



City of
Los Banos
At the Crossroads of California

Contract Documents
for
Construction of

**NORTHGATE SEWER LIFT STATION
EMERGENCY POWER IMPROVEMENTS**

FEBRUARY 2024

Bid Proposals must be received no later than 2:00 p.m. March 21, 2024
City of Los Banos City Clerk
520 J Street
Los Banos, CA 93635

City of Los Banos
Public Works Department

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Advertisement for Bids

CITY OF LOS BANOS
520 J Street
Los Banos, California 93635

Notice is hereby given that separate sealed bids for the award of contract for the **Construction of NORTHGATE SEWER LIFT STATION EMERGENCY POWER IMPROVEMENTS** will be received by the City of Los Banos at the office of the City Clerk until 2:00 p.m. Pacific Daylight Savings Time, March 21, 2024 and then at said office publicly opened and read aloud.

The major work consists of furnishing and installing a self-contained standby generator set including concrete foundation, electrical controls and conduits at the existing sanitary sewer lift station located at 556 Rockport Drive; in the City of Los Banos.

The time for completion shall be one hundred and fifty (150) working days.

The Contract Documents, in their entirety, can be viewed and/or obtained from the City of Los Banos website at www.losbanos.org or at the following locations:

Central California Builders Exchange (www.cencalbx.com)

Builders Exchange of Stockton (www.besonline.com)

Valley Builders Exchange, Inc. (www.valleybx.com)

Builders Exchange of Santa Clara County (www.bxscco.com)

Dodge Data & Analytics (www.construction.com/plans/)

A payment bond prepared and executed in accordance with California Civil Code Section 9550 and a bond for faithful performance of the contract will be required of the successful bidder who is awarded the contract.

The successful bidder must comply with the latest general prevailing rate of per diem wages as determined by the Director of Industrial Relations, State of California, Department of Industrial Relations and is to be paid to the various craftsmen and laborers required to construct said improvements and is made a part of the specifications and contract for said work to which reference is hereby made for further particulars.

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

This project is subject to compliance monitoring and enforcement by the Department of Industrial Relations. Contractor registration information can be found at:

<http://www.dir.ca.gov/Public-Works/PublicWorks.html>

Each bid shall be accompanied by cashier's or certified check or by a bidder's bond, made payable to the City of Los Banos and executed by a corporate surety licensed to issue surety bonds in the State of California, for an amount equal to at least ten percent (10%) of the amount of said bid and no bid shall be considered unless such cashier's or certified check or bidder's bond is enclosed therewith.

The successful bidder of this project shall have the following current and active California State Contractor's License at the time of the submission of the bid and throughout the duration of the contract: **Class A.**

Prospective bidders are required to attend a mandatory pre-bid meeting at 11:15 a.m. on March 6, 2024 at the project location, 556 Rockport Drive, Los Banos.

Bids will not be considered from bidders who were not physically in attendance at the mandatory

pre-bid meeting.

Bidders shall refer to the Contract Document's Information for Bidders for complete instructions.

Bidders are solely responsible for the cost of preparing their bids.

The City specifically reserves the right, in its sole discretion, to reject any or all bids, to re-bid, or to waive inconsequential defects, in bidding not involving time, or quality of the work. The City may reject any and all bids and waive any minor irregularities in the bids.

Information for Bidders

Sealed bids will be received by the City of Los Banos (herein called the "Owner"), at the office of the City Clerk until 2:00 p.m. Pacific Daylight Savings Time, March 21, 2024 then at said office, publicly opened and read aloud. Owner shall reject all bids received after the specified time and will return such bids to bidder, unopened. Bidders must submit bids in accordance with these instructions. No emailed or faxed bids will be accepted.

The major work consists of furnishing and installing a self-contained standby generator set including concrete foundation, electrical controls and conduits at the existing sanitary sewer lift station located at 556 Rockport Drive; in the City of Los Banos. The time for completion is one hundred and fifty (150) calendar days.

Each bid must be submitted in a sealed envelope and addressed to the City of Los Banos at 520 J Street, Los Banos, CA 93635. Each sealed envelope containing a bid must be plainly marked on the outside as **"Northgate Sewer Lift Station Emergency Power Improvements: Attention City Clerk"**, and the envelope shall also bear on the outside, the name of the bidder, and their address. If forwarded by mail, the sealed envelope containing the bid must be enclosed in another envelope addressed to the City of Los Banos at 520 J Street, Los Banos, CA, 93635, and also clearly state, **"Northgate Sewer Lift Station Emergency Power Improvements: Attention City Clerk"**.

A complete bid includes the Bid Form, List of Subcontractors, Equal Employment Opportunity, Non-Collusion Affidavit, Debarment and Suspension Certification, Bid Schedule, Experience, Bid Bond with surety, and a copy of a current California State Contractor's License. A signed Addendum, if issued, must also be submitted with the sealed bid. The Total Bid Amount must be filled in, in ink or typewritten, and the bid must be fully completed and executed when submitted. Only one set of original bid forms are required to be submitted. Mistakes must be corrected and the correction inserted; correction must be initialed in ink by person or persons signing the bid. No conditional bids will be accepted.

The bid shall be signed by a person or persons legally authorized to bind bidder to the contract. The individual or individuals signing each document shall warrant that they are authorized to bind the bidder.

The Owner may waive any informalities or minor defects or reject any and all bids. Any bid may be withdrawn prior to the above scheduled time for the opening of bids or authorized postponement thereof. Any bid received after the time and date specified shall not be considered. No bidder may withdraw a bid within 30 days after the actual date of the opening thereof. Should there be reasons why the contract cannot be awarded within the specified period, the time may be extended by mutual agreement between the Owner and the bidder.

Each bid must be accompanied by a bid bond payable to the Owner for ten percent (10%) of the total amount of the bid. As soon as the bid amounts have been compared, the Owner will return the bid security of all except the three lowest responsive and responsible bidders. Once a bid has been awarded, and the payment bond and performance bond of the successful bidder has been received by the Owner, the bid security of the three remaining lowest responsive and responsible bidders will be returned.

All bonds must be acknowledged before a Notary Public by both the bidder and the surety. Attorneys-in-fact who sign bid bonds or payment bonds and performance bonds must file with each bond a certified and effective dated copy of their power of attorney.

Award and Execution of Contract

The party to whom the contract is awarded will be required to execute the Agreement, and obtain the performance bond and payment bond along with satisfactory evidence of insurance within ten (10) calendar days from the date when the Notice of Award is delivered to the successful bidder. The Notice of Award shall be accompanied by the necessary agreement and bond forms. In case of failure of the bidder to execute the Agreement, the Owner may, at his option, consider the bidder in default, in which

case the bid bond accompanying the bid shall become the property of the Owner.

A performance bond and a payment bond, each in the amount of 100 percent of the Contract Price, with a corporate surety named on the current list of "Surety Companies Acceptable on Federal Bonds" as published in the Treasury Department Circular Number 570, will be required for the faithful performance of the contract. The payment bond must be issued by an admitted surety insurer holding a certificate of authority to transact surety insurance in California issued by the Insurance Commissioner.

All bonds must be acknowledged before a Notary Public by both the bidder and the surety. Attorneys-in-fact who sign bid bonds or payment bonds and performance bonds must file with each bond a certified and effective dated copy of their power of attorney.

The Owner, within 15 days of receipt of the performance bond, payment bond and agreement signed by the party to whom the contract was awarded, shall sign the Agreement and return to such party an executed duplicate of the agreement. Should the Owner not execute the Agreement within such period, the bidder may, by written notice, withdraw his signed Agreement. Such notice of withdrawal shall be effective upon receipt of the notice by the Owner.

The Notice to Proceed shall be issued within 10 days of the execution of the Agreement by the Owner. Should there be reasons why the Notice to Proceed has not been issued within such period, the time may be extended by mutually agreed upon, and the bidder may terminate the Agreement without further liability on the part of either party.

All applicable laws, ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the project shall apply to the Contract throughout.

Subcontractors

The subcontractors listed by bidder in the bid shall list therein the name and address of 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 or \$10,000, whichever is greater, in accordance with the Subletting and Subcontracting Fair Practices Act, commencing with Section 4100 of the Public Contract Code. The bidder's attention is invited to other provisions of the Act related to the imposition of penalties for a failure to observe its provisions by using unauthorized subcontractors or by making unauthorized substitutions.

Registration with California Department of Industrial Relations (DIR)

A contractor or subcontractor shall not be qualified to bid on, be listed in a bid proposal, subject to the requirements of Section 4104 of the Public Contract Code, or engage in the performance of any contract for public work, as defined in this chapter, unless currently registered and qualified to perform public work pursuant to Section 1725.5. It is not a violation of this section for an unregistered contractor to submit a bid that is authorized by Section 7029.1 of the business and Professions Code or by Section 10164 or 20103.5 of the Public Contract Code, provided the contractor is registered to perform public work pursuant to Section 1725.5 at the time the contract is awarded. Labor Code Section 1771.1(a) requires contractors and their subcontractors to possess and maintain such registration with DIR in order to be awarded and to perform on public works projects (regardless of funding source).

Pursuant to Section 1771.4, each contractor and subcontractor shall furnish certified payroll records to the Labor Commissioner at least monthly and in a format prescribed by the Labor Commissioner of the DIR. Until such time that the DIR gives awarding agencies direct access to all certified payrolls submitted by contractors and subcontractors, contractor and his subcontractors are also required to submit copies of payroll records to Owner on a monthly basis. Information on the above can be found at:

<http://www.dir.ca.gov/Public-Works/PublicWorks.html>

Prevailing Wage

This work is subject to prevailing wage requirements. If there is a difference between the minimum wage rates predetermined by the Secretary of Labor and the prevailing wage rates determined

by the Director of the Department of Industrial Relations of the State of California for similar classification of labor, the contractor and his subcontractor shall not pay less than the higher wage rate. In accordance with the provisions of Section 1773 of the Labor Code of the State of California, the Owner has obtained from the Director of the Department of Industrial Relations, the general prevailing rate for each craft, classification, or type of workman required for execution of the Agreement. A copy of said prevailing rate of per diem wages is on file in the office of the Owner, and available from the California Department of Industrial Relations' Internet web site at <http://www.dir.ca.gov/DLSR/PWD>.

The Federal minimum wage rates for this work as predetermined by the United States Secretary of Labor may be examined at the offices described above where the Contract Documents may be seen. Addenda to modify the Federal minimum wage rates, if necessary, will be posted on the internet at www.losbanos.org. Future effective general prevailing wage rates, which have been predetermined are on file with the California Department of Industrial Relations and are referenced but not printed in the general prevailing wage rates.

Pre-Bid Meeting

Prior to submitting a sealed bid, bidder will attend a mandatory pre-bid meeting at the project site. The date of the mandatory pre-bid meeting is March 6, 2024. The address for the mandatory meeting is 556 Rockport Drive in Los Banos, California. The start time for the meeting is 11:15 a.m., sharp.

Bids will not be considered from bidders who were not physically in attendance at the mandatory pre-bid meeting.

Bidders must satisfy themselves as to the accuracy of the estimated quantities in the Bid Schedule by examination of the site and a review of the drawings and specifications including addenda. After bids have been submitted, the bidder shall not assert that there was misunderstanding concerning the quantities of work or the nature of the work to be done. The failure or omission of any bidder to do any of the foregoing shall not relieve any bidder from any obligation with respect to his bid.

The Contract Documents contain the provisions required for the construction of the project. The Owner will not be responsible for, nor be bound by, any oral instructions, interpretations, or explanations issued by the Owner or its representatives. Any request for clarifications or questions of the Contract Documents shall be made in writing or email and deliverable to:

City of Los Banos Public Works Department
Attn: Charles Bergson, P.E.
charles.bergson@losbanos.org
411 Madison Avenue
Los Banos, CA 93635

Requests for clarification or questions shall be delivered to the Owner before 5:00 p.m. PDST on March 13, 2024. Any Owner response to a request for clarification, questions and answers will be posted to the City's website at www.losbanos.org no later than 5:00 p.m. PDST on March 15, 2024 and if necessary, shall become a part of the bid as an addendum.

Proposed timeline of events associated with the awarding of bid:

Release of Advertisement for Bid		February 21, 2024
Pre-Bid Meeting – On Site - Mandatory	11:15 a.m.	March 6, 2024
Deadline to Submit Questions/Clarifications	5:00 p.m.	March 13, 2024
Addendum/Questions/Clarifications posted	5:00 p.m.	March 15, 2024
Bid Opening	2:00 p.m.	March 21, 2024
City Council Considers Bid	6:00 p.m.	April 3, 2024 (tentative)
Issuance of a Notice to Proceed	On or before:	April 12, 2024 (tentative)
Construction to Begin	On or before:	April 22, 2024 (tentative)

Qualification of Bidder

The Owner may make such investigation as it deems necessary to determine the ability of the bidder to provide the services requested, and the bidder shall furnish to the Owner all information and data for this purpose as the Owner may request. The Owner reserves the right to reject any bid should the evidence submitted by, or investigation of, the bidder fail to satisfy the Owner that such bidder is properly qualified to carry out the obligations of the bid and to complete the requirements contemplated therein.

Governing Law and Venue

This bid, or any contract that may result from the award of this bid, shall be deemed to be made under, and shall be governed by and construed in accordance with, the laws of the State of California. Any action brought to enforce the terms, or provision of this bid or any contract that may result from the award of this bid, shall have venue in the County of Merced, State of California.

Mandatory Bid Protest Procedure

The lack of prompt procedure to resolve disputes regarding the bidding process would impair the Owner's ability to carry out its purpose of contracting this project in a timely manner. Therefore, to the maximum extent authorized by law and notwithstanding any other procedures specified in these Contract Documents, all disputes and/or protests regarding the bidding process shall be subject to the following procedure. In submitting a bid to the Owner for this work, the bidder agrees to comply with and to be bound by this procedure.

Any bid protest must be submitted in writing to the Owner before 5:00 p.m. on the fifth (5th) business day following bid opening.

1. The initial protest document must contain a complete statement of the basis for the protest, and all supporting documentation. A non-refundable fee of One Thousand Dollars (\$1,000.00) made payable to the "City of Los Banos" shall accompany the protest documents and will be used by the Owner to recover costs in evaluating the bid protest. A bid protest submitted without the requisite fee shall not be considered by the Owner.
2. The party filing the protest must have actually submitted a bid for the work. A subcontractor of a party submitting a bid for the work may not submit a bid protest. Only bidders who the Owner otherwise determines are responsive and responsible are eligible to protest a bid.
3. A party may not rely on the bid protest submitted by another bidder, but must timely pursue its own protest.
4. The protest must refer to the specific portion of the Contract Documents which forms the basis for the protest.
5. The protest must include the name, address and telephone number of the person representing the protesting party.
6. The party filing the protest must concurrently transmit a copy of the initial protest document and any attached documentation to all other parties with a direct financial interest which may be adversely affected by the outcome of the protest. Such parties shall include all other bidders who appear to have a reasonable prospect of receiving an award depending upon the outcome of the protest.
7. The Owner will give the protested bidder five (5) business days after the receipt of the protest to submit a written response. The responding bidder shall transmit the response to the protesting bidder concurrent with the delivery to the Owner.
8. The procedure and time limits set forth in this paragraph are mandatory and are the bidder's sole and exclusive remedy in the event of bid protest. The bidder's failure to comply with these procedures shall constitute a waiver of any right to further pursue the bid protest, including filing a Government Code Claim or legal proceedings.

If the Owner determines that a protest is frivolous, the protesting bidder may be determined to be non-responsive and/or non-responsible and that bidder may be determined to be ineligible for future contract awards.

Cancellation of Contract

The Owner may terminate any contract derived from this bid as follows:

- WITHOUT CAUSE at any time by giving thirty (30) calendar days written notice to the successful bidder;
- WITH CAUSE (Default) at any time by giving ten (10) calendar days written notice to the successful bidder. Cancellation for cause shall be at the discretion of the Owner and shall be, but is not limited to, failure to supply the items, materials, equipment or services specified within the time allowed or within the terms, conditions or provisions of this bid. The successful bidder may not cancel any contract derived from this bid, without prior written consent of the Owner.

Bid Form

TO: City of Los Banos
520 J Street
Los Banos, CA 93635

In compliance with the Advertisement for Bids the undersigned, as bidder, hereby offers to provide to the Owner, in accordance with the terms and conditions in the provisions set forth in the Contract Documents the stated total bid amount quoted on this Bid Form for the work of

Northgate Sewer Lift Station Emergency Power Improvements

Total Bid Amount: \$_____

(Total Bid Amount in Written Form)

The undersigned certifies under penalty of perjury under the laws of the State of California and the United States of America, that the above quotation constitutes a bona-fide offer for the work, that undersigned is a duly authorized representative of the company listed, that the quotation is in no way sham or collusive, and that the executed Agreement between the bidder and Owner constitutes acceptance of bidder's total bid for the work stated in the Contract Documents. The undersigned has read the General Provisions, Special Provisions, and Technical Specifications in these Contract Documents. The undersigned further certifies, under penalty of perjury that the Non-Collusion Affidavit required by Title 23 United States Code, Section 112 and Public Contract Code Section 7106; and the Title 49 Code of Federal Regulations, Part 29 Debarment and Suspension Certification are true and correct.

The undersigned acknowledges receipt of the following addenda: _____

Signature: _____ Date: _____

Print Name: _____ Title: _____

Name of Business: _____

Doing business as: (*Circle One*): An Individual A Partnership A Corporation

Business Address: _____

Telephone No.: _____ Fax No.: _____

E-Mail Address: _____

License Number: _____ Class & Expiration Date: _____

List of Subcontractors

As of March 1, 2015, Contractors (and sub-contractors) wishing to bid on public works contracts shall be registered with the State Division of Industrial Relations and certified to bid on Public Works contracts. Please register at: <https://www.dir.ca.gov/Public-Works/Contractor-Registration.html>

In accordance with Title 49, Section 26.11 of the Code of Federal Regulations, and Section 4104 of the Public Contract Code of the State of California, as amended, the following information is required for each sub-contractor who will perform work amounting to more than one half of one percent (0.5%) of the Total Base Bid of \$10,000 (whichever is greater). **Photocopy this form for additional firms.**

Project: **Northgate Sewer Lift Station Emergency Power Improvements**

The following work will be performed (or provided) by the following subcontractors, and coordinated by bidder:

Bid Item No.	Description of Work to be Performed	Percent of Total Contract	Subcontractor's License No.	DIR Registration No.	Subcontractor's Name and Address

Equal Employment Opportunity

Contractor hereby certifies that bidder and subcontractors

- ☐ Have
☐ Have Not

participated in a previous contract or subcontract subject to the equal opportunity clauses, as required by Executive Orders 10925, 11114, or 11246, and that, where required, have filed with the Joint Reporting Committee, the Director of the Office of Federal Contract Compliance, a Federal Government contracting or administering agency, or the former President's Committee on Equal Employment Opportunity, all reports due under the applicable filing requirements.

Note: The above certification is part of the bid. Signing this bid on the signature portion thereof shall also constitute signature of these certifications.

Non-Collusion Affidavit
PUBLIC CONTRACT CODE 7106

In conformance with Title 23 United States Code Section 112 and Public Contract Code 7106 the bidder declares that the bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation; that the bid is genuine and not collusive or sham; that the bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid, and has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or that anyone shall refrain from bidding; that the bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the bidder or any other bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any other bidder, or to secure any advantage against the public body awarding the contract of anyone interested in the proposed contract; that all statements contained in the bid are true; and, further, that the bidder has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid, and will not pay, any fee to any corporation, partnership, company association, organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham bid.

Debarment and Suspension Certification

TITLE 49, CODE OF FEDERAL REGULATIONS, PART 29

The bidder, under penalty of perjury, certifies that, except as noted below, he/she or any other person associated therewith in the capacity of owner, partner, director, officer, and manager:

- Is not currently under suspension, debarment, voluntary exclusion, or determination of ineligibility by any federal agency;
- Has not been suspended, debarred, voluntarily excluded or determined ineligible by any federal agency within the past 3 years;
- Does not have a proposed debarment pending; and
- Has not been indicted, convicted, or had a civil judgment rendered against it by a court of competent jurisdiction in any matter involving fraud or official misconduct within the past 3 years.

If there are any exceptions to this certification, insert the exceptions to an additional sheet of paper and include with the bid.

Exceptions will not necessarily result in denial of award, but will be considered in determining bidder responsibility. For any exception noted above, indicate on an additional sheet of paper to whom it applies, initiating agency, and dates of action.

NPDES/MS4 Compliance Certification

All construction projects within the City limits must comply with the National Pollutant Discharge Elimination System (NPDES) storm water regulation adopted by the EPA and the Phase II Small Municipal Separate Storm Sewer System (MS4) General Permit requirements, regardless of size.

The City is required under these permits to provide information to Contractors performing work within City limits about training opportunities to assist in managing potential pollutants from construction –related activities, selection, installation, implementation, and maintenance of Best Management Practices (BMPs), as well as overall program compliance. The City has provided such information and helpful links on their website at <http://www.losbanos.org/city-government/departments/public-works/>, under the Storm Water Management Plan tab.

The Bidder acknowledges that they are aware of the necessity to be in compliance with the NPDES and MS4 permits while working within City limits, and that information regarding such is available on the City's website.

Note: The above certifications are part of the bid. Signing this bid on the signature portion thereof shall also constitute signature of these certifications.

Experience

Bidder shall identify three (3) most recently completed projects similar to work described in these Contract Documents.

	1	2	3
Project Title			
Public Agency			
Address			
Telephone No.			
Engineer in Charge			
Project Value (\$)			
Date Accepted			
Claims Filed?*			

* If yes, please explain below:

[illegible]

**Bid Schedule
For
NORTHGATE SEWER LIFT STATION EMERGENCY POWER IMPROVEMENTS**

Bidder agrees to perform all the work described in the Contract Documents for the following unit and lump sum prices and understands that the quantity of work shown is approximate only. The schedule shall be completed by the bidder with the unit and lump sum prices entered in numerals. The extensions shall be made by the bidder. In case of discrepancy between the unit prices and the extension thereof, the unit price shall be considered as correct when evaluating bids.

ITEM NO.	ITEM	QUANTITY AND UNIT		UNIT PRICE		AMOUNT
1	Mobilization/Demobilization	1	LS	\$	\$	
2	Demolition (Removal: € Controls)	1	LS	\$	\$	
3	Electrical (Controls, Wiring & Appurtenances), F&I	1	LS	\$	\$	
4	Electrical (Standby Generator), F&I	1	LS	\$	\$	
5	Electrical Fees	1	LS	\$	\$	
6	Remove Concrete (Lift Station Site)	1,932	SF	\$	\$	
7	Minor Concrete (Lift Station Site), F&I	675	SF	\$	\$	
TOTAL:				\$		

Note: The representations made herein are made under penalty of perjury. Any information contained in the bid which is proven false shall be considered nonresponsive and this bid shall be rejected.

Bid Bond

We, _____

as Contractor, and _____

as Surety, jointly and severally, bind ourselves, our heirs, representatives, successors and

assigns, as set forth herein, to the **City of Los Banos** (herein called "Owner") for payment

of the penal sum of _____

_____, Dollars (\$_____),

lawful money of the United States. Contractor has submitted the accompanying bid proposal

for the construction of: **Northgate Sewer Lift Station Emergency Power Improvements**

If the Contractor is awarded the contract and enters into a written agreement, in the form prescribed by the Owner, at the price designated by Bid Schedule, and files a payment bond and performance bond with the Owner, or substitute security in lieu thereof, in the time and manner specified by the Owner, and carries all insurance in type and amount which conforms to the General Provisions, Special Provisions, and Technical Specifications in these Contract Documents and furnishes required certificates and endorsements thereof, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

Forfeiture of this bond, or any deposit made in lieu thereof, shall not preclude the Owner from seeking all other remedies provided by law to cover losses sustained as a result of the Contractor's failure to do any of the foregoing.

Contractor and Surety agree that if the Owner is required to engage the services of an attorney in connection with the enforcement of this bond, each shall pay Owner's reasonable attorney's fees incurred with or without suit.

Executed on _____, 20

(Seal if Corporation)

Contractor

By: _____

Title _____

[SIGNATURE SHEET CONTINUES ONTO NEXT PAGE]

Any claims under this bond may be addressed to:

_____ (name and address of Surety)

_____ (name and address of Surety's agent for service of
process in California, if different from above)

_____ (phone number of Surety's agent in California)

(Attach Acknowledgment)

Surety

By _____

(Attorney-in-Fact)

Notice: No substitution or revision to this bond form will be accepted. Sureties must be authorized to do business in and have an agent for service of process in California.

All bond forms must be acknowledged before a Notary Public by both the Contractor and the Surety. Attorneys-in-fact who sign bond forms must file with each bond a certified and effective dated copy of their power of attorney.

Agreement

SAMPLE

Note: Particulars left blank in this sample will be filled with project specific information as outlined in these bid documents.

THIS Agreement is dated as of the _____ day of _____ in the year 20__ by and between the **City of Los Banos, a California municipal corporation** ("Owner") and [ENTER NAME AND TYPE OF ENTITY] ("Contractor").

Owner and Contractor, in consideration of the mutual covenants hereinafter set forth, agree as follows:

1. WORK. Contractor shall complete the work indicated in Owner's Contract Documents entitled "**Northgate Sewer Lift Station Emergency Power Improvements Project.**"

The work is generally described as follows:

- The major work consists of furnishing and installing a self-contained standby generator set including concrete foundation, electrical controls and conduits at the existing sanitary sewer lift station located at 556 Rockport Drive; in the City of Los Banos.
- Contractor shall furnish all of the material, supplies, tools, equipment, labor and other services necessary for the construction and completion of the work described herein.

2. CONTRACT TIME. Contractor shall commence the work required by the Contract Documents within 10 calendar days after the date of the Notice to Proceed and will complete the same within the time period set forth in the bid, unless the period for completion is extended otherwise by the Contract Documents.

3. LIQUIDATED DAMAGES. Owner and Contractor recognize that time is of the essence of this Agreement and that Owner will suffer financial loss if the work is not completed within the time specified in Paragraph 2 herein, plus any extensions thereof allowed in accordance with Paragraph 21, Time for Completion and Liquidated Damages, of the General Provisions. The parties also recognize the delays, expense and difficulties involved in proving in a legal proceeding the actual loss suffered by Owner if the work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty) Contractor shall pay Owner Eight Hundred Dollars (\$ 800.00) for each day that passes after the time specified in Paragraph 2 herein.

4. CONTRACT PRICE. Owner shall pay Contractor for completion of the work in accordance with the Contract Documents in current funds the amount set forth in the Bid Schedule(s). The Contractor agrees to perform all of the work described in the Contract Documents for the unit and lump sum prices set forth in the Bid Schedule(s).

5. PAYMENT PROCEDURES. Contractor shall submit applications for payment in accordance with Paragraph 24, Progress Estimates, of the General Provisions. Applications for payment will be processed by Owner as provided in the General Provisions.

6. CONTRACT DOCUMENTS. The Contract Documents which comprise the entire agreement between Owner and Contractor concerning the work consists of this Agreement and the following attachments to this Agreement:

- (A) Advertisement for Bids
- (B) Information for Bidders
- (C) Bid
- (D) Bid Bond
- (E) Agreement
- (F) Payment Bond
- (G) Performance Bond
- (H) Notice of Award
- (I) Notice to Proceed
- (J) Change Order
- (K) General Provisions
- (L) Special Provisions
- (M) Technical Specifications prepared by Provost & Pritchard Consulting Group entitled
"Northgate Sewer Lift Station Emergency Power Improvements Project",
dated January 31, 2024.
- (N) Drawings prepared by Provost & Pritchard Consulting Group numbered 1
through 8.
- (O) Addenda
No. _____, dated _____ 20__
No. _____, dated _____ 20__

There are no Contract Documents other than those listed in this Paragraph 6. The Contract Documents may only be amended by change order as provided in Paragraph 19, Changes in the Work, of the General Provisions.

7. MISCELLANEOUS.

A. Terms used in this Agreement which are defined in Paragraph 1 of the General Provisions will have the meanings indicated in the General Provisions.

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

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

D. The Laws of the State of California shall govern this Agreement. Venue is Merced County. The provisions of this paragraph shall survive expiration or other termination of this Agreement regardless of the cause of such termination.

E. All bids become property of the Owner. All bids, including the accepted bid and any subsequent contract become public records per the requirements of the California Government Code, Sections 6250-6270, "California Public Records Act". Proprietary material must be clearly marked as such. Pricing and service elements of the successful bid are not consider proprietary information. The Owner will treat all information submitted in a bid as available for public inspection once the Owner has selected a contractor. If you believe that you have a legally justifiable basis under the California Public Records Act (Government Section 6250 et. seq.) for protecting the confidentiality of any information contained within your bid, you must identify any such information, together with the legal basis of your claim in your bid. In order for the Owner to assess confidentiality of any such information on your behalf, you must request, execute and submit an Owner-prepared written agreement to defend and indemnify the Owner for any liability, costs, and expenses incurred in asserting such confidentiality as part of your bid. The final determination as to whether the Owner will assert your claim of confidentiality on your behalf shall be sole discretion of the Owner.

F. This Agreement shall not be interpreted in favor of any Party by virtue of said Party not having prepared this Agreement.

G. If any time period provided for in this Agreement ends on the day other than a Business Day, the time period shall be extended to the next Business Day.

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

Date

By: _____
Authorized Representative of Owner

Title: _____

ATTEST:

Lucille L. Mallonee
City Clerk

APPROVED AS TO FORM:

William A. Vaughn
City Attorney

Date

By: _____
Authorized Representative of Contractor

Title: _____

(Seal if Corporation)

(Attach Acknowledgement for Authorized Representative of Contractor)

Certificate of Contractor

I, _____
(Name)

certify that I am a/the _____
(Title)

designate sole proprietor, partner in partnership, or corporate officer with Contractor License

Number _____ in the entity named as Contractor in the foregoing Agreement. I

hereby expressly certify that the name of the entity to which I am associated is

(Company Name)

that this entity is in good standing and has complied with all applicable laws and regulations, and

that I have been expressly authorized by the proper parties in this entity to execute the Agreement
on behalf of the above-named entity.

ATTEST:

Signature: _____

This form must be acknowledged before a Notary Public. The acknowledgement must be attached.

Payment Bond

We, _____

as Contractor, and _____

as Surety, jointly and severally, bind ourselves, our heirs, representatives, successors and

assigns, as set forth herein, to the **City of Los Banos** (herein called "Owner") for payment

of the penal sum of _____

_____ Dollars (\$ _____),

lawful money of the United States. Owner has awarded the contract and entered into an

Agreement with the Contractor for the construction of:

Northgate Sewer Lift Station Emergency Power Improvements Project

If Contractor or any of his subcontractors fails to pay any of the persons named in Section 9100 of the California Civil Code, or amounts due under the Unemployment Insurance Code with respect to work or labor performed under the contract or during the one-year guarantee period, or for any amounts required to be deducted, withheld, and paid over to the Franchise Tax Board from the wages of employees of the Contractor and his subcontractors pursuant to Section 13020 of the Unemployment Insurance Code, with respect to such work and labor, then Surety will pay the same in an amount not exceeding the sum specified above, and also will pay, in case suit is brought upon this bond, such reasonable attorney's fees as shall be fixed by the court.

This bond shall insure to the benefit of any of the persons named in Section 9100 of the California Civil Code, so as to give a right of action to them or their assigns in any suit brought upon this bond.

Surety agrees that no change, extension of time, alteration, or addition to the terms of the Contract, or the work to be performed, or the Provisions shall in any way affect its obligation on this bond, and it does hereby waive notice thereof.

Contractor and Surety agree that should Owner become a party to any action on this bond that each will also pay Owner's reasonable attorney's fees incurred therein in addition to the above sum.

[SIGNATURE SHEET BEGINS ON NEXT PAGE]

Executed in four original counterparts on: _____, 20____

Contractor

(Seal if Corporation)

By: _____

Title: _____

(Attach Acknowledgment of Authorized Representative of Contractor)

Any claims under this bond may be addressed to:

_____ (name and address of Surety)

(name and address of Surety's agent for service of
process in California, if different from above)

(phone number of Surety's agent in California)

(Attach Acknowledgment)

Surety

By _____
(Attorney-in-Fact)

Notice: No substitution or revision to this bond form will be accepted. Sureties must be authorized to do business in and have an agent for service of process in California.

All bond forms must be acknowledged before a Notary Public by both the Contractor and the Surety. Attorneys-in-fact who sign bond forms must file with each bond a certified and effective dated copy of their power of attorney.

Performance Bond

We, _____

as Contractor, and _____

as Surety, jointly and severally, bind ourselves, our heirs, representatives, successors and

assigns, as set forth herein, to the **City of Los Banos** (herein called "Owner") for payment

of the penal sum of _____

_____ Dollars (\$ _____),

lawful money of the United States. Owner has awarded the contract and entered into an

Agreement with the Contractor for the construction of:

Northgate Sewer Lift Station Emergency Power Improvements Project

The condition of this obligation is such that if the Contractor shall in all things abide by and well and truly keep and perform the covenants, and agreements in the said Contract Agreement, and any alteration thereof made as therein provided, on his part to be kept and performed at the time and in the manner therein specified, and shall faithfully fulfill the one-year guarantee of all materials and workmanship, and shall indemnify and save harmless the Owner and the Owner's Representative, and their consultants, and each of their directors, officers, employees and agents, as therein stipulated, this obligation shall become null and void, otherwise, it shall be and remain in full force and effect.

This Performance Bond shall remain in full effect during the one-year guaranty period following the completion of the work.

Surety agrees that no change, extension of time, alteration, or addition to the terms of the General Provisions, Special Provisions, and Technical Specifications in these Contract Documents shall in anyway affect its obligation in the bond, and it does hereby waive notice thereof.

Contractor and Surety agree that if the Owner is required to engage the services of an attorney in connection with the enforcement of this bond, each shall pay Owner's reasonable attorney's fees incurred with or without suit, in addition to the above sum.

[SIGNATURE SHEET BEGINS ON NEXT PAGE]

Executed in four original counterparts on : _____, 20____

Contractor

(Seal if Corporation)

By: _____

Title: _____

(Attach Acknowledgment of Authorized Representative of Contractor)

Any claims under this bond may be addressed to:

_____ (name and address of Surety)

_____ (name and address of Surety's agent for service of
process in California, if different from above)

_____ (phone number of Surety's agent in California)

(Attach Acknowledgment)

Surety

By _____
(Attorney-in-Fact)

Notice: No substitution or revision to this bond form will be accepted. Sureties must be authorized to do business in and have an agent for service of process in California.

All bond forms must be acknowledged before a Notary Public by both the Contractor and the Surety. Attorneys-in-fact who sign bond forms must file with each bond a certified and effective dated copy of their power of attorney.

Notice of Award

To: _____

Date: _____
Project: _____

The Owner has considered the bid submitted by you for the above described work dated _____, 20____.

You are hereby notified that your bid has been accepted for the unit and lump sum prices set forth in the Bid Schedule totaling \$_____.

You are required by the Information for Bidders to execute the Agreement and furnish the required Contractor's performance bond and payment bond within ten (10) calendar days for the date of this Notice to you.

Before the Notice to Proceed can be issued, all required certificates of insurance, as stated in Section 29 of the General Provisions, and a copy of your Los Banos Business License must be submitted.

If you fail to execute said Agreement and to furnish said bonds within ten days from the date of this Notice, said Owner will be entitled to consider all your rights arising out of the Owner's acceptance of your bid as abandoned and as a forfeiture of your Bid Bond. The Owner will be entitled to such other rights as may be granted by law.

You are required to return an acknowledged copy of this Notice of Award to the Owner.

Owner

By _____

Title _____

ACCEPTANCE OF NOTICE

Receipt of the above Notice of Award is hereby
acknowledged by

(Name of Contractor)

this _____ day of _____, 20____

By _____

Title _____

Notice to Proceed

To: _____

Date: _____
Project: _____

You are hereby notified to commence work in accordance with the Agreement dated _____, 20_____, on or before _____, 20_____, and you are to complete the work by _____, 20_____.

You are required to return an acknowledged copy of this Notice to Proceed to the Owner.

Owner

By _____

Title _____

ACCEPTANCE OF NOTICE

Receipt of the above Notice to Proceed is hereby
acknowledged by

(Name of Contractor)

_____ this _____ day of _____, 20_____

By _____

Title _____

Change Order

Order No. _____

Date: _____

Agreement Date: _____

Project: _____

Owner: _____

Contractor: _____

The following changes are hereby made to the Contract Documents:

Justification:

Change to Contract Price:

Original Contract Price: \$ _____

Current Contract Price adjusted by previous
Change Order: \$ _____

The Contract Price due to this Change Order
will be (increased) (decreased) by: \$ _____

The new Contract Price including this
Change Order will be: \$ _____

Change to Contract Time:

The Contract Time will be (increased) (decreased) by
calendar days. _____

The date for completion of all work will be: _____

The undersigned hereby agrees to the above-described amendment of the Agreement.

Contractor

Owner

This Change Order shall become a part of the Contract Documents only upon signature of both parties.

General Provisions

1. Terms and Definitions

Wherever used in the Contract Documents, the following terms shall have the meanings indicated, which shall be applicable to both the singular and plural thereof:

Addenda - Written or graphic instruments issued prior to the execution of the Agreement which modify or interpret the Contract Documents, by additions, deletions, clarifications or corrections.

ANSI – American National Standards Institute, current designation as of the Bid date unless otherwise indicated.

ASME – American Society of Mechanical Engineers, current designation as of the Bid date unless otherwise indicated.

ASTM – American Society for Testing Materials, current designation as of the Bid date unless otherwise indicated.

AWWA – American Water Works Association, current designation as of the Bid date unless otherwise indicated.

Bid - The offer or proposal of the bidder submitted on the prescribed form setting forth the prices for the work to be performed.

Bidder - Any person, firm or corporation submitting a bid for the work.

Bonds - Bid, Performance and Payment Bonds and other instruments of security, furnished by the Contractor and his surety in accordance with the Contract Documents.

Change Order - A written order to the Contractor authorizing an addition, deletion or revision in the work within the general scope of the Contract Documents, or authorizing an adjustment in the contract price or contract time.

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

Contract Documents - the contract, including Advertisement for Bids, Information for Bidders, Bid, including Bid Representations and Certifications, Bid Bond, Agreement, Payment Bond, Performance Bond, Notice of Award, Notice to Proceed, Change Order, General Provisions, Special Provisions, Technical Specifications, Drawings, and Addenda.

Contract Price – The total monies payable to the Contractor under the terms and conditions of the Contract Documents.

Contract Time – The number of calendar or working days as stated in the Contract Documents for the completion of the work.

Contractor – The person, firm or corporation with whom the Owner has executed the Agreement.

Drawings – The part of the Contract Documents which shows the characteristics and scope of the work to be performed and which have been prepared or approved by the Engineer.

Engineer – City Engineer of the City of Los Banos, acting either directly or through properly authorized agents, such agents, acting within the scope of the particular duties entrusted to them.

Field Order – A written order effecting a change in the work not involving an adjustment in the contract price or an extension of the contract time, issued by the Engineer to the Contractor during construction.

IEEE – Institute of Electrical and Electronics Engineers, current designation as of the bid date unless otherwise indicated.

NEMA – National Electrical Manufacturers Association, current designation as of the bid date unless otherwise indicated.

Notice of Award – The written notice of the acceptance of the Bid from the Owner to the successful bidder.

Notice to Proceed – Written communication issued by the Owner to the Contractor authorizing him to proceed with the work and establishing the date of commencement of the work.

Owner – City of Los Banos.

Production Data – All illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate a material, product or system for some portion of the work.

Project – The undertaking to be performed as provided in the Contract Documents.

REA – Rural Electrification Association, current designation as of the bid date unless otherwise indicated.

Samples – Physical examples which illustrate materials, equipment or workmanship, and establish standards by which the work will be judged.

Shop Drawings – All drawings, diagrams, schedules and other data which are specifically prepared for the work by the Contractor, a subcontractor, manufacturer, supplier or distributor, to illustrate some portion of the work.

Specifications – A part of the Contract Documents consisting of written descriptions of a technical nature of materials, equipment, construction systems, standards and workmanship.

Standards - City of Los Banos Standard Specifications, The Standard Specifications of the Department of Transportation of the State of California (Caltrans) dated 2010 and subsequent updates to that 2010 edition, and The Standard Plans of the Department of Transportation of the State of California (Caltrans) dated 2010 and subsequent updates to this 2010 edition.

Subcontractor – An individual, firm or corporation having a direct contract with the Contractor or with any other subcontractor for the performance of a part of the work at the site.

Supplier – Any person or organization who supplies materials or equipment for the work, including that fabricated to a special design, but who does not perform labor at the site.

Work – All labor necessary to produce the construction required by the Contract Documents, and all materials and equipment incorporated or to be incorporated in the project.

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

2. Order of Precedence of Contract Documents

In resolving conflicts resulting from errors or discrepancies in any of the Contract Documents, the order of precedence shall be as follows:

1. Permits from other agencies as may be required by law
2. Change orders
3. Agreement
4. Addenda
5. Contractor's Bid (Bid Form)
6. Advertisement for Bids
7. Information for Bidders
8. Supplementary General Conditions
9. General Provisions
10. Special Provisions
11. Technical Specifications
12. Drawings
13. Referenced Standard Specifications

If the conflicts cannot be resolved by the precedence prescribed above, the most stringent requirements shall prevail.

3. Venue

Contractor, and any subcontractor, supplier and any other person or organization performing any part of work, agree that each of them will waive jurisdiction and venue and shall submit to the jurisdiction of the courts of the State of California in the County of Merced, regardless of residence or domicile, with respect to any actions or suits at law or in equity arising under or related to the bidding, award or performance of the work or with regard to any matter whatsoever arising out of or relating to the validity, construction, interpretation or reinforcement of the Agreement as against Owner or any of their consultants, and/or any of their respective directors, officers, employees, representatives or agents.

4. Giving Notice

Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or if delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

5. Cumulative Remedies

The duties and obligations imposed by these General Provisions and the rights and remedies available hereunder to the parties hereto, and, in particular but without limitation, the warranties, guarantees and obligations imposed upon Contractor by the General Provisions and all of the rights and remedies available to Owner thereunder are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by laws or regulations, by special warranty or guarantee or by other provisions of the Contract Documents, and the provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right and remedy to which they apply.

6. Non-discrimination

During the performance of the project, Contractor and subcontractors shall not unlawfully discriminate

against any employee or applicant for employment because of race, color, ancestry, religion, sex, national origin, marital status, age, medical condition (cancer related), physical handicap (including AIDS), or sexual orientation. Equal employment extends, but is not limited to recruitment, compensation, benefits, layoff, termination, and all other conditions of employment. Contractor and subcontractors shall ensure that the evaluation/treatment of their employees and applicants for employment are free of such discrimination. Contractor and subcontractors shall comply with the provisions of the Fair Employment and Housing Act (Government Code, Section 12900 et seq.) and the applicable regulations promulgated there under (California Administrative Code, Title 2, Section 7285.0 et seq.). The applicable regulations of the Fair Employment and Housing Commission implementing Government Code, Section 12900, set forth in Chapter 5 of Division 4 of Title 2 of the California Administrative Code and incorporated into this agreement by reference and made a part hereof as if set forth in full.

Contractor and any subcontractors shall give written notice of their obligations under this clause to labor organizations with which they have a collective bargaining or other agreement.

Contractor shall include the nondiscrimination and compliance provisions of the clause in all subcontracts to perform work under the contract.

Contractor shall grant access by representative of the Department of Fair Employment and Housing and the Owner upon reasonable notice at any time during normal business hours, but in no case less than twenty-four (24) hours notice, to such of its books, records, accounts, other sources of information and its facilities as said Owner shall require to ascertain compliance with this clause.

7. Non-discrimination of the Disabled

The Owner will not aid or perpetuate discrimination against a qualified disabled individual by funding as an agency, organization, or person that discriminates on the basis of handicap in providing aid, benefit, or service to beneficiaries of the program or activity. The Owner is committed to provide access to all Owner services, programs, and meetings open to the public for people with disabilities. In this regard the Owner and all of its vendors and Contractor will take all reasonable steps to ensure that disabled individuals have the maximum opportunity for the same level of aid, benefit, or service as any other individual.

8. Additional Instructions and Detail Drawings

The Contractor may be furnished additional instructions and detail drawings by the Engineer, as necessary to carry out the work required by the Contract Documents. The additional drawings and instructions thus supplied will become a part of the Contract Documents. The Contractor shall carry out the work in accordance with the additional detail drawings and instructions.

9. Schedules, Reports and Records

The Contractor shall submit to the Owner such schedules, reports, records and other data as the Owner may request concerning work performed or to be performed.

Prior to the first partial payment estimate, the Contractor shall submit schedules showing the order in which he proposed to carry on the work, including dates at which he will start the various parts of the work, estimated date of completion of each part and, as applicable:

- A. A detailed cost breakdown of the work under each bid item awarded. The breakdown, after receiving favorable review by the Engineer, will become the basis for partial payment determination. Elements of work shall be grouped by building, structure, pipeline, system, etc. Within each grouping, work shall be itemized by readily measurable quantities of work completed in place. For example, concrete should be in units of cubic yard including form work and reinforcing steel. Mobilization costs, bond and insurance costs, and overhead costs shall not be prorated over items of work. In the event the cost breakdown is not favorably reviewed by the Engineer, another cost breakdown shall be submitted that is mutually acceptable to the Contractor and the Engineer.
- B. The dates at which special detail drawings will be required; and respective dates for

submission of shop drawings, the beginning of manufacture, the testing and the installation of materials, supplies and equipment. The Contractor shall also submit a schedule of payments that he anticipates he will earn during the course of the work.

10. Drawings and Specifications

The intent of the drawings and specifications is that the Contractor shall furnish all labor, materials, tools, equipment, and transportation necessary to complete the project in an acceptable manner, ready for use, occupancy or operation by the Owner.

In case of conflict between the drawings and specifications, the specifications shall govern. Figure dimensions on drawings shall govern over scale dimensions and detailed drawings shall govern over general drawings.

Any discrepancies found between the drawings and specifications and site condition or any inconsistencies or ambiguities in the drawings or specifications shall be immediately reported to the Engineer, in writing, who shall promptly correct such inconsistencies or ambiguities in writing. Work done by the Contractor after his discovery of such discrepancies, inconsistencies or ambiguities shall be done at the Contractor's risk.

The Owner will furnish to the Contractor, free of charge, six copies of drawings and specifications for the work. The Contractor shall keep one copy of all current drawings and specifications on the job site, in good order, available to the Engineer and his representatives.

All drawings, specifications, and copies thereof furnished by the Owner are the property of the Owner. They are not to be used on other work, and, with the exception of the signed contract set, are to be returned to the Owner on request, at the completion of the work.

11. Shop Drawings, Production Data and Samples

The Contractor shall review, approve and submit to the Engineer all Shop Drawings, Production Data and Samples as may be necessary for prosecution of the Work and as required by the Contract Documents. The Contractor shall review and approve all Shop Drawings, Production Data and Samples prior to submitting them to the Engineer. By approving and submitting Shop Drawings, Production Data and Samples, the Contractor represents that he has determined and verified all materials, measurements and criteria related thereto, and that he has checked and coordinated the information contained within such submittals with the requirements of the Contract Documents. Any Shop Drawing, Production Data or Sample submitted to the Engineer without having been approved by the Contractor will be returned unreviewed to the Contractor.

For each item where shop drawings, production data or samples are required, the Contractor shall submit a minimum of six approved sets, hard copies, or one set, electronically. The Engineer shall review all shop drawings, production data and samples and retain three sets after his review. The remaining sets shall be returned to the Contractor with actions defined as follows:

- A. NO EXCEPTIONS TAKEN – Accepted subject to its compatibility with future submissions and additional partial submissions for portions of the work not covered in this submission.
- B. MAKE CORRECTIONS NOTED – Same as NO EXCEPTIONS TAKEN except that minor corrections as noted shall be made by the Contractor.
- C. REVISE AND RESUBMIT – Rejected because of major inconsistencies or errors which shall be resolved by the Contractor prior to subsequent review by the Engineer.
- D. REJECTED – Submitted material does not conform to Contract Documents in major respect.

The Engineer's review is only for general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. It shall not include review of quantities, dimensions, weights or gauges, fabrications processes, construction methods, coordination with other trades, or construction safety precautions, all of which are the responsibility of the Contractor.

The Engineer shall not be responsible for any deviations from the Contract Documents not brought to the attention of the Engineer in writing by the Contractor and acknowledged in writing by the Engineer.

Portions of the work requiring shop drawings, production data and samples shall not begin until the submission has been favorably reviewed by the Engineer. A copy of each favorably reviewed shop drawing, product data and sample shall be kept in good order by the Contractor at the site and shall be available to the Engineer.

12. Materials, Services and Facilities

It is understood that, except as otherwise specifically stated in the Contract Documents, the Contractor shall provide and pay for all materials, labor, tools, equipment, water, light, power, transportation, supervision, and all other services and facilities of any nature whatsoever necessary to execute, complete, and deliver the work within the specified time.

Materials and equipment shall be so stored as to insure the preservation of their quality and fitness for the work. Stored materials and equipment to be incorporated in the work shall be located so as to facilitate prompt inspection.

Manufactured articles, materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned as directed by the manufacturer.

Materials, supplies and equipment shall be in accordance with samples submitted by the Contractor and reviewed by the Engineer.

Materials, supplies or equipment to be incorporated into the work shall not be purchased by the Contractor or any subcontractor subject to a chattel mortgage or under a conditional sale contract or other agreement by which an interest is retained by the seller.

13. Inspection and Testing

All materials and equipment used in the construction of the project shall be subject to adequate inspection and testing in accordance with generally accepted standards, as required and defined in the Contract Documents.

The Contractor shall provide, at his expense, the necessary testing and inspection services required by the Contract Documents, unless otherwise provided. (See Section 6 of the Special Provisions)

The Owner shall provide all other inspections and testing services not required by the Contract Documents. If the Contract Documents, laws, ordinances, rules, regulations or orders of any public authority having jurisdiction specifically require any work to be inspected, tested, approved by someone other than the Contractor, the Contractor will give the Engineer timely notice of readiness. The Contractor will then furnish the Engineer the required certificates of inspection, testing or approval.

Neither observations by the Engineer nor inspections, tests or approvals by persons other than the Contractor shall relieve the Contractor from his obligations to perform the Work in accordance with the requirements of the Contract Documents.

The Engineer and his representatives will at all times have access to the Work. In addition, authorized representatives and agents of the Owner and appropriate Federal or State agencies shall be permitted to inspect all work, material, payrolls, records of personnel, invoices of materials, and other relevant data and records. The Contractor will provide proper facilities for such access and observation of the Work and also for any inspection or testing thereof.

If any work is covered contrary to the written request of the Engineer, it must, if requested by the Engineer be uncovered of his observation and replaced at the Contractor's expense.

If any work has been covered which the Engineer has not specifically requested to observe prior to it being covered, or if the Engineer considers it necessary or advisable that covered work be inspected or tested by others, the Contractor, at the Engineer's request, will uncover expose or otherwise make available for observation, inspection or testing as the Engineer may require, that portion of the work in question, furnishing all necessary labor, materials, tools, and equipment. If it is found that such work is

not found to be defective, the Contractor will be allowed an increase in the contract price of an extension of the contract time, or both, directly attributable to such uncovering, exposure, observation, inspection, testing and reconstruction and an appropriate change order shall be issued.

14. Substitutions

Whenever a material, article or piece of equipment is identified on the Drawings or Specifications by reference to brand name or catalogue number, it shall be understood that this is referenced for the purpose of defining the performance of other salient requirements and that other products of equal capacities, quality and function shall be considered. The Contractor may recommend the substitution of a material, article or piece of equipment of equal substance and function for those referred to in the Contract Documents by reference to brand name or catalogue number, and if, in the opinion of the Engineer, such material, article, or piece of equipment is of equal substance and function to that specified, the Engineer may approve its substitution and use by the Contractor. The Contractor warrants that if substitutes are approved, no major changes in the function or general design of the project will result. Incidental changes or extra component parts required to accommodate the substitute will be made by the Contractor without a change in the contract price or contract time.

15. Patents

The Contractor shall pay all applicable royalties and license fees. He shall defend all suits or claims for infringement of any patent rights and save the Owner harmless from loss on account thereof, except that the Owner shall be responsible for any such loss when a particular process, design, or the product of a particular manufacturer or manufacturers is specified, but if the Contractor has reason to believe that the design, process or product specified is an infringement of a patent, he shall be responsible for such loss unless he promptly gives such information to the Engineer.

16. Surveys, Permits and Regulations

The Engineer will furnish lines and grades as required for the construction of the work. The Contractor shall make a general check of all lines, dimensions and elevations and shall make all necessary rechecks during the progress of the work to avoid errors in construction. The Contractor shall be responsible for proper dimensions and fittings of all items of work being performed by him. Should any discrepancy be found in lines, dimensions or elevations, they shall be reported to the Engineer immediately.

The Contractor shall protect all existing property and survey monuments, including survey control monuments for this work. The Contractor is responsible for protecting and preserving survey monuments and other survey markers. Any survey monuments damaged as a direct or indirect result of construction activities shall be re-established by a duly licensed land surveyor at the Contractor's sole expense. A corner record shall be filed in accordance with State law for any reset monuments at the Contractor's sole expense.

The Contractor shall carefully preserve benchmarks, reference points and stakes and, in case of willful or careless destruction, he shall be charged with the resulting expense and shall be responsible for any mistakes that may be caused by their unnecessary loss or disturbance.

Permits and licenses of a temporary nature necessary for the prosecution of the work shall be secured and paid for by the Contractor. Permits, licenses and easements for permanent structures or permanent changes in existing facilities shall be secured and paid for by the Owner, unless otherwise specified. The Contractor shall give all notices and comply with all laws, ordinances, rules and regulations bearing on the conduct of the Work as drawn and specified. If the Contractor observes that the Contract Documents are at variance therewith, he shall promptly notify the Engineer in writing, and any necessary changes shall be adjusted as provided in Paragraph 19 of these General Provisions, Changes in the Work.

17. Protection of Work, Property and Persons

The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the work. He will take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to all employees on the work and

other persons who may be affected thereby, all the work and all materials or equipment to be incorporated therein, whether in storage on or off the site, and other property at the site or adjacent thereto, including trees, shrubs, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

The Contractor shall comply with all applicable laws, ordinances, rules, regulations and orders of any public body having jurisdiction. He shall erect and maintain, as required by the conditions and progress of the work, all necessary safeguards for safety and protection. He shall notify owners of adjacent utilities when prosecution of the work may affect them. The Contractor shall remedy all damages, injury or loss to any property caused, directly or indirectly, in whole or in part, by the Contractor, any subcontractor or anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, except damage or loss attributable to the fault of the Contract Documents or to the acts or omissions of the Owner or the Engineer or anyone employed by either of them or anyone for whose acts either of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of the Contractor.

In emergencies affecting the safety of persons or the work or property at the site or adjacent thereto, the Contractor, without special instruction or authorization from the Engineer or Owner, shall act to prevent threatened damage, injury or loss. He will give the Engineer prompt written notice of any significant changes in the work or deviations from the Contract Documents caused thereby, and a change order shall thereupon be issued covering the changes and deviations involved.

18. Supervision by Contractor

The Contractor shall supervise and direct the work. He shall be solely responsible for the means, methods, techniques, sequences and procedures of construction. The Contractor shall employ and maintain on the work, a qualified supervisor or superintendent who shall have been designated in writing by the Contractor as the Contractor's representative at the site. The supervisor shall be present on the site at all times as required to perform adequate supervision and coordination of the work.

19. Changes in the Work

The Owner may at any time, as the need arises, order changes within the scope of the work without invalidating the Agreement. If such changes increase or decrease the amount due under the Contract Documents, or in the time required for performance of the work, an equitable adjustment shall be authorized by written change order.

The Engineer may also, at any time, by issuing a field order, make changes in the details of the work. The Contractor shall proceed with the performance of any changes in the work so ordered by the Engineer unless the Contractor believes that such field order entitles him to a change in contract price or contract time, or both, in which event he shall give the Engineer written notice thereof within seven (7) days after the receipt of the ordered change, and the Contractor shall not execute such changes pending the receipt of an executed change order or further instruction from the Owner.

20. Changes in Contract Price

The contract price may be changed only by a written change order. The value of any work covered by a change order or of any claim for increase or decrease in the contract price shall be determined by one or more of the following methods in the order of precedence listed below:

- A. Unit prices previously approved.
- B. An agreed lump sum.
- C. If a lump sum or unit price cannot be mutually agreed upon, the Contractor shall be entitled to the sum of the following costs of doing the extra work:
 1. Direct Labor Costs. Charges for cost of all the labor furnished and used by the Contractor shall be made for manual classifications up to and including general foreman. It will not include charges for assistant superintendents, superintendents, office personnel,

timekeepers, and maintenance and mechanics. The time charged to extra work shall be subject to the daily approval of the Engineer and evidence of such daily approval shall be submitted with the billing. Labor rates used to calculate the costs shall be those so designated in the Advertisement for Bids. No time or charges will be allowed, except when the men are actually engaged in the proper, efficient, and diligent performance or completion of the extra work as authorized. Overtime shall not be worked without prior approval by the Engineer.

2. Equipment Costs. Charges for the rental and operation of the equipment furnished and used by the Contractor shall be made for all prime construction and automotive equipment. It will not include charges for equipment or tools with a new cost of \$1,000.00 or less. Equipment time charges must be subject to the daily approval submitted with the billing. The equipment rental and operation rates used shall be those agreed upon by the Engineer and the Contractor prior to commencement of the extra work. No time or charges will be allowed except when equipment is actually being used for the proper and efficient performance or completion of the extra work as authorized.

3. Material Costs. Charges for the cost of materials furnished by the Contractor shall be made providing such furnishing was specifically authorized in the extra work order and the actual use verified by the Engineer. Charges must be net cost to the Contractor delivered at the job, and vendor's invoice must accompany the billing along with verification of use of such materials by the Engineer.

4. Tools, Supplies, Overhead, Supervision and Profit. A charge for tools, supplies, overhead, supervision and profit will be allowed in the amount of 15% of the Total Direct Labor Costs, and Material Costs, as defined above.

Any extra work performed hereunder shall be subject to all of the provisions of the contract and the Contractor's sureties shall be bound with reference thereto as under the Contract.

21. Time for Completion and Liquidated Damages

The date of beginning and the time for completion of the work are essential conditions of the Contract Documents and the work embraced shall be commenced on a date specified in the Notice to Proceed.

Time is of the essence in this Agreement. The Contractor shall proceed with the work at such a rate of progress to ensure full completion within the contract time. It is expressly understood and agreed, by and between the Contractor and the Owner, that the contract time for the completion of the work described herein is a reasonable time.

The parties hereto agree that it is extremely difficult and impractical in this case to determine the actual damages the Owner will suffer if the Contractor fails to complete the work within the contract time and for said reason, if the Contractor shall fail to complete the work within the contract time, or extension of time granted by the Owner, then the Contractor will pay to the Owner the amount for liquidated damages as specified in the Agreement for each calendar day that the Contractor shall be in default after the time stipulated in the Contract Documents. The time for completion of the work shall be extended, and the Contractor shall not be charged with liquidated damages or any excess cost when the delay in completion of the work is due to the following, and the Contractor has promptly given written notice of such delay to the Engineer:

- A. To any preference, priority or allocation order duly issued by the Owner.
- B. To unforeseeable caused beyond the control and without the fault or negligence of the Contractor, including but not restricted to, acts of God or of the public enemy, acts of the Owner, acts of another contractor in the performance of a contract with the Owner, fires, floods, epidemics quarantine restrictions, strikes, freight embargoes, and climatic conditions which, in the opinion of the Engineer, make prosecution of the work unreasonably difficult.
- C. To any delays of subcontractors occasioned by any of the causes specified in the above

paragraphs.

22. Correction of Work

The Contractor shall promptly remove from the premises all work rejected by the Engineer for failure to comply with the Contract Documents, whether incorporated in the construction or not, and the Contractor shall promptly replace and re-execute the work in accordance with the Contract Documents and without expense to the Owner and shall bear the expense of making good all work of other contractors destroyed or damaged by such removal or replacement.

23. Suspension of Work, Termination and Delay

The Owner may, at any time and without cause, suspend the work or any portion thereof for a period of not more than ninety days, or such further time as agreed upon by the Contractor, by written notice to the Contractor and the Engineer, which notice shall fix the date on which work shall be resumed. The Contractor will resume that work on the date so fixed. The Contractor will be allowed an increase in the contract price or an extension of the contract time, or both, directly attributable to any such suspension.

If the Contractor is adjudged as bankrupt or insolvent, or if he makes a general assignment for the benefit of his creditors, or if a trustee or receiver is appointed for the Contractor or for any of his property, or if he files a petition to take advantage of any debtor's act or to reorganize under the bankruptcy or applicable laws, or if he repeatedly fails to supply sufficient skilled workmen or suitable materials or equipment, or if he fails to make prompt payments to subcontractors or for labor, materials or equipment or if he disregards laws, ordinances, rules, regulations or orders of any public body having jurisdiction over the work or if he disregards the authority of the Engineer, or if he otherwise violates any provision of the Contract Documents, then the Owner may, without prejudice to any other right or remedy and after giving the Contractor and his surety a minimum of ten (10) days from delivery of a written notice, terminate the services of the Contractor, and finish the work by whatever method he may deem expedient. In such case the Contractor shall not be entitled to receive any further payment until the work is finished. If the unpaid balance, the Contractor shall pay the difference to the Owner. Such costs incurred by the Owner will be determined by the Engineer and incorporated in a change order.

Where the Contractor's services have been so terminated by the Owner, said termination shall not affect any right of the Owner against the Contractors then existing or which may thereafter accrue. Any retention or payment of monies by the Owner due the Contractor will not release the Contractor from compliance with the Contract Documents.

After ten (10) days from delivery of a written notice to the Contractor and the Engineer, the Owner may without cause and without prejudice to any other right or remedy, elect to abandon the project and terminate the contract. In such case, the Contractor shall be paid for all work executed and any expense sustained plus reasonable profit.

If, through an act or fault of the Contractor, the work is suspended for a period of more than ninety (90) days by the Owner or under an order of court or other public authority, or the Engineer fails to act on any request for payment within thirty (30) days after it is submitted, or the Owner fails to pay the Contractor substantially the sum approved by the Engineer or awarded by arbitrators within thirty (30) days of its approval and presentation, then the Contractor may, after the (10) days from delivery of a written notice to the Owner and the Engineer stop the work until he has been paid all amounts then due, in which event and upon resumption of the work, change orders shall be issued for adjusting the contract price or extending the contract time or both to compensate for the costs and delays attributable to the stoppage of the work.

24. Progress Estimates

On or about the last day of the calendar month, the Contractor will, except as hereinafter provided, make in writing and certify to the Owner an estimate which, in his opinion, is just and fair of the amount and value of the work completed by the Contractor up to that time in the performance of the contract. In case of work for which unit prices are named in the contract, the estimate shall be computed on the basis of said unit prices. In the case of work for which a lump sum is named in the contract, the Engineer may

use a breakdown of the lump sum price submitted by the Contractor, provided that such breakdown is submitted within 10 calendar days after the execution of the Agreement in a form acceptable to the Engineer. No payment will be made to the Contractor until such schedule has been submitted to and reviewed by the Engineer. To the figure thus arrived at shall be added any amounts due the Contractor for extra work and the amount of any approved claims for extra costs to the date of the progress estimate the retained percentage hereinafter provided for shall be deducted from the total thus computed; and from the remainder, there shall be further deducted any amounts due the Owner from the Contractor for supplies or materials furnished or services rendered and any other amounts that may be due the Owner under the terms of the contract. In preparing estimates for partial payment, consideration shall be given to delivery on the site of pipe, and fittings which will become a part of the finished construction work and for which payment in full has been made by the Contractor, but no consideration will be given to preparatory work done or other materials on hand. From the balance thus determined shall be deducted the amount of all previous payments and the remainder shall constitute the partial estimate for that month. Such partial estimates shall not be required to be made by strict measurement, but may be made by measurement or by estimation or partly by one method and partly by the other and it shall be sufficient if they are approximate only. Partial estimates may be withheld or reduced if, in the opinion of the Engineer, the Contractor is not diligently and efficiently endeavoring to comply with the intent of the Agreement.

25. Progress Payments

The Owner will make payments on account of the contract as follows: Not later than the 30th day of the month following the month in which the contract is awarded, and the 30th day of each calendar month thereafter, the Owner will pay to the Contractor 95% of the amount earned by the Contractor during the preceding month at the rate of prices set forth in the contract, based on the estimate of the Engineer.

The retention will be held by the Owner until 35 days following filing of the Notice of Completion.

26. Prompt Payment

The Contractor shall promptly pay all subcontractors and suppliers within ten (10) days of receipt of any progress payment, final payment or retention paid by the Owner to the Contractor. Contractor shall advise all subcontractors and suppliers that all second-tier subcontractors and suppliers must be paid within then (10) days of their receipt of payment from the Contractor.

27. Acceptance and Final Payment

Upon receipt of written notice from the Contractor that the work is ready for final inspection and acceptance, the Engineer will promptly make such inspection, and when he finds the work acceptable under the contract, and the contract fully performed, he will promptly issue a final certificate, over his own signature, stating that the work required by this contract has been completed. The Owner then shall issue a formal Notice of Completion, and the entire balance found to be due shall be paid to the Contractor by the Owner 35 days from the date of recording by the Owner of the Notice of Completion of all work covered by this contract.

Before issuance of the Notice of Completion, the Contractor shall submit evidence satisfactory to the Owner that all payrolls, material bills, and other indebtedness connected with the work have been paid, or if not paid, then the Contractor shall submit evidence of the status of any unpaid indebtedness.

The making and acceptance of the final payment shall constitute a waiver of all claims by the Owner except the following:

- A. those arising from unsettled liens;
- B. those arising from faulty work appearing within 12 months after the date of filing of the Notice of Completion;
- C. those arising from failure to meet the requirements of the Contract Documents or the specifications; or,

- D. those arising from manufacturers' guarantees.

The acceptance by Contractor of the final payment referred to in this paragraph 27 herein, shall be a release of Owner from all claims of liability to Contractor for anything done or furnished for, or relating to, the work or for any act or neglect of Owner or of any person relating to or affecting the work, except demands against Owner for the remainder, if any, of the amounts kept or retained under the provisions of Paragraph 25, Progress Payments, herein; and excepting pending, unresolved claims.

28. Quantities and Unit Prices

The quantities noted in the schedule are approximation for comparing bids, and no claim shall be made against the Owner for excess or deficiency therein. Payment at the unit prices set forth in the schedule will constitute payment in full for the completed work and will include materials, supplies, labor, tools, machinery, and all other expenditures incident to satisfactory compliance with the contract, unless otherwise specifically provided.

The quantities of work performed will be computed for payment by the Engineer on the basis of measurements taken by the Engineer, and these measurements shall be final and binding.

29. Insurance

The Contractor shall not commence work under this Agreement until he has obtained all the insurance required under this section and such insurance has been approved by the Owner, nor shall the Contractor allow any subcontractor to commence work on his subcontract until the insurance required of the subcontractor has been so obtained and approved. All insurance required under this section shall be maintained at the expense of the Contractor continuously during the life of the contract up to the date of acceptance of the work by the Owner.

Commercial General Liability and Automobile Liability Insurance – The Contractor shall provide and maintain the following commercial general liability and automobile liability insurance:

- A. Coverage – Coverage for commercial general liability and automobile liability insurance shall be at least as broad as the following:
 - 1. Insurance Services Office Commercial General Liability coverage (Occurrence Form CG 0001)
 - 2. Insurance Service Office Form Number CA 0001 (ed. 1/87) covering Automobile Liability, Code 1 (any auto)
- B. Limits – The Contractor shall maintain limits no less than the following:
 - 1. General Liability – Two million dollars (\$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 the project/location (with the ISO CG 2501 or insurer's equivalent endorsement provided to the Owner) or the general aggregate limit shall be twice the required occurrence limit.
 - 2. Automobile Liability – One million dollars (\$1,000,000) per accident for bodily injury and property damage combine single limit.
- C. Required provisions – The general liability and automobile liability policies are to contain, to be endorsed to contain the following provisions:
 - 1. The Owner and its directors, officers, employees, agents and volunteers are to be covered as insured 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 Owner and its directors, officers, employees, agents, and volunteers.

2. For any claims related to this work, the Contractor's insurance shall be the primary insurance as respects the Owner and its directors, officers, employees, agents and volunteers. Any insurance, pooled coverage or self-insurance maintained by the Owner and its directors, officers, employees, agents and volunteers shall not contribute to it.
 3. Any failure to comply with reporting or other provisions of the policies including breaches of warranties shall not affect coverage provided to the Owner and their directors, officers, employees, agents and volunteers.
 4. 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.
 5. 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 Owner.
- D. Deductibles and Self-Insured Retentions – Any deductible or self-insured retention must be declared to and approved by the Owner. At the option of the Owner, either the insurer shall reduce or eliminate such deductibles or self-insured retentions.
- E. Acceptability of Insurers – Insurance is to be placed with insurers having a current A.M. Best's rating of no less than A-: VII or equivalent.

Workers' Compensation and Employer's Liability Insurance – The Contractor and all subcontractors shall cover or insure under the applicable laws relating to workers' compensation insurance, all of their employees working on or about the construction site, regardless of whether such coverage or insurance is mandatory or merely elective under law, and the Contractor shall defend, protect and save harmless the Owner and its directors, officers, employees, agents and volunteers from and against all claims, suits, and actions arising from any failure of the Contractor or any subcontractor to maintain such insurance. Before beginning work, Contractor shall furnish to the Owner satisfactory proof that Contractor has taken out for the period covered by the work under this Contract, full compensation insurance for all persons employed directly by Contractor or through subcontractors in carrying out the work contemplated under this Contract, all in accordance with the "Workers' Compensation and Insurance Act," Division IV of the Labor Code of the State of California and any Acts amendatory thereof.

The Contractor shall provide employer's liability insurance in the amount of, at least, \$1,000,000 per accident for bodily injury and disease.

The Contractor shall provide the Owner with a certificate of Workers' Compensation and Employers liability insurance coverage.

In signing the Agreement, Contractor makes the following certification required by Section 1861 of the Labor Code:

"I am aware of the provisions of Section 3700 of the Labor Code which requires each employer to be insured against liability for workmen'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."

Evidences and Cancellation of Insurance – Prior to execution of the Agreement, the Contractor shall file with the Owner evidence of insurance from an insurer or insurers certifying to the coverage of all insurance required herein. Such evidence shall include original copies of the ISO CG 2010 (or insurer's

equivalent) signed by the insurer's representative and certificate of insurance (Accord Form 25-S or equivalent). All evidence of shall be certified by a properly authorized officer, agent or qualified representative of the insurer and shall certify the names of the insured, any additional primary insurers, where appropriate, the type and amount of the insurance, the location and operations to which the insurance applies, the expiration date, and that the insurer will give by certified mail, written notice to the Owner at least thirty (30) days prior to the effective date of any cancellation, lapse or material change in the policy.

The Contractor shall, upon demand of the Owner, deliver to the Owner all such policy or policies of insurance and the receipts for payment of premiums thereon; and should the Contractor neglect to obtain and maintain in force any such insurance or deliver such policy or policies and receipts to the Owner, then it shall be lawful for the Owner to obtain and maintain such insurance, and the Contractor hereby appoints the Owner the true and lawful attorney-in-fact to do all things necessary for this purpose. All money paid by the Owner for insurance premiums under the provisions of this article shall be charged to the Contractor.

30. Contract Security

The Contractor shall, within ten (10) days after the receipt of the Notice of Award, furnish the Owner with a performance bond and a payment bond in penal sums equal to 100% of the contract price, conditioned upon the performance by the Contractor of all undertakings, covenants, terms, conditions and agreements of the Contract Documents, and upon the prompt payment by the Contractor to all persons supplying labor and materials in the prosecution of the work provided by the Contract Documents. Such bonds shall be executed by the Contractor and corporate bonding company licensed to transact such business in the state in which the Work is to be performed and named on the current list of "Surety Companies Acceptable Federal Bonds" as published in the Treasury Department Circular Number 570. The expense of these bonds shall be borne by the Contractor. If at any time a surety on any such bond is declared a bankrupt or loses its right to do business in the state in which the work is to be performed or is removed from the list of surety companies accepted on Federal bonds, Contractor shall within ten (10) days after notice from the Owner to do so, substitute an acceptable bond (or bonds) in such form and sum and signed by such other surety or sureties as may be satisfactory to the Owner. The premiums on such bond (s) shall be paid by Contractor. No further payments shall be deemed due nor shall be made until the new surety or sureties shall have furnished an acceptable bond to the Owner.

Attached to the bonds shall be the original, or a certified copy, of the unrevoked appointment, power of attorney, bylaws or other instrument which entitles and authorizes the person to execute the bond to do so, a certified copy of the certificate of authority or the insurer issued by the Insurance Commissioner of the county in which the Owner is located which would state that the certificate of authority of the insurer (the bonding company) has not been surrendered, revoked, cancelled, annulled, or suspended.

The performance bond shall remain in full force and effect during the warranty period of 12 months from the date of acceptance of the work by the Owner.

If requested by the Owner or Engineer, copies of the insurer's most recent annual statement and quarterly statement filed with the Department of Insurance pursuant to Article 10 (commencing with Section 900) of Chapter 1 of Part 2 of Division 1 of the Insurance Code, shall be provided to the Owner or Engineer within 10 calendar days of the insurer's receipt of the request to submit the statements.

31. Assignments

Neither the Contractor nor the Owner shall sell, transfer, assign or otherwise dispose of the contract or any portion thereof, or of his right, title or interest therein, or his obligation thereunder, without written consent of the other party.

32. Indemnification

Contractor shall indemnify and hold harmless and defend the Owner and the Engineer and their directors, officers, employees, agents or volunteers, and each of them from and against:

- A. Any and all claims, demands, causes of action, damages, costs, expenses, losses or liabilities, in law or in equity, of every kind and nature whatsoever for, but not limited to, injury to or death of any person including Owner and/or Engineer and/or Contractor, or any directors, officers, employees, agents volunteers of the Owner, Engineer or Contractor, and damages to or destruction of property of any person, including but not limited to, Owner, Engineer and/or Contractor and their directors, officers, employees, agents or volunteers arising out of or in any manner directly or indirectly connected with the work to be performed under this Agreement, however caused regardless of any negligence of the Owner or the Engineer or their directors, officers, employees, agents, or volunteers, except the sole negligence of willful misconduct or active negligence of the Owner or the Engineer or their directors, officers, employees, agents or volunteers:
- B. Any and all actions, proceedings, damages, costs, expenses, penalties or liabilities in law or equity, of every kind or nature whatsoever, arising out of , resulting from or on account of the violation of any governmental law or regulation, compliance with which is the responsibility of Contractor.

Contractor shall defend, at Contractor's own cost, expense and risk, any and all such aforesaid suits, actions or other legal proceedings of every kind that may be brought or instituted against the Owner and the Engineer or their directors, officers, employees, agents or volunteers.

Contractor shall pay and satisfy any judgment, award or decree that may be rendered against the Owner and their directors, officers, employees, agents, or volunteers in any such suit, action or other legal proceedings.

Contractor shall reimburse the Owner and their directors, officers, employees, agents and/or volunteers, for any and all legal expenses and costs incurred by them in connection therewith or in enforcing the indemnity herein provided.

Contractor agrees to carry insurance for this purpose as set out in the specifications. See Paragraph 29 of these General Provisions for insurance specifications and coverage. Contractor's obligation to indemnify shall not be restricted to insurance proceeds, if any, received by the Owner and the Engineer or their directors, officers, employees, agents and/or volunteers.

33. Separate Contracts

The Owner reserves the right to let other contracts in connection with this project. The Contractor shall afford other contractors reasonable opportunity for the introduction and storage of their materials and the execution of their work, and shall properly connect and coordinate his work with theirs. If the proper execution or results of any part of the Contractor's work depend upon the work of any other contractor, the Contractor shall inspect and promptly report to the Engineer any defects in such work that render it unsuitable for such proper execution and results.

The Owner may perform additional work related to the project by himself, or he may let other contracts containing provisions similar to these. The Contractor will afford the Contractors who are parties to such contracts (or the Owner, if he is performing the additional work himself), reasonable opportunity for the introduction and storage of materials and equipment and the execution of work, and shall properly connect and coordinate his work with theirs.

In the performance of additional work by other contractors or the Owner is not noted in the Contract Documents prior to the execution of the Agreement, written notice thereof shall be given to the Contractor prior to starting any such additional work. If the Contractor believes that the performance of such requires additional expense or entitles him to an extension of the contract time, he may make a claim therefore as provided in Items 19 and 20 of these General Provisions.

34. Subcontracting

The Contractor may utilize the services of specialty subcontractors on those parts of the work which, under normal contracting practices, are performed by specialty subcontractors.

The Contractor shall be fully responsible to the Owner for the acts and omissions of his subcontractors, and of persons either directly or indirectly employed by them, as he is of the acts and omissions of persons directly employed by him.

The Contractor shall cause appropriate provisions to be inserted in all contracts relative to the work to bind subcontractors to the Contractor by the terms of the Contract Documents in so far as applicable to the work of subcontractors and to give the Contractor the same power as regards terminating any subcontract that the Owner may exercise over the Contractor under any provision of the Contract Documents.

Nothing contained in this contract shall create any contractual relation between any subcontractor and the Owner.

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

35. Employment of Apprentices

The Contractor and any subcontractor under him shall comply with the requirements of Sections 1777.5 and 1777.6 of the Labor Code in the employment of apprentices. The responsibility for compliance with the provisions of said Section 1777.5 for all apprenticeship occupations shall rest with the Contractor. Information relative to apprenticeship standards, wage schedules and other requirements may be obtained from the Division of Apprenticeship Standards, 455 Golden Gate Avenue, San Francisco, California, or from its branch offices.

36. Payment of Prevailing Wages

The Contractor and all subcontractors under him shall pay all laborers, workmen and mechanics on all work included in this contract no less than the general prevailing rate of per diem wages for work performed, (to-wit, within the limits of the City), and no less than the general prevailing rate of per diem wages for legal holiday and overtime work in said locality, which per diem wages shall not be less than the stipulated rate contained in a schedule thereof which has been ascertained and determined by the Council to be the general prevailing rate of per diem wages for each craft or type of workman or mechanic needed to execute this contract, and which is now on file with the City Clerk, as set forth in the Information for Bidders, and by reference it is incorporated herein and made a part hereof.

The Contractor shall forfeit, as a penalty to the Owner, two hundred dollars (\$200.00) for each laborer, workman or mechanic employed for each calendar day or portion thereof such laborer, workman or mechanic is paid less than the said stipulated rates for any work done under this contract by him or by any subcontractor under him in violation of Articles 1 and 2 of Chapter 1 Part 7 of Division 11 of the Labor Code of the State of California, and said sums and amounts which shall have been so forfeited pursuant to the herein paragraph and the said terms of said Labor Code shall be withheld and retained from payments due to the Contractor under said contract, pursuant to this contract and the said terms of said Labor Code; but no sum shall be so withheld, retained or forfeited except from the final payment without a full investigation by either the Division of Labor law Enforcement of the State Department of Industrial Relations or by said Council.

The difference between such stipulated prevailing wage rates and the amount paid to each workman for each calendar day, or a portion thereof, for which each workman was paid less than the stipulated prevailing wage rate shall be paid to each workman by the Contractor. The Contractor shall comply with the provisions of Section 1775 of the Labor Code of the State of California.

The Contractor and his subcontractors shall submit certified payroll information electronically to the Department of Industrial Relations as well as a hard copy of said certified payrolls to the Owner on a monthly basis.

37. Registration to Train Apprentices

Pursuant to Labor Code Section 1777.5, all contractors shall file with the appropriate Joint Apprenticeship Training Committee, a DAS-140 form registering to train apprentices. This requirement to register to train apprentices is mandated by Section 1777.5 whether or not you are signatory to or a party of any approved training program. Only those programs approved by the California Apprenticeship Council are applicable to accept DAS-140 registration forms.

If the contractor is approved to train apprentices, then apprentices must be called in a ratio not less than one apprentice hour for each five journeyman hours.

However, if the entire contract may be completed within 20 working days or the entire contract (nor subcontracts) is less than thirty thousand (\$30,000), then the Contractor is exempt from requesting apprentices under Labor Code Section 1777.5.

In addition, all contractors are required to make appropriate training contributions as set forth in the prevailing wage determination to each appropriate JATC, or in the alternative, to the California Apprenticeship Council. Payments shall be made not less than monthly, calculated and paid by the fifteenth of each month, for work performed that prior month.

The address for the applicable Joint Apprenticeship Training Committee and for the California Apprenticeship Council can be obtained by calling the Division of Apprenticeship Standards.

38. Penalties

Failure to pay the appropriate prevailing wage can result in penalties being assessed as follows:

- A. Up to \$50.00 per day per worker for each and every violation; and,
- B. debarment from future public works for a period not to exceed three years.
- C. \$50.00 per day per worker for each failure to comply with the payment of overtime for all hours worked in excess of 8 in one day or 40 in one week.

Failure to register to train apprentices or failure to pay the appropriate training contribution can result in penalties being assessed as follows:

- A. \$100.00 per day for each day of violation; and,
- B. debarment from future public works for a period not to exceed three years.

39. Engineer's Authority

The Engineer shall act as the Owner's representative. He shall decide questions which may arise as to quality and acceptability of materials furnished and work performed. He shall interpret the intent of the Contract Documents in a fair and unbiased manner. The Engineer will make visits to the site and determine if the work is proceeding in accordance with the Contract Documents.

The Contractor will be held strictly to the intent of the Contract Documents in regard to the quality of materials, workmanship and execution of the work. Inspections may be made at the factory or fabrication plant of the source of material supply.

The Engineer will not be responsible for the construction means, controls, techniques, sequences, procedures, or construction safety.

40. Land and Rights-of-Way

Prior to issuance of the Notice to Proceed, the Owner shall obtain all land and rights-of-way necessary for carrying out and for the completion of the work to be performed pursuant to the Contract Documents, unless otherwise mutually agreed.

The Owner shall provide to the Contractor information which delineates and describes the lands owned and rights-of-way acquired.

The Contractor shall provide, at his own expense and without liability to the Owner, any additional land

and access thereto that the Contractor may desire for temporary construction facilities, or for storage of materials.

41. Warranty and Guarantee

Contractor warrants and guarantees to Owner that all work will be in accordance with the Contract Documents and will not be defective. Prompt notice of defects known to Owner shall be given to Contractor. All defective work, whether or not in place, may be rejected, corrected or accepted as provided in Paragraph 19, Changes in the Work, of these General Provisions. Defective work may be rejected even if approved by prior inspection.

42. One (1) Year Warranty Period

The warranty period shall commence when the Notice of Completion is issued, at notice of beneficial occupancy or at notice of partial utilization of the work to be warranted has been issued, or a later date if so specified in the Agreement, or mutually agreed to, and extend until one (1) year after that date or whatever longer period may be prescribed by laws or regulations or by the terms of any applicable special guarantee or specific provision of the Contract Documents.

43. Correction of Defective Work

If within the designated warranty period, or such longer period as may be required by Laws or Regulations, the work, or any part of the work, is discovered to be defective, Contractor shall promptly, without an adjustment in contract price and in accordance with Owner's written instructions, either correct that defective work, or if it has been rejected by Owner, remove it from the site and replace it with non-defective work. If circumstances warrant it, including but not limited to, in an emergency, Owner may have the defective work corrected or the rejected work removed and replaced. In that event, Contractor shall not be allowed to recover any associated costs, and he shall reimburse Owner for all direct, indirect and consequential costs of Owner, and Owner shall be entitled to an appropriate decrease in contract price, to withhold a set-off against amount recommended for payment, or make a claim on Contractor's bond if Contractor has been paid in full. Where defective work (and damage to other work resulting therefrom) has been corrected, removed or replaced during the warranty period, the one (1) year warranty period with respect to such work will be extended for an additional period of one (1) year after such correction or removal and replacement has been satisfactorily completed.

44. Early Completion

The one (1) year warranty period will not begin until the Notice of Completion is filed. If Contractor completes the work or portions thereof prior to this time, he shall preserve the equipment and/or facilities by developing and implementing a preventive maintenance program in compliance with manufacturer's recommendations to maintain the equipment and/or facilities unless Owner has issued a notice of beneficial occupancy or notice of partial utilization for the warranted work. At start up, Contractor will be required to get his equipment and/or facilities ready to put into service.

45. Extended Warranties and Guarantees

Owner may at its sole discretion extend the one (1) year warranty period up to twenty-four (24) months, in which case Contractor shall maintain the warranties and guarantees. If such extension of the one (1) year warranty period causes an increase in the cost of the warranties and guarantees provided by Contractor, an adjustment in contract price shall be made as provided by the Contract Documents.

46. Arbitration

With the prior approval of the Owner and the Contractor, all claims, disputes and other matters in question arising out of, or relation to, the Contract Documents or the breach thereof, except for claims which have been waived by the making and acceptance of final payment as provided by Item 27 of these General Provisions, may be decided by arbitration in accordance with the Arbitration Rules of the American Arbitration Association. If entered into, the agreement to arbitrate shall be specifically

enforceable under the prevailing arbitration law. The award rendered by the arbitrators shall be final, and judgment may be entered upon it in any court having jurisdiction thereof.

Notice of the request for arbitration shall be filed in writing with the other party to the Contract Documents and with the American Arbitration Association, and a copy shall be filed with the Engineer. The request for arbitration shall set forth specifically the dispute to be arbitrated. Acceptance by the other party of the request to arbitrate shall constitute the agreement to arbitrate and arbitration shall proceed forthwith. No legal proceedings other than to enforce arbitration shall be commenced on any issue covered by the arbitration agreement.

The Contractor shall carry on the work and maintain the progress schedule during any arbitration proceedings, unless otherwise mutually agreed in writing.

47. Taxes

The Contractor shall pay all sales, consumer, use and other similar taxes required by the law of the place where the work is performed.

48. Contractor's Understanding

It is understood and agreed that the Contractor has, by careful examination, satisfied himself as to the nature and extent of the work, the character, quality, and quantity of the materials to be encountered, the character of the equipment and facilities needed preliminary to and during the prosecution of the work, the general and local conditions, and all other matters which can in any way affect the work under this contract. No verbal agreement or conversation with any officer, agent or employee of the Engineer or the Owner, either before or after the execution of this Agreement, shall affect or modify any of the terms or obligations herein contained.

49. Accidents

The Contractor shall provide, at the site, such equipment and medical facilities as are necessary to supply first-aid service to anyone who may be injured in connection with the work. The Contractor must promptly report in writing to the Engineer all accidents whatsoever arising out of, or in connection with the performance of the work, whether on or adjacent to the site which causes death, personal injury, or property damages, giving full details and statements of witnesses. In addition, if death or serious injuries or serious damages are caused, the accident shall be reported immediately by telephone or messenger to both the Engineer and the Owner. If any claim is made by anyone against the Contractor or any subcontractor on account of any accident, the Contractor shall promptly report the facts in writing to the Engineer, giving full details of the claim.

50. Safety and Sanitation

The Contractor shall provide adequate safety and sanitation facilities according to State laws and local ordinances.

The Contractor will assume sole and complete responsibility for job site conditions during the course of construction of the project, including safety of all persons and equipment. This responsibility shall apply continuously and not be limited to normal working hours.

51. Climatic Conditions

The Engineer may order the Contractor to suspend any work that may be subject to damage by climatic conditions. The Contractor may suspend work if climatic conditions are such that the Contractor is unable to work. In such case, the Contractor, within seven days, shall request in writing a change order to extend the contract time.

52. Officials Not To Benefit

No official of the Owner shall receive any benefit that may arise by reason of this contract.

53. Clean-Up

During the progress of the work, the Contractor shall maintain the site and related structures and equipment in a clean, orderly condition and free from unsightly accumulations of rubbish. Upon completion of the work, the Contractor shall remove from the vicinity of the work all plants, buildings, rubbish, unused materials, concrete forms, temporary bridging, and other like material, belonging to him or used under his direction during construction, and in the event of his failure to do so, the same may be removed by the Owner after 10 calendar days notice to the Contractor at the expense of the Contractor, and his surety or sureties shall be liable therefore.

As part of the final clean-up, the Contractor shall dress up and grade the right-of-way to match existing ground surfaces, and shall remove therefrom all weeds and other growth. Where the construction has crossed yards or driveways, they shall be restored to a condition equivalent to the condition existing prior to the construction as determined by the Engineer.

No direct payment will be made to the Contractor for any clean-up work, but all compensation therefore shall be included in the prices bid in the schedule for the various items of work.

54. Notice to Owner

In the event this contract involves digging trenches or excavations that extend deeper than four feet below the surface, the Contractor shall promptly, and before the following conditions are disturbed, notify Owner, in writing, of any:

- A. Material that the Contractor believes may be material that is hazardous waste, as defined in Section 25117 of the Health Safety Code, that is required to be removed to a Class I, Class II, or Class III disposal site in accordance with provisions of existing law;
- B. Subsurface or latent physical conditions at the site differing from those indicated;
- C. Unknown physical conditions at the site of any unusual nature, different materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the contract.

Owner shall promptly investigate the conditions. If Owner finds that the conditions do materially so differ, or do involve hazardous waste, and cause a decrease or increase in the Contractor's cost of, or the time required for, performance of any part of the work, Owner shall issue a change order under the procedures described in the contract.

In the event a dispute arises between Owner and Contractor whether the conditions materially differ, or involve hazardous waste, or cause a decrease or increase in the Contractor's cost of, or time required for, performance of any part of the work, the Contractor, shall not be excused from any scheduled completion date provided for by the contract, but shall proceed with all work to be performed under the contract. The Contractor shall retain any and all rights provided either by contract or by law which pertain to the resolution of disputes and protests between Contractor and Owner.

55. Payment of Withheld Funds

The Owner shall retain 5% of each payment from Contractor and shall make prompt and regular incremental acceptances of portions, as determined by the Owner, of the agreed upon work, and pay retention to the Contractor based on these acceptances. The Contractor, or subcontractor, shall return all monies withheld in retention from a subcontractor within 30 days after receiving payment for work satisfactorily completed and accepted including incremental acceptances of portions of the contract agreement work by the Owner. Federal law (49CFR26.29) requires that any delay or postponement of payment over 30 days may take place only for good cause and with the Owner's prior written approval. Any violation of this provision shall subject the violating Contractor or subcontractor to the penalties, sanctions and other remedies specified in Section 7108.5 of the Business and Professions Code. These requirements shall not be construed to limit or impair any contractual, administrative, or judicial remedies otherwise available to the Contractor or subcontractor in the event of a dispute involving late payment or nonpayment by the Contractor, deficient subcontract performance, or noncompliance. When the work is

complete, the Owner will issue a Notice of Completion to the County. The Owner will pay all retention funds to the Contractor thirty-five (35) Days after Notice of Completion has been recorded.

56. Storm Water Pollution Prevention Measures

Storm Water Pollution Prevention Measures shall be performed in accordance with the provisions in Section 13-3, "Storm Water Pollution Prevention Plan," of the Standard Specifications.

A. GENERAL

In compliance with the State and Federal regulations regarding storm water management during construction, the Contractor shall not allow any debris, waste materials or pollutants, originating from the Contractor's operations, to enter the storm drainage system, which leads to contamination of local creeks and ponding basins.

The Contractor shall properly dispose of all wastes and excess materials in a legal manner to the satisfaction of the Owner.

B. SELECTIVE BMPS FOR STORM WATER POLLUTION PREVENTION

As applicable to the project or directed by the Engineer, the Contractor shall implement any or all of the following Best Management Practices (BMPs):

1. Material Handling and Storage

a. Nonhazardous Materials

i. Designated Delivery and Storage Area

The Contractor shall propose areas in the vicinity of or within the project site or within the Contractor's staging site, which are suitable for material delivery and storage. To the maximum extent practicable, these areas shall be away from gutters, catch basins, drainage courses or creeks. The Contractor shall submit the proposed areas to and shall obtain the approval from the Engineer in writing prior to bringing in materials.

ii. Storage of Granular Materials

The Contractor shall store granular materials at least ten feet (10') away from any inlet or curb return and shall prevent the granular materials from entering the storm drain system, drainage courses or creeks. During wet weather or when rain is forecast within 24 hours, the Contractor shall cover granular materials with a tarpaulin and surround the material with sandbags or other approved heavy objects.

b. Hazardous Materials

i. Hazardous materials include, but are not limited to, petroleum products, antifreeze, paints, thinners, solvents, pesticides, herbicides and various other toxic chemicals.

ii. The Contractor shall propose, within the project site or the Contractor's staging site, an area that is suitable for hazardous material delivery and storage. To the maximum extent practicable, the area shall be away from inlets, gutters, drainage courses or creeks. The Contractor shall submit the proposed area to and shall obtain approval from the Engineer in writing prior to bringing in hazardous materials.

iii. The Contractor shall label and store all hazardous materials and hazardous wastes in accordance with secondary containment regulations, the City of Los Banos Hazardous Materials Storage Ordinance and all applicable Merced County, State and Federal laws and

regulations.

iv. The Contractor shall keep all hazardous materials or waste in containers and fully covered to avoid contamination of storm runoff.

v. The Contractor shall keep an accurate, up-to-date inventory, including Materials Safety Data Sheets (MSDSs), of hazardous materials and hazardous wastes stored on-site to assist emergency response personnel in the event of a hazardous material incident.

2. Hazardous Material Usage

a. The Contractor shall follow all local, State and Federal policies, laws and regulations governing the use of hazardous materials.

b. The Contractor shall use only Category III pesticides for pest control. If Category III pesticides are unavailable, have been tried but proven ineffective, or when it is necessary to prevent a pest outbreak that poses an immediate threat to public health or significant economic loss, the City may consider allowing the use of Category II pesticides with a dose of up to LD50 (a dose that kills 50 percent of the targeted pest population in the laboratory) provided that the risk to the applicator and impact to the environment can be justified. Use of Category I pesticides is prohibited.

c. Apply pesticides at the appropriate time to maximize their effectiveness and minimize the likelihood of discharging non-degraded pesticides into storm water system, drainage courses and creeks.

d. Mix only as much material as is necessary for treatment. Calibrate application equipment prior to and during use to ensure desired application rate. Do not mix or load pesticides adjacent to storm drain system, drainage courses or creeks.

e. The Contractor shall not overapply herbicides, pesticides or fertilizers and shall follow the manufacturer's instructions regarding uses, protective equipment, ventilation, flammability and mixing of chemicals. Over-application of a pesticide is a "label violation" subject to an enforcement action by the Merced County Agriculture Department.

f. When rain is forecast within 24 hours or during wet weather, the Contractor shall not apply chemicals in outside areas unless otherwise allowed by the Engineer in writing.

3. Integrated Pest Management Methods

The Contractor shall employ, in place of pesticides, integrated pest management methods including:

a. No control

b. Physical or mechanical methods

c. Least toxic chemicals (insecticidal soaps and oil, etc.)

4. Vehicle and Equipment Cleaning, Maintenance and Fueling

a. Cleaning

The Contractor shall not clean or wash vehicles or equipment on-site or in the streets. If allowed by the Engineer in writing, cleaning and washing shall be performed in a designated and bermed area approved by the Engineer using water only. No soaps, solvents, degreasers, steam cleaning equipment or similar methods are permitted. The Contractor shall not allow wash water to flow into streets, gutters, storm drain system, drainage courses or creeks.

b. Maintenance and Fueling

i. The Contractor shall perform maintenance and fueling of vehicles or equipment in a designated, bermed area or over a drip pan that will prevent waste, leaks or spills from entering streets, gutters, storm drain system, drainage courses or creeks.

ii. The Contractor shall inspect all vehicles and equipment arriving on-site for leaking fluids and shall promptly repair leaking vehicles and equipment. Drip pans shall be used to catch leaks until repairs can be made. Shut-off valves on equipment must be working properly.

5. Spill Prevention and Control

a. If hazardous materials are used on the project, the Contractor shall keep a stockpile of spill clean-up materials, such as rags or absorbents, readily accessible on-site.

b. Above-ground storage tanks and their installations shall comply with City, State and Federal requirements.

c. The Contractor shall immediately contain and prevent spills or leaks from entering storm drain system, drainage courses or creeks and shall properly clean up and dispose of the spills or leaks. The Contractor shall not wash the spills or leaks into streets, gutters, storm drain system, drainage courses or creeks and shall not bury the spills or leaks.

d. In case of a hazardous material spillage, the Contractor shall immediately call 911 and shall handle the spilled material in accordance with the requirements of 6, "Disposal of Hazardous Waste," below.

6. Disposal of Hazardous Waste

a. Unless the Contractor is a licensed hazardous waste handler, the Contractor shall contract with a licensed hazardous waste handler to remove and dispose of hazardous waste materials unless the waste quantities to be transported are below threshold limits for transportation as specified in the State and Federal regulations.

b. The Contractor shall arrange for regular hazardous waste collection to comply with limits for storage of hazardous waste.

c. The Contractor may dispose of dry, empty paint cans, buckets, paintbrushes, rollers, rags and drop cloths in the trash.

d. The Contractor shall dispose of hazardous waste at facilities authorized for treatment, storage and disposal of hazardous waste only.

7. Street Sweeping

At the end of each day or as directed by the Engineer, the Contractor shall sweep roadways of all debris and excess materials attributed to the Contractor's operations.

8. Water Usage

a. The Contractor shall use the least amount of water necessary for dust control and street sweeping operations.

b. The Contractor shall not use water to flush dust and debris down the street in place of street sweeping.

9. Dumpsters and Portable Sanitary Facilities

a. If dumpsters or portable sanitary facilities are used, they shall be

stationed at least ten feet (10') away from storm drain facilities.

b. The Contractor shall arrange for regular waste collection to keep dumpsters and portable sanitary facilities from overflowing and shall regularly inspect these facilities for leaks. If a leak is discovered, the Contractor shall arrange for the repair or replacement of facilities that leak. The Contractor shall not wash the dumpsters or portable sanitary facilities on-site.

10. Earthwork

The Contractor shall maximize the control of erosion and sediment by using the Best Management Practices for erosion and sedimentation control described in the California Storm Water Best Management Practice Handbook—Construction Activity or ABAG Manual of Standards for Erosion and Sediment Control Measures.

11. Dewatering

a. The Contractor shall route water through a control device, such as a sediment trap, sediment basin or Baker tank, to remove settleable solids prior to discharging the water into the storm drain system. Refer to the California Storm Water Management Practice Handbook for these sediment control measures.

b. Approval of the control device shall be obtained in advance from the Engineer.

c. Filtration of the water following the control device may be required on a case-by-case basis.

d. If the Engineer determines that the dewatering operation would not generate an appreciable amount of settleable solids, the control device may be waived.

12. Saw Cutting

a. During saw cutting or grinding operation, use as little water as possible.

b. During saw cutting, the Contractor shall cover or barricade catch basins using filter fabric, straw bales, sandbags or fine gravel dams to keep slurry out of the storm drain system. When protecting a catch basin, the Contractor shall ensure that the entire opening of the catch basin is covered. Refer to California Storm Water Best Management Practice Handbook for these control measures.

c. The Contractor shall shovel, absorb or vacuum saw cut slurry and pick up the waste as the work progresses prior to moving to the next location, as specified elsewhere in these specifications or as directed by the Engineer.

d. If saw cut slurry enters catch basins, the Contractor shall, at the Contractor's cost, clean up the storm drain system immediately.

13. Concrete, Grout and Mortar Related Work

a. Material Handling

i. The Contractor shall avoid mixing excess amounts of fresh concrete or cement mortar on-site.

ii. The Contractor shall store concrete, grout and mortar away from storm drain facilities or drainage courses and shall ensure that these materials do not enter the storm drain system.

b. Washing of Concrete Truck and Tools

- i. The Contractor shall not wash out concrete trucks or equipment into streets, gutters, storm drain system, drainage courses or creeks.
- ii. The Contractor shall perform washing of concrete trucks and tools off-site or in a designated area on-site where the water will flow onto dirt or into a temporary pit in a dirt area. The Contractor shall let the water percolate into the soil and dispose of the hardened concrete in a trash container. If a suitable dirt area is not available, the Contractor shall collect the wash water and dispose of it off-site.

14. Asphalt Concrete Paving

a. Project Site Management

- i. When rain is forecast within 24 hours or during wet weather, the Engineer may prevent the Contractor from paving.
- ii. The Engineer may direct the Contractor to protect drainage courses by using earth dike, straw wattle or sandbag to trap and filter sediment. Refer to California Storm Water Best Management Practice Handbook for these control measures.
- iii. The Contractor shall place drip pans or absorbent material under paving equipment when not in use.
- iv. The Contractor shall cover catch basins and manholes when paving or applying prime coat, tack coat, seal coat, fog seal or slurry seal.
- v. If the paving operation includes an on-site mixing plant, the Contractor shall comply with Merced County NPDES General Industrial Activities Storm Water Permit requirements.
- vi. The Contractor shall preheat, transfer or load hot bituminous material away from storm drain system, drainage courses or creeks.

b. Paving Waste Management

The Contractor shall not sweep or wash down excess sand (placed as part of a sand seal or to absorb excess oil) into streets, gutters, storm drain system or creeks but shall collect the sand and dispose of it off-site. The Contractor shall not wash fresh asphalt concrete pavement.

15. Painting

a. General

- i. The Contractor shall remove as much excess paint as possible from brushes, rollers and other tools before starting cleanup.
- ii. The Contractor shall conduct cleaning of painting equipment and tools in a designated area approved by the Engineer.
- iii. The Contractor shall not allow wash water from cleaning of painting equipment and tools into streets, gutters, storm drain system, drainage courses or creeks.

b. Water-Based Paint

To the maximum extent practicable, the Contractor shall dispose of wash water from water cleaning of brushes, rollers and other tools used in water-based painting work to the sanitary sewer or direct wash water onto dirt area and spade in.

c. Oil-Based Paint

The Contractor shall dispose of waste thinner and solvent and sludge from cleaning of brushes, rollers and other tools used in oil-based painting work as hazardous waste and the Contractor shall handle the waste as described in Section 6, "Disposal of Hazardous Waste," above. To the maximum extent practicable, the Contractor shall filter paint thinner and solvents for reuse.

16. Thermoplastic

- a. The Contractor shall transfer and load hot thermoplastic away from drainage systems or drainage courses or creeks.
- b. The Contractor shall sweep thermoplastic grindings into plastic bags. Yellow thermoplastic grindings may require special handling as they may contain paint.

C. CONTRACTOR TRAINING AND AWARENESS

1. The Contractor shall train all employees and subcontractors on the storm water pollution prevention requirements contained in these specifications.
2. The Contractor shall inform subcontractors of the storm water pollution prevention contract requirements and include appropriate subcontract provisions to ensure that these requirements are met.
3. The Contractor shall post warning signs in areas treated with chemicals.

D. BMP IMPLEMENTATION

The Contractor shall be responsible throughout the duration of the construction period for installing and maintaining the applicable BMPs and for removing and legally disposing of temporary control measures. Unless otherwise directed by the Engineer or specified elsewhere in these specifications, the Contractor's responsibility for BMP implementation shall continue throughout any temporary suspension of work ordered in conformance with the provisions in Section 8-1.06, "Suspensions," of the Standard Specifications.

Throughout the rainy season, all soil-disturbed areas of the site shall be fully protected with soil stabilization and sediment control device approved by the Engineer at the end of the same day the soil is disturbed unless fair weather is predicted the next day and the protective measures are exempt by the Engineer. The Contractor shall monitor the weather forecast on a daily basis and inform the Engineer of the forecast. The National Weather Service forecast shall be used for this purpose. If precipitation is predicted for the following day, construction schedule shall be altered as required to install appropriate BMPs or to ensure that the already installed BMPs are in good operating condition prior to the onset of rain.

E. BMP MAINTENANCE

To ensure proper implementation and effectiveness of the BMPs, the Contractor shall regularly inspect and maintain the deployed BMPs throughout the construction site. The Contractor shall identify corrective actions and the time needed to address any deficient BMPs or reinstate any BMPs that have been discontinued. The Contractor shall keep written records of all BMP inspections, maintenance and corrective actions.

The frequency of the BMP inspection shall be as follows:

1. Prior to a forecast storm;
2. After any precipitation that causes runoff;
3. At 24-hour intervals during extended rain events; and
4. Routinely, at a minimum of once every week.

If the Contractor or the Engineer identifies a deficiency in the deployment or functioning of a BMP, the deficiency shall be corrected immediately. If requested by the Contractor and

approved by the Engineer in writing, the deficiency may be corrected at a later time or date but the corrective action shall not be later than the onset of the subsequent rain event. The correction of deficient BMPs shall be at no additional cost to the City.

F. RESPONSIBILITIES, CONSEQUENCES, AND REMEDIES

1. Conformance with the provisions of this section or other requirements in various other sections of these specifications shall not relieve the Contractor from the Contractor's responsibilities as provided in various relevant articles of Section 7, "Legal Relations and Responsibilities to the Public," of the Standard Specifications, and as specified herein.
2. For purposes of this section, costs and liabilities include, but are not limited to, fines, penalties and damages, whether assessed against the City or the Contractor, including those levied under the Federal Clean Water Act and the State Porter-Cologne Water Act.
3. If solid or liquid materials or waste, hazardous or otherwise, or pollutants originating from the Contractor's operation enter the storm drain system or water courses, the Contractor will be required to thoroughly clean up the affected storm drain facilities and water courses to the satisfaction of the Engineer. If the Contractor fails to clean up the affected facilities as required, the City will issue a stop-work order and take necessary actions to effect the cleanup of the affected facilities.
4. The Contractor shall be responsible for all costs, including fines, the City's cost of defense, the cost of cleanup by others ordered by the City, and liabilities imposed by law as a result of the Contractor's failure or negligence in complying with the requirements specified herein.
5. In accordance with the provisions of Section 7-1.05, "Indemnification," of the standard Specifications if the Contractor fails to accept or reject a tender of defense and indemnity within fifteen (15) calendar days, the City may, in addition to the remedies authorized by law, retain any sum due the Contractor until disposition has been made of all claims or suits for damages or until the Contractor accepts or rejects the tender of defense, whichever occurs first.

G. PAYMENT

Full compensation for storm water pollution control shall be considered as included in the payment for various other items of work and no additional compensation will be made therefore.

Special Provisions

1. Requirements

It is required that there be constructed and completed in accordance with the Contract Documents for "Construction of **Northgate Sewer Lift Station Emergency Power Improvements Project**" for the City of Los Banos, all work as described in these Contract Documents.

2. Description of Work

The principal components of the work to be performed under these Contract Documents include the following:

The major work consists of furnishing and installing a self-contained standby generator set including concrete foundation, electrical controls and conduits at the existing sanitary sewer lift station located at 556 Rockport Drive; in the City of Los Banos.

Any incidental work not described in the Contract Documents which is necessary to complete the Work shall be furnished and installed as part of this contract at no additional cost to the Owner. The work shall be complete and ready for service to the satisfaction of the Owner. The Contractor shall have had the opportunity to inspect the site and observe actual working conditions during the mandatory pre-bid meeting.

3. Commencement, Prosecution and Completion of Work

The Contractor shall commence work and shall complete all of the work in accordance with the schedule and within the time stated in the bid. The capacity of the Contractor's construction plant, sequence of operations, method of operations, and the forces employed shall at all times during the continuance of the contract, be subject to the approval of the Engineer and shall be such as to ensure the completion of the work within the time specified.

4. Hours of Work

Construction work shall be completed between the hours of 7:00 a.m. and 9:00 p.m. Monday through Friday using normal construction practices. No work shall be performed on Saturday or Sunday. The Contractor may request to the Owner to perform construction outside of these specified hours.

5. Permits and Business Licenses

The Contractor will need an Encroachment Permit from the Public Works Department prior to start of construction. The Contractor and all subcontractors working within the city limits of Los Banos shall apply for and have issued a business license from the City of Los Banos (209-827-7000) prior to commencement of work.

6. Testing

Field density tests shall be made of each compacted layer (subbase and aggregate base) as directed by the Engineer. When these tests indicate that the density of any layer of fill or portion thereof is less than the specified density, that layer shall be reworked until the required density has been obtained.

Field density tests (compaction testing) shall be performed by a geotechnical laboratory retained by the Owner and under the supervision of a registered geotechnical engineer.

Initial compaction testing will be paid by the Owner. Retesting of areas that failed the initial testing will be paid for by the Contractor.

7. Responsibility Regarding Existing Utilities and Private Property

The existence and location of public and private utilities indicated on the drawings are not guaranteed and any additional utilities and facilities not shown on the drawings shall be investigated and protected by the

Contractor. The Contractor shall be held responsible for damage to and for maintenance and protection of existing pipelines, public utilities, drives, curbs and gutters, sidewalks, and fences. Excavation in the vicinity of existing public utility structures, underground electrical or telephone cable, oil or gas pipelines, and waterlines shall be carefully done by hand. The Contractor shall adequately protect all adjoining property and structures from damage, whether within or without of the Owner furnished rights-of-way, and shall be fully responsible for any damage to adjoining property and structures which may result from work done under this contract. The Contractor shall use extreme care during construction to prevent damage from dust to crops and adjacent property. The Contractor shall sprinkle the areas where the passage of operation of vehicles and equipment creates a dust problem, or take other preventive measures as directed by the Engineer. The Contractor shall furnish all labor, equipment, materials and means required to control dust which is in any way a result of the Contractor's operations.

The Contractor shall be responsible for all damage or injury which may result to any property, outside of the construction right-of-way or within the right-of-way where so noted, from the Contractor's operations hereunder, or otherwise, from the performance of the Agreement by said Contractor or any of his subcontractors or employees.

The Contractor shall attempt to maintain access to the residential and commercial driveways within the construction area at all times during working hours and shall provide access during non-working hours, weekends and holidays.

Payment for all work specified above shall be included in the unit or lump sum prices bid in the schedule for the various items of work.

8. Obstructions

The Contractor shall notify the Engineer and the appropriate regional notification center for operators of subsurface installation at least 3 working days, but not more than 14 calendar days, prior to performing any excavation or other work close to any underground pipeline, conduit, duct, wire or other structure. Failure to contact the notification center prohibits excavation. Regional notification centers include but are not limited to the following:

NOTIFICATION CENTER	TELEPHONE
Underground Service Alert Northern California (USA) www.usanorth811.org	811 or 1-800-227-2600

9. Materials Furnished By Owner

No labor, material, or other facilities shall be provided by the Owner unless otherwise indicated on the drawings or in the Contract Documents.

10. Materials Furnished By Contractor

Unless otherwise stipulated, the Contractor shall provide and pay for all materials, labor, water, tools, equipment, light, power, transportation, and other facilities necessary for the execution and completion of the work.

11. Schedule of Values, Material List and Substitutions

Prior to the commencement of work, and within 10 days following the signing of the contract by the Owner and the Contractor, the Contractor shall submit 2 copies of a Schedule of Values for all lump sum bid items in the Bid Schedule and a *complete* list of equipment and materials to be furnished, including all substitutions proposed to the Engineer for approval. Partial or incomplete material lists will not be considered. No substitutions will be considered thereafter. Only one request for substitution will be considered on each item of material or equipment.

12. Request for Extension of Time

All extension of time requests shall be made in writing to the Engineer within seven (7) calendar days from the delay occurrence date. In the case of continuing cause of delay, only one claim is necessary.

13. Rights-of-Way

The Contractor shall not be entitled to extra compensation for hardships and increased cost caused by the work being adjacent to telephone-telegraph lines and guy wires, power lines and guy wires, buildings, fences, pipelines, ditches, roadways, and other obstacles which may physically restrict or limit the use of construction equipment. In some cases, such physical confinement may necessitate special methods of construction of the work. If the Contractor desires to utilize additional area, he shall obtain the necessary approvals from the landowner. No additional compensation shall be paid to the Contractor for the cost of obtaining additional right-of-way or for the inability to obtain such.

14. Coordination with Other Work

Other work including but not necessarily restricted to relocation of power and telephone poles, installation of a gas line and relocation of water meters may be in progress near or at the construction site at the time the Contractor is in performance of the work specified herein. The Contractor shall coordinate his work with that of others so that prosecution of all work will proceed smoothly.

15. Closure of Streets

The Contractor will be allowed to temporarily close the streets being paved to vehicular traffic between the hours 7:00 a.m. and 5:00 p.m. on the day the streets are being paved. All street closure dates shall be coordinated with and approved by the Engineer for approval no later than 10 working days prior to the earliest proposed closures and detours.

16. Construction Signs, Barricades, Lights and Flagmen

The Contractor shall furnish, erect and maintain adequate barricades, lights, signs and other devices and take other protective measures to prevent damage to the public. The Contractor shall also furnish adequate warning to the public of dangerous conditions to be encountered. Where one lane of a public road is closed, the Contractor shall furnish flagmen at each end of the closed lane to control traffic in the open lane. The Contractor shall also furnish adequate warning to the public of dangerous conditions to be encountered.

Payment for traffic control and other safety measures shall be included in the Traffic Control Plan lump sum price bid in the Bid Schedule.

17. Traffic Control Plan

It is the Contractor's sole responsibility to establish and implement a Traffic Control Plan conforming to Sections 7-1.08, "Public Convenience" 7-1.09, "Public Safety", and Section 12, "Construction Area Traffic Control Devices", of the Caltrans Standard Specifications. Nothing in these Contract Documents shall be construed as relieving the Contractor from his responsibility.

The Traffic Control Plan shall be prepared, stamped and signed by a professional engineer registered in California, and three copies provided to the Engineer before the Contractor is issued a Notice to Proceed.

Payment for the preparation and implementation of the Traffic Control Plan shall be made at the applicable lump sum price bid in the Bid Schedule.

18. Disposal of Waste Materials

Waste material shall be disposed of in accordance with local regulatory requirements. Provide watertight conveyance for liquid, semi-liquid or saturated solids which tend to bleed during transport. Liquid loss from transported materials is not permitted, whether being delivered to construction site or hauled away for disposal. Fluid materials hauled for disposal must be specifically acceptable at selected disposal site.

19. Noise Control

Conduct operations to cause least annoyance to residents in vicinity of work, and comply with applicable local ordinances. Equip compressors, hoists, and other apparatus with mechanical devices necessary to minimize noise and dust. Equip compressors with silencers on intake lines. Equip gasoline or oil-operated equipment with silencers or mufflers on intake and exhaust lines.

20. Water Supply

Water will be available to the Contractor in performance of the work without charge from all Owner fire hydrants. Prior to the use of any hydrant the Contractor shall notify the Owner and obtain and install a meter furnished by the Public Works Department on the fire hydrant. It will be the Contractor's responsibility to convey the water to the work site. Regardless of the method of conveyance chosen, it shall not be cause for closure of any streets nor shall it create a nuisance to nearby residents. An air gap shall be maintained between the hose or pipe discharge to prevent possible backflow in the event of distribution system pressure loss. The Contractor shall pay a One Thousand Dollar (\$1,000) deposit per meter for the use of the fire hydrant meter. The deposit may be refunded in full if the fire hydrant meter is returned undamaged.

21. Notifications

The Owner will notify the Contractor in writing of any non-compliance with the foregoing provisions or of any environmentally objectionable acts and corrective action to be taken. State or local agencies responsible for verification of certain aspects of the environmental protection requirements shall notify the Contractor in writing, through the Owner, of any non-compliance with State or local requirements. The Contractor shall, after receipt of such notice from the Owner or from the regulatory agency through the Owner, immediately take corrective action. Such notice, when delivered to the Contractor or his authorized representative at the site of the work, shall be deemed sufficient for the purpose. If the Contractor fails or refuses to comply promptly, the Owner may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to any such stop orders shall be made the subject of a claim for extension of time or for excess costs or damages by the Contractor unless it is later determined that the Contractor was in compliance.

22. Work Not Listed in Proposal

It is the intent of the plans, specifications and contract documents to provide for the construction of completed and finished facilities and works of improvement unless otherwise specifically provided. Except for authorized changes in the work, payment for said complete and finished facilities and works of improvement will be made only on the basis of the contract items of work listed in the proposal. All other work, including the furnishing of plants, labor, materials, tools, equipment, and incidentals, provided for in the plans, specifications and contract documents, or required for the proper completion of the work as a whole, for which no separate payment has been provided shall be a supplementary obligation of the Contractor and payment therefore shall be considered included in the prices paid for the various contract items of work listed in the proposal.

23. Submittals

The Contractor shall submit to the Engineer, a minimum of six sets, hard copies, or one electronic copy of the following submittals for review and approval:

1. Electrical Controls and Appurtenances
2. Concrete Mix Design
3. Generator

Within 10 days after the effective date of the Agreement and before starting to perform any work, the Contractor shall submit to the Engineer for review and approval:

1. A work schedule indicating the times for starting and completing the various stages of the work. No progress payment shall be made to Contractor until an acceptable schedule has been submitted to the Engineer.
2. Traffic Control Plan
3. Notice to Residents in English and Spanish
4. A Schedule of Values - a breakdown of each lump sum price to be used to determine deductive change orders, if necessary.
5. A complete list of equipment and materials to be furnished
6. City of Los Banos Business License for Contractor and all subcontractors

If more than TWO submittals for a single item are required because of incorrect or insufficient data, or the submittal is unacceptable, or because the Contractor wishes to change previously approved material, then all costs incurred by the Owner for the additional review shall be deducted from monies due the Contractor.

A revised work schedule shall be submitted within 5 days of request by the Engineer. No future progress payments shall be made to Contractor until an acceptable schedule has been submitted to Engineer.

24. Bid Item Descriptions

See Section 01 22 00 of the Technical Specifications.



City of
Los Banos
At the Crossroads of California

Technical Specifications
for
Construction of

**NORTHGATE SEWER LIFT STATION
EMERGENCY POWER IMPROVEMENTS**

January 31, 2024



DATE SIGNED 1/31/2024

Civil Divisions



DATE SIGNED 2/2/2024

Electrical Divisions

**City of Los Banos
520 J Street
Los Banos, CA 93635**

City of Los Banos
Public Works Department

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END SECTION

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SECTION 01 22 00
EXPLANATION OF BID ITEMS

PART 1 GENERAL

The Contract payment for the specified items of work as set forth in the Bid Schedule shall be full compensation for furnishing all labor, materials, methods or processes, implements, tools, equipment and incidentals and for doing all work involved as required by the provisions of the Contract Documents for a complete in place and operational system.

- A. Unless otherwise specified in the Specifications, quantities of work shall be determined per each, or from measurements or dimensions in a horizontal plane. All materials shall be measured on the basis of "in place" quantities and paid for using the units listed in the bid schedule.
- B. Except as noted, the Engineer will make field measurements of unit price items in order to determine the quantities of the various items as a basis for payment. On all unit price items, the contractor will be paid for the actual amount of the work performed in accordance with the contract documents, as computed from field measurements.
 - 1. Work or quantities not listed in the description of bid items are considered incidental to other construction and will not be separately measured or paid for. Compensation for such work and/or material shall be included in the prices paid for other items of work.

1.2 BID ITEMS

Bid Item 1 – **Mobilization, Demobilization, Bonds and Insurance:** Payment for this item shall include full compensation for all labor, materials, tools, equipment and incidentals making up the cost of mobilization, move-in, move-out, all necessary bonds, insurance, permits, licenses, and fees required during the performance of the work as specified. This item also includes demobilization, including the removal of all equipment, supplies, personnel and incidentals from the project at the end of construction. Payment for mobilization shall be made with the first progress payment and shall not exceed 80 percent of the bid item amount. Payment for demobilization shall be made with the last progress payment and shall not be less than 20 percent of the bid item amount. This bid item will be paid for by Lump Sum.

Bid Item 2 – **Electrical (controls, wiring & appurtenances), F&I:** Payment under this item shall be considered full compensation for all labor, materials, tools, equipment and incidentals required to furnish and install electrical controls, wiring and appurtenances as specified and all other work necessary to complete the installations in accordance with the Plans and Specifications. This bid item will be paid for by Lump Sum, prorated, based on percentage of work completed.

Bid Item 3 – **Electrical (Standby Generator), F&I:** Payment under this item shall be considered full compensation for all labor, materials, tools, equipment, and incidentals required to furnish and install an electrical standby generator,

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appurtenances and construct the generator foundation as specified and all other work necessary to complete the installation in accordance with the Plans and Specifications. This bid item will be paid for by lump sum, prorated, based on percentage of work completed.

Bid Item 4 – **Electrical Fees:** Payment under this item shall be considered full compensation for all labor, and incidentals required to pay for all PG&E electrical connection/application fees and inspections necessary to complete the installations in accordance with the Plans and Specifications. This bid item will be paid for by Lump Sum, prorated, based on percentage of work completed.

Bid Item 5 – **Demolition (Removal: (E) Controls and Piping):** Payment under this item shall be considered full compensation for all tools, equipment and incidentals required to remove controls, piping and appurtenances as indicated on the drawings and specified. This bid item will be paid for by Lump Sum, prorated, based on percentage of work completed.

Bid Item 6 – **Remove Concrete:** Payment under this item shall be considered full compensation for all labor, materials, tools, equipment and incidentals required to remove concrete slab to install conduits and generator foundation. This bid item includes saw cutting, concrete removal, excavation, and all other work required to result in fully removed concrete slab. Bid quantity shown is estimated from approximate dimensions. This bid item will be paid for per Square Foot.

Bid Item 7 – **Minor Concrete (lift station site), F&I:** Payment under this item shall be considered full compensation for all labor, materials, tools, equipment and incidentals required to replace the removed concrete slab to match existing concrete slab section. This bid item includes preparation and compaction of Subgrade, furnishing, grading and compacting the granular base material, forming, furnishing the Portland cement concrete, placement, finishing and all other work required to result in a complete concrete slab. Bid quantity shown is estimated from theoretical dimensions. This bid item will be paid for per Square Foot.

END SECTION

EXPLANATION OF BID ITEMS
01 22 00-2

SECTION 01 77 00
CONTRACT CLOSEOUT

PART 1 GENERAL

1.1 GENERAL

- A. It is the intent of these Contract Documents that the Contractor shall deliver a complete and operable facility capable of performing its intended functions and ready for use.

1.2 CLEANING

- A. Throughout the period of construction the Contractor shall keep the Work site free and clean of all rubbish and debris, and shall promptly remove from the site, or from property adjacent to the site of the Work, all unused and rejected materials, surplus earth, concrete, plaster, and debris, excepting select material which may be required for refilling or grading.

1.3 FINAL SITE CLEAN-UP

- A. Upon completion of the Work, and prior to final acceptance, the Contractor shall remove from the vicinity of the Work all paint, surplus material, and equipment belonging to him or used under his direction during construction.
- B. The Contractor shall restore to original condition all property not designated for alteration by these Contract Documents.

1.4 FINAL BUILDING CLEAN-UP

- A. On all building projects and wherever else applicable, besides general broom cleaning, the following special cleaning shall be performed at completion of the Work:
 - 1. Hardware shall be cleaned and polished of all traces of stains, dust, dirt, paints, and blemishes.
 - 2. Equipment shall be cleaned and stains, paint, dirt and dust shall be removed.
 - 3. Dust, cobwebs, and traces of insects and dirt shall be removed.

1.5 WASTE DISPOSAL

- A. The Contractor shall dispose of surplus materials, waste products, demolition materials, and debris. The Contractor shall transport and dispose of waste materials in accordance with applicable laws and regulations.

1.6 PROJECT RECORD DOCUMENTS

- A. The Contractor shall maintain at the site, available to the Owner and Engineer, one copy of the Contract Documents, Drawings, Shop Drawings, Change Orders, and other modifications in good order and annotated to show all changes made during construction. These Documents shall be delivered to the Engineer for the Owner upon completion of the Work.
- B. Record documents shall be reviewed during progress meetings to ascertain that all changes have been recorded.
- C. Store Record Documents separate from documents used for construction.

1.7 TOUCH-UP AND REPAIR

- A. The Contractor shall touch-up or repair finished surfaces on structures, equipment, fixtures, or installations that have been damaged prior to final acceptance. Surfaces on which such touch-up or repair cannot be successfully accomplished shall be completely refinished or in the case of hardware and similar small items, the item shall be replaced. Such items shall include, but not be limited to, the following:
 - 1. Road surfaces
 - 2. Sidewalk and Driveway surfaces
 - 3. Exposed equipment surfaces
 - 4. Exposed piping surfaces

1.8 EQUIPMENT START-UP

- A. After all acceptance tests have been completed by the Contractor and Owner but prior to final acceptance, the Contractor shall recheck all equipment for proper alignment and adjustment, check oil levels, re-lubricate all bearings and wearing points, and in general assure that all equipment is in proper condition for continuous operation.

1.9 OPERATION AND MAINTENANCE (O&M) MANUALS

- A. The contractor shall provide operations and maintenance manuals for all equipment to the City prior to final project acceptance.

1.10 FINAL EQUIPMENT CHECK

- A. After testing and before acceptance, all equipment shall be test run by the Owner for a minimum of 7 days to ensure proper operation. At the end of the test run each piece of machinery shall be lubricated and all components and couplings checked for proper alignment and adjustment.
- B. 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 Engineer's inspection.

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- C. Provide submittals to the Owner required by other governing authorities.

1.11 MANUFACTURER'S CERTIFICATES OF PROPER INSTALLATION

- A. The Contractor shall submit manufacturers' certificates of proper installation for all items of equipment.

PART 2 PRODUCTS

(Not Used)

PART 3 EXECUTION

(Not Used)

END SECTION

CONTRACT CLOSEOUT
01 77 00-3

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CONTRACT CLOSEOUT
01 77 00-4

SECTION 02 01 20
PROTECTION OF UNDERGROUND
FACILITIES AND SURVEY MONUMENTS

PART 1 GENERAL

1.1 UNDERGROUND FACILITIES

- A. Not Shown or Indicated: If an underground facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated with reasonable accuracy in the Contract Documents, the following shall apply.
1. Contractor shall develop and execute a work-plan, subject to Engineer's approval to protect underground facilities.
 2. The Contractor shall expose, prior to staking and trenching, all existing utilities and existing facilities which may control proposed facility grades, and alignment. Two working days notice shall be given to the Engineer prior to commencing this work.
 3. Full compensation for all costs involved in locating, verifying, protecting, exposing, and otherwise providing for utilities shall be included in the amounts bid for the various items of work, and no separate payment shall be made therefore.

1.2 PROTECTION

- A. The Contractor shall not interrupt the service function or disturb the supporting base of any Utility by disrupting any facility identified in the Plans and Specifications without authority from the Owner or order from the Engineer. Where protection of such facilities is required to ensure support of utilities, the Contractor shall, unless otherwise provided, furnish and place the necessary protection at the Contractor's expense.
- B. The Contractor shall be prepared at all times with labor, equipment and materials to make repair on damaged mains or Utility facilities. The Contractor shall immediately notify the Engineer and the Utility owner if he disturbs, disconnects, or damages any Utility. The Contractor shall bear the costs of repair or replacement of any utility facility described with reasonable accuracy in the Plans and Specifications that is damaged by the Contractor. No extra compensation will be made for the repair of any services or mains damaged by the Contractor, nor for any damage incurred if the neglect or failure of providing protective barriers, lights and other devices or means required to protect such existing utilities or facilities described with reasonable accuracy in the Plans and Specifications.

1.3 SURVEY MARKERS AND PERMANENT REFERENCE POINTS

- A. Surveying and Permanent Survey Markers

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The Engineer will take measurements to assure the preservation of survey markers (monuments and bench marks). The Contractor shall not disturb permanent survey markers without the consent of Engineer and shall bear the expense of replacing any that may be disturbed without permission.

1. Replacement of survey markers shall be done only by the Engineer.
2. If disturbing of markers cannot be avoided, the Owner shall pay the cost of replacing said markers.

B. Lot Corner Monuments

The Contractor shall preserve property line and corner survey markers except where their destruction is unavoidable and the Contractor is proceeding in accordance with accepted practice. Markers that are lost or disturbed by his operations shall be replaced at the Contractor's expense by the Engineer. A corner record shall be filed in accordance with State law for any reset monuments at the Contractor's sole expense.

END SECTION

PROTECTION OF UNDERGROUND FACILITIES
02 01 20-2

SECTION 02 41 00
DEMOLITION

PART 1 GENERAL

1.1 DESCRIPTION

- A. The work of this section consists of demolition and removal of pavements, slabs, miscellaneous debris, control boxes, salvaged items, and portions of abandoned utilities.

1.2 WORK INCLUDED

- A. Repair and restoration of areas damaged due to demolition work.
- B. Salvaging of equipment for Owner.
- C. Removal of demolished materials from site.
- D. Remove existing piping and other existing structures as shown on the Plans to be removed.
- E. Properly dispose of all removed materials which are not salvaged for Owner.

1.3 RELATED WORK

- A. Section 03 30 01 Cast-In-Place Concrete (Site Work)

1.4 SEQUENCING

- A. Sequence work to minimize interference with sewer lift station operations.

1.5 REGULATORY REQUIREMENTS

- A. Obtain required permits from City of Los Banos.
 - 1. Business License
- B. Dispose of removed materials in an approved disposal or salvage facility.
- C. Contractor and all subcontractors shall obtain City of Los Banos business license.

1.6 REFERENCES

- A. Section 19 – Earthwork, State Standard Specifications
- B. Section 90 – Portland Cement, State Standard Specifications

1.7 SUBMITTALS

- A. Submittals shall be in accordance with the General and Special Provisions.

DEMOLITION
02 41 00-1

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- B. Demolition plan including sequence of operations. The plan shall specifically address methods of demolition, schedule, sequence of demolition, and procedures for archeological monitoring. Demolition shall not proceed until the plan has been approved.

1.8 QUALITY ASSURANCE

- A. General: Take all necessary precautions with regard to safety in carrying out the demolition and site work. Erect suitable barriers around open excavations and fulfill all appropriate requirements of CAL/OSHA. Comply with safety requirements for demolition, ANSI A10.6-90.

1.9 PROJECT CONDITIONS

- A. Underground utilities exist at this site. Contractor shall take all necessary precautions to protect said utilities. Notify Engineer of any deviation in utility location from that which is shown on the drawings.
- B. Keep dust to a minimum at project site. Use sprinklers or water trucks as necessary or as directed by the Engineer.
- C. Ensure safety of persons in demolition area. Provide temporary barricades as required.
- D. Excavations may encounter groundwater and require dewatering depending on the time of year and amount of seasonal run-off. Loose sands exposed in excavation sidewalls may be unstable and require shoring or lying back in accordance with OSHA requirements. Flowing sands may also be encountered in excavations below groundwater levels.

1.10 CLOSEOUT SUBMITTALS

- A. As specified in Section 01 77 00 – Contract Closeout.
- B. Show all capped and abandoned utility terminations and location of remaining facilities on project Record Drawings.

PART 2 PRODUCTS

2.1 REPAIR AND RESTORATION MATERIALS

- A. Asphalt and concrete shall match existing materials and conditions.
- B. Asphalt and concrete shall be replaced in conformance with project specification and City of Los Banos Standards.

2.2 MATERIALS

- A. Salvaged Materials: Materials to be salvaged shall remain the property of the Owner and shall be stockpiled as directed by the Engineer. Contractor shall inventory all

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salvaged materials. Stockpiled materials shall be free of hazardous substances. Salvage materials include but are not limited to:

1. Electrical Controls
- B. Items to be Salvaged and Relocated shall be salvaged and/or relocated as shown on the drawings, or as directed by the Engineer.
 - C. Materials and items demolished and not designated for reuse, salvage or transfer to the Owner, as well as all debris, rubbish and other materials resulting from the demolition operations, shall become the property of the Contractor and shall be removed from the site within 48 hours of demolition.
 - D. Storage or sale of the removed items will not be permitted at the site.

PART 3 EXECUTION

3.1 INSPECTION

- A. Prior to demolition, inspect the site conditions, verifying all governing dimensions, notes and specifications. Notify the Engineer of any errors or omissions in the contract documents.
- B. Make such explorations and probes as are necessary to ascertain any required protection measures before proceeding with the demolition and removal work.

3.2 PREPARATION

- A. Protect existing, appurtenances, structures, which are not to be demolished.

3.3 DEMOLITION REQUIREMENTS

- A. Conduct demolition to protect and minimize damage to structures and existing improvements.
- B. Conduct salvaging to protect and minimize damage to salvaged equipment.
- C. All work within City right of way shall conform to Section 15 of the State Standard Specifications.
- D. Execute the work in a careful, orderly and safe manner, with the least possible disturbance to the public. Cease operations immediately if adjacent work appears to be endangered. Do not resume operations until corrective measures have been taken.
- E. Pavement and Slabs:
 1. Remove completely all Portland cement concrete slabs-on-grade including, but not limited to, equipment pads, sidewalks, etc.

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2. Saw cut existing asphalt concrete pavements cleanly in straight continuous lines. Remove asphalt concrete pavement as shown on the drawings.
- F. Items to be Salvaged: Remove as directed by the Engineer. Remove carefully. All salvaged material remains the property of the Owner. Store where directed by the Engineer.

3.4 SALVAGE EQUIPMENT

- A. Salvaged equipment shall be delivered to the Owner at a designated site within the project site. Salvaged equipment shall be placed on wood or concrete blocks so the equipment will be 4 inches minimum above ground elevation.
- B. Equipment to be salvaged at the lift station:
1. All electrical panels, including breakers, contactors, disconnects, fuses, relays and switches.
- C. Electrical equipment items to be salvaged are covered in the electrical plans and specifications:

3.5 PRESERVATION

- A. If indicated or required, preserve trees, plants, rock outcroppings, or other features designated to remain. Protect trees and plants from damage; fell trees in a manner which shall not injure standing trees, plants and improvements which are to be preserved.

3.6 RESTORATION

- A. All demolition areas, staging/stockpiling, and open excavations shall be filled in accordance with the Earthwork Sections. Fill all open excavations deeper than one foot to an elevation to match the surrounding topography.
1. New Construction Areas: As shown on drawings.

3.7 DISPOSAL

- A. As specified in the General and Special Provisions.

END SECTION

DEMOLITION
02 41 00-4

SECTION 03 30 01
CAST-IN-PLACE CONCRETE (SITE WORK)

PART 1 GENERAL

1.1 WORK INCLUDED

- A. Work required under this section consists of furnishing all materials, supplies, equipment, tools, transportation, and facilities, and performing all labor and services incidental to furnishing and installing concrete work as described in this section of the Specifications, shown on the accompanying Plans, or reasonably implied therefrom, except as hereinafter specifically excluded. The work shall include, but is not necessarily limited to:
 - 1. All form work including special forms as required for any special construction and/or to accommodate the work of others and removal of forms.
 - 2. All concrete reinforcement, placement, bending and forming thereof.
 - 3. All concrete and cement finishing, all surface treatment and curing including non-slip finishes.
 - 4. Installation of all reglets, bolts, anchors, cans, sleeves, column bolts, etc., whether furnished under this section or by others.
 - 5. The furnishing of all items required to be or shown on the Plans as embedded in concrete, which are not specifically required under other sections.
 - 6. Setting headers and screens finishing, curing, and protecting concrete.
- B. Where prior inspection and test of materials are required, documentary evidence, in the form of test reports, shall be furnished prior to the time the material is incorporated into the work. All rejected material shall be promptly removed from the premises.

1.2 REFERENCES

- A. American Concrete Institute (ACI)
- B. American Society for Testing and Materials (ASTM)
- C. State Standard Specifications
- D. California Building Code (CBC)

1.3 DEFECTIVE WORK

- A. Work considered to be defective may be ordered, by the Engineer, to be replaced in which case the Contractor shall remove and replace the defective work at his

CAST-IN-PLACE CONCRETE (SITE WORK)
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expense. Work considered to be defective shall include, but not be limited to, the following:

1. Concrete incorrectly formed, or not conforming to details and dimensions on the Plans or with the intent of these documents or concrete the surfaces of which are out of plumb or level.
2. Concrete in which defective or inadequate reinforcing steel has been placed.
3. Concrete containing wood, cloth, or other foreign matter, rock pockets, voids, honeycombs, cracks or cold joints not scheduled or indicated on the Plans.
4. Concrete below specified strength.

1.4 SUBMITTALS

- A. Provide material certificates, mix designs including laboratory testing, shop fabrication and placement drawings, and schedule for all reinforcing steel, embedded items, form release and curing compounds.

PART 2 PRODUCTS

2.1 CONCRETE

- A. Concrete shall conform to Section 90 of the State Standard Specifications. Unless otherwise shown on the plans or specified in other sections, all concrete shall conform to the following table of Portland cement mix requirements and minimum 28-day compressive strength. Portland cement shall be Type II.

Location	Mix Requirements
Paving, Exterior Slabs, and Sidewalks Exposed to Freezing	3,500 PSI, F1, S0, W1, C1 (W/C Max 0.55)
Paving, Exterior Slabs, and Sidewalks	2,500 PSI, F0, S0, W1, C1
Structural Footings and Interior Slabs	3,000 PSI, F0, S0, W1, C1
Walls, Beams, and Columns Where there is Human Occupancy	4,000 PSI, F0, S0, W0, C0
Buildings for Ag Occupancy Only (i.e., Commodity Barn)	4,000 PSI, F0, S1, W1, C1 (W/C Max 0.40)
Structural Concrete Exposed to Sewage/Manure (5.5 Sack Minimum)	4,500 PSI, F0, S1, W2, C1 (W/C Max 0.50)
Structural Concrete for (Check) Structure (5.5 Sack Minimum)	4,000 PSI, F0, S0, W2, C1 (W/C Max 0.50)
All Other Structural Concrete	4,000 PSI, F0, S0, W0, C0

1. Water/cement ratio shall not exceed 0.45 (by weight).

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2. Slump at placement shall be 4 inches +/- 1 inch.

2.2 AGGREGATE

- A. Aggregate for normal weight concrete shall conform to Section 90-1.02C, "Aggregates" of the State Standard Specifications. Aggregates shall be free of dirt, clay balls, roots, bark and other deleterious substances and shall be thoroughly washed before use.
- B. The combined aggregates for concrete shall conform to the grading limits for the one-inch, maximum size specified in Section 90-1.02C(4)(d), "Aggregate Gradation" of the State Standard Specifications, Combined Aggregate Gradings.

2.3 WATER

- A. Water shall comply with Section 90-1.02D, "Water" of the State Standard Specifications, and shall be clean and free from injurious amounts of acids, alkalis, salts, oils, organic materials or other deleterious substances.

2.4 FLYASH

- A. Fly Ash: Shall comply with SSS Section 90-1.02B(3), "Supplementary Cementitious Materials", and shall comply with AASHTO M 295, Class F or N.
 1. Type of fly ash shall be compatible with the type of cement and the intended use of the concrete.
- B. The combined weight of fly ash conforming to AASHTO M 295, Class F or N shall not exceed the amount provided for in Section 90-1.02B(3), "Supplementary Cementitious Materials" of the State Standard Specifications.

2.5 ADMIXTURES

- A. Admixtures shall comply with Section 90-1.02E, "Admixtures", of the State Standard Specifications
- B. Air Entraining: ASTM C260
- C. Water Reducing: ASTM C494, Type A, D or F
- D. Accelerating: ASTM C494, Type C or E
 1. No admixture containing any chloride ions is acceptable.
- E. Retarding: ASTM C494, Type B, D or G

2.6 REINFORCING STEEL

- A. Rebar shall be ASTM A615, Grade 60.
- B. Welded wire fabric shall conform to ASTM A1064.

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2.7 EXPOSED-TO-VIEW CONCRETE

- A. For exposed-to-view concrete, where legs of metal supports are in contact with forms, provide supports with legs which are plastic protected (CRSI, Class I).
- B. Metal bar supports in slab covers for sewage-containing structures shall also be provided with plastic coated legs.

2.8 FORM MATERIALS

- A. Exposed Concrete: Plywood complying with U.S. Plywood Standard PS-1 "BB (Concrete Form) Plywood" Class I, or better.
- B. Textured Finish Concrete: Units of face design, size arrangement and configuration to match control sample.
- C. Form Release Agent shall leave behind a paintable concrete surface.
 - 1. Release #1, The Burke Co., or Engineer approved equivalent.

2.9 CURING MATERIALS

- A. Polyethylene film
- B. Reinforced waterproof paper
 - 1. Sisal Kraft, Orange Label, or approved equal.
- C. Liquid-membrane curing compound
 - 1. Curing compound shall comply with ASTM C309, Type 2.
 - a. White pigmented material
 - b. Clear pigment may be used for concrete that will be exposed to public view.

PART 3 EXECUTION

3.1 REINFORCING STEEL

- A. Comply with CRSI, "Placing Reinforcing Bars" and as specified herein.
- B. Place reinforcing steel and embedded items in accordance with approved shop drawings.
- C. Splicing of bars shall be by lapping. Lapped splices shall be 50 bar diameters for bar size through #6 and 62 bar diameters for larger bars, unless otherwise shown on the Plans.

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- D. Splicing of the wire fabric shall be by lapping. Lapped splices shall be two full mesh, minimum.
- E. All rebar in vertical walls shall be supported by concrete block spacers or metal chairs.
- F. Prior to placement of the concrete, reinforcing steel shall be cleaned and free of all concrete, dirt, oil, mill scale, rust or other coatings that would reduce or destroy the bond.
- G. All reinforcing steel and embedded items shall be reviewed and approved by the Engineer prior to concrete placement.

3.2 FORMS

- A. All forms shall be cleaned and an approved agent applied each time they are used and shall be so constructed and set as to resist, without springing or settlement, the pressure of the concrete and the placing operations.
- B. In designing forms and falsework, the concrete shall be treated as a liquid weighing at least 150 lbs. per cubic foot for vertical loads and not less than 85 lbs. per cubic foot for horizontal pressure. The design of the forms and falsework system shall include allowances for temporary construction loads. The rate of placement of concrete shall be so regulated that the pressures caused by the wet concrete will not exceed the designed form pressure. The unsupported length of wooden columns and compression members shall not exceed 30 times the width of the least side.
- C. All forms shall be set and maintained in true alignment, grade and section until the concrete has sufficiently set. The interior surfaces of forms shall be adequately treated with an acceptable material to insure non-adhesion of mortar. All forms shall be mortar-tight. When forms appear to be unsatisfactory in any way, concrete placement shall be stopped until the defects have been corrected.
- D. All exposed outside corners, including the top edges of all walls, machinery bases and curbs shall have a $\frac{3}{4}$ -inch chamfer.
- E. Metal tie rods or anchorages within the forms shall be fitted with suitable cones or comparable devices. Metal tie rods or anchorages shall be removed to a depth of 1" from the surface without injury to the concrete. All fittings for metal ties shall be of such design that upon their removal, the cavities which are left will be of the smallest possible size, but of sufficient diameter to allow the cavity to be "dry packed" with cement mortar. The cavities shall be filled with cement mortar and the surface left sound, smooth and even.
- F. Form release agent shall be applied to the form so that no agent comes in contact with reinforcing steel.

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3.3 PLACING

- A. All concrete shall be placed before it has taken its initial set and shall be placed in horizontal layers and in such a manner as to avoid segregation. The concrete adjacent to the forms and joints shall be thoroughly consolidated with a vibrator operating at not less than 4,500 vibrations per minute.
1. Pumping equipment shall be of suitable type, without Y-sections, and with adequate pumping capacity.
 2. Loss of slump in pumping shall not exceed 1 $\frac{1}{2}$ -inch.
 3. Concrete shall not be placed through reinforcing that may cause separation of aggregates.
- B. The concrete shall be deposited as nearly as possible in its final position. Drop chutes and elephant trunks shall be used on drops greater than 5 feet. Concrete shall be placed at such a rate that all concrete in the same lift will be deposited on plastic concrete. The concrete comprising each unit of work shall be placed in a continuous lift.
- C. The Contractor shall notify the Engineer 24 hours (1 working day) prior to concrete placement.
1. The form work and reinforcing steel placement shall be approved by the Engineer prior to ordering concrete.
- D. Form Removal. Minimum times for removal after concrete placement are as follows:
- | | |
|---|---------|
| Beam sides but not shoring | 3 days |
| Column forms and wall forms | 2 days |
| Forms for supported slabs but not shoring | 14 days |
- E. Construction Joints
1. At ends of the first concrete pour, ensure the end forms of walls are removable without releasing the side forms. Provide seals around reinforcement and water stop to prevent mortar leaks.
 2. Overlap the hardened concrete of the first pour with forms for the second pour. Brace the ends of the forms against the hardened concrete to prevent joint offsets and mortar leakage. Align any exterior features required on the finished surface.

3.4 CONCRETE JOINTS

A. Control Joints:

1. Space typical control joints in slabs on grade or suspended slabs not exceeding 10 feet. Control joints shall not be provided in water containment structures.
2. If cast-in with the concrete, positively locate the preformed joint filler and hold rigidly in place during concreting.
3. If saw-cut, use a wheeled power saw as soon as the concrete surface is firm enough. Saw-cut control joints must be constructed within 8-hours after concrete placement. Fill the groove with sealant over a backer rod.

B. Construction Joints:

1. Produce quality concrete, with full continuity of reinforcing and water tightness across the joints.
2. Space typical slab joints not exceeding 20 feet in the direction of the transverse or secondary reinforcing, typically the smaller reinforcing nearer to the center of the slab thickness. Space typical vertical wall joints no more than 30 feet apart.
3. After the first concrete placement at the joint, do not walk on or disturb any reinforcing extending into the second placement area for at least 48 hours.
4. Before depositing new concrete on or against concrete that has hardened, clean and roughen the entire surface of the joint exposing clean coarse aggregate solidly embedded in mortar matrix. Provide typically 1/4-inch roughness or amplitude of the concrete surface measured from the top of the exposed aggregate to the bottom of pockets between stones.
5. Drench the prepared joint with clean water and remove prior to the concrete pour.
6. Cover horizontal wall joints and wall-to-slab joints with a minimum thickness of 2 inches and a maximum of 6 inches of the modified concrete mix, consisting of the designated concrete mix with one-half of the coarse aggregate removed.
7. For joints that are shown on architectural drawings as having a continuous reveal or recess, leave the wood form or pour strip used to create the reveal or recess in place or re-insert before roughening. Prevent the next concrete placement from filling the reveal or recess.

C. Expansion Joints

1. Stop all steel reinforcing clear of the joint at each side.
2. Prepare a smooth first concrete surface with all voids filled.

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3. Provide preformed joint filler, securely fastened to the existing concrete as directed by the Manufacturer.
 4. Install bond breaker and sealant after curing is completed and when directed.
- D. Bonding to Pre-existing Concrete: Mechanically roughen the old surface to a 1/4-inch amplitude, as defined in construction joint paragraph above. Apply epoxy bonding material prior to concreting, as recommended by the manufacturer.

3.5 CONCRETE CURING

- A. Exposed concrete surfaces shall be protected from premature drying by covering as soon as possible with canvas, plastic sheets with sealed joints, burlap, sand or other satisfactory materials and kept continuously moist; or, if the surfaces are not covered, they shall be kept continuously moist by flushing or sprinkling.
1. Curing shall continue for a period of not less than 7 days after placing the concrete. If curing compound is used, two (2) applications will be made for even coverage. Curing methods must be approved by the Engineer.

3.6 FINISHING

- A. Defective and honeycombed surfaces shall be chipped back to such a depth to expose solid concrete. The surface shall be dampened and coated with a bonding agent and packed with mortar.
- B. Concrete Finishes for Vertical Wall Surfaces:
1. Form facing material shall produce a smooth, hard, uniform texture.
 - a. Use forms specified for surfaces exposed to view in accordance with the Plans and other Specification Sections.
 2. At a minimum, repair the following surface defects:
 - a. Tie holes
 - b. Honeycombs deeper than 1/4"
 - c. Air pockets deeper than 1/4"
 - d. Rock holes deeper than 1/4"
 - e. Scabbing
 3. Chip or rub off fins exceeding 1/8" in height.
 4. Provide SF/ESF 3.0 finish and a smooth-rubbed finish for:
 - a. Walls being waterproofed, painted, coated with some other material.
 - b. Use at all exposed surfaces not specified to receive another finish.

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C. Concrete Finishes for Horizontal Slab Surfaces:

1. General: Tamp concrete to force coarse aggregate down from surface. Screed with straightedge, eliminate high and low places, bring surface to required finish elevations; slope uniformly to drains. Dusting of surface with dry cement or sand during finishing processes not permitted.
2. Slab Finish shall be as follows:
 - a. Surfaces intended to receive damp proofing or water proofing membranes: Float finish.
 - b. Floors intended to receive floor coverings and MCC rooms: Trowel finish.
 - c. Sidewalks, garage floors, drive-throughs and ramps: Broom finish.
 - d. Exterior slabs, platforms, steps and landings, exterior and interior pedestrian ramps and interior stairs and all process equipment areas, not covered by other finish materials: Broom finish.
3. Deviation in finish surface shall not exceed $\frac{1}{4}$ " in 10 ft.
4. No tolerance will be allowed that will result in the maximum running, or cross, slope exceeding the requirements of the Americans with Disabilities Act.

3.7 TESTING

- A. Testing of concrete shall be as required by the Engineer and in accordance with ACI 301, Chapter 1.6.
 1. All costs of initial testing will be paid by the Owner unless otherwise noted.
 2. All costs involved, including those required by the Engineer, in retesting of concrete required because of a failure to meet these Specifications shall be at the expense of the Contractor.

3.8 WATERTIGHTNESS OF CONCRETE WORK

- A. It is the intent of this Specification to obtain concrete and grout with homogenous structure, which when hardened will have the required strength, is watertight, and resistance to weathering.

END SECTION

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SECTION 26 05 00

BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes

1. Provide all labor, materials and equipment necessary to complete the installation required for the items specified under Division 26.

B. Related work under this section

1. Labor and materials required to furnish and install the electrical systems in a complete and operational fashion.
2. Carpentry, masonry, steel and concrete materials and labor required for construction of proper stands, bases and supports for electrical materials and equipment.
3. Cutting and patching of holes required by installation including flashing and counter-flashing of roof and exterior wall penetrations.
4. Excavating, pumping and backfilling required for installation.
5. Repair of damage to the premises resulting from construction activities under this Section to Owner's satisfaction.
6. Removal of work debris from construction activities to Owner's satisfaction.
7. Testing and cleaning of equipment installed.

C. Work not under this section

1. Furnishing of motors, pumps, fans, compressors, water heaters, thermostats and motor starters included under Division 40, or as noted otherwise.
2. Finish painting of exposed metal surfaces as noted on plans.
3. Electrical Contractor shall provide connections to mechanical equipment where voltage exceeds 50 V and all necessary raceways for low voltage controls.

D. Related sections

1. Where items specified in other Division 26 sections conflict with the requirements of this Section, the most stringent requirement shall govern.
2. The requirements of this Section apply to all Division 26 work, as applicable.

1.02 REFERENCES

A. Comply with the latest edition of the following applicable specifications and standards except as otherwise shown or specified:

1. CCR –California Code of Regulations
 - a. Title 8 –Industrial Relations; Section 1 –Department of Industrial Relations

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- 1) Chapter 3.2 -California Occupational Safety and Health Regulations (CAL/OSHA)
- 2) Chapter 4 –Section of Industrial Safety
 - a) Subchapter 4 -Construction Safety Orders (CSO)
 - b) Subchapter 5 -Electrical Safety Orders (ESO)
- b. Title 24 –California Building Standards
 - 1) Part 1 -Building Standards Administrative Code
 - 2) Part 2 -California Building Code (CBC); International Building Code (IBC) with California amendments
 - 3) Part 3 -California Electrical Code(CEC); NFPA 70 National Electrical Code (NEC) with California amendments
 - 4) Part 4 -California Mechanical Code (MEC); IAPMO Uniform Mechanical Code (UMC) with California amendments
 - 5) Part 5 -California Plumbing Code; IAPMO Uniform Plumbing Code (UPC) with California amendments
 - 6) Part 6 -California Energy Code
 - 7) Part 7 -California Elevator Safety Construction Code
 - 8) Part 9 -California Fire Code; International Fire Code (IFC) with California amendments
 - 9) Part 12 -California Reference Standards Code
2. CPUC –California Public Utilities Commission
 - a. GO-95; Rules for Overhead Electric Line Construction
 - b. GO-128; Rules for Construction of Underground Electric Supply and Communication Systems
3. IEEE –Institute of Electrical and Electronic Engineers
 - a. C2; National Electrical Safety Code (NESC)
4. NECA –National Electrical Contractors Association
 - a. 1; Standard Practices for Good Workmanship in Electrical Contracting
 - b. 4090; Manual of Labor Units
5. All applicable local municipal codes and ordinances.
6. Applicable rules and regulations of local utility companies.

1.03 SUBMITTALS

A. Product Data

1. Refer to General and Special Provisions.

B. Closeout Submittal

1. Furnish three complete sets of maintenance and operating instructions bound in a binder and indexed to Owner. Start compiling data upon approval of materials

and equipment. Final inspection will not be made until Engineer approves binders. Refer also to General and Special Provisions for additional requirements.

2. Provide one of each tool required for proper equipment operation and maintenance provided under this Division. All tools shall be delivered to the Owner at project completion.
3. Provide two keys to Owner for each lock furnished under Division 26.
4. As-Built Drawings
 - a. Refer to General and Special Provisions.

1.04 SUBSTITUTIONS

1. Refer to General and Special Provisions.

1.05 CHANGE ORDER PROPOSALS

- A. Refer to General and Special Provisions.
- B. All change order proposals and requests, both additive and deductive, shall be accompanied by a detailed materials and labor breakdown for each specific task and/or item.

1.06 QUALITY ASSURANCE

- A. References to codes, standards, specifications and recommendations of technical societies, trade organizations and governmental agencies shall mean that latest edition of such publications adopted and published prior to bid submittal. Such codes or standards shall be considered a part of this Specification as though fully repeated herein.
- B. Work and materials shall be in full accordance with the latest rules and regulations of applicable state or local laws or regulations and standards of following:
 1. National Fire Protection Association (NFPA)
 2. California Electrical Code (CEC)
 3. California Occupational Safety Health Act (Cal-OSHA)
 4. California State Fire Marshall (CSFM)
 5. California Code of Regulations (CCR)
 6. Electrical Safety Orders, CAC Title 8 (ESO)
 7. California Public Utilities Commissions, General Order 95 (GO-95)
 8. Applicable rules and regulations of local utility companies.
 9. NECA 1-2006, Standard Practices for Good Workmanship in Electrical Contracting
- C. All electrical equipment and material furnished under Division 26 shall conform to all CEC requirements and bear the Underwriters' Laboratories (UL) label where applicable.

- D. Nothing in the Contract Documents shall be construed to permit work not conforming to these Codes. Whenever the indicated material, workmanship, arrangement or construction is of high quality or capacity than that required by the above rules and regulations, the Contract Documents shall take precedence. Should there be any direct conflict between the rules and regulations and Contract Documents, the rules shall govern.
- E. All electrical equipment and material furnished under this Division shall conform to NEMA and ASTM standards, CEC and bear the Underwriters' Laboratories (UL) label where such label is applicable.
- F. All electrical work shall conform to manufacturer's written instruction, and the NECA Standard Practices for Good Workmanship in Electrical Contracting and all published recommended practices at the time of project. The Contractor shall use the requirements within the Specifications whenever they exceed NECA guidelines.
- G. Follow manufacturer's direction where these direction cover points not included with the Contract Documents.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Packing, shipping, handling and unloading
 - 1. Damage to the equipment delivered to the site or in transit to the job shall be the responsibility of the Contractor.
 - 2. Equipment and material delivery of shall be scheduled as required for timely, expeditious progress of work.
- B. Storage and protection of job equipment is the responsibility Contractor.
- C. Comply with General and Special Provisions requirements with regards to waste management and disposal.

1.08 PROJECT CONDITIONS

- A. Discrepancies
 - 1. In the event of discrepancies with the Contract Documents, Engineer shall be notified with sufficient time as stated within General and Special Provisions to allow the issuing of an addendum prior to the bid opening.
 - 2. If, in the event that time does not permit notification of clarification of discrepancies prior to the bid opening, the following shall apply:
 - a. The drawings govern in matters of quantity and specifications govern in matters of quality.
 - b. In the event of conflict within the drawings and specifications involving quantities or quality, the greater quantity or higher quality shall apply. Such discrepancies shall be noted and clarified within the contractor's bid. No additional allowances will be made because of errors, ambiguities or omissions which reasonably should have been discovered during the bid preparation.

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- B. Verify all power and communication utilities' requirements prior to commencement of any utility work. Make proper adjustments to the construction to satisfy the serving utility.
- C. Information shown relative to services is based upon available records and data, but shall be regarded as approximate only. Make minor deviations found necessary to conform to actual locations and conditions without extra cost. Verify locations and elevations of utilities prior to commencement of excavation for new underground installation.
- D. Exercise extreme care in excavating near existing utilities to avoid any damage thereto; be responsible for any damage caused by such operations. Contact all utility companies to obtain exact locations prior to commencement of construction.
- E. The electrical plans indicate the general layout and arrangement; the field conditions shall determine exact locations. Field verify all conditions and modify as required to satisfy design intent. Maintain all required working clearances.
- F. Fees, permits and utility services
 - 1. Obtain and pay for all permits and service charges required for the installation of this work. Arrange for required inspections and secure approvals from authorities having jurisdiction. Arrange for all utility connections and pay charges incurred including excess service charges if any.
 - 2. Extra charges imposed by the electrical and communication utility companies shall be included in the bid, if available. Unless otherwise stated, these charges will be assumed to include in the bid.
- G. Provide and maintain temporary construction power. The General Contractor will pay for electric energy charges. Should the Electrical Contractor be the prime contractor, the Electrical Contractor shall pay for energy charges unless negotiated with Owner.

1.09 SEQUENCING

- A. Coordinate work within phasing plans as provided by the Owner.

1.10 WARRANTY

- 1. Refer to General and Special Provisions.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Materials mentioned herein or on Drawings require that the items be provided and of quality noted or an approved equal. All materials shall be new, full weight, standard in all respects and in first-class condition. Insofar as possible, all materials used shall be of the same brand or manufacturer throughout for each class of material or equipment.

- B. Trade names or catalog numbers stated herein indicates grade or quality of material desired. Materials, where applicable, shall be UL labeled and in accordance with NEMA standards.
- C. Dimensions, sizes and capacities shown are a minimum. Do not make changes without written permission of Engineer.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine Construction Documents and Site; be familiar with types of construction where electrical installation is involved. Note carefully other sections of Specifications with their individual cross-references, standard details, etc.
- B. Any electrical work or materials shown either in Construction Documents, but not mentioned herein, or vice versa, shall be executed the same as if mentioned herein, in a workmanlike manner in accordance with all published NECA Standards of Installation.
- C. Coordinate work with other crafts to avoid conflicts, and check all outlet locations with drawings and specifications. Make minor adjustments without additional cost to Owner.
- D. Engineer will make clarifications and rulings concerning any obvious discrepancies or omissions in work prior and after bidding. Perform all work involved in correcting obvious errors or omissions after award of contract as directed by Engineer at Contractor's expense.
- E. Examine site dimensions and locations against Drawings and become informed of all conditions under which work is to be done before submitting proposals. No allowance will be made for extra expense due to error.
- F. Layouts of equipment, accessories and wiring systems are diagrammatic (not pictorial), but shall be followed as closely as possible. Construction Documents are for assistance and guidance, and exact locations, distance, levels, etc., will be governed by construction; accept same with this understanding.
- G. Horsepower of motors or wattage of equipment indicated in Construction Documents is estimated horsepower or wattage requirement of equipment furnished under other sections of Specifications. Size all feeders (conduit and wiring), motor starters, overload protection and circuit breakers to suit horsepower of motors or wattage of equipment actually furnished under various sections of specifications. However, in no case shall feeders and branch circuits (conduit and wiring) and circuit breakers be of smaller capacities or sizes than those indicated on Drawings or specified, unless approved in writing by Engineer.

3.02 PREPARATION

- A. Seal all exterior wall penetrations in an approved watertight manner and to the satisfaction of Engineer and Owner.

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- B. Channels, joiners, hangers, caps, nuts and bolts and associated parts shall be plated electrolytically with zinc followed immediately thereafter by treating freshly deposited zinc surfaces with chromic acid to obtain a surface which will not form a white deposit on surface for an average of 120 hours when subjected to a standard salt spray cabinet test, or shall be hot dipped galvanized

3.03 *INSTALLATION*

A. Equipment identification

- 1. Properly identify panelboards, remote control switches, push buttons, terminal boxes, etc. with a descriptive nameplate. Make nameplate with 3/32" laminated plastic with black background and white letters. Machine engraved letters 1/8" high for equipment in device box(es) and 1/4" high for panelboards, terminal cabinets or larger items. Punched strip type nameplates and cardholders in any form are not acceptable. Fasten nameplates with oval head machine screws, tapped into front cover/panel.

B. Working spaces

- 1. Provide adequate working space around electrical equipment in compliance with Article 4 of Electrical Safety Orders and CEC 110.26. In general provide 78" of headroom and 30" wide minimum clear workspace in front of panelboards and controls. In addition to the above, provide the following minimum working clearances:
 - a. 0V – 150V (line-to-ground) provide 36" minimum clear distance.
 - b. 151V – 600V (line-to-ground) provide 42" minimum clear distance.

C. Equipment supports

- 1. Anchor all electrical equipment to structure. Support systems shall be adequate to withstand seismic forces per CBC.

D. Excavating and backfilling

- 1. Excavate and backfill as required for installation of Work. Restore all surfaces, roadways, walks, curbs, walls existing underground installations, etc., cut by installations to original condition in an acceptable manner. Maintain all warning signs, barricades, flares and lanterns as required by ESO and local ordinances.
- 2. Dig trenches straight and true to line and grade, with bottom clear of any rock points. Support conduit for entire length on undisturbed original earth. Minimum conduit depth of pipe crown shall be 24" below finished or natural grade, unless otherwise noted.

E. Forming, cutting and patching

- 1. In new construction, Contractor shall provide any special forming, recesses, chased, etc., and provide wood blocking, backing and grounds as necessary for the proper installation of electrical work. Be responsible for notifying Contractor that such provision is necessary; layout work and check to see that it suits his requirements.

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- a. Provide metal backing plates, anchor plates and such that are required for anchorage of electrical work under Division 26; securely weld or bolt to metal framing. Wood blocking or backing will not be permitted in combination with metal framing.
 2. Be responsible for proper placement of pipe sleeves, hangers, inserts and supports for this Work.
- F. Concrete work
1. Provide concrete work related solely to electrical work. Concrete work, including forming and reinforcing steel installed for all electrical work, shall comply with all applicable requirements of Division 03, or in accordance with the State of California Standard Specifications issued by the Department of Transportation (CALTRANS).

3.04 REPAIR/RESTORATION

- A. Cutting, patching and repairing of existing construction to permit installation of work under Division 26 is the responsibility of Contractor. Repair or replace all damage to existing work in kind to Owner's satisfaction.
- B. Obtain Engineer's approval prior to performing any cutting or patching of concrete, masonry, wood or steel structure within building.

3.05 FIELD QUALITY CONTROL

- A. Inspection of work
 1. Working parts shall be readily accessible for inspection, repair and renewal. The right is reserved to make reasonable changes in equipment location shown on Drawings prior to rough in without additional costs to the Owner.
 2. During construction all work will be subject to observation by the Engineer and his representatives. Assist in ascertaining any information that maybe required.
 3. Do not allow or cause any work installed hereunder to be covered up or enclosed before it has been inspected and approved. Should any work be enclosed or covered prior to approval, uncover work, and after it has been inspected and approved, restore work of all others to the condition in which it was found at the time of cutting, all without additional costs to Owner.
- B. Furnish all testing equipment as maybe required.
- C. Test all wiring and connections for continuity and grounds; where such tests indicate faulty insulation or other defects, locate, repair and re-test.
- D. Check rotation of all motors and correct if necessary.

3.06 CLEANING

- A. Repair or replace all broken, damaged or otherwise defective parts without additional cost to Owner, and leave entire work in a condition satisfactory to Engineer. At completion, carefully clean and adjust all equipment, fixtures and trim installed as part of this work; leave systems and equipment in satisfactory operating condition.

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- B. Clean out and remove from the site all surplus materials and debris resulting from this work; this includes surplus excavated materials.

3.07 DEMONSTRATION

- A. At project completion, Contractor shall allot a period of not less than 8 hours per well site for instruction of operating and maintenance personnel in the use of all systems installed under this Division. This time is in addition to any instruction time stated in the Specifications of other sections for other equipment (i.e., fire alarm, security, intercom, etc.). All personnel shall be instructed at one time, the Contractor shall make all necessary arrangements with manufacturer's representatives as may be required. Contractor, if any, for the above services shall pay all costs.

3.08 PROTECTION

- A. In performance of work, protect work of other trades as well as work under this Division from damage.
- B. Protect electrical equipment, stored and installed, from dust, water or other damage.

END SECTION

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SECTION 26 05 19

CONDUCTORS AND CABLES

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes

1. Provide all labor, materials and equipment necessary for the installation of all conductors and cables under this Section related to lighting, power, mechanical, control and signal systems.

B. Related sections

1. Where items specified in other Division 26 sections conflict with the requirements of this Section, the most stringent requirement shall govern.
2. The requirements of this Section apply to all Division 26 work, as applicable.
3. Consult all other sections, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete installation.

1.02 REFERENCES

A. Comply with the latest edition of the following applicable specifications and standards except as otherwise shown or specified:

1. ASTM -American Society for Testing and Materials
 - a. B3; Standard Specification for Soft or Annealed Copper Wire
 - b. B8; Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
 - c. B787/B787M; Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation
 - d. D1000; Standard Test Method for Pressure-Sensitive Adhesive-Coated Tapes Used for Electrical and Electronic Applications
2. CCR –California Code of Regulations, Title 24
 - a. Part 3 -California Electrical Code(CEC); NFPA 70 National Electrical Code (NEC) with California amendments
3. UL -Underwriters Laboratories, Inc.
 - a. UL 83; Thermoplastic-Insulated Wire and Cables
 - b. UL 486A 486B; Wire Connectors
 - c. UL 486C; Splicing Wire Connectors
 - d. UL 486D; Standard for Insulated Wire Connector Systems For Underground Use Or In Damp Or Wet Locations

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- e. UL 486E; Standard for Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors
- f. UL 493; Thermoplastic-Insulated Underground Feeders and Branch Circuit Cables
- g. UL 510; Standard for Polyvinyl Chloride, Polyethylene and Rubber Insulating Tape
- h. UL 854; Service-Entrance Cables
- 4. NEMA –National Electrical Manufacturer’s Association
 - a. WC 70-1999; Nonshielded Power Cables Rated 2000 Volts or less for the Distribution of Electrical Energy
- 5. IEEE –Institute of Electrical and Electronic Engineers
 - a. 82; Standard Test Procedure for Impulse Voltage Tests on Insulated Conductors

1.03 DELIVERY

- A. Wire shall be in original unbroken package. Obtain approval of Inspector or Engineer before installation of wires.

PART 2 - PRODUCTS

2.01 BUILDING WIRE

- A. Conductor material
 - 1. Provide annealed copper for all wire, conductor and cable of not less than 98% conductivity.
 - 2. Wire #8 AWG and larger shall be stranded.
 - 3. Wire #10 AWG and smaller shall be solid.
- B. Insulation material
 - 1. All insulated wire, conductor and cable shall be 600 Vac rated.
 - 2. Feeder and branch circuits larger than #6 AWG shall be type THW, XHHW or THHN/THWN.
 - 3. Feeder and branch circuits #6 AWG and smaller shall be type TW, THW, XHHW or THHN/THWN.
 - 4. Control circuits shall be type THW or THHN/THWN.
 - 5. Wires shall bear the UL label, be color-coded and marked with gauge, type and manufacturer’s name on 24” centers.

2.02 FLEXIBLE CORDS AND CABLES

- A. Provide flexible cords and cables of size, type and arrangement as indicated on Drawings.

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- B. Type S flexible cords and cable shall be manufactured in accordance with CEC Article 400 and composed of two or more conductors and a full sized green insulated grounding conductor with an outer rubber or neoprene jacket.
- C. Flexible cords and cables shall be fitted with wire mesh strain relief grips either as a integral connector component or an independently supported unit.
- D. Suspended flexible cords and cables shall incorporate safety spring(s).

2.03 WIRE CONNECTIONS AND TERMINATIONS

- A. Electrical spring wire connectors
 - 1. Provide multi-part construction incorporating a non-restricted, zinc coated square cross-sectional steel spring enclosed in a steel sheet with an outer jacket of plastic and insulating skirt.
 - 2. Self-striping pigtail and tap U-contact connectors are not acceptable.
- B. Compression type terminating lugs
 - 1. Provide tin-plated copper high compression type lugs for installation with hand or hydraulic crimping tools as directed by manufacturer. Notch or single point type crimps are not acceptable.
 - 2. Two hole, long barrel lugs shall be provided for size #4/O AWG and larger wire where terminated to bus bars. Use minimum of three crimps per lug where possible.
- C. Splicing and insulating tape
 - 1. Provide black, UV resistant, self extinguishing, 7 mil thick vinyl general purpose electrical tape per UL 510 and ASTM D1000. 3M Scotch 33 or equal.
- D. Insulating putty
 - 1. Provide pads or rolls of non-corrosive, self-fusing, 125 mil thick rubber putty with PVC backing sheet per UL 510 and ASTM D1000. 3M Scotchfil or equal.
- E. Insulating resin
 - 1. Provide two-part liquid epoxy resin with resin and catalyst in pre-measured, sealed mixing pouch. 3M Scotchcast 4 or equal.
 - 2. Use resin with thermal and dielectric properties equal to the cable's insulating properties.
- F. Terminal strips
 - 1. Provide box type terminal strips in the required quantities plus 25% spare. Install in continuous rows.
 - 2. Use the box type terminal strips with barrier open backs and with ampere ratings as required.
 - 3. Identify all terminals strips and circuits.
- G. Crimp type connectors
 - 1. Provide insulated fork or ring crimp terminals with tinned electrolytic copper-brazed barrel with funnel wire entry and insulation support.

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2. Fasten crimp type connectors or terminals using a crimping tool recommended by the manufacturer.
 3. Provide insulated overlap splices with tinned seamless electrolytic copper-brazed barrel with funnel wire entry and insulation support.
 4. Provide insulated butt splices with tinned seamless electrolytic copper-brazed barrel with center stop, funnel wire entry and insulation support.
- H. Cable ties
1. Provide harnessing and point-to-point wire bundling with nylon cable ties. Install using tool supplied by manufacturer as required.
- I. Wire lubricating compound
1. UL listed for the wire insulation and conduit type, and shall not harden or become adhesive.
 2. Shall not be used on wire for isolated type electrical power systems.
- J. Bolt termination hardware
1. Bolts shall be plated, medium carbon steel heat-treated, quenched and tempered equal to ASTM A-325 or SAE Grade 5; or silicon bronze alloy ASTM B-9954 Type B.
 2. Nuts shall be heavy semi-finished hexagon, conforming to ANSI B18.2.2, threads to be unified coarse series (UNC), class 2B steel or silicon bronze alloy.
 3. Flat washers shall be steel or silicon bronze, Type A plain standard wide series, conforming to ANSI B27.2. SAE or narrow series shall be used.
 4. Belleville conical spring washers shall be hardened steel, cadmium plated or silicon bronze.
 5. Each bolt connecting lug(s) to a terminal or bus shall not carry current exceeding the following values:
 - a. 1/4" bolt – 125 A
 - b. 5/16" bolt – 175 A
 - c. 3/8" bolt – 225 A
 - d. 1/2" bolt – 300 A
 - e. 5/8" bolt – 375 A
 - f. 3/4" bolt – 450 A

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Thoroughly examine site conditions for acceptance of wire and cable installation to verify conformance with manufacturer and specification tolerances. Do not commence with work until all conditions are made satisfactory.

3.02 *INSTALLATION*

- A. All wire, conductor, and cable with their respective connectors, fittings and supports shall be UL listed for the installed application and ambient conditions.
- B. Feeders and branch circuits in wet locations shall be rated 75°C minimum.
- C. Feeders and branch circuits in dry locations shall be rated 90°C minimum.
- D. Minimum conductor size
 - 1. #12 AWG copper for all power and lighting branch circuits.
 - 2. #14 AWG copper for all line voltage signal and control wiring, unless otherwise indicated.
- E. Remove and replace conductors under the following conditions at no additional costs to the Owner:
 - 1. Installed within wrong specified conduit or raceway.
 - 2. Damaged during installation.
 - 3. Of insufficient length to facilitate proper splice of conductors

3.03 *WIRING METHODS*

- A. Install wires and cable in accordance with manufacturer's written instructions, as shown on Drawings and as specified herein.
- B. Install all single conductors within raceway system, unless otherwise indicated.
- C. Parallel circuit conductors and terminations shall be equal in length and identical in all aspects.
- D. Provide adequate length of conductors within electrical enclosures and neatly train to termination points with no excess. Terminate such that there is no bare conductor at the terminal.
- E. Splice cables and wires only in junction boxes, outlet boxes, pull boxes, manholes or handholes.
- F. Group and bundle with tie wrap each neutral with its associated phase conductors where more than one neutral conductor is present within a conduit.
- G. Install cable supports for all vertical feeders in accordance with CEC Article 300. Provide split wedge type fittings, which firmly clamp each individual cable and tighten due to cable weight.
- H. Seal cable where exiting a conduit from an exterior underground raceway with a non-hardening compound (i.e., duct seal or equal).
- I. Provide UL listed factory fabricated, solder-less metal connectors of size, ampacity rating, material, type and class for applications and for services indicated. Use connectors with temperature ratings equal or greater than the conductor or cable being terminated.
- J. Stranded wire shall be terminated using fittings, lugs or devices listed for the application. Under no circumstances shall stranded wire be terminated solely by wrapping it around a screw or bolt.

- K. Flexible cords and cables supplied as part of a pre-manufactured assembly shall be installed according to manufacturer's published instructions.

3.04 *WIRING INSTALLATION IN RACEWAYS*

- A. Install wire in raceway after interior of building has been physically protected from weather, and all mechanical work likely to injure conductors has been completed.
- B. Pull all conductors into raceway at the same time.
- C. Use UL listed, non-petroleum base and insulating type pulling compound as needed.
- D. Completely mandrel all underground or concrete encased conduits prior to installation.
- E. Completely and thoroughly swab raceway system prior to installation
- F. Do not use block and tackle, power driven winch or other mechanical means for pulling conductors smaller than #1 AWG.
- G. Wire pulling
 - 1. Provide installation equipment that will prevent cutting or abrasion of insulation during installation.
 - 2. Maximum pull tension shall not exceed manufacturer's recommended value during installation for cable being measured with tension dynameter.
 - 3. Use rope made of non-metallic material for pulling.
 - 4. Attach pulling lines by means of either woven basket grips or pulling eyes attached directly to the conductors.
 - 5. Pull multiple conductors simultaneously within same conduit.

3.05 *WIRE SPLICES, JOINTS AND TERMINATIONS*

- A. Join and terminate wire, conductors and cables in accordance with UL 486, CEC and manufacturer's instructions.
- B. Thoroughly clean wires before installing lugs and connectors.
- C. Make splices, taps and terminations to carry full conductor ampacity without perceptible temperature rise, and shall be made mechanically and electrically secure.
- D. Terminate wires in terminal cabinets using terminal strips, unless otherwise indicated.
- E. Insulate spare conductors with electrical tape and leave sufficient length to terminate anywhere within panel or cabinet.
- F. Encapsulate splices in wet locations using specified insulating resin kits.
- G. Make up all splices and taps in accessible junction or outlet boxes with connectors as specified herein. Pigtails and taps shall be the same color as feed conductor with at least 6 inches of tail, all neatly packed within box.
- H. Where conductors are to be connected to metallic surfaces, coated surfaces shall be cleaned to base metal surface before installing connector. Remove lacquer coating of conduits where ground clamps are to be installed.

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- I. Branch circuits (#10 AWG and smaller) connectors shall comply with 2.03.A and 2.03.B above.
- J. Branch circuits (#8 AWG and larger)
 - 1. Join or tap conductors using insulated mechanical compression taps with pre-molded, snap-on insulating boots or specified conformable insulating pad and over-wrapped with two half-lapped layers of vinyl insulating tape starting and ending at the middle of joint.
 - 2. Terminate conductors using mechanical compression lugs in accordance with manufacturer's recommendation or as specified elsewhere.
 - 3. Field installed compression connectors for 250 MCM and larger shall have not less than two clamping elements or compression indents per wire.
 - 4. Insulate splices and joints with materials approved for the particular use, location, voltage and temperature.
- K. Termination hardware assemblies
 - 1. Al/Cu lugs connected to aluminum plated or copper bus shall be secured with steel bolt, flat washer (two per bolt), Belleville washer and nut.
 - 2. Copper lugs connected to copper buss shall be secured using silicon bronze alloy bolt, flat washer (two per bolt), Belleville washer and nut.
 - 3. The crown of Belleville washers shall be under the nut.
 - 4. Bolt assemblies shall be torque to manufacturer's recommendations. Where manufacturer recommendation is not obtainable, the following shall be used:
 - a. 1/4" -20 bolt at 80 inch-pound torque
 - b. 5/16" -18 bolt at 180 inch-pound torque
 - c. 3/8" -20 bolt at 20 inch-pound torque
 - d. 1/2" -20 bolt at 40 inch-pound torque
 - e. 5/8" -20 bolt at 55 inch-pound torque
 - f. 3/4" -20 bolt at 158 inch-pound torque

3.06 IDENTIFICATION

- A. Securely tag all branch circuits. Mark conductors with specified vinyl wrap-around markers. Where more than two conductors run through a single outlet, mark each conductor with the corresponding circuit number.
- B. Provide all terminal strips with each individual terminal identified using specified vinyl markers.
- C. In manholes, pullboxes and handholes provide tags of embossed brass type with cable type and voltage rating. Attach tags to cable with slip-free plastic cable lacing units.
- D. Color coding
 - 1. For 120/208 Volt (or 120/240 Volt), 1 phase, 3 wire systems:
 - a. Phase A – Black

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- b. Phase B – Red
 - c. Neutral – White
 - d. Ground – Green
2. For 120/208 Volt, 3 phase, 4 wire systems:
- a. Phase A – Black
 - b. Phase B – Red
 - c. Phase C – Blue
 - d. Neutral – White
 - e. Ground – Green
3. For 277/480 Volt, 3 phase, 4 wire systems:
- a. Phase A – Brown
 - b. Phase B – Orange
 - c. Phase C – Yellow
 - d. Neutral – Gray
 - e. Ground – Green
4. Switch leg individually installed shall be the same color as the branch circuit to which they originate, unless otherwise indicated.
5. Travelers for 3-way and 4-way switches shall be a distinct color and pulled with the circuit switch leg or neutral.

3.07 FIELD QUALITY CONTROL

- A. Supply labor, materials and test equipment required to perform continuity and ground tests.
- B. Electrical testing
- 1. Perform feeder and branch circuit insulation test after installation and prior to connection to device.
 - 2. Tests shall be performed by 600 Vdc megger for a continuous 10 seconds from phase-to-phase and phase-to-ground.
 - 3. Torque test conductor connections and terminations for conformance to Specifications.
 - 4. If any failure is detected, locate failure, determine cause and replace or repair cable to Engineer's satisfaction at no additional costs.
 - 5. Furnish test results in type written report form for review by Engineer.

END SECTION

SECTION 26 05 26

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes

1. Provide all labor, materials and equipment necessary to complete the installation required for the item specified under this Section, including but not limited to power system grounding.

B. Related sections

1. Where items specified in other Division 26 sections conflict with the requirements of this Section, the most stringent requirement shall govern.
2. The requirements of this Section apply to all Division 26 work, as applicable.
3. Consult all other sections, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete installation.

1.02 REFERENCES

A. Comply with the latest edition of the following applicable specifications and standards except as otherwise shown or specified:

1. CCR –California Code of Regulations, Title 24
 - a. Part 3 -California Electrical Code (CEC); NFPA 70 National Electrical Code (NEC) with California amendments
2. IEEE –Institute of Electrical and Electronic Engineers
 - a. 142; Recommend Practices for Grounding of Industrial and Commercial Power Systems
3. NFPA –National Fire Protection Association
 - a. 780; Lightning Protection Code
4. UL –Underwriters Laboratories, Inc.
 - a. 467; Grounding and Bonding Equipment

1.03 SYSTEM DESCRIPTION

- A. This Section provides for the grounding and bonding of all electrical and communication apparatus, machinery, appliances, components, fittings and accessories where required to provide a permanent, continuous, low impedance, grounded electrical system.
- B. Ground the electrical service system neutral at service entrance equipment as shown on the Drawings.

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- C. Ground each separately derived system, as defined in CEC 250.5 (D) and on the Drawings, unless specifically noted otherwise.
- D. Except as otherwise indicated, the complete electrical installation including the neutral conductor, equipment and metallic raceways, boxes and cabinets shall be completely and effectively grounded in accordance with all CEC requirements, whether or not such connections are specifically shown or specified.

1.04 SUBMITTALS

- A. Submit manufacturer's data for equipment and materials specified within this Section in accordance with Section 26 05 00.

1.05 QUALITY ASSURANCE

- A. All materials, equipment and parts comprising the materials specified herein shall be new and unused, bearing UL labels where applicable.

PART 2 - PRODUCTS

2.01 CONCRETE ENCASED GROUNDING ELECTRODE (UFER GROUND)

- A. #3/O AWG minimum bare stranded copper conductor.

2.02 DRIVEN (GROUND) RODS

- A. Copper clad steel, minimum 3/4" diameter by 10'-0" length, sectional type with copper alloy couplings and carbon steel driving stud; Weaver, Cadweld or equal.

2.03 INSULATED GROUNDING BUSHINGS

- A. Plated malleable iron body with 150°C molded plastic insulated throat and lay-in ground lug; OZ/Gedney BLG, Thomas & Betts #TIGB series or equal.

2.04 CONNECTION TO PIPE

- A. Cable to pipe connections; OZ/Gedney G-100B series, Thomas & Betts #290X series or equal.

2.05 CONNECTIONS TO STRUCTURAL STEEL, GROUND RODS OR SPICES

- A. Where required by the Drawings, grounding conductors shall be spliced together, connected to ground rods or connected to structural steel using exothermic welds, Cadweld or equal, or high pressure compression type connectors, Cadweld, Thomas & Betts or equal.

2.06 BONDING JUMPERS

- A. OZ/Gedney Type BJ, Thomas & Betts #3840 series or equal.

2.07 GROUND CONDUCTOR

- A. Ground conductor shall be code size UL labeled, Type THWN insulated copper wire, green in color.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Grounding electrodes

1. Concrete encased grounding electrode (Ufer ground)
 - a. Provide a #3/O AWG minimum bare copper conductor encased along the bottom of concrete foundation, footing or trench which is in direct contact with the earth and where there is no impervious waterproofing membrane between the footing and soil. The electrode shall extend through a horizontal length of 30' minimum and shall be encased in not less than 2" or more than 5" of concrete separating it from surrounding soil. The electrode shall emerge from the concrete slab through a protective non-metallic sleeve and shall be extended to BGB or as shown on Drawings.
2. Supplementary grounding electrode (ground ring, grid and driven rod)
 - a. Provide as shown driven ground rod(s). Interconnect ground rod with structural steel and adjacent rods with code size bare copper conductor. Ground rods shall be space no less than 6'-0" on centers from any other electrode or electrodes of another electrical system.
3. Separately derived electrical system grounding electrode
 - a. Ground each separately derived system per CEC 250-26 or as shown on Drawings, whichever is greater.
4. Metal underground water pipe
 - a. Contractor shall install an accessible grounding electrode conductor from the main incoming cold water line to BGB. The electrode conductor shall be sized per CEC Table 250-94 or as shown on Drawings, whichever is greater.

B. Grounding electrode conductor

1. Provide grounding electrode conductors per CEC Table 250-94 or as shown on Drawings, whichever is greater.

C. Power system grounding

1. Connect the following items using code size copper grounding conductors as shown on Drawings:
 - a. Concrete encased electrode (Ufer ground)
 - b. Ground rod(s)
 - c. Incoming cold and fire water pipes
 - d. Structural steel
 - e. Distribution transformer secondary

D. Equipment Bonding/Grounding

1. Provide a code sized copper ground conductor, whether indicated or noted on the drawings, in each of the following:
 - a. All power distribution conduits and ducts
 - b. Distribution feeders
 - c. Motor and equipment branch circuits
 - d. Device branch circuits
2. Provide a separate grounding bus at distribution panelboards, loadcenters, switchboards and motor control centers. Connect all metallic enclosed equipment so that with maximum fault current flowing, shall be maintained at not more than 35V above ground.
3. Metallic conduits terminating in concentric, eccentric or oversized knockouts at panelboards, cabinets, gutters, etc. shall have grounding bushings and bonding jumpers installed interconnecting all such conduits.
4. Provide bonding jumpers across expansion and deflection coupling in conduit runs, pipe connections to water meters and metallic cold water dielectric couplings.
5. Provide ground wire in flexible conduit connected at each end via grounding bushing.
6. Provide bonding jumpers across all cable tray joints.
7. Bond each end of metallic conduit longer than 36" in length to grounding conductor using a #6 AWG pigtail.

3.02 *FIELD QUALITY CONTROL*

- A. Contractor using test equipment expressly designed for that purpose shall perform all ground resistance tests in conformance with IEEE guidelines. Contractor shall submit typewritten records of measured resistance values to Engineer for review and approval prior to energizing the system.
- B. Obtain and record ground resistance measurements both from electrical equipment ground bus to the ground electrode and from the ground electrode to earth. Furnish and install additional bonding and add grounding electrodes as required to comply with the following resistance limits:
 1. Resistance from ground bus to ground electrode and to earth shall not exceed 5 ohms unless otherwise noted.
 2. Resistance from the farthest panelboard, loadcenter, switchboard or motor control center ground bus to the ground electrode and to earth shall not exceed 20 ohms maximum.
- C. Inspection
 1. The Engineer or Inspector prior to encasement, burial or concealment thereto shall review the grounding electrode and connections.

END OF SECTION

SECTION 26 05 33

RACEWAYS AND BOXES

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes

1. Provide all labor, materials and equipment necessary to complete the installation required for the items specified under this Section, including but not limited to electrical conduits; outlet, junction and pull boxes; and related supports.

B. Related sections

1. Where items specified in other Division 26 sections conflict with the requirements of this Section, the most stringent requirement shall govern.
 - a. 26 05 26 – Grounding and Bonding for Electrical Systems
2. The requirements of this Section apply to all Division 26 work, as applicable.
3. Consult all other sections, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete installation.

1.02 REFERENCES

A. Comply with the latest edition of the following applicable specifications and standards except as otherwise shown or specified:

1. ANSI –American National Standards Institute
 - a. C33.91; Specification for Rigid PVC Conduit
 - b. C80.1; Specification Rigid Steel Conduit, Zinc-Coated
 - c. C80.3; Specification for Electrical Metallic Tubing, Zinc-Coated
 - d. C80.6; Intermediate Metal Conduit (IMC), Zinc-Coated
2. CCR –California Code of Regulations, Title 24
 - a. Part 2 -California Building Code (CBC); International Building Code (IBC) with California amendments
 - b. Part 3 -California Electrical Code(CEC); NFPA 70 National Electrical Code (NEC) with California amendments
3. NECA –National Electrical Contractors Association
 - a. 101, Standard for Installing Steel Conduit (Rigid, IMC, EMT)
 - b. 111, Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC) (ANSI)

4. NEMA –National Electrical Manufacturer’s Association
 - a. FB 1; Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable
 - b. FB 2.10; Selection and Installation Guidelines for Fittings for Use with Non-flexible Electrical Metal Conduit or Tubing (Rigid Metal Conduit, Intermediate Metal Conduit, and Electrical Metallic Tubing)
 - c. FB 2.20; Selection and Installation Guidelines For Fittings for Use With Flexible Electrical Conduit and Cable
 - d. OS 1; Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports
 - e. OS 3; Selection and Installation Guidelines for Electrical Outlet Boxes
 - f. RN 1; Polyvinyl-Chloride Externally Coated Galvanized Rigid Steel Conduit and Electrical Metallic Tubing
 - g. TC 2; Electrical Plastic Tubing and Conduit
 - h. TC 3; PVC Fittings for Use with Rigid PVC Conduit and Tubing
 - i. TC 14; Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
5. OSHPD Anchorage Pre-approvals
 - a. OPA-0003; Superstrut Seismic Restraint System
 - b. OPA-0114; B-Line Seismic Restraints
 - c. OPA-0120; Unistrut Seismic Bracing System
 - d. OPA-0242; Power-Strut Seismic Bracing System
6. UL –Underwriter’s Laboratories, Inc.
 - a. 1; Standard for Flexible Metal Conduit
 - b. 6; Rigid Metal Electrical Conduit
 - c. 360; Standard for Liquid-Tight Flexible Steel Conduit
 - d. 514A; Metallic Outlet Boxes, Electrical
 - e. 514B; Fittings for Conduit and Outlet Boxes
 - f. 651; Schedule 40 & 80 PVC Conduit
 - g. 797; Electrical Metallic Tubing
 - h. 1242; Intermediate Metal Conduit
 - i. 1684; Reinforced Thermosetting Resin Conduit (RTRC) and Fittings

1.03 SYSTEM DESCRIPTION

- A. Furnish, assemble, erect, install, connect and test all electrical conduits and related raceway apparatus required and specified to form a complete installation.

1.04 SUBMITTALS

- A. Submit manufacturer’s data for materials specified within this Section in accordance to Section 26 05 00.

1.05 QUALITY ASSURANCE

- A. All materials, equipment and parts comprising the materials specified herein shall be new and unused, bearing UL labels where applicable.
- B. Installation shall conform to the NECA installation guidelines unless otherwise indicated within this Section

PART 2 - PRODUCTS

2.01 MATERIALS

A. Conduits and Fittings

1. Rigid steel conduit (RMC)

- a. Conduit: Standard weight, mild steel pipe, and zinc coated on both inside and outside by a hot dipping or shearardizing process manufactured in accordance with UL 6 and ANSI C80.1 specifications.
- b. Fittings (couplings, elbows, bends, etc.)
 - 1) Shall be steel or malleable iron.
 - 2) Coupling and unions shall be threaded type, assembled with anti-corrosion, conductive and anti-seize compound at joints made absolutely tight to exclude water.

c. Bushings

- 1) Insulating bushings: Threaded polypropylene or thermosetting phenolic rated at 150°C minimum.
- 2) Insulating grounding bushing: Threaded cast body with insulating throat and steel "lay-in" ground lug.
- 3) Insulating metallic bushing: Threaded cast body with plastic insulated throat rated at 150°C minimum.

2. Coated rigid steel conduit (CRMC)

- a. Conduit: Equivalent to RMC with a Polyvinyl chloride (PVC) coated bonded to the galvanized outer surface of the conduit. The bonding between the PVC coating and conduit surface shall be ETL PVC-001 compliant. The coating thickness shall be a minimum of 40mil.
- b. Fittings (couplings, elbows, bends, etc.)
 - 1) Equivalent to RMC above with bonded coating same as conduit.
 - 2) The PVC sleeve over fittings shall extend beyond hub or coupling approximately one diameter or 1 1/2" whichever is smaller.

c. Bushing equivalent to RMC above.

3. Electrical metallic tubing (EMT)

- a. Conduit: Cold rolled steel tubing with zinc coating on outside and protective enamel on inside manufactured in accordance with UL 797 and ANSI C80.3 specifications.

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- b. Couplings: Steel or malleable iron with compression type fastener via a nut.
 - c. Connectors: Steel or malleable iron with compression type fastener via a nut with plastic insulated throat rated at 150°C minimum.
 - 4. Rigid non-metallic conduit (PVC)
 - a. Conduit: PVC composed Schedule 40, 90°C manufactured in accordance with NEMA TC 2 and UL 651 specifications.
 - b. Fittings: Molded PVC, slip on solvent welded type in accordance to NEMA TC 3.
 - 5. Liquid tight flexible metallic conduit (LFMC)
 - a. Conduit: PVC coated, continuous, flexible steel spirally wound with zinc coating on both inside and outside in accordance with UL 360.
 - b. Connectors: Steel or malleable iron with compression type fastener via a nut with plastic insulated throat rated at 150°C minimum.
 - 6. Miscellaneous Fittings and Products
 - a. Conduit sealing bushings: Steel or cast malleable iron body and pressure clamps with PVC sleeve, neoprene sealing grommets and PVC coated steel pressure rings. Supplied with neoprene sealing rings between body and PVC sleeve.
 - b. Watertight cable terminators: One piece, compression molded sealing ring with PVC coated steel pressure disks, stainless steel screws and zinc plated cast iron locking collar.
 - c. Watertight cable/cord connectors: Liquid tight steel or cast malleable iron body with sealing neoprene bushing and stainless steel retaining ring.
 - d. Expansion fittings: Multi-piece unit of hot dip galvanized malleable iron or steel body and outside pressure bussing design to allow a maximum of 4" movement (2" in either direction). Furnish with external braid tinned copper bonding jumper. UL listed for both wet and dry locations.
 - e. Expansion/deflection couplings: Multi-piece unit comprised of a neoprene sleeve, internal flexible tinned copper braid attached to bronze end couplings with stainless steel bands. Coupling to provide minimum of 3/4" movement and 30 degrees deflection from normal. UL listed for both wet and dry locations.
 - f. Conduit bodies: Raintight, malleable iron, hot-dip galvanized body with threaded hubs, stamped steel cover, stainless steel screws and neoprene gasket.
 - g. Other couplings, connectors and fittings shall be equal in quality, material and construction to items specified herein.
- B. Boxes
- 1. Outlet boxes
 - a. Standard: Galvanized one-piece of welded pressed steel type in accordance with NEMA OS 1 and UL 514. Boxes shall not be less than 4" square and at least 1 1/2" deep.

- b. Concrete: Galvanized steel, 4" octagon ring with mounting lug, backplate and adapter ring type in accordance with NEMA OS 1 and UL 514. Depth as required by application.
 - c. Masonry: Galvanized steel, 3.75" high gang box in accordance with NEMA OS 1 and UL 514.
 - d. Surface cast metal: Cast malleable iron body, surface mounted box with threaded hubs and mounting lugs as required in accordance with NEMA OS 1 and UL 514. Furnish with ground flange, steel cover and neoprene gasket.
2. Pull and junction boxes
- a. Sheet metal boxes: Standard or concrete outlet box wherever possible; otherwise use 16 gauge galvanized sheet metal, NEMA 1 box sized per CEC with machine screwed cover.
 - b. Cast metal boxes: Install standard cast malleable iron outlet or device box when possible.
 - c. Flush mounted boxes: Install overlapping cover with flush head screws.
 - d. In-ground mounted pull holes/boxes: Install pre-cast concrete box, sized per Drawing or CEC with pre-cast or traffic rated lid.
- C. Pull line/cord
- 1. Polypropylene braided line or Let-line #232 or equal of 1/8" diameter with a minimum break strength of 200 pounds.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Thoroughly examine site conditions for acceptance of wire and cable installation to verify conformance with manufacturer and specification tolerances. Do not commence with work until all conditions are made satisfactory.

3.02 PREPARATION

- A. Conduit
 - 1. Provide all necessary conduit fittings, connectors, bushings, etc. required to complete conduit installation to meet the CEC and intended application whether noted, shown or specified within.
 - 2. Location of conduit runs shall be planned in advance of the installation and coordinated with other trades.
 - 3. Where practical, install conduits in groups in parallel vertical or horizontal runs that avoid unnecessary offsets.
 - 4. All conduits shall be parallel or at right angles to columns, beams and walls whether exposed or concealed.
 - 5. Conduits shall not be placed closer than 12" to a flue, parallel to hot water, steam line or other heat sources; or 3" when crossing perpendicular to the above said lines when possible.

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6. Install exposed conduit as high as practical to maintain adequate headroom. Notify Engineer if headroom will be less than 102".
7. Do not obstruct spaces required by Code in front of electrical equipment, access doors, etc.
8. The largest trade size conduit in concrete floors and walls shall not exceed 1/3 thickness or be spaced a less than three conduit diameters apart unless permitted by Engineer. All conduits shall be installed in the center of slab or wall, and never between reinforcing steel and bottom of floor slab.
9. Install additional pull boxes, not shown on Drawings, in sufficient quantities to facilitate pulling of conductors and cables such that total spacing does not exceed 150 feet or 270 degrees, total; and maximum pulling tension will not be exceeded.
10. When installing underground conduits to specified depth; depth shall be taken from finished grade as it will be at project completion. Should finish grade be above existing grade by an amount equal to or greater than specified depth, conduit shall be installed not less than 6" below existing grade.
11. Verify that information concerning finish grade is accurate, for should the underground run be less than the specified depth, Contractor may be required to re-install conduit to meet the required depth.
12. Unless otherwise specified, underground conduits shall be installed with top side not less than 24" below finished grade; this depth applies to all conduits outside of building foundations including those under walks, open corridors or paved areas.
13. Utility company service conduits installation depth shall be as directed by their respective specifications and requirements.

B. Boxes

1. Before locating outlet boxes, check Contract Documents for type of construction and make sure that there is no conflict with other equipment. Locate outlet boxes as shown and locate so as not to interfere with other Work or equipment.
2. Install all outlet boxes flush within walls, ceiling and floors except where installed within non-finished rooms, cabinetry, attic spaces or as indicated on Drawings.
3. Locate pull boxes and junction boxes within concealed, accessible locations where possible.
4. Adjust position of outlet boxes within masonry wall to accommodate course lines.

3.03 *INSTALLATION*

A. Conduit

1. Minimum conduit size shall be 3/4" unless otherwise indicated.
2. All conduit work shall be concealed unless otherwise indicated. Exposed conduits shall be permitted within unfinished rooms/spaces to facilitate installation.
3. Install conduit in complete runs prior to installing conductors or cables.

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4. Make long radius conduits bends free from kink, indentations or flattened surfaces. Make bends carefully to avoid injury or flattening. Bends 1 1/4" size and larger shall be factory made ells, or be made with a manufactured mechanical bender. Heating of steel conduit to facilitate bending or that damage galvanized coating will not be permitted.
5. Remove burrs and sharp edges at end of conduit with tapered reamer.
6. Protect and cover conduits during construction with metallic bushings and bushing "pennies" to seal exposed openings.
7. Assemble conduit threads with anti-corrosion, conductive, anti-seize compound and tighten securely.
8. Install conduits shall that no traps to collect condensation exist.
9. Fasten conduit securely to boxes with locknuts and bushings to provide good grounding continuity.
10. Install pull cords/line within any spare or unused conduits of sufficient length to facilitate future cable installation.
11. Penetrations
 - a. Locate penetrations within structural members as shown on Drawings and as directed by Engineer. Should it be necessary to notch any framing member, make such notching only at locations and in a manner as approved by Engineer.
 - b. Do not chase concrete or masonry to install conduit unless specifically approved by Engineer.
 - c. Cutting or holes
 - 1) Install sleeves for cast-in-place concrete floors and walls. After installing conduit through penetration, seal using dry-pack grouting compound (non-iron bearing, chloride free and non-shrinking) or fire rated assembly if rated floor or wall. Use escutcheon plate on floor underside to contain compound as necessary.
 - 2) Cut holes with a hole saw for penetrations through non-concrete or non-masonry members.
 - 3) Provide chrome plated escutcheon plates at all publicly exposed wall, ceiling and floor penetrations.
 - d. Sealing
 - 1) Non-rated penetration openings shall be packed with non-flammable insulating material and sealed with gypsum wallboard taping compound.
 - 2) Fire rated penetration shall be sealed using a UL classified fire stop assembly suitable to maintain the equivalent fire rating prior to the penetration.
 - 3) Use escutcheon plates to hold sealing or fire rated compound as necessary.

e. Waterproofing

- 1) Make penetrations through any damp-proofed/waterproofed surfaces within damp/wet locations as such as to maintain integrity of surface.
- 2) Install specified watertight conduit entrance seals at all below grade wall and floor penetrations.
- 3) At roof penetrations furnish roof flashing, counter flashing and pitch-pockets compatible to roof assembly.
- 4) Where possible conduits that horizontally penetrate a waterproof membrane shall fall away from and below the penetration's exterior side.
- 5) Make penetrations through floors watertight with mastic, even when concealed within walls or furred spaces.

12. Supports

- a. Conduits shall be support and braced per OSHPD pre-approved anchorage systems when those methods are implemented and installed.
- b. Sizes of rods and cross channels shall be capable of supporting 4 times and 5 times actual load, respectively. Anchorage shall support the combined weight of conduit, hanger and conductors.
- c. Support individual horizontal conduit 1 1/2" and smaller by means of 2 hole straps or individual hangers.
- d. Galvanized iron hanger rods sizes 1/4" diameter and larger with spring steel fasteners, clips or clamps specifically design for that purpose for 1 1/2" conduits and larger.
- e. Support multi-parallel horizontal conduits runs with trapeze type hangers consisting of 2 or more steel hanger rods, preformed cross channels, 'J' bolts, clamps, etc.
- f. Support conduit to wood structures by means of bolts or lag screws in shear, to concrete by means of insert or expansion bolts and to brickwork by means of expansion bolts.
- g. Support multi-parallel vertical conduits runs with galvanized Unistrut, Power-Strut or approved equal type supports anchored to wall. Where multi-floored conduits pass through floors, install riser clamps at each floor.
- h. Maximum conduit support spacing shall be in accordance with NECA Standard of Installation:
 - 1) Horizontal runs:
 - a) 3/4" and smaller at 60" on centers, unless building construction prohibits otherwise, then 84" on centers.
 - b) 1" and larger at 72" on centers, unless building construction prohibits otherwise or any other condition, then 120" on centers.
 - 2) Vertical runs:
 - a) 3/4" and smaller @ 84" on centers.
 - b) 1" and 1 1/4" @ 96" on centers.

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- c) 1 1/2" and larger @ 120" on centers.
- d) Any vertical condition such as shaftways and concealed locations for any sized conduit, 120" on centers.
- i. Anchorage for RMC/IMC supports unless otherwise specified:
 - 1) < 1" IMC/RMC = #10 bolt/screw.
 - 2) 1" IMC/RMC = 1/4" bolt/screw.
 - 3) 1 1/2" and 2" IMC/RMC = 3/8" bolt/screw.
 - 4) 3" IMC/RMC, 4" EMT = 1/2" bolt/screw.
 - 5) > 3"IMC/RMC = 5/8" bolt/screw.
- j. Anchorage for EMT supports unless otherwise specified:
 - 1) < 1 1/2" EMT = #10 bolt/screw.
 - 2) 1 1/2" EMT = 1/4" bolt/screw.
 - 3) 2, 2 1/2" and 3" EMT = 3/8" bolt/screw.
 - 4) 4" EMT = 1/2" bolt/screw.
 - 5) > 4"EMT = 5/8" bolt/screw.

B. Boxes

1. Install boxes as shown on Drawings and as required for splices, taps, wire pulling, equipment connections and Code compliance.
2. Install additional pull boxes, not shown on Drawings, in sufficient quantities to facilitate pulling of conductors and cables such that total spacing does not exceed 150 feet or 270 degrees, total; and maximum pulling tension will not be exceeded.
3. Install plaster rings on all outlet boxes in stud walls or in furred, suspended or exposed ceilings. Covers shall be of a depth suited for installation.
4. Provide gasketed cast metal cover plates where boxes are exposed in damp or wet locations
5. Install access door for boxes installed within concealed locations without access.
6. Install approved factory made knockout seal where knockouts are not present.
7. Refer to Architectural interior elevations and details shown for exact mounting heights of all electrical outlets. In general, locate outlets as shown or specific and complies with Americans with Disabilities Act:
 - a. Convenience outlets: +18"AFF or +6" above counter or splash.
 - b. Local switches: +48"AFF or +6" above counter or splash.
 - c. Telecommunication outlets: +18"AFF or +48"AFF for wall telephone or intercom device.
 - d. Verify all mounting heights with Drawings, and where heights are not suited for construction or finish please consult Engineer.
8. Use conduit bodies to facilitate pulling of conductor or cables or change conduit direction. Do not splice within conduit bodies.

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9. Enclose pull box with additional rated gypsum board as necessary to maintain wall's original fire rating.
10. Install galvanized steel cover plates on all open boxes within dry listed areas.
11. Install in-ground pull holes/boxes flush to grade finish at finished areas or 1" above finished landscaped grade. Seal all conduits terminating in pull hole/box watertight. Install and grout around bell ends where shown. Cover and lids shall be removable without damage to adjacent finish surfaces.
12. Support
 - a. Accurately place boxes for finish, independently and securely supported by adequate blocking or manufacturer channel type heavy-duty box hangers for stud walls. Do not use nails to support boxes.
 - b. Support boxes independent of conduit system.
 - c. Mount boxes installed within ceilings to 16 gauge metal channel bars attached to main runners or joists.
 - d. Support boxes within suspended acoustical tile ceilings directly from structure above when light fixture are to be installed from box.
 - e. Use auxiliary plates, bar or clips and grouted in place for masonry, block or pour-in-place concrete construction.

3.04 APPLICATION

A. Conduit

1. RMC suitable for all damp, dry and wet locations except when in contact with earth. IMC not suitable for hazardous locations as stated within CEC.
2. CRMC suitable for damp or wet locations, concealed within concrete or in contact with earth.
3. PVC suitable for beneath ground floor slab, except when penetrating, and direct earth burial. Do not run exposed within concrete walls or in floor slab unless indicated on Drawings or per Engineer's permission.
4. LFMC application same as FMC above but for damp or wet locations.

B. Termination and joints

1. Use raceway fittings compatible with associated raceway and suitable for the location.
2. Raceways shall be joined using specified couplings or transitions where dissimilar raceway systems are joined.
3. Conduits shall be securely fastened to cabinets, boxes and gutters using (2) two locknuts and insulating bushing or specified insulated connector. Where joints cannot be made tight and terminations are subject to vibration, use bonding jumpers, bonding bushings or wedges to provide electrical continuity of the raceway system. Use insulating bushings to protect conductors where subjected to vibration or dampness. Install grounding bushings or bonding jumpers on all conduits terminating at concentric or eccentric knockouts.

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4. Terminations exposed at weatherproof enclosures and cast outlet boxes shall be made watertight using specified connectors and hubs.
 5. Stub freestanding equipment conduits through concrete floors for connections with top of coupling set flush with finished floor. Install plugs to protect threads and entrance of debris.
 6. Install specified cable sealing bushings on all conduits originating outside the building walls and terminating within interior switchboard, panel, cabinet or gutters. Install cable sealing bushings or raceway seal for conduit terminations in all grade level or below grade exterior pull, junction or outlet boxes.
 7. Where conduits enter building from below grade inject into filled raceways pre-formulated rigid 2 lbs. density polyurethane foam suitable for sealing against water, moisture, insects and rodents.
 8. Install expansion fitting or expansion/deflection couplings per manufacturer's recommendations where:
 - a. Any conduit that crosses a building structure expansion joint; secure conduit on both sides to building structure and install expansion fitting at joint.
 - b. Any conduit that crosses a concrete expansion joint; install expansion/deflection at joint.
 - c. Any conduit greater than 1-1/4" is routed along roof top in runs greater than 100 feet; install expansion fittings every 100 feet.
 - d. Engineer may allow LFMC in lieu of expansion fitting or expansion/deflection couplings on conduits 2" and smaller within accessible locations upon further review and written consent.
- C. Boxes
1. Standard type suitable for all flush installations and all dry concealed locations.
 2. Concrete type suitable for all flush concrete installations.
 3. Masonry type suitable for all flush concrete and block installations.
 4. Surface cast meta type suitable for all exposed damp and wet surface mounted locations, and dry surface mounted locations less than 96" from finished floor.

END SECTION

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SECTION 26 18 11

OVERCURRENT PROTECTION DEVICES

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes

1. Provide all labor, materials and equipment necessary to complete the installation required for the items specified under this Section, including but not limited to overcurrent protection devices.

B. Related sections

1. Where items specified in other Division 26 sections conflict with the requirements of this Section, the most stringent requirement shall govern.
2. The requirements of this Section apply to all Division 26 work, as applicable.
3. Consult all other sections, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete installation.

1.02 REFERENCES

A. Comply with the latest edition of the following applicable specifications and standards except as otherwise shown or specified:

1. CCR –California Code of Regulations, Title 24
 - a. Part 3 -California Electrical Code(CEC); NFPA 70 National Electrical Code (NEC) with California amendments
2. Federal Specification
 - a. W-C-375; Circuit Breakers, Molded Case, Branch Circuit And Service
3. NEMA –National Electrical Manufacturer's Association
 - a. AB 1; Molded-Case Circuit Breakers, Molded Case Switches, and Circuit-Breaker Enclosures
 - b. PB 2.2; Application Guide for Ground Fault Protective Devices for Equipment
4. UL -Underwriters Laboratories, Inc.
 - a. 248; Low Voltage Fuses
 - b. 468; Wire Connectors

- c. 508E; IEC Type "2" Coordination Short Circuit Tests
- d. 489; Molded-Case Circuit Breakers and Circuit Breaker Enclosures
- e. 943; Standard for Ground-Fault Circuit-Interrupters

1.03 SUBMITTALS

- A. Submit manufacturer's data for materials specified within this Section in accordance to Section 26 05 00.
- B. Production test of circuit breakers upon request of Engineer.
- C. Submittal shall show the following information: circuit breaker numbering, circuit breaker type and short circuit rating, provisions for future circuit breakers, bussing, including neutral and ground, ratings and enclosure dimensions and trims.

1.04 QUALITY ASSURANCE

- A. All materials, equipment and parts comprising the materials specified herein shall be new and unused, bearing UL labels where applicable.
- B. The manufacturing facility shall be registered by Underwriters Laboratories Inc. to the International Organization for Standardization ISO 9002 Series Standards for quality.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Handle carefully to avoid damage to internal components, enclosure and finish.
- B. Store in a clean, dry environment. Maintain factory packaging and, if required, provide an additional cover to protect enclosure in harsh environments.

PART 2 - PRODUCTS

2.01 FUSES

- A. All power distribution fuses shall be time-delay, high interrupting (200kAIC minimum) and current limiting type, unless otherwise indicated. All fuses shall be of same manufacturer and model.
 - 1. Motor branch circuit fuses (0 – 600A): UL Class RK5 dual element, time delay type shall be size for UL 508E "Type 2" coordination for the motor controller. Coordinate fuse selection with motor starter overload relay heaters as required.
 - 2. General purpose feeder fuses (0 – 600A): UL Class RK1 dual element, time delay type shall be size per Drawings.
- B. Control and instrumentation fuses shall be of type and rating as recommended by equipment manufacturer, suitable for fuse blocks or holders installation.

2.02 MOLDED CASE CIRCUIT BREAKERS

A. General

1. Circuit breakers shall be constructed using glass reinforced insulating material. Current carrying components shall be completely isolated from the handle and the accessory mounting area.
2. Circuit breakers shall have an over center, trip free, toggle operating mechanism which will provide quick-make, quick-break contact action. The circuit breaker shall have common tripping of all poles.
3. The circuit breaker handle shall reside in a tripped position between ON and OFF to provide local trip indication.
4. The maximum ampere rating and UL, IEC, or other certification standards with applicable voltage systems and corresponding interrupting ratings shall be clearly marked on face of circuit breaker after installation.
5. Circuit breakers shall have an RMS interrupting capacity not less than shown on Drawings, or if not shown shall not be less than:
 - a. 25kA for 480V systems
 - b. 22kA for 240V (or less) systems
6. Each circuit breaker shall be equipped with a push-to-trip button, located on the face of the circuit breaker to mechanically operate the circuit breaker tripping mechanism for maintenance and testing purposes.
7. Circuit breakers shall be equipped with UL Listed electrical accessories as noted on Drawing. Circuit breaker handle accessories shall provide provisions for locking handle in the ON and OFF position.
8. All circuit breakers shall be UL Listed for reverse connection without restrictive line and load markings and be suitable for mounting in any position.
9. Circuit breakers shall be constructed with factory installed mechanical lugs. All circuit breakers shall be UL Listed to accept field installable/removable mechanical type lugs. Lug body shall be bolted in place; snap in design not acceptable. All lugs shall be UL Listed to accept solid (not larger than #8 AWG) and/or stranded copper and aluminum conductors. Lugs shall be suitable for 90°C rated wire, sized according to the 75°C temperature rating in the CEC.
10. All circuit breakers shall be capable of accepting bus connections.

B. Thermal-Magnetic Circuit Breakers

1. Circuit breakers shall have a permanent trip unit containing individual thermal and magnetic trip elements in each pole.

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2. Thermal trip elements shall be factory preset and sealed. Circuit breakers shall be true RMS sensing and thermally responsive to protect circuit conductor(s) in a 40°C ambient temperature.
3. Circuit breaker frame sizes above 100 amperes shall have a single magnetic trip adjustment located on the front of the circuit breaker.
4. Provide equipment ground fault protection where shown on Drawing with the following features.
 - a. Ground fault sensing system shall be modified zero sequence sensing type and not require any external power to trip the circuit breaker.
 - b. The ground fault sensing system shall be suitable for use on grounded systems. The ground fault sensing system shall be suitable for use on three-phase, three-wire circuits where the system neutral is grounded but not carried through the system or on three-phase, four-wire systems.
 - c. Ground fault pickup current setting and time delay shall be field adjustable. A switch shall be provided for setting ground fault pickup point. A means to seal the pickup and delay adjustments shall be provided.
 - d. The ground fault sensing system shall include a ground fault memory circuit to sum the time increments of intermittent arcing ground faults above the pickup point.
 - e. A means of testing the ground fault system to meet the on-site testing requirements of CEC 230.95 (C) shall be provided.
 - f. Local visual ground fault trip indication shall be provided.
 - g. The ground fault sensing system shall be provided with Zone Selective Interlocking (ZSI) communication capabilities compatible with other thermal magnetic circuit breakers equipped with ground fault sensing, electronic trip circuit breakers with integral ground fault sensing and external ground fault sensing systems as noted on Drawings.

C. Electronic Trip Circuit Breakers

1. Circuit breaker trip system shall be a microprocessor-based true RMS sensing design with sensing accuracy through the thirteenth (13th) harmonic. Sensor ampere ratings shall be as indicated on Drawings.
2. The integral trip system shall be independent of any external power source and shall contain no less than industrial grade electronic components.
3. The ampere rating of the circuit breaker shall be determined by the combination of an interchangeable rating plug, the sensor size and the long-time pickup adjustment on the circuit breaker. The sensor size, rating plug and adjustment positions shall be clearly marked on the face of the circuit breaker. Circuit breakers shall be UL Listed to carry 80% (or 100% where noted on Drawings) of their ampere rating continuously.

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4. The following time/current response adjustments shall be provided. Each adjustment shall have discrete settings and shall be independent of all other adjustments.
 - a. Instantaneous Pickup
 - b. Long Time Pickup
 - c. Long Time Delay
 - d. Short Time Pickup
 - e. Short Time Delay
 - f. Ground Fault Pickup (when specified with ground fault protection)
 - g. Ground Fault Delay (when specified with ground fault protection)
5. A means to seal the trip unit adjustments in accordance with CEC 240.6 (B) shall be provided.
6. Local visual trip indication for overload, short circuit and ground fault trip occurrences shall be provided.
7. An ammeter to individually display all phase currents flowing through the circuit breaker shall be provided. All current values shall be displayed in true RMS with 2% accuracy.
8. Long Time Pickup indication to signal when loading approaches or exceeds the adjusted ampere rating of the circuit breaker shall be provided.
9. The trip system shall include a Long Time memory circuit to sum the time increments of intermittent overcurrent conditions above the pickup point. Means shall be provided to reset Long Time memory circuit during primary injection testing.
10. An ammeter to individually display all phase currents flowing through the circuit breaker shall be provided. Indication of inherent ground fault current flowing in the system shall be provided on circuit breakers with integral ground fault protection. All current values shall be displayed in true RMS with 2% accuracy.
11. Circuit breakers shall be equipped with back-up thermal and magnetic trip system.
12. Equipment Ground Fault Protection shall be provided where noted on Drawings.
 - a. Circuit breakers shall be provided with integral equipment ground fault protection for grounded systems. The circuit breaker shall be suitable for use on three-phase, three-wire circuits where the system neutral is grounded but not carried through the system or on three-phase, four-wire systems.

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- b. A separate neutral current transformer shall be provided for three-phase, four-wire systems.
 - c. Ground fault sensing system shall be residual sensing type.
 - d. The trip system shall include a ground fault memory circuit to sum the time increments of intermittent ground faults above the pickup point.
 - e. A means of testing the ground fault system to meet the on-site testing requirements of CEC 230.95 (C) shall be provided.
 - f. Local visual trip indication for a ground fault trip occurrence shall be provided.
 - g. The ground fault sensing system shall be provided with Zone Selective Interlocking (ZSI) communication capabilities compatible with other thermal magnetic circuit breakers equipped with ground fault sensing, electronic trip circuit breakers with integral ground fault sensing and external ground fault sensing systems as noted on Drawings.
13. Circuit breaker trip system shall be equipped with an externally accessible test port. Disassembly of the circuit breaker shall not be required for testing. Test set shall be capable of verifying the operation of all trip functions with or without tripping the circuit breaker.

PART 3 -EXECUTION

3.01 PREPARATION

- A. Notify Engineer no later than 10 working days for adjustable circuit breaker settings not shown within Drawings. Submit to Engineer the following information:
 - 1. Panel, switchboard name/ID
 - 2. Circuit breaker identifier (i.e., main circuit breaker, load served, etc.)
 - 3. List of necessary settings (i.e., trip settings, time delays, etc.)

3.02 INSTALLATION

- A. Install equipment and their accessories in to manufacturer's instructions, pertinent Codes, and with recognized industry practices to insure device operates properly.
- B. Tighten electrical connectors and terminals in accordance to manufacturer's requirements. Where the manufacturer does not have published torque tightening values, comply with the requirements of UL 468.

3.03 FIELD QUALITY CONTROL

- A. Check tightness of circuit breaker connections using a calibrated torque wrench or torque screwdriver per manufacturer's written specifications.

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- B. Contractor to obtain the services of an independent testing company who shall provide quality control and adjustments as well as tests for
 - 1. Check each circuit breaker above 100A on a 225A frame for long-time and short-time delay pickup and instantaneous pickup.
 - a. Instantaneous pickup current shall be determined by 4 cycles or less.
 - b. b. Perform timing test with 300% of breaker trip unit rated current.
 - c. Adjust unit if required, so that the tripping characteristics are within the limits of the published time-current characteristic curves for that particular trip unit.
 - 2. Test and calibrate ground fault protection trip and pickup time on 225A frame breakers and larger.
- C. Physically test key interlock systems to check for proper functionality.
- D. Check and set where required all protective device settings in accordance with approved coordination study settings and conduct ground fault acceptance tests.

3.04 *ADJUSTING*

- A. Adjust all operating mechanisms for free mechanical movement per manufacturer's specifications.
- B. Adjust circuit breaker trip and time delay settings to values indicated as instructed by Engineer.
 - 1. Check each circuit breaker above 100A, long-time and short-time delay pickup and instantaneous pickup. Instantaneous pickup current shall be determined by 4 cycles or less. Perform timing test with 300% of breaker trip unit rated current. Adjust unit if required, so that the tripping characteristics are within the limits of the published time-current characteristic curves for that particular trip unit.
 - 2. Main circuit breaker ground fault setting shall be per CEC 230.95 (A) or as directed by Engineer.

3.05 *PROTECTION*

- A. When directed by Engineer provide physical means to "permanently fix" settings for rotary and DIP type switches with a thin coat of clear lacquer.

3.06 *CLEANING*

- A. Remove marks, dirt and debris from installed equipment surfaces for "new like" appearance.

END SECTION

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SECTION 26 32 13

ENGINE GENERATOR

PART 1 — GENERAL

1.01 SUMMARY

A. Section includes

1. Provide all labor, materials and equipment necessary to complete the installation required for the items specified under this Section, including but not limited to engine generators, its accessories and controls.

B. Related work under this section

1. Where items specified in other Division 26 sections conflict with the requirements of this Section, the most stringent requirement shall govern.
 - a. 26 05 26 – Grounding and Bonding for Electrical Systems
 - b. 26 18 11 – Overcurrent Protection Devices
2. The requirements of this Section apply to all Division 26 work, as applicable.
3. Consult all other sections, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete installation.

1.02 REFERENCES

A. The generator set and its installation and on-site testing shall conform to the requirements of the following codes and standards:

1. CCR –California Code of Regulations, Title 24
 - a. Part 3 -California Electrical Code(CEC); NFPA 70 National Electrical Code (NEC) with California amendments
 - b. Part 9 -California Fire Code; WFCU Uniform Fire Code (UFC) with California amendments
2. FCC Part 15, Subpart B.
3. ISO –International Organization for Standardization
 - a. 8528; Reciprocating Internal Combustion Engine Driven Alternating Current Generating Sets (All Parts)
4. IEEE –Institute of Electrical and Electronic Engineers
 - a. C2; National Electrical Safety Code (NESC)
 - b. 446; Recommended Practice for Emergency and Standby Power Systems for Industrial and Commercial Applications
5. NECA –National Electrical Contractors Association
 - a. 404; Recommended Practice for Installing Generator Sets
6. NEMA –National Electrical Manufacturer's Association

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- a. ICS 1; Industrial Control and Systems: General Requirements
 - b. MG 1; Motors and Generators
 - c. MG 2; Safety Standard for Construction and Guide for Selection, Installation, and Use of Electric Motors and Generators
7. NFPA –National Fire Protection Association
- a. 37; Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines
 - b. 99; Standard for Health Care Facilities
 - c. 110; Standard for Emergency and Standby Power Systems
8. UL -Underwriters Laboratories, Inc.
- a. 508; Standard for Industrial Control Equipment
 - b. 2085; Standard for Protected Aboveground Tanks for Flammable and Combustible Liquids
 - c. 2200; Standard for Stationary Engine Generator Assemblies

1.03 SYSTEM DESCRIPTION

- A. Provide a standby power system to supply electrical power at 120/240Volts,60 Hertz, 3 Phase, 4 Wire. The generator shall consist of a liquid cooled diesel engine, a synchronous AC alternator, and system controls with all necessary accessories for a complete operating system, including but not limited to the items as specified hereinafter.
- B. The stand-by generator set shall be supplied to operate on No. 2 diesel fuel. The engine shall be liquid cooled by means of engine mounted radiator.
- C. The stand-by generator set shall be rated continuous stand-by (defined continuous for the duration of any power outage) per Part 2 below.
- D. Engine: The turbo charged engine shall be diesel fueled, 4 cycle, liquid cooled, with a governed speed of 1800 RPM. Engine shall be turbocharged with intercooler/aftercooler, forged steel crankshaft and rods. Engine shall be equipped with 90% efficient controls for crankcase emissions, in full conformance with the latest and applicable California Air Resources requirements and all local emissions requirements. Submit certifications with the submittals.

1.04 SUBMITTALS

- A. Submit manufacturer's data for materials specified within this Section in accordance to Section 26 05 00.
- B. The submittal shall contain the following minimum information:
 - 1. Engine Generator specification sheet
 - 2. Controls specification sheet(s)
 - 3. Installation / Layout dimensional drawing
 - 4. Wiring schematic
 - 5. Sound data

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- 6. Emission certification
- 7. Warranty statement
- C. Manufacturer shall assist Owner in acquiring all necessary CARB installation and initial operation permits for the gen-set.

1.05 QUALITY ASSURANCE

- A. Installation shall conform to NECA 404, Recommended Practice for Installing Generator Sets unless otherwise specified.
- B. The engine shall be equipped with all devices and accessories required to meet the California Air Resources Board and other applicable State and Local emissions standards.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Handle carefully to avoid damage to internal components, enclosure and finish.
- B. Store in a clean, dry environment. Maintain factory packaging and, if required, provide an additional cover to protect enclosure in harsh environments.

1.07 WARRANTY

- A. Furnish one-year guarantee in accordance with and in form required under Section 26 05 00.
- B. The generator set and associated equipment shall be warranted for a period of not less than 5 years from the date of commissioning against defects in materials and workmanship.
- C. Service and support
 - 1. The manufacturer of the generator set shall maintain service parts inventory at a central location which is accessible to the service location 24 hours per day, 365 days per year.
 - 2. The generator set shall be serviced by a local service organization that is trained and factory certified in generator set service. The supplier shall maintain an inventory of critical replacement parts at the local service organization, and in service vehicles. The service organization shall be on call 24 hours per day, 365 days per year.
 - 3. The manufacturer shall maintain model and serial number records of each generator set provided for at least 20 years.

1.08 SYSTEM STARTUP

- A. Refer to manufacturer's documentation to start-up procedures and requirements.

PART 2 — PRODUCTS

2.01 MANUFACTURER

- A. All equipment shall be new and of current production of a National firm, who manufactures the generator, engine, control panel, acoustical assemblies comprising the stand-by generator set as a matched unit, having a service and parts organization.
- B. Manufacturer: Blue Star or approved equal.
- C. General
 - 1. Basis of design is Blue StarJD80-03FT4 with Level 2 Sound Housing.
 - 2. Ratings based on site conditions of : Altitude 100 ft. ambient temperatures up to 105°F
 - 3. The generator set rating shall be based on emergency/standby service.
 - 4. The generator set shall operate at 1800 RPM and at a voltage of: 120/240Vac, 3 phase, Four-wire, 60 Hz.
 - 5. The generator set shall be stand-by rated at 80kW, 100kVA, 120A at 0.8 PF.
 - 6. The alternator shall support the following site requirements:
 - a. Support (2) 15hp FNVR pumps with 5kVA of receptacle load with 20% maximum voltage drop on start up.

2.02 ENGINE

- A. Engine Rating and Performance
 - 1. The prime mover shall be a liquid cooled, diesel fueled, turbocharged after-cooled engine of 4-cycle design. It will have adequate horsepower to achieve rated kW output with at an operating speed of 1800 RPM.
 - 2. The engine shall support a 100% load step.
 - 3. The generator system shall support generator start-up and load transfer within 10 seconds.
- B. Engine Oil System
 - 1. Full pressure lubrication shall be supplied by a positive displacement lube oil pump. The engine shall have a replaceable oil filter(s) with internal bypass and replaceable element(s).
 - 2. The engine shall operate on mineral based oil. Synthetic oils shall not be required.
 - 3. The oil shall be cooled by an oil cooler which is integrated into the engine system.

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C. Engine Cooling System

1. The engine is to be cooled with a unit mounted radiator, fan, water pump, and closed coolant recovery system. The coolant system shall include a coolant fill box which will provide visual means to determine if the system has adequate coolant level. The radiator shall be designed for operation in 122 degrees F, (50 degrees C) ambient temperature.
2. The engine shall have (a) unit mounted, thermostatically controlled water jacket heater(s) to aid in quick starting. The wattage shall be as recommended by the manufacturer.
3. Engine coolant and oil drain extensions, equipped with pipe plugs and shut-off valves, must be provided to the outside of the mounting base for cleaner and more convenient engine servicing.
4. A radiator fan guard must be installed for personnel safety that meets UL and OSHA safety requirements.

D. Engine Starting System

1. Starting shall be by a solenoid shift, DC starting system.
2. The engine's cranking batteries shall be lead acid. The batteries shall be sized per the manufacturer's recommendations. The batteries supplied shall meet NFPA 110 cranking requirements of 90 seconds of total crank time. Battery specifications (type, amp-hour rating, cold cranking amps) to be provided in the submittal.
3. The genset shall have an engine driven, battery charging alternator with integrated voltage regulation.
4. The genset shall have an automatic dual rate, float equalize, 10 amp battery charger. The charger must be protected against a reverse polarity connection. The chargers charging current shall be monitored within the generator controller to support remote monitoring and diagnostics. The battery charger is to be factory installed on the generator set. Due to line voltage drop concerns, a battery charger mounted in the transfer switch will be unacceptable.

E. Engine Fuel System

1. The engine fuel system shall be designed for operation on #2 diesel fuel and cold weather diesel blends.
2. The engine shall include a primary fuel filter, water separator, manual fuel priming pump, and engine flexible fuel lines must be installed at the point of manufacture. Element shall be replaceable paper type.
3. The engines suction line shall be fitted with a check valve to secure prime for the engines injection pump.

F. Engine Controls

1. Engines that are equipped with an electronic engine control module (ECM), shall monitor and control engine functionality and seamlessly integrate with the genset controller through digital communications. ECM monitored parameters shall be integrated into the genset controllers NFPA 110 alarm and warning requirements. All ECM fault codes shall be displayed at the genset controller in standard language - fault code numbers are not acceptable.

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2. For engines without ECM functionality or for any additional genset controller monitoring, sensors are to be conditioned to a 4-20ma signal level to enhance noise immunity and all sensor connections shall be sealed to prevent corrosion.
3. Engine speed shall be controlled with an integrated isochronous governor function with no change in alternator frequency from no load to full load. Steady state regulation is to be 0.25%.

G. Engine Exhaust & Intake

1. The engine exhaust emissions shall meet the EPA emission requirements for standby power generation.
2. The manufacturer shall supply its recommended stainless steel, flexible connector to couple the engine exhaust manifold to the exhaust system. A rain cap will terminate the exhaust pipe after the silencer. All components must be properly sized to assure operation without excessive back pressure when installed.
3. The manufacturer shall supply a critical grade exhaust silencer as standard. For applications with site specific sound requirements (reference section 1.1), the silencer shall be selected to achieve site sound levels.
4. For gensets in a weather or sound attenuated enclosure, all exhaust piping from the turbo-charger discharge to the silencer shall be thermally wrapped to minimize heat dissipation inside the enclosure.
5. The engine intake air is to be filtered with engine mounted, replaceable, dry element filters.

2.03 ALTERNATOR

- A. The alternator shall be the voltage and phase configuration as specified in this Section.
- B. The alternator shall be a 4 pole, revolving field, stationary armature, synchronous machine. The excitation system shall utilize a brushless exciter with a three phase full wave rectifier assembly protected against abnormal transient conditions by a surge protector. Photo-sensitive components will not be permitted in the rotating exciter.
- C. The alternator shall include a permanent magnet generator (PMG) for excitation support. The system shall supply a minimum short circuit support current of 300% of the rating (250% for 50Hz operation) for 10 seconds.
- D. Three phase alternators shall be 12 lead, broad range capable of supporting voltage reconnection. Single phase alternators shall be four lead and dedicated voltage designs (600v) shall be six lead. All leads must be extended into a NEMA 1 connection box for easy termination. A fully rated, isolated neutral connection must be included by the generator set manufacturer.
- E. The alternator shall use a single, sealed bearing design. The rotor shall be connected to the engine flywheel using flexible drive disks. The stator shall be direct connected to the engine to ensure permanent alignment.

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- F. The alternator shall meet temperature rise standards of UL2200 (120 degrees C). The insulation system material shall be class "H" capable of withstanding 125 degrees C temperature rise.
- G. The alternator shall be protected against overloads and short circuit conditions by advanced control panel protective functions. The control panel is to provide a time current algorithm that protects the alternator against short circuits. To ensure precision protection and repeatable trip characteristics, these functions must be implemented electronically in the generator control panel -- thermal magnetic breaker implementation are not acceptable.
- H. An alternator strip heater shall be installed to prevent moisture condensation from forming on the alternator windings. A tropical coating shall also be applied to the alternator windings to provide additional protection against the entrance of moisture.

2.04 CONTROLS

- A. The generator control system shall be a fully integrated microprocessor based control system for standby emergency engine generators meeting all requirements of NFPA 110 level 1.
- B. The generator control system shall be a fully integrated control system enabling remote diagnostics and easy building management integration of all generator functions. The generator controller shall provide integrated and digital control over all generator functions including: engine protection, alternator protection, speed governing, voltage regulation and all related generator operations. The generator controller must also provide seamless digital integration with the engine's electronic engine control module (ECM) if so equipped. Generator controller's that utilize separate voltage regulators and speed governors or do not provide seamless integration with the engine management system are considered less desirable.
- C. Communications shall be supported with building automation via the Modbus protocol without network cards. Optional internet and intranet connectivity shall be available.
- D. The control system shall provide an environmentally sealed design including encapsulated circuit boards and sealed automotive style plugs for all sensors and circuit board connections. The use of non-encapsulated boards, edge cards, and pc ribbon cable connections are considered unacceptable.
- E. Circuit boards shall utilize surface mount technology to provide vibration durability. Circuit boards that utilize large capacitors or heat sinks must utilize encapsulation methods to securely support these components.
- F. A predictive maintenance algorithm that alarms when maintenance is required. The controller shall have the capability to call out to the local servicing dealer when maintenance is required.
- G. Diagnostic capabilities should include time-stamped event and alarm logs, ability to capture operational parameters during events, simultaneous monitoring of all input or output parameters, callout capabilities, support for multi-channel digital strip chart functionality and .2 msec data logging capabilities.
- H. In addition to standard NFPA 110 alarms, the application loads should also be protected through instantaneous and steady state protective settings on system voltage, frequency, and power levels.

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- I. The control system shall provide pre-wired customer use I/O: 4 relay outputs (user definable functions), communications support via RS232, RS485, or an optional modem. Additional I/O must be an available option.
- J. Customer I/O shall be software configurable providing full access to all alarm, event, data logging, and shutdown functionality. In addition, custom ladder logic functionality inside the generator controller shall be supported to provide application support flexibility. The ladder logic function shall have access to all the controller inputs and customer assignable outputs.
- K. The control panel will display all user pertinent unit parameters including: engine and alternator operating conditions; oil pressure and optional oil temperature; coolant temperature and level alarm; fuel level (where applicable); engine speed; DC battery voltage; run time hours; generator voltages, amps, frequency, kilowatts, and power factor; alarm status and current alarm(s) condition per NFPA 110 level 1.

2.05 ENGINE / ALTERNATOR PACKAGING

- A. The engine/alternator shall be isolated from the generator frame with rubber isolators. The packaging shall not require the addition of external spring isolators.
- B. A mainline, thermal magnetic circuit breaker carrying the UL mark shall be factory installed. The breaker shall be rated between 100 to 125% of the rated ampacity of the genset. The line side connections are to be made at the factory. Output lugs shall be provided for load side connections.
- C. A second mainline, thermal magnetic circuit breaker carrying the UL mark shall be factory installed. The line side connections are to be made at the factory. Output lugs shall be provided for cam lock connections at side of cabinet for load bank connection.
- D. The generator shall include a unit mounted 120 volt convenience outlet.
- E. Enclosure
 - 1. The genset shall be packaged with a sound attenuating enclosure with a maximum rating of 79dBA at any location 23 feet from the generator set in a free field environment.
 - 2. The enclosure shall be completely lined with sound deadening material. This material must be of a self-extinguishing design.
 - 3. The enclosure shall be made of steel with a minimum thickness of 14 gauge. The enclosure is to have hinged, removable doors to allow access to the engine, alternator and control panel. The hinges shall allow for door fit adjustment. Hinges and all exposed fasteners will be stainless steel or JS5000. The use of pop-rivets weakens the paint system and not allowed on external painted surfaces. Key-locking and pad-lockable door latches shall be provided for all doors.
 - 4. The enclosure shall be coated with electrostatic applied powder paint, baked and finished to manufacturer's specifications. The color will be manufacturer's standard.
 - 5. The enclosure shall utilize an upward discharging radiator hood. Due to concerns relative to radiator damage, circulating exhaust, and prevailing winds, equipment without a radiator discharge hood will not be acceptable.

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6. The genset silencer shall be mounted on the discharge hood of the enclosure. Due to architectural concerns, silencers mounted on the top of the generator enclosure are not acceptable. Gensets with silencers mounted inside the main generator compartment are acceptable only if the silencer is thermally wrapped to minimize heat stress on the surrounding components.

F. Base:

1. The engine-generator set shall be mounted with vibration isolators Caldyn or equal, on a heavy duty steel base to maintain proper alignment between components. The engine-generator set shall incorporate a battery tray with battery hold-down clamps within the base rails.

G. Sub-base fuel tank

1. The packaging shall include a double wall, sub-base mounted, UL142 listed fuel tank. The tank shall be sized to provide 24 hours of run time.
2. The tank shall include fuel suction and return connections, normal and emergency vents, secondary containment emergency vent and rupture basin sensor, mechanical fuel level indication and a stub-up area convenient for electrical conduit entry.
3. The fuel tank shall use an electric fuel sensor to provide an analog indication of fuel level. The controller shall have a warning indication on low fuel level and provide optional shutdown functionality for low, low fuel level.
4. The fuel tank shall have a sloped top and bottom. The sloped top allows water to run off. The sloped bottom allows the water and other impurities in the fuel to collect near the back of the tank away from the fuel suction point.
5. The fuel tank must be supplied by the engine-generator set manufacturer and be installed before shipment.

2.06 LOOSE ITEMS

- A. Supplier to itemize loose parts that require site mounting and installation. Preference will be shown for gensets that factory mount items like mufflers, battery chargers, etc.
- B. Spare Parts:
 1. Fuses: One spare set
 2. Filters One spare set (air, fuel, oil)

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Equipment shall be installed by the contractor in accordance with final submittals and Drawings. Installation shall comply with applicable state and local codes as required by the authority having jurisdiction. Install equipment in accordance with manufacturer's instructions and instructions included in the listing or labeling of UL listed products.

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- B. Installation of equipment shall include furnishing and installing all interconnecting wiring between all major equipment provided for the on-site power system. The contractor shall also perform interconnecting wiring between equipment sections (when required), under the supervision of the equipment supplier. Provide flexible electrical connections from pad to equipment.
- C. Equipment shall be installed on concrete housekeeping pads. Equipment shall be permanently fastened to the pad in accordance with manufacturer's instructions and seismic requirements of the site.
- D. Equipment shall be initially started and operated by representatives of the manufacturer.
- E. All equipment shall be physically inspected for damage. Scratches and other installation damage shall be repaired prior to final system testing. Equipment shall be thoroughly cleaned to remove all dirt and construction debris prior to initial operation and final testing of the system.

3.02 *STARTUP AND COMMISSIONING*

- A. The supplier of the electric generating plant and associated items covered herein shall provide factory trained technicians to checkout the completed installation and to perform an initial startup inspection to include:
 - 1. Ensuring the engine starts (both hot and cold) within the specified time.
 - 2. Verification of engine parameters within specification.
 - 3. Verify no load frequency and voltage, adjusting if required.
 - 4. Test all automatic shutdowns of the engine-generator.
 - 5. Perform a load test of the electric plant, ensuring full load frequency and voltage are within specification by using building load.
- B. Provide documentation of the above tests in accordance to NFPA 110.

3.03 *TESTING*

- A. The complete installation shall be tested for compliance with the specification following completion of all site work. Testing shall be conducted by representatives of the manufacturer, with required fuel supplied by Contractor. The Engineer shall be notified in advance and shall have the option to witness the tests.
- B. Installation acceptance tests to be conducted on-site shall include a "cold start" test, a two hour full load test, and a one step rated load pickup test in accordance with NFPA 110. Provide a resistive load bank and make temporary connections for full load test.
- C. Perform a power failure test on the entire installed system. This test shall be conducted by opening the power supply from the utility service, and observing proper operation of the system for at least 2 hours. Coordinate timing and obtain approval for start of test with site personnel.
- D. After installation, the Contractor shall demonstrate to the Owner and the Local Fire Authority that the fuel system is complete, without leaks and is seismically braced.

3.04 TRAINING

- A. Training is to be supplied by the start-up technician during commissioning. The training should cover basic generator operation and common generator issues that can be managed by the end-user.
- B. Training is to include manual operation of system.

END SECTION

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SECTION 26 36 00

AUTOMATIC TRANSFER & BYPASS-ISOLATION SWITCH

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes

1. Provide all labor, materials and equipment necessary to complete the installation required for the items specified under this Section, including but not limited to automatic transfer switches (ATS) or automatic transfer switch with by-pass switch (ATS/BPS).

B. Related sections

1. Where items specified in other Division 26 sections conflict with the requirements of this Section, the most stringent requirement shall govern.
 - a. 26 05 26 – Grounding and Bonding for Electrical Systems
2. The requirements of this Section apply to all Division 26 work, as applicable.
3. Consult all other sections, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete installation.

1.02 REFERENCES

A. Comply with the latest edition of the following applicable specifications and standards except as otherwise shown or specified:

1. CCR –California Code of Regulations, Title 24
 - a. Part 3 -California Electrical Code(CEC); NFPA 70 National Electrical Code (NEC) with California amendments
2. NEMA –National Electrical Manufacturer's Association
 - a. ICS10-1993 (formerly ICS2-447) -AC Automatic Transfer Switches
3. NFPA –Nation Fire Protection Association
 - a. NFPA 99 -Essential Electrical Systems for Health Care Facilities
 - b. NFPA 110 -Emergency and Standby Power Systems
4. UL -Underwriters Laboratories, Inc.
 - a. UL 508 Industrial Control Equipment
 - b. UL 1008 -Standard for Transfer Switch Equipment

1.03 SUBMITTALS

- A. Submit manufacturer's data for materials specified within this Section in accordance to Section 26 05 00.**

- B. Shop Drawings shall indicate front and side enclosure elevations with overall dimensions shown; conduit entrance locations and requirements; nameplate legends; one-line diagrams; equipment schedule; and instrument details.

1.04 QUALITY ASSURANCE

- A. The complete assembly shall be factory tested to ensure proper operation of the individual components and correct overall sequence of operation and to ensure that the operating transfer time, voltage, frequency and time delay settings are in compliance with the specification requirements.
- B. Upon request, the manufacturer shall provide a notarized letter certifying compliance with all of the requirements of this specification including compliance with the above codes and standards, and withstand and closing ratings. The certification shall identify, by serial number(s), the equipment involved. No exceptions to the specifications, other than those stipulated at the time of the submittal, shall be included in the certification.
- C. The manufacturer shall be certified to ISO 9001 International Quality Standard and the manufacturer shall have third party certification verifying quality assurance in design/development, production, installation, and servicing in accordance with ISO 9001.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect, and handle products in conformance with manufacturer's recommended practices as outlined in applicable Installation and Maintenance Manuals.
- B. Store in a clean, dry space. Maintain factory protection and/or provide an additional heavy canvas or heavy plastic cover to protect structure from dirt, water, construction debris, and traffic. Where applicable, provide adequate heating within enclosures to prevent condensation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Emerson Power/ASCO Series 7000 or approved equal.

2.02 EQUIPMENT

- A. Mechanically Held Transfer Switch
 - 1. The transfer switch shall be electrically operated and mechanically held. The electrical operator shall be a momentarily energized, single-solenoid mechanism. Main operators which include overcurrent disconnect devices, linear motors or gears shall not be acceptable. The switch shall be mechanically interlocked to ensure only two possible positions, normal or emergency.
 - 2. All transfer switch sizes shall use only one type of main operator for ease of maintenance and commonality of parts.

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3. The switch shall be positively locked and unaffected by momentary outages, so that contact pressure is maintained at a constant value and contact temperature rise is minimized for maximum reliability and operating life.
 4. All main contacts shall be silver composition. Switches rated 600 amperes and above shall have segmented, blow-on construction for high withstand and close-on capability and be protected by separate arcing contacts.
 5. Inspection of all contacts shall be possible from the front of the switch without disassembly of operating linkages and without disconnection of power conductors. Switches rated 600 amps and higher shall have front removable and replaceable contacts. All stationary and moveable contacts shall be replaceable without removing power conductors and/or bus bars.
 6. Designs utilizing components of molded-case circuit breakers, contactors, or parts thereof, which are not intended for continuous duty, repetitive switching or transfers between two active power sources are not acceptable.
 7. Where neutral conductors must be switched as shown on the plans, the AS shall be provided with fully rated overlapping neutral transfer contacts. The neutrals of the normal and emergency power sources shall be connected together only during the transfer and retransfer operation and remain connected together until power source contacts close on the source to which the transfer is being made. The overlapping neutral contacts shall not overlap for a period greater than 100 milliseconds. Neutral switching contacts that do not overlap are not acceptable.
 8. Where neutral conductors are to be solidly connected as shown on the plans, a neutral conductor plate with fully rated AL-CU pressure connectors shall be provided.
- B. Bypass-Isolation Switch (only as noted on Drawings)
1. A two-way bypass-isolation switch shall provide manual bypass of the load to either source and permit isolation of the automatic transfer switch from all source and load power conductors. All main contacts shall be manually driven.
 2. Power interconnections shall be silver-plated copper bus bar. The only field installed power connections shall be at the service and load terminals of the bypass-isolation switch. All control interwiring shall be provided with disconnect plugs.
 3. Separate bypass and isolation handles shall be utilized to provide clear distinction between the functions. Handles shall be permanently affixed and operable without opening the enclosure door. Designs requiring insertion of loose operating handles or opening of the enclosure door to operate are not acceptable.
 4. Bypass to the load-carrying source shall be accomplished with no interruption of power to the load (make before break contacts). Designs that disconnect the load when bypassing are not acceptable. The bypass handle shall have three operating modes: "Bypass to Normal," "Automatic," and "Bypass to Emergency." The operating speed of the bypass contacts shall be the same as the associated transfer switch and shall be independent of the speed at which the manual handle is operated. In the "Automatic" mode, the bypass contacts shall be out of the power circuit so that they will not be subjected to fault currents to which the system may be subjected.

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5. The isolation handle shall provide three operating modes: "Closed," "Test," and "Open." The "Test" mode shall permit testing of the entire emergency power system, including the automatic transfer switches with no interruption of power to the load. The "Open" mode shall completely isolate the automatic transfer switch from all source and load power conductors. When in the "Open" mode, it shall be possible to completely withdraw the automatic transfer switch for inspection or maintenance to conform to code requirements without removal of power conductors or the use of any tools.
6. When the isolation switch is in the "Test" or "Open" mode, the bypass switch shall function as a manual transfer switch.
7. Designs requiring operation of key interlocks for bypass isolation or ATS's that cannot be completely withdrawn when isolated are not acceptable.

C. Microprocessor Controller

1. The controller's sensing and logic shall be provided by a single built-in microprocessor for maximum reliability, minimum maintenance, and the ability to communicate serially through an optional serial communication module.
2. A single controller shall provide twelve selectable nominal voltages for maximum application flexibility and minimal spare part requirements. Voltage sensing shall be true RMS type and shall be accurate to $\pm 1\%$ of nominal voltage. Frequency sensing shall be accurate to $\pm 0.2\%$. The panel shall be capable of operating over a temperature range of -20 to +60°C and storage from -55 to +85°C.
3. The controller shall be connected to the transfer switch by an interconnecting wiring harness. The harness shall include a keyed disconnect plug to enable the controller to be disconnected from the transfer switch for routine maintenance. Sensing and control logic shall be provided on multi-layer printed circuit boards. Interfacing relays shall be industrial grade plug-in type with dust covers. The panel shall be enclosed with a protective cover and be mounted separately from the transfer switch unit for safety and ease of maintenance. The protective cover shall include a built-in pocket for storage of the operator's manuals.
4. All customer connections shall be wired to a common terminal block to simplify field-wiring connections.
5. The controller shall meet or exceed the requirements for Electromagnetic Compatibility (EMC) as follows:
 - a. IEEE472 (ANSI C37.90A) Ring Wave Test.
 - b. ENC55011 1991 Class A Conducted and Radiated Emission.
 - c. EN61000-4-2 Electrostatic Discharge Immunity, Direct Contact & Air Discharge.
 - d. EN61000-4-3 Radiated Electromagnetic Field Immunity.
 - e. EN61000-4-4 Electrical Fast Transient Immunity.
 - f. EN61000-4-5 Surge Immunity.
 - g. ENV50141 HF Conducted Disturbances Immunity.

D. Enclosure

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1. The ATS/BPS shall be furnished in a NEMA type 1 enclosure unless otherwise shown on the plans.
2. All standard and optional door-mounted switches and pilot lights shall be 16mm industrial grade type or equivalent for easy viewing & replacement. Door controls shall be provided on a separate removable plate, which can be supplied loose for open type units.

2.03 OPERATION

A. Controller Display and Keypad

1. A four line, 20 character LCD display and keypad shall be an integral part of the controller for viewing all available data and setting desired operational parameters. Operational parameters shall also be available for viewing and limited control through the serial communications input port. The following parameters shall only be adjustable via DIP switches on the controller:
 - a. Nominal line voltage and frequency
 - b. Single or three phase sensing
 - c. Operating parameter protection
 - d. Transfer operating mode configuration: (Open transition, Closed transition or Delayed transition)
2. All instructions and controller settings shall be easily accessible, readable and accomplished without the use of codes, calculations, or instruction manuals.

B. Voltage, Frequency and Phase Rotation Sensing

1. Voltage and frequency on both the normal and emergency sources (as noted below) shall be continuously monitored, with the following pickup, dropout and trip setting capabilities (values shown as % of nominal unless otherwise specified):

Parameter	Sources	(Dropout/Trip)	(Pickup/ Reset)
Undervoltage	N&E,3 ϕ	70 to 98%	85 to 100%
Overvoltage	N&E,3 ϕ	102 to 115%	2% below trip
Underfrequency	N&E	85 to 98%	90 to 100%
Overfrequency	N&E	102 to 110%	2% below trip
Unbalance	N&E	5 to 20%	1% below dropout

2. Repetitive accuracy of all settings shall be within $\pm 0.5\%$ over an operating temperature range of -20°C to 60°C .
3. Voltage and frequency settings shall be field adjustable in 1% increments either locally with the display and keypad or remotely via serial communications port access.
4. The controller shall be capable (when activated by the keypad or through the serial port) of sensing the phase rotation of both the normal and emergency sources. The source shall be considered unacceptable if the phase rotation is not the preferred rotation selected (ABC or CBA).

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5. Source status screens shall be provided for both normal & emergency to provide digital readout of voltage on all 3 phases, frequency, and phase rotation.

C. Time Delays

1. An adjustable time delay of 0 to 6 seconds shall be provided to override momentary normal source outages and delay all transfer and engine starting signals. Capability shall be provided to extend this time delay to 60 minutes by providing an external 24 VDC power supply.
2. A time delay shall be provided on transfer to emergency, adjustable from 0 to 60 minutes, for controlled timing of transfer of loads to emergency.
3. Two time delay modes (which are independently adjustable) shall be provided on re-transfer to normal. One time delay shall be for actual normal power failures and the other for the test mode function. The time delays shall be adjustable from 0 to 60 minutes. Time delay shall be automatically bypassed if the emergency source fails and the normal source is acceptable.
4. A time delay shall be provided on shut down of engine generator for cool down, adjustable from 0 to 60 minutes.
5. A time delay activated output signal shall also be provided to drive an external relay(s) for selective load disconnect control. The controller shall have the ability to activate an adjustable 0 to 5 minute time delay in any of the following modes:
 - a. Prior to transfer only.
 - b. Prior to and after transfer.
 - c. Normal to emergency only.
 - d. Emergency to normal only.
 - e. Normal to emergency and emergency to normal.
 - f. All transfer conditions or only when both sources are available.
6. The controller shall also include the following built-in time delays for optional Closed Transition and Delayed Transition operation:
 - a. 1 to 5 minute time delay on failure to synchronize normal and emergency sources prior to closed transition transfer.
 - b. 0.1 to 9.99 seconds time delay on an extended parallel condition of both power sources during closed transition operation.
 - c. 0 to 5 minute time delay for the load disconnect position for delayed transition operation.
7. All time delays shall be adjustable in 1 second increments, except the extended parallel time, which shall be adjustable in .01 second increments.
8. All time delays shall be adjustable by using the LCD display and keypad or with a remote device connected to the serial communications port.

D. Additional Features

1. A three position momentary-type test switch shall be provided for the test / automatic / reset modes. The test position will simulate a normal source failure. The reset position shall bypass the time delays on either transfer to emergency or retransfer to normal.
2. Auxiliary contacts, rated 10 amps, 250 VAC shall be provided consisting of one contact, closed when the ATS is connected to the normal source and one contact closed, when the ATS is connected to the emergency source.
3. LED indicating lights (16mm industrial grade, type 12) shall be provided; one to indicate when the ATS is connected to the normal source (green) and one to indicate when the ATS is connected to the emergency source (red).
4. LED indicating lights (16mm industrial grade, type 12) shall be provided and energized by controller outputs. The lights shall provide true source availability of the normal and emergency sources, as determined by the voltage sensing trip and reset settings for each source.
5. Provide the ability to select "commit/no commit to transfer" to determine whether the load should be transferred to the emergency generator if the normal source restores before the generator is ready to accept the load.
6. Terminals shall be provided for a remote contact that opens to signal the ATS to transfer to emergency and for remote contacts that open to inhibit transfer to emergency and/or retransfer to normal. Both of these inhibit signals can be activated through the keypad or serial port.
7. An inphase monitor shall be provided in the controller. The monitor shall control transfer so that motor load inrush currents do not exceed normal starting currents, and shall not require external control of power sources. The inphase monitor shall be specifically designed for and be the product of the ATS manufacturer. The inphase monitor shall be equal to ASCO Feature 27.
8. The controller shall be capable of accepting a normally open contact that will allow the transfer switch to function in a non-automatic mode using an external control device.
9. System Status -The controller LCD display shall include a "System Status" screen which shall be readily accessible from any point in the menu by depressing the "ESC" key a maximum of two times. This screen shall display a clear description of the active operating sequence and switch position. Controllers that require multiple screens to determine system status or display "coded" system status messages, which must be explained by references in the operator's manual, are not permissible.
10. Self-Diagnostics -The controller shall contain a diagnostic screen for the purpose of detecting system errors. This screen shall provide information on the status-input signals to the controller that may be preventing load transfer commands from being completed.
11. Communications Interface -The controller shall be capable of interfacing, through an optional serial communication module, with a network of transfer switches, locally (up to 4000 ft.) or remotely through modem serial communications. Standard software specific for transfer switch applications shall be available by the transfer switch manufacturer. This software shall allow for the monitoring, control and setup of parameters.

12. Data Logging –The controller shall have the ability to log data and to maintain the last 99 events, even in the event of total power loss. The following events shall be time and date stamped and maintained in a non-volatile memory:

a. Event Logging

- 1) Data and time and reason for transfer normal to emergency.
- 2) Data and time and reason for transfer emergency to normal.
- 3) Data and time and reason for engine start.
- 4) Data and time engine stopped.
- 5) Data and time emergency source available.
- 6) Data and time emergency source not available.

b. Statistical Data

- 1) Total number of transfers.
- 2) Total number of transfers due to source failure.
- 3) Total number of days controller is energized.
- 4) Total number of hours both normal and emergency sources is available.

13. Communications Module -A full duplex RS485 interface shall be installed in the ATS controller to enable serial communications. The serial communications shall be capable of a direct connect or multi-drop configured network. This module shall allow for the seamless integration of existing or new communication transfer devices. The serial communication interface shall be equal to ASCO Accessory 72.

2.04 WITHSTAND AND CLOSING RATINGS

- A. The ATS/BPS shall be rated to close on and withstand the available RMS symmetrical short circuit current at the ATS/BPS terminals with the type of overcurrent protection shown on the plans.
- B. The ATS/BPS shall be UL listed in accordance with UL 1008 and be labeled in accordance with that standard's 1½ and 3 cycle, long-time ratings. ATS/BPS's which are not tested and labeled with 1½ and 3 cycle (any breaker) ratings and have series, or specific breaker ratings only, are not acceptable.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine ATS to provide adequate clearances for installation.
- B. Check that concrete pads (floor mounted models) and walls (wall mounted models) are level and free of irregularities.
- C. Begin work only after unsatisfactory conditions are corrected.

3.02 INSTALLATION

- A. Install switchboard in location shown on Drawings, in accordance with manufacturer's written instructions. Anchor to resist seismic forces as indicated on Drawings and in accordance with California Building Code anchorage requirements. Provide all testing and inspections requirements by inspecting authority.
- B. Tighten accessible bus connection and mechanical fasteners after placing switchboard.

3.03 FIELD QUALITY CONTROL

- A. Inspect complete installation for physical damage, proper alignment, anchorage and grounding prior to energizing.
- B. Manufacturers' field services
 - 1. The ATS/BPS manufacturer shall maintain a national service organization of company-employed personnel located throughout the contiguous United States. The service center's personnel must be factory trained and must be on call 24 hours a day, 365 days a year.
 - 2. The manufacturer shall maintain records of each switch, by serial number, for a minimum of 20 years.

3.04 CLEANING

- A. Touch up scratched or marred surfaces to match original finish.

END SECTION

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SECTION 31 23 17
TRENCHING, BACKFILLING AND COMPACTING

PART 1 GENERAL

1.1 WORK INCLUDED

- A. This section includes material, testing, and installation for trench excavation, backfilling and compacting.

1.2 REFERENCES

- A. ANSI/ASTM C136 – Sieve Analysis of Fine and Coarse Aggregates.
- B. ANSI/ASTM D1557 – Moisture-Density Relations of Soils and Sol-Aggregate Mixture Using 10 lb (4.54 kg) Hammer and 18-inch (457 mm) Drop.
- C. ANSI/ASTM D1556 – Density of Soil and base rock in Place by Sand-Cone Method.
- D. ASTM D6938 – Density of soil and base rock in place by Nuclear method.
- E. ASTM D2937 – Density of soil and in place by Tube method.
- F. Section 26 – Aggregate Bases, State Standard Specifications.

1.3 SUBMITTALS

- A. Submit plans as required for worker protection against caving ground in excavations.
- B. Submittals shall be in accordance with the General and Special Provisions.

1.4 PROTECTION

- A. Protect excavations by shoring, bracing, sheet piling, underpinning, or other methods required to prevent cave-in or loose soil from falling into excavation.
 - 1. Trenches shall have sloping, sheeting, shoring, and bracing conforming with 29CFR1926, Subpart P—Excavations, CAL/OSHA requirements, and the Contract Documents.
- B. Notify Engineer of unexpected subsurface conditions.
- C. Protect bottom of excavations and soil adjacent to and beneath foundations from frost.
- D. When the pipe laying is not in progress, including the noon hours, close the open ends of pipe. Do not allow trench water, animals or foreign material to enter the pipe.

1.5 CONTROL AND DIVERSION OF WATER

- A. General – The Contractor shall furnish or procure all materials and labor required for constructing and maintaining all temporary diversion and protective works and shall furnish, install, maintain, and operate all necessary pumping and other equipment for removal of water from the various parts of the work and for maintaining the foundations and other parts of the work free from water.
- B. Plan – Prior to beginning any work on the removal of water from trenches, the Contractor shall submit for the Engineer's approval a water control plan showing his proposed method for the removal of water from trenches and other parts of the work.
- C. Dispose of the water in a manner that will prevent damage to the adjacent property and in accordance with regulatory requirements.
- D. Do not drain trench water through the pipeline under construction.

1.6 PROJECT CONDITIONS

- A. Underground utilities may exist at this site. Contractor shall take all necessary precautions to protect said utilities. Notify Engineer of any deviation in utility location from that which is shown on the drawings.
- B. Obtain all required permits and licenses before installing utilities and follow the rules and requirements of the authority having jurisdiction.
- C. Arrange construction sequences to provide the shortest practical time that the trenches will be open to avoid hazard to the public, and to minimize the possibility of trench collapse.

PART 2 MATERIALS

2.1 NATIVE EARTH BACKFILL

- A. Native earth backfill used above the pipe zone shall be fine-grained materials free from roots, debris, and rocks larger than 3 inches.

2.2 SELECT AND IMPORT MATERIAL IN PIPE AND BEDDING ZONE

- A. Pea Gravel: Natural stone; washed, free of clay, shale, organic matter; 1/4-inch minimum to 5/8-inch maximum size.
- B. Sand: Natural river or bank sand; free of silt, clay, loam, friable or soluble materials, and organic matter, graded in accordance with Section 19-3.02F(2), State Standard Specifications, within the following limits.

Sieve Size	Percent Passing By Weight
No. 4	75 – 100
No. 200	0 - 10

- C. Imported sand shall have a sand equivalent of 30 per ASTM D2419.

2.3 WATER FOR COMPACTION

- A. Water shall be free of organic materials injurious to the pipe coatings, have a pH of 7.0 to 9.3, maximum chloride concentration of 500 mg/l, and a maximum sulfate concentration of 500 mg/l.

PART 3 EXECUTION

3.1 GENERAL

- A. Excavation, grading and compaction shall conform to State Standard Specifications, Section 19, Earthwork.

3.2 INSPECTIONS

- A. Verify stockpiled material has been approved for reuse.
- B. Verify areas to be backfilled are free of debris, snow, ice, or water, and surfaces are not frozen.

3.3 PREPARATION

- A. Identify required lines, levels, contours, and datum.

3.4 AC PAVEMENT AND CONCRETE REMOVAL

- A. Cut bituminous and concrete pavements, regardless of the thickness, curbs, gutters and sidewalks prior to excavation of trenches.
 - 1. Width of material removed shall be at least equal to the required width of the trench at ground surface.
 - 2. Width of material removed shall be as shown on the Plans.
 - 3. AC pavement and concrete rubble shall not be used for trench backfill.

3.5 TRENCH EXCAVATION

- A. Excavate the trench to the lines and grades shown on the Drawings and details with allowance for pipe thickness, sheeting and shoring if used, and for special bedding.
- B. Paved Areas: Cut existing pavement to full depth to a true line before excavation and maintain the edge suitable for repaving. Pavement removed shall not be used as backfill.
- C. Trenching Guidelines: Excavate the trench to the approximate level of the grade of the utility line to be installed, using adequate trench width and side slopes to safely accommodate worker access.

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1. Unstable Trench Bottom: Secure approval of depth of over-excavation and stabilization method. For wet trench construction, use approved method of dewatering through diversion, damming and pumping, well points, or underdrain systems. Dispose of removed fluidized materials as approved. Use bedding material to build a suitable foundation to within 6 inches of finished utility grade, prior to bedding with the specified material. Compact layers to 95 percent of maximum density in not greater than 6-inch layers. Do not proceed with utility installation until wet trench and unstable conditions are corrected to the satisfaction of the Engineer.
- D. Remove areas of sub-grade not readily capable of it-situ compaction.
 1. Backfill with Bedding or Select Backfill material and compact to density equal to requirements for subsequent backfill.
- E. Correct unauthorized excavation at no cost to Owner.
 1. If the trench is excavated below the required grade, refill any part of the trench excavated below the grade.
 2. Place the refilling material over the full width of trench in compacted layers not exceeding eight inches deep to the established grade with allowance for special bedding.
- F. Trench widths in the pipe zone shall be as shown on the drawings. If no details are shown, maximum width shall be 24 inches greater than the pipe outside diameter.
 1. Trench width at the top of the trench will not be limited except where width of excavation would undercut adjacent structures and footings. In such case, width of trench shall be such that there is at least two feet between the top edge of the trench and the structure or footing.
- G. Remove lumped soil, boulders and rock.
- H. Excavation shall not interfere with normal 45 degree bearing splay of foundations.
- I. During trench excavation, place the excavated material only within the working area. Do not obstruct roadways or streets. Conform to federal, state, and local codes governing the safe loading of trenches with excavated material.

3.6 LENGTH OF OPEN TRENCH

- A. Limit the length of open trench to amount of pipe installed in one working day.
- B. Complete backfilling, temporary or first layer paving, not more than 400 feet in the rear of pipe laying operation.

3.7 TRENCH EXCAVATION IN EMBANKMENT AREAS

- A. Construct and compact the embankment to an elevation one foot, minimum, over the top of the largest pipe or conduit to be installed prior to trench excavation.

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3.8 *UNSUITABLE MATERIAL*

- A. Unsuitable material shall be excavated and disposed of in a lawful manner off the project site, all disposal shall be approved by the Engineer prior to initiating the work.

3.9 *DEWATERING*

- A. The Contractor shall keep all excavation free from water. Furnish, install, maintain, and operate all necessary pumping and other equipment for dewatering of excavations. The Contractor shall at all times have on the project sufficient pumping equipment for immediate use, including stand-by pumps for use in case other pumps become inoperable.
- B. The dewatering operation shall be continuous, so that the excavated areas are kept free from water during the construction, until backfill has been placed to a sufficient height to anchor the work against possible floatation.
- C. Dewatering devices shall be adequately filtered to prevent the removal of fines from the soil.
- D. Repair any damage caused by the failure of any part of the protective works. Remove temporary protective works when they are no longer needed for dewatering purposes.
- E. Any drain rock required in the trench bottom to convey water or stabilize wet soil shall be included at no extra cost to the Owner.
- F. Provision of dewatering and dewatering equipment shall be considered part of the project with no additional compensation allowed.

3.10 *TRENCH BACKFILLING*

- A. Support pipe during placement and compaction of bedding fill.
- B. Backfilling and cleanup work shall be accomplished as sections of pipe or conduit are tested and approved. Vehicular travel through the work site shall be impeded or obstructed as little as possible.
- C. Compaction: Use vibratory compactors for sands and gravels (non-cohesive soils). Use mechanical tampers for sand and gravel containing a significant portion of fine-grained materials, such as silt and clay (cohesive soils). Hand tamp around pipe or cable to protect the lines until adequate cushion is attained. Puddling or water flooding for consolidation of backfill or compaction by wheel rolling will not be permitted.
- D. Employ a placement method that will not disturb or damage pipe or utilities.
- E. Maintain optimum moisture content of backfill materials to attain required compaction density.
- F. Compact trench backfill to the specified relative compaction. Compact by using mechanical compaction or hand tamping. Do not use high impact hammer type

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equipment except where the pipe manufacturer warrants in writing that such use will not damage the pipe.

- G. Compact material placed within 12 inches of the outer surface of the pipe by hand tamping only.
 - 1. Carefully place the material around the pipe so that the pipe barrel is completely supported and that no voids or uncompacted areas are left beneath the pipe.
 - 2. Use particular care in placing material on the underside of the pipe to prevent lateral movement during subsequent backfilling.
- H. After pipe has been bedded, place pipe zone material simultaneously on both sides of the pipe, in maximum 8-inch lifts, keeping the level of backfill the same on each side.
- I. Do not use any axle-driven or tractor-drawn compaction equipment within 5 feet of building walls, foundations, and other structures.
- J. Do not permit free fall of the material until at least two feet of cover is provided over the top of the pipe. Do not drop sharp, heavy pieces of material directly onto the pipe or the tamped material around the pipe. Do not operate heavy equipment over the pipe until at least 3 feet of backfill has been placed and compacted over the pipe.
- K. Remove surplus backfill materials from site.
- L. Leave stockpile areas completely free of excess fill materials.

3.11 COMPACTION REQUIREMENTS

- A. Relative compaction requirements shall be as shown on the Plans.

END SECTION

SECTION 31 23 19
STRUCTURE EXCAVATION & BACKFILLING

PART 1 GENERAL

1.1 WORK INCLUDED

- A. The work of this section consists of excavation and backfill for concrete structures, and preparation of subgrade for concrete flatwork.
- B. Haul, place, rough grade, compact, and finish grade excavated material as engineered fill on those portions of the project site where it is necessary in order to construct the facilities indicated on the Plans.
- C. Dispose of unsuitable material off-site or in designated areas, as directed by the Engineer.

1.2 RELATED WORK

- A. Section 31 23 17 – Trenching, Backfilling and Compacting

1.3 REFERENCES

- A. ANSI/ASTM C136 – Sieve Analysis of Fine and Coarse Aggregates.
- B. ANSI/ASTM D1557 – Moisture-Density Relations of Soils and Sol-Aggregate Mixture Using 10 lb (4.54 kg) Hammer and 18-inch (457 mm) Drop. (Curve).
- C. ANSI/ASTM D1556 – Density of Soil and base rock in Place by Sand-Cone Method.
- D. ASTM D2937 – Density of soil and in place by Tube method.

1.4 SUBMITTALS

- A. Submit plans as required for worker protection against caving ground in excavations.
- B. Submittals shall be in accordance with the General and Special Provisions.

1.5 SAMPLES

- A. Submit samples in accordance with the General and Special Provisions.

1.6 DEFINITION

- A. Unsuitable Material: Unsuitable material is material determined to be
 - 1. Incapable of being compacted to specified density using ordinary methods at optimum moisture content.
 - 2. Too wet to be properly compacted if circumstances prevent satisfactory in-place drying prior to incorporation into the work.

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3. Otherwise unsuitable for the planned use.

1.7 PROTECTION

- A. Protect excavations by shoring, bracing, sheet piling, underpinning, or other methods required to prevent cave-in or loose soil from falling into excavation.
- B. Notify Engineer of unexpected subsurface conditions.
- C. Protect bottom of excavations and soil adjacent to and beneath foundations from frost.
- D. Grade excavation top perimeter to prevent surface water run-off into excavation.

1.8 CONTROL AND DIVERSION OF WATER

- A. General – The Contractor shall furnish or procure all materials and labor required for constructing and maintaining all necessary cofferdams, channels, flumes, drains, sumps, and/or other temporary diversion and protective works and shall furnish, install, maintain, and operate all necessary pumping and other equipment for removal of water from the various parts of the work and for maintaining the foundations and other parts of the work free from water.

1.9 SITE CONDITIONS

- A. Underground utilities may exist at this site. Contractor shall take all necessary precautions to protect said utilities. Notify Engineer of any deviation in utility location from that which is shown on the drawings. The site has been previously excavated to install the existing lift station and associated underground utilities as such, it is expected that most excavation will take place within a previously backfilled area. No geotechnical investigation or soils exploration has been performed for this project.

PART 2 PRODUCTS

2.1 SELECT BED AND FILL MATERIALS

- A. Conform to Section 31 23 17, Trenching, Backfilling, and Compacting.

2.2 SELECT MATERIAL

- A. Gravel: Pit run, natural stone; free of shale, clay, friable materials and debris; graded in accordance with 1½" x ¾" aggregate grading in Section 90-1.02C, State Standard Specifications.
- B. Pea Gravel: natural stone; washed, free of clay, shale, organic matter; ¼ inch minimum to ⅝ inch maximum size.
- C. Sand: Natural river or bank sand; free of silt, clay, loam, friable or soluble materials, and organic matter, graded in accordance with ANSI/ASTM C136 within the following limits:

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<u>Sieve Size</u>	<u>Percent Passing</u>
No. 4	75-100
No. 200	0-10

- D. Class 2 Aggregate Base: material as specified for $\frac{3}{4}$ " maximum grading in the State Standard Specifications, Section 26.

2.3 *ENGINEERED FILL MATERIAL*

- A. Native granular soil materials may be used as engineered fill. Particles larger than three inches shall be removed from trench backfill, particles larger than six inches shall be removed from engineered fill.
- B. All imported fill material placed in structural areas shall consist of predominantly granular soil that is non-expansive, and shall be approved by the Engineer prior to use.
1. The R-value of the imported fill material shall be at least 50.

2.4 *GRANULAR BACKFILL/AGGREGATE BASE COURSE*

- A. Granular backfill and aggregate base course shall meet the requirements of State Standard Specifications, Section 26, Class 2 aggregate base, $\frac{3}{4}$ inch maximum.
- B. Material from concrete crushing operations may be used as granular backfill provided it meets the above requirements.

PART 3 EXECUTION

3.1 *GENERAL*

- A. Provide required shoring, sheeting, and slope layback necessary to protect the excavation, as needed, for the safety of the employees and as required by applicable State and Federal laws. Provide suitable barricades for public safety, regardless of trench depth.
- B. Upon completion of excavation and before placing forms or structures, notify the Engineer who will inspect the excavation and may take tests to determine soil-bearing values.
- C. Identify required lines, levels, contours, and datum.
1. Stake and identify the extent of all earthwork operations prior to starting work.
- D. Use suitable material removed from excavation before importing backfill.
- E. Verify that stockpiled fill to be reused is approved by the Engineer.
- F. Verify areas to be backfilled are free of debris, snow, ice, or water, and surfaces are not frozen.

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3.2 DEWATERING

- A. The Contractor shall keep all excavation free from water. Furnish, install, maintain, and operate all necessary pumping and other equipment for dewatering of excavations. The Contractor shall at all times have on the project sufficient pumping equipment for immediate use, including stand-by pumps for use in case other pumps become in-operable.
- B. The dewatering operation shall be continuous, so that the excavated areas are kept free from water during the construction, until backfill has been placed to a sufficient height to anchor the work against possible floatation.
- C. Dewatering devices shall be adequately filtered to prevent the removal of fines from the soil.
- D. Repair any damage caused by the failure of any part of the protective works. Remove temporary protective works when they are no longer needed for dewatering purposes.
- E. Provision of dewatering and dewatering equipment shall be considered part of the project with no additional compensation allowed.
- F. Any drain rock required in the trench bottom to convey water or stabilize wet soil shall be included at no extra cost to the Owner.

3.3 EXCAVATION

- A. Carefully excavate to the established lines and grades shown on the drawings, or as revised and approved by the engineer, to provide a firm, uniform, and unyielding foundation for the proposed structures.
- B. Excavations for all footings, piers, finished walls and grade beams shall be sufficiently large so that forms for concrete may be properly placed, removed, and inspected.
 - 1. Excavation for footings may be made to the net footing size plus two inches if the earth banks are sufficiently stable to remain in position until the concrete is in place and if approved by the Engineer.
- C. The bottoms of footings, piers, slabs, walls, and grade beams to receive concrete shall be level before placing concrete. All foundations shall rest on firm bearing in undisturbed soil, or on controlled compacted fill.
 - 1. The exposed subgrade surface shall be scarified to a depth of 8 inches, conditioned to optimum moisture content and compacted to at least 95 percent of the maximum dry density.
- D. If any existing foundations, roots, stumps, debris, waste materials, pipes, or similar items have been removed, the Contractor shall excavate below these portions to solid undisturbed earth and foundations in these areas shall be built to necessary levels.

3.4 SURPLUS MATERIAL

- A. Unless otherwise specified, surplus excavated material shall be used to widen embankments uniformly or to flatten slopes, or it shall be disposed of in a uniform manner along the adjacent roadway around the site or otherwise as approved.
- B. Unless otherwise specified, surplus excavated material shall be used as fill for other areas requiring fill as shown on the Plans. Excess material that is not needed for engineered fill may be disposed of at an off-site spoil area. The location of the off-site spoil area, the limits of the fill area, the depths of fill, and the manner of work shall be as directed by the Engineer.
- C. Stockpile surplus material as shown on the plans and/or as directed by the Engineer.
- D. Leave stockpile areas completely free of excess fill materials.

3.5 UNSUITABLE MATERIAL

- A. Unsuitable material shall be excavated and disposed of in a uniform manner off the project site, within the Owner's property as approved, however all disposal shall be approved by the Engineer prior to initiating the work.

3.6 BACKFILLING

- A. Unless otherwise shown in the Plans, all backfill shall conform to Section 19-3 of the State Standard Specifications.
- B. Do not place backfill against concrete until concrete has cured sufficiently to accept the load as determined by Section 19-3.03E of the State Standard Specifications.
- C. Place and compact common fill material in continuous layers not exceeding eight inches loose depth.
- D. Employ a placement method so not to disturb or damage pipes or utilities.
- E. Maintain optimum moisture content of backfill materials to attain required compaction density.
- F. Remove surplus materials from site.

END SECTION

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