The test shall be performed with the cover resting on a flat, rigid surface such as concrete or a 1 steel plate

4. Covers shall have molded lettering, ELECTRIC or COMM as applicable

5. Fastening devices used to secure the cover to the box shall be capable of withstanding a minimum torque of 15 foot-pounds and minimum straight pullout strength of 750 pounds.

6. The material is tested according to the requirements of ASTM D543, Section 7, Procedure 1, for chemical resistance. The manufacturer is responsible for proof of compliance with the latest version of the ASTM standards

7. Comply with the following acceptance standards.

   a. ASTM D570

   b. ASTM D635

   c. ASTM D790

   d. ASTM G154

D. Acceptable level of quality for handholes: equivalent to Quazite by Hubbell.

2.03 SOURCE QUALITY CONTROL

A. Provide in accordance with City of Pleasanton Specifications and Special Provisions.

PART 3 – EXECUTION

3.01 GENERAL

A. Measure, mix and place concrete, and compact as required in Division 03.

B. Provide no less than 3 inches of concrete between outside of a duct and the earth. Provide no less than 2 inches of concrete between adjacent ducts. Refer to Drawings for spacing requirements. Provide side forms for each duct bank.

C. Duct line concrete pours to be continuous between handholes and between handholes and structures.

D. Where duct lines pass through concrete walls, concrete envelopes shall be extended through the finished flush with inside surfaces. Watertight construction joints of an approved type shall be provided.

E. Duct banks shall be reinforced when laid on backfill covering new pipelines, roads, parking lots or any are subject to vehicular traffic. Beneath these areas, install reinforcing bars as shown on the Drawings, extending 10 feet beyond area needing protection.

F. Duct lines shall be laid in trenches on mats of gravel not less than 6 inches thick and well graded.

G. Provide red electrical duct banks for safety purposes.

H. Install raceways to drain away from buildings. Raceways between handholes shall drain toward the handholes. Raceway slopes may not be less than 3 inches per 100-feet.

I. Make raceway entrances to buildings and vaults with hot dipped rigid galvanized steel conduit not less than 10 feet long. Conduits which are not concrete encased for runs below floor slabs in slab-on-grade construction shall be hot dipped rigid galvanized steel conduit. Conduits which are concrete encased for runs below floor slabs in slab-on-grade construction shall be encased under the slab to their respective equipment.

3.02 PROJECT CONDITIONS AND COORDINATION

A. Coordination with other Underground Utilities

1. Locate existing underground utilities through use of an underground utility piping location services company. Locate existing underground utilities and piping before any excavation begins.

2. Coordinate conduit routing, duct bank and handholes with other new and existing underground utilities. Revise locations and elevations as required to suit field conditions and ensure conduits, duct runs, and handholes do not interfere with existing and new underground utilities and piping.

3.03 INSTALLATION

A. Provide excavation and backfilling required for ductbank handhole installation.

B. Assemble duct banks using non-magnetic saddles, spacers, and separators. Position separators to provide 3-inch minimum separation between the outer surfaces of the ducts.

C. Firmly fix ducts in place during pouring of concrete. Carefully spade and vibrate the concrete to insure filling of all spaces between ducts.

D. Make bends with sweeps of not less than 48-inch radius or 5 degree angle couplings.

E. Make a transition from non-metallic to PVC coated rigid steel conduit where duct banks enter structures or turn upward for continuation above grade. Terminate the ducts in insulated grounding bushings. Continue ducts inside buildings with steel, metallic conduit.

F. Where ducts enter handholes, terminate the ducts in suitable end bells.

G. Provide expansion/deflection fittings in accordance with the requirements specified in Section 16130.

H. Do not backfill with material containing large rock, paving materials, cinders, large or sharply angular substances, corrosive material, or other materials that can damage or contribute to corrosion of ducts or cables or prevent adequate compaction of fill.

I. After completion of the duct bank and prior to pulling cable, pull a mandrel, not less than 12 inches long and with a cross section approximately 1/4 inch less than the inside cross section of the duct, through each duct. Then pull a rag swab or sponge through to make certain that no particles of earth, sand or gravel have been left in the duct.

J. Install a bare stranded copper duct bank ground cable in each duct bank envelope. Make ground electrically continuous throughout the entire duct bank system. Connect ground cable to building and station ground grid or to equipment ground buses. In addition, connect ground cable to steel conduit extensions of the underground duct system. Provide ground clamp and bonding of each steel conduit extension, where necessary to maintain continuity of the ground system. Terminate ground conductor at last manhole or handhole for outlying structures.

K. Install a warning ribbon approximately 12 inches below finished grade over all underground duct banks. The identifying ribbon shall be a PVC tape, detectable metal backed, 3 inches wide, red color, permanently imprinted with CAUTION BURIED ELECTRIC LINE BELOW in black letters.

L. Plug and seal all empty spare ducts entering buildings and structures. Seal all ducts in use entering buildings and structures. Seal shall be watertight. Acceptable level of quality: equivalent to O-Z/Gedney Type Dux Duct Sealing Compound.

M. Install duct banks in conformance with NEC and NESC.

N. Install handholes where shown on Drawings. Verify final locations in field.

O. Complete installation of handholes so that structures are watertight. Provide expansion/deflection fitting for each conduit entry into the handholes.

P. Conduits to extend 3 inches above concrete slab surface, unless otherwise indicated. Conduits to be bushed to protect cables and provide means for grounding.

Q. Duct bank conduit spacers: non-metallic, snap together intermediate and bottom pieces, sized for conduit diameter and code spacing. Acceptable level of quality: equivalent to Carlon Snap-Loc. Separators shall be compatible with the conduit utilized. Stagger conduit joints by rows and layers to provide a duct line having maximum strength. During construction, protect partially completed duct lines from the entrance of debris by conduits plugs. As each section of a duct line is completed, a testing mandrel not less than 12 inches long with a diameter 1/4-inch less than the size of the conduit, shall be drawn through each conduit, after which a brush having the diameter of the duct, and having stiff bristles shall be drawn through until the conduit is clear of all particles of earth, sand and/or gravel; conduit plugs shall then be immediately installed. Provide a plastic pull rope, having a minimum of 3 additional feet at each end, in all spare ducts.

3.04 DUCT BANK INSTALLATION

A. Bends to have a radius greater than 36 inches or 12 times conduit inside diameter, whichever is greater.

B. Install duct with minimum slope of 4 inches per 100-feet. Slope duct away from building entrances.

C. Install no more than equivalent of three 90-degree bends between pull points.

D. Provide suitable fittings to accommodate expansion and deflection where required.

E. Use suitable separators and chairs installed not greater than 4-feet on centers. Conduit separation shall be per code, and not less than 3 inches.

F. Securely anchor duct to prevent movement during concrete placement. Use re-bar holders at spacers and secure with No. 4 re-bar driven into the earth at a minimum of 1-foot.

G. Connect to manhole wall using No. 6 re-bar dowels. Dowels shall be located at each corner, and 12 inches on center. Insert dowels minimum 3 inches into manhole and 3 feet into duct bank.

H. Tops of concrete-encased ducts

1. Not less than 24 inches and not less than shown on the Drawings, below finished grade

2. Not less than 30 inches and not less than shown on the Drawings, below roads and other paved surfaces

I. Tops of direct burial ducts and conduits

1. Not less than 24 inches and not less than shown on the Drawings, below finished grade

2. Not less than 30 inches and not less than shown on the Drawings, below roads and other paved surfaces

3.05 CABLE PULLING

A. Inspection, handling, storage, temperature conditioning prior to installation, bending and training limits, pulling limits, and calculation parameters for installation of cables must comply with manufacturer's recommendations. For ease of installation and prevention of cable damage, utilize quadrant blocks located properly along the cable run.

B. Provide soapstone, graphite, or talc cable lubricant for rubber or plastic jacketed cables.

C. Lubricants for assisting in the pulling or jacketed cables: specifically recommended by cable manufacturer.

D. Cable pulling tensions may not exceed the maximum pulling tensions recommended by the cable manufacturer.

E. Medium voltage cables: individually fire/arc proofed.

3.06 CABLE TERMINATING

A. Terminations of insulated power and lighting cables shall be protected from accidental contact, deterioration of coverings and moisture by the use of terminating devices and materials. Terminations shall be made using materials and method as indicated or specified or as designed by cable manufacturer and termination kit manufacturer.

3.07 GROUNDING

A. Ground duct banks with a bare stranded copper ground wire that is run within the duct bank and is bonded and grounded at both ends. Conduit may not be used as the ground conductor.

B. Install a ground rod for each manhole. Bond exposed metal manhole accessories and concrete reinforcing rods with bare copper wire and connect to ground rod and ductbank ground cable. Provide foam sealant for rod penetration in manhole floor for watertight seal.

C. Install a bare stranded copper duct bank ground cable in each duct bank envelope. Make ground electrically continuous throughout the entire duct bank system. Connect ground cable to building and station ground grid or to equipment ground buses. In addition, connect ground cable to steel conduit extensions of the underground duct system, handholes. Provide ground clamp and bonding of each steel conduit extension, where necessary to maintain continuity of the ground system. Where grounding systems/grids are not available at the end of the ductbank

for connection of the ductbank ground wire, provide a ground rod at the end of the ductbank and bond to associated ductbank ground wire.

3.08 FIELD QUALITY CONTROL

A. Provide in accordance with City of Pleasanton Specifications and Special Provisions.

3.09 STARTUP & COMMISSIONING

A. Provide in accordance with City of Pleasanton Specifications and Special Provisions.

3.10 CLOSEOUT ACTIVITIES

A. Provide in accordance with City of Pleasanton Specifications and Special Provisions.

END OF SECTION

SECTION 16453

ELECTRICAL STUDY

PART 1 – GENERAL

1.01 SUMMARY

A. Provide electrical studies for the following in accordance with this Section and applicable reference standards listed in Article 1.03.

1. Arc Flash Hazard Analysis. Analysis shall be provided per the requirements set forth in the NFPA 70E Standard for Electrical Safety in the Workplace. The arc flash risk assessment shall be performed according to the IEEE Standard 1584, the IEEE Guide for Performing Arc-Flash Calculations.

2. Short-Circuit Study

3. Protective Device Coordination Study

B. The scope of the studies shall include all new, existing, and modified electrical distribution equipment at the Turnout No.4 Booster Pump Station.

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per City of Pleasanton Specifications and Special Provisions.

1.03 REFERENCES

A. Reference Standards

1. Institute of Electrical and Electronics Engineers, Inc. (IEEE)

a. IEEE 141 Recommended Practice for Electric Power Distribution and Coordination of Industrial and Commercial Power Systems

b. IEEE 242 Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems

c. IEEE 399 Recommended Practice for Industrial and Commercial Power System Analysis

d. IEEE 241 Recommended Practice for Electric Power Systems in Commercial Buildings

e. IEEE 1015 Recommended Practice for Applying Low-Voltage Circuit Breakers Used in Industrial and Commercial Power Systems

f. IEEE 1584 Guide for Performing Arc-Flash Hazard Calculations

2. American National Standards Institute (ANSI)

   a. ANSI C57.12.00 Standard General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers

   b. ANSI C37.13 Standard for Low Voltage AC Power Circuit Breakers Used in Enclosures

   c. ANSI C37.010 Standard Application Guide for AC High Voltage Circuit Breakers Rated on a Symmetrical Current Basis

   d. ANSI C 37.41 Standard Design Tests for High Voltage Fuses, Distribution Enclosed Single-Pole Air Switches, Fuse Disconnecting Switches and Accessories.

3. The National Fire Protection Association (NFPA)

   a. NFPA 70 National Electrical Code

   b. NFPA 70E Standard for Electrical Safety in the Workplace

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per City of Pleasanton Specifications and Special Provisions.

1.05 SUBMITTALS

A. Submit in accordance with City of Pleasanton Specifications and Special Provisions.

B. Submittals for review/approval

1. The studies shall be submitted to the Engineer prior to receiving final approval of the distribution equipment Shop Drawings and/or prior to release of equipment Drawings for manufacturing. If formal completion of the study may cause delays in equipment shipments, approval from the Engineer may be obtained for a preliminary submittal of data to ensure that the selection of device ratings and characteristics will be satisfactory to properly select the distribution equipment. The formal study will be provided to verify preliminary findings.

C. Submittals for construction

1. The results of the short-circuit, protective device coordination and arc flash risk assessment studies shall be summarized in a final report. A minimum of 5 bound copies of the complete final report shall be submitted. For large system studies, submittals requiring more than 5 copies of the report will be provided without the section containing the computer printout of the short-circuit input and output data. Electronic PDF copies of the report will be provided upon request.

2. The report shall include the following sections

   a. Executive Summary including Introduction, Scope of Work, and Results/Recommendations

   b. Short-Circuit Methodology Analysis Results and Recommendations

   c. Short-Circuit Device Evaluation Table

   d. Protective Device Coordination Methodology Analysis Results and Recommendations

   e. Protective Device Settings Table

   f. Time-Current Coordination Graphs and Recommendations

   g. Arc Flash Risk Assessment Results and Recommendations including the details of the incident energy and flash protection boundary calculations, along with Arc Flash boundary distances, working distances, Incident Energy levels and Personal Protection Equipment levels.

   h. Arc Flash Labeling section showing types of labels to be provided. Section will contain descriptive information as well as typical label images.

   i. One-line system diagram that shall be computer generated and will clearly identify individual equipment buses, bus numbers used in the short-circuit analysis, cable and bus connections between the equipment, calculated maximum short-circuit current at each bus location, device numbers used in the time-current coordination analysis, and other information pertinent to the computer analysis.

1.06 QUALITY ASSURANCE

A. Provide in accordance with City of Pleasanton Specifications and Special Provisions.

B. Qualifications: per City of Pleasanton Specifications and Special Provisions and as follows.

1. The short-circuit, protective device coordination and arc flash risk assessment studies shall be conducted under the responsible charge and approval of a Registered Professional Electrical Engineer skilled in performing and interpreting the power system studies.

2. The Registered Professional Electrical Engineer shall be an employee of the equipment manufacturer or an approved engineering firm.

3. The Registered Professional Electrical Engineer shall have a minimum of 5 years of experience in performing power system studies.

4. The approved engineering firm shall demonstrate experience with Arc Flash Risk Assessment by submitting names of at least ten actual arc flash hazard risk assessments it has performed in the past year.

C. The engineering firm shall have a minimum of 10 year's experience in performing power system studies.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with City of Pleasanton Specifications and Special Provisions.

1.08 SITE CONDITIONS

A. Existing Conditions: per City of Pleasanton Specifications and Special Provisions.

PART 2 – PRODUCTS

2.01 STUDIES

A. Furnish an Arc Flash Risk Assessment Study per NFPA 70E -Standard for Electrical Safety in the Workplace, reference Article 130.3 and Annex D, including short-circuit and protective device coordination studies.

B. Perform studies using one of the following programs

1. ESA's Easypower
2. SKM
3. ETAP

2.02 DATA

A. Furnish data as required for the power system studies to the Contractor's engineer performing the short circuit protective device coordination and arc flash risk assessment studies. Provide a listing of required data. Expedite collection of the data to assure completion of the studies as required for final approval of the distribution equipment Shop Drawings and prior to the release of the equipment for manufacturing.

B. Source combination may include present and future motors and generators.

C. Load data utilized may include existing and proposed loads obtained from Contract Documents provided by Owner or by Contractor.

D. If applicable, include fault contribution of existing motors in the study. Obtain required existing equipment data, if necessary, to satisfy the study requirements. Contractor shall obtain existing studies and analyses from the Owner as required.

2.03 SHORT-CIRCUIT ANALYSIS

A. Transformer design impedances shall be used when test impedances are not available.

B. Provide the following

1. Calculation methods and assumptions

2. Selected base per unit quantities

3. One-line diagram of the system being evaluated that clearly identifies individual equipment buses, bus numbers used in the short-circuit analysis, cable and bus connections between the equipment, calculated maximum short-circuit current at each bus location and other information pertinent to the computer analysis.

4. The study shall include input circuit data including electric utility system characteristics, source impedance data, conductor lengths, number of conductors per phase, conductor impedance values, insulation types, transformer impedances and X/R ratios, motor contributions, and other circuit information as related to the short-circuit calculations.

5. Tabulations of calculated quantities including short-circuit currents, X/R ratios, equipment short-circuit interrupting or withstand current ratings and notes regarding adequacy or inadequacy of the equipment rating.

6. Results, conclusions, and recommendations. A comprehensive discussion section evaluating the adequacy or inadequacy of the equipment must be provided and include recommendations as appropriate for improvements to the system.

C. For solidly grounded systems, provide a bolted line-to-ground fault current study for applicable buses as determined by the Engineer performing the study.

D. Protective Device Evaluation

1. Evaluate equipment and protective devices and compare to short circuit ratings.

2. Adequacy of switchgear, motor control centers, and panelboard bus bars to withstand short-circuit stresses.

3. Vendor shall notify Owner in writing, of any circuit protective devices improperly rated for the calculated available fault current.

2.04 PROTECTIVE DEVICE TIME-CURRENT COORDINATION ANALYSIS

A. Protective device coordination time-current curves (TCC) shall be displayed on log-log scale graphs.

B. Include on each TCC graph, a complete title with descriptive device names.

C. Terminate device characteristic curves at a point reflecting maximum symmetrical or asymmetrical fault current to which the device is exposed.

D. Identify the device associated with each curve by manufacturer type, function, and, if applicable, tap, time delay, and instantaneous settings recommended.

E. Plot the following characteristics on the TCC graphs, where applicable

1. Electric utility's overcurrent protective device

2. Medium voltage equipment overcurrent relays

3. Medium and low voltage fuses including manufacturer's minimum melt, total clearing, tolerance, and damage bands

4. Low voltage equipment circuit breaker trip devices, including manufacturer's tolerance bands

5. Transformer full-load current, magnetizing inrush current, and ANSI through-fault protection curves

6. Medium voltage conductor damage curves

7. Ground fault protective devices, as applicable

8. Pertinent motor starting characteristics and motor damage points, where applicable

9. Pertinent generator short-circuit decrement curve and generator damage point

10. The largest feeder circuit breaker in each motor control center and applicable panelboard

F. Provide adequate time margins between device characteristics such that selective operation is provided, while providing proper protection.

G. Provide the following

1. A one-line diagram shall be provided which clearly identifies individual equipment buses, bus numbers, device identification numbers and the maximum available short-circuit current at each bus when known.

2. A sufficient number of log-log plots shall be provided to indicate the degree of system protection and coordination by displaying the time-current characteristics of series connected overcurrent devices and other pertinent system parameters.

3. Computer printouts shall accompany the log-log plots and will contain descriptions for each of the devices shown, settings of the adjustable devices, and device identification numbers to aid in locating the devices on the log-log plots and the system one-line diagram.

4. The study shall include a separate, tabular printout containing the recommended settings of all adjustable overcurrent protective devices, the equipment designation where the device is located, and the device number corresponding to the device on the system one-line diagram.

5. A discussion section which evaluates the degree of system protection and service continuity with overcurrent devices, along with recommendations as required for addressing system protection or device coordination deficiencies.

6. Vendor shall notify Owner in writing of any significant deficiencies in protection and/or coordination. Provide recommendations for improvements.

2.05 ARC FLASH RISK ASSESSMENT

A. The arc flash risk assessment shall be performed according to the IEEE 1584 equations that are presented in NFPA70E Annex D. The arc flash risk assessment shall be performed in conjunction with the short-circuit analysis (Section 2.03) and the protective device time-current coordination analysis (Section 2.04).

B. The flash protection boundary and the incident energy shall be calculated at significant locations in the electrical distribution system (switchboards, switchgear, motor-control centers, panelboards, busway, and splitters) where Work could be performed on energized parts.

C. Circuits 240V or less fed by single transformer rated less than 125 kVA may be omitted from the computer model and will be assumed to have a hazard risk category 0 per NFPA 70E.

D. Working distances shall be based on IEEE 1584. The calculated arc flash protection boundary shall be determined using those working distances.

E. When appropriate, the short circuit calculations and the clearing times of the phase overcurrent devices will be retrieved from the short circuit and coordination study model. Ground overcurrent relays should not be taken into consideration when determining the clearing time when performing incident energy calculations.

F. The short circuit calculations and the corresponding incident energy calculations for multiple system scenarios must be compared and the greatest incident energy must be uniquely reported for each equipment location in a single table. Calculations must be performed to represent the maximum and minimum contributions of fault current magnitude for normal and emergency operating conditions. The minimum calculation will assume that the utility contribution is at a minimum. Conversely, the maximum calculation will assume a maximum contribution from the utility. Calculations shall take into consideration the parallel operation of synchronous generators with the electric utility, where applicable as well as any stand-by generator applications.

G. The Arc-Flash Risk Assessment shall be performed utilizing mutually agreed upon facility operational conditions, and the final report shall describe, when applicable, how these conditions differ from worst-case bolted fault conditions.

H. The incident energy calculations must consider the accumulation of energy over time when performing arc flash calculations on buses with multiple sources. Iterative calculations must take into account the changing current contributions, as the sources are interrupted or decremented with time. Fault contribution from motors should be decremented as follows:

    1. Fault contribution from induction motors should not be considered beyond 5 cycles.

I. For each piece of ANSI rated equipment with an enclosed main device, two calculations shall be made. A calculation shall be made for the main cubicle, sides, or rear; and shall be based on a device located upstream of the equipment to clear the arcing fault. A second calculation shall be made for the front cubicles and shall be based on the equipment's main device to clear the arcing fault. For all other non-ANSI rated equipment, only one calculation shall be required and it shall be based on a device located upstream of the equipment to clear the arcing fault.

J. When performing incident energy calculations on the line side of a main breaker (as required per above), the line side and load side contributions must be included in the fault calculation.

K. Mis-coordination should be checked amongst all devices within the branch containing the immediate protective device upstream of the calculation location and the calculation should utilize the fastest device to compute the incident energy for the corresponding location.

L. Arc Flash calculations shall be based on actual overcurrent protective device clearing time. A maximum clearing time of 2 seconds will be used based on IEEE 1584 Section B.1.2. Where it is not physically possible to move outside of the flash protection boundary in less than 2 seconds during an arc flash event, a maximum clearing time based on the specific location shall be utilized.

M. Provide the following

1. Results of the Arc-Flash Risk Assessment shall be submitted in tabular form, and shall include device or bus name, bolted fault and arcing fault current levels, flash protection boundary distances, working distances, personal-protective equipment classes and AFIE (Arc Flash Incident Energy) levels.

2. The Arc-Flash Risk Assessment shall report incident energy values based on recommended device settings for equipment within the scope of the study.

3. The Arc-Flash Risk Assessment may include recommendations to reduce AFIE levels and enhance worker safety.

2.06 SOURCE QUALITY CONTROL

A. Provide in accordance with City of Pleasanton Specifications and Special Provisions.

PART 3 – EXECUTION

3.01 FIELD ADJUSTMENT

A. Contractor shall adjust relay and protective device settings according to the recommended settings table provided by the coordination study.

B. Field adjustments to be completed by the equipment manufacturer under the separate Startup and Acceptance Testing Contract portion of Project Specifications.

C. Contractor shall make minor modifications to equipment as required to accomplish conformance with short circuit and protective device coordination studies.

D. Contractor shall notify Owner in writing of any required major equipment modifications.

3.02 ARC FLASH LABELS

A. Provide a 4 inch by 6 inch Brady thermal transfer type label of high adhesion polyester for each Work location analyzed.

B. The labels shall be designed according to the following standards

1. UL969 – Standard for Marking and Labeling Systems

2. ANSI Z535.4 – Product Safety Signs and Labels

3. NFPA 70 (National Electric Code) – Article 110.16

C. The label shall include the following information

1. Nominal System Voltage

2. Arc flash boundary

3. At least one of the following:

a) Available incident energy and the corresponding working distance, or the arc flash PPE category in Table 130.7(C)(15)(a) or 130.7(C)(15)(c) for the equipment, but not both.

b) Minimum arc rating of clothing

c) Site-specified level of PPE.

D. Labels shall be printed by a thermal transfer type printer, with no field markings

E. Arc flash labels shall be provided for equipment as identified in the study and the respective equipment access areas per the following

1. Floor Standing Equipment: Labels shall be provided on the front of each individual section. Equipment requiring rear and/or side access shall have labels provided on each individual section access area. Equipment line-ups containing sections with multiple incident energy and flash protection boundaries shall be labeled as identified in the Arc Flash Analysis table.

2. Wall Mounted Equipment: Labels shall be provided on the front cover or a nearby adjacent surface, depending upon equipment configuration.

3. General Use Safety labels shall be installed on equipment in coordination with the Arc Flash labels. The General Use Safety labels shall warn of general electrical hazards associated with shock, arc flash, and explosions, and instruct workers to turn off power prior to Work.

F. Install labels as provided by the study. Technician providing the installation shall have completed an 8-hour instructor led Electrical Safety Training Course which includes NFPA 70E material including the selection of personal protective equipment.

G. Provide labels for specific hazard categories as shown below in Figures 3.02-1 and 3.02-2.

FIGURE 3.02-1 TYPICAL ARC FLASH WARNING LABEL

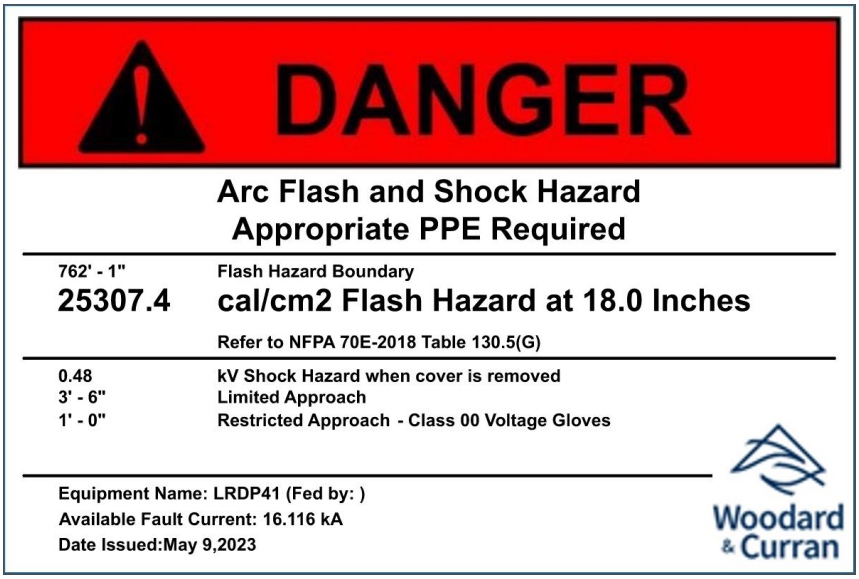

FIGURE 3.02-2 TYPICAL ARC FLASH DANGER LABEL (NO SAFE PPE)

3.03 ARC FLASH TRAINING

A. The vendor supplying the Arc Flash Risk Assessment shall train the Owner's qualified electrical personnel of the potential arc flash hazards associated with working on energized equipment (minimum of 4 hours). The training shall be certified for continuing education units (CEUs) by the International Association for Continuing Education Training (IACET) or equivalent. The trainer shall offer 2 sessions of training for plant staff. The trainer shall be an authorized OSHA Outreach instructor.

B. The vendor supplying the Arc Flash Risk Assessment shall offer instructor led and online NFPA 70E training classes.

3.04 FIELD QUALITY CONTROL

A. Provide in accordance with City of Pleasanton Specifications and Special Provisions.

3.05 STARTUP & COMMISSIONING

A. Provide in accordance with City of Pleasanton Specifications and Special Provisions.

3.06 CLOSEOUT ACTIVITIES

A. Provide in accordance with City of Pleasanton Specifications and Special Provisions.

END OF SECTION

SECTION 16640
CATHODIC PROTECTION

PART 1 GENERAL

1.1 THE REQUIREMENT

A. The Contractor shall furnish all materials, install all equipment and provide all labor necessary to complete the work shown on the Drawings and or/listed below and all other work and miscellaneous items not specifically mentioned but reasonably inferred, including all accessories and appurtenances required for a complete system. The intent of this specification is to provide for a complete, functional corrosion control system for the Turnout #4 Booster Pump Station and Discharge Pipeline (F-1 Line) in Pleasanton.

B. Work included in this section consists of all components of the cathodic protection system; including anodes, cables, test stations, and any other work necessary to complete the installation. Work on this project includes a combination of the following items, depending on the pipe material selected for the Project:

1. Cathodic protection of pipeline, pipe segments and/or metallic fittings.
2. Polyethylene encasement of buried ductile iron pipe.
3. Polyethylene encasement of buried ductile iron fitting.
4. Cathodic protection of copper pipe of appurtenances.
5. Polyethylene encasement of buried copper pipe.
6. Bonding of flanges, flexible couplings and other non-welded fittings.
7. Joint bonding of ductile iron pipe & fittings
8. Coating of insulating joints and buried harness sets
9. Installation of magnesium anodes, cables, insulating joints, coatings for buried insulating joints, and test stations.
10. Backfill and compaction of backfill.
11. Provide shop Drawings, reports, permits, and obtain City's approval where required.
12. Correction of all deficiencies.
13. The work shall include the provision of all materials, equipment, and apparatus not specifically mentioned herein or noted on the plans, but which are obviously necessary to complete the work specified.

1.2 REFERENCE SPECIFICATIONS

A. This section contains references to the following documents. They are a part of this section as specified and modified. In case of a conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.

1. American Society of Testing and Materials (ASTM)
2. National Electrical Manufacturers Association (NEMA)
3. American Water Works Association (AWWA)
4. National Association of Corrosion Engineers (NACE)
5. American National Standards Institute (ANSI)

1.3 CODES AND REGULATIONS

A. All materials, workmanship, and installation shall conform to all requirements of the legally constituted authority having jurisdiction. These authorities include, but are not limited to, the latest revision of the State of California, Department of Industrial Relations, Division of Industrial Safety Orders of the Industrial Accident Commission, and all other applicable State, County, or City codes and regulations. Nothing in the Drawings or specifications is to be construed to permit work not conforming to these regulations and codes. Where larger size or better grade materials than required by these regulations and codes are specified, the specifications and Drawings shall have precedence.

1.4 CONTRACTOR SUBMITTALS

A. A complete list of equipment and material, including name and manufacturer, catalog number, size, finish and any other pertinent data necessary for proper identification

PART 2 PRODUCTS

2.1 GENERAL

A. All materials shall conform to the requirements set forth herein or as designated on the Drawings, unless otherwise specified. All materials must be new, free from defects, and shall be of the best commercial quality for the purpose specified. The Contractor shall furnish all necessary items and accessories not shown on the Drawings or specified herein, but which are required to fully carry out the specified intent of the work, without additional cost to the City.

2.2 ZINC ANODES

A. Zinc anodes shall be ASTM B418, Type II alloy anodes with composition and dimensions as indicated below. Each anode shall be cast with a steel core and the core shall protrude from one end and shall be of sufficient length to permit attachment of a lead wire. Each anode shall conform to the following chemical composition and dimensions.

B. Each anode shall conform to the following chemical composition:

Element		Range
1.	Aluminum	0.005% Max.
2.	Cadmium	0.003% Max.
3.	Iron	0.0014% Max.
4.	Lead	0.003% Max.
5.	Copper	0.002% Max.
6.	Zinc	Remainder

C. Bare Anode Dimensions

1. Nominal Weight Bare (lbs.)	Height (inches)	Width (inches)	Length(inches)
a. 18	1.4	1.4	36
b. 30	2	2	30

D. Anode Core Strap: Galvanized steel, with one end of anode recessed to provide access to the rod for connection of the lead wire.

E. Lead Wire: No. 10 AWG, Type THHN or THWN (Black) silver brazed to the rod, making a mechanically secure connection.

F. Soldered Connection and Core: Seal entirely with electrical potting compound.

G. Magnesium Anode Packaging: Prepackaged in a cloth bag containing low resistivity backfill consisting of 75% hydrated gypsum, 20% bentonite, and 5% sodium sulfate.

H. Manufacturers, or equal

1. Farwest Corrosion.
2. Corrpro Companies.

2.3 CABLES

A. All underground cables utilized for bonding cables shall be single conductor, stranded copper, Type CP, insulated for 600 volts with High Molecular Weight Polyethylene (HMWPE) in accordance with the requirements of ASTM D1248, Type 1, Class C, Category 5, Grades E-4 and E-5.

B. All cables for galvanic anodes and test stations shall be Type THHN or THWN, stranded, copper, sized as shown on the plans, and shall conform to Federal Specifications JC-30B. The color of the insulation shall be as indicated on the Drawings.

C. Test Leads and Anode Leads: Extend 18 inches minimum above grade after connection to test station panel board.

2.4 CABLE-TO-PIPE CONNECTIONS

A. The cable connections to the steel pipelines shall be accomplished utilizing an exothermic welding process as shown on the Drawings. Each cable shall be fitted with a copper sleeve for accomplishing the weld and cartridge, sleeves and molds for each weld shall be furnished by the same manufacturer. All materials for welding shall be sized and in accordance with recommendations in manufacturers' literature.

1. Manufacturers, or equal

    a. “Cadweld" by Erico Products, Inc.
    b. "Thermoweld" by Continental Industries, Inc.

2.5 CABLE-TO-PIPE COATING MATERIAL

A. Corrosion protection for exothermic cable-to-pipe connections shall utilize two part epoxy resin.

B. Manufacturers, or equal

1. Durcon-164, by Duriron Company
2. Scotchcast Resin No. 4, by 3-M Company
3. CC-1 Potting Compound, by PSI Products
4. Propoxy 20 epoxy putty by the Hercules Chemical Company

2.6 TEST STATION METERING SHUNTS

A. Anode metering shunts shall be 0.01 ohm, 8 amp capacity, with 1% accuracy.

B. Manufacturers, or equal

1. Tinker & Rasor

2.7 FLUSH GRADE TEST STATION

A. Flush grade test stations shall be traffic boxes with cast iron cover as shown on the Drawings. Terminal boxes shall be locking type, constructed of high-impact, molded Lexan plastic. The test box shall be provided with sufficient hardware and binding post terminals for each cable as shown on the Drawings. All test station hardware, including nuts, bolts and shorting straps shall be nickel plated brass.

B. Manufacturers, or equal

1. Christy G5 traffic box or Brooks Type 1RT traffic box with a cast iron lid as shown on the Drawing. The cover shall be manufactured with "CP-TEST" markings for easy identification.
2. Terminal Boxes shall be Model "T-3" by Tinker & Rasor

2.8 CABLE SPLICES

A. All cable splices shall be accomplished utilizing a steel split bolt connector or crimp-type connector. The connector appropriately sized for the #10 AWG anode lead cable and the #8 AWG anode header cable. The connector shall be installed and wrapped with two layers of half-lapped rubber tape, followed with two layers of half-lapped PVC tape.

2.9 CABLE WARNING TAPE

A. All buried test station cables shall have plastic warning tape installed a minimum of 12 inches above the top of the cables for the entire buried length of the cables. The warning tape shall be 4 inches wide and shall be yellow with black lettering with the legend "CAUTION, CATHODIC PROTECTION CABLES BURIED BELOW" in 3 inches high lettering printed at a minimum of seven foot intervals along the entire buried length of the cable.

2.10 CABLE IDENTIFICATION TAG

A. All cables in the terminal boxes shall be identified. The identification tags shall be white plastic "zip-tie" type straps with a plastic tab of sufficient size to allow the pipeline station to be written on the tab with a permanent felt tip marker.

2.11 INSULATING JOINTS

A. Insulating Flange

1. Each insulating flange set shall consist of a full-face central gasket, a full-length sleeve for each flange bolt, and two insulating washers with two steel washers for each bolt. The central gasket shall be 1/8-inch thick sheet packing, having a dielectric constant of 300 volts per mil, minimum, and NSF 61 compliant such as G-10 with EPDM sealing elements manufactured by PSI. Bolt sleeves shall be fabric reinforced phenolic resin or mylar, and insulating washers shall be constructed of fabric reinforced phenolic resin. The complete assembly shall have an ANSI pressure rating equal to that of the flanges between which it is installed.

B. Insulating Flanged Coupling Adapters

1. Insulating elements shall be installed to electrically isolate the water pipeline from existing pipelines. The insulating elements shall consist of a full-face central gasket, two sleeves for each end of the flange bolt, and two insulating washers with two steel washers for each bolt. The central gasket shall be 1/8-inch thick sheet packing, having a dielectric constant of 300 volts per mil, minimum, and NSF 61 compliant such as G-10 with EPDM sealing elements manufactured by PSI. Bolt sleeves shall be fabric reinforced phenolic resin or mylar, and insulating washers shall be constructed of fabric reinforced phenolic resin. The complete assembly shall have an ANSI pressure rating equal to that of the flanges between which it is installed.

C. Insulating Flexible Coupling

1. A double boot assembly shall be installed on the flexible coupling to electrically isolate the water pipeline from existing pipelines.

2.12 RIGID PVC CONDUIT AND FITTINGS

A. Rigid polyvinylchloride (PVC) conduit and fittings shall be Schedule 40, manufactured to NEMA TC-2 and WC-1094 specifications and shall be U.L. approved.

2.13 BURIED AND IN-VAULTS, MECHANICAL COUPLINGS, HARNESS SETS AND INSULATING JOINTS COATING MATERIAL

A. Viscous Elastic Coatings and Sealants (VEC) or a three part wax tape coating system shall be used for coating all buried and in-vaults mechanical couplings, harness sets and insulating joints.

1. Viscous Elastic Coatings & Sealants (VEC)

    a. Manufacturers, or equal

        1) Viscotaq Coatings
        2) Stopaq Coatings

2. Three part wax tape coating system

    a. Coatings for afore-mentioned joints shall consist of a non-conductive, petrolatum-based coating system, such as Trenton Wax Tape #1 by The Trenton Corporation, or approved equal. The coating system shall consist of a prime coat as an initial surface preparation to displace moisture on the surface and to improve adhesion of the wax tape. A wrap material shall be used to provide a smooth contour on the surface of the joint as well as for protection of the substrate. An over wrap shall be used as a final coating to provide increased mechanical strength of the coating. The prime coat shall be a petrolatum material with corrosion inhibitors and plasticizers. The wrap coat shall be a synthetic fabric saturated with a blend of petroleum wax, plasticizers and corrosion inhibitors. The over wrap shall be plasticized, self-adhesive PVC tape.

2.14 BITUMASTIC

A. Coating for all buried bolts, nuts and metallic washers of the ductile iron pipe and the copper insulating corporation stops shall be Bitumastic 300M coal tar mastic coating, as manufactured by Carboline or approved equal..

2.15 POLYETHYLENE SHEETS FOR PIPE ENCASEMENT.

A. The polyethylene sheets used for encasement of the ductile iron pipe and fittings shall be minimum 8-mils thick in accordance with AWWA C-105. The polyethylene sleeves used for encasement of the copper pipe shall be a minimum 6-mils thick, and shall be of sufficient diameter to slip over the pipe without getting damaged.

PART 3 EXECUTION

3.1 MATERIAL DELIVERY, STORAGE AND PROTECTION

A. All materials and equipment to be used in construction shall be stored in such a manner to be protected from detrimental effects from the elements. If warehouse storage cannot be provided, materials and equipment shall be stacked well above ground level and protected from the elements with plastic sheeting or other method as appropriate.

3.2 GENERAL

A. All materials, workmanship and installation shall conform to all requirements of the legally constituted authority having jurisdiction. These authorities include, but are not limited to, the latest revision of the State of California, Department of Industrial Relations, Division of Industrial Safety, Electrical Orders; The National Electric Code, General Construction Safety Orders of the Industrial Accident Commission; and all other applicable State, County, or City codes and regulations. Nothing in the Drawings or specifications is to be construed to permit work not conforming to these regulations and codes. Where larger size or better grade materials than required by these regulations and codes are specified, the Specifications and Drawings shall have precedence.

3.3 GALVANIC ANODES

A. Galvanic anodes shall be installed in the trench horizontally in native soil, after excavation to proper depth, equal to the bottom of the pipeline, at the edge of the trench to maximize the distance from the pipeline, a minimum of 3 feet from fittings and a minimum of 5 feet from the pipelines. Spacing between anodes shall be a minimum of 10 feet, if multiple anodes are installed at a single test station location. Prior to placing anodes in the trench or hole, paper or plastic bags shall be removed, but the cloth bag shall remain around the anode. Care shall be exercised during installation to prevent damage to the cloth bag and loss of

backfill material. After placing anodes in the trench, native soil, free of rocks and other foreign objects shall be placed around the anode to a minimum cover of one foot above the anode. Flood the anode hole with 5 gallons of fresh water when the backfill reaches one foot above the anode. Remainder of the trench shall then be backfilled with native soil. During installation, anodes shall not be supported or handled by use of attached wires.

B. The number of anodes to be installed at each test station is designated on the Drawings.

C. Where it is not possible to achieve a distance of 5 feet of the anodes from the ductile pipeline, the ductile iron pipe for the linear length from the first anode to the last anode plus 10 feet at the beginning and plus 10 feet from the end shall be double encased in polyethylene.

3.4 CABLES

A. Cables buried in the ground shall be direct buried and shall be laid straight, without kinks. The cable shall have a minimum cover of 30 inches. Each cable run shall be continuous in length and free of joints or splices. Care shall be exercised during installation to avoid punctures, cuts, and similar damage to insulation. Any damage to insulation will require replacement of the entire cable length. Backfill surrounding the cables shall be native soil free of foreign materials. Cable warning tape shall be installed 12-inches above the entire buried length of the cable.

3.5 CABLE-TO-PIPE CONNECTIONS

A. Cable-to-pipe connections shall be installed in the manner and at the locations shown on the Drawings. Coating materials shall be removed from the pipe surface over an area just sufficient to make the connections. The surface shall be cleaned to white metal by grinding or filing prior to welding the conductor. Grinding with resin impregnated wheels shall not be allowed. The conductor shall be welded to the pipe by the exothermic process with a copper sleeve fitted over the conductor, and only sufficient insulation shall be removed from the conductor to allow placing in welding mold. After the weld has cooled, all slag shall be removed and the weld shall be tested with a sharp blow from a 16 ounce hammer to assure proper metallurgical bond. All defective welds shall be removed and replaced. All exposed surfaces of copper and steel shall be covered with a minimum thickness of ¼ in. of insulating materials as shown on the Drawings.

B. Mortar Coated Pipe Connection Coating

1. The exposed metal and surrounding surface shall be cleaned of contaminants and coated with ¼ inch thick application of epoxy. After the epoxy has dried, restore the coating by using non-shrink mortar.

3.6 TEST STATIONS

A. Test stations shall be installed at locations designated on the Drawings and at all anode installation locations. The test station shall be located at the edge of the trench closest to the curb. Exact locations of test stations shall be determined by the City in the field. The terminal end of each cable shall be identified with the structure identification using the permanent cable identification tags.

B. The test station leads shall be tested by the Contractor and results approved by the City prior to backfill.

3.7 JOINT BONDING

A. All non-welded rubber gasket joints, mechanical joints, flange joints and threaded joints shall be bonded with an insulated copper cable, sized as shown on the Drawings. The overall length of the conductor shall permit maximum movement of the pipe joint without transferring any tensile stress to the cable, per pipe manufacturer's recommendations.

3.8 INSULATING FLANGED JOINTS

A. All insulating components of the insulating flanged gasket set shall be cleaned of all dirt, grease, oil and other foreign materials immediately prior to assembly. Bolt holes in mating flanges shall be properly aligned at the time bolts and insulating sleeves are inserted to prevent damage to the insulation. After flanged bolts have been tightened, each insulating washer shall be inspected for cracks or other damage. All damaged washers shall be replaced. After assembly, resistance between each bolt and flange shall be measured with an approved ohmmeter, and the minimum resistance shall be 50,000 ohms. Where the insulating joint is assembled in the shop and shipped as a unit, resistance shall be measured in the shop between the flanges and between each bolt and flange and shall meet the above requirements. All insulating flanged joints shall be coated as shown on the Drawings and specified below.

B. The completed assembly shall be tested with a flange insulation tester such as Gas Electronics Model 601, or equal for the integrity of the insulation. This testing shall be conducted in the presence of the City and approved prior to backfill.

3.9 COATING BURIED INSULATING FLANGED JOINTS AND HARNESS SETS

A. Viscous Elastic Coatings & Sealants (VEC) Option

1. Use wire brush, power brush or an abrasive cleaning pad to remove all loose material, dirt and grime from substrate to a minimum cleanliness of SSPC SP2. Clean pipe/substrate with denatured alcohol. Apply VEC coating and overlap 10% or 1/2inch minimum to substrate. For uneven areas, around bolts and in voids apply Viscous Elastic Paste materials. Paste should be packed into these areas leaving as few air pockets as possible. Once the substrate is coated using the VEC an outer wrap shall be applied for mechanical protection.

B. Three Part Wax Tape Coating System Option

1. Surfaces shall be cleaned of all dirt, grease, oil and other foreign materials immediately prior to coating. Remove loose rust, paint and other foreign matter in accordance with SSPC SP2 or SP3. A prime coating shall be applied in a uniform coating over the entire surface to be wrapped. A liberal coating shall be applied to threads, cavities, shoulders, pits and other irregularities. A fill coating shall be molded and packed onto irregular surfaces such as flanges, valves or flexible couplings to create a smooth profile prior to wrapping. A wrap coating shall be spirally wrapped using a minimum of 55 percent overlap to ensure a double thickness of material. At the completion of each roll the overlaps shall be smoothed by hand in the direction of the spiral to ensure sealing of the overlap. A 2-inch overlap shall be maintained when overlapping one roll with the end of a new roll. Overlap shall occur on the top half of the pipeline. A guard coating shall be spirally over-wrapped using a 55 percent overlap to ensure a double coating.

3.10 FIELD COATING OF BURIED FLANGE HARDWARE

A. All buried nuts and bolts shall be coated with bitumastic prior to polyethylene encasement. After flange hardware is installed use wire brush, power brush or an abrasive cleaning pad to remove all loose material, dirt and grime from substrate to a minimum cleanliness of SSPC SP2. Apply Bitumastic coating liberally with a medium bristle brush to the extent that all surfaces are completely covered with

no bare spots visually evident. Coat exposed surfaces of bolts, washers and nuts, giving special attention to the bottom-side surfaces. Follow the manufacturer's recommendations for drying times required before polyethylene encasement and backfill.

3.11 POLYETHYLENE ENCASEMENT OF PIPE AND FITTINGS

A. Encase the buried ductile iron pipes and fittings in minimum 8-mil polyethylene in accordance with AWWA C-105. Encase copper pipe in polyethylene sleeves a minimum 6-mils thick.

3.12 SYSTEM COMMISSIONING

A. After installation of the cathodic protection facilities, the system shall be tested, and adjusted by the Project's corrosion engineer, to assure conformance with the Specifications. Testing shall include a determination of proper installation of each component, adequacy of test stations and insulating joints, anodes, dielectric insulation and electrical continuity of bonded pipe fittings. Upon completion of tests, a detailed report will be submitted describing any deficiencies detected. Any and all deficiencies shall be corrected by the Contractor and site conditions restored prior to final acceptance. All retesting shall be at the Contractor's expense.

B. After the final acceptance, if at the Insulating Joint Test Stations both the project pipe and the existing pipe show adequate levels of cathodic protection, then the Project's corrosion engineer shall bond across the insulating joints to make the new and existing pipe electrically continuous. If the existing pipelines do not show adequate cathodic protection, the insulating joint shall not be bonded across.

3.13 After installation of the cathodic protection facilities, the system shall be tested, and adjusted by the Project's corrosion engineer, to assure conformance with the Specifications. Testing shall include a determination of proper installation of each component, adequacy of test stations and insulating joints, anodes, dielectric insulation and electrical continuity of bonded pipe fittings. Upon completion of tests, a detailed report will be submitted describing any deficiencies detected. Any and all deficiencies shall be corrected by the Contractor and site conditions restored prior to final acceptance. All retesting shall be at the Contractor's expense.

3.14 The Contractor shall notify the City 48 hours prior to installation of any cathodic protection components so that inspections can be scheduled. Phone messages

left with others will not be considered adequate notification. The Contractor shall not backfill any cathodic protection components prior to inspection and approval by the City.

3.15 QUALITY ASSURANCE

A. All work shall be performed to the satisfaction of the City.

B. The Contractor shall not substitute for the specified materials unless approved by the City.

C. Compaction of backfill and trenches shall match the existing conditions and shall be approved by the City.

3.16 INTERFERENCE AND EXACT LOCATIONS

A. The Contractor shall coordinate and properly relate this work to the site and to the work of all trades. The general locations of the facilities are shown on the Drawings. However, the Contractor shall visit the premises and thoroughly familiarize himself with all details of the work and working conditions, verify existing conditions in the field, determine the exact locations of existing pipelines and structures and advise the City of any discrepancy that may prevent or hinder the specified work from being completed. The Contractor shall be solely responsible for location and marking underground structures so as to avoid damage during construction.

3.17 AS BUILT DRAWINGS

A. The "as-built" drawings with dimensions to locate all components such as test stations, anode beds, etc. shall be provided by the Contractor in PDF format.

END OF
SECTION

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SECTION 17010

INSTRUMENTATION AND CONTROLS GENERAL REQUIREMENTS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide instrumentation and controls in accordance with this Section and applicable reference standards listed in Article 1.03.

2. Work by Contractor

a. PLC Programming

b. OIT Programming

c. HMI Programming

d. Integration of new SCADA system

B. Related Requirements

1. Division 16 Electrical – Specifications for electrical wiring standards and practices

2. Section 17500 – Control Strategies

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

A. Reference Standards

1. American National Standards Institute (ANSI)

2. ASTM International (ASTM)

3. FM Global (FM)

4. International Society of Automation (ISA)

a. ISA-RP60.3 Recommended Practice

5. National Electrical Code (NEC)

6. National Electrical Manufacturers Association (NEMA)

7. National Fire Protection Association (NFPA)

    a. NFPA 70

    b. NFPA 79 Electrical Standard for Industrial Machinery

8. Occupational Safety and Health Administration (OSHA)

9. Underwriters Laboratories (UL)

    a. Standard 508A - Standard for Industrial Control Panels

B. Definitions

1. PLC – Programmable Logic Controller

2. RIO – Remote Input/Output Rack

3. OIT – Operator Interface Terminal

4. HMI – Human Machine Interface

5. RTU – Remote Terminal Unit

6. I/O – Input/Output

7. SCADA – Supervisory Control and Data Acquisition

8. Modules – devices that plug into a chassis or connect to an adjacent module and are keyed to allow installation in only one direction

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, sequencing, and scheduling: per Division 01 General Requirements.

1. Coordinate equipment, instrument and material delivery with Project schedule. Notify Engineer if delivery schedule of equipment, instruments, or material affects Project schedule. Include documentation from equipment Supplier indicating revised delivery schedule and reason for change.

2. Coordinate delivery of equipment, instruments or materials for installation in system or control panel.

1.05 SUBMITTALS

A. Submit in accordance with Division 01 General Requirements.

B. Product Data

1. Instrumentation

2. PLC and OIT

3. SCADA Computers and Software

C. Shop Drawings

1. SCADA control panels

D. Closeout and maintenance material submittals: per Division 01 General Requirements.

1. Provide operation procedures, equipment descriptions, intended modes of operation, system unit testing procedures and safety measures during operation.

2. Provide record drawings and instructions for maintenance of system equipment. Incorporate maintenance procedures and schedules, coordinate and cross-reference to detailed operational procedures provided by manufacturers.

3. Include a list of local, authorized distributor's service departments stocking manufacturer's parts and equipment and providing local service.

4. Instrument list or ISA data sheets, including tag numbers

5. Configuration and programming manuals for each type of PLC and each type of OIT.

6. Copies of all Shop Drawings, reports, maintenance data, and schedules, description of operation, and spare parts information.

7. Control panel section of O&M manuals shall include

a. Record drawings of control panels updated to reflect the panels after checkout and startup.

b. Installation and operation manuals for all major control panel components, network switches, PLCs, I/O modules, and communication equipment.

1.06 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 01 General Requirements.

B. Acceptance at Site

1. Check equipment, instruments and materials for damage or defects within 7 days of delivery.

1.08 SITE CONDITIONS

A. Existing conditions: per Division 01 General Requirements.

1.09 MAINTENANCE

A. Furnish extra materials as specified below. Make interchangeable with and of same material and workmanship as corresponding original parts.

B. Control Panel Spares: one of each type of the following.

1. Surge arrestor
2. Fuses (minimum 10 percent spares of each type)
3. 24 VDC communication power supply
4. Intrinsic safety barrier
5. Radio

C. Programmable Logic Controllers: one of each type of the following.

1. PLC power supply
2. PLC processor
3. I/O module
4. Communication module
5. Memory module

PART 2 – PRODUCTS

2.01 MATERIALS

A. Provide instruments, SCADA control panels, and materials in accordance with Division 01 General Requirements.

1. Verify availability of equipment, instruments and materials and submit an "or-equal" or substitute if production is discontinued.

2.02 SOURCE QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 FIELD QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements.

3.02 STARTUP & COMMISSIONING

A. Provide in accordance with Division 01 General Requirements.

1. Test instruments and SCADA control panels for proper termination and operation, in presence of Engineer.

2. Calibrate instruments in accordance with manufacturer's recommended procedure.

3.03 CLOSEOUT ACTIVITIES

A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

SECTION 17500

CONTROL NARRATIVE

TABLE OF CONTENTS

1. INTRODUCTION

A Controls Integrator shall integrate the control system and complete the necessary PLC, OIT and Human Machine Interface (HMI) programming. The following descriptions are provided to assist the Controls Integrator during the integration process and are a supplement to the Process and Instrumentation Diagrams and Control Wiring Diagrams provided in the Drawings.

The Controls Integrator needs to become familiar with the aforementioned documents and incorporate the controls related information contained in these into the programming.

Note all HMI screens shall be submitted for review and approval by the Engineer of Record and Owner before field deployment and startup.

1.1 ABBREVIATIONS & DEFINITIONS

- Control System: The Control System shall consist of all hardware, software, programming, and equipment/instrumentation setup required to implement controls described in the Specifications.
- Controls Integrator: The company that performs the programming and controls integration for this project.
- Engineer: Woodard & Curran Inc.
- HMI: Human machine interface. (Refers to SCADA PC.)
- HOA: Hand-Off-Auto
- "Local" or "Hand" operations shall be initiated by a push button or selector switch located either adjacent to the piece equipment or on the starter cabinet.
- OIT: Operator interface terminal.
- Owner: City of Pleasanton
- PLC: Programmable Logic Controller
- "Remote Manual" operations shall allow an operator to control the operation of a piece of equipment (e.g. start/stop or open/close) from the HMI.
- "Remote Automatic" operations shall control the operation of a piece of equipment (e.g. start/stop or open/close) based on control logic programmed into the PLC.
- SCADA: Supervisory Control and Data Acquisition.
- {SP}: operator adjustable set point
- {##.# units}: operator adjustable set point and recommended initial value for the set point, including the recommended units and decimal places

1.2 CONTROL SYSTEM GENERAL REQUIREMENTS

The following sections outline general requirements for local control panels, OIT terminals and the monitoring and control of equipment and processes. It also describes the coordination and data transfer on the Ethernet network between control panels and other displays.

1.2.1 Hand-Off-Auto

Hand-Off-Auto (H-O-A) switches are provided adjacent to equipment as indicated on the Drawings or as specified. Unless specified otherwise all H-O-A switches shall operate as follows:

- When in "Hand" the equipment shall run at full speed or based on a manually input speed setting entered via the VFD if a VFD is provided. When in the hand position, only the basic equipment safety measures are operable, and some interlocks intended to protect equipment might be bypassed (e.g., a pump run in Hand could be run dry).
- When in "Off" the equipment will be off.
- When in "Auto" the equipment shall be operated through the PLC system.
- Provide an alarm indication when HOA switch is not in the Auto position.

1.2.2 Open-Close-Remote

Open-Close-Remote (OCR) switches are not provided for automated control valves; however, the programmer shall provide an electronic OCR within SCADA as indicated:

- When in "Open" the valve is commanded to open fully or to a select position.
- When in "Close" the valve is commanded to close.
- When in "Remote" the valve is operated based on process conditions

1.2.3 Motor Run Time Monitoring

The SCADA system shall monitor and display the total 'lifetime' running time for all motors indicated on the Process & Instrumentation Diagrams (pumps, mixers, blowers) in units of ##,###.# hours.

1.2.4 Equipment Status Indication

The SCADA system shall display the status of HOA switches, equipment, valves, and analog instrumentation described herein. Status indication shall include whether or not the motor is energized/running, valve position/command open/closed, and the value of analog inputs in the units indicated herein. All analog inputs shall include a graphical depiction of the measured quantity in proportion to the scale of the range (e.g. water level in a tank). Liquid level in all tanks shall be displayed in depth and in gallons (as determined by tank geometry per the Contract Drawings).

1.2.5 Emergency Stops (E-Stops)

For all equipment with E-stop switches, the control system shall have an "E-stop switch engaged – (equipment name and tag number)" alarm if an emergency stop switch is engaged. The control loop shall clear the alarm when the E-stop switch is reset in the field. The E-stop circuit shall be normally closed such that the alarm will activate if the E-stop circuit loses power or fails for any other reason. The equipment shall be inoperable until the E-stop circuit is energized. The equipment shall de-energize immediately if the E-stop is engaged.

1.2.6 Variable Frequency Drives (VFDs)

All VFDs shall be provided with Ethernet communications modules. The Contractor shall provide to the SCADA system the following information for every VFD installed, at a minimum:

- Speed reference set point in Remote.
- Display of speed feedback, 0-100%.
- Run time meters.
- General Fault Alarm
- Current

All VFD powered equipment shall include indication of over-amperage and over-torque alarms at the control system, unless noted otherwise.

1.2.7 Operator Adjustable Inputs & Allowable Range

Operator adjustable inputs are indicated throughout the narrative with {brackets} and shall be required as indicated herein and in the Contract drawings. For each operator adjustable input, provide a range of allowable values that can be entered. The values of the high end and the low end of the range shall be as determined by the Engineer. The operator screens shall not accept set point changes outside the allowable range and shall provide notification that the input is out of range. Typical values for inputs are provided herein for reference purposes.

1.2.8 Password Protected Access

Provide at a minimum, the following levels of security access: 1) viewing but no adjustment of set points, 2) allows adjustment of set points excluding alarms and interlocks, 3) administrative access to all functionality, alarm limits, interlocks. Coordinate security settings with Engineer and Group.

1.2.9 Motor Overloads

The majority of motor-driven equipment has overload devices to protect the equipment from overload condition. For all equipment with such devices, as shown on the Contract Drawings, the SCADA system shall monitor and provide alarms for all overload conditions. Each alarm shall be labeled with the corresponding equipment tag and description as noted on the Contract Drawings.

1.2.10 Analog Signal Out of Range

For all equipment with 4-20mA signals connected to the PLC, as shown on the Contract Drawings, the SCADA system shall monitor and provide an alarm if the signal goes out of that range (i.e. less than 4mA or greater than 20mA). Each alarm shall be labeled with the corresponding equipment tag and description as noted on the Contract Drawings.

1.2.11 Failure or Fault Alarms

Generate failure or fault alarms for equipment and processes using physical status and/or based on all applicable conditions. Label faults and alarms with the specific device tags and descriptions.

1.2.12 Alarm Management

Display all alarms on the HMI including new unacknowledged alarms and acknowledged alarms that are still in active alarm state. Display the tag name, description, date and time.

The HMI shall include a means to activate or suppress individual alarms for each piece of equipment. The HMI shall also include a general "Alarm Acknowledge" button that will clear all alarms once the specific condition is corrected. Unless otherwise noted, all alarms shall have an operator adjustable delay prior to alarm activation. The length of the delay period shall be determined based on signal response times and shall be designed to provide system protection while avoiding nuisance alarms. The initial delay period shall be determined by the system Contractor and approved by the Engineer.

Alarm enable/disable, delays, and setpoint adjustment shall be password protected.

All alarms shall be labeled with functional descriptions and the device's equipment tag (see the Contract Drawings for equipment tagging). The alarm descriptions shall be submitted for reviewed and approval by the Engineer.

1.2.13 Interlocks

The control loops for equipment that have motor overloads, current sensitive relays, high temperature sensors or any other interlock shall have interlocks built into the PLC control logic to prevent the equipment from running in the Automatic mode if the interlock condition occurs. Interlocks shall not prevent running equipment in Manual.

1.2.14 Project Screens and Trending

The following listing provides a summary of the screens to be provided, including but not limited to the screen listing in the Contract:

* Overall System Screen: Develop screens that show the overall system, status of each piece of equipment, key flow rates, and water surface elevations.
* Process screens: for each unit process, provide and indicate if a piece of equipment has an alarm or fault associated with it and what the alarm/fault is.
* Run time totalizers: for every piece of equipment, provide a display of total run time (##,###.# hours). Provide the equipment tag number and description next to each display.
* Alarm log and management.
* Communications system and PLC status.
* Trend Screens: provide trend screens for instruments and analog level, flow, pressure and temperature inputs, as specified herein.

1.2.15 Local Control Panels

Integrate information from control panels mounted adjacent to equipment, whether provided by the Manufacturer or the Contractor, into the SCADA system. Provide duplication of all information displayed locally at the SCADA screen. Local control panels for this project include the following. Some of the panels have CP-# numbers and others do not. This controls description has added control panel numbers, in italics, for those panels that lack numbers so that they can be clearly identified in the description.

- Pump Station RTU

2. PROCESS CONTROLS

2.1 TURNOUT INTRUSION ALARM

Control System: Pump Station RTU

Drawing: I-2

Overview: The control system will provide continuous display of the Turnout Intrusion Alarm as measured by door intrusion switch (XS-001). The control system will provide the following control:

- Alarm for Turnout Intrusion, as measured at the door intrusion switch (XS-001), when the switch is held for more than {60 seconds} without the operator bypassing the intrusion alarm.

Interlocks:

None

2.2 TURNOUT INLET PRESSURE

Control System: Pump Station RTU

Drawing: I-2

Overview: The control system will provide continuous display (psi) of the Turnout Inlet Pressure using pressure transmitter (PIT-001). The control system will provide the following operator control:

- Alarm for Turnout Inlet Low Pressure, as measured at the Turnout Inlet Pressure Transmitter (PIT-001), when the pressure is below the setpoint {xxx psi} for more than {10 seconds} while any Booster Pump (P-100, P-200, or P-300) is running.
- Alarm for Turnout Inlet High Pressure, as measured at the Turnout Inlet Pressure Transmitter (PIT-001), when the pressure is above the setpoint {xxx psi} for more than {10 seconds} while any Booster Pump (P-100, P-200, or P-300) is running.
- Alarm for Instrument Failure, as measured at the Turnout Inlet Pressure Transmitter (PIT-001), if the RTU receives a signal outside the 4-20 mA range for more than {30 seconds}.

Interlocks:

None

2.3 TURNOUT FLOW

Control System: Pump Station RTU

Drawing: I-2

Overview: The control system will provide continuous display (GPM) of the Turnout Flow using flow meter (FIT-001). The control system will provide the following operator control:

- Alarm for Turnout Low Flow, as measured at the Turnout Flow Meter (FIT-001), when the flow rate is equal to or lower than the set point {xxx GPM} for more than {10 seconds}.
- Alarm for Turnout High Flow, as measured at the Turnout Flow Meter (FIT-001), when the flow rate is equal to or higher than the set point {xxx GPM} for more than {10 seconds}.
- Alarm for Instrument Failure, as measured at the Turnout Flow Meter (FIT-001), if the PLC receives a signal outside the 4-20 mA range for more than {30 seconds}.

Interlocks:

None

2.4 TURNOUT VALVE CONTROL

Control System: Pump Station RTU

Drawing: I-2

Overview: The control system will provide continuous display of Turnout Control Valve (FCV-001) position status, full open status, full closed status, and include on screen selection for automatic and manual valve control. The control system will provide the following operator control:

- Normal automatic operation is selected from the HMI screen. Under normal conditions, Turnout Control Valve (FCV-001) will modulate to meet flow demand. If Booster Pumps (P-100, P-200, & P-300) are called to run, the valve will remain fully open.
- Turnout Control Valve (FCV-001) will be called to close if any of the following alarms are active:
    - Discharge Low Fluoride Alarm, as measured by Discharge Fluoride Analyzer (AIT-401)
    - Discharge High Fluoride Alarm, as measured by Discharge Fluoride Analyzer (AIT-401)

- Discharge Low Chlorine Alarm, as measured by Discharge Chlorine Analyzer (AIT-402)
- Discharge High Chlorine Alarm, as measured by Discharge Chlorine Analyzer (AIT-402)
- Discharge Low Free Chlorine Alarm, as measured by Discharge Free Chlorine Analyzer (AIT-403)
- Discharge High Free Chlorine Alarm, as measured by Discharge Free Chlorine Analyzer (AIT-403)
- Discharge High Conductivity Alarm, as measured by Discharge Conductivity Analyzer (AIT-404)

- Alarm when Turnout Control Valve (FCV-001) is commanded to open but does not receive fully open status after {30 seconds} have elapsed.
- Alarm when Turnout Control Valve (FCV-001) is commanded to close but does not receive fully closed status after {30 seconds} have elapsed.

Interlocks:

Turnout Control Valve (FCV-001) shall be allowed to open only if all of the following alarms are inactive:

- Discharge Low Fluoride Alarm, as measured by Discharge Fluoride Analyzer (AIT-401)
- Discharge High Fluoride Alarm, as measured by Discharge Fluoride Analyzer (AIT-401)
- Discharge Low Chlorine Alarm, as measured by Discharge Chlorine Analyzer (AIT-402)
- Discharge High Chlorine Alarm, as measured by Discharge Chlorine Analyzer (AIT-402)
- Discharge Low Free Chlorine Alarm, as measured by Discharge Free Chlorine Analyzer (AIT-403)
- Discharge High Free Chlorine Alarm, as measured by Discharge Free Chlorine Analyzer (AIT-403)
- Discharge High Conductivity Alarm, as measured by Discharge Conductivity Analyzer (AIT-404)

2.5 TURNOUT SUMP LEVEL MONITORING

Control System: Pump Station RTU

Drawing: I-2

Overview: The control system will provide continuous display of the level status for the Turnout Sump using level switches (LSL-005 & LSH-005). The control system will provide the following control:

- Alarm for Turnout Sump Low Level, as measured at the Turnout Sump Low Level Switch (LSL-005), when the switch is held for more than {10 seconds}.

- Alarm for Turnout Sump High Level, as measured at the Turnout Sump High Level Switch (LSH-005), when the switch is held for more than {10 seconds}.

Interlocks:

None

2.6 TURNOUT SUMP PUMP CONTROL

Control System: Pump Station RTU

Drawing: I-2

Overview: The control system will provide continuous display of Turnout Sump Pump (P-005) run status, start/stop status, seal fail alarm status, over temp alarm status, hand-off-auto status and include on screen selection for automatic and manual pump control. The control system will provide the following operator control:

- Normal automatic operation is selected from the HMI screen. Under normal conditions Turnout Sump Pump (P-005) shall start when Turnout Sump High Level Alarm, as measured at the Turnout Sump High Level Switch (LSH-005), is active. The pump shall continue to run until Turnout Sump Low Level Alarm, as measured at the Turnout Sump Low Level Switch (LSL-005), becomes active, at which point the pump will stop.
- In MANUAL, the selected pump will run; in OFF, the pump will stop.
- Alarm when Turnout Sump Pump (P-005) is commanded to run and fails to run after {5 seconds} have elapsed.

Interlocks:

If Turnout Sump Low Level Alarm, as measured at the Turnout Sump Low Level Switch (LSL-005) is active, Turnout Sump Pump (P-005) shall not be allowed to run.

2.7 BOOSTER PUMP SUCTION PRESSURE

Control System: Pump Station RTU

Drawing: I-2

Overview: The control system will provide continuous display (psi) of the Booster Pump Suction Pressure using pressure transmitter (PIT-002). The control system will provide the following operator control:

- Alarm for Booster Pump Suction Low Pressure, as measured at the Booster Pump Suction Pressure Transmitter (PIT-002), when the pressure is below the setpoint {xxx psi} for more than {10 seconds} while any Booster Pump (P-100, P-200, or P-300) is running.
- Alarm for Booster Pump Suction High Pressure, as measured at the Booster Pump Suction Pressure Transmitter (PIT-002), when the pressure is above the setpoint {xxx psi} for more than {10 seconds} while any Booster Pump (P-100, P-200, or P-300) is running.
- Alarm for Instrument Failure, as measured at the Booster Pump Suction Pressure Transmitter (PIT-002), if the RTU receives a signal outside the 4-20 mA range for more than {30 seconds}.

Interlocks:

None

2.8 BOOSTER PUMP STRUCTURE INTRUSION ALARM

Control System: Pump Station RTU

Drawing: I-2

Overview: The control system will provide continuous display of the Booster Pump Structure Intrusion Alarm as measured by door intrusion switch (XS-002). The control system will provide the following control:

- Alarm for Booster Pump Structure Intrusion, as measured at the door intrusion switch (XS-002), when the switch is held for more than {60 seconds} without the operator bypassing the intrusion alarm.

Interlocks:

None

2.9 BOOSTER PUMP BYPASS VALVES

Control System: Pump Station RTU

Drawing: I-2

Overview: The control system will provide continuous display of Booster Pump Suction Control Valve (FCV-002) and Booster Pump Bypass Control Valve (FCV-003) full open status, full closed status, and include on screen selection for automatic and manual valve control. The control system will provide the following operator control:

- Normal automatic operation is selected from the HMI screen. Under normal conditions, Booster Pump Bypass Control Valve (FCV-003) shall remain open, and Booster Pump Suction Control Valve (FCV-002) shall remain closed. If any of the Booster Pumps (P-100, P-200, & P-300) are called to run, Booster Pump Bypass Control Valve (FCV-003) shall be called to close, and Booster Pump Suction Control Valve (FCV-002) shall be called to open.
- Alarm when Booster Pump Suction Control Valve (FCV-002) is commanded to open but does not receive fully open status after {30 seconds} have elapsed.
- Alarm when Booster Pump Suction Control Valve (FCV-002) is commanded to close but does not receive fully closed status after {30 seconds} have elapsed.
- Alarm when Booster Pump Bypass Control Valve (FCV-003) is commanded to open but does not receive fully open status after {30 seconds} have elapsed.
- Alarm when Booster Pump Bypass Control Valve (FCV-003) is commanded to close but does not receive fully closed status after {30 seconds} have elapsed.

Interlocks:

- None

2.10 BOOSTER PUMP CONTROL

Control System: Pump Station RTU

Drawing: I-2

Overview: The control system will provide continuous display of Booster Pumps (P-100, P-200, & P-300) run status, start/stop status, fault status, hand-off-auto status, speed command, speed feedback and include on screen selection for automatic and manual pump control. The control system will provide the following operator control:

- Normal automatic operation is selected from the HMI screen. Under normal conditions Booster Pumps (P-100, P-200, & P-300) shall operate in a Lead, Lag, Lag-Lag operation. When flow demand goes above (2000 GPM) as measured by Turnout Flow Meter (FIT-001), the Lead pump shall be called to run. If the Lead pump cannot satisfy the flow demand, the Lag pump shall also be called to run. If the Lead and Lag pumps both cannot satisfy the flow demand, the Lag-Lag pump shall be called to run. Pumps shall set their speed accordingly to meet the flow demand. The pumps shall rotate between Lead, Lag, and Lag-Lag after each call to run.
- If status of either Turnout Control Valve (FCV-001) or Booster Pump Suction Control Valve (FCV-002) is reporting as closed or faulted, turn OFF Booster Pumps (P-100, P-200, & P-300).
- In MANUAL, the selected pump will run; in OFF, the pump will stop.

- If Booster Pump Low Suction Pressure Alarm is active, as measured at the Booster Pump Suction Pressure Transmitter (PIT-002), turn OFF Booster Pumps (P-100, P-200, & P-300).
- If Booster Pump High Discharge Pressure Alarm is active, as measured at the Booster Pump Discharge Pressure Transmitter (PIT-020), turn OFF Booster Pumps (P-100, P-200, & P-300).
- Booster Pumps (P-100, P-200, & P-300) shall stop if any of the following alarms are active:
    - Discharge Low Fluoride Alarm, as measured by Discharge Fluoride Analyzer (AIT-401)
    - Discharge High Fluoride Alarm, as measured by Discharge Fluoride Analyzer (AIT-401)
    - Discharge Low Chlorine Alarm, as measured by Discharge Chlorine Analyzer (AIT-402)
    - Discharge High Chlorine Alarm, as measured by Discharge Chlorine Analyzer (AIT-402)
    - Discharge Low Free Chlorine Alarm, as measured by Discharge Free Chlorine Analyzer (AIT-403)
    - Discharge High Free Chlorine Alarm, as measured by Discharge Free Chlorine Analyzer (AIT-403)
    - Discharge High Conductivity Alarm, as measured by Discharge Conductivity Analyzer (AIT-404)
- Alarm when any Booster Pump (P-100, P-200, or P-300) is commanded to run and fails to run after {5 seconds} have elapsed.

Interlocks:

The status of both Turnout Control Valve (FCV-001) and Booster Pump Suction Control Valve (FCV-002) shall be open before any Booster Pump (P-100, P-200, or P-300) turns ON.

If Booster Pump Low Suction Pressure Alarm is active, as measured at the Booster Pump Suction Pressure Transmitter (PIT-002), Booster Pumps (P-100, P-200, & P-300) shall not be allowed to run.

If Booster Pump High Discharge Pressure Alarm is active, as measured at the Booster Pump Discharge Pressure Transmitter (PIT-020), Booster Pumps (P-100, P-200, & P-300) shall not be allowed to run.

Booster Pumps (P-100, P-200, & P-300) not be allowed to run if any of the following alarms are active:

- Discharge Low Fluoride Alarm, as measured by Discharge Fluoride Analyzer (AIT-401)
- Discharge High Fluoride Alarm, as measured by Discharge Fluoride Analyzer (AIT-401)
- Discharge Low Chlorine Alarm, as measured by Discharge Chlorine Analyzer (AIT-402)
- Discharge High Chlorine Alarm, as measured by Discharge Chlorine Analyzer (AIT-402)

- Discharge Low Free Chlorine Alarm, as measured by Discharge Free Chlorine Analyzer (AIT-403)
- Discharge High Free Chlorine Alarm, as measured by Discharge Free Chlorine Analyzer (AIT-403)
- Discharge High Conductivity Alarm, as measured by Discharge Conductivity Analyzer (AIT-404)

2.11 BOOSTER PUMP DISCHARGE PRESSURE

Control System: Pump Station RTU

Drawing: I-2

Overview: The control system will provide continuous display (psi) of the Booster Pump Discharge Pressure using pressure transmitter (PIT-020). The control system will provide the following operator control:

- Alarm for Booster Pump Discharge High Pressure, as measured at the Booster Pump Discharge Pressure Transmitter (PIT-020), when the pressure is above the setpoint {xxx psi} for more than {10 seconds} while any Booster Pump (P-100, P-200, or P-300) is running.
- Alarm for Booster Pump Discharge Low Pressure, as measured at the Booster Pump Discharge Pressure Transmitter (PIT-020), when the pressure is below the setpoint {xxx psi} for more than {10 seconds} while any Booster Pump (P-100, P-200, or P-300) is running.
- Alarm for Instrument Failure, as measured at the Booster Pump Discharge Pressure Transmitter (PIT-020), if the RTU receives a signal outside the 4-20 mA range for more than {30 seconds}.

Interlocks:

None

2.12 BOOSTER PUMP DISCHARGE FLUORIDE MEASUREMENT

Control System: Pump Station RTU

Drawing: I-2

Overview: The control system will provide continuous display (mg/L) of the Booster Pump Discharge Fluoride using conductivity sensor (AIT-401). The control system will provide the following operator control:

- Alarm for Booster Pump Discharge High Fluoride, as measured at the Booster Pump Discharge Fluoride Transmitter (AIT-401), when the fluoride level is greater than {xxx mg/L} setpoint for more than {30 seconds}.
- Alarm for Booster Pump Discharge Low Fluoride, as measured at the Booster Pump Discharge Fluoride Transmitter (AIT-401), when the fluoride level is lower than {xxx mg/L} setpoint for more than {30 seconds}.
- Alarm for Instrument Failure if the PLC receives a signal outside the 4-20 mA range for more than {30 seconds}.

Interlocks:

None

2.13 BOOSTER PUMP DISCHARGE CHLORINE MEASUREMENT

Control System: Pump Station RTU

Drawing: I-2

Overview: The control system will provide continuous display (mg/L) of the Booster Pump Discharge Chlorine using conductivity sensor (AIT-402). The control system will provide the following operator control:

- Alarm for Booster Pump Discharge High Chlorine, as measured at the Booster Pump Discharge Chlorine Transmitter (AIT-402), when the chlorine level is greater than {xxx mg/L} setpoint for more than {30 seconds}.
- Alarm for Booster Pump Discharge Low Chlorine, as measured at the Booster Pump Discharge Chlorine Transmitter (AIT-402), when the chlorine level is lower than {xxx mg/L} setpoint for more than {30 seconds}.
- Alarm for Instrument Failure if the PLC receives a signal outside the 4-20 mA range for more than {30 seconds}.

Interlocks:

None

2.14 BOOSTER PUMP DISCHARGE FREE CHLORINE MEASUREMENT

Control System: Pump Station RTU

Drawing: I-2

Overview: The control system will provide continuous display (mg/L) of the Booster Pump Discharge Free Chlorine using conductivity sensor (AIT-403). The control system will provide the following operator control:

- Alarm for Booster Pump Discharge High Free Chlorine, as measured at the Booster Pump Discharge Free Chlorine Transmitter (AIT-403), when the free chlorine level is greater than {xxx mg/L} setpoint for more than {30 seconds}.
- Alarm for Booster Pump Discharge Low Free Chlorine, as measured at the Booster Pump Discharge Free Chlorine Transmitter (AIT-403), when the free chlorine level is lower than {xxx mg/L} setpoint for more than {30 seconds}.
- Alarm for Instrument Failure if the PLC receives a signal outside the 4-20 mA range for more than {30 seconds}.

Interlocks:

None

2.15 BOOSTER PUMP DISCHARGE CONDUCTIVITY MEASUREMENT

Control System: Pump Station RTU

Drawing: I-2

Overview: The control system will provide continuous display (µS/cm) of the Booster Pump Discharge Conductivity using conductivity sensor (AIT-404). The control system will provide the following operator control:

- Alarm for Booster Pump Discharge High Conductivity, as measured at the Booster Pump Discharge Conductivity Transmitter (AIT-404), when the conductivity is greater than {xxx µS/cm} setpoint for more than {30 seconds}.
- Alarm for Booster Pump Discharge Low Conductivity, as measured at the Booster Pump Discharge Conductivity Transmitter (AIT-404), when the conductivity is lower than {xxx µS/cm} setpoint for more than {30 seconds}.
- Alarm for Instrument Failure if the PLC receives a signal outside the 4-20 mA range for more than {30 seconds}.

Interlocks:

None

2.16 FLUORIDE STORAGE TANK LEVEL MEASUREMENT

Control System: Pump Station RTU

Drawing: I-3

Overview: The control system will provide continuous display (inches) of the Fluoride Storage Tank Level using weight transmitter (WIT-400). The control system will provide the following operator control:

- Alarm for Fluoride Storage Tank Low-Low Level, as measured at the Fluoride Storage Tank using weight transmitter (WIT-400), when the weight is below the setpoint {xxx lbs} for more than {10 seconds}.
- Alarm for Fluoride Storage Tank Low Level, as measured at the Fluoride Storage Tank using weight transmitter (WIT-400), when the weight is below the setpoint {xxx lbs} for more than {10 seconds}.
- Alarm for Fluoride Storage Tank High Level, as measured at the Fluoride Storage Tank using weight transmitter (WIT-400), when the weight is above the setpoint {xxx lbs} for more than {10 seconds}.
- Alarm for Instrument Failure, as measured at the Fluoride Storage Tank using weight transmitter (WIT-400), if the RTU receives a signal outside the 4-20 mA range for more than {30 seconds}.

Interlocks:

None

2.17 FLUORIDE STORAGE TANK LEAK MONITORING

Control System: Pump Station RTU

Drawing: I-3

Overview: The control system will provide continuous display of the leak status for the Fluoride Storage Tank using level switch (LSL-400). The control system will provide the following control:

- Alarm for Fluoride Storage Tank Leak, as measured at the Fluoride Storage Tank Containment Area Level Switch (LSH-400), when the switch is held for more than {10 seconds}.

Interlocks:

None

2.18 FLUORIDE INJECTION VAULT LEAK MONITORING

Control System: Pump Station RTU

Drawing: I-3

Overview: The control system will provide continuous display of the leak status for the Fluoride Injection Vault using level switch (LSL-405). The control system will provide the following control:

- Alarm for Fluoride Injection Vault Leak, as measured at the Fluoride Injection Vault Level Switch (LSH-405), when the switch is held for more than {10 seconds}.

Interlocks:

None

2.19 FLUORIDE BUILDING INTRUSION ALARM

Control System: Pump Station RTU

Drawing: I-3

Overview: The control system will provide continuous display of the Door Intrusion Alarm as measured by door intrusion switch (XS-402). The control system will provide the following control:

- Alarm for Building Intrusion, as measured at the door intrusion switch (XS-402), when the switch is held for more than {60 seconds} without the operator bypassing the intrusion alarm.

Interlocks:

None

2.20 FLUORIDE PUMP CONTROL

Control System: Pump Station RTU

Drawing: I-3

Overview: The control system will provide continuous display of the Fluoride Pump (P-400) run status, fault status, speed command, and include on screen selection for automatic and manual pump control. The control system will provide the following operator control:

- Normal automatic operation is selected from the HMI screen. Under normal conditions Fluoride Pump (P-400) shall run when flow is detected by flow meter (FIT-001). For any flow under {500gpm} the pump shall run at {5%}. Above {500gpm}, the pump shall ramp up speed linearly from {5%} at {500gpm} to {54%} at {5200gpm}. The pump shall remain at a max speed of {54%} for any flow rates over {5200gpm}.
- If status Turnout Control Valve (FCV-001) is reporting as closed or faulted, turn OFF Fluoride Pump (P-400).
- If status of both Booster Pump Bypass Control Valve (FCV-003) and Booster Pump Suction Control Valve (FCV-002) is reporting as closed or faulted, turn OFF Fluoride Pump (P-400).
- If Discharge High Fluoride Alarm, as measured by Discharge Fluoride Analyzer (AIT-401) is active, turn OFF Fluoride Pump (P-400).
- If Alarm for Fluoride Storage Tank Low-Low Weight, as measured at the Fluoride Storage Tank Weight using weight transmitter (WIT-400) is active, turn OFF Fluoride Pump (P-400).
- In MANUAL, the selected pump will run; in OFF, the pump will stop.
- Alarm when Fluoride Pump (P-400) is commanded to run and fails to run after {5 seconds} have elapsed.

Interlocks:

The status of Turnout Control Valve (FCV-001) shall be open before Fluoride Pump (P-400) turns ON.

The status of at least one of Booster Pump Bypass Control Valve (FCV-003) and Booster Pump Suction Control Valve (FCV-002) shall be open before Fluoride Pump (P-400) turns ON.

Fluoride Pump (P-400) shall not be allowed to run if Discharge High Fluoride Alarm, as measured by Discharge Fluoride Analyzer (AIT-401) is active.

Fluoride Pump (P-400) shall not be allowed to run if Alarm for Fluoride Storage Tank Low-Low Weight, as measured at the Fluoride Storage Tank Weight using weight transmitter (WIT-400) is active.

** END OF SECTION ***

CITY OF PLEASANTON
PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION

ATTACHMENT B

TURNOUT #4 BOOSTER PUMP STATION AND DISCHARGE PIPELINE (F-1 LINE)

Project No. CIP-24171

GEOTECHNICAL REPORT

APPENDIX B

(Geotechnical Report)

CITY OF PLEASANTON
PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION

ATTACHMENT B

TURNOUT #4 BOOSTER PUMP STATION AND DISCHARGE PIPELINE (F-1 LINE)

Project No. CIP-24171

GEOTECHNICAL REPORT

GEOTECHNICAL INVESTIGATION REPORT
CITY OF PLEASANTON
EMERGENCY WATERLINE PROJECT
STONERIDGE DRIVE
PLEASANTON, CALIFORNIA

BSK PROJECT NO.: G00001782

PREPARED FOR:

CITY OF PLEASANTON
200 OLD BERNAL AVENUE
PLEASANTON, CA 94566

JANUARY 22, 2024

399 Lindbergh Avenue
Livermore CA 94551
P 925.315.3151
www.bskassociates.com

Sent via email: anelkie@cityofpleasantonca.gov

January 22, 2024 BSK Proposal No. G00001782

Mr. Adam Nelkie
Assistant Director of Engineering
City of Pleasanton
200 Old Bernal Avenue
Pleasanton, California 94566

SUBJECT: Geotechnical Investigation Report
City of Pleasanton Emergency Waterline Project
Stoneridge Drive
Pleasanton, California

Dear Mr. Nelkie:

BSK Associates (BSK) is pleased to submit our geotechnical investigation report for the above-referenced project in Pleasanton, California. The enclosed report describes our geotechnical investigation performed at the project site (Site), and our conclusions and geotechnical design recommendations for the project.

In summary, it is our opinion that the Site is suitable for the proposed improvements provided the recommendations presented in this report are incorporated in the design and construction of the project. The conclusions and recommendations presented in the enclosed report are based on limited subsurface investigation and laboratory testing programs. Consequently, variations between anticipated and actual subsurface soil conditions may be found in localized areas during construction. If significant variation in the subsurface conditions is encountered during construction, BSK should review the recommendations presented herein and provide supplemental recommendations if necessary.

Additionally, design plans should be reviewed by our office prior to their issuance for conformance with the general intent of our recommendations presented in the enclosed report.

We appreciate the opportunity of providing our services to you on this project and trust this report meets your needs currently. If you have any questions concerning the information presented, please contact us at (925) 315-3151.

Sincerely,
BSK Associates, Inc.

Carrie L. Foulk, PE, GE #3016
Geotechnical Group Manager

REGISTERED PROFESSIONAL ENGINEER
CARRIE L. FOULK
No. 3016
Exp. 09/30/25
GEOTECHNICAL
STATE OF CALIFORNIA

Cristiano Melo, PE, GE #2756
Livermore Branch Manager

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Figures and Appendices

1. INTRODUCTION

This report presents the results of our geotechnical investigation for the City of Pleasanton Emergency Waterline Project located on Stoneridge Drive between Johnson Drive and Hopyard Road in Pleasanton, California. **Our investigation was limited to where the waterline crosses the canal 200 feet west of Franklin Drive and the booster pump station at the southwest corner of the intersection of Stoneridge Drive and Hopyard Road (Site).** A Vicinity Map showing the location of the Site is presented on Figure 1. This report contains a description of our site investigation methods and findings at the Site, including field and laboratory data. Based on these findings, this report presents conclusions regarding the geotechnical concerns for the planned waterline.

1.1 Site and Project Description

1.1.1 Pipeline

A new 24-inch diameter waterline will be installed along Stoneridge Drive between Johnson Drive and Hopyard Road in Pleasanton, California. According to the preliminary civil plans provided to us by Woodard & Curran dated August 9, 2023, sheets C-1 to C-4, the pipeline will be installed on the north side of Stoneridge Drive for most of the alignment and will turn south and cross Stoneridge Drive approximately 500 feet east of Johnson Drive. The pipeline will be installed using cut and cover methods except where it crosses under an approximately 12-foot-deep canal located approximately 200 feet west of Franklin Drive, where the bore and jack trenchless method will be used to cross under the canal. The location of the trenchless crossing is shown on the Site Plan, Figure 2. The canal is channelized in a 6-foot-tall by 12-foot-wide reinforced concrete box culvert under Stoneridge Drive according to the preliminary site plans. The surrounding topography is relatively flat with minor topographic relief and the elevation along Stoneridge Drive ranges from about 323 to 330 feet according to the preliminary civil plans.

The trenchless portion of the new pipeline alignment will be installed inside a 36-inch diameter steel casing and will be approximately 130 feet long and will have a maximum invert depth of about 15 feet below existing ground surface (BGS). The jacking and receiving shafts will be about 20 feet and 8 feet wide, respectively, and about 18 feet deep BGS.

1.1.2 Booster Pump Station

According to a preliminary plan sheet provided to us by Woodard & Curran, entitled “Turnout No. 4 Booster Pump Station and Discharge Pipeline” dated August 3, 2023 and based on our discussions with Woodard & Curran, a booster pump station will be installed at the southwest corner of the intersection of Stoneridge Drive and Hopyard Road within an existing City of Pleasanton utility area. The booster pump station will include a 15-foot wide by 30-foot long by 10-foot-deep concrete vault, a smaller turnout vault, a transformer, equipment pads, and modifications to the existing fluoride building. The new waterline will connect with the new booster pump station.

If the actual site and project descriptions differ significantly from that described above, especially the amount of grading anticipated for the project, we should be notified, so that we can review our scope of services and associated recommendations for applicability.

1.2 Purpose and Scope of Services

The purpose of this investigation was to explore and evaluate the subsurface conditions at the Site to provide geotechnical input for the design and construction of the planned improvements. The scope of services, as outlined in our proposal dated October 13, 2023 (Proposal No. G00001782) consisted of pre-field activities, field investigation, laboratory testing, engineering analysis, and preparation of this report.

Our investigation specifically excludes the assessment of site environmental characteristics, particularly those involving hazardous substances. Our scope of services did not include the evaluation of contaminants in the soil, water, or air.

2. SITE INVESTIGATION

2.1 Field Investigation

Our field investigation was performed on November 22 and December 8, 2023 to evaluate the subsurface conditions at the location of the trenchless crossing and at the location of the booster pump station as approximately shown on Figure 2. The field investigation consisted of drilling three soil borings (labeled B-1 through B-3) that were extended to depths of approximately 30 to 31½ feet BGS. The borings were drilled using a truck-mounted drill rig equipped with hollow stem augers by Exploration Geoservices of San Jose, California. The borings were logged by a BSK field geologist.

Relatively undisturbed samples of the subsurface materials were obtained using a split spoon sampler with a 2.5-inch inside diameter (I.D.) and a 3-inch outside diameter (O.D.) fitted with stainless steel liners. The sampler was driven 18 inches using a 140-pound, automatic and semi-automatic hammers falling 30 inches, and blow counts for successive 6-inch penetration intervals were recorded. The blow counts were reported on the final boring logs. After the sampler was withdrawn from the boreholes, the samples were removed, sealed to reduce moisture loss, labeled, and returned to our laboratory. Prior to sealing the samples, strength characteristics of the cohesive soil samples recovered were evaluated using a hand-held pocket penetrometer. The results of these tests are shown adjacent to the samples on the boring logs.

Soil classifications made in the field, based on visual/manual assessment of the auger cuttings and samples, were re-evaluated in the laboratory after further examination and testing. Where laboratory tests were performed, most of the test results appear in the final boring logs (refer to the "Laboratory Testing" section below for further details). Final soil classification was assessed through the judgement of a responsible Geotechnical Engineer supplemented with the laboratory testing at various intervals in general accordance with the ASTM *Standard Practice for Classification of Soils for Engineering Purposes* (D2487). A summary of the Unified Soil Classification System (USCS), adapted by ASTM D2487 and D2488 is presented in Appendix A, Figure A-1. The Soil Description Key and Log Key are presented on Figure A-2 and A-3. Sample classifications, and blow counts recorded during sampling, and other related information are presented on the soil boring logs within Appendix A. Discussion of the subsurface conditions encountered at the Site is presented in the "Subsurface Conditions" section of this report.

Prior to the subsurface exploration, Underground Service Alert (USA North 811) was notified to provide utility clearance. A drilling permit was obtained from Zone 7 Water Agency (County) and an encroachment permit was obtained from the City of Pleasanton. Upon completion of the field investigation, the borings were backfilled with cement grout under the supervision of a County inspector. Borings B-1 and B-2 were capped with hot mix asphalt and boring B-3 was capped with Quikrete (rapid setting concrete). Excess soil cuttings generated by the borings during the drilling operation were hauled offsite.

The locations of our exploration points were estimated by our field representative based on rough measurements from existing features at the Site. The elevations shown on the boring logs were estimated

based on the preliminary civil plans by Woodard & Curran. As such the elevations and locations of the exploration points should be considered approximate to the degree implied by the methods used.

2.2 Laboratory Testing

Laboratory tests were performed on selected soil samples to evaluate their physical characteristics and engineering properties. The laboratory testing program included dry unit weight and moisture content, Atterberg limits, unconsolidated-undrained triaxial compression (TXUU), sieve analysis, and hydrometer analysis testing. Most of the laboratory test results are presented on the boring logs. The results of the Atterberg limits, TXUU, sieve analysis, and hydrometer analysis tests are presented graphically in Appendix B.

Analytical testing was performed on samples obtained from depths of about 2½ to 19½ feet BGS in borings B-1 through B-3 to assist in evaluating the corrosion potential of the soils at the Site. The corrosion results are presented at the end of Appendix B and were performed by CERCO Analytical of Concord, California using ASTM methods.

3. SITE GEOLOGY AND SEISMICITY

The Site is located within the Amador and Livermore Valleys of the western/central most portion of the Dublin 7½-minute quadrangle. The Amador and Livermore Valleys are a synclinal basin bounded on the east by the Greenville Fault and on the west by the Calaveras Fault. The basin is also bounded on the southeast by the Las Positas Fault and on the southwest by hills lying above the northeast dipping Verona Thrust Fault. The valley floor is mainly filled with Holocene and Pleistocene alluvial deposits that emanated from the surrounding hills by various creeks. According to the California Geological Survey (CGS, 2008[1]), the Site is underlain by Holocene basin deposits and alluvial fan deposits consisting mainly of fine-grained soils – dominated by clay and silt with interbedded lobes of coarser alluvium. According to the CGS (2008[2]), the Site is located within a Seismic Hazard Zone for liquefaction.

The Site is located within a highly seismic area of the greater San Francisco Bay Area. The seismic activity within the Bay Area is associated with the San Andreas Fault System which constitutes one of Earth's major tectonic plate boundaries, separating the North American and Pacific tectonic plates. The two plates are moving past each other in a right lateral sense. Stresses built up by plate motion are periodically released predominately by strike slip movement along the San Andreas Fault System, which in the Bay Area includes the San Andreas Fault, Hayward Fault, Calaveras Fault, and other associated active faults. The nearest active and zoned faults are the Calaveras Fault located approximately less than a mile to the west, the Pleasanton Fault located approximately less than a mile to the northeast, and the Verona Fault 4 miles to the southeast. Due to proximity to active faults in the region, the Site will likely be subjected to moderate to intense ground shaking from a future significant earthquake on the aforementioned faults or other active faults in the Bay Area.

[1] California Geological Survey Staff (2008), Seismic Hazard Zone Report for the Dublin 7.5-Minute Quadrangle, Alameda County, California: California Geological Survey Seismic Hazard Zone Report 112.

[2] California Geological Survey Staff (2008), Earthquake Zone of Required Investigation, Dublin Quadrangle: California Geological Survey Earthquake Fault Zones and Seismic Hazard Zones, released August 27, 2008.

4 SUBSURFACE CONDITIONS

According to our borings, the Site is generally underlain by soft to firm fat clay to the maximum depth explored of approximately 31½ feet BGS.

Free groundwater was not observed within our borings. However, because the subsurface consists of high plasticity clay, it is likely that the boreholes were not left open long enough for the groundwater to infiltrate into the boreholes and reach equilibrium. The CGS (2008) indicates that historically high groundwater at the Site is less than 10 feet BGS. Groundwater was measured in monitoring wells about 1,000 north of the Site as shallow as about 5 feet BGS.

It should be noted that groundwater levels can fluctuate several feet depending on factors such as seasonal rainfall, groundwater withdrawal, and construction activities on this or adjacent properties or if water seepage from leaking pipelines or other exposed improvements within excavations is encountered.

The above is a general description of soil and groundwater conditions encountered at the Site. For a more detailed description of the soils encountered, refer to the boring logs in Appendix A. It should be noted that subsurface conditions can deviate from those conditions encountered at the boring locations. If significant variation in the subsurface conditions is encountered during construction, it may be necessary for BSK to review the recommendations presented herein and recommend adjustments as necessary.

5. DISCUSSIONS AND CONCLUSIONS

Based on the results of our investigation, it is our opinion that the proposed emergency waterline and booster pump station project is feasible geotechnically and may proceed as planned. This conclusion assumes that the recommendations presented in this report will be incorporated into the design and construction of this project.

Additional discussions, conclusions, and recommendations are presented below. Specific recommendations regarding geotechnical design and construction aspects for the project are presented in the "Recommendations" section of this report.

5.1 Fault-Related Ground Surface Rupture and Ground Shaking

The project site is not located within an Alquist-Priolo Earthquake Fault Zone and no mapped active fault traces are known to traverse the project site. As discussed in the "Site Geology and Seismicity" section of this report, the Site is located within 1 to 8 miles of several active faults and is located within a highly seismic area. Therefore, we expect the Site to be subjected to ground shaking during a significant seismic event on the active faults in the Bay Area and surrounding region during the design life of the project. Because no known active faults cross or project toward the Site, we conclude that the potential for fault-related surface rupture at the Site is low. Mitigation of ground shaking should be addressed by incorporating pertinent seismic requirements of the 2022 California Building Code (CBC) in the design of the new structures for the project.

5.2 Expansive Soils

Atterberg limits test results for the soils in the upper approximately 3 to 25 feet BGS are indicative of soils having a very high shrink and swell potential (i.e., very high expansion potential) when exposed to cycles of moisture fluctuation. The soils had a liquid limit (LL) range of about 51 to 64 and a plastic index (PI) range of about 29 to 44. The Atterberg limits test results are presented on Figure B-1 in Appendix B.

5.3 Liquefaction Potential

Liquefaction is a condition where saturated, granular soils undergo a substantial loss of strength and deformation due to pore pressure increase, resulting from cyclic stress application induced by earthquakes. In the process, the soil acquires mobility sufficient to permit both horizontal and vertical movements if the soil is not confined. Soils most susceptible to liquefaction are loose, clean, uniformly graded, silt and fine sand, as well as some lean clay deposits.

Because the soils encountered in our borings consisted of fat clays, we conclude that the potential for liquefaction and liquefaction related phenomena such as ground surface disruption and lateral spread to adversely impact the Site, within the maximum depth of our borings of 30 feet BGS, is very low.

5.4 Dynamic Compaction/Seismic Settlement Potential

Another type of seismically induced ground failure, which can occur as a result of seismic shaking, is dynamic compaction or seismic settlement. Such phenomena typically occur in unsaturated, loose granular material or uncompacted fill soils. Based on the stratigraphy and consistency/density of the soils encountered in our borings, we conclude that the potential for seismic settlement to occur at the Site is very low.

6. RECOMMENDATIONS

Presented below are recommendations for the trenchless method, manhole and pipe design, seismic considerations, and earthwork as well as associated construction considerations for this project.

6.1 Trenchless Method

As previously discussed, the horizontal auger boring trenchless method (also known a bore and jack) is being considered for the installation of the portion of the new pipeline segment to be installed under the canal crossing. Based on the subsurface conditions encountered in our borings (soft to firm clay), we conclude that this trenchless method is feasible for this project. Provided below are some guidelines to be considered in the design of the trenchless method to be used.

6.1.1 Trenchless Pipeline Installation Techniques

Selection of an appropriate trenchless installation technique for a particular location usually depends on a number of factors including pipe material type and size, length and depth of run, subsurface conditions, depth to groundwater, alignment and grade control tolerances, space constraints in the site vicinity, and environmental factors. The selected trenchless method should take into consideration the presence of soft to firm clayey soil within the upper approximately 30 feet BGS underlying the Site, which typically have very low infiltration/permeability rates. Also, historic groundwater at the Site is mapped at a depth of about 10 feet BGS, and has been measured as shallow as about 5 feet near the Site. Therefore, groundwater should be expected at the depth of the trenchless crossing.

6.1.2 Lateral Earth Pressures for Jacking/Receiving Shafts

The design of shoring for the project, including jacking and receiving shafts, should be the responsibility of the contractor and should be designed by a professional engineer registered in the State of California. Equivalent fluid active, at-rest, and passive pressures of 45 pcf, 90 pcf, and 350 pcf, respectively, may be considered in shoring design **assuming the Site is dewatered**. If the Site is not dewatered, we recommend designing the shoring using a design groundwater depth of 5 feet BGS and active, at-rest, and passive pressures of 85 pcf, 105 pcf, and 170 pcf, respectively, below the design groundwater depth. These values should be confirmed by the shoring designer based on the subsurface conditions encountered in the borings at the Site, the type of shoring to be used, and the shoring designer's experience with similar

subsurface conditions. Also, applicable surcharge loading induced by construction equipment, vehicle traffic, soil stockpiles, and existing nearby improvements should be considered in the design of the shoring.

6.1.3 Minimum Depth of Cover

Based on the 2018 Caltrans Guidelines and Specifications for Trenchless Technology Projects[3], ASCE's Standard Design and Construction Guidelines for Microtunneling[4], and the anticipated diameter of the casing for the trenchless crossing (36 inches), and because the casing for horizontal auger boring is installed as the borehole excavation takes place (which substantially reduces the potential for a cave-in and related ground subsidence) the minimum depth of cover is 10 feet. The minimum depth of cover should be measured between the ground surface and the top of the trenches casing, and assumes that the contractor will utilize appropriate trenchless construction practices during construction and that proper settlement/heaving monitoring takes place during construction. Refer to the "Construction Monitoring and Instrumentation" section of this report for additional information.

6.1.4 Construction Monitoring and Instrumentation

Care should be exercised during the trenchless operation to avoid excessive loss of ground which could propagate to the surface and cause settlement and distress to the pavement and surrounding improvements along Stoneridge Drive. Therefore, we recommend installing ground surface monuments along and within a zone extending at least as far laterally to either side of the planned path of the trenchless work limits as the trenchless casing is deep (based on invert of casing). The elevation of the monuments should be read prior to the start, throughout, and after the trenchless operation is completed. The frequency of monitoring readings during the trenchless operation will depend on the sensitivity of nearby structures to movement. As a minimum, we recommend that readings be performed at least once a day during trenchless activities. Monitoring records should be made available to the pertinent agencies having jurisdiction over the project and their consultants on the same day each reading is performed. If significant movement of the ground surface is noticed during the trenchless operation, work should be immediately halted. Trenchless operations should not proceed again until steps have been taken to address the potential for further movement, such as properly backfilling and abandoning the drill hole with grout to prevent further subsidence.

6.1.5 Contractor Selection

The successful construction of the trenchless method being considered will be substantially determined by the experience and performance of the specialty contractor retained to perform the work. We recommend the use of a specialty contractor with a minimum of 5 to 10 years of continuous construction

[3] Caltrans (2018), Caltrans Encroachment Permits, Guidelines and Specifications for Trenchless Technology Projects, dated August 2018.
[4] ASCE (2014), Standard Design and Construction Guidelines for Microtunneling, CI/ASCE 36-14, dated February 24, 2014.

experience in similar drilling conditions on projects of similar scope (i.e., pipe diameter, pipe material, length, and depth) with the specific trenchless method to be used by that contractor for this project. Contractors to be considered in the bidding process should provide examples of trenchless projects they have successfully completed in the past 5 years installing similar utilities in similar subsurface conditions. The example projects should note instances when things went wrong during particular projects and how they were remediated during construction.

6.2 Manhole and Pipe Design

6.2.1 Foundation Bearing Support for Manholes and Pipes

Manhole foundations should consist of concrete bases placed on firm, undisturbed soil or compacted backfill. For manholes, the bearing pressures at which foundation soils will experience no net increase in pressure are estimated at about 600, 900, 1,200, and 1,500 pounds per square foot (psf), for depths of 5, 10, 15, and 20 feet BGS, respectively. These pressures assume a groundwater depth of 5 feet BGS. In-place densities of 110 to 130 pounds per cubic foot (pcf) may be assumed for existing in-situ soils and for compacted soil backfill for use in estimating the weight of soil removed and of backfill placed. Should loads greater than the weight of the material excavated be imposed on the surface or subsurface soils, we should be contacted to evaluate the bearing capacity at the location of the proposed construction.

The bottom of pipe and manhole subgrades should be firm and stable, free of debris, loose soil or mud, and free-standing water prior to concrete or pipe placement. In addition, clay soils exposed at the bottom of the manhole excavations should not be allowed to dry out prior to placing concrete.

At locations where soft soils are encountered at the proposed pipe and manhole subgrade elevations, or where the subgrade soils are disturbed during construction, stabilization of the excavation bottom may be needed. This could consist of a layer of rock ballast wrapped in filter fabric as recommended in the "Pipe Foundation" section of this report. Selection of the stabilization method to be used should be based on the severity of the conditions present during construction and consultation with BSK.

6.2.2 Vertical Loads on Pipe

The pipe selected should be capable of supporting vertical loads due to the soil overburden (trench backfill) and surcharge, including traffic loads. An in-place density of 130 pounds per cubic foot may be assumed for the trench backfill, and Marston's Formula[5] may be used. The vertical pressure on the pipe due to an H-20 live load, as defined in the "American Iron and Steel Institute, Handbook of Steel Drainage and Highway Construction Products", may be taken as follows:

[5] Marston, A, and Anderson, A.P., "The Theory of Loads on Pipes in Ditches and Tests of Cement and Clay Drain Tile and Sewer Pipe." Iowa Eng. Sta., Bull. No. 31 (1913).

VERTICAL LOADS ON PIPE	
Height of Cover Over Pipe (Feet)	**Vertical Pressure on Pipe (psf)**
1	1,800
2	800
4	400
6	200
8	100
>8	Neglect live load

Additional surcharge loads on the pipe should be considered in the design if the loads are located above the pipe or within a 1H:1V (horizontal to vertical) plane projected upwards from the spring line of the pipe.

6.2.3 Manhole and Booster Pump Station Walls

We anticipate standard manhole walls 10 feet or less in depth are capable of resisting the lateral earth pressures and surcharge lateral loads due to normal H-20 roadway traffic expected at this Site. For manholes deeper than 10 feet and booster pump station walls, or those exposed to loads greater than H-20 loads, the design of walls should be checked using the at-rest pressures discussed below and the anticipated surface loads.

We consider manhole and booster pump station walls to be relatively rigid so that they cannot yield sufficiently to develop active earth pressures. For this relatively unyielding wall condition, equivalent fluid at-rest lateral earth pressures of 90 and 105 pounds per cubic feet (pcf) above and below the design groundwater of 5 feet BGS, respectively, may be used for design.

Surcharge loads adjacent to the walls should also be included in the design of the walls. A rectangular distribution acting over the upper 10 feet of depth of the walls with a pressure equal to one-half of the surcharge load may be used.

Lateral loads may be resisted by a combination of friction between foundation bottoms and the supporting subgrade, and by passive resistance acting against vertical faces of the structures. An allowable lateral sliding resistance adhesion of 500 psf between the foundation and supporting subgrade may be used. For passive resistance, allowable equivalent fluid pressures of 350 and 170 pcf above and below the design groundwater depth of 5 feet BGS, respectively, may be used against the opposite wall of the manholes and booster pump station. The friction and passive values include factors of safety of about 1½.

Passive resistance in the upper one foot of the manhole and booster pump station walls should be neglected unless the ground surface is confined by concrete slabs, pavements, or other such positive protection.

Section 1803.5.12 of the 2022 California Building Code (CBC) requires that the design for foundation walls and retaining walls supporting backfill heights greater than 6 feet include seismic earth pressures. Therefore, we recommend using a seismic pressure of 62 pcf above design groundwater depth and 30 pcf below design groundwater depth of 5 feet BGS based on Agusti and Sitar (2013)[6]. This pressure is expressed as an equivalent fluid pressure and would be added to the wall design in addition to the static values presented above. The seismic earth pressure should be applied as a triangular distribution with the resultant force acting at 1/3 times the wall height above the base of the wall.

6.2.4 Pipe Foundation

Where pipe subgrade soils are firm and stable, free of debris, loose soil or mud, and free-standing water, no pipe foundation material is needed. However, if loose sands or other soft or loose soils are encountered at the proposed subgrade elevations for the pipeline and manholes, or where the subgrade soils are disturbed during construction, we recommend that the pipe foundation consist of a layer of rock ballast wrapped in filter fabric (Mirafi® 140N or equivalent) placed below the subgrade. Before placing the rock ballast, the subgrade should be overexcavated a minimum of 9 inches below its design elevation, followed by the placement of filter fabric.

The filter fabric should cover the entire width of the excavation at the locations where rock ballast is used, and its seams should be fixed to the excavation walls before the placement of the rock ballast material. Once these steps are accomplished, the overexcavated subgrade should be filled with rock ballast to achieve a firm and stable surface. The rock ballast material should meet both of the following criteria:

- Consist of Class 1, Type B Permeable Material meeting the requirements of Section 68 of the 2010 Caltrans Standard Specifications; and
- Consist of crushed stone, or gravel, durable and free from slaking, or decomposition under action of alternate wetting or drying.

Once the rock ballast is placed, the filter fabric seams should be detached from the walls of the excavation, and wrapped around the rock ballast, and should overlap a minimum of one foot. Likewise, the filter fabric seams for any consecutive sections of rock ballast placed longitudinally along the excavation should also overlap a minimum of one foot.

6.2.5 Bedding and Embedment

The following pipe bedding and embedment material recommendations should be followed unless City- or agency-specific standards are followed.

[6] Agusti, G.C. and Sitar, Nicholas (2013), Seismic Earth Pressures on Retaining Structures in Cohesive Soils, Report No. UCB GT 13-02, August 2013.

Pipe bedding should be placed for a thickness of at least 6 inches below the bottom of pipes and should consist of imported sand that meets the requirements discussed in the "Fill Material" section of this report. The same material used as pipe bedding may be used as pipe embedment (also known as shading), which is the material typically placed from the top of the pipe bedding to 12 inches above the top of the pipe. It is important that the bedding and shading material be free-flowing to enable complete support and coverage around the pipes, especially under the pipe haunches, prior to compaction.

Coarse-grained sand, gravel, and drain rock should be avoided as pipe bedding and/or embedment unless the material is fully enclosed in a filter fabric, such as Mirafi® 140N or equivalent. Otherwise, the native fine-grained soils to be used as excavation backfill above the pipe embedment could potentially migrate into coarse grained or gap graded material causing loss of ground and resulting in ground settlement. This could result in pipe joint movement and pavement distress.

6.2.6 Pipe, Manhole, and Trench Backfill Settlement

Provided the recommendations presented in this report are properly followed, we anticipate that pipe and manhole settlement post-construction will be negligible. However, the trench backfill section for open-cut trenching is expected to settle an amount equivalent to about 1 percent of the backfill thickness even if it is compacted to a minimum of 90 percent compaction. For instance, if the backfill thickness is 10 feet, that would be equivalent to about 1¼ inches of settlement. Although most of this settlement is expected to occur during construction, any settlement that occurs in the trench backfill will be differential relative to areas of the Site that are not excavated. To address this potential settlement, after excavations are backfilled to within finished aggregate base elevation, consideration should be given to waiting for a period of 15 to 30+ days before paving the top of the trench backfill to allow for most of the settlement to occur. Alternatively, the required compaction for the trench backfill could be increased to a minimum of 95 percent compaction. Increasing the compaction effort should reduce the amount of trench settlement, but it will not eliminate it.

6.3 Pipeline Thrust Blocks

Thrust blocks for buried pipelines may be designed using an allowable lateral bearing pressure of 900 psf at a minimum depth of 3 feet into firm native soil or properly compacted engineered fill. This value may be increased by 300 psf for each additional foot of depth beyond the recommended minimum, up to a maximum allowable value of 1,500 psf. For evaluation during temporary test cases, these values may be increased by a factor of 1.5.

6.4 Modulus of Soil Reaction for Buried Flexible Pipes

Based on Jeyapalan (2001)[7], the modulus of soil reaction for buried flexible pipes can be calculated using the equation below.

$$E' = (S_C) \times (E'_b)$$

Where:

- E' is the soil modulus of soil reaction for a buried flexible pipe (in units of psi).
- S_C is the soil support combination factor obtained from Table A below (unitless). The parameters needed to read Table A are defined below.
  - E'_n is the modulus of soil reaction for the native soil surrounding the trench (in units of psi).
  - E'_b is the modulus of soil reaction for the pipe embedment material (in units of psi).
  - B_d is the trench width (in units of inches).
  - D is the outside diameter of the pipe (in units of inches).

Based on our findings, we recommend using an E'_n value of 750 psi for the native clayey surficial soils underlying the Site. Table B below provides recommended E'_b values for various materials based on compaction effort applied to the embedment material during trench backfill.

TABLE A
SOIL SUPPORT COMBINING FACTOR, S_C

E'_n/E'_b	$B_d/D = 1.5$	$B_d/D = 2.0$	$B_d/D = 2.5$	$B_d/D = 3.0$	$B_d/D = 4.0$	$B_d/D = 5.0$
0.1	0.15	0.30	0.60	0.80	0.90	1.00
0.2	0.30	0.45	0.70	0.85	0.92	1.00
0.4	0.50	0.60	0.80	0.90	0.95	1.00
0.6	0.70	0.80	0.90	0.95	1.00	1.00
0.8	0.85	0.90	0.95	0.98	1.00	1.00
1.0	1.00	1.00	1.00	1.00	1.00	1.00
1.5	1.30	1.15	1.10	1.05	1.00	1.00
2.0	1.50	1.30	1.15	1.10	1.05	1.00
3.0	1.75	1.45	1.30	1.20	1.08	1.00
≥5.0	2.00	1.60	1.40	1.25	1.10	1.00

[7] Jeyapalan, J.K. (2001), Modulus of Soil Reaction (E') Values for Pipeline Design, 2001 ASCE Pipeline Conference, Advances in Pipelines Engineering and Construction, July 15-18, San Diego, CA, pp. 1-12.

TABLE B MODULUS OF SOIL REACTION FOR THE PIPE EMBEDMENT MATERIAL, E'_b		
Embedment Material	**Level of Compaction[1]**	
	90%	**95%**
Native soil	750 psi[2]	
Caltrans Class 2 AB	1,500 psi	2,000 psi
Silty Sand/Poorly Graded Sand (SP/SM)	1,350 psi	1,750 psi
CLSM	2,300 psi[2]	

Notes:
1. Using the Modified Proctor test (ASTM D1557).
2. Level of compaction is not applicable to this type of material.

6.5 Mat Foundation Recommendations

We recommend the criteria presented in the table below be incorporated into the design of mat foundations for this project.

MAT FOUNDATION CRITERIA[1]	
Static Allowable Bearing Capacity[2]	1,500 psf
Seismic/Wind Allowable Bearing Capacity[2]	2,250 psf
Passive Resistance (Equivalent Fluid Pressure)[3, 4]	350 and 170 pcf above and below design groundwater depth of 5 feet BGS
Allowable Coefficient of Friction[4]	0.30
Modulus of Vertical Subgrade Reaction[5]	40 psi/in
Minimum Slab Thickness[6] at the Edges	18 inches

Notes:

1. Mat slab foundations should be supported on a minimum of 12 inches of compacted Caltrans Class 2 aggregate base to provide enhance slab support. If moisture vapor through the slab is objectionable (i.e., moisture sensitive flooring or objects will be placed over slabs), a vapor barrier at least 15 mils thick (meeting the requirements of the "Floor Slab Moisture" section of this report) and capillary moisture break consisting of a minimum 6-inch-thick layer of crushed drain rock should be installed underneath mat foundations. If used, the crushed drain rock layer may substitute an equivalent amount of the recommended aggregate base layer. The crushed rock layer should be ¾-inch maximum size with no more than 10 percent by weight passing the #4 sieve.
2. Includes a factor of safety of at least 3 for static loading and at least 2 for transient loading (i.e., seismic or wind conditions).
3. Neglect upper 1 foot if surface is not confined by concrete slab or pavement. **For foundations located on or proximate to sloping ground , such as bioretention areas, the passive resistance should be neglected in the upper portion of the foundation until there is a horizontal distance of at least 7 feet between the slope face and the nearest edge of the foundation.**
4. The allowable coefficient of friction and passive resistance may be used concurrently, and the passive resistance can be increased by one-third for wind and/or seismic loading. Values include a factor of safety of at least 1½.
5. Based on a one square foot bearing plate. This unadjusted value needs to be adjusted for the actual size of the mat as follows:
    a. Multiply by [(m+0.5)/(1.5 x m)] where m is the ratio of the mat length divided by its width (unitless).
    b. If a computer program is used to design the mat for this project and it requires the input of a modulus of subgrade reaction for the Site, the designer should check whether the program requires input of the unadjusted or adjusted modulus of vertical subgrade reaction.
6. Below lowest adjacent finished grade. The thickened edge should be a minimum of 12 inches wide. The slab designer should determine the slab concrete thickness and reinforcing. **If the mat slab is below grade, the thickened edge can be eliminated.**

Provided that the foundations are designed according to the recommendations presented above and constructed properly, total and differential elastic and liquefaction-induced settlements are estimated to be on the order of 1-inch and ½-inch, respectively. Differential settlement is defined in this report as the vertical difference in settlement across a horizontal distance of 30 feet, whichever is less. A majority of the estimated elastic settlement is expected to occur during construction as the foundation is loaded.

6.5.1 Additional Considerations for Mat Foundations

Where foundations are located adjacent to below-grade structures (including existing footings) or near major underground utilities, the foundation should extend below a 1H:1V (horizontal to vertical) plane projected upward from the structure foundation or bottom of the underground utility to avoid surcharging the below grade structure and underground utility with foundation loads. Where this is not possible or feasible, we recommend that CLSM be used to backfill the portion of the utility trench that extends below the 1H:1V projection. Also, if a utility crosses under the mat slab, if it is located within 2 x W of the bottom of the slab, where W = width of the slab, the utility should be encased in CLSM or lean concrete. If a perpendicular utility is located below a depth of 2 x W below the slab, the utility does not need to be encased in CLSM or lean concrete, but the trench should be backfilled with CLSM a distance of 2 feet laterally on each side of the edge of the slab. In addition, where utilities cross through the slab, flexible waterproof caulking should be provided between the sleeve and the pipe. Utility plans should be reviewed by BSK prior to trenching for conformance to these requirements.

Concrete for foundations should be placed neat against firm native soil or engineered fill. **It is critical that foundation excavations not be allowed to dry before placing concrete.** If shrinkage cracks appear in the foundation excavations, the excavations should be thoroughly moistened to close all cracks prior to concrete placement. The foundation excavations should be monitored by a representative of BSK for compliance with appropriate moisture control and to confirm the adequacy of the bearing materials.

6.6 Retaining Walls

Below-grade walls up to about 10 feet in height are anticipated for this project. Such retaining walls may be supported on mat foundations meeting the recommendations presented in the “Mat Foundations” section of this report. Additional recommendations for retaining walls are presented below.

6.6.1 Lateral Earth Pressures

Lateral earth pressures are presented in the table below and are expressed as equivalent fluid pressures (unit weights) in units of pounds per cubic foot (pcf). In addition to these earth pressures, the designer should use the below design groundwater values unless a drainage system is installed behind the walls.

RECOMMENDED LATERAL EARTH PRESSURES FOR BELOW GRADE WALLS[1,2]		
Description	**Equivalent Fluid Density, pcf (above design groundwater depth)[3]**	**Equivalent Fluid Density, pcf[4] (below design groundwater depth)[3]**
At-rest Earth Pressure (rigid walls)	90	105

Notes:
1. Applies to walls backfilled with on-site soils.
2. Applies to backfill gradients of 6H:1V or flatter.
3. A design groundwater depth of 5 feet BGS should be used.
4. Includes hydrostatic pressure.

6.6.2 Seismic Wall Pressures

According to Section 1803.5.12 of the 2022 California Building Code (CBC), dynamic seismic lateral earth pressures need to be included in the design of foundation walls and retaining walls supporting more than 6 feet of backfill height. Based on Agusti and Sitar (2013)[8] and a PGA_M value[9] of 0.855g for the Site, we recommend using seismic pressure increments as shown in the table below.

RECOMMENDED SEISMIC LATERAL EARTH PRESSURES FOR BELOW GRADE WALLS[1,2]		
Description	**Equivalent Fluid Density, pcf (above design groundwater depth)[3]**	**Equivalent Fluid Density, pcf (below design groundwater depth)[3]**
Rigid walls	62	30

Notes:
1. Applies to walls backfilled with on-site soils.
2. Applies to backfill gradients of 6H:1V or flatter.
3. A design groundwater depth of 5 feet BGS should be used.

The seismic earth pressure should be applied as a triangular distribution with the resultant force acting at a location 1/3 times the wall height above the base of the wall.

6.6.3 Wall Drainage

Retaining walls higher than 2 feet and less than 5 feet deep BGS should be either designed to resist hydrostatic pressures or be well-drained to reduce the potential for hydrostatic pressures to develop

[8] Agusti, G.C. and Sitar, N.(2013), Seismic Earth Pressures on Retaining Structures in Cohesive Soils, Geotechnical Engineering Department of Civil and Environmental Engineering, University of California at Berkley, Report No. UCB GT 13-02.

[9] Refer to the "2022 CBC Mapped Seismic Design parameters" section of this report.

behind the walls. (Walls deeper than 5 feet BGS below grade should be designed for hydrostatic pressures.) A typical drainage system for a retaining wall may consist of a 1- to 2-foot-wide zone of Caltrans Class 2 Permeable material immediately behind the wall with a perforated pipe at the base of the wall discharging to a storm drain or other appropriate discharge facility via gravity flow. As an alternative, a prefabricated drainage board may be used in lieu of the Class 2 Permeable material. **Unless the surface within 5 feet laterally behind the walls is protected by concrete or pavement, the drainage zone behind retaining walls should be capped with a minimum 12-inch-thick layer of properly compacted on-site clayey soils to reduce the risk of surface runoff discharging into the wall drain.**

6.6.4 Surcharge Loads

Surcharge loads caused by vehicular and/or construction traffic adjacent to the walls may be assumed to consist of a rectangular distributed uniform pressure of 100 psf acting over the entire height of the retaining walls. For other surcharge loads, a rectangular distribution with a uniform pressure equal to one-half of the surcharge pressure should be used for restrained walls (at-rest earth pressure condition). The wall designer should evaluate whether this surcharge is appropriate for the expected loading. Additional analyses during design may be needed to evaluate the effects of non-uniform surcharge loads such as point loads, line loads, or other such presently undefined surcharge loads. In that case, we should be consulted for supplemental geotechnical recommendations.

6.7 Uplift Loading Due to Buoyancy

The below-grade structures should be designed to resist a buoyancy force based on the recommended design groundwater depth of 5 feet BGS. The weight of the structures may be used to resist this uplift pressure as well as friction between the below-grade walls and the surrounding backfill. An allowable friction coefficient of 0.2 between the walls and surrounding backfill may be used. This value includes a factor of safety of about 1½. Normal pressures of 60D psf and 30D psf above and below the design groundwater depth, respectively, where D is the depth in feet of the below-grade walls below the ground surface, may be used to compute the normal force to be used with the allowable friction coefficient.

If the mat foundations for the below-grade structures extend beyond the outer wall limits to form a “lip”, the weight of the backfill above the lip plus a soil wedge extending upward at a 60-degree angle from the horizontal from the edge of the lip may also be used to resist uplift pressure in lieu of the wall friction discussed in the paragraph above. Effective soil unit weights of 120 and 58 pcf may be used above and below the design groundwater depth, respectively.

6.8 2022 CBC Mapped Seismic Design Parameters

Provided below are mapped seismic design parameters based on the 2022 California Building Code (CBC) for this project. Based on Section 1613.2.2 of the 2022 CBC, the Site shall be classified as Site Class A, B, C, D, E or F based on the Site soil properties and in accordance with Chapter 20 of ASCE 7-16. Based on our investigation, we recommend the Site be classified as a Site Class D. We have not performed a site-specific ground motion hazards analysis for this project. Instead, we have provided mapped CBC seismic parameters in the table below, including increased values for S_{M1} and S_{D1} per the exception for Site Class D sites provided in ASCE 7-16, Supplement 3, Section 11.4.8, Item 1.

2022 CBC SEISMIC DESIGN PARAMETERS (Lat: 37.691085, Lon: -121.903991)			
Seismic Design Parameter	**Value**		**Reference**
Site Class	D		ASCE 7-16, Table 20.3-1
MCE_R Mapped Spectral Acceleration (g)	S_S = 1.869	S_1 = 0.687	USGS Mapped Values
Site Coefficients (Site Class D)	F_a = 1.0	F_v = 1.7[A]	ASCE 7-16, Table 11.4-1 & -2 **(Supplement 3)**
MCE_R Mapped Spectral Acceleration Adjusted for Site Class Effects (g)	S_{MS} = 1.869	S_{M1} = 1.752 **(See Note B below)**	ASCE 7-16, Eq. 11.4-1 & -2 **(Supplement 3)**
Design Spectral Acceleration (g)	S_{DS} = 1.246	S_{D1} = 1.168 **(See Note B below)**	ASCE 7-16, Eq. 11.4-3 & -4 **(Supplement 3)**
Site Short Period – T_S (Seconds)	T_S = 0.937		$T_S = S_{D1}/S_{DS}$
Site Long Period T_L (Seconds)	8		USGS Mapped Value
Seismic Design Category (SDC)	D		ASCE 7-16, Section 11.6
MCE_G peak ground acceleration adjusted for Site Class effects (g)	PGA_M = 0.855		ASCE 7-16, Section 11.8.3

Definitions:
MCE_R = Risk-Targeted Maximum Considered Earthquake
MCE_G = Maximum Considered Earthquake Geometric Mean
Notes:

A. See requirements for site-specific ground motions in ASCE 7-16, Section 11.4.8. This value of F_v shall be used only for calculation of T_S, determination of Seismic Design Category, linear interpolation for intermediate values of S_1, and when taking the exceptions under Items 1 and 2 of Section 11.4.8 for the calculation of S_{D1}.

B. S_{M1} and S_{D1} values with a 50% increase assuming the exception for Site Class D described in ASCE 7-16 Supplement 3, Section 11.4.8, Item 1 is taken. Otherwise, a site-specific ground motion analysis per ASCE 7-16 Section 21.2 is required.

6.9 Earthwork

6.9.1 Site Stripping/Demolition

Prior to the start of excavations for this project, the Site should first be cleared and stripped to remove all surface vegetation, organic laden topsoil and debris generated during the demolition of existing pavements. Stripped topsoil from landscaped areas may be stockpiled for later use in landscaping or unimproved areas of the Site; however, this material should not be reused for engineered fill.

Any buried tree stumps, roots, or major root systems thicker than approximately 1-inch in diameter, septic tanks and leach field lines, uncovered during site stripping and/or grading activities should be removed. Unit prices for removal of such material should be obtained during bidding.

6.9.2 Existing Utilities

Active or inactive utilities within the construction area should be protected, relocated, or abandoned. Pipelines that are 2 inches or less in diameter may be left in place provided they are cut off and capped. Pipelines larger than 2 inches in diameter should be removed or filled with a 1-sack sand-cement slurry mix. Active utilities to be reused should be carefully located and protected during demolition and construction activities at the Site.

6.9.3 Excavation, Shoring, and Backfill

We anticipate that excavations for new utility lines, manholes, booster pump station improvements, and jacking and receiving shafts can be made with standard earthwork equipment, such as excavators, backhoes, and trenchers. Based on the subsurface conditions encountered in our borings, we expect the sidewalls of trenches to remain relatively vertical for a period of several days. Nevertheless, the longer the trenches remain open the higher the potential for the sidewalls to start to slough off or cave.

All excavations made at the Site should be evaluated to monitor stability prior to personnel entering them. All trenches and excavations should conform to the current OSHA requirements for work safety. It is the contractor's responsibility to follow OSHA temporary excavation guidelines and grade the slopes with adequate layback or provide adequate shoring and underpinning of existing structures and improvements, as needed. Slope layback and/or shoring measures should be adjusted as necessary in the field to suit the actual conditions encountered in order to protect personnel and equipment within excavations.

Where the stability of adjoining structures could be endangered by excavation operations, support systems such as shoring, bracing, or underpinning may be required to provide structural stability and to protect personnel working within the excavation. The design and installation of shoring, bracing, or underpinning required for the project should be the responsibility of the contractor and should be designed by a professional engineer registered in the State of California. We recommend that the

proposed shoring, bracing, and underpinning system design be submitted (along with the appropriate design calculations) to the design team in advance for review. The purpose of the review would be to evaluate whether proper soil parameters have been used and to confirm whether the anticipated deflections are within the tolerance established by the owner or its designer.

Based on the subsurface conditions encountered in our borings, discontinuous, conventional shoring, such as trench boxes and hydraulic shores with plywood/steel plates ("speed shores"), may adequately support excavation walls. However, these discontinuous shoring systems are not considered appropriate for use in jacking and receiving shafts for the trenchless crossing. The shoring for jacking and receiving shafts consist of sheet piles, soldier pile and lagging, or similar methods and should be properly braced. Shoring should be removed as the excavations are backfilled. Shoring should be designed to resist earth pressures exerted by the retained soil plus any applicable surcharge loading, such as construction equipment and stockpiles.

Excavations should be properly dewatered as discussed in the “Temporary Dewatering” section below. Construction equipment and soil stockpiles should be set back a minimum horizontal distance of “H” away from the edge of excavations, where H is equal to the depth of the excavation. This setback distance also applies to shored excavations unless the shoring design takes into account any surcharge loads associated with the construction equipment and stockpiles.

Care should be taken during construction to reduce the impact of trenching on adjacent structures and pavements. Excavations should be located so that no structures, foundations, and slabs, existing or new, are located above an imaginary plane projected 1H:1V upward from any point in an excavation unless the excavation is properly shored and excavated in stages. If structures are located within this 1H:1V projection line, the shoring should be designed to handle the surcharge loading from the adjacent structure and allow no horizontal movement of the excavation. Prior to the installation of the shoring and excavation, monitoring points should be established immediately behind the shoring, at midway points between the adjacent structure and the shoring, and at the edge of the adjacent structure. These points should be surveyed daily during installation of the shoring and staged excavation. If any lateral movement is detected, the excavation operation should be stopped immediately and measures should be taken to halt further movement, such as placing a fill buttress in front of the shoring. The shoring design should then be reevaluated and revised as needed. The design and installation of shoring, bracing, or underpinning required for the project should be the responsibility of the contractor and should be designed by a professional engineer registered in the State of California having at least 5 years of experience designing shoring.

During wet weather, appropriate provisions, such as the use of earthen berms, should be made to prevent water runoff from ponding adjacent to the top of excavations and/or flowing over the sides of the excavations, otherwise the excavations side walls and/or slopes could be compromised. All runoff should be collected and disposed of outside the construction limits. Backfill for excavations should be compacted as noted in the “Compaction Requirements” section and Appendix C of this report. Special care should be taken in the control of excavation backfilling under structures and pavements. Poor compaction may

cause excessive settlements resulting in damage to overlying structures and the pavement structural section.

Where utility trenches extend from the exterior into the interior limits of pavements, CSLM should be used as backfill material for a distance of 2 feet laterally on each side of the pavement edge to reduce the potential for the trench to act as a conduit to exterior surface water. Utility trenches located in landscaped areas should also be capped with a minimum of 12 inches of compacted on-site clayey soils.

6.9.4 Temporary Dewatering

Free groundwater was not observed within our borings. However, because the subsurface consists of high plasticity clay, it is likely that the boreholes were not left open long enough for the groundwater to infiltrate into the borehole and reach equilibrium. Historically high groundwater at the Site is approximately 10 feet BGS. However, groundwater was measured in monitoring wells about 1,000 north of the Site as shallow as about 5 feet BGS.

Groundwater should be lowered and maintained at least 2 feet below the bottom of the planned excavations in order to maintain the undisturbed state of the supporting soils and to allow proper compaction of backfill after below-grade structures and utility lines are installed. After backfill of all below-grade structures and utility lines, the dewatering operations may be terminated to allow the groundwater table to return to its natural level.

We anticipate that dewatering in the project area will be performed in stages and can be performed using sumps, drains, and open pumping. Because the subgrade is clay, deep wells and well points may not be as effective. The contractor should be fully responsible for developing and implementing a dewatering program. This should include making any necessary adjustments to the dewatering program during construction based on actual field conditions encountered.

The successful implementation of the dewatering program for this project will be substantially determined by the experience and performance of the contractor retained to perform the dewatering. Therefore, we recommend that the general contractor for the project be required to retain the services of a specialty dewatering subcontractor to review the anticipated subsurface conditions, develop, and implement a proper dewatering program for the project. We recommend the use of a specialty dewatering subcontractor with a minimum of 5 to 10 years of continuous construction experience in similar subsurface conditions on projects of similar scope (i.e., depth of excavations, proximity to and type of existing structures and utility lines, etc.). The dewatering subcontractor selected should provide examples of dewatering for projects they have successfully completed in the past 5 years under similar subsurface conditions and similar scope to this project. The example projects should note instances when things went wrong during particular projects and how they were successfully remediated during construction.

Temporary dewatering may cause ground subsidence that could result in adverse settlement of structures near the areas being dewatered. Therefore, the dewatering subcontractor should evaluate the need to install observation wells between existing structures and the dewatering activities to monitor changes in groundwater levels. If dewatering-induced settlements are anticipated by the dewatering subcontractor, it should consider implementing modifications to its dewatering program and possibly underpinning existing structures (if allowed by the owner and/or its consultants). If underpinning is anticipated by the dewatering subcontractor, prior to implementation of the underpinning, the project owner and its consultants should review the underpinning plans to evaluate the assumptions made in the underpinning design. This review should not be considered as relieving the dewatering subcontractor from full responsibility for the underpinning plans and its satisfactory implementation.

Consideration should also be given by the dewatering subcontractor to installing ground surface settlement monuments adjacent to structures located near areas of the Site to be dewatered and monitoring these monuments on a regular basis during dewatering activities. Monitoring records should be made available to the owner and its consultants on a regular basis during construction. If significant movement of the ground surface is noticed during or after the dewatering operation is completed, measures should be immediately taken by the dewatering subcontractor to halt further settlement from occurring. The dewatering subcontractor should then develop and implement a plan for successfully mitigating the settlement.

6.9.5 Fill Material

From a geotechnical standpoint only, except for organic laden soil, the on-site soil is suitable for use as general engineered fill and trench backfill if it is free of deleterious matter. Maximum particle size for fill material should be limited to 3 inches, with at least 90 percent by weight passing the 1-inch sieve. Proper granular bedding and shading should be used beneath and around new utilities. Where imported fill is required, it should adhere to the above gradation recommendations, and conform to the following minimum criteria:

IMPORT FILL CRITERIA	
Plasticity Index	20 or less (general fill) 12 or less (bedding and shading)
Liquid Limit	Less than 35% (general fill) Less than 30% (bedding and shading)
% Passing #200 Sieve	8% – 40% (general fill) Less than 8% (bedding and shading)

Highly pervious materials such as pea gravel or clean sands are not recommended as fill material because they permit transmission of water to the underlying soils. Imported fill material should not be any more corrosive than the on-site soils and should not be classified as being more corrosive than "moderately corrosive." Prior to transporting proposed import materials to the Site, the contractor should make representative samples of the material available to BSK at least 5 working days in advance to allow the

engineer enough time to confirm the material meets the above requirements. If prior corrosion testing results are not available for the proposed import fill materials, then the samples should be made available to the project's corrosion consultant at least 10 working days in advance, so that corrosion testing may be conducted if this testing is deemed necessary. All on-site or import fill material should be compacted to the recommendations provided in Appendix C.

6.9.6 Controlled Low Strength Material (CLSM)

CLSM typically consists of a mixture of cement, fly ash, coarse and fine aggregate, an air entrainment admixture, and water. The CLSM should have a 28-day compressive strength of at least 50 pounds per square inch (psi) tested in conformance with ASTM D4832 and sampled in accordance with ASTM D5971. For future excavatability of the CLSM, its 28-day compressive strength should not exceed 1,000 psi. A minimum of one set of cylinders should be cast each day CLSM is placed. One flowability test should be conducted per ASTM D6103 each day CLSM is placed and should be at least 8 inches diameter prior to placement.

The CLSM mix design should be reviewed by the design team and BSK for approval at least 10 business days prior to its use. CLSM placement should be observed and tested by a qualified representative of BSK.

6.9.7 Compaction Requirements

Subgrade soils, fill, and backfill should be compacted to a minimum of 90 percent compaction at least 2 percent over the optimum moisture content for clayey soils and near optimum moisture content for granular soils based on ASTM D1557 (latest edition). **It is important to meet this minimum moisture conditioning due to the anticipated high expansion potential of the Site soils.** The upper 12 inches below finished subgrade underneath pavements and concrete flatwork exposed to vehicular traffic should be compacted to a minimum of 92 percent compaction at least 2 percent over the optimum moisture for clayey soils and to a minimum of 95 percent compaction near optimum moisture content for granular soils. Aggregate base underneath pavement should be compacted to a minimum of 95 percent compaction at near optimum moisture content. Where fills/backfills are greater than 7 feet in depth below finish grade, the zone below a depth of 7 feet should be compacted to a minimum of 95 percent compaction. A summary of our compaction recommendations is presented in Appendix C.

6.9.8 Weather/Moisture Considerations

If earthwork operations and construction for this project are scheduled to be performed during the rainy season (usually November to May) or in areas containing saturated soils, provisions may be required for drying and/or stabilizing the soil through the use of scarification and air drying, geotextile fabric and dryer soils, and/or via admixtures, such as lime- or cement-treatment of the soil prior to compaction. Conversely, additional moisture may be required during dry months. Water trucks should be made available in sufficient numbers to provided adequate water during earthwork operations.

6.10 Corrosion Potential

Soil samples were collected during our subsurface investigation at depths of about 5 to 7 feet, 19½ feet, and 2½ feet BGS in borings B-1, B-2, and B-3, respectively, and submitted for corrosion testing. The samples were tested by CERCO Analytical, a State-certified laboratory in Concord, California, for redox potential, pH, resistivity, chloride content, and sulfate content in accordance with ASTM test methods. The test results are presented at the end of Appendix B. Also included is the evaluation by CERCO Analytical of the corrosion test results.

Based upon the resistivity measurements, the samples tested were classified as "corrosive to severely corrosive" by CERCO Analytical. The sulfate ion concentrations ranged from 580 to 7,900 mg/kg (ppm). These results are indicative of exposure categories S1 and S2 per Table 19.3.1.1 of ACI 318-19. **CERCO Analytical recommends that, based on the chloride and sulfate ion concentrations at borings B-1 and B-2, a specialized concrete mix design should be prepared by a qualified corrosion engineer.** They also recommend that all buried iron, steel, cast iron, ductile iron, galvanized steel, and dielectric coated steel or iron be properly protected against corrosion depending upon the critical nature of the structure. CERCO Analytical also recommend that all buried metallic pressure piping, such as ductile iron firewater pipelines, should be protected against corrosion. **The recommendations contained in the summary letters provided by CERCO presented in Appendix B should be carefully followed.** Because we are not corrosion specialists, we recommend that a corrosion specialist be consulted for advice on proper corrosion protection for underground piping which will be in contact with the soils and other design details.

The above are general discussions. A more detailed investigation may include more or fewer concerns and should be directed by a corrosion expert. BSK does not practice corrosion engineering. Consideration should also be given to soils in contact with concrete that will be imported to the Site during construction, such as topsoil and landscaping materials, which typically contain fertilizers and other chemicals that can be highly corrosive to metals and concrete. Any imported soil or landscaping materials should not be any more corrosive than the on-site soils and should not be classified as being more corrosive than "moderately corrosive." Also, on-site cutting and filling may result in soils contacting concrete that were not anticipated at the time of this investigation.

6.11 Plan Review and Construction Observation

We recommend that BSK will be retained by the Client to review the geotechnical aspects of the project plans and specifications before they go out to bid. It has been our experience that this review provides an opportunity to detect misinterpretation or misunderstandings of our recommendation prior to the start of construction.

Because limited subsurface investigation was conducted for this project, we recommend that BSK be retained to provide observation and testing services during construction. This will allow BSK the opportunity to observe actual conditions exposed during construction and to provide supplemental recommendations if warranted by the exposed conditions. Earthwork should be performed in accordance

with the recommendations presented in this report, or as recommended by BSK during construction. BSK should be notified at least two weeks prior to the start of construction and prior to when observation and testing services are needed.

7. ADDITIONAL SERVICES AND LIMITATIONS

7.1 Additional Services

The review of plans and specifications, and field observation and testing during construction by BSK are an integral part of the conclusions and recommendations made in this report. If BSK is not retained for these services, the client will be assuming BSK's responsibility for any potential claims that may arise during or after construction due to the misinterpretation of the recommendations presented herein. The recommended tests, observations, and consultation by BSK during construction include, but are not limited to:

- review of plans and specifications;
- observations of site grading, including stripping and engineered fill construction;
- observation of retaining wall and foundation excavations;
- observation of trenchless excavation; and
- in-place density testing of fills, backfills, and finished subgrades.

7.2 Limitations

The recommendations contained in this report are based on our field observations, subsurface exploration, laboratory tests, review of available geologic maps and publications, and our present knowledge of the proposed construction. It is possible that soil conditions could vary between or beyond the points explored. If soil conditions are encountered during construction that differ from those described herein, we should be notified immediately in order that a review may be made and any supplemental recommendations provided. If the scope of the proposed construction, including the proposed loads or structural locations, changes from that described in this report, our recommendations should also be reviewed.

We prepared this report in substantial accordance with the generally accepted geotechnical engineering practice as it exists in the Site area at the time of our study. No warranty, either express or implied, is made. The recommendations provided in this report are based on the assumption that an adequate program of tests and observations will be conducted by BSK during the construction phase in order to evaluate compliance with our recommendations. Other standards or documents referenced in any given standard cited in this report, or otherwise relied upon by the author of this report, are only mentioned in the given standard; they are not incorporated into it or "included by reference", as that latter term is used relative to contracts or other matters of law.

This report may be used only by the Client and only for the purposes stated within a reasonable time from its issuance, but in no event later than two (2) years from the date of the report, or if conditions at the Site have changed. If this report is used beyond this period, BSK should be contacted to evaluate whether site conditions have changed since the report was issued.

Also, land or facility use, on and off-site conditions, regulations, or other factors may change over time, and additional work may be required with the passage of time. Based on the intended use of the report, BSK may recommend that additional work be performed and that an updated report be issued.

The scope of services for this subsurface investigation and geotechnical report did not include environmental assessments or evaluations regarding the presence or absence of wetlands or hazardous substances in the air, soil, surface water, or groundwater at this Site.

BSK conducted subsurface exploration and provided recommendations for this project. We understand that BSK will be given the opportunity to perform a formal geotechnical review of the final project plans and specifications. In the event BSK is not retained to review the final project plans and specifications to evaluate if our recommendations have been properly interpreted, we will assume no responsibility for misinterpretation of our recommendations.

We recommend that all earthwork during construction be monitored by a representative from BSK, including site preparation, trenchless excavation, and placement of engineered backfill. The purpose of these services would be to provide BSK the opportunity to observe the actual soil conditions encountered during construction, evaluate the applicability of the recommendations presented in this report to the soil conditions encountered, and recommend appropriate changes in design or construction procedures if conditions differ from those described herein.

FIGURES

References: 1. https://www.arcgis.com/apps/mapviewer/index.html, 2024
Note: Location is approximate

The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. BSK makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a land survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.

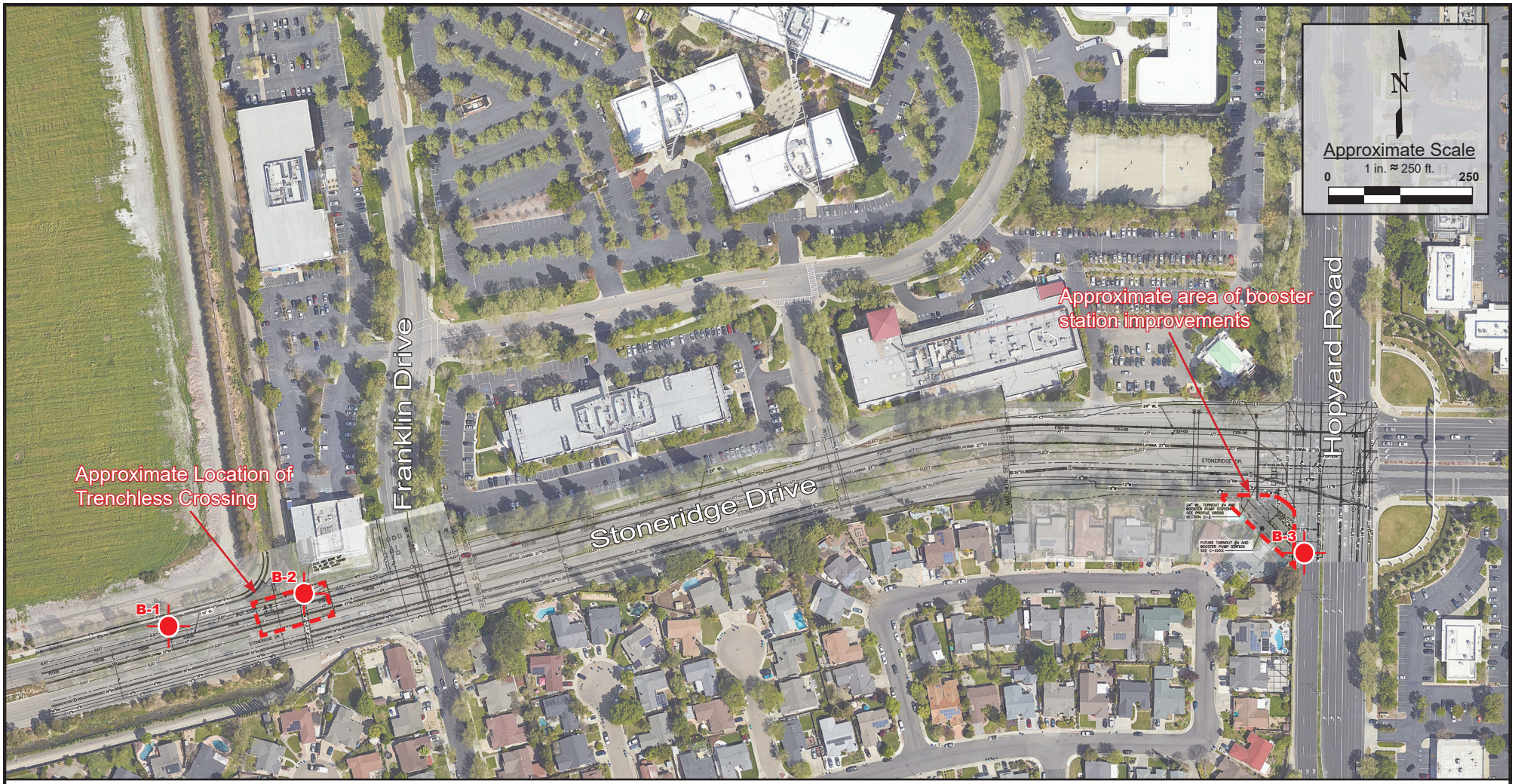
BSK ASSOCIATES

PROJECT NO.	G00001782
DRAWN:	1/5/24
DRAWN BY:	D. Tower
CHECKED BY:	C. Foulk
FILE NAME:	Figures.indd

VICINITY MAP

City of Pleasanton
Emergency Waterline Project
Stoneridge Drive
Pleasanton, California

FIGURE
1



References: 1. Plans entitled "Pleasanton 2023 Turnout #4 Line F Pipeline" by Woodward & Curran, dated August 9, 2023

Note: Locations are approximate

Legend

B-1 Approximate Boring Location

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BSK ASSOCIATES®

PROJECT NO.	G00001782
DRAWN:	1/15/24
DRAWN BY:	D. Tower
CHECKED BY:	C. Foulk
FILE NAME:	SitePlan.indd

SITE PLAN

City of Pleasanton
Emergency Waterline Project
Stoneridge Drive
Pleasanton, California

FIGURE

2

APPENDIX A

Boring Logs

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D2487/2488)

MAJOR DIVISIONS				GRAPHIC LOG		TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS (More than half of material is larger than the #200 sieve)	GRAVELS (More than half of coarse fraction is larger than the #4 sieve)	CLEAN GRAVELS WITH <5% FINES	Cu ≥4 and 1≤ Cc≤3		GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
			Cu <4 and/or 1>Cc >3		GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
		GRAVELS WITH 5 to 12% FINES	Cu ≥4 and 1≤ Cc≤3		GW-GM	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE FINES
					GW-GC	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE CLAY FINES
			Cu <4 and/or 1>Cc >3		GP-GM	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE FINES
					GP-GC	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE CLAY FINES
		GRAVELS WITH >12% FINES			GM	SILTY GRAVELS, GRAVEL-SILT-SAND MIXTURES
					GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
					GC-GM	CLAYEY GRAVELS, GRAVEL-SAND-CLAY-SILT MIXTURES
	SANDS (More than half of coarse fraction is smaller than the #4 sieve)	CLEAN SANDS WITH <5% FINES	Cu ≥6 and 1≤ Cc≤3		SW	WELL-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE OR NO FINES
			Cu <6 and/or 1>Cc >3		SP	POORLY-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE OR NO FINES
		SANDS WITH 5 to 12% FINES	Cu ≥6 and 1≤ Cc≤3		SW-SM	WELL-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE FINES
					SW-SC	WELL-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE CLAY FINES
			Cu <6 and/or 1>Cc >3		SP-SM	POORLY-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE FINES
					SP-SC	POORLY-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE CLAY FINES
		SANDS WITH >12% FINES			SM	SILTY SANDS, SAND-GRAVEL-SILT MIXTURES
					SC	CLAYEY SANDS, SAND-GRAVEL-CLAY MIXTURES
					SC-SM	CLAYEY SANDS, SAND-SILT-CLAY MIXTURES
FINE GRAINED SOILS (More than half of material is smaller than the #200 sieve)	SILTS AND CLAYS (Liquid limit less than 50)				ML	INORGANIC SILTS AND VERY FINE SANDS, SILTY OR CLAYEY FINE SANDS, SILTS WITH SLIGHT PLASTICITY,
					CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
					CL-ML	INORGANIC CLAYS-SILTS OF LOW PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
					OL	ORGANIC SILTS & ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS (Liquid limit greater than 50)				MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILT
					CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
					OH	ORGANIC CLAYS & ORGANIC SILTS OF MEDIUM-TO-HIGH PLASTICITY

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D2487/2488)

FIGURE

A-1

SOIL DESCRIPTION KEY

MOISTURE CONTENT

DESCRIPTION	ABBR	FIELD TEST
Dry	D	Absence of moisture, dusty, dry to the touch
Moist	M	Damp but no visible water
Wet	W	Visible free water, usually soil is below water table

CEMENTATION

DESCRIPTION	FIELD TEST
Weakly	Crumbles or breaks with handling or slight finger pressure
Moderately	Crumbles or breaks with considerable finger pressure
Strongly	Will not crumble or break with finger pressure

PLASTICITY

DESCRIPTION	ABBR	FIELD TEST
Non-plastic	NP	A 1/8-in. (3 mm) thread cannot be rolled at any water content.
Low (L)	LP	The thread can barely be rolled and the lump or thread cannot be formed when drier than the plastic limit.
Medium (M)	MP	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. The lump or thread crumbles when drier than the plastic limit
High (H)	HP	It takes considerable time rolling and kneeding to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump or thread can be formed without crumbling when drier than the plastic limit

GRAIN SIZE

DESCRIPTION		SIEVE SIZE	GRAIN SIZE	APPROXIMATE SIZE
Boulders		>12"	>12"	Larger than basketball-sized
Cobbles		3 - 12'	3 - 12"	Fist-sized to basketball-sized
Gravel	coarse	3/4 -3"	3/4 -3"	Thumb-sized to fist-sized
	fine	#4 - 3/4"	0.19 - 0.75"	Pea-sized to thumb-sized
Sand	coarse	#10 - #4	0.079 - 0.19"	Rock salt-sized to pea-sized
	medium	#40 - #10	0.017 - 0.079"	Sugar-sized to rock salt-sized
	fine	#200 - #10	0.0029 - 0.017"	Flour-sized to sugar-sized
Fines		Passing #200	<0.0029	Flour-sized and smaller

STRUCTURE

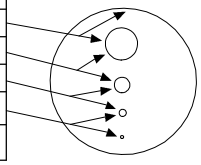
DESCRIPTION	CRITERIA
Stratified	Alternating layers of varying material or color with layers at least 1/4 in. thick, note thickness
Laminated	Alternating layers of varying material or color with the layer less than 1/4 in. thick, note thickness
Fissured	Breaks along definite planes of fracture with little resistance to fracturing
Slickensided	Fracture planes appear polished or glossy, sometimes striated
Blocky	Cohesive soil that can be broken down into small angular lumps which resist further breakdown
Lensed	Inclusion of small pockets of different soils, such as small lenses of sand scattered through a mass of clay; note thickness
Homogeneous	Same color and appearance throughout

CONSISTENCY - FINE-GRAINED SOIL

CONSISTENCY	ABBR	FIELD TEST
Very Soft	VS	Thumb will penetrate soil more than 1 in. (25 mm)
Soft	S	Thumb will penetrate soil about 1 in. (25 mm)
Firm	F	Thumb will indent soil about 1/4 in. (6 mm)
Hard	H	Thumb wil not indent soil but readily indented with thumbnail
Very Hard	VH	Thumbnail will not indent soil

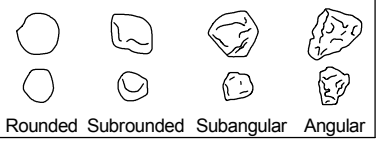
REACTION WITH HCL

DESCRIPTION	FIELD TEST
None	No visible reaction
Weak	Some reaction, with bubbles forming slowly
Strong	Violent reaction, with bubbles forming immediately



ANGULARITY

DESCRIPTION	ABBR	CRITERIA
Angular	A	Particles have sharp edges and relatively plane sides with unpolished surfaces
Subangular	SA	Particles are similar to angular description but have rounded edges
Subrounded	SR	Particles have nearly plane sides but have well-rounded corners and edges
Rounded	R	Particles have smoothly curved sides and no edges



APPARENT / RELATIVE DENSITY - COARSE-GRAINED SOIL

APPARENT DENSITY	ABBR	SPT (# blows/ft)	MODIFIED CA SAMPLER (# blows/ft)	CALIFORNIA SAMPLER (# blows/ft)	RELATIVE DENSITY (%)	FIELD TEST
Very Loose	VL	<4	<4	<5	0 - 15	Easily penetrated with 1/2-inch reinforcing rod by hand
Loose	L	4 - 10	5 - 12	5 - 15	15 - 35	Difficult to penetrate with 1/2-inch reinforcing rod pushed by hand
Medium Dense	MD	10 - 30	12- 35	15 - 40	35 - 65	Easily penetrated a foot with 1/2-inch reinforcing rod driven with 5-lb. hammer
Dense	D	30 - 50	35 - 60	40 - 70	65 - 85	Difficult to penetrate a foot with 1/2-inch reinforcing rod driven with 5-lb. hammer
Very Dense	VD	>50	>60	>70	85 - 100	Penetrated only a few inches with 1/2-inch reinforcing rod driven with 5-lb. hammer

LOG SYMBOLS

	BULK / BAG SAMPLE	-4	PERCENT FINER THAN THE NO. 4 SIEVE (ASTM Test Method C 136)
	SPLIT BARREL SAMPLER (2-1/2 inch outside diameter)	-200	PERCENT FINER THAN THE NO. 200 SIEVE (ASTM Test Method C 117)
	SPLIT BARREL SAMPLER (3 inch outside diameter)	LL	LIQUID LIMIT (ASTM Test Method D 4318)
	STANDARD PENETRATION SPLIT SPOON SAMPLER (2 inch outside diameter)	PI	PLASTICITY INDEX (ASTM Test Method D 4318)
	CONTINUOUS CORE	TXUU	UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (EM 1110-1-1906)/ASTM Test Method D 2850
	SHELBY TUBE	EI	EXPANSION INDEX (UBC STANDARD 18-2)
	ROCK CORE	COL	COLLAPSE POTENTIAL
	GROUNDWATER LEVEL (encountered at time of drilling)	UC	UNCONFINED COMPRESSION (ASTM Test Method D 2166)
	GROUNDWATER LEVEL (measured after drilling)		
	SEEPAGE	MC	MOISTURE CONTENT (ASTM Test Method D 2216)

GENERAL NOTES

Boring log data represents a data snapshot.

This data represents subsurface characteristics only to the extent encountered at the location of the boring.

The data inherently cannot accurately predict the entire subsurface conditions to be encountered at the project site relative to construction or other subsurface activities.

Lines between soil layers and/or rock units are approximate and may be gradual transitions.

The information provided should be used only for the purposes intended as described in the accompanying documents.

In general, Unified Soil Classification System designations presented on the logs were evaluated by visual methods.

Where laboratory tests were performed, the designations reflect the laboratory test results.

The Responsible Geotechnical Engineer, Professional Engineer, or Professional Geologist uses professional judgement and visual-manual procedures in general conformance with ASTM D2488 to classify soil when the full classification suite of tests per ASTM D2487 is not conducted.

BSK Associates
399 Lindbergh Avenue
Livermore, CA 94551
Telephone: (925) 315-3151

LOG OF BORING NO. B-1

Project Name: **Pleasanton Emergency Waterline**
Project Number: **G00001782**
Project Location: **Stoneridge Drive, Pleasanton, CA**
Logged by: **M. Romero**
Checked by:

Surface El.: **327 feet**
Location: **Approximately: 37.690685, -121.910418**

Depth, feet	Graphic Log	MATERIAL DESCRIPTION	Samples	Sample Number	Penetration Blows / 6 inches	Pocket Penetrometer, TSF	% Passing No. 200 Sieve	In-Situ Dry Weight (pcf)	In-Situ Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
		ASPHALT: approximately 6 inches of asphalt										
		FILL: approximately 24 inches of gravelly soil, likely aggregate base										
		Fat CLAY (CH): dark gray, moist, soft to firm, high plasticity										
		gray, calcium carbonate veins		1A 1B	6 4	1.5						
5		TXUU (see figure B-2) c= 1,160 psf		1C	5	2.8		77	44			
		dark gray		2A 2B 2C	3 6 8	2.0						
10		dark gray to gray, trace fine sand, iron oxide staining		3A 3B 3C	2 4 5	1.5	98	77	43			
15				4A 4B 4C	2 4 4	1.5 2.0						
20		firm, mottled with calcium carbonate		5A 5B 5C	3 5 7	2.5	97	93	32			

Completion Depth: 30.0
Date Started: 11/22/23
Date Completed: 11/22/23
California Sampler: 2.5-in inner diameter
SPT Sampler: 1.4-in inner diameter

Drilling Equipment: Exploration GeoServices Mobil B-53R
Drilling Method: Hollow Stem Auger
Drive Weight: 140 lbs
Hole Diameter: 8-in
Drop: 30-in
Remarks: Automatic Hammer

GEO_TARGET PLEASANTON WATERLINE BORINGS.GPJ GEOTECHNICAL 08.GDT 1/20/24

BSK Associates
399 Lindbergh Avenue
Livermore, CA 94551
Telephone: (925) 315-3151

LOG OF BORING NO. B-1

Project Name: **Pleasanton Emergency Waterline**
Project Number: **G00001782**
Project Location: **Stoneridge Drive, Pleasanton, CA**
Logged by: **M. Romero**
Checked by:

Surface El.: **327 feet**
Location: **Approximately: 37.690685, -121.910418**

Depth, feet	Graphic Log	MATERIAL DESCRIPTION	Samples	Sample Number	Penetration Blows / 6 inches	Pocket Penetrometer, TSF	% Passing No. 200 Sieve	In-Situ Dry Weight (pcf)	In-Situ Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
		Fat CLAY (CH): dark gray, moist, soft to firm, high plasticity *(continued)*										
25		grayish brown, very moist, slight iron oxide staining		6A 6B 6C	4 3 4	2.0 1.8						
		firm		7A 7B 7C	5 8 7	2.8 2.0		90	28			
30		Boring terminated at approximately 30 feet. No free groundwater was observed. Boring was backfilled with cement grout and capped with hot mix asphalt.										
35												
40												

Completion Depth: 30.0
Date Started: 11/22/23
Date Completed: 11/22/23
California Sampler: 2.5-in inner diameter
SPT Sampler: 1.4-in inner diameter

Drilling Equipment: Exploration GeoServices Mobil B-53R
Drilling Method: Hollow Stem Auger
Drive Weight: 140 lbs
Hole Diameter: 8-in
Drop: 30-in
Remarks: Automatic Hammer

GEO_TARGET PLEASANTON WATERLINE BORINGS.GPJ GEOTECHNICAL 08.GDT 1/20/24

BSK Associates
399 Lindbergh Avenue
Livermore, CA 94551
Telephone: (925) 315-3151

LOG OF BORING NO. B-2

Project Name: **Pleasanton Emergency Waterline**
Project Number: **G00001782**
Project Location: **Stoneridge Drive, Pleasanton, CA**
Logged by: **M. Romero**
Checked by:

Surface El.: **327 feet**
Location: **Approximately: 37.690856, -121.909594**

Depth, feet	Graphic Log	MATERIAL DESCRIPTION	Samples	Sample Number	Penetration Blows / 6 inches	Pocket Penetrometer, TSF	% Passing No. 200 Sieve	In-Situ Dry Weight (pcf)	In-Situ Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
		ASPHALT: approximately 6 inches of asphalt										
		FILL: approximately 24 inches of gravelly soil, likely aggregate base										
		Fat CLAY (CH): gray, moist, firm, high plasticity, calcium carbonate veins		1A 1B 1C	7 3 5	2.0 2.5		82	40			
5		grayish brown		2A 2B 2C	2 4 6	2.5 2.3	100					
		soft to firm, slight iron oxide staining TXUU (see figure B-2) c= 945 psf		3A 3B 3C	2 3 4	1.5		83	39			
10												
15		gray mottled with yellowish brown		4A 4B 4C	2 4 5	1.8	98	79	45			
20		dark grayish brown, firm, increased calcium carbonate veins		5A 5B 5C	2 4 7	2.0 2.3						

Completion Depth: 30.0
Date Started: 11/22/23
Date Completed: 11/22/23
California Sampler: 2.5-in inner diameter
SPT Sampler: 1.4-in inner diameter

Drilling Equipment: Exploration GeoServices Mobil B-53R
Drilling Method: Hollow Stem Auger
Drive Weight: 140 lbs
Hole Diameter: 8-in
Drop: 30-in
Remarks: Automatic Hammer

BSK Associates
399 Lindbergh Avenue
Livermore, CA 94551
Telephone: (925) 315-3151

LOG OF BORING NO. B-2

Project Name: **Pleasanton Emergency Waterline**
Project Number: **G00001782**
Project Location: **Stoneridge Drive, Pleasanton, CA**
Logged by: **M. Romero**
Checked by:

Surface El.: **327 feet**
Location: **Approximately: 37.690856, -121.909594**

Depth, feet	Graphic Log	MATERIAL DESCRIPTION	Samples	Sample Number	Penetration Blows / 6 inches	Pocket Penetrometer, TSF	% Passing No. 200 Sieve	In-Situ Dry Weight (pcf)	In-Situ Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
25		**Fat CLAY (CH):** gray, moist, firm, high plasticity, calcium carbonate veins *(continued)*										
		medium to high plasticity, trace fine gravel		6A 6B 6C	3 5 8	2.0 2.5	94			64	20	44
30		grayish brown, trace coarse sand, gypsum crystal/precipitate present		7A 7B 7C	4 7 8	2.5						
		Boring terminated at approximately 30 feet. No free groundwater was observed. Boring was backfilled with cement grout and capped with hot mix asphalt.										
35												
40												

Completion Depth: 30.0
Date Started: 11/22/23
Date Completed: 11/22/23
California Sampler: 2.5-in inner diameter
SPT Sampler: 1.4-in inner diameter

Drilling Equipment: Exploration GeoServices Mobil B-53R
Drilling Method: Hollow Stem Auger
Drive Weight: 140 lbs
Hole Diameter: 8-in
Drop: 30-in
Remarks: Automatic Hammer

GEO_TARGET PLEASANTON WATERLINE BORINGS.GPJ GEOTECHNICAL 08.GDT 1/20/24

BSK Associates
399 Lindbergh Avenue
Livermore, CA 94551
Telephone: (925) 315-3151

LOG OF BORING NO. B-3

Project Name: **Pleasanton Emergency Waterline**
Project Number: **G00001782**
Project Location: **Stoneridge Drive, Pleasanton, CA**
Logged by: **M. Romero**
Checked by:

Surface El.: **330 feet**
Location: **Approximately: 37.6909790, -121.9038280**

Depth, feet	Graphic Log	MATERIAL DESCRIPTION	Samples	Sample Number	Penetration Blows / 6 inches	Pocket Penetrometer, TSF	% Passing No. 200 Sieve	In-Situ Dry Weight (pcf)	In-Situ Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
		ASPHALT: approximately 8 inches of asphalt										
		FILL: approximately 20 inches of gravelly soil, likely aggregate base										
		Fat CLAY (CH): greenish black, moist, firm, high plasticity		1A 1B 1C	23 22 18	4.0 4.3				51	22	29
5				2A 2B 2C	11 21 21	3.0 2.0		84	36			
		TXUU (see figure B-3) c= 1,380 psf										
10		soft to firm		3A 3B 3C	6 9 12	2.3 2.0						
15				4A 4B 4C	12 15 17	2.3		90	25			
20				5A 5B 5C	6 12 15	2.0 2.3		87	31			

Completion Depth: 31.5
Date Started: 12/8/23
Date Completed: 12/8/23
California Sampler: 2.5-in inner diameter
SPT Sampler: 1.4-in inner diameter

Drilling Equipment: Exploration GeoServices Mobil B-61
Drilling Method: Hollow Stem Auger
Drive Weight: 140 lbs
Hole Diameter: 8-in
Drop: 30-in
Remarks: Automatic Hammer

BSK Associates
399 Lindbergh Avenue
Livermore, CA 94551
Telephone: (925) 315-3151

LOG OF BORING NO. B-3

Project Name: **Pleasanton Emergency Waterline**
Project Number: **G00001782**
Project Location: **Stoneridge Drive, Pleasanton, CA**
Logged by: **M. Romero**
Checked by:

Surface El.: **330 feet**
Location: **Approximately: 37.6909790, -121.9038280**

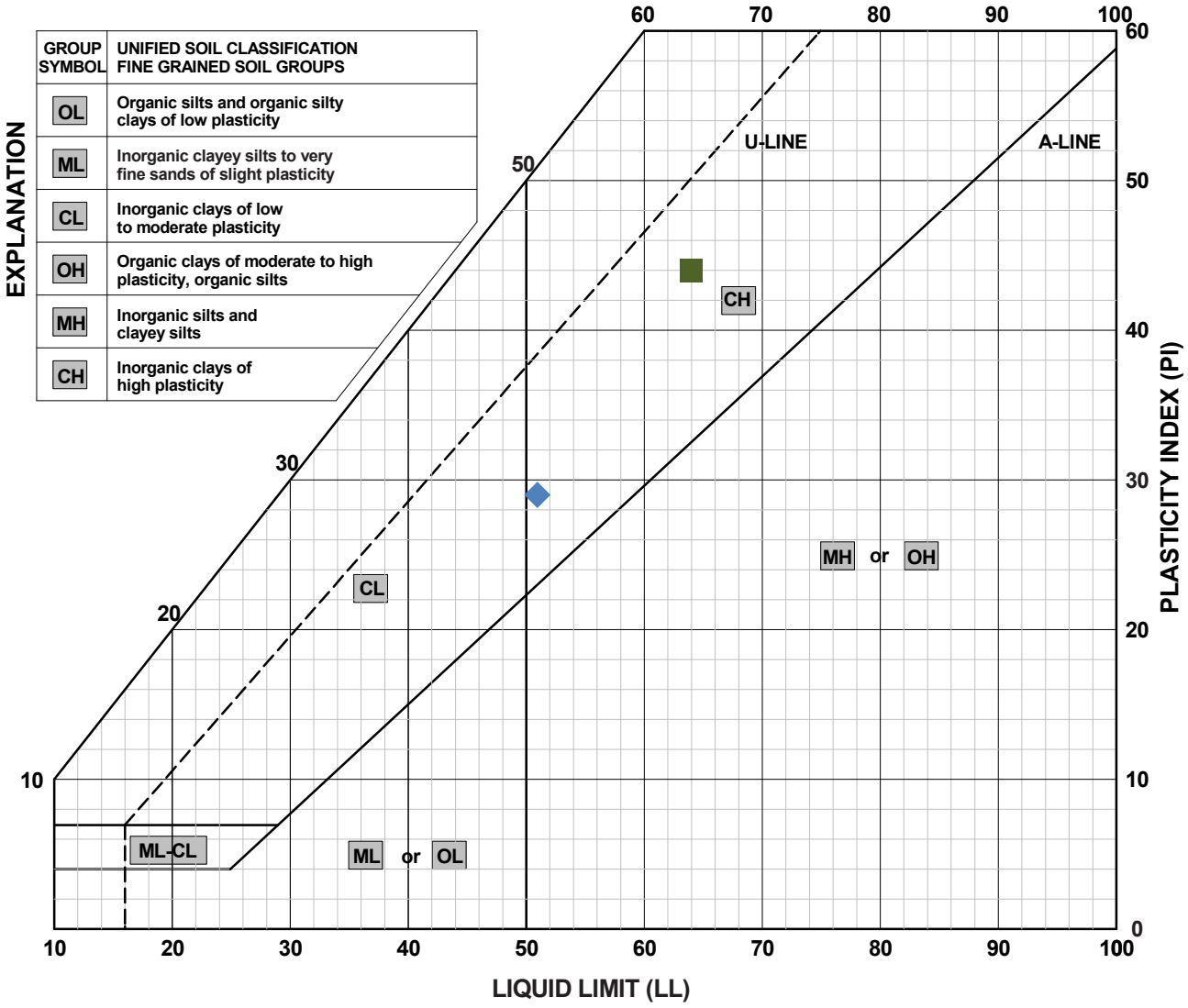
Depth, feet	Graphic Log	MATERIAL DESCRIPTION	Samples	Sample Number	Penetration Blows / 6 inches	Pocket Penetrometer, TSF	% Passing No. 200 Sieve	In-Situ Dry Weight (pcf)	In-Situ Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
25		**Fat CLAY (CH):** greenish black, moist, firm, high plasticity *(continued)*										
		soft		6A 6B 6C	10 12 20	2.0						
30				7A 7B 7C	10 12 15	2.0						
		Boring terminated at approximately 31.5 feet. No free groundwater was observed. Boring was backfilled with cement grout and capped with Quikrete.										
35												
40												

Completion Depth: 31.5
Date Started: 12/8/23
Date Completed: 12/8/23
California Sampler: 2.5-in inner diameter
SPT Sampler: 1.4-in inner diameter

Drilling Equipment: Exploration GeoServices Mobil B-61
Drilling Method: Hollow Stem Auger
Drive Weight: 140 lbs
Hole Diameter: 8-in
Drop: 30-in
Remarks: Automatic Hammer

APPENDIX B

Laboratory Test Results



LEGEND:	SOURCE	DEPTH (ft)	LL	PL	PI	DESCRIPTION
■	B-2	24.5	64	20	44	Fat Clay (CH)
◆	B-3	2.5	51	22	29	Fat Clay (CH)

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BSK ASSOCIATES

PROJECT NO. G00001782
DRAWN: 1/5/24
DRAWN BY: D. Tower
CHECKED BY: C. Foulk
FILE NAME: Figures.indd

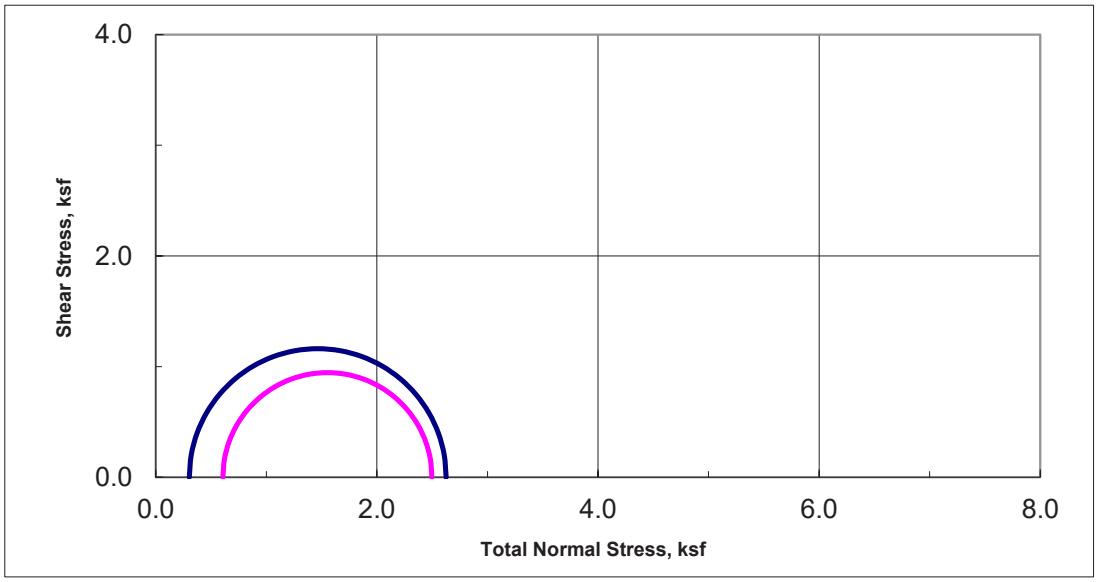
ATTERBERG LIMITS

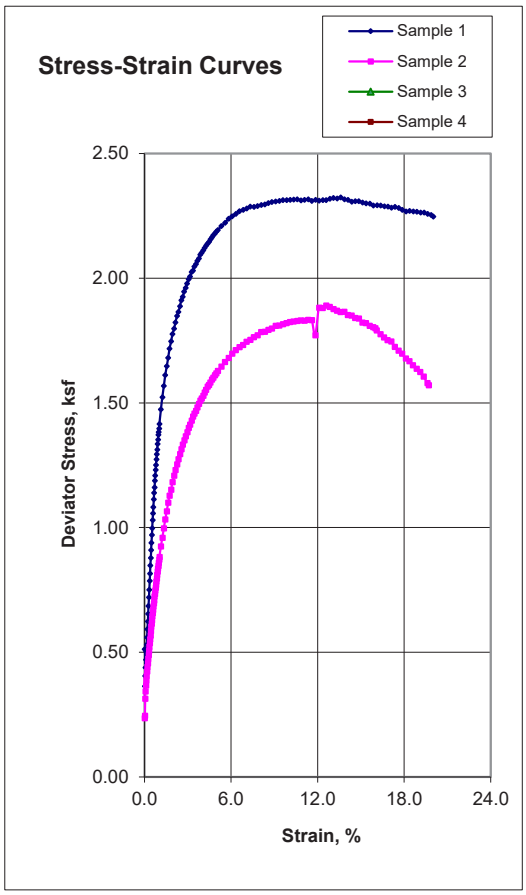
City of Pleasanton
Emergency Waterline Project
Stoneridge Drive
Pleasanton, California

FIGURE
B-1

COOPER TESTING LABORATORY

Unconsolidated-Undrained Triaxial Test
ASTM D2850





Sample Data				
	1	2	3	4
Moisture %	44.0	38.5		
Dry Den,pcf	77.3	82.9		
Void Ratio	1.221	1.070		
Saturation %	99.1	98.9		
Height in	4.96	4.96		
Diameter in	2.41	2.40		
Cell psi	2.1	4.2		
Strain %	13.60	12.59		
Deviator, ksf	2.323	1.891		
Rate %/min	1.00	1.00		
in/min	0.050	0.050		
Job No.:	664-525			
Client:	BSK Associates			
Project:	G00001782			
Boring:	B-1	B-2		
Sample:	1C	3C		
Depth ft:	4.5	9.5		

Visual Soil Description	
Sample #	
1	Fat Clay (CH)
2	Fat Clay (CH)
3	
4	
Remarks:	

Note: Strengths are picked at the peak deviator stress or 15% strain which ever occurs first per ASTM D2850.

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BSK ASSOCIATES

PROJECT NO.	G00001782
DRAWN:	1/5/24
DRAWN BY:	D. Tower
CHECKED BY:	C. Foulk
FILE NAME:	Figures.indd

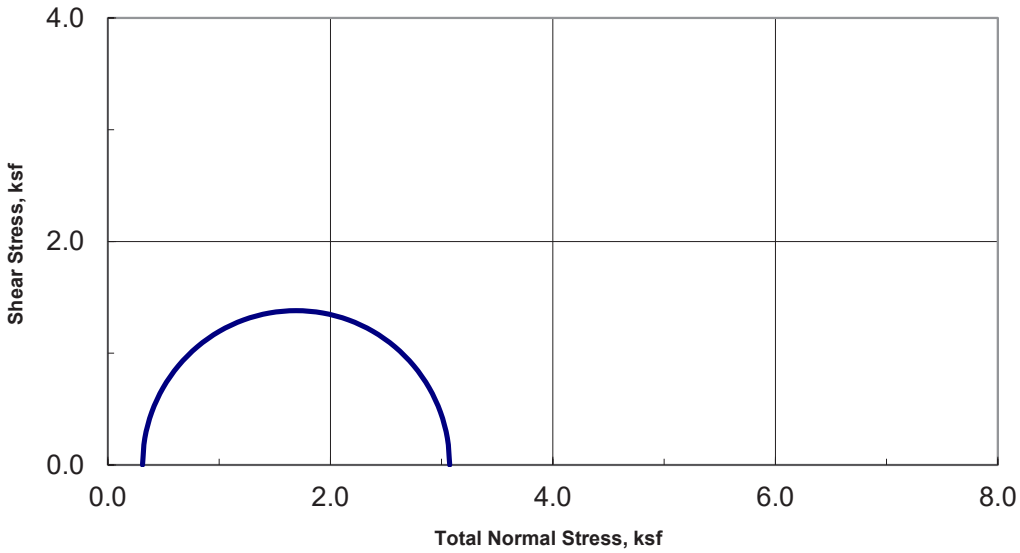
UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

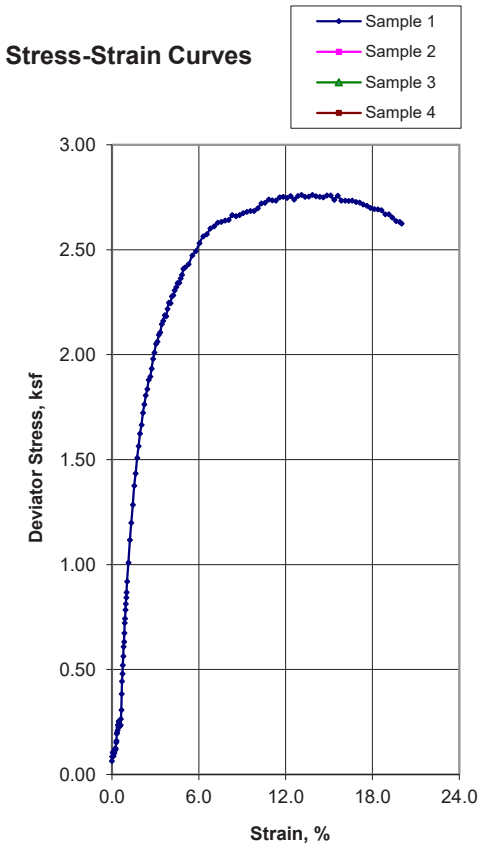
City of Pleasanton
Emergency Waterline Project
Stoneridge Drive
Pleasanton, California

FIGURE
B-2

COOPER TESTING LABORATORY

Unconsolidated-Undrained Triaxial Test
ASTM D2850





Sample Data	1	2	3	4
Moisture %	36.3			
Dry Den,pcf	84.1			
Void Ratio	1.004			
Saturation %	97.5			
Height in	4.97			
Diameter in	2.40			
Cell psi	2.2			
Strain %	13.85			
Deviator, ksf	2.762			
Rate %/min	1.00			
in/min	0.050			
Job No.:	664-528			
Client:	BSK Associates			
Project:	G00001782			
Boring:	B-3			
Sample:	2C			
Depth ft:	6			

Visual Soil Description	
Sample #	
1	Fat Clay (CH)
2	
3	
4	

Remarks:

Note: Strengths are picked at the peak deviator stress or 15% strain which ever occurs first per ASTM D2850.

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BSK ASSOCIATES

PROJECT NO.	G00001782
DRAWN:	1/5/24
DRAWN BY:	D. Tower
CHECKED BY:	C. Foulk
FILE NAME:	Figures.indd

UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

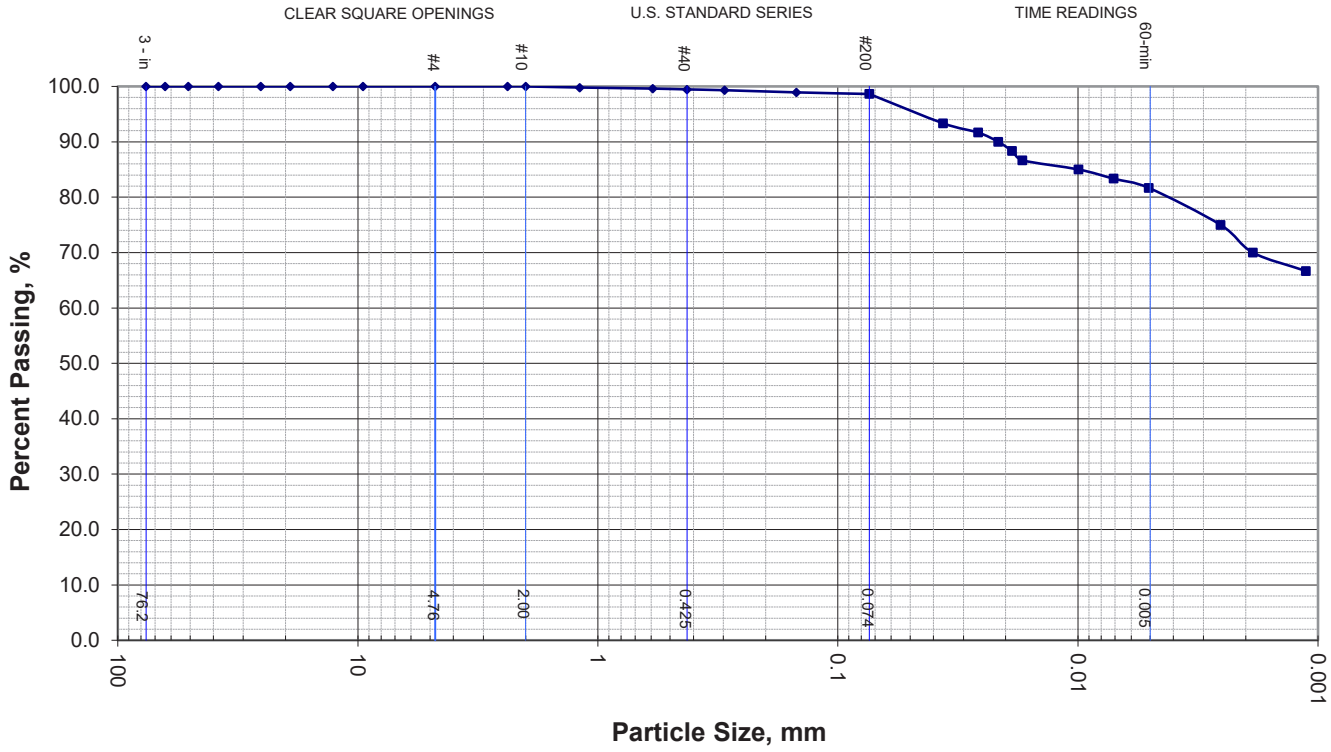
City of Pleasanton
Emergency Waterline Project
Stoneridge Drive
Pleasanton, California

FIGURE
B-3

GRAIN SIZE ANALYSIS OF SOILS
(ASTM D 422)

Client:	Woodard & Curran	Project No.:	G00001782
Project:	City of Pleasanton	Boring Number:	B-1
Tested By:	NS	Sample ID:	3B
Reviewed By:	RC	Sample Depth:	10.5'
		Date Tested:	12/5/2023

SIEVE ANALYSIS | **HYDROMETER ANALYSIS**



PARTICLE SIZE DISTRIBUTION

Cobbles	Gravel	Sand			Silt (non-plastic)	Clay (Plastic)
		Coarse	Medium	Fine		
0	-	-	0	1	17	82

Specific Gravity, G_s - 2.65

Description of Soil: Fat Clay (CH)

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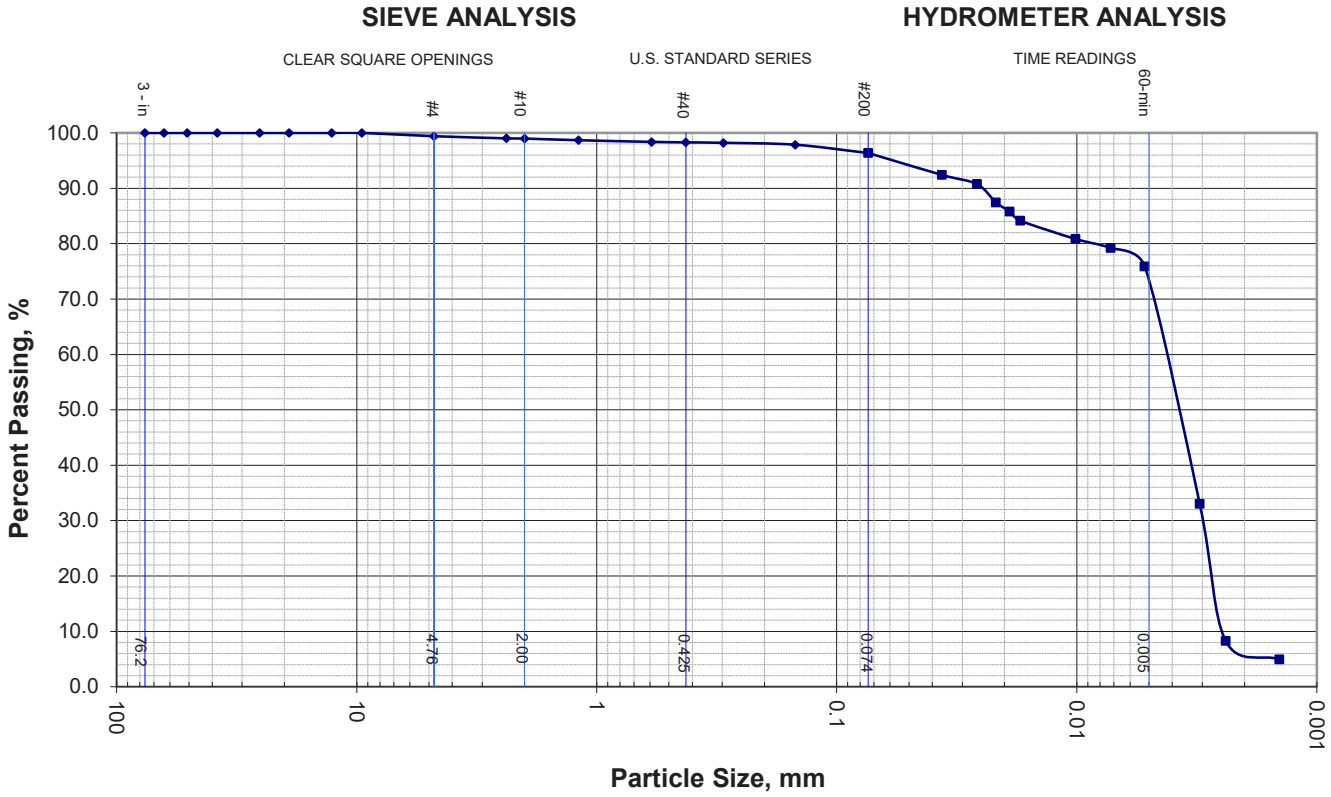
BSK ASSOCIATES

PROJECT NO. G00001782	**GRAIN SIZE ANALYSIS**
DRAWN: 1/5/24	
DRAWN BY: D. Tower	
CHECKED BY: C. Foulk	City of Pleasanton Emergency Waterline Project Stoneridge Drive Pleasanton, California
FILE NAME: Figures.indd	

FIGURE **B-4**

GRAIN SIZE ANALYSIS OF SOILS
(ASTM D 422)

Client:	Woodard & Curran	Project No.:	G00001782
Project:	City of Pleasanton	Boring Number:	B-1
Tested By:	NS	Sample ID:	5B
		Sample Depth:	20.5'



PARTICLE SIZE DISTRIBUTION

Cobbles	Gravel	Sand			Silt (non-plastic)	Clay (Plastic)
		Coarse	Medium	Fine		
0	1	0	1	2	23	73

Specific Gravity, G_s - 2.65

Description of Soil: Fat Clay (CH)

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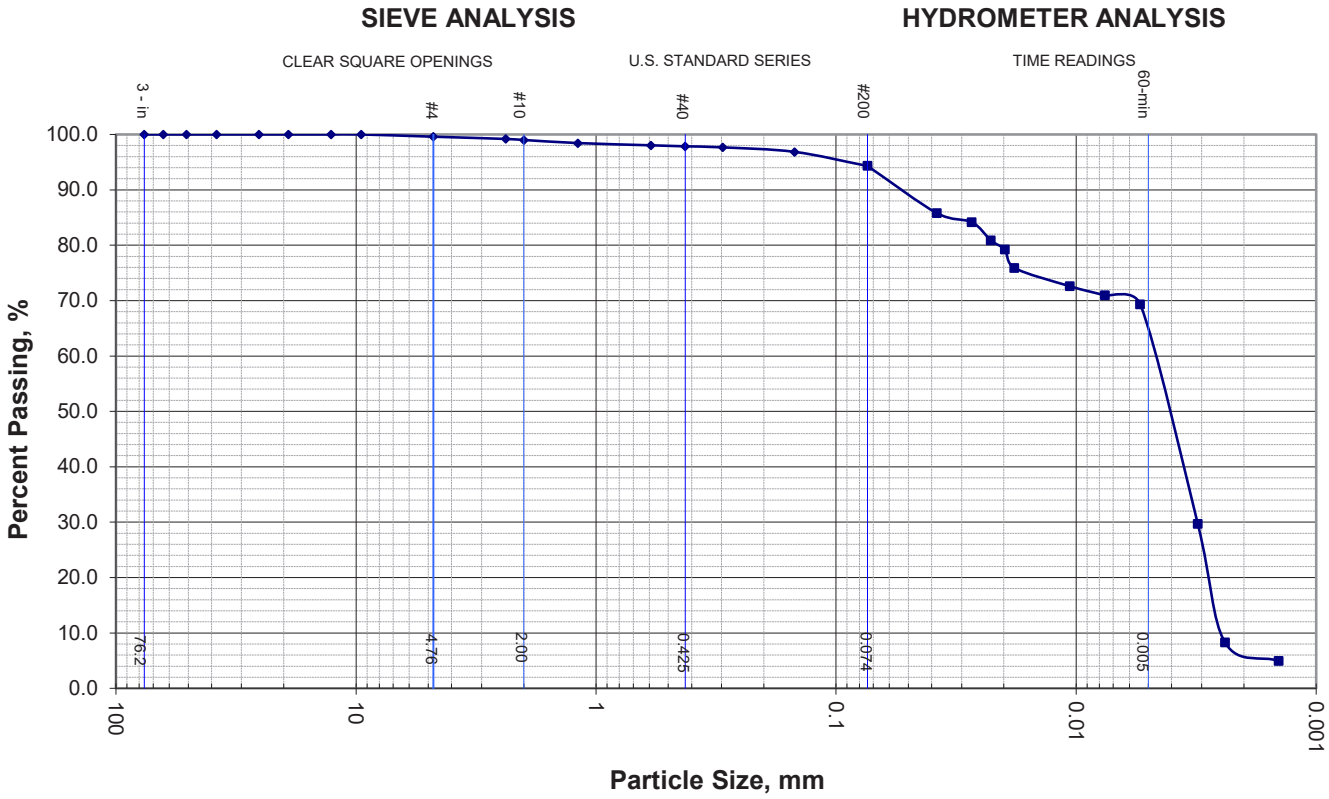
BSK ASSOCIATES

PROJECT NO. G00001782	**GRAIN SIZE ANALYSIS**
DRAWN: 1/5/24	
DRAWN BY: D. Tower	
CHECKED BY: C. Foulk	City of Pleasanton Emergency Waterline Project Stoneridge Drive Pleasanton, California
FILE NAME: Figures.indd	

FIGURE **B-5**

GRAIN SIZE ANALYSIS OF SOILS
(ASTM D 422)

Client:	Woodard & Curran	Project No.:	G00001782
Project:	City of Pleasanton	Boring Number:	B-2
Tested By:	NS	Sample ID:	6B
		Sample Depth:	24'



PARTICLE SIZE DISTRIBUTION

Cobbles	Gravel	Sand			Silt (non-plastic)	Clay (Plastic)
		Coarse	Medium	Fine		
0	0	1	1	4	29	65

Specific Gravity, G_s - 2.65

Description of Soil: Fat Clay with Sand (CH)

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BSK ASSOCIATES

PROJECT NO. G00001782	**GRAIN SIZE ANALYSIS**
DRAWN: 1/5/24	
DRAWN BY: D. Tower	
CHECKED BY: C. Foulk	City of Pleasanton Emergency Waterline Project Stoneridge Drive Pleasanton, California
FILE NAME: Figures.indd	

FIGURE **B-6**

CERCO analytical
1100 Willow Pass Court, Suite A
Concord, CA 94520-1006
925 462 2771 Fax. 925 462 2775
www.cercoanalytical.com

14 December, 2023

Job No. 2312015
Cust. No. 12667

Ms. Carrie Foulk
BSK Associates Engineers & Laboratories
399 Lindbergh Avenue
Livermore, CA 94551

Subject: Project No.: G00001782
Project Name: City of Pleasanton Emergency Waterline
Corrosivity Analysis – ASTM Test Methods

Dear Ms. Foulk:

Pursuant to your request, CERCO Analytical has analyzed the soil samples submitted on December 08, 2023. Based on the analytical results, this brief corrosivity evaluation is enclosed for your consideration.

Based upon the resistivity measurements, Sample No.002 is classified as "severely corrosive" and Sample No.001 is classified as "corrosive". All buried iron, steel, cast iron, ductile iron, galvanized steel and dielectric coated steel or iron should be properly protected against corrosion depending upon the critical nature of the structure. All buried metallic pressure piping such as ductile iron firewater pipelines should be protected against corrosion.

The chloride ion concentrations reflect 30 mg/kg and 360 mg/kg, and are determined to be sufficient to attack steel embedded in a concrete mortar coating. Chloride ion concentrations greater than 300 mg/kg are considered corrosive to embedded reinforcing steel; and, as such, the concrete mix design shall be adjusted accordingly by a qualified corrosion engineer.

The sulfate ion concentrations reflect 660 mg/kg and 7,900 mg/kg and are determined to be sufficient to damage reinforced concrete structures and cement mortar-coated steel at these locations. Soils containing sulfate ion concentrations greater than 2,000 mg/kg will require a specialized concrete mix designed by a qualified corrosion engineer.

The pH of the soils are 8.01 and 8.39, which does not present corrosion problems for buried iron, steel, mortar-coated steel and reinforced concrete structures.

The redox potentials are 200-mV and 210-mV. Both samples are indicative of potentially "slightly corrosive" soils resulting from anaerobic soil conditions.

This corrosivity evaluation is based on general corrosion engineering standards and is non-specific in nature. For specific long-term corrosion control design recommendations or consultation, please call *JDH Corrosion Consultants, Inc. at (925) 927-6630.*

We appreciate the opportunity of working with you on this project. If you have any questions, or if you require further information, please do not hesitate to contact us.

Very truly yours,
CERCO ANALYTICAL, INC.

for

J. Darby Howard, Jr., P.E.
President

JDH/jdl
Enclosure

CERCO analytical
1100 Willow Pass Court, Suite A
Concord, CA 94520-1006
925 462 2771 Fax. 925 462 2775
www.cercoanalytical.com

Client: BSK Associates Engineers & Laboratories
Client's Project No.: G00001782
Client's Project Name: City of Pleasanton Emergency Waterline
Date Sampled: 22-Nov-23
Date Received: 8-Dec-23
Matrix: Soil
Authorization: Signed Chain of Custody

Date of Report: 14-Dec-2023

Job/Sample No.	Sample I.D.	Redox (mV)	pH	Conductivity (umhos/cm)*	Resistivity (100% Saturation) (ohms-cm)	Sulfide (mg/kg)*	Chloride (mg/kg)*	Sulfate (mg/kg)*
2312015-001	B-1 @ 5-7'	200	8.39	-	550	-	30	660
2312015-002	B-2 @ 19.5'	210	8.01	-	240	-	360	7,900[(1)]

Method:	ASTM D1498	ASTM D4972	ASTM D1125M	ASTM G57	ASTM D4658M	ASTM D4327	ASTM D4327
Reporting Limit:	-	-	10	-	50	15	15
Date Analyzed:	13-Dec-2023	13-Dec-2023	-	13-Dec-2023	-	13-Dec-2023	13-Dec-2023

Julia Clauson
Chemist

* Results Reported on "As Received" Basis

N.D. - None Detected

(1) Reporting limit is elevated to 750 mg/kg due to dilution

Quality Control Summary - **All laboratory quality control parameters were found to be within established limits**

CERCO analytical
1100 Willow Pass Court, Suite A
Concord, CA 94520-1006
925 462 2771 Fax. 925 462 2775
www.cercoanalytical.com

20 December, 2023

Job No. 2312035
Cust. No. 12667

Ms. Carrie Foulk
BSK Associates Engineers & Laboratories
399 Lindbergh Avenue
Livermore, CA 94551

Subject: Project No.: G00001782
Project Name: City of Pleasanton Emergency Waterline
Corrosivity Analysis – ASTM Test Methods

Dear Ms. Foulk:

Pursuant to your request, CERCO Analytical has analyzed the soil sample submitted on December 15, 2023. Based on the analytical results, this brief corrosivity evaluation is enclosed for your consideration.

Based upon the resistivity measurement, this sample is classified as "corrosive". All buried iron, steel, cast iron, ductile iron, galvanized steel and dielectric coated steel or iron should be properly protected against corrosion depending upon the critical nature of the structure. All buried metallic pressure piping such as ductile iron firewater pipelines should be protected against corrosion.

The chloride ion concentration is 50 mg/kg and is determined to be insufficient to attack steel embedded in a concrete mortar coating.

The sulfate ion concentration is 580 mg/kg and is determined to be sufficient to potentially be detrimental to reinforced concrete structures and cement mortar-coated steel at these locations. Therefore, concrete that comes into contact with this soil should use sulfate resistant cement such as Type II, with a maximum water-to-cement ratio of 0.55.

The pH of the soil is 8.30, which does not present corrosion problems for buried iron, steel, mortar-coated steel and reinforced concrete structures.

The redox potential is 120-mV and is indicative of potentially "moderately corrosive" soils resulting from anaerobic soil conditions.

This corrosivity evaluation is based on general corrosion engineering standards and is non-specific in nature. For specific long-term corrosion control design recommendations or consultation, please call *JDH Corrosion Consultants, Inc. at (925) 927-6630.*

We appreciate the opportunity of working with you on this project. If you have any questions, or if you require further information, please do not hesitate to contact us.

Very truly yours,
CERCO ANALYTICAL, INC.

for

J. Darby Howard, Jr., P.E.
President

JDH/jdl
Enclosure

CERCO analytical
1100 Willow Pass Court, Suite A
Concord, CA 94520-1006
925 462 2771 Fax. 925 462 2775
www.cercoanalytical.com

Client: BSK Associates Engineers & Laboratories
Client's Project No.: G00001782
Client's Project Name: City of Pleasanton Emergency Waterline
Date Sampled: 8-Dec-23
Date Received: 15-Dec-23
Matrix: Soil
Authorization: Signed Chain of Custody

Date of Report: 20-Dec-2023

Job/Sample No.	Sample I.D.	Redox (mV)	pH	Conductivity (umhos/cm)*	Resistivity (100% Saturation) (ohms-cm)	Sulfide (mg/kg)*	Chloride (mg/kg)*	Sulfate (mg/kg)*
2312035-001	~~B-2~~ B-3 @ 2.5'	120	8.30	-	550	-	50	580

Method:	ASTM D1498	ASTM D4972	ASTM D1125M	ASTM G57	ASTM D4658M	ASTM D4327	ASTM D4327
Reporting Limit:	-	-	10	-	50	15	15
Date Analyzed:	18-Dec-2023	18-Dec-2023	-	18-Dec-2023	-	18-Dec-2023	18-Dec-2023

Julia Clauson
Chemist

* Results Reported on "As Received" Basis
N.D. - None Detected

Quality Control Summary - All laboratory quality control parameters were found to be within established limits

APPENDIX C

Summary of Compaction Recommendations

Area	Compaction Recommendations (See Notes 1, 2, 3, 4, 6)
Trenches[5]	Compact trench backfill to a minimum of 90 percent compaction near optimum moisture content for granular soils and to a minimum of 90 percent compaction a minimum of 2 percent over optimum moisture content for clayey soils. Where trenches will be under paving, the upper 12 inches should be compacted as recommended below. Proper granular bedding and shading should be used beneath and around new utilities.
Pavements	Compact upper 12 inches of subgrade to a minimum of 95 percent compaction near optimum moisture content for granular soils and to a minimum of 92 percent compaction a minimum of 2 percent over optimum moisture content for clayey soils. Compact aggregate base to a minimum of 95 percent compaction near optimum moisture content.

Notes:
(1) Depths are below finished subgrade elevation.
(2) All compaction requirements refer to relative compaction as a percentage of the laboratory standard described by ASTM D1557.
(3) Backfill material should be compacted in lifts not exceeding 8 inches in loose thickness.
(4) All subgrades should be firm and stable.
(5) In landscaping areas only, the percent compaction in trenches may be reduced to 85 percent within the upper 2 feet.
(6) Where backfills are greater than 7 feet in depth below finish grade, the portion below a depth of 7 feet should be compacted to a minimum of 95 percent compaction.

APPENDIX D

Important Information About This Geotechnical-Engineering Report

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, you can benefit from a lowered exposure to problems associated with subsurface conditions at project sites and development of them that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed herein, contact your GBA-member geotechnical engineer. Active engagement in GBA exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Understand the Geotechnical-Engineering Services Provided for this Report

Geotechnical-engineering services typically include the planning, collection, interpretation, and analysis of exploratory data from widely spaced borings and/or test pits. Field data are combined with results from laboratory tests of soil and rock samples obtained from field exploration (if applicable), observations made during site reconnaissance, and historical information to form one or more models of the expected subsurface conditions beneath the site. Local geology and alterations of the site surface and subsurface by previous and proposed construction are also important considerations. Geotechnical engineers apply their engineering training, experience, and judgment to adapt the requirements of the prospective project to the subsurface model(s). Estimates are made of the subsurface conditions that will likely be exposed during construction as well as the expected performance of foundations and other structures being planned and/or affected by construction activities.

The culmination of these geotechnical-engineering services is typically a geotechnical-engineering report providing the data obtained, a discussion of the subsurface model(s), the engineering and geologic engineering assessments and analyses made, and the recommendations developed to satisfy the given requirements of the project. These reports may be titled investigations, explorations, studies, assessments, or evaluations. Regardless of the title used, the geotechnical-engineering report is an engineering interpretation of the subsurface conditions within the context of the project and does not represent a close examination, systematic inquiry, or thorough investigation of all site and subsurface conditions.

Geotechnical-Engineering Services are Performed for Specific Purposes, Persons, and Projects, and At Specific Times

Geotechnical engineers structure their services to meet the specific needs, goals, and risk management preferences of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client.

Likewise, geotechnical-engineering services are performed for a specific project and purpose. For example, it is unlikely that a geotechnical-engineering study for a refrigerated warehouse will be the same as one prepared for a parking garage; and a few borings drilled during a preliminary study to evaluate site feasibility will not be adequate to develop geotechnical design recommendations for the project.

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project or purpose;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, the reliability of a geotechnical-engineering report can be affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying the recommendations in it. A minor amount of additional testing or analysis after the passage of time – if any is required at all – could prevent major problems.

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read the report in its entirety. Do not rely on an executive summary. Do not read selective elements only. *Read and refer to the report in full.*

You Need to Inform Your Geotechnical Engineer About Change

Your geotechnical engineer considered unique, project-specific factors when developing the scope of study behind this report and developing the confirmation-dependent recommendations the report conveys. Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the elevation, configuration, location, orientation, function or weight of the proposed structure and the desired performance criteria;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project or site changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept*

responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface using various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing is performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgement to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team through project completion to obtain informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, they are not final, because the geotechnical engineer who developed them relied heavily on judgement and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* exposed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a continuing member of the design team, to:

- confer with other design-team members;
- help develop specifications;
- review pertinent elements of other design professionals' plans and specifications; and
- be available whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction-phase observations.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for information purposes only.* To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. This happens in part because soil and rock on project sites are typically heterogeneous and not manufactured materials with well-defined engineering properties like steel and concrete. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually provide environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not obtained your own environmental information about the project site, ask your geotechnical consultant for a recommendation on how to find environmental risk-management guidance.

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, the engineer's services were not designed, conducted, or intended to prevent migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration. Confront the risk of moisture infiltration*** by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GEOPROFESSIONAL BUSINESS ASSOCIATION

Telephone: 301/565-2733
e-mail: info@geoprofessional.org www.geoprofessional.org

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