



**DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION**

**VOLUME 1:
GENERAL PROVISIONS, NOTICE TO BIDDERS,
SPECIAL PROVISIONS, PROPOSAL AND CONTRACT
FOR RFB PWD 26.601**

**Emergency Generator Replacement
CIP Project Nos. 26162 & 26250**

Bid Opening Date – August 5, 2026

11:00 a.m.

To be used in conjunction with the City Standard Specifications and Details dated July 2024, the State Standard Specifications and Plans dated 2025 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

Michael A. Stella, P.E.
City Engineer
License No. 54642
Expires: 12/31/2027

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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 express courier to 123 Main Street), Pleasanton, CA 94566, until 11:00 a.m., **August 5, 2026**, for work as described in the Plans and Specifications entitled:

RFB PWD 26.601 Emergency Generator Replacement CIP Project Nos. 26162 & 26250

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

This work will consist of replacement of and/or installation of new emergency generators and associated electrical, structural, mechanical, and site improvements as described in Specification Section 01010 Summary of Work and as shown on the Drawings at the following locations in the City of Pleasanton:

Laurel Creek Booster Pump Station
5875 Laurel Creek Dr, Pleasanton, CA 94588

900 Santos Booster Pump Station
9000 Santos Ranch Rd, Pleasanton, CA 94588

1300 Santos Booster Pump Station
9400 Santos Ranch Rd, Pleasanton, CA 94588

S-7 Sewer Lift Station
4950 Bernal Ave, Pleasanton, CA 94566

S-12 Sewer Lift Station
302 Happy Valley Rd, Pleasanton, CA 94566

The Engineer's cost estimate for the project is \$6,393,979.

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 will be electronically available on the City's website and Bidnet Direct at <https://www.bidnetdirect.com/california/cityofpleasantonca> at no charge. The City requires all parties interested in this bid opportunity to download the bid documents on Bidnet Direct at <https://www.bidnetdirect.com/california/cityofpleasantonca> 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.

The City is committed to ensuring its procurement process is accessible to all interested parties. Individuals requiring reasonable accommodations or alternative formats of the solicitation documents to participate in this procurement process should contact the City's designated representative as soon as possible, and no later than five (5) business days before the bid due date, to allow sufficient time to process the request. The City will make reasonable efforts to provide requested accommodations. Requests for accommodations should be directed to Steven Yee at syee@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 BidNet Direct) 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>

BidNet Direct
<https://www.bidnetdirect.com/>

Pre-Bid Walk

A Pre-Bid Walk is scheduled for Wednesday, July 22, 10:00 a.m. for bidders interested in visiting the project sites. The Pre-Bid walk will begin at Laurel Creek Booster Pump Station located at 5875 Laurel Creek Dr. The Pre-Bid Walk is not mandatory, however, highly encouraged to attend.

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 bid of a responsible 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 or C-10 Electrical** Contractor's license issued by the State of California (<https://www.cslb.ca.gov/>). 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 7-1.02I(2) "Nondiscrimination" under this contract.

Questions

Questions should be directed to the project engineer by email only at syee@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: 7/10/2026

Signed by:
By: Jocelyn Kwong
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Jocelyn Kwong, City Clerk

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BID PROPOSAL

RFB PWD 26.601
Emergency Generator Replacement
CIP Project Nos. 26162 & 26250

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 **RFB PWD 26.601 EMERGENCY GENERATOR REPLACEMENT, CIP PROJECT NOS. 26162 & 26250**, 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.

Bidder shall agree to commence work under this Contract within fifteen (15) calendar days after the date of written "Notice to Proceed" and fully complete the project within **290** working days after start of work. Bidder shall pay as liquidated damages in the sum of **\$2,000.00** per calendar day should the successful Bidder fail to complete the work within this time limit unless the successful Bidder is granted a time extension.

Bidder acknowledges receipt of the following addendum:

<u>No.</u>	<u>Date</u>	<u>No.</u>	<u>Date</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

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

BID SCHEDULE A: Laurel Creek Booster Pump Station					
Item No.	Quantity (Approximate)	Unit of Measure	Item Description	Unit Price	Total
A.1	1	LS	Mobilization and Demobilization		
A.2	1	LS	Water Pollution Control Program		
A.3	1	LS	Demolition – Fuel Area & Fencing, Pavement, Existing Generator		
A.4	1	LS	Hazardous Materials Disposal (Generator Fluids, Batteries, & Fuel)		
A.5	8	CY	Foundation Excavation		
A.6	9	CY	Generator Foundation		
A.7	1	LS	Electrical Demolition and 300A NEMA 4X Camlock		
A.8	1	LS	200 kW Outdoor Diesel Generator & Installation		
A.9	1	LS	Electrical Main & Interface with Existing ATS		
A.10	1	LS	SCADA Modifications		
A.11	1	LS	Site Electrical		
A.12	1	LS	Permitting, Testing, and Startup		
Subtotal Bid Schedule A (Items A.1 through A.12)				\$	

BID SCHEDULE B: Santos 900 Booster Pump Station					
Item No.	Quantity (Approximate)	Unit of Measure	Item Description	Unit Price	Total
B.1	1	LS	Mobilization and Demobilization		
B.2	1	LS	Water Pollution Control Program		
B.3	10	CY	Foundation Excavation		
B.4	11	CY	Generator Foundation		
B.5	1	LS	Fencing Modifications and Gate		
B.6	1	LS	Electrical Demolition and 300A NEMA 4X Camlock		
B.7	1	LS	200 kW Outdoor Diesel Generator & Installation		

BID SCHEDULE B: Santos 900 Booster Pump Station					
Item No.	Quantity (Approximate)	Unit of Measure	Item Description	Unit Price	Total
B.8	1	LS	Electrical Main & ATS		
B.9	1	LS	SCADA Modifications		
B.10	1	LS	Site Electrical		
B.11	1	LS	Permitting, Testing, and Startup		
Subtotal Bid Schedule B (Items B.1 through B.11)				\$	

BID SCHEDULE C: Santos 1300 Booster Pump Station					
Item No.	Quantity (Approximate)	Unit of Measure	Item Description	Unit Price	Total
C.1	1	LS	Mobilization and Demobilization		
C.2	1	LS	Water Pollution Control Program		
C.3	8	CY	Foundation Excavation		
C.4	9	CY	Generator Foundation		
C.5	1	LS	Electrical Demolition and 300A NEMA 4X Camlock		
C.6	1	LS	150 kW Outdoor Diesel Generator & Installation		
C.7	1	LS	Electrical Main & ATS		
C.8	1	LS	SCADA Modifications / Addition		
C.9	1	LS	Site Electrical		
C.10	1	LS	Permitting, Testing, and Startup		
Subtotal Bid Schedule C (Items C.1 through C.10)				\$	

BID SCHEDULE D: S-7 Sewer Lift Station					
Item No.	Quantity (Approximate)	Unit of Measure	Item Description	Unit Price	Total
D.1	1	LS	Mobilization and Demobilization		
D.2	1	LS	Water Pollution Control Program		
D.3	1	LS	Demolition – Fuel Area & Fencing, Pavement, Existing Generator		
D.4	1	LS	Hazardous Materials Disposal (Generator Fluids, Batteries, & Fuel)		
D.5	8	CY	Foundation Excavation		
D.6	9	CY	Generator Foundation		
D.7	1	LS	AC Pavement Restoration of Conduit Trenches, Around Generator Foundation, and Fuel & Fence Post Demolition		
D.8	1	LS	Electrical Demolition and 300A NEMA 4X Camlock		
D.9	1	LS	125 kW Outdoor Diesel Generator & Installation		
D.10	1	LS	Electrical Main & ATS		

BID SCHEDULE D: S-7 Sewer Lift Station					
Item No.	Quantity (Approximate)	Unit of Measure	Item Description	Unit Price	Total
D.11	1	LS	SCADA Modifications / Additions		
D.12	1	LS	Site Electrical		
D.13	1	LS	Permitting, Testing, and Startup		
Subtotal Bid Schedule D (Items D.1 through D.13)				\$	

BID SCHEDULE E: S-12 Sewer Lift Station					
Item No.	Quantity (Approximate)	Unit of Measure	Item Description	Unit Price	Total
E.1	1	LS	Mobilization and Demobilization		
E.2	1	LS	Water Pollution Control Program		
E.3	1	LS	Demolition – Existing Generator		
E.4	5	CY	Demolition – Existing Generator Foundation		
E.5	1	LS	Hazardous Materials Disposal (Generator Fluids, Batteries, & Fuel)		
E.6	5	CY	Generator Foundation		
E.7	1	LS	Electrical Demolition		
E.8	1	LS	80 kW Indoor Diesel Generator & Installation		
E.9	1	LS	Electrical Main & ATS		
E.10	1	LS	SCADA Modifications / Additions		
E.11	1	LS	Site Electrical		
E.12	1	LS	Permitting, Testing, and Startup		
Subtotal Bid Schedule E (Items E.1 through E.12)				\$	
TOTAL ALL BID SCHEDULES A, B, C, D, & E (Total all items A.1 through A.12, B.1 through B.11, C.1 through C.10, D.1 through D.13, and E.1 through E.12)					

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.

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

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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,

**RFB PWD 26.601
EMERGENCY GENERATOR REPLACEMENT
CIP PROJECT NOS. 26162 & 26250**

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)

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 5-1.13 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 "Bidding" 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 "Contract Award and Execution" 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 or C-10 Electrical** Contractor's 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
- Certificate of insurance naming the City of Pleasanton as additional insurer, and supporting endorsement letter
- Completed W-9 form
- 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.

CONTRACT

RFB PWD 26.601 EMERGENCY GENERATOR REPLACEMENT CIP PROJECT NOS. 26162 & 26250

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 **RFB PWD 26.601 EMERGENCY GENERATOR REPLACEMENT , CIP PROJECT NOS. 26162 & 26250**

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:

Procurement and setting up of temporary portable generators, demolition and removal of existing diesel emergency generators and ancillary systems, collection and disposal of hazardous diesel fuel and engine system fluids, demolition of existing concrete foundations, demolition and removal of existing electrical equipment, raceways, and wiring, procurement and installation of new diesel emergency generators and ancillary systems, concrete foundations and preparation for concrete foundations, fencing retrofit, electrical equipment, components, raceways, and wiring, PLC control programming modifications, surface restorations, generator permitting, testing, startup, and construction administration.

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 **RFB PWD 26.601 EMERGENCY GENERATOR REPLACEMENT, CIP PROJECT NOS. 26162 & 26250** and addenda thereto, if any.
- B. Contract Change Orders approved by the City Engineer, done in accordance with the Approved Plans and Specifications and 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 hold harmless, defend, and indemnify the City, its officers, agents and employees ("Indemnities"), against any and all claims, costs, demands, causes of action, suits, losses, expenses, attorney's fees, or liability, arising from or in any manner related to Contractor's (includes Contractor's employees, agents, or subcontractors) negligent act or omission, whether alleged or actual, regarding the work or services performed or caused to be performed pursuant to this Agreement and any amendments thereto. Contractor shall not, however, be obligated to indemnify Indemnities from claims arising from the sole negligence or willful misconduct of Indemnities. This indemnification includes any claim that the

materials or equipment provided under this Agreement, or any tool, article or process used, constitutes an infringement of any patent issued by the United States. This indemnification provision shall survive termination or cancellation of the Agreement.

6. Insurance. During the term of this Agreement, Contractor shall maintain at its own cost and expense the following insurance coverage with insurers with an A.M. Best's rating of no less than A: VII. Contractor shall have the obligation to furnish City, as additional insured, the minimum coverages identified below, or such greater or broader coverage for City, if available in the Contractor's policies.
 - a. Commercial General Liability Insurance. Commercial general liability insurance at least as broad as Insurance Services Office (ISO) CG 00 01 for limits of at least \$2,000,000 per occurrence, \$4,000,000 general aggregate, and \$2,000,000 products and complete operation aggregate for bodily injury and property damage. The policy shall include a per project or per location general aggregate endorsement. If a per project/location endorsement is not available, the limit for the general aggregate shall be doubled. The policy shall provide that the City, its officers, employees, volunteers and agents are named additional insureds as evidenced by an additional insured using ISO form CG 20 10 (or equivalent) for ongoing operations and satisfactory to the City Attorney. The policy shall allow and be endorsed primary insurance for work performed by Contractor and its subcontractors, and that no other insurance or self-insurance effected by City or other additional insured will be called on to contribute to or cover a loss thereunder. Coverage shall provide and be endorsed to include a waiver of subrogation in favor of the City and its officials, officers, employees, volunteers, and agents.
 - b. Automobile Liability Insurance. Automobile liability insurance coverage for owned, non-owned, and hired autos using ISO Business Automobile Coverage form CA 00 01 (or equivalent) in an amount not less than \$2,000,000 each accident. If the Contractor's business/company does not own any automobiles, coverage for hired and non-owned autos shall be provided. The policy shall provide and be endorsed that the City, its officials, officers, employees, agents, and volunteers are included or named as additional insureds. The policy shall provide and be endorsed to include a waiver of subrogation in favor of the City, its officials, officers, employees, agents, and volunteers.
 - c. Workers' Compensation and Employer's Liability Insurance. Statutory Workers' Compensation and Employer's Liability Insurance shall be provided for all persons employed directly or indirectly by Contractor. The Statutory Workers' Compensation Insurance and Employer's Liability Insurance shall be provided with limits of not less than \$1,000,000 each accident, \$1,000,000 by disease-policy limit, and \$1,000,000 by disease-each employee. No proprietor, partner, executive officer, or member shall be excluded. In the alternative, Contractor may rely on a self-insurance program to meet those requirements, but only if

the program of self-insurance complies fully with the provisions of the California Labor Code. Determination of whether a self-insurance program meets the standards of the California Labor Code shall be solely in the discretion of City. The insurer, if insurance is provided, or Contractor, if a program of self-insurance is provided, shall allow, and be endorsed to waive all rights of subrogation against City and its officers, officials, employees, agents, and volunteers. The requirement to maintain Statutory Worker's Compensation and Employer's Liability Insurance may be waived by the City upon written verification that Contractor does not have any employees.

For work or services deemed public works, by signing this Agreement, Contractor is certifying, pursuant to Section 1861 of the California Labor Code, that: "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."

- d. Certificate of Insurance and Endorsements. Contractor shall file a certificate of insurance and all required endorsements with the City prior to the City's execution of this Agreement, and prior to engaging in any operation or activity set forth in this Agreement. The Certificate of Insurance shall provide in writing that the insurance afforded by this Certificate shall not be suspended, voided, canceled, reduced in coverage or in limits without providing notice to the City in accordance with California Insurance Code section 677.2 which requires the notice of cancellation to: 1) include the effective date of the cancellation; 2) include the reasons for the cancellation; and 3) be given at least 30 days prior to the effective date of the cancellation, except that in the case of cancellation for nonpayment of premiums or for fraud, the notice shall be given no less than 10 days prior to the effective date of the cancellation. Notice shall be sent by certified mail, return receipt requested. In addition, the insured shall provide thirty (30) days prior written notice to the City of any cancellation, suspension, reduction of coverage or in limits, or voiding of the insurance coverage required by this agreement. The City reserves the right to require complete certified copies of policies.
- e. Adequacy of Coverage. City reserves the right to modify these insurance requirements/coverages based on the nature of the risk, prior experience, insurer, or other special circumstances
- f. Subcontractors. Contractor shall include all subcontractors as insured 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 in this Agreement, including but not limited to naming additional insureds.

- g. Waiver of Subrogation. The insurer agrees to waive all rights of subrogation against the City, its officers, employees and agents.
- h. Defense Costs. Coverage shall be provided on a “pay on behalf of” basis, with defense costs payable in addition to policy limits. There shall be no cross-liability exclusions.
- 7. Independent Contractor. The Contractor is an independent contractor retained by the City. All personnel employed by the Contractor, including subcontractors, and personnel of subcontractors, are not and shall not be employees of the City.
- 8. Contractor’s Warranty. Contractor shall bear the risk of loss or damage to any goods associated with the services until delivered to and accepted by City. Contractor further warrants that all work done and goods provided under this Agreement shall: a) meet all conditions of the Agreement; b) shall be free from all defects in design, material and workmanship; and 3) shall be fit for the purposes intended. If any defects occur within the 12 months following acceptance, Contractor shall be solely responsible for the correction of those defects.
- 9. Labor Code/Prevailing Wages. The work performed under this Agreement is a “public work” and prevailing wage laws shall apply. No less than the general prevailing rate of per diem wages, and not less than the general prevailing rate of per diem wages for holidays and overtime work, for each craft, classification or type of worker needed to execute the work under this Agreement shall be paid to all workers, laborers and mechanics employed in the execution of the work by the Contractor or any subcontractor doing or contracting to do any part of the work. The appropriate determination of the Director of the California Department of Industrial Relations shall be available for inspection. Contractor shall post, at each job site, a copy of the prevailing rate of per diem wages.

To the extent applicable, Contractor shall comply with all requirements of the California Labor Code, including but not limited to, Labor Code sections: 1773.2 (regarding posting wage determinations at each job site); section 1776 (regarding the certification, maintenance, and availability for inspection of payroll records); section 1777.5 (regarding employment of apprentices); section 1810 (regarding a legal day’s work as 8 hours of labor); and section 1775 (regarding penalties for violations). The Contractor shall forfeit fifty dollars (\$50.00) for each calendar day or portion thereof for each worker paid less than the stipulated prevailing rates for any public work done under the Agreement by it or by any subcontractor under Contractor.

- 10. 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.
- 11. 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: _____
Joe Calabrigo, Interim City Manager

ATTEST:

Jocelyn Kwong, City Clerk

APPROVED AS TO FORM:

Daniel G. Sodergren, City Attorney

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 **RFB PWD 26.601 EMERGENCY GENERATOR REPLACEMENT, CIP PROJECT NOS. 26162 & 26250**, 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 **RFB PWD 26.601 EMERGENCY GENERATOR REPLACEMENT, CIP PROJECT NOS. 26162 & 26250**, 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 Section 9000) 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 Title 3 (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)

CONTRACTOR'S BOND FOR ONE YEAR MAINTENANCE

RFB PWD 26.601 EMERGENCY GENERATOR REPLACEMENT CIP PROJECT NOS. 26162 & 26250

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 **RFB PWD 26.601 EMERGENCY GENERATOR REPLACEMENT, CIP PROJECT NOS. 26162 & 26250** 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

Surety

By: _____

By: _____

By: _____

By: _____

Date Signed

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 July 2024 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 2025 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 \$1,000,000 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, 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 Subcontractors.

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".

SECTION 6. MEASUREMENT AND PAYMENT

6-01. Payments: Attention is directed to Section 9-1.16, "Progress Payments," and 9-1.17, "Payment After Contract 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 California 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.

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 July 2024)

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

(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 July 2024, 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.

SPECIAL PROVISIONS

PART 1 GENERAL

1.01 STANDARD SPECIFICATIONS

- A. Any item of work not specified in the following Special Provisions and Technical Specifications or not shown in the Bid Drawings shall be referred to the City Standards.

1.02 PROJECT DESCRIPTION

- A. The Work consists of construction of the Emergency Generator Replacement Project. The work includes procurement and setting up of temporary portable generators, demolition and removal of existing diesel emergency generators and ancillary systems, collection and disposal of hazardous diesel fuel and engine system fluids, demolition of existing concrete foundations, demolition and removal of existing electrical equipment, raceways, and wiring, procurement and installation of new diesel emergency generators and ancillary systems, concrete foundations and preparation for concrete foundations, fencing retrofit, electrical equipment, components, raceways, and wiring, PLC control programming modifications, surface restorations, generator permitting, testing, startup, and construction administration as shown in the Contract Documents. Work also includes reconstruction of existing facilities affected by the Work and incidentals for complete and usable facility.
- B. The City will contract separately with Tesco Controls to integrate RCS control and alarm points into its existing SCADA Network. The Contractor shall retain the services of Tesco or other equivalent systems integrator for installation modifications to existing Tesco power and control equipment, and for modifications to the existing PLC control programs. The Contractor shall provide reasonable access to the City and all representatives of the City, for the City to inspect, monitor, and maintain operations of the existing pumping station facilities.

1.03 LOCATION OF PROJECT

- A. The Work is located in the City of Pleasanton California at the City's potable water booster pump station and sewer lift station sites, as indicated in the Drawings, in the following locations:
 - 1. Laurel Creek Booster Pump Station is located at:
5875 Laurel Creek Dr, Pleasanton, CA 94588
 - 2. 900 Santos Booster Pump Station is located at:
9000 Santos Ranch Rd, Pleasanton, CA 94588
 - 3. 1300 Santos Booster Pump Station is located at:
9400 Santos Ranch Rd, Pleasanton, CA 94588

4. S-7 Sewer Lift Station is located at:
4950 Bernal Ave, Pleasanton, CA 94566
5. S-12 Sewer Lift Station is located at:
302 Happy Valley Rd, Pleasanton, CA 94566

1.04 ACTIVITIES BY OTHERS

- A. Activities by others which may affect performance of work include:
 1. All project sites listed in paragraph 1.03.A are active potable water or sewer conveyance facilities and shall remain in continuous operation throughout the work. The Contractor shall not impact operation of the existing facilities.
- B. The Contractor shall provide access to each project site and all existing facilities therein for City staff to operate and maintain facilities during construction at all times.

1.05 PROJECT SCHEDULE

- A. The work covered under this project as defined in these Contract Documents shall be diligently prosecuted in accordance with the schedule proposed by the Contractor and approved by the Engineer to ensure completion within 290 working days from the date of Notice to Proceed.

1.06 SUPERINTENDENCE

The Contractor shall have on the job at all times a competent superintendent/foreman with the proper authority to represent the Contractor. All directions given by the City to the superintendent/foreman shall be as binding as if given to the Contractor.

1.07 GENERAL REQUIREMENTS AND CONSTRAINTS ON WORK AND SCHEDULING OF WORK

- A. Site access to the project sites for Contractor will be provided by the City.
- B. General requirements and constraints on Work:
 1. The Laurel Creek Booster Pump Station, 900 Santos Booster Pump Station, 1300 Santos Booster Pump Station are active potable water booster pumping facilities, and the S-7 Sewer Lift Station and S-12 Sewer Lift Station are active sewer conveyance facilities, all of which are critical for the City.
 2. Conduct Work such that the City's ability to pump potable water or sewage water is not impaired throughout construction.
 3. Conduct commissioning activities as specified in Specification Section 01662, and in Divisions 11 and 16. Commission in a manner that will not impair capabilities of essential elements of any of the project facilities and/or reduce rated pumping capacity throughout the Contract time.

4. The status of the Laurel Creek Booster Pump Station, 900 Santos Booster Pump Station, 1300 Santos Booster Pump Station, S-7 Sewer Lift Station, and S-12 Sewer Lift Station facilities shall be defined as "operational" when each station is capable of meeting the rated station pumping flow rate.
5. Confined entry work is not anticipated for the project. If any work for the project requires entry into a confined space as defined by OSHA, working within the confined space including vaults, manholes, or lift station wetwell or drywells requires a confined space entry. Contractor shall comply with all pertinent regulatory requirements as such for confined space entry, including OSHA. Contractor shall provide all required safety plans for entry and emergency extractions and meet requirements identified herein.
6. Any temporary or accidental power-down or disablement of existing wetwell and drywell ventilation systems by the Contractor to a non-functional state for areas Classified per the National Fire Protection Association (NFPA) 820, Standard for Fire Protection in Wastewater Treatment and Collection Facilities will require the Contractor to provide temporary ventilation facilities as necessary until power and function to said ventilation systems are restored as required by Federal, State, and Local regulations. At a minimum, Contractor shall provide ventilation systems that provide a minimum of 12 air changes per hour in the wetwell and 6 air changes per hour for the drywell when temporary ventilation is required for temporary or accidental power-downs or disablements.
7. The Contractor shall provide temporary gas monitoring systems for any access to vaults, manholes, or wetwell or drywell areas as necessary to perform work as required by Federal, State, and Local regulations.

1.08 SHUTDOWN AND CONSTRUCTION CONSTRAINTS

A. General shutdown constraints:

1. Execute the Work while the Laurel Creek Booster Pump Station, 900 Santos Booster Pump Station, 1300 Santos Booster Pump Station, S-7 Sewer Lift Station, and the S-12 Sewer Lift Station are in operation.
2. All Contract activities must be accomplished without interrupting service and/or shutting down pumping at any potable water booster station or any sewer lift station. Outages of any station equipment or electrical systems are allowed only by advanced notification and approval of the Engineer as specified herein.
3. Organize work to be completed without any shutdowns as much as possible.
4. Provide thorough advanced planning, including having required equipment, materials, and labor on hand prior to outage and start of Contract work.

5. Provide temporary pumping, power, lighting, controls, instrumentation, and safety devices as necessary to allow for operations of existing facilities and compliance with OSHA and all other applicable Federal, State, and Local safety requirements. Contractor shall provide temporary generator for low voltage systems as further described in herein and the Drawings.

B. Work at Lift Stations:

1. Installation of the new or replacement generators and related improvements shall occur while the lift stations are in service.
2. The Contractor shall submit proposed schedule and work sequence for work for each station for review and approval by the Engineer
3. Contractor must have approved Entry/Safe Work Plans prior to entry of personnel into any confined space.
4. Unplanned shutdowns due to emergencies are not defined in this Section.

C. Construction constraints:

1. The following constraints shall be observed while working in and around each of the project sites .
 - a. The acceptable working hours during construction are from 8AM - 5PM, Monday through Friday.
 - b. Keep each station in service during construction.
 - c. Request shutdown dates for the shutdown of electrical components for each station in writing a minimum of 28 calendar days in advance of the anticipated shutdown. Electrical outages shall be coordinated and accomplished by the Contractor and witnessed by the City operations staff. The Contractor shall be responsible or any schedule impacts shall it not be prepared and fail to meet the scheduled outage.

D. Allowed Outages

1. Each station may be taken out of service for no more than 8 hours per outage, with no more than one station experiencing an outage at a time (simultaneous or overlapping outages at two or more stations are not allowed). Outages are allowed only during normal working hours, unless approved by the City. Outages are only allowed on Monday or Tuesday. During the outage, the Contractor shall furnish and operate a generator to power the communications panel/RTU to assure that instrumentation control and alarms remain intact during the outage.

1.09 COMPLIANCE WITH DRINKING WATER PERMIT – NOT USED

1.10 REQUIREMENTS FOR MAINTAINING CONTINUOUS OPERATION OF EXISTING FACILITIES

- A. Facilities or conditions required to keep the existing stations operational include, but are not limited to, the following:
 - 1. Electrical power including transformers, distribution wiring, and motor control centers.
 - 2. Piping for conveyance of sewage at S-7 Sewer Lift Station, and at S-12 Sewer Lift Station.
 - 3. Piping for conveyance of potable water at Laurel Creek Booster Pump Station, at 900 Santos Booster Pump Station, and at 1300 Santos Booster Pump Station.
 - 4. Fencing and gates.
 - 5. Lighting.
 - 6. Instrumentation, meters, controls, and telemetry equipment.
 - 7. Safety equipment and features, including emergency showers and eyewashes at Laurel Creek Booster Pump Station, at 1300 Santos Booster Pump Station, at S-7 Sewer Lift Station, and at S-12 Sewer Lift Station.
 - 8. Parking for City employees and vehicles required for operation and maintenance of the Laurel Creek Booster Pump Station, 900 Santos Booster Pump Station, 1300 Santos Booster Pump Station, S-7 Sewer Lift Station, and the S-12 Sewer Lift Station sites.
 - 9. Telephone system.
 - 10. Storm drainage.
- B. Conduct the Work and provide temporary facilities required to keep the existing potable water booster pump station and sewer lift stations continuously operational.

1.11 OPERATIONS AND MAINTENANCE ACCESS

- A. Provide safe, continuous access at each project site for City operations personnel.

1.12 UTILITIES

- A. The locations of the existing facilities indicated in the Drawings are approximate and are based on previous as-built Drawings. The Contractor is responsible for locating all existing utilities prior to construction. These activities shall be closely coordinated with the Engineer at least 3 working days in advance of locating facilities.
- B. Provide advance notice to and utilize services of Underground Services Alert (U.S.A.) for location and marking of underground utilities operated by utility agencies other than the Owner.
- C. Maintain electrical, telephone, water, gas, sanitary facilities, and other utilities within existing facilities in service. Provide temporary utilities when necessary.

- D. New yard utilities were designed using existing facility drawings:
 - 1. Field verification of utilities locations was not performed during design.
 - 2. Services crossed or located nearby by new yard utilities may require relocation and possible shutdowns.

PART 2 SUBMITTALS

2.01 REQUESTED SYSTEM OUTAGES

- A. For all work involving any shutdown (partial or full) of the electrical feed to the project sites (identified in Article 1.07), Contractor shall submit outage request 28 calendar days prior to the requested outage date. For all other outages, Contractor shall submit outage request two weeks prior to requested outage date. Outage request shall describe scope of work, start of outage, outage duration, as well as identify plan to provide power or other utilities as may be needed for potable water pumping operations at Laurel Creek Booster Pump Station, 900 Santos Booster Pump Station, or 1300 Santos Booster Pump Station, or for wastewater pumping operations at S-7 Sewer Lift Station or S-12 Sewer Lift Station to continue. Contractor shall also identify a contingency plan in the event that Contract work is unable to be completed within the approved outage window.

2.02 SAFETY PLANS REQUIREMENTS

- A. Within 20 calendar days of Notice to Proceed, the Contractor shall submit a site safety plan with the fundamental purpose to protect all personnel (City and Contractor), City owned facilities, and any impact to City operations. Safety plan shall include requirements to ensure safe access and working conditions that are in compliance with applicable Federal, State, and Local requirements.

PART 3 EXECUTION

3.01 WORK COORDINATION

- A. Schedule and coordinate the overall Work and construction operations, including the work of subcontractors and the timely provision of products and supplies.
- B. Perform Work in an orderly and logical sequence. Individual specification Sections may identify specific requirements that are related to Work sequence. These types of constraints are not repeated in this Section but shall be followed by the Contractor.
- C. Refer to Specification Section 01040 – Coordination and Project Requirements for additional requirements.

END OF SPECIAL PROVISIONS

City of Pleasanton



VOLUME 2: TECHNICAL SPECIFICATIONS AND PLAN SHEETS (100% Design) FOR

EMERGENCY GENERATOR REPLACEMENT

Project Nos. 26162 & 26250

Prepared by:

WOOD RODGERS, Inc.

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CITY OF PLEASANTON
EMERGENCY GENERATOR REPLACEMENT
TECHNICAL SPECIFICATIONS
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SECTION 01010

SUMMARY OF WORK

PART 1 – GENERAL

1.01 SCOPE

A. The work in this **Contract** includes, but is not limited to, the following:

1. Construction Administration: Includes, but is not limited to, sureties, insurance, submittal and RFI processing, progress meetings and billings, project schedules, construction coordination, and other peripheral activities associated with contract compliance and project implementation.
2. Mobilization: Supply and transport of construction equipment, materials, supplies, appurtenances, etc., to perform the work.
3. Demobilization: Demobilization of construction plan and equipment, removal thereof, and final cleanup and restoration of the sites.
4. Replacement of five (5) emergency generators at the following locations:
 - a. Laurel Creek Booster Pump Station: Construction includes but is not limited to, installation of a temporary portable generator, demolition of existing outdoor above ground diesel fuel storage tank and concrete foundation including demolition of related fuel and electrical lines, fencing enclosure, and shade structure, demolition of existing indoor engine generator including exhaust and earthwork excavation and foundation preparation, concrete foundation, diesel engine driven outdoor generator with fuel base tank, surfacing restoration, connection to the existing ATS and new electrical power and control equipment upgrades including underground and above ground electrical work, generator permitting assistance, commissioning and operational testing, and removal of the temporary portable generator.
 - b. 900 Santos Booster Pump Station: Construction includes but is not limited to, installation of a temporary portable generator, earthwork excavation and foundation preparation, concrete foundation, diesel engine driven outdoor generator with fuel base tank, existing fencing modifications for gate addition, surfacing restoration, ATS and electrical power and control equipment upgrades including underground and above ground electrical work, generator permitting assistance, commissioning and operational testing, and removal of the temporary portable generator.

- c. 1300 Santos Booster Pump Station: Construction includes but is not limited to, installation of a temporary portable generator, earthwork excavation and foundation preparation, concrete foundation, diesel engine driven outdoor generator with fuel base tank, surfacing restoration, ATS and electrical power and control equipment upgrades including underground and above ground electrical work, generator permitting assistance, commissioning and operational testing, and removal of the temporary portable generator.
- d. S-7 Sewer Lift Station: Construction includes but is not limited to, installation of a temporary portable generator, demolition of existing diesel fuel storage tank and concrete foundation including demolition of related fuel and electrical lines and fencing enclosure, pavement saw-cutting and demolition, earthwork excavation and foundation preparation, concrete foundation, diesel engine driven outdoor generator with fuel base tank, pavement surfacing restoration, ATS and electrical power and control equipment upgrades including underground and above ground electrical work, generator permitting assistance, commissioning and operational testing, and removal of the temporary portable generator.
- e. S-12 Sewer Lift Station: Construction includes but is not limited to, installation of a temporary portable generator, demolition of existing indoor diesel engine generator with fuel base tank, it associated engine exhaust piping and radiator exhaust shroud, concrete saw-cutting and demolition of its concrete foundation pad within the building, foundation preparation and construction of the replacement concrete foundation, diesel engine driven indoor generator with fuel base tank, adjustment of existing tank fuel fill lines to the new tank fill location, new engine exhaust and radiator exhaust shroud, ATS and electrical power and control equipment upgrades including underground and above ground electrical work, generator permitting assistance, commissioning and operational testing, and removal of the temporary portable generator.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Materials are specified in these **Contract** Specifications.

PART 3 – EXECUTION

3.01 CONTRACTOR'S PLANT AND EQUIPMENT

- A. Construction Security: The **Contractor** shall, at all times, be responsible for the security of the construction site located within the fenced property of the **Owner's** Pump Station Sites for the duration of the **Contract**. The **Engineer**, the **Owner**, or the **City**, shall not take any responsibility for missing or damaged equipment, tools, or personal belongings. Materials left on-site are at the **Contractor's** risk and, if lost, damaged or stolen, are at the **Contractor's** expense. The **Contractor** shall be responsible for all project materials and equipment until the **City** has taken possession of such materials and equipment.
- B. Generator Site Security: The **City's** security protocols for the seven generator sites will remain in effect for the entire duration of the Project. The **Contractor** shall, at all times, maintain the presence of a security person at the main front entry gate, responsible for monitoring and recording all vehicles and personnel entering and leaving the plant for the purposes of performing work in this Contract. The security person shall remain on-site during construction hours on days when on-site construction activities are scheduled. The security person shall provide written daily logs and reports to include vehicle descriptions, licenses, personnel, times and dates, and brief descriptions as applicable. Copies of the daily logs and reports must be made available to the **Owner** on a weekly basis.
- C. Workshop and Storage Facilities: The **Contractor** shall provide Storage facilities for the protection of materials and supplies from the weather, and shall keep the facilities clean and in proper order at all times.
- D. Parking Facilities: Parking areas for the automobiles used by the **Contractor's** construction employees and **Contractor's** own vehicles shall be as coordinated by the **Contractor** and permitted by the **Owner**.

3.02 CONTRACTOR'S UTILITIES

- A. Electrical Power: The **Contractor** shall provide and make arrangements for temporary electric power for all purposes of power and lighting as required for the construction work of the **Contract**, and shall maintain such service until the completion of the **Contract**.
- B. Temporary Generators: The **Contractor** shall not disconnect temporary trailer-mounted generators on site throughout the duration of the construction unless for temporary repositioning as allowed by and coordinated with the **Owner**.

- C. Water: The **Contractor** shall make arrangements with the **Owner** to provide water required for construction of the work.
- E. Sanitary Facilities: The **Contractor** shall make arrangements for the maintenance of adequate toilet facilities at, or near, the various work sites and shall pay the costs thereof.

3.03 LANDS PROVIDED BY OWNER

- A. The **Owner** will provide designated laydown/staging areas. Access for the **Owner** shall be maintained for Owner operation of the existing facilities at all times.

3.04 SHIPPING AND PROTECTION OF EQUIPMENT

- A. Definition: For the purpose of this paragraph, “equipment” means all mechanical devices, all electrical devices, all items removed by **Contractor** for later reinstallation, and all items with one or more moving parts.
- B. Packing and Markings: All equipment shall be adequately and effectively protected against damage from moisture, dust, handling or other cause during transport from the manufacturer’s or the supplier’s premises to the job site. Each item or package shall be clearly marked with a fitting or distinguishing mark, which shall be shown on the packing list. Stiffeners shall be used, where necessary, to maintain shapes and to give rigidity. Parts of equipment shall be delivered in assembled or sub-assembled units, where possible.
- C. Identification of Equipment: Each item of equipment shall have firmly affixed to it a nameplate, label, or tag with its equipment number or other discrete identifying mark.
- D. Storage of Equipment: **Contractor** shall provide Storage for equipment for the entire interval between receiving and installation, and for the entire interval between being removed and reinstalled. Equipment shall be stored in an enclosed space that affords protection from weather, dust, and mechanical damage, and that provides favorable temperature, humidity and ventilation conditions, as required, to ensure against equipment deterioration. For equipment that is not intended and prepared for outdoor installation, the Storage container shall be heated above dew-point temperature.
- E. Protection of Equipment After Installation: After installation, all equipment shall be protected, as required. During construction, and until final acceptance by the **Engineer**, all equipment that may be affected must be completely covered.
- F. Delivery of Equipment: Neither the **Engineer** nor the **Owner** will accept materials or equipment deliveries for the **Contractor**.

- G. Security: Security of equipment stored by the **Contractor** is the **Contractor's** responsibility. All losses or damages shall be replaced or repaired at the **Contractor's** expense.
- H. Salvaged equipment: All equipment identified by the **City** to be salvaged by the **City** originally located at the generator sites, shall be delivered to the **City** by the **Contractor**, at a location designated by the **City**. Assume designated location is within fifteen vehicular miles for bidding purposes. Care shall be taken when storing loading/unloading and delivering salvaged equipment so as not to cause additional damage beyond the existing condition of the equipment prior to demo and removal work. The **City** shall be permitted to inspect the condition of the equipment to be salvaged during removal, while in Storage prior to delivery, and during loading/unloading of the equipment. For any excessive damage to the equipment which is determined to be caused by the **Contractor**, the **Contractor** shall reimburse the **City** for an agreed upon amount, up to the used value of the equipment.

All equipment specified to be salvaged by the **City** originally located at the generator sites, shall be delivered to the **City**, and shall be included in the Contract price according to the Bid Schedule.

3.05 TESTING AND INSPECTION

- A. General: The **Contractor** shall select a certified testing agency approved by the **Engineer** to perform field-testing of earthwork, masonry, cast-in-place materials as required to be incorporated into the work. Field testing of said items and materials shall be conducted per Section 01410 – Testing Laboratory Services.

All materials, equipment, installation and workmanship included in this **Contract**, if so required by the **Engineer** and/or the **City**, shall be tested and inspected to provide compliance with the **Contract** requirements. No tests specified herein shall be applied until the item to be tested has been inspected and approval given for the application of such tests. Tests and inspections shall include:

1. The delivery acceptance test and inspections.
2. The installed test and inspections of items as installed.

Tests and inspections, unless otherwise specified or accepted, shall be in accordance with the recognized standards of the industry and per the latest version of the County of Alameda Standard Construction Specifications, including all revisions. All tests shall be performed to the satisfaction of the **Engineer** and the **City**.

The form of evidence of satisfactory fulfillment of delivery acceptance test and of installed test and inspection requirements shall be, at the discretion of the **Engineer** and the **City**, either by tests and inspections carried out in their presence, or by certificates or reports of tests and inspections carried out by approved persons or organizations.

B. Delivery Acceptance Tests and Inspections: The delivery acceptance tests and inspections shall be at the **Contractor's** expense for any materials or equipment specified, and shall include the following:

1. Tests of items during the process of manufacture and/or on completion of manufacture (i.e.: material tests, hydraulic pressure tests, electric tests, performance and operating tests, and inspections) shall be in accordance with the relevant standards of the industry, and more particularly as detailed in individual clauses of these specifications, or as may be required by the **Engineer** or the **City**, to ensure that the items tested and inspected comply with the requirements of this **Contract**.
2. Inspection of all items delivered at the site in order that the **Engineer** may be satisfied that such items are of the specified quality and workmanship and are in good order and condition at the time of delivery.

3.06 SAFETY

A. The **Contractor** shall execute and maintain their work so as to avoid injury or damage to any person or property. All work shall be done in conformance with the state of California, Division of Industrial Safety and OSHA Standards. Safety precautions as applicable shall include, but not be limited to: adequate fume protection; adequate illumination for underground and night operation; instruction in accident prevention for all employees; such machinery guards, walkways, scaffolds, ladders, bridges, and other safety devices, equipment and wearing apparel as are necessary or lawfully required to prevent accidents or injuries; and the proper inspection and maintenance of all safety measures. **Contractor** shall have emergency phone numbers and addresses posted on the job site.

3.07 TRENCH SAFETY

A. A **Contractor's** work shall conform to the provisions of Section 6705 of the Labor Code of the state of California.

- B. Excavation for any trench or open excavation five (5) feet, or more, in depth shall not begin until the **Engineer** has received the **Contractor's** detailed plan for worker protection from the hazards of caving ground during the excavation of such trench. Such plan shall be submitted at least thirty (30) days before the **Contractor** intends to begin excavation and shall show the details of the design of shoring, bracing, sloping, or other provisions to be made for worker protection during such excavation. No such plan shall allow the use of shoring, sloping, or a protective system less effective than that required by the Construction Safety Orders of the Division of Industrial Safety. If such plan varies from the shoring system standards established by the Construction Safety Orders, the plan shall be prepared and signed by an engineer who is registered as a Civil or Structural Engineer in the state of California.
- C. In addition, the **Contractor** shall obtain, pay for, and comply with all provisions of the permit required by Section 6500 of the California Occupational Safety and Health Act of 1973.

3.08 PROTECTION OF EXISTING IMPROVEMENTS

- A. Existing facilities, utilities, and property shall be protected from damage that could result from the **Contractor's** operations. All trees, shrubbery, fences, walls, and other improvements, including existing pavements, sidewalks, street improvements, and underground utilities, and other improvements not shown on the Contract Drawings, shall be protected from damage by the **Contractor** throughout the construction period. Existing roadways and other improved surfaces shall be protected from damage by vehicles with tracks or lugs.
- B. Any damage resulting from the **Contractor's** operations shall be repaired by the **Contractor** to the condition that existed prior to the damage, and to the satisfaction of the **Owner**, at no additional cost to the **Owner**.
- C. The **Owner** may deduct from payments otherwise due the **Contractor**, the estimated cost of repairing any damage created by the **Contractor's** operation, until such time that repairs are made by the **Contractor** to the **Owner's** satisfaction.
- D. The **Contractor** shall provide temporary security fencing at the project site during the work.

3.09 RESTORATION OF STRUCTURES AND SURFACES

- A. Structures, Equipment and Pipework: The **Contractor** shall remove such existing structures, equipment, and pipework as may be necessary for the performance of the work, and shall rebuild or replace the items thus removed in as good a condition as found or better. The **Contractor** shall repair any existing structures that may be damaged as a result of the work.
- B. Curbs, Gutters, Driveways and Sidewalks: All curbs, gutters, driveways, sidewalks, and similar structures that are broken or damaged by the installation of the work shall be reconstructed by the **Contractor**. Reconstruction shall be of the same kind of materials with the same finish and in not less than the same dimensions as the original work. Repairs shall be made by removing and replacing the entire portions between joints or scores, and not by merely refinishing any damaged part. All work shall match the appearance of the existing improvements as nearly as possible.
- C. Roads and Streets: All roads and streets in which the surface is removed, broken, or damaged, or in which the ground has caved, or settled, due to work under this **Contract**, shall be completely resurfaced and brought to the original grade and crown section, unless otherwise indicated. Before resurfacing material is placed, edges of pavements shall be trimmed back far enough to provide clean, solid, vertical faces, and shall be free of any loose material. Roadways used by the **Contractor** for hauling materials, equipment, supplies, etc., shall be cleaned and repaired if the condition of the roadway is damaged, or otherwise affected, due to the **Contractor's** operations.
- D. Cultivated Areas and Other Surface Improvements: All cultivated and natural areas (agricultural lands or lawns), and other surface improvements, including roadside drainage ditches, which are damaged by actions of the **Contractor**, shall be restored as nearly as possible to their original condition.

**** END OF SECTION ****

SECTION 01040

COORDINATION AND PROJECT REQUIREMENTS

PART 1 – GENERAL

1.01 PROJECT COORDINATION

- A. Coordinate scheduling, submittals and work of various Sections of the Specifications and subcontractors to assure efficient and orderly sequence of interdependent construction. Provide accommodations for items to be furnished and installed by **City** and labeled "NIC" (Not In Contract) on the Drawings and for **Owner** Furnished/Contractor Installed (OFICI) items.
- B. **Contractor** shall submit any and all contract correspondence, submittals, RFIs, progress payment applications, and other required transmittals or documentation to **Engineer** for review and distribution to various reviewing and associated parties as necessary. The **Engineer** will provide document control, host construction coordination meetings, and provide construction liaison assistance to the **Owner** and **City**. The **City** will provide final acceptance of all construction work, materials, and services rendered by the **Contractor**. The **City** will provide on-site inspections, materials testing/quality control spot checking at his discretion, and interface with the **Engineer** and **Owner** for construction coordination purposes.

1.02 GENERAL SEQUENCING OF THE WORK

- A. The following work sequence is one suggested means of constructing the project and shall be followed in general unless another suitable method of completing the work is developed by the Contractor and approved by the Owner. This suggested work sequence is general in nature and does not include all work activities required by this Contract for completion of the work. The suggested work sequence shall be coordinated with the requirements of other specification Sections and the Drawings in order to complete the Work in a timely and satisfactory manner.
- B. Work Sequence For All Sites, Unless Otherwise Noted:
 - 1. Mobilization, site inspection, preparation of staging areas, and setup of pollution control as applicable.
 - 2. Delivery and setup of temporary portable generator.
 - 3. Identification of existing underground utilities within the work area, including coordination with Underground Service Alert (USA), utility providers, and exploratory potholing, trenching, or digging as necessary.

4. Collecting of and disposal of hazardous generator engine and fuel tank fuels and fluids.
5. Demolition of existing generator fuel lines and electrical wiring, and demolition and capping of electrical conduit (Laurel Creek Booster Pump Station and S-7 Sewer Lift Station only)
6. Demolition of existing outdoor above ground diesel fuel storage tank (Laurel Creek Booster Pump Station and S-7 Sewer Lift Station only)
7. Demolition of existing shade structure (Laurel Creek Booster Pump Station only)
8. Demolition of existing fuel area concrete foundation and curbing, and existing fencing enclosure (Laurel Creek Booster Pump Station and S-7 Sewer Lift Station only)
9. Demolition of existing generator:
 - a. For Existing Indoor Generators without Fuel Base Tank (Laurel Creek Booster Pump Station and S-7 Sewer Lift Station only):
 - 1) Demolition of engine exhaust and cooling system air exhaust components, indoor engine generator skid assembly, and anchorage.
 - b. For Existing Indoor Generators with Fuel Base Tank (S-12 Sewer Lift Station only):
 - 1) Demolition of engine exhaust and cooling system air exhaust components, indoor engine generator upper skid assembly, fuel tank sub-base, and anchorage.
10. Perform earthwork excavation for installation of all underground conduits and for the new generator foundation.
11. Perform concrete foundation preparation work, and installation of formwork and reinforcement, and concrete.
12. Perform retrofit fencework for installation of gate (900 Santos Booster Pump Station only).
13. Procurement, installation, and permitting of diesel engine driven outdoor generator with fuel base tank and sound attenuation enclosure (Laurel Creek Booster Pump Station, 900 Santos Booster Pump Station, 1300 Santos Booster Pump Station, and S-12 Sewer Lift Station only), and procurement, installation, and permitting of diesel engine driven indoor generator with fuel base tank and exhaust system, and fuel fill piping connection (S-7 Sewer Lift Station only).
14. Perform site surfacing restoration for areas disturbed.
15. Perform electrical equipment modifications for installation of and connections to the new ATS (or connection to the existing ATS at Laurel Creek Booster Pump Station only) and connections to the generator control panel, and supporting electrical modifications, and perform PLC program modifications.
16. Perform electrical testing including NETA testing, and perform generator and site electrical functionality testing and commissioning.

17. Perform Arc Flash analysis and labeling.
18. Remove the temporary portable generator.
19. Perform site cleanup and demobilization.

1.03 MECHANICAL AND ELECTRICAL COORDINATION

- A. The **Contractor's** superintendent or a specially assigned assistant shall be designated the Mechanical/Electrical Coordinator and shall coordinate the exact location, space priorities and sequence of installation of all mechanical and electrical work with each other and with all other trades. The Mechanical/Electrical Coordinator shall assure compliance with the requirements of this paragraph 1.02.
- B. The location of mechanical and electrical work may be indicated diagrammatically on the Drawings. Actual locations shall follow locations shown on the Drawings as closely as practicable, but shall be altered or adjusted in the field by the mechanical/electrical coordinator as required by the following:
 1. In finished spaces install mechanical and electrical work concealed within the space available.
 2. Organize mechanical and electrical work to make efficient use of space. Combine similar items into groups; make all runs parallel to or at right angles with building lines where practical.
 3. Layout and install work to provide adequate space and access for adjustment, servicing, and maintenance and maximize space available for future installation of additional services or replacement of existing services.
 4. Coordinate location of switches, panelboards, pullboxes, generators, and other exposed mechanical and electrical items with functional and visual elements. Verify location of questionable items with the **City** before proceeding.
- C. Prepare large-scale detailed installation drawings showing the work of all affected trades to coordinate the actual installed location of all equipment and of all mechanical and electrical work for all areas. Review coordination drawings with the **Owner**, the **Engineer**, and the **City** and all affected trades before proceeding.
- D. Review Shop Drawings and Product Data prior to submission for the **Engineer's** and the **City's** review to assure that physical characteristics and service requirements are compatible with contract requirements, field conditions, and other items submitted.

- E. Verify that required services such as electrical power characteristics, control wiring, and utility requirements of items and equipment submitted and furnished are compatible with services provided. Notify the **Engineer**, the **Owner**, and the **City** of potential problems prior to ordering items or equipment and prior to installing services or completing construction in areas where services would have to be installed.
- F. Schedule installation sequence of various elements of mechanical and electrical work to achieve optimum compliance with requirements under Mechanical and Electrical Coordination in this Section.
- G. Conduct regular weekly coordination meetings with affected trades, the **Engineer**, the **Owner**, and the **City** to establish and maintain coordination and resolve conflicts or disputes.

1.04 CUTTING, FITTING, AND PATCHING

- A. Provide cutting, fitting, or patching required to complete the Work and to make all of its parts fit together properly. Include cutting, fitting, and patching required to:
 - 1. Fit the several parts together and to integrate with other work.
 - 2. Uncover work to install or correct ill-timed work.
 - 3. Provide openings in elements of work for penetrations of mechanical and electrical work.
 - 4. Remove and replace defective and non-conforming work.
 - 5. Remove samples of installed work for testing.
- B. Request guidance from the **Engineer** and the **City** prior to beginning cutting or altering construction which affects:
 - 1. Structural integrity of any element.
 - 2. Functional performance of any element.
 - 3. Integrity of weather-exposed or moisture-resistant elements.
 - 4. Efficiency, maintenance, or safety of elements.
 - 5. Visual qualities of sight-exposed elements.
 - 6. Work by **Owner** or separate contractor.

- C. Execute cutting and patching using workers that specialize in and are skilled in installing the type of work being cut or patched.
- D. Perform work in accordance with the Contract Documents or in the absence of specific requirements comply with best trade practice for the work involved.
 - 1. Execute work by methods that will avoid damage to other work.
 - 2. Provide proper support and substrates to receive patching and finishing materials.
 - 3. Cut concrete materials using masonry saw or core drill. Locate all reinforcing steel, conduits and pipes with electronic detecting devices prior to cutting or core drilling existing concrete.
 - 4. Replace or patch work with new materials meeting the requirements of these specifications or if not specified matching materials and finishes of existing or adjacent work.
 - 5. Cut wall, ceiling and floor finishes are to fit snugly around pipes, sleeves, ducts, conduit, and other penetrations. Provide fire and/or acoustical caulking as required by code or conditions of use.
 - 6. Maintain integrity of wall, ceiling, or floor construction; completely seal voids against smoke, fire and water.
 - 7. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for an assembly, refinish entire unit.
 - 8. Report any hazardous or unsatisfactory conditions to the **Engineer** and the **City**.

1.05 ALTERATION PROJECT PROCEDURES

- A. Plan, schedule and perform alteration work as required to minimize impacting the **Owner's** continued operations.
- B. The existing water, sewer, storm drain, electrical and telephone utilities must remain in operation during construction. Schedule utility interruptions, piping connections, and interruption of existing operations as required to permit continued compliance with regulatory requirements and to meet the **Owner's** requirements.
- C. Perform cutting fitting and patching in accordance with provisions in other paragraphs of this Section. Where new work abuts or aligns with existing work perform a smooth even transition. When a smooth unnoticeable transition is not feasible cut existing surfaces along a straight line at a natural dividing point and provide a groove or cover plate as recommended by the **City**.

- D. Provide new construction in accordance with the technical specifications or if not specified provide new construction matching adjacent existing work in material and finish.

1.06 CONNECTIONS TO UNDERGROUND UTILITIES, CONDUITS, OR PROCESS PIPING

- A. **Contractor** to obtain best available current information on location, identification and marking of existing utilities, piping and conduits and other underground facilities before beginning any excavation. In areas where utilities that participate in Underground Service Alert may occur, call **800-642-2444** or **811** in Northern California for information at least two (2) working days in advance of beginning work. Give the **City** two (2) working days notice before beginning work.
- B. **Contractor** to obtain Right of Entry from property owners adjacent to project work areas prior to working in private property right of way.
- C. The location of existing utilities and underground facilities known to the **Engineer** are shown in their approximate location based on information available at the time of preparing the Drawings. The actual location, size type and number of utilities and underground facilities may differ from that shown and utilities or underground facilities may be present that are not shown. See City of Pleasanton Standard Specifications and Details (Standard Specifications), July 2024, for the **Contractor's** responsibilities and for differing conditions that warrant a change in Contract Price.
- D. Use extreme care when excavating or working in areas that may contain existing utilities, process piping, conduits or other underground facilities. Use careful potholing, hand digging and probing to determine the exact locations of underground installations. Some locations contain multiple pipes or conduits.
- E. Where connections to existing utilities or other underground facilities is required, or where new piping or conduits may cross or interfere with existing utilities or underground facilities, carefully excavate and uncover existing installations to a point one foot below the pipe or conduit to determine the actual elevation and alignment. Call the **Engineer's** attention to differing existing conditions that may require a clarification or change.

1.07 FIELD ENGINEERING AND LAYOUT

- A. Standard Specifications Section 1-16 requires the **Contractor** to accurately layout the Work including the corners of buildings and other structures, the elevation of every floor, deck, roof, tank bottom, channel, and utility alignments.

- B. The **Contractor** shall employ a Surveyor or Civil Engineer to layout all detailed dimensions and elevations from reference points. Use recognized engineering survey methods and documentation techniques.

1.08 PRECONSTRUCTION MEETING

- A. Prior to beginning the Work, the **Contractor** and its key personnel and Subcontractors including the **Contractor's** Superintendent, Project Manager, and Field Engineer shall attend a meeting with the **Owner, Engineer,** and the **City** to discuss the following:

1. Name, Authority, and Responsibilities of Parties Involved
2. Project Procedures:
 - a. Progress Meetings
 - b. Correspondence
 - c. Notification
 - d. Submittal of Product Data, Shop Drawing Samples, and Proposed Equivalents
 - e. Requests for Information
 - f. Field Instructions
 - g. Requests for Quotation
 - h. Change Orders
 - i. Owner's "Items of Concern List"
3. Temporary Schedule and Contractor's Construction Schedule
4. Temporary Facilities and Control
5. Plant Security During Construction
6. Testing During Construction
7. Contractor Coordination
8. Weekly Progress Meetings
9. Mechanical/Electrical Coordination

10. Maintenance of Record Drawings
 11. Owner-Provided Items of Work and Owner-Furnished Contractor-Installed Items
 12. Early Beneficial or Partial Occupancy
 13. Final Testing, Startup, and Balancing
 14. Punch Lists and Project Closeout Procedures
 15. Final Deliverables including Record Drawings, Operation and Maintenance Manuals, and Special Guarantees.
 16. Schedule of Values
- B. No first partial payment shall be made until an accepted Schedule and a Schedule of Values has been completed to the satisfaction of the **City** and **Owner**.

1.09 PROGRESS MEETINGS

- A. The **Engineer** will conduct bi-weekly progress meetings with the **Contractor**, **Owner**, and **City** at the job site. Attendance is required by **Contractor's** project manager, superintendent and affected Subcontractors and suppliers. The **Engineer** will prepare, maintain and distribute agenda and dated record of: (1) actions required and taken and (2) decisions needed and made.
- B. Agenda:
1. Review critical items/action list.
 2. Review work progress. Compare actual progress with planned progress shown on the **Contractor's** rolling four-week Schedule. Discuss Corrective action required. Compare actual and projected progress with **Contractor's** Construction Schedule, and propose methods to correct deficiencies.
 3. Review status of Submittals; review delivery dates and the date of need for critical items.
 4. Review coordination problems.
 5. Schedule needed testing and critical inspections.
 6. Review critical requirements for each trade or major piece of equipment prior to beginning work or installation.
 7. Discuss **Contractor** Quality Control.

8. Review Updated Storm Water Pollution Prevention Plan.
9. Discuss open items on "Items of Concern List."
10. Discuss impact of proposed changes on progress Schedule.
11. Submit and review monthly progress payment (second meeting of the month).
12. Other business.

1.10 MISCELLANEOUS PROJECT CORRESPONDENCE

- A. All written correspondence between the **Contractor** and the **Engineer, Owner**, or the **City** shall be via utilization of e-mail or electronically transmitted files compatible with Microsoft Office (file types *.DOC, *.DOCX, *.XLS, *.XLSX), common image or video viewer format (file types *.JPG, *.TIF, *.MP4), or Portable Document Format (file type *.PDF).

1.11 PERFORMANCE SPECIFICATIONS AND CONTRACTOR DESIGNED WORK

- A. Work under this **Contract** may be specified by a combination of descriptive, performance, reference standard and proprietary specifications. In the event of conflict between any of the various specification methods used to specify a single item the order of precedence shall be the order in which the methods are listed in the preceding sentence. The terms used to describe types of Specifications are taken from the "Construction Specification Institute (CSI) Handbook of Practice."
- B. Where Specifications are used to define the characteristics of **Contractor** designed systems, items or components, the **Contractor** shall be fully responsible to design, engineer, manufacture, and install the systems, items and components to meet the specified functional requirements, performance requirements, quality standards, durability standards and conditions of use as well as all applicable codes, regulations and referenced trade or industry standards. The **Contractor** shall perform such design by employing engineers licensed in the State in which the Work is being constructed. The **Contractor's** design submittals shall include calculations and assumptions on which the design is based and shall be stamped and signed by appropriately licensed engineers.
- C. The **Engineer** and the **City** shall have the right to rely on the expertise and professional competence of the **Contractor's** design. Favorable review of the **Contractor's** design submittal shall not relieve the **Contractor** from full responsibility for the adequacy of the **Contractor** design.

1.12 MATERIAL AND EQUIPMENT

A. General:

1. Verify that products delivered meet requirements of Contract Documents and the requirements for favorably reviewed submittals.

B. Compatibility of Equipment and Material:

1. Similar items, equipment, devices or products furnished under a single specification section shall all be made by the same manufacturer and have interchangeable parts.
2. In addition, but only if so stated in each affected Specification Section, similar items furnished under two or more Specification Sections shall be made by the same manufacturer and have interchangeable parts.
3. All similar materials or products that are interrelated or used together in an assembly shall be compatible with each other.

C. Transportation and Handling:

1. Transport and handle products in accordance with the manufacturer's instructions.
2. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.
3. Provide equipment and personnel to handle products using methods to prevent soiling, disfigurement, or damage.

D. Storage and Protection:

1. Store and protect products in accordance with the manufacturer's instructions. Seals and labels shall be intact and legible.
2. Store moisture sensitive products, including finish woodwork, gypsum products, acoustical products, motors, electrical equipment, instruments, and controls in weathertight, humidity and temperature controlled enclosures.
3. For exterior Storage of fabricated products, place items on sloped supports, aboveground.

4. Cover products subject to deterioration from moisture, dust, or sunlight with opaque watertight but breathable sheet covering. Provide ventilation to avoid condensation.
 5. Provide off-site Storage and protection including insurance coverage when site does not permit onsite Storage or protection.
 6. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing of the materials with foreign matter.
 7. Provide facilities, equipment and personnel to store products using methods to prevent soiling, disfigurement, or damage.
 8. Arrange Storage of products to permit access for inspection. Periodically inspect stored products to ensure they are undamaged and are maintained under specified conditions.
- E. Installation Standards and Manufacturers' Recommendations:
1. Install all products and materials in strict compliance with the most restrictive of the following:
 - a. The manufacturer's or provider's written instructions or recommendations. Follow step-by-step installation procedures.
 - b. Recommendations of referenced trade associations or standards.
 - c. These specifications and drawings.
 2. Where conflicts exist present alternatives with advantages and disadvantages to **Engineer, Owner, and City** for decision.
- F. If reference standards or manufacturer's instructions contain provisions that would alter or are at variance with relationships between the parties to the Contract set forth in the Contract Documents, the provisions in the Contract Documents shall take precedence. See Standard Specifications Section 4.

1.13 BACKING, SUPPORTS AND FASTENERS

- A. Provide backing, supports, bracing, fasteners and other provisions required for the proper support and attachment of all work. Backing, supports, bracing and fasteners shall be sized to resist vertical and horizontal loads, including seismic and wind loads required by applicable codes and in accordance with Seismic Design Requirements in this Section and as stated on the Drawings. Where finishes in existing facilities must be removed to install backing or where finishes are installed in new construction prior to installing backing, the **Contractor** shall remove finishes, install backing, and reinstall finishes.
- B. Low velocity pneumatic type power-driven fasteners may be used only:
 - 1. Where specifically shown, specified or approved.
 - 2. Where they meet the structural requirements for a particular assembly with a safety factor of at least 400 percent.
 - 3. Power-driven fasteners may not be used for electrical or mechanical installations or to attach any items loaded in withdrawal or subject to vibration.

1.14 SEISMIC DESIGN REQUIREMENTS

- A. Provide vertical support, lateral bracing, anchorage, and adequate space for seismic movement of the following items:
 - 1. Mechanical, electrical and other equipment devices, fixtures and appurtenances.
 - 2. Conduit, piping, cable trays, raceways, ducts and similar systems.
 - 3. Suspended ceilings, raised floors, partitions, architectural features and other non-structural items.
- B. If a detailed design is shown in the Contract Documents, follow the detailed design. If a detailed design is not shown, design the item to resist static and dynamic operational loads, plus seismic loads as follows:
 - 1. Fifty percent (50%) of the item weight plus contents acting in any direction at the center of gravity of the item but not less than 200 pounds. Add this load to the weight of the item and contents, when acting downwards. When acting upwards, do not deduct the weight of the item and contents.

2. Alternatively, submit a design and calculations prepared by a Structural Engineer registered in the State in which the project is being built. The design shall comply with the Design Criteria as stated on the Structural Drawings.
- C. Detail each item to resist the above loadings, plus satisfy the more restrictive of the requirements of the applicable technical specification section in Divisions 2 through 17, and the following requirements:
1. For mechanical piping, process piping and electrical conduits follow: Guidelines for seismic restraints of Mechanical Systems by SMACNA modified as follows:
 - a. Seismically brace all piping regardless of size or location. Provide transverse braces at all changes in direction and at the end of the all pipe runs. Space transverse braces not more than 20 feet apart. Provide longitudinal braces at 40-foot centers.
- D. Coordinate the layout and detailing of each item so that adequate space is provided between items for seismic motion. Provide additional supports and restraints between items of different systems when necessary to prevent seismic impacts or interaction.
- E. Take responsibility for providing enough space between adjacent items to prevent them from hitting each other during a seismic event.

1.15 SAFETY

- A. In accordance with generally accepted construction practice, applicable law and the Standard Specifications, the **Contractor** shall be solely and exclusively responsible for:
1. Construction means and methods.
 2. Safety of employees engaged in the work while on and off the site.
 3. Safety of the **Owner**, the **City**, the **Engineer**, and others who may visit or be affected by the work.
 4. Safety of the work itself including material and equipment to be incorporated therein.
 5. Safety of other property at the site or adjacent thereto.
 6. Safety programs, equipment and protective devices required to assure the safety of persons and property for whom/which the **Contractor** is responsible.

- B. The duties of the **Engineer** or **City** in conducting review of the **Contractor's** performance is not intended to include review of the adequacy of the **Contractor's** work methods, equipment, bracing, scaffolding or safety measures in, on, or near the construction site.
- C. The **Contractor** is hereby informed that work on this project could be hazardous. The **Contractor** shall carefully instruct all personnel working in potentially hazardous work areas regarding potential dangers, and shall provide such necessary safety equipment and instructions as required to prevent injury to personnel and damage to property, and shall comply with all applicable laws and regulations including State OSHA, Federal OSHA, and other regulations referenced in these Contract Documents.
- D. The **Contractor** shall, at all times, maintain the job in a condition that is safe for the **Owner, Engineer, and the City** and their Consultants to make site visits and to conduct construction reviews. If the **Owner** cannot allow personnel to visit the job because it is not safe, the **Contractor** is not providing required safe access to the Work as required by Standard Specifications Section 1-22.
- E. The **Contractor** shall prepare a Safety Plan meeting the requirements of applicable regulations. As a minimum, the Contractor's Safety Plan shall set forth definite procedures for informing workers about safety, for instructing workers in safe practices, for ensuring that workers are using appropriate safety equipment and safe work practices and for reporting accidents.

1.16 EXCAVATION AND TRENCHING; WORK WITHIN CONFINED SPACES

- A. Submit specific plans to the **Engineer** showing details of provisions for worker protection from caving ground in accordance with Section 6705 of the California State Labor Code. The detailed plans shall show the design of shoring, bracing, sloping banks or other provisions, and shall be prepared by a Civil or Structural Engineer licensed in the State in which the Work is performed and retained by the **Contractor**. Acceptance of the detailed plans submitted is only an acknowledgment of the submission and does not constitute review or approval of the designs, design assumptions, criteria, completeness, applicability to areas of intended use, or implementation of the plans, which are solely the responsibility of the **Contractor** and his Registered Engineer.
- B. Work Within Confined Spaces: Work within confined spaces is subject to applicable laws, regulations and safety orders, including applicable California Tunnel Safety Orders and Regulations.

- C. The foregoing provisions do NOT reduce the requirement for the **Contractor** to maintain safety in ALL operations performed by the **Contractor** or its Subcontractors.

1.17 CONTRACTOR'S QUALITY CONTROL

- A. The **Contractor** shall be fully responsible for inspecting the work of its suppliers and Subcontractors to assure that the work when completed will comply with the standards for materials and workmanship required by the Contract Documents. See Standard Specifications Section 1-13.
- B. Inspections, periodic observations and testing performed by the **Engineer** or the **City** are for the **City's** benefit and information only and shall not be construed as partial or incremental acceptance of the work and shall not be deemed to establish any duty on the part of the **Engineer** or the **City** to the **Contractor**, its subcontractors or suppliers.
- C. The **Contractor** shall:
1. Monitor quality control over suppliers, manufacturer, products, services, site conditions, and workmanship, to produce work of specified quality.
 2. Comply fully with manufacturer's installation instructions, including performing each step in sequence as recommended by the manufacturer.
 3. Request information from the **Engineer** before proceeding with work when manufacturers' instructions or reference standards conflict with Contract Documents.
 4. Comply with specified standards as a minimum quality for the work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
 5. Perform work by persons specializing in the specific trade and class of work required and qualified to produce workmanship of specified quality.
 6. Secure products in place with positive anchorage devices designed and sized to withstand seismic, static and dynamic loading, vibration, and physical distortion or disfigurement.
- D. If reference standards or manufacturers' instructions contain provisions that would alter or are at variance with relationships between the parties to the Contract set forth in the Contract Documents, the provisions in the Contract Documents shall take precedence as specified in Standard Specifications Section 1-04.

- E. The **Contractor** shall be responsible for any damage to **Owner**-furnished equipment upon delivery to the site. The **Contractor** shall be responsible for inspecting equipment and materials prior to unloading, and for confirming with the **Owner** the acceptable condition and quantity of delivered items. The **Contractor** shall be responsible for loading, storing, and the security of materials. Any equipment and material delivered damaged to the site shall be rejected and returned to the manufacturer. Any equipment or material damaged or stolen shall be replaced by the **Contractor** at no cost to the **Owner**.
- F. The **Contractor** shall provide assistance required by the **City** to adequately inspect the Work including ladders, scaffolding, lighting, ventilation and other aids to facilitate access and provide a safe working environment.

1.18 TESTING LABORATORY SERVICES AND CERTIFIED LABORATORY REPORTS

- A. The **Contractor** shall provide testing in accordance with Standard Specifications Section 1-26 and other pertinent portions of the Standard Specifications, and Section 01410 – Testing Laboratory Services. Where **Contractor**-testing is specifically required by the technical specifications, the **Contractor** shall submit Certified Laboratory Reports required by the technical specification sections.

****** END OF SECTION ******

SECTION 01090
REFERENCE STANDARDS

PART 1 – GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Applicability of Reference Standards.
- B. Provision of Reference Standards at site.
- C. Acronyms used in Contract Documents for Reference Standards. Source of Reference Standards.

1.02 QUALITY ASSURANCE

- A. For products or workmanship specified by association, trade, or Federal Standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. The date of the standard is that in effect as of the Bid date, or the date of the **Owner-Contractor** Agreement when there are no bids, except when a specific date is specified.
- C. When required by an individual Specifications section, obtain a copy of the standard. Maintain a copy at the job site during submittals, planning, and progress of the specific work, until Substantial Completion.

1.03 SCHEDULE OF REFERENCES

- A. ACI American Concrete Institute
 Box 19150, Redford Station
 Detroit, MI 48219
- B. ANSI American National Standards Institute
 1430 Broadway
 New York, NY 10018
- C. APA American Plywood Association
 Box 11700
 Tacoma, WA 98411

- D. ASTM American Society for Testing and Materials
1916 Race Street
Philadelphia, PA 19103
- E. AWS American Welding Society
2501 NW 7th Street
Miami, FL 33125
- F. FM Factory Mutual System
1151 Boston – Providence Turnpike
Norwood, MA 01062
- G. FS Federal Specification
General Services Administration
Specifications and Consumer Information
Distribution Section (WFSIS)
Washington Navy Yard, Bldg. 197
Washington, DC 20407
- H. IEEE Institute of Electrical and Electronics Engineers
345 East 47th Street
New York, NY 10017
- I. ISA International Society of Automation
(International Society for Measurement and Control)
67 T.W. Alexander Drive
P.O. Box 12277
Research Triangle Park, NC 27709
- J. MIL Military Specification
Naval Publications and Forms Center
5801 Tabor Avenue
Philadelphia, PA 19120
- K. NEMA National Electrical Manufacturers' Association
2101 L Street, N.W.
Washington, DC 20037
- L. PCA Portland Cement Association
5420 Old Orchard Road
Skokie, IL 20076
- M. CPSSD City of Pleasanton Standard Specifications and Details
City of Pleasanton Public Works Department
200 Old Bernal Avenue
Pleasanton, CA 94566

N. UL Underwriters' Laboratories, Inc.
333 Pfingston Road
Northbrook, IL 60062

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

****** END OF SECTION ** ****

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SECTION 01220

MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.01 SUMMARY

- A. Measurement and payment for Bid Items listed in proposal shall be based upon use of lump sum or unit price method for each and all Bid Items as described.
- B. Payment for the Work in each Section of these Contract Documents shall be included as part of the lump sum or unit price bid amount for which such Work is appurtenant.
 - 1. No additional payment will be made for Work described in any Section for which no express bid item is provided.

1.02 CONTRACTOR-FURNISHED SURVEYS

- A. No payment will be made to Contractor for Contractor-furnished surveys other than such additional payment Contractor may be entitled to due to corrected payment quantities based on Contractor-furnished surveys.

1.03 WORK NOT LISTED IN BID SCHEDULE

- A. Include costs for related Work and appurtenances required and/or implied by Permits and Contract Documents but not listed as a separate Bid Item under appropriate Bid Item or items within Bid Schedule.

1.04 PROTECTING EXISTING UTILITIES

- A. Payment for locating, potholing, exposing, and protecting existing utilities will be included in price bid for Work items for which such Work is appurtenant.
- B. Payment for abandoning or removing existing utilities will be included in price bid for Work items for which such Work is appurtenant.
- C. Utility Protection or Relocation by Contractor as Shown in Contract Documents: When work on a utility is shown within Contract Documents to be done by Contractor, but is not included as a separate bid item, Contractor shall make arrangements and coordinate with utility owner regarding schedule for performance of Work. Costs for such Work shall be included in unit prices or lump sum amounts bid for the various Contract items. Submit proposed method of relocation or protecting utility for review. Review by City will not relieve Contractor of any responsibility.

- D. Utility Relocation by Contractor for Contractor's Convenience: Temporary relocation or alteration of any utility, desired by Contractor solely for their convenience in performance of Work, to a position or condition other than that provided for on Contract Documents shall be Contractor's own responsibility. Make arrangements with utility or property owners regarding such Work. Repair, replacement or relocation of buried utilities shall be completed at Contractor's expense by either Utility's forces, or by contractor accepted by Utility in writing and properly licensed to perform Work. Costs of such Work for Contractor's convenience shall be absorbed in unit prices or lump sum amounts bid for the various Contract items at no additional cost to City.
- E. Utility Relocations by City: When Contract Documents indicate a utility is to be relocated, altered, or reconstructed by forces other than Contractor, City will conduct negotiations in respect to such work and work will be done at no cost to Contractor. No additional compensation will be given for delays or inconvenience by others to finish their work on schedule due to unforeseen difficulties.
- F. Unknown Utility Installation by Others During Contract Work: If utility is disclosed or installed subsequent to award of Contract, and utility is not shown on Contract Documents, with reasonable accuracy, and said utility is found to occupy space required to be occupied by Work, City's Representative will determine whether utility requires location, relocation, removal, repair of damages, alteration, support or protection.
1. Perform Work in accordance with Contract Documents provided or accepted by City and in accordance with the following:
 - a. Where undisclosed utilities are discovered and located by Contractor when performing this Contract, immediately notify City in writing.
 - b. When said utility is found to occupy space required to be occupied by part of permanent Works to be constructed under Contract or parallel to permanent works and within vertical planes on each side at distance away equal to maximum allowable trench width measured in plane 12" above top of pipe, exclusive of branches or other facilities, as specified in Contract Documents, or to be within specified excavation pay lines (when such are specified in Contract Documents); City will arrange for relocation or alteration of said utility or require Contractor to do same.
 - c. Utilities found to cross excavation, but not intercepting permanent Work to be constructed or interfering with construction shall be maintained in place at Contractor's expense.
 - d. Utilities interfering with construction techniques used shall be protected or relocated.

- e. When utilities roughly parallel new Work and portions of utilities do not lie within vertical planes specified above, or do not lie within excavation pay lines (when such are shown in Contract Documents), advise City thereof, and in cooperation with utility owner, provide and place support for proper protection to guarantee continuous and safe operation of utility.
- f. Maintain continuous sanitary sewer service. Should existing sanitary sewer or maintenance hole extend within proposed excavation, submit method of construction or support for acceptance by City, and assume responsibilities therefor. Costs for such work shall be borne by Contractor.
- g. If work is done by others, provide time and working space for protection and relocation required.
- h. City will compensate Contractor for their direct costs of locating, relocating, removal, repair, support or protecting undisclosed utilities, together with cost of equipment used for Work necessarily idled during such Work.
- i. Contractor will not be entitled to extra compensation or extension of time when Extra Work is required to repair damage to undisclosed utilities caused by failure of Contractor to exercise reasonable care.
- j. Contractor will not be entitled to compensation for indirect or consequential costs or damages incurred as a result of Extra Work required.
- k. When directed or accepted by City, changes in line or grade of structure being built may be made to avoid utilities.
- l. Additional costs because of such changes will be paid for by Change Order as Extra Work.

1.05 INCREASES IN PAYMENT DUE TO UNANTICIPATED OVEREXCAVATION DURING TRENCHING

- A. No payment will be made for overexcavation except where overexcavation is authorized in writing by City's Representative.
- B. Excavations not extending below a horizontal plane 18" below pipe inverts or outside vertical planes 18" on each side of constructed pipe ODs will be considered to fall within the limits of reasonable excavation and will not be credited as Extra Work.
- C. City-directed excavation outside these limits will not be considered Extra Work until at least 1000' or 5% of the total trench length, whichever is greater, has required overexcavation outside these limits.
- D. After 1000' or 5% of the total trench length has required City-directed overexcavation outside these limits, Contractor shall notify City's Representative of their intent to charge for subsequent overexcavation as Extra Work.
- E. Subsequent Work requiring excavation outside these limits 18" below or on either side of pipelines will be credited as Extra Work for volumes outside the limiting prism.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 SCOPE

- A. This section defines Bid Items listed in Bid schedule and describes measurement and payment provisions for each item.

3.02 BID SCHEDULE A: LAUREL CREEK BOOSTER PUMP STATION

A. BID ITEM A.1: MOBILIZATION AND DEMOBILIZATION

1. Amount bid for Mobilization/Demobilization shall not exceed 10.0% of Contractor's Bid total. Amounts bid in excess of stipulated 10.0% cap will not be paid until project completion.
2. Payment for this item will be made at lump sum price listed in Bid Schedule including but not limited to providing bonds and insurance, obtaining required permits, taking construction photographic and video documentation, preparing project schedules, constructing temporary noise attenuation facilities, performing exploratory excavation, and compliance with General and Supplementary conditions.
3. Work to be paid under this Bid Item shall also include furnishing, setting up, and removing Contractor's operations at project site including temporary offices, buildings, trailers, utilities, services, sanitary facilities, staging areas, and security.
4. Work to be paid under this Bid Item shall also include payment for demobilization, removal of temporary facilities, cleanup of construction site, providing record drawings, operation and maintenance manuals, and warranties, complete in place.

B. BID ITEM A.2: WATER POLLUTION CONTROL PROGRAM

1. No measurement will be made for this lump sum Bid Item.
2. Work to be paid under this Bid Item shall also include installing, maintenance and removal of necessary Best Management Practices (BMPs) for pollution control and spill control purposes required by Regional Water Quality Control Board, including establishment of erosion control plan and reporting procedures, placement of erosion control measures, monitoring, reporting, payment of fines due to Contractor's negligence and appurtenant Work required by Contract Documents.

C. BID ITEM A.3: DEMOLITION - FUEL AREA & FENCING, PAVEMENT,
EXISTING GENERATOR

1. No measurement will be made for this lump sum Bid Item.
2. This work to be paid under this Bid Item includes demolishing the existing fuel area, pavement, fuel tank fencing and roof structure, fuel tank pad, piping, and its appurtenances. Demolition of existing generator, ducting, fuel lines, conduit, supports, and anchors. Work shall include cleaning, grubbing, scalping, removing all vegetation and construction debris from the limits shown on the Plans.
3. All demolished described above shall be removed from the site and properly disposed of by the Contractor
4. The Contractor must protect the onsite electrical transformer in place while performing the work described in this bid item.

D. BID ITEM A.4: HAZARDOUS MATERIALS DISPOSAL (GENERATOR
FLUIDS, BATTERIES, & FUEL)

1. No measurement will be made for this lump sum Bid Item.
2. This work includes handling hazardous waste materials, transporting hazardous waste in the appropriate containers, labeling, and proper disposal to comply with EPA regulations.
3. Work to be paid under this Bid Item shall include work described in, reimbursement for permit and inspection fees required by public agencies to perform Work within public agency jurisdictions as required by public agencies and Contract Documents.

E. BID ITEM A.5: FOUNDATION EXCAVATION

1. Measurement is made based on cubic yard completed.
2. Payment shall constitute full compensation for all labor, materials, tools, equipment, and incidentals to excavate and backfill the areas with materials shown on the drawings, and as specified herein.

F. BID ITEM A.6: GENERATOR FOUNDATION

1. Measurement is made based on cubic yard completed.
2. Work to be paid under this Bid Item shall include work described in furnishing all labor, materials, tools, equipment, and incidentals including but not limited to: concrete, reinforcing steel, formwork, and anchor bolts for the construction of the slab-on-grade foundation. Concrete foundation will be constructed per the Structural Plans and project Specifications.

G. BID ITEM A.7: ELECTRICAL DEMOLITION & 300A NEMA 4X CAMLOCK

1. No measurement will be made for this lump sum Bid Item.
2. Work to be paid under this Bid Item consist of modification of motor, motor starters, panels, and other devices as indicated on the drawings. The removal and/or relocation of electrically powered or controlled equipment, starters, wiring, and other miscellaneous devices associated with equipment to be removed or relocated. Removal of cable tap box and returned to the city, removal of manual transfer switches and automatic transfer switches.
3. Procurement and installation of portable generator and Camlock panel.

H. BID ITEM A8: 200KW OUTDOOR DIESEL GENERATOR & INSTALLATION

1. No measurement will be made for this lump sum Bid Item.
2. Work includes procurement and installation of 200kW outdoor diesel generator, with built in fuel tanks per generator specification. Work to be paid under this Bid Item shall include labor, materials, tools, equipment, and incidentals.

I. BID ITEM A.9: ELECTRICAL MAIN & INTERFACE WITH EXISTING ATS

1. No measurement will be made for this lump sum Bid Item.
2. Work to be paid under this Bid Item consist of labor, materials, products, tools, equipment, and incidentals. Work includes modifications of the existing electrical switchboards prior to wiring the new gensets, existing ATS, and associated auxiliary equipment.

J. BID ITEM A.10: SCADA MODIFICATIONS

1. No measurement will be made for this lump sum Bid Item.
2. Work to be paid under this Bid Item consist of labor, materials, products, tools, equipment, and incidentals. Work includes wirings of new signals to existing SCADA system.

K. BID ITEM A.11: SITE ELECTRICAL

1. No measurement will be made for this lump sum Bid Item.
2. Work to be paid under this Bid Item consist of labor, materials, products, tools, equipment, and incidentals.
3. Provide and install electrical underground and exposed conduits and raceways, wiring, junction boxes, pull boxes, terminal boxes, wire terminations, conduit and raceway supports, conduit and wire termination fittings, labeling, and testing.
4. The work under this Bid Item shall include furnishing and installing all necessary excavation safety measures including, but not limited to sheeting, shoring and bracing or equivalent method for protection of life and limb in trenches and open excavation in conformance with applicable safety orders, complete in place.

L. BID ITEM A.12: PERMITTING, TESTING, AND STARTUP

1. No measurement will be made for this lump sum Bid Item.
2. Work to be paid for includes furnishing all labor, fluids, testing, material and equipment necessary for pre-commissioning activates associated with first time startup of equipment, instruments, and electrical gear for the operation of the generator.

3.03 BID SCHEDULE B: SANTOS 900 BOOSTER PUMP STATION

A. BID ITEM B.1: MOBILIZATION & DEMOBILIZATION

1. Amount bid for Mobilization/Demobilization shall not exceed 10.0% of Contractor's Bid total. Amounts bid in excess of stipulated 10.0% cap will not be paid until project completion.
2. Payment for this item will be made at lump sum price listed in Bid Schedule including but not limited to providing bonds and insurance, obtaining required permits, taking construction photographic and video documentation, preparing project schedules, constructing temporary noise attenuation facilities, performing exploratory excavation, and compliance with General and Supplementary conditions.
3. Work to be paid under this Bid Item shall also include furnishing, setting up, and removing Contractor's operations at project site including temporary offices, buildings, trailers, utilities, services, sanitary facilities, staging areas, and security.
4. Work to be paid under this Bid Item shall also include payment for demobilization, removal of temporary facilities, cleanup of construction site, providing record drawings, operation and maintenance manuals, and warranties, complete in place.

B. BID ITEM B.2: WATER POLLUTION CONTROL PROGRAM

1. No measurement will be made for this lump sum Bid Item.
2. Work to be paid under this Bid Item shall also include installing, maintenance and removal of necessary BMPs for pollution control and spill control purposes required by Regional Water Quality Control Board, including establishment of erosion control plan and reporting procedures, placement of erosion control measures, monitoring, reporting, payment of fines due to Contractor's negligence and appurtenant Work required by Contract Documents.

C. BID ITEM B.3: FOUNDATION EXCAVATION

1. Measurement is made based on cubic yard completed.
2. Work to be paid for includes furnishing all labor, materials, equipment, and incidentals to excavate and backfill the areas with materials shown on the drawings, and as specified herein.

D. BID ITEM B.4: GENERATOR FOUNDATION

1. Measurement is made based on cubic yard completed.
2. Work to be paid under this Bid Item shall include work described in, furnishing all labor, materials, tools, equipment, and incidentals including but not limited to: concrete, reinforcing steel, formwork, and anchor bolts for the construction of the slab-on-grade foundation. Concrete foundation will be constructed per the Structural Plans and project Specifications.

E. BID ITEM B.5: FENCING MODIFICATIONS AND GATE

1. No measurement will be made for this lump sum Bid Item.
2. Work to be paid under this Bid Item shall include work described in, furnishing all labor, materials, tools, equipment, and incidentals including but not limited to: concrete, reinforcing steel, formwork, and anchor bolts for the construction of the gate per manufacturer selected. Procurement and installation of chain link fence, gates, and accessories in conformance with the lines, grades, and details as shown.

F. BID ITEM B.6: ELECTRICAL DEMOLITION & 300A NEMA 4X CAMLOCK

1. No measurement will be made for this lump sum Bid Item.
2. Work to be paid under this Bid Item consist of modification of motor, motor starters, panels, and other devices as indicated on the drawings. The removal and/or relocation of electrically powered or controlled equipment, starters, wiring, and other miscellaneous devices associated with equipment to be removed or relocated. Removal of cable tap box and returned to the city, removal of manual transfer switches and automatic transfer switches.
3. Procurement and installation of portable generator and Camlock panel.

G. BID ITEM B.7: 200KW OUTDOOR DIESEL GENERATOR & INSTALLATION

1. No measurement will be made for this lump sum Bid Item.
2. Work includes procurement and installation of 200kW outdoor diesel generator, with built in fuel tanks per generator specification. Work to be paid under this Bid Item shall include labor, materials, tools, equipment, and incidentals.

H. BID ITEM B.8: ELECTRICAL MAIN & ATS

1. No measurement will be made for this lump sum Bid Item.
2. Work to be paid under this Bid Item consist of labor, materials, products, tools, equipment, and incidentals. Work includes procurement and installation of electrical switchboards prior to wiring the new gensets, ATS, and associated auxiliary equipment.

I. BID ITEM B.9: SCADA MODIFICATIONS

1. No measurement will be made for this lump sum Bid Item.
2. Work to be paid under this Bid Item consist of labor, materials, products, tools, equipment, and incidentals. Work includes wirings of new signals to existing SCADA system.

J. BID ITEM B.10: SITE ELECTRICAL

1. No measurement will be made for this lump sum Bid Item.
2. Work to be paid under this Bid Item consist of labor, materials, products, tools, equipment, and incidentals.
3. Provide and install electrical underground and exposed conduits and raceways, wiring, junction boxes, pull boxes, terminal boxes, wire terminations, conduit and raceway supports, conduit and wire termination fittings, labeling, and testing.
4. The work under this Bid Item shall include furnishing and installing all necessary excavation safety measures including, but not limited to sheeting, shoring and bracing or equivalent method for protection of life and limb in trenches and open excavation in conformance with applicable safety orders, complete in place.

K. BID ITEM B.11: PERMITTING, TESTING, AND STARTUP

1. No measurement will be made for this lump sum Bid Item.
2. Work to be paid for includes furnishing all labor, fluids, testing, material and equipment necessary for pre-commissioning activates associated with first time startup of equipment, instruments, and electrical gear for the operation of the generator.

3.04 BID SCHEDULE C: SANTOS 1300 BOOSTER PUMP STATION

A. BID ITEM C.1: MOBILIZATION & DEMOBILIZATION

1. Amount bid for Mobilization/Demobilization shall not exceed 10.0% of Contractor's Bid total. Amounts bid in excess of stipulated 10.0% cap will not be paid until project completion.
2. Payment for this item will be made at lump sum price listed in Bid Schedule including but not limited to providing bonds and insurance, obtaining required permits, taking construction photographic and video documentation, preparing project schedules, constructing temporary noise attenuation facilities, performing exploratory excavation, and compliance with General and Supplementary conditions.
3. Work to be paid under this Bid Item shall also include furnishing, setting up, and removing Contractor's operations at project site including temporary offices, buildings, trailers, utilities, services, sanitary facilities, staging areas, and security.

4. Work to be paid under this Bid Item shall also include payment for demobilization, removal of temporary facilities, cleanup of construction site, providing record drawings, operation and maintenance manuals, and warranties, complete in place.

B. BID ITEM C.2: WATER POLLUTION CONTROL PROGRAM

1. No measurement will be made for this lump sum Bid Item.
2. Work to be paid under this Bid Item shall also include installing, maintenance and removal of necessary BMPs for pollution control and spill control purposes required by Regional Water Quality Control Board, including establishment of erosion control plan and reporting procedures, placement of erosion control measures, monitoring, reporting, payment of fines due to Contractor's negligence and appurtenant Work required by Contract Documents.

C. BID ITEM C.3: FOUNDATION EXCAVATION

1. Measurement is made based on cubic yard completed.
2. Work to be paid for includes furnishing all labor, materials, equipment, and incidentals to excavate and backfill the areas with materials shown on the drawings, and as specified herein.

D. BID ITEM C.4: GENERATOR FOUNDATION

1. Measurement is made based on cubic yard completed.
2. Work to be paid under this Bid Item shall include work described in furnishing all labor, materials, tools, equipment, and incidentals including but not limited to: concrete, reinforcing steel, formwork, and anchor bolts for the construction of the slab-on-grade foundation. Concrete foundation will be constructed per the Structural Plans and project Specifications.

E. BID ITEM C.5: ELECTRICAL DEMOLITION & 300A NEMA 4X CAMLOCK

1. No measurement will be made for this lump sum Bid Item.
2. Work to be paid under this Bid Item consist of modification of motor, motor starters, panels, and other devices as indicated on the drawings. The removal and/or relocation of electrically powered or controlled equipment, starters, wiring, and other miscellaneous devices associated with equipment to be removed or relocated. Removal of cable tap box and returned to the city, removal of manual transfer switches and automatic transfer switches. Removal of existing camlock panel to be replaced with new.
3. Procurement and installation of portable generator and Camlock panel.

F. BID ITEM C.6: 150KW OUTDOOR DIESEL GENERATOR & INSTALLATION

1. No measurement will be made for this lump sum Bid Item.
2. Work includes procurement and installation of 150kW outdoor diesel generator, with built in fuel tanks per generator specification. Work to be paid under this Bid Item shall include labor, materials, tools, equipment, and incidentals.

G. BID ITEM C.7: ELECTRICAL MAIN & ATS

1. No measurement will be made for this lump sum Bid Item.
2. Work to be paid under this Bid Item consist of labor, materials, products, tools, equipment, and incidentals. Work includes procurement and installation of electrical switchboards prior to wiring the new gensets, ATS, and associated auxiliary equipment.

H. BID ITEM C.8: SCADA MODIFICATIONS/ADDITIONS

1. No measurement will be made for this lump sum Bid Item.
2. Work to be paid under this Bid Item consist of labor, materials, products, tools, equipment, and incidentals. Work includes wirings of new signals to existing SCADA system.

I. BID ITEM C.9: SITE ELECTRICAL

1. No measurement will be made for this lump sum Bid Item.
2. Work to be paid under this Bid Item consist of labor, materials, products, tools, equipment, and incidentals.
3. Provide and install electrical underground and exposed conduits and raceways, wiring, junction boxes, pull boxes, terminal boxes, wire terminations, conduit and raceway supports, conduit and wire termination fittings, labeling, and testing.
4. The work under this Bid Item shall include furnishing and installing all necessary excavation safety measures including, but not limited to sheeting, shoring and bracing or equivalent method for protection of life and limb in trenches and open excavation in conformance with applicable safety orders, complete in place.

J. BID ITEM C.10: PERMITTING, TESTING, AND STARTUP

1. No measurement will be made for this lump sum Bid Item.
2. Work to be paid for includes furnishing all labor, fluids, testing, material and equipment necessary for pre-commissioning activates associated with first time startup of equipment, instruments, and electrical gear for the operation of the generator.

3.05 BID SCHEDULE D: S-7 SEWER LIFT STATION

A. BID ITEM D.1: MOBILIZATION & DEMOBILIZATION

1. Amount bid for Mobilization/Demobilization shall not exceed 10.0% of Contractor's Bid total. Amounts bid in excess of stipulated 10.0% cap will not be paid until project completion.
2. Payment for this item will be made at lump sum price listed in Bid Schedule including but not limited to providing bonds and insurance, obtaining required permits, taking construction photographic and video documentation, preparing project schedules, constructing temporary noise attenuation facilities, performing exploratory excavation, and compliance with General and Supplementary conditions.
3. Work to be paid under this Bid Item shall also include furnishing, setting up, and removing Contractor's operations at project site including temporary offices, buildings, trailers, utilities, services, sanitary facilities, staging areas, and security.
4. Work to be paid under this Bid Item shall also include payment for demobilization, removal of temporary facilities, cleanup of construction site, providing record drawings, operation and maintenance manuals, and warranties, complete in place.

B. BID ITEM D.2: WATER POLLUTION CONTROL PROGRAM

1. No measurement will be made for this lump sum Bid Item.
2. Work to be paid under this Bid Item shall also include installing, maintenance and removal of necessary BMPs for pollution control and spill control purposes required by Regional Water Quality Control Board, including establishment of erosion control plan and reporting procedures, placement of erosion control measures, monitoring, reporting, payment of fines due to Contractor's negligence and appurtenant Work required by Contract Documents.

C. BID ITEM D.3: DEMOLITION – FUEL AREA & FENCING, PAVEMENT, EXISTING GENERATOR

1. No measurement will be made for this lump sum Bid Item.
2. This work includes demolishing the existing fuel area, pavement, fuel tank fencing and roof structure, fuel tank pad, piping, and its appurtenances. Demolish existing generator, ducting, fuel lines, conduit, supports, and anchors. Work under this Bid Item shall include cleaning, grubbing, scalping and removing all vegetation and construction debris from the limits shown on the Plans
3. All demolished described above shall be removed from the site and properly disposed of by the Contractor

D. BID ITEM D.4: HAZARDOUS MATERIALS DISPOSAL (GENERATOR FLUIDS, BATTERIES, & FUEL)

1. No measurement will be made for this lump sum Bid Item.
2. This work includes handling hazardous waste materials, transporting hazardous waste in the appropriate containers, labeling, and proper disposal to comply with EPA regulations.
3. Work to be paid under this Bid Item shall include work described in, reimbursement for permit and inspection fees required by public agencies to perform Work within public agency jurisdictions as required by public agencies and Contract Documents.

E. BID ITEM D.5: FOUNDATION EXCAVATION

1. Measurement is made based on cubic yard completed.
2. Work to be paid for includes furnishing all labor, materials, equipment, and incidentals to excavate and backfill the areas with materials shown on the drawings, and as specified herein.

F. BID ITEM D.6: GENERATOR FOUNDATION

1. Measurement is made based on cubic yard completed.
2. Work to be paid under this Bid Item shall include work described in furnishing all labor, materials, tools, equipment, and incidentals including but not limited to: concrete, reinforcing steel, formwork, and anchor bolts for the construction of the slab-on-grade foundation. Concrete foundation will be constructed per the Structural Plans and project Specifications.

G. BID ITEM D.7: AC PAVEMENT RESTORATION OF CONDUIT TRENCHES, AROUND GENERATOR FOUNDATION, AND FUEL & FENCE POST DEMOLITION

1. No measurement will be made for this lump sum Bid Item.
2. Work to be paid under this Bid Item consist of placement of aggregate base (AB) and asphaltic concrete (AC) pavement above and adjacent to below ground and at-grade installation work within existing AC paved areas as indicated on the drawings. Work includes restoration to match existing pavement removed and adjacent pavement to remain for completion of pavement hardscape over conduit trenches, around the perimeter of the foundation for the new generator, and over fuel tank foundation and fuel line demolition and fence post demolition work.

H. BID ITEM D.8: ELECTRICAL DEMOLITION & 300A NEMA 4X CAMLOCK

1. No measurement will be made for this lump sum Bid Item.
2. Work to be paid under this Bid Item consist of modification of motor, motor starters, panels, and other devices as indicated on the drawings. The removal and/or relocation of electrically powered or controlled equipment, starters, wiring, and other miscellaneous devices associated with equipment to be removed or relocated. Removal of cable tap box and returned to the city, removal of manual transfer switches and automatic transfer switches. Removal of existing Camlock panel to be replaced with new.
3. Procurement and installation of portable generator to Camlock panel during the duration of construction.

I. BID ITEM D.9: 125KW OUTDOOR DIESEL GENERATOR & INSTALLATION

1. No measurement will be made for this lump sum Bid Item.
2. Work includes procurement and installation of 125kW outdoor diesel generator, with built in fuel tanks per generator specification. Work to be paid under this Bid Item shall include labor, materials, tools, equipment, and incidentals.

J. BID ITEM D.10: ELECTRICAL MAIN & ATS

1. No measurement will be made for this lump sum Bid Item.
2. Work to be paid under this Bid Item consist of labor, materials, products, tools, equipment, and incidentals. Work includes procurement and installation of electrical switchboards prior to wiring the new gensets, ATS, and associated auxiliary equipment.

K. BID ITEM D.11: SCADA MODIFICATIONS

1. No measurement will be made for this lump sum Bid Item.
2. Work to be paid under this Bid Item consist of labor, materials, products, tools, equipment, and incidentals. Work includes wirings of new signals to existing SCADA system.

L. BID ITEM D.12: SITE ELECTRICAL

1. No measurement will be made for this lump sum Bid Item.
2. Work to be paid under this Bid Item consist of labor, materials, products, tools, equipment, and incidentals.
3. Provide and install electrical underground and exposed conduits and raceways, wiring, junction boxes, pull boxes, terminal boxes, wire terminations, conduit and raceway supports, conduit and wire termination fittings, labeling, and testing.

4. The work under this Bid Item shall include furnishing and installing all necessary excavation safety measures including, but not limited to sheeting, shoring and bracing or equivalent method for protection of life and limb in trenches and open excavation in conformance with applicable safety orders, complete in place.

M. BID ITEM D.13: PERMITTING, TESTING, AND STARTUP

1. No measurement will be made for this lump sum Bid Item.
2. Work to be paid for includes furnishing all labor, fluids, testing, material and equipment necessary for pre-commissioning activates associated with first time startup of equipment, instruments, and electrical gear for the operation of the generator.

3.06 BID SCHEDULE E: S-12 SEWER LIFT STATION

A. BID ITEM E.1: MOBILIZATION & DEMOBILIZATION

1. Amount bid for Mobilization/Demobilization shall not exceed 10.0% of Contractor's Bid total. Amounts bid in excess of stipulated 10.0% cap will not be paid until project completion.
2. Payment for this item will be made at lump sum price listed in Bid Schedule including but not limited to providing bonds and insurance, obtaining required permits, taking construction photographic and video documentation, preparing project schedules, constructing temporary noise attenuation facilities, performing exploratory excavation, and compliance with General and Supplementary conditions.
3. Work to be paid under this Bid Item shall also include furnishing, setting up, and removing Contractor's operations at project site including temporary offices, buildings, trailers, utilities, services, sanitary facilities, staging areas, and security.
4. Work to be paid under this Bid Item shall also include payment for demobilization, removal of temporary facilities, cleanup of construction site, providing record drawings, operation and maintenance manuals, and warranties, complete in place.

B. BID ITEM E.2: WATER POLLUTION CONTROL PROGRAM

1. No measurement will be made for this lump sum Bid Item.
2. Work to be paid under this Bid Item shall also include installing, maintenance and removal of necessary BMPs for pollution control and spill control purposes required by Regional Water Quality Control Board, including establishment of erosion control plan and reporting procedures, placement of erosion control measures, monitoring, reporting, payment of fines due to Contractor's negligence and appurtenant Work required by Contract Documents.

C. BID ITEM E.3: DEMOLITION – EXISTING GENERATOR

1. No Measurement will be made for this lump sum Bid Item.
2. Work to be paid under this Bid Item shall include work described in, furnishing all labor, materials, tools, equipment, and incidentals including but not limited to removal of existing generator, ducting, and connections. Disposal of generator and its appurtenances. Protect existing utilities in place not called to be removed by Contract Documents.

D. BID ITEM E.4: DEMOLITION – EXISTING GENERATOR FOUNDATION

1. Measurement is made based on cubic yard completed.
2. Work to be paid under this Bid Item shall include work described in, but not limited to, furnishing all labor, materials, tools, equipment, and incidentals including but not limited to removal of existing generator foundation. Protect in place existing utilities not called to be demoed by Contract Documents.

E. BID ITEM E.5: HAZARDOUS MATERIALS DISPOSAL (GENERATOR FLUIDS, BATTERIES, & FUEL)

1. No measurement will be made for this lump sum Bid Item.
2. This work includes handling hazardous waste materials, transporting hazardous waste in the appropriate containers, labeling, and proper disposal to comply with EPA regulations.
3. Work to be paid under this Bid Item shall include work described in, but not limited to, including reimbursement for permit and inspection fees required by public agencies to perform Work within public agency jurisdictions as required by public agencies and Contract Documents.

F. BID ITEM E.6: GENERATOR FOUNDATION

1. Measurement is made based on cubic yard completed.
2. Work to be paid under this Bid Item shall include work described in, furnishing all labor, materials, tools, equipment, and incidentals including but not limited to: concrete, reinforcing steel, formwork, and anchor bolts for the construction of the slab-on-grade foundation. Concrete foundation will be constructed per the Structural Plans and project Specifications.

G. BID ITEM E.7: ELECTRICAL DEMOLITION

1. No measurement will be made for this lump sum Bid Item.
2. Work to be paid under this Bid Item consist of modification of motor, motor starters, panels, and other devices as indicated on the drawings. The removal and/or relocation of electrically powered or controlled equipment, starters, wiring, and other miscellaneous devices associated with equipment to be removed or relocated. Removal of cable tap box and returned to the city, removal of manual transfer switches and automatic transfer switches. Protect existing transformers and camlock panels in place.

H. BID ITEM E.8: 80KW INDOOR DIESEL GENERATOR & INSTALLATION

1. No measurement will be made for this lump sum Bid Item.
2. Work includes procurement and installation of 80kW indoor diesel generator, with built in fuel tanks per generator specification. Work to be paid under this Bid Item shall include labor, materials, tools, equipment, generator installation plan, and incidentals.

I. BID ITEM E.9: ELECTRICAL MAIN & ATS

1. No measurement will be made for this lump sum Bid Item.
2. Work to be paid under this Bid Item consist of labor, materials, products, tools, equipment, and incidentals. Work includes procurement and installation of electrical switchboards prior to wiring the new gensets, ATS, and associated auxiliary equipment.

J. BID ITEM E.10: SCADA MODIFICATIONS/ADDITION

1. No measurement will be made for this lump sum Bid Item.
2. Work to be paid under this Bid Item consist of labor, materials, products, tools, equipment, and incidentals. Work includes wirings of new signals to existing SCADA system.

K. BID ITEM E.11: SITE ELECTRICAL

1. No measurement will be made for this lump sum Bid Item.
2. Work to be paid under this Bid Item consist of labor, materials, products, tools, equipment, and incidentals.
3. Provide and install electrical underground and exposed conduits and raceways, wiring, junction boxes, pull boxes, terminal boxes, wire terminations, conduit and raceway supports, conduit and wire termination fittings, labeling, and testing.
4. The work under this Bid Item shall include furnishing and installing all necessary excavation safety measures including, but not limited to sheeting, shoring and bracing or equivalent method for protection of life and limb in trenches and open excavation in conformance with applicable safety orders, complete in place.

L. BID ITEM E.12: PERMITTING, TESTING, AND STARTUP

1. No measurement will be made for this lump sum Bid Item.
2. Work to be paid for includes furnishing all labor, fluids, testing, material and equipment necessary for pre-commissioning activates associated with first time startup of equipment, instruments, and electrical gear for the operation of the generator.

**** END OF SECTION ****

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SECTION 01300

SUBMITTALS

PART 1 – GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Standard Compliance
- B. Administrative Procedures
- C. Construction Progress Schedules
- D. Schedule of Values
- E. Shop Drawings
- F. Manufacturers' Data
- G. Samples
- H. Project Record Drawings
- I. Review of **Contractor's** Information
- J. Submittal Procedure
- K. **Contractor** Submittals
- L. Operations and Maintenance Manuals
- M. Submittals Log and Operations and Maintenance Manuals Log

1.02 RELATED REQUIREMENTS

- A. City of Pleasanton Standard Specifications and Details (Standard Specifications), July 2024.
- B. Section 01410: Testing Laboratory Services.
- C. Section 01700: **Contract** Close Out.

1.03 STANDARD COMPLIANCE

- A. When materials or equipment must conform to the standards of organizations such as, but not limited to, the American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), National Electrical Manufacturers Association (NEMA), and Underwriter's Laboratories (UL), documents showing or proving conformance shall be submitted.
- B. If an organization uses a label or a listing to indicate compliance with a particular standard, the label or listing will be acceptable evidence, unless otherwise specified in the individual sections. In lieu of the label or listing, the **Contractor** shall submit a certificate from an independent testing organization which is competent to perform acceptable tests and is approved by the **Engineer**. The certificate shall state that the item has been tested in accordance with the specified organization's standard. For materials and equipment whose compliance with organizational standards or specifications is not regulated by an organization using its own listing or label as proof of compliance, a certificate of compliance from the manufacturer shall be submitted for approval. The certificate shall identify the manufacturer, the product, and the referenced standard, and shall state that the manufacturer certifies that the product conforms to all requirements of the project specification and of the referenced standards listed.

1.04 ADMINISTRATIVE PROCEDURES

- A. Refer to Section 1-14 of the Standard Specifications.
- B. Transmit each submittal with the form that is provided in **Appendix B**.
- C. Sequentially number the submittals. Revised submittals shall be designated by the original number and a sequential alphabetic suffix.
- D. Submit the quantity of submittal copies which the **Contractor** requires plus nine (9) additional copies to the **Engineer** which will be retained by the **City**, the **Owner**, and the **Engineer**. Submit an electronic copy in Adobe PDF format via email, FTP, or cloud-based electronic file platform to the **Engineer**.
- E. Apply **Contractor's** stamp, signed or initialed, certifying that review, verification or Products required, field dimensions, adjacent construction Work, and coordination of information, is in accordance with the requirements of the Contract Documents.
- F. Schedule submittals to expedite the Project, and deliver to the **Engineer** at 3301 C Street, Building 100-B, Sacramento, CA 95816. Coordinate submission of related items.

- G. For each submittal for review, allow up to 30 calendar days excluding delivery time to and from the **Contractor**. If selected submittals must be returned in a timely fashion to meet Project schedules, notify the **City** and **Engineer** during the preconstruction meeting of specific submittals that will require an expedited review. Select submittals shall be reviewed within ten (10) calendar days.
- H. Transmit each item under the **Engineer's** accepted form provided in Appendix B. Identify Project, **Contractor**, subcontractor, major supplier; identify pertinent Drawing sheet and detail number, and Specification section number, as appropriate. Identify deviations from Contract Documents. Provide space for the **City's** and the **Engineer's** review stamps.
- I. Comply with progress schedule for submittals related to Work progress. Coordinate submittal of related items.
- J. After the **Engineer's** and the **City's** reviews of the submittal, revise and resubmit as required, identifying changes made since the previous submittal.
- K. Distribute copies of reviewed submittals to concerned persons. Instruct recipients to promptly report in writing any inability to comply with provisions.

1.05 CONSTRUCTION PROGRESS SCHEDULES

- A. Refer to Section 1-21: CPM Schedule of the Standard Specifications.
- B. Submit the initial progress schedules and the schedule of values for lump sum bid items in duplicate to the **Engineer** and the **Owner** within five (5) days after award of the **Contract**. After reviews, revise and resubmit as required. Submit a copy to the **City**.
- C. Submit a horizontal bar chart with a separate bar for each major trade or operation, identifying the first workday of each week. Clearly show the critical path.
- D. Show submittal dates required for shop drawings, product data, and samples, and product delivery dates, including those furnished by the **Owner**. Submit a copy to the **City**.

1.06 SCHEDULE OF VALUES

- A. Provide the Schedule of Values, which shall include all cost-loaded construction activities required for completion of the Work listed in order of the sequence of the Work. The Schedule of Values shall include all costs, with the sum total equal to the value of the **Contract**, including all labor, material, equipment, overhead, and profit.

- B. For all changes during construction, including additions, deletions or revisions to the **Contract**, the **Contractor** shall maintain an updated and viewable version of the schedule which shall reflect an updated **Contract** cost.

1.07 SHOP DRAWINGS

- A. Shop drawings shall show types, sizes, accessories, elevations, floor plans, sectional views, installation details, elementary diagrams, and wiring diagrams. Wiring diagrams shall identify circuit terminals and shall indicate the internal wiring for each item of equipment. Drawings shall also indicate adequate clearance for operation, maintenance and replacement of operating equipment devices. If any equipment is disapproved, the drawings shall be revised to show acceptable equipment and then be resubmitted.

1.08 MANUFACTURER'S DATA

- A. Submittals for each manufactured item shall be comprised of the manufacturer's descriptive literature, drawings, diagrams, performance and characteristic curves and catalog cuts. The manufacturer's name, trade name, model or catalog number, nameplate data, size, layout dimensions, capacity, project specification references, and any other additional information necessary to establish contract compliance shall be clearly indicated.
- B. Mark each copy to clearly identify applicable products, models, options, and other data; supplement manufacturer's standard data to provide information unique to the Work. Include manufacturer's installation instructions when required by the Specification Section. Failure to mark applicable products and to cross out non-applicable products shall cause rejection of the entire submittal.
- C. Submit the quantity of submittal copies that the **Contractor** requires plus nine (9) additional copies, which will be retained by the **City**, the **Owner**, and the **Engineer**.

1.09 MANUFACTURER'S INSTALLATION INSTRUCTIONS

- A. When specified in individual specification sections, submit printed instructions for delivery, Storage, assembly, installation, start-up, adjusting, and finishing in quantities specified for product data.
- B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

1.10 MANUFACTURER'S CERTIFICATES

- A. When specified in individual specification sections, submit certification by the manufacturer in quantities specified for product data.
- B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or product, but must be acceptable to the **City** and the **Engineer**.

1.11 SAMPLES

- A. Submit the full range of the manufacturer's standard colors, textures, and patterns for the **City's** and **Engineer's** selections. Submit samples for selection of finishes within 15 days after the date of the **Contract**.
- B. Submit samples to illustrate functional characteristics of the product, including integral parts and attachment devices. Coordinate submittal of different categories for interfacing work.
- C. Include identification on each sample, giving full information.
- D. Submit the number specified in the respective Specification Section. Reviewed samples that may be used in the Work are indicated in the Specification Section.
- E. Provide field finishes at the project site as required by individual Specifications section. Install the sample complete and finished. Acceptable finishes in place may be retained in completed Work.

1.12 REVIEW OF CONTRACTOR'S INFORMATION

- A. When review and checking for acceptance is required of any drawing or any information regarding materials and equipment, the **Contractor** shall prepare or secure, and submit for review to the **Engineer**, the quantity of submittal copies which the **Contractor** requires, plus nine (9) additional copies that will be retained by the **City, Owner, and Engineer**.

Within thirty (30) days of receipt of said submittal copies, the **Engineer** will return the marked copies indicating one of the following four (4) actions:

1. If review and checking indicates no exceptions, copies will be returned marked “NO EXCEPTIONS TAKEN” and work may begin immediately on incorporating the material and equipment covered by the submittal into the work.
 2. If review and checking indicates limited corrections are required, copies will be returned marked “MAKE CORRECTIONS NOTED”. Work may begin immediately on incorporating into the work the material and equipment covered by the corrected submittal.
 3. If review and checking indicates insufficient or incorrect data has been submitted, copies will be returned marked “REVISE AND RESUBMIT”. No work may begin on incorporating the material and equipment covered by this submittal into the work until the submittal is revised, resubmitted, and returned marked either “NO EXCEPTIONS TAKEN” or “MAKE CORRECTIONS NOTED”.
 4. If review and checking indicates the material and equipment submittal is unacceptable, copies will be returned marked “REJECTED”. No work may begin on incorporating the material and equipment covered by this submittal into the work until a new submittal is made and returned marked either “NO EXCEPTIONS TAKEN” or “MAKE CORRECTIONS NOTED”.
- B. Approval by the **Engineer** and the **City** shall not relieve the **Contractor** from responsibility for any errors or omissions in such drawings, nor from responsibility for complying with requirements of this **Contract**.
- C. If Shop Drawings show variations from **Contract** requirements, **Contractor** shall describe such variations in writing, separate from the drawings, at time of submission. All such variations must be approved by the **Engineer** and **City**.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

3.01 SUBMITTAL PROCEDURE

- A. At least thirty (30) days prior to the **Contractor’s** need for approval, the **Contractor** shall forward to the **Engineer** all submittals required by the individual Sections of the Specifications.
- B. All submittals shall be identified by submittal number on the letter of transmittal. Specification number shall also be identified on the letter of transmittal. Submittals shall be numbered consecutively and resubmittals shall have a number suffix. For example:

1. 1st Submittal: 2
2. 1st Resubmittal: 2.1
3. 2nd Resubmittal: 2.2, etc.

3.02 CONTRACTOR SUBMITTALS

Items to be submitted are specified in individual Sections of these Specifications. Submittals for each Section shall be bound together in one book. The book shall have numbered tab dividers for each item. Submittals that are related to, or affect, each other shall be forwarded simultaneously as a package to facilitate coordinated review. Uncoordinated submittals will be rejected. Do not combine unrelated materials in the same submittal. Submittals shall be arranged in same order as they appear in the Specification Section. Items shall be clearly marked with the same identification numbers as those indicated on the drawings. The **Contractor** shall include an appropriate submittal time within each item of work on the Construction Schedule. Discrete elements of the submittal may be marked individually per Article 1.11 (above) as separated in the submittal respectively.

3.03 PROJECT RECORD DRAWINGS

- A. During the prosecution of the Work, using colored ink per Standard Specifications 1-28, make changes on a set of clean, full-size drawings. Show all changes and revisions to the original design that affect the permanent structures and that will exist in the completed work. Reference underground utilities to permanent physical objects. Reference water, piping, conduit and electric lines to corners of structure. Include schematic diagrams for all electrical equipment with terminal numbers shown. These prints shall have all dimensions and corrections initialed by the **City** and **Engineer**.
- B. Upon completion of the Project, those revisions that show changes made in actual construction from those shown on Contract Drawings shall be legibly and neatly transferred to a set of reproducible transparencies by the **Engineer**.
- C. Keep record drawings current. Certification by the **Contractor** of accuracy and completeness will be required. Three (3) copies of the project record drawings, including prints and final reproducibles, are the property of the **City** and shall be delivered to the **Engineer** before **Contract** closeout.

**** END OF SECTION ****

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SECTION 01410

TESTING LABORATORY SERVICES

PART 1 – GENERAL

1.01 DESCRIPTION

A. Work Included:

1. The **Contractor** shall provide all quality control materials testing including, but not limited to, concrete, soil compaction, and masonry, and as otherwise required by these specifications. Provide such testing and inspecting as specified to be furnished by the **Contractor** in this section and/or elsewhere in the Contract Documents. The **Contractor** is responsible for quality control testing.
2. Electrical, mechanical, and controls testing shall be provided by the **Contractor** as prescribed in the respective specification sections herein, including, but not limited to: factory acceptance tests; factory and field functional performance tests; factory quality control materials tests; and as otherwise required by the individual specification sections herein. The requirements of this specification section shall in no way relieve the **Contractor** from providing the required testing and reporting activities specified in the individual specification sections herein.
3. Any and all **Contractor** testing shall be performed by a certified testing lab approved by the **Engineer** and/or the **City**.
4. Cooperate with the selected testing agency and all others responsible for testing and inspecting the work on behalf of the **City**, as described herein.
5. The **City** shall receive hard copies of all **Contractor**-provided testing via the **Engineer**. Provide four (4) copies of all testing reports.

B. Related Work:

1. Requirements for testing may be described in various sections of these specifications and applicable codes.
2. Where no testing requirements are described but the **City** decides that testing is required, the **City** may require such testing to be performed under current pertinent standards for testing. Payment for such testing will be made as described in this section.

C. Work Not Included:

1. Non-mandatory **City** Testing: The **City** will select an independent testing laboratory for quality assurance checking at its discretion.

1.02 TESTING DESCRIPTION

A. Material Strength:

1. The **Owner** will only pay for initial testing services for concrete strength and slump, soil compaction, and masonry and grout strength.
2. When initial tests indicate non-compliance with the Contract Documents, the costs of the additional tests associated with that non-compliance will be borne by the **Contractor** at his expense.

B. Operational Testing: All operational tests shall be paid for by the **Contractor**.

C. Code Compliance Testing: Inspections and tests not identified in these specifications, that are required by codes or ordinances, or by a plan approval authority, and which are made by a legally constituted authority, shall be the responsibility of and shall be paid for by the **Contractor**, unless otherwise provided in the Contract Documents.

D. Contractor's Convenience Testing:

1. Inspecting and testing performed exclusively for the **Contractor's** convenience shall be the sole responsibility of the **Contractor**.
2. Employment of an approved and certified testing laboratory shall in no way relieve the **Contractor** of the obligation to perform the Work in accordance with requirements of the Contract Documents.

E. The **City** will pay for its own quality assurance testing.

1.03 REFERENCES

- A. ANSI/ASTM D3740 - Practice for Evaluation of Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Districting Design and Construction.
- B. ANSI/ASTM E329 - Standard Recommended Practice for Inspection and Testing Agencies for Concrete, Steel, and Bituminous Materials as Used in Construction.

1.04 LABORATORY REPORTS

- A. After each **Contractor**-furnished inspection and test, promptly submit four (4) copies of the laboratory report to the **Engineer**. Include the date issued, the project title and number, the name of the inspector, the date and time of sampling or inspection, the identification of product and specifications sections, the location in the Project, the type of inspection or test, the date of the test, the results of the test, and conformance with Contract Documents. When requested by the **City** or **Engineer**, provide interpretation of test results.

1.05 LIMITS ON TESTING LABORATORY AUTHORITY

- A. Laboratory may not release, revoke, alter, or enlarge on requirements of the Contract Documents.
- B. Laboratory may not approve or accept any portion of the Work.
- C. Laboratory may not assume any duties of **Contractor**.
- D. Laboratory has no authority to stop Work.

1.06 CONTRACTOR RESPONSIBILITIES

- A. The **Contractor's** materials testing staff will collect all samples as required to conduct the Work.
- B. Cooperate with **City**-retained laboratory personnel, and provide access to the Work and to the manufacturer's facilities.
- C. Provide incidental labor and facilities to provide access to the work to be tested, to obtain and handle samples at the site or at the source of products to be tested, to facilitate tests and inspections, and for Storage and curing of test samples.
- D. Notify the **City** three (3) working days prior to the expected time for operations requiring inspection and testing services.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

3.01 COOPERATION WITH TESTING LABORATORY

- A. Representatives of the **Contractor's** and the **City's** testing laboratory shall have access to the Work at all times and at all locations where the Work is in progress. Provide facilities for such access to enable the laboratory to perform its functions properly.

3.02 TAKING SPECIMENS

- A. All specimens and samples for testing, unless otherwise provided in the Contract Documents, shall be taken by the testing personnel. All sampling equipment and personnel shall be provided by the testing laboratory. All deliveries of specimens and samples to the testing laboratory shall be performed by the testing laboratory.

3.03 SCHEDULES FOR TESTING

- A. Establishing Schedule:
 - 1. By advance discussion with the testing laboratory approved by the **City**, determine the time required for the laboratory to perform its tests and to issue each of its findings.
 - 2. Provide all time required within the construction schedule.
- B. Revising Schedule: When changes to the construction schedule are necessary during construction, coordinate all such changes with the testing laboratory as required.
- C. Adherence to Schedule: When the testing laboratory is ready to test according to the established schedule, and is prevented from testing or taking specimens due to incompleteness of the Work, all extra charges for testing attributable to the delay may be back-charged to the **Contractor** and shall not be borne by the **Owner**.

3.04 TESTING PROCEDURES

- A. Notification: As an exception to requirements that may be stated elsewhere in the **Contract**, the **City** shall be given three (3) working days' notice prior to each occurrence where testing is required. The **Contractor** shall provide all test equipment and personnel and submit written copies of all test results, regardless of whether the **City's** testing lab is present or not.

- B. Failure to Meet Test: Any system material or workmanship which is found defective on the basis of acceptable tests shall be reported to the **Engineer** and **City**. The **Contractor** shall replace the defective material or equipment and have the test repeated until the results of the test prove satisfactory to the **Engineer** and **City** without additional cost to the **Owner**.

**** END OF SECTION ****

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SECTION 01570

ENVIRONMENTAL PROTECTION

PART 1 GENERAL

1.01 SUMMARY

- A. During the progress of the Work, keep the work areas occupied by the **Contractor** in a neat and clean condition and protect the environment both on-site and off-site, throughout and upon completion of the construction project.

1.02 SUBMITTALS

- A. Develop an Environmental Protection Plan in detail and submit it to the **Engineer** in the Product Information category within ten (10) days from the date of the **Contract** Start Date. Distribute the plan to all employees and to all subcontractors and their employees. The Environmental Protection Plan shall include, but not be limited to, the following items:
 - 1. Copies of required permits.
 - 2. Proposed sanitary landfill site.
 - 3. Other proposed disposal sites.
 - 4. Copies of any agreements with public or private landowners regarding equipment, materials Storage, borrow sites, fill sites, or disposal sites. Any such agreement made by the **Contractor** shall be invalid if its execution causes violation of local or regional grading or land use regulations.
 - 5. Water pollution control plan.

1.03 MITIGATION OF CONSTRUCTION IMPACTS

- A. Requirements: All operations shall comply with all federal, state and local regulations pertaining to water, air, solid waste and noise pollution and the **Contractor** shall pay all applicable permit fees.
- B. Definitions of Contaminants:
 - 1. Sediment: Soil and other debris that have been eroded and transported by runoff water.

2. Solid Waste: Rubbish, debris, garbage and other discarded solid materials resulting from construction activities, including a variety of combustible and non-combustible wastes, such as ashes, waste materials that result from construction or maintenance and repair work, leaves and tree trimmings.
3. Chemical Waste: Includes petroleum products, bituminous materials, salts, acids, alkalies, herbicides, pesticides, disinfectants, organic chemicals and inorganic wastes. Some of the above may be classified as "hazardous."
4. Sanitary Wastes:
 - a. Sewage: That which is considered as domestic sanitary sewage.
 - b. Garbage: Refuse and scraps resulting from preparation, cooking, dispensing and consumption of food.
5. Hazardous Materials, as defined by applicable laws and regulations: Undisclosed hazardous material contamination, if encountered, will constitute a changed site condition. This includes all hazardous materials discovered which are not in Storage or in use by the **Contractor** as required in order to perform the Work. The **Contractor** shall immediately notify the **Engineer** and the **Owner** upon discovery of undisclosed hazardous materials or contamination on the Project site.

C. Protection of Natural Resources:

1. General:
 - a. It is intended that the natural resources within the project boundaries and outside the limits of permanent work performed under this **Contract** be preserved in their existing condition or be restored to an equivalent or improved condition upon completion of the Work. Confine construction activities to areas defined by the public roads, easements, and work area limits shown on the Drawings, and as specified in Special Provisions. Return construction areas to their pre-construction elevations, except where surface elevations are otherwise noted to be changed. Maintain natural drainage patterns. Conduct construction activities to avoid ponding stagnant water conducive to mosquito breeding.
2. Land Resources:
 - a. Do not remove, cut, deface, injure or destroy trees or shrubs outside the work area limits. Do not remove, deface, injure or destroy trees within the work area without permission from the **City**.

- b. Protection: Protect trees that are located near the limits of the **Contractor's** work areas which could possibly be defaced, bruised or injured or otherwise damaged by the **Contractor's** operations. No ropes, cables or guys shall be fastened to or attached to any existing nearby trees or shrubs for anchorages unless specifically authorized. Where such special emergency use is permitted, the **Contractor** shall be responsible for any damage resulting from such use.
- c. Trimming: Trim and seal tree limbs overhanging the line of the work and in danger of being damaged by the **Contractor's** operations in accordance with recognized standards for such work. Remove other tree limbs under the direction of the **City**, so that the tree will present a balanced appearance.
- d. Treatment of Roots: Do not cut roots unnecessarily during excavating or trenching operations. Expose major roots encountered in the course of excavation and do not sever. Wrap them in burlap as a protective measure while exposed. Neatly trim all other roots larger than one inch in diameter that are severed in the course of excavation at the edge of the excavation or trench and paint them with a heavy coat of an approved tree seal.
- e. Repair or Restoration: Repair or replace any trees or other landscape features that are scarred or damaged by equipment or construction operations as specified below. The repair and/or restoration plan shall be favorably reviewed prior to its initiation.
- f. Temporary Construction: Obliterate all signs of temporary construction facilities, such as haul roads, work areas, structures, foundations of temporary structures, stockpiles of excess or waste materials, or any other vestiges of construction, as directed by the **City**. Level all temporary roads, parking areas and any other areas that have become compacted or shaped. Any unpaved areas where vehicles are operated shall receive a suitable surface treatment or shall be periodically wetted down to prevent construction operations from producing dust damage and nuisance to persons and property, at no additional cost to the **Owner**. Keep haul roads clear at all times of any object which creates an unsafe condition. Promptly remove any contaminants or construction material dropped from construction vehicles. Do not drop mud and debris from construction equipment on public streets. Sweep clean turning areas and pavement entrances as necessary.

3. Water Resources: Investigate and comply with all applicable federal, state and local regulations concerning the discharge (directly or indirectly) of pollutants to the underground and natural waters. Perform all work under this **Contract** in such a manner that any adverse environmental impacts are reduced to a level that is acceptable to the **Owner** and regulatory agencies. Refer to Section 02240 - Dewatering for dewatering and water disposal requirements.
 - a. Oily Substances: At all times, special measures shall be taken to prevent oil or other hazardous substances from entering the ground, drainage areas or local bodies of water in such quantities as to affect normal use, aesthetics, or produce a measurable impact upon the area. Any soil or water which is contaminated with oily substances due to the **Contractor's** operations shall be disposed of in accordance with applicable regulations.
 - b. Chlorinated Water: Take special measures to prevent chlorinated water from entering the ground or surface waters. Dechlorinate chlorinated water prior to discharge. The Environmental Protection Plan and the Storm Water Pollution Prevention Plan shall contain a description of dechlorination measures and procedures. Revise plans based on regulatory, **City** and **Owner** review comments. No discharge of dechlorinated water will be permitted until a favorable plan review has been completed.
4. Fish and Wildlife Resources: Perform all work and take such steps required to prevent any interference or disturbance to fish and wildlife. The **Contractor** will not be permitted to alter water flows or otherwise significantly disturb native habitat adjacent to the project area which are critical to fish and wildlife except as may be indicated or specified.
5. Cultural Resources: The Project does not pass through any known archaeological sites. However, it is conceivable that unrecorded archaeological sites could be discovered during the construction. In the event that artifacts, human remains, or other cultural resources are discovered during excavations at Work locations, the **Contractor** shall protect the discovered items, notify the **Owner** and **City**, and comply with applicable law.
6. Noise Control: The following noise control procedures shall be employed:
 - a. Maximum noise levels adjacent to any residence, business, or other populated area shall not exceed the noise limitations set forth in CAL OSHA.
 - b. Equipment: Jack hammers shall be equipped with exhaust mufflers and steel muffling sleeves. Air compressors should be of a quiet type, such as a "whisperized" compressor.

- c. Operations: Keep noisy equipment as far as possible from noise-sensitive site boundaries. Machines should not be left idling. Use electric power in lieu of internal combustion engine power wherever possible. Maintain equipment properly to reduce noise from excessive vibration, faulty mufflers, or other sources. All engines shall have mufflers.
 - d. Scheduling: Schedule noisy operations so as to minimize their duration at any given location.
 - e. Monitoring: To determine whether or not the above noise limits are being met and whether or not noise barriers are needed, the **Contractor** shall use a portable sound level meter meeting the requirements of American National Standards Institute Specification S1.4 for Type 2 sound level meters. If non-complying noise levels are found, the **Contractor** shall be responsible for the monitoring and correction of excessive noise levels.
7. Dust Control, Air Pollution and Odor Control: Employ measures to prevent the creation of dust, air pollution and odors.
- a. Unpaved areas where vehicles are operated shall be routinely wetted down or given an equivalent form of treatment, to eliminate dust formation.
 - b. Store all volatile liquids, including fuels or solvents in closed containers.
 - c. No open burning of debris, lumber, or other scrap will be permitted.
 - d. Properly maintain equipment to reduce gaseous pollutant emissions.
8. Construction Storage Areas: Storage of construction equipment and materials shall be limited to the designated **Contractor's** Storage or staging area.
- a. Store and service equipment at the designated **Contractor's** Storage area where oil wastes shall be collected in containers. Oil wastes shall not be allowed to flow onto the ground or into surface waters. Containers shall be required at the construction site for the disposal of materials such as paint, paint thinner, solvents, motor oil, fuels, resins and other environmentally deleterious substances. No dumping of surplus concrete or grout on the site will be permitted.
9. Sanitation: During the construction period, provide adequate and conveniently located chemical sanitation facilities, properly screened, for the use of construction crews and visitors to the site. Facilities shall be regularly maintained.

10. Fire Prevention: Take steps to prevent fires including, but not limited to, the following:

- a. Provide spark arrestors on all internal combustion engines.
- b. Store and handle flammable liquids in accordance with the Flammable and Combustible Liquids Code, NFPA 30.
- c. Provide fire extinguishers at hazardous locations or operations, such as welding and temporary field offices.

11. Erosion and Sediment Transport Control:

- a. Discharge construction runoff into small drainages at frequent intervals to avoid buildup of large, potentially erosive flows.
- b. Prevent runoff from flowing over unprotected slopes.
- c. Keep disturbed areas to the minimum size necessary for construction.
- d. Keep runoff away from disturbed areas during construction.
- e. Direct flows over vegetated areas prior to discharge into public storm drainage systems.
- f. Trap sediment before it leaves the site, using such techniques as check dams, sediment ponds, or siltation fences.
- g. Remove and dispose of all construction-generated siltation that occurs in off-site retention ponds.
- h. Stabilize disturbed areas as quickly as possible per **Contract** Specifications, Drawings, Environmental Protection Plan, and Storm Water Pollution Prevention Plan or Water Pollution Control Program.

1.04 DISPOSAL OPERATIONS

A. Solid Waste Management:

- 1. Supply solid waste transfer containers. Daily remove all debris such as spent air filters, oil cartridges, cans, bottles, combustibles and litter. Take care to prevent trash and papers from blowing onto adjacent property. Encourage personnel to use refuse containers. Convey contents to a sanitary landfill.

2. Washing of concrete containers where wastewater may reach adjacent property or natural water courses will not be permitted. Remove any excess concrete to the sanitary landfill.
- B. Chemical Waste and Hazardous Materials Management: Furnish containers for the Storage of spent chemicals used during construction operations. Dispose of chemicals and hazardous materials in accordance with applicable regulations.
- C. Garbage: Store garbage in covered containers, pick up garbage daily and dispose of in a sanitary landfill.
- D. Dispose of vegetation, weeds, rubble, and other materials removed by the clearing, stripping and grubbing operations off-site at a suitable disposal site in accordance with applicable regulations.
- E. Excavated Materials:
1. Native soil complying with the requirements of Section 02200 – Earthwork, may be used for backfill, fill, and embankments, as allowed by that Section.
 2. Spoil Material:
 - a. Remove all material which is excavated in excess of that which is required for backfill, and such excavated material which is unsuitable for backfill, from the site and dispose of off-site in accordance with applicable regulations at the disposal site indicated in the Environmental Protection Plan. No additional compensation will be paid to the **Contractor** for such disposal. Include all such costs in the appropriate unit bid prices for the Project. Remove rubbish and materials unsuitable for backfill immediately following excavation. Remove material in excess of that required for backfill immediately following backfill operations.
 - b. Rubbish shall consist of all materials not classified as suitable materials or rubble and shall include shrubbery, trees, timber, trash and garbage.

**** END OF SECTION ****

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SECTION 01571

WATER POLLUTION CONTROL PROGRAM (WPCP)

PART 1 - GENERAL

1.01 SUMMARY

- A. During the progress of the Project, keep the work areas occupied by the Contractor in a neat and clean condition and protect the environment both on-site and off-site, throughout and upon completion of the construction project. The Project results in less than 1 acre of soil disturbance, due to the size of the disturbance a Storm Water Pollution Prevention Plan (SWPPP) is not required, however, a Water Pollution Control Plan (WPCP) must be developed by the Contractor and approved by the City prior to construction.

1.02 SUBMITTALS

- A. Develop a WPCP and submit it to the State for approval prior to the start of construction. The WPCP shall include, but not be limited to the following items:
 - 1. WPCP Certification and Approval
 - 2. Project Information
 - 3. Pollution Sources and Control Measures
 - 4. Water Pollution Control Drawings (WPCD)
- B. Submit 4 copies of the WPCP within 14 calendar days after the Start Date stated in the Notice to Proceed. The City will review the WPCP within 14 calendar days. If revisions are required, make corrections and resubmit within 7 calendar days.

1.03 MITIGATION OF CONSTRUCTION IMPACTS

- A. All operations shall comply with all federal, state and local regulations pertaining to water, air, solid waste and noise pollution and the Contractor shall pay all applicable permit fees.
- B. The WPCP must detail the following:
 - 1. Chemicals, potential pollutants and hazardous materials to be used
 - 2. Methods for (includes copies of drawings, details, and/or descriptions):
 - 3. Dewatering
 - 4. Street Cleaning
 - 5. Managing run-on and run-off
 - 6. Spill prevention and control
 - 7. Handling and disposal of solid waste.
 - 8. Methods for safekeeping and secondary containment of chemicals, potential pollutants, and hazardous materials.
 - 9. Storage and dispensing of fuel and lubricants.

10. Clean out and disposal of concrete.
 11. Construction BMP maintenance, inspection, and repair.
 12. Sanitation provisions
- C. Construction BMP implementation and removal schedule.
- D. The WPCD shall include a map showing:
1. Location of soil stockpiles and solid waste containers
 2. Vehicle and equipment fueling, servicing, cleaning and storage areas
Material storage areas.
 3. Locations of erosion and sediment control BMPs.
 4. Site drainage during execution of the Work.
 5. Stabilized vehicle accesses
 6. Concrete clean out areas

1.04 LIABILITIES AND PENALTIES

- A. Review of the WPCP, prepared by the Contractor, shall not relieve the Contractor from liabilities arising from non-compliance of storm water pollution regulations. City review of the WPCP, prepared in its entirety by the Contractor, shall not relieve the Contractor from liabilities arising from non-compliance of storm water pollution regulations.
- B. Contractor shall be held responsible for paying all penalties for violations of permit conditions. The State shall recover from the Contractor all costs of any fines against the City, due to non-compliance by the Contractor.

1.05 COMPLIANCE

- A. If the Contractor fails to comply with the requirements of this Specification, the State can stop all or a portion of the Contractor's operations and direct the installation of erosion, sedimentation, or water pollution control, the organizing and scheduling of work, the preparation of required reports or documentation, or other work required to achieve compliance.
- B. The Contractor must install BMPs, maintain BMPs, perform inspections, remove BMPs, and prepare documentation required by WPCP applicable to the Work. At a minimum, inspections must be done weekly and 24 hours prior to, during, and after each rain event, and every 24 hours during extended rain events. The Contractor is solely responsible for preparing and maintaining inspection and monitoring records; and for including those records in the WPCP, copies of which must be made available to the City upon request.

**** END OF SECTION ****

SECTION 01600
MATERIAL AND EQUIPMENT

PART 1 – GENERAL

1.01 DESCRIPTION

A. Requirements Included:

1. Products.
2. Transportation and Handling.
3. Storage and Protection.
4. Substitutions and Product Options.

B. Related Requirements:

1. Section 01300 – Submittals: Submittal of Manufacturers' Certificates.

1.02 QUALITY ASSURANCE

Include within the **Contractor's** quality assurance program such procedures as are required to ensure full protection of work and materials.

1.03 PRODUCT DELIVERY, STORAGE AND HANDLING

Manufacturer's Recommendations:

- A. Except as otherwise approved by the **Engineer** and the **City**, determine and comply with manufacturer's recommendations on product handling, Storage and protection.
1. Maintain packaged materials with seals unbroken and labels intact until time of use.
 2. Promptly remove damaged materials and unsuitable items from the job site, and promptly replace with materials or items meeting the specified requirements, at no additional cost to the **Owner**.
- B. The **Engineer** or the **City** may reject as non-complying, such materials and products that do not bear identification satisfactory to the **Engineer** or the **City** as to manufacturer, grade, quality, and other pertinent information.

- C. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.

1.04 JOB CONDITIONS

A. Storage and Protection:

1. Store products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weather-tight enclosures; maintain products within temperature and humidity ranges required by manufacturer's instructions.
2. For exterior Storage of fabricated products, place products on sloped supports above ground. Cover products subject to deterioration with impervious sheet covering; provide ventilation to avoid condensation.
3. Store loose granular materials on solid surfaces in a well-drained area, and prevent mixing with foreign matter.
4. Arrange the Storage area to provide access for inspection. Periodically inspect the Storage area to ensure that the products are undamaged and maintained under required conditions.
5. After installation, provide coverings to protect products from damage from traffic and construction operations, and then remove the coverings when they are no longer needed.
6. Maintain finished surfaces clean, unmarred, and suitably protected until accepted by the **City**.

B. Repairs and Replacements:

1. In event of damage, promptly make replacements and repairs to the approval of the **City** and at no additional cost to the **Owner**.
2. Additional time required to secure replacements and to make repairs will not be considered by the **Owner** to justify an extension in the **Contract** Time of Completion.

1.05 ALTERNATIVES

A. Product Options:

1. Within ten (10) days after date of the **Contract**, submit to the **Engineer** a complete list of major products proposed, with the name of the manufacturer, the trade name, and the model.
2. Options:
 - a. Products Specified by Reference Standards or by Description Only: Any product meeting those standards.
 - b. Products Specified by Naming One or More Manufacturers with a Substitute Paragraph: Submit a request for substitution for any manufacturer not specifically named.
 - c. Products Specified by Naming Several Manufacturers: Products of named manufacturers meeting specifications; no options, no substitutions allowed.
 - d. Products Specified by Naming Only One Manufacturer: No options, no substitutions allowed.

B. Substitutions:

1. Within ten (10) days after the date of the **Contract**, the **Contractor** shall submit requests to the **Engineer** for consideration of substitutions.
2. Document each request with complete data substantiating compliance of the proposed substitution with Contract Documents.
3. The request constitutes a representation that the **Contractor**:
 - a. Has investigated the proposed product and determined that it meets or exceeds, in all respects, the specified product.
 - b. Will provide the same warranty for substitution as for specified product, whichever is greater.
 - c. Will coordinate installation and make other changes that may be required for Work to be complete in all respects.
 - d. Waives claims for additional costs that may subsequently become apparent due to use or implementation of the substitution.

4. Substitutions will not be considered when they are indicated or implied on shop drawings or product data submittals without a separate written request, or when acceptance will require substantial revision of Contract Documents.
5. The **Engineer** and the **City** will determine acceptability of a proposed substitution, and will notify the **Contractor** of acceptance or rejection in writing within a reasonable time.
6. The **Engineer** and the **City** can, at their option, require as a condition of acceptance of a substitution that the **Contractor** provide a credit to the **Owner** for the difference in cost of product(s) or components, or systems proposed as a substitution.
7. If, upon the **Engineer's** and the **City's** review of a substitution, it is determined the substitution is not acceptable, for whatever reason, the **Contractor** shall supply the specified product or products.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

3.01 SHIPPING AND PROTECTION OF EQUIPMENT

- A. Definition: For the purpose of this article, "equipment" means all mechanical devices, all electrical devices, and all items with one or more moving parts.
- B. Packing and Marking: All equipment shall be adequately and effectively protected against damage from moisture, dust, handling or other cause during transport from the manufacturer's or supplier's premises to the site. Each item or package shall be clearly marked with a fitting or distinguishing mark that shall be shown on the packing lists. Stiffeners shall be used where necessary to maintain shapes and to give rigidity. Parts of equipment shall be delivered in assembled or sub-assembled units where possible.
- C. Identification of Equipment: Each item of equipment shall have firmly affixed to it a nameplate, label or tag with its equipment number or other discrete identifying mark.

- D. Storage of Equipment: The **Contractor** shall provide Storage for equipment; for the entire interval between receiving and installation, and for the entire interval between being removed and reinstalled. Equipment shall be stored in an enclosed space affording protection from weather, dust and mechanical damage and providing favorable temperature, humidity and ventilation conditions as required to ensure against equipment deterioration. The Storage container shall be heated above dew-point temperature.
- E. Protection of Equipment After Installation: After installation, all equipment shall be protected as required. During construction, including finishing, all equipment that may be affected must be completely covered.
- F. Delivery of Equipment: The **Owner** or **City** personnel will not accept materials or equipment deliveries for the **Contractor**.
- G. Security: Security of equipment stored by the **Contractor** is his responsibility. All losses or damages shall be replaced or repaired at the **Contractor's** expense.

**** END OF SECTION ****

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SECTION 01662

COMMISSIONING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This section contains requirements for the commissioning of each facility. All commissioning work, as described in this section, shall be performed by the **Contractor**.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 COMMISSIONING PERIOD

- A. After completion of the operational test, the **Contractor** shall remove all temporary piping, controls and other alterations to the permanent systems that may have been needed during the facility testing and shall perform the tasks necessary to make the improvements constructed under this contract fully operational.
- B. The commissioning period system shall be continuous period of 5 days. Should the commissioning period be interrupted at any time due to the **Contractor's** work, the commissioning period shall be restarted from the beginning of the full 5 day period. No additional compensation will be provided.
- C. During the commissioning period, the **City** shall be responsible for all normal operational costs and the **Contractor** shall bear the costs of all necessary repairs or replacements, including labor and materials, required to keep the facility operational.
- D. The **Contractor** shall be available at all times during commissioning periods to provide immediate assistance in case of trouble or failure of any portion of the facility. The commissioning period shall be considered ended when all corrections required by the **Engineer** to assure a reliable and completely operational facility are complete. The completion of the commissioning period is required prior to final acceptance.

3.02 FACILITY CLEANUP

A. Prior to final acceptance of the facility, the **Contractor** shall clean the facility. This shall include at a minimum the following:

1. Removal of concrete, asphalt or mud from any metal, painted surfaces or concrete block
2. Wash down of the asphalt and other hardscape surfaces to remove dirt or mud
3. Removal of any project debris, equipment or stockpiles of material that the **City** does not want
4. Wipe down of the interior areas of the control building accessed during construction to remove surface dust
5. Removal of debris and dusting all electrical enclosures
6. Removal of mud and debris from all underground vaults and pullboxes
7. Remove debris, leaves and trash from the landscaping areas

**** END OF SECTION ****

SECTION 01700

CONTRACT CLOSEOUT

PART 1 – GENERAL

1.01 DESCRIPTION

A. Requirements Included:

1. Closeout Procedures.
2. Final Cleaning.
3. Project Record Documents.
4. Systems Demonstration.

B. Related Requirements:

1. City of Pleasanton Standard Specifications and Details (Standard Specifications), latest edition, including revisions.
2. Section 01780 – Operation and Maintenance Data

1.02 CLOSEOUT PROCEDURES

- A. When **Contractor** considers Work has reached final completion, submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for the **Engineer's** and **City's** inspection.
- B. In addition to submittals required by the conditions of the **Contract**, provide submittals required by governing authorities, and submit a final statement of accounting giving total adjusted **Contract** Sum, previous payments, and sum remaining due.
- C. The **Engineer** will issue a final Change Order and all supporting documentation reflecting approved adjustments to Contract Sum not previously made by Change Order for the **Engineer's** and **Owner's** approval.

1.03 FINAL CLEANING

- A. Execute cleaning and removal of all remaining debris prior to final inspection.

- C. Clean interior and exterior surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces. Clean equipment and fixtures to a sanitary condition, clean or replace filters or mechanical equipment. Clean roofs, gutters, downspouts, and drainage systems.
- D. Clean site; sweep paved areas, rake clean other surfaces.
- E. Remove waste and surplus materials, rubbish, and construction facilities from the Project and from the site.

1.04 PROJECT RECORD DOCUMENTS

- A. Store documents separate from those used for construction.
- B. Keep documents current; do not permanently conceal any work until required information has been recorded.
- C. At **Contract** closeout, submit documents to **Engineer** with transmittal letter containing date, Project title, **Contractor's** name and address, list of documents, and signature of **Contractor**.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

**** END OF SECTION ****

SECTION 01740

WARRANTIES AND BONDS

PART 1 – GENERAL

1.01 DESCRIPTION

A. Requirements Included:

1. Preparation and submittal of warranties and bonds.

B. Related Requirements:

1. Section 01300 - Submittals.
2. Section 01700 - Contract Closeout.
3. Individual Specifications Sections: Provisions of warranties and bonds required for specific products or work.

1.02 FORM OF SUBMITTALS

- A. Bind in commercial quality 8½ x 11-inch three-ring side binders, with hard-back, cleanable, clear “view pocket” plastic covers.
- B. Label the cover of each binder with a typed or printed title "WARRANTIES AND BONDS", and with the title of the Project. Include the name, address and telephone number of the **Contractor**, and the name of the responsible principal.
- C. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section, and the name of Product or work item.
- D. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List the subcontractors, suppliers, and manufacturers, with the names, addresses, and telephone numbers of the responsible principals.

1.03 PREPARATION OF SUBMITTALS

- A. Obtain warranties and bonds, executed in duplicate by responsible subcontractors, suppliers, and manufacturers, within ten (10) days after completion of the applicable item of work. Except for items put into use with **City's** permission, leave data of beginning of time of warranty until the Date of Substantial Completion is determined.
- B. Verify that all documents are in proper form and contain full information.
- C. Co-execute submittals when required.
- D. Retain warranties and bonds until the time specified for submittal.

1.04 TIME OF SUBMITTALS

- A. For equipment or component parts of equipment put into service during construction with the **City's** permission, submit documents within (10) ten days after acceptance.
- B. Make other submittals within ten (10) days after the Date of Substantial Completion, prior to the final Application for Payment.
- C. For items of Work when acceptance is delayed beyond Date of Substantial Completion, submit within ten (10) days after acceptance, listing the date of acceptance by the **City** as the beginning of the warranty period.

PART 2 – PRODUCTS - NOT USED

PART 3 – EXECUTION

3.01 DURATION OF WARRANTIES

- A. Warranties for construction shall be for a period of one (1) year from the date of acceptance by the **City**.
- B. Warranties for all equipment, including but not limited to, generator systems, mechanical, electrical, and instrumentation equipment, couplings, connections, switches, indicators, supports, raceways, surfacing, and pre-cast and cast-in place concrete and masonry work, shall be for a period of one (1) year from the date of Project acceptance by the **City**. Exceptions shall be made for particular equipment and items where extended warranties are otherwise identified in these Specifications.

**** END OF SECTION ****

SECTION 01780

OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This section specifies the format and content of operation and maintenance manuals along with the instruction to **City's** personnel.

1.02 REFERENCES

- A. Section 01300 – Submittals
- B. Section 01770 – Contract Closeout
- C. Individual Specifications Sections: Specific requirements for operation and maintenance data.

1.03 QUALITY ASSURANCE

- A. Prepare instructions and data by personnel experienced in maintenance and operation of described products.

1.04 HARD COPY FORMAT

- A. Prepare data in the form of an instructional manual.
- B. Binders: Commercial quality, 8-1/2 x 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. Correlate data into related consistent groupings for each binder.
- C. Documentation included shall be clear and legible.
- D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of project; identify volume number for multiple volume references.
- E. Provide tabbed indexed for each separate product and system, with typed description of product and major component parts of equipment.
- F. Text: Manufacturer's printed data, or typewritten data on 24 pound paper.
- G. Drawings: Provide reinforcement of bound edge. Bind in with text; fold larger drawings neatly to size of text pages. Preferably no drawings larger than 11" x 17" unless approved by the **Engineer**. Drawings larger than 11" x 17" shall be inserted into pockets.
- H. Contents: Prepare a Table of Contents for each volume, with each product or system description identified, in four parts as follows:

1. Part 1: Directory, listing names, addresses, and telephone numbers of Product Engineer, Contractor, Subcontractors, and major equipment suppliers.
2. Part 2: Operation and maintenance instructions arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors, supplies and parts distributor. Identify the following:
 - a. Significant design criteria.
 - b. List of equipment.
 - c. Parts list for each component.
 - d. Operating instructions.
 - e. Maintenance instructions for equipment and systems.
 - f. Maintenance instructions for finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
3. Part 3: Project documents and certificates, including the following:
 - a. Shop drawings and product data.
 - b. Certificates.
 - c. Photocopies of warranties.
4. Part 4: Design Data.

1.05 INSTRUCTION OF CITY PERSONNEL

- A. Before final inspection, instruct **City's** designated personnel in operation, adjustment, and maintenance of products, equipment, and systems, at agreed upon times. Provide minimum three separate periods of training for the City by manufacturer representatives and experts on the equipment installed. Each separate training period shall be a minimum of four (4) hours, and shall be professionally video recorded.
- B. Use operation and maintenance manuals as basis for instruction. Review contents of manual with personnel in detail to explain all aspects of operation and maintenance.
- C. Prepare and insert additional data in Operation and Maintenance Manual when need for such data becomes apparent during instruction.
- D. All training and related materials shall be completed within the allotted Contract time, and prior to the start of the 30-day test period.

1.06 SUBMITTAL OF OPERATION AND MAINTENANCE DATA

- A. Submit two copies of preliminary draft or proposed formats and outlines of contents before 25% of work is completed.

- B. Submit one copy of completed volumes 14 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Engineer's comments. Revise content of all document sets as required prior to final submission.
- C. Submit four sets of revised final volumes in final form within 14 days after final inspection.

1.07 ELECTRONIC SUBMITTALS

- A. Each USB compatible flash drive should be clearly marked to identify the contents on the drive.
- B. Submit two (2) USB compatible flash drive containing all Contractor generated electronic documents contained in the final volumes (drawings, text, etc.). Files shall be in the AutoCAD and Microsoft Office file format so as to be editable.
- C. Submit two (2) USB compatible flash drives containing the final instructional manual in an Adobe PDF format as described in Subsection 1.04.

**** END OF SECTION ****

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SECTION 01900

SEISMIC REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section is applicable to the following secondary structural system elements, non-structural components, and/or equipment:
 - 1. Mechanical, electrical, and plumbing equipment and appurtenances
 - 2. Conduit, piping, and similar systems

1.02 REFERENCES

- A. American Society of Civil Engineers Standard ASCE 7-22, Minimum Design Loads for Buildings and Other Structures, Chapters 11, 13, 15.
- B. California Building Code, 2025 Edition.

1.03 DEFINITIONS

- A. **Engineer**: The Engineer responsible for the preparation of Contract Documents.
- B. **Specialty Engineer**: Structural or Civil Engineer provided by the contractor licensed in the State of California responsible for specific elements of the primary structural system, the secondary structural system, non-structural elements and/or equipment supported by structures.

1.04 GENERAL DESIGN REQUIREMENTS

- A. The **Contractor** is responsible for producing designs that resist the total seismic forces in accordance with the seismic design criteria. The **Contractor** is responsible for coordinating between the **Engineer** and the Specialty Engineer.
- B. The seismic design for non-structural components and equipment shall be in accordance with the CBC Chapter 16, and the required coefficients and factors for determining the total design seismic forces are provided for in the project geotechnical report.
- C. Coordinate the layout so that adequate space is provided between items for relative motion. Provide additional supports and restraints between items of different systems when necessary to prevent seismic impacts or interaction.
- D. Design anchorages of all elements of structures, non-structural components, equipment supported by structures, and non-building structures to resist static and dynamic operational loads, plus total seismic loads specified in the CBC, ASCE 7-22 Section 13.3.

1.05 DESIGN REQUIREMENTS FOR PIPING AND CONDUITS

- A. The **Contractor** is responsible for producing designs for support of piping, conduit, duct or other systems to resist total seismic forces based on the seismic design criteria coefficients specified above unless shown on the Contract Documents. Except where the technical specifications give specific exemption from resistance of seismic forces, all supports shall be designed to meet seismic criteria.
- B. Where possible, pipes, conduit, and their connections shall be constructed of ductile materials (e.g., copper, ductile iron, steel or aluminum and brazed, welded or screwed connections). Pipes, conduits and their connections, constructed of non-ductile materials (e.g., cast iron, no-hub pipe and plastic), shall have the brace spacing reduced to one-half of the spacing allowed for ductile material.
- C. Seismic restraints may be omitted for the following conditions, where flexible connections are provided between components and the associated piping and conduit:
 - 1. All other exposed piping less than 2.5-inches inside diameter or electrical conduit less than 2.5-inches trade size.
- D. As an alternative to designing the supports and anchorage, where an approved national standard provides a basis for the earthquake-resistant design, submit standard, data, and details for piping, conduit, duct or other systems:
 - 1. For mechanical piping, process piping and electrical conduits, follow Guidelines for Seismic Restraints of Mechanical Systems by SMACNA modified as follows:
 - a. Seismically brace piping regardless of size or location. Provide transverse braces at all changes in direction and at the end of all pipe runs. Space transverse braces not more than 20 feet apart. Provide longitudinal braces at 40-foot centers.

1.06 SUBMITTALS

- A. Submit in accordance with Section 01300.
- B. Submit certification for equipment not listed in this specification but included in the contract documents that the equipment itself is designed to resist all internal seismic forces based on the seismic design criteria for the project.
- C. Where required in the equipment specifications in or listed below, submit signed and sealed structural calculations and detailed drawings from a Specialty Engineer where the project is being built for the attachments and anchorage to the primary structure.

Required anchorage items include:

 - 1. Emergency Generator Anchorage
 - 2. Electrical equipment panels.
- D. Structural calculations and detailed drawings shall be prepared by a Specialty Engineer.

- E. Structural calculations and detailed drawings shall clearly show the total design seismic forces which will be transferred from the elements of the structural system, non-structural components, and/or equipment and their attachments to the prime structure.

1.07 QUALITY ASSURANCE

- A. The **Contractor** is responsible for submitting signed and sealed structural calculations and detailed drawings from a Specialty Engineer
- B. Comply with the California adopted and amended versions of the International Building Code (IBC) Section 1613, the referenced sections of ASCE 7.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

**** END OF SECTION ****

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SECTION 02200

EARTHWORK

PART 1 – GENERAL

1.01 DESCRIPTION

- A. Scope of Work: The **Contractor** shall furnish all labor, materials, equipment, and incidentals necessary to perform all excavation, backfill, grading, compaction, shoring and bracing required to complete the work shown on the drawings, and specified herein. The work shall include, but not necessarily be limited to, excavation for structures, footings, conduit, pipe, and paving; backfilling, fill, stone protection/erosion control revetments; embankment and grading; disposal of surplus and unsuitable materials; and all incidental related work.
- B. Related Work Specified in Other Sections
 - 1. Section 02510 Asphalt Paving
 - 2. Section 02600 Sheet piling, Shoring, and Bracing
 - 3. Section 03300 Cast-in-Place Concrete

1.02 REFERENCE PUBLICATIONS

- A. The publications referred to hereinafter form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. The latest edition of referenced publications in effect at the time of construction shall govern.
 - 1. State of California - Department of Transportation (Caltrans) Standard specification.
 - 2. City of Pleasanton Standard Specifications for Public Construction.

American Society of Testing Materials (ASTM) Standards	
C 136	Method for Sieve Analysis of Fine and Coarse Aggregates
D 1556	Density of Soil in Place by the Sand-Cone Method
D 1557	Moisture-Unit Weight Relations of Soil and Aggregate Mixtures Using 10-lb (4.54 kg) Rammer and 18-in. (457 mm) Drop
D 487	Classification of Soils for Engineering Purposes
D 2922	Density of Soil and Soil Aggregate in place by Nuclear Methods
D 3017	Moisture Content of Soil and Soil Aggregate in Place by Nuclear Methods

1.03 SUBMITTALS

- A. The following information shall be submitted for approval in accordance with the General Conditions and Section 01300 - Submittals.
1. Test Report: The **Contractor** shall submit sieve analysis of fine and coarse aggregate materials prior to incorporation into the work.
 2. For each imported material proposed for use, the **Contractor** shall notify the **Engineer** of the source of the material and shall furnish, for approval of the **Engineer**, a representative sample weighing approximately fifty (50) pounds at least ten (10) calendar days prior to the date of anticipated use of such material.
 3. Grading, erosion, and sediment control plan.
 4. Manufacturer's catalog data and installation instructions for geotextile fabric.
 5. Certificates of compliance or affidavits signed by legally authorized officials from the geotextile manufacturer and quarry certifying the geotextile and riprap meet this requirements of this specification. Quarry source, gradation, samples, and test results demonstrating compliance with these Specifications for the stone materials shall be submitted per Section 01300.
 6. Geotextile samples of the same production lot used in the work. The minimum sample size shall be one (1) square foot.

PART 2 – PRODUCTS

2.01 GENERAL

- A. Materials shall be furnished, as required, from on-site sources or hauled to the site from off-site sources.

2.02 ENGINEERED FILL

- A. Unless otherwise indicated or specified, engineered fill shall be used beneath slabs, for the backfill of structures, and for trench backfill. Material shall consist of soil excavated on-site, or hauled to the site from off-site sources, free of organic material, wood, trash, peat, broken concrete and other objectionable material which may be compressible or which cannot be compacted properly. Imported soil shall be essentially granular (less than 50% passing the No. 200 sieve) and have a plasticity index (P.I.) less than 15. The material to be used must be acceptable to the **Engineer**. Engineered fill shall not contain clods or stones larger than two (2) inches in any dimension.

2.03 SAND

- A. Sand shall be used as bedding and cover for pipes less than twelve (12) inches in diameter, handholes, process stainless steel tubing, and electrical conduits, in conformance with the details on the Drawings.
- B. Sand shall be clean and free of organic material, trash, peat, and other objectionable material and conform to the following gradation:

<u>Sieve Size</u>	<u>% Passing</u>
No. 4	100
No. 8	80 - 100
No. 100	0 - 35
No. 200	0 - 8

2.04 DRAIN ROCK

- A. Drain rock shall be clean, free-draining gravel or crushed rock and shall conform to the requirements of the Caltrans Standard Specifications, Section 68, Class 1.

2.05 GEOTEXTILE FABRIC

- A. Geotextile fabric shall be a non-woven, heavy-weight material no less than twelve (12) ounces per square yard. Amoco 4557, as manufactured by Amoco Fabrics and Fibers Co., Mirafi 1120N, as manufactured by Nicolon Mirafi Group; Trevira 011/420, as manufactured by Contech Construction Products, Inc.; or an approved

equal shall be used. Geotextile fabric shall only be used as an underlayment beneath stone protection unless otherwise specified.

2.06 STONE PROTECTION MATERIAL

- A. Stone for riprap shall be quarry stone, well graded, and angular. Material shall be clean and free from deleterious impurities including alkali, earth, clay, refuse, and adherent coatings. Stone shall be separated at the quarry and delivered to the site in accordance with Section 72, "Slope Protection," of Caltrans Standard Specifications. Facing class gradation shall be used. Apparent specific gravity shall be a minimum of 2.5 per ASTM C127 with a minimum durability index of 52 per Caltrans Test 229. A certificate of compliance shall be submitted to the **Engineer** for approval prior to use.

PART 3 – EXECUTION

3.01 GRADE TOLERANCES

- A. Grades for all finished earth surfaces shall not vary more than 0.1 foot from the elevation indicated in these Specifications or on the Drawings.

3.02 EXCAVATION

- A. **Contractor** to account for sufficient dewatering time to allow soils to dry. Excavations to be entered by people should conform to current Cal/OSHA requirements.
- B. Where organic materials, yielding subgrade, or other deleterious materials are encountered during foundation excavations, they shall be removed, as directed by the **Engineer**. The **Contractor** shall promptly notify the **Engineer** if these materials are encountered. Overexcavation shall not proceed without approval of the **Engineer**. The **Contractor** shall be reimbursed at the bid item unit price "Overexcavation" for excavation that is specifically directed by the **Engineer**. Payment shall constitute full compensation for all labor, materials, equipment, and incidentals to excavate and backfill the areas with materials shown on the drawings, and as specified herein. Prior to proceeding, the **Contractor** and **Engineer** shall agree to a method of measurement of quantities. Any overexcavations and subsequent backfill without approval of the **Engineer** shall be at the **Contractor's** expense.

- C. Permanent side slopes of excavations shall be no steeper than the safe stable slope for the soils encountered. In no case shall the side slopes exceed 3 horizontal to 1 vertical without written approval of the **Engineer**. Temporary construction slopes shall be no steeper than 1 horizontal to 1 vertical.
- D. If, through failure of the **Contractor** to care for, dewater properly, or failure to conduct this excavation work properly, so that the surface of the subgrade is unsuitable due to the **Contractor's** methods or negligence, the **Contractor** shall remove the unsuitable material and replace it with lean concrete or engineered fill material, as specified, at the **Contractor's** own expense. The condition of the subgrade must be approved by the **Engineer** before subsequent work proceeds.

3.03 DEWATERING OF EXCAVATIONS

- A. The **Contractor** is responsible to control surface and subsurface water in the foundation excavations. The nature of control measures may depend on the seasonal effects on groundwater levels.

3.04 SUBGRADE PREPARATION

- A. After stripping and excavation operations, the native subgrade soils in areas to receive engineered fills shall be scarified; moisture conditioned to at least two percent (2%) above the optimum moisture content and compacted. Compaction shall be based on laboratory test procedure ASTM D1557. Subgrade shall be scarified to a minimum depth of six (6) inches and compacted to not less than ninety five percent (95%) of the soil's maximum dry density (ASTM D1557).relative compaction. Foundations for all concrete slabs and structures shall consist of a minimum of six (6) inches compacted $\frac{3}{4}$ " Class 2 aggregate base, compacted to not less than ninety five percent (95%) of the soil's maximum dry density unless otherwise specified on the Plans or in these Specifications.

3.05 BACKFILL FOR STRUCTURES

- A. Backfill behind structures shall meet the requirements of structure backfill. The backfilling operations shall not commence until cast-in-place concrete has been in place a minimum of seven (7) days and the concrete has obtained its specified twenty-eight (28) day compressive strength. Compaction equipment, or methods which cause displacement or may damage structures, shall not be used. Backfill within three (3) feet of the structure shall be compacted with hand-operated power tampers.

3.06 PLACEMENT OF ENGINEERED FILL

- A. Engineered fill shall be spread in layers and shall have uniform moisture content of at least the optimum moisture. If necessary to obtain uniform distribution of moisture, water shall be added to each layer by sprinkling and the soil disced, harrowed, or otherwise manipulated after the water is added. The layers of the fill material shall not exceed twelve (12) inches compacted thickness. Each layer shall be compacted with suitable compaction equipment to provide the specified dry densities. Engineered fill shall be compacted to not less than ninety percent (90%) of the soil's maximum dry density. Relative compaction shall be based upon laboratory test procedure ASTM D 1557. No fill shall be placed during weather conditions, which will alter the moisture content of the fill materials sufficiently to make adequate compaction impossible. After placing operations have been stopped because of adverse weather conditions, no additional fill material shall be placed until the last layer compacted has been checked and found to be compacted to the specified densities. The placement of fill materials on yielding subgrade soils is prohibited.
- B. Field density testing shall be made to assure adequate compaction throughout the entire area. If the dry densities are not satisfactory to the **Engineer**, the **Contractor** will be required to take necessary steps to achieve the specified densities.

3.07 TRENCH EXCAVATION AND BACKFILLING

A. General

- 1. Excavation for all trenches required for the installation of pipes, conduits, and handholes shall be made to the depths indicated on the drawings. Width of trench excavation shall be limited where indicated on the drawings. The **Contractor** shall render the bottom of the excavations firm and dry, and in all respects, acceptable to the **Engineer**.
- 2. The trench may be excavated by machinery to, or just below, the designated subgrade, provided that the bottom of the trench does not vary from the designated subgrade by more than 0.2 foot.

B. Trench Backfilling

- 1. Trench backfilling shall be as shown in the approved Construction Drawings.

3.08 CONSOLIDATION OF COARSE AGGREGATE MATERIALS

- A. The crushed rock beneath structural slabs shall be consolidated by light vibratory compaction or thoroughly wheel rolling with equipment as large as practical to compact the crushed rock without causing damage to the underlying geotextile fabrics or foundation materials.

3.09 GRADING

- A. Grading shall be performed at such places as are indicated on the drawings, to the lines, grades, and elevations shown, and shall be made in such a manner that the requirements for formation of embankment can be followed. All unacceptable material encountered, of whatever nature within the limits of grading, shall be removed and disposed off-site.
- B. During the process of excavation, the grade shall be maintained in such condition that it will be well drained at all times. If necessary, temporary drains and drainage ditches shall be installed to intercept or divert surface water, which may affect the prosecution of the work.
- C. Excavated materials suitable for engineered fills shall be stockpiled, as necessary, in approved areas for later use. The stockpiles shall be maintained in such condition that it will be well drained at all times.
- D. At completion of the work, excess materials shall be disposed of per these specifications.

3.10 DISPOSAL OF UNSUITABLE AND EXCESS MATERIALS

- A. All excavated earthen materials not utilized in the construction shall be the property of the **Contractor** and shall be legally removed from the site and disposed of at the **Contractor's** expense.

3.11 PLACEMENT OF GEOTEXTILE AND STONE PROTECTION

- A. Areas on which stone protection is to be placed shall be trimmed and dressed to conform to the Drawings within an allowable tolerance of plus zero to minus three inches. Where areas are below the minimum grade, they shall be brought to grade by:
 - (a) Filling with well compacted earth similar to adjacent materials for above water areas, and
 - (b) Stone fill below water areas.Immediately prior to placing the stone protection, the prepared base shall be inspected by the **Engineer** and no stone protection shall be placed thereon until that area has been approved.

- B. The geotextile fabric shall be installed underneath the stone protection where shown on the drawings, in accordance with Section 72 of the State Specifications. Fabric joints shall be overlapped no less than twenty-four inches (24") with the overlap consistent with the direction of stone placement and flow.
- C. The areas to receive stone protection, as identified on the drawings, shall be overlaid with the geotextile fabric and shall be anchored within a one-foot (1') wide by two-foot (2') deep key trench about the perimeter of the area. The **Contractor** shall backfill the keyway trench with riprap.
- D. Stone protection shall be placed where specified in such a manner as to produce a well-graded mass with a minimum practicable percentage of voids, and shall be constructed to the lines and grades shown on the Drawings. Placement of material shall be in compliance with Method B Placement as prescribed by Section 72-2: "Rock Slope Protection" of Caltrans Standard Specifications. A tolerance of zero to plus three inches from the thickness shown on the Drawings is acceptable. Stone protection shall be placed in such a manner as to avoid displacing the underlying material. The finished stone protection shall be free from pockets of small stones and clusters of larger stones. Placing stone protection by methods likely to cause segregation of the various sizes is not acceptable. The desired distribution of the various sizes of stones throughout the mass shall be obtained by selective loading of the material at the quarry or other source, by controlled dumping of successive loads during final placing, or by other methods of placement which will produce the specified results. Rearranging of individual stones by mechanical equipment or by hand will be required to the extent necessary to obtain a reasonably well graded distribution of stone sizes as specified above and to provide a finished surface free of protruding stones. Dozers or other equipment which would cause degradation or displacement of stone shall not be used on the slopes. The **Contractor** shall maintain the stone protection until accepted by the Engineer.

3.12 TESTING

- A. The **Owner** will pay for initial compaction tests during placement of backfill materials to check compliance with the Specifications. If material does not meet specified requirements, **Contractor** shall pay for the additional tests required until compliance is obtained. The **Contractor** shall remove surface material at locations designated by the **Engineer** and provide such assistance, as necessary, for sampling and testing by the testing laboratory.

**** END OF SECTION ****

SECTION 02419

SELECTIVE STRUCTURE DEMOLITION

PART 1 - GENERAL

1.01 SUMMARY

A. Related Documents:

1. Drawings and general provisions of the Subcontract apply to this Section.
2. Refer to Section 01010, Summary of Work, for specific list of equipment to be demolished or salvaged.

B. Section Includes: Selective demolition as follows:

1. Structural, mechanical and electrical materials and equipment as indicated.
 - a. Domestic water and sewer mains and shall remain in operation, and shall not be permitted to shutdown unless approved by the **City** prior to shutdown.
2. Remove materials from site, and dispose of legally.
3. Disconnect, remove, cap and identify utilities for future reconnection.

C. Related Sections:

1. Section 01010: Summary of Work
2. Section 01040: Coordination and Project Requirements
3. Section 01300: Submittals

1.02 SUBMITTALS

- A. Shop Drawings:** Indicate areas for demolition, removal sequence, and location of salvageable items.
- B. Project Record Documents:** Accurately record locations of capped utilities, conduits, and subsurface obstructions.

1.03 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Obtain required permits from the City, County, and other applicable authorities.
2. Do not close or obstruct roadways or sidewalks without permits.
3. Comply with applicable procedures if hazardous or contaminated materials are discovered or suspected.

1.04 PROJECT CONDITIONS

A. Protect adjacent work to remain, and items to be turned over to the City, from damage.

B. Existing Conditions:

1. If lead, asbestos or other hazardous materials are found or suspected, immediately stop work in the suspected area and advise the Project Manager. Do not recommence work in the area until advised by the Project Manager that the area has been cleared for work.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Inspect and verify the existing conditions and become familiar with the extent of the Work.
- B. Examine the site to determine proper access within the limitations of the Contract so as not to interfere with adjacent roads, driveways, walks, buildings, corridors, means of access and egress, and work areas.

3.02 PREPARATION

- A. Interfaces With Other Work: Coordinate extent of selective demolition work with limits of new work and existing work to remain, and with demolition and modification requirements shown on the Drawings.

B. Protection:

1. Protect existing materials, appurtenances and equipment which are not to be demolished. Existing materials, appurtenances and equipment, building exterior and interior, and landscaping altered or damaged during demolition work shall be repaired or replaced to match existing undisturbed conditions at no additional cost to the **City**.
2. Provide proper and permanent support to adjacent structure for all piping, conduits and cables to remain.
3. Use periodic light water mist, temporary enclosures, and other suitable methods to limit dust and dirt. Comply with applicable environmental protection regulations.

C. Field verify the exact location of existing concealed utilities. Use caution if working in or about concealed or exposed utilities.

3.03 EXECUTION

A. Remove items in an orderly and careful manner.

1. Cut surfaces so as to minimize the amount of new surfaces required to match existing. Make cuts plumb, true, level and straight, or as otherwise required to provide proper surfaces to receive new work and repairs.
2. Cut asphalt and concrete by power saw in neat, sharp straight lines. Repair broken edges or as directed by Project Manager.
3. Use concrete and masonry saws that provide water to the blade.

3.04 DISPOSAL AND CLEANUP

- A. Material removed under this Subcontract which is not to be salvaged or reused in the Project shall become the property of the Subcontractor and shall be promptly removed from LBNL. Do not store or permit debris to accumulate at the site.
- B. Unless indicated otherwise, remove demolished material from site. Dispose of materials legally off site. Do not burn or bury materials on site.

****** END OF SECTION ******

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SECTION 02510

ASPHALT PAVING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The **Contractor** shall furnish all labor, materials, equipment, and incidentals necessary to construct all paving and gravel surfacing restoration shown on the drawings, and/or specified herein. The work shall include, but not necessarily be limited to, scarifying and preparing the subgrade, placing and compacting engineered fill materials, placing and compacting Class 2 aggregate base coarse, placing and compaction asphalt concrete, and all related work.

1.02 SUBMITTALS

- A. Submit in accordance with Section 01300 – Submittals
- B. Manufacturer's Data or Certificate of Compliance:
1. Aggregate base
 2. Asphalt concrete
- C. A certificate of compliance signed by the manufacturer shall be furnished prior to the use of any asphalt materials. The certificate shall state that the material complies with the requirements of these Specifications. A certificate shall be furnished with each lot of material delivered to the site and the lot so certified shall be clearly identified in the certificate. Certificates of compliance shall be provided for each type of asphalt product used.

1.03 REFERENCE PUBLICATIONS

State of California Department of Transportation (State)	
	Standard Specifications
	Standard Plans
American Society for Testing Materials (ASTM) Standard	
D 2922	Density of Soil and Soil Aggregate in Place by Nuclear Methods
D 3017	Moisture Content of Soil and Soil Aggregate Place by Nuclear Methods

PART 2 - PRODUCTS

2.01 CLASS 2 AGGREGATE BASE

- A. Class 2 aggregate base shall meet all requirements of State Specification Section 26-1.02A for ¾-inch maximum grading.

2.02 PAINT BINDER (TACK COAT)

- A. The paint binder (tack coat) shall meet all the requirements of State Specification Section 94.

2.03 ASPHALT CONCRETE

- A. Asphalt concrete shall meet the requirements of State Specification Section 39-2 for Type B Asphalt Concrete (1/2 inch maximum aggregate, medium grading).

PART 3 - EXECUTION

3.01 FINAL GRADING

- A. The final grade of the asphalt concrete shall vary not more than 0.05 foot from the elevations indicated on the drawings, and shall conform to the requirements of State Specification Section 39-6. All areas shall be graded to drain.

3.02 SCARIFYING AND COMPACTING

- A. All the subgrade material underlying asphalt concrete or gravel surfacing shall be cleared and stripped per Section 02200, Earthwork, and then scarified to a depth of at least six (6) inches, moisture conditioned as required, and compacted to a relative compaction of not less than ninety-five percent (95%).

3.03 CLASS 2 AGGREGATE BASE

- A. Class 2 aggregate base shall be placed to a depth as shown on the Plans and in these Specifications. Placement, moisturizing, spreading, and compaction of Class 2 aggregate base shall meet all requirements of State Specification Sections 26-1.03 through 26-1.05, Standard Specification Section 7, and the details on the drawings. Class 2 aggregate base shall be compacted to not less than ninety-five percent (95%) of maximum dry density.

3.04 PAINT BINDER (TACK COAT)

- A. Tack coat shall be applied in accordance with State Specification Section 39-4.02 at all locations where asphalt concrete abuts concrete.

3.05 ASPHALT CONCRETE

- A. Asphalt concrete shall be placed where indicated on the drawings. Storing, proportioning, mixing, equipment, spreading, compacting, and miscellaneous asphalt concrete shall conform to the requirements of State Specification Sections 39-3 through 39-7, and Standard Specification Section 9.

3.06 TESTING

A. The **City** will perform laboratory and the initial field testing for density, moisture, and compaction of the asphalt base. The **Contractor** shall pay for re-testing of locations failing to meet the specified compaction in the initial test. Test laboratory shall provide written reports on the following test methods:

1. Moisture, density and compaction per ASTM D 2922 and D 3017.

**** END OF SECTION ****

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SECTION 02600

SHEETING, SHORING AND BRACING

PART 1 - GENERAL

1.01 SCOPE

- A. This section specifies requirements for sheeting, shoring and bracing of trenches and excavations greater than 5 feet in depth.

1.02 REFERENCES

- A. 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.

<u>Reference</u>	<u>Title</u>
CAL OSHA	<i>State of California Construction Safety Orders</i> <i>California State Labor Code</i>

1.03 DESIGN REQUIREMENTS

- A. The Contractor shall design sheeting, shoring, and bracing in accordance with Article 6 of *CAL OSHA* and the *California State Labor Code*. The standards of design referred to in the Labor Code shall be those of CAL OSHA. The shoring procedure designed by the Contractor shall be suitable for the site subsurface conditions and project operational constraints.

1.04 SUBMITTALS

- A. Submit in accordance with Section 01300 – Submittals
- B. The Contractor shall submit to the Owner information required by Section 6705 of the *California State Labor Code*.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 GENERAL

- A. The construction of sheeting, shoring and bracing shall not disturb the state of soil adjacent to or below the trench or excavation.

**** END OF SECTION ****

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SECTION 02820

CHAIN LINK FENCE AND GATES

PART 1 - GENERAL

1.01 SUMMARY

- A. This work consists of all labor, materials, and equipment necessary for furnishing and installing chain link fence, gates, and accessories in conformance with the lines, grades, and details as shown.

1.02 RELATED WORK

- A. Section 05505 Miscellaneous Metalwork
- B. Standard Construction Specifications, Section 45

1.03 MANUFACTURER'S QUALIFICATIONS

- A. Fence, gates, and accessories shall be products of manufacturers regularly engaged in manufacturing items of type specified.

1.04 SUBMITTALS

- A. Submit for approval in accordance with Section 01300 Submittals and conform to the requirements herein.
- B. Furnish the following:
- C. Manufacturer's Literature and Data: Chain link fencing, gates and all accessories.
- D. Manufacturer's Certificates: Zinc-coating complies with specifications.
- E. Shop Drawings for gates.
- F. Certification that fence alignment meets requirements of contract documents.

1.05 WARRANTY

- A. Provide manufacturer's written warranty in which manufacturer agrees to repair or replace fence, gates, and accessories that fail in materials or workmanship within specified warranty period five (5) years from substantial completion. Manufacturer may not disclaim any implied warranty such as merchantability or fitness for a particular purpose. Both the expressed and implied terms of the warranty shall be read together for the benefit of the City.

1.06 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. American Society for Testing and Materials (ASTM):
 - 1. A90/A90M Test Method for Weight of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings.
 - 2. A121 Metallic Coated Carbon Steel Barbed Wire

3. A123/A123M Specification for Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products
4. A392 Zinc-Coated Steel Chain-Link Fence Fabric
5. A641/A641M Specification for Zinc-Coated (Galvanized) Carbon Steel Wire
6. A853 Specification for Steel Wire, Carbon, for general use.
7. A817 Metal-Coated Steel Wire for Chain-Link Fence Fabric and Marcellled Tension Wire
8. C94/C94M Ready Mixed Concrete
9. F567 Installation of Chain-Link Fence
10. F626 Fence Fittings
11. F900 Industrial and Commercial Swing Gates
12. F1043 Strength and Protective Coatings on Metal Industrial Chain-Link Fence Framework
13. F1083 Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Materials shall conform to ASTM F1083 and ASTM A392 ferrous metals, zinc coated; and detailed specifications forming the various parts thereto; and other requirements specified herein. Zinc coat metal members (including fabric, gates, posts, rails, hardware and other ferrous metal items) after fabrication shall be reasonably free of excessive roughness, blisters and sal-ammoniac spots.

2.02 CHAIN LINK FABRIC

- A. ASTM A392 9-gauge galvanized wire woven in a 50 mm (2 inch) mesh. Top and bottom selvage shall have twisted and barbed finish. All rods, bars, bands, clips, bolts, tension wire, and other fittings shall be galvanized.
- B. Wire mesh shall be galvanized after woven.

2.03 POST, FOR GATES AND FENCING

- A. ASTM F1083, Group 1A, Regular Grade, Schedule 40, round, galvanized steel. Provide post braces and truss rods for each gate, corner, pull or end post. Provide truss rods with turnbuckles or other equivalent provisions for adjustment. Posts and rails shall be of minimum size as follows:
- B. For fencing not exceeding 6'-0" maximum height:
 1. Line posts shall be 1-5/8 inch
 2. End posts shall be 2-1/2 inch
 3. Top rails shall be 1-3/8 inch

C. For fencing not exceeding 8'-0" maximum height:

1. Line posts shall be 2-1/2 inch
2. End posts shall be 3 inch
3. Top rails shall be 1-5/8 inch

2.04 BARBED WIRE

- A. Provide chain link vertical straight galvanized steel 3-strand barb wire arm at end of each fence post and at top of gate vertical posts. Maximum 8' spacing.
- B. Barb wire shall be minimum Class 3, 12.5-gauge double strand, galvanized steel wire with 4-point.

2.05 CONCRETE

- A. Concrete for post footings shall have a 28-day compressive strength of 3,000 psi (25.8 MPa). Non shrinking grout shall consist of one part Portland cement to three parts clean, well graded sand, non shrinking grout additive and the minimum amount of water to produce a workable mix.

2.06 SWING GATES

- A. Swing gates shall be as shown on Drawings. Fabricate chain link swing gates in accordance with ASTM F900. Gate frame to be of welded construction. Weld areas to be protected with zinc-rich paint pursuant to ASTM A780. The gate frame members are to be spaced no greater than 8' 0" apart horizontally or vertically. Pipe to be Schedule 40. Chain link fabric to match specification of fence system. Fabric to be stretched tightly and secured to vertical outer frame members using tension bar and tension bands spaced 12" on center and tied to the horizontal and interior members 12" on center using 9 gauge galvanized steel ties.

2.07 GATE HARDWARE

- A. Provide vandal resistant hardware for all gates to secure gates in the closed position. Provide covered padlockable enclosure for single leaf gates.
- B. Hinges shall allow gates to swing through 180 degrees from closed to open position, except where existing conditions do not allow. Hinges will be welded in place.
- C. Latch:
 1. Galvanized forked type capable of retaining gate in closed position and have provision for padlock.
 2. Latch shall be compliant with 2010 ADA Standards for Accessible Design. Provide accessible latch – lever or other design not requiring tight pinching, grasping or twisting of the wrist.
 3. Latch shall permit operation from either side of gate.

2.08 ACCESSORIES

- A. Accessories as necessary: caps, rail and brace ends, wire ties or clips, braces and tension bands, tension bars, truss rods, and miscellaneous accessories conforming to ASTM F626.

- B. Tension Wire
 - 1. Metallic Coated Steel Marcellled Tension Wire: 7 gauge (0.177 in.) marcellled wire, Type II Zinc-Coated Class 4 - 1.2 oz/ft
- C. Fittings
 - 1. Tension and Brace Bands: Galvanized pressed steel, minimum steel thickness of 12 gauge (0.105 in.), minimum width of 3/4 inches and minimum zinc coating of 1.20 oz/ft². Bands supplied with 5/16 in or 3/8 in galvanized steel carriage bolts.
 - 2. Terminal Post Caps, Line Post Loop Tops, Rail and Brace Ends, Boulevard Clamps, Rail Sleeves: Pressed steel galvanized after fabrication having a minimum zinc coating of 1.20 oz/ft².
 - 3. Truss Rod Assembly: 3/8 in. diameter steel truss rod with a pressed steel tightener, minimum zinc coating of 1.2 oz/ft², assembly capable of withstanding a tension of 2,000 lbs.
 - 4. Tension Bars: Galvanized steel one-piece length 2 in. less than the fabric height. Minimum zinc coating 1.2 oz. /ft².
 - 5. Bars shall have a minimum cross section of 3/16 in. by 3/4 in.
- D. Tie Wire and Hog Rings
 - 1. Tie Wire and Hog Rings: Galvanized minimum zinc coating 1.20 oz/ft² 9-gauge (0.148) steel wire spacing per manufacturer's recommendation.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install fence by properly trained crew, on previously prepared surfaces, to line and grade as shown. Install fence in accordance with ASTM F567 and with the manufacturer's printed installation instructions, except as modified herein or as shown. Maintain all equipment, tools, and machinery while on the project in sufficient quantities and capacities for proper installation of posts, chain links and accessories.

3.02 POST CAPS

- A. Fit all exposed ends of post with caps, unless otherwise shown on the Drawings. Provide caps that fit snugly and are weathertight. Where top rail is used, provide caps to accommodate the top rail. Install post caps as recommended by the manufacturer and as shown.

3.03 SUPPORTING ARMS

- A. Design supporting arms, when required, to be weathertight. Where top rail is used, provide arms to accommodate the top rail. Install supporting arms as recommended by the manufacturer and as shown.

3.04 ACCESSORIES

- A. Supply accessories (posts braces, tension bands, tension bars, truss rods, and miscellaneous accessories), as required and recommended by the manufacturer, to accommodate the installation of a complete fence, with fabric that is taut and attached properly to posts, rails, and tension wire.

3.05 FABRIC

- A. Pull fabric taut and secure with wire ties or clips to the top rail and bottom rail close to both sides of each post and at intervals of not more than 600 mm (24 inches) on centers. Secure fabric to posts using stretcher bars and ties or clips.

3.06 GATES

- A. Install gates plumb, level, and secure for full opening without interference. Set keepers, stops and other accessories into concrete as required by the manufacturer and as shown. Adjust hardware for smooth operation and lubricate where necessary.

3.07 FINAL CLEAN UP

- A. Remove all debris, rubbish and excess material from the site.

**** END OF SECTION ****

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SECTION 03100

CONCRETE FORMWORK

PART 1 – GENERAL

1.01 DESCRIPTION

The work of this Section includes providing concrete formwork, bracing, shoring, and supports.

1.02 RELATED SECTIONS

A. The work of the following Sections applies to the work of this Section. Other Sections, not referenced below, shall also apply to the extent required for proper performance of the work.

1. Section 03200 – Concrete Reinforcement
2. Section 03300 – Cast-in-Place Concrete.
3. Section 03600 – Grout.

1.03 SPECIFICATIONS AND STANDARDS

A. Except as otherwise indicated, the current editions of the following apply to the work of this Section:

1. PS 1 – U.S. Product Standard for Concrete Forms, Class I.
2. ACI 117 – Standard Tolerances for Concrete Construction and Materials.
3. ACI 318 – Building Code Requirements for Reinforcing Concrete.
4. ACI 347 – Recommended Practice for Concrete Formwork.

1.04 SHOP DRAWINGS AND SAMPLES

The following shall be submitted in compliance with Section 01300 – Submittals:

A. Falsework Calculations and Drawings: The **Contractor's** attention is directed to the provisions of Section 1717 of the Division of Industrial Safety, Construction Safety Orders, which requires that all falsework or vertical shoring installations where the height of the falsework or vertical shoring, as measured from the top of the sills to the

- soffit of the superstructure, exceeds 14 feet, or where individual horizontal span lengths exceed 16 feet, or provision for vehicular or railroad traffic through falsework or vertical shoring is made, and shall be approved and signed by a civil engineer, registered in the state of California; provided further, that a copy of the falsework plan or shoring layout shall be available on the job site at all times.
- B. Detailed plans of the falsework proposed to be used: Such plans shall be in sufficient detail to indicate the general layout, sizes of members, anticipated stresses, grade of materials to be used in the falsework, means of protecting existing construction which supports falsework, and typical soil conditions.
- C. Catalog information on:
1. Form ties and all related accessories, including taper tie plugs, if taper ties are used.
 2. Form gaskets.

PART 2 – PRODUCTS

2.01 GENERAL

- A. Materials for concrete forms and falsework shall conform to ACI 347 and the requirements herein.
- B. Except as otherwise expressly accepted, all lumber brought on the job site for use as forms, shoring, or bracing shall be new material. All forms shall be smooth surface forms and shall be of the following materials:
1. Columns – Steel, plywood or fiberglass
 2. Walls – Steel or plywood panel
 3. Floor – Plywood
 4. All Other Work – Steel panels, plywood or tongue and groove lumber

2.02 FORM AND FALSEWORK MATERIALS

- A. Materials for concrete forms, formwork, and falsework shall conform to the following requirements:
1. Lumber shall be Douglas Fir or Southern Pine, construction grade or better, in conformance with U.S. Product Standard PS20.

2. Plywood for concrete formwork shall be new, waterproof, synthetic resin bonded, exterior type Douglas Fir or Southern Pine plywood manufactured especially for concrete formwork and shall conform to the requirements of PS 1 for Concrete Forms, Class I, and shall be edge sealed.
3. Form materials shall be wood, plywood, or other approved material that will not adversely affect the concrete and will facilitate placement of concrete to the shape, form, line, and grade shown. Wood forms for surfaces to be painted shall be Medium Density Overlaid plywood, MDO Ext. Grade. Metal surfaced forms are not allowed.
4. Unless otherwise indicated, exterior corners in concrete members shall be provided with $\frac{3}{4}$ -inch chamfers. Re-entrant corners in concrete members shall not have fillets unless otherwise indicated.

PART 3 – EXECUTION

3.01 GENERAL

- A. Forms and falsework shall be designed and constructed in accordance with ACI 347, and the requirements herein, except that the submittal of detailed falsework will not be required.
- B. Tolerances: The variation from established grade or lines shall not exceed $\frac{1}{4}$ inch in 10 feet and there shall be no offsets or visible waviness in the finished surface. All other tolerances shall be within the tolerances of ACI 117.
- C. Forms to confine the concrete and shape it to the required lines shall be used wherever necessary. The **Contractor** shall assume full responsibility for the adequate design of all forms, and any forms which are unsafe or inadequate in any respect shall promptly be removed from the work and replaced at the **Contractor's** expense. A sufficient number of forms of each kind shall be provided to permit the required rate of progress to be maintained. The design and inspection of concrete forms, falsework, and shoring shall comply with applicable local, state and Federal regulations. Plumb and string lines shall be installed before concrete placement and shall be maintained during placement. Such lines shall be used by the **Contractor's** personnel and by the **Engineer**, and shall be in sufficient number and properly installed. During concrete placement, the **Contractor** shall continually monitor plumb and string line form positions and immediately correct deficiencies.
- D. Concrete forms shall conform to the shape, lines, and dimensions of members as called for on the Drawings, and shall be substantial, free from surface defects, and sufficiently tight to prevent leakage. Forms shall be properly braced or tied together

to maintain their position and shape under a load of freshly-placed concrete. If adequate foundation for shores cannot be secured, trussed supports shall be provided.

3.02 FORM DESIGN

All forms shall be true in every respect to the required shape and size, shall conform to the established alignment and grade, and shall be of sufficient strength and rigidity to maintain their position and shape under the loads and operations incident to placing and vibrating the concrete. Suitable and effective means shall be provided on all forms for holding adjacent edges and ends of panels and sections tightly together and in accurate alignment so as to prevent the formation of ridges, fins, offsets, or similar surface defects in the finished concrete. Plywood, 5/8-inch and greater in thickness, may be fastened directly to studding if the studs are spaced close enough to prevent visible deflection marks in the concrete. The forms shall be tight so as to prevent the loss of water, cement and fines during placing and vibrating of the concrete. Specifically, the bottom of wall forms that rest on concrete footings or slabs shall be provided with a gasket to prevent loss of fines and paste during placement and vibration of concrete. Such gasket may be a 1-inch to 1½-inch diameter polyethylene rod held in position to the underside of the wall form. Adequate clean-out holes shall be provided at the bottom of each lift of forms. The size, number, and location of such clean-outs shall be as acceptable to the **Engineer**. Whenever concrete cannot be placed from the top of a wall form in a manner that meets the requirements of the Contract Documents, form windows shall be provided in the size and spacing needed to allow placement of concrete to the requirements of Section 03300 – Cast-In-Place Concrete. The size, number, and location of such form windows shall be acceptable to the **Engineer**.

3.03 CONSTRUCTION

- A. Vertical Surfaces: All vertical surfaces of concrete members shall be formed, except where placement of the concrete against the ground is shown. Not less than one (1) inch of concrete shall be added to the thickness of the concrete member as shown where concrete is permitted to be placed against trimmed ground in lieu of forms. Such permission will be granted only for members of comparatively limited height and where the character of the ground is such that it can be trimmed to the required lines and will stand securely without caving or sloughing until the concrete has been placed.
- B. Construction Joints: Concrete construction joints will not be permitted at locations other than those shown or specified, except as may be acceptable to the **Engineer**. When a second lift is placed on hardened concrete, special precautions shall be taken in the way of the number, location, and tightening of ties at the top of the old lift and bottom of the new to prevent any unsatisfactory effect whatsoever on the concrete. Pipe stubs and anchor bolts shall be set in the forms where required.

C. Form Ties

1. Embedded Ties: Holes left by the removal of form tie cones shall be reamed with suitable toothed reamers in order to leave the surface of the holes clean and rough before being filled with mortar as indicated in Section 03300 – Cast-In-Place Concrete. Wire ties for holding forms will not be permitted. No form-tying device or part thereof, other than metal, shall be left embedded in the concrete. Ties shall not be removed in such manner as to leave a hole extending through the interior of the concrete members. The use of snap-ties which cause spalling of the concrete upon form stripping or tie removal will not be permitted. If steel panel forms are used, rubber grommets shall be provided where the ties pass through the form in order to prevent loss of cement paste. Where metal rods extending through the concrete are used to support or to strengthen forms, the rods shall remain embedded and shall terminate not less than one inch back from the formed face or faces of the concrete.
2. Removable Ties: Where taper ties are approved for use, the larger end of the taper tie shall be on the wet side of walls in water retaining structures. After the taper tie is removed, the hole shall be thoroughly cleaned and roughened for bond. A precast neoprene or polyurethane tapered plug shall be located at the wall centerline. The hole shall be completely filled with non-shrink grout for water bearing and below-grade walls. The hole shall be completely filled with non-shrink or regular cement grout for above-grade walls that are dry on both sides. Exposed faces of walls shall have the outer two (2) inches of the exposed face filled with a cement grout that shall match the color and texture of the surrounding wall surface.

3.04 REUSE OF FORMS

Forms may be reused only if in good condition and only if acceptable to the **Engineer**. Light sanding between uses will be required wherever necessary to obtain uniform surface texture on all exposed concrete surfaces. Exposed concrete surfaces are defined as surfaces that are permanently exposed to view. In the case of forms for the inside wall surfaces of hydraulic/water retaining structures, unused tie rod holes in forms shall be covered with metal caps or shall be filled by other methods acceptable to the **Engineer**.

3.05 REMOVAL OF FORMS

Careful procedures for the removal of forms shall be strictly followed, and this work shall be done with care so as to avoid injury to the concrete. No heavy loading on green concrete will be permitted. The time required to establish said strength shall be as determined by the **Engineer**, who will make several test cylinders for this purpose from concrete used in the first group of roof panels placed. If the time so determined is more than the seven-day minimum, then that time shall be used as the minimum length of time.

Forms for all vertical walls and columns shall remain in place at least two (2) days after the concrete has been placed. Forms for all parts of the work not specifically mentioned herein shall remain in place for periods of time as determined by the **Engineer**.

3.06 MAINTENANCE OF FORMS

Forms shall be cleaned, treated with a releasing agent, and maintained in accordance with ACI 347 and the following. The form surfaces shall be treated with a nonstaining mineral oil or other lubricant acceptable to the **Engineer**. Any excess lubricant shall be satisfactorily removed before placing the concrete. Where field oiling of forms is required, the **Contractor** shall perform the oiling at least two weeks in advance of their use. Care shall be exercised to keep oil off the surfaces of steel reinforcement and other metal items to be embedded in concrete.

3.07 FALSEWORK

Falsework, including staging, walkways, forms, ladders, and similar appurtenances, shall be designed, engineered, constructed, and maintained according to the applicable requirements of the provisions of the OSHA Safety and Health Standards for Construction, and the requirements of the Construction Safety Orders of the California Division of Industrial Safety.

****** END OF SECTION ******

SECTION 03200

CONCRETE REINFORCEMENT

PART 1 – GENERAL

1.01 DESCRIPTION

This Section specifies reinforcing steel for use in reinforced concrete.

1.02 QUALITY ASSURANCE

- A. Quality Control by **Contractor**: To demonstrate conformance with the specified requirements for concrete reinforcement, the **Contractor** shall provide certified mill test reports as product data in accordance with paragraph 03200-2.06.
- B. References: This Section contains references to 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.

Unless otherwise specified, references to documents shall mean the documents in effect at the time of Advertisement for Bids or Invitation to Bid (or on the effective date of the Agreement if there were no Bids). 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, whether or not the document has been superseded by a version with a later date, discontinued or replaced.

Reference	Title
ACI 315	Details and Detailing of Concrete Reinforcement
ASTM A1064	Carbon-Steel Wire and Welded Wire, Plain, and Deformed
ASTM A615/A615M	Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM A706/A706M	Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM A775/A775M	Epoxy-Coated Reinforcing Steel Bars
ASTM A996	Rail Steel and Axle Steel Deformed Bars for Concrete Reinforcement
ASTM E329	Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction
AWS D1.4	Structural Welding Code-Reinforcing Steel
CRSI PRB	Placing Reinforcing Bars
CRSI MSP-1	Manual of Standard Practice
FEDSPEC QQ-W-461H	Wire, Steel, Carbon (Round, Bare, and Coated)

1.03 PLACING DRAWINGS

The **Contractor** shall prepare reinforcement placing drawings conforming to the requirements of ACI 315. Placing drawings shall include bar lists, schedules, bending details, placing details, and placing plans and elevations as required to fully delineate this portion of the work. The placing drawings shall be submitted to the **Engineer** for review and comment. Review shall be for general conformance with the contract documents regarding bar grade, size, spacing and configuration. Bar dimensions and quantities will not be reviewed.

1.04 SUBMITTALS

Reinforcement placing drawings conforming to the requirements of paragraph 03200-1.02 shall be provided in accordance with Section 01300 – Submittals.

PART 2 – PRODUCTS

2.01 BAR REINFORCEMENT

Reinforcing bars shall be deformed billet steel in conformance with ASTM A615, including supplementary requirements. Bars shall be Grade 60, except ties or field-bent bars where specified shall be Grade 40. Bars to be welded shall be Grade 60 and shall be deformed billet steel conforming to ASTM A706. ASTM A996 steel shall not be used. Bars provided as dowels for future construction and bars where specified shall be epoxy-coated in conformance with ASTM A775.

2.02 WIRE FABRIC

Wire fabric shall be welded steel mesh conforming to ASTM A1064.

2.03 WIRE AND PLAIN BARS

Wire used as reinforcement and bars used as spiral reinforcement in structures shall be cold drawn steel conforming to ASTM A1064.

2.04 TIE WIRE

The wire shall be minimum 16-gage annealed steel conforming to FEDSPEC QQ-W-461H.

2.05 BAR SUPPORTS

Bar supports coming into contact with forms shall be CRSI Class 1 plastic protected or Class 2 stainless steel protected and shall be located in accordance with CRSI MSP-1 and placed in accordance with CRSI PRB. Concrete block supports shall be provided for footing. Concrete blocks are not allowed at slabs-on-ground pads. Stainless steel or plastic protected plain steel supports shall be provided for other work.

2.06 PRODUCT DATA

The following product data shall be provided in accordance with Section 01300 – Submittals prior to installation:

- A. Certified mill test reports.
- B. Welder qualification certificate in accordance with AWS D1.4.
- C. Bar tags.

PART 3 – EXECUTION

3.01 FABRICATION

Reinforcing steel shall not be bent or straightened in a manner which will injure the material. Bars with kinks or with bends not shown shall not be used. Heating or welding bars shall be performed in accordance with AWS D1.4 and shall only be permitted where specified or approved by the **Engineer**. Bars shall not be welded at the bend.

3.02 PLACEMENT

Reinforcing steel shall be placed in accordance with CRSI PRB and CRSI MSP-1.

Reinforcing steel shall be positioned accurately and secured against displacement by using annealed iron wire at intersections and shall be supported by concrete or metal chairs, spacers or metal hangers. Tack welding of cross bars is not acceptable. Bars shown on the drawings shall not be repositioned (buried) to act as support bars. Additional bars shall be provided as required for supports. Steel rods and pegs may be used to support reinforcing steel on rock foundations. Reinforcing steel shall be placed in such a manner as to not damage waterproofing membrane or plastic lining which has been previously applied or constructed. Reinforcing steel shall be shop-bent or slightly relocated where necessary to clear waterstop. Reinforcing steel shall not be placed on fresh concrete or forced into fresh concrete.

Supports for embedded items shall not be welded to the reinforcement. Additional reinforcement may be provided for this purpose.

3.03 SPLICING

Reinforcing steel shall be spliced as shown on the Drawings. Additional splices may be provided where approved by the **Engineer**.

Reinforcing steel shall not be spliced in areas of maximum stress. Splices of adjacent bars shall be staggered at least one splice length, unless otherwise specified. Splices in welded wire fabric shall be at least 1½ meshes wide.

3.04 CLEANING

Reinforcing steel shall be cleaned of mill rust scale, dried concrete, or other coatings that may reduce bond. Reinforcement reduced in section is not acceptable. When concrete placement is delayed, reinforcement shall be cleaned by sandblasting if directed by the **Engineer**.

3.05 REPAIR OF EPOXY COATING

Epoxy coating damage need not be repaired in cases where the damaged area is 0.1 square inch or smaller. All damaged areas larger than 0.1 square inch shall be repaired in conformance with ASTM A775.

**** END OF SECTION ****

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SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 – GENERAL

1.01 DESCRIPTION

This Section specifies cast-in-place concrete which consists of furnishing all material, mixing and transporting equipment, and performing all labor for the proportioning, mixing, transporting, placing, consolidating, finishing and curing of concrete in the structure. Concrete shall be composed of Portland Cement, fine aggregate, coarse aggregate, pozzolan, admixtures, and water as hereinafter specified.

1.02 QUALITY ASSURANCE

- A. Quality Control by **Contractor**: To demonstrate conformance with the specified requirements for cast-in-place concrete, the **Contractor** shall provide the services of an independent testing laboratory which complies with the requirements of ASTM E329. The testing laboratory shall sample and test concrete materials as specified in paragraphs 03300-2.01 and 2.02. Costs of testing laboratory services shall be borne by the **Contractor**.
- B. Quality Control by **Owner**: To monitor conformance with the specified requirements for cast-in-place concrete, the **Owner** will provide the services of an independent testing laboratory which complies with the requirements of ASTM E329. The testing laboratory will sample and test concrete materials as specified in paragraph 03300-3.16 and may also independently sample and test any other of the **Contractor's** proposed materials. Costs of these testing laboratory services will be borne by the **Owner**.
- C. Basis for Quality: Cast-in-place concrete shall conform to the requirements of ACI 301, except as modified herein.
- D. References: This Section contains references to the following documents (table below). The reference documents 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 reference documents, the requirements of this Section shall prevail.

Unless otherwise specified, references to documents shall mean the documents in effect at the time of Advertisement for Bids or Invitation to Bid (or on the effective date of the Agreement if there were no Bids). 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, whether or not the document has been superseded by a version with a later date, discontinued or replaced.

Reference	Title
AASHTO T210	Aggregate Durability Index
ACI 211.1	Selecting Proportions for Normal, Heavy Weight and Mass Concrete
ACI 214	Evaluation of Strength Test Results of Concrete
ACI 301	Structural Concrete for Buildings
ACI 304	Guide for Measuring, Mixing, Transporting, and Placing Concrete
ACI 305R	Hot Weather Concreting
ACI 306R	Cold Weather Concreting
ACI 347	Concrete Formwork
ASTM C31	Making and Curing Concrete Test Specimens in the Field
ASTM C33	Concrete Aggregates
ASTM C39	Compressive Strength of Cylindrical Concrete Specimens
ASTM C40	Organic Impurities in Fine Aggregate for Concrete
ASTM C42	Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
ASTM C88	Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C94	Ready-Mixed Concrete
ASTM C117	Materials Finer Than 75- μ m (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C131	Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C136	Sieve Analysis of Fine and Coarse Aggregates
ASTM C142	Clay Lumps and Friable Particles in Aggregates
ASTM C143	Slump of Portland Cement Concrete
ASTM C150	Portland Cement
ASTM C157	Length Change of Hardened Cement Mortar and Concrete
ASTM C172	Sampling Freshly Mixed Concrete
ASTM C231	Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C260	Air-Entraining Admixtures for Concrete
ASTM C289	Potential Reactivity of Aggregates (Chemical Method)
ASTM C309	Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C494	Chemical Admixtures for Concrete
ASTM C595	Blended Hydraulic Cements
ASTM C618	Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete
ASTM D75	Sampling Aggregates
ASTM D2419	Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate
ASTM E329	Inspection and Testing Agencies for Concrete, Steel, and Bituminous Materials as Used in Construction
CRD-C572	Corps of Engineers Specifications for Polyvinylchloride Waterstop

1.03 SUBMITTALS

Submittals shall be provided in accordance with Section 01300 – Submittals and shall include the following information:

- A. A copy of this specification section, with addendum updates included, and all referenced and applicable sections, with addendum updates included, with each paragraph check-marked to indicate specification compliance or marked to indicate requested deviations from specification requirements. Check marks (✓) shall denote full compliance with a paragraph as a whole. If deviations from the specifications are indicated and therefore requested by the **Contractor**, each deviation shall be underlined and denoted by a number in the margin to the right of the identified paragraph referenced to a detailed written explanation for requesting the deviation. The **Engineer** shall be the final authority for determining acceptability of requested deviations. The remaining portions of the paragraph not underlined will signify compliance on the part of the **Contractor** with the specifications. Failure to include a copy of the marked-up specifications, along with justification(s) for any requested deviations to the specification requirements, with the submittal shall be sufficient cause for rejection of the entire submittal with no further consideration.
- B. Reports of Concrete Mix Designs: Mix design submittals shall conform to the requirements Section 1905 of the California Building Code, most recent edition. Additional requirements for the reports are specified in paragraph 03300-2.02C.
- C. Manufacturer's Data: Copies of manufacturer's data shall be provided for the following:
 - 1. Waterstops.
 - 2. Retardants.
 - 3. Curing compounds.
 - 4. Bonding compounds.
 - 5. Surface hardener.
 - 6. Pozzolan.
- D. Laboratory Test Reports: Before delivery of materials, copies of the reports of the tests specified herein shall be provided. Test reports on previously tested materials shall be accompanied by the manufacturer's statement that the previously tested material is the same type, quality, manufacture and make as that proposed for use in this project. Test reports are required for the following:

1. Cement.
 2. Aggregates.
 3. Pozzolan.
 4. Admixtures.
 5. Curing compounds.
 6. Retardants.
 7. Bonding compounds.
 8. Concrete strength, slump, temperature, and air content.
- E. Evidence of Testing Laboratory Competence: The **Contractor** shall require that the laboratory provide directly to the **Engineer** evidence of the most recent inspection of its facilities by the Cement and Concrete Reference Laboratory of the National Bureau of Standards. The evidence shall show that deficiencies mentioned in the report of that inspection have been corrected. The evidence of inspection shall be provided prior to beginning the work of this section.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Cement: Portland Cement shall be ASTM C150, Type II or Type V, low alkali, containing less than 0.60 percent alkalis. Portland-pozzolan cement shall be ASTM C595, Type IP (MS), interground, low alkali.

B. Aggregates

1. General: Except as modified herein, fine and coarse aggregates shall conform to ASTM C33. Fine and coarse aggregates shall be regarded as separate ingredients. Aggregates shall be nonreactive and shall be washed before use.

Tests for size and grading of fine and coarse aggregates shall be in accordance with ASTM C136. Combined aggregates shall be well and uniformly graded from coarse to fine sizes to produce a concrete that has optimum workability and consolidation characteristics. The final combined aggregate gradation shall be established during the design mix.

When sources of aggregates are changed, test reports shall be provided for the new material. The tests specified shall be performed prior to commencing concrete work.

2. Fine Aggregate: Fine aggregate shall be hard, dense, durable particles of either sand or crushed stone regularly graded from coarse to fine. Gradation shall conform to ASTM C33. Fine aggregate shall not exceed 40 percent by weight of combined aggregate total, except for concrete with coarse aggregate of less than maximum size ½ inch.

Variations from the specified gradations in individual tests will be acceptable if the average of three consecutive tests is within the specified limits and the variation is within the permissible variation listed below:

U.S. Standard:	Permissible Variation in
<u>Sieve Size:</u>	<u>Individual Tests, Percent</u>
30 and Coarser:	2
50 and Finer:	0.5

Other tests shall be in accordance with the following specifications:

Test	Test Method	Requirements
Amount of material	ASTM C117	3 percent passing No. 200 sieve maximum by weight
Reactivity	ASTM C289	As specified in ASTM C33, Appendix
Sand equivalent	ASTM D2419	Minimum 75

3. Coarse Aggregate: Coarse aggregate shall be hard, dense and durable gravel or crushed rock-free from injurious amounts of soft and friable particles, alkali, and organic matter. Other deleterious substances shall not exceed the limits listed in ASTM C33, Table 3. Gradation of each coarse aggregate size specified in paragraph 03300-2.02 A shall conform to ASTM C33, Table 2.

Before and during field trial mixes, the **Contractor** may make minor adjustments to the above gradation to produce the specified concrete.

During progress of the work, variations from the specified gradations will be acceptable in individual tests if the average of three consecutive tests is within the specified limits.

Other tests shall be in accordance with the following specifications:

Test	Test method	Requirements
Durability index	AASHTO T210	Minimum 75
Soundness	ASTM C88	10 percent maximum loss with sodium sulfate
Amount of material	ASTM C117	1.0 percent maximum passing No. 200 sieve by weight
Abrasion	ASTM C131	35 percent maximum loss after 500 revolutions in Los Angeles machine
Clay lumps and friable particles	ASTM C142	4.5 percent maximum by weight
Reactivity	ASTM C289	As specified in ASTM C33, Appendix

- C. Pozzolan: Pozzolan shall be Class N, natural pozzolan, or Class F, fly ash, conforming to ASTM C618. Fly ash pozzolan shall contain less than one percent by weight carbon and less than three percent by weight sulfur trioxide. Pozzolan supplied during the life of the project shall have been formed at the same single source.

The pozzolan color shall not substantially alter the resulting concrete from the normal gray color and appearance.

D. Admixtures

1. General: Admixtures shall be compatible with the concrete. Calcium chloride or admixtures containing calcium chloride are not acceptable. Admixtures shall be used in accordance with the manufacturer's recommendations and shall be added separately to the concrete mix.
2. Water Reducing Retarder: Water reducing retarder shall be ASTM C494, Type D, and shall be Master Builders, Pozzolith 300-R; Sika Chemical Corp., Plastiment; or equal.

The water reducing retarder shall reduce the water required at least 11 percent for a given concrete consistency and shall comply with the water/cement ratio standards of ACI 211.1.

3. Air Entraining Agent: Air entraining agent shall be Master Builders, MB-AE10; W. R. Grace and Co.; DaraVair; or equal. The air entraining agent added shall produce, in accordance with ASTM C260, an entrained air content specified in paragraph 03300-2.02 A for each class of concrete.

- E. Water: Water for washing aggregate, for mixing and for curing shall be free from oil and deleterious amounts of acids, alkalis, and organic materials; shall not contain more than 1,000 mg/l of chlorides as Cl, nor more than 1,300 mg/l of sulfates as SO₄; and shall not contain an amount of impurities that may cause a change of more than 25 percent in the setting time of the cement nor a reduction of more than five percent in the compressive strength of the concrete at 14 days when compared with the result obtained with distilled water. Additionally, water used for curing shall not contain an amount of impurities sufficient to discolor the concrete.

2.02 CONCRETE CHARACTERISTICS

- A. Mix Proportioning: Concrete shall be normal weight concrete composed of specified cement, pozzolan, admixtures, aggregates and water proportioned and mixed to produce a workable, strong, dense, and impermeable concrete. The **Contractor** may substitute interground Portland-pozzolan cement conforming to ASTM C595, containing the specified amount of pozzolan in lieu of Portland Cement and pozzolan. Pozzolan may be omitted in concrete exposed to normal atmospheric conditions and concrete not in contact with the ground or liquid. Water/cement ratio is based on the combined contents of cement and pozzolan in a given mix proportion.

Concrete shall be provided in accordance with the following:

Concrete Class	ASTM Coarse Aggregate Size Number	Maximum Water/Cement Ratio	Minimum Cement Sacks/Cubic Yard Concrete	Pozzolan, Percent by Weight of Portland Cement	Minimum Percent Air Content	Water Reducing Retarder	Minimum ^a 28-day Compressive Strength, psi
A-1	57	0.45	5.5	18-20	3	Yes	4500
A-2	57	0.45	5.50	0	3	Yes	4500
B-1	57	0.45	5.75	18-20	3	Yes	4500
B-2	57	0.45	5.75	0	3	Yes	4500
C-1	57	0.45	6.0	18-20	3	Yes	4500
C-2	57	0.45	6.0	0	3	Yes	4500
D	8	0.45	5.50	0	0	Yes	3000
E ^b	467	0.50	3.0	0	0	No	2000
F	—	0.85	—	0	0	No	500 ^c
G	467	0.50	5.5	0	0	No	2500
H	8	0.45	5.5	0	0	Yes	3000

Notes for table:

- Compressive strength shall be determined at the end of 28 days based on test cylinders made and tested in accordance with ASTM C39.
- Concrete encasement for electrical conduit shall contain 5 pounds of synthetic red coloring, Davis Colors No. 10-329, or equal, per cubic yard of concrete.
- Minimum 28-day compressive strength shall be 500 psi and maximum 28-day compressive strength shall be 1000 psi.

B. Use: Concrete shall be provided by class for the corresponding use listed as follows:

Type of Use	Class of Concrete
Concrete greater than 24 inches thick.	A or B
Concrete 12 to 24 inches thick, inclusive, and reinforced pipe encasement.	B or C
Concrete less than 12 inches thick.	C
Building footings, slab-on-ground, pavement, sidewalks, ramps, curbs and pipe encased in reinforced concrete	D
Pipe bedding, yard piping encasement, electrical conduit encasement (duct banks), and concrete fill.	E
Encasement of reinforcement extension for future construction.	F
Non-structural	G
Topping Concrete	H

For the use listed, concrete slump, sampled in accordance with ASTM C172 and tested in accordance with ASTM C143, shall be as follows:

Type of Use	Working Limit, Inches	
	Minimum	Maximum
Mass concrete, foundation slabs greater than 24 inches thick, tunnel inverts and unformed slopes.	1	2
Floor slabs, beams, foundation slabs and footings 24 inches thick or less, reinforced pipe encasement, pavement, sidewalks and curbs.	2	3
Walls and columns.	3	4½
Topping concrete.	—	1
Pipe bedding, yard piping encasement, electrical conduit encasement.	4	8
Concrete fill.	3	4

C. Control Tests

1. Mix Design: Before beginning concrete work, the **Contractor** shall determine the proper proportions of materials for each strength and class of concrete. The mix shall consist of specified cement, pozzolan, admixtures, aggregate and water. Methods for selecting and adjusting proportions of the ingredients shall be in accordance with ACI 211.1. The laboratory reports of each mix design shall state whether the items reported comply with the specifications and shall show (1) the expected strength; (2) corresponding slump; (3) expected drying shrinkage; (4) weights and test results of the ingredients; and, (5) other physical properties necessary to check each mix design. Copies of the laboratory reports shall be submitted in accordance with paragraph 03300-1.03.

Each mix design shall be checked in the laboratory by the preparation of two trial batches, one with minimum slump and one with maximum slump. For each batch, six standard test cylinders shall be cast and cured as specified for the field concrete. Three cylinders from each batch shall be tested at age 7 days, two at age 14 days, and one at age 28 days. Drying shrinkage shall be measured as specified in paragraph 03300-2.02 C.3.

2. Field Trial Mix: After acceptance of laboratory mix design and (except as noted below) prior to concrete placement, the **Contractor** shall establish, based upon the accepted design mixes, field proportions for the classes of concrete required. Field trial concrete shall be manufactured using the equipment to be used for the work. Minor adjustments shall be made in the design mixes to provide a dense, homogeneous, durable concrete with good workability and finishing qualities. Six standard test cylinders shall be obtained from the field trial mixes for concrete Classes A, B and C and tested as specified for mix design test cylinders. Drying shrinkage shall be measured as specified in paragraph 03300-2.02 C.3. The **Engineer** shall be notified one week in advance of field trial mix work; field trial mix work shall be performed with representatives of the **Engineer** and the testing laboratory being present. Sampling and testing of concrete shall be done by the independent testing laboratory specified in paragraph 03300-1.02 A. Certified copies of the laboratory test results shall be submitted to the **Engineer**. The **Contractor** may, solely at his own risk, produce, sample, and test field trial mixes for submittal concurrent with the submittal of the mix design required in paragraph 03300-2.02 C.1.

Concrete shall not be placed in the field prior to acceptance of the field trial mix.

3. **Drying Shrinkage:** Drying shrinkage specimens shall be prepared from the same concrete used for preparing compression test cylinders for mix design and for field trial mix and are required only for Classes A, B and C concrete. From each mix, three specimens shall be prepared. The drying shrinkage specimens shall be 4 x 4 x 11-inch prisms with an effective gage length of 10 inches, prepared, cured, dried and measured in accordance with ASTM C157 and as modified herein. Specimens shall be removed from molds at an age of 23 ± 1 hour after batching and shall be placed immediately in water at $73 \pm 3^{\circ}\text{F}$. Expansion, expressed as a percentage of original length, shall be measured at age seven days. This length at age seven days shall be the base length for drying shrinkage calculations. Specimens shall then be stored immediately in a humidity control room maintained at $73 \pm 3^{\circ}\text{F}$ and 50 ± 4 percent relative humidity for the remainder of the test measurement, to determine the drying shrinkage, expressed as percentage of base length, shall be made and reported separately for 7, 14, 21 and 28 days of drying after seven days of moist curing.

The average drying shrinkage of each group of the test specimens after 28 days of drying shall not exceed the following:

<u>Specimen</u>	<u>Drying shrinkage, percent</u>
Mix design	0.042
Field trial	0.053

2.03 WATERSTOPS

A. General

1. Waterstops of the type specified herein shall be embedded in the concrete across joints as shown. All waterstops shall be fully continuous for the extent of the joint. When splices are necessary to provide such continuity, perform the work in conformance with printed instructions of manufacturer of the waterstops. Support and protect the waterstops throughout the work and repair or replace any waterstops damaged during the progress of the work at no additional cost to the **City**. Store all waterstops to permit free circulation of air around the waterstop material.
2. If any waterstop is installed in the concrete on one side of a joint, while the other half or portion of the waterstop remains exposed to the atmosphere for more than two days, then shade and protect the exposed waterstop from direct rays of the sun during the entire exposure and until the exposed portion of the waterstop is embedded in concrete.

B. Splices in Waterstops

1. Perform by heat sealing the adjacent waterstop sections in accordance with the manufacturer's printed recommendations. It is essential that:
 - a. The material not become damaged by heat sealing.
 - b. The splices have a tensile strength of not less than 60 percent of the unspliced materials tensile strength.
 - c. The continuity of the waterstop ribs and of its tubular center axis be maintained.
2. Butt joints of the ends of two identical waterstop sections may be made while the material is in the forms.
3. Prior to placement in the forms, prefabricate all joints with waterstops involving more than two ends to be jointed together, and all joints which involve an angle cut, alignment change, or the joining of two dissimilar waterstop sections; allow not less than 24-inch long strips of waterstop material beyond the joint. After inspection and approval of the prefabricated waterstop joint assemblies, install the assemblies in the forms and butt weld the ends of the 24-inch strips to the straight run portions of waterstop in place in the forms.
4. Where a centerbulb waterstop intersects and is jointed with a non-centerbulb waterstop, exercise care to seal the end of the centerbulb, using additional PVC material if needed.

C. Joint Construction

1. Setting Waterstops
 - a. To eliminate faulty installation that may result in joint leakage, exercise care to correctly position the waterstops during installation. Adequately support and anchor the waterstops during the progress of the work to insure the proper embedment in the concrete. Equally divide the symmetrical halves of the waterstops between the concrete pours at the joints. The center axis of the waterstops shall be coincident with the joint openings. Ensure maximum density and imperviousness of the concrete by thoroughly working it in the vicinity of all joints.
 - b. When placing flat-strip waterstops in the forms, prevent them from being folded over by the concrete as it is placed. Unless otherwise shown, secure all waterstops with light wire ties on 12-inch centers that pass through the edge of the waterstop and are tied to the curtain of reinforcing steel. Horizontal

waterstops, with their flat face in a vertical plane, shall be held in place with continuous supports to which the top edge of the waterstop shall be tacked. When placing concrete around horizontal waterstops, with their flat face in a horizontal plane, work concrete under the waterstops by hand to avoid the formation of air and rock pockets.

- c. When placing centerbulb waterstops in expansion joints, the centerbulb shall be centered on the joint filler material.
 - d. Terminate waterstops in vertical wall joints 6 inches from the top of the wall when such waterstops do not connect with any other waterstop and are not to be extended for a future concrete placement.
2. Joint Location: Provide construction joints, and other types of joints, where shown on the Contract Drawings. If not shown, provide construction joints at 40-foot maximum spacing for all concrete construction, unless noted otherwise. Submit the location of all joints, of any type, to the **Engineer** for acceptance.
3. Joint Preparation: Exercise special care in preparing concrete surfaces at joints where bonding between two sections of concrete is required. Unless otherwise shown, such bonding will be required at all horizontal joints in walls. Surfaces shall be prepared in accordance with the requirements of Section 03300 – Cast-In-Place Concrete. Except on horizontal wall construction joints, wall to slab joints or where otherwise shown or specified, at all joints where waterstops are required, coat the joint face of the first pour with a bond breaker as specified herein.
4. Construction Joint Sealant
- a. Where groove and sealant is noted on the Contract Drawings, provide a construction joint with tapered grooves and fill with approved construction joint sealant. The material used for forming the tapered grooves shall be left in the grooves until just before the grooves are cleaned and filled with joint sealant. After removing the forms from the grooves, remove all laitance and fins, and sand-blast the grooves. Allow the grooves to become thoroughly dry, and then blow out; immediately thereafter, prime them, place bond breaker tape in the bottom of the groove, and fill grooves with the construction joint sealant. The primer used shall be supplied by the same manufacturer supplying the sealant. Do not use sealant without a primer. Exercise care to completely fill the sealant grooves. Areas designated to receive a sealant fillet shall be thoroughly cleaned, as outlined for the tapered grooves, prior to application of the sealant.

- b. Place the primer and sealant strictly in accordance with the printed recommendations of the manufacturer, taking special care to properly mix the sealant prior to application. Do not coat the sides of the sealant groove with bond breaker, curing compound, or any other substance that would interfere with proper bonding of the sealant. All sealant shall achieve final cure at least seven (7) days before the structure is filled with water.
- c. All sealant shall be installed by a competent waterproofing specialty **Contractor** who has a successful record of performance in similar installations.
- d. Thorough, uniform mixing of two-part, catalyst-cured materials is essential; exercise special care to properly mix the sealer before its application.
- e. Any joint sealant which, after the manufacturer's recommended curing time for the job conditions of the work hereunder, fails to fully and properly cure shall be completely removed; the groove shall be thoroughly sandblasted to remove all traces of the uncured or partially cured sealant and primer, and shall be re-sealed with the specified joint sealant. All costs of such removal, joint treatment, re-sealing, and appurtenant work shall be at the expense of the **Contractor**.

D. PVC Waterstops

- 1. General: Waterstops shall be extruded from an elastomeric polyvinyl chloride compound containing the plasticizers, resins, stabilizers, and other materials necessary to meet the requirements of these Specifications. No reclaimed or scrap material shall be used. The **Contractor** shall obtain from the waterstop manufacturer and shall furnish to the **Engineer** for review, current test reports and a written certification of the manufacturer that the material to be shipped to the job meets the physical requirements as outlined in the U.S. Army Corps of Engineers (USACE) Specification CRD-C572 and those listed herein.
- 2. Flatstrip and Center-Bulb Waterstops: Flatstrip and center-bulb waterstops shall be as indicated; provided, that at no place shall the thickness of flat strip waterstops, including the center bulb type, be less than 3/8-inch.
- 3. Multi-Rib Waterstops: Multi-rib waterstops, where required, shall be as indicated. Prefabricated joint fittings shall be used at all intersections of the ribbed-type waterstops.
- 4. Other Types of Waterstops: When other types of waterstops, not listed above, are required, they shall be subjected to the same requirements as those listed herein.

5. Waterstop Performance Requirements: When tested in accordance with the specified test standards, the waterstop material shall meet or exceed the following requirements:

Property	Test Method	Required Limits
Water Absorption	ASTM D 570	0.15% max
Tear Resistance	ASTM D 624	200lb/in (35 kN/m) min.
Ultimate Elongation	ASTM D 638	350% min.
Tensile Strength	ASTM D 638	2000 psi (13.78 Mpa) min.
Low Temperature Brittleness	ASTM D 756	No Failure @ -35°F (-37°C)
Stiffness in Flexure	ASTM D 747	600 psi (4.13 Mpa) min.
Specific Gravity	ASTM D 792	1.45 max.
Hardness, Shore A	ASTM D 2240	79 ± 3
Tensile Strength after accelerated extraction	CRD-C 572	1850 psi (11.03 Mpa) min.
Elongation after accelerated extraction	CRD-C 572	300% min.
Effect of Alkalis after 7 days: Weight Change Hardness Change	CRD-C 572	between -0.10% / +0.25% +/- 5 points

E. Hydrophilic Rubber

- Where a hydrophilic rubber waterstop, as supplied by Greenstreak, is called for, install in conformance with the manufacturer's instructions and recommendations; except, as modified herein.
- Hydrophilic rubber waterstop shall only be used where complete confinement by concrete is provided. Hydrophilic rubber waterstop shall not be used in expansion or contraction joints nor in the first six inches of any intersecting joint.
- The hydrophilic rubber waterstop shall be located as near as possible to the center of the joint and it shall be continuous around the entire joint. The minimum distance from the edge of the waterstop to the face of the member shall be five inches.
- Where the thickness of the concrete member to be placed on the hydrophilic rubber waterstop is less than 12 inches, the waterstop shall be placed in grooves formed or ground into the concrete. The groove shall be at least ¾-inch deep and 1¼-inch wide. When placed in the groove, the minimum distance from the edge of the waterstop to the face of the member shall be 2.5 inches.

5. Where a hydrophilic rubber waterstop is used in combination with PVC waterstop, the hydrophilic rubber waterstop shall overlap the PVC waterstop for a minimum of 12 inches and shall be placed in contact with the PVC waterstop.
6. The hydrophilic rubber waterstop shall not be placed when the temperature of the waterstop material is below 40°F. The waterstop material may be warmed so that it shall remain above 40°F during placement; however, means used to warm the material shall in no way harm the material or its properties. The waterstop shall not be installed where the air temperature falls outside the manufacturer's recommendation range.
7. The concrete surface under the hydrophilic rubber waterstop shall be smooth and uniform. The concrete shall be ground smooth if needed. Alternately, the hydrophilic rubber waterstop shall be bonded to the surface using an epoxy gel adhesive that completely fills all voids and irregularities beneath the waterstop material. Prior to installation, the concrete surface shall be wire brushed to remove any laitance or other materials that may interfere with the bonding of the adhesive.

2.04 SEALANTS AND JOINT FILLERS

- A. Sealants and preformed joint fillers shall be as specified in Section 07900 – Caulking and Sealants.

2.05 BONDING COMPOUNDS

- A. Epoxy resin bonding compounds shall be used for wet areas and shall be Adhesive Engineering, Concrese Nos. 1001, 1001-LPL or 1180 as applicable; Sika Chemical Corporation, Sikadur 35, Hi-Mod LV, Sikadur 32, Hi-Mod, or Sikadur 31, Hi-Mod Gel, Sikatop 111 as applicable; The Burke Company 881 LPL Epoxy; or equal.

Non-epoxy bonding compounds shall be used for dry areas and shall be The Burke Company, Acrylic Bondcrete; Imperial Chemical Industrial, Inc., Thoro System Products, Acryl 60; Thorobond; or equal.

Bonding compounds shall be applied in accordance with the manufacturer's instructions.

2.06 RETARDANT

Retardant for exposing aggregates for nonformed surfaces in construction joints shall be Sika Rugasol-S, Horn Aggretex-H, The Burke Company True Etch Surface Retarder, or equal. Retardant shall be applied in accordance with manufacturer's instructions sufficient to assure a minimum penetration of 1/8 inch.

2.07 SURFACE HARDENER

Surface hardener shall be premixed, noncolored, nonmetallic Master Builders, Mastercron; Sonneborn, Harcol; A. C. Horn Inc., Durafax; The Burke Company Non-Metallic Floor Hardener; or equal. Surface hardener shall be applied in accordance with manufacturer's instructions. Product and/or application procedure shall be compatible with concrete having air contents as noted in paragraph 03300-2.01 D.3.

2.08 CURING AND SEALING COMPOUNDS

Curing and sealing compound shall be Master Builders, Masterseal; A. C. Horn Inc., Horn Clearseal EM180; The Burke Company Spartan-Cote WB Cure Seal Hardener; or equal, conforming to ASTM C309. Curing compounds shall be clear and shall be applied in accordance with the manufacturer's instructions, except as otherwise specified.

2.09 FORMS

Forms shall conform to ACI 347 and shall be designed and constructed to provide the finish specified in paragraph 03300-3.12 B.

2.10 PRODUCT DATA

- A. Each load of ready-mixed concrete delivered to the job site shall be accompanied by a delivery ticket showing the information listed in ASTM C94, Section 16. Each delivery ticket shall be provided as product data in accordance with Section 01300 – Submittals.
- B. Manufacturer's Data: Copies of manufacturer's data shall be provided for the following:
 - 1. Waterstops.
 - 2. Retardants.
 - 3. Curing compounds.
 - 4. Bonding compounds.
 - 5. Surface hardener.
 - 6. Pozzolan.

- C. Laboratory Test Reports: Before delivery of materials, copies of the reports of the tests specified herein shall be provided. Test reports on previously tested materials shall be accompanied by the manufacturer's statement that the previously tested material is the same type, quality, manufacture and make as that proposed for use in this project. Test reports are required for the following:
1. Cement.
 2. Aggregates.
 3. Pozzolan.
 4. Admixtures.
 5. Curing compounds.
 6. Retardants.
 7. Bonding compounds.
 8. Concrete strength, slump, temperature, and air content.
 9. Final laboratory report.
- D. Ready-Mixed Concrete Truck Delivery Tickets: Each load of ready-mixed concrete delivered to the job site shall be accompanied by a delivery ticket showing the information listed in ASTM C94, Section 16.
- E. Evidence of Testing Laboratory Competence: The **Contractor** shall require that the laboratory provide directly to the **Engineer** evidence of the most recent inspection of its facilities by the Cement and Concrete Reference Laboratory of the National Bureau of Standards. The evidence shall show that deficiencies mentioned in the report of that inspection have been corrected. The evidence of inspection shall be provided prior to beginning the work of this Section.

PART 3 – EXECUTION

3.01 GENERAL

- A. As provided in the general conditions, the **Owner** is defining the quality of cast-in-place concrete by specifying in this part some of the means, methods, techniques, sequences and procedures for construction of cast-in-place concrete. The **Contractor**, without relinquishing authority and responsibility for supervision and direction of the work, agrees to follow the specified means, methods, techniques, sequences and procedures.

Except as specified under paragraphs 03300-1.03 and 2.02, field quality control tests for concrete strength will be conducted by the **Owner**. The **Contractor** shall notify the **Engineer** at least two days in advance whenever a sample and test of concrete materials is required by these specifications.

3.02 CONCRETE

- A. Concrete shall be truck-mixed, ready-mixed concrete conforming to the applicable portions of ASTM C94. Materials shall be proportioned by weighing. Pozzolan shall be introduced into the mixer with cement and other components of the concrete mix; pozzolan shall not be introduced into a wet mixer ahead of other materials or with mixing water. Water shall be introduced at the time of charging the mixer; additional water may be introduced within 45 minutes from charging the mixer, provided the specified slump is not exceeded; or the **Contractor** shall be responsible for producing concrete of the specified characteristics. He shall arrange with his testing laboratory for inspection as required to comply with these specifications.

Concrete shall be delivered to the site of work and discharge shall be completed within 1½ hours after introduction of the water to the mixture.

3.03 CONVEYING AND PLACING CONCRETE

- A. Conveying Concrete: Concrete shall be conveyed from the mixer to the forms in accordance with ACI 301, Chapter 8. Concrete which has segregated in conveying shall be removed from the site of the work.

B. Placing Concrete

1. General: Concrete shall be placed in accordance with ACI 301, Chapter 8, and ACI 304, Chapter 6.
2. Placing Concrete by Pumping: Pumped concrete shall be the class and consistency specified in paragraph 03300-2.02 A for the use specified in paragraph 03300-2.02 B and in accordance with a design accepted under paragraphs 03300-2.02 C.1 and 03300-2.02 C.2.

Slump shall be measured at the hose discharge. Slump loss in pumping, measured between the pumping unit inlet hopper and the hose discharge, shall not exceed one inch. Before starting each pumping operation, the pump and line shall be primed with a cement slurry to lubricate the system. Cement slurry shall be wasted outside the forms.

3. Placing Concrete in Hot Weather: In hot weather (above 85°F), concrete shall be placed in accordance with ACI 305.

4. Placing Concrete in Cold Weather: In cold weather (below 45°F), concrete shall be placed in accordance with ACI 306R.
- C. Consolidating Concrete: Concrete shall be consolidated in accordance with ACI 301, Chapter 8. Concrete placing shall be suspended if proper consolidation is not being secured until proper consolidation can be achieved.
- D. Whenever the air temperature exceeds 80°F or the wind speed exceeds 15 mph at the time of placement, concrete in slabs shall be treated as follows. Immediately after the concrete has been screeded, it shall be treated with a liquid evaporation retardant in accordance with the manufacturer's printed instructions. The retardant shall be used again after each work operation as necessary to prevent drying shrinkage cracks. The evaporation retardant shall be Confilm as manufactured by Master Builders, Eucobar as manufactured by Euclid Chemical Company, or equal.

3.04 FORMWORK

- A. Formwork shall conform to ACI 347. All forms shall be sealed and shall be sufficiently tight to prevent loss of mortar from the concrete. The **Contractor** shall design and construct all formwork systems to provide only those lines and delineations indicated, unless otherwise approved by the **Engineer**. Formwork shall be constructed to allow erection in proper sequence and to permit removal without damage to the finished concrete surfaces.

The **Contractor** shall design, construct, and erect all forms for reuse; withdraw projecting nails or other objects from contact surfaces before reusing; clean and completely recondition all forms prior to reuse; and repair any damage to forming surfaces caused during previous usage. Approval of the **Engineer** shall be required for each reuse. Formwork with patches or repairs affecting appearance of the concrete surfaces will not be permitted. The **Contractor** is responsible for the strength and suitability of the formwork.

Unless otherwise specified, exposed edges of concrete on the outside of structures and all those in the inside of structures shall be chamfered or beveled at an angle of 45 degrees by using a PVC chamfer strip with nailing leg, such bevel being 3/4-inch on a side. If so directed by the **Engineer**, however, the **Contractor** shall provide square edges for any portion of the work. Tape and seal all reveal strips to prevent leakage and leave a perfectly smooth finish.

3.05 CURING AND SEALING

- A. General: Concrete curing shall be completed by water curing or by using a clear membrane curing compound or by a combination of both methods. Repairs or

treatment of concrete surfaces shall be coordinated so that interruption of the curing will not be necessary.

Concrete surface temperature shall be maintained between 50°F and 80°F for at least five days. Curing concrete in hot weather (above 85°F) shall be in accordance with ACI 305 R. Curing concrete in cold weather (below 45°F) shall be in accordance with ACI 306 R.

- B. Water Curing: When water curing is used, concrete shall be kept wet continuously for a minimum of 10 days after placement. Absorptive mats or fabric may be used to retain moisture during the curing period.

Unless otherwise specified, water curing shall be used in hot weather for water containment structures. Forms shall be covered and kept moist. The forms shall be loosened, as soon as possible without damage to the concrete, and provisions made for curing water to run down inside them. During form removal, care shall be taken to provide wet cover to newly exposed surfaces. At the end of the specified curing period, the covering shall be left in place without wetting for several days.

- C. Curing Compound: When curing compound is used, it shall be applied as soon as the concrete has set sufficiently so as not to be marred by the application or immediately following form removal for vertical and other formed surfaces. Preparation of surfaces, quantities used, application procedures, and installation precautions shall be followed in strict compliance with the manufacturer's instructions.

Curing compound shall not be used on concrete surfaces to be coated, waterproofed, moisture-proofed, tiled, roofed, or where other coverings are to be bonded, unless the curing compound is compatible with the final finish covering or it is removed prior to covering.

3.06 PROTECTION

- A. Concrete shall be protected from injurious action by sun, rain, flowing water, frost and mechanical injury, and shall not be allowed to dry out from the time it is placed until the expiration of curing periods.

Steel troweled slabs shall be protected with kraft paper, 6-mil thick polyethylene membrane, or other similar waterproof material for at least two weeks after placement. Joints between adjacent strips of the paper shall be sealed. Float or broom finished slabs need be protected after curing only in areas subject to damage during construction.

Arrangements for covering, insulating, and protecting concrete in cold weather shall be in accordance with ACI 306 R.

3.07 CONSTRUCTION JOINTS

- A. General: Concrete in each unit of construction shall be placed continuously. Before new concrete is placed on or against concrete which has set, forms shall be retightened and the surface of the set concrete shall be cleaned of foreign matter. Watertight joints shall be provided as specified in paragraph 03300-3.10.
- B. Construction: Construction joints shall be formed as specified. A rough surface of exposed concrete aggregates shall be produced using a surface retardant at construction joints, including joints between slab and topping concrete. The limit of the treated surfaces shall be one inch away from the joint edges. Within 24 hours after placing, retarded surface mortar shall be removed either by high pressure water jetting or stiff brushing or combination of both so as to expose coarse aggregates. A rough surface of exposed aggregate may also be produced by sandblasting followed by high pressure water jetting. Sandblasting, if used, shall remove 1/8-inch of laitance film and shall expose coarse aggregate to insure adequate bond and watertightness at the construction joints.
- C. Locations: Construction joint locations shall be as follows:
1. Walls exceeding 50 feet in length shall be cast in panels not to exceed 40 feet in length. Where the number of panels is three or more, the panels shall be cast in an alternating pattern, unless five days have elapsed between castings of adjoining panels.
 2. Joints in beams or girders shall be located at or near the midpoint between supports.
 3. Joints in the members of a floor system shall be made at or near the center of the span.
 4. Joints in walls and columns shall be at the underside of floors, slabs, beams or girders and at the tops of footings or floor slabs. Joints in columns shall be perpendicular to the axis.
 5. Slabs shall be cast in panels not to exceed 40 feet in length or not to exceed 1,600 square feet in area. Panels shall be cast in checkerboard patterns. Minimum lapsed time between placing adjacent panels shall be 24 hours.

Vertical construction joints shall be grooved at exposed faces. Grooves subjected to wetting or weather shall be calked with joint sealer as specified.

Reinforcing steel and welded wire fabric shall be continued across construction joints. Girders and floor slabs shall not be constructed over columns or walls until at least one hour has elapsed to allow for shrinkage in the column or wall. No joint will be allowed between a slab and a beam or girder unless otherwise specified. Joints shall be perpendicular to the main reinforcement. Waterstops shall be provided in construction joints at locations as specified in paragraph 03300-3.10.

3.08 INSERTS AND EMBEDMENTS

- A. Inserts: Where pipes, castings or conduits are to pass through structures, the **Contractor** shall place such pipes or castings in the forms before placing the concrete, or he may provide openings in the concrete for subsequent insertion of such pipes, castings or conduits. Such openings shall be provided with waterstops and V-shaped construction joint as shown and shall have a slight flare to facilitate grouting and permit the escape of entrained air during grouting. Horizontal conduits, where shown in structural slabs and beams, shall be placed between the top and bottom layers of reinforcement.

Additional reinforcement shall be provided around large openings as shown. The grout shall be nonshrink grout as specified in Section 03600 – Grout.

- B. Embedments: Gate frames, gate thimbles, special castings, channels or other miscellaneous metal parts that are to be embedded in the concrete shall be set and secured in the forms prior to concrete placement. Unless otherwise specified, anchor bolts and inserts shall be embedded in concrete as shown. The **Contractor** shall provide inserts, anchors or other bolts necessary for the attachment of piping, valves, metal parts and equipment. Nailing blocks, plugs, strips, and the like necessary for the attachment of trim, finish and similar work shall be provided. Voids in sleeves, inserts and anchor slots shall be filled temporarily with readily removable material to prevent the entry of concrete into the voids. Operators or sleeves for gate or valve stems shall be positioned to clear reinforcing steel, conduit and other embedments, and to align accurately with equipment.

3.09 EXPANSION JOINTS

- A. Expansion joints shall be as shown. Reinforcement or other embedded metal items bonded to the concrete shall not extend through expansion joints. Waterstops shall be provided in expansion joints as specified in paragraph 03300-3.10.

3.10 WATERSTOPS

- A. Waterstops shall conform to ACI 301, paragraph 6.3. Waterstops shall be securely held in position during placing of concrete. If, after placing concrete, waterstops are materially out of position or shape, the surrounding concrete shall be removed, the waterstop reset, and concrete replaced in accordance with paragraph 03300-3.11.
- B. Waterstops shall be provided where indicated on the Contract Drawings and at the following joints:
- C. Expansion joints in structures.
- D. Joints in parts of structures exposed to ground or water on one side and occupied by nonsubmerged equipment or by personnel on the other.
- E. Wall and slab joints of tanks and channels subject to water pressure. Waterstops shall be provided from six inches above high water level to structural foundation slab or footing, or as otherwise noted on the drawings.

Field splices are acceptable only in straight sections. Crosses, tees, and other shapes shall be fabricated prior to delivery to the site of the work.

3.11 MODIFICATION OF EXISTING CONCRETE

- A. Existing concrete shall be removed and the remaining surfaces resurfaced as specified. The remaining concrete shall be protected from damage. Where possible, clean lines shall be made by sawing through the existing concrete. The concrete may be broken out after initial saw cuts in the event thickness prevents cutting through. Where it is not possible to use a saw, the initial cuts shall be made with chipping hammers. These cuts shall be sufficient to prevent damage to the remaining concrete. In general, an opening in existing concrete shall be oversized one inch on all sides and built back to the correct dimension with an epoxy grout. Where oversized openings cannot be made, the concrete shall be cut to the correct dimension, with the exposed reinforcing cut back an additional one inch and the resulting hole filled with epoxy grout. Cut or broken concrete surfaces shall be resurfaced with an epoxy grout. Concrete surfaces to be coated shall be dry. Where new concrete adjoins existing concrete surfaces or surfaces which have been cut, such surfaces shall be cleaned by sandblasting to remove laitance, loose coatings and foreign materials, and coated with the bonding compound just prior to the placement of the new concrete. Bonding compounds shall be as specified in paragraph 03300-2.05. Unless otherwise specified, continuity of reinforcing steel shall be obtained across the joint either by exposing existing bars to provide sufficient laps with new bars or by welding existing bars with new bars. Where shown, dowels shall be drilled and set with epoxy grout into existing concrete.

3.12 FORMED SURFACE FINISHES

- A. Repair of Minor Surface Defects: Surface defects, including tie holes, minor honeycombing or otherwise defective concrete shall be repaired in accordance with ACI 301, Chapter 9. Areas to be patched shall be cleaned. Minor honeycombed or otherwise defective areas shall be cut out to solid concrete to a depth of at least one inch. The edges of the cut shall be perpendicular to the surface of the concrete. Patches on exposed surfaces shall be finished to match the adjoining surfaces after they have set. Patches shall be kept continuously wet for 48 hours and further cured as specified for the concrete. Finished surfaces shall be protected from stains and abrasions. Finishes shall be equal in workmanship, texture and general appearance to that of the adjacent concrete.
- B. Major Concrete Defects: Concrete with honeycombing, voids or rock pockets which exposes the reinforcing steel or with defects which affect structural strength may be cause for reject of the work as determined by the **Engineer**. If acceptable repairs can be made without adversely affecting the structural integrity of the work, remove the section and either dry pack, or reform and repour to match the adjacent structure. Do not cut the reinforcing, but cut keys into the adjacent sound concrete to securely fasten the patch to the original work. Prepare edges of the damaged area with a minimum of a one-inch cut perpendicular to the concrete surface. Coat all surfaces with an approved epoxy bonding compound prior to patching and in accordance with the epoxy manufacturer's instructions. Provide a patch with strength and modulus of elasticity compatible with the parent concrete. Repaired concrete must be kept continuously wet for 48 hours and further cured as specified for the concrete. Finished surfaces shall be protected from stains and abrasions. Finishes shall be equal in workmanship, texture and general appearance to that of the adjacent concrete.

All major concrete repair procedures and methods must be submitted to the **Engineer** and approved by the **Engineer** prior to making such repairs.

- C. Formed Surface Finishing: Formed surfaces shall be finished as soon as practicable after form removal and repair of surface defects. Finishes shall be as follows.
1. Finish A: Finish A shall be a grout clean finish in accordance with ACI 301, Section 10.3.2. Surfaces shall be lightly sandblasted prior to sacking. For interior areas not exposed to moisture or weather, water used in the mortar shall be mixed with a PVA bonding compound as recommended by the manufacturer. Finish A shall be provided for painted and unpainted surfaces; surfaces of stair wells; interior surfaces of equipment rooms, galleries and tunnels; operations areas; exposed channels and tanks from one foot below minimum water surfaces and up; and permanently exposed vertical and sloped surfaces, such as pipe chases. Finish A shall also be provided on the floors and full depth of the walls of the UV channels between the inlet baffle plates and the level control gates.

2. Finish B: Finish B shall be the same as Finish A, except that the final burlap rubbing may be omitted, providing the steel trowel scraping removes the loose buildup from the surface. Finish B shall be provided for waterproof and moisture proof coated surfaces.
3. Finish C: Finish C shall be referred to as a finish, which has surface imperfections less than 3/8-inch in any dimension. Surface imperfections greater than 3/8-inch shall be repaired or removed and the affected areas neatly patched. Finish C or smoother shall be provided for interior surfaces of wet wells, tanks and channels from one foot below minimum water surfaces and down and otherwise unfinished interior surfaces.
4. Finish D: Finish D shall be the finish for surfaces which may be left as they come from the forms, except that tie holes shall be plugged and defects greater than ½ inch in any dimension shall be repaired.

3.13 SLAB FINISHES

- A. General: The finishes specified herein include surface finishes, treatments and toppings for floors and slabs. Floors shall be sloped to drain uniformly. Unless otherwise specified, slope shall be minimum 1/8-inch per foot towards nearest drain. Where finish is not specified, floor slabs shall receive steel troweling. Dry cement shall not be used on new concrete surfaces to absorb excess moisture. Edges shall be rounded to a radius of ½ inch. Joints shall be grooved to a radius and depth of ¼ inch each. Finishes shall match the sample panels provided under paragraph 03300-1.03.
- B. Float Finish: Float finish shall conform to ACI 301, Section 11.7.2. Floating shall be performed with a hand or power-driven float. Floating of any one area shall be the minimum necessary to produce the finish specified. Floating shall compact and smooth the surface and close any cracks and checking of surfaces. Float finish shall be applied to surfaces of channel and tank bottom slabs and to footings.
- C. Steel Trowel Finish: Steel trowel finish shall conform to ACI 301, Section 11.7.3. Immediately after final troweling, the surface shall be cured and protected as specified in paragraphs 03300-3.04 and 03300-3.05. Hard steel trowel finish shall be provided on all slabs and floors unless specified otherwise. Surface hardener shall be troweled into the finished surface where specified.
- D. Broomed Finish: Broomed finish shall conform to ACI 301, Section 11.7.4. Broomed finish shall be provided for walks, tops of tanks, slabs on grade exposed to atmosphere, and where otherwise indicated or specified.

- E. Samples of Concrete Floor Finishes: A sample concrete panel, four feet by four feet, four inches thick, representative of each specified finish, shall be provided to the **Engineer**. The panels shall be representative of the workmanship and finishes required. Samples shall be approved in field prior to the start of such work

3.14 TOPPING CONCRETE

- A. Subfloor Finish: Slabs to receive topping, tile or grout as shown shall be float finished to required elevations. Immediately following the final finishing, the slab shall be treated with a retardant.
- B. Topping Concrete: These requirements shall apply to the placement of normal concrete topping, with or without surface hardener, on a hardened base slab.

Slabs to receive topping concrete shall have an exposed aggregate subfloor finish as specified in paragraph 03300-3.14 A. Dirt, laitance and loose aggregate shall be removed. The cleaned base shall be kept wet for a period of 24 hours prior to the application of topping. Excess water shall be removed, and a neat cement grout shall be applied and brushed into the surface of the base. The cement grout shall not be allowed to dry and shall be spread within 15 minutes of the topping placement. The topping shall then be placed to grade, compacted by rolling or tamping, and floated. The surface shall be tested with a straightedge to detect high and low spots of over 1/8 inch in 10 feet which shall be eliminated. Surface hardener shall be incorporated where specified. When the floor has hardened sufficiently, it shall receive a hard steel trowel finish.

3.15 RELATED SURFACES

- A. Monolithic Surfacing: Monolithic surfacing shall be provided on floor areas as specified. Monolithic surfacing shall consist of a steel trowel finish hardened with a surface hardener as specified in paragraph 03300-2.07. Surface hardener shall be applied in an amount of at least 0.75 pounds per square foot. Surface hardener shall be applied in accordance with the manufacturer's recommendations and directions.
- B. Stair Tread: Stair tread shall be constructed with nonskid nosing as specified in Section 13237. Tread shall have a steel trowel finish with surface hardener and shall have a slope of 1/8 inch per foot toward the front. Ends of treads shall have a 1/16 to 1/8-inch cut between concrete and metal tread to allow for expansion.
- C. Grooved Border: Provide grooved border as shown on drawings.

D. Finishing Of Unformed Surfaces: Related Unformed Surfaces. Tops of walls or buttresses, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces shall be struck smooth after concrete is placed and shall be floated to a texture reasonably consistent with that of the adjacent formed surfaces. Final treatment of formed surfaces shall continue uniformly across the unformed surfaces.

1. Pavements and Sidewalks: The surfaces of the concrete shall be screeded to grade and sloped to drain. After screeding, the surface shall receive a broomed finish as specified in paragraph 03300-3.13 D. Edges and expansion joints shall be rounded to a radius of ½ inch. Joints shall be grooved to a radius and depth of ¼ inch each.

3.16 FIELD SAMPLING AND TESTS

A. General: Field sampling and testing will be performed by the independent testing laboratory specified in paragraph 03300-1.02 B. Samples of aggregates and concrete will be taken at random locations and at such times to represent the quality of the materials and work throughout the project. The laboratory will provide the necessary labor, materials and facilities for sampling the aggregate and for casting, handling and storing the concrete samples at the site of work. Aggregates will be sampled in accordance with paragraph 03300-3.16 B not less than 30 days prior to the use of such aggregates in the work. The minimum number of samples and tests are specified in paragraph 03300-3.16 C. Field sampling and tests will be by the **Owner** as specified in paragraph 03300-3.01.

B. Sampling

1. Aggregates

- a. General: Fine and coarse aggregates will be sampled in accordance with ASTM D75. Samples will be taken at the discharge gates of the bins feeding the weigh hopper. The **Contractor** shall provide safe and suitable facilities for obtaining samples. Samples will be obtained at the concrete batch plant at the frequency specified in paragraph 03300-3.16 C. Sampling will be repeated when the source of material is changed or when unacceptable deficiencies or variations from the specified requirements of materials are found in testing. Aggregate samples will be tagged and their sources identified.
- b. Coarse Aggregate: A sample weighing between 50 and 60 pounds will be taken after the batch plant is brought up to full operation. The samples will be taken so that a uniform cross-section, accurately representing the materials on the belt or in the bins, is obtained.

- c. Fine Aggregate: Samples will be taken as specified for coarse aggregate. The samples will be taken for sieve analysis of fine aggregate and specific gravity tests. Samples of sand will be taken when the sand is moist.
2. Concrete: Samples of plastic concrete will be obtained in accordance with ASTM C172. Samples for pumped concrete will be taken at the hose discharge point. Samples for other concrete will be taken at the hopper of concreting equipment or transit mix truck.

C. Testing

1. Aggregate: A minimum of one test of coarse aggregate per 400 cubic yards of concrete and a minimum of one test of fine aggregate per 200 cubic yards of concrete used will be made to confirm continuing conformance with specifications for gradation, cleanliness and sand equivalent. A maximum of one test per day of each aggregate is required. The full test program is required before source changes will be accepted.
2. Concrete: Strength Tests: The strengths specified for the design mix will be verified by the **Owner's** testing laboratory during placement of the concrete. Verification will be accomplished by testing standard cylinders of concrete samples taken at the job site.

Standard cylinders will represent the concrete placed in the forms. One set of four standard cylinders will be cast of each class of concrete for each 100 cubic yards or less or for each 4,000 square feet of surface area poured per day. A fifth cylinder will be cast for every three sets of four cylinders, typical at each structure. Casting, handling and curing of cylinders will be in accordance with ASTM C31. Additional cylinders will be provided when an error in batching is suspected. For the first 24 hours after casting, the cylinders will be kept moist in a Storage box constructed and located so that its interior air temperature will be between 60 and 80 degrees F. At the end of 24 hours, the cylinders will be transported to the testing laboratory.

Testing of specimens for compressive strength will be in accordance with ASTM C39. Tests will be made at 7, 14, and 28 days from time of casting. One test cylinder from each group of four will be tested at the end of 7 and 14 days and two will be tested at the end of 28 days. The fifth cylinder will be tested at the end of 90 days only. A strength test will consist of the average strength of two cylinders cast from material taken from a single load of concrete.

Each strength test result will be the average of the strengths of two test cylinders at 28 days, except that if one cylinder in a set of two shows evidence of low strength due to improper sampling, casting, handling or curing, the result of the remaining one cylinder will be used.

The average of any three consecutive 28-day strength test results of the cylinders representing each class of concrete for each structure shall be equal to or greater than the specified strength and not more than 10 percent of the strength test results shall have values less than the specified 28-day strength for the total job concrete. No individual strength test results shall be less than the specified strength by more than 500 pounds per square inch.

Certified reports of the test results will be available to the **Contractor**. Test reports will include sufficient information to identify the mix used, the stationing or location of the concrete placement, and the quantity placed. Slump, air content, temperature of concrete, and ambient temperature will be noted. The 28-day strength test results will be evaluated in accordance with ACI 214. Quality control charts showing field test results will be included with the test results for each class of concrete in each major structure. Charts will be prepared in accordance with ACI 214. Quality control charts will be maintained throughout the entire job and will be available for the **Contractor's** review at any time.

If the 28-day test results fall below the specified compressive strength for the class of concrete required for any portion of the work, adjustment in the proportions, water content, or both, shall be made as necessary at the **Contractor's** expense. Changes and adjustments shall be reported in writing to the **Engineer**.

If compressive test results indicate concrete in place may not meet structural requirements, tests shall be made to determine if the structure or portion thereof is structurally sound. Tests may include, but not be limited to, cores in accordance with ASTM C42 and any other analyses or load tests acceptable to the **Engineer**. Costs of such tests shall be borne by the **Contractor**.

- a. Tests for Consistency of Concrete: The slump shall be as specified when measured in accordance with ASTM C143. Samples for slump determination will be taken from the concrete during placing. Tests will be made at the beginning of concrete placement operation and at subsequent intervals to insure that the specification requirements are met. Slump tests will also be performed whenever standard cylinders are cast.

- b. Tests for Temperature and Air Content: Temperature tests will be made at frequent intervals during hot or cold weather conditions until satisfactory temperature control is established. Whenever standard cylinders are cast, temperature tests will be performed.

Air content shall be as specified when measured in accordance with ASTM C231. Air content will be measured whenever standard cylinders are cast.

- D. Final Laboratory Report: A final report, prepared by the **Owner's** testing laboratory, will be provided at the completion of all concreting. This report will summarize the findings concerning concrete used in the project and provide totals of concrete used by class and structure. Final quality control charts for compressive strength tests for classes of concrete specified in each major structure will be included. The report will also include the concrete batch plant's coefficient of variation and standard deviation results for each class of concrete as determined in accordance with ACI 214.

3.17 WATERTIGHTNESS, TESTING AND REPAIR

- A. Concrete tanks, channels, sumps, and basins which have walls or slabs that are designed to contain liquids (water, chemicals, sewage) or common with areas occupied by equipment or personnel and subjected to hydrostatic pressure, shall be tested for watertightness. The tests shall be made prior to application of waterproofing coating. Testing shall consist of filling the tank with water to the maximum operating water surface for at least 24 hours. Visible damp spots, leakage, or seepage revealed by the test, including those caused by shrinkage of concrete, honeycombed areas, construction joints, or other sources shall be repaired by either or both of the following methods:

1. Grouting of the joint by drilling grout holes to the affected crack or honeycombed area, installing injection ports and forcing epoxy grout into the joint under pressure.
2. Cutting of a bevel groove on the waterside of the joint. The groove shall be ½ inch to ¾ inch in width and depth and shall be calked with epoxy joint sealer in accordance with manufacturer's instructions.

The test requirements shall be in accordance with Section 03310 – Hydraulic Structure Testing. Continue the test and repair procedure until the structure satisfies the leakage calculation requirement and the visible leakage requirement. Visible leaks are any damp spots that can be picked up with and are visible on a facial tissue.

The **Contractor** shall retest tanks or channels which have been repaired to check the suitability of repairs. Water required for the testing and retesting shall be provided by the **Contractor** and disposed of so as not to create a nuisance.

3.18 CLEANUP

- A. Upon completion of the work and prior to final inspection, the **Contractor** shall clean all concrete surfaces. The cleaning procedures shall be as follows: After sweeping with an ordinary broom to remove the loose dirt, the surface shall be flushed with clean water. Final scrubbing by hand or machine shall follow.

Floors having curing and sealing compound shall be cleaned of loose dirt and debris by sweeping with ordinary brooms. They shall then be washed and mopped with clean water. Finally, one additional coat of the same clear curing and sealing compound shall be applied in the same manner as specified.

**** END OF SECTION ****

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SECTION 03600

GROUT

PART 1 – GENERAL

1.01 DESCRIPTION

- A. This Section specifies grout for uses other than masonry.

1.02 QUALITY ASSURANCE

- A. Quality Control by **Contractor**: To demonstrate conformance with the specified requirements for grout, the **Contractor** shall provide the services of an independent testing laboratory which complies with the requirements of ASTM E329. The testing laboratory shall sample and test grout materials as required in this section. Costs of testing laboratory services shall be borne by the **Contractor**.

1.03 SUBMITTALS

- A. Comply with Section 01300 – Submittals.
- B. Include a copy of this specification section with addendum updates, all referenced and applicable sections, and each paragraph check-marked to indicate specification compliance or marked to indicate requested deviations from specification requirements.
 - 1. Use check marks (✓) to denote full compliance with a paragraph as a whole.
 - 2. If deviations from the specifications are indicated and, therefore requested by the **Contractor**, underline each deviation and denote by a number in the margin to the right of the identified paragraph.
 - 3. The remaining portions of the paragraph not underlined will signify compliance on the part of the **Contractor** with the specifications.
 - 4. Include a detailed, written justification for each deviation.
 - 5. Failure to comply with this paragraph is sufficient cause to reject the entire submittal.

C. Manufacturer's Data: Manufacturer's data shall be provided for the following:

1. Bonding compounds.
2. Nonshrink grout.
3. Pressure grout.
4. Retardants.
5. Epoxy grout.
6. Polymer concrete.

D. Laboratory Test Reports: Test reports on previously tested materials shall be accompanied by the manufacturer's statement that the previously tested material is the same type, quality, manufacture, and make as that proposed for use in this project. Test reports are required for the following:

1. Cement.
2. Aggregates.
3. Retardants.
4. Bonding compounds.
5. Epoxy resin.

E. Evidence of Testing Laboratory Competence: The **Contractor** shall require that the laboratory provide directly to the **Engineer** evidence of the most recent inspection of its facilities by the Cement and Concrete Reference Laboratory of the National Bureau of Standards. The evidences shall show that deficiencies mentioned in the report of that inspection have been corrected. The evidence of inspection shall be provided prior to delivery of materials to the job site.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Cement: Portland Cement shall be ASTM C150, Type II or Type V, low alkali, containing less than 0.60 percent alkalis.

B. Aggregate

1. General: Aggregate shall be nonreactive and shall be washed before use. When sources of aggregate are changed, test reports shall be provided for the new material. The tests specified shall be performed prior to commencing grout work.
2. Fine Aggregate: Fine aggregate shall be hard, dense, durable particles of either sand or crushed stone regularly graded from coarse to fine and shall conform to ASTM C33 as modified herein. When tested in accordance with ASTM C136, gradation shall be such that 100 percent by weight will pass a standard No. 8 mesh sieve and no less than 45 percent by weight will pass a standard No. 40 mesh sieve.

Variation from the specified gradations in individual tests will be acceptable if the average of three consecutive tests is within the specified limits and the variation is within the permissible variation listed below:

U.S. Standard	Permissible Variation In
<u>Sieve Size</u>	<u>Individual Tests, Percent</u>
30 or coarser	2.0
50 or finer	0.5

Other tests shall be in accordance with the following specifications:

Test	Test method	Requirements
Organic Impurities	ASTM C40	Color lighter than standard
Amount of Material Passing No. 200 Sieve	ASTM C117	3% maximum by weight
Soundness	ASTM C88	10% maximum loss with sodium sulfate
Reactivity	ASTM C289	Innocuous aggregate
Sand Equivalent	ASTM D2419	Minimum 80

C. Admixtures

1. General: Admixtures shall be compatible with the grout. Calcium chloride or admixtures containing calcium chloride are not acceptable. Admixtures shall be used in accordance with the manufacturer's recommendations and shall be added separately to the grout mix.

2. Water Reducing Retarder: Water reducing retarder shall be ASTM C494 Type D and shall be Master Builders Pozzolith 300-R, Sika Corporation Plastiment, or equal.
 3. Lubricant for Cement Pressure Grouting: Lubricant additive for cement pressure grouting shall be Intrusion Prepakt Intrusion Aid, Sika Intraplast N, or equal.
- D. Water: Water for washing aggregate, for mixing and for curing shall be free from oil and deleterious amounts of acids, alkalies, and organic materials; shall not contain more than 1000 mg/l of chlorides as Cl, nor more than 1300 mg/l of sulfates as SO₄; and shall not contain an amount of impurities that may cause a change of more than 25 percent in the setting time of the cement nor a reduction of more than five percent in the compressive strength of the grout at 14 days when compared with the result obtained with distilled water. Additionally, water used for curing shall not contain an amount of impurities sufficient to discolor the grout.

2.02 GROUT

- A. Drypack Grout: Drypack grout shall be a mixture of approximately one part cement, one and one-half to two parts sand, water reducing retarder, and sufficient water to make a stiff workable mix.
- B. Cement Grout: Cement grout shall be a mixture of one part cement, two parts sand, proportioned by volume, admixtures for pressure grouting, and sufficient water to form a workable mix.
- C. Nonshrink Grout: Nonshrink grout is available with both metallic and nonmetallic aggregate. Metallic aggregate grout shall be Master Builders Embeco 636, The Burke Company Metallic Spec Grout, Sonnoborn Ferrolith G Redimix, or equal. Nonmetallic aggregate grout shall be Five Star Products, Inc. Five Star Grout, Master Builders Masterflow 713, The Burke Company Non-Ferrous, Non-Shrink Grout, or equal.
- D. Epoxy Grout for Crack Repair and Dowel Anchorage: Except as noted below, epoxy grout shall be a high modulus, two-component, moisture-insensitive, 100-percent solids, thermosetting modified polyamid epoxy compound. The consistency shall be a paste form capable of not sagging in horizontal or overhead anchoring configurations. Material shall conform to ASTM C881, Type 1, Grade 3, such as Adhesive Engineering Concrecive 1440 series, Sika Corporation Sikadur Hi-Mod Series, Adhesive Technology Corporation Solidbond 200, or equal, and shall have a heat deflection temperature in excess of 130°F.

Epoxy for pressure grouting/crack injection shall be a two-component, moisture-insensitive, high modulus, injection grade, 100 percent solids, blend of epoxy-resin compounds. The consistency shall be as required to achieve complete penetration in hairline cracks and larger. Material shall conform to ASTM C881, Type 1, Grade 1, such as Sika Corporation Sikadur 52, Adhesive Engineering Company SCB products, Adhesive Technology Corporation SLV 300 series, or equal.

- E. Polymer Concrete (for Resurfacing or Patching): Polymer concrete (for resurfacing or patching) shall consist of a liquid binder and dry aggregate mixed together to make a mortar or grout of a consistency as required for the application. The liquid binder shall be a chemical and oil resistant, stress relieved, low modulus, moisture insensitive, two-component epoxy-resin compound. The consistency shall be similar to lightweight oil for proper mixing with aggregate. Material shall conform to ASTM C881, Type 3, Grade 1, such as Sika Corporation Sikadur Lo-Mod series, Adhesive Engineering Concrecive 1470, Adhesive Technology Corporation 400 series, or equal.

The aggregate shall be oven dry in sealed packages until time of mixing, and shall be of size and consistency compatible with recommendations of manufacturer of liquid binder for intended application.

- F. Adhesive Capsules for Dowel Anchorage: Adhesive resin capsules shall consist of sealed glass capsules containing premeasured amounts of a polyester or vinylester resin, quartz sand aggregate and a hardener contained in a separate vial within the capsule. Adhesive capsules shall be Hilti HEA Capsules, Molly Parabond Capsules, or equal.

2.03 PRESSURE GROUTING EQUIPMENT

Pressure grouting equipment shall include a mixer and holdover agitator tanks and shall be designed to place grout at pressures up to 50 psi. Gages shall be provided to indicate pressure used. The mixer shall be provided with a meter capable of indicating to one-tenth of a cubic foot the volume of grout used.

- A. Manufacturer's Data: Manufacturer's data shall be provided for the following:

1. Bonding compounds.
2. Nonshrink grout.
3. Pressure grout.
4. Retardants.
5. Epoxy grout.
6. Polymer concrete.

- B. Laboratory Test Reports: Test reports on previously tested materials shall be accompanied by the manufacturer's statement that the previously tested material is the same type, quality, manufacture, and make as that proposed for use in this project. Test reports are required for the following:
1. Cement.
 2. Aggregates.
 3. Retardants.
 4. Bonding compounds.
 5. Epoxy resin.
- C. Evidence of Testing Laboratory Competence: The **Contractor** shall require that the laboratory provide directly to the **Engineer** evidence of the most recent inspection of its facilities by the Cement and Concrete Reference Laboratory of the National Bureau of Standards. The evidences shall show that deficiencies mentioned in the report of that inspection have been corrected. The evidence of inspection shall be provided prior to delivery of materials to the job site.

PART 3 – EXECUTION

3.01 GENERAL

Bonding compound for use with grout is specified in Section 03300 – Cast-In-Place Concrete. Primer, if required for polymer concrete, shall be provided per manufacturer's recommendation.

3.02 DRYPACK GROUT

Drypack grout shall be used for built-up surfaces, setting miscellaneous metal items and minor repairs.

Surfaces required to be built up with drypack grout shall be roughened by brushing, cleaned, and coated with the bonding compound specified in paragraph 03300-2.05 before the application of the grout. The drypack grout shall be applied immediately following the application of the bonding compound in bands or strips to form a covering of the required thickness. The covering shall be smooth. Construction joints in the grout shall be sloped and shall be cleaned and wetted before application is resumed.

Drypack grout shall be cured in accordance with Section 03300 – Cast-In-Place Concrete.

Grout shall not be placed during freezing weather unless adequate protection is provided.

3.03 CEMENT GROUT

Cement grout shall be used for filling nonbearing portions of equipment pads and pressure grouting.

Except for the specialized equipment for pressure grouting, mixing and placing apparatus shall be similar to that normally used for cast-in-place concrete. Grout shall be mixed for a period of at least one minute. Diluted grout shall be agitated to keep ingredients mixed.

3.04 NONSHRINK GROUT

Nonshrink, nonmetallic aggregate grout shall be used for the bearing surfaces of machinery and equipment bases, column base plates and bearing plates. Nonshrink metallic aggregate grout shall be used for setting anchor bolts and grouting reinforcing steel holes. Grout shall meet the requirements of CRD-C621 and shall be placed in accordance with manufacturer's instructions.

Holes required for grouting shall be blown clean with compressed air and left free of dust or standing water. Horizontal holes for grouting shall be drilled at a slight downward angle to facilitate holding the grout until setting is complete. Bolts or reinforcing steel installed in horizontal grout holes shall be bent slightly accordingly.

3.05 EPOXY GROUT

Epoxy grout shall be used for repairing cracks by pressure grouting or gravity flow, repairing structural concrete, and may be used for setting reinforcing dowels or anchor bolts into holes for grouting. Concrete shall be primed in accordance with the grout manufacturer's instructions.

Use of epoxy grout for anchorage of bolts or reinforcing dowels shall be subject to the following conditions:

- A. Use shall be limited to locations where exposure, on an intermittent or continuous basis, to acid concentrations higher than 10 percent, to chlorine gas, or to machine or diesel oils, is extremely unlikely.
- B. Use shall be limited to applications where exposure to fire or exposure to concrete or rod temperature above the product's heat deflection temperature or 120 degrees F (whichever is less) is extremely unlikely. Overhead applications (such as pipe supports) because of the above concerns, shall be disallowed.

- C. Approval from **Engineer** for specific application and from supplier of equipment to be anchored, if applicable.
- D. Anchor diameter and grade of steel shall be per contract documents or per equipment supplier specifications. Anchor shall be threaded or deformed full length of embedment and shall be free of rust, scale, grease, and oils.
- E. Embedment depth and hole diameter shall be as specified.
- F. Holes shall have rough surfaces, such as can be achieved using a rotary percussion drill.
- G. Holes shall be blown clean with compressed air and be free of dust or standing water prior to application of grout.
- H. Anchor shall be left undisturbed and unloaded for full curing period.
- I. Anchors shall not be placed in concrete below 25°F.

3.06 ADHESIVE CAPSULES

Adhesive resin capsules may be used for setting and anchoring reinforcing dowels or anchor bolts into predrilled holes in concrete. Use of the adhesive resin capsules for anchorage of reinforcing dowels or bolts shall be as specified in paragraph 05501-3.03.

3.07 PRESSURE GROUTING

Prior to grouting, systems and holes to be grouted shall be washed clean. Washing is not required for grouting soil voids outside pipe cylinders or casing pipes. Grouting, once commenced, shall be completed without stoppage. In case of breakdown of equipment, the **Contractor** shall wash out the grouting system sufficiently to ensure fresh grout and adequate bond and penetration will occur upon restarting the grouting operation. Grout pressure shall be maintained until grout has set.

****** END OF SECTION ******

SECTION 05501

ANCHOR BOLTS AND ANCHORING DEVICES

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Anchor bolts, concrete anchors and other anchoring devices.

1.02 DESIGN REQUIREMENTS

- A. Seismic and Wind Design Requirements shall be as shown on Drawing G-02.
- B. Where specified in the individual equipment sections, provide calculations and supporting drawings and details prepared and signed by a professional civil or structural engineer registered in the state of California. Submit with equipment.

1.03 SUBMITTALS

- A. Comply with Section 01300 – Submittals.
- B. Include a copy of this specification section with addendum updates, all referenced and applicable sections, and each paragraph check-marked to indicate specification compliance or marked to indicate requested deviations from specification requirements.
 - 1. Use check marks (✓) to denote full compliance with a paragraph as a whole.
 - 2. If deviations from the specifications are indicated and, therefore requested by the **Contractor**, underline each deviation and denote by a number in the margin to the right of the identified paragraph.
 - 3. The remaining portions of the paragraph not underlined will signify compliance on the part of the **Contractor** with the specifications.
 - 4. Include a detailed, written justification for each deviation.
 - 5. Failure to comply with this paragraph is sufficient cause to reject the entire submittal.

C. Include the following items:

1. Product Data: Manufacturer's data for nuts, bolts, concrete anchors, chemical anchors and other fasteners.
2. Catalog data and ICC reports for each type of anchor bolt.

1.04 QUALITY ASSURANCE

- A. Provide special inspection for the installation of chemical anchors in accordance with sections 1704.4 and 1704.13 of the CBC and with the requirements stated in ICC Product Evaluation Service Report.
- B. Do not use expansion-type concrete anchors or adhesive-type anchors set in holes drilled in the concrete as a substitution for cast-in-place anchor bolts.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Unless otherwise specified or indicated on the Drawings, materials of construction for anchoring devices shall conform to the following:
 1. Anchor bolts and other anchoring devices, nuts and washers installed indoors: Type 304 stainless steel.
 2. Anchor bolts and other anchoring devices, nuts and washers installed outdoors or in locations exposed to wastewater: Type 316 stainless steel.

2.02 ANCHORING DEVICES

- A. Cast-in-Place Anchor Bolts
 1. Conform to ASTM A320.
 2. Minimum Length of Bolt: Provide bolt length such that the length of the embedded anchor is at least 10 bolt diameters.
 3. Minimum length of 90-degree hook: four bolt diameters.
- B. Concrete Anchors
 1. Concrete Anchors: Drilled in place wedge-type anchors are not allowed.

C. Studs

1. ASTM A 108 with 50,000 pounds per square inch minimum yield strength, and 60,000 pounds per square inch minimum tensile strength.
2. Manufacturers: One of the following or equal:
 - a. Nelson Stud Welding Company, S3L Shear Connectors or H4L Concrete Anchors.
 - b. Stud Welding Products, Headed Concrete Anchors and Shear Connectors or Concrete Anchors.

D. Chemical Anchors

1. Do not use in overhead applications, in chlorine gas environments, or where anchor may be exposed to machine or diesel oils.
2. Materials: Type 304 stainless steel all-thread rod with vinyl ester resin adhesive.
 - a. Stainless steel all-thread rod: Conform with ASTM F 593.
3. Manufacturers: One of the following or equal:
 - a. Hilti HIT-HY 150 MAX (wet or dry).
 - b. Hilti HIT-RE 500 (submerged).
 - b. Simpson Set XP Adhesive.

PART 3 – EXECUTION

3.01 GENERAL ANCHORING REQUIREMENTS

- A. Install anchor bolts, concrete anchors and other anchoring devices with at least two threads projecting beyond the nut, but no more than ½ inch projecting beyond the nut.
- B. Prior to installing nuts, coat threads of stainless steel bolts with material to prevent galling of threads.
 1. Manufacturers: One of the following or equal:
 - a. Never Seez Compound Corporation, Never-Seez.
 - b. Oil Research, Inc., WLR No. 111.

- C. Tighten nuts on anchor bolts, concrete anchors and other anchoring devices to the "snug-tight" condition, defined as tightness attained by a few impacts of an impact wrench or the full effort of a man using an ordinary wrench.

3.02 CAST-IN-PLACE ANCHOR BOLTS

- A. Accurately place anchor bolts to be embedded in concrete within the formwork and perpendicular to surface from which they will project. Secure in correct position while concrete is placed.
- B. Do not allow anchor bolts to touch reinforcing steel. Where anchor bolts are within $\frac{1}{4}$ inch of reinforcing steel, isolate with a minimum of four wraps of 10-mil polyvinyl chloride tape in area adjacent to reinforcing steel.
- C. In anchoring machinery bases subject to heavy vibration, use two nuts, with one serving as a locknut.
- D. Where bolts are indicated on the Contract Drawings for future use, first coat thoroughly with non-oxidizing wax, then turn nuts down full depth of thread and neatly wrap exposed thread with waterproof polyvinyl tape.
- E. Where indicated on the Contract Drawings, set anchor bolts in metal sleeves having inside diameter approximately two inches greater than the bolt diameter and a minimum of 10-bolt diameters deep. Fill sleeves with grout when equipment is grouted in place.
- F. Anchor bolts may be cast in concrete in lieu of using concrete anchors.

3.03 CONCRETE ANCHORS AND CHEMICAL ANCHORS

- A. Do not use concrete anchors or chemical anchors in lieu of anchor bolts.
- B. Drill holes using concrete drill bits and impact type drill motors. Hole diameter shall be in accordance with the manufacturer's recommendations.
- C. Clean drilled hole using compressed air to dislodge and remove drilling dust.
- D. Accurately locate concrete anchors and set perpendicular to surfaces from which they will project. Minimum embedment lengths as indicated on the Contract Drawings.

**** END OF SECTION ****

SECTION 05505

MISCELLANEOUS METALWORK

PART 1 – GENERAL

1.01 SCOPE

This Section specifies miscellaneous metalwork, which consists of custom fabricated steel metalwork other than structural metalwork.

1.02 QUALITY ASSURANCE

A. General: Shop and field welding shall conform to the requirements of the AISC Manual of Steel Construction.

The use of salvaged, reprocessed or scrap materials will not be permitted.

1.03 SUBMITTALS

A. Comply with Section 01300 – Submittals.

B. Include a copy of this specification section with addendum updates, all referenced and applicable sections, and each paragraph check-marked to indicate specification compliance or marked to indicate requested deviations from specification requirements.

1. Use check marks (✓) to denote full compliance with a paragraph as a whole.
2. If deviations from the specifications are indicated and therefore requested by the **Contractor**, underline each deviation and denote by a number in the margin to the right of the identified paragraph.
3. The remaining portions of the paragraph not underlined will signify compliance on the part of the **Contractor** with the specifications.
4. Include a detailed, written justification for each deviation.
5. Failure to comply with this paragraph is sufficient cause to reject the entire submittal.

C. Include the following items:

1. Manufacturer's catalog data confirming capacity and removal efficiency.

2. Dimensional drawings.
3. Parts list with materials of construction.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Nonstructural steel bars, angles, clips, and similar items: ASTM A36 or ASTM A283.
- B. Iron castings: ASTM A48.
- C. Structural steel tubing: ASTM A500, Grade B.
- D. Steel bolts (except flanges and anchor bolts): ASTM A307, Grade A.
- E. Stainless steel: ASTM A320, Type 304.

2.02 FABRICATION

A. General

1. Unless otherwise specified punch holes 1/16 inch larger than the nominal size of the bolts.
2. If needed because of the thickness of the metal, subpunch and ream, or drill holes.
3. Perform fabrication including cutting, drilling, punching, threading, and tapping required for miscellaneous metal or adjacent work prior to hot-dip galvanizing.

B. Seat Angles, Supports and Brackets

1. If seat angles pass over slide gate guides, weld to the guides.
2. If seat angles for grating, supports for floor plates, clips for precast panels and brackets for piping are specified as steel, hot-dip galvanized after fabrication.

C. Power Driven Pins

1. Power driven pins may be used in interior locations of nonprocess areas.
2. Material: heat-treated steel alloy per AISI 1062 or 4063 and zinc plated.
3. Provide pins with capped or threaded heads capable of transmitting the loads the shanks are required to support.

4. If pins are connected to steel, provide with longitudinal serrations around the circumference of the shank.
5. Provide complete information describing pin capacities and connections to the **Engineer**.
6. Obtain approval of the **Engineer** prior to the use of pins at all locations.

D. Iron Castings

1. Provide where specified on the drawings.
2. If castings weigh less than 100 pounds, hot dip galvanize after machining.
3. If castings weigh greater than 100 pounds, hot dip galvanize where specified.

E. Other Miscellaneous Steel Metalwork

1. Provide other miscellaneous steel metalwork including embedded and nonembedded steel metalwork, hangers and inserts as specified on the drawings. Hot-dip galvanize after fabrication.

PART 3 – EXECUTION

3.01 INSTALLATION

A. General

1. Fieldwork is not permitted on galvanized items. Drilling of bolts or enlargement of holes to correct misalignment will not be allowed.
2. Protect dissimilar metals from galvanic corrosion by means of pressure tapes, coatings or isolators.
3. Metalwork to be embedded in concrete: position accurately and hold in correct position while the concrete is placed; or, if specified, form recesses or blockouts in the concrete. Clean thoroughly all surfaces of metalwork in contact with or embedded in concrete. If approved by the Engineer, recesses may be neatly cored in the concrete after it has attained its design strength and the metalwork grouted in place. Construct embedments as specified in Section 03300 – Cast-In-Place Concrete.

- B. Seat Angles, Supports and Guides: Set seat angles for grating and supports for floor plates so that the floor and grating and floor plates are flush with the floor.

- C. Power Driven Pins: Retain a craftsman who is certified by the manufacturer to set power driven pins. Drive pins in one initial movement by an instantaneous force that has been selected to attain the required penetration. Comply with the following:

Material Penetrated by Pin	Penetrated Material's Minimum Thickness	Penetration of Pin's Shank in Supporting Material	Minimum Space from Center of Pin's Shank to Edge of Penetrated Material	Minimum Pin Spacing
Concrete	16D	6D Minimum	14D	20D
Steel	¼ Inch	Steel Thickness Plus 2D	4D	7D

Where D = Pin Shank Diameter.

When required by the **Engineer**, perform pullout tests to prove the effectiveness of the anchorage and the capacity of the pin.

3.02 CLEANING

- A. After installation, clean and touch damaged surfaces of shop-primed metals with the same material used for the shop coat. Repair damaged surfaces of galvanized metals as specified in Section 05910 – Hot Dip Zinc Coating.

****END OF SECTION****

SECTION 05910

HOT DIP ZINC COATING

PART 1 – GENERAL

1.01 SCOPE

Application of zinc coating to steel using the hot dip method.

1.02 SUBMITTALS

- A. Comply with Section 01300 – Submittals.
- B. Include a copy of this specification section with addendum updates, all referenced and applicable sections, and each paragraph check-marked to indicate specification compliance or marked to indicate requested deviations from specification requirements.
 - 1. Use check marks (✓) to denote full compliance with a paragraph as a whole.
 - 2. If deviations from the specifications are indicated and therefore requested by the **Contractor**, underline each deviation and denote by a number in the margin to the right of the identified paragraph.
 - 3. The remaining portions of the paragraph not underlined will signify compliance on the part of the **Contractor** with the specifications.
 - 4. Include a detailed, written justification for each deviation.
 - 5. Failure to comply with this paragraph is sufficient cause to reject the entire submittal.
- C. Include the following items:
 - 1. Manufacturer's product data showing conformance to the specified product.
 - 2. Narrative description of method for application of zinc coating.
 - 3. Coating applicator's Certificate of Compliance that the hot-dip galvanized coating meets or exceeds the specified requirements of ASTM A123 or A153, as applicable.
 - 4. Source quality control procedures.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Zinc Coating Material: In accordance with ASTM A153.
- B. Zinc Dust-Zinc Oxide Coating: Conform to MILSPEC DOD-P-21035. Manufactured by ZRC Worldwide, or equal.

2.02 FABRICATION REQUIREMENTS

- A. Comply with applicable portions of ASTM A143, A384 and A385.

PART 3 – EXECUTION

3.01 APPLICATION

- A. Where specified, galvanize steel members, fabrications, and assemblies after fabrication and in accordance with ASTM A123.
- B. Unless otherwise specified, hot-dip zinc coat steel items weighing 100 pounds or less.
- C. Galvanized Bolts and Nuts
 - 1. Bolts and nuts 5/8-inch in diameter and larger: Hot-dip zinc coated per ASTM A153.
 - 2. Bolts and nuts smaller than 5/8-inch and all other bolts, screws, nuts, washers and other minor steel fasteners: Mechanically zinc coated as specified in Section 05911 – Mechanical Zinc Coating.

3.02 COATING REQUIREMENTS

- A. Coating Thickness: Coating Grade 35 per ASTM A123, Table 2.

3.03 REPAIR OF DEFECTIVE GALVANIZED COATING

- A. Damaged Zinc Coating
 - 1. Clean substrate surface, then repair with zinc dust-zinc oxide coating per ASTM A780. Comply also with instructions published by the manufacturer of the zinc dust-zinc oxide coating.
 - 2. Apply multiple coats to achieve a dry film thickness of 8 mils.

- B. If items are not physically damaged, but have insufficient or deteriorating zinc coatings, or if items are damaged in shipment or prior to installation, remove items from the project site for repair by the hot-dip zinc coating method.

****END OF SECTION****

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SECTION 05911

MECHANICAL ZINC COATING

PART 1 – GENERAL

1.01 DESCRIPTION

- A. This Section specifies mechanically applied zinc coating. This coating shall be used on steel fasteners including bolts, screws, nuts and washers. Anchor bolts shall conform to Section 05501 – Anchor Bolts and Anchoring Devices. Electroplated corrosion protection is not an acceptable substitute for mechanical zinc coating.

1.02 QUALITY ASSURANCE

- A. Zinc Coating Thickness: Coating thickness shall be Class 50 as specified in ASTM B695.
- B. References: This Section contains references to 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.

Unless otherwise specified, references to documents shall mean the documents in effect at the time of Advertisement for Bids or Invitation to Bid (or on the effective date of the Agreement if there were no Bids). 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, whether or not the document has been superseded by a version with a later date, discontinued or replaced.

Reference	Title
ASTM A153	Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM B695	Coatings of Zinc Mechanically Deposited on Iron and Steel

PART 2 – PRODUCTS

2.01 MATERIALS

- A. The coating material shall be as specified in ASTM A153.

2.02 PRODUCT DATA

- A. Information shall be provided as product data that describes materials and methods of coating used in accordance with Section 01300 - Submittals.

PART 3 – EXECUTION

3.01 FIELD REPAIR

- A. Damaged surfaces of zinc coated metals shall be repaired as specified in Section 05910 – Hot Dip Zinc Coating.

****END OF SECTION****

SECTION 07900

CAULKING AND SEALANTS

PART 1 - GENERAL

1.01 SUMMARY

- A. Purpose
 - 1. The purpose of caulking in this work is to provide a positive barrier against the penetration of air and moisture at joints between items where caulking is essential to the continued integrity of the barrier or to finish construction.
 - 2. Such caulking will normally be performed under the work of various sections of these specifications but shall be performed in strict accordance with the provisions of this section.
 - 3. All sealants shall be installed prior to application of paints and waterproof coatings.
 - 4. All caulking, sealants and adhesives shall comply with Pollutant Control and VOC Limits per SCAQMD Rule 1168 and CGBSC Table 5.504.4.1 and Table 5.504.4.2
 - 5. Related work described elsewhere: Caulking in this work may be required in the execution of work of the various sections of these specifications.

1.02 REFERENCES

- A. SWRI (Sealant, Waterproofing and Restoration Institute) - Sealant and Caulking Guide Specifications.
- B. ASTM C1193 -Standard Guide Sealants
- C. ASTM C834 - Latex Sealing Compounds.
- D. ASTM C919 - Use of Sealants in Acoustical Applications.
- E. ASTM C920 - Elastomeric Joint Sealants.
- F. ASTM D1056 - Flexible Cellular Materials - Sponge or Expanded Rubber.

1.03 SUBMITTALS

- A. Comply with section 01300.
- B. MSDS data sheet.
- C. Samples:
 - 1. Samples of all exposed caulking and sealants are required for Architect's approval. Unless directed otherwise, apply samples in 6 inch runs in actual joints at the job site. The samples shall show the materials, workmanship, bond, and color of the caulking work throughout the project and shall match that of the approved sample joint.
 - 2. Samples: Submit two samples illustrating sealant colors for selection.

- D. Product Data: Provide manufacturer's data indicating sealant chemical characteristics, performance criteria, substrate preparation, limitations, and color availability.

1.04 QUALITY ASSURANCE

- A. Qualifications of applicators:
 - 1. Company specializing in performing the work of this section with 5 years minimum documented experience approved by manufacturer.
 - 2. Installation of caulking shall be performed only by workmen thoroughly skilled and specially trained in the techniques to apply caulking, and who are completely familiar with the written recommendations of the manufacturer of the caulking material used.
 - 3. Indication of lack of skill on the part of caulking installers shall be sufficient grounds for the Architect to reject installed caulking and to require its immediate removal and complete re-caulking at no additional cost to the Owner.
- B. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum five years documented experience.
- C. Inspection prior to installation: Applicator and/or sealant representative must provide a written statement prior to installation of the sealant that the areas to be sealed are acceptable. All corrections should be done before those areas are sealed.
- D. Perform work in accordance with SWRI requirements and as modified by sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- E. Perform acoustical sealant application work in accordance with ASTM C 919.
- F. Maintain one copy of each document on site.

1.05 PRODUCT HANDLING

- A. Storage
 - 1. Store all caulking materials and equipment under conditions recommended by its manufacturer.
 - 2. Do not use materials stored for a period of time exceeding the maximum recommended shelf life of the material.
- B. Protection: Use all means necessary to protect caulking materials before, during and after installation and to protect the installed work and materials of other trades.
- C. Handling: Comply with manufacturer's recommendations for proper handling and protection of sealant material.
- D. Repairs: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

1.06 COORDINATION

- A. Coordinate the work with all sections referencing this section.

1.07 JOB CONDITIONS

- A. Schedule operations so that working joints are most likely to be normal size. Apply materials within manufacturer recommended surfaces and ambient temperature ranges.

1.08 WARRANTY

- A. Include coverage for installed sealants accessories which fail to achieve airtight seal; watertight seal, and exhibit loss of adhesion or cohesion, or do not cure.
- B. Materials -10 years vertical, 5 years horizontal.
- C. Installation - Two (2) years.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. All materials, unless otherwise specifically approved by the Architect, shall be single or plural component, compatible with substrates, non-sagging or self-leveling, and non-staining type in neutral color, color per drawings or other color approved by the architect where exposed to view.

2.02 SEALANTS

- A. One of the following or an equal approved by the architect from manufacturer's standard colors, unless otherwise specified for this project:
- B. Silicone:
 - 1. One-part, conforming to ASTM C-920-87, Type S, Grade NS, Class 25 for construction joints, Chem-Calk1200 Bostik, Inc., Pecora 860, Pecora Corp., Dow Corning #795, General Electric Silpruf #2000 or equal.
 - 2. One-part conforming to ASTM C-920-87, Type S, Grade NS, Class 25, for glazing details, Chem-Calk1200 Bostik, Inc., Pecora 860, Pecora Corp Dow Corning #999, General Electric #4000 or #2000 or equal.
- C. Polyurethane:
 - 1. One-part, gun-grade sealant conforming to ASTM C920-87 Type s, Grade NS, Uses: expansion and control joints in metal curtain wall, perimeter of door and window framing; Chem-Calk 900 series by Bostik Inc., Dyna Trol I-XL by Pecora Corp. Sika-Flex 1-A or 15 L-M, or equal
 - 2. Two-part, gun-grade sealant conforming to ASTM 920 87 Type M, Grade M, Sika-Flex 2C-NS or equal.
 - 3. Two-part, self-leveling sealant conforming to ASTM C-920-87 type M, Grade P, 2C or equal. For Hard Traffic use: Chem-Calk 555-SL, Sika-Flex 7G.

- D. Interior Sealant: Acrylic Latex, one-part, gun-grade, paintable conforming to ASTM C-834-81, Chem-Calk 600 series or Pecora AC-20 plus silicone or equal.
- E. Acoustical Sealant: For concealed joints to control sound transmission dust and air. Henry's #313 or equal.
- F. Backer rod: All filler material shall be new and clean with no oils and non-staining. Shall be made of polyethylene foam, completely compatible with the caulking material and as recommended by the caulking manufacturer for the materials, joint conditions and use.

2.03 EQUIPMENT

- A. All equipment shall be only such equipment as is specifically recommended by the manufacturer of the caulking material being installed.

2.04 MIXING

- A. Follow manufacturer's mixing instructions for mixing ratios, temperature limitations and length of mixing times.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

- A. Inspection:
 - 1. Prior to all caulking, carefully inspect the surfaces to which caulking is to be applied and verify that they are clean, sound, and free from deleterious material which might adversely affect the bond.
 - 2. Verify that caulking may be installed in accordance with the manufacturer's recommendations.
- B. Corrections:
 - 1. Clean all surfaces as necessary.
 - 2. In the event of discrepancy, immediately notify the Architect.
 - 3. Do not proceed with installation of caulking in areas of discrepancy until all such discrepancies have been resolved.

3.02 CHOICE OF CAULKING MATERIAL

- A. Use only that caulking material which is best suited to the installation and is so recommended by the caulking material manufacturer.

3.03 PREPARATION AND INSTALLATION

- A. Joint Design: Size of joint shall be calculated to allow for anticipated movement to be within the capabilities of the approved sealant. Unless otherwise required by sealant manufacturer's printed recommendations, use backing material to control sealant depths as follows:
 - 1. Minimum Width: Not less than 1/4" wide.
 - 2. Minimum Depth: Not less than 1/4" deep.

3. Maximum Movement: The width of the joint shall be wide enough to allow the sealant to work within its limitations.
 4. Width/Depth Ratio: The depth of the sealant should be no greater than the width. As a general rule the width should be twice the depth. If joint width is over ½ inch, caulking shall remain ½ inch thick across joint.
- B. Joint Cleaning: Clean all joints thoroughly, and blow out or vacuum loose particles from joints. Material in contact with sealant shall be dry, fully cured, and free of laitance, loose aggregate, form release agents, curing compounds, water repellants, paint, and other surface treatments. Surfaces with protective coatings shall be cleaned to remove protective coatings or oil deposits. Joints in masonry and concrete work shall not be sealed until substrate has cured a minimum of 12 days minimum.
- C. Primers: Primer shall be provided on metal, masonry, concrete, and wood surfaces, and other surfaces as recommended by the sealant manufacturer. Primer shall not be applied to surfaces which will be exposed after caulking is completed.
- D. Joint Backing: Backing shall be installed in all joints to receive sealant. Backing shall be sized to require 20% to 50% compression upon insertion, and placed in accordance with "Joint Design" paragraph. In joints not of sufficient depth to allow backing, install bond breaking tape at back of joint. Avoid lengthwise stretching of backing material.
1. Backing material shall be a resilient type such as Soft-Backer Rod closed cell backer rod, as recommended by the manufacturer. Oakum or other types of absorptive materials shall not be used as a backing material. When closed cell backing is used, care must be exercised to avoid puncturing of the skin opening up the cell structure.
 2. Install closed cell rod 24 hours prior to application of sealant to allow outgassing of rod.

3.04 APPLICATION

- A. Apply sealant immediately after joints are cleaned, primed and backed. Work in vertical surfaces shall be done with standard hand-caulking guns or power actuated caulking guns. The sealant shall be extruded through nozzles of such diameter as to allow a full bead of materials to run into joint, and not to exceed width of joint. Force sealant into joint by tooling to insure full contact with side-walls and backing.

3.05 JOINT FINISHING

- A. Neatly tool joints to slightly concave surface using methods recommended by sealant manufacturers. Repair any air pockets exposed by tooling. Tool so as to compress material and improve adhesion to surface joints. At horizontal traffic joints, tool joints 1/8" below finish grades. At horizontal building flashing joints, tool material to divert water away from joint or to prevent the ability to collect water.

3.06 CLEAN UP

- A. All surfaces adjacent to the sealant shall be cleaned of all excess sealant or primer and left in neat condition subject to the approval of the Architect.

3.07 SCHEDULE

- A. Polyurethane: Concrete, aluminum, wood, door and window frames, exterior trim.
- B. Silicone: Glass to Glass, Glass to Aluminum, Solid Surfacing, Plastics and Metals, other as approved by material manufacture and Architect.
- C. Acrylic Latex: Interior Use Only. Paint, Gypsum Drywall, trim, etc

**** END OF SECTION ****

SECTION 07910

PREFORMED JOINT FILLERS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This section specifies preformed joint fillers as required to complete the required work as shown on the Drawings and specified herein.

1.02 REFERENCED SECTIONS

- A. Section 01300 – Submittals

1.03 QUALITY ASSURANCE

- A. Reference – 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 documents are included as references under this section as if referenced directly. In the event of conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.

Reference	Title
ASTM D994	Preformed Expansion Joint Filler for Concrete (Bituminous Type)

PART 2 - PRODUCTS

2.01 PREFORMED ASPHALT FIBERBOARD

- A. Preformed asphalt fiberboard joint filler shall be in accordance with ASTM D994 and shall be 1/2-inch thick unless otherwise specified.

2.02 PRODUCT DATA

- A. The Manufacturer's recommendations for the handling and installation of the material shall be provided in accordance with Section 01300.

PART 3 - EXECUTION

3.01 GENERAL

- A. Where it is necessary for the filler to be fixed to existing concrete or other building materials, a suitable adhesive recommended by the filler manufacturer shall be used. Filler surfaces shall be clean and dry prior to the placement of the concrete.

3.02 PREFORMED ASPHALT FIBERBOARD

- A. Preformed asphalt fiberboard joint fillers shall be used for expansion joints surrounding the wellhead concrete pedestal, between the pedestal exterior and the surrounding asphaltic concrete paving. Install after complete curing of the pedestal concrete, prior to pavement surfacing work.

****** END OF SECTION ******

SECTION 09900

PROTECTIVE COATINGS

PART 1 GENERAL

1.01 Summary

A. Section Includes:

1. Coat or paint all facilities and equipment which are part of this Contract.

B. Section Excludes:

1. Metal completely embedded in concrete (except aluminum).
2. Piping buried in ground or encased in concrete.
3. Items that are Hot Dipped Galvanized, unless otherwise noted on the Drawings.
4. Galvanized grating, galvanized bolts, and galvanized grating frames.
5. Chain link fence and galvanized fence gates.
6. Rubber.
7. Stainless steel.
8. Bronze, brass.
9. Nameplates and grease fittings.
10. Factory finished electrical panels.
11. Factory fusion epoxy coated items (except for field touchup).
12. Aluminum or galvanized ductwork enclosed inside furred ceiling spaces.
13. Aluminum handrail and aluminum guardrail.
14. Machined surfaces

C. Refer to additional coating work as noted on the Structural Drawings.

1.02 References

- A. Where standards of surface preparation are described by citing SSPC specification numbers reference is made to the “Steel Structures Painting Manual” Volume 2 published by the Steel Structures Painting Council.
- B. American Society of Testing and Materials (ASTM):
 - 1. ASTM D4060 Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser
 - 2. ASTM D2794 Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
 - 3. ASTM D4541 Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
 - 4. ASTM F1249 Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor

1.03 Definitions

- A. The term “paint”, “coatings”, or “finishes” as used herein, shall include surface treatments, emulsions, enamels, paints, epoxy resins, and all other protective coatings, excepting galvanizing or anodizing, whether used as a pretreatment, primer, intermediate coat, or finish coat.
- B. Dry Film Thickness (DFT): The prime coat and the sum of all fully cured applied coats for the paint system.
- C. Exterior Surface: Surface that is not inside a building or structure and is exposed to the weather. Epoxy surfaces that are affected by the ultraviolet rays from the sun shall be considered an exterior surface if the sun can shine on the surface.
- D. Stripe Coat: Coating applied to the edge, corner, welds or bolts which is applied prior to application of additional system coats.
- E. Submerged: Surfaces that are under water or the vertical extension of those walls that are partly under water during normal operating conditions.

1.04 Submittals

- A. Submit for approval in accordance with Section 01330 Submittals, and conform to the requirements herein.
- B. Prior to ordering material, submit a complete schedule of materials to be used. Include manufacturer's brand name, product name, and designation number for each coat of each system to be used.
- C. Prior to commencing work, submit a detailed list of all surfaces and equipment items upon which the Contractor intends to apply protective coatings.
- D. Provide the following information on each paint product:
 - 1. Abrasion resistance, ASTM D4060, 1 kg load at 1000 cycles, CS-17 wheel.
 - 2. Impact resistance, ASTM D2794, direct and reverse.
 - 3. Moisture vapor transmission, ASTM F1249.
 - 4. Adhesion, ASTM D4541.
- E. If materials other than those listed are submitted, submit additional information to **Engineer** for review and determination of equivalency to materials and systems specified.
- F. Provide Material Safety Data Sheets (MSDSs) for all products.
- G. Manufacturer's Certification: That products furnished meet applicable Air Quality Management District regulations as to allowable volatile organic compound (VOC) content for the place of application and use intended.
- H. Submit a full range of the manufacturer's standard and let down finish colors for review and selection by the Owner. After final colors have been selected, submit two 8-1/2 by 11-inch samples on cardboard of each color indexed as to manufacturer and color designation. Color chips 3/4-inch by 1-1/2-inch may be used for pipe color codes.
- I. Submit 4 pipe and equipment color code charts, 11 by 14 inches in size, with typed labels and using color chips. Upon favorable review, frame charts and mount under glass, suitable for hanging in work areas.

1.05 Quality Assurance

A. Environmental Regulatory Requirements:

1. All work, material, procedures, and practices under this Section shall conform to requirements of the local Air Resources Board or Air Quality Management District having jurisdiction. Prime or finish coat painting done in locations other than the project site shall be in accordance with air quality regulations in effect at the place the coating is applied. Products specified herein are, to the best of the Engineer's knowledge, in compliance with the applicable volatile organic compounds (VOC) levels allowable at the date these Specifications were issued for bid.
2. The Air Resources Board or Air Quality Management District having jurisdiction may prohibit the sale or application of paints and enamels containing more than the stipulated percentages of volatile organic solvents manufactured after a stated date. Provide material meeting applicable regulations effective at the date of manufacture, or if not available, provide top of the line materials developed as replacements for specified materials and meeting applicable regulations as to VOC solvents content.
3. If the Contractor applies coatings that have been modified or thinned other than as recommended by manufacturer, he will be responsible for any fines, costs, remedies or legal actions that may result.

1.06 Delivery, Storage and Handling

- A. Deliver all coating materials in unopened containers with manufacturer's label, which must include name, batch number and date and VOC content.
- B. Store in an assigned area onsite with concurrence from the coating manufacturers. Maintain Storage area clean and fire safe. Dispose of used rags, thinner and buckets daily. Store solvents in closed approved Storage containers.
- C. Submerge solvent soaked rags in water.

1.07 Project Conditions

A. Environmental Requirements:

1. Provide ambient temperatures recommended by manufacturer of material to be applied.
2. Provide adequate ventilation.

3. Provide 40- to 50-foot candles of illumination on all surfaces in areas to be painted including floors, walls and ceiling even though they do not require painting.
4. Use temporary dust barriers to close off areas being painted from areas where other work is being performed.

1.08 Colors and Samples

- A. Before starting work, obtain favorably reviewed color schedule.
- B. Colors are to be factory mixed, using light-fast colorants proportioned by accurate measurement into proper type base. All coatings must be formulated to perform in the climate and environment to which they will be exposed.

PART 2 PRODUCTS

2.01 Materials

- A. Paints used in each system to be the product of one manufacturer.
- B. Shop applied prime coats shall be compatible with the systems included in these specifications. If necessary, a barrier coat shall be applied between existing prime coat and subsequent field coats to ensure compatibility.
- C. Substituted coating systems shall be of the same generic type as those specified.
- D. Coating systems shall not contain lead.
- E. Abrasives shall not be classified a hazardous material under California Title 22.
- F. Materials: Paints and protective coatings listed in the Paint Systems and the Schedule in Part 3 of this Section refer to the following manufacturers and are specified as levels of quality. It is understood that the words "or equal" are included herein:
 1. AkzoNobel/Devoe Coatings (D)
 2. Sherwin Williams (SW)
 3. Kop Coat (K)
 4. Tnemec Co. (T)
 5. Roto Metals (RG)
 6. Protecto Wrap (PW)
 7. Tapecoat (TC)
 8. Chemical Products Co. (ZRC)
 9. PPG/Ameron (A)
 10. Thermecoat-Welco (TW)

11. CRC Industries (CRC)
12. Rustoleum (R)
13. Porter Hythane (PH)

2.02 Paint Systems

System 1: General Ferrous Exposed to Atmosphere

1st Coat - Bare Metal DFT = 5 - 8 mils	High Solids Epoxy	(D) Bar-Rust 235 or 231 (A) Amerlock 2, 400, or 600 (SW) Macropoxy 646
DFT = 2.5 - 3.5 mils	Zinc-Rich Polyurethane	(T) Series 94-H2O, Hydro-Zinc
Finish Coat(s) DFT = 5 - 6 mils	High Solids Epoxy	(D) Bar-Rust 235 or 231 (A) Amerlock 2, 400, or 600 (T) Series 188 (SW) Macropoxy 646
Final coat for exterior surfaces DFT = 2.5 - 3 mils additional	Aliphatic Polyurethane	(D) Devthane 379 (A) Pitthane Ultra 95-812 Series gloss (T) Series 1090 (SW) Hi Solids Poly 250

System 2: Galvanized Metal Surface Repair

One coat:		
To be left unpainted:	Eutectic-type repair	(TW) Gal-Viz (RG) ReGalv
To be painted:	High 92-95% Zinc content by weight	(ZRC) Cold Galv. Compound
DFT = 4 - 8 mils		(CRC) Zinc It (A) Amerlock 2AL (D) Interzinc 52
DFT = 2.5 – 3.5 mils		(T) Series 94-H2O, Hydro-Zinc

System 3: Submerged Ferrous Metal (NOT USED)

1st Coat - Bare Metal	High Solids Epoxy	(D) Bar-Rust 233H or Interline 850
DFT = 6 - 8 mils	(NSF Approved)	(A) NovaGuard 840 (T) Series L140F, Pota-Pox + (SW) Sherplate 600
Finish Coat(s)		(A) NovaGuard 840
DFT = 6 - 8 mils		(SW) Sherplate 600
Total DFT = 12 - 16 mils		(T) Series L140F, Pota-Pox +

System 4: Bleeding Surfaces: (Not buried)

1st Coat(s)	High Solids Epoxy	(D) Bar Rust 235
DFT = 5 - 6 mils		(A) Amerlock 2, 400, or 600 (T) Series 188 (SW) Macropoxy 646
Finish Coat(s)	High Solids Epoxy	(D) Bar Rust 235
DFT = 5 - 6 mils		(A) Amerlock 2, 400, or 600
Total DFT = 10 - 12 mils		(T) Series 188 (SW) Macropoxy 646
Final coat for exterior surfaces	Aliphatic Polyurethane	(D) Devthane 379
DFT = 2.5 - 3 mils additional		(A) Pitthane Ultra 95-812 Series gloss (T) Series 1090 (SW) Hi Solids Poly 250

System 5: Prefinished Machinery Coating (Other than prime coat)

One coat	Aliphatic Polyurethane	(D) Devthane 379
DFT = 3 mils		(A) AmershielVOC (T) Series 1090 (SW) Hi Solids Poly 250

System 6: Galvanized Steel and Non-Ferrous Metals

1st Coat(s)	High Solids Epoxy	(D) Tru-Glaze 4030 or Devran 201H (A) Amerlock 2, 400, or 600 (SW) Macropoxy 646 (T) Series 115
DFT = 5 - 8 mils		
DFT = 2 - 4 mils	Hydrophobic Acrylic	
Finish Coat(s)	High Solids Epoxy	(D) Bar Rust 235 (A) Amerlock 2, 400, or 600 (SW) Macropoxy 646 (T) Series 1029, Enduratone
DFT = 5 - 8 mils		
DFT = 2 - 3 mils	High Dispersion Pure Acrylic	
Final coat for exterior surfaces	Aliphatic Polyurethane	(D) Devthane 379 (A) Pitthane Ultra 95-812 Series gloss (SW) Hi Solids Poly 250
DFT = 2 - 3 mils additional		

System 7: Miscellaneous Service Coating

One full brush coat	Coal Tar or High Solids Epoxy	(K) Bituplastic #33 (A) SigmaShield 880 (T) Series 46H-413, Hi-Build Tneme-Tar
DFT = 20 - 30 mils		
DFT = 8 - 10 mils		

System 8: Buried Valves (NOT USED)

One full brush coat	Coal Tar or High Solids Epoxy	(D) Interzone 984 (PW) 160/160 H Mastic (TC) TC Masti (A) SigmaShield 880 (T) Series 46H-413, Hi-Build Tneme-Tar (SW) Targuard B69 Series
DFT = 20 - 30 mils		
DFT = 16 - 20 mils		
1st Coat(s)		
DFT = 8 - 16 mils		
Finish Coat(s)		(SW) Targuard B69 Series
DFT = 8 - 16 mils		
Total DFT = 16 - 32 mils		

System 9: Welded Steel Water Storage Tanks and Pressure Vessels (NOT USED)

Interior -

Three coats min.

High Solids Epoxy
(NSF Approved)

DFT = 25 mils

(A) Novaguard 810 ER
(SW) SherPlate PW
(T) Series 22, Epoxoline
(D) Enviroline 2405

DFT = 20 mils

Exterior -

Prime Coat

High Solids Epoxy

DFT = 3 - 4 mils

DFT = 5 - 10 mils

DFT = 4 - 6 mils

(A) Amercoat 68HS
(SW) Macropoxy 646 FC
(D) Interseal 670HS or
Bar Rust 231
(T) Series 94-H2O, Hydro-Zinc

DFT = 2.5 - 3.5 mils

Zinc-Rich Polyurethane

Intermediate Coat

High Solids Epoxy

DFT = 4 - 6 mils

(T) Series L69, Hi-Build
Epoxoline II
(D) Interseal 670HS or
Bar Rust 231

Finish Coat
- Exterior Surfaces

Aliphatic Polyurethane

DFT = 5 mils

(A) PSX 700
(SW) Sher-Loxane 800
(T) Series 1095, Endura-Shield

DFT = 2 - 3 mils

(D) Interthane 990V

Apply a stripe coat of (A) Amercoat 68HS, (SW) Macropoxy 646 FC or (T) Series 22, Epoxoline to all welds, edges and irregular surfaces before applying Prime Coat.

System 10: PVC, CPVC and FRP, Ultraviolet

Light Sand Blast

1st Coat(s)

DFT = 5 - 8 mils

DFT = 2 - 3 mils

High Solids Epoxy

(D) Bar Rust 235

(A) Amerlock 2, 400, or 600

(SW) Macropoxy 646

(T) Series 188

Finish Coat(s)

DFT = 2 - 3 mils

Aliphatic Polyurethane

(D) Devthane 379

(A) Pitthane Ultra 95-812

Series gloss

(T) Series 1090

(SW) Hi Solids Poly 250

System 11: Interior of Welded Steel Water Storage Tank Roof, Shell Plate & Appurtenances Above Top of Overflow (NOT USED)

Interior -

Prime Coat (Vapor Space)
(apply to bare metal)

DFT = 4 - 6 mils

DFT = 3 - 4 mils

Primer
(NSF Approved)

(D) Bar Rust 233H LV

(A) Amercoat 68HS

(SW) Corothane I Galvapak
1K

(T) Series 94-H2O, Hydro-
Zinc

DFT = 2.5 - 3.5 mils

Zinc-Rich Polyurethane

1st Coat(s)
(Contrasting Color)

DFT = 4 - 6 mils

High Solids Epoxy
(NSF Approved)

(D) Bar Rust 233H LV

(A) Amerlock 2

(SW) SherPlate 600

(T) Series L140F, Pota-Pox +

2nd Coat(s)
(Contrasting Color)

DFT = 4 - 6 mils

High Solids Epoxy
(NSF Approved)

(D) Bar Rust 233H LV

(A) Amerlock 2

(SW) SherPlate 600

(T) Series L140F, Pota-Pox +

Finish Coat (Shell & Floor)	High Solids Epoxy (NSF Approved)	(D) Interline 975P
DFT = 25 mils		(A) Novaguard 810 ER (SW) SherPlate PW (T) Series 22, Epoxoline, Series FC22, Epoxoline

Apply a stripe coat of (A) Amerlock 2, (SW) SherPlate 600, (T) Series L140F, Pota-Pox + or (T) Series 22, Epoxoline to all welds, edges and irregular surfaces before applying Prime Coat.

Exterior - Prime Coat DFT = 3 - 4 mils DFT = 5 - 10 mils DFT = 4 - 6 mils	High Solids Epoxy	
DFT = 2.5 - 3.5 mils	Zinc-Rich Polyurethane	(A) Amercoat 68HS (SW) Macropoxy 646 FC (D) Interseal 670HS or Bar Rust 231 (T) Series 94-H2O, Hydro-Zinc
Intermediate Coat DFT = 4 - 6 mils	High Solids Epoxy	(T) Series L140F, Pota-Pox + (D) Interseal 670HS or Bar Rust 231
Finish Coat DFT = 5 - 6 mils DFT = 2 - 3 mils	Aliphatic Polyurethane High Dispersion Pure Acrylic	(A) PSX 700 (SW) Sher-Loxane 800 (T) Series 1029, Enduratone (D) Interthane 990V

Apply a stripe coat of (A) Amercoat 68HS, (SW) Macropoxy 646 FC or (T) Series L140F, Pota-Pox + to all welds, edges and irregular surfaces before applying Prime Coat.

System 12: Concrete Floors, Walls and Sumps in Chemical Rooms and Chemical Containment Areas - Horizontal and Vertical Surfaces Where Specified in the Coating Schedule (NOT USED)

Primer DFT = 3.5 - 4.5 mils	Elastomer Modified Epoxy Vinyl Ester	(SW) Magnalux 1100
Body Coat DFT = 60 - 65 mils	Novolac Vinyl Ester, Applied as slurry coat	(SW) Magnalux 1200 clear with 20 lb Type M aggregate per gallon
Mat	Fiberglass Mat	(SW) 1.0 oz fiberglass mat
Saturant Coating* DFT = 40 - 50 mils	Novolac Vinyl Ester	(SW) Magnalux 1200 clear
1st Coat(s) DFT = 15 - 20 mils	Novolac Vinyl Ester	(SW) Magnalux 2100 FF, charcoal gray
2nd Coat(s) DFT = 8 - 16 mils	Novolac Vinyl Ester	(SW) Magnalux 2100 FF, charcoal gray
Total DFT = 126.5 – 155.5 mils		

- or -

Primer 2 Coat(s) DFT = 2 - 3 mils Total DFT = 4 - 6 mils	Elastomer Modified Epoxy Vinyl Ester	(A) Novaguard 1900
Body Coat DFT = 250 mils	Novolac Vinyl Ester, Applied as slurry coat	(A) 6510 Grout – Novaguard 6200 resin with 4 oz Part C per gallon
Mat	Fiberglass Mat	(A) 1.5 oz fiberglass mat
Saturant Coating* DFT = 250 mils	Novolac Vinyl Ester	(A) Novaguard 6200 resin

1st Coat(s) DFT = 250 mils	Novolac Vinyl Ester	(A) Novaguard 6200 resin
2nd Coat(s) DFT = 32 - 40 mils	Novolac Vinyl Ester	(A) Novaguard 6850
Total DFT = 786 – 796 mils		

- or -

For Floors and walls:		
1st Coat (Horizontal Only) DFT = 46 - 52 mils	Polyurethane Concrete	(T) Series N241 with aggregate refusal broadcast
1st Coat (Vertical Only) DFT = 4 - 8 mils	Novolac Epoxy	(T) Series 282
2nd Coat (Horizontal and Vertical) DFT = 4 - 8 mils	Novolac Epoxy	(T) Series 282
3rd Coat (Horizontal Only) DFT = 4 - 8 mils	Novolac Epoxy	(T) Series 282
Total DFT = 58 – 76 mils		
For Sumps and Containment Areas:		
Concrete Re-surfacer 1/32” up to 2”	Epoxy Filler	(T) Series 215
Primer DFT = 4 - 6 mils	Novolac Vinyl Ester	(T) Series 1407
Body (Mortar) Coat DFT = 50 - 60 mils	Novolac Vinyl Ester	(T) Series 1416
Mat	Fiberglass Mat	(T) Series 211-228
Saturant Coating* DFT = 20 - 30 mils	Novolac Vinyl Ester	(T) Series 1416-900
1st Coat(s) DFT = 50 - 60 mils	Novolac Vinyl Ester	(T) Series 1416-900

2nd Coat(s) DFT = 15 - 20 mils	Novolac Vinyl Ester	(T) Series 1416-900
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Total DFT = 139 – 176 mils

- or -

Primer DFT = 3.5 - 4.5 mils	Elastomer Modified Epoxy Vinyl Ester	(D) Ceilcote 370HT
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Body Coat DFT = 60 - 65 mils	Novolac Vinyl Ester, Applied as slurry coat	(D) Ceilcote 6650
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Mat	Fiberglass Mat	(D) Fiberglass mat
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Saturant Coating* DFT = 10 - 15 mils	Novolac Vinyl Ester	(D) ceilcote 370HT
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1st Coat(s) DFT = 15 - 20 mils	Novolac Vinyl Ester	(D) Ceilcote Flakeline 232
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2nd Coat(s) DFT = 15 - 20 mils	Novolac Vinyl Ester	(D) Ceilcote 232
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Total DFT = 103.5 – 124.5 mils

*Apply saturant coating at a thickness to only wet out the fiberglass mat. Any attempt to build a film on top of the mat may result in sags and runs

PART 3 EXECUTION

3.01 Surface Preparation

- A. Perform surface preparation in accordance with this Section and the latest revision of the following requirements or manufacturer's requirements, whichever is more stringent:
1. Shop Prime: Shop prime all steel surfaces not subject to abrasive blasting. Clean surfaces in accordance with the Structural Steel Painting Council specifications SSPC-SP 2, "Hand Tool Cleaning," and SSPC-SP 3, "Power Tool Cleaning."
 2. Brush Clean: Remove dirt, dust, loose rust and foreign matter in accordance with specification SSPC-SP 2, "Hand Tool Cleaning."

3. Solvent Clean: Solvent clean metallic surfaces to be painted to remove all oils or grease in accordance with specification SSPC-SP 1, "Solvent Cleaning." Use solvents recommended by manufacturer of paint to be used in each area. In addition, lightly hand sand copper piping.
4. Abrasive Blast: Conform to the requirements of SSPC-SP 10, "Near White Blast Cleaning." Paint all blasted surfaces within 8 hours of blasting unless the Engineer gives specific permission to do otherwise. Remove all weld spatter by grinding or chipping prior to sandblasting.
5. Commercial Blast Cleaning: Conform to the requirements of SSPC-SP 6. Paint all blasted surfaces within 8 hours of blasting unless the Engineer gives specific permission to do otherwise. Remove all weld spatter by grinding or chipping prior to cleaning.
6. Preparation of Concrete Surfaces: Conform to the requirements of SSPC-SP 13, "Surface Preparation of Concrete." Allow new concrete to cure a minimum of 28 days. Verify concrete dryness prior to coating application in accordance with one of the following standards:
 - a. ASTM F 1869 "Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride" (maximum allowable moisture vapor transmission is three pounds per 1,000 square feet per 24-hour period).
 - b. F 2170 "Standard Test Method for Determining Relative Humidity in Concrete using in situ Probes" (maximum allowable relative humidity is 80%).
 - c. D 4263 "Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method" (no moisture present).

Concrete substrates shall be clean, dry, and free of oil, grease, dirt, dust, chemical spills, unreacted silicates, chlorides, and other contaminants, and shall exhibit surface pH levels within the range recommended by the coating system manufacturer.

3.02 Application

- A. All steel coating application to be done in accordance with the latest revision of SSPC-PA:
 1. When successive coats of paint of the same colors are specified, tint alternate coats sufficiently to produce enough contrast to indicate complete coverage of the surface.
- B. Apply all material in strict accordance with manufacturer's instructions. Apply first coat immediately after surface preparation. Keep all paints at a consistency and applied in accordance with the printed directions of the manufacturer. The painting shall be done by hand, spray or roller as approved by the Engineer in conformance to individual paint manufacturer's recommendations. The Engineer and paint supplier will review all surfaces to be painted on the job prior to application of any coatings. Once the Contractor begins undercoating or priming, this will be their guarantee that

the surface is acceptable to paint. All painted surfaces are to be free from drips, ridges and brush marks. The following stipulations also apply:

1. Thinning permitted only when recommended by the manufacturer and only with thinner recommended for use with the particular product.
2. The use of additives to improve working characteristics or to lengthen or shorten set time is prohibited.
3. Items difficult or impossible to paint after installation are to be painted before installation and touched up after installation.
4. Apply each coat to a uniform, even coating; lay material on in one direction and finish at right angles. Allow material to thoroughly dry between coats. Scuff, sand and remove all runs, sags, overspray, surface roughness and other defects between each coat. Dust and wipe surface clean before applying next coat.
5. Cutting in is to be sharp and straight, free from overlaps or fuzzy edges. Redo any imperfect work.
6. Apply not less than the number of coats or dry film thickness specified. Apply additional coats if required for uniform coverage, full hiding, and to achieve film continuity. Finished work to be uniform in color, full coverage, smooth and free of sags and brush marks.
7. Do not apply coating when temperature is below 55 degrees F or when the temperature of the surface to be painted is less than 4 degrees F over the dew point temperature, or over a surface temperature of 110 degrees F. Perform coating operations only under favorable environmental conditions. Take all steps necessary to protect and completely cure the work. Correct defective work to the full satisfaction of the Engineer.
8. Apply the last finish coat on all work after all major construction is complete and the work areas have been cleaned up and are dust free.

3.03 Pipe and Equipment Identification

- A. Identify all piping and equipment exposed to the atmosphere, both interior and exterior, and including pipe located in concrete pipe trenches, by a combination of color coding, stenciling or pressure-sensitive tape and direction arrows.
- B. Identify painted pipe 4 inches in diameter and larger by stenciling identification names and directional arrows. Identify unpainted pipe and pipe less than 4 inches in diameter by color vinyl pressure-sensitive lettered labels and arrows. Place names and arrows every 16 feet and wherever a pipe enters or leaves a room or a pipe trench. Provide lettering size as follows

<u>Pipe Diameter</u>	<u>Lettering Size (Height)</u>
1-1/4" or less	1/2"
1-1/2" to 2"	3/4"
2-1/2" to 6"	1-1/4"
8" to 10"	2-1/2"
Over 10"	3-1/2"

- C. Provide pipe identification names as listed in the Piping Schedule in Section 10401 Identifying Devices, except that the Engineer will abbreviate any names exceeding 20 letters. Directional arrows are to be in black and be proportional to lettering. Color of equipment and pipe shall be as shown on a schedule to be provided by the Engineer and Owner. Gloss enamel is to be used for stenciling.
- D. The Owner will prepare a color schedule after the protective coatings are favorably reviewed. Notify the Owner and Engineer thirty (30) Calendar Days before the color schedule is needed. Colors will require special mixing. The number of different colors needed will be as indicated by the following schedule:
- | | |
|--------------------------------------|--|
| 1. Raw Water | Devoe 6650 Medium Green |
| 2. Backwash Supply | Devoe 4100 Light Blue |
| 3. Surface Wash Supply | Devoe 4100 Light Blue |
| 4. Potable Water (hot or cold) | Devoe 4100 Light Blue |
| 5. Filtered Water | Devoe 4100 Light Blue |
| 6. Backwash Waste | Devoe 1400 Medium Brown |
| 7. Reclaimed Water | Devoe 1400 Medium Brown |
| 8. Compressed Air and Instrument Air | Devoe 5574 Light Green |
| 9. Drain | Devoe 2904 Haze Gray |
| 10. Sodium Bisulfite | Devoe 8047 Sulfur Yellow w/black bands |
| 11. Drain | Devoe 2904 Haze Gray |
| 12. Steel Tanks | Devoe DC 5300 Bayberry |
| 13. Sodium Hypochlorite | Devoe 8047 Sulfur Yellow w/black bands |
- E. Paint equipment in the same color as the pipe to which it is connected, i.e., Pipe Supports.

3.04 Field Quality Control

A. Pinhole and Continuity Testing:

1. After the application of the prime and finish coats of Paint Systems 3 and 9 surface protective coating systems on metal surfaces, perform continuity and pinhole checking by means of a low voltage electrical resistance meter and check

thickness with a magnetic thickness gauge to determine that pinhole free condition and specified film thickness of the paint system has been achieved over all of the painted surfaces. Repair all deficiencies in film integrity and thickness in accordance with the manufacturer's instructions.

2. The Engineer or an independent testing consultant may perform its own continuity and pinhole checking and thickness checks in addition to the Contractor's required tests. The appropriate equipment and necessary support, if requested, is to be provided by the Contractor. Repair any additional deficiencies in film integrity and thickness per the manufacturer's instructions and to the satisfaction of the Engineer.
 3. The Contractor's attention is directed to the fact that past use of this instrument has demonstrated that the painter must apply at least two and usually three or more stripe coats along all edges and angles and crevices formed by joining members in addition to the coats specified in order to achieve a pinhole free surface.
- B. Adhesion Testing: Where there is a question of paint or coating adhesion to surfaces, demonstrate to the Engineer's satisfaction that the coating adhesion to the area in question is equal to or greater than that which the paint manufacturer literature states may be achieved by this product. An "Elcometer Adhesion Tester" is to be used by the Contractor to accomplish this demonstration.
- C. Continuity, Pinhole and Adhesion Testing Support: Provide scaffolding, ladders, lighting and labor as required to facilitate the Engineer's check. Repair any areas damaged during and by the testing operation.

3.05 Cleaning and Completion

- A. At the completion of this portion of the Work, remove all debris, remove all paint and stains from Work for which paint finish is not intended, touchup all marred surfaces, and leave all buildings and structures in a clean condition, ready for use.
- B. Refinish all damaged or imperfect painting to the satisfaction of the Engineer prior to final acceptance of the facility.
- C. Finish Work, except waterproofing mastics, is to present an even, pleasing and uniform color and appearance. Surfaces exhibiting coatings with shadows, streaks, overlap marks, sags, drips, roughness or non-uniform sheen shall be considered as improperly applied and shall not be considered acceptable.
- D. Leave all machinery nameplate data tags clean and readable and all grease fittings clean and usable.

3.06 Spare Paint

- A. Furnish 1-gallon (minimum) container of each type and color of finish product used. Label containers. Each product shall have a minimum of 11 months of shelf life at project completion.

3.07 Application Schedule

- A. Provide coatings in accordance with the following exposure schedule:

<u>Exposure</u>	<u>Surface Preparation</u>	Paint System	Note (see below)
General ferrous exposed to atmosphere	Bare Metal: Sandblast Shop Primed: Hand Tool Cleaned	1	1
Galvanized metal surface repair	Hand Tool Cleaning	2	2
Submerged ferrous metal	Abrasive Blast except Solvent Clean galvanized items	3	3
Bleeding surface	Solvent Clean per paint manufacturer's recommendations	4	4
Prefinished machinery coating	Hand Tool Cleaning	5	5
Exposed galvanized steel, copper and other non-ferrous metals	Solvent Clean, Lightly Hand Sand	6	6
Vent pipes exposed at building roofs and metal mounted in contact with walls	Hand Tool Cleaning	7	7
Buried valves, flanges, etc.	Solvent Clean and Hand Tool Cleaning	8	8
Factory finish coated items not requiring field painting	Touch-up	-	9
Welded Steel Water Storage Tanks and Pressure Vessels	Near White Blast	9 & 11*	10
PVC, CPVC, & FRP pipe & structures	SSPC SP-1 and then lightly abrade surface with medium grain sandpaper	9	11
Floors and sumps in chemical areas, including vertical walls of containment areas	Abrasive blast, shot-blast, water jet or mechanically abrade concrete surfaces to remove laitance, curing compounds, hardeners, sealers and other contaminants and to provide a minimum ICRI-CSP 3 or greater surface profile. Large cracks, voids and other surface imperfections should be filled with a recommended filler or surfacer	12	12

* System 11 applies only to Welded Steel Treated and Backwash Water Tanks.

B. Notes to Application Schedule:

1. These surfaces include, but are not limited to: general miscellaneous ferrous metal; machinery; pumps; supports; valve handwheels and stands; valve bodies; piping systems; structural steel; steel elements; except where other systems in this schedule are more specifically applicable.
2. Use galvanize-repair paint to repair-galvanize surfaces to be painted. Use eutectic-type repair to repair-galvanize surfaces to remain unpainted.
3. Apply this system to both ferrous metal and galvanized metal submerged in or suspended over water. These surfaces include but are not limited to machinery parts, piping, valves, brackets and supports, and miscellaneous supports, braces, and pump columns. Do not blast clean galvanized surfaces, instead provide one prime coat of 40 passivator prior to finish painting. Coat inaccessible surfaces prior to erection.
4. All items furnished with asphalt or coal tar (bleeding) shop coats which would otherwise be covered by System 1.
5. All piping, valves, pumps, drives, machinery, and equipment that have factory finish coats that will be exposed to atmosphere. This system provides for repair of above named items and color uniformity with rest of field coat items.
6. Exposed galvanized ducts, exposed metal electric conduit, other galvanized steel items except those specifically excluded, exposed copper pipe and other non-ferrous metal items.
7. All cast iron soil pipe and associated flashing above the building roof. Also coat metal items which are surface mounted on exterior, basement or gallery masonry walls, plaster walls and concrete surfaces. Coat such metal items only on the contact surfaces unless otherwise specified; specifically include electrical panels, control cabinets, fixtures and guardrail support brackets.
8. Buried steel and cast-iron valves, operators, steel flanges, and other buried ferrous metals.
9. All panels and equipment with factory finishes identified elsewhere as not requiring field paint, damaged during shipping, Storage, or installation: touch-up in the field in a manner compatible with the factory coating with respect to paint type, color, and texture. Touch-up fusion epoxy-coated items only with material provided by the fusion epoxy fabricator. If more than 5 percent of the surface requires touchup, return the items to the fabricator for recoating.
10. Not used.
11. Apply to PVC, CPVC, and FRP piping and structures exposed to sunlight.
12. Concrete surfaces to be coated include the containment sump horizontal and vertical surfaces within the Fluoride Room.

**** END OF SECTION ****

SECTION 11000

GENERAL REQUIREMENTS FOR EQUIPMENT

PART 1 – GENERAL

1.01 SCOPE

- A. This Section specifies general requirements that are applicable to all mechanical equipment. The **Contractor** is responsible for ensuring that all mechanical equipment meets the specific requirements of the individual equipment specification section.
- B. General Requirements
 - 1. All equipment provided by the **Contractor** shall be of new sturdy construction with ample strength for all stresses that may occur during fabrication, transportation, erection, and during continuous or intermittent operations. All new equipment provided by the **Contractor** and all new and used equipment obtained from the **Owner** shall be adequately stayed, or braced and anchored, and shall be installed in a neat and workmanlike manner. Appearance as well as utility shall be given consideration in the design of details.
 - 2. All new equipment shall include all production line improvements made up to the delivery or **Contract** date.
 - 3. The furnishing and installation of equipment shall include testing, checking levels and alignment, furnishing and placing of lubricants of whatever type, and furnishing of factory trained service mechanics or engineers where called for. All equipment, when finally installed, shall be complete and ready for operation without binding or overloading of critical components or motors. The **Contractor** shall furnish all appurtenances, piping, valves, fittings, wiring, supports, hangers, etc., that are required to place the equipment in first-class operating condition and in a neat and workmanlike manner.
 - 4. All fasteners for aluminum shall be made of stainless steel. All steel, other than stainless steel, shall be isolated from aluminum with stainless steel, neoprene, or other approved material.

1.02 QUALITY ASSURANCE

A. Motors and Control Devices

1. Motors: Motors and motor modifications shall be as specified in the particular equipment section.
2. Control Devices: Control devices, wiring, starters, and other electrical items provided with mechanical equipment shall be as specified in the electrical sections of these specifications.

B. References

1. This Section references the documents listed below. 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 prevail.

Reference	Title
AFBMA Std 9-78	Load Ratings and Fatigue Life for Ball Bearings
AFBMA Std 11-78	Load and Fatigue Life for Roller Bearings
ANSI B1.1-82	Unified Screw Threads
ANSI B2.1-68	Pipe Threads (Except Dupeal)
ANSI B16.1-72	Cast Iron Pipe Flanges and Flanged Fittings, Class 125
ANSI B18.2.1-81	Square and Hex Bolts and Screws, Including Askew Head Bolts, Hex Cap Screws, and Log Screws
ANSI B18.2.2-72	Square and Hex Nuts

1.03 PROTECTION DURING SHIPMENT

A. Shipping

1. Equipment shall be shipped in sealed, weathertight, enclosed conveyances, and protected against damaging stresses during transport and handling.
2. 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.

3. Damage shall be corrected to conform to the requirements of the **Contract** before the assembly is incorporated into the Work. The **Contractor** shall bear the costs arising out of dismantling, inspection, repair, and reassembly.

PART 2 - PRODUCTS

2.01 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 AFBMA Methods of Evaluating Load Ratings of Ball and Roller Bearings. Bearings shall have a minimum L-10 rating life of 50,000 hours. The rating life shall be determined using the maximum equipment operating speed.
- B. 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.
 1. 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° C and shall be equipped with a filler pipe and an external level indicator gage.

2.02 GUARDS

- A. Exposed moving parts shall be provided with guards that meet the requirements of OSHA. Guards shall be fabricated of 14-gage steel, 1/2-13-15 expanded metal screen to provide visual inspection of moving parts without removal of the guard. Guards shall be galvanized after fabrication and painted with the equipment. Guards shall be designed to be readily removable to facilitate maintenance of moving parts. Provisions shall be made to extend lube fittings through guards. Any holes in the guards shall be reinforced.

2.03 CAUTION SIGNS

- A. Equipment with guarded moving parts that operate automatically or by remote control shall be identified by signs reading "THIS MACHINE STARTS AUTOMATICALLY". Signs shall be installed near guarded moving parts.

2.04 NAMEPLATES

- A. Nameplates shall be provided on each item of equipment and shall contain the specified equipment name or abbreviation, and equipment number. Equipment nameplates shall be engraved or stamped on stainless steel and fastened to the equipment in an accessible location with stainless steel screws or drive pins.

2.05 LUBRICANTS

- A. The **Contractor** shall provide for each item of mechanical equipment a supply of the lubricant required for at least one (1) year. Lubricants shall be of the type recommended by the equipment manufacturer.

2.08 SPARE PARTS

- A. Where spare parts are required by the specifications, the spare parts for each separate piece of equipment shall be packed in a heavily constructed, painted wood box with a hinged cover and a locking clasp. The top of the cover shall be painted with the words "SPARE PARTS" followed by the name and number of the piece of equipment involved.
- B. Each part shall be individually wrapped in a waterproof container and tagged. Spare bearings shall be encapsulated in an airtight plastic film.
- C. Spare parts shall not be used by the **Contractor** during the startup and commissioning of equipment.

2.06 SPECIAL TOOLS AND ACCESSORIES

- A. Any and all tools, instruments, or accessories of a special nature that are required to assemble, disassemble, maintain, or repair any item of equipment shall be furnished by the **Contractor** with that piece of equipment. Special tools shall be tagged and well-marked, indicating their service and the piece of equipment for which their use is intended. Operation and maintenance manuals shall contain a list and description or pictorial representation of all special tools required for a given piece of equipment.

2.07 LIFTING EYES

- A. Lifting eyes shall be provided on all equipment weighing over 80 pounds.

PART 3 - EXECUTION

3.01 GENERAL

- A. Equipment shall be provided and tested within the tolerances recommended by the equipment manufacturer. This requirement, however, shall not be construed as relieving the **Contractor** of overall responsibility for the work.

3.02 INSTALLATION AND TESTING

- A. The **Contractor** shall cause each item of equipment to be installed, aligned and tested. As specified for specific equipment, installation and testing shall be done under the direction of installation engineers who have been factory-trained by the equipment manufacturer. Upon completion of the project and as a condition precedent to final acceptance, the **Contractor** shall furnish written certification from the equipment manufacturers that each item has been installed, aligned, and tested correctly, and that the installation meets all of the manufacturer's requirements for efficient, trouble-free operation. This provision, however, shall not be construed as relieving the **Contractor** of his responsibility for this portion of the work. The **Contractor** shall furnish all fuel, lubricants, and other required materials for testing and shall perform all work, all in accordance with manufacturer's recommendation.

**** END OF SECTION ****

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SECTION 16010

REQUIREMENTS FOR ELECTRICAL WORK

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This section specifies electrical work including labor, electrical material, equipment, and installation and testing requirements for complete operating system. Electrical work shall also include demolition and or relocation and modifications of existing electrical equipment as shown and specified in these specifications. All equipment requiring power and or control shall include equipment furnished under this section and other sections of the specifications. The electrical drawings included in this project document are diagrammatic only and functional in nature and do not specify exact locations of equipment or equipment terminations. The scope of this project also includes all required work for a temporary 240V and 480V three-phase standby power to continue service to the existing pump stations and facility during construction. For SCADA and related work under this project, the Contractor shall procure services from Tesco Controls, as an I&C system integrator, who has supplied and currently maintained the existing SCADA system for the City.

1.02 QUALITY ASSURANCE

- A. References: This section contains references to 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.
- B. Unless otherwise specified, references to documents shall mean the documents in effect at the time of Advertisement for Bids or Invitation to Bid (or on the effective date of the Agreement if there were no Bids). 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, whether or not the document has been superseded by a version with a later date, discontinued or replaced.

Reference	Title
ANSI A58.1	Minimum Design Loads for Building and Other Structures
IEEE 81	Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System
IEEE C57.12.01	General Requirements for Dry-Type Distribution and Power Transformers

Reference	Title
NEMA 250	Enclosures for Electrical Equipment (1000 Volt Maximum)
NEMA ICS 1	General Standards for Industrial Controls and Systems
NEMA ICS 2	Industrial Control Devices, Controllers, and Assemblies
NEMA ICS 6	Enclosures for Industrial Controls and Systems
NEMA ST20	Dry-Type Transformers for General Application
NEMA WD 1	General Requirements for Wiring Devices
NFPA 70	National Electrical Code (NEC)
CBC	California Building Code
CEC	California Electrical Code
CEnC	California Energy Code
CALGreen	California Green Building Standards
CBEES	California Building Energy Efficiency Standards
UL 50	Enclosures for Electrical Equipment
UL 62	Flexible Cords and Cables
UL 67	Panelboards
UL 489	Molded-Case Circuit Breakers and Circuit Breaker Enclosures
UL 506	Specialty Transformers
UI 508A	Standard for Industrial Control Panel

- C. Identification of Listed Products: Electrical equipment and materials shall be listed by an independent testing laboratory for the purpose for which they are to be used. Three such organizations are Underwriters Laboratories, Inc. (UL), Canadian Standards Association (CSA), and Electrical Testing Laboratories (ETL). The independent testing laboratory shall be acceptable to the inspection authority having jurisdiction.

1.03 SUBMITTALS

- A. The following specific submittal requirements for the applicable switchgear, switchboard, motors, transformers, power distribution panels, transfer switches or generators shall be followed:

1. Contractor shall formally place an order with equipment manufacturer within thirty days of the award of the contract. The order shall include all relevant drawings and specs including any addendum items associated with the equipment.
 2. Contractor shall submit shop drawings to the City as soon as possible or within 6 weeks of the order being placed for long lead items such as standby generator.
 3. Contractor shall forward review comments to equipment manufacturer within two days after receipt of the comments by the City.
 4. Contractor shall provide the release for manufacturing to equipment manufacturer within 3 business days of receiving a favorably reviewed submittal and shall provide the City with the shipping date.
 5. Prior to shipment, a local factory test of the equipment witnessed by the City shall occur.
- B. The following information shall be provided for all electrical equipment and materials in accordance with Section 01300:
1. Verification of fault withstands and interrupting ratings of all applicable power equipment and devices.
 2. Interconnection diagrams -The Contractor shall prepare interconnection diagrams depicting all cable requirements together with their actual terminations as specified below.

Interconnection diagrams shall be drawn to reflect actual, physical relationship between equipment and or components as shown on the drawings. The interconnection diagram shall indicate wiring between panels, terminal boxes, remotely mounted devices, and motor starters. The diagrams shall interface with the manufacturer's internal connection diagrams for panels. The diagrams shall indicate the terminations to terminal blocks of field devices at each end of the cable, the number of conductors in the cable, the size of wire, and the number of spare conductors. For each termination, the diagrams shall indicate the terminal number, wire color, and wire number as it appears on the wire marker. All terminal blocks, including spares, shall be indicated on the diagrams. Interconnection diagrams shall be provided for review and approval prior to installation of equipment.
 3. Catalog-cuts including technical specifications, application information, ratings, make and model number, and other information required to verify the equipment and/or material meets the requirements of this specification. Each page of the submittal shall have a page number. Submittals without a page number on each page shall be rejected, not reviewed.
 4. A copy of this specification section with addenda updates, and all referenced sections with addenda updates, with each paragraph check marked to show specification compliance or marked to show deviations.

1.04 PROJECT/SITE CONDITIONS

- A. General: Unless otherwise specified, equipment and material shall be sized and rated for an ambient temperature of 40 degrees C at an elevation ranging from sea level to 100 feet without exceeding the manufacturer's stated ratings. All outdoor locations shall be considered as wet areas. Enclosures for outdoors, unless otherwise noted, shall be minimum NEMA 3R, weather proof.
- B. Seismic: All electrical equipment and supports shall be braced in accordance with latest California Building Codes. Seismic calculations shall be submitted for review and approval for heavy equipment such as diesel generators, switchgear, ATS, switchboards etc. Calculations shall be prepared by California licensed engineer.
- C. Classified Hazardous locations: All areas in this project shall be considered as general purpose areas. No classified hazardous locations are located in this project.

1.05 ELECTRIC SERVICE

- A. Electric service for all facilities is existing and provided by Pacific Gas and Electric Company. No new PG&E service is required. Contractor, however, shall be responsible for coordinating this work with PG&E and the City to ensure a timely installation of the electrical equipment. Contractor shall be responsible for trenching, furnishing and installation of underground service conduits, generator's concrete pads, bollards, grounding as detailed on the drawings. Coordination with the City's staff and the Engineer is required.
- B. Refer to Section 01010 – Summary of Work and Section 01040 – Coordination and Project Requirements for additional requirements regarding constraints and restrictions including sequence of work. Tentative priority shall be as follows:

Site name	Site address
900 Santos Booster Station	9000 Santos Ranch Road
1300 Santos Booster Station	9400 Santos Ranch Road
S-7 Sewer Lift Station	4950 Bernal Ave
S-12 Sewer Lift Station	302 Happy Valley Road
Laurel Creek Lift Station	5800 Foot Hill Road

The above priority as well as constraints including but not limited to shutdown duration, temporary power furnished by the Contractor at each site shall be confirmed by the City during construction phase with shut down being scheduled and approved by the City in advance. Staging areas shall be coordinated with the City at the pre-construction meeting. Construction activities beyond standard working hours (7:00AM to 3:30PM) shall be pre-approved by the City.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Equipment and materials shall be new and free from defects. All equipment of the same or similar type shall be of the same manufacturer throughout the work. Standard production materials shall be used wherever possible.

2.02 RACEWAY, FITTINGS, AND SUPPORTS

- A. General: Conduit shall be provided for power, control, instrumentation, grounding, lighting, receptacles, and signaling systems.
- B. Raceway:
 - 1. All exposed conduit, indoor and outdoor, shall be threaded, galvanized, rigid steel conduit. All conduit accessories such as couplings, elbows, junction boxes etc. shall also be galvanized steel. Minimum size of conduit shall be 3/4 inch. Bushings shall be galvanized, malleable iron with insulating collars. Grounding bushings shall be locking type with a feed through compression lug. Unions shall be galvanized, ferrous alloy type. Threadless fittings are not acceptable. Running threads shall not be used in lieu of conduit nipples. Threaded hubs shall be used to terminate conduits entering boxes. RGS conduit and accessories shall be manufactured by Robroy Industries, Allied Tube and Conduit, or approved equal.
 - 2. Liquidtight, flexible steel conduit shall be formed from spirally wound, galvanized steel strip with successive convolutions securely interlocked and jacketed with liquidtight, plastic cover. Minimum size shall be 3/4 inch. Fittings for liquidtight conduit shall have cadmium-plated, malleable iron body and gland nut with cast-in lug, brass grounding ferrule threaded to engage conduit spiral and O-ring seals around the conduit and box connection and insulated throat. Forty-five and 90-degree fittings shall be used where applicable.
 - 3. Embedded or direct buried underground conduit shall be Schedule 40, high impact, polyvinyl chloride (PVC). Minimum size shall be 2 inch.
 - 4. Fittings for PVC conduit shall be solvent welded type.
- C. Boxes:
 - 1. Boxes for use outdoors and in process areas shall be hot-dip, galvanized cast ferrous alloy type FD with integrally cast-threaded hubs for conduit entry. Boxes larger than FD boxes shall be welded steel and hot-dip galvanized after fabrication.
 - 2. Boxes installed in special areas where electrical metallic tubing is specified shall be standard UL approved electrogalvanized sheet steel, 4-inch square or octagon minimum trade size.
 - 3. Conduit bodies shall be ferrous alloy type with screw taps for fastening covers. Gaskets shall be made of neoprene.
 - 4. Boxes for hazardous locations where indicated on the drawings shall be suitable for Class 1 Div I hazardous location. They shall be corrosive resistant, high tensile strength malleable iron and with threaded aluminum cover. They shall be manufactured by Crouse-Hinds, Appleton Electric, or approved equal.

- D. Raceway Supports: Galvanized steel framing channels shall be used to support groups of conduit. Individual conduit supports shall be one-hole stainless steel malleable iron pipe straps with stainless steel clamp backs and nesting backs where required. Ceiling hangers where used shall be adjustable, stainless steel rod hangers. Straps or plumbers tape are not acceptable. Hanger rods shall be 1/2-inch all thread stainless steel rod.
- E. Concrete Pull Boxes: Provide and install pre-cast concrete pull boxes in locations indicated on the Drawings and as required by NEC. Pull boxes shall be:
 - 1. Designed for heavy traffic conditions, with pull box and cover designed for heavy traffic bridge loading H-20
 - 2. Minimum 2 feet by 3 feet by 3 feet depth with 3/4 inch diameter pulling irons located at each end. Concrete material shall be reinforced Class A.
 - 3. Provided with engraved "Electrical" or "Instrumentation" or "Telephone" as applicable on the top side of the covers.

2.03 CONDUCTORS, WIRE, AND CABLE

- A. General: Conductors, wires, and cable shall be provided for power, control, lighting, receptacles, instrumentation, grounding and signal circuits. The quantity and size of conductors shall be as specified.
- B. Power and Control Conductors: Power and control conductors shall be single conductor, stranded, annealed copper with 600-volt XHHW (Rubber) insulation, Okonite, Southwire, CABLEC; or approved equal.
- C. Lighting and Receptacle Circuit Conductors: Conductors for lighting and receptacle circuits shall be single conductor, annealed copper with 600-volt XHHW (rubber) insulation. Conductor sizes No. 10 AWG and larger shall be stranded. No. 12 AWG shall be solid conductor. Minimum conductor size shall be No. 12 AWG. Conductors shall be Okonite, Southwire; CABLEC; or approved equal.
- D. Grounding Conductors: Grounding conductors shall be as specified in paragraph 16010-2.7 A.
- E. Instrumentation and Signal Cable: Cable for instrumentation and signal circuit shall be twisted shielded pair or triad as specified, No. 16 AWG 7-strand copper with 600-volt PVC insulation, 100 percent aluminum-Mylar tape shield, No. 18 AWG tinned copper drain wire and overall PVC jacket, Okonite, Okoseal-N type P-OS, CABLEC, or approved equal.
- F. Splicing and Terminating Materials:
 - 1. Connectors: Connectors for stranded conductors shall be tool applied tin-plated copper, compression type of the correct size and UL approved for the application.

Connectors for wire sizes No. 10 AWG and smaller shall be nylon self-insulated, ring tongue or locking-spade terminals. Connectors for wire sizes No. 8 AWG and larger shall be one-hole lugs up to size No. 3/0 AWG and two-hole or four-hole for size 4/0 AWG and larger. Mechanical clamp, dimple, or screw-type connectors are not acceptable.

480-volt motor terminations shall be made using bolt connected lugged connectors and factory engineered kits consisting of heat shrinkable, polymeric insulating material with high dielectric strength mastic sealant.

Termination of solenoid valves, 120-volt motors, and other devices furnished with pigtail leads shall be made using self-insulating, tubular compression connectors.

2. Terminal Blocks: Terminal blocks shall be provided for external control and power wires size 10 AWG and smaller. Terminal blocks shall be 600 volts, heavy-duty, rated 20 amperes for control and 30 amperes for power. Short circuit rating for the blocks shall match or exceed rating of the panel or enclosure where the blocks are located.
- G. Wire Markers: Wire markers shall be yellow or white shrink tubing, Thermofit Marker System (TMS) by Raychem Co., Thomas and Betts equivalent, or approved equal for conductors No. 10 AWG and smaller and locking tab cable markers, W.H. Brady Co., Thomas and Betts, or approved equal, for conductors No. 8 and larger. Letters and numbers identifying each conductor shall be machine printed in permanent black ink.

2.04 WIRING DEVICES

- A. General: Receptacles, plugs, switches, and appurtenances shall be provided as specified on the drawings. Wiring devices shall be UL approved for the current and voltage specified and shall comply with NEMA WD-1. Receptacles and switches shall be premium, specification grade. GFI type in weather proof cover/box shall be provided for all outdoor receptacles.
- B. Receptacles: Receptacles shall be 20A, 120V, and grounding type. Receptacles for use outdoors and in wet process areas shall be corrosion resistant, GFI type, marine duty with polycarbonate weatherproof lift covers, Hubbell 53CM62/53CM21, General Electric, or approved equal.
- C. Switches: Switches for use outdoors and in wet process areas shall be 20 amp, press-switch type with weatherproof, corrosion-resistant neoprene plate, Hubbell, Arrow-Hart, or approved equal. Switches located in classified hazardous locations shall be suitable for installation in such locations. They shall be made by Killard Hazloc Series, Appleton, Crouse-Hinds , or approved equal.

2.05 INDIVIDUAL MOTOR STARTERS

- A. General: Unless otherwise specified, individual motor starters shall be combination type with molded case motor circuit protector, 3-pole, 600-volt AC contactor, and three overload relays, NEMA size 1 minimum. Each motor starter shall be individually enclosed. Starters shall be manufactured by Cutler-Hammer, Allen-Bradley, General Electric, or approved equal.
- B. Enclosures: The door of the motor starter enclosure shall be interlocked with an externally operated disconnect handle, lockable in the open position. Enclosures shall be NEMA 12 for dry indoor areas and NEMA 3R for outdoor and wet process areas.

- C. Motor Branch Circuit Protection: Molded case motor circuit protectors shall be magnetic only with trip settings adjustable over a range of 700 to 1300 percent of the full load current of the motor served. The motor circuit protector, in conjunction with the starter, shall be rated to interrupt 42,000 amperes (symmetrical) unless otherwise specified.
- D. Overload Relay: Overload relays shall be bimetallic type with separate heaters for each of the three poles. Reset shall be accomplished with a reset pushbutton located on the unit door exterior. Trip setting shall be adjustable from 85 to 115 percent of the motor full load rating.
- E. Control Circuits: Control power transformers, fuses, and control devices shall be provided as specified. Two control transformer primary fuses, rated to interrupt 200,000 amperes at 600 volts, shall be provided on all motor starters. Each motor starter shall be provided with one control circuit secondary fuse rated to interrupt 10,000 amperes at 250 volts and sized at 125 percent of the control circuit full load current. Control circuit shall be 120 V with grounded leg.
- F. Wiring: Conductors shall be switchboard type and rated 90 degrees C above ambient temperature. Conductor shall be identified with tag numbers as specified.
- G. Manual Starters: Manual starters shall be provided as indicated on the drawings. Manual starters shall consist of a horsepower rated quick-make, quick-break toggle mechanism together with one or two overloads as specified. Voltage shall be as specified. Indoor and dry location shall be NEMA 12. For outdoor and wet process area, they shall be NEMA 4X corrosive resistant. For classified hazardous locations, they shall be rated for such locations and shall be manufactured by Square D, General Electric, or approved equal.

2.06 ELECTRICAL CONTROL DEVICES

- A. Control Devices:
 - 1. PUSHBUTTONS: Pushbuttons shall be flush head, 30mm diameter, heavy-duty, industrial, 600 volts, 10 amperes, continuous with NEMA rating to match enclosure types. Pushbutton operators shall be red for stop functions and black for all other functions. Escutcheon plates shall be as specified on the drawings. For field mounted pushbuttons, each stop pushbutton shall be provided with a galvanized steel padlockable mechanism. For hazardous locations, the control stations shall be rated as explosion proof suitable for such locations. They shall be Killark Hazloc Series, Appleton, Crouse-Hinds or approved equal.
 - 2. Selector Switches: Selector switches shall be heavy-duty, 30mm diameter, industrial type, with NEMA rating to match enclosure type, rated 600-volt, 10-ampere, continuous. Switches shall be provided with contact blocks and number of positions as required performing the specified operations. The escutcheon legend shall be as specified on the drawings.

3. Indicating Lights: Indicating lights shall be 30mm diameter, industrial, heavy-duty, push-to-test, transformer type with LED lamps. Indicating lights shall be NEMA rated to match enclosure type. Color of lens shall be as specified.
4. Control Stations: Unless otherwise specified, control stations shall be NEMA 12 or 13 for dry, indoor locations and NEMA 4X for process areas and outdoor locations, Allen Bradley Bulletin 800H, Crouse-Hinds NCS series, or approved equal.
5. Security (limit switches). Security switches shall be heavy duty, industrial type with adjustable arm, lever made of stainless steel material. Each switch shall have one normally open and one normally closed contact rated for at least 5A at 120VAC. The switches shall be NEMA 4X, and shall be as manufactured by General Electric, Square D, or approved equal.

B. Control Relays:

1. Load-Switching Control Relays: Control relays used for switching loads (solenoids, actuators, contactors, motor starter coils, etc.) shall be heavy-duty, machine tool type. Relays that have contacts used for remote interlocking or for which the switching load is not shown shall also be heavy-duty machine tool type.

Contacts shall, as a minimum, be 4-pole and be field interchangeable to either normally open or normally closed. Relay shall be capable of accepting a 4-pole adder.

AC relays shall have NEMA A600 contact ratings and electrical clearances for up to 600 volts. DC relays shall have NEMA P300 contact ratings and electrical clearances of up to 250 volts.

Relays shall be Allen Bradley Bulletin-700, Square D Class 8501, or approved equal.

2. Logic Level Switching Control Relays: Control relays used for switching solid-state logic and signal circuits shall be Potter Brumfield series KUP, Schrack Series RA, or approved equal. Relays shall have a minimum of three SPDT, gold-flashed, fine silver contacts rated 3 amps resistive at 120 volts AC or 28 volts DC. Relay shall be plug-in type with heavy-duty, barrier-protected screw terminal sockets and clear polycarbonate dust cover with clip fastener. AC models shall have neon lamp indicator wired in parallel with coil.
3. Timing Relays: Solid state timing relays shall be pulse-count type using a high frequency RC oscillator and integrated circuit counter for timing. Electrolytic capacitors shall not be used in the timing circuits. Time delays from 0.1 seconds to 48 hours shall be available with each timer model adjustable over a 20:1 range. On-delay, off-delay, and single-shot

timing models shall be available. Timer shall reset in 0.03 seconds or less. Timer accuracy shall be plus or minus 2.0 percent under normal conditions. The timing relay shall have two NEMA Form-C timed contacts. Solid state timing relays shall be Agastat, STA series, Eagle Signals equivalent, or approved equal.

4. Intrinsically Safe Relays: These relays shall be suitable for use with 24VDC power source with pilot devices located in hazardous classified locations as defined by NEC Article 500. The relays shall be manufactured by:
 - a. R.K Electronics
 - b. Gem Sensors Divison of IMO, Inc
 - c. R. Stalh, Inc.
 - d. Idec
 - e. Equal

Provide each relay with two DPDT contacts each rated for at least 5-amp.

All float switches located in Class 1 Div I hazardous location shall be provided with intrinsically safe relays located in control panel or where specifically shown on the drawings.

2.07 GROUNDING MATERIAL

- A. Cable: Grounding cable shall be concentric stranded, annealed bare copper. Cable size shall be as specified, and shall not be smaller than #4/0 AWG.
- B. Ground Rods: Ground rods shall be copper-covered steel, 3/4-inch diameter, and 10 feet long. Rods shall have threaded type, removable caps so that extension rods of the same diameter and length may be added where necessary. The rods shall be manufactured by ERICO, Galvan Industries, Inc. or approved equal.
- C. Compression Connectors: Compression connectors shall be cast copper as manufactured by Thomas and Betts, OZ. Gedney, or approved equal.
- D. Bolted Connectors: Bolted connectors shall be Burndy, O.Z. Gedney, or approved equal.
- E. Equipment Grounding: Install a green insulated equipment grounding conductor with each feeder and branch circuit from the power source grounding means to the load equipment or device.

2.08 DISTRIBUTION EQUIPMENT

- A. Panelboards: Where required on the drawings, panelboards shall be circuit breaker, dead front type with bus bar construction. Panelboards shall be composed of individually mounted circuit breakers designed to be removed without disturbing other breakers.

Bus shall be tin-plated copper and shall have a current rating as shown on the panel schedules sized in accordance with UL 67. Panel fault withstand rating shall be equal to the interrupting rating of the smallest circuit breaker in the panel.

Panelboards shall be provided with a separate ground bus and a full capacity neutral bus. Neutral bus shall be mounted on insulated standoffs with removable link connector to ground bus. Provide an inside pocket to hold circuit directory. Panelboards shall be Cutler-Hammer, Allen-Bradley, or approved equal.

For outdoor locations, provide lighting panels with NEMA 4X enclosures with padlockable provisions.

- B. Circuit Breakers: Circuit breakers shall be molded-case type provided for the current ratings and pole configurations specified on the panelboard schedule. Circuit breakers rated 120/208 volts and 120/240 volts AC shall have a minimum interrupting current rating of 22K amperes (symmetrical) at 240 volts AC. Circuit breakers rated 277/480 volts AC shall have a minimum interrupting current rating of 42K amperes (symmetrical) at 480 volts.

Circuit breakers shall be bolt-on type.

Circuit breakers shall be listed in accordance with UL-489 for the service specified. Breakers rated 200A or higher shall be provided with solid-state trip unit with multi-functions.

Load terminals of circuit breakers shall be solderless connectors.

Circuit breakers and panelboards shall be products of the same manufacturer.

Enclosed circuit breakers for outdoor installation shall be 65kA rated, NEMA 4X, enclosure. Interlocks shall be provided as shown and or required on the drawings.

- C. Dry-type Transformers: Where required on the drawings, transformers shall conform to IEEE-C57.12.01 and UL 506. The voltage, frequency, number of phases, and KVA rating shall be as specified. Transformers shall have "Energy Star" label as required by latest California Energy Regulations Title 24. They shall be manufactured by Cutler-Hammer, Square D, General Electric, or approved equal.

Transformers 15 KVA and above shall have a Class 220 insulation system in accordance with NEMA ST20. Transformers 25 KVA and greater shall be designed not to exceed 80 degrees C temperature rise.

Transformer coils shall be copper windings. Aluminum windings shall not be acceptable. Transformer coils 15 KVA and above shall be impregnated with varnish. Transformer coils 10 KVA and below shall be encapsulated.

Transformers shall have electrically isolated primary and secondary windings. Primary and secondary winding configurations shall be as specified. Provisions shall be made to permit separate grounding of the neutral conductor and the enclosure. Single-phase transformers shall be the four winding type.

Transformers 15 KVA and above shall be provided with two 2-1/2 percent full capacity taps above normal voltage and four 2-1/2 percent full capacity taps below rated voltage on the primary winding.

Terminal compartments shall be sized to permit termination of cables specified. Terminal connections shall be made in the bottom third of the enclosure. The terminals shall be copper and sized for the cable specified.

Transformers rated 15 KVA and smaller shall be provided with weatherproof, non-ventilated enclosures.

Indoor transformers rated greater than 15 KVA shall be provided with drip-proof, ventilated enclosures. Outdoor transformers shall have weatherproof enclosures.

2.09 SURGE SUPPRESSION SYSTEM

- A. Where shown on the drawings, provide and install an UL 1449 listed surge suppression system of latest MOV type technology for each of the main service switchboard or switchgear. The suppressor shall be of voltage type with thermal fusing. The suppressor shall be capable of withstanding 100,000 amperes per phase and shall be equipped with LED indicator, dry contact for remote alarm and local audible alarm. It shall be Square D SurgeLogic XW series, Cutler-Hammer, or General Electric, or approved equal system suitable for use with 480/277V three-phase four-wire service. A main service MCC shall also be provided with surge suppression system.

2.10 NAMEPLATES

- A. Nameplates shall be made from laminated phenolic plastic. The nominal size of the nameplates shall be 3/4 inch high by 2 inches long. Master nameplate shall be 2-inch high by 4-inch long. Nameplates shall have black backgrounds with 1/4-inch white letters. If abbreviations are required because of space limitations, abbreviations shall be submitted to the Construction Manager for approval prior to manufacture. Nameplates shall be fastened using self-tapping stainless steel screws. The use of adhesives will not be permitted on the outside of enclosures.

2.11 LIMIT SWITCHES

- A. Where required, limit switches shall be NEMA 4X, corrosive resistant, rated suitable for monitoring door's opening to trigger two DPDT 5A rated contacts. They shall be heavy duty, industrial type made by Allen-Bradley 800 series, Square D or approved equal.

2.12 PORTABLE GENERATOR CAMLOK TERMINATION PANELS

- A. Camlok termination panels shall be 600V rated, NEMA 4X, 304 SS, wall mounted with current ratings as shown on the drawings. The panels shall have the following characteristics:
 - 1. 100% rated circuit breaker, 65kA, ratings 150A, 200A, 300A as shown on drawings.
 - 2. Enclosures with CAM type male connectors color coded for three-phase and ground, and for neutral where shown and or required on the drawings.
 - 3. UL 1008 listed
 - 4. Hinged, padlockable access panel for CAM type connector feeder cables.

5. Padlockable door handle 3-point latching, and internal print pocket.
6. Manufactured by ESL Power Systems, PowerTron, Asco, or equal.

2.13 ENCLOSED CIRCUIT BREAKER PANEL

- A. Enclosed circuit breaker panel shall be provided and installed where shown on the drawings. The panel shall have the following characteristics:
 1. Molded case circuit breaker(s) with rating as shown on the drawings
 2. Mechanical or Kirkey interlocks where shown on the drawings
 3. Minimum 42kA short circuit rating
 4. NEMA 4X (316 SS) for outdoor installation and NEMA 12 for indoor location
 5. UL508A listed
 6. Manufactured by Tesco, AIC, Eaton, or equal

PART 3 - EXECUTION

3.01 GENERAL

- A. Unless otherwise detailed or dimensioned, electrical layout drawings are diagrammatic. Actual conduit installation shall be coordinated with field conditions. Junction boxes and pull boxes with quantity as required shall be furnished and installed. The Contractor shall coordinate the location of electrical material and equipment with the work. Core drill wall as required for conduits entering the existing building. No conduit installation that creates tripping hazards is acceptable.

Electrical equipment shall be protected from dust, water, and damage.

For work in existing electrical panel and enclosure, verify and lock out power source to assure the panel and enclosure are de-energized prior to working on them.

3.02 RACEWAY, FITTINGS, AND SUPPORTS

- A. General: The Contractor shall limit the number of directional changes of conduit to a total of not more than 270 degrees in any run between pull boxes. Conduit runs shall be limited to 400 feet, less 100 feet for each 90-degree change in direction.

Signal conduit shall be separated from AC power and control conduits. The minimum separation shall be 10 inches for rigid steel and 12 inches for PVC conduits.

Tag power, signal and control conduits with stainless steel tag fastened to conduit with stainless steel cable. Tags shall be engraved with identification as designated on the single-line diagrams. Tags shall be installed at each conduit termination to an enclosure, MCC, control panel, disconnect, motor j-box, signal transmitter, sensor etc..

Cap each spare conduit where required as per detail shown on the drawings.

- B. Exposed Conduits: Rigid metallic conduit shall be assembled to provide a continuous ground path. Joints shall be made with standard couplings or threaded unions. Bends and offsets shall be made with a hicky or conduit bending machine or shall be factory preformed bends.

Exposed conduit shall be run on supports spaced not more than 10 feet apart and shall be constructed with runs parallel and perpendicular to walls, structural members, or intersections of vertical planes and ceiling. No conduit shall approach closer than 6 inches to any object operating above 30 degrees C.

Conduit supports shall be secured to concrete walls and ceilings by means of cast-in-place anchors, die cast, rustproof alloy expansion shields, or cast-flush anchors. Wooden plugs, plastic inserts, or gunpowder driven inserts are not acceptable as a base for securing conduit supports.

Liquidtight, flexible steel conduit shall be used for the final connection to equipment, devices, and instruments where flexibility is required.

The length of liquidtight flexible steel conduit shall not exceed the lesser of 15 times the trade diameter of the conduit or 36 inches.

- C. Embedded or Encased Conduit: Conduits constructed in concrete which is in contact with earth shall be separated from earth by at least 3 inches of concrete. Clearances equal to the nominal conduit diameter but not less than 2 inches, shall be maintained between encased or embedded conduits except where conduits cross or terminate.
- D. PVC-coated Rigid Galvanized Steel Conduit: Where specifically noted on the drawings, exposed conduits shall be PVC-coated rigid galvanized steel with matching conduit boxes and accessories.
- E. “Eys” seals: Install “Eys” seals as required per NEC, and as shown on the drawings for hazardous locations and locations as identified on the drawings. Fill the seals with compound recommended by the seal manufacturer.

3.03 CONDUCTORS, WIRE, AND CABLE

- A. General: Raceway construction shall be complete, cleaned, and protected from the weather prior to wire and cable being installed. Pulling wire and cable into conduit shall be completed without damaging or putting undue stress on the cable insulation. Soapstone, Talc, or UL listed pulling compounds are acceptable lubricants for pulling wire and cable. Grease is not acceptable. Nylon pull rope shall be pulled through the conduit immediately after concrete pour.

Each power, control, signal, and instrumentation conductor shall be identified at each terminal to which it is connected utilizing the wire markers specified in paragraph 16010-2.03 G.

600-volt conductors will be color coded as follows:

480 V Power

Phase A – Brown
Phase B – Orange
Phase C – Yellow
Neutral – White
Ground – Green

120/208V Lighting and Receptacles

Phase A – Black
Phase B – Red
Phase C – Blue
Neutral – White
Ground – Green

AC Control

Red

DC Control/Monitoring

24V + Purple
24V - Gray

- B. 600-Volt Conductor and Cable: Slack shall be provided in junction and pull boxes. Slack shall be sufficient to allow cable or conductors to be routed along the walls of the box.

Conductors crossing hinges shall be bundled in groups not exceeding 12 and shall be so arranged that they will be protected from chaffing when the hinged member is moved.

Raceway fill limitations shall be as defined by NEC and the following:

Lighting and receptacle circuits may be together in the same conduit in accordance with derating requirements of the NEC. However, lighting and receptacle circuits shall not be in conduit with other circuits.

Solid wire shall not be lugged nor shall electrical spring connectors be used on any except for solid wires in lighting and receptacle circuits. Lugs and connectors shall be installed with a compression tool.

For submersible pump cable installation where shown on the drawings, follow the pump manufacturer's recommendations and requirements. Furnish and install 316 stainless steel cable grips required to properly support the cables in addition to 316 stainless steel hooks and heavy duty, non corrosive, fiberglass cable ties as required. Cable grips shall be manufactured by Kellems, Hubbell, or approved equal.

- C. Signal and Instrumentation Cables: Signal and instrumentation circuits shall be run as individual shield twisted pairs or triads. Triads shall be used wherever three-wire circuits are required. Terminal blocks shall be provided at cable junction for running signal leads and shield drain wires. Each conductor shall be identified at such junctions. Instrumentation cables shall be continuous without any splices.

Shields shall not be used as a ground path.

3.04 WIRING DEVICES

- A. Switches and receptacles for use outdoors and in process areas shall be mounted in "FD" type boxes or PVC-coated boxes in locations specified. Unless otherwise specified, switches shall be mounted 48 inches above the floor. Receptacles shall be mounted 18 inches above the floor in finished areas and 48 inches above the floor in process areas and outdoors unless otherwise specified.

3.05 INDIVIDUAL MOTOR STARTERS

- A. Individual motor starters shall be mounted with the operating mechanism 48 inches above the finished floor unless otherwise specified. The Contractor shall size the overload heater elements to the nameplate full load amperes of the motor served. Motor circuit protectors shall be adjusted to the lowest setting not causing false tripping.

3.06 MISCELLANEOUS CONTROL DEVICES

- A. Control stations generally shall be mounted 48 inches above the floor unless otherwise specified.

3.07 GROUNDING

- A. Electrical equipment and enclosures, metal surfaces of equipment, and metal structural members shall be grounded. Grounding system shall be provided in compliance with the NEC and as specified on the drawings.

Embedded and buried cable connections shall be made by cast copper compression connectors utilizing diamond or hexagon dies and a hand compression tool for wire sizes 2 AWG and smaller and a hydraulic pump and compression head for wire size 2/0 AWG and larger. Embedded ground cables and fittings shall be securely attached to concrete reinforcing steel with tie wires.

Grounding conductors which extend beyond concrete surfaces for equipment connection shall be extended a sufficient length to reach the final connection point without splicing. Grounding conductors which project from a concrete surface shall be located as close as possible to a corner of the equipment pad, protected by conduit or terminated in a flush grounding plate.

Exposed ground connections shall be made by bolted connectors. Exposed grounding conductors shall be supported by noncorrosive metallic hardware at 4-foot intervals or less.

Grounding conductors entering enclosures shall be bonded together to the enclosure if it is metallic and to metallic raceway within terminating at the enclosure. Metal surfaces shall be cleaned prior to making grounding connections and bonds.

When install ground rods, field verify exact location of existing underground utilities such as water piping, gas piping, electrical conduits or ductbanks, vault or manholes etc prior to installation of the ground rods to avoid damage to the existing underground utilities.

3.08 LIGHTING FIXTURES

- A. General: The location and type of fixtures and receptacles are shown on the drawings. Raceways and wire shall be provided from the fixtures, switches, and receptacles to the lighting panel in accordance with the NEC.

Fixtures labeled to require conductors with a temperature rating exceeding 75 degrees C shall be spliced to circuit conductors in a separately mounted junction box. Fixture shall be connected to junction box using flexible conduit with a temperature rating equal to or greater than that of the fixture.

Labels and marks, except the UL label, shall be removed from exposed parts of the fixtures. Fixtures shall be cleaned when the project is ready for acceptance.

3.09 PANELBOARDS

- A. The contractor shall type in the circuit descriptions on the circuit directory as shown on the final record drawings or panel schedule.

3.10 TESTING

- A. General: Prior to energizing the electrical circuits, the tests shall be performed as specified. Unless otherwise specified, a 500-volt megohmmeter shall be used for resistance measurements.

The measurements of the tests shall be recorded on the specified forms and provided in accordance with paragraph 16010-1.3.

- B. Insulation Resistance Measurements:

1. General: General insulation resistance measurements shall be made on conductors and energized parts of electrical equipment. Minimum acceptable values of insulation resistance shall be in accordance with the applicable ICEA, NEMA, or ANSI standards for the equipment or material being tested, unless otherwise specified. The ambient temperature at which insulation resistance is measured shall be recorded on the test form.
2. Conductor and Cable Tests: The phase-to-ground insulation resistance shall be measured for all circuits 120 volts and above except lighting circuits. Measurements may be made with motors and other equipment connected.
3. Insulation resistance measurements shall be recorded and submitted to the Engineer for review and approval. Insulation with resistance of less than 10 megohms is not acceptable.
4. Motor Tests: All motors shall have their insulation resistance measured before they are connected. Motors 50 HP and larger shall have their insulation resistance measured at the time of delivery as well as when they are connected. Insulation resistance values less than 10 megohms are not acceptable.

C. **FUNCTIONAL CHECKOUT:**

1. Prior to energization of equipment, the Contractor shall perform a functional checkout of the control circuit. Prior to functional testing, all protective devices shall be adjusted and made operative. Checkout shall consist of energizing each control circuit and operating each control, alarm or malfunction device and each interlock in turn to verify that the specified action occurs. Contractor shall submit a description of its proposed functional test procedures prior to the performance of functional checkout.
2. The Contractor shall verify that motors are connected to rotate in the correct direction. Verification may be accomplished by momentarily energizing the motor, provided the Contractor confirms that neither the motor nor the driven equipment will be damaged by reverse operation.

D. **GROUNDING SYSTEM TESTS:**

1. The Contractor shall test each grounding connection to determine the ground resistance. The grounding test shall be IEEE Standard 81. A plot of ground resistance readings for each isolated ground rod or ground mat shall be provided to the Construction Manager on 8-1/2 x 11 inch size graph paper. The current reference rod shall be driven at least 100 feet from the ground rod or grid under test. The measurements shall be made at 10-foot intervals beginning 25 feet from the test electrode and ending 75 feet from it, in direct line between the ground rod or center of grid and the current reference electrode.
2. A grounding system that shows greater than 2 ohm resistance for the flat portion of the plotted data shall be considered inadequately grounded. The Contractor shall add additional parallel connected ground rods and/or deeper driven rods until the ground resistance measurements meet the 2 ohm requirement. Ground rods required over that specified will be paid for as extra work. Use of salts, water, or compounds to attain the specified ground resistance is not acceptable.

3.11 RECORD DRAWINGS

- A. Record drawings refer to those documents clearly maintained and annotated by the Contractor during construction include record drawings in accordance with these specifications. Contractor shall submit record drawings that reflect as-installed conditions. Drawings do not conform or do not show as installed conditions shall be rejected and shall be resubmitted by the Contractor for no additional cost to the District until acceptance by the Engineer. Markups for deviations and changes shall be on a full size set of drawings with color markers.

3.12 SEQUENCE OF WORK

- A. For general project construction sequence, refer to section 01040 Coordination and Project Requirements for details. For electrical work, Contractor shall follow Sequence of Work as described in this section. Submit plan for review and approval two weeks in advance.

3.13 TEMPORARY POWER DURING CONSTRUCTION

- A. Temporary power required during construction shall include a portable rental 208V and 480V three-phase generators to provide backup power to the existing pump stations. See section 01040 for details of project constraints.

3.14 COORDINATION OF WORK WITH TESCO CONTROLS

- A. Contractor shall fully coordinate its work with Tesco who is the SCADA PLC system supplier for the City and thus has full knowledge of the existing PLC system at each site. All signals shown to be connected to respective PLC shall be clearly identified and marked/tagged per section 16075 Electrical Identification. Final terminations of the signals will be done by the Contractor under Tesco's supervision. Final, revised as-builts prepared by Tesco shall include new signals from the emergency generator system at each site. SCADA system HMI software displays shall include status and alarm signals shown on the drawings. See specs section 17520 for required SCADA work for Tesco to perform under the Contractor in this project.

3.15 MODIFICATIONS TO EXISTING ELECTRICAL SWITCHBOARDS AND GEAR

- A. Contractor shall modify existing electrical switchboards, MCCs and gear in order to install and connect new equipment and new devices as shown on the drawings. It is the Engineer's preference that the modification work be performed by the manufacturer or authorized service distributor of the original switchboards so that the work matches with existing installation as much as possible. All modification work shall be done with experienced field personnel who have at least 10 to 15 years working on 480V electrical power distribution equipment. Advanced shutdown requests shall be planned ahead and submitted to the City for review and approval prior to actually performing the work. For stations involving existing main service breaker, the Contractor shall contact PG&E to arrange for shutdown and restore service after the required work is done.

Temporary power is also required to keep existing systems functional with minimum interruptions. Follow all safety precautions and lock-out tag-out procedures as required by NEC, OSHA, NESC and other applicable regulations in performing the work. Make record of the changes as required in the above paragraph 3.11.

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SECTION 16050

ELECTRICAL DEMOLITION AND MODIFICATIONS

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, and incidentals required to demolish, modify and/or remove the electrical and instrumentation systems and equipment as shown on the Drawings or specified herein. All demolition work shall be performed by licensed and experienced electricians. All electrical sources shall be field verified to be de-energized and locked out prior to demolition work.
- B. Unless specifically noted as being reused, all conduit, wire, boxes, etc. detailed on the Drawings shall be new equipment installed under this Work.
- C. The electrical modifications and removals work shall consist of, but not necessarily be limited to, removal or modifications of existing equipment in the following generalized categories:
 - 1. Modification of motors, motor starters, panels, lights, outlets and other devices as indicated on the Drawings.
 - 2. Any electrically powered or controlled equipment indicated as being removed such as emergency generators in this Contract and associated electrical appurtenances.
 - 3. Existing electrical equipment or electrical equipment associated with mechanical or process equipment which needs to be removed or relocated due to conflicts with new construction.
 - 4. Electrical control devices, starters, wiring, and other miscellaneous devices associated with equipment that will be modified or reused under this Contract.
 - 5. Instrumentation and control equipment and related conduit and wire associated with equipment being removed under this Contract.

1.02 RELATED WORK

- A. Additional requirements for equipment demolition and salvage are specified in Section 02419 – Selective Demolition

1.03 SUBMITTALS

- A. All submittals shall be in accordance with Specifications.

PART 2 -PRODUCTS (NOT USED)

PART 3 -EXECUTION

3.01 EQUIPMENT TO BE REMOVED

- A. Due to physical drawing space limitation, only the major electrical and instrumentation equipment to be removed are shown or noted on the Drawings and failure to detail all equipment exactly shall not relieve the Contractor from the responsibility for its removal as directed by the Engineer. Removal items such as wire, conduit, junction boxes, anchorages, etc. are in general not detailed on the Drawings. Most of the existing electrical power and control equipment was manufactured by Tesco, and thus it is efficient and preferred for the Contractor to enlist Tesco perform field assistance of modifications to the existing electrical equipment.
- B. Where removal of electrical, instrumentation, or any other equipment with wired connections is called for in this Work, the work shall include the removal of the associated electrical hardware as specified herein unless noted otherwise.
- C. Unless otherwise noted, all wiring shall be removed from the conduits; boxes and fittings and all exposed conduit shall be removed. Unless specifically noted otherwise, concealed conduits shall be cut flush with the floor, wall, or ceiling and plugged with non-shrink grout.
- D. Electrical power, control, or instrumentation equipment, exposed conduit, wiring, etc. rendered inoperative by modifications to existing equipment under these sections or other Divisions of this contract shall be removed unless specifically noted that it is to be abandoned in place.
- E. Not all existing conduits are shown on the Drawings. In general, existing conduits are shown only where they may be reused; or where they potentially affect or may be affected by new work under this Contract; or for providing useful background information to the Contractor regarding the existing electrical installation.
- F. Where existing conduit or wire associated with removed equipment is to be reused, it will be specifically noted on the Drawings or Conduit and Cable Schedules.
- G. No existing conduits, wiring, or electrical appurtenances shall be removed or in any way damaged unless allowed by the provisions of this Section. Any existing conduits or wiring or other electrical appurtenances that are encountered as an obstruction to new construction which are not covered by the provisions of this Specification shall be brought to the attention of the City.
- H. Where functions of existing cables or conduits are replaced by new cable or conduits because of additions of new panels, instruments, revision to control strategy, etc., the existing cables and exposed conduits shall be removed unless noted otherwise. Where shown on the drawings, or where terminating in equipment enclosures, concealed conduits shall be retained and marked as spares.

- I. Equipment removed shall not be reused under this contract unless specifically noted on the Drawings or Specifications.
- J. To minimize disruptions to the existing pump station operations, the schedule for modifications and removal of existing equipment shall be coordinated with and approved by the Engineer and City.
- K. Where, if applicable, any existing circuits are disconnected due to abandonment or removal of existing equipment, the remaining motor starters or circuit breakers for these circuits shall be retagged as spares. At motor control centers, the tags shall be laminated nameplates matching the existing ones. In circuit breaker panels, the circuit directory card or list shall be changed to reflect as installed conditions.
- L. Demolished and removed equipment, conduit, wire, etc., shall become the property of the Contractor unless specifically noted otherwise on the Drawings. Contractor shall be responsible for disposing removed equipment in conformance with the requirements of Section 02419 - Demolition. Where specifically shown on the Drawings, selected electrical equipment shall be protected, removed and turned over to the City per the requirements of Section 02419 - Demolition.
- M. The following specific items shall be removed and returned to the City:
 - 1. Laurel Creek cable tap box
 - 2. Santos Ranch 900 Booster LS cable tap box
 - 3. Santos Ranch 1300 Booster LS cable tap box
 - 4. S7 Sewer Lift Station cable tap box
 - 5. S12 Sewer Lift Station cable tap box
 - 6. All removed Manual Transfer Switches and Automatic Transfer Switches.
 - 7. All existing temporary, portable generators and portable cables.
- N. Coordinate with the City Representative location where these above items be shipped to. Protect equipment until delivered to the City.

**** END OF SECTION ****

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SECTION 16075

ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Identification of electrical conductors, raceways and equipment, and electrical equipment signs.
- B. Related Sections:
 - 1. Section 16010 – Requirements for Electrical Work
 - 2. Section 17520 – SCADA PLC System

1.02 REFERENCES

- A. National Electrical Code (NEC):
 - 1. Article 110–22 - Disconnecting Means.
 - 2. Article 210–4 - Multi-wire Branch Circuits.
 - 3. Article 200 - Use and Identification of Grounded Conductors.
 - 4. Article 384 - Switchboards and Panelboards.
 - 5. Article 300 - Wiring Methods.

1.03 SUBMITTALS

- A. Shop Drawings:
 - 1. General: Submit Shop Drawings for electrical equipment room layouts, drawn at a minimum at 3/8 inch = 1 foot, scale.
 - 2. Cross Reference: Diagram shall carry a uniform and coordinated set of wire numbers and terminal block numbers to permit cross-referencing between the Contract Document Drawings, the Drawings prepared by the CONTRACTOR, and equipment O&M Manual Drawings.
 - 3. Drawing number cross references and continuation references shall also be provided. Contractor-prepared Drawings shall reference applicable CONTRACTOR Drawings such as P&IDs, control and logic diagrams, interface wiring diagrams, Panel Drawings, etc. Contractor-prepared Drawings shall also reference applicable Drawings provided by equipment manufacturers.
 - 4. On any Drawing prepared for this project, if a wire, circuit, enclosure, panel, or device is continued on another Drawing, the continuation Drawing shall be referenced (and vice-versa). Wherever wires are shown connected to terminals, the Drawings which show the continuation of the circuits on those terminals must be referenced.

5. Interconnection Diagrams: Cables shall not be installed into raceways until the wiring interconnection diagrams are reviewed by the design engineer.
 6. Sample schematics and diagrams are indicated on typical detail Drawings for reference and understanding of minimum information required for submittal of Shop Drawings schematics and diagrams, and submittal of O&M schematics and diagrams.
 7. Include tagging system, labels, markers, hazard tape, nameplates, and signs.
- B. Product Data: Include tagging system, labels, markers, and warning signs, and hazard tape.
- C. Project Record Documents:
1. Document wire, cable, and conductor tags, and bundle tags installed in accordance with the Contract Documents.
 2. Document installed wire, cable, and conductor tags and bundle tags when not specifically indicated.
 3. Indicate on Record Drawings deviations from accepted Shop Drawing conductor identification.

1.04 QUALITY ASSURANCE

- A. Pre-installation Meeting:
1. Conduct in accordance with Section 16010.
 2. Purpose: To clearly define requirements specified for circuit/cable/conductor identification, hold a meeting including representatives of Contractor, City, and Engineer prior to significant cable or conductor purchase and installation/termination.

PART 2 -PRODUCTS

2.01 LABELS

- A. Manufacturers: One of the following or approved equal:
1. Brady.
 2. Seton.
- B. Type: Sleeve type.

2.02 CONDUCTOR AND CABLE MARKERS

- A. Manufacturers: One of the following or approved equal:
 - 1. Brady.
 - 2. Seton.
- B. Type: Slip-on PVC sleeve or strap-on type.
- C. Printed using Brady marker "XC PLUS," or approved equal.
- D. Markers used in tunnels or other wet locations shall be on heat-shrinkable marking sleeves.
- E. Use self-laminating vinyl on white background for markers within electrical equipment such as panels, termination cabinets, motor control centers.
- F. Use engraved stainless steel tags with circuit designation fastened to direct buried cables in underground pull boxes as detailed on the drawings.

2.03 RACEWAYS IDENTIFICATION (TAGS)

- A. Conduit numbers shall be pressure stamped into a non corrosive 2 inch long, 1/2 inch wide stainless steel tape, Dymo marking system or approved equal. A tag with number shall be fixed with No. 18 AWG or larger type 304 stainless steel wire, to each conduit segment and at the end of each conduit and within 3 feet of each pull box, panelboard, and switchboard.

2.04 NAMEPLATES, LABELS AND SIGNS

- A. Nameplates:
 - 1. Type: Black lamicoid with white letters.
 - 2. Fastener: Round head stainless steel screws.
- B. Automatic Equipment and High Voltage Warning Signs:
 - 1. Type: Suitable for exterior use and meeting OSHA regulations.
- C. Power Pole Labels: Vinyl plastic with details as shown on the drawings.
 - 1. Manufacturers: One of the following or approved equal:
 - a. Brady.
 - b. Seton.

- D. Underground Hazard Tape: 6 inches wide. Detectable, aluminum with warning wording.
 - 1. Manufacturers: One of the following or approved equal:
 - a. Panduit.
 - b. Thomas and Betts.

PART 3 -EXECUTION

3.01 CIRCUIT IDENTIFICATION

- A. Identify 3-phase system conductors and cables as Phases A, B, and C and identify 1-phase system conductors and cables at electrical equipment including, but not limited to, switchgear, switchboards, panelboards, motor control centers, and motors.
 - 1. Match CITY's existing electrical system identification scheme or meet requirements of the authority responsible for the project.
 - 2. 3-phase 480 Volts AC System Conductors: Phase A, brown; Phase B, orange; Phase C, yellow.
 - 3. Single-Phase Conductors for 120/240/208 VAC Circuits: Phase A, black; Phase B, red; Phase C, blue.
 - 4. Neutral Conductor: White for 120 VAC and gray for 277 VAC.
 - 5. Insulated Equipment Grounding Conductor: Green.
 - 6. General Purpose AC Control Conductors: Red.
 - 7. General Purpose DC Control Conductors: Purple (+), Gray (-)
 - 8. Where used, identify 15 kilovolt class cables with 3 stripes of color tape specified in item 3 above.
 - 9. Where used, identify 5 kilovolt cable with 2 stripes of color tape specified in item 3 above.
- B. Use color coding and phasing consistent throughout the site. Bus bars at panelboards and motor control centers to be connected Phase A-B-C, top to bottom, or left to right facing connecting lugs.
- C. Conductors Number 2 American Wire Gauge (AWG) and smaller to be factory color coded with a separate color for each phase and neutral, which shall be used consistently throughout the system. Larger cables to be coded by the use of colored tape.
- D. In addition to color coding, for all 1-phase and 3-phase systems, identify each cable (single or multi-conductor) and conductor at each end, in each manhole, pullbox, cable tray, or other component of the raceway system. This identification is applicable to all power, control, alarm, signal, instrumentation cables, and conductors.

- E. Identify each cable (single or multi-conductor) and groups or bundles of individual single conductors in each manhole, pullbox, cable tray, or other component of the raceway system with circuit identification markers. Implement a "from-to" cable/conductor bundle tagging system as part of this identification effort.
- F. Identify each individual conductor at each termination. This includes such locations as switchgear, switchboards, motor control centers, variable frequency drives, control panels, junction/terminal boxes, all field devices, and all other locations where conductors are terminated. Identify the termination of these conductors in accordance with the accepted Shop Drawings. Tag conductors with sleeve type labels.
- G. Where more than 1 nominal voltage system exists, identify each ungrounded system conductor by phase and system. Permanently post means of identification at each branch-circuit panelboard, switchboard, switchgear, motor control center, or other type of power distribution equipment.
- H. Include the following minimum information for wire and cable identification.
 - 1. Circuit number or load identification tag number as per section 16075.
 - 2. Origin (from source).
 - 3. Destination (to load).

3.02 NAMEPLATES

- A. Furnish and install nameplates for all electrical equipment indicated on the Drawings. Each disconnect control system, breaker, switch, panelboard, MCC, switchboard, control panels etc., shall have nameplate indicating equipment name and circuit designation.
- B. Each disconnect means for service, feeder, branch, or equipment conductors and pushbutton stations shall have nameplates indicating its purpose or identifying the load.
- C. Each lighting switch and convenience outlet shall have a nameplate indicating its 120VAC power circuit number from lighting panelboard.

3.03 AUTOMATIC EQUIPMENT WARNING

- A. Mount permanent warning signs at mechanical equipment which may be started automatically or from remote locations. Fasten warning signs with round head stainless steel screws or bolts, located and mounted in a manner acceptable to ENGINEER.
- B. Mount permanent and conspicuous warning signs on (front and back) equipment, doorways to equipment rooms, pull boxes, manholes, where the voltage exceeds 600 volts.

- C. Place a warning ribbon or other effective means suitable for conditions above ductbank underground installations.
- D. Place warning signs on utilization equipment that has more than one source of power. Provide panel and circuit number of conductor tag of the power source disconnect.
- E. Place warning signs on utilization equipment that has 120 VAC control voltage source used for interlocking. Provide panel, circuit number, and conductor tag of control voltage source disconnect.

3.04 CONDUIT TAGS

- A. Install conduit tags (engraved stainless steel round tags) at each conduit termination to control panel, MCC, ATS, enclosure, disconnect, pull box, junction box etc.. Conduit tag names shall be as per single-line and control one-line and schematic diagrams shown on the drawings.

**** END OF SECTION ****

SECTION 16210

PERMANENT DIESEL GENERATORS

PART 1 - GENERAL

1.01 SCOPE

- A. The Contractor shall furnish and install and test complete a permanent electric generating system which shall be rated for a minimum output listed below, at 0.8 power factor, 480-volt, 240-volt, 3-phase, 4-wire, 60-Hertz, 40-degree-C ambient, without exceeding NEMA MG1 temperature rise limits at rated load.

Laurel Creek Booster Pump Station	200 kW 480V 3-phase 4W
900 Santos Booster Pump Station	200 kW 480V 3-phase 4W
1300 Santos Booster Pump Station	150 kW 480V 3-phase 4W
S-7 Sewer Lift Station	125 kW 480V 3-phase 4W
S-12 Sewer Lift Station	80 kW 240V 3-phase 4W

The scope of work shall include removal of existing generators, modifications of the existing electrical switchboards prior to wirings to the new gensets, ATS and associated auxiliary equipment. The scope also includes wirings of new signals to existing SCADA system at each respective site. It is very critical that the new generators shall not exceed the foot prints/dimensions as shown on the construction documents.

- B. The standby electric generating system shall be suitable for outdoor installation except S-12 Sewer Lift Station, and shall be rated for up to an altitude of 1000 feet without derating.
- C. The standby systems shall be a package of:
1. A diesel engine driven electric system to provide standby electric power.
 2. Engine mounted control system.
 3. Starting batteries with high cranking capacity in low temperature environment, Skid-mounted accessories as specified including batteries, UL listed battery charger.
 4. Engine skid-mounted control panel.
 5. All other equipment and accessories as required providing a complete and operating system.

6. Self-contained, critical, skid-mounted muffler in the noise attenuated, aluminum enclosure except S-12 Sewer Lift Station.
 7. State compliant, sub-based, fuel tank mounted in the skid.
 8. Rodent-proof metal screen around the base of the unit to prevent rodents' entry. Screens are not required for those inherently designed as rodent-proof enclosure.
- D. All materials, equipment, and parts comprising the units specified herein, shall be new and unused, of current manufacture and of the highest grade.

1.02 RELATED SECTIONS:

- A. Section 16010 – Requirements for Electrical Work.
- B. Section 01040 - Coordination and Project Requirements
- C. Front-end specifications- Special Provisions

1.03 QUALITY ASSURANCE:

- A. The engine, generator, and all major items of auxiliary equipment shall be manufactured in the U.S. by manufacturers currently engaged in the production of such equipment. The unit shall be factory assembled and tested by the engine manufacturer and shipped to the jobsite by its authorized dealer having a parts and service facility in the area. The performance of the generator shall be certified by manufacturer as to the full power rating stability, and voltage and frequency regulation, and field load tested at site.
- B. The unit offered under these Contract Documents shall be covered by the manufacturer's standard warranty or guarantee on new machines and shall be a minimum of two years. All generators supplied under this project shall be a product of a single manufacturer.
- C. Before the equipment is delivered, a factory certified test log of the generator sets showing a minimum of $\frac{3}{4}$ hour testing with $\frac{1}{2}$ hour at 100 percent rated load, continuously, shall be submitted to the Engineer. This generating system shall be full-load tested at the manufacturer facilities for a period of 2 hours, with the manufacturer's providing necessary inductive load banks. Any defects which become evident during this test shall be corrected by the manufacturer at its own expense.

- D. On completion of the installation of the generator, field start-up shall be performed by a factory-trained dealer service representative. Operating and maintenance instruction books shall be supplied and procedures explained to operating personnel. This training session shall not be less than two hours.

1.04 SUBMITTALS

- A. Submit shop drawings and product data which shall include the following as a minimum:
 - 1. Catalog cuts, physical dimensions and installation details including conduit terminations.
 - 2. Wiring diagrams and control schematics including power connection requirements.
 - 3. Complete bills of material accounting for all equipment including loose spare parts.
 - 4. Air emission compliance certification for use in California and BAAQMD.
 - 5. Seismic calculations by a California registered professional structural engineer.
 - 6. Complete O&M Manual. (Hard copy and electronic copy-pdf version)
- B. Submit Installation Plan for the generator equipment at S-12 Sewer Lift Station for review and approval prior to the commencement of demolition and installation activities at the S-12 Sewer Lift Station site. The Installation Plan shall include a minimum of the following:
 - 1. Lists or descriptions of portable hoisting, rigging, and/or lifting equipment anticipated to be used, with information on load capacities, dimensions, lifting heights, and clearance requirements.
 - 2. Proposed plan sequence for the demolition and removal of the existing generator including, but not limited to, removal of existing generator ancillary components, removal of existing generator and engine, removal of existing fuel tank sub-base, demolition of the existing concrete foundation, construction of the new concrete foundation and any underground electrical modifications work, installation of the fuel sub-base, installation of the engine-generator upper skid assembly on the fuel sub-base, and installation of generator equipment ancillary components including fuel fill piping, exhaust components and supports, air exhaust ducting, and electrical connections. Plan shall include temporary removal of the existing doors and/or door frame if removal is proposed as part of the Installation Plan.

3. Proposed schedule to include all of the above activities, at a minimum. Schedule shall include estimated durations of activities.
4. Include how site security will be maintained, particularly if Installation Plan includes temporary removal of doors and/or door framing.

PART 2 - PRODUCTS

2.01 ENGINE AND ACCESSORIES

- A. The engine shall be water cooled inline or Vee-type four-stroke cycle compression ignition Diesel engine.
- B. The engine governor shall maintain frequency regulation not to exceed 3 percent from no load to full rated load.
- C. The units shall be mounted on a structural steel subbase and shall be provided with suitable vibration isolators which shall be seismically fastened to the concrete slab with steel anchor bolts. The design shall conform to California seismic requirements as specified in the Special Provisions.
- D. Safety shutoffs for high water temperature, low oil pressure, over speed, and engine over crank shall be provided. An engine-mounted radiator with blower type fan shall be provided and sized to maintain safe operation at 115 degrees F maximum ambient temperature. The radiator shall be equipped for a duct adapter flange. Air flow restriction from the radiator shall not exceed 0.5 inch water gauge.
- E. The engine cooling system shall be filled with a solution of 50 percent ethylene glycol.
- F. The engine exhaust shall be provided with a suitable critical residential type silencer manufactured by Kittel, Maxim, or approved equal. Provide a rain cap for the exhaust, vertical pipe. Physical noise for outdoor units from their weather proof, aluminum enclosures shall not exceed the following dBA or better at 23 feet: 73dBA, 74dbA, and 76dBA for 125 kW, 150 kW, and 200 kW genset respectively.
- G. The engine's accessories such as gauges, fuel piping, fittings, and valves shall be supplied and installed with the engine in accordance with appropriate local codes and regulations. Provide one 2000 Watt, 240 VAC single-phase, thermostatically controlled jacket water heaters. Block heaters are 2000, 2500, 3000 and 4000W respectively.

- H. A 24-volt DC electric starting system, as recommended by the engine manufacturer, with positive engagement drive and automatic starter cut out upon starting shall be furnished.
- I. Generator manual and automatic start-stop controls in the generator control panel shall be provided. Controls shall provide two auxiliary contacts for activating accessory items. Controls shall include a 30-second cranking cycle limit with lockout. (Three 10-second cranks or a single 30-second crank.)
- J. A 24-volt lead-acid storage battery set of the heavy-duty diesel starting type shall be provided. The battery set shall be of sufficient capacity to provide for 1-1/2 minutes total cranking time without recharging and shall be rated no less than 220 amp-hours. A battery rack and necessary cables and clamps shall be provided. A UL listed battery charger in a NEMA 12 enclosure mounted in the generator enclosure shall be provided to float charge the batteries. The charger shall be heavy duty, industrial type suitable for use with 120VAC power input. It shall be as manufactured by LaMarch, Sens or approved equal.
- K. The engine shall be certified Tier 4 as applicable by the California Air Resources Board to have a particulate matter (PM) emission rate of no greater than 0.01g/bhp-hr or stricter. The certification for the engine shall be submitted to the Engineer as proof that this requirement is met. The engine shall meet all other requirements by the Bay Area Air Quality Management District for emissions from a stationary emergency diesel engine.

2.02 GENERATOR

- A. The generator shall be a 4-pole or 6-pole revolving field type with static exciter and magnetic amplifier or SCR voltage regulator. Commutator or commutator brushes will not be acceptable. Class F insulation shall be used on the stator and rotor, and both shall be further protected with 100 percent epoxy impregnation and an overcoat of resilient insulating material to reduce possible fungus and abrasive deterioration. The stator shall be directly connected to the engine flywheel housing, and the rotor shall be driven through a semi flexible driving flange to insure permanent alignment. Voltage regulation shall be within plus or minus 2 percent of rated voltage, from no load to full-load. The instantaneous voltage dip shall be less than 15 percent of rated voltage when full load and rated power factor is applied to the generator. Recovery to stable operation shall occur within 5 seconds. Stable or steady-state operation is defined as operation with terminal voltage remaining constant within plus or minus one percent of rated voltage. A rheostat shall provide a minimum of plus or minus 5 percent voltage

adjustment from rated value. Temperature rise at full-load determined by resistance shall be within rating as defined by NEMA MG-1.

- B. The specified standby kW shall be for continuous electrical service during use of the units.
- C. These ratings must be substantiated by manufacturer's standard published curves. Special ratings or maximum ratings will not be acceptable.
- D. A generator mounted, general purpose type, vibration isolated 14-gauge steel control panel shall be provided. Provide a ETHERNET-based communication port for future connection to the existing SCADA PLC system.
- E. Control panel shall contain, but not be limited to the following digital (or electronic keyboard type display) equipment:
 - 1. Voltmeter, 3-1/2-inch, 2 percent accuracy
 - 2. Ammeter, 3-1/2-inch, 2 percent accuracy
 - 3. Voltmeter/ammeter phase selector switch
 - 4. Frequency meter, 3-1/2-inch, dial type
 - 5. Manual, Test and Automatic starting controls
 - 6. Panel illumination lights and switch
 - 7. Voltage level adjustment rheostat
 - 8. Engine oil pressure gauge
 - 9. Engine water temperature gauge
 - 10. Indicator lights for low oil pressure, high water temperature, over speed, and over crank alarms and alarm reset pushbutton
 - 11. Running time hour meter .
 - 12. Start pushbutton, stop pushbutton and HOA control mode selector switch. One exterior, Emergency stop switch shall be provided and mounted at visible location on the exterior of the enclosure.
 - 13. Starting batteries low – high charge indicator.
 - 14. Provide a non-resettable totalizing hour meter that measures hours of operation or fuel usage.
 - 15. Provide common engine/generator fault alarm dry contact for remote indication. Additional dry contacts from I/O module shall be provided for the following:
 - a. Low coolant level

- b. Pre low oil pressure
- c. Pre high engine temperature
- d. Generator Not-in-Auto mode
- e. Running
- f. Generator breaker tripped
- g. Low oil pressure
- h. High engine temperature
- i. Overspeed
- j. Overcrank
- k. Fuel Tank Leak

16. The generator shall automatically run when it detects low battery voltage.

- F. A generator mounted main line molded-case, 600V class, three-pole, circuit breaker shall be installed as a load circuit interrupting and protection devices for each genset. The circuit breakers shall be sized in accordance with provisions of the NEC and size of the generators. They shall operate both manually for normal switching function and automatically during overload and short circuit conditions. It shall be provided with ground-fault interruption.
- G. Generator exciter field type circuit breakers do not meet the above electrical standards and will not be acceptable for line protection.
- H. Provide loose recommended spare parts such as fan belts, air, fuel and oil filters for each genset for no additional cost to the City.

2.03 BUILT-IN FUEL TANK

- A. Fuel tank shall be 24-hr capacity, California-State-compliant, UL-2085, sub-based with double wall configuration mounted on the base of the generator's skid. The following items shall be included: Hazmat Labeling, Wire Fuel alarms (95% High, 50% Low, and Leak) to controller, fuel alarm panel with 4" NPT Fuel Fill Fitting for OPV, OPV with Fill down Tube, 5 gallon Spill/Fill Box, and 12ft extensions-shipped loose. The fuel tank sub-base for the generator system at the S-12 Sewer Lift Station shall be provided with fuel inlet connection for remote fill/spill containment, and shall not be equipped with a 5 gallon Spill/Fill Box, for the installation connecting to the existing remote fill/spill containment station as shown on the Drawings.

<u>Location</u>	<u>Tank Capacity</u>
Laurel Creek Booster Pump Station	375 gal
900 Santos Booster Pump Station	375 gal
1300 Santos Booster Pump Station	375 gal
S-7 Sewer Lift Station	250 gal
S-12 Sewer Lift Station	150 gal

- B. Tank shall be provided with a fuel leak detection system with an alarm contact for remote indication and alarm. Tank shall also be provided with a level transmitter which continuously monitor the fuel level and provide an analog 4-20mADC signal for remote monitoring functions.
- C. Tank shall be provided with height and weight I-beam per State of California Code.
- D. Tank for generator at S-12 shall be shipped and delivered to the project site separate from the engine-generator upper skid assembly, to permit field installation of the fuel sub-base and the engine-generator upper skid assembly within the existing building. The existing building doorway which may be utilized for generator equipment installation access is limited to a nominal 6'-0"W X 6'-4"H double leaf doorway in a 6'-4"W X 6'-8"H rough opening in the existing building exterior wall. The existing doorway does not have a raised threshold above the building finished floor elevation.

2.04 MANUFACTURERS:

- A. The diesel engine generator package shall be manufactured by Blue Star, Caterpillar, Rehlko, Onan/Cummins, or approved equal.
- B. Generators with dimensions exceeding layout as shown on the drawings shall not be acceptable.

PART 3 - EXECUTION

3.01 SYSTEM INSTALLATION

- A. Provide services of a factory-trained field engineer to review, check, test and supervise installation of the standby system as per manufacturer's recommendations and requirements. Verify exact location of conduit terminations with approved shop drawings prior to pouring concrete slab.

- B. Engine set shall be leveled and placed on Spring type vibration isolators. Shim with steel shims to ensure an even level installation.
- C. Check for correct phase rotation prior to performing at least four hours of full load test with the required load bank and record full load parameters such as engine temperature, oil pressure, load, power factor, water temperature, voltage, frequency and engine speed in rpm.
- D. Perform final onsite functional tests including manual and automatic controls and protective devices. 2-hr full load test shall be performed with portable load bank for 2 hrs, and followed by the station actual loads for half an hour. Records of the field test including engine parameters shall be submitted for review and approval as part of required as-built documents. Refill generator's tank with no.2 diesel fuel (for the amount used in the testing) after testing without any additional charge to the City.
- E. Submit final as-built documents with any field changes and certification that the installed system has been functional properly and is ready for final acceptance by the City.
- F. Provide grounding system as indicated and shown on the drawings. Enclosure and frame of the genset shall be bonded to the grounding electrode system.
- G. Make sure engine block heater has been properly hooked up to power source. Battery charger and batteries fully connected and properly secured. Radiator is filled up with coolant. Rodent's screen has been properly installed. Protection posts where shown on the drawings shall be installed properly to protect the enclosure from accidental vehicle's impact.
- H. Confirm and verify functionally that an exterior mounted emergency engine shut down, NEMA 4X, push button with ring guard is provided and installed.

3.02 TRAINING:

- A. Provide 1 hour class room training session and 2 hours of on-site training session to the City's personnel. (Travel time not included).

3.03 GENERATOR PERMITS:

- A. The Contractor shall fully submit completed permit applications to local Air Quality District on the City's behalf with technical data readily available during construction phase of the project. All required fees associated with the application

shall be paid by the City. Timely submission of the application shall be required to assure no delays impacting functional startups and testing of the emergency power system at each station.

**** END OF SECTION ****

SECTION 16250

LOW-VOLTAGE AUTOMATIC TRANSFER SWITCHES

PART 1 - GENERAL

1.01 SCOPE

- A. The Contractor shall furnish and install as shown on the drawings wall-mounted, indoor or outdoor or open type low-voltage (600 volts and below) 480V and 240V three-phase, 3-pole, automatic transfer switch (ATS) function having the ratings as indicated on the drawings, features/accessories and enclosures as specified herein.

1.02 RELATED SECTIONS

- A. Section 16010 – Electrical Requirements

1.03 REFERENCES

- A. The automatic transfer switches and all components shall be designed, manufactured and tested in accordance with the latest applicable standards of UL and NEMA as follows:
 - 1. UL 50 -- Cabinets and Boxes
 - 2. UL 489 -- Molded Case Circuit Breakers
 - 3. UL 508 -- Industrial Control Systems
 - 4. UL 1008 -- Transfer Switches
 - 5. UL 1087 -- Molded Case Switches
 - 6. NEMA ICS -- Industrial Controls and Systems.

1.04 SUBMITTALS -- FOR REVIEW/APPROVAL

- A. The following information shall be submitted to the ENGINEER:
 - 1. Master drawing index
 - 2. Dimensioned outline drawing
 - 3. Schematic diagram and theory of operation
 - 4. Component list
 - 5. Conduit entry/exit locations
 - 6. Assembly ratings including:
 - a. Short-circuit rating
 - b. Voltage
 - c. Continuous current.

1.05 REGULATORY REQUIREMENTS

- A. A certificate of compliance with UL 1008 must be submitted for the transfer switches to be supplied. The certificate is not required if the manufacturer's published data submitted and approved reflect a UL 1008 listing. Proof of UL 1008 listing does not, however, relieve the Contractor of compliance with other provisions of this specification.

1.06 DELIVERY, STORAGE AND HANDLING

- A. The automatic transfer switches shall be delivered to the job site suitably protected against the environmental conditions and with space heaters wired for temporary connection to prevent condensation while in storage.

1.07 OPERATION AND MAINTENANCE MANUALS

- A. Submit in accordance with the requirements of the Special Provisions, copies of the equipment and maintenance manuals shall be provided.
- B. Operation and maintenance manuals shall include the following information:
 - 1. Instruction books and/or leaflets
 - 2. Recommended renewal parts list
 - 3. Drawings and information required by section 1.4.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. The automatic transfer switch (ATS) shall be the product of ASCO 7000 Series as per the City's Standards. For outdoor mounted locations, ATS shall be located in a door-in-door NEMA 3R enclosure. For MCC-mounted locations, ATS shall be open-type fully assembled for field mounting and integrating in existing enclosure. For indoor, stand-alone location, ATS shall be NEMA 12. Refer to drawings at each site for specific enclosure requirements.

2.02 RATINGS

- A. The transfer switch shall have withstand, closing and interrupting ratings of 65,000 amperes minimum at 480V. Continuous Ampere rating shall be noted on the drawings, 480V three-phase, three-pole as shown on the drawings.
- B. The voltage rating of the transfer switch shall be no less than the system voltage rating. The continuous current rating of the transfer switch shall be no less than the maximum continuous current requirements of the system.

- C. The transfer switch shall be 100% equipment rated for continuous duty as shown on the drawings and shall conform to the applicable requirements of UL 1008 for emergency system total load.
- D. All pilot devices and relays shall be of the industrial type with self-cleaning contacts and rated 10-amperes.
- E. The automatic transfer switches shall be fully rated to protect all types of loads, inductive and resistive, from loss of continuity of power, without derating, either open or enclosed.
- F. Transfer switches shall have a minimum 60-cycle withstand rating of 65 kA. The transfer switch shall be rated for application with upstream power circuit breakers and insulated case circuit breakers having short-time delay settings of up to 30 cycles. Contacts shall not weld when used with upstream overcurrent protective devices that do not incorporate instantaneous trip units.

2.03 CONSTRUCTION

- A. The transfer switches shall consist of completely enclosed contact assemblies and a separate control logic panel. The contact assemblies shall be operated by a non-fused motor operator or stored energy mechanism and be energized only momentarily during transfer, providing inherently double throw switching action. Control power for all transfer operations shall be derived from the line side of the source to which the load is being transferred.
- B. Transfer switches shall be capable of being operated manually or automatically under full load conditions. Manual operation shall be accomplished via a permanently affixed manual operator or integrally mounted pushbutton operators located on the face of the contact assemblies. Removable manual operating handles and handles which move in the event that electrical operators should suddenly become energized while performing a manual transfer operation are not acceptable. The manual operator shall provide the same contact-to-contact transfer time as provided under normal automatic operation to prevent possible flashovers from switching the main contacts slowly. In addition, provisions shall be made to allow disengagement of the electrical operator during manual operation.
- C. Each transfer switch shall be positively interlocked both mechanically and electrically to prevent simultaneous closing of both sources under either automatic or manual operation. Main contacts shall be mechanically locked in position in both normal and emergency positions. A neutral position shall not be possible under normal electrical operation unless a delayed transition accessory is required for switching highly inductive loads. Each transfer switch shall have a manual neutral position for load circuit maintenance. A transfer switch position indicator shall be visible from the front of the switch to show to which source the transfer switch is connected.

- D. Inspection and replacement of all separate arcing contacts (moving and stationary) shall be possible from the front of the transfer switch.
- E. An electronic sensing and control logic panel shall be separately mounted from the power switching portion of the transfer switch. The two sections shall be connected by control cables with plug-in connectors. The control section shall be capable of being disconnected from the power section for maintenance purposes.
- F. The logic circuit shall utilize electronic components mounted on printed circuit boards to accomplish functions such as timing, time delays, and voltage and frequency monitoring. LEDs shall be furnished to indicate the operation of each solid-state function. Modifications shall be available for field installation without voiding the UL label.
- G. The transfer switch shall be equipped with a voltage selection plug making it suitable for operation on standard voltages from 208 through 600 volts AC, 50 or 60 hertz, by placing the voltage selection plug in the proper voltage receptacle.

2.04 WIRING/TERMINATIONS

- A. Terminal blocks shall conform to NEMA ICS 4. Terminal facilities shall be arranged for entrance of external conductors from the top or bottom of the enclosure. The main transfer switch terminals shall be suitable for the termination of conductors shown on the plans.

2.05 SEQUENCE OF OPERATION

- A. The transfer switch shall automatically transfer its load circuit to a standby power supply upon failure of its normal or preferred source.
- B. Upon loss of phase-to-phase voltage of the normal source to 80% of nominal, and after a time delay, adjustable from 0.5 to 15 seconds, to override momentary dips and/or outages, a 10-ampere, 30-Vdc contact shall close to initiate starting of the emergency or standby source power plant. Transfer to the alternate source shall take place immediately upon attainment of 90% of rated voltage and frequency of that source. For switches not involving engine generator sets as power plants, transfer shall occur after an adjustable time delay of 1 to 60 seconds to override momentary dips and outages.
- C. When the normal source has been restored to 90% of rated voltage, and after a time delay, adjustable from 0.5 to 32 minutes (to ensure the integrity of the normal power source), the load shall be automatically retransferred to the normal source. The transfer switch shall also have the capability to be programmed in such a manner that the re-transfer can also be done manually.
- D. A time delay, adjustable from 0.5 to 32 minutes, shall delay shutdown of the emergency or standby power source after retransfer to allow the generator to run unloaded for cool-down, after which the generator shall be automatically shut down.

- E. If the emergency or standby power should fail while carrying the load, transfer to the normal power supply shall be made instantaneously upon restoration of the normal source to satisfactory conditions.

2.06 ENCLOSURE

- A. The transfer switch, as shown on the drawings, shall be fully enclosed, NEMA 12 for indoor stand-alone location, NEMA 3R for outdoor locations, or open type to be installed and integrated in existing MCC. Refer to design drawings for specific requirement for each site.

2.07 ACCESSORIES

- A. The following logic and options shall be supplied:
 - 1. The logic of the transfer switch shall function via a microprocessor. The set points shall be field adjustable without the use of special tools. The switch shall have a multi-tap voltage selection plug for ease of voltage adjustment in the field. LED lights shall be included on the exterior of the switch to show:

Normal	Source	Available
Emergency	Source	Available
Normal	Source	Connected
Emergency	Source	Connected
Load Energized.		

- B. A digital readout shall display each option as it is functioning. Readouts shall display actual line-to-line voltage, line frequency and timers. When timers are functioning, the microprocessor shall display the timer counting down. All set points can be re-programmed from the front of the switch when the switch is in the program mode. A test pushbutton shall be included as part of the microprocessor. The switch shall include the following:
 - 1. Provide a time delay transfer from the normal power source to the emergency power source (0 seconds to 30 minutes). This option does not effect the engine start circuit.
 - 2. Provide a timer to override a momentary power outage or voltage fluctuation (0 seconds to 120 seconds).
 - 3. Provide a time delay transfer from the emergency power source to the normal power source (0 seconds to 30 minutes).
 - 4. Provide a timer to allow the generator to run unloaded after re-transfer to the normal power supply (1 second to 30 minutes).
 - 5. Provide single-phase under voltage and under frequency sensing on the emergency power source. Voltage shall be factory set at 90% pickup and 80% dropout. Frequency sensing shall be set at 58-hertz pickup and 56-hertz dropout.
 - 6. Provide a pilot light to indicate that the switch is in the normal position as an integral part of the microprocessor.

7. Provide a pilot light to indicate that the switch is in the emergency position as an integral part of the microprocessor.
 8. Provide a pilot light to indicate that the normal power is available as an integral part of the microprocessor.
 9. Provide a pilot light to indicate that the emergency power is available as an integral part of the microprocessor.
 10. Provide auxiliary relay contacts that are energized when the power is available on the normal source.
 11. Provide auxiliary relay contacts that are energized when the power is available on the emergency source.
 12. Provide double lugs on the load side for connections to loads.
- C. The following features shall be provided:
1. Time delay normal to emergency, adjustable.
 2. Time delay emergency to normal, adjustable.
 3. Green pilot light to indicate switch in normal position and red pilot light to indicate switch in emergency position.
 4. White pilot lights marked "Normal Source" and "Emergency Source" to indicate that respective source voltages are available.
 5. Tripped position indicating lights for both sources.
 6. Relay auxiliary contacts (2 NO and 2 NC) to indicate transfer switch position and the availability of each source.
- D. The following features shall also be provided:
1. Time delay engine start, adjustable.
 2. Time delay engine cool off, adjustable.
 3. Engine start dry contact.
 4. Loadbank dump dry contact (for future use)
 5. Frequency/voltage relay for emergency source, frequency adjustable from 45 to 60 Hz and voltage fixed at 90% pickup, 70% dropout.
 6. Delayed transition time delay, adjustable from 0 to 120 seconds, to allow disconnection of the load during transfer in either direction to prevent excessive inrush currents due to out-of-phase switching of large inductive loads.
 7. Four-position selector switch permitting four (4) modes of transfer switch operation: TEST (simulates normal power outage), AUTO (standard automatic operation), OFF (de-energizes control relays and opens the engine start circuit for maintenance purposes), ENGINE START (retains transfer switch in normal position and initiates a testing of the engine start circuit). Furnish white pilot light for OFF indication.

- E. A transfer switch position indicator shall be visible from the front of the switch.
- F. Provide pump station exerciser (selectable load, no-load transfer). The exerciser will be 7 day selectable for any duration for any day during the week.
- G. Provide an Ethernet (Modbus TCP/IP) communication port for future use.
- H. Furnish loose, two spare digital displays (keypads) to the City for no additional costs for future use.
- I. The transfer switch short circuit rating (65 kA) shall be marked on the exterior of the switch in accordance with NEC Article 700.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Check for shipping materials and remove them before installation. Observe for any damage on the enclosure.

3.02 FACTORY TESTING

- A. The following standard factory tests shall be performed on the equipment provided under this section. All tests shall be in accordance with the latest version of UL and NEMA standards.
 - 1. Insulation check to ensure the integrity of insulation and continuity of the entire system.
 - 2. Visual inspection to ensure that the switch matches the specification requirements and to verify that the fit and finish meet quality standards.
 - 3. Mechanical tests to verify that the switch's power sections are free of mechanical hindrances.
 - 4. Electrical tests to verify the complete electrical operation of the switch and to set up time delays and voltage sensing settings of the logic.
- B. The manufacturer shall provide three (3) certified copies of standard factory test reports.

3.03 INSTALLATION

- A. The Contractor shall install all equipment per the manufacturer's recommendations and the Contract Drawings. Contractor shall have a service of the ATS manufacturer field engineer to supervise the installation of the ATS. This field work shall be one day minimum in addition to required field startup and training.

3.04 FIELD ADJUSTMENTS

- A. The Contractor shall field adjust all timing and voltage settings of the transfer switch as necessary for proper operation of the unit.

3.05 FIELD TESTING

- A. Demonstrate satisfactory operations of the installed unit to the Engineer for acceptance. Make sure to have the transfer switch programmed in such a manner that transfer and re-transfer functions shall be manually selectable by the City attending staff.
- B. Check to make sure rodent protection screens have been installed. Fuel tank been filled up after testing.

3.06 TRAINING

- A. Provide one 1-hr classroom training session and one 2-hr onsite training session to the City's electrical personnel. (Travel time not included)

3.07 SIGNAGE

- A. For ATS feeding service entrance electrical gear, provide a sign at the existing service entrance equipment gear indicating that the gear is connected to an on-site power source and its location in accordance with NEC Article 700.

**** END OF SECTION ****

SECTION 16305

POWER SYSTEM STUDY

PART 1 - GENERAL

1.01 REQUIREMENTS

- A. The Contractor shall prepare a short circuit (SC), load flow (LF), and protective device evaluation/coordination (PDEC) and arc flash study for the Pump Stations' electrical power systems in accordance with the requirements of these Specifications and as shown.
- B. The study shall include all portions of the electrical distribution system from the utility service for utility power sources down to and including the 208V distribution system. This shall include all new electrical equipment as shown on the single-line diagrams.
- C. It is the responsibility of the Contractor to obtain the short circuit information required for the study from PG&E and from the field at each facility. The equipment characteristics and data in the study shall match the equipment and associated impedance actually being installed. The contractor shall also have the responsibility to field verify data of the existing electrical switchboard, feeder cables, wirings, circuit breaker makes and models etc necessary for the complete studies.
- D. The Contractor shall expedite and be fully responsible for collection of data from equipment suppliers, from the City to assure completion of the studies as required for final approval of the distribution equipment shop drawings and/or prior to releasing the equipment for manufacture.
- E. The study shall be performed with SKM Electrical Engineering software as a preferred option. Use of E-Tap is also acceptable.

1.02 QUALIFICATIONS OF ORGANIZATION RESPONSIBLE FOR THE STUDY

- A. Short circuit studies, protective device evaluation studies, and protective device coordination studies shall be performed by a professional electrical engineer from the medium voltage switchgear manufacturer or an electrical testing agency who has been regularly engaged in short circuit and protective device coordination services for a period of at least 10 years. The study shall utilize proven computer programs for making three-phase fault duty and single phase ground fault duty calculations. The studies shall be signed and stamped by a professional electrical engineer, registered in the State of California, responsible for the studies. This service shall be performed by Square D Engineering services, Electric Reliability Services, Eaton Engineering Services, or General Electric Engineering Services.

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. The short circuit and protective device coordination study shall be conducted under the applicable standards of the American National Standards Institute (ANSI), and the latest edition of the National Electrical Code (NEC). Specifically, the following standards shall apply.

ANSI/IEEE 141 - Recommended Practice for Electrical Power Distribution for Industrial Plants

ANSI/IEEE 242 - Recommended Practice for Protection, and Coordination of Industrial, and Commercial Power Systems

ANSI/IEEE C 37.010 - Application Guide for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis

ANSI/IEEE C 37.13 - Low-Voltage AC Power Circuit Breakers Used in Enclosures

ANSI/IEEE C 57.109 - Guide for Transformer Through-Fault-Current Duration

1.04 CONTRACTOR SUBMITTAL

- A. The short circuit protective device coordination report shall conform to the requirements of this Section entitled “Power Systems Study.”
- B. Studies related to distribution system protection and coordination shall be submitted to the City prior to receiving final approval of the distribution equipment shop drawings and/or prior to release of equipment for manufacture. If formal completion of the studies may cause delay in equipment manufacture, approval from the Engineer may be obtained for a preliminary submittal of sufficient detail to ensure that device selection will be adequate. Preliminary submittal shall indicate the computer program (preferably SKM) for use in performing the work of this section. Submit both hard copy and electronic version including completed SKM databases to the City. A copy of a full size 22” x 34” single-line diagram folded in a plastic 8.5” x 11” holder shall be submitted as part of the submittal.
- C. Protective device and coordination evaluation studies must be approved by the City and the Engineer prior to system implementation and testing.

PART 2 - PRODUCTS

2.01 GENERAL

- A. The study organization shall prepare a single-line diagram of the power system. This single-line diagram shall identify all specific components considered in the study, and the ratings as well as contributions of all power devices (This includes,

but is not limited to: transformers, circuit breakers, relays, fuses, buses, conduit material and cables). The study input data shall include the power company's short circuit contribution, resistance and reactance components of the branch impedances, the X/R ratios, base quantities selected, and other source impedances.

2.02 SHORT CIRCUIT STUDY (SC)

- A. The short circuit study shall be performed with the aid of a digital computer program and shall be in accordance with ANSI C37.5, IEEE Standard 242, and IEEE Standard 141. The short circuit study shall include a minimum of two general groups of system-wide calculations including 3-phase bolted faults and single-phase line-to-ground faults. The study shall produce a minimum of 4 complete system-wide sets of data and calculation results including 4 sets covering 3-phase bolted faults and 6 sets covering single-phase line-to-ground faults. The 4 sets of data and results for each group shall correspond to switching, motor and power supply operating arrangements for the worst-case faults on the bus of:
1. Main Meter and Service Switchboard while running under PG&E power as a power system and under emergency generator as a power system.
- B. Typical operating arrangements for worst-case faults are indicated in Table 1

**SHORT CIRCUIT STUDY
OPERATING ARRANGEMENTS FOR WORST-CASE FAULTS WHEN RUNNING
UNDER EMERGENCY GENERATORS**

TABLE 1

Short Circuit Case	Main Bus On	Notes
480V PG&E power available (bolted 3-phase fault) symmetrical	Meter and Main Service Switchboard	Assume all pumps and all auxiliaries are operating
Same as above (ground fault)	Meter and Main Service Switchboard	Same as above
480V Emergency power available (bolted 3-phase fault) symmetrical	Meter and Main Service Switchboard	Assume all pumps and all auxiliaries are operating
Same as above (ground fault)	Meter and Main Service Switchboard	Same as above

Note: For Lift Station S-12, the voltage is 240V 3-phase

2.03 PROTECTIVE DEVICE EVALUATION STUDY (PDEC)

- A. A protective device evaluation study shall be performed to determine the adequacy of current transformers, circuit breakers, molded case switches, relays, fuses, and other protective devices by tabulating and comparing the short circuit ratings of these devices with the calculated fault currents. Any problem areas or inadequacies in the equipment due to prospective short-circuit currents shall be promptly brought to the Engineer's attention.

2.04 PROTECTIVE DEVICE COORDINATION STUDY (PDEC)

- A. A protective device coordination study shall be performed to provide the necessary calculations required to select or check the selection of power fuse ratings, protective relay characteristics and settings, ratios and characteristics of associated current transformers, and low-voltage breaker trip characteristics and settings.

2.05 TIME / CURRENT COORDINATION CURVES (PDEC)

- A. As a minimum, the time current coordination curves for the power distribution system shall include the following on 5 cycle log-log graph paper:
 - 1. Time-current curve for each circuit breaker, protective relay or fuse showing graphically that the settings will provide protection and selectivity within industry standards. Each curve shall be identified; relay taps and time dial settings shall be specified. Curves shall be provided for ground fault settings as well as phase bolted fault settings.
 - 2. Time-current curves for each device shall be positioned to provide the maximum selectivity to minimize system disturbances during fault clearing. Where selectivity cannot be achieved, the Engineer shall be notified as to the cause.
 - 3. Time-current curves and points for transformer, motor, bus, cable and equipment damage.
 - 4. Circuit interrupting device operating and interrupting times.
 - 5. Indicate maximum fault values on the graph.
 - 6. Sketch of bus and breaker arrangement.
 - 7. Magnetizing inrush points of transformers.
 - 8. Motor starting currents and thermal limits of motors 150 HP and above.
 - 9. All restrictions of the ANSI and National Electrical Code shall be adhered to and proper coordination intervals and separation of characteristics curves shall be maintained.

2.06 LOAD FLOW (LF)

- A. Several steady state load flow studies shall be conducted. The initial tap settings of all the 208-volt transformers shall deliver the nominal 208 volts at the associated switchboard and MC main buses, and all transformers seeing all connected load running at full load. For any power system with a combined 100hp of motor loads or larger, a steady state load flow with the above initial conditions shall be provided for the following cases and shall be submitted for Engineer review.
- B. Load flow studies shall be provided for the two switching and operational arrangements described in Table 1 for the short circuit calculations.
- C. Load flow studies shall show all major node voltages and branch currents including motor terminals, associated MCC, and associated transformers both secondary and primary. A summary of identified branch voltage drops shall be provided to identify voltage drop problems.

2.07 ARC FLASH HAZARD ANALYSIS

- A. Perform an arc flash hazard analysis after the short circuit and protective device coordination study has been completed.
- B. The analysis shall be calculated by means of the SKM Power Tools for Windows computer software package. Pertinent data, rationale employed, and assumptions in developing the calculations shall be incorporated in the introductory remarks of the study.
- C. The analysis shall be in accordance with latest applicable NFPA 70E, OSHA 29-CFR, Part 1910 Sub part S and IEEE 1584 Standards.
- D. The arc flash analysis will determine the following:
 - 1. Flash Hazard Protection Boundary
 - 2. Limited Approach Boundary
 - 3. Restricted Boundary
 - 4. Prohibited Boundary
 - 5. Incident Energy Level
 - 6. Required Personal Protective Equipment Class
 - 7. Type of Fire Rated Clothing
- E. Produce an Arc Flash Warning label listing items above for each of the major equipment covered in the scope of work. Also include the bus name and voltage. Labels shall be printed in color and be printed on adhesive backed heavy duty vinyl Labels.

- F. Produce Bus Detail sheets that list the items D 1-7 from above and the following additional items:
 - 1. Bus Name
 - 2. Upstream Protective Device Name, Type, and Settings
 - 3. Bus Line to Line Voltage
- G. Produce Arc Flash Evaluation Summary Sheet listing the following additional items:
 - 1. Bus Name
 - 2. Upstream Protective Device Name, Type, and Settings
 - 3. Bus Line to Line Voltage
 - 4. Bus Bolted Fault
 - 5. Protective Device Bolted Fault Current
 - 6. Arcing Fault Current
 - 7. Protective Device Trip / Delay Time
 - 8. Breaker Opening Time
 - 9. Solidly Grounded Column
 - 10. Equipment Type
 - 11. Gap
 - 12. Arc Flash Boundary
 - 13. Working Distance
 - 14. Incident Energy
 - 15. Required Protective Fire Rated Clothing Type and Class

2.08 STUDY REPORT

- A. The results of the power system study shall be summarized in a final report signed and stamped by a California registered professional engineer. The report shall include the following minimum sections:
 - 1. Introduction, executive summary and recommendations, assumptions, reduced copy of the one-line drawing and a folded full size one-line drawing.
 - 2. Arc Flash Evaluations Summary Spreadsheet
 - 3. Bus Detail Sheets
 - 4. Coordination curves and settings of protective devices

5. Arc Flash Hazard Warning Labels printed in color on adhesive backed labels. On each label, date, name, address and phone of the organization performing the study shall be indicated. Each label shall not be smaller than 4" by 6". For outdoor electrical equipment, the labels shall be suitable for outdoor usage and shall be water-proof.

PART 3 - EXECUTION

3.01 FIELD INVESTIGATION

- A. The Contractor shall provide a field data of motor, transformer, conduit, buses, cable, switchboard, protective devices, breakers, interlocks, operational and setting data and nameplate information from new or existing electrical equipment in the field for input into the studies.

3.02 PROTECTIVE DEVICE TESTING, CALIBRATION TESTING, CALIBRATION AND ADJUSTMENT

- A. For breakers with multi-function electronic settings, the Low Voltage 600V equipment manufacturer may have an option to provide the services of a qualified field engineer and necessary tools and equipment to test, calibrate, and adjust the protective relays, motor protection devices, and circuit breaker trip devices as recommended in the power system coordination study.

3.03 STUDY REPORT

- A. The results of the power system study shall be summarized in a final report. Six bound copies of the final report signed and sealed with PE stamp and signature shall be submitted. The report shall include the following:
 1. Description, purpose, basis, criteria, scope and assumptions of the study.
 2. Single-line diagram drawing with short circuit data and details.
 3. Tabulation of all protective devices, which shall be identified on the single line diagram. Devices ratings versus calculated short circuit duties, and commentary regarding same. Device settings versus transformer inrush currents, motor starting currents and calculated short circuit currents and commentary regarding same.
 4. Time/current coordination, colored curves for all protective devices.
 5. Computerized fault current calculations and input data.
 6. Specific recommendations on equipment ratings, protective device settings and ratings.
 7. Equipment and wire input data impedances shall be clearly listed.
 8. Instrumentation, condition, and connections for each study
 9. Transformer, motor and cable damage curves.
 10. Equipment hazard category and labels.

3.04 RECOMMENDED CHANGES

- A. If recommended changes in breakers or fuses or protective devices will provide coordination where coordination was not originally possible, the Contractor shall incorporate these changes at no additional cost to the City. Additional protective devices recommended by this study, not shown or specified in the Contract Documents, may be proposed, but are not part of the requirements of the Contract Documents.

3.05 FINAL STUDY REPORT

- A. After all the City's submittal comments and any setting revisions to the equipment have been incorporated, a Final Study Report (hard copy and electronic version) shall be submitted to the Engineer prior to implementation of the settings and affixing the arc flash labels on the electrical equipment.
- B. Computer disk copies of the report input and output SKM data bases shall be submitted with the final report in addition to the 4 bound copies. The SC, LF and PDEC computer program name version and phone number and address of the manufacturer shall be indicated.
- C. Final report shall have PE stamp and signature of the engineer who performed the studies.

3.06 LABEL IMPLEMENTATION

- A. Affix all respective arc flash labels on all electrical equipment that have been covered by the study.

**** END OF SECTION ****

SECTION 16920

600 VOLT MOTOR CONTROL CENTERS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope: This section specifies existing freestanding, factory assembled 600 volt motor control center section (MCC) to be modified as shown in the drawings. It also specifies new compartment doors with auxiliary equipment and devices as shown on the drawings.
- B. Equipment List: MCCs and accessories specified herein shall be manufactured by Eaton, Allen-Bradley, or equal.

1.02 RELATED SECTIONS

- A. Section 16010 – Requirements for Electrical Work.
- B. Section 16250 – Low Voltage Automatic Transfer Switch.

1.03 REFERENCES

- A. This section contains references to 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.

Reference	Title
ANSI/NEMA ICS 1-88	General Standards for Industrial Controls and Systems
ANSI/NEMA ICS 2-88	Industrial Control Devices, Controllers and Assemblies
JIC EMP 1-67	Electrical Standards for Mass Production Equipment
UL 845-88	Motor Control Centers

1.04 SUBMITTALS

- A. The following specific submittal requirements for the MCC's shall be followed:
 - 1. Contractor shall use Eaton components for the required modifications to the existing MCCs in this project.
- B. The following information contain in three-ring binder shall be provided and submitted in accordance with Section 16010:
 - 1. Elementary connection, single-line diagram, individual equipment control schematic diagrams, and interconnection diagrams as required in accordance with JIC EMP 1 and/or NEMA ICS standards. Each and every terminal shall be identified with terminal number. Remote mounted pilot devices shall also be identified on wiring diagram.
 - 2. List of starters and feeder tap compartments indicating the size and type of circuit protection. Nameplate schedule for each equipment compartment door shall also be submitted.
 - 3. Interrupting withstand and continuous current rating of:
 - a. Bus bars
 - b. Feeder tap units
 - c. Starter units
 - d. Main incoming units

PART 2 - PRODUCTS

2.01 ACCEPTABLE PRODUCTS

- A. Motor control centers shall comply with ANSI/NEMA ICS 2-322, AC General-Purpose Motor Control Centers, Eaton.
- B. Circuit Breakers (Thermal Magnetic): Thermal-magnetic circuit breakers shall be molded case equipped with toggle type handle, quick-make, quick-break over center switching mechanism that is trip-free so that breaker cannot be held closed against short circuits and abnormal currents. The tripped position shall be clearly indicated by breaker handle maintaining a position between "ON" and "OFF." All poles shall open, close, and trip simultaneously. Minimum short circuit capacity shall be 65,000 amps symmetrical at 480V AC. Molded case breaker of 200 amp or larger shall be provided with solid-state multi function trip units with long time, long time delay, short time, short time delay and ground fault protection. Main breaker for MCC shall be provided with a shunt trip coil and with two auxiliary switches rated for 5A minimum. The shunt trip and its auxiliary contacts are for future use.

- C. Terminal Blocks: Terminal blocks shall be screw type rated 600 volts; 20 amperes for control wiring and 30 amperes power wiring (starters size 3 and larger shall terminate the power leads directly to the contactor). The number of terminal blocks shall be specified on the drawings. Terminal blocks shall be provided with integral marking strips and shall be permanently marked with the conductor number as specified on the drawings. Internal wiring shall be connected on one side of the terminal block; outgoing conductors shall be connected to the other side.
- D. Electrical Control Devices, Control Relays, Control and Power (Dry type) transformers shall be as per section 16010.

2.02 MISCELLANEOUS

- A. General:
 - 1. Control devices such as pushbuttons, selector switches, indicating lights (push-to-test type) and overload reset pushbuttons shall be mounted on the unit compartment door.
 - 2. The control devices shall comply with the requirements of applicable DIV 16 sections.
- B. Nameplates: Nameplates shall be provided in accordance with the requirements of paragraph 16075-2.4 Nameplates shall be provided for all cubicles and compartments. A Master nameplate with large lettering (one-inch high) shall be provided identifying name of the motor control center. In addition, provide a sign to indicate that "This electrical gear is supported by an emergency generator located on the outside of the MCC building" in accordance with NEC Article 700.
- C. For new breaker to be installed in existing MCC where kirk key interlocks are required, make sure the interlocked breakers shall operate accordingly ie only one breaker can be closed at any one time.
- D. For new ATS integrated in MCC, remove exiting equipment and wiring prior to installation and wiring of new ATS.

PART 3 - EXECUTION

3.01 GENERAL

- A. The motor control center sections shall be erected in accordance with the recommendations of the manufacturer and with the details specified herein.
- B. The overload relay heater elements class 20 shall be provided by the Contractor and sized based on the actual full load amperes of the motor connected to the starter. Provide a summary of all overload heaters including the motor nameplate data and corresponding overload heater catalog number and rating as part of as-built drawings for review and approval.
- C. The motor circuit protectors shall be adjusted by the Contractor to the lowest setting not causing false tripping.

- D. Install anchor bolts to hold down MCC as per typical detail shown on the drawing to resist seismic activities. Install anchor bolts to hold down auxiliary enclosure as per the manufacturer's requirements to meet seismic requirements per California Building Code. Caulk around the base of the auxiliary enclosure after installation.
- E. Provide color coded tapes and circuit identification to all power cables and terminals. Refer to Section 16010 for color assignment.
- F. For modified sections of the MCC, new compartment doors shall be required for new devices. Provide internal supports for new breakers and with isolation from other energized parts.

3.02 FIELD TESTS

- A. Motor control centers modified components shall be tested in accordance with Section 16010 and Section 16250. Testing shall include individual breakers, ATS. Submit final as-built prior to performing final acceptance test. Field test records to be submitted shall include data such as motor nameplate rating, overload catalog number and rating and actual full load current drawn by the installed equipment. This data shall be included in the final O&M submittal

**** END OF SECTION ****

SECTION 17520

SCADA - PROGRAMMABLE LOGIC CONTROLLER SYSTEM

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope:

1. General:

- a. The Contractor shall furnish, install and wire all SCADA system hardware required for this project. The SCADA system is existing. The SCADA control panels for the entire system were manufactured by Tesco Controls and thus required parts and or accessories shall also be supplied by Tesco to match existing installation. In addition, the PLC/RTU, local HMI/OIT software and the SCADA programming required for all signals under this project shall also be performed entirely by Tesco. The Contractor however shall be required to provide all labor and materials to wire and connect all new signals to the new PLC system components in coordination with Tesco as specified and as shown on the drawings.
- b. The existing PLC/RTU cabinet shall remain functional during construction, and shall only be shut down when required for the modifications and or additions. Coordination with the City staff is required.
- c. The PLC/RTU manufactured by Tesco are as follows:

Laurel Creek LS	Tesco L3000
Santos Ranch 900 Santos LS	Tesco L2000
Santos Ranch 1300 Santos LS	Tesco L2000
S7 Sewer LS	Liquitronic 5
S12 Sewer LS	Tesco L2000

2. Control System Responsibilities:

- a. The Contractor shall be responsible for all control systems work described in these specifications and drawings, including PLCs, network/communication equipment, including for programming and configuration services explicitly required by the SCADA system.
- b. The Contractor or subcontractor shall test the PLC/I/O system as specified herein to verify proper performance after modification work.
- c. Perform functional testing and training as described in this section.

3. Definitions:

- a. Where a term is used in this section relating to instrumentation, and the meaning is not defined therein or elsewhere in the Contract Documents, the meaning of the term shall be as defined in ISA S51.1 Process Instrumentation Terminology, or if not contained in ISA 51.1, as defined in listed reference standards under “References”.
- b. CEET - Complete End to End Testing.
- c. Control Circuit: Any logical circuit (operating usually at 120VAC or less or DC) whose principal purpose is the conveyance of control and interlock/protection information and not the conveyance of energy for the operation of an electrically powered device.
- d. HMI: Human Machine Interface.
- e. LAN: Local Area Network e.g. Ethernet is a local area network based on IEEE standard 802.3 with TCP/IP protocol.
- f. NAT - Network Acceptance Testing.
- g. Panel: An instrument support system which may be either a flat surface, a partial enclosure, or a complete enclosure for instruments and other devices used in process control systems. Unless otherwise specified or clearly indicated by the context, the term “panel” in these Contract Documents shall be interpreted as a general term, which includes flat panels, enclosures, cabinets and consoles.
- h. PLC: Programmable Logic Controller. This term is interchangeable with RTU Remote Terminal Unit.
- i. Power Circuit: Any circuit operating at 120 VAC or more, whose principal purpose is the conveyance of power for motors, lighting and other power devices. 24VDC associated with SCADA system shall remain and observed.

B. Test:

1. General:

- a. Any testing or startup activity that requires the participation of the City shall be scheduled by the Contractor through written notification to the City. Contractor shall provide regularly updated testing and startup schedules to the City. In addition to any other form of notification, Contractor shall notify the City by email, or other mutually agreed upon means, five working days immediately prior to any testing or other activity requiring the participation of the City. Failure to properly notify City shall result in rescheduling of test activity, solely at Contractor expense and without an extension to the project completion schedule.

2. Operational Readiness Tests (ORT):
 - a. General: Prior to startup and the Functional Acceptance Test, the entire system shall be certified (inspected, tested and documented) that it is ready for operation.
 - b. Basic End-to-End Testing (BEET):
 - 1) For each and every analog and discrete circuit, perform Basic End-to-End Testing (BEET). This includes, but is not limited to, all local control panels, MCCs, VFDs, generators, ATS, and hardwired circuits in control panels.
 - 2) For each input, activate the signal at the primary field device, either by creating necessary process and equipment conditions or by disconnecting the wires at the field device and simulating the input signal. At the PLC, using the PLC programming software, verify proper receipt of the signal.
 - 3) For each output signal from the PLC, activate the PLC output signal using the PLC programming software, and verify proper receipt of the signal at the controlled device in the field, either by observing equipment operation or by disconnecting the wires at the equipment and verifying proper receipt of the signal.
 - 4) Verify proper signal receipt at all intermediate devices, such as indicators, signal trip and relay modules, etc.
 - 5) The Loop/Component Inspections and Tests shall be implemented using District-approved forms and checklists.
 - 6) Each loop shall have a Loop Status Report to organize and track its inspection, adjustment and calibration. These reports shall include the following information and check off items with spaces for sign off by the system supplier:
 - a) Project Name.
 - b) Loop Number.
 - c) Tag Number for each component.
 - d) Check offs/signoffs for each component.
 - e) Tag/identification.
 - f) Installation.
 - g) Termination - wiring.
 - h) Termination - tubing.
 - i) Calibration/adjustment.
 - j) Signoffs/signoffs for the loop.
 - k) Panel interface terminations.
 - l) I/O interface terminations.
 - m) I/O signal operation.
 - n) Inputs/outputs operational: received/sent, processed, adjusted.

- o) Total loop operation.
- p) Space for comments.
- q) Each active Analog Subsystem element and each I/O module shall have a Component Calibration Sheet. These sheets shall have the following information, spaces for data entry and a space for sign off by the system supplier:
 - 1) Project Name.
 - 2) Loop Number.
- 3) Component Tag Number of I/O Module Number.
- 4) Component Code Number Analog System.
- 5) Manufacturer (for Analog system element).
- 6) Model Number/Serial Number (for Analog system).
- 7) Summary of Functional Requirements. For example:
 - 7a) For Indicators and Recorders: Scale and chart ranges
 - 7b) For Transmitters/Converters: Scale and chart ranges
 - 7c) For Computing Elements: Function
 - 7d) For Controllers: Action (direct/reverse) control modes (PID)
 - 7e) For Switching Elements: Unit range, differential (FIXED/ADJUSTABLE), reset (AUTO/MANUAL)
 - 7f) For I/O Modules: Input or output
- r) . Calibrations; for example:
 - 1) For Analog Devices: Required and actual inputs and outputs at 0, 25, 50, 75 and 100 percent of span, rising and falling.
 - 2) For Discrete Devices: Required and actual trip points and reset points.
 - 3) For Controllers: Mode settings (PID).
 - 4) For I/O Modules: Required and actual inputs or outputs for 0, 10, 25, 50, 75 and 100 percent of span, rising and falling; 9 points calibration (5 points calibration will be rejected).
 - 5) Space for comments.
 - 6) Space for sign off by the ISS.
 - 7) The ISS shall maintain the Loop Status Reports and Components Calibration sheets at the job site and make them available to the Construction Administrator/District at any time.

- s). These inspections and tests do not require witnessing. However, the Construction Administrator will review and initial all Loop Status Sheets and Component Calibration Sheets and spot-check their entries periodically and upon completion of the Operational Readiness Tests. Any deficiencies found shall be corrected.
- c. Complete End-to-End Acceptance Tests (CEET):
 - 1) For each PLC, CEET testing shall not commence until all Loop Acceptance Tests for the PLC have been satisfactorily completed, and all test results (including all forms signed off) have been submitted for review and accepted. For each and every analog and discrete circuit, perform an end-to-end test between the field device and the HMI computer operator station, and including all intermediate readouts. Also test each signal circuit transmitted over digital networks (i.e. ETHERNET, RS-422 links, etc.).
 - 2) In general, the end-to-end testing is a two or more person test. The Contractor shall provide personnel to operate equipment or simulate signals that are to be verified as part of this test.
 - 3) Check each loop from the field element to the respective computer control display. Include all intermediate field instruments, control devices, panels, indicators and other devices in the loop to ensure proper operation and linkage to computer control station displays.
 - 4) Analog signals shall be tested at 0, 50, and 100 percent of scale to verify the proper receipt on computer control displays.
 - 5) Discrete input circuits shall be tested to verify proper state when the field device is switched between states. Discrete output circuits shall be tested to verify equipment responds properly (start, stop, etc.).
 - 6) Contractor shall provide adequate time in the Construction Schedule for CEET testing.

3. FUNCTIONAL ACCEPTANCE TEST (FAT)

- a. Prior to startup and the Functional Acceptance Test (FAT), the entire installed instrument and control system shall be certified that it is ready for operation. All preliminary testing, inspection, and calibration shall be complete as defined in the Operational Readiness Tests.
- b. Once the facility has been started up and is operating, a witnessed FAT shall be performed on the complete system to demonstrate that it is operating and in compliance with these Specifications. Each specified function shall be demonstrated on a paragraph-by-paragraph, loop-by-loop, and site-by-site basis.

- c. Strategy Field Testing (SFT):
- 1) This test shall be performed by the Integrator with the assistance and cooperation of the Contractor. The Contractor shall provide a qualified start-up and testing representative on-site, assisting and participating in the testing full-time, for the duration of the SFT.
 - 2) The Contractor shall include in the Construction Schedule at least two days of SFT testing work for each of the control strategies and shall provide staff for these periods, as required above for this work.
 - 3) For each control strategy and for each electrical schematic diagram, demonstrate the proper operation of all hardware and software logic and control functions. Perform a step by step test of each function described in each control strategy.
 - 4) Perform separate tests on each individual piece of equipment, and for each control loop.
 - 5) Perform the proper operation of each discrete control loop to ensure the proper operation of motors, hand switches, interlocks, solenoid valves, other auxiliary devices, status lights, computer control operator interfaces, and alarms.
 - 6) Updated versions of the documentation specified to be provided for during the Factory Tests shall be made available at the job site both before and during the tests. In addition, one copy of all O&M Manuals shall be made available at the job site both before and during testing.
 - 7) The system shall operate for a continuous 96 hours without failure before this test will be considered successful.

1.02 QUALITY ASSURANCE

A. References:

1. Work specified in this Section shall follow the applicable code and standards: EIA, ANSI, IEEE, ISA and NFPA.
2. Where provisions of the pertinent codes and regulations, requirements of the referenced standards, or these specifications conflict, the more stringent of the requirements shall govern.
3. Field verification of each make and model of the required SCADA PLC at each pump station shall be performed prior to submission of shop drawings.
4. All existing wiring convention such as color codes etc shall be followed for additional and or modified wirings.

1.03 SUBMITTALS

A. General:

1. Make all submittals and resubmittals in strict accordance with the provisions of Division 1, Section 1A-7 - Submittals, Manuals, Operating Instructions, and Affidavits.
2. Make all submittals listed in Part 1.03-B, and any others required to fully describe what is to be furnished and/or installed under this Section.

B. Required Submittals:

Submittal shall list the following for each specific site to avoid confusion:

1. Drawing index and detail part list.
2. System configuration diagram and updated I/O list
3. Hardware list and cutsheets.
4. Bill of materials.
5. Test plan.

PART 2 - PRODUCTS

2.01 MANUFACTURER AND SUPPLIER

- #### **A.**
- SCADA System components shall be manufactured by Tesco Controls to match existing installation. No other brands shall be acceptable.

PART 3 - EXECUTION

3.01 ACCEPTANCE TESTING

- #### **A.**
- Perform final acceptance testing with the presence of the City and the City's representative. Demonstrate all correct signal wirings and control logics to the City's satisfaction.

3.02 TRAINING

- #### **A.**
- While the SCADA system is existing and has been functional and been maintained by Tesco under a separate maintenance contract with the City, a refresher training shall be provided by Tesco for at least two City staff. The training shall be at least for 4-hr with class room and field practice. Training materials shall include updated documentation and as-builts.

3.03 RECORD DRAWINGS AND DOCUMENTATION

- #### **A.**
- The Contractor shall have Tesco update and provide updated documentations at each site where signals are added and or modified in this project. Submit records and documents at the end of the project before project close out.

**** END OF SECTION ****

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